RTS (QE) radio tool setter

Compliance information for this product is available by scanning the QR code or visiting **www.renishaw.com/mtpdoc**

Contents

Before you begin

Trade marks

Google Play and the Google Play logo are trademarks of Google LLC.

Apple and the Apple logo are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc., registered in the U.S. and other countries.

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

Features of the RTS and features of similar Renishaw products, are the subject of one or more of the following patents and/or patent applications:

CN 117178489	JP 2024-513611	US 7285935
CN 117178490	JP 2024-513612	US 7665219
CN 117223227	JP 2024-515274	US 7821420
EP 1931936	TW I333052	
EP 4324100	US 2024-0171213	
EP 4324101	US 2024-0171214	
EP 4324102	US 2024-0178879	

RTS (model RTSQE) software notices

This RTS product includes embedded software (firmware) to which the following notices apply:

US government notice

NOTICE TO UNITED STATES GOVERNMENT CONTRACT AND PRIME CONTRACT CUSTOMERS

This software is commercial computer software that has been developed by Renishaw exclusively at private expense. Notwithstanding any other lease or licence agreement that may pertain to, or accompany the delivery of, this computer software, the rights of the United States Government and/or its prime contractors regarding its use, reproduction and disclosure are as set forth in the terms of the contract or subcontract between Renishaw and the United States Government, civilian federal agency or prime contractor respectively. Please consult the applicable contract or subcontract and the software licence incorporated therein, if applicable, to determine your exact rights regarding use, reproduction and/or disclosure.

Renishaw software EULA

Renishaw software is licensed in accordance with the Renishaw licence at:
www.renishaw.com/legal/softwareterms

RTS (model RTSQE) software licensing agreement

This RTS product includes the following third-party software:

BSD 3-Clause Licence

Copyright © 2009 – 2015 ARM LIMITED. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. Neither the name of ARM nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL COPYRIGHT HOLDERS AND CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Intended use

The RTS is a radio tool setting probe that enables automated broken tool detection and rapid measurement of the tool length and diameter of a wide range of tools on machining centres of all sizes.

Safety

Information to the user

This product is supplied with non-rechargeable batteries that do not contain lithium. Refer to the battery manufacturer's literature for specific battery operating, safety and disposal guidelines.

• Do not attempt to recharge the batteries.

• Replace the batteries only with the specified type.

• Do not mix new and used batteries in the product.

• Do not mix different types or brands of batteries in the product.

• Ensure that all batteries are inserted with the correct polarity in accordance with the instructions in this manual and indicated on the product.

• Do not store the batteries in direct sunlight.

• Do not expose the batteries to water.

• Do not expose the batteries to heat or dispose of the batteries in a fire.

• Avoid forced discharge of the batteries.

• Do not short circuit the batteries.

• Do not disassemble, apply excessive pressure, pierce, deform or subject the batteries to impact.

• Do not swallow the batteries.

• Keep the batteries out of the reach of children.

• If the batteries are swollen or damaged do not use them in the product and exercise caution when handling them.

• Dispose of waste batteries in accordance with your local environmental and safety laws.

Ensure that you comply with international and national battery transport regulations when transporting the batteries or this product with the batteries inserted. Lithium metal batteries are classified as dangerous goods for transportation and require labelling and packaging in accordance with the dangerous goods regulations before being offered for transportation. To reduce the risk of shipment delays, should you need to return this product to Renishaw for any reason, do not return any batteries.

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

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.

If the probe system fails, 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 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.

This page is intentionally left blank.

RTS basics

Introduction

The RTS (model RTSQE) is a new generation radio tool setting probe that is compatible for application with either the RMI-Q or RMI-QE radio machine interface.
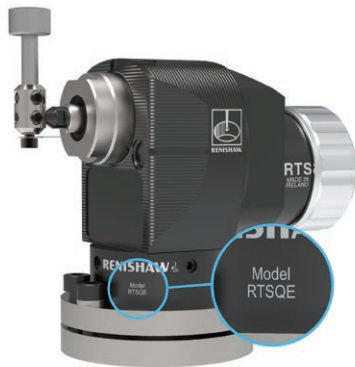
Interface compatibility		
Interface type	RTSQ	RTSQE
RMI-Q	Compatible	Compatible
RMI-QE	–	Compatible

NOTE: Older generation RTS tool setters without the "Model RTSQE" marking cannot be used with the RMI-QE.

The RTS is a tool setting probe that enables automated broken tool detection and rapid measurement of the tool length and diameter of a wide range of tools, on machining centres of all sizes, or where line-of-sight between probe and receiver is difficult to achieve.

The RTS is part of the latest generation of 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 hybrid FHSS (frequency-hopping spread spectrum) technology, which allows multiple systems to operate in the same machine shop without risk of interference.

All RTS settings are configured using Opti-Logic™ or Trigger Logic™. These techniques enable the user to review and subsequently change probe settings.

Configurable settings are:

- Trigger filter setting

- Hibernation setting*

* in RMI-Q mode only.

Getting started

A multicolour LED provides visual indication of selected probe settings and status:

- Trigger filter setting.

- Hibernation setting*.

- Tool setter status – triggered or seated.

- Battery condition.

* in RMI-Q mode only.

Batteries are inserted or removed as shown (for further information, see **page 3-5**, "Installing the batteries").

On insertion of the batteries, the LED will begin to flash, starting with a LED check (for further information, see **page 4-2**, "Reviewing the probe settings"). A LED check displaying a single flash of red, green, blue indicates that the probe is operating in RMI-Q mode. A LED check displaying double flashes of red, green, blue indicates that the probe is operating in RMI-QE mode.

System interface

The RTS is optimised for use with the RMI-Q or RMI-QE. The RMI-Q or RMI-QE is a combined antenna, interface and receiver unit used to communicate between the RTS and the machine controller. For more details, refer to the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504) or the *RMI-QE radio machine interface* installation guide (Renishaw part no. H-6551-8520).

It is necessary that the RTS is partnered to either an RMI-Q or RMI-QE. Prior to partnering for the first time, the RTS is pre-set to operate in RMI-QE mode. The LED check will display double flashes of red, green, blue.

NOTE: The RTS (model RTSQE) is not compatible for use with the older RMI integrated interface/receiver.

Probe configuration

It is recommended that the Probe Setup app is used to configure the probe.

The Probe Setup app simplifies the process of configuring Renishaw machine tool probes compatible with Opti-Logic™ or Trigger Logic™.

The app provides clear, step-by-step, visual instructions and video tutorials to guide a user through the process of setting up and configuring a Renishaw machine tool probing system.

The Probe Setup app is available for download on the App Store and Google Play and also from several app stores in China.

or

Opti-Logic™

Opti-Logic is the process of transmitting and receiving data from the app to a Renishaw machine tool probe using pulses of light; for more information, see **page 4-1**, "Configuring the probe using the Probe Setup app".

Trigger Logic™

Trigger Logic™ (for further information, see **page 4-2**, "Reviewing the probe settings") 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, observed via the LED display, to allow selection of the required mode options.

Current probe settings can also be reviewed by simply removing the batteries for a minimum of 5 seconds, and then replacing them to activate the Trigger Logic review sequence (for further information, see **page 4-2**, "Reviewing the probe settings").

Probe modes

The RTS probe can be in one of four 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. **"Hibernation mode"** is only applicable to **"radio on mode"** when used with a RMI-Q.

Operational mode – When activated by the **"radio on"** method, the probe is switched on and ready for use.

Configuration mode – Ready to change the probe settings using Opti-Logic or Trigger Logic.

Partnering mode – When activated via Trigger Logic, the probe can be partnered with an RMI-Q or RMI-QE.

Configurable settings

Trigger filter

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

Level 1 disables the trigger filter.

Level 2 adds a nominal 6.7 ms delay 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.

Factory set to Level 1 (OFF). It is always necessary to calibrate the probe when the trigger filter is changed.

NOTE: Level 2 (trigger filter on) is compatible for the on-centre length measurement of non-rotating tools only. It is not compatible for the measurement of radius/diameter or length off-centre.

Hibernation mode

Only applicable to **'radio-on mode'** when RTS is used with a RMI-Q.

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.

The 'wake-up' frequency can be set to 30 seconds, 5 seconds or set to off (the probe never goes into hibernation).

The 'wake-up' frequency is factory set to 30 seconds.

If its partnered RMI-Q is found, the RTS goes from **"hibernation mode"** to **"standby mode"**, ready for **"radio-on"**.

NOTE: "Hibernation mode" does not exist when RTS (model RTSQE) is used with a RMI-QE.

Partnering mode

System set-up is achieved using Opti-Logic or Trigger Logic and powering on the RMI-Q or RMI-QE. Alternatively "ReniKey" may be used (see notes below).

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

Partnering to a RMI-Q or RMI-QE will configure the RTS to operate in either RMI-Q or RMI-QE mode and display specific probe settings accordingly.

The RTS **"operating mode"** can be determined by observing the LED check that is displayed when the batteries are inserted into the probe (for further information, see **page 4-2**, "Reviewing the probe settings"). Display of **"Hibernation mode"** indicates that the RTS is in RMI-Q mode.

NOTES:

Prior to partnering for the first time, the RTS is pre-set to operate in RMI-QE mode. The LED check will display double flashes of red, green, blue.

Systems using the RMI-Q or RMI-QE can be partnered with up to four probes (any combination of tool setters and/or spindle probes) manually. Alternatively this can be achieved by using ReniKey; a Renishaw machine macro cycle which does not require the RMI-Q or RMI-QE to be power cycled.

ReniKey software (Renishaw part no. A-5687-5000) is available from your local Renishaw distributor/office.

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 time (configured by RMI-Q or RMI-QE)

When the RTS is used with an RMI-Q or RMI-QE, the turn-on time can be configured (in the interface) 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
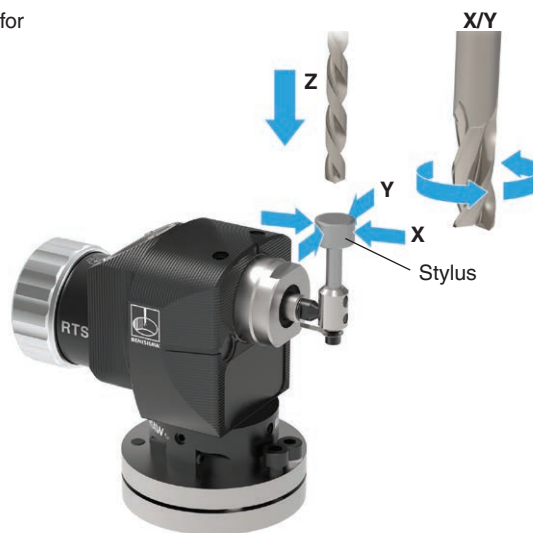
The tool is driven in the machine Z axis for tool length measurements and broken tool detection.

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; refer to the *Probe software for machine tools* data sheet (Renishaw part no. H-2000-2298).

This data sheet 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 r/min

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

Diameters below 24 mm: 800 r/min is used.

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

Diameters above 127 mm: 150 r/min is used.

First touch – machine feedrate

The feedrate (f) is calculated as follows:

$f = 0.16 \times r/min$ f units mm/min (diameter set)
$f = 0.12 \times r/min$ f units mm/min (length set)

Second touch – machine feedrate

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

RTS dimensions

43.9 (1.73) 66.05 (2.60)

60 (2.36)

33 (1.30)

74.5 (2.93)

93.25 (3.67)

57 (2.24)

RTS

RENISHAW

RENISHAW
Model
RTSQE

Cap head bolt
and T nut
M10 / M12 MAX
Typical bolt length
30 (1.18)
supplied by user

Ø62.5 (2.46)

2 × Ø6 mm dowel pins holes
M/C bed holes for dowel pins

$$\varnothing \; \begin{matrix} 6.13 \, (0.24) \\ 5.95 \, (0.23) \end{matrix} \times 13 \, (0.51) \text{ deep MIN}$$

equi-spaced on Ø54 (2.125) PCD at 45° to RTS axis
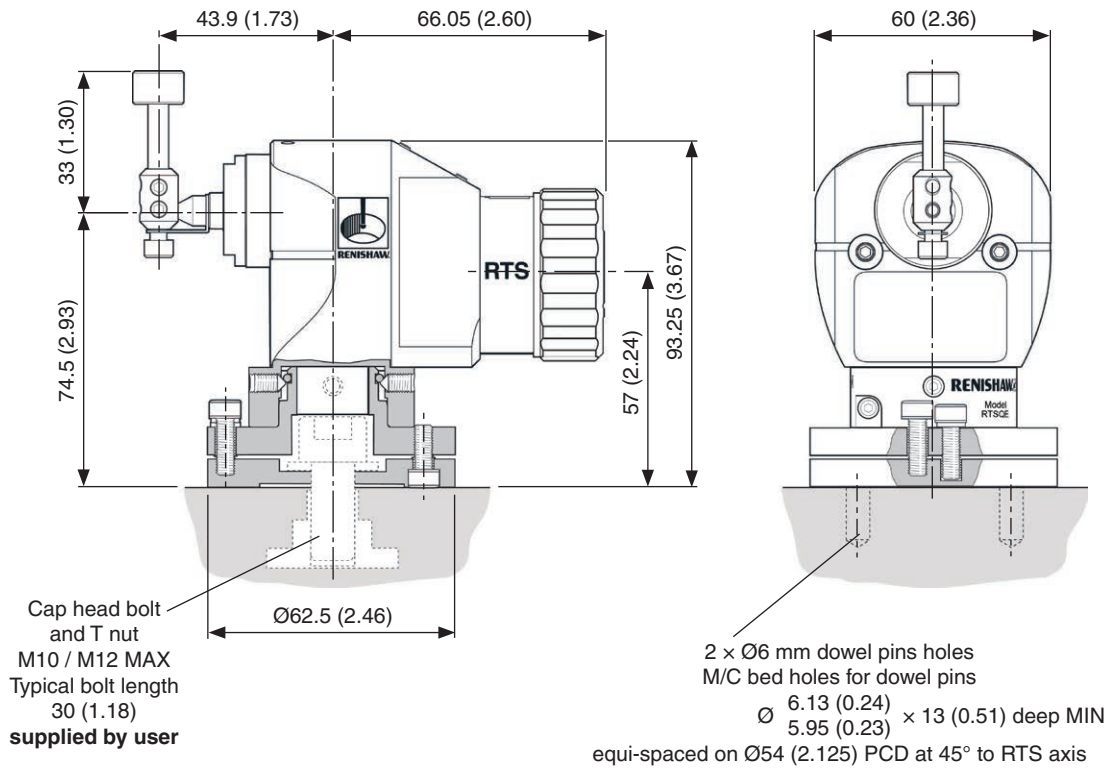
Machining details for dowel pins

Ø54 (2.126)

2 × Ø6 mm dowel pin holes
M/C bed holes for dowel pins

$$\begin{matrix} 6.13 \, (0.24) \\ 5.95 \, (0.23) \end{matrix} \times 13 \, (0.51) \text{ deep MIN}$$

45°

Dimensions given in mm (in)
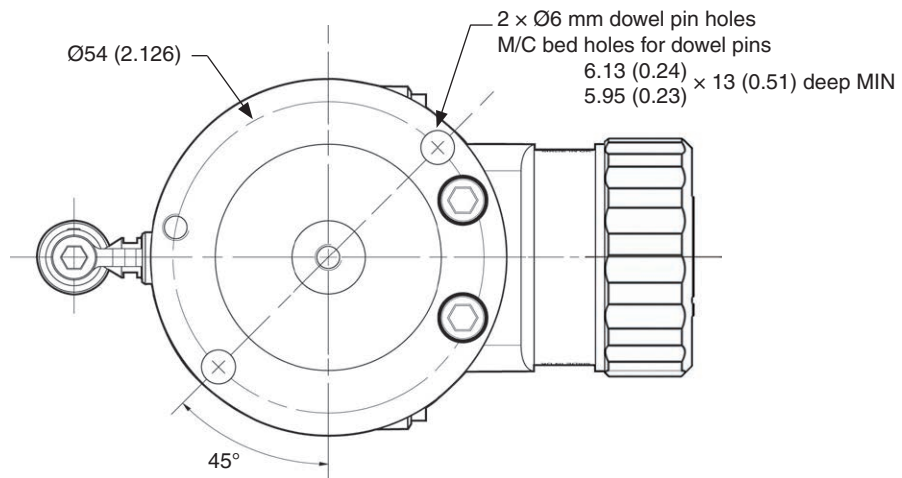
![RENISHAW apply innovation™]

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

Raising block

Cranked horizontal stylus adaptor kit

Dimensions given in mm (in)

RTS specification

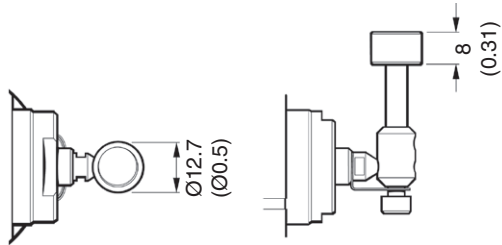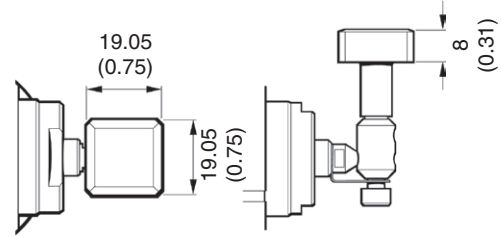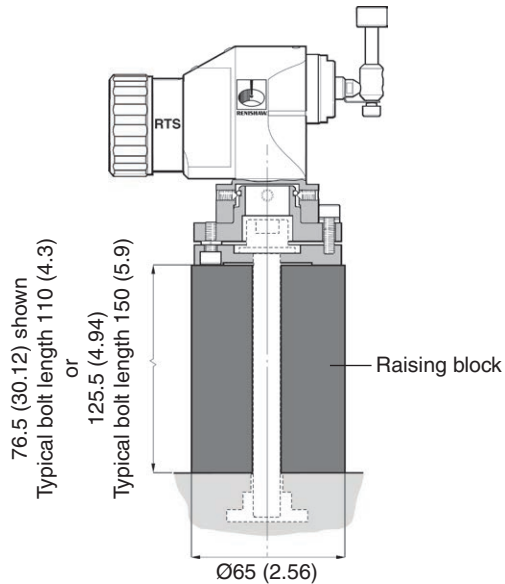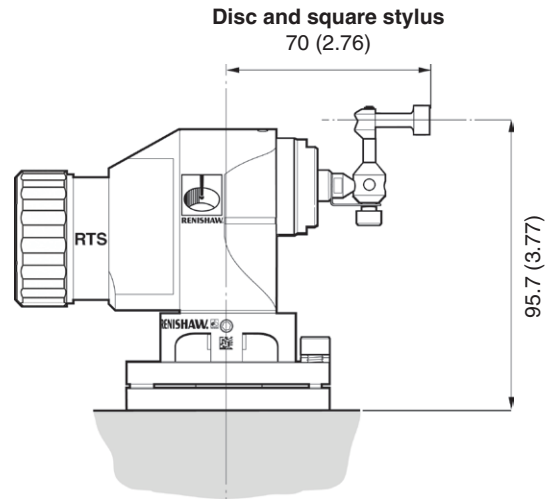| Principal application	Tool measuring and broken tool detection on vertical and horizontal machining centres and gantry machining centres.	
Overall dimensions	Length with disc stylus	116.30 mm (4.58 in)
	Length with square stylus	119.48 mm (4.70 in)
	Width	62.50 mm (2.46 in)
	Height with disc and square 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-Q or RMI-QE combined antenna, interface and receiver unit	
Sense directions	±X, ±Y, +Z	
Mounting	M10 / M12 T bolt (not supplied) Optional SPIROL® pins to allow accurate remounting	
Unidirectional repeatability	1.0 µm (40 µin) 2σ [1]	
Stylus trigger force [2] [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	±3.5 mm (0.14 in)
	+Z plane	6 mm (0.24 in)
Environment	IP rating	IPX8, BS EN 60529:1992+A2:2013
	IK rating	IK01, BS EN 62262:2002+A1:2021 [for glass window]
	Storage temperature	−25 °C to +70 °C (−13 °F to +158 °F)
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)
	Indoor/outdoor use	Indoor use
	Altitude	≤3000 m
	Relative humidity	5% to 95%
	Wet location	Yes, water/oil/coolant
	Pollution degree	Level 2
Battery types	2 × AA 1.5 V alkaline or 2 × AA 3.6 V lithium-thionyl chloride (LTC)	
Battery reserve life	Approximately one week after a low battery warning is first given	
Typical battery life	See table on **page 2-11**	
Low battery indication	Blue flashing LED in conjunction with normal red or green probe status LED	
Dead battery indication	Constant or flashing red	

[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 stylus by the tool 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, machine deceleration and system latency.

[3]   These are the factory settings; manual adjustment is not possible.

Typical battery life

Typical battery type		2 × AA 3.6 V LTC		2 × AA 1.5 V alkaline	
Typical battery life		"Standard" switch-on (1 s)	"Fast" switch-on (0.5 s)	"Standard" switch-on (1 s)	"Fast" switch-on (0.5 s)
	Standby life	99 months	63 months	51 months	34 months
	Light usage 1%	87 months	58 months	44 months	31 months
	Heavy usage 5%	58 months	44 months	28 months	22 months
	Continuous use	4860 hours	4860 hours	2160 hours	2160 hours

NOTES:

Battery life figures quoted in the above table are applicable to the RTS (model RTSQE) when used with a RMI-QE interface/receiver. Using an RMI-Q interface/receiver will result in a reduction from the figures quoted.

1% usage = 14 minutes/day.
5% usage = 72 minutes/day.

Battery life is dependent on the quality of the external RF environment in which the probing system is operating.

This page is intentionally left blank.

System installation

Installing the RTS with an RMI-Q or RMI-QE
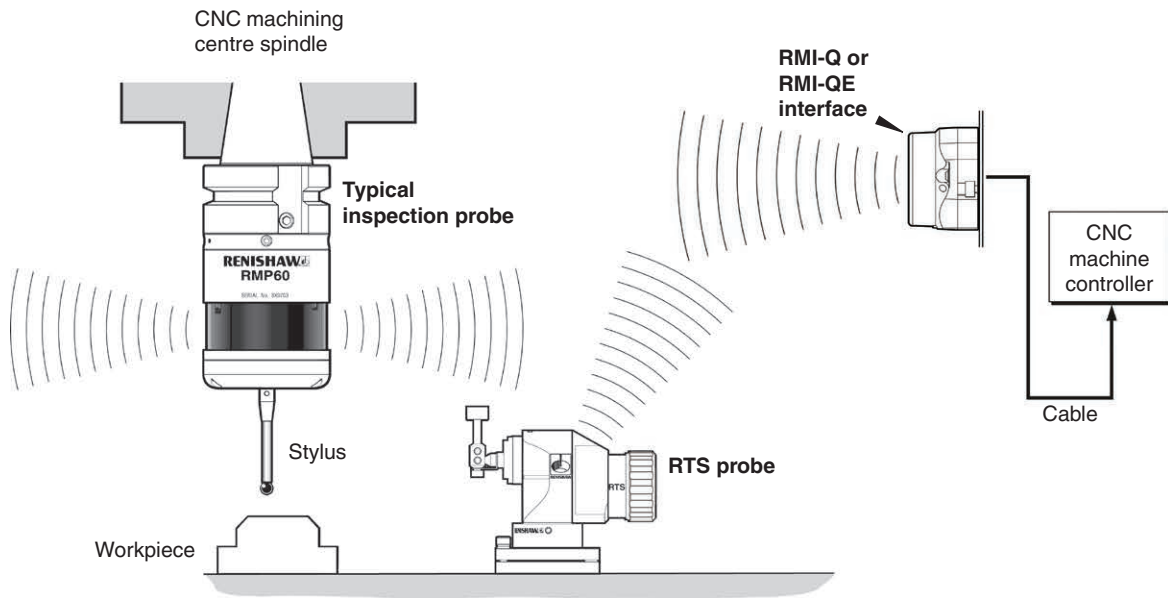
Operating envelope

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 inside the machine, as long as the probe and transmitter are kept within the performance envelope and the RMI-Q or RMI-QE signal LED remains on at all times.

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

Positioning the RTS and RMI-Q or RMI-QE

The probe system should be installed so that the probe and interface remain positioned within each other's performance envelope (shown in the figure on **page 3-3**) over the full travel of the machine's axes. To assist in finding the optimum position of the RMI-Q or RMI-QE, the signal quality is displayed on an RMI-Q or RMI-QE signal LED. Ensure that the signal LED indicates a green or yellow (good) communication strength when the RTS is operating (see the following note regarding **"Hibernation mode"**).

NOTES:

RTS installation with RMI-Q.

RTS has a built-in **"hibernation mode"** (battery-saving mode) that saves battery life when the RMI-Q is unpowered or out of range. When an RTS is partnered with an RMI-Q, 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), the system will automatically re-synchronise within 30 seconds once the RTS is back in range. 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™.

"Hibernation mode" does not exist when RTS (model RTSQE) is used with a RMI-QE.

Performance envelope

The RTS and RMI-Q or RMI-QE must be within each other's performance envelope as shown on **page 3-3**. 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.

Performance envelope when using the RTS with the RMI-Q or RMI-QE

RMI-Q
or
RMI-QE

RTS TOP VIEW

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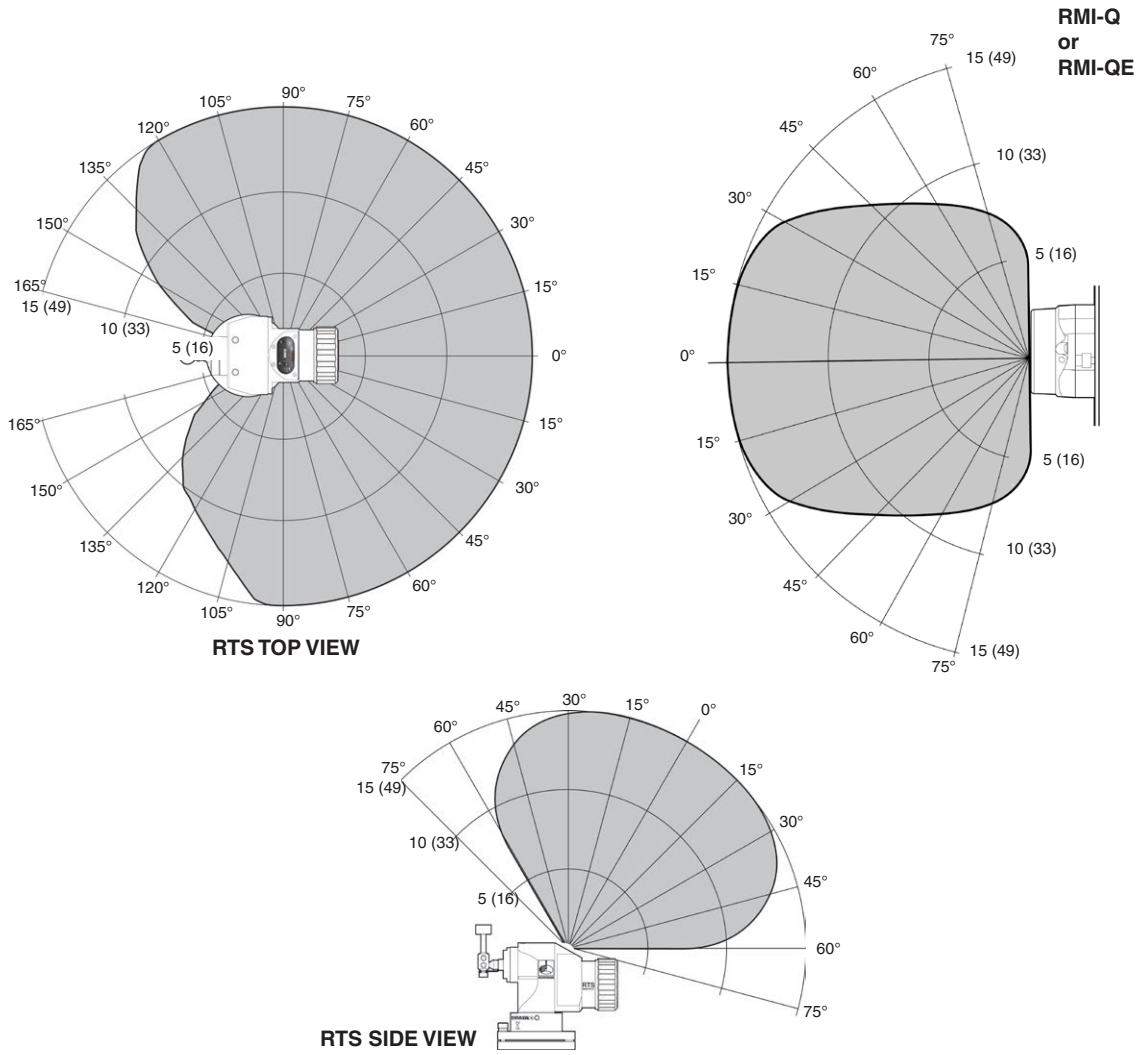
Typical plot at +20 °C (+68 °F)
Transmission range in m (ft)

Operating and switch-on / switch-off

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

5 mm A/F (thin)
2.5 Nm – 2.7 Nm
(1.84 lbf.ft – 1.99 lbf.ft)

Stylus

Captive link

Break stem

2 mm A/F
1.0 Nm – 1.2 Nm
(0.74 lbf.ft – 0.89 lbf.ft)

2

Support bar

2 mm A/F
1.0 Nm – 1.2 Nm
(0.74 lbf.ft – 0.89 lbf.ft)

3

3 mm A/F
2.5 Nm – 2.7 Nm
(1.84 lbf.ft – 1.99 lbf.ft)

apply innovation™
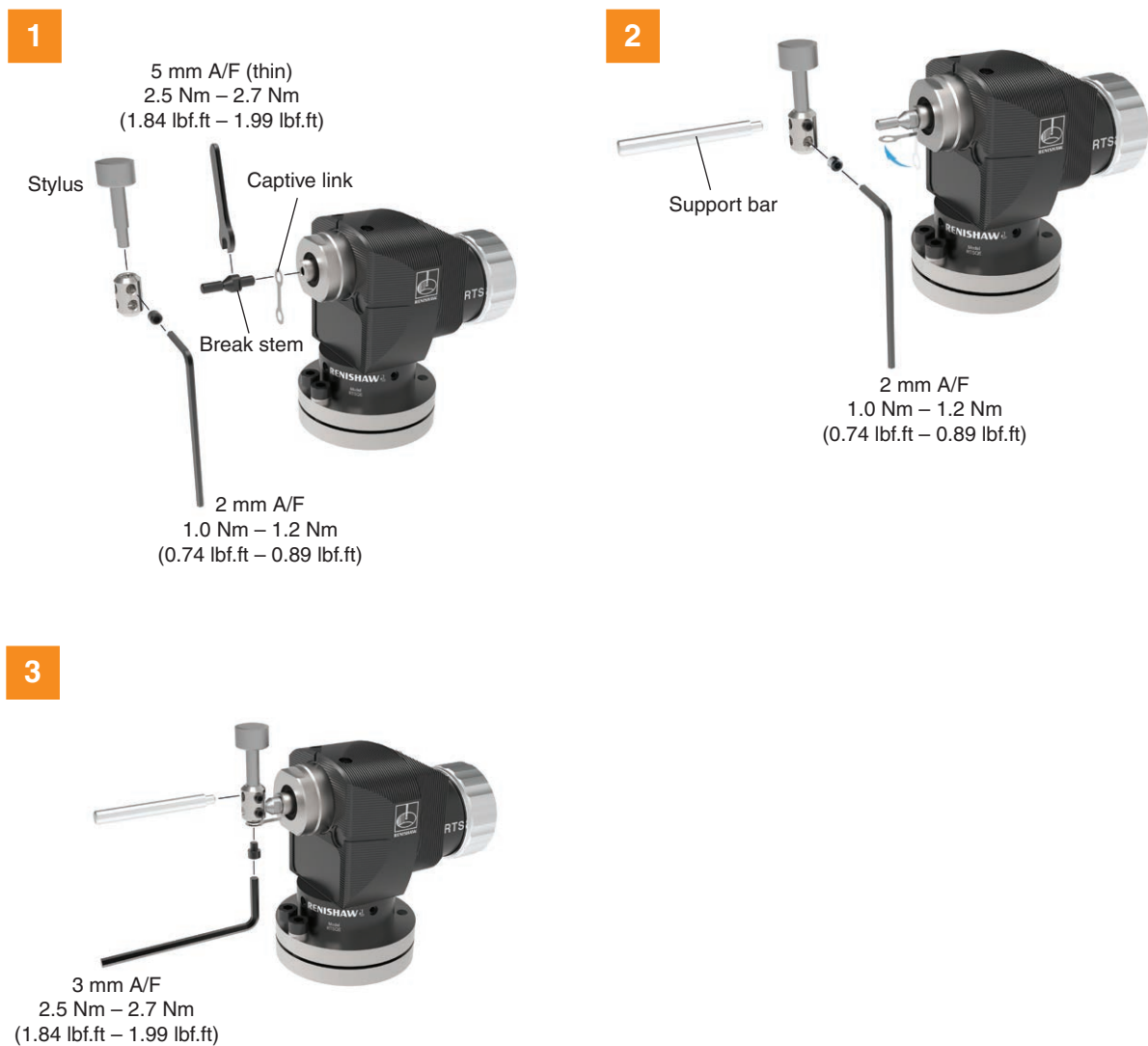
Installing the batteries

NOTES:

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 more information, see **page 4-2**, "Reviewing the probe settings").

For more information and a list of suitable battery types, see **page 5-2**, "Changing the batteries".

Mounting the probe on a machine table

2.5 mm A/F
0.7 Nm – 0.9 Nm
(0.52 lbf.ft – 0.66 lbf.ft)
1 × 4

1

2

2
2.5 mm A/F
0.7 Nm – 0.9 Nm
(0.52 lbf.ft – 0.66 lbf.ft)
× 4

1

2

1

M10 / M12 bolt and T nut
(not supplied)

Locating pin
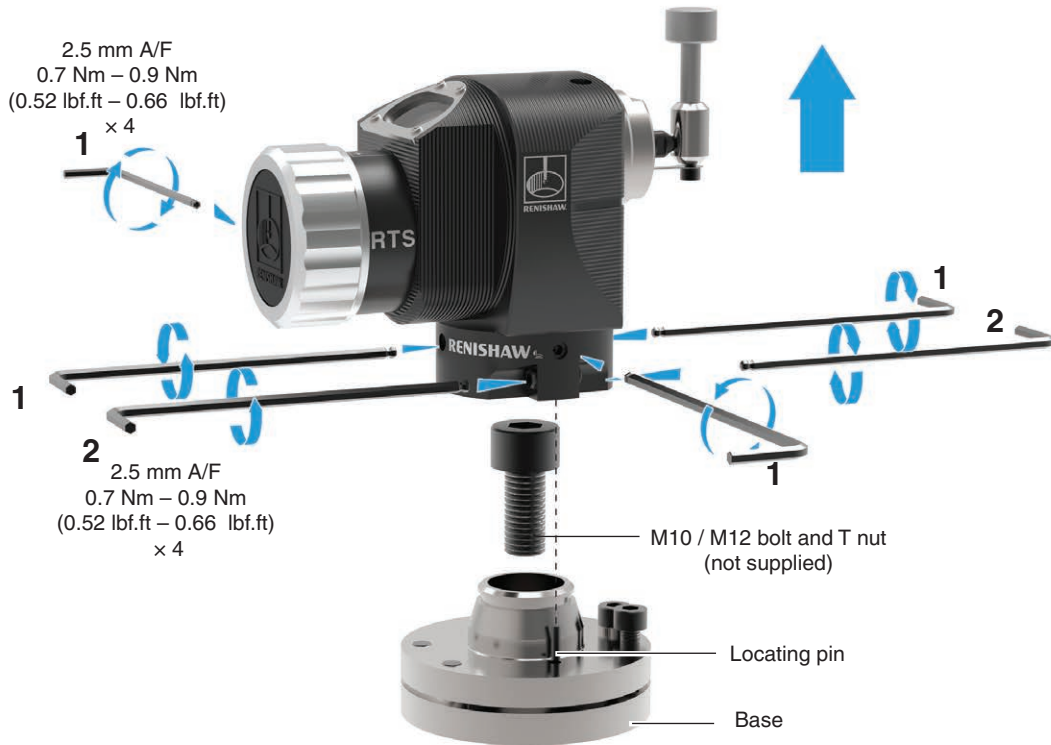
Base

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 A/F 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 **pages 3-9 – 3-12**, "Square stylus setting", "Coarse rotational adjustment" and "Fine rotational adjustment" before tightening screws **2**.

5.   Fit the stylus; see **page 3-4**, "Fitting the stylus, break stem and captive link", for further information.

Dowel pins (for more information, see **page 2-8**, "RTS dimensions").

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

1

2.5 mm A/F
0.7 Nm – 0.9 Nm
(0.52 lbf.ft – 0.66 lbf.ft)
× 2

± 2.5 µm

Probe module
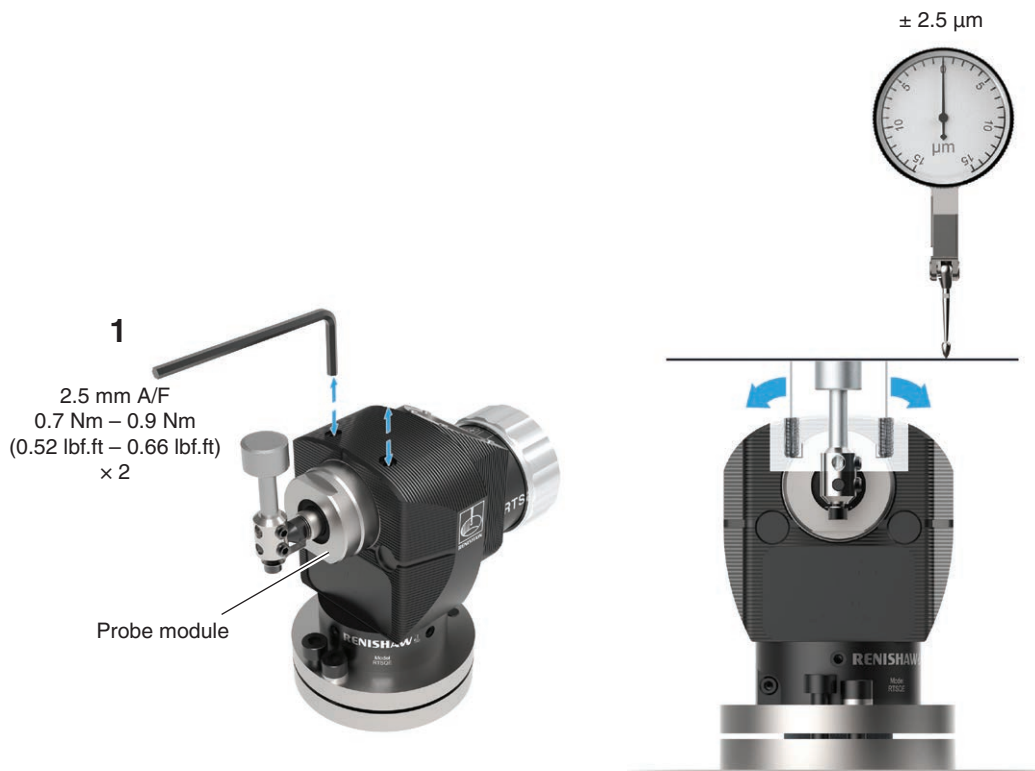
Stylus level setting (continued)

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

± 2.5 µm

3
Height adjusting
screw
4 mm A/F
4.6 Nm – 5.6 Nm
(3.40 lbf.ft – 4.13 lbf.ft)

2
Locking screw
4 mm A/F
4.6 Nm – 5.6 Nm
(3.40 lbf.ft – 4.13 lbf.ft)
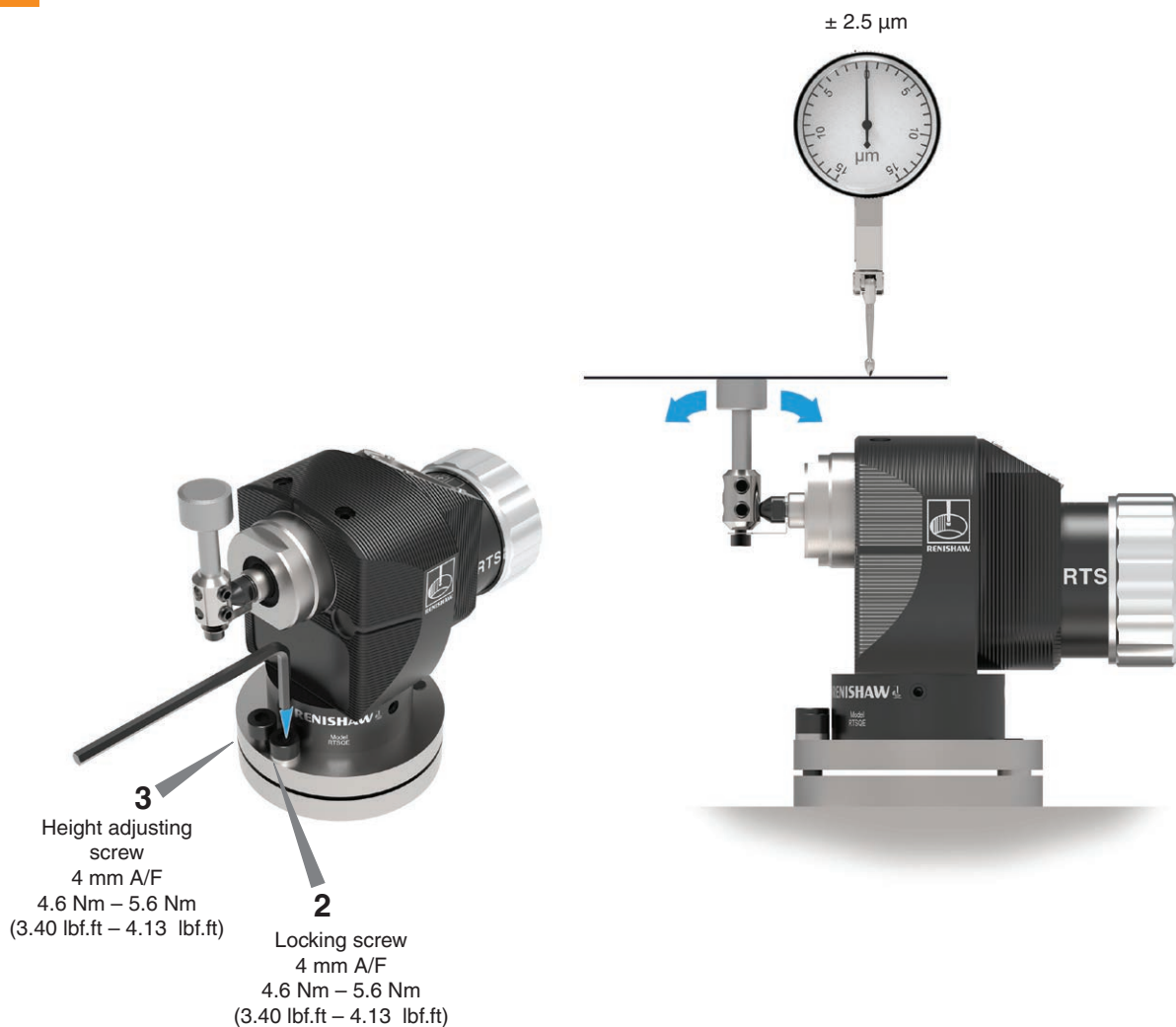
Square stylus setting only

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.

3

± 100 µm

Support bar

Stylus break stem with captive link

1
2 mm A/F
1.0 Nm – 1.2 Nm
(0.74 lbf.ft – 0.89 lbf.ft)

Square stylus setting only (continued)

Fine rotational adjustment

Slacken the four body locking screws **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.

5

± 5 µm

3

3

2.5 mm A/F
0.7 Nm – 0.9 Nm
(0.52 lbf.ft – 0.66 lbf.ft)
× 2
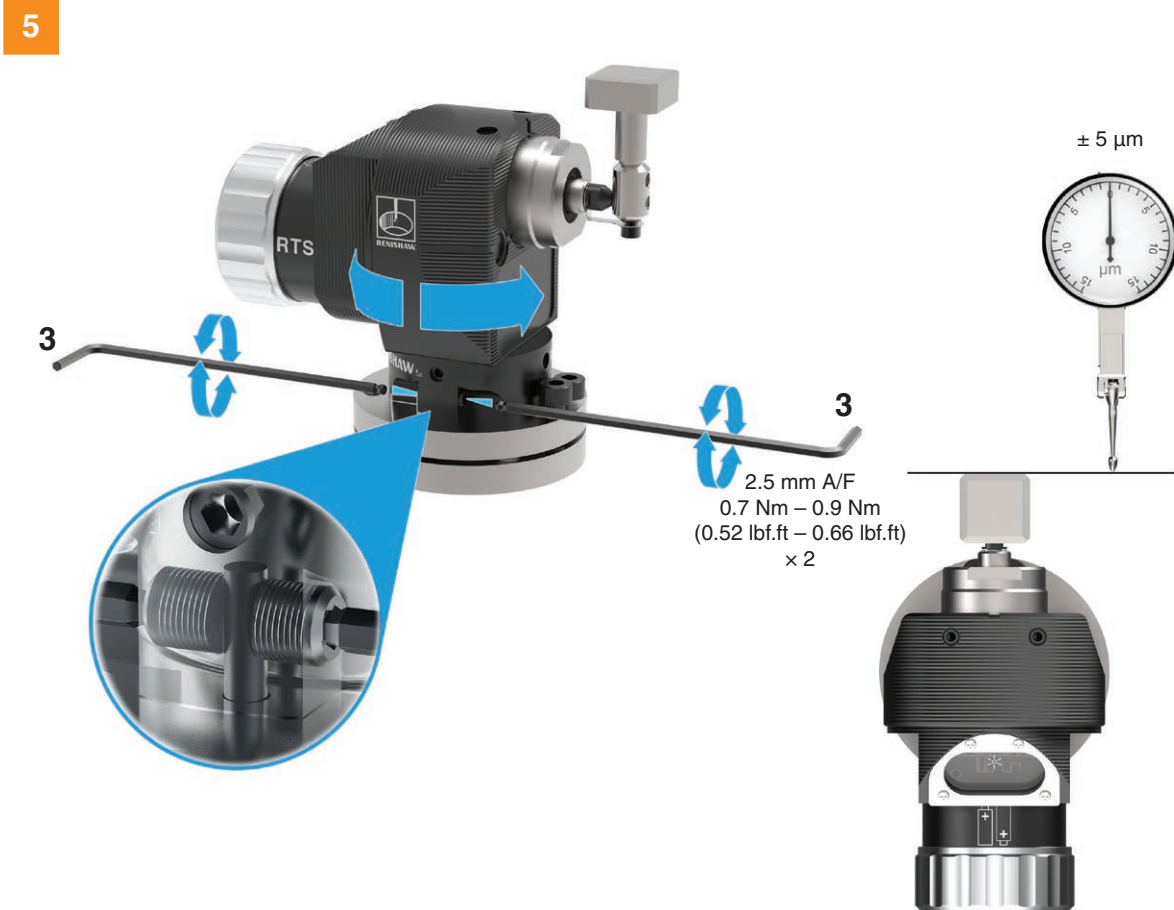
Square stylus setting only (continued)

Fine rotational adjustment (continued)

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

6

2.5 mm A/F
0.7 Nm – 0.9 Nm
(0.52 lbf.ft – 0.66 lbf.ft)
× 4

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 the probe is calibrated in the following circumstances:

*   When a probe system is to be used for the first time.

*   When the trigger filter 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 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 coordinates). 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.

This page is intentionally left blank.

Probe configuration

Configuring the probe using the Probe Setup app

The Probe Setup app simplifies the process of configuring Renishaw machine tool probes compatible with Opti-Logic™ or Trigger Logic™.

The app provides clear, step-by-step, visual instructions and video tutorials to guide a user through the process of setting up and configuring a Renishaw machine tool probing system.

Using Opti-Logic™

Opti-Logic™ is the process of transmitting and receiving data from the app to a Renishaw machine tool probe using pulses of light. The app will ask for the probe version to be entered. The probe version is displayed at the back of the battery compartment which is visible when the battery cassette is removed.

The Probe Setup app is available for download on the App Store and Google Play and several app stores in China.

Reviewing the probe settings

Key to the symbols

🔴	LED short flash
🟥	LED long flash

LED check

RMI-Q		RMI-QE
🔴 🟢 🔵	or	🔴🔴 🟢 🟢 🔵 🔵

Trigger filter

Level 1		Level 2
🟢 🟢 🟥	or	🟢 🟢 🟩

Hibernation mode (**RMI-Q** only)

30 s		5 s		Off
🔵 🔵 🟥	or	🔵 🔵 🟩	or	🔵 🔵 🟦

Battery status

Battery good		Battery low
🟢🟢🟢🟢🟢🟢🟢🟢	or	🟢🔵🟢🔵🟢🔵🟢🔵🟢🔵🟢🔵🟢🔵🔵

Probe in standby mode (after 5 seconds)
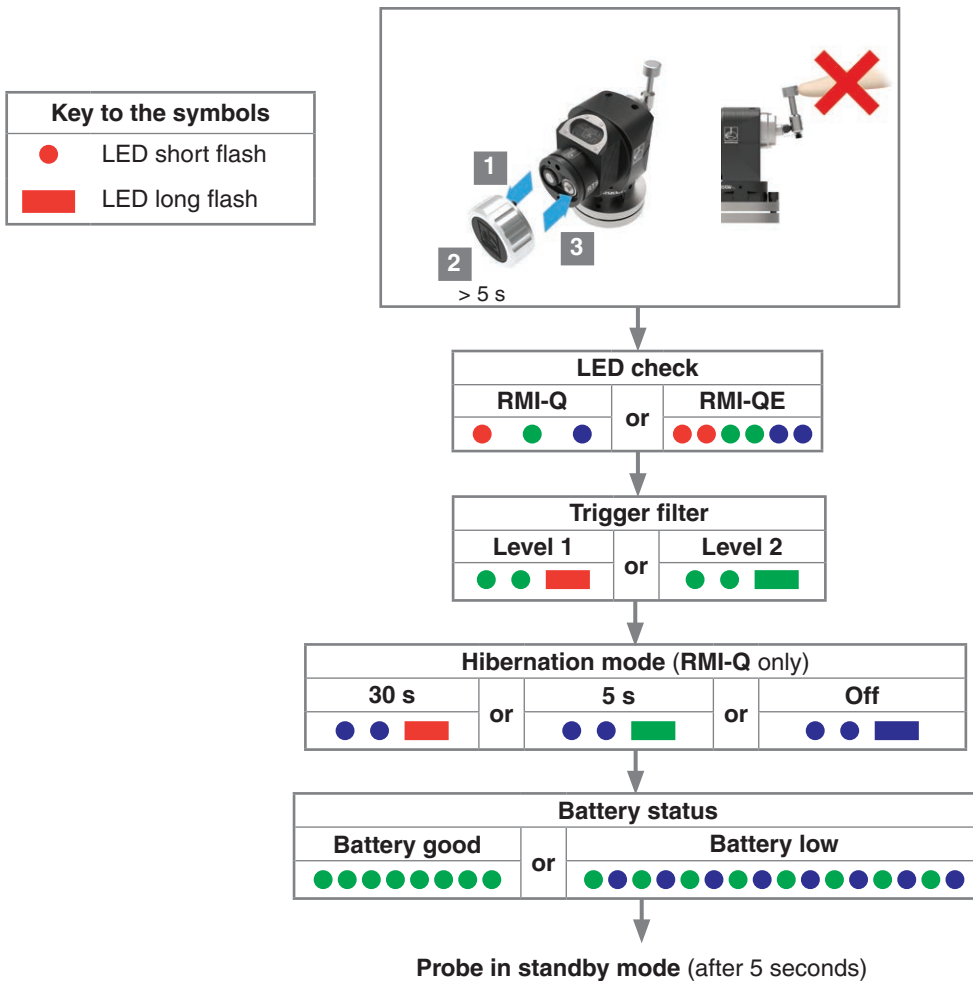
Probe partnering function

The probe partnering function enables the RTS to be partnered with an RMI-Q or RMI-QE interface independently of the configuration process for other probe settings. To partner RTS with RMI-Q or RMI-QE, insert the batteries or, if they have already been installed, remove them for 5 seconds and then refit them.

Following the LED check, the RTS will proceed to show the probe settings. This will end with **"Battery status"** being displayed. If the battery power is good, battery status will be eight green flashes. If battery power is low, each green flash will be followed by a blue flash.

Whilst the **"Battery status"** is being displayed, deflect and immediately release the stylus to enter **"Partnering mode"**.

"Partnering mode off" will be displayed as a sequence of light blue flashes. At this point either the RMI-Q or RMI-QE must be turned on.

If an RMI-Q is turned on, the RTS will continue to display the sequence of light blue flashes. If an RMI-QE is turned on, the RTS display sequence will now incorporate a long yellow flash.

On the RTS select **"Partnering mode on"** by deflecting the stylus for less than 4 seconds. After a successful partnering indicated by a light blue, light blue, green flash, the RTS will timeout after 20 seconds and then go into standby. If **"Partnering mode on"** is not selected, the RTS will timeout after 120 seconds and then go into standby (see **page 4-6**, "RTS – RMI-Q partnership", or **page 4-8**, "RTS – RMI-QE partnership", for further information).

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.
⬇	To exit, leave the stylus untouched for more than 120 seconds.
⬇	Partnering successful. Probe is now in standby.

> 5 s

LED check		
RMI-Q	or	RMI-QE
● ● ●		● ● ● ● ● ●

All probe settings will be shown, ending with **"Battery status"** being displayed.

Battery status		
Battery good	or	Battery low
● ● ● ● ● ● ● ●		● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
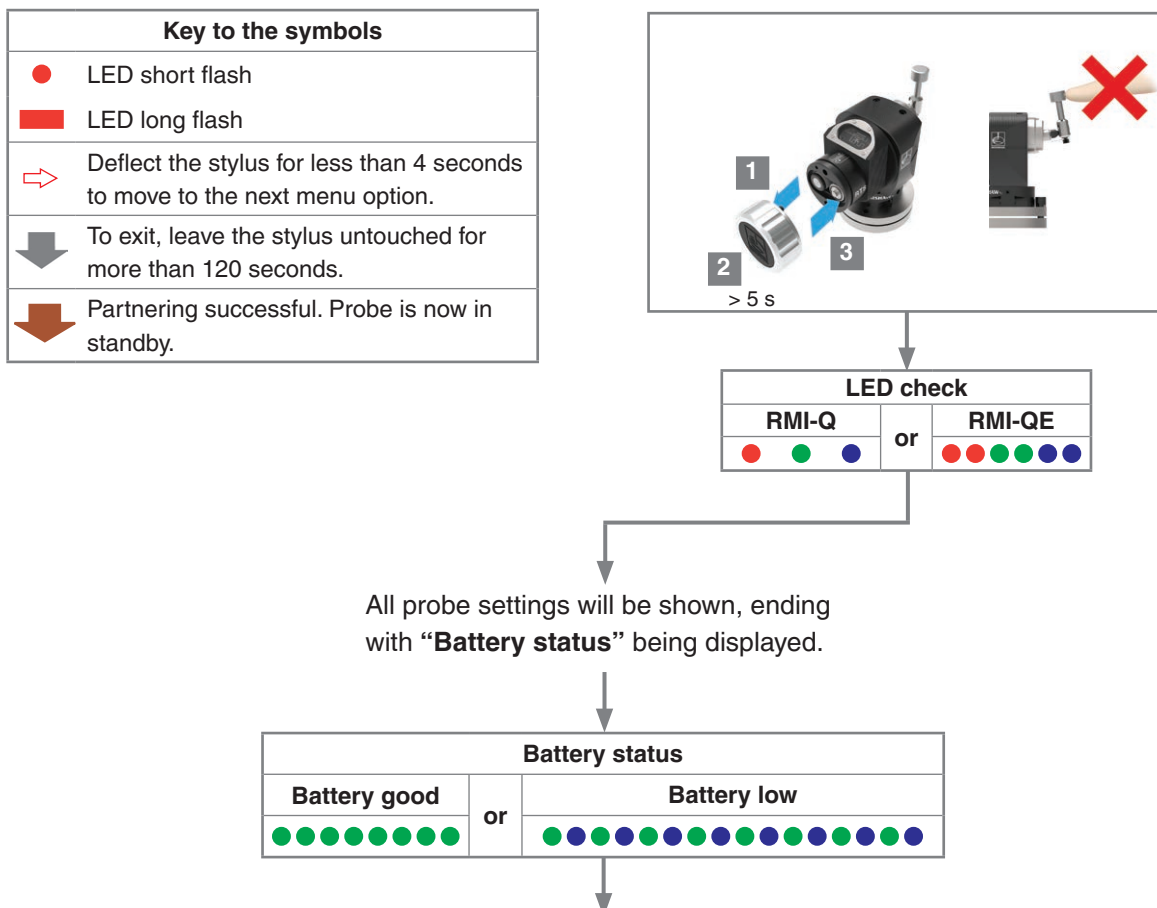
Whilst the **"Battery status"** is being displayed, deflect and release the stylus to enter **"Partnering mode"**. Probe status will flash red to acknowledge this.

NOTE: Wait until the first battery status flash has occurred before deflecting the stylus, and then release the stylus when the red flash is observed. Ensure this is done before the last battery status flash is displayed.
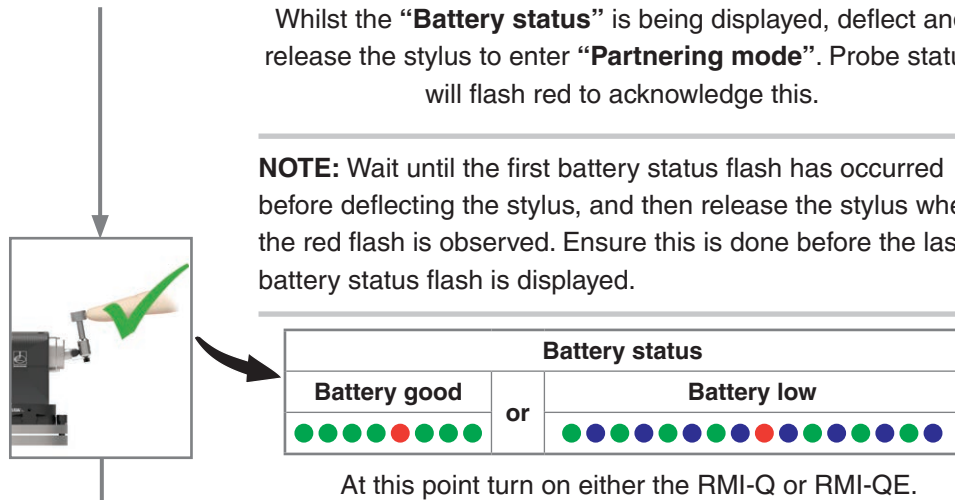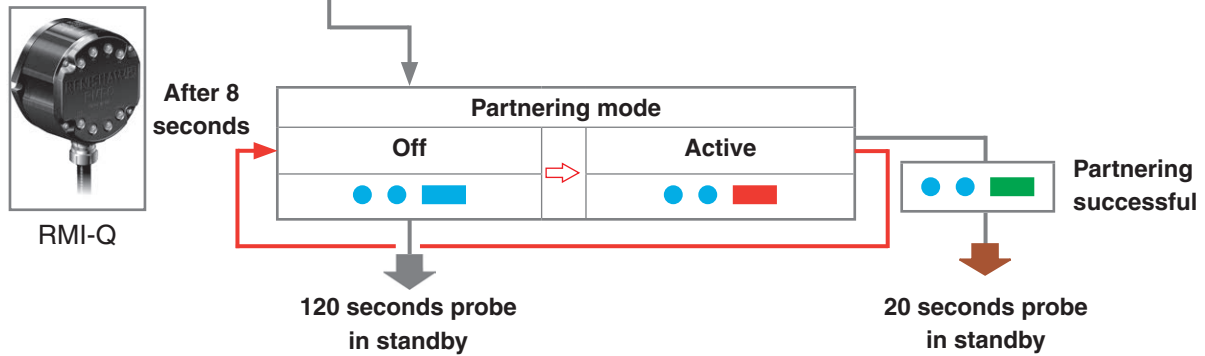
Battery status		
Battery good	or	**Battery low**
🟢🟢🟢🟢🔴🟢🟢🟢		🔵🔵🔵🔵🔵🔵🟢🔴🔵🔵🔵🔵🟢🔵

At this point turn on either the RMI-Q or RMI-QE.

With RMI-Q switched on

RMI-Q

After 8 seconds

Partnering mode		
Off	⇨	**Active**
🔵 🔵 ▬		🔵 🔵 ▬

Partnering successful
🔵 🔵 ▬

120 seconds probe in standby

20 seconds probe in standby

If partnering is unsuccessful **"Partnering mode off"** will be displayed again after 8 seconds. Deflect the stylus for less than 4 seconds to select **"Partnering mode active"** again.

or

With RMI-QE switched on
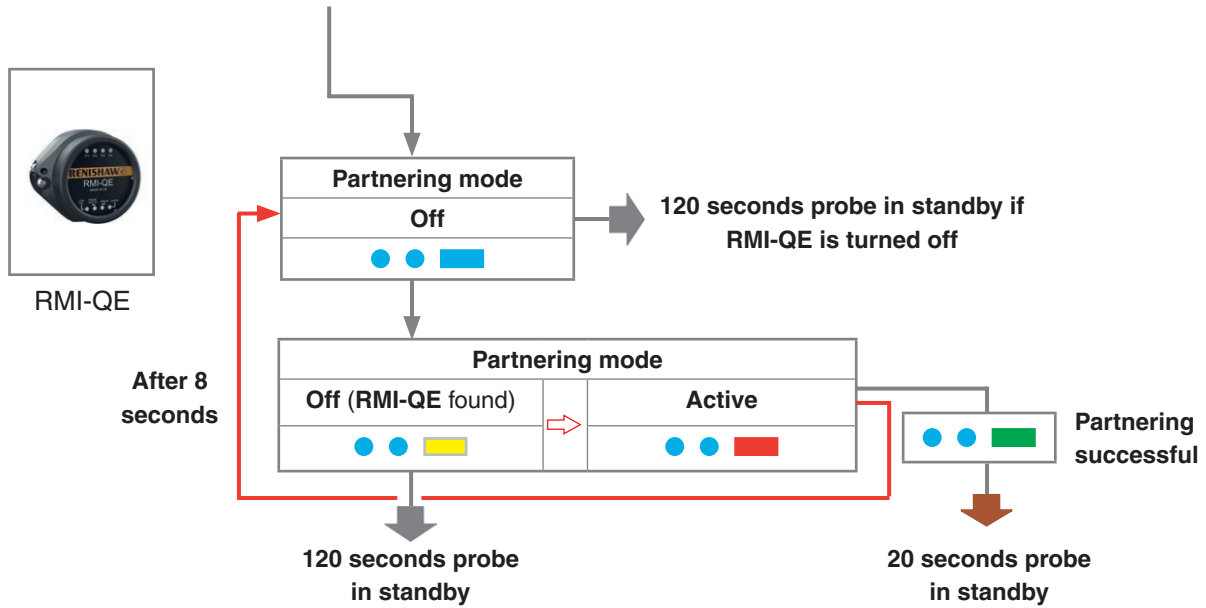
RMI-QE

Partnering mode
Off
● ● ▬

→ **120 seconds probe in standby if RMI-QE is turned off**

After 8 seconds

Partnering mode	
Off (**RMI-QE** found)	**Active**
● ● ▬	● ● ▬

⇨

| ● ● ▬ | **Partnering successful** |

120 seconds probe in standby

20 seconds probe in standby

If partnering is unsuccessful **"Partnering mode off"** will be displayed again after 8 seconds. When **"Partnering mode off** (**RMI-QE** found)**"** is displayed, deflect the stylus for less than 4 seconds to select **"Partnering mode active"** again.

RTS – RMI-Q partnership

System set-up is achieved by using Trigger Logic™ and powering on the RMI-Q. Alternatively, partnering to an RMI-Q can be achieved by using ReniKey; a Renishaw machine macro cycle which does not require the RMI-Q to be power cycled.

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.

The RTS should be operated with only one partnered RMI-Q being active (powered).

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

Partnering mode
Off
● ● ▬

Switch on the RMI-Q

SYSTEM STATUS LED
● ● ● ● ●
RMI-Q in **"Partnering mode"** with empty probe location

RMI-Q

✓ or

SYSTEM STATUS LED
○ ● ○ ● ○
RMI-Q in **"Partnering mode"** with full probe location

✓

Deflect the stylus to select **"Partnering mode active"**. Ensure this is done within 60 seconds of the RMI-Q system status LED flashing green.

SYSTEM STATUS LED
● ● ● ● ●
Partnering pending

RMI-Q

SYSTEM STATUS LED	SYSTEM STATUS LED
● ● ● ● ●	● ● ● ● ●
New radio probe partnered	Radio probe cleared from location

✓ or ✓

Displayed for 5 seconds

NOTE: Refer to the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504) when partnering up to four radio probes.

> 20 s

The probe is now in standby and the system is ready for use.
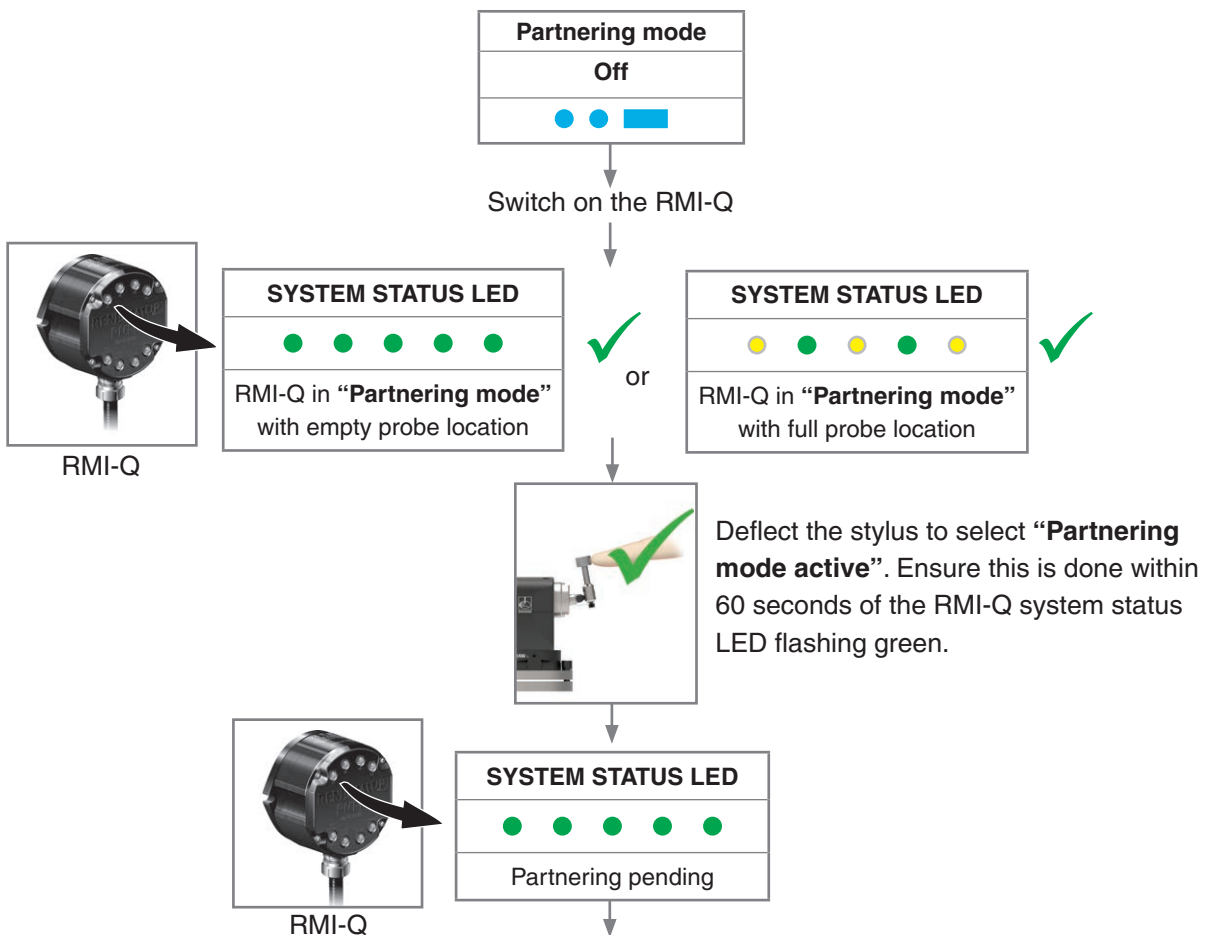
RTS – RMI-QE partnership

System set-up is achieved by using Trigger Logic™ and powering on the RMI-QE. Alternatively, partnering to an RMI-QE can be achieved by using ReniKey; a Renishaw machine macro cycle which does not require the RMI-QE to be power cycled.
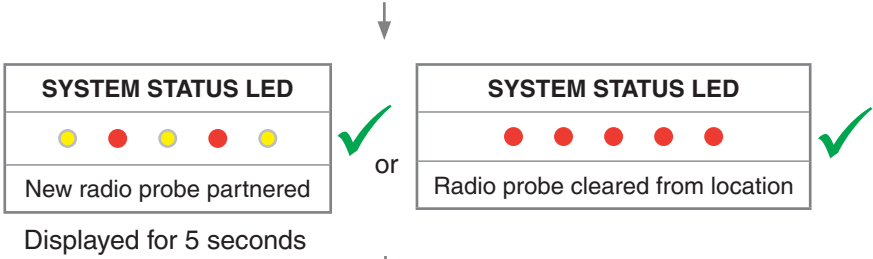
Partnering is required during initial system set-up. Further partnering will be required if either the RTS or RMI-QE is changed.

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-QE but then used with another system will need to be repartnered before being used again with the RMI-QE.

See **page 4-3** "Probe partnering function" for further information on how to reach **"Partnering mode"**.

Partnering mode
Off
● ● ▬

Switch on the RMI-QE

Partnering mode
Off (**RMI-QE** found)
● ● ▬

SYSTEM STATUS LED		SYSTEM STATUS LED
● ● ● ● ● ✓	or	○ ● ○ ● ○ ✓
RMI-QE in **"Partnering mode"** with empty probe location		RMI-QE in **"Partnering mode"** with full probe location

RMI-QE

Deflect the stylus to select **"Partnering mode on"**. Ensure this is done within 60 seconds of the RMI-QE system status LED flashing green.

PROBE STATUS LED

🔵 🔵 🟥

Partnering pending

↓

PROBE STATUS LED

🔵 🔵 🟩 ✓

Partnering mode completed successfully

RMI-QE

SYSTEM STATUS LED

🟢 🟢 🟢 🟢 🟢

Partnering pending

↓

SYSTEM STATUS LED

🟡 🔴 🟡 🔴 🟡 ✓ or

New radio probe partnered

Displayed for 5 seconds

SYSTEM STATUS LED

🔴 🔴 🔴 🔴 🔴 ✓

Radio probe cleared from location

↓

❌

> 20 s

The probe is now in standby and the system is ready for use.

NOTE: Refer to the *RMI-QE radio machine interface* installation guide (Renishaw part no. H-6551-8520) when partnering up to four radio probes.

Changing the probe settings when partnering to an RMI-Q

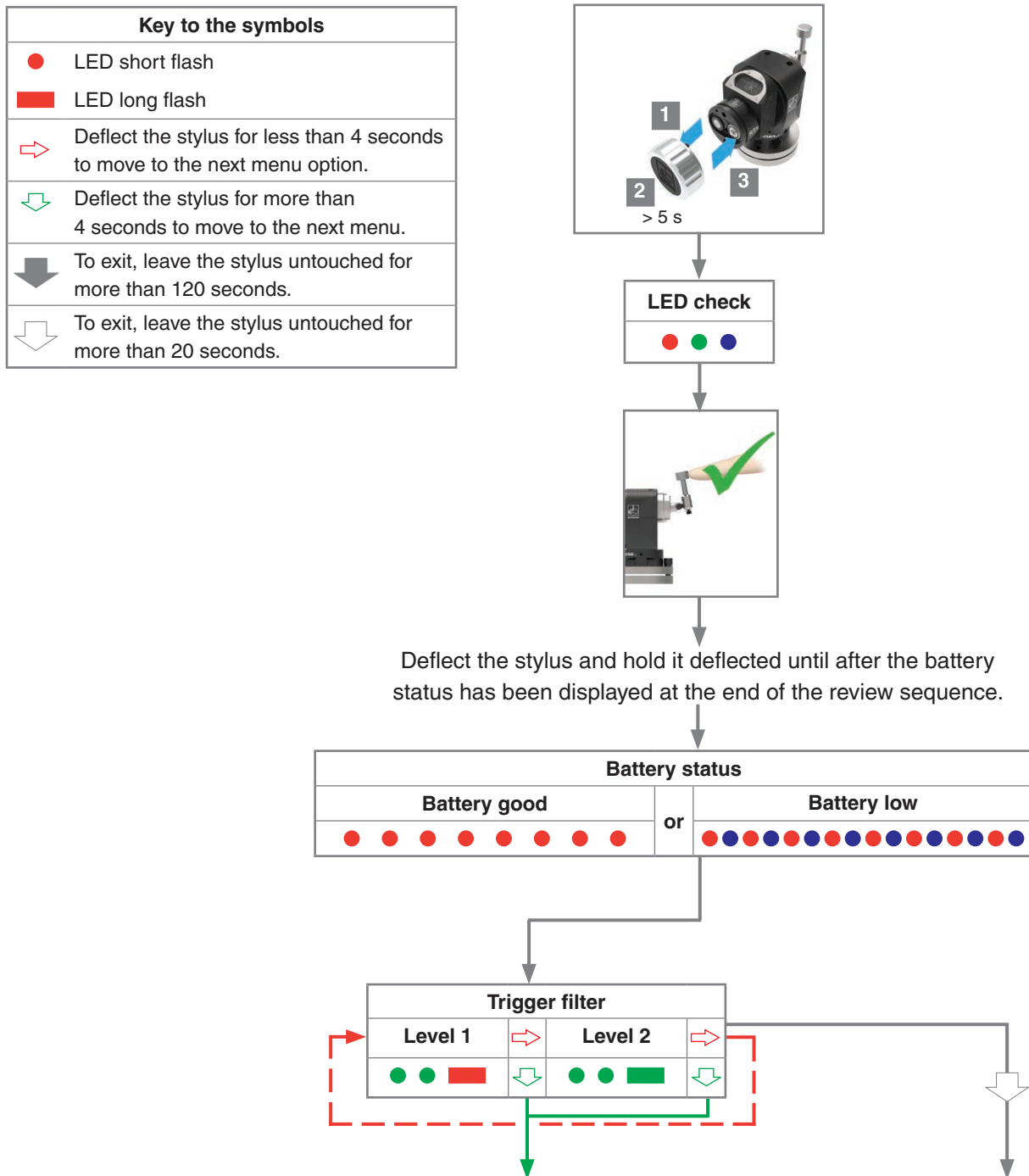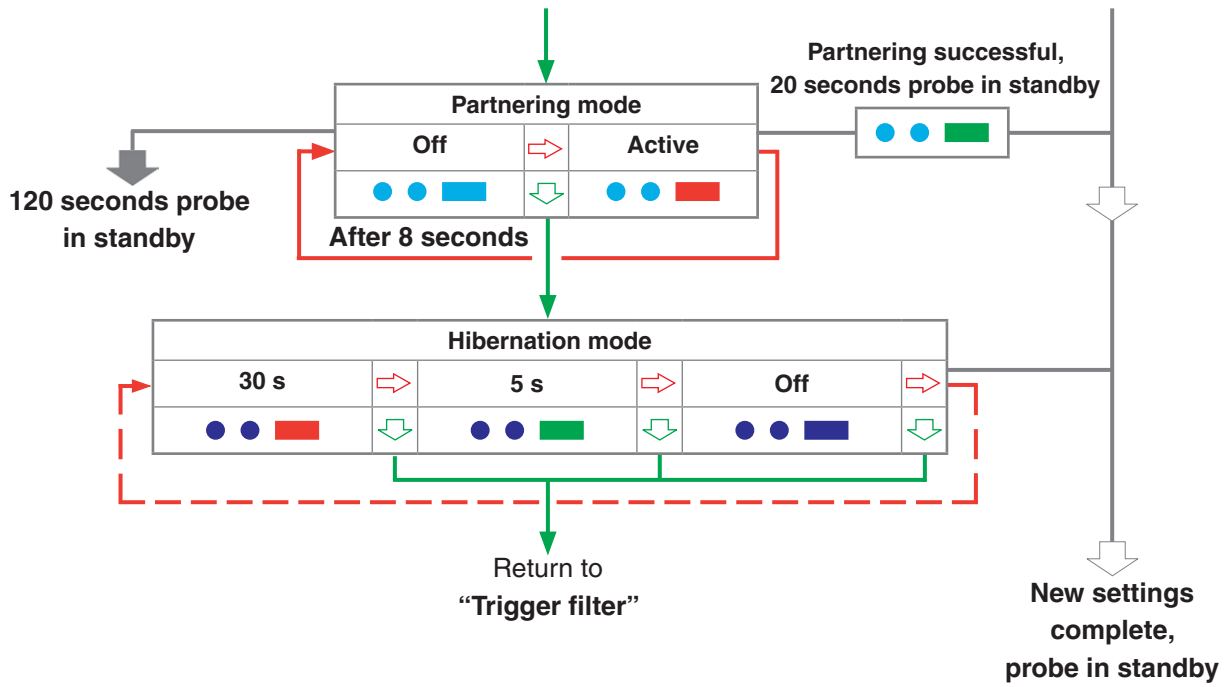Probe settings can be changed using Trigger Logic. Insert the batteries or, if they have already been installed, remove them for 5 seconds and then refit them.

Following the LED check, immediately deflect the stylus and hold it deflected until eight 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 **"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 120 seconds.
⇩	To exit, leave the stylus untouched for more than 20 seconds.

> 5 s

LED check
● ● ●

Deflect the stylus and hold it deflected until after the battery status has been displayed at the end of the review sequence.

Battery status			
Battery good		**Battery low**	
● ● ● ● ● ● ● ●	or	●●●●●●●●●●●●●●●	

Trigger filter			
Level 1	⇨	**Level 2**	⇨
● ● ▬	⇩	● ● ▬	⇩

RENISHAW

apply innovation™

**Partnering successful,
20 seconds probe in standby**

Partnering mode

Off	⇨	Active
● ● ▬	⇩	● ● ▬

After 8 seconds

**120 seconds probe
in standby**

Hibernation mode

30 s	⇨	5 s	⇨	Off	⇨
● ● ▬	⇩	● ● ▬	⇩	● ● ▬	⇩

Return to
"Trigger filter"
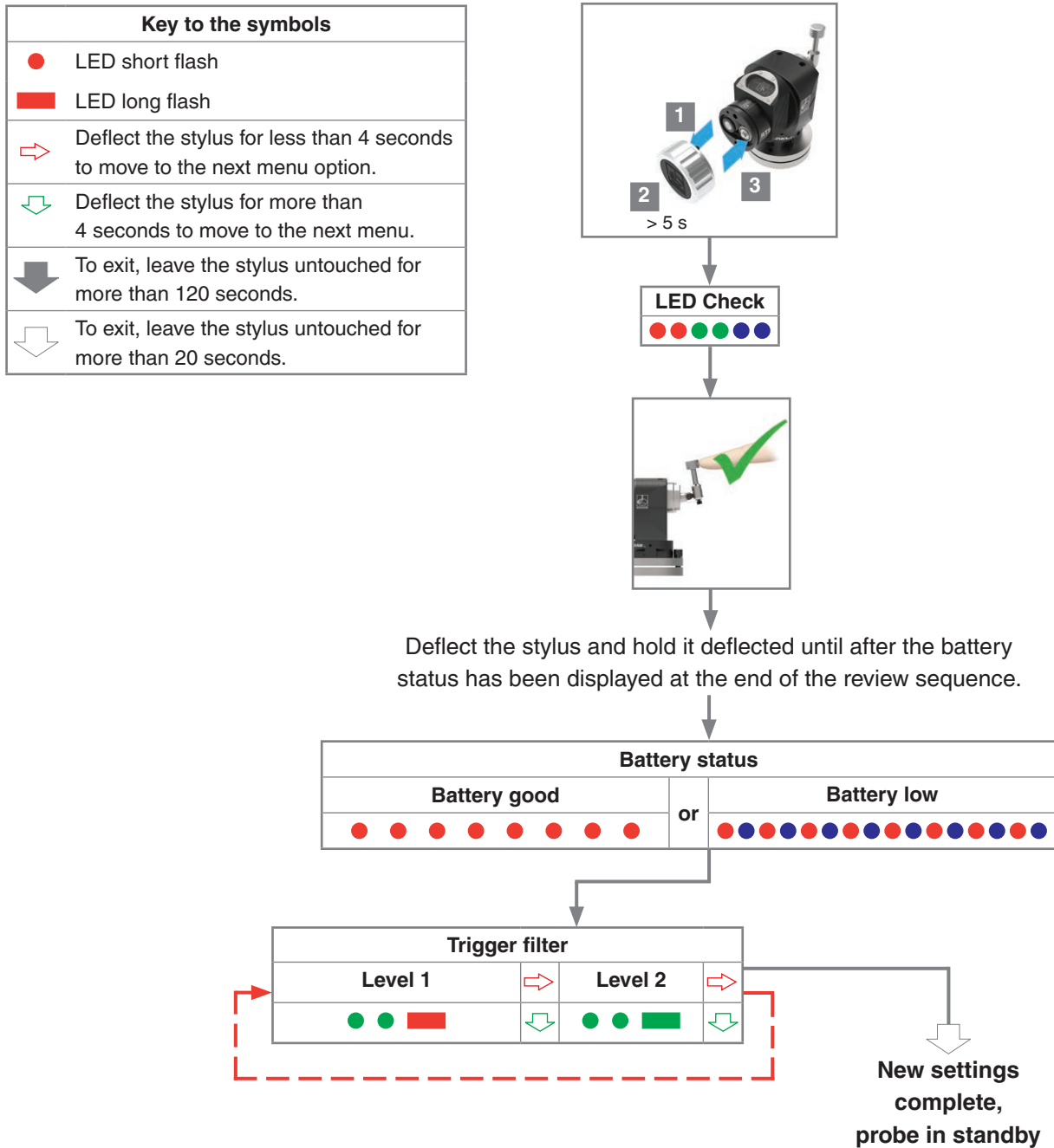
**New settings
complete,
probe in standby**

NOTE: To partner an RTS with an RMI-Q see **page 4-6**, "RTS – RMI-Q partnership", for further information. Once partnering has been successful, the RTS will display **"Partnering successful"** and go into standby after 20 seconds.

Changing the probe settings when partnering to a RMI-QE

Probe settings can be changed using Trigger Logic. Insert the batteries or, if they have already been installed, remove them for 5 seconds and then refit them.

Following the LED check, immediately deflect the stylus and hold it deflected until eight 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 **"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 120 seconds.
⇩	To exit, leave the stylus untouched for more than 20 seconds.

> 5 s

LED Check
🔴🔴🟢🟢🔵🔵

Deflect the stylus and hold it deflected until after the battery status has been displayed at the end of the review sequence.

Battery status		
Battery good	or	**Battery low**
🔴 🔴 🔴 🔴 🔴 🔴 🔴 🔴		🔵🔴🔵🔴🔵🔴🔵🔴🔵🔴🔵🔴🔵🔴🔵🔴

Trigger filter				
Level 1	⇨	**Level 2**	⇨	
🟢 🟢 🟥	⇩	🟢 🟢 🟩	⇩	

New settings complete, probe in standby

NOTE: To partner an RTS with an RMI-QE, see **page 4-3**, "Probe partnering function", for further information on how to reach **"Partnering mode"**.

Master reset function

RTS features a master reset function to assist users who have mistakenly changed the probe settings into an unintended state.

The application of the master reset function will clear all current probe settings and return the probe to default settings.
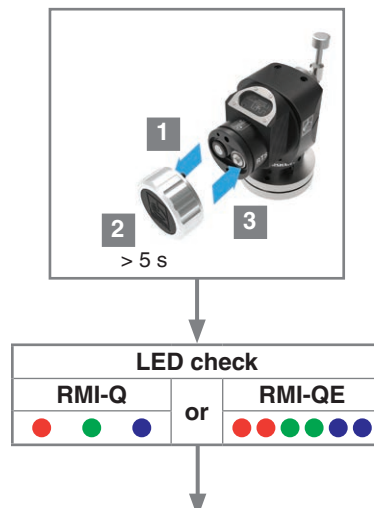
The default settings are as follows:

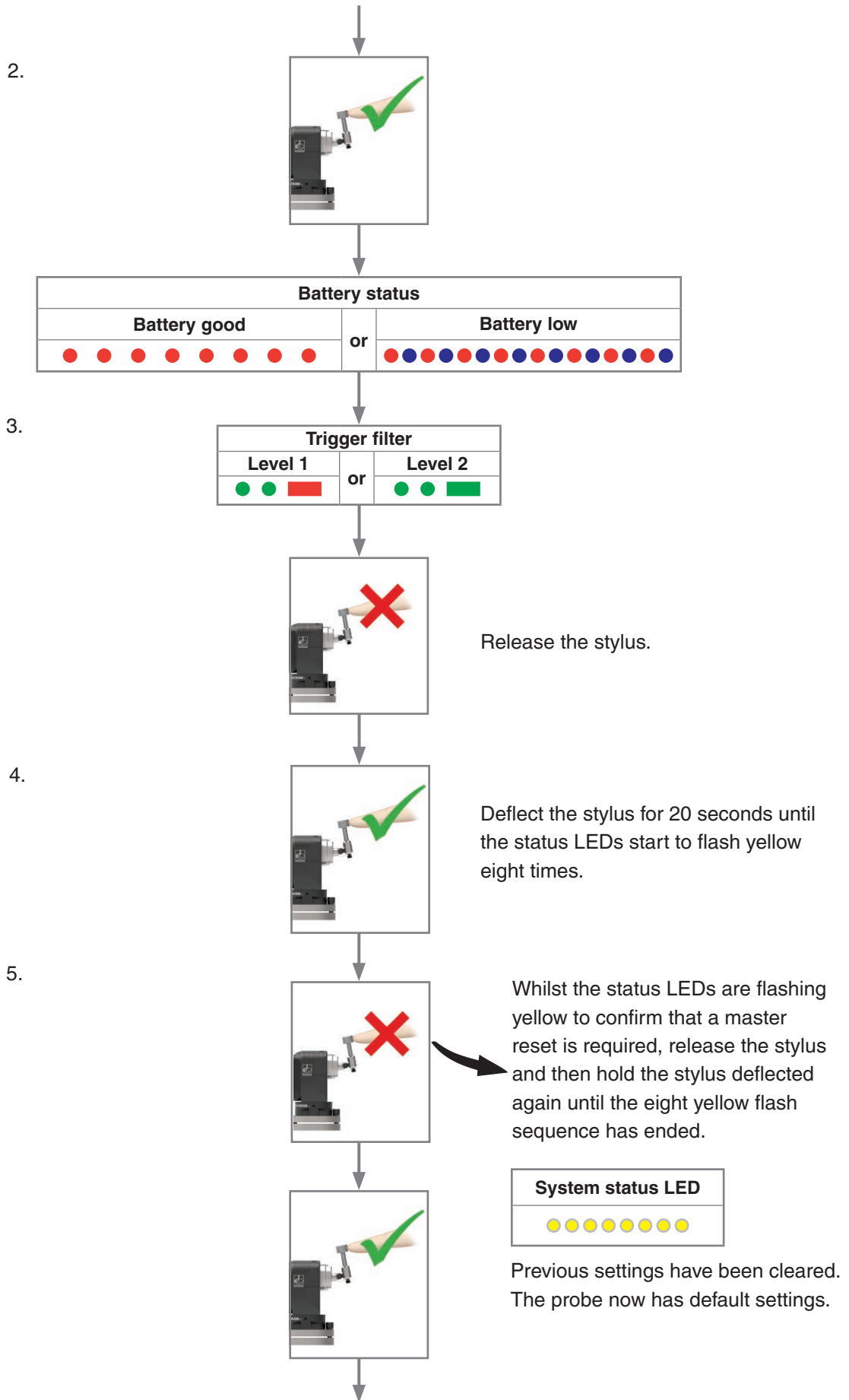*   Trigger filter: Level 1

*   Hibernation mode on 30 s

The default settings may not be representative of the required probe settings. Further configuration of RTS may subsequently be necessary to achieve the required probe settings.
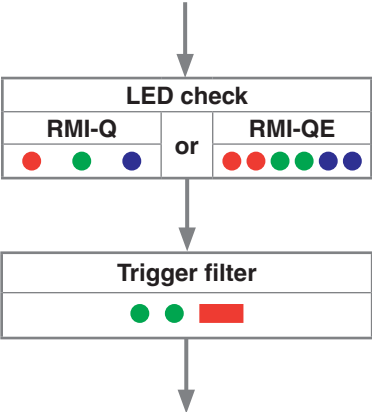
To reset the probe

1. Insert the batteries or, if they have already been installed, remove them for 5 seconds and then refit them.

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

3. Keep the stylus deflected until the **"Trigger filter"** setting (or first Trigger Logic menu) is displayed, then release it.

4. Deflect the stylus for 20 seconds. The status LEDs will flash yellow eight times. A confirmation for master reset is required, if nothing is done the probe will timeout.

5. To confirm that a master reset is required, release the stylus and then hold the stylus deflected again until the eight yellow flash sequence has ended. This action clears all probe settings and returns the probe to default settings. Following an LED check, the RTS returns to Trigger Logic and displays **"Trigger filter"**.

6. Further configuration using Trigger Logic may be necessary to achieve the required probe settings.

1.

2.

Battery status		
Battery good	or	**Battery low**
● ● ● ● ● ● ● ●		●●●●●●●●●●●●●●●

3.

Trigger filter		
Level 1	or	**Level 2**
● ● ▬		● ● ▬

Release the stylus.

4.

Deflect the stylus for 20 seconds until the status LEDs start to flash yellow eight times.

5.

Whilst the status LEDs are flashing yellow to confirm that a master reset is required, release the stylus and then hold the stylus deflected again until the eight yellow flash sequence has ended.

System status LED
●●●●●●●●

Previous settings have been cleared. The probe now has default settings.

LED check		
RMI-Q	**or**	**RMI-QE**
🔴 🟢 🔵		🔴 🔴 🟢 🟢 🔵 🔵

Trigger filter
🟢 🟢 🟥

Probe is now back in the Trigger Logic menu and will display **"Trigger filter"**.

6.   Configure probe settings as required using Trigger Logic

---

NOTE: RTS will continue to be partnered with either the RMI-Q or RMI-QE following the activation of the master reset function.

Operating mode

Multicoloured probe status LED

Opti-logic

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 **page 4-2**, "Reviewing the probe settings", for further information).

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.

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

Changing the batteries

NOTES:

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

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 cassette gasket and mating surfaces are clean and free from dirt before reassembly.

If dead batteries are inadvertently inserted, the LEDs will remain a constant red.

Battery types

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

✓	**All AA alkaline batteries**

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

✓	**Saft:**	LS 14500	✗	**Maxell:**	ER6C
	Tadiran:	SL-760/S		**Minamoto:**	ER14505S
		TL-5903/S, TL-2100/S		**Tadiran:**	SL-560/S,
	Xeno:	XL-060F			TL-4903/S

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

NOTE: Lithium-thionyl chloride batteries are available from other manufacturers. However, these are untested by Renishaw so correct operation of the probe cannot be guaranteed.

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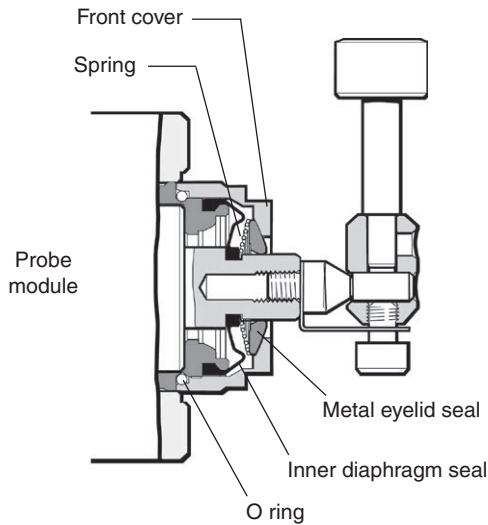
The probe is a precision tool and must be handled with care.

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 **page 5-1**, "Cleaning the probe".

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**, "Inspecting the inner diaphragm seal", for further information). If it is pierced or damaged contact Renishaw.

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

Inspecting the inner diaphragm seal

Spanner 24 mm or 15/16 in
2.7 Nm – 3.3 Nm
(1.99 lbf.ft – 2.43 lbf.ft)

Inner diaphragm seal

Spring

Metal eyelid seal

Spanner 5 mm A/F
2.4 Nm – 2.8 Nm
(1.77 lbf.ft – 2.07 lbf.ft)

Front cover

Stylus and break
stem assembly

1. Remove the stylus/break stem assembly using the 5 mm A/F 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.

   CAUTION: 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.

This page is intentionally left blank.

Fault-finding

Symptom	Cause	Action
The probe fails to power up (no LEDs illuminated or fails to indicate current probe settings).	Dead batteries.	Change batteries.
	Unsuitable batteries.	Fit suitable 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.
	Poor connection between battery cassette mating surfaces and contacts.	Remove any dirt and clean the contacts before reassembly.
The probe fails to switch on.	Dead batteries.	Change batteries.
	Unsuitable batteries.	Fit suitable batteries.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
	Radio link failure / RTS out of range.	Check position of RMI-Q or RMI-QE; for more information, see **page 3-2**, "Positioning the RTS and RMI-Q or RMI-QE".
	No RMI-Q or RMI-QE "start/stop" signal (**"radio on"** method only).	Check RMI-Q or RMI-QE for green start LED.
	RTS in **"hibernation mode"** (RMI-Q only).	Ensure probe is in range and wait up to 30 seconds, then resend switch-on signal. Check position of RMI-Q, for more information; see **page 3-2**, "Positioning the RTS and RMI-Q or RMI-QE".

Symptom	Cause	Action
The 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 or RMI-QE; for more information, see **page 3-2**, "Positioning the RTS and RMI-Q or RMI-QE".
	RMI-Q or RMI-QE receiver / machine fault.	Refer to receiver / machine user's guide.
	Dead batteries.	Change batteries.
	Excessive machine vibration causing false probe trigger.	Change trigger filter setting.
	Probe unable to measure tool.	Check that the correct tool is in the spindle and that the correct tool offset is being applied. Check that stylus has not broken.
	Selection error for RMI-Q or RMI-QE.	Review interface error indication and correct.
The spindle crashes into the 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 part and stylus.
	Loose probe mounting on machine bed or loose stylus.	Check and tighten as appropriate.
	Excessive machine vibration.	Change trigger filter setting. Eliminate vibrations.
	Environmental or physical change caused an error in calibrated offset.	Review probing software. Repeat calibration routine.
	Calibration out of date and/or incorrect offsets.	Review probing software and make speeds the same.
	Calibration and probing speeds not the same.	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 settings to increase back off distance.
	Probing speed too high or too low.	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.

Symptom	Cause	Action
RTS status LEDs do not correspond to RMI-Q or RMI-QE status LEDs.	Radio link failure – RTS out of RMI-Q or RMI-QE range.	Check position of RMI-Q or RMI-QE; for more information, see **page 3-2**, "Positioning the RTS and RMI-Q or RMI-QE".
	RTS has been enclosed/shielded by metal.	Review installation.
	RTS and RMI-Q or RMI-QE are not partnered.	Partner RTS and RMI-Q or RMI-QE; for more information, see **page 4-6**, "RTS – RMI-Q or RMI-QE partnership".
RMI-Q or RMI-QE error LED lit during probing cycle.	Dead batteries.	Change batteries.
	Probe not switched on or probe timed out.	Change setting. Review turn off method.
	Radio link failure / RTS out of range.	Check position of RMI-Q or RMI-QE; for more information, see **page 3-2**, "Positioning the RTS and RMI-Q or RMI-QE".
	RTS and RMI-Q or RMI-QE are not partnered.	Partner RTS and RMI-Q or RMI-QE, for more information, see **page 4-6**, "RTS – RMI-Q or RMI-QE partnership".
	Probe selection error.	Verify that one radio probe is working and is correctly selected on the RMI-Q or RMI-QE.
	0.5 second turn-on error.	Ensure that all radio probes are 'Q' or 'QE' marked probes, or change the RMI-Q or RMI-QE turn-on time to 1 second.
RMI-Q or RMI-QE low battery LED lit.	Low batteries.	Change batteries soon.
Reduced range.	Local radio interference.	Identify and remove.
	Radio link failure / RTS out of range.	Check position of RMI-Q or RMI-QE; for more information, see **page 3-2**, "Positioning the RTS and RMI-Q or RMI-QE".
The probe fails to switch off.	No RMI-Q or RMI-QE "start/stop" signal (**"radio on"** method only).	Check RMI-Q or RMI-QE for green start LED.

Symptom	Cause	Action
The 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.

This page is intentionally left blank.

Parts list

Item	Part number	Description
RTS (QE)	A-5646-0001	RTS (QE) probe with disc stylus, AA alkaline batteries, tools and support card. 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 × 19.05 mm (0.75 in × 0.75 in).
Break stem kit	A-5003-5171	Stylus protection kit comprising: break stem (× 1), captive link (× 1), support bar (× 1), M4 screw (× 2), M4 grub screw (× 3), hexagon keys: 2 mm (× 1), 3 mm (× 1) and spanner 5 mm (× 1).
Stylus holder kit	A-2008-0389	Stylus holder kit comprising stylus holder and screws.
AA battery	P-BT03-0005	AA battery – alkaline – supplied as standard with probe (pack of two).
AA battery	P-BT03-0008	AA battery – lithium-thionyl chloride (pack of two).
Battery cap	A-5401-0301	RTS battery cap assembly.
Seal	A-4038-0301	Battery housing seal.
Tool kit	A-5401-0300	Kit comprising : break stem (× 1), captive link (× 2), support bar (× 1), M4 screw (× 2), M4 grub screw (× 3), spirol pin (× 2), hexagon keys: 2 mm A/F (× 1), 2.5 mm A/F (× 1), 3 mm A/F (× 1), 4 mm A/F (× 1) and spanner 5 mm A/F (× 1).
RMI-Q	A-5687-0049	RMI-Q (side exit) with 8 m (26.2 ft) cable, tools and support card.
RMI-Q	A-5687-0050	RMI-Q (side exit) with 15 m (49.2 ft) cable, tools and support card.
RMI-QE	A-6551-0049	RMI-QE with 8 m (26.2 ft) cable, tools and support card.
RMI-QE	A-6551-0050	RMI-QE with 15 m (49.2 ft) cable, tools and support card.
RMI-QE	A-6551-0051	RMI-QE with 30 m (98.4 ft) 17-way cable with flying lead, tools and support card.
RMI-Q mounting bracket	A-2033-0830	RMI-Q mounting bracket with fixing screws, washers and nuts.
RMI-QE mounting bracket	A-6551-0120	RMI-QE mounting bracket with fixing screws, washers and nuts.

Item	Part number	Description
Publications. These can be downloaded from our website at **www.renishaw.com**.		
RMI-Q IG	H-5687-8504	Installation guide: for set-up of the RMI-Q.
RMI-QE IG	H-6551-8520	Installation guide: for set-up of the RMI-QE.
Styli	H-1000-3200	Technical specifications guide: 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.

![RENISHAW apply innovation™]