

RMP60 – radio machine probe



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Renishaw part no: H-5742-8504-02-A

First issued: November 2012

Revised: March 2014
April 2014

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Before you begin

Before you begin

Disclaimer

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Trade marks

RENISHAW and the probe symbol used in the RENISHAW logo are registered trade marks of Renishaw plc in the United Kingdom and other countries. **apply innovation** and names and designations of other Renishaw products and technologies are trade marks of Renishaw plc or its subsidiaries.

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

Warranty

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

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

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

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

Changes to equipment

Renishaw reserves the right to change equipment specifications without notice.

CNC machines

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

Care of the probe

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

Patents

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

| | |
|----------------|-----------------|
| CN 100466003 | JP 3967592 |
| CN 101287958 | JP 4237051 |
| CN 101482402 | JP 4575781 |
| EP 0695926 | JP 4754427 |
| EP 1185838 | JP 4773677 |
| EP 1373995 | JP 4851488 |
| EP 1425550 | JP 5238749 |
| EP 1457786 | JP 5390719 |
| EP 1477767 | KR 1001244 |
| EP 1477768 | TW I333052 |
| EP 1576560 | US 2011/0002361 |
| EP 1701234 | US 5669151 |
| EP 1734426 | US 6776344 |
| EP 1804020 | US 6941671 |
| EP 1931936 | US 7145468 |
| EP 1988439 | US 7285935 |
| EP 2216761 | US 7441707 |
| WO 2004/057552 | US 7486195 |
| WO 2007/028964 | US 7665219 |
| IN 215787 | US 7812736 |
| | US 7821420 |

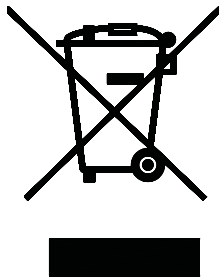
EC declaration of conformity



Renishaw plc hereby declares that the RMP60 radio machine probe is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Contact Renishaw plc at www.renishaw.com/rmp60 for the full EC declaration of conformity.

WEEE directive



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

FCC Information to user (USA only)

47 CFR Section 15.19

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

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

47 CFR Section 15.21

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

Radio approval

Radio equipment – Canadian warning statements

English

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

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

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

Français

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

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

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

Radio approvals

| | | |
|---------------|--------|--|
| Argentina | RMP60 | CNC ID: C-13091 |
| | RMP60M | CNC ID: C-13095 |
| Brazil: | | 0011-14-2812 |
| | |  |
| | | “Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.” |
| Canada: | | IC: 3928A-RMP60Q |
| China: | RMP60 | CMIIT ID: 2012DJ8119 |
| | RMP60M | CMIIT ID: 2012DJ8120 |
| Europe: | | CE |
| Japan: | RMP60 | 205-120132 |
| | RMP60M | 205-120134 |
| Singapore: | RMP60 | Reg. No: N2329-12 |
| | RMP60M | Reg. No: N2330-12 |
| | |  |
| South Africa: | RMP60 | TA-2013/1149 |
| | RMP60M | TA-2013/1150 |
| | |   |
| South Korea: | RMP60 | KCC-CRM-R1P-RMP60 |
| | RMP60M | KCC-CRM-R1P-RMP60M |
| Taiwan: | RMP60 | CCAB13LP413AT0 |
| | RMP60M | CCAB13LP4130T8 |

附件一

低功率電波輻射性電機管理辦法

第十二條

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

第十四條

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

前項合法通信，指依電信法規定作業之無線電通信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

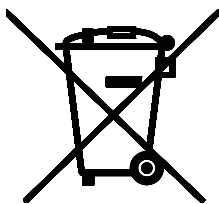
USA: FCC ID: KQGRMP60Q

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

Safety

Information to the user

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



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

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

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

- Keep the batteries out of the reach of children.
- Do not get batteries wet.

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

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

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

The RMP60 has a glass window. Handle with care if broken to avoid injury.

Information to the machine supplier/installer

It is the machine supplier's responsibility to ensure that the user is made aware of any hazards involved in operation, including those mentioned in Renishaw product literature, and to ensure that adequate guards and safety interlocks are provided.

Under certain circumstances, the probe signal may falsely indicate a probe seated condition. Do not rely on probe signals to halt the movement of the machine.

Information to the equipment installer

All Renishaw equipment is designed to comply with the relevant EC and FCC regulatory requirements. It is the responsibility of the equipment installer to ensure that the following guidelines are adhered to, in order for the product to function in accordance with these regulations:

- any interface **MUST** be installed in a position away from any potential sources of electrical noise, i.e. power transformers, servo drives etc;
- all 0 V/ground connections should be connected to the machine "star point" (the "star point" is a single point return for all equipment ground and screen cables). This is very important and failure to adhere to this can cause a potential difference between grounds;

- all screens must be connected as outlined in the user instructions;
- cables must not be routed alongside high-current sources, i.e. motor power supply cables etc, or be near high-speed data lines;
- cable lengths should always be kept to a minimum.

Equipment operation

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

RMP60 basics

Introduction

The RMP60 probe is part of a new generation of radio transmission part probing systems, 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 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 (see 'Installing the batteries' for further information).

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

System interface

The RMI-Q is an integrated interface/receiver used to communicate between the RMP60 probe and the machine control.

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

Trigger Logic™

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

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

Probe modes

The 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.

1. Radio on/Radio off
2. Radio on/Timer off
3. Spin on/Spin off
4. Spin on/Timer off
5. Shank switch on/Shank switch off

| RMP60 switch-on method | RMP60 switch-off method | Switch-on time |
|--|--|-------------------------------------|
| Switch-on options are configurable | Switch-off options are configurable | |
| <p>Radio on</p> <p>Radio switch on is commanded by machine input.</p> | <p>Radio off</p> <p>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.</p> <p>Timer off (timeout)</p> <p>Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset.</p> | 1 second (see notes below). |
| <p>Spin on</p> <p>Spin at 500 rev/min for 1 second minimum.</p> | <p>Spin off</p> <p>Spin at 500 rev/min for 1 second minimum. A timer automatically switches the probe off 90 minutes after the last trigger if it is not spun.</p> <p>Timer off (timeout)</p> <p>Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset.</p> | 1 second maximum (see notes below). |
| <p>Shank switch on</p> | <p>Shank switch off</p> | 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 1.0 second.

For more information on the user selectable switch-on time when operating with RMI-Q, please refer to the RMI-Q installation guide.

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 RF environment this may rise to a maximum of 3.0 seconds.

In 'spin on' mode, the 1 second starts from the moment the spindle reaches 500 rev/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-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.

Factory set to 30 seconds.

Multiple probe mode

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

Up to four RMP60s can be used with a single RMI-Q in 'radio on/off' mode. For further details of this functionality, please refer to the *RMI-Q 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-Q, 16 choices of 'mode on' colours are available, each representing a different machine tool installation. See 'Multiple probe settings' in Section 4, "Trigger Logic™".

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 needs to 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 to be partnered is partnered after selecting the 'multiple probe mode' setting and choosing the 'mode on' option. See 'Changing the probe settings' in Section 4, "Trigger Logic™".

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) 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-Q.

The addition of any further probe(s), or replacements, into a multi-probe installation can be achieved simply 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-Q.

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

NOTES:

Systems using the RMI-Q can be partnered with up to four RMP60s manually. Alternatively this can be achieved by using ReniKey; a Renishaw machine macro cycle which does not require the RMI-Q to be power cycled.

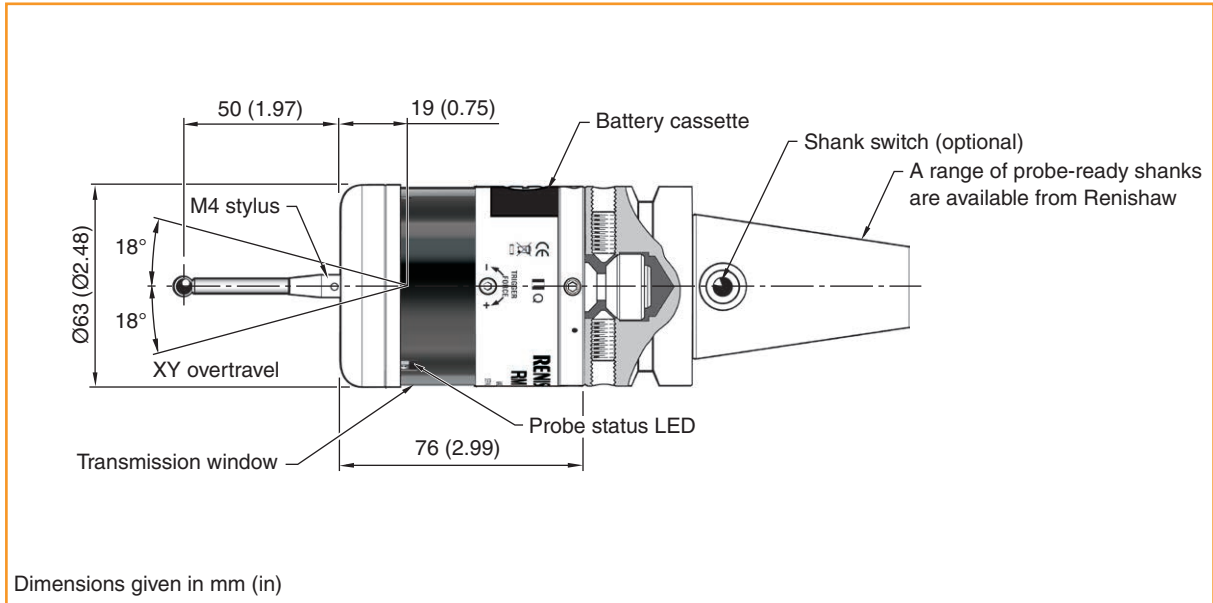
For more information or to download Renikey free of charge visit:
www.renishaw.com/mtpsupport/renikey

Partnering by ReniKey is not available for 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



| 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 | 76 mm (2.99 in) |
| | Diameter | 63 mm (2.48 in) |
| Weight (without shank) | With batteries | 876 g (30.90 oz) |
| | Without batteries | 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 rev/min | |
| Operating range | Up to 15 m (49.2 ft) | |
| Receiver/interface | RMI-Q or RMI combined interface and receiver unit | |
| Sense directions | ±X, ±Y, +Z | |
| Unidirectional repeatability | 1.00 µm (40 µin) 2σ (see note 1) | |
| Stylus trigger force (see notes 2 and 3) 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) | |
| Stylus overtravel | XY plane | ±18° |
| | +Z plane | 11 mm (0.43 in) |

Note 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.

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

Note 3 Tests carried out using a 50 mm stylus.

| | | |
|-------------------------------|--|--------------------------------------|
| Environment | IP rating | IPX8 |
| | Storage temperature | -25 °C to +70 °C (-13 °F to +158 °F) |
| | Operating temperature | +5 °C to +55 °C (+41 °F to +131 °F) |
| Battery types | 2 x AA 1.5 V alkaline or 2 x AA 3.6 V Lithium Thionyl Chloride | |
| Battery reserve life | Approximately one week after a low battery warning is first given. | |
| Typical battery life | See table below. | |
| 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. | |

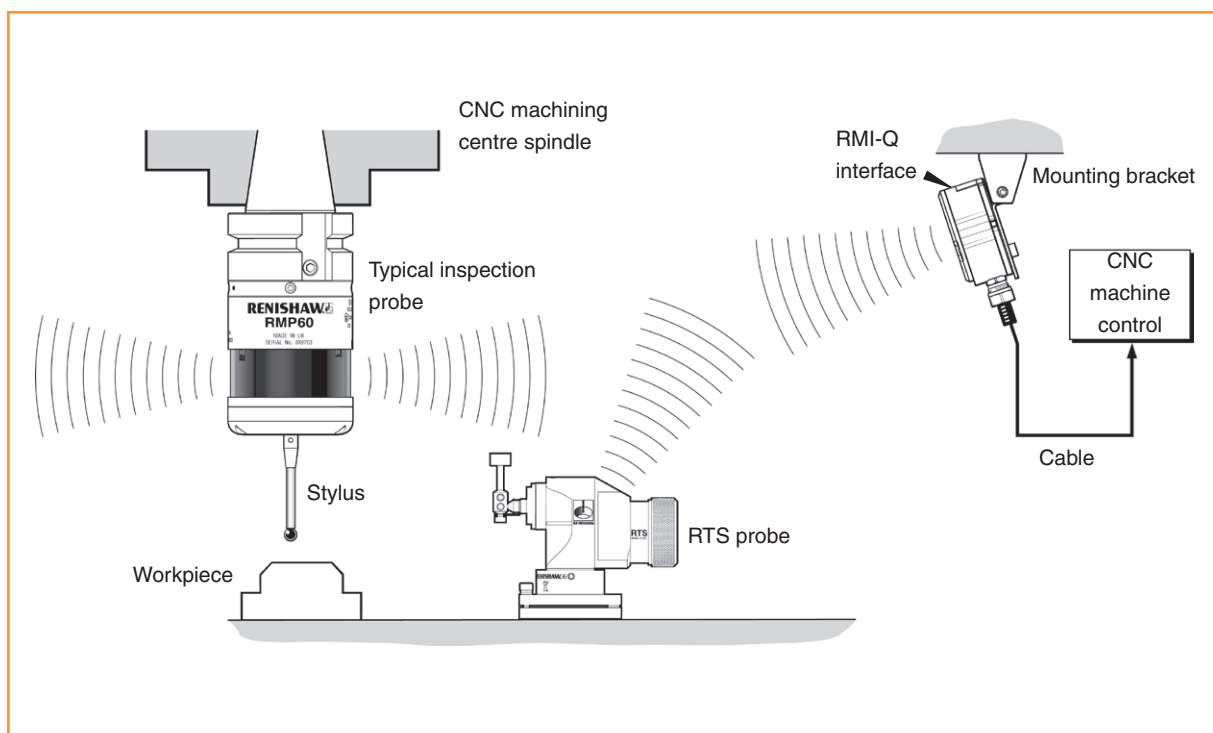
| Battery type | Shank switch-on | | | Spin switch-on | | |
|---------------------------------|-----------------|----------|----------------|----------------|----------|----------------|
| | Standby life | 5% usage | Continuous use | Standby life | 5% usage | Continuous use |
| Alkaline | 540 days | 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) | | Continuous use |
| | Standby life | 5% usage | Standby life | 5% usage | |
| 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.

System installation

Installing the RMP60 with an RMI-Q



Operating envelope

Radio transmission does not require line-of-sight and will pass through very small gaps and machine tool windows. This allows easy installation, either inside or outside the machine enclosure.

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

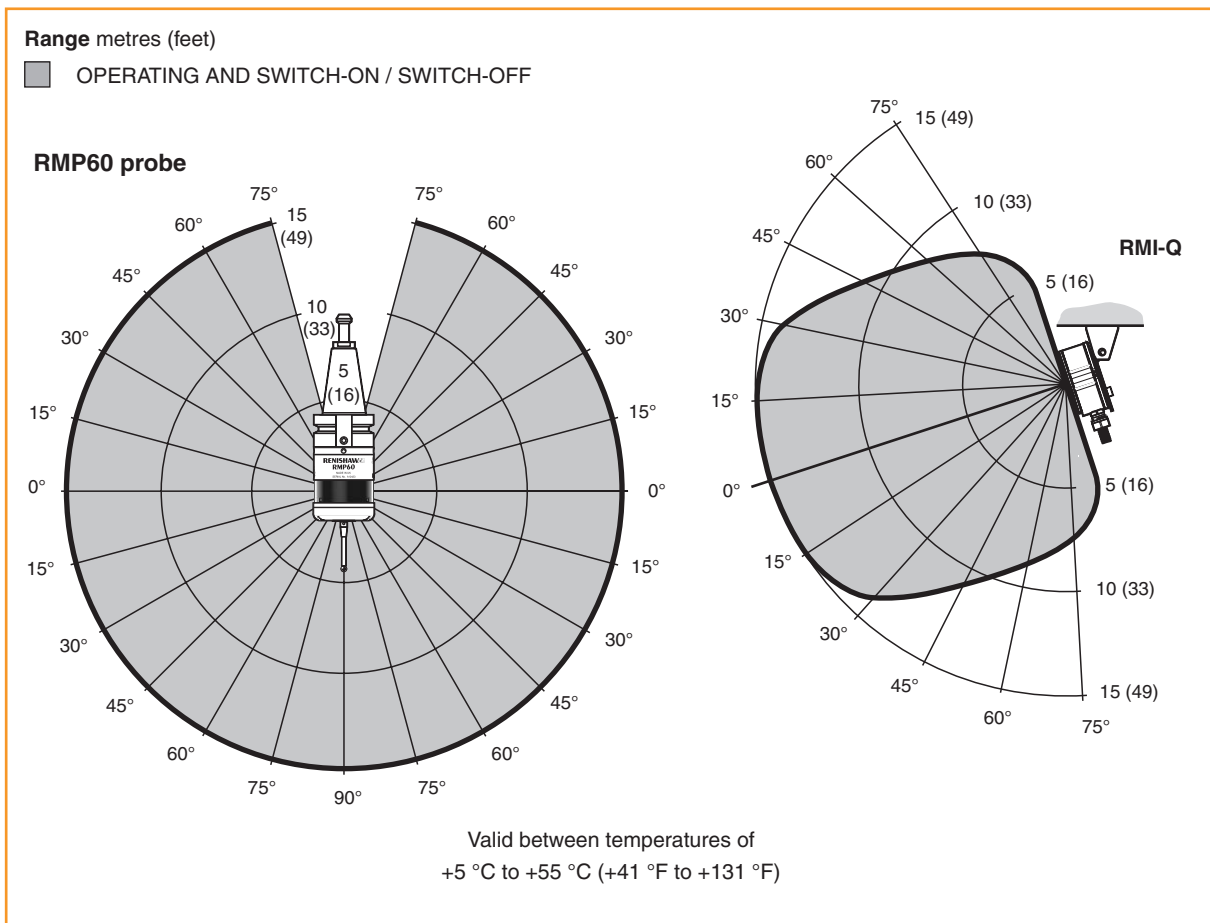
When operating, do not cover the probe glass window or the RMI-Q with your hands, as this will affect the performance.

RMP60 / RMI-Q positioning

The probe system should be positioned so that the optimum range can be achieved over the full travel of the machine's axes. Always face the front cover of the RMI-Q in the general direction of the machining area and the tool magazine, ensuring both are within the performance envelope shown below. To assist in finding the optimum position of the RMI-Q, the signal quality is displayed on an RMI-Q signal LED.

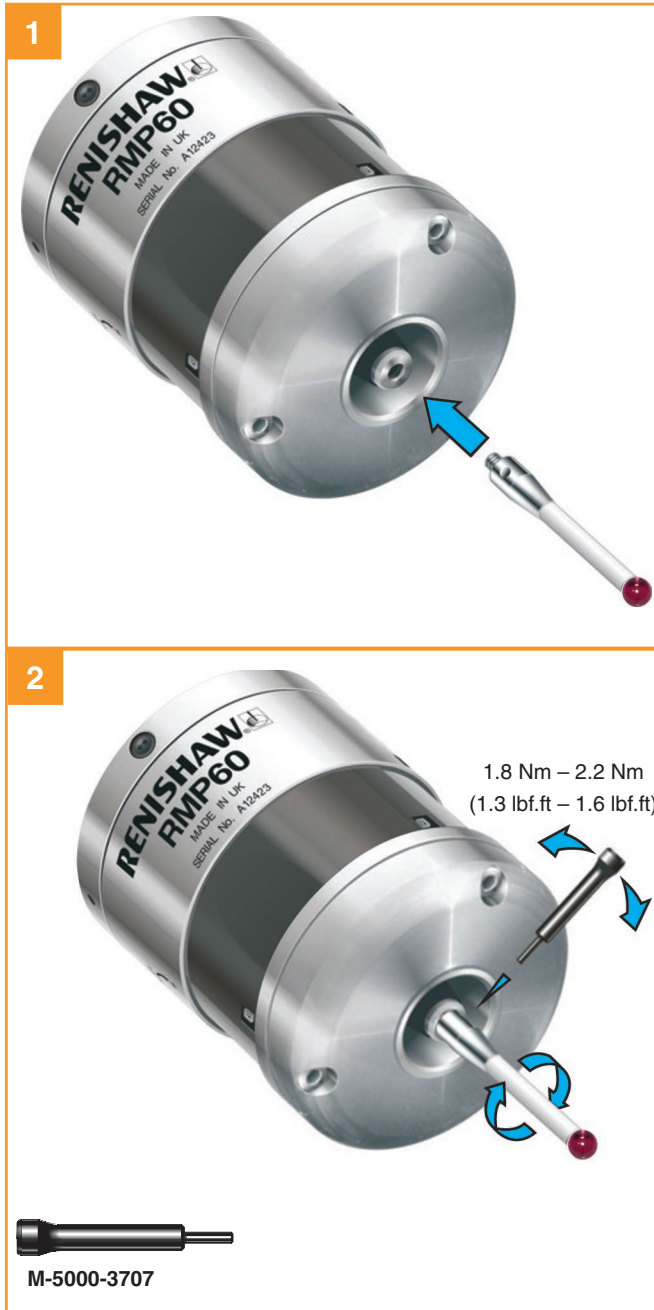
Performance envelope

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



Preparing the RMP60 for use

Fitting the stylus



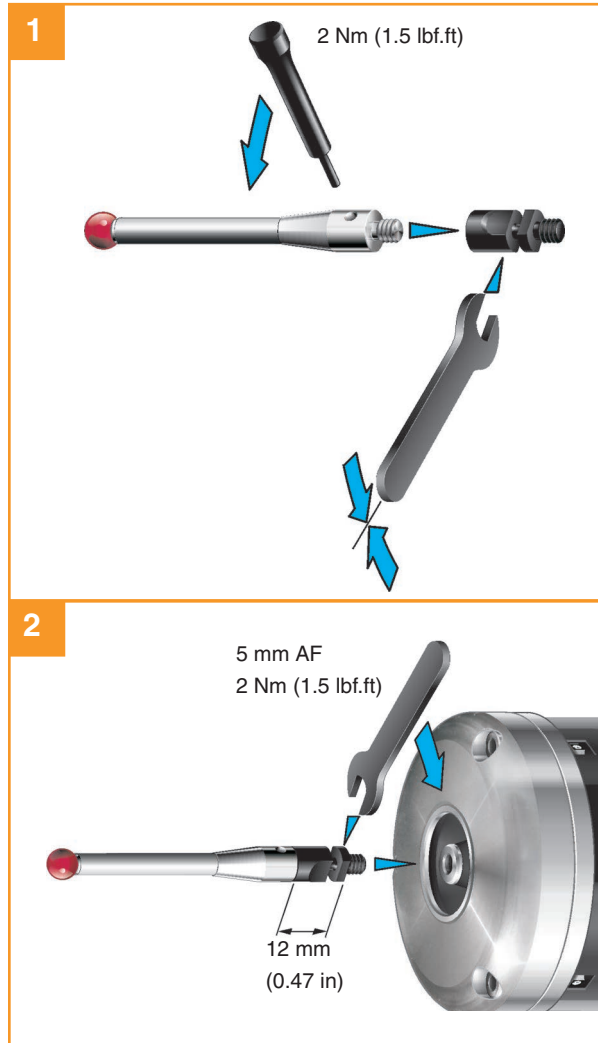
Stylus weak link

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

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 details, see Section 4, "Trigger Logic™").

2



3



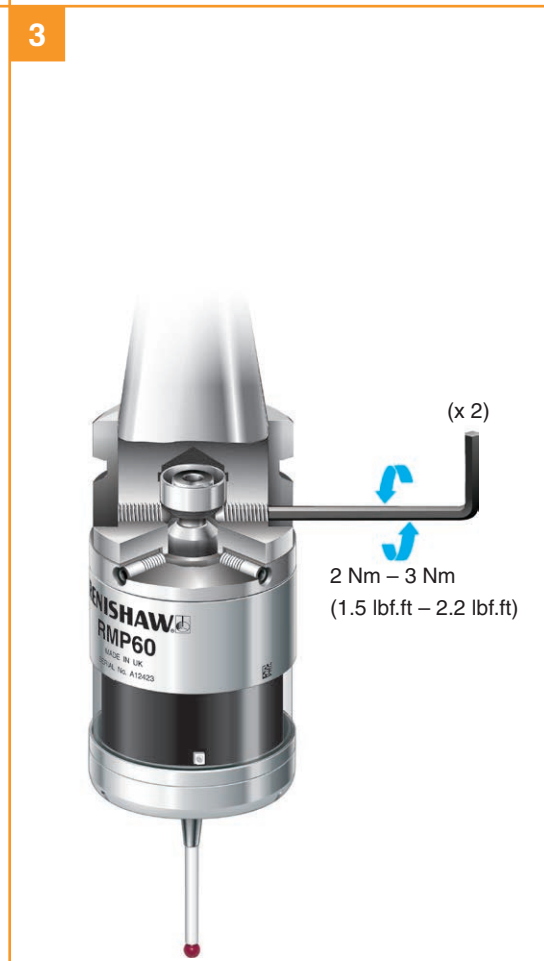
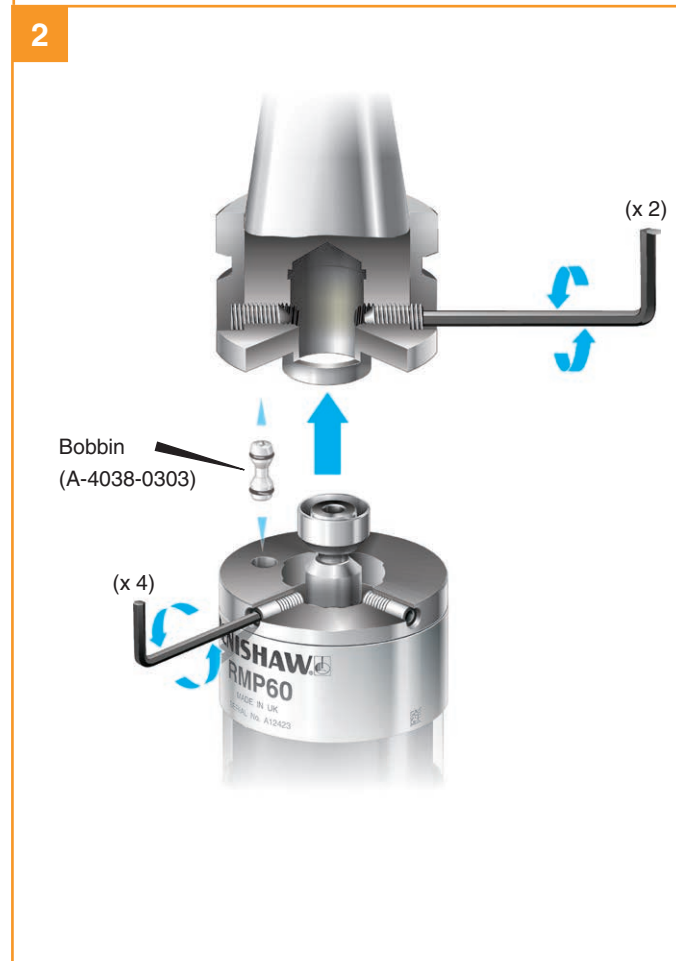
4



Mounting the probe on a shank (or machine table)



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).



Stylus on-centre adjustment

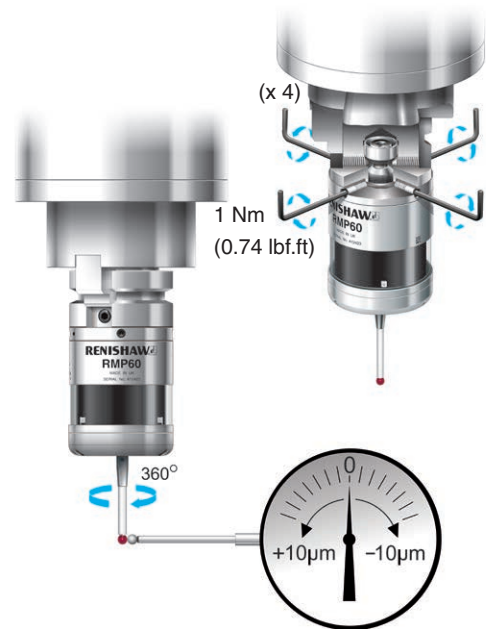
NOTES:

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.

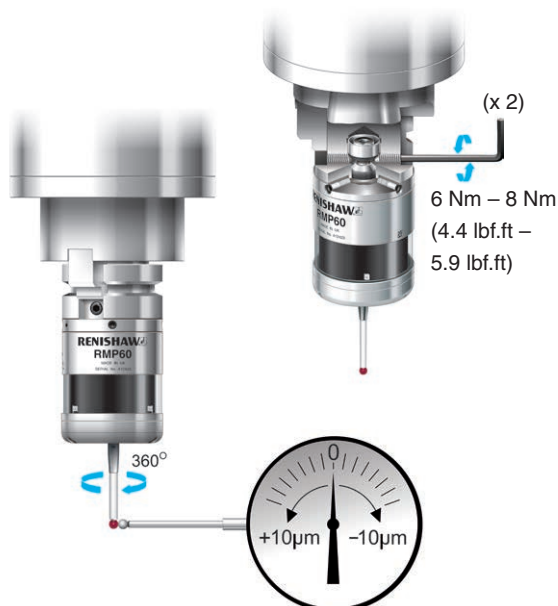
If a probe and shank assembly is dropped, it must be rechecked for correct on-centre adjustment.

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

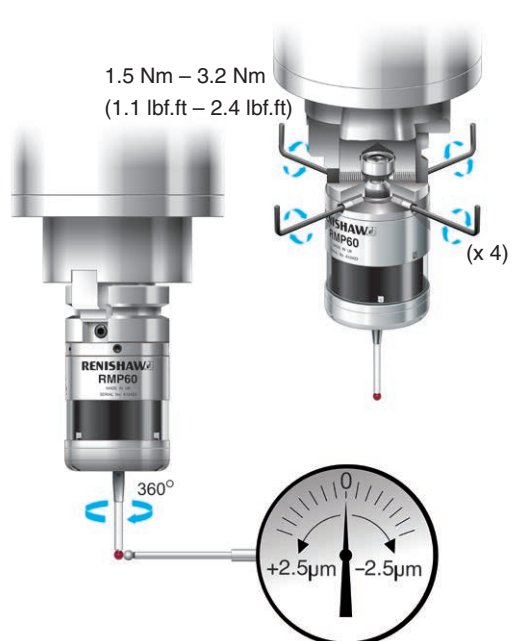
1



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 e.g. 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

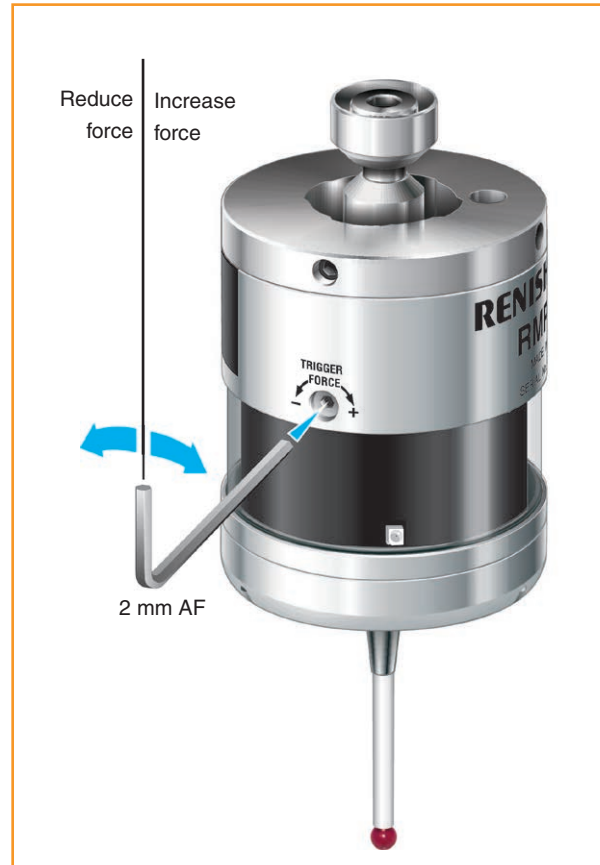
| | |
|---------------|----------------------------|
| XY low force | 0.75 N, 76 gf (2.70 ozf) |
| XY high force | 1.40 N, 143 gf (5.04 ozf) |
| +Z | 5.30 N, 540 gf (19.06 ozf) |

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 delay is changed;
- when a new stylus is fitted to the probe;
- when it is suspected that the stylus has become distorted or that the probe has been crashed;
- at regular intervals to compensate for mechanical changes of your machine tool;
- 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 "Stylus on-centre adjustment" earlier in this section). 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.

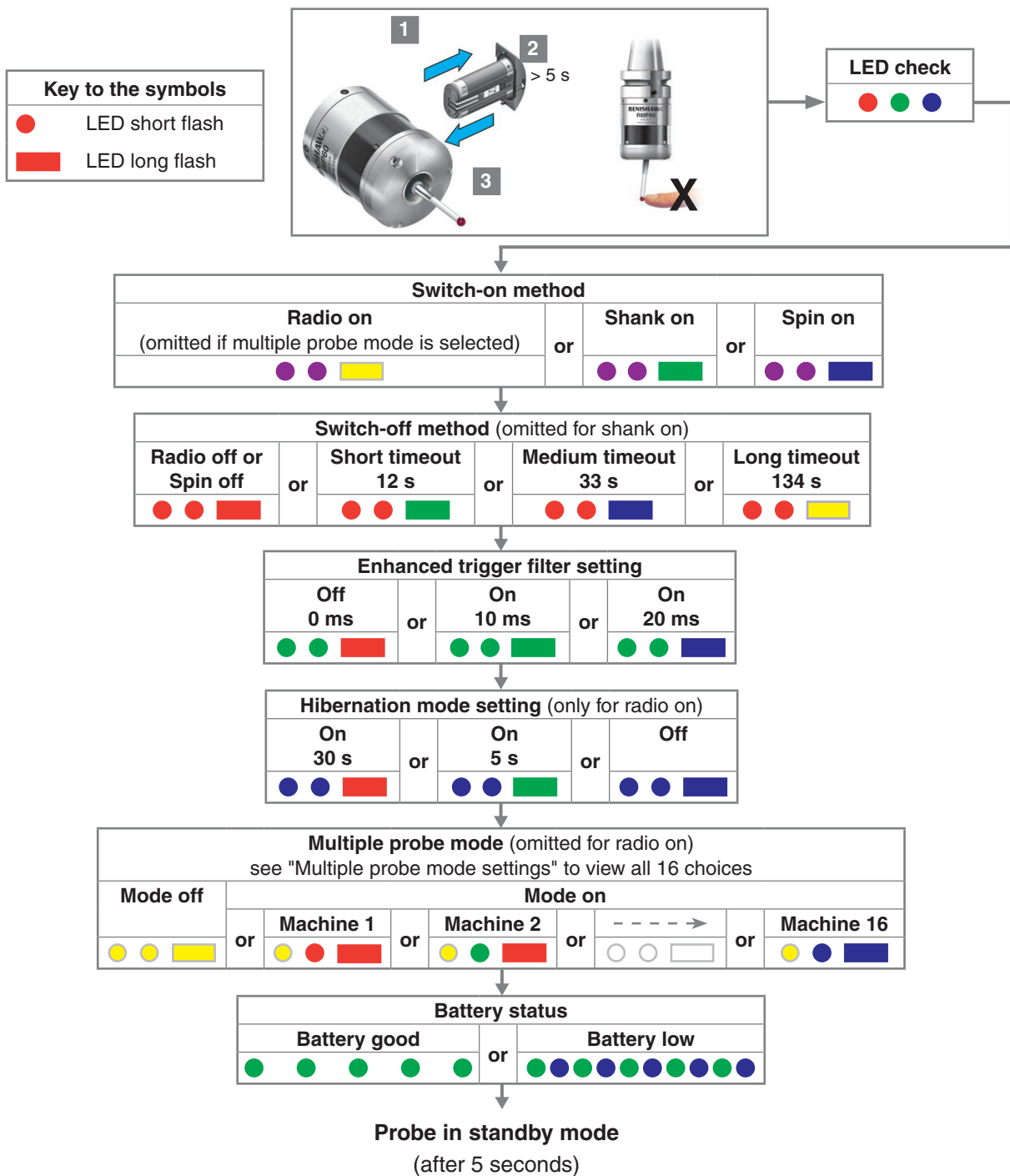
Calibrating the probe length

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.

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Trigger Logic™





Reviewing the probe settings



Probe settings record

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

✓ tick ✓ tick

| | | | Factory settings | New settings |
|--|-----------------------|--|------------------|--------------|
| Switch-on method | Radio on |  | ✓ | |
| | Shank on |  | | |
| | Spin on |  | | |
| Switch-off method | Radio or spin |  | ✓ | |
| | 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

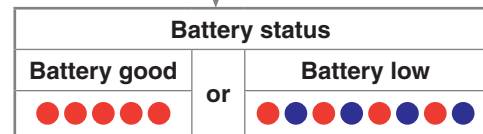
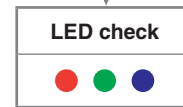
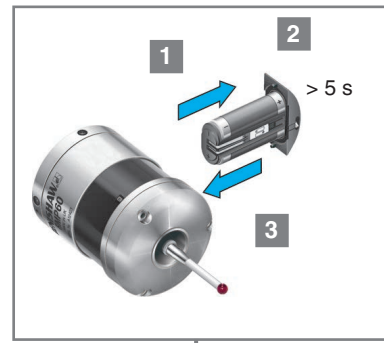
Changing the probe settings

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

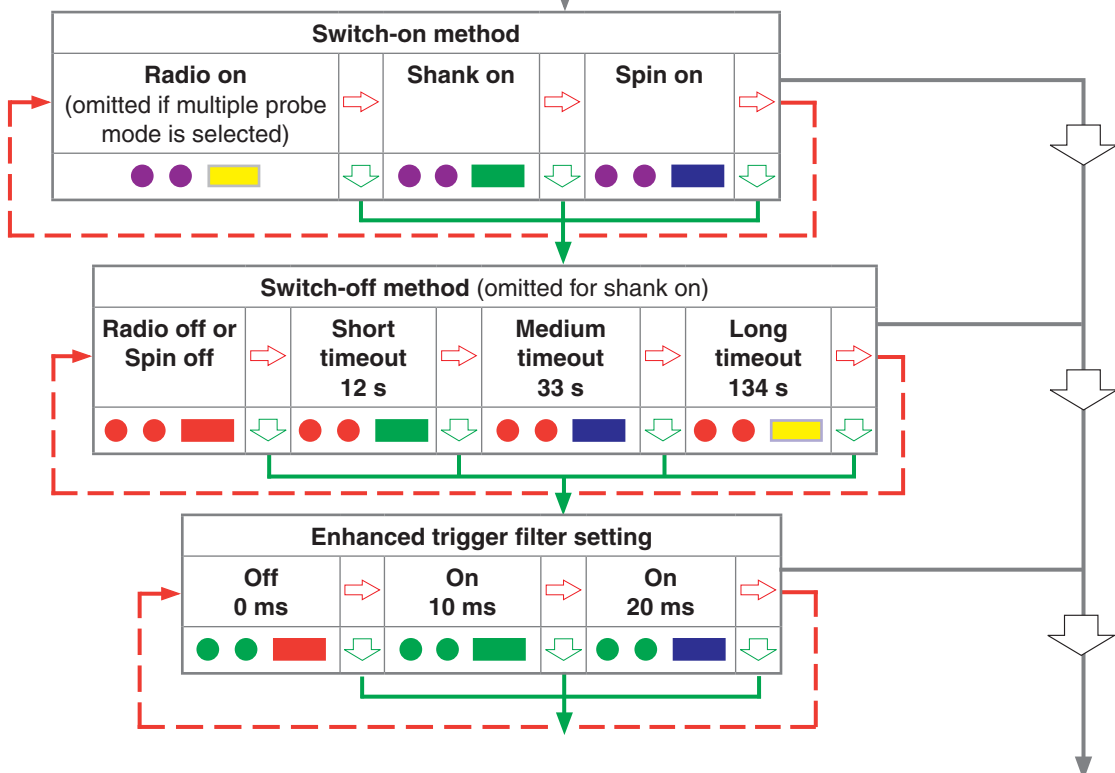
Following the LED check, immediately deflect the stylus and hold it deflected until five red flashes have been observed (if the battery power is low then each of the five red flashes will be followed by a blue flash).

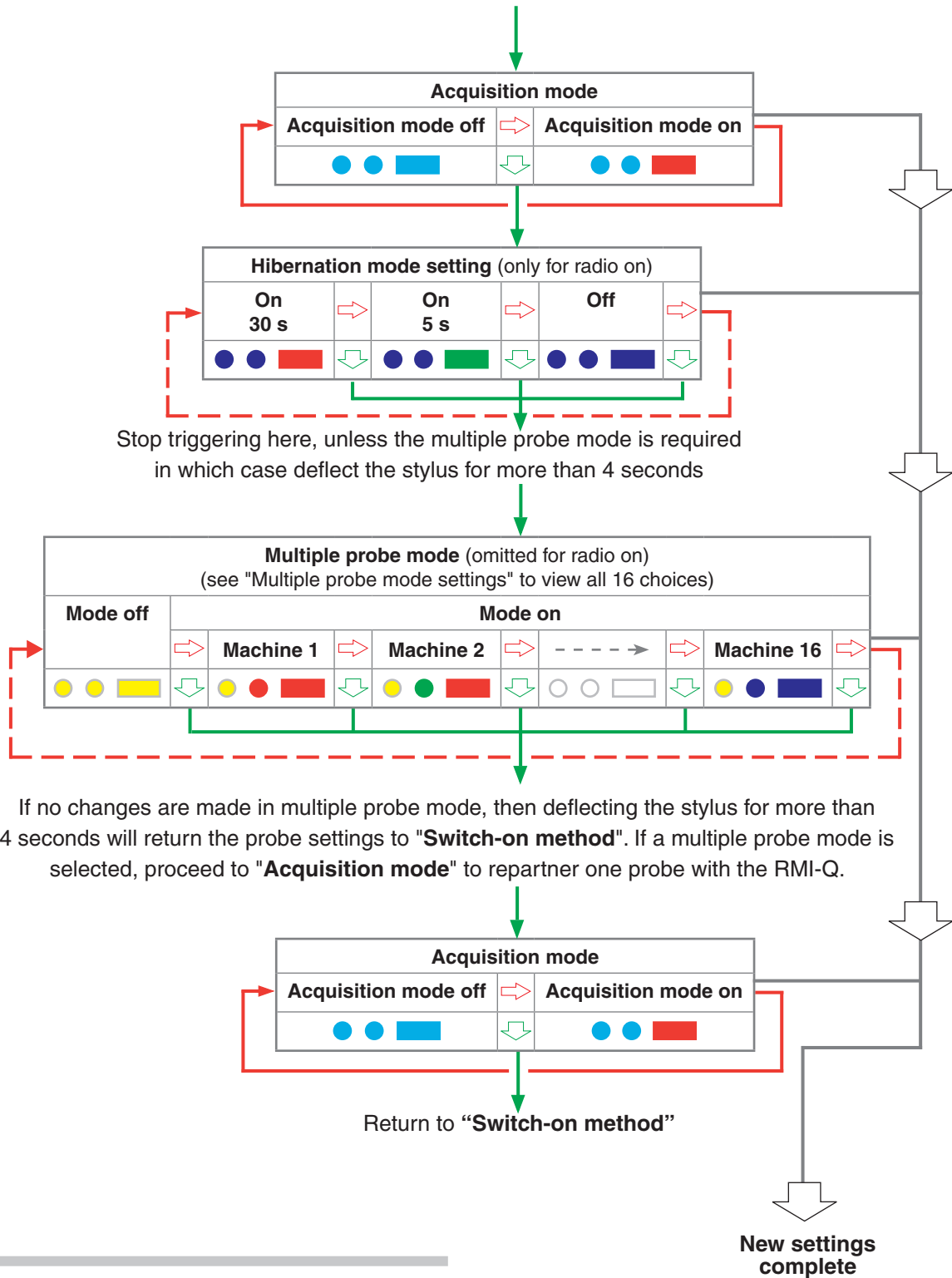
Keep the stylus deflected until the "**Switch-on method**" setting is displayed, then release the stylus. The probe is now in configuration mode and Trigger Logic™ is activated.

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. |





NOTE: If using multiple probe mode please refer to the *RMI installation guide* (Renishaw part no. H-4113-8554) or the *RMI-Q installation guide* (Renishaw part no. H-5687-8504).

NOTE: To partner an RMP60 with an RMI please see "RMP60 – RMI partnership". Once acquisition has been successful, the RMP60 will revert to "Acquisition mode off".

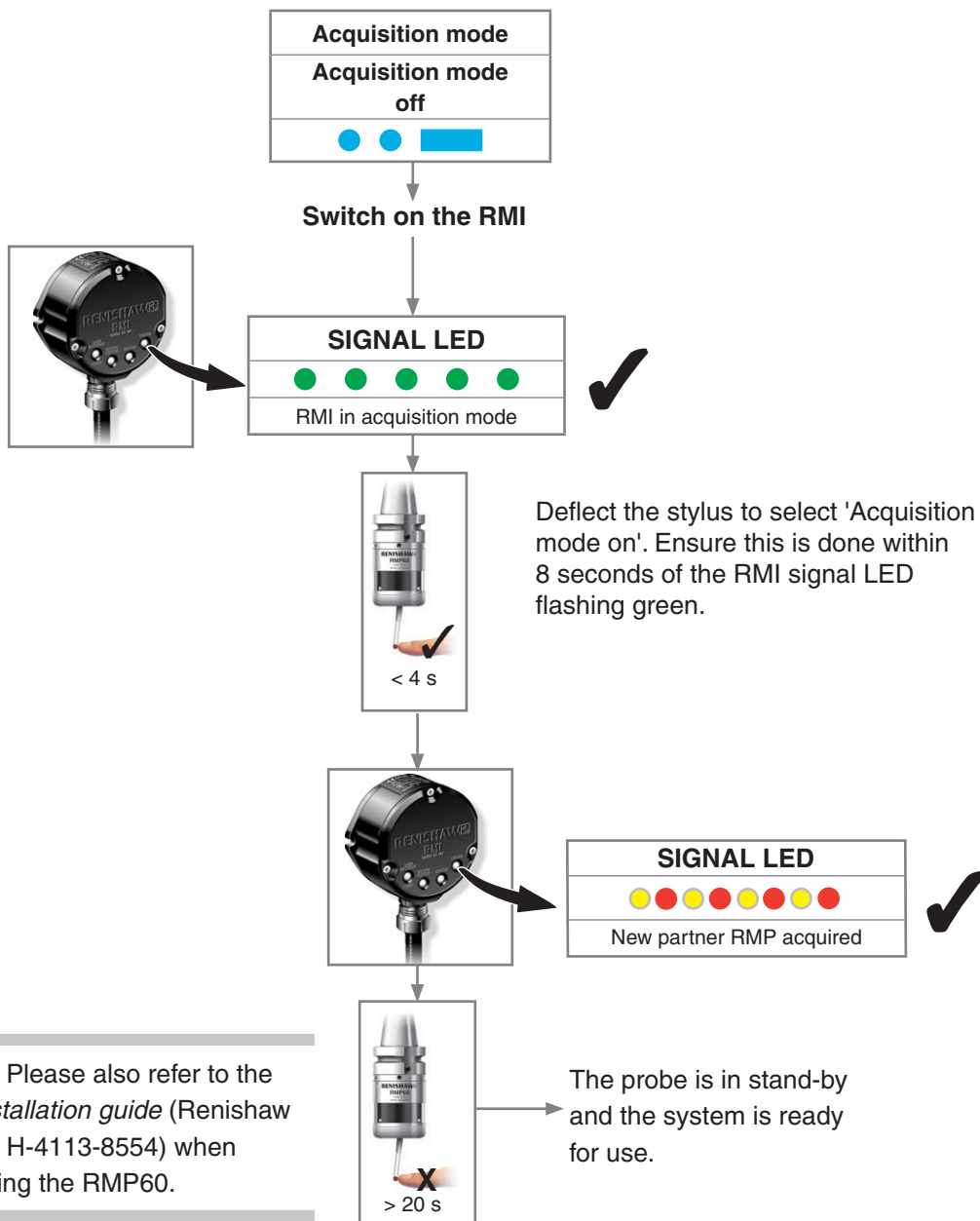
NOTE: To partner an RMP60 with an RMI-Q please see "RMP60 – RMI-Q partnership". Once acquisition has been successful, the RMP60 will revert to "Acquisition mode off".

RMP60 – RMI partnership

System set-up is achieved using Trigger Logic™ and powering the RMI. Partnering is only 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 when changing 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".



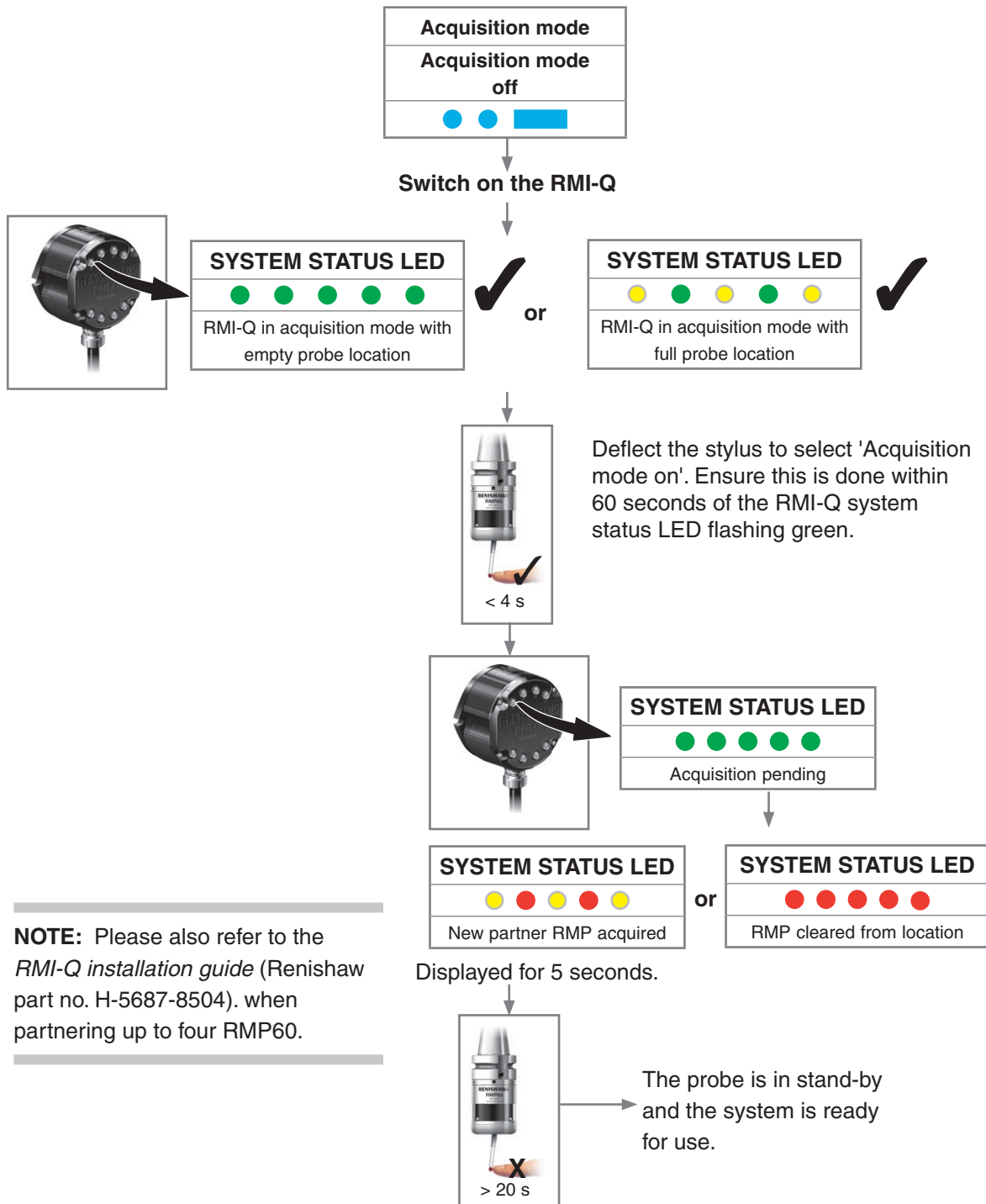
RMP60 – RMI-Q partnership

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.

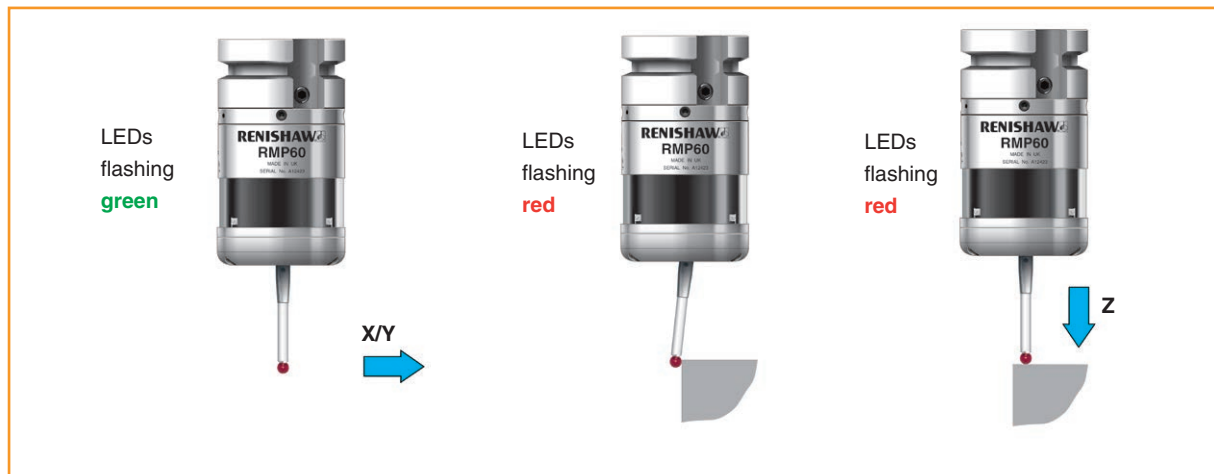
Partnering will not be lost by reconfiguring the probe settings or when changing batteries. Partnering can take place anywhere within the operating envelope.

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



NOTE: Please also refer to the *RMI-Q installation guide* (Renishaw part no. H-5687-8504). when partnering up to four RMP60.

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 | ■ |
| Fast flashing red or Flashing red and green or Sequence when batteries are inserted | Dead battery or unsuitable battery | ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● |

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

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

Maintenance

Maintenance

You may undertake the maintenance routines described in these instructions.

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

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

Cleaning the probe

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



Changing the batteries

1



! CAUTIONS:

Do not leave dead batteries in the probe.

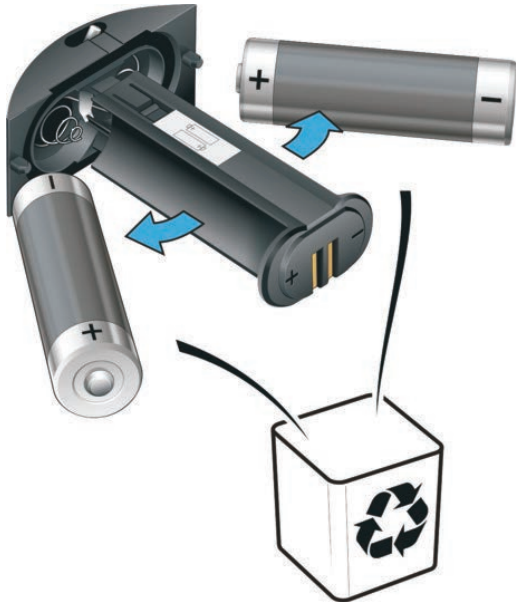
When changing batteries, do not allow coolant or debris to enter the battery compartment.

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

Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.

2



! CAUTION: Please 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 into the probe, the LEDs will remain a constant red.

| Battery types | | | |
|----------------|---|---|---|
| Alkaline x2 | Lithium Thionyl Chloride x2 | | Nickel Cadmium/Nickel Metal Hydride x2 |
| AA 1.5 V ✓ | Saft: Sonnenschein: Tadiran: Xeno: | LS 14500 ✓ SL-760/S ✓ TL-5903/S, TL-2100/S XL-060F | AA 1.2 V ✓ |



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. **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.

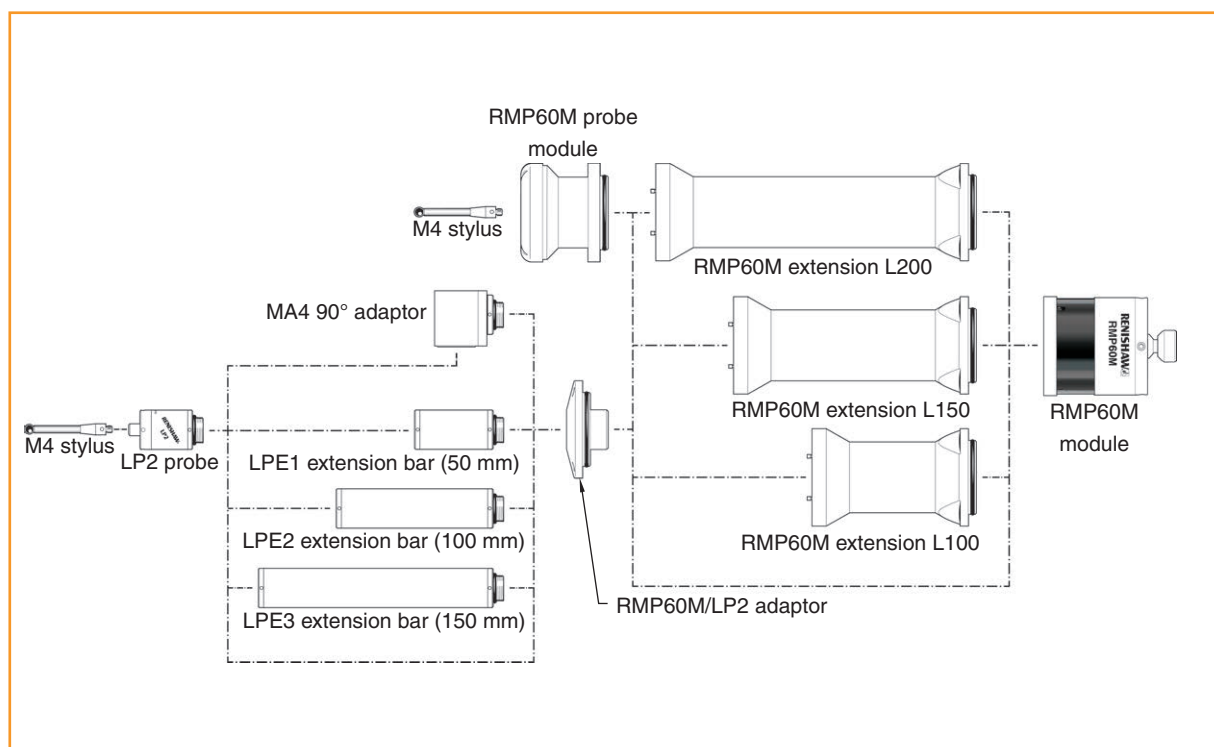


RMP60M system

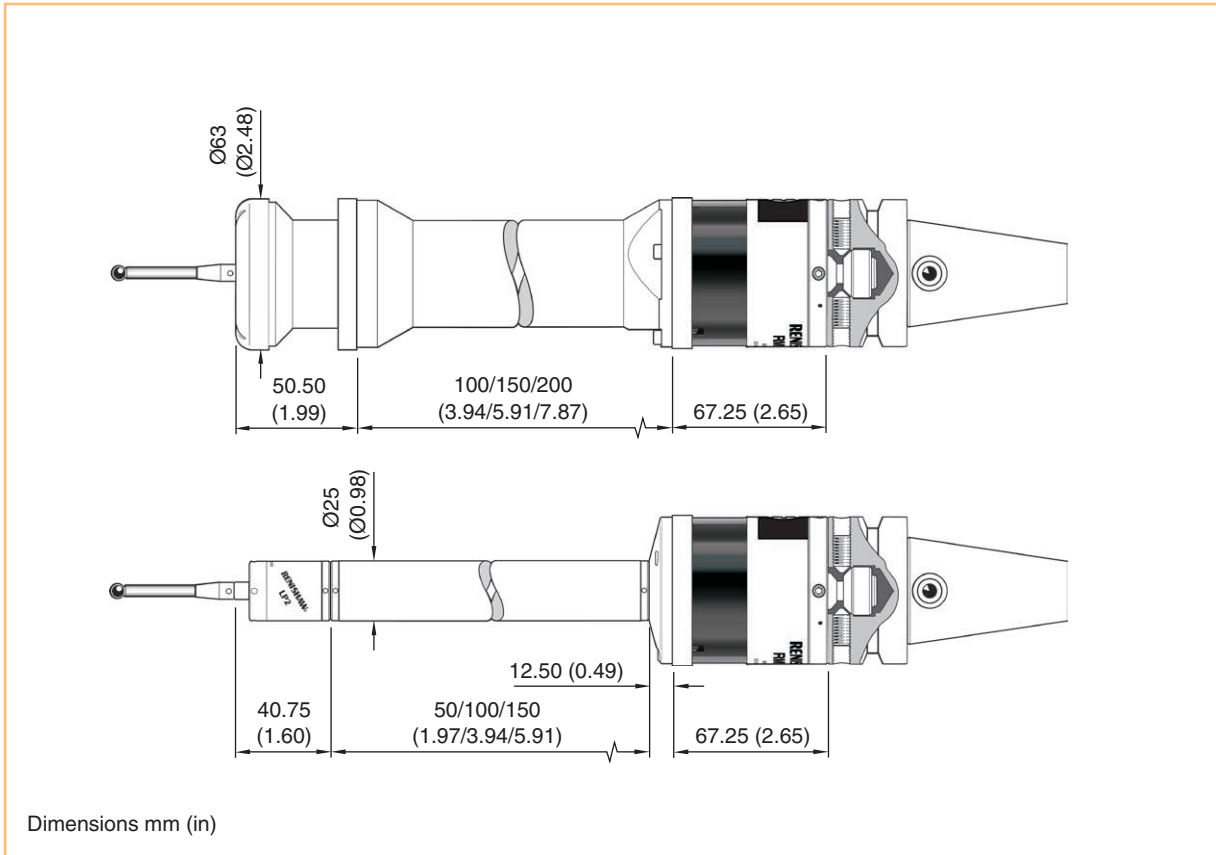
RMP60M system

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.

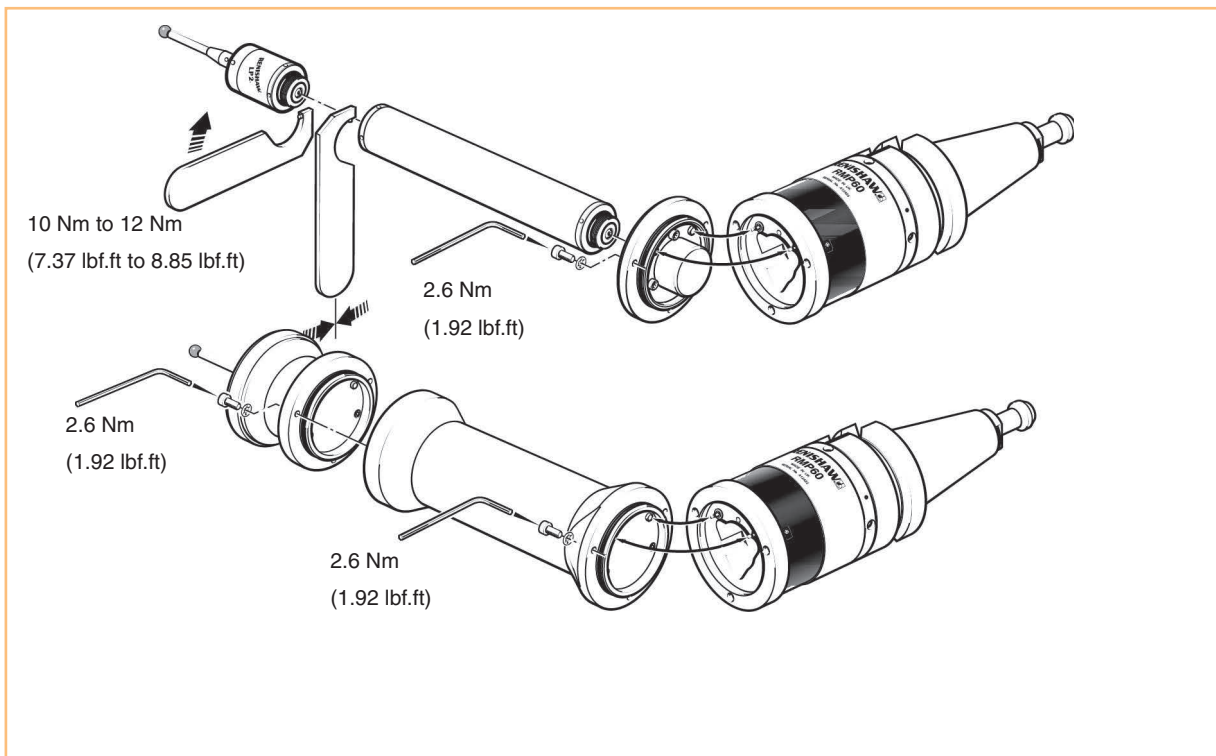
See Section 8, "Parts list".



RMP60M dimensions



RMP60M screw torque values



Fault-finding

| Symptom | Cause | Action |
|---|--|---|
| Probe fails to power up (no LEDs illuminated or fails to indicate current probe settings). | Dead batteries. | Change batteries. |
| | Unsuitable batteries. | Change batteries. |
| | Batteries inserted incorrectly. | Check battery insertion. |
| | 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 contacts before reassembly. |
| Probe fails to switch on. | Dead batteries. | Change batteries. |
| | Batteries inserted incorrectly. | Check battery insertion. |
| | Probe out of range. | Check position of RMI-Q, see operating envelope. |
| | No RMI-Q 'start/stop' signal (radio on mode only). | Check RMI-Q for green start LED. |
| | Incorrect spin speed (spin switch-on 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. | 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-Q, see operating envelope. |

| Symptom | Cause | Action |
|---|--|--|
| Machine stops unexpectedly during a probing cycle. | Radio link failure/RMP60 out of range. | Check interface/receiver and remove obstruction. |
| | 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-Q. | Review interface error indication and correct. |
| 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 and probing speeds not the same. | Review probing software and make speeds the same. |
| | Calibration feature has moved. | Correct position. |
| | Measurement occurs as stylus leaves surface. | Review probing software. |
| | Measurement occurs within the machine's acceleration and deceleration zone. | Review probe filter settings and probing software to increase back off distance. |
| | Probing speed too high 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. | Enable enhanced trigger filter. Eliminate vibrations. |

| Symptom | Cause | Action |
|--|--|---|
| RMP60 status LEDs do not correspond to RMI-Q status LEDs. | Radio link failure – RMP60 out of RMI-Q range. | Check position of RMI-Q, see operating envelope. |
| | RMP60 has been enclosed/ shielded by metal. | Review installation. |
| | RMP60 and RMI-Q are not partnered. | Partner RMP60 and RMI-Q. |
| 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-Q see operating envelope. |
| | Dead batteries. | Change batteries |
| | RMP60 and RMI-Q are not partnered. | Partner RMP60 with RMI-Q. |
| | Probe selection error. | Verify that one RMP is working and is correctly selected on the RMI-Q. |
| | 0.5 second turn-on error. | Ensure that all RMPs are 'Q' marked probes, or change the RMI-Q turn-on time to 1 second. |
| RMI-Q low battery LED lit. | Low batteries. | Change batteries soon. |
| Reduced range. | Local radio interference. | Identify and remove. |

| Symptom | Cause | Action |
|---|---|---|
| Probe fails to switch off. | Incorrect switch-off method configured. | Check configuration and alter as required. |
| | No RMI-Q 'start/stop' signal (radio on mode only). | Check RMI-Q for green start LED. |
| | Probe in timeout mode and placed in tool magazine and is being triggered by movement. | Use shorter timeout setting or use different switch off mode. |
| | 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. |
| 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

| Type | Part number | Description |
|----------------------------------|-------------|---|
| RMP60 | A-5742-0001 | RMP60 probe with batteries, tool kit and quick-start guide (factory set to radio on/radio off). |
| RMP60M module | A-5742-1003 | RMP60M module with batteries, tool kit and quick-start guide (factory set to radio on/radio off). |
| Battery | P-BT03-0005 | AA battery – alkaline type – supplied as standard with probe (two required). |
| Battery | P-BT03-0008 | AA battery – Lithium Thionyl Chloride (two required). |
| Stylus | A-5000-3709 | PS3-1C ceramic stylus 50 mm long with Ø6 mm ball. |
| Weak link kit | A-2085-0068 | Weak link (Part no. M-2085-0069 x 2) and 5 mm AF spanner. |
| Tool kit | A-4038-0304 | Probe tool kit comprising Ø1.98 mm stylus tool (x 1), 2.0 mm AF hexagon key (x 1), 2.5 mm AF hexagon keys (x 2), 4.0 mm AF hexagon key (x 1) and shank grub screws (x 2). |
| Battery cassette | A-4038-0300 | RMP60 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-5687-0050 | RMI-Q side exit with 15 m (49.2 ft) cable, tool kit and user's guide. |
| Mounting bracket | A-2033-0830 | Mounting bracket with fixing screws, washers and nuts. |
| 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. |

| Type | Part number | Description |
|---|-------------|---|
| 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 | A-5742-8501 | Quick-start guide: for rapid set-up of the RMP60 probe, includes CD with installation guides. |
| RMI | A-4113-8550 | Quick-start guide: for rapid set-up of the RMI, includes CD with installation guides. |
| RMI-Q | A-5687-8500 | Quick-start guide: for rapid set-up of the RMI-Q, includes CD with installation guides. |
| Styli | H-1000-3200 | Technical specification: Styli and accessories. |
| Software features | H-2000-2289 | Data sheet: Probe software for machine tools – illustrated features. |
| Software list | H-2000-2298 | Data sheet: Probe software for machine tools – list of programs. |
| Taper shanks | H-2000-2011 | Data sheet: Taper shanks for machine tool probes. |

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