

RTS radio tool setter



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Contents

Contents

Before you begin	1.1
Before you begin	1.1
Disclaimer	1.1
Trademarks	1.1
Warranty	1.1
Changes to equipment	1.1
CNC machines	1.1
Care of the probe	1.1
Patents	1.2
EC declaration of conformity	1.3
WEEE directive	1.3
FCC declaration (USA)	1.3
Radio approval	1.4
Safety	1.5
Information to the user	1.5
Information to the machine supplier / installer	1.5
Information to the equipment installer	1.5
Equipment operation	1.5
RTS basics	2.1
Introduction	2.1
Getting started	2.1
System interface	2.1
Trigger Logic™	2.1
Modes of operation	2.1
Configurable settings	2.2
Enhanced trigger filter	2.2
Acquisition mode	2.2
Switch-on	2.2

- Operation. 2.3
 - Software routines 2.3
 - Achievable set-up tolerances 2.3
 - Recommended rotating tool feed rates 2.3
- RTS dimensions 2.4
- RTS specification 2.5
 - Typical battery life. 2.5
- System installation 3.1**
 - Installing the RTS with an RMI 3.1
 - Operating envelope 3.1
 - Installing the RTS with an RMI-Q 3.2
 - Operating envelope 3.2
 - Performance envelope when using the RTS with an RMI/RMI-Q 3.3
 - RTS – RMI/RMI-Q positioning 3.3
 - Performance envelope 3.3
 - Preparing the RTS for use. 3.4
 - Fitting the stylus, break stem and captive link 3.4
 - Installing the batteries 3.5
 - Mounting the RTS on a machine table. 3.6
 - Stylus level setting 3.7
 - Square stylus only 3.9
 - Calibrating the RTS. 3.13
 - Why calibrate a probe? 3.13
- Trigger Logic™ 4.1**
 - Reviewing the current probe settings 4.1
 - Changing the probe settings 4.2
 - RTS – RMI/RMI-Q partnership 4.3
 - Operating mode. 4.4
 - Probe status LEDs 4.4
- Maintenance. 5.1**
 - Maintenance 5.1
 - Cleaning the probe 5.1
 - Changing the batteries 5.2
 - Battery types 5.3
 - Routine maintenance 5.4
 - Inspecting the inner diaphragm seal 5.5
- Fault finding. 6.1**
- Parts list 7.1**

Before you begin

Before you begin

Disclaimer

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Trademarks

RENISHAW® and the probe emblem used in the RENISHAW logo are registered trademarks of Renishaw plc in the UK and other countries.

apply innovation and Trigger Logic are trademarks of Renishaw plc.

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

Warranty

Equipment requiring attention under warranty must be returned to your equipment supplier. No claims will be considered where Renishaw equipment has been misused, or where repairs or adjustments have been attempted by unauthorised persons. Prior consent must be obtained in instances where Renishaw equipment is to be substituted or omitted. Failure to comply with this requirement will invalidate the 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	CN100466003C
CN	CN101287958A
CN	CN101482402A
EP	0652413
EP	0695926
EP	0967455
EP	1373995
EP	1425550 B
EP	1457786
EP	1576560
EP	1701234
EP	1734426
EP	1804020
EP	1931936
EP	1988439
EP	2214147
EP	2216761
IN	2004/057552
IN	2004/057552
IN	2007/028964
IN	215787
JP	2004-279,417
JP	2004-522,961
JP	2008-203270
JP	2009-507240
JP	3,126,797
JP	4237051
JP	4398011
JP	4575781
TW	200720626
US	2006/0215614A1
US	5,279,042
US	5,669,151
US	6,275,053 B1
US	6,941,671 B2
US	7145468B2
US	7285935
US	7486195
US	7665219

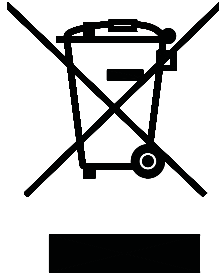
EC declaration of conformity



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 at 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 declaration (USA)

FCC 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.
2. This device may accept any interference received, including interference that may cause undesired operation.

FCC 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

Europe:

USA:

Japan:

China:

Canada:

Australia:

New Zealand:

Switzerland:

Norway:

Safety

Information to the user

The RTS is supplied with two non-rechargeable AA alkaline batteries. Once the charge in these batteries is depleted, please dispose of them in accordance with your local environmental and safety laws. Do not attempt to recharge these batteries.

Please ensure replacement batteries are of the correct type and are fitted with the correct polarity in accordance with the instructions in this manual, 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.

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 0V/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.

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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;
- tool setter status - triggered or seated;
- battery condition.

Batteries are inserted or removed as shown in **Section 5, "Maintenance"** page 5.2.

On insertion of the batteries, the LED will begin to flash (see **Section 4, "Trigger Logic™"** page 4.1).

System interface

The RMI and RMI-Q are combined antenna, interface and receiver units used to communicate between the RTS and the machine controller.

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 deflection (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.

Modes of operation

The RTS can be in one of three modes:

Standby mode: where the RTS is awaiting a switch-on signal.

Operational mode: activated by the switch-on method described on the next page, the RTS is ready for use.

Configuration mode: where Trigger Logic™ may be used to configure the following probe settings.

Configurable settings

Enhanced trigger filter

Probes subjected to high levels of vibration or shock loads may trigger without having been contacted. 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.

Acquisition mode

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

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

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

Partnering can take place anywhere within the operating envelope.

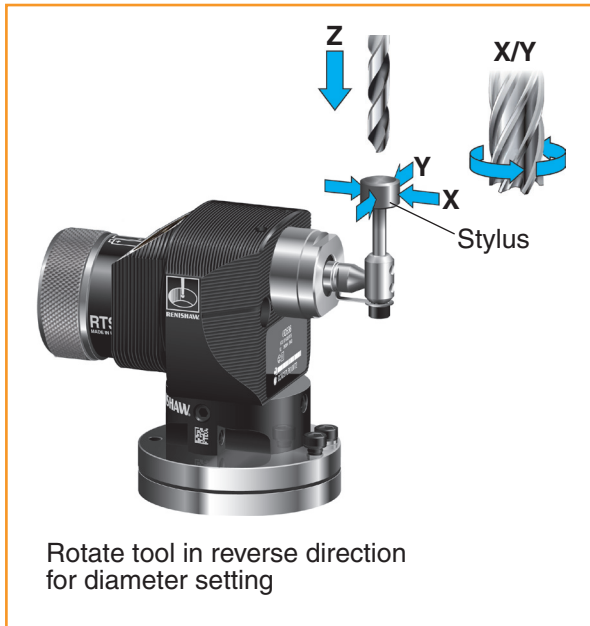
Switch-on

When the RTS is used with an RMI the turn-on time is 1.0 second. When the RTS is used with an RMI-Q the turn-on time can be configured, in the RMI-Q, to either 0.5 seconds or 1.0 second. For best battery life, select 1.0 second turn-on time.

A timer automatically switches the probe off 90 minutes after the last trigger 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



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/inspectionplus.

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 feed rates

Cutters should be rotated in reverse 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 feed rate

The feedrate (f) is calculated as follows:

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

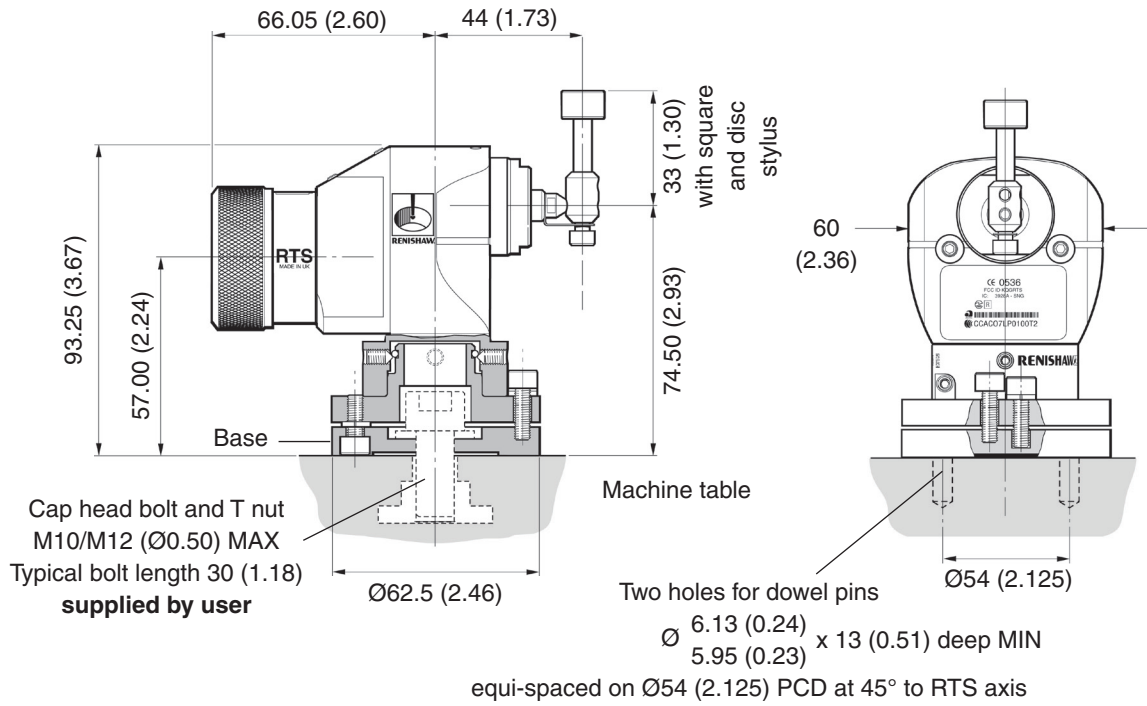
$$f = 0.12 \times \text{rev/min} \quad f \text{ units mm/min (length set)}$$

Second touch – machine feed rate

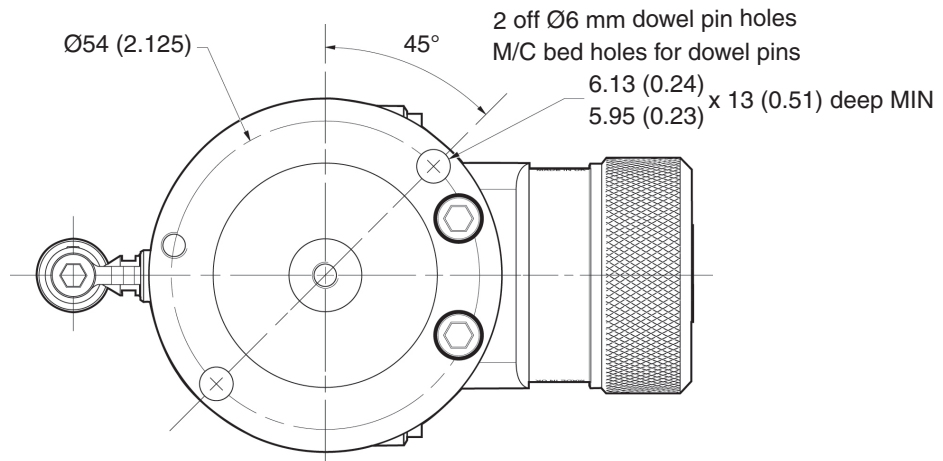
800 rev/min, 4 mm/min (0.16 in/min) feedrate.

RTS dimensions

Dimensions given in mm (in)



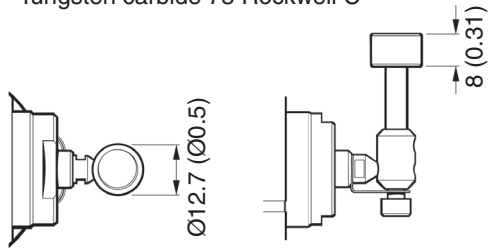
Machining details for dowel pins



RTS dimensions (continued)

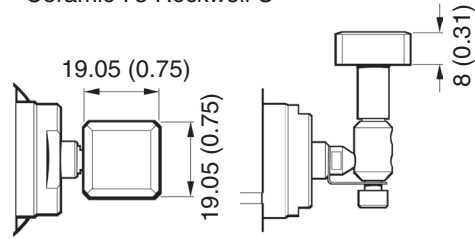
Disc stylus

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

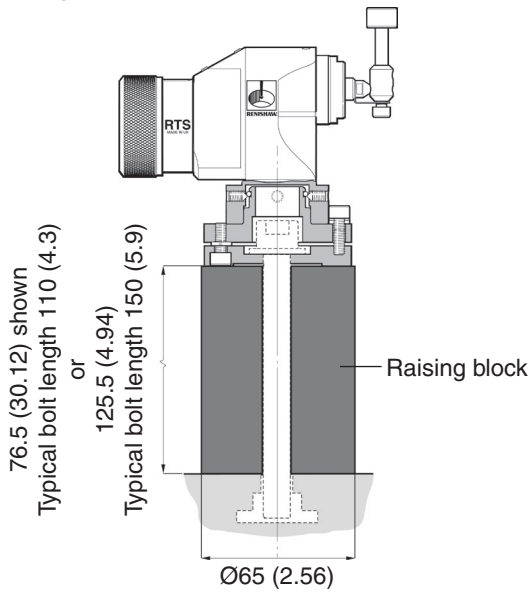


Square stylus

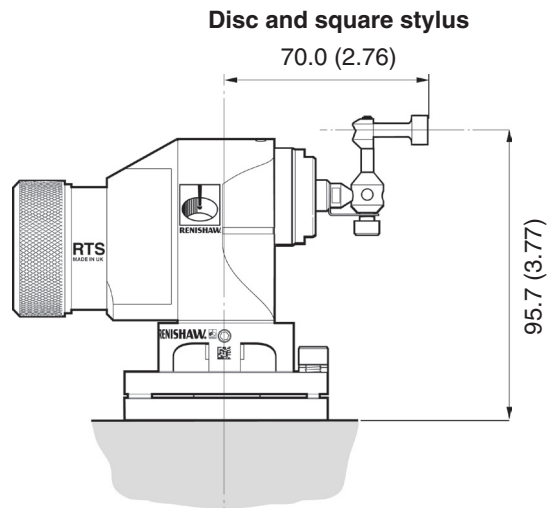
19.05 mm x 19.05 mm (0.75 in x 0.75 in)
 Ceramic 75 Rockwell C



Raising block



Cranked horizontal stylus adaptor kit



RTS specification

Principal application	Tool setting on CNC 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	870 g (30.69 oz)
	Without batteries	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 or RMI-Q (combined antenna, interface and receiver unit)	
Sense directions	Omni-directional $\pm X$, $\pm Y$, $+Z$	
Uni-directional repeatability	1.0 μm (0.00004 μin) 2 sigma*	
Stylus trigger force	1.3 N to 2.4 N/130 gf to 240 gf (4.5 ozf to 8.5 ozf) depending on the sense direction. §	
Stylus overtravel	XY plane	± 3.5 mm (0.14 in)
	+Z plane	6 mm (0.24 in)
Environment	IP rating	IPX8 (EN/IEC60529)
	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 x AA 1.5 V alkaline or 2 x 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 below	
Low battery indication	Blue flashing LED in conjunction with normal red or green probe status LED	
Dead battery indication	Constant or flashing red	

* Probe module results valid as tested with a 35 mm (1.38 in) straight stylus and a velocity of 480 mm/min (1.57 ft/min).

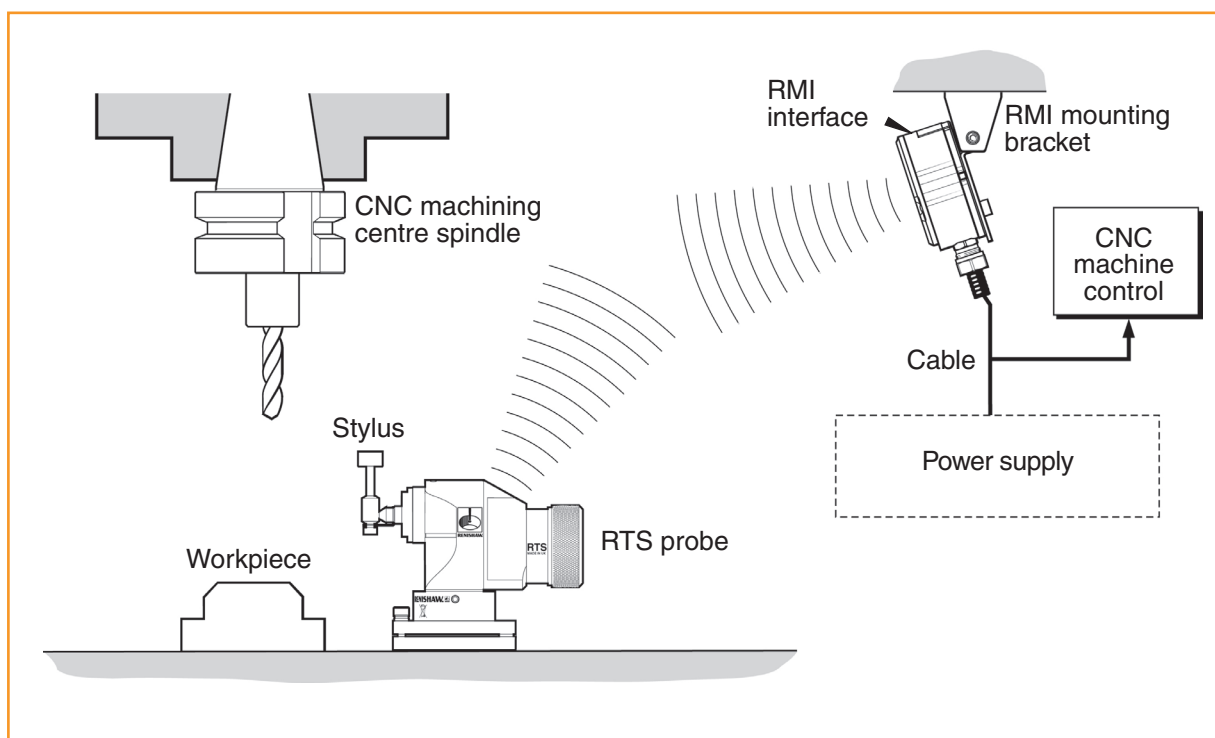
§ Specification using 50 mm (1.97 in) straight stylus.

Typical battery life

Battery type	Standby life	5% usage (72 minutes/day)	Continuous use
Alkaline	270 days maximum	175 days maximum	540 hours
Lithium Thionyl Chloride	600 days maximum	400 days maximum	1,410 hours

System installation

Installing the RTS with an RMI



Operating envelope

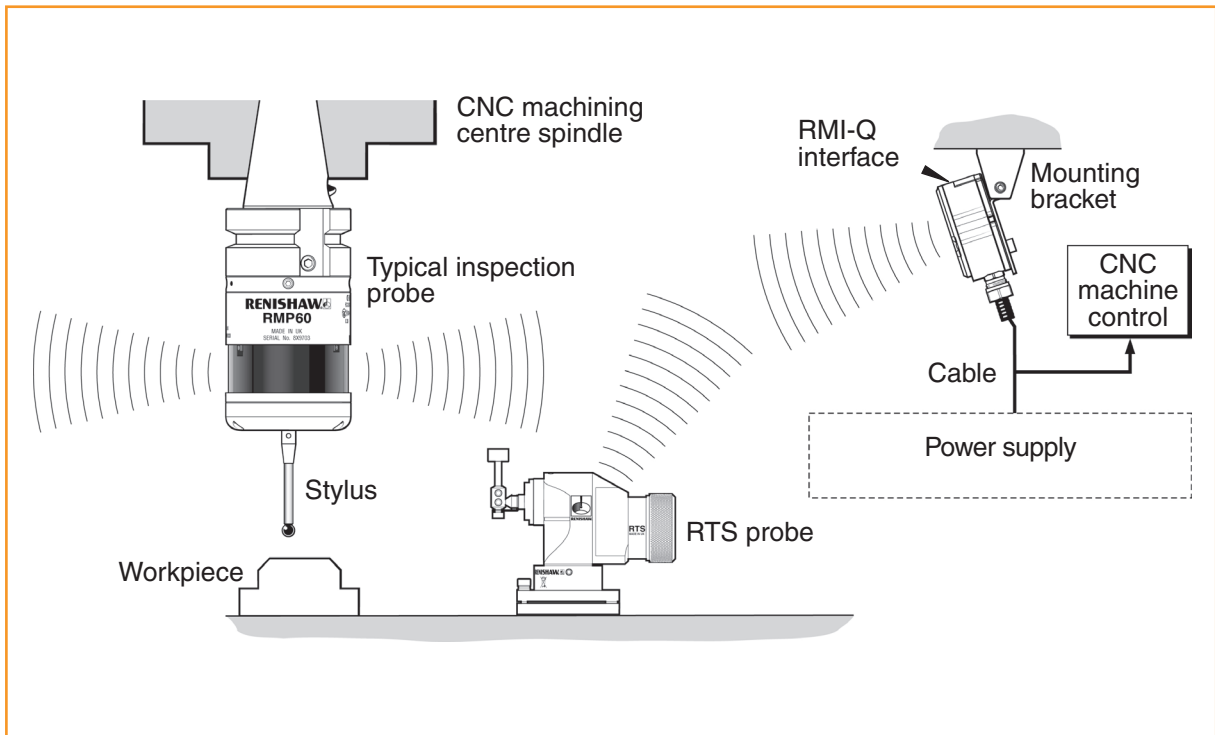
Radio transmission does not require line-of-sight between the probe and transmitter and will pass through very small gaps and machine tool windows. This allows easy installation, either inside or outside the machine enclosure, so long as the probe and transmitter are kept within the performance envelope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

Coolant and swarf residue accumulating on the RTS and RMI may 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 cover or the RTS glass window with your hand as this can also affect transmission performance.

Some reduction in range may result when operating in temperatures of 0 °C to +5 °C (+32 °F to +41 °F) and +50 °C to +60 °C (+122 °F to +140 °F).

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, so long as the probe and transmitter are kept within the performance envelope specified and that the RMI signal LED remains on at all times.

Coolant and swarf residue accumulating on the RTS and RMI-Q may 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.

Some reduction in range may result when operating in temperatures of 0 °C to +5 °C (+32 °F to +41 °F) and +50 °C to +60 °C (+122 °F to +140 °F).

Performance envelope when using the RTS with an RMI/RMI-Q

RTS - RMI/RMI-Q positioning

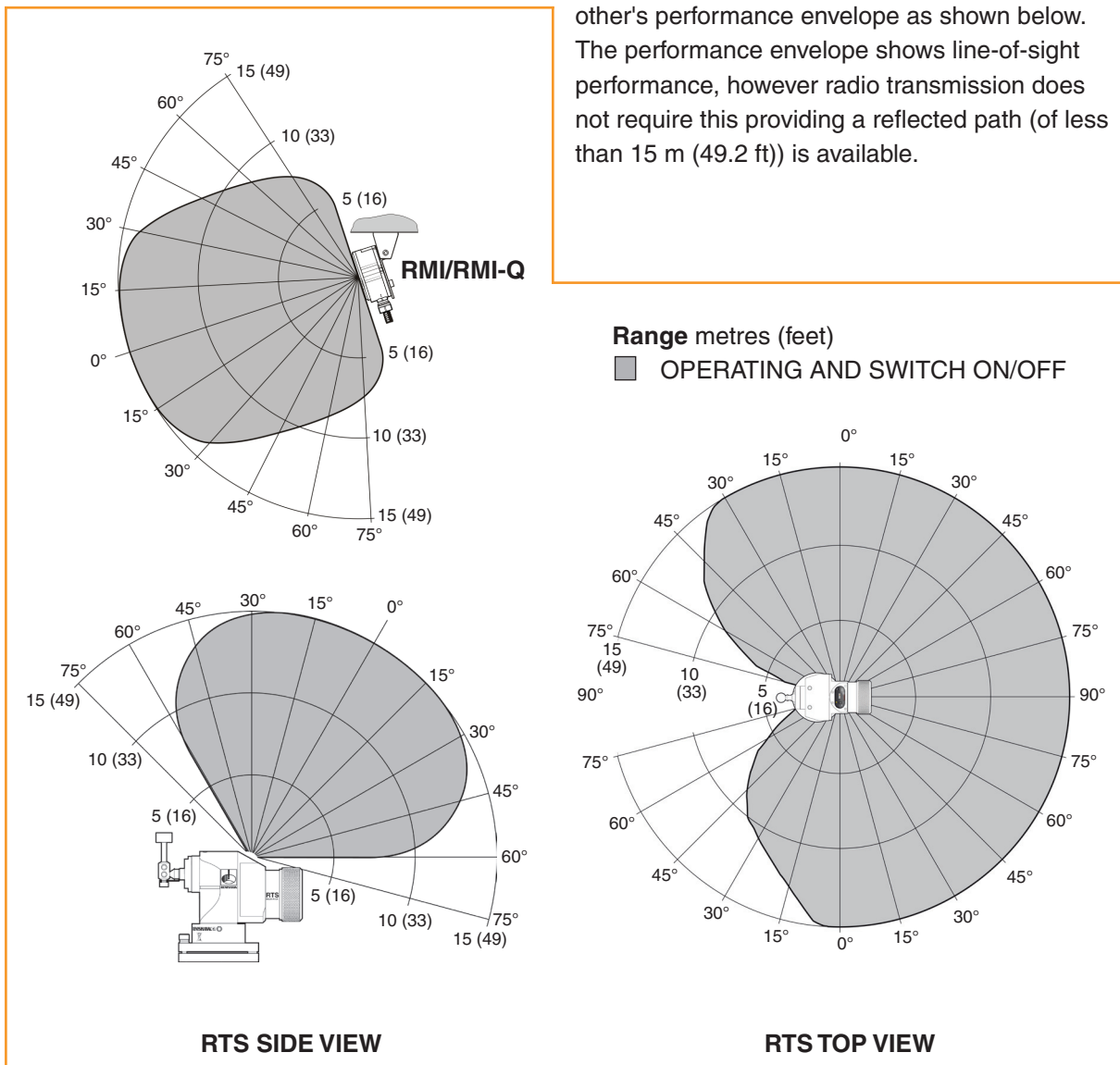
The probe system should be positioned so that the optimum range can be achieved over the full travel of the machine's axes. Always face the front cover of the RMI/RMI-Q in the general direction of the machining area and the tool magazine, ensuring both are within the performance envelope shown below.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

NOTE: RMI/RMI-Q installation with RTS.

RTS has a built-in hibernate mode (battery saving mode) that saves battery life when the RMI/RMI-Q is unpowered. The RTS goes into hibernate mode 30 seconds after the RMI/RMI-Q is unpowered (or the RTS is out of range). When in hibernate mode, the RTS checks for a powered RMI/RMI-Q every 30 seconds. If found, the RTS goes from hibernate 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.

Performance envelope

The RTS and RMI/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.



Preparing the RTS for use

Fitting the stylus, break stem and captive link

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

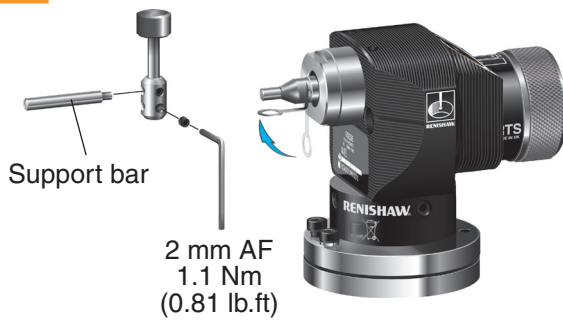
In the event of the break stem breaking, the captive link ties the stylus to the probe, which prevents the stylus falling into the machine.

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

1



2



3



Installing the batteries

1



NOTES:

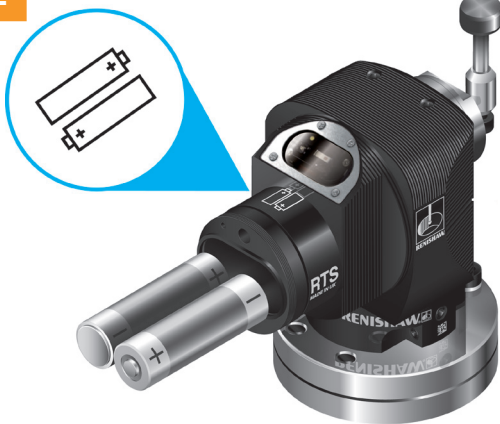
See **Section 5, "Maintenance"** for a list of suitable battery types.

If dead batteries are inadvertently inserted into the probe, the LED will remain a constant red (for details, see **Section 4, "Trigger Logic™"** page 4.4).

Ensure the product is clean and dry before inserting batteries.

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

2



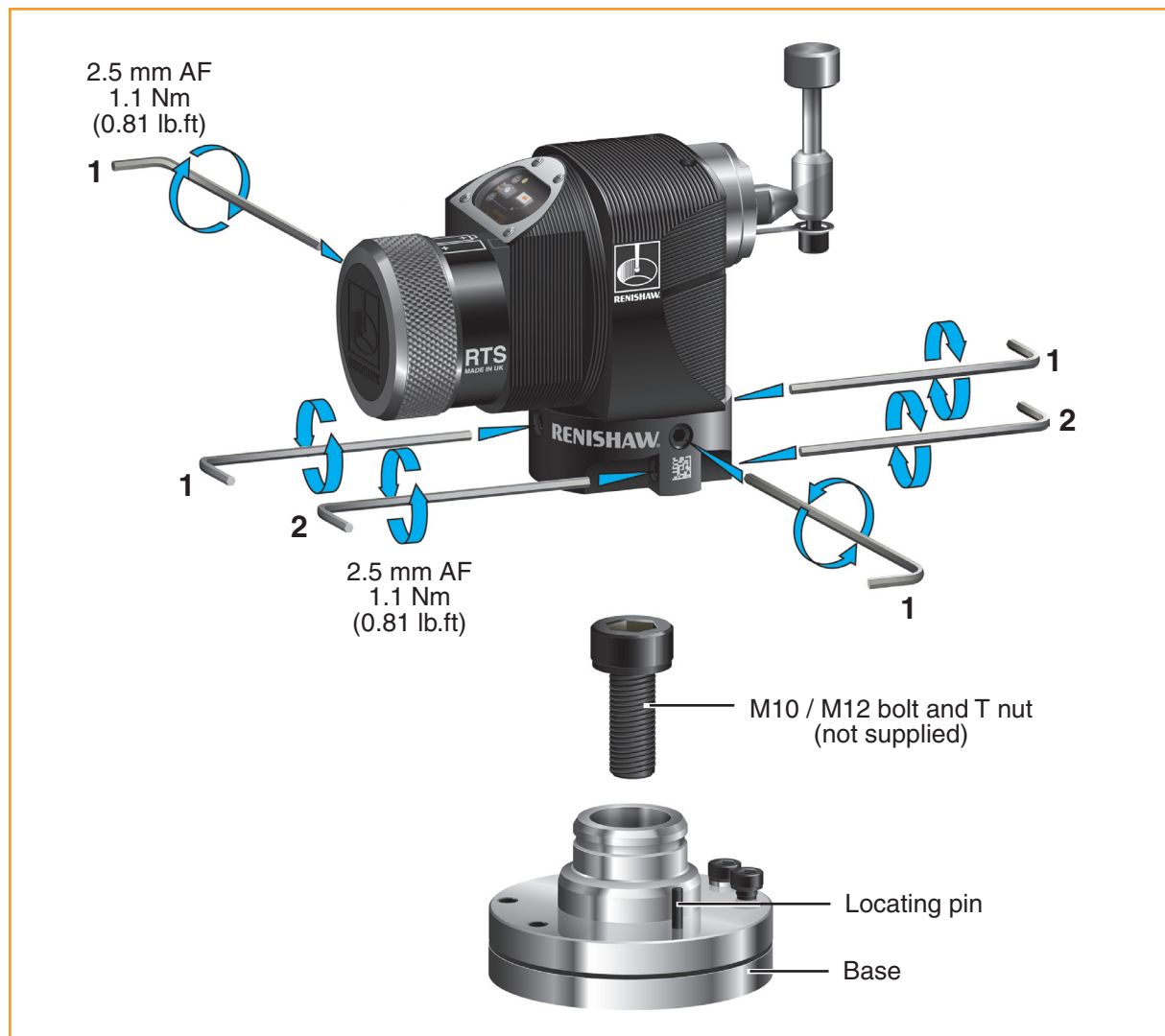
When inserting batteries, check that the battery polarity is correct.

After inserting the batteries, the LED will display the current probe settings (for details, see **Section 4, "Trigger Logic™"** page 4.1).

3



Mounting the RTS on a 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.
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 only**", "**Coarse rotational adjustment**" and "**Fine rotational adjustment**" pages 3.9 - 3.12 before tightening screws **2**.
5. Fit the stylus. See "**Fitting the stylus, break stem and captive link**" page 3.4.

Dowel pins (shown on page 2.4)

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

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 (continued)

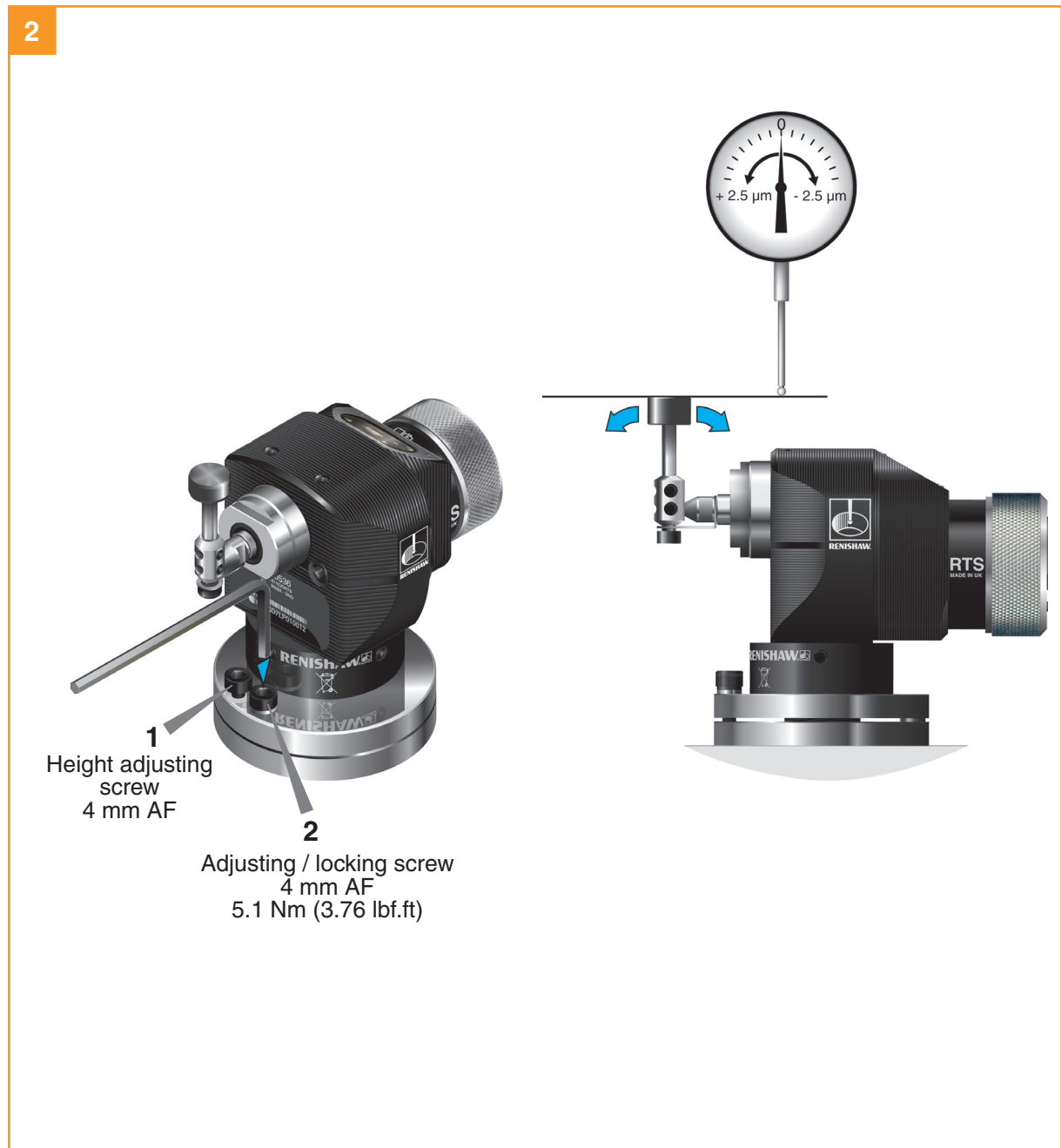
Front to back level adjustment

To raise the front

Slacken locking screw **2** and adjust height adjusting screw **1** until the stylus is level. Then fully tighten screw **2**.

To lower the front

Keep slackening height adjusting screw **1** and adjusting/locking screw **2** until the stylus is level. Then fully tighten screw **2**.



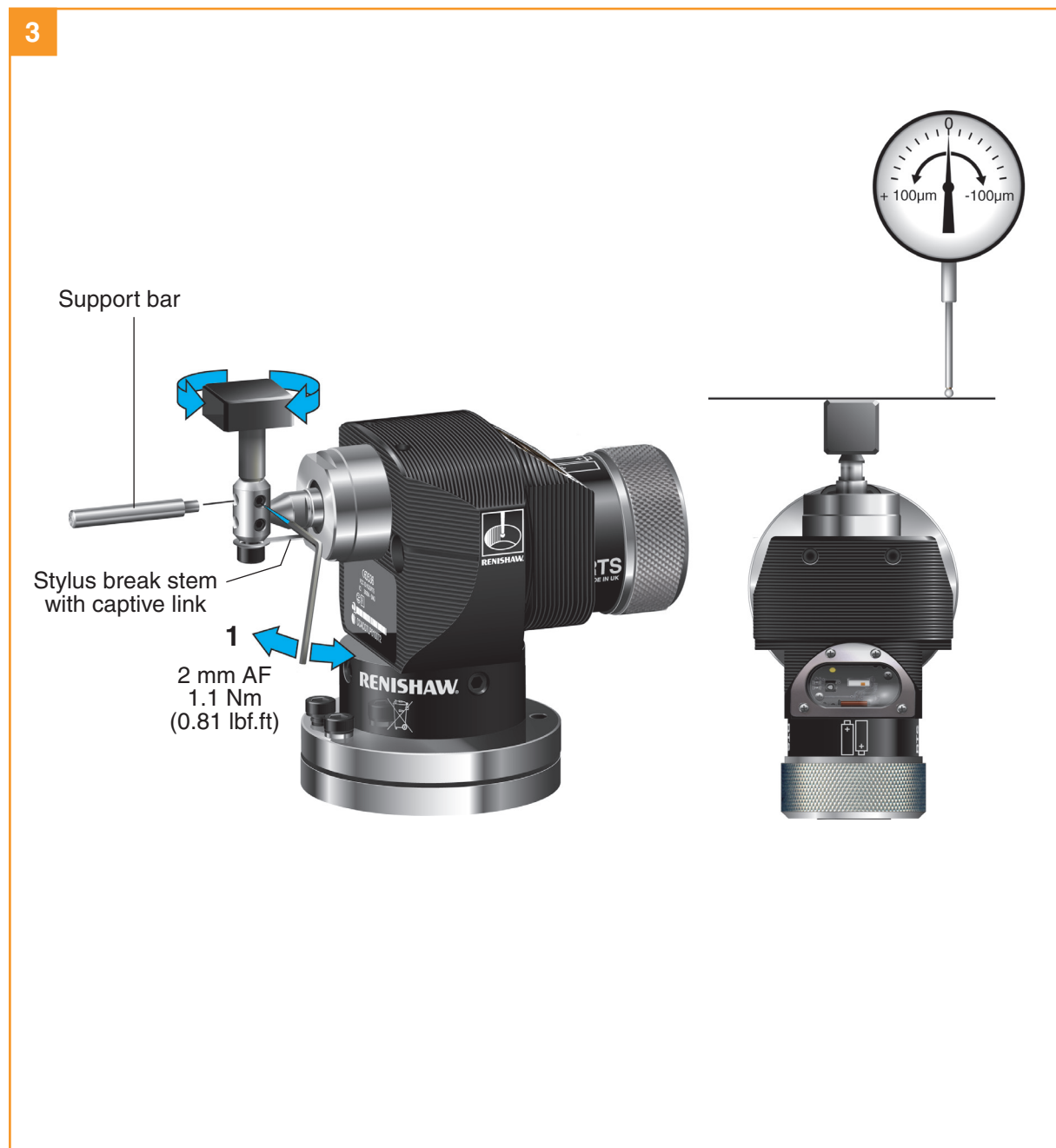
Square stylus only

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

Coarse rotational adjustment

Slacken grub screw **1** and 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.



Square stylus only (continued)

Fine rotational adjustment

Slacken the four body locking screws 1.



Square stylus only (continued)

Fine rotational adjustment (continued)

Opposing grub screws **2** 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.



Square stylus only (continued)

Fine rotational adjustment (continued)

Tighten the four body locking screws 1.



Calibrating the RTS

Why calibrate a probe?

A 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 you calibrate your probe in the following circumstances:

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

When your 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 not necessarily the true physical stylus face positions.

NOTE:

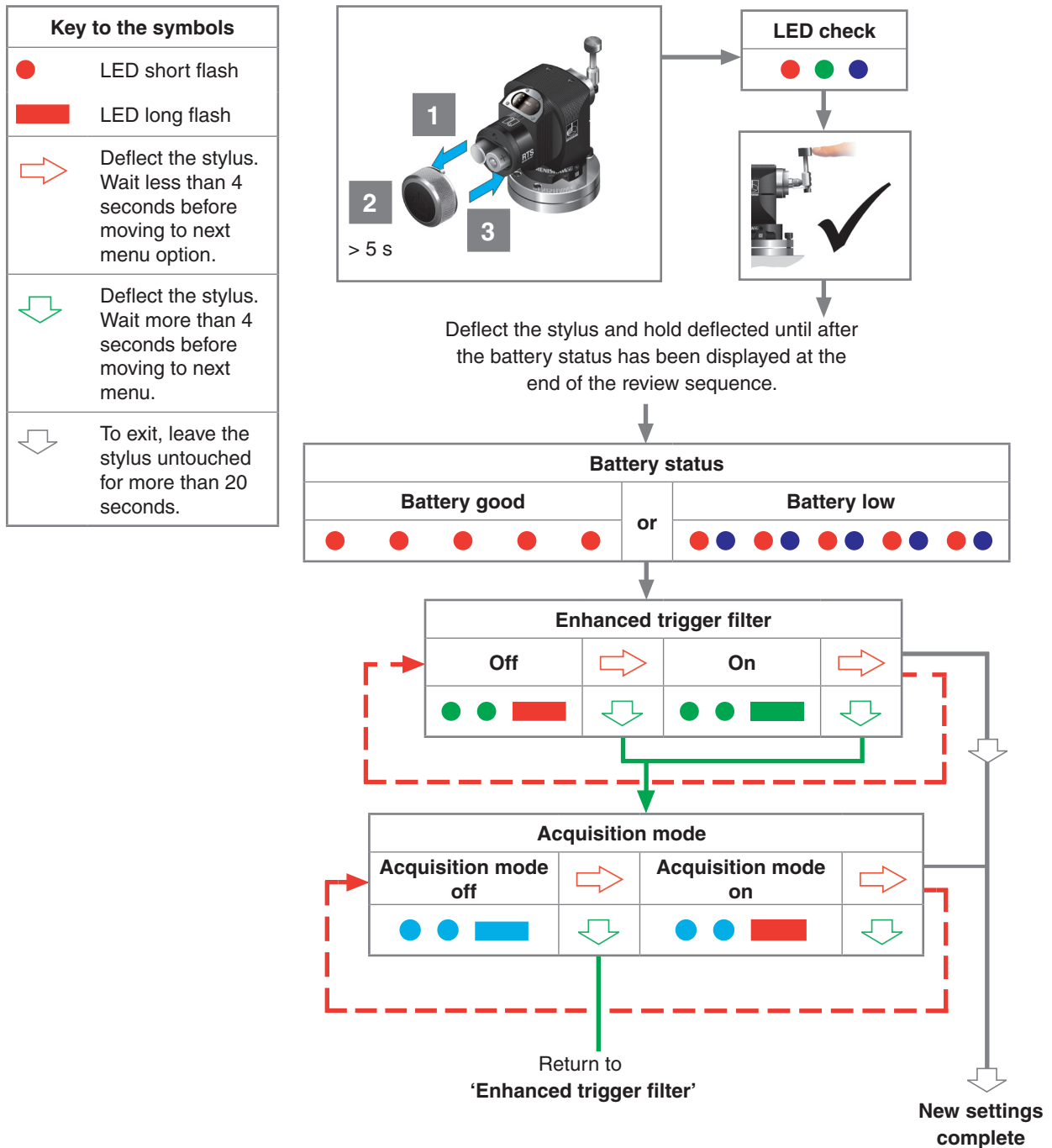
Poor repeatability of probe trigger point values indicates that either the probe/stylus assembly is loose or a machine/probe fault exists. Further investigation is required.

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Changing the probe settings

Insert batteries or, if already installed, remove for 5 seconds and replace. Following the LED check, immediately deflect the stylus and hold deflected until five red flashes have been observed (if the battery power is low then each of the five red flashes will be followed by a blue flash).

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



NOTE: To partner an RTS with an RMI/RMI-Q please see "RTS – RMI/RMI-Q partnership" page 4.3. Once acquisition has been successful, the RTS will revert to "Acquisition mode off".

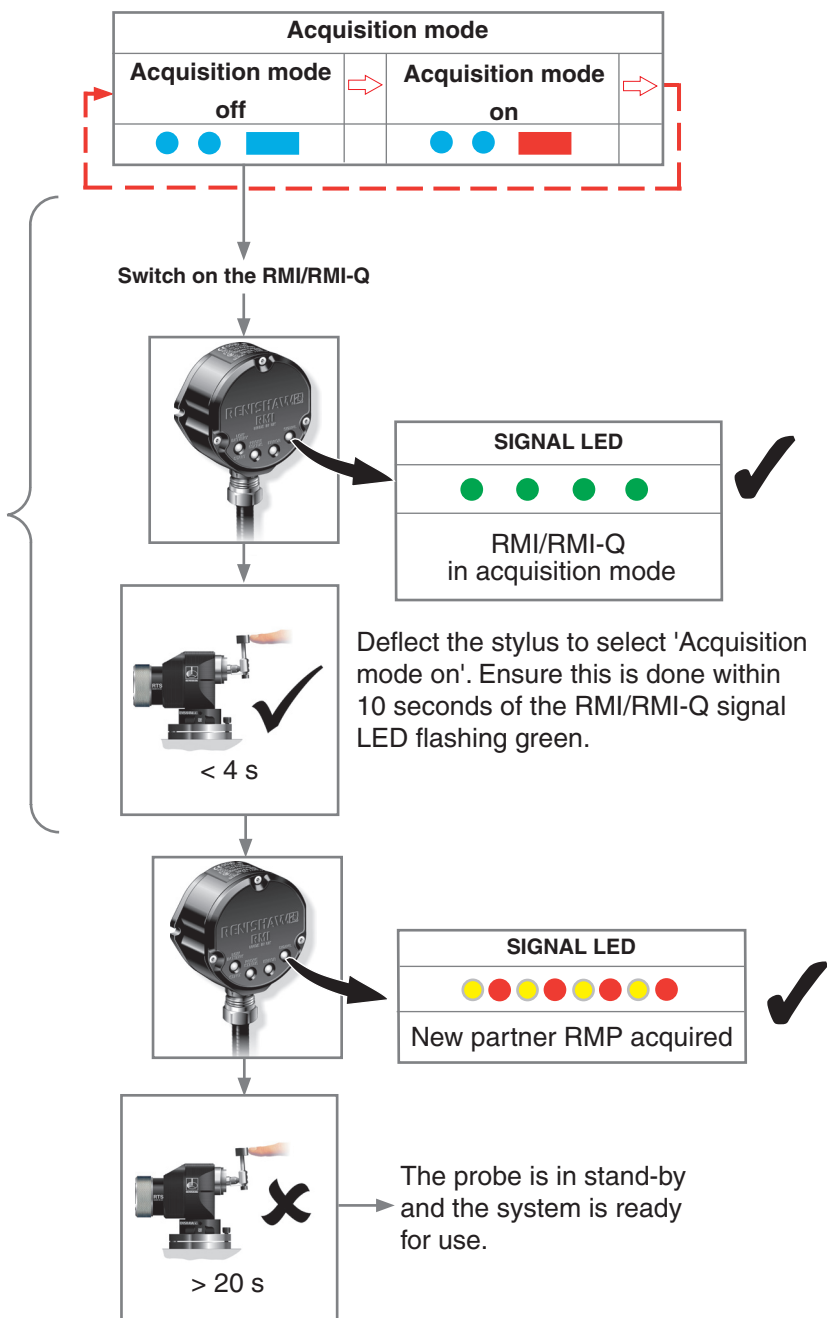
RTS – RMI/RMI-Q partnership

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

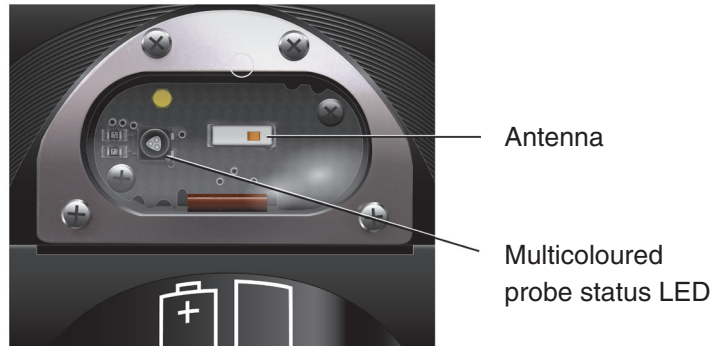
In configuration mode, configure the probe settings as required until you reach the "Acquisition mode" menu, which defaults to "Acquisition mode off".

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

NOTE: Once in 'Acquisition mode off', ensure the next two steps are completed within 20 seconds.



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	■

NOTES:

Due to the nature of Lithium Thionyl Chloride batteries, if a 'low battery' LED sequence is ignored or overlooked, then 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 re-activates as the batteries recover sufficiently to provide the probe with power.
3. The probe begins to run through the LED review sequence, see 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 authorised Renishaw Service Centres.

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

Cleaning the probe

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

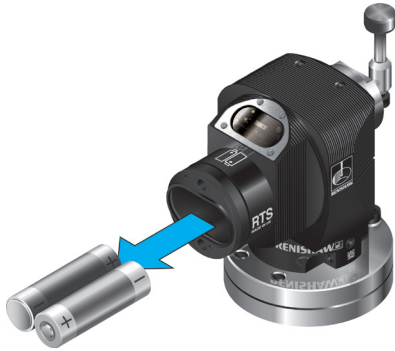


Changing the batteries

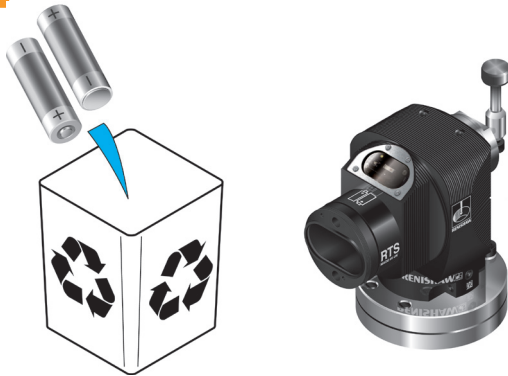
1



2



3



4



CAUTIONS:

Do not leave exhausted batteries in the probe.

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

Ensure 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 (page 5.3).

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

Further battery safety information is available on page 1.5.

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
RS: 596-602, 201-9438,
 324-6748
Radio shack: 55025148
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.

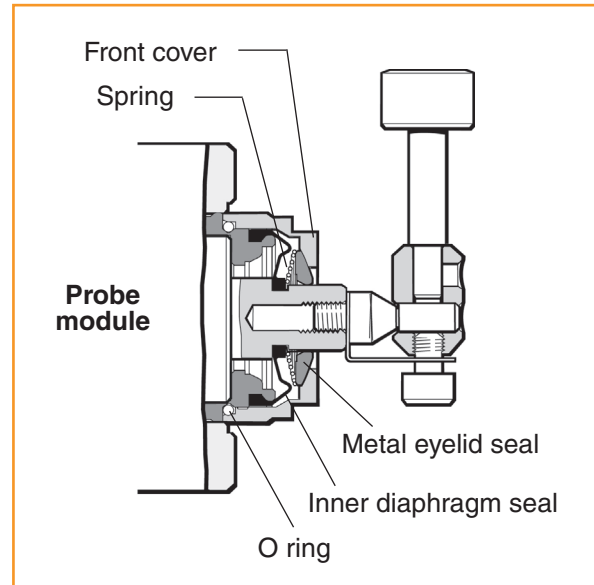
Ensure the probe is firmly secured to its mounting.

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, see 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 page 5.5. If it is pierced or damaged please contact Renishaw.

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



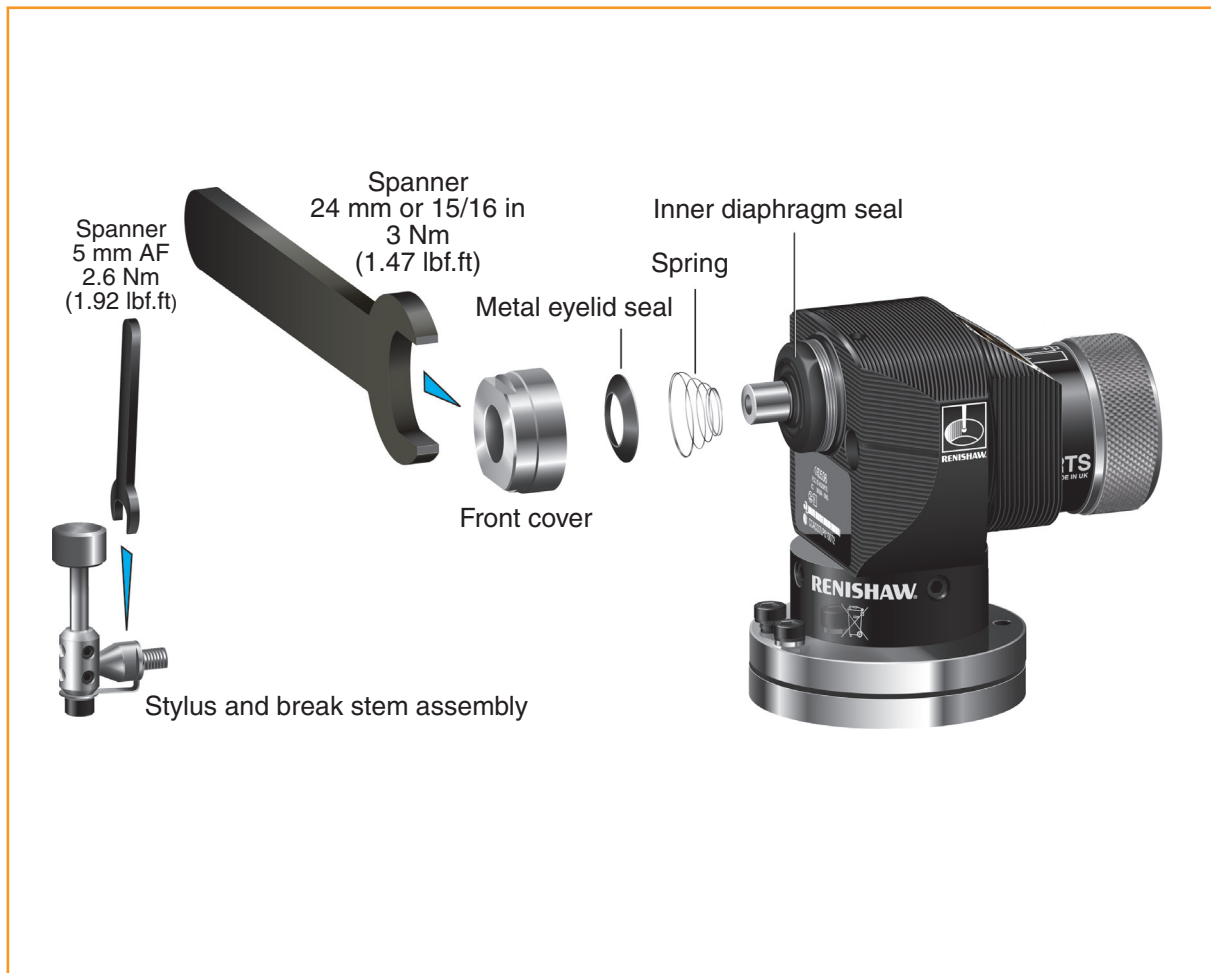
Inspecting the inner diaphragm seal

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 the inner diaphragm seal. Remove the metal eyelid and spring.
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.



CAUTION:

Loose components may fall out.



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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.
	Wrong batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
Probe fails to switch on.	Dead batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion.
	Probe out of range.	Check position of RMI/RMI-Q, see operating envelope.
	No RMI/RMI-Q "start/stop" signal.	Check RMI/RMI-Q for green start LED.
	RTS in hibernation mode.	Ensure probe is in range and wait up to 30 seconds, then resend switch-on signal. Check position of RMI/RMI-Q, see operating envelope.
Machine stops unexpectedly during a probing cycle.	Radio link failure/RTS out of range.	Check interface/receiver and remove obstruction.
	RMI receiver/machine fault.	Refer to receiver/machine user's guide.
	Dead batteries.	Change batteries.
	Probe unable to find target surface.	Check that part is correctly positioned and that stylus has not broken.
	False probe trigger.	Enable enhanced trigger filter.
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 part or stylus.	Clean part and stylus.
	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.
	Calibration and probing speeds not the same.	Review probing software.
	Measurement occurs as stylus leaves surface.	Review probing software.
	Measurement occurs within the machine's acceleration and deceleration zone.	Review probing software and probe filter settings.
	Probing speed too high.	Perform simple repeatability trials at various speeds.
	Temperature variation causes machine and workpiece movement.	Minimise temperature changes.
	Machine tool faulty.	Perform health checks on machine tool.
RTS status LEDs do not correspond to RMI status LEDs.	Radio link failure – RTS out of RMI/RMI-Q range.	Check position of RMI/RMI-Q, see operating envelope.
	RTS has been enclosed/shielded by metal.	Remove from obstruction.
	RTS and RMI/RMI-Q are not partnered.	Partner RTS and RMI/RMI-Q.

Symptom	Cause	Action
RMI/RMI-Q error LED lit during probing cycle.	Probe not switched on or probe timed out.	Change setting. Review turn off method.
	Probe out of range.	Check position of RMI/RMI-Q, see operating envelope.
RMI/RMI-Q low battery LED lit.	Low batteries.	Change batteries soon.
Reduced range.	Local radio interference.	Identify and remove.
Probe fails to switch off.	Incorrect switch-off method configured.	Check configuration and alter as required.
	No RMI/RMI-Q 'start/stop' signal.	Check RMI/RMI-Q for green start LED.
	Probe in timeout mode and placed in tool magazine and is being triggered by movement.	Use shorter timeout setting or use different switch-off mode.
Probe goes into Trigger Logic™ configuration mode and cannot be reset.	Probe trigger function is damaged.	Return to Renishaw.

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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	A-4113-0050	RMI – side exit – with 15 m (49.2 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 web site 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	H-2000-5220	Installation and user's guide: RMI – radio machine interface.
RMI-Q	H-5687-8500	Quick-start guide: for rapid set-up of the RMI-Q, includes CD with installation guide.

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