Installation guide
H-5742-8504-02-D

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RMP60 radio machine probe

Renishaw plc. Registered in England and Wales. Company no: 1106260. Registered office: New Mills, Wotton-under-Edge, Gloucestershire, GL12 8JR, UK.

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

Disclaimer

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Trade marks

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.

Changes to equipment

Renishaw reserves the right to change equipment specifications without notice.

CNC machines

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

Care of the probe

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

Patents

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

CN 100416216
CN 100466003
CN 101476859
CN 101482402
EP 1425550
EP 1457786
EP 1477767
EP 1576560
EP 1613921
EP 1804020
EP 1931936
EP 2216761
IN 215787
IN 234921
IN 8707/DELNP/2008
WO 2004/057552
JP 4237051
JP 4575781
JP 4852411
JP 5238749
JP 5390719
KR 1001244
TW I333052
US 6941671
US 7285935
US 7316077
US 7486195
US 7665219
US 7821420
US 9140547

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 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 batteries or this product with the batteries inserted. To reduce the risk of shipment delays, should you need to return this product to Renishaw for any reason, do not return any batteries.

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 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 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.

RMP60 basics

Introduction

The RMP60 probe forms part of Renishaw's family of radio transmission part probing systems. It is ideally suited to large machining centres or 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 many 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 "Trigger Logic™". This technique enables the user to review and subsequently change probe settings by deflecting the stylus whilst observing the LED display.

Configurable settings are:

- Switch-on / switch-off method
- Trigger filter setting
- Hibernation setting*
- Multiple probe mode

Getting started

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

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 a LED check (for more information, see page 4.1, "Reviewing the probe settings",).

System interface

The radio machine interface (RMI-Q) 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).

RMP60 is also compatible with the older radio machine interface (RMI) integrated interface/receiver. For more details, refer to the *RMI radio machine interface* installation guide (Renishaw part no. H-4113-8554).

Trigger Logic™

Trigger Logic™ (for more information, see page 4.1, “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.

A Probe Setup app is available that simplifies this process with clear, interactive instructions and informative videos and is available for download on the App Store and Google Play.

or

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 4.1, “Reviewing the probe settings”).

Probe modes

The RMP60 probe can be set in one of three modes:

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

NOTE: The RMP60 will enter **“hibernation mode”** should the system interface be powered off or out of range for a period of 30 seconds. This is a configurable setting.

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

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

Configurable settings

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	Switch-on 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 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 (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 (selection is made in RMI-Q). Otherwise, the switch-on time is 1 second.

For more information on the user selectable switch-on time when operating with RMI-Q, see the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504).

User selectable switch-on time is not available with the RMI.

In **"radio on mode"**, the switch-on time assumes a good radio communication link. In a poor radio frequency (RF) environment this may rise to a maximum of 3 seconds.

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.

Enhanced trigger filter

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

When the filter is enabled, a constant nominal 10 ms or 20 ms delay is introduced 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.

Factory set to OFF.

Hibernation mode

Only applicable to "**radio-on mode**".

When the RMP60 is in standby and the RMI or 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 or RMI-Q.

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

Factory set to 30 seconds.

Multiple probe mode

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 or RMI-Q.

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

NOTES:

"Multiple probe mode" is a function of the RMP60. As such, the option 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 or RMI-Q, 16 choices of **"mode on"** colours are available, each representing a different machine tool installation. (for more information, see page 4.2, "Multiple probe mode settings").

All probes operating with a single RMI or 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 or 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 to be partnered is partnered after selecting the **"multiple probe mode setting"** and choosing the **"mode on"** option. (for more information, see page 4.4, "Changing the probe settings").

There is no limit to the number of probes that can be used with a single RMI or 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) into a single probe installation will require that all probes are reconfigured to the same **"mode on"** colour choice and that one of the probes is then repartnered with the RMI or RMI-Q.

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.

Acquisition mode

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

Partnering is only required during initial system set-up. Further partnering is only required if the RMP60, RMI or RMI-Q is changed.

NOTES:

Systems using the RMI-Q can be partnered with up to four RMP60s manually. 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.

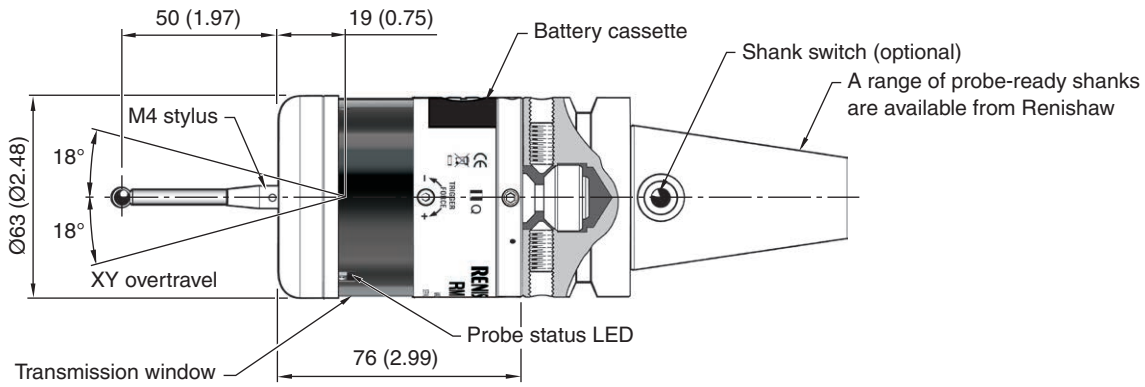
For more information or to download ReniKey free of charge visit:
www.renishaw.com/mtpsupport/renikey

Partnering by ReniKey is not available for the RMI.

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



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 or RMI-Q combined interface and receiver unit	
Sense directions	±X, ±Y, +Z	
Unidirectional repeatability	1.00 µm (40 µin) 2σ[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 latency.

3 Tests carried out using a 50 mm stylus.

Environment	IP rating	IPX8, BS EN 60529:1992+A2:2013
	IK rating RMP60	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)
Battery types	2 x AA 1.5 V alkaline or 2 x 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

Battery type	Shank switch-on			Spin switch-on		
	Standby life	**5% usage**	**Continuous use**	**Standby life**	**5% usage**	**Continuous use**
Alkaline	540 days	270 days	610 hours	240 days	170 days	600 hours
Lithium-thionyl chloride	890 days	560 days	1690 hours	520 days	390 days	1670 hours

Battery type	Radio switch-on				
	(1 second turn on)		(0.5 second turn on)		
	Standby life	**5% usage**	**Standby life**	**5% usage**	**Continuous use**
Alkaline	410 days	240 days	260 days	180 days	650 hours
Lithium-thionyl chloride	760 days	510 days	560 days	420 days	1710 hours

NOTE: 5% usage = 72 minutes/day.

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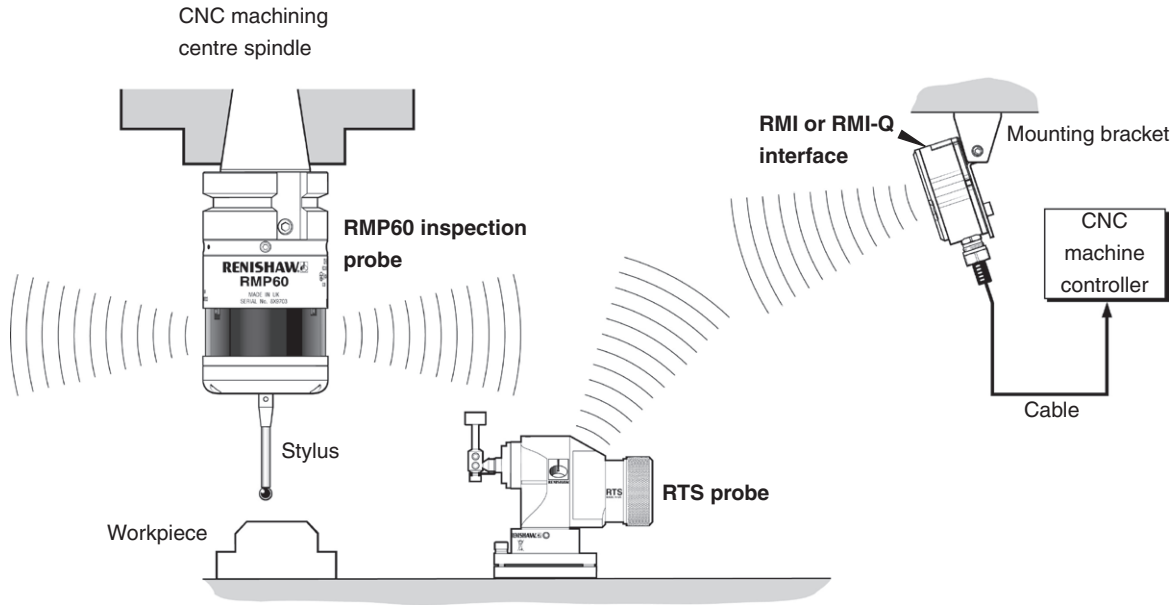
System installation

Installing the RMP60 with an RMI or RMI-Q



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, either inside or outside the machine enclosure, as long as the probe and RMI or RMI-Q are kept within the performance envelope. See page 3.2 “Performance envelope”, for further information.

Coolant and swarf residue accumulating on the RMP60 and RMI or RMI-Q 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 or the RMI or RMI-Q with your hands, as this will affect the performance.

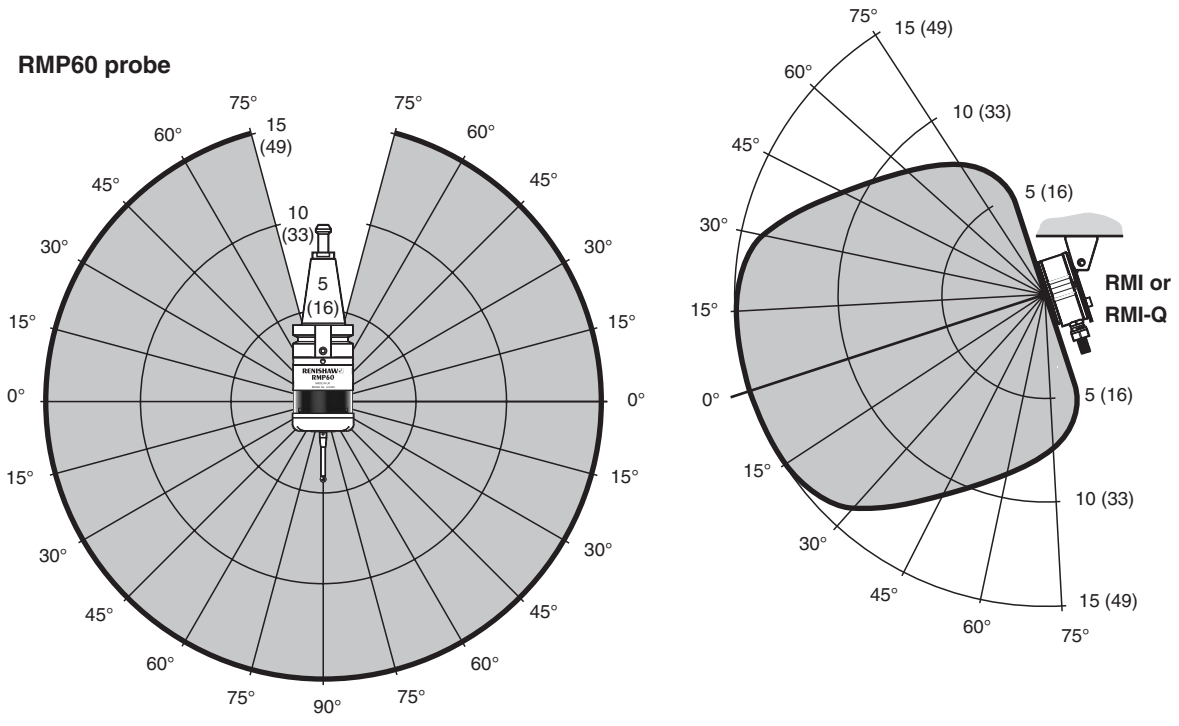
Positioning the RMP60 and RMI or RMI-Q

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 or RMI-Q in the general direction of the machining area and the tool magazine, ensuring both are within the performance envelope shown below. To assist in finding the optimum position of the RMI or RMI-Q, the signal quality is displayed on an RMI or RMI-Q signal LED.

Performance envelope

The RMP60 and RMI or RMI-Q must be within each other's performance envelope, as shown below. The performance envelope shows line-of-sight performance, however, radio transmission does not require this as any reflected radio paths will be less than the 15 m (49.2 ft) operating range.

Performance envelope when using the RMP60 with the RMI or RMI-Q



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

Preparing the RMP60 for use

Fitting the stylus

1

2

M-5000-3707

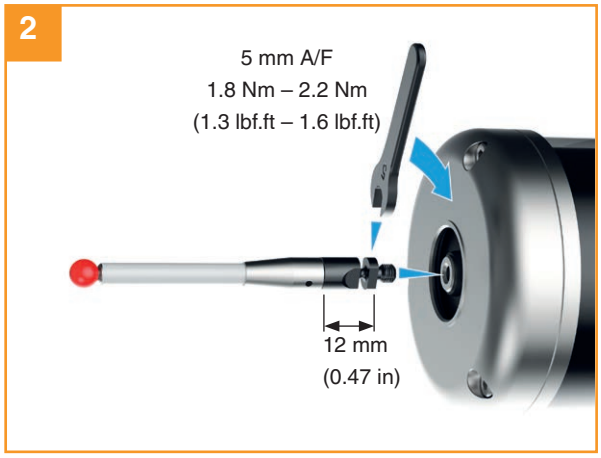
Stylus weak link

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

Fitting 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.



Removing a broken weak link

Installing the batteries

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.

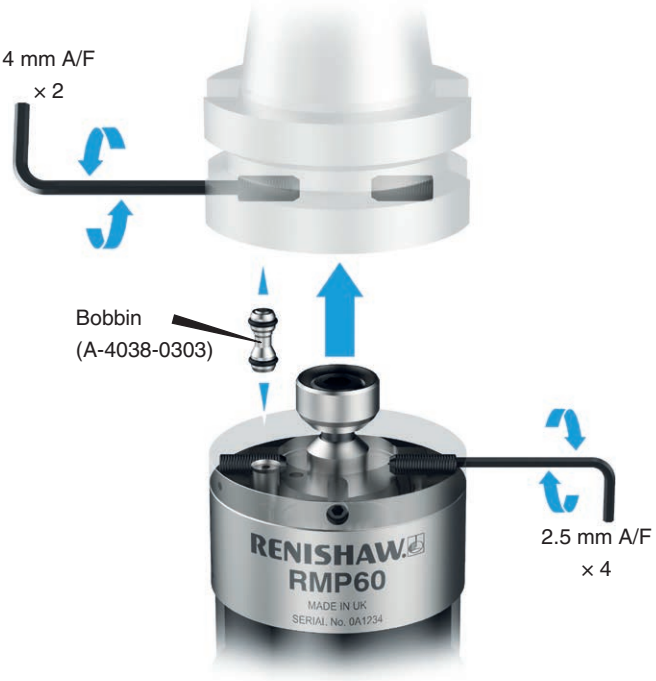
After inserting the batteries the LEDs will display the current probe settings (for further information, see page 4.1,“Reviewing the probe settings”).

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



3

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.

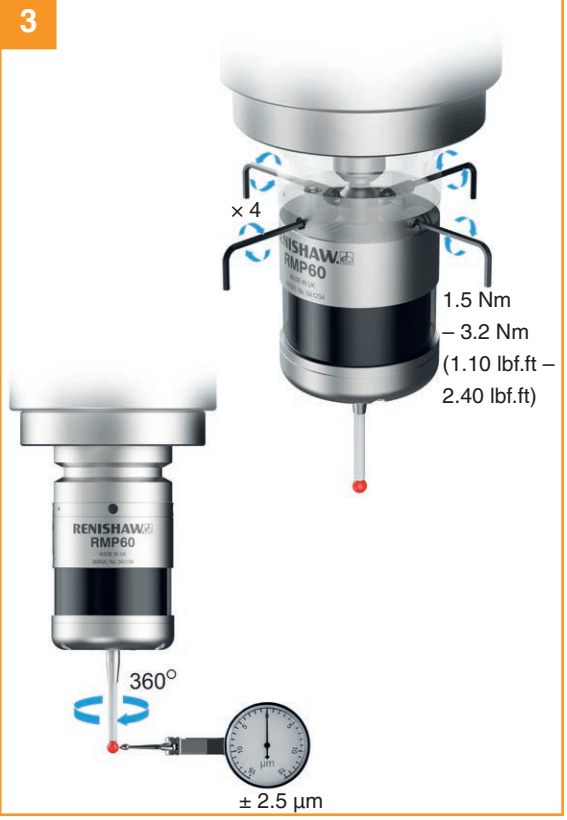
If a probe and shank assembly is dropped, it must be rechecked for correct on-centre adjustment.

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

1

2

3



Stylus trigger force and adjustment

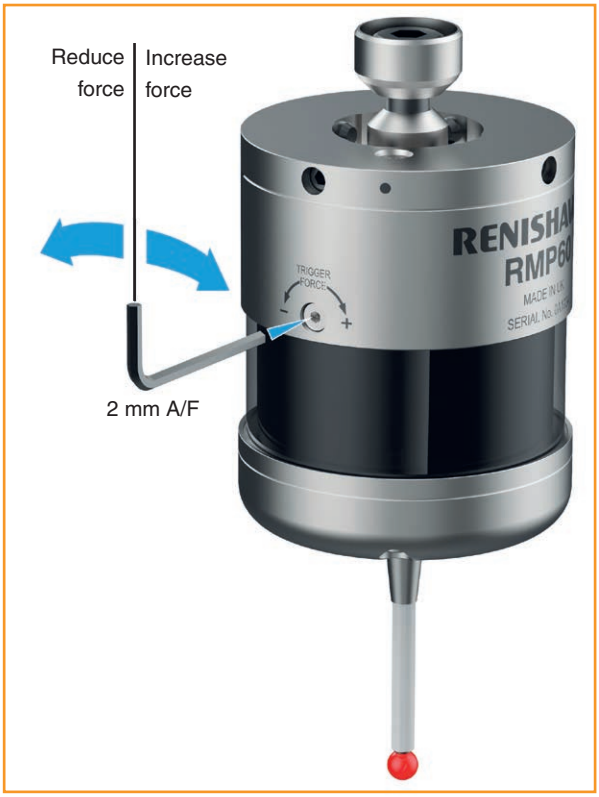
Spring force within the probe causes the stylus to sit in a unique position and return to this position following each stylus deflection.

Stylus trigger force is set by Renishaw. The user should only adjust trigger force in special circumstances, for example, where there is excessive machine vibration or insufficient force to support the stylus weight.

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 enhanced 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 values 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.

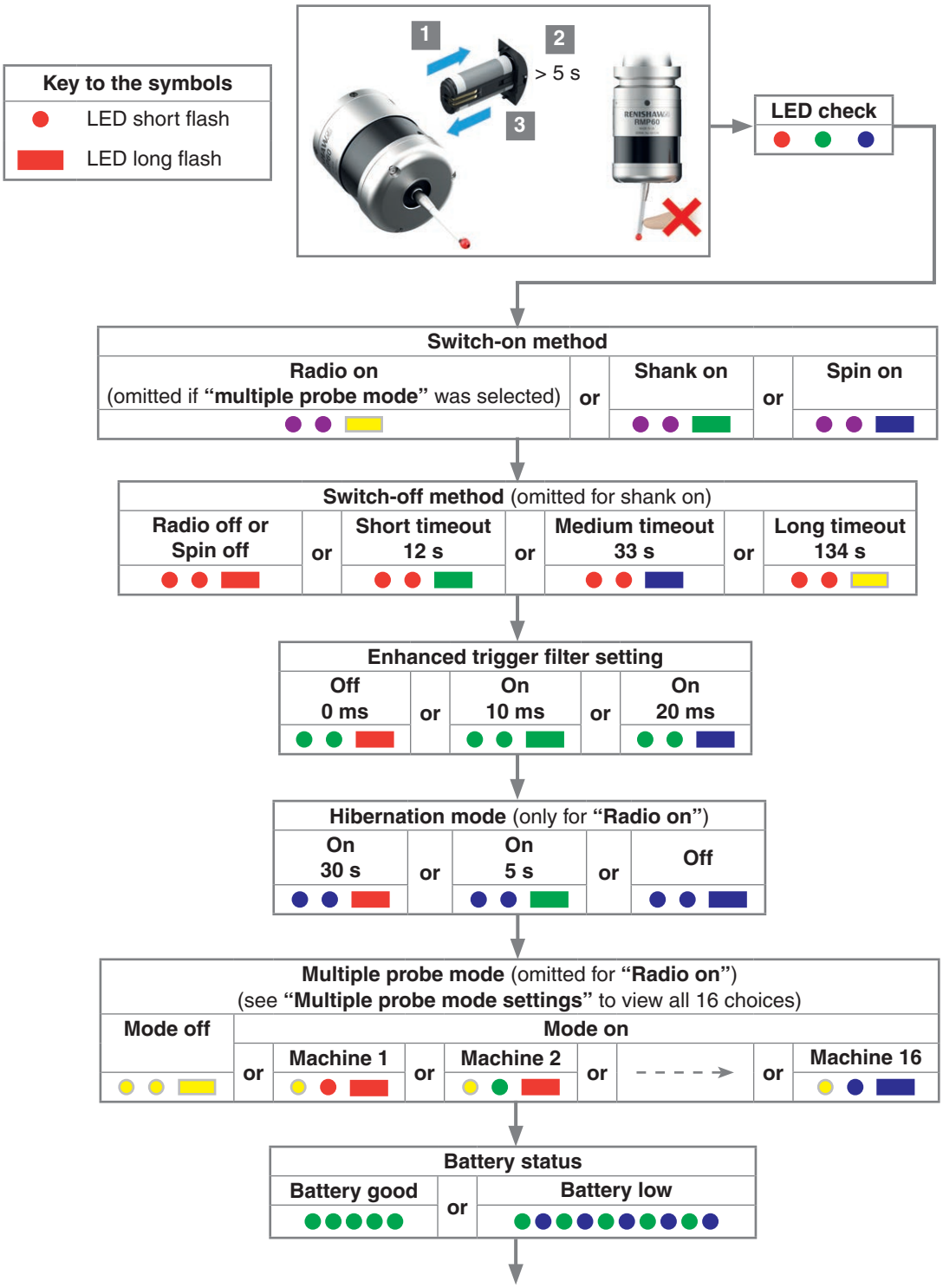
NOTE: The stored radius values are based on the true electronic trigger points. These values are different from the physical sizes.

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.

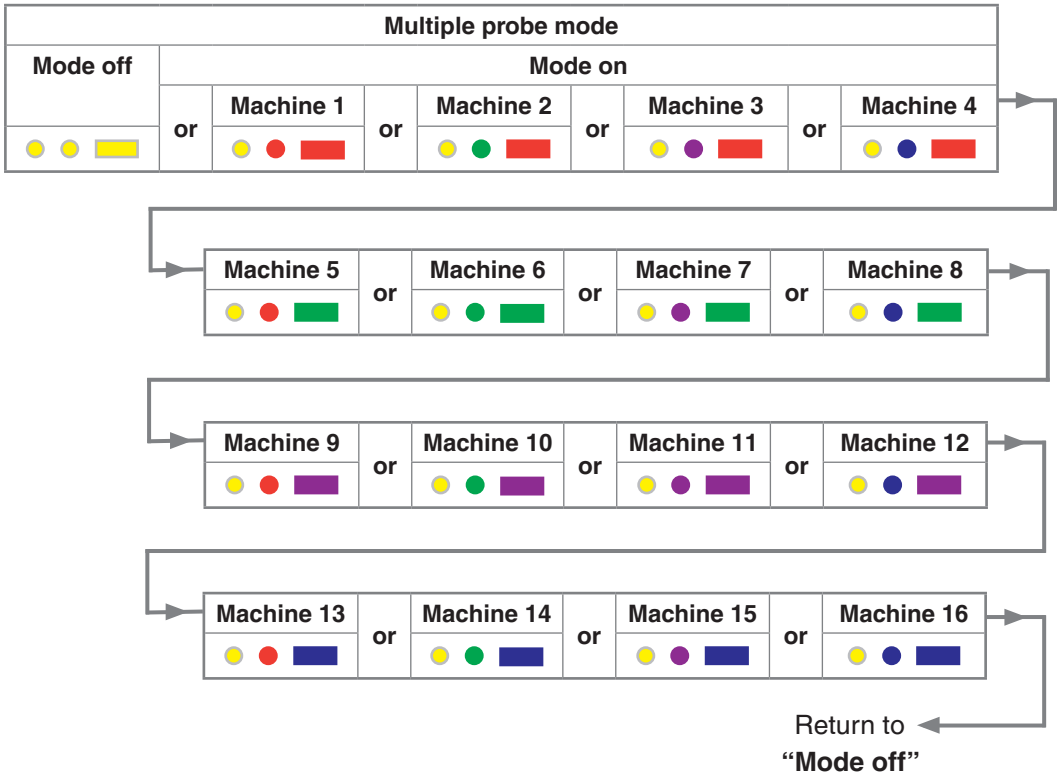
Trigger Logic™

Reviewing the probe settings



Multiple probe mode settings

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



Probe settings record

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

			✓ tick: Factory settings	✓ tick: New settings
Switch-on method	Radio on	● ● ▭	✓	
	Shank on	● ● ▭		
	Spin on	● ● ▭		
Switch-off method	Radio off or spin off or shank off	● ● ▭	✓	
	Short timeout (12 s)	● ● ▭		
	Medium timeout (33 s)	● ● ▭		
	Long timeout (134 s)	● ● ▭		
Enhanced trigger filter setting	Off (0 ms)	● ● ▭	✓	
	On (10 ms)	● ● ▭		
	On (20 ms)	● ● ▭		
Hibernation mode setting	On (30 s)	● ● ▭	✓	
	On (5 s)	● ● ▭		
	Off	● ● ▭		
Multiple probe mode	Off (factory set)	● ● ▭	✓	
	On (machine number)	See **"Multiple probe settings"**		

Factory settings are for kit (A-5742-0001) only.

RMP60 serial no .....

Changing the probe settings

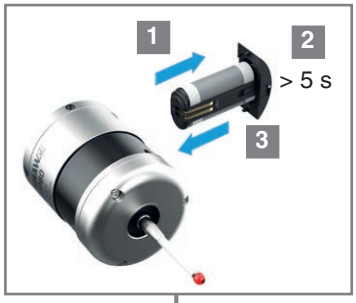
Insert the batteries or, if they have already been installed, remove them for five seconds and then refit them.

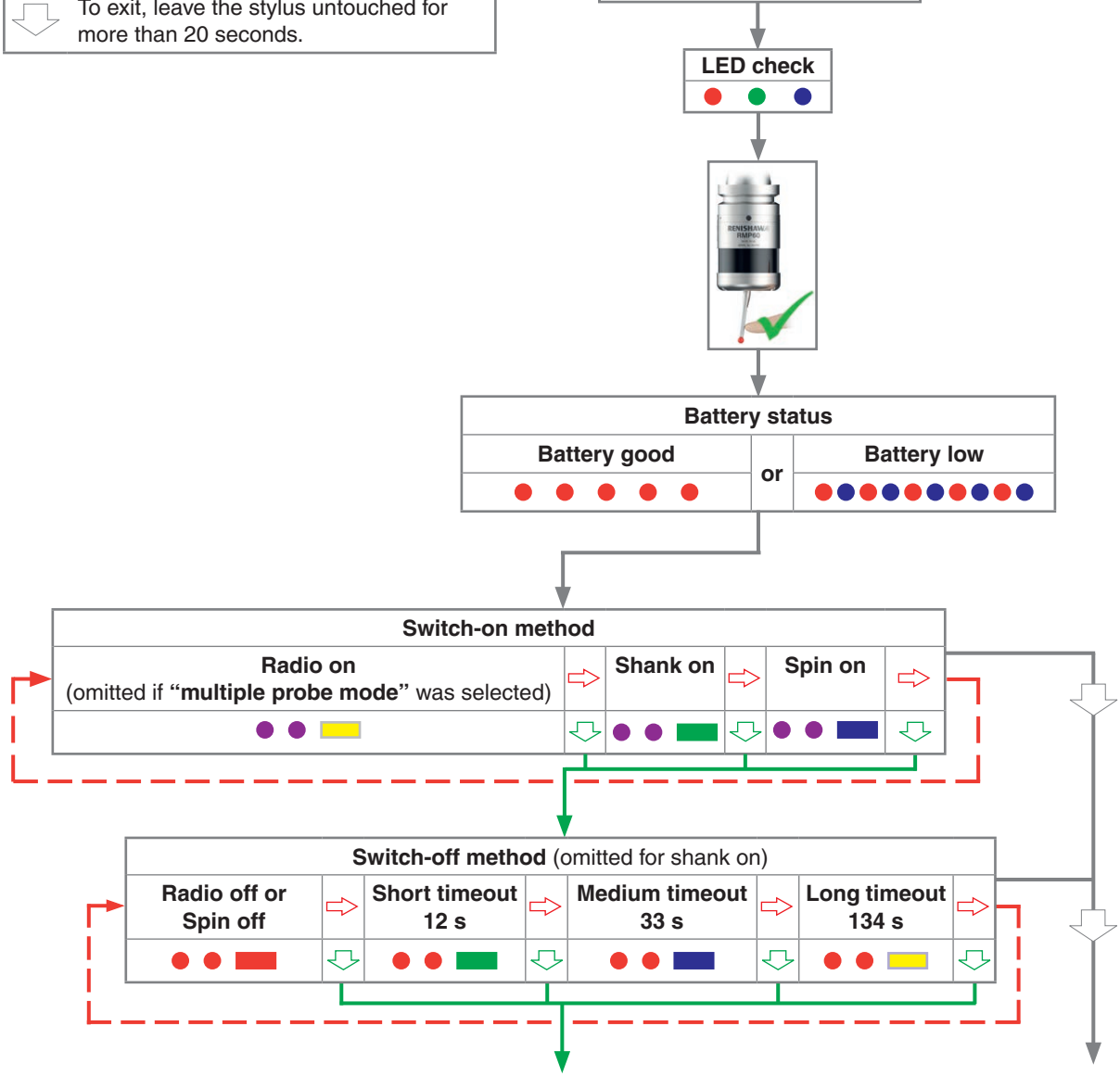
Following the LED check, immediately deflect the stylus and hold it deflected until five red flashes have been observed (if the battery power is low, each red flash will be followed by a blue flash).

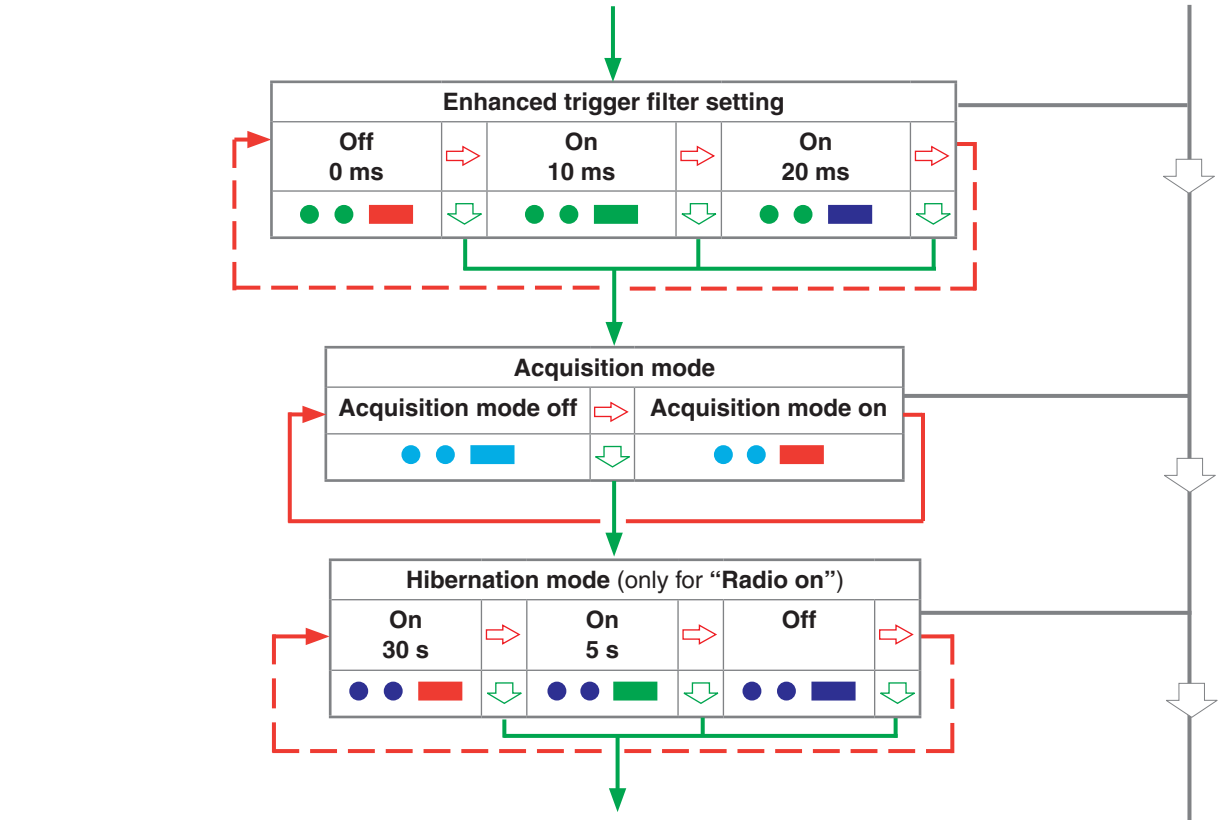
Keep the stylus deflected until the "**Switch-on method**" setting is displayed, then release it. The probe is now in configuration mode and Trigger Logic™ is activated.

CAUTION: Do not remove the batteries whilst in the configuration mode. Leave the stylus untouched for more than 20 seconds to exit.

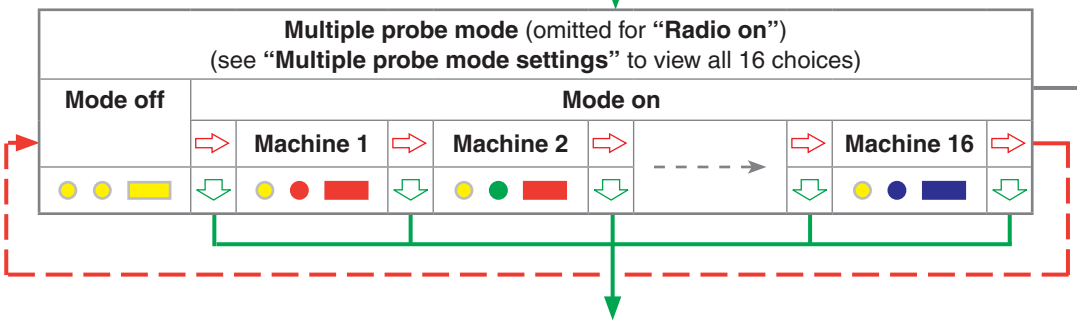
Key to the symbols	
●	LED short flash
▬	LED long flash
⇨	Deflect the stylus for less than 4 seconds to move to the next menu option.
⇩	Deflect the stylus for more than 4 seconds to move to the next menu.
⇩	To exit, leave the stylus untouched for more than 20 seconds.



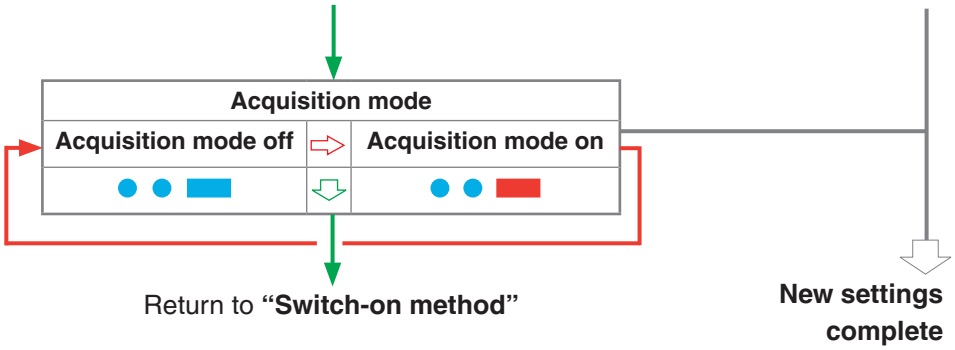




Stop triggering here, unless "**Multiple probe mode**" is required, in which case deflect the stylus for more than 4 seconds.



If no changes are made in "**Multiple probe mode**", deflecting the stylus for more than 4 seconds will return the probe settings to **"Switch-on mode"**. If "**Multiple probe mode**" is selected, proceed to "**Acquisition mode**" to repartner one probe with the RMI or RMI-Q.



NOTES:

If using "**Multiple probe mode**", refer to the *RMI radio machine interface* installation guide (Renishaw part no. H-4113-8554) or 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 or RMI-Q.

To partner an RMP60 with an RMI, see page 4.7, "RMP60 – RMI partnership" or to partner an RMP60 with an RMI-Q, see page 4.8, "RMP60 – RMI-Q partnership" Once Acquisition has been successful, the RMP60 will revert to "**Acquisition mode off**".

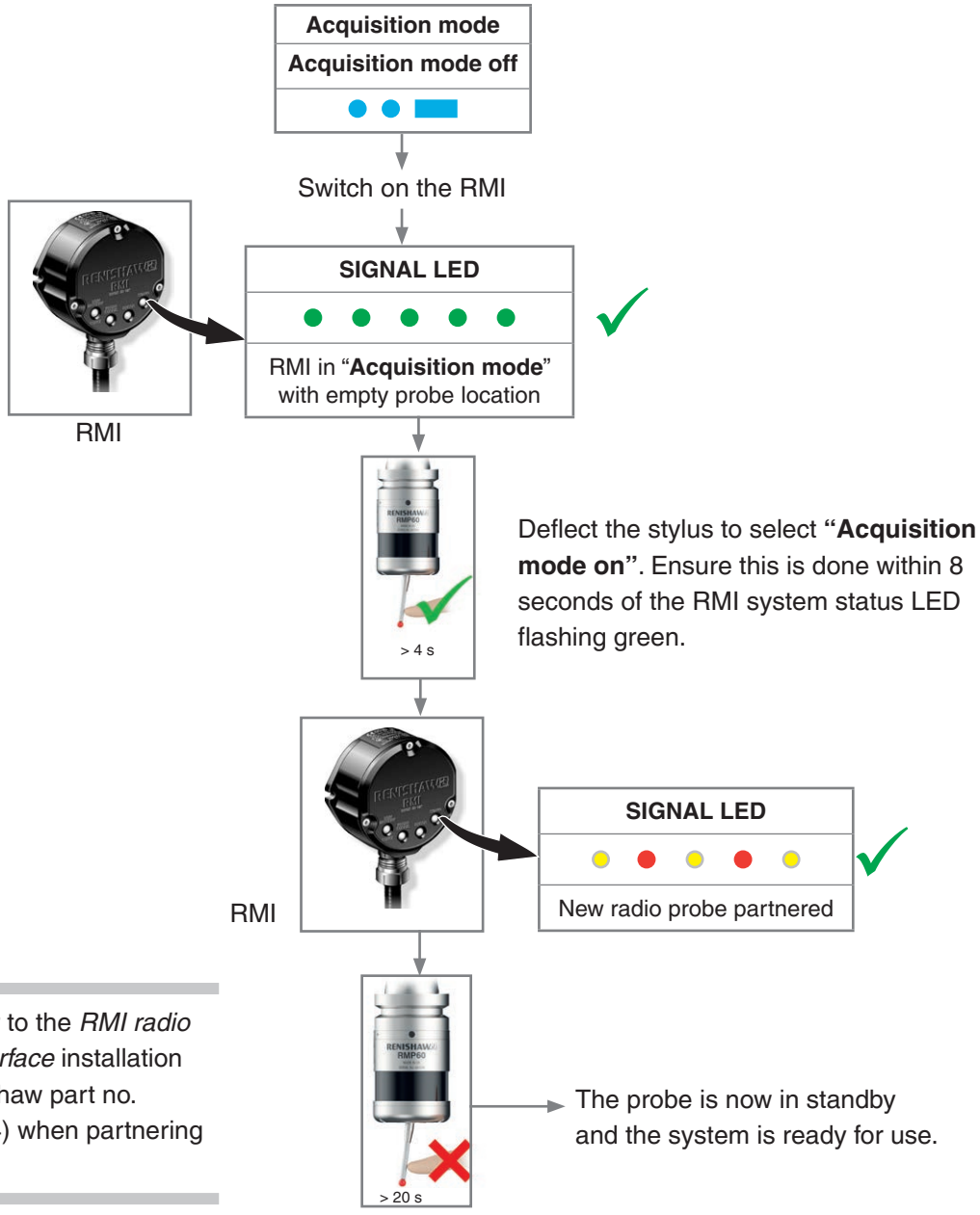
RMP60 – RMI partnership

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

Partnering is required during initial system set-up. Further partnering will be required if either the RMP60 or RMI is changed, or a system is reconfigured for multiple probes (**"multiple probe mode"**).

Partnering will not be lost by reconfiguring the probe settings or changing the batteries, except where **"multiple probe mode"** is selected. Partnering can take place anywhere within the operating envelope.

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



NOTE: Refer to the *RMI radio machine interface* installation guide (Renishaw part no. H-4113-8554) when partnering the RMP60.

RMP60 – RMI-Q partnership

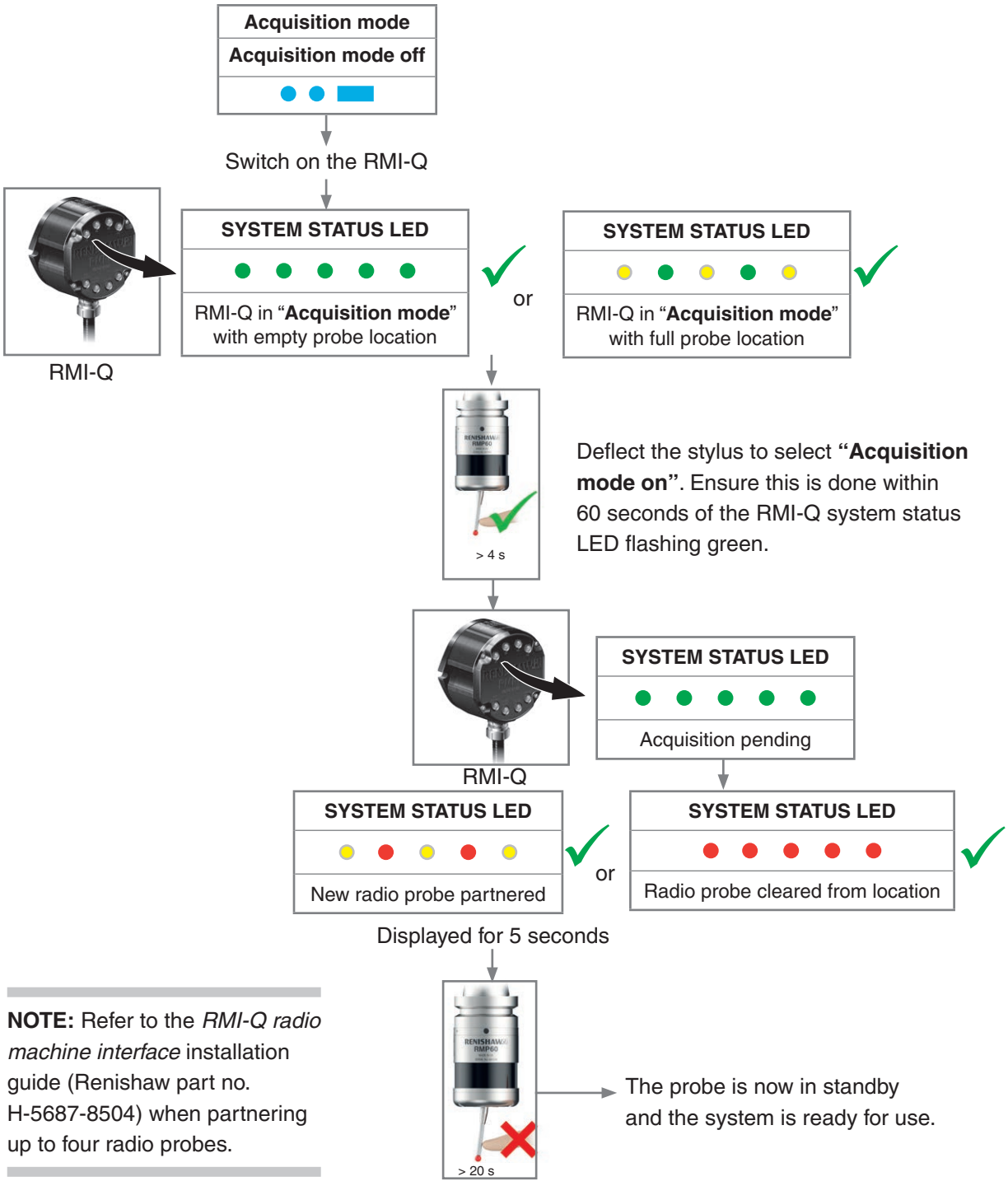
System set-up is achieved using Trigger Logic and powering on the RMI-Q or applying ReniKey.

Partnering is required during initial system set-up. Further partnering will be required if either the RMP60 or RMI-Q is changed.

Any RMP60 that is partnered with RMI-Q, but then used with another system, will need to be partnered again when it is brought to the RMI-Q.

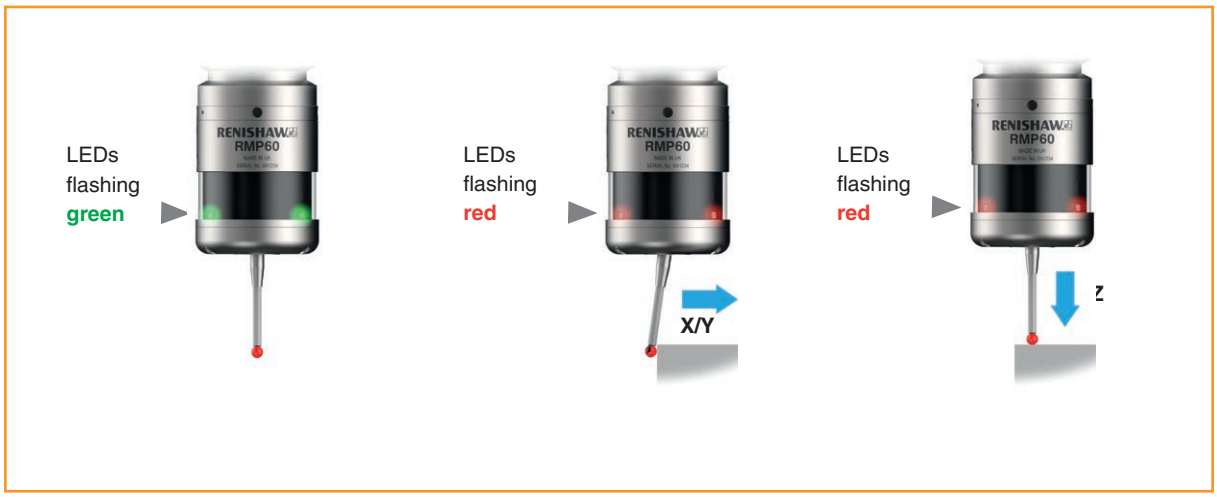
Partnering will not be lost by reconfiguring the probe settings or changing the batteries. Partnering can take place anywhere within the operating envelope.

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



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

Operating mode



Probe status LEDs

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

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

1. When the probe is active, the batteries discharge until battery power becomes too low for the probe to operate correctly.
2. The probe stops functioning, but then reactivates as the batteries recover sufficiently to provide the probe with power.
3. The probe begins to run through the LED review sequence (see page 4.1, “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.

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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 has a glass window. 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.

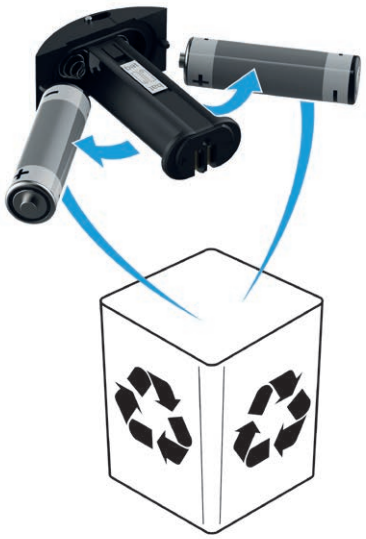
Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.

1

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

2



3

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:**	LS 14500	**AA 1.2 V** ✓
		Tadiran:	SL-760/S, TL-5903/S, TL-2100/S ✓	
		Xeno:	XL-060F	

4

5

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.

NOTE: Do not remove the inner diaphragm as your warranty will be invalidated.

Outer diaphragm replacement

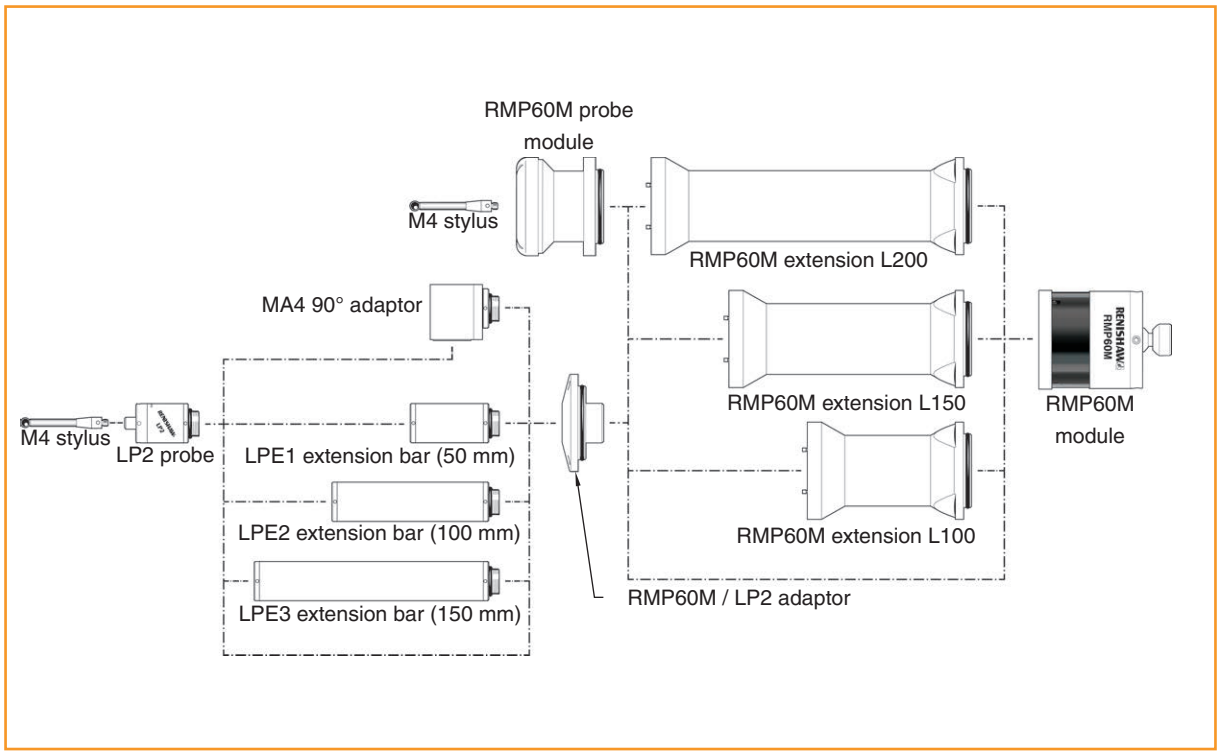
5. Fit the new diaphragm over the centre.
6. Locate the outer edge of the diaphragm to rest on the outer edge of the inner diaphragm.
7. Refit the front cover and M3 screws.
8. Refit the stylus and recalibrate the probe.

RMP60M system

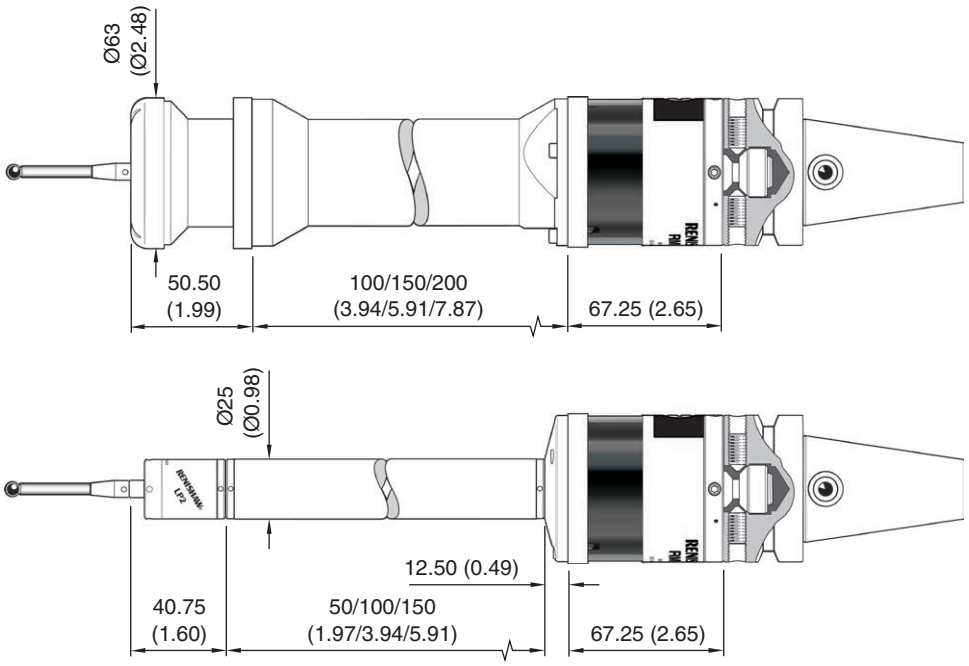
RMP60M system

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".

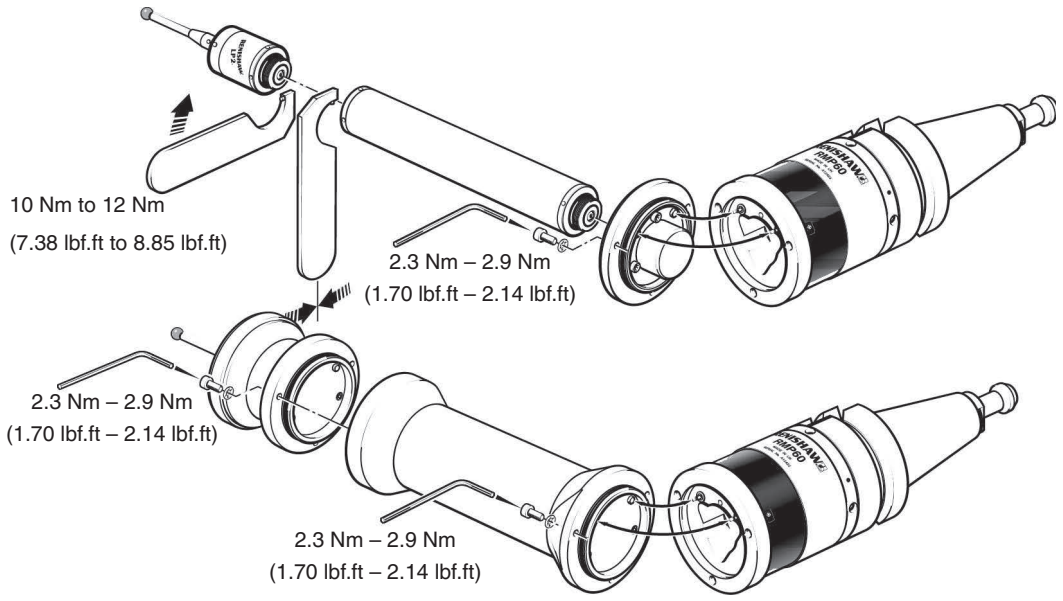


RMP60M dimensions



Dimensions mm (in)

RMP60M screw torque values



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 or RMI-Q, see operating envelope.
	No RMI or RMI-Q “start/stop” signal (**“radio on mode”** only).	Check RMI or RMI-Q for green start LED.
	Incorrect spin speed (**“spin switch on mode”** only).	Check spin speed and duration.
	Malfunctioning shank switch (**“shank switch mode”** only).	Check switch operation.
	Incorrect **“switch on mode”** configured.	Check configuration and alter as required.
	Incorrect **“multiple probe mode setting”** configured.	Check configuration and alter as required.
	RMP60 in **“hibernation mode”** (**“radio on mode”** only).	Ensure probe is in range and wait up to 30 seconds, then resend switch-on signal. Check position of RMI or RMI-Q, see operating envelope.

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 or RMI-Q receiver/machine fault.	Refer to receiver/machine user's guide.
	Dead batteries.	Change batteries.
	Probe unable to find target surface.	Check that part is correctly positioned and that stylus has not broken.
	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.	Enable enhanced trigger filter.
	Selection error for RMI or RMI-Q.	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.
	Excessive machine vibration.	Enable enhanced trigger filter. Eliminate vibrations.
	Environmental or physical change caused an error in calibrated offset.	Review probing software. Repeat calibration routine.
	Calibration and probing speeds not the same.	Review probing software and make speeds the same.
	Calibration 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 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
RMP60 status LEDs do not correspond to RMI or RMI-Q status LEDs.	Radio link failure – RMP60 out of RMI or RMI-Q range.	Check position of RMI or RMI-Q, see operating envelope.
	RMP60 has been enclosed/ shielded by metal.	Remove from obstruction.
	RMP60 and RMI or RMI-Q are not partnered.	Partner RMP60 and RMI or RMI-Q.
RMI or RMI-Q error LED lit during probing cycle.	Probe not switched on or probe timed out.	Change setting. Review turn off method.
	Probe out of range.	Check position of RMI or RMI-Q, see operating envelope.
	Dead batteries.	Change batteries.
	RMP60 and RMI or RMI-Q are not partnered.	Partner RMP60 with RMI or RMI-Q.
	Probe selection error.	Verify that one radio probe is working and is correctly selected on the RMI or RMI-Q.
	0.5 second turn-on error.	Ensure that all radio probes are ‘Q’ marked probes, or change the RMI-Q turn-on time to 1 second.
RMI or 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 or RMI-Q "start / stop" signal (**"radio on"** method only).	Check RMI or RMI-Q 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.

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Parts list

Item	Part number	Description
RMP60	A-5742-0001	RMP60 probe with batteries, tools and product support card (factory-set to radio on / radio off).
RMP60M module	A-5742-1003	RMP60M module with batteries, tools and product support card (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 x 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.
Cassette seal	A-4038-0301	Battery cassette housing seal..
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 product support card.
RMI-Q	A-5687-0050	RMI-Q (side exit) with 15 m (49.2 ft) cable, tools and product support card
Mounting bracket	A-2033-0830	RMI or RMI-Q 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.
RMP/OMP60M probe module assembly	A-4038-1002	RMP60M probe module assembly.
RMP/OMP60M LP2 adaptor	A-4038-0212	RMP60M LP2 adaptor assembly.

Item	Part number	Description
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**.		
RMI-Q IG	H-5687-8504	Installation guide: for set-up of the RMI-Q.
Styli	H-1000-3200	Technical specifications guide: Styli and accessories – or visit our Web shop 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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