RENISHAW
apply innovation™

RMP60 (QE) radio machine probe

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

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Before you begin

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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 RMP60 and RMP60M and other similar Renishaw products, are the subject of one or more of the following patents and/or patent applications:

CN 100416216	JP 4237051	US 6941671
CN 100466003	JP 4575781	US 7145468
CN 101476859	JP 4852411	US 7285935
CN 101482402	JP 5238749	US 7316077
EP 1425550	JP 5390719	US 7441707
EP 1457786	KR 1001244	US 7486195
EP 1576560	TW I333052	US 7665219
EP 1613921		US 7812736
EP 1804020		US 7821420
EP 1931936		US 9140547
EP 2216761		
IN 215787		
IN 234921		
IN 8707/DELNP/2008		
IN WO2004/057552		

RMP60 (model RMP60QE) software notices

This RMP60 product includes embedded software (firmware) to which the following notices apply:

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Intended use

The RMP60 is a radio spindle probe that enables automated workpiece inspection and job set-up on multi-tasking machines, machining centres and gantry machining centres.

Safety

Information to the user

This product is supplied with non-rechargeable batteries that do not contain lithium. For specific battery operating, safety and disposal guidelines refer to the battery manufacturers' literature.

- 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 RMP60 and RMP60M have glass windows. 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.

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RMP60 basics

Introduction

The RMP60 (model RMP60QE) is a new generation radio transmission probe that is compatible for application with either an RMI-Q or RMI-QE radio machine interface.

NOTE: Older generation RMP60 probes without the "Model RMP60QE" marking cannot be used with an RMI-QE.
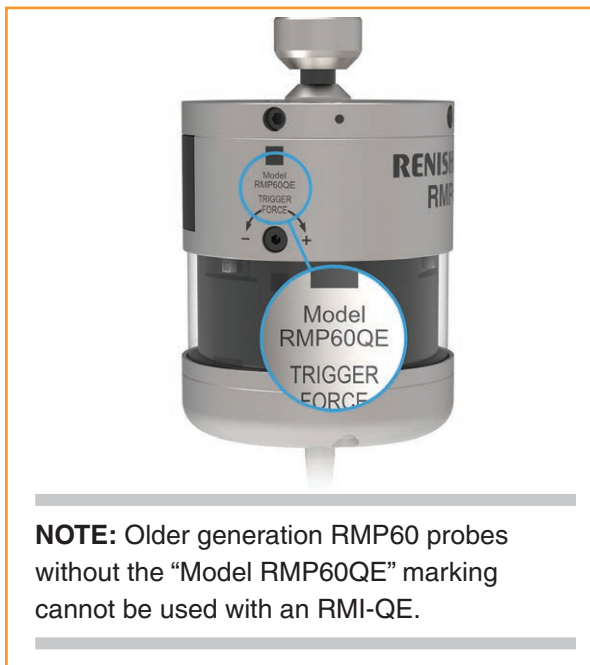
The RMP60 enables automated workpiece inspection and job set-up on multi-tasking machines, machining centres and gantry machining centres.

It is ideally suited to machining centres where line-of-sight between probe and receiver is difficult to achieve.

Featuring an integrated probe module the RMP60 delivers exceptional robustness and generous overtravel.

The RMP60 complies 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.

The RMP60 can be used alone or form part of a larger system comprised of multiple radio spindle probes and/or tool setters to function with a single interface.

All RMP60 settings are configured using either Opti-Logic™ or Trigger Logic™. These techniques enable the user to review and subsequently change probe settings.

Configurable settings are:

- Switch-on / switch-off method

- Trigger filter setting

- Hibernation setting*

- Multiple probe mode*

* in RMI-Q mode only.

Getting started

Three multicolour probe LEDs provide visual indication of selected probe settings and status.

For example:

- Switch-on and switch-off methods

- Probe status – triggered or seated

- Battery condition

Batteries are inserted or removed as shown (for more information, see page 3.5, **"Installing the batteries"**).

On insertion of batteries, the LEDs will begin to flash, starting with an LED check (for more information, see page 4.2, **"Reviewing the probe settings"**). An LED check displaying a single flash of red, green, blue indicates that the probe is operating in RMI-Q mode. An LED check displaying double flashes of red, green, blue indicates that the probe is operating in RMI-QE mode.

System interface

The RMI-Q or RMI-QE is an integrated interface/receiver used to communicate between the RMP60 probe 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 RMP60 is partnered to either an RMI-Q or RMI-QE. Prior to partnering for the first time, the RMP60 is pre-set to operate in RMI-QE mode. The LED check will display double flashes of red, green, blue.

NOTE: The RMP60 (model RMP60QE) is **not** compatible 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 more 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 more information, see page 4.2, **"Reviewing the probe settings"**).

Probe modes

The RMP60 probe can be in one of three modes:

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

NOTE: The RMP60 will enter **"hibernation mode"** should the RMI-Q 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 one of the switch-on methods, the probe is switched on and ready for use.

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

Configurable settings

Switch-on / switch-off methods

The following switch-on / switch-off options are user-configurable.

- Radio on / Radio off

- Radio on / Timer off

- Spin on / Spin off

- Spin on / Timer off

- Shank switch on / Shank switch off

RMP60 switch-on method Switch-on options are configurable	RMP60 switch-off method Switch-off options are configurable	Probe ready time
Radio on Radio switch on is commanded by machine input.	**Radio off** Radio switch off is commanded by machine input. A timer automatically switches the probe off 90 minutes after the last trigger or reseat if it is not turned off by machine input. **Timer off (timeout)** Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reseat.	1 second maximum (see notes below).
Spin on Spin at 500 r/min for 1 second minimum.	**Spin off** Spin at 500 r/min for 1 second minimum. A timer automatically switches the probe off 90 minutes after the last trigger if it is not spun. **Timer off (timeout)** Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reseat.	1 second maximum (see notes below).
Shank switch on	**Shank switch off**	1 second maximum

NOTES:

In **"radio on mode"**, the switch-on time is user selectable "fast" or "standard" when using RMI-Q or RMI-QE (selection is made in the relevant interface).

For more information on the user selectable switch-on time when operating with RMI-Q or RMI-QE, 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).

In **"radio on mode"**, the switch-on time assumes a good radio communication link. In a poor radio frequency (RF) environment the switch-on time may increase.

In **"spin on mode"**, the 1 second starts from the moment the spindle reaches 500 r/min.

The RMP60 must be on for a minimum of 1 second before being switched off.

Timeout off is not applicable in level start mode, 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).

Trigger filter

Probes subjected to high levels of vibration or shock loads may output probe trigger signals without having contacted any surface. RMP60 trigger filter settings improve the probe's resistance to these effects.

Level 1 disables the trigger filter.

Level 2 adds a nominal 10 ms delay to the probe output.

Level 3 adds a nominal 20 ms delay to the probe output.

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

The trigger filter is factory set to Level 1 (OFF).

Hibernation mode

Only applicable to **"radio-on mode"** when RMP60 is used with a RMI-Q.

When the RMP60 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 RMP60 goes from **"hibernation mode"** to **"standby mode"**, ready for **"radio-on"**.

NOTE: "Hibernation mode" does not exist when an RMP60 (model RMP60QE) is used with an RMI-QE.

Multiple probe mode (only applicable when RMP60 is used with RMI-Q)

The RMP60 can be configured, using Trigger Logic, to allow multiple radio probes in "spin on/spin off" or "shank on/shank off" to be used with a single RMI-Q.

Up to four RMP60s can be used with a single RMI-Q or in **"radio on / radio off mode"**. For further details of this functionality, refer to the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504).

NOTES:

"Multiple probe mode" will not appear when the **"radio on"** option has been selected.

RMP60 probes which are set to **"multiple probe mode on"** can coexist alongside any number of RMP60 probes set to **"multiple probe mode off"**.

To allow multiple radio probes to work in close proximity, and with a single RMI-Q, 16 choices of **"mode on"** colours are available, each representing a different machine tool installation; for more information, see page 4.3, **"Multiple probe mode settings"**.

All probes operating with a single RMI-Q must be set to the same **"mode on"** colour choice; any multiple probes located on adjacent machines must all be set to an alternative **"mode on"** colour choice.

NOTE: Each probe per **"mode on"** colour choice must be partnered with the RMI-Q. By configuring multiple probes to a single **"mode on"** colour choice, all probes using this **"mode on"** colour choice will have the same identity.

The probe is partnered after selecting the **"multiple probe mode"** setting and choosing the **"mode on"** option; for more information, see page 4.10, **"Changing the probe settings"**.

There is no limit to the number of probes that can be used with a single RMI-Q so long as they all have the same **"mode on"** colour choice. All RMP60 probes are factory set to **"mode off"**.

The addition of any further probe(s), or replacements, into a multi-probe installation can be achieved through the reconfiguration of the probe to the same **"mode on"** colour choice.

NOTE: "Multiple probe mode" does not exist when an RMP60 (model RMP60QE) is used with an 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 either the RMP60, RMI-Q or RMI-QE are changed.

Partnering to an RMI-Q or RMI-QE will configure the RMP60 to operate in either RMI-Q or RMI-QE mode and display specific probe settings accordingly.

The RMP60 operating mode can be determined by observing the LED check that is displayed when the batteries are inserted into the probe (for more information, see page 4.2, **"Reviewing the probe settings"**). Display of **"Hibernation mode"** or **"Multiple probe mode"** menus also indicates that the RMP60 is in RMI-Q mode.

NOTES:

Prior to partnering for the first time, the RMP60 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 RMP60 probes manually. Alternatively, partnering to an RMI-Q or RMI-QE, 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.

For more information on ReniKey visit:
www.renishaw.com/mtpsupport/renikey

Partnering will not be lost by reconfiguration of probe settings or when changing batteries, except where **"multiple probe mode"** is selected.

Partnering can take place anywhere within the operating envelope.

RMP60 dimensions

50 (1.97) 19 (0.75)

Battery cassette

Shank switch (optional)

A range of probe-ready shanks are available from Renishaw

M4 stylus

Ø63 (Ø2.48)

18°

18°

XY overtravel

Probe status LED

RMP60 window

76 (2.99)

Dimensions given in mm (in)
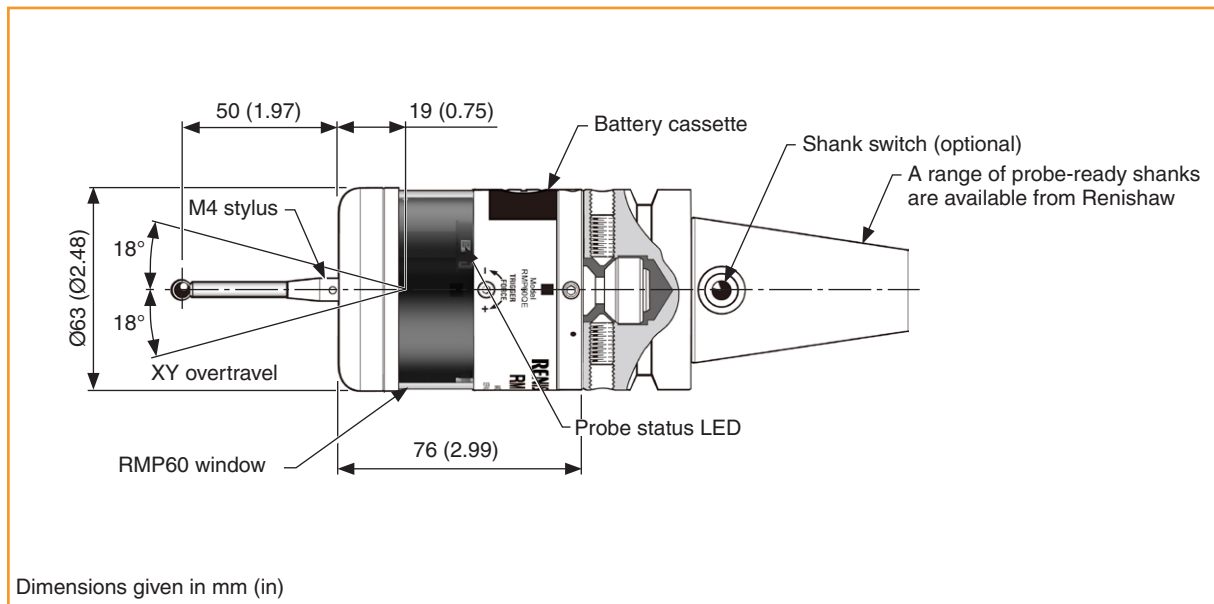
Stylus overtravel limits		
Stylus length	±X/±Y	Z
50 (1.97)	21 (0.82)	11 (0.43)
100 (3.94)	37 (1.45)	11 (0.43)

RMP60 specification

Principal application	Workpiece inspection and job set-up on multi-tasking machines, machining centres and gantry machining centres.	
Dimensions	Length Diameter	76 mm (2.99 in) 63 mm (2.48 in)
Weight (without shank)	With batteries Without batteries	876 g (30.90 oz) 826 g (29.14 oz)
Transmission type	Frequency hopping spread spectrum (FHSS) radio	
Radio frequency	2400 MHz to 2483.5 MHz	
Switch-on methods	Radio M-code, spin on or shank switch	
Switch-off methods	Radio M-code, timer, spin off or shank switch	
Spindle speed (maximum)	1000 r/min	
Operating range	Up to 15 m (49.2 ft)	
Receiver/interface	RMI-Q or RMI-QE combined interface and receiver unit	
Sense directions	±X, ±Y, +Z	
Unidirectional repeatability	1.00 µm (40 µin) $2\sigma^1$	

Stylus trigger force [2] [3]
Factory setting:
    XY low force
    XY high force
    +Z
	
	0.75 N, 76 gf (2.70 ozf)
	1.40 N, 143 gf (5.04 ozf)
	5.30 N, 540 gf (19.06 ozf)	

Maximum setting:
    XY low force
    XY high force
    +Z
	
	2.00 N, 204 gf (7.19 ozf)
	3.50 N, 357 gf (12.59 ozf)
	14.00 N, 1428 gf (50.36 ozf)	

Minimum setting:
    XY low force
    XY high force
    +Z
	
	0.50 N, 51 gf (1.80 ozf)
	0.90 N, 92 gf (3.24 ozf)
	3.50 N, 357 gf (12.59 ozf)	

Stylus overtravel	XY plane +Z plane	±18° 11 mm (0.43 in)

1   Performance specification is tested at a standard test velocity of 480 mm/min (18.9 in/min) with a 50 mm stylus Significantly higher velocity is possible depending on application requirements.

2   Trigger force, which is critical in some applications, is the force exerted on the component by the stylus when the probe triggers. The maximum force applied will occur after the trigger point (for example overtravel). The force value depends on related variables including measuring speed, machine deceleration and system latency.

3   Tests carried out using a 50 mm stylus.

Environment	IP rating	IPX8, BS EN 60529:1992+A2:2013 (IEC 60529:1989+A1:1999+A2:2013)
	IK rating	IK01 (BS EN IEC 62262: 2002) [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)
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 below.	
Rechargeable batteries	Either Nickel Cadmium (NiCd) or Nickel Metal Hydride (NiMh) can be used. However, when these battery types are fitted, expect a battery life of approximately 50% less than that quoted for alkaline batteries together with a reduced low battery warning period.	

Typical battery life

Typical battery type		2 × AA 3.6 V LTC			
		Radio on		**Spin on**	**Shank on**
		(1 s turn-on)	(0.5 s turn-on)		
Typical battery life	Standby life	101 months	65 months	79 months	169 months
	Light usage 1%	89 months	59 months	71 months	135 months
	Heavy usage 5%	59 months	45 months	51 months	75 months
	Continuous use	4870 hours	4870 hours	4750 hours	4720 hours

Typical battery type		2 × AA 1.5 V alkaline			
		Radio on		**Spin on**	**Shank on**
		(1 s turn-on)	(0.5 s turn-on)		
Typical battery life	Standby life	54 months	34 months	39 months	98 months
	Light usage 1%	46 months	31 months	35 months	74 months
	Heavy usage 5%	29 months	22 months	24 months	37 months
	Continuous use	2210 hours	2220 hours	2130 hours	2140 hours

NOTES:

Battery life figures quoted in the tables above are applicable to the RMP60 (model RMP60QE) when used with an 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.

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System installation

Installing the RMP60 with an RMI-Q or RMI-QE

CNC machining
centre spindle

RMI-Q or
RMI-QE
interface

RMP60 inspection
probe

CNC
machine
controller

Cable

Stylus

RTS probe

Workpiece
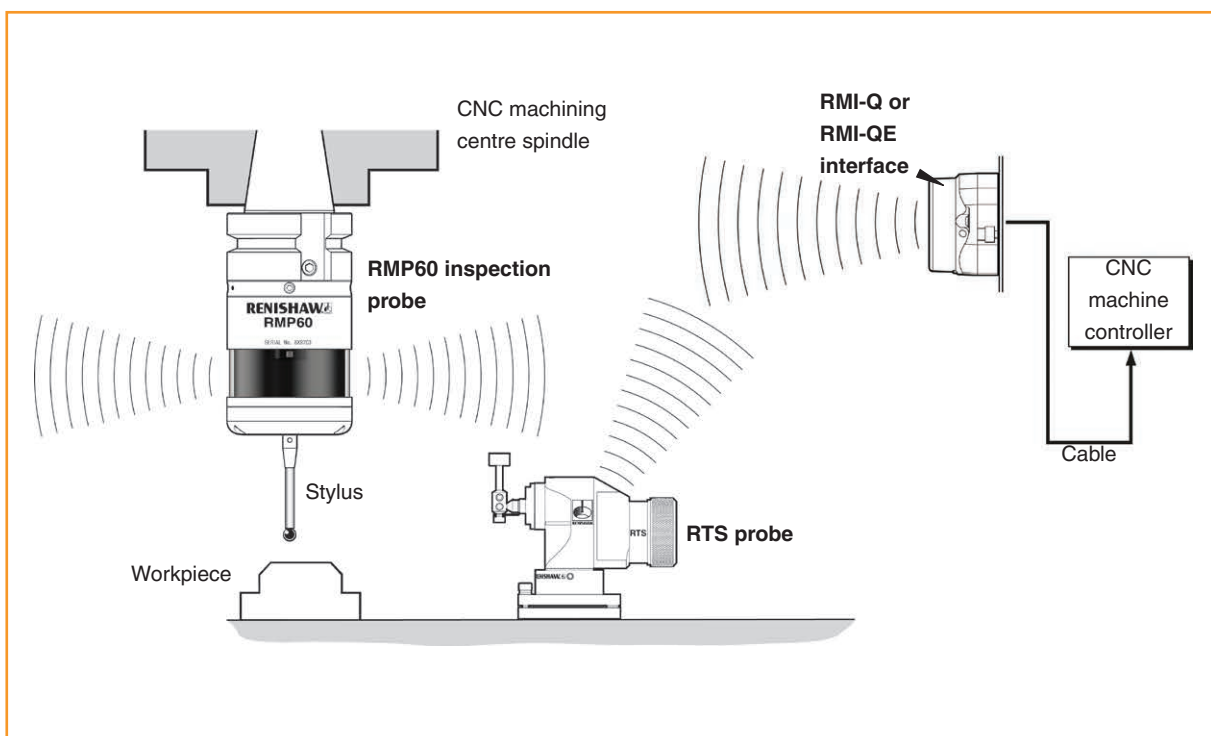
Operating envelope

Radio transmission does not require line-of-sight between the probe and interface as it works via reflected paths, and will pass through gaps and machine tool windows. This allows easy installation inside the machine.

Coolant and swarf residue accumulating on the RMP60 and RMI-Q or RMI-QE may have a detrimental effect on transmission performance. Wipe clean as often as is necessary to maintain unrestricted transmission.

When operating, do not cover the probe glass window, RMI-Q, or RMI-QE with your hands, as this will affect the performance.

Positioning the RMP60 and RMI-Q or RMI-QE

The probe system should be positioned so that the optimum range can be achieved over the full travel of the machine's axes. Always face the front cover of the RMI-Q or RMI-QE 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-Q or RMI-QE, the signal quality is displayed on an RMI-Q or RMI-QE signal LED.

NOTES:

Installing the RMP60 and RMI-Q

The RMP60 has a built-in **"hibernation mode"** (battery-saving mode) that saves battery life when the RMI-Q is unpowered in **"radio-on"** (**"radio-off"** or **"timer-off"**) configurations. The RMP60 goes into **"hibernation mode"** 30 seconds after the RMI-Q is unpowered (or the RMP60 is out of range). When in **"hibernation mode"**, the RMP60 checks for a powered RMI-Q every 30 seconds. If found, the RMP60 goes from **"hibernation mode"** to **"standby mode"**, ready for **"radio-on"**.

"Hibernation mode" does not exist when an RMP60 (model RMP60QE) is used with an RMI-QE.

Performance envelope

The RMP60 and RMI-Q or RMI-QE must be within each other's performance envelope, as shown below. The performance envelope shows line-of-sight performance, however, this is not necessary for the RMP60 radio transmission as it will operate with any reflected radio path provided that the reflected path length does not exceed the 15 m (49.2 ft) operating range.

Performance envelope when using the RMP60 with the RMI-Q or RMI-QE
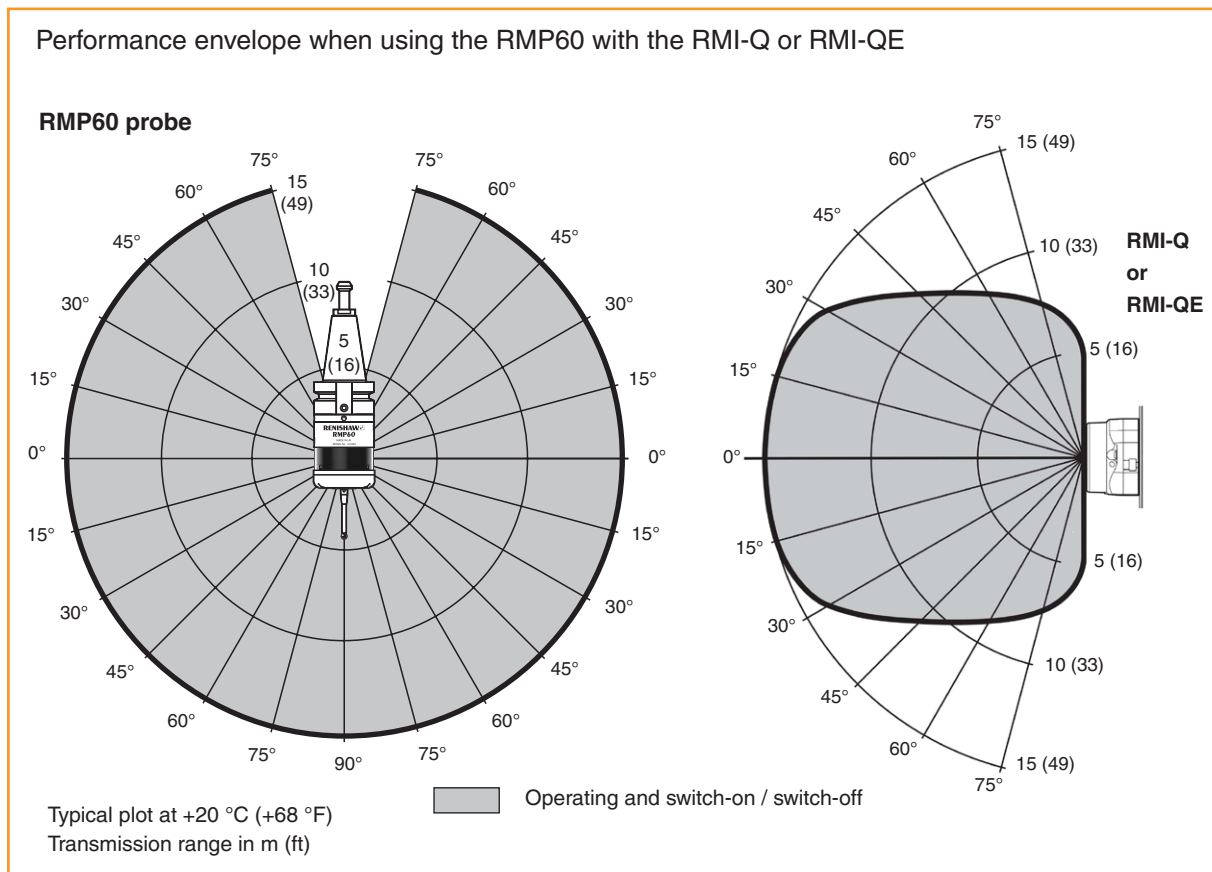
Preparing the RMP60 for use

Fitting the stylus

1

2

1.8 Nm – 2.2 Nm
(1.3 lbf.ft – 1.6 lbf.ft)

M-5000-3707
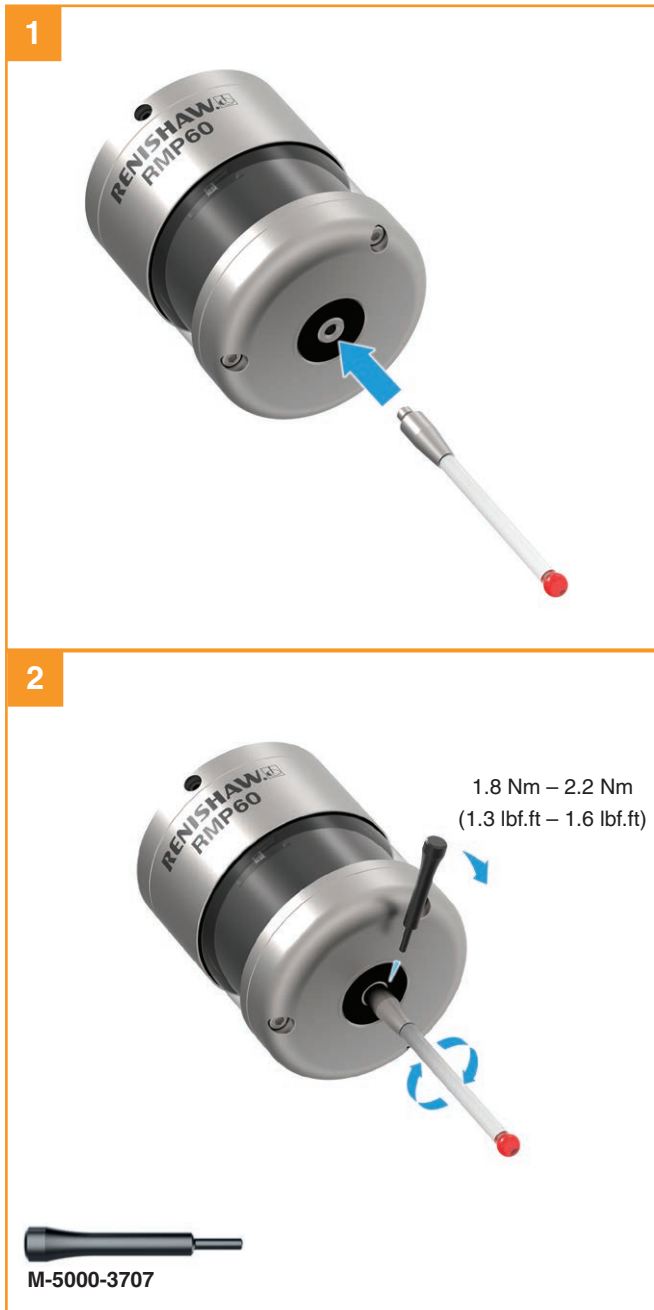
Stylus weak link

NOTE: Must be used with steel styli. For optimum metrology performance do not use a weak link with ceramic or carbon fibre styli.

Fitting a stylus with weak link onto RMP60

In the event of excessive stylus overtravel, the weak link is designed to break, thereby protecting the probe from damage.

Take care to avoid stressing the weak link during assembly.

1

1.8 Nm – 2.2 Nm
(1.3 lbf.ft – 1.6 lbf.ft)

2

5 mm A/F
1.8 Nm – 2.2 Nm
(1.3 lbf.ft – 1.6 lbf.ft)

12 mm
(0.47 in)
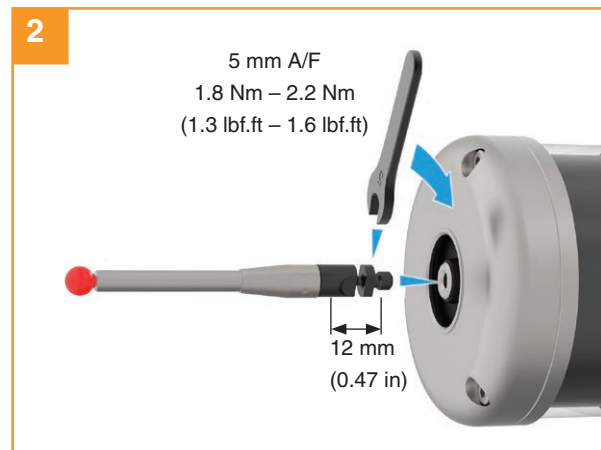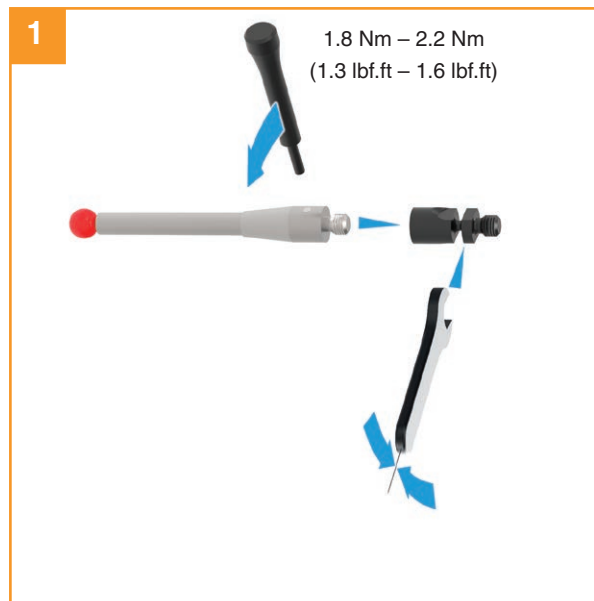
Removing a broken weak link

Installing the batteries

1

NOTES:

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

Ensure the product is clean and dry before inserting batteries.

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

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

After inserting the batteries the LEDs will display the current probe settings (for more information, See page 4.2, **"Reviewing the probe settings"**).

2

3

4

Mounting the probe on a shank

NOTE: In instances where the RMP60 is to be used with a shank switch, it will be necessary to remove the plug from the rear of the probe using pliers. This should then be substituted with the bobbin (A-4038-0303).

1

2

4 mm A/F
× 2

Bobbin
(A-4038-0303)

2.5 mm A/F
× 4

3

2 Nm – 3 Nm
(1.5 lbf.ft – 2.2 lbf.ft)
× 2

Stylus on-centre adjustment

NOTES:

During adjustment, care must be taken not to rotate the probe relative to the shank, as damage to the bobbin (A-4038-0303) can occur where fitted.

If a probe and shank assembly is dropped, it must be rechecked for correct on-centre adjustment.

Do not hit or tap the probe to achieve on-centre adjustment.

1

× 4

360°

± 10 µm

2

× 2

6 Nm – 8 Nm (4.4 lbf.ft – 5.9 lbf.ft)

360°

± 10 µm

3

× 4

1.5 Nm – 3.2 Nm (1.1 lbf.ft – 2.4 lbf.ft)

360°

± 2.5 µm
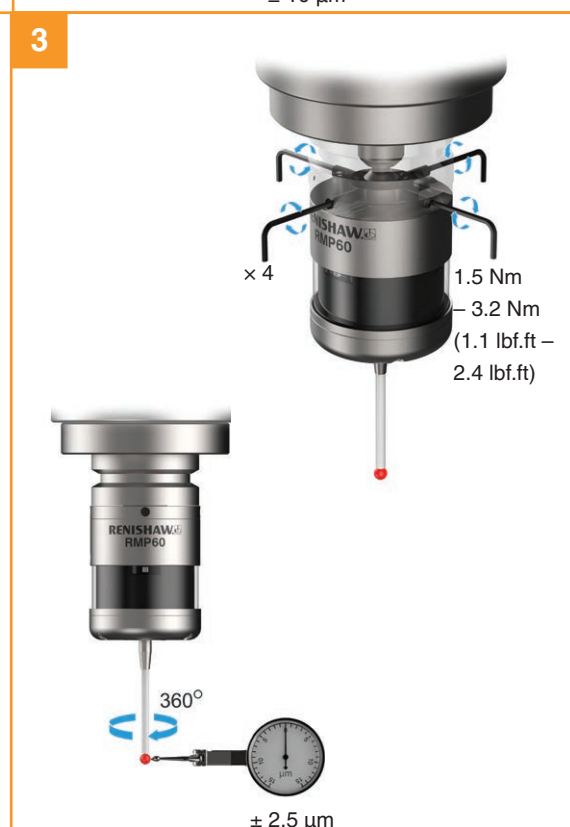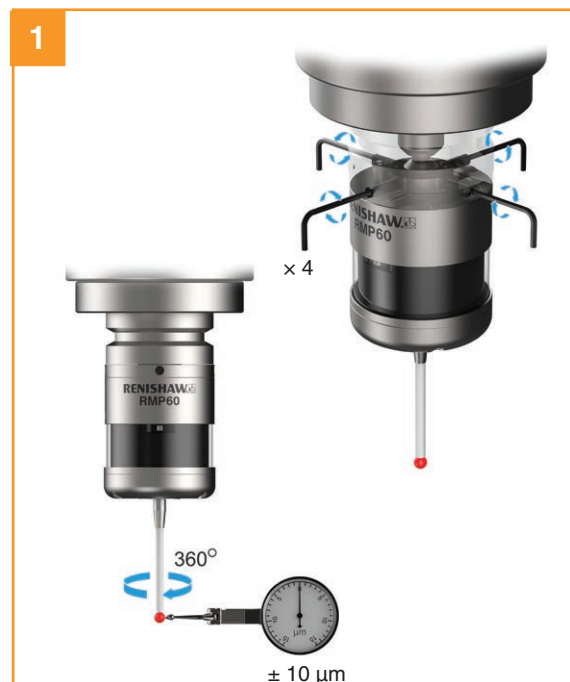
Stylus trigger force and adjustment

Spring force within the probe causes the stylus to sit in a unique position and return to this position following each stylus deflection.

Stylus trigger force is set by Renishaw but, in special circumstances, can be adjusted by the user for example. where there is excessive machine vibration or insufficient force to support the stylus weight, that results with a deflection of the stylus without contacting a part.

To adjust the trigger force, turn the adjusting screw anticlockwise to reduce the force (more sensitive) or clockwise to increase the force (less sensitive). A stop helps to prevent damage which could be caused by overtightening the adjusting screw.

XY trigger forces vary around the stylus seating.

Factory setting

XY low force   0.75 N, 76 gf (2.70 ozf)
XY high force   1.40 N, 143 gf (5.04 ozf)
+Z   5.30 N, 540 gf (19.06 ozf)

Maximum setting

XY low force   2.00 N, 204 gf (7.19 ozf)
XY high force   3.50 N, 357 gf (12.59 ozf)
+Z   14.00 N, 1428 gf (50.36 ozf)

Minimum setting

XY low force   0.50 N, 51 gf (1.80 ozf)
XY high force   0.90 N, 92 gf (3.24 ozf)
+Z   3.50 N, 357 gf (12.59 ozf)
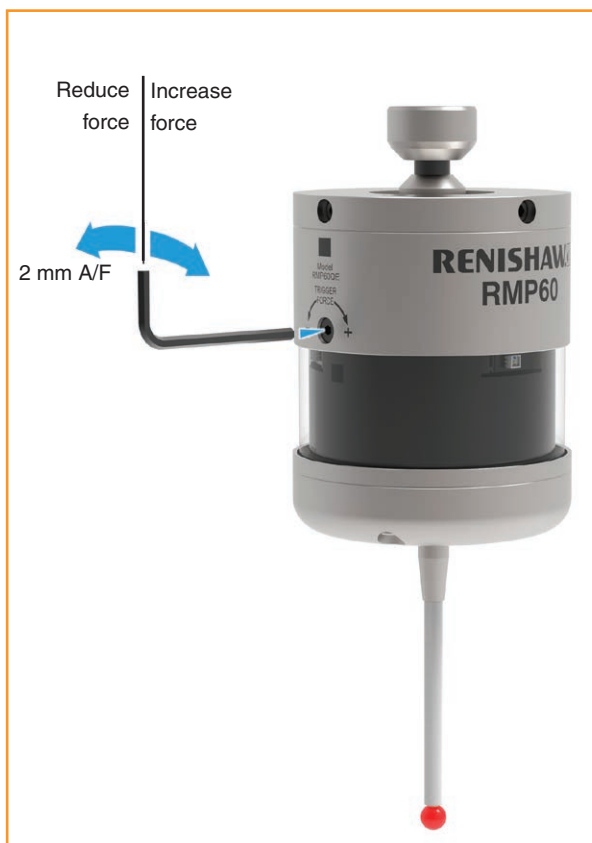
Calibrating the RMP60

Why calibrate a probe?

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

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

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

- When the 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.

- If repeatability of relocation of the probe shank is poor. In this case, the probe may need to be recalibrated each time it is selected.

It is good practice to set the tip of the stylus on-centre, because this reduces the effect of any variation in spindle and tool orientation (see page 3.7, **"Stylus on-centre adjustment"**, for further information). A small amount of run-out is acceptable, and can be compensated for as part of the normal calibration process.

Three different operations are to be used when calibrating a probe. They are:

- Calibrating either in a bored hole or on a turned diameter of known position.

- Calibrating either in a ring gauge or on a datum sphere.

- Calibrating the probe length.

Calibrating in a bored hole or on a turned diameter

Calibrating a probe, either in a bored hole or on a turned diameter of known size, automatically stores values for the offset of the stylus ball to the spindle centre line. The stored values are then used automatically in the measuring cycles. Measured values are compensated by these values so that they are relative to the true spindle centre line.

Calibrating in a ring gauge or on a datum sphere

Calibrating a probe either in a ring gauge or on a datum sphere with a known diameter automatically stores one or more value for the radius of the stylus ball. The stored values are then used automatically by the measuring cycles to give the true size of the feature. The values are also used to give true positions of single surface features.

NOTE: The stored radius values are based on the true electronic trigger points. These values are different from the physical sizes.

Calibrating the probe length

Calibrating a probe on a known reference surface determines the length of the probe, based on the electronic trigger point. The stored value for length is different from the physical length of the probe assembly. Additionally, the operation can automatically compensate for machine and fixture height errors by adjusting the probe length value that is stored.

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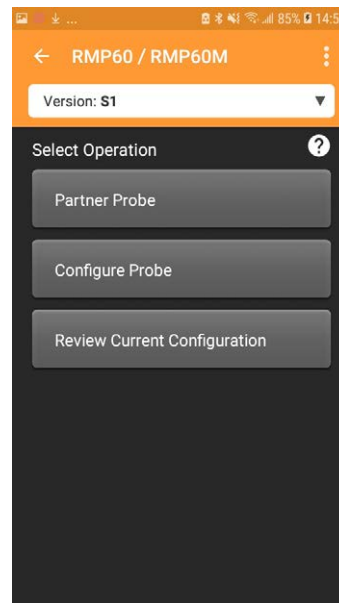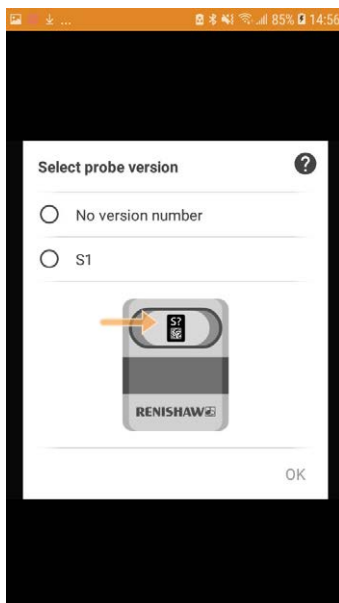
The Probe Setup app is available for download on the App Store and Google Play and several app stores in China.

Reviewing the probe settings

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

LED check

RMI-Q		RMI-QE
● ● ●	or	● ● ● ● ● ● ●

Switch-on method

Radio on (omitted if **"multiple probe mode"** was selected)		Shank on		Spin on
● ● ▬	or	● ● ▬	or	● ● ▬

Switch-off method (timeout options not applicable in **"Shank mode"**)

Radio off or Spin off or Shank off		Short timeout 12 s		Medium timeout 33 s		Long timeout 134 s
● ● ▬	or	● ● ▬	or	● ● ▬	or	● ● ▬

Trigger filter

Level 1		Level 2		Level 3
● ● ▬	or	● ● ▬	or	● ● ▬

Hibernation mode (**RMI-Q** using **"Radio on"** only)

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

Multiple probe mode (**RMI-Q** only, omitted for **"Radio on"**)
(see **"Multiple probe mode settings"** to view all 16 choices)

Mode off		Mode on					Machine 16
		Machine 1		Machine 2			
● ● ▬	or	● ● ▬	or	● ● ▬	or	- - - → or	● ● ▬

Battery status

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

Probe in standby mode

Multiple probe mode settings

(RMI-Q application only)

Deflect the stylus for less than 4 seconds to cycle to the next setting.

Multiple probe mode								
Mode off	**Mode on**							
	or	**Machine 1**	or	**Machine 2**	or	**Machine 3**	or	**Machine 4**

Machine 5	or	**Machine 6**	or	**Machine 7**	or	**Machine 8**

Machine 9	or	**Machine 10**	or	**Machine 11**	or	**Machine 12**

Machine 13	or	**Machine 14**	or	**Machine 15**	or	**Machine 16**

Return to
"Mode off"
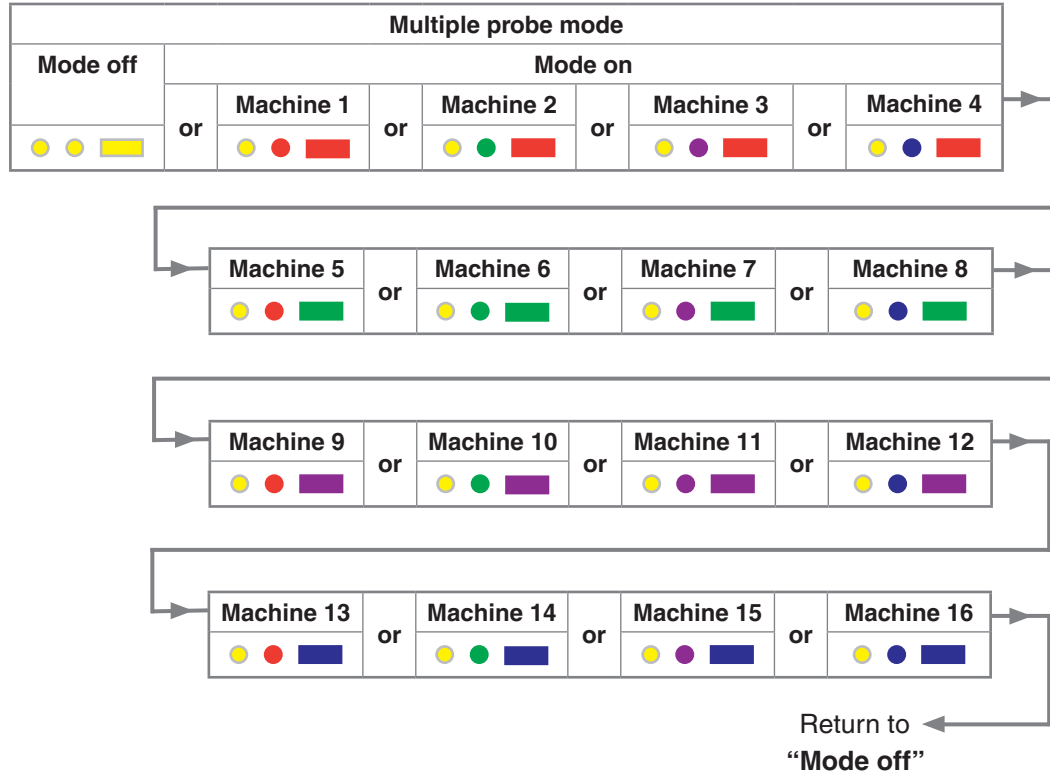
Probe settings record

This page is provided to note your probe's settings.

✓ tick

			Factory settings	New settings
Switch-on method	Radio on	● ● ▭(yellow)	✓	
	Shank on	● ● ▬(green)		
	Spin on	● ● ▬(blue)		
Switch-off method	Radio or spin or shank	● ● ▬(red)	✓	
	Short timeout (12 s)	● ● ▬(green)		
	Medium timeout (33 s)	● ● ▬(blue)		
	Long timeout (134 s)	● ● ▭(yellow)		
Trigger filter	Level 1	● ● ▬(red)	✓	
	Level 2	● ● ▬(green)		
	Level 3	● ● ▬(blue)		
Hibernation mode setting (**RMI-Q** only)	On (30 s)	● ● ▬(red)	✓	
	On (5 s)	● ● ▬(green)		
	Off	● ● ▬(blue)		
Multiple probe mode (**RMI-Q** only)	Off (factory set)	● ● ▭(yellow)	✓	
	On (machine number)	See **"Multiple probe settings"**		

Factory settings are for kit (A-6587-0001) only.

RMP60 serial no ....

Probe partnering function

The probe partnering function enables the RMP60 to be partnered with the RMI-Q or RMI-QE interface independently of the configuration process for other probe settings. To partner RMP60 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 RMP60 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 cyan flashes. At this point the RMI-Q or RMI-QE must be turned on.

If an RMI-Q is turned on, the RMP60 will continue to display the sequence of cyan flashes. If an RMI-QE is turned on, the RMP60 display sequence will now incorporate a long yellow flash.

On the RMP60 select "**Partnering mode on**" by deflecting the stylus for less than 4 seconds. After successful partnering indicated by a cyan, cyan, green flash, the RMP60 will timeout after 20 seconds and then go into standby. If "**Partnering mode on**" is not selected, the RMP60 will timeout after 120 seconds and then go into standby (see page 4.7, **"RMP60 – RMI-Q partnership"**, or page 4.8, **"RMP60 – 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.

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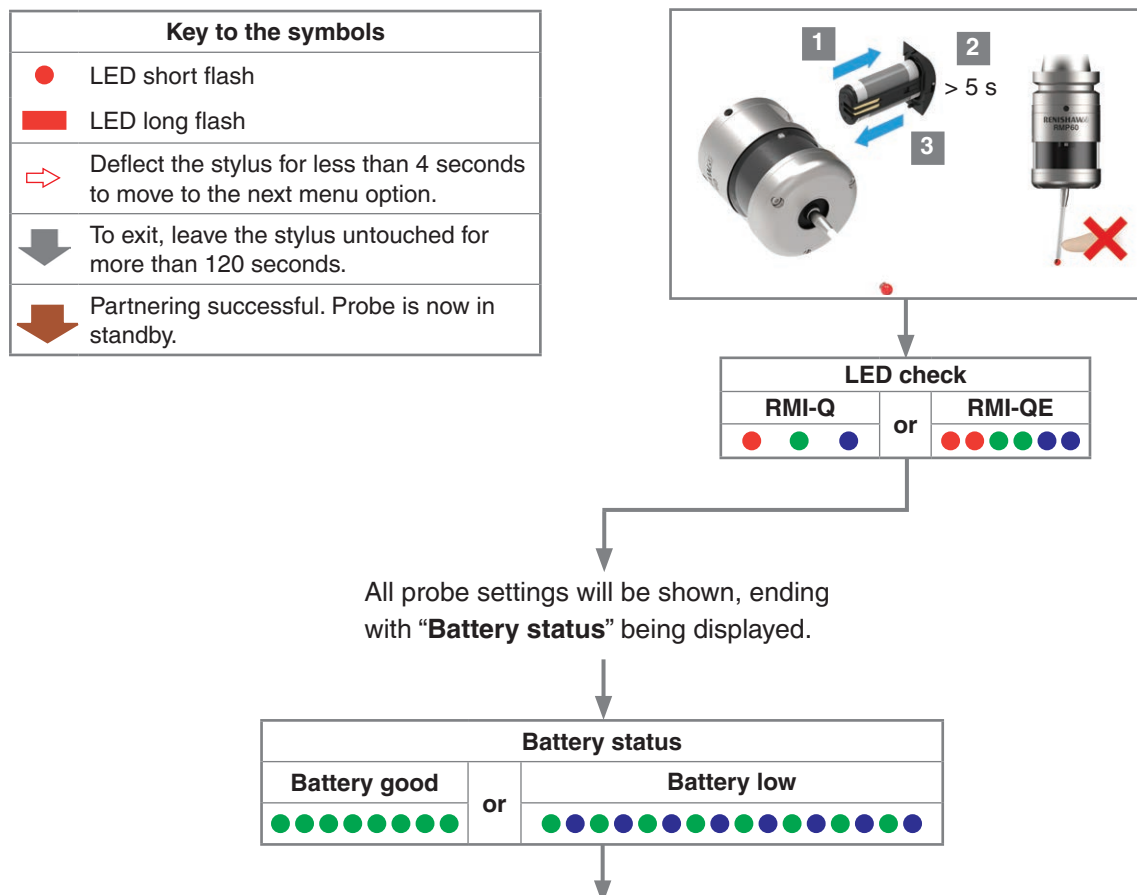
Whilst the "**Battery status**" is being displayed, deflect and release the stylus to enter "**Partnering mode**". Probe status will flash red to acknowledge this.

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**
🟢🟢🟢🟢🔴🟢🟢🟢		🟢🔵🔵🔵🔵🟢🔴🔵🔵🔵🔵🟢
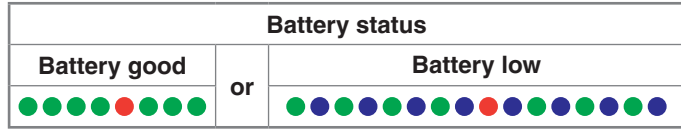
At this point turn on the RMI-Q or RMI-QE.

With RMI-Q switched on
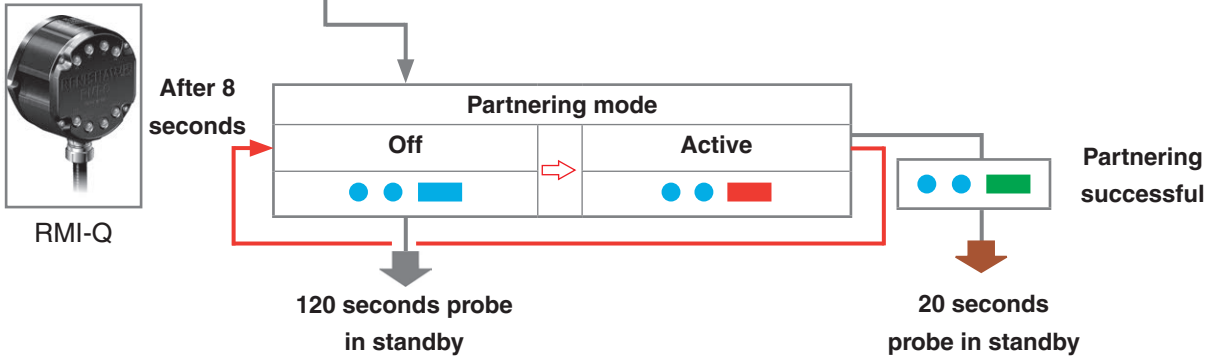
RMI-Q

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
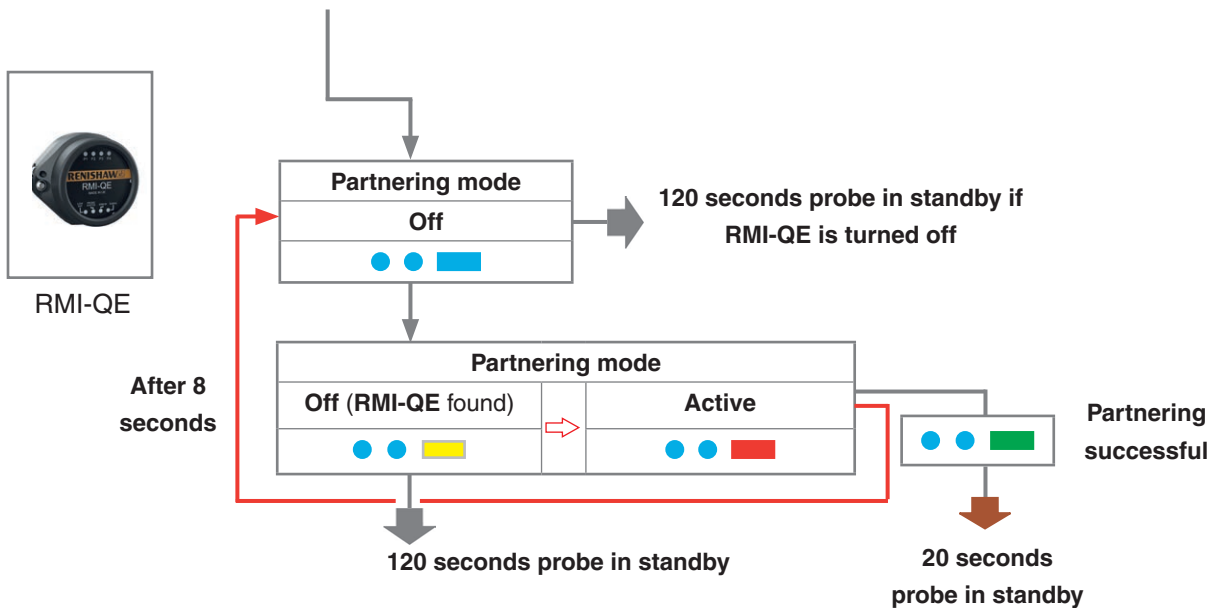
RMI-QE

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.

RMP60 – RMI-Q partnership

System set-up can be 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 RMP60 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.

RMP60 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

RMI-Q

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

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.

RMI-Q

SYSTEM STATUS LED
● ● ● ● ●
Partnering pending

SYSTEM STATUS LED
○ ● ○ ● ○
New radio probe partnered

Displayed for 5 seconds

or

SYSTEM STATUS LED
● ● ● ● ●
Radio probe cleared from location

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.
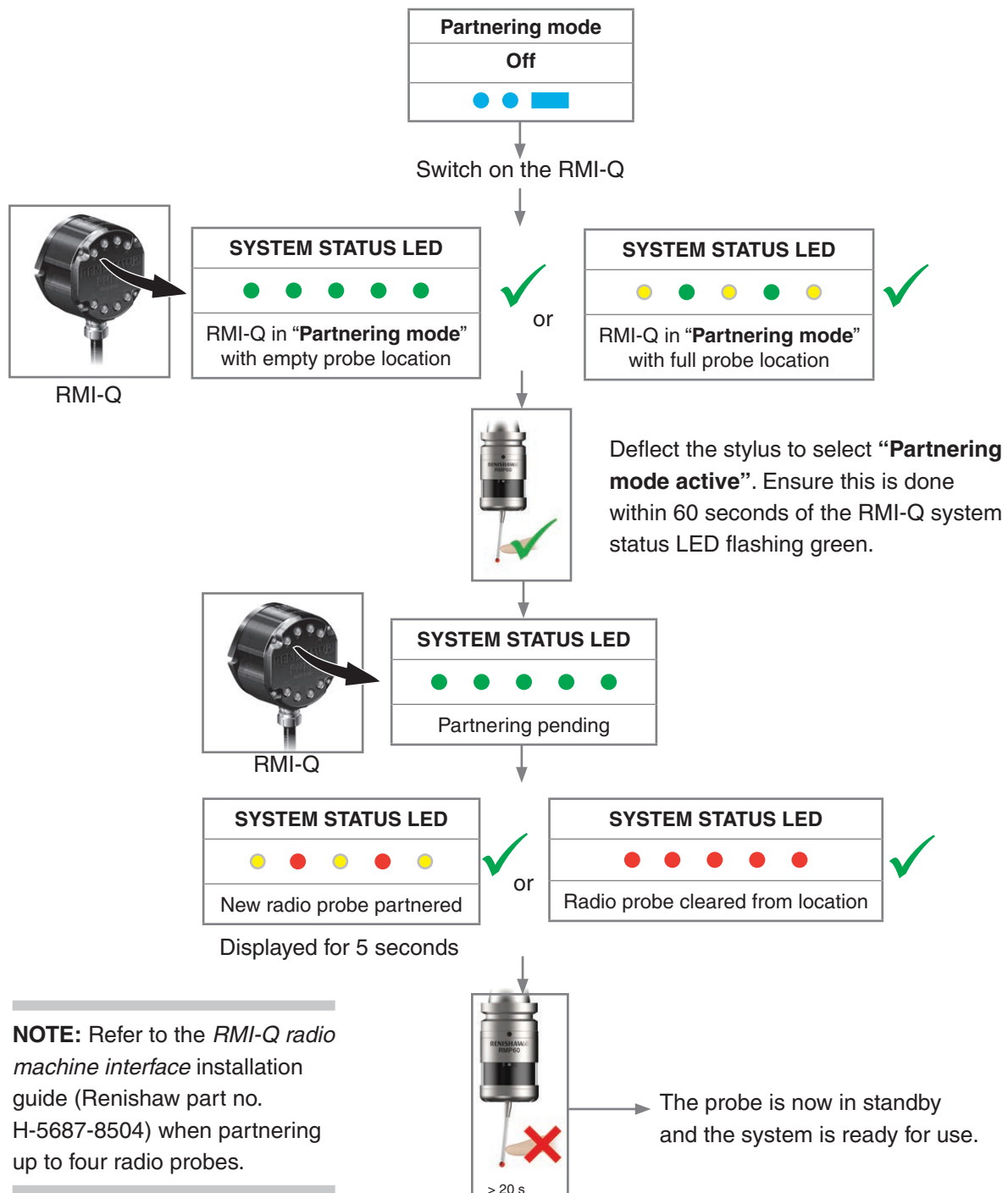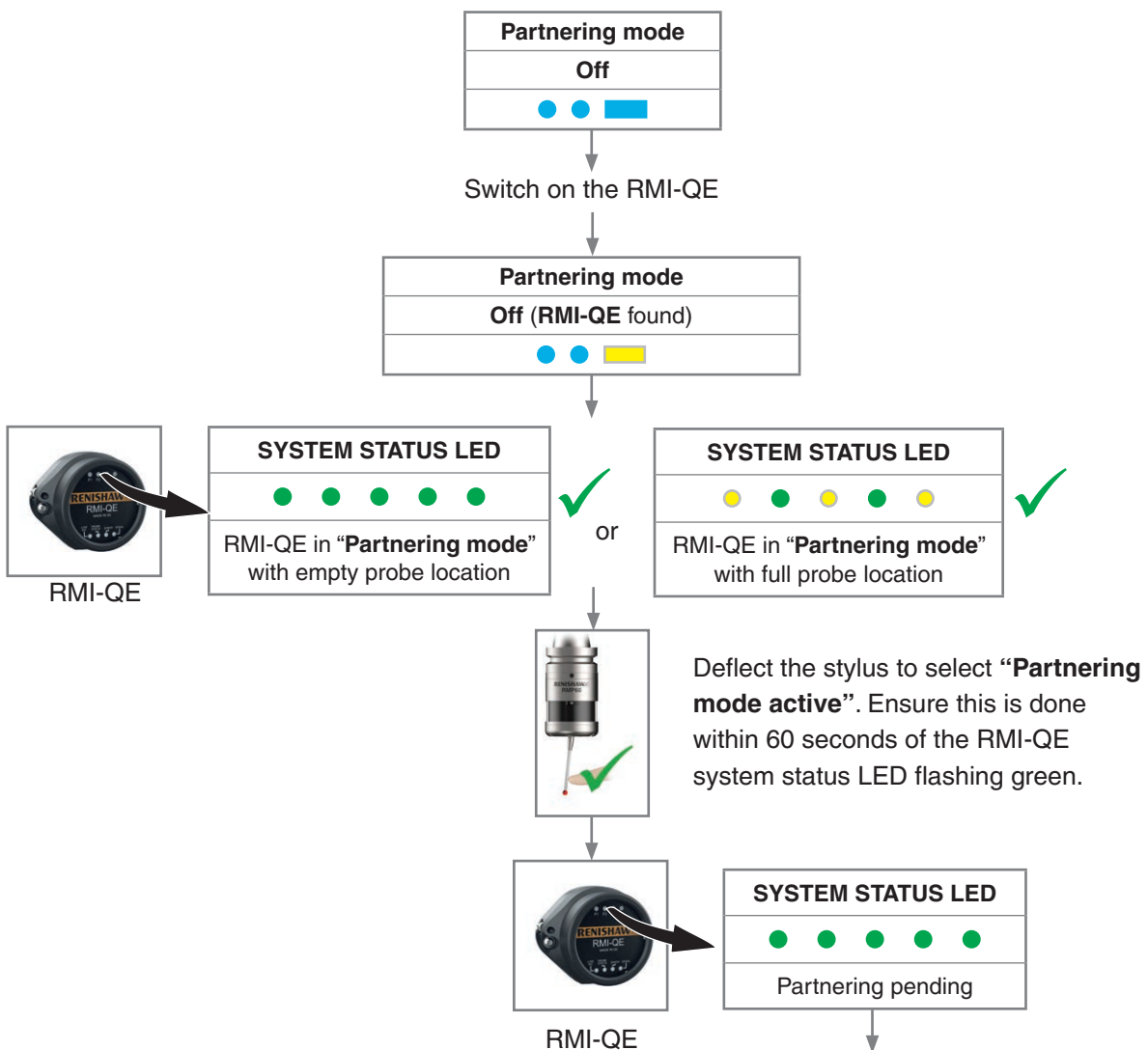
RMP60 – RMI-QE partnership

System set-up can be 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 RMP60 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 RMP60 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 4.5 **"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
🟢 🟢 🟢 🟢 🟢
RMI-QE in "**Partnering mode**" with empty probe location

or

SYSTEM STATUS LED
🟡 🟢 🟡 🟢 🟡
RMI-QE in "**Partnering mode**" with full probe location

RMI-QE

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

SYSTEM STATUS LED
🟢 🟢 🟢 🟢 🟢
Partnering pending

RMI-QE

SYSTEM STATUS LED
🟡 🔴 🟡 🔴 🟡
New radio probe partnered

✓ or ✓

SYSTEM STATUS LED
🔴 🔴 🔴 🔴 🔴
Radio probe cleared from location

Displayed for 5 seconds

> 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 probe settings when partnered 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 "**Switch-on method**" setting is displayed, then release it.

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.

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**
🔴 🔴 🔴 🔴 🔴 🔴 🔴 🔴		🔴🔵🔴🔵🔴🔵🔴🔵🔴🔵🔴🔵🔴🔵🔴

Switch-on method					
Radio on (omitted if "**multiple probe mode**" was selected)	⇨	**Shank on**	⇨	**Spin on**	⇨
🟣 🟣 🟨	⇩	🟣 🟣 🟩	⇩	🟣 🟣 🟦	⇩

Switch-off method (timeout options not applicable in "**Shank mode**")							
Radio off or Spin off or Shank off	⇨	**Short timeout** 12 s	⇨	**Medium timeout** 33 s	⇨	**Long timeout** 134 s	⇨
🔴 🔴 🟥	⇩	🔴 🔴 🟩	⇩	🔴 🔴 🟦	⇩	🔴 🔴 🟨	⇩

Trigger filter

Level 1	⇨	Level 2	⇨	Level 3	⇨
● ● ▬	⬇	● ● ▬	⬇	● ● ▬	⬇

Partnering successful, 20 seconds probe in standby

● ● ▬

Partnering mode

Off	⇨	Active
● ● ▬	⬇	● ● ▬

120 seconds probe in standby

After 8 seconds

Hibernation mode (only for **"Radio on"**)

On 30 s	⇨	On 5 s	⇨	Off	⇨
● ● ▬	⬇	● ● ▬	⬇	● ● ▬	⬇

Stop triggering here, unless "**Multiple probe mode**" is required, in which case deflect the stylus for more than 4 seconds.

Multiple probe mode (omitted for **"Radio on"**)
(see **"Multiple probe mode settings"** to view all 16 choices)

Mode off		Mode on								
	⇨	Machine 1	⇨	Machine 2	⇨	- - - →	⇨	Machine 16	⇨
● ● ▬	⬇	● ● ▬	⬇	● ● ▬	⬇		⬇	● ● ▬	⬇

If no changes are made in "**Multiple probe mode**", deflecting the stylus for more than 4 seconds will return the probe settings to beginning of the Trigger Logic menu. If "**Multiple probe mode**" is selected, proceed to "**Partnering mode**" to repartner one probe with the RMI-Q.

Partnering successful,
20 seconds probe in standby

Partnering mode

Off	⇨	**Active**
● ● ▬	⇩	● ● ▬

After 8 seconds

120 seconds probe in standby

Return to **"Switch-on method"**

New settings complete, probe in standby

NOTES:

If using "**Multiple probe mode**", refer to the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504).

Further probes used require the same **"Multiple probe mode"** setting, but do not need to be partnered with the RMI-Q.

To partner an RMP60 with an RMI-Q, see page 4.7, **"RMP60 – RMI-Q partnership"**, for further information. Once partnering has been successful, the RMP60 will display **"Partnering successful"** and go into standby after 20 seconds.

Changing probe settings when partnered to an 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).
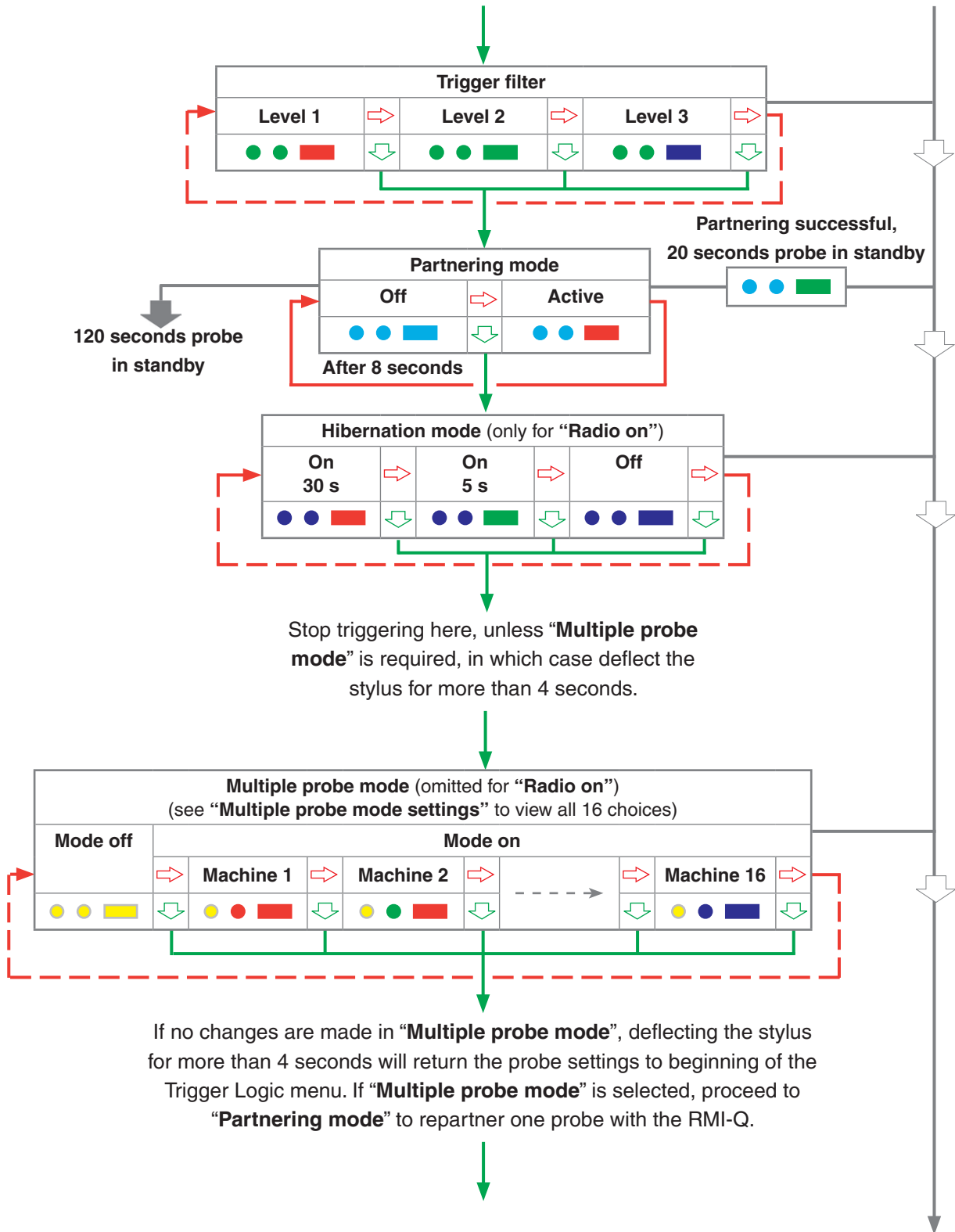
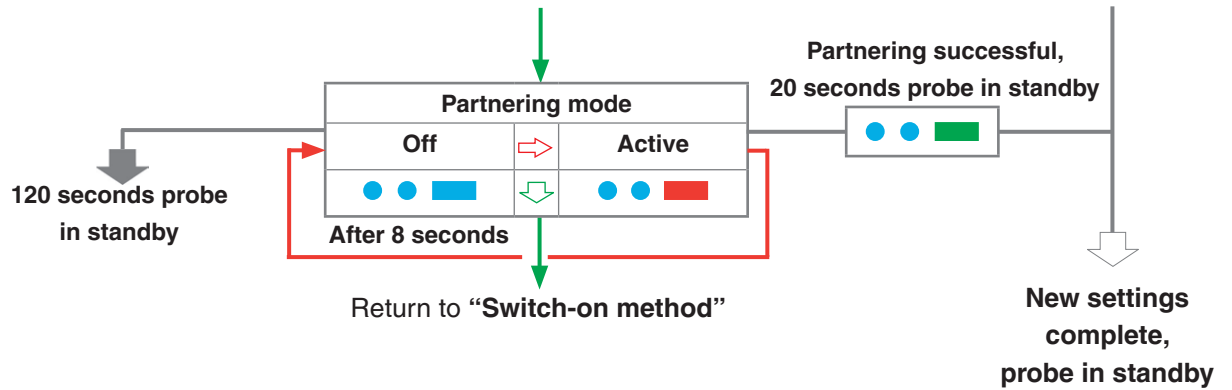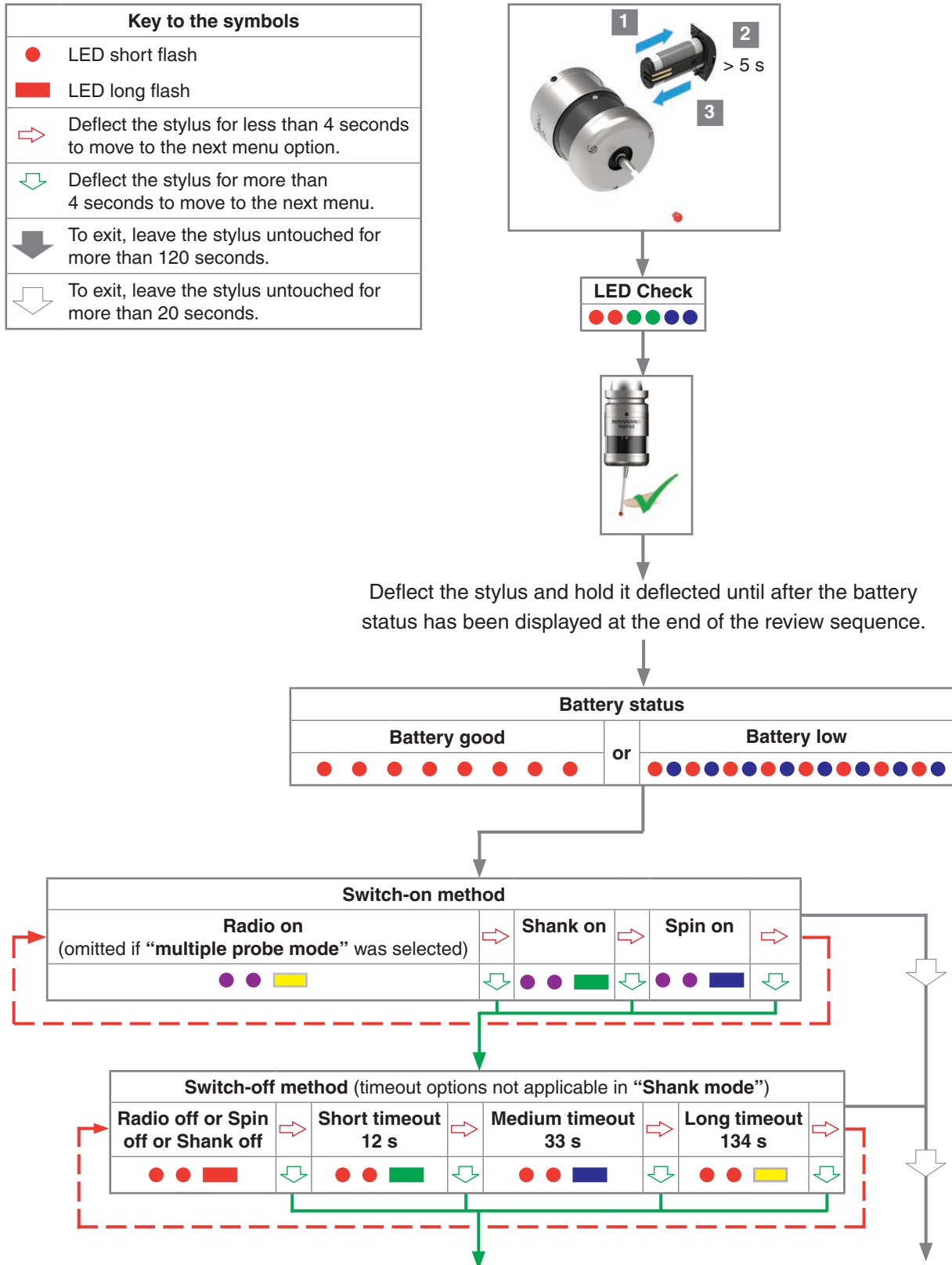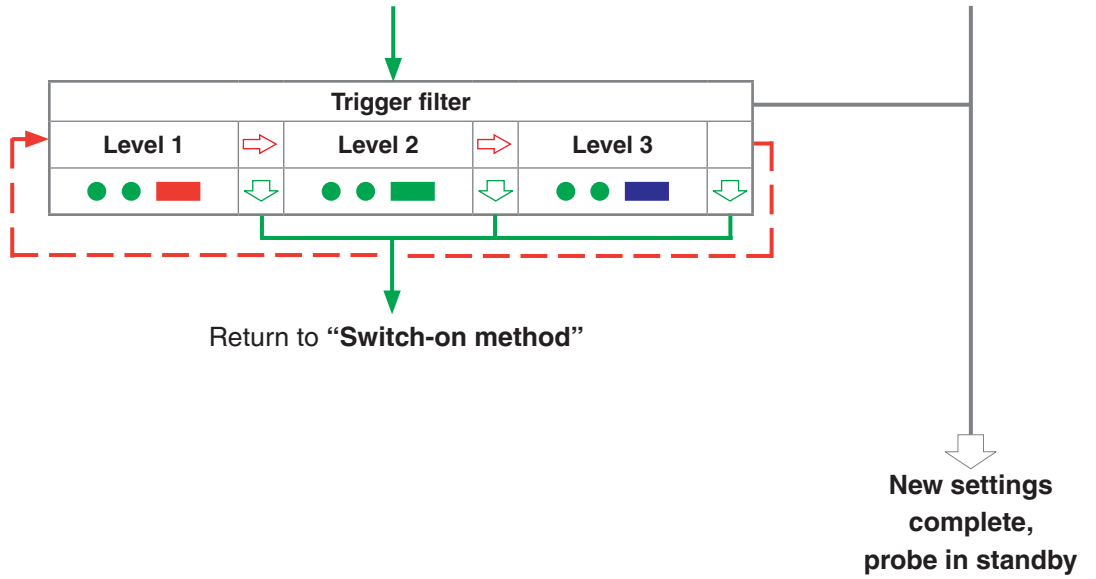Keep the stylus deflected until the "**Switch-on method**" setting is displayed, then release it.

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**
● ● ● ● ● ● ● ●		● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●

Switch-on method						
Radio on (omitted if "**multiple probe mode**" was selected)		⇨	**Shank on**	⇨	**Spin on**	⇨
● ● ▬			⇩ ● ● ▬	⇩	● ● ▬	⇩

Switch-off method (timeout options not applicable in "Shank mode")							
Radio off or Spin off or Shank off	⇨	**Short timeout 12 s**	⇨	**Medium timeout 33 s**	⇨	**Long timeout 134 s**	⇨
● ● ▬	⇩	● ● ▬	⇩	● ● ▬	⇩	● ● ▬	⇩

Trigger filter					
Level 1	⇨	**Level 2**	⇨	**Level 3**	
● ● ▬	⇩	● ● ▬	⇩	● ● ▬	⇩

Return to **"Switch-on method"**

**New settings
complete,
probe in standby**

NOTE: To partner an RMP60 with an RMI-QE, see page 4.5 **"Probe partnering function"** for
further information on how to reach "**Partnering mode**".

Master reset function

RMP60 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 using Trigger Logic™ will clear all current probe settings and return the probe to default settings.

The default settings are as follows:

- Radio switch-on

- Radio switch-off

- Trigger filter: Level 1

- Hibernation mode on 30 s

- Multiple probe mode off

The default settings may not be representative of the required probe settings. Further configuration of the RMP60 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 "**Switch-on method**" 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 no action is taken, the probe will time out.

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 RMP60 returns to Trigger Logic and displays "**Switch-on method**".

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

1.
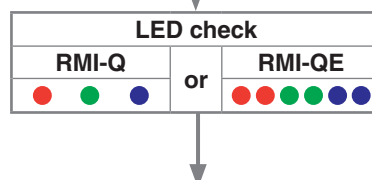
2.

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

3.

Switch-on method				
Radio on (omitted if **"multiple probe mode"** was selected)	or	**Shank on**	or	**Spin on**
● ● ▬		● ● ▬		● ● ▬

Release the stylus.

4.

Deflect the stylus for 20 seconds until the status LEDs start to flash yellow eight times.
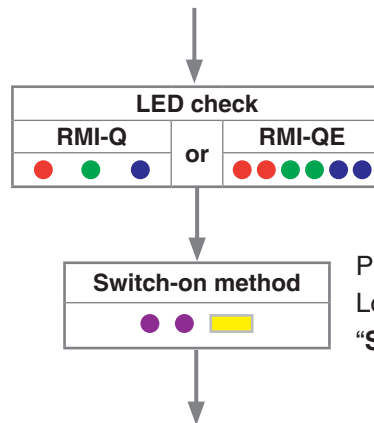
5.

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.

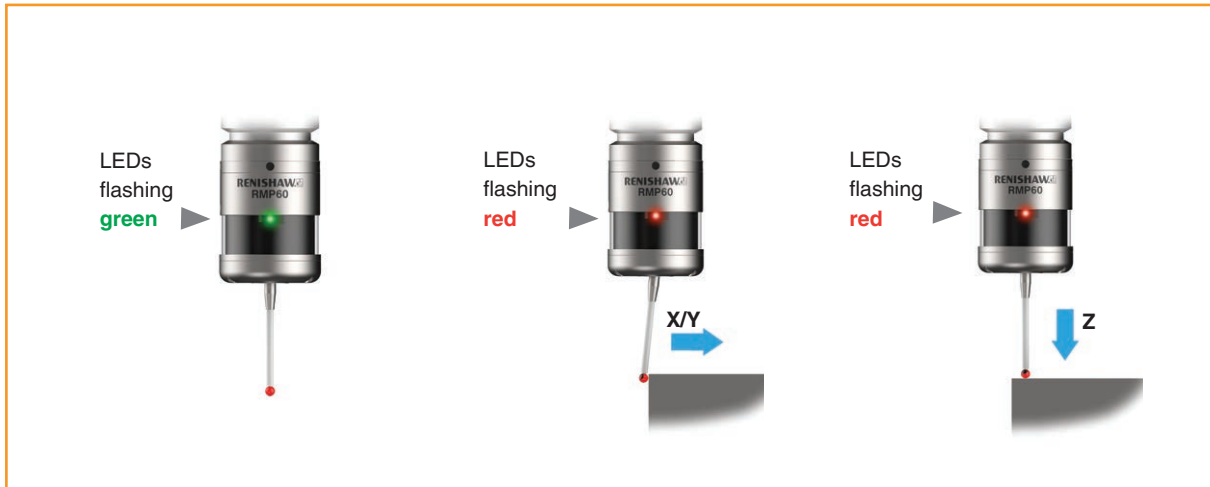| LED check		
RMI-Q	**or**	**RMI-QE**
🔴 🟢 🔵		🔴🔴🟢🟢🔵🔵

Switch-on method
🟣 🟣 🟨

Probe is now back in the Trigger Logic menu and will display **"Switch-on method"**.

6.   Configure probe settings as required using Trigger Logic

NOTE: The RMP60 will continue to be partnered with either the RMI-Q or RMI-QE following the activation of the master reset function.

Operating mode

Probe status LEDs

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

NOTE: Due to the nature of lithium-thionyl chloride batteries, if a "low battery" LED warning is ignored, it is possible for the following sequence of events to occur:

1. When the probe is active, the batteries discharge until battery power becomes too low for the probe to operate correctly.

2. The probe stops functioning, 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 RMP60 and RMP60M have glass windows. Handle with care if broken to avoid injury.

Changing the batteries

CAUTIONS:

Do not leave dead batteries in the probe.

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

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

Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.

CAUTION: Dispose of dead batteries in accordance with local regulations. Never dispose of batteries in a fire.

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			
Alkaline **× 2**	**Lithium-thionyl chloride** **× 2**		**Nickel Cadmium / Nickel Metal Hydride** **× 2**
AA 1.5 V ✓	**AA 3.6 V** **Saft:** **Tadiran:** **Xeno:**	LS 14500 SL-760/S, TL-5903/S, TL-2100/S XL-060F ✓	**AA 1.2 V** ✓

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.

Diaphragm replacement

RMP60 diaphragms

The probe mechanism is protected from coolant and debris by two diaphragms. These provide adequate protection under normal working conditions.

You should periodically check the outer diaphragm for signs of damage. If this is evident, replace the outer diaphragm.

Do not remove the inner diaphragm. If it is damaged, return the probe to your supplier for repair.

Outer diaphragm inspection

1. Remove the stylus.

2. Undo the three M3 front cover screws and remove the front cover.

3. Inspect the outer diaphragm for damage.

4. To remove the outer diaphragm, grip by the outer edge and pull off.

Inner diaphragm inspection

Inspect the inner diaphragm for damage. If it is damaged, return the probe to your supplier.

CAUTION: Do not remove the inner diaphragm. This will invalidate your warranty.

Outer diaphragm replacement

5. Fit the new diaphragm over the centre.

6. Locate the outer edge of the diaphragm to rest on the outer edge of the inner diaphragm.

7. Refit the front cover and M3 screws.

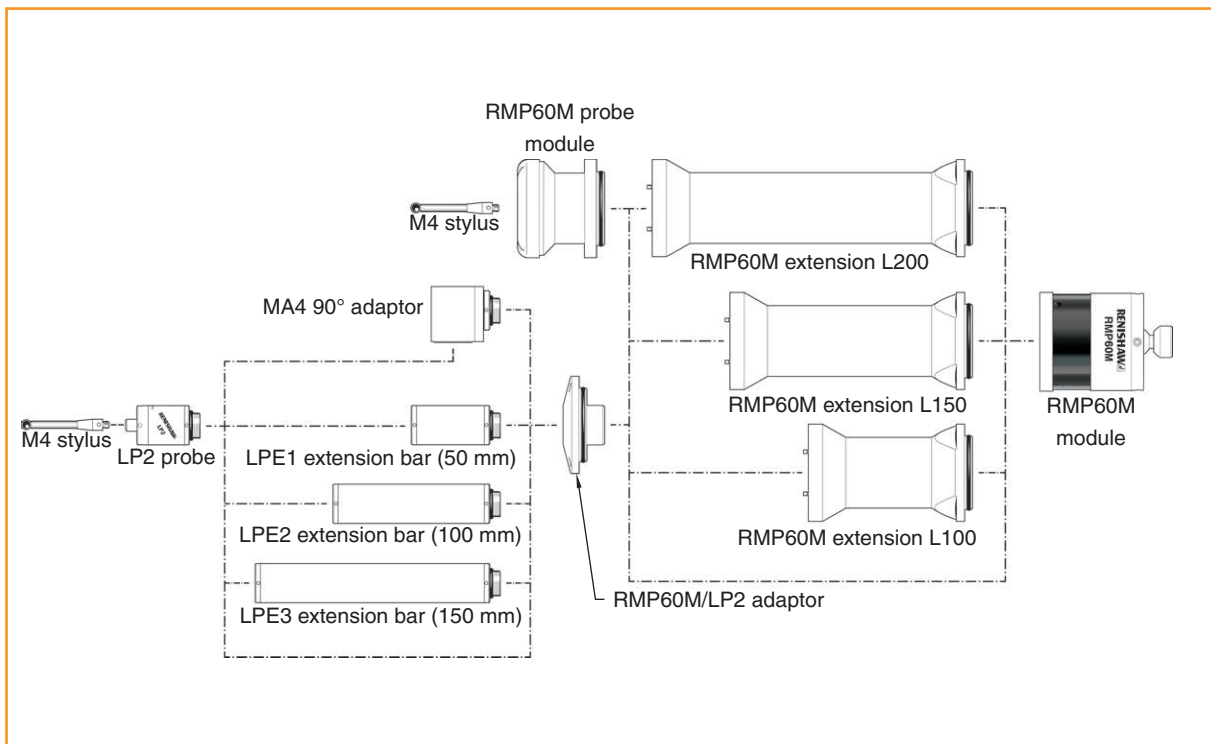8. Refit the stylus and recalibrate the probe.

M3 screw
2.5 mm A/F
1 Nm (0.74 lbf.ft)

Cover

Outer diaphragm
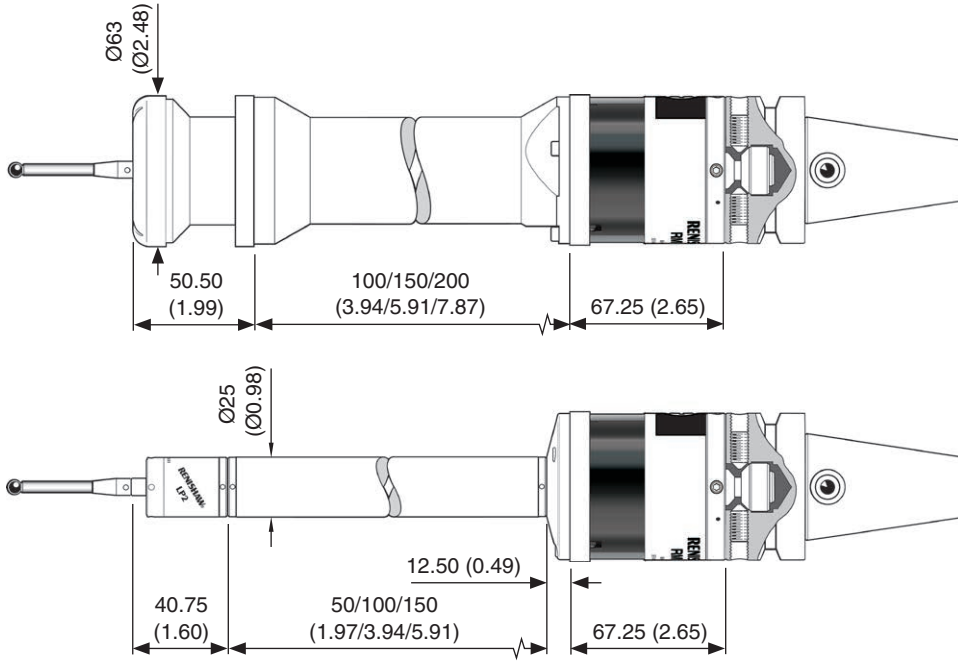
Inner diaphragm

RMP60M system

RMP60M system

The RMP60M is a special modular version of the RMP60. It enables probe inspection of part features inaccessible to the RMP60, by fitting selected adaptors and extensions as shown below.

See Section 8, **"Parts list"**.

RMP60M dimensions

Ø63
(Ø2.48)

50.50
(1.99)

100/150/200
(3.94/5.91/7.87)

67.25 (2.65)

Ø25
(Ø0.98)

12.50 (0.49)

40.75
(1.60)

50/100/150
(1.97/3.94/5.91)

67.25 (2.65)

Dimensions mm (in)

RMP60M screw torque values

10 Nm to 12 Nm
(7.37 lbf.ft to 8.85 lbf.ft)

2.6 Nm
(1.92 lbf.ft)

2.6 Nm
(1.92 lbf.ft)

2.6 Nm
(1.92 lbf.ft)
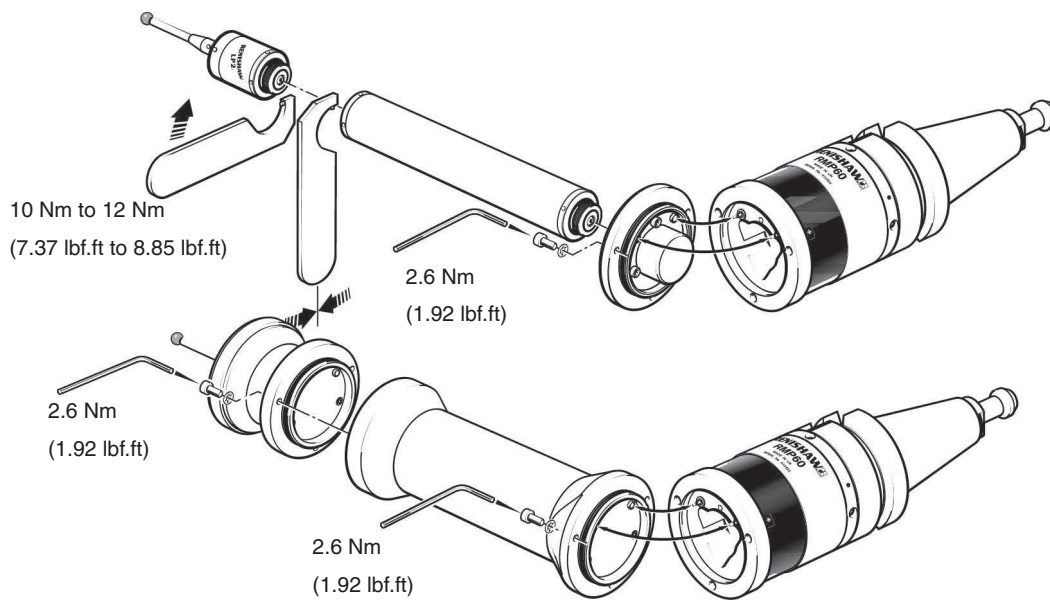
Fault-finding

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.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
	Probe out of range.	Check position of RMI-Q or RMI-QE, see operating envelope.
	No RMI-Q or RMI-QE "start/stop" signal (**"radio on mode"** only).	Check RMI-Q or RMI-QE for green start LED.
	Incorrect spin speed (**"spin on mode"** only).	Check spin speed and duration.
	Malfunctioning shank switch (**"shank switch-mode"** only).	Check switch operation.
	Incorrect **"switch on"** method configured.	Check configuration and alter as required.
	Incorrect **"multiple probe mode"** setting configured (RMI-Q only).	Check configuration and alter as required.
	RMP60 in **"hibernation mode"** (RMI-Q and **"radio on"** method only).	Ensure probe is in range and wait up to 30 seconds, then resend switch-on signal. Check position of RMI-Q, see operating envelope.
	Spin on is within 1 second of spin off.	Check for 1 second dwell following spin off.

Symptom	Cause	Action
The machine stops unexpectedly during a probing cycle.	Radio link failure/RMP60 out of range.	Check interface/receiver and remove obstruction.
	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 find target surface.	Check that part is correctly positioned and that stylus has not broken.
	Stylus not given sufficient time to settle from a rapid deceleration.	Add a short dwell before the probing move (length of dwell will depend on stylus length and rate of deceleration).
	False probe trigger.	Change trigger filter setting.
	Selection error for RMI-Q or RMI-QE.	Review interface error indication and correct.
The probe crashes.	Workpiece obstructing probe path.	Review probing software.
	Probe length offset missing.	Review probing software.
	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.
	Poor tool change repeatability.	Redatum probe after each tool change.
	Loose probe mounting on shank or loose stylus.	Check and tighten as appropriate.
	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.
	Calibration and probing speeds not the same.	Review probing software.
	Calibration feature has moved.	Correct the position.
	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 to increase back off distance.
	Probing speed too fast or too slow.	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.
	Excessive machine vibration.	Change trigger filter setting. Eliminate vibrations.

Symptom	Cause	Action
RMP60 status LEDs do not correspond to RMI-Q or RMI-QE status LEDs.	Radio link failure – RMP60 out of RMI-Q or RMI-QE range.	Check position of RMI-Q or RMI-QE, see operating envelope.
	RMP60 has been enclosed/ shielded by metal.	Review installation.
	RMP60 and RMI-Q or RMI-QE are not partnered.	Partner RMP60 and RMI-Q or RMI-QE.
RMI-Q or RMI-QE 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-Q or RMI-QE, see operating envelope.
	Dead batteries.	Change batteries.
	RMP60 and RMI-Q or RMI-QE are not partnered.	Partner RMP60 with RMI-Q or RMI-QE.
	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.

Symptom	Cause	Action
The probe fails to switch off.	Incorrect **"switch-off"** method configured.	Check configuration and alter as required.
	No RMI-Q or RMI-QE "start/stop" signal (**"radio on"** method only).	Check RMI-Q or RMI-QE for green start LED.
	Probe in **"timeout mode"** and placed in tool magazine and being triggered by movement.	Use shorter timeout setting or use different switch-off method.
	Malfunctioning shank switch (**"shank switch mode"** only).	Check switch operation.
	Incorrect spin speed (spin switch on only).	Check spin speed.
	Level start used for M-code on/off when the probe is set to radio on/timeout off.	Change to a pulsed M-code or change the probe to radio on/off.
The probe goes into Trigger Logic™ configuration mode and cannot be reset.	Probe was triggered when batteries were inserted.	Do not touch the stylus or stylus mounting face during battery insertion.

Fault-finding

7.6

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Parts list

8.1

Item	Part number	Description
RMP60 (QE)	A-6587-0001	RMP60 (QE) probe with batteries, tools and support card (factory-set to radio on/radio off).
RMP60M (QE) module	A-6587-1001	RMP60M (QE) module with batteries, tools and support card guide (factory-set to radio on/radio off).
Battery	P-BT03-0005	AA battery – alkaline – supplied as standard with probe (pack of two).
Battery	P-BT03-0008	AA battery – lithium-thionyl chloride (pack of two).
Stylus	A-5000-3709	PS3-1C ceramic stylus 50 mm (1.97 in) long with Ø6 mm ball.
Weak link kit	A-2085-0068	Weak link (part no. M-2085-0069 × 2) and 5 mm A/F spanner.
Tool kit	A-4038-0304	Probe tool kit comprising Ø1.98 mm stylus tool (× 1), 2.0 mm A/F hexagon key (× 1), 2.5 mm A/F hexagon key (× 2), 4.0 mm A/F hexagon key (× 1) and shank grub screw (× 2).
Battery cassette	A-4038-0300	Battery cassette assembly.
Battery gasket	A-4038-0301	Battery cap gasket kit.
Diaphragm kit	A-4038-0302	RMP60 diaphragm kit.
Bobbin kit	A-4038-0303	Bobbin for shank switch (supplied with shank).
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-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.
Styli tool	M-5000-3707	Tool for tightening/releasing styli.
LP2	A-2063-6098	LP2 probe complete with two C spanners and TK1 tool kit.
Extension L100	A-4038-1010	RMP60M extension – 100 mm long.
Extension L150	A-4038-1027	RMP60M extension – 150 mm long.
Extension L200	A-4038-1028	RMP60M extension – 200 mm long.

Item	Part number	Description
RMP/OMP60M probe module	A-4038-1002	RMP60M probe module assembly.
RMP/OMP60M LP2 adaptor	A-4038-0212	RMP60M LP2 adaptor assembly.
LPE1	A-2063-7001	LPE1 extension bar – 50 mm long.
LPE2	A-2063-7002	LPE2 extension bar – 100 mm long.
LPE3	A-2063-7003	LPE3 extension bar – 150 mm long.
MA4	A-2063-7600	MA4 90° adaptor assembly.
Publications. These can be downloaded from our website at **www.renishaw.com**.		
RMP60 (QE) QSG	H-6587-8500	Quick-start guide: for rapid set-up of the RMP60 (QE) probe.
RMI-Q QSG	H-5687-8500	Quick-start guide: for rapid set-up of the RMI-Q.
RMI-Q IG	H-5687-8504	Installation guide: for set-up of the RMI-Q.
RMI-QE QSG	H-6551-8500	Quick-start guide: for rapid set-up of the RMI-QE.
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.
Taper shanks	H-2000-2011	Data sheet: taper shanks for machine tool probes.

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