

# RMP60 - radio machine probe



© 2012 Renishaw plc. All rights reserved.

This document may not be copied or reproduced in whole or in part, or transferred to any other media or language, by any means, without the prior written permission of Renishaw plc.

The publication of material within this document does not imply freedom from the patent rights of Renishaw plc.

Renishaw part no: H-5742-8504-01-A (Beta Site only)

First issued: July 2012

Draft copy 09/07/12

# Contents

## Contents

<b>Before you begin</b> .....	<b>1.1</b>
Before you begin .....	1.1
Disclaimer .....	1.1
Trademarks .....	1.1
Warranty .....	1.1
Changes to equipment .....	1.1
CNC machines .....	1.1
Care of the probe .....	1.1
Patents .....	1.2
EC declaration of conformity .....	1.3
WEEE directive .....	1.3
FCC information to the user (USA only) .....	1.3
Radio approval .....	1.4
Safety .....	1.5
<b>RMP60 basics</b> .....	<b>2.1</b>
Introduction .....	2.1
Getting started .....	2.1
System interface .....	2.1
2nd generation RMP60 .....	2.2
Trigger Logic™ .....	2.2
Modes of operation .....	2.2
Configurable settings .....	2.2
Enhanced trigger filter .....	2.4
Hibernation mode .....	2.4
Multiple probe mode .....	2.4
Acquisition mode .....	2.5
RMP60 dimensions .....	2.6

RMP60 specification .....	2.7
<b>System installation .....</b>	<b>3.1</b>
Installing the RMP60 with an RMI or RMI-Q .....	3.1
Operating envelope .....	3.1
Performance envelope when using the RMP60 with the RMI or RMI-Q .....	3.2
Preparing the RMP60 for use .....	3.3
Fitting the stylus .....	3.3
Installing the batteries .....	3.5
Mounting the probe on a shank (or machine table) .....	3.6
Stylus on-centre adjustment. ....	3.7
Stylus trigger force and adjustment. ....	3.8
Calibrating the RMP60 .....	3.9
Why calibrate a probe? .....	3.9
Calibrating in a bored hole or on a turned diameter. ....	3.9
Calibrating in a ring gauge or on a datum sphere .....	3.9
Calibrating the probe length .....	3.9
<b>Trigger Logic™ .....</b>	<b>4.1</b>
Reviewing the current probe settings .....	4.1
Multiple probe settings .....	4.2
Probe settings record .....	4.3
Changing the probe settings .....	4.4
RMP60 – RMI partnership. ....	4.6
RMP60 – RMI-Q partnership. ....	4.7
Operating mode. ....	4.8
<b>Maintenance .....</b>	<b>5.1</b>
Maintenance .....	5.1
Cleaning the probe .....	5.1
Changing the batteries .....	5.2
Diaphragm replacement .....	5.4
<b>RMP60M system .....</b>	<b>6.1</b>
RMP60M system .....	6.1
RMP60M dimensions .....	6.2
RMP60M screw torque values. ....	6.2
<b>Fault finding .....</b>	<b>7.1</b>
<b>Parts list .....</b>	<b>8.1</b>

# Before you begin

## Before you begin

### Disclaimer

RENISHAW HAS MADE CONSIDERABLE EFFORTS TO ENSURE THE CONTENT OF THIS DOCUMENT IS CORRECT AT THE DATE OF PUBLICATION BUT MAKES NO WARRANTIES OR REPRESENTATIONS REGARDING THE CONTENT. RENISHAW EXCLUDES LIABILITY, HOWSOEVER ARISING, FOR ANY INACCURACIES IN THIS DOCUMENT.

### Trademarks

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

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

## Warranty

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

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 2009-507240
CN 101287958	JP 2010-238243
CN 101482402A	JP 3967592
EP 0695926	JP 4237051
EP 1185838	JP 4575781
EP 1373995	JP 4754427
EP 1425550	JP 4773677
EP 1457786	JP 4851488
EP 1477767	KR 1001244
EP 1477768	TW I333052
EP 1576560	US 2011-0002361-A1
EP 1701234	US 5279042
EP 1734426	US 5669151
EP 1804020	US 6,776,344 B2
EP 1931936	US 6941671
EP 1988439	US 7145468
EP 2216761	US 7285935
IN 2004/057552	US 7441707
IN 2004/057552	US 7486195
IN 2007/028964	US 7665219
IN 215787	US 7812736
	US 7821420



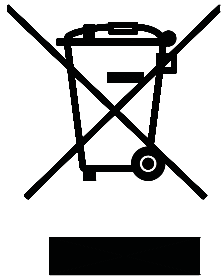
## EC declaration of conformity



Renishaw plc declares that the RMP60 radio machine probe complies with the applicable standards and regulations.

Contact Renishaw plc at [www.renishaw.com/rmp60](http://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 the 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.
2. This device may 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.

### 47 CFR Section 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

## 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.

#### French

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

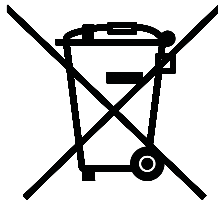
Europe:	CE
USA:	TBA
Canada:	TBA
Japan:	TBA
China	TBA



## 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 used in this product indicate that the batteries must be collected and disposed of separately from household waste in accordance with EU battery directive 2006/66/EC. Please contact your local authority about the rules on the separate collection of batteries because correct disposal helps to prevent negative consequence for the environmental and human health.

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

- Ensure that all batteries are inserted with the correct polarity.
- Do not store batteries in direct sunlight or rain.
- Do not heat or dispose of batteries in a fire.
- Avoid forced discharge of the batteries.
- Do not short-circuit the batteries.

- Do not disassemble, pierce, deform or apply excessive pressure to the batteries.
- Do not swallow the batteries.
- Keep the batteries out of the reach of children.
- Do not get batteries wet.

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

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 0V/ground connections should be connected to the machine "star point" (the "star point" is a single point return for all equipment ground and screen cables). This is very important and failure to adhere to this can cause a potential difference between grounds;
- all screens must be connected as outlined in the user instructions;
- cables must not be routed alongside high current sources, i.e. motor power supply cables etc, or be near high speed data lines;
- cable lengths should always be kept to a minimum.

### Equipment operation

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

# RMP60 basics

## Introduction

RMP60 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.

RMP60 features an integrated probe module delivering exceptional robustness and generous overtravel.

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). This allows many systems to operate in the same machine shop without risk of cross-talk.

RMP60 can be **operated/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 current probe settings' for further information).

## System interface

The RMI or RMI-Q are integrated interfaces/receivers used to communicate between the RMP60 probe and the machine control.



## 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 deflection (triggering) to systematically lead the user through the available choices to allow selection of the required mode options.

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

## Modes of operation

The RMP60 probe can be in one of three modes:

**Standby mode:** where the probe is awaiting a switch on signal.

**Operational mode:** activated by one of the switch on methods described on this page. In this mode the RMP60 is ready for use.

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

**Hibernation mode:** ??????




## 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 Switch on options are configurable	RMP60 switch off method Switch off options are configurable	Switch on time
<p><b>Radio on</b></p> <p>Radio switch on is commanded by machine input.</p>	<p><b>Radio off</b></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><b>Timer off (timeout)</b></p> <p>Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset.</p>	<p>1 second maximum (see note below).</p>
<p><b>Spin on</b></p> <p>Spin at 500 rev/min for 1 second minimum.</p>	<p><b>Spin off</b> </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><b>Timer off (timeout)</b></p> <p>Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset.</p>	<p><b>1 second maximum</b> (see note below).</p>
<p><b>Shank switch on</b></p>	<p><b>Shank switch off</b></p>	<p>1 second maximum.</p>


**NOTES:**

In 'radio on' mode, the switch on time is user selectable 0.5 or 1.0 second maximum when using RMI-Q (selection is made in RMI-Q). Otherwise 1.0 second maximum.

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.

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

In 'spin on mode', the 2 seconds starts from the moment the spindle reaches 500 rev/min.

After being switched on, the RMP60 must be on for 1 second minimum 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 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 RMP60 is in standby and 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/off' or 'shank on/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/off' mode. For further details of this functionality, please refer to the RMI-Q installation guide.

---

## 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. See 'Multiple probe settings' in **Section 4 - Trigger Logic™**.

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. Only one probe per 'mode on' colour choice needs to be partnered with the RMI or RMI-Q as, 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 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 are 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 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 or RMI-Q.

Partnering is only required during initial system set-up. Further partnering is only required if either the RMP60 or RMI/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 powered cycled.

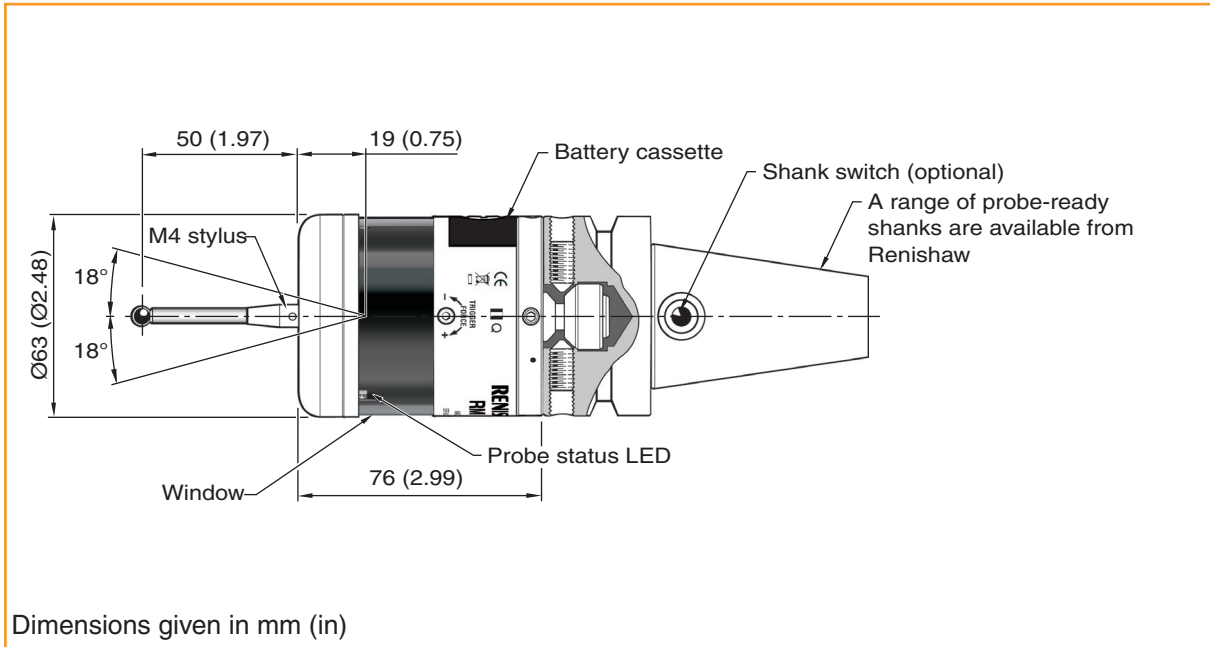
Partnering by ReniKey is not available for RMI.

---

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	$\pm X/\pm Y$	Z
50 (1.97)	21 (0.82)	11 (0.43)
100 (3.94)	37 (1.45)	11 (0.43)



## RMP60 specification

<b>Principal application</b>	Workpiece measurement and job set-up on medium to large horizontal, vertical and gantry machining centres, 5-axis machines, twin spindle machines and vertical turret lathes.	
<b>Dimensions</b>	Length	76 mm (2.99 in)
	Diameter	63 mm (2.48 in)
<b>Weight (without shank)</b>	With batteries	876 g (30.90 oz)
	Without batteries	826 g (29.14 oz)
<b>Transmission type</b>	Frequency hopping spread spectrum (FHSS) radio	
<b>Radio frequency</b>	2400 MHz to 2483.5 MHz	
<b>Switch-on methods</b>	Radio M code, spin on or shank switch	
<b>Switch-off methods</b>	Radio M code, timer, spin off or shank switch	
<b>Spindle speed (maximum)</b>	1000 rev/min	
<b>Operating range</b>	Up to 15 m (49.2 ft)	
<b>Receiver/interface</b>	RMI or RMI-Q combined interface and receiver unit	
<b>Sense directions</b>	Omni-directional $\pm X$ , $\pm Y$ , $+Z$	
<b>Repeatability</b>	1.00 $\mu\text{m}$ (40 $\mu\text{in}$ ) 2 sigma – 50 mm stylus length (see note 1)	
<b>Stylus trigger force</b> (see notes 2 and 3) Factory setting:		
XY low force	0.75 N, 75 gf (2.64 ozf)	
XY high force	1.40 N, 140 gf (4.92 ozf)	
Z	5.30 N, 530 gf (18.69 ozf)	
Maximum setting:		
XY low force	2.0 N, 200 gf (7.0 ozf)	
XY high force	3.5 N, 350 gf (12.3 ozf)	
Z	14.0 N, 1400 gf (49.38 ozf)	
Minimum setting:		
XY low force	0.50 N, 50 gf (1.7 ozf)	
XY high force	0.90 N, 90 gf (3.2 ozf)	
Z	3.50 N, 350 gf (12.35 ozf)	
<b>Stylus overtravel</b>	XY plane	$\pm 18^\circ$
	+Z plane	11 mm (0.43 in)

Note 1 Performance specification is achieved at a standard test velocity of 480 mm/min (18.9 in/min) with ceramic styli. 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.

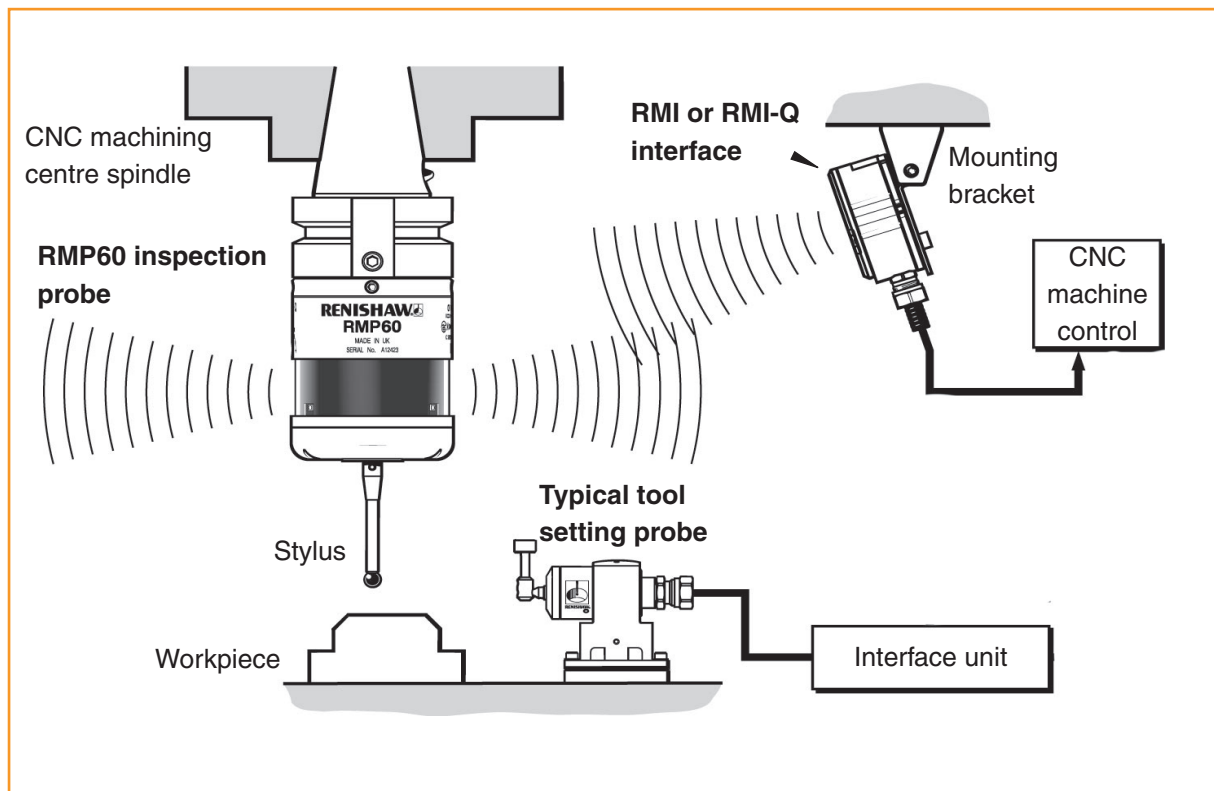
<b>Environment</b>	IP rating	IPX8
	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)
<b>Battery types</b>	2 x AA 1.5 V alkaline or 2 x AA 3.6 V Lithium Thionyl Chloride	
<b>Battery reserve life</b>	Approximately one week after a low battery warning is first given.	
<b>Typical battery life</b>	See table below.	
<b>Rechargeable batteries</b>	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
<b>Alkaline</b>	TBA days	TBA days	TBA hours	TBA days	TBA days	TBA hours
<b>Lithium Thionyl Chloride</b>	TBA days	TBA days	TBA hours	TBA days	TBA days	TBA hours
Battery type	Radio switch on (1 second turn on)		Radio switch on (0.5 second turn on)		Continuous use	
	Standby life	5% usage	Standby life	5% usage		
<b>Alkaline</b>	TBA days	TBA days	TBA days	TBA days	TBA hours	
<b>Lithium Thionyl Chloride</b>	TBA days	TBA days	TBA days	TBA days	TBA hours	

**NOTE:** 5% usage = 72 minutes/day.

# System installation

## Installing the RMP60 with an RMI or 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 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 touch either the RMI or RMI-Q cover or the probe glass window with your hand, as this will affect the performance.

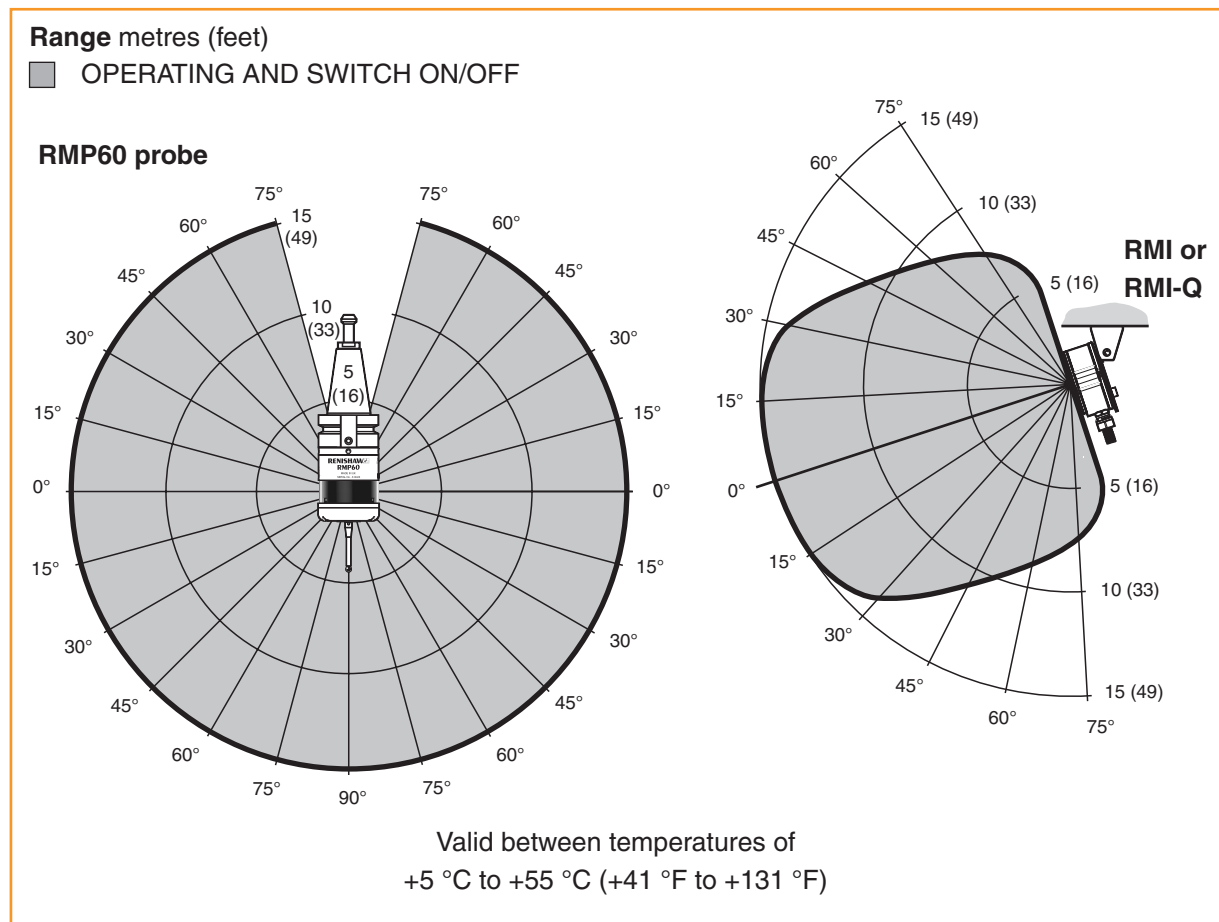
## Performance envelope when using the RMP60 with the RMI or RMI-Q

### RMP60 / RMI or 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 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.



## 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.

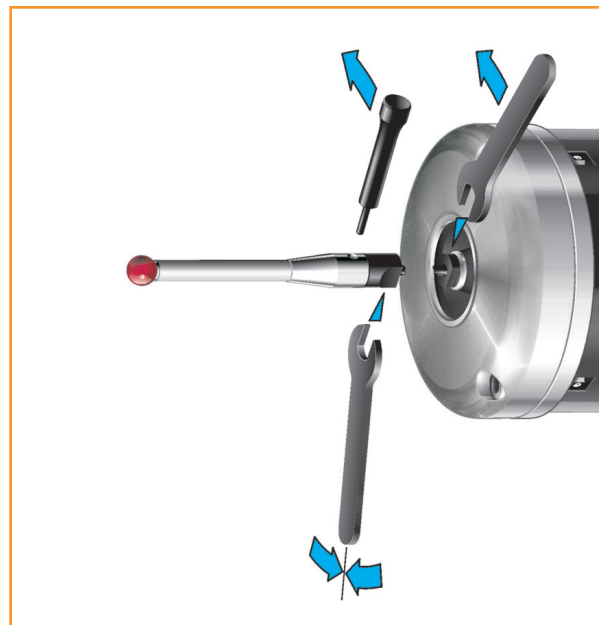
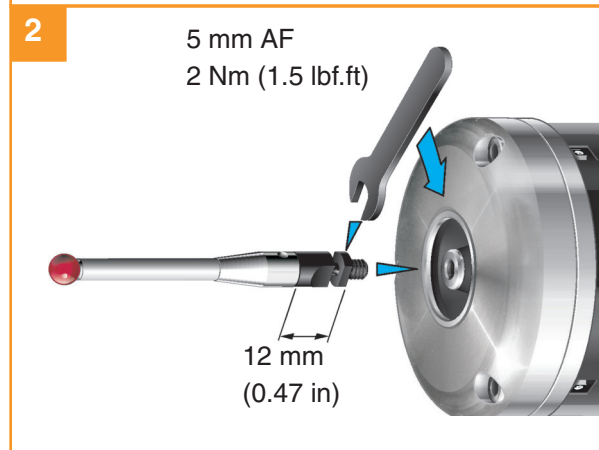
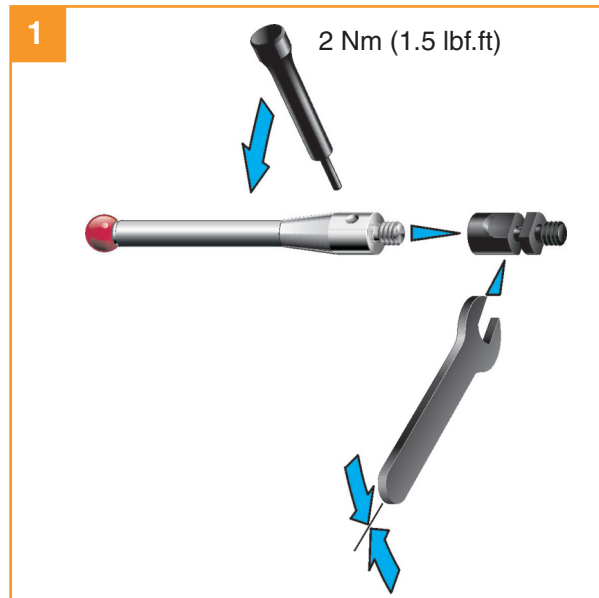
#### Fitting stylus with weak link onto RMP60

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.

**The stylus colouring in these three illustrations has been changed to reflect a steel styli more, as the note says "do not use a weak link with ceramic or carbon fibre styli" and we showed it with a ceramic styli**

#### Removing a broken weak link



## Installing the batteries

1



### NOTES:

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

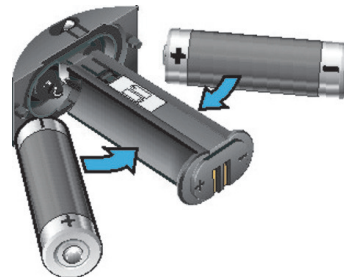
Ensure the product is clean and dry before inserting batteries.

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



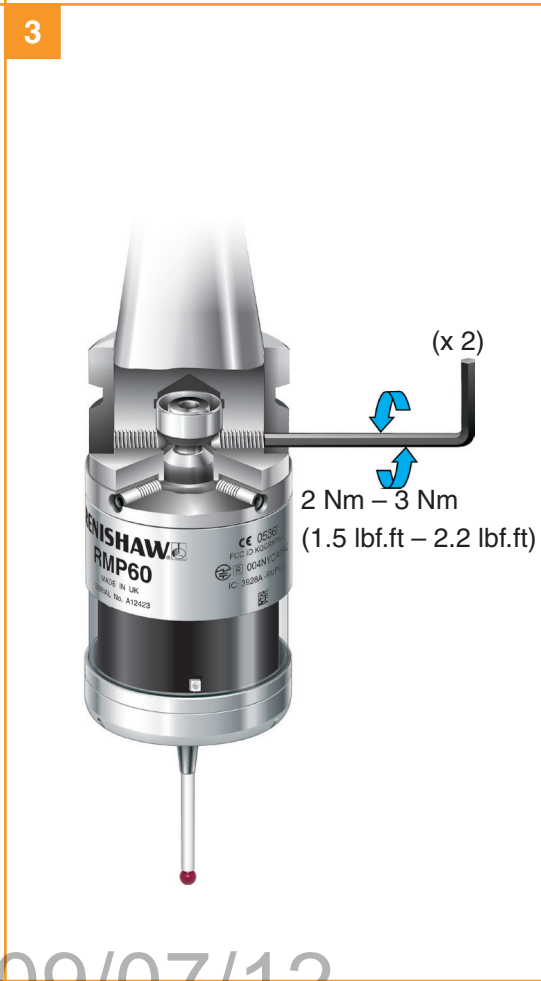
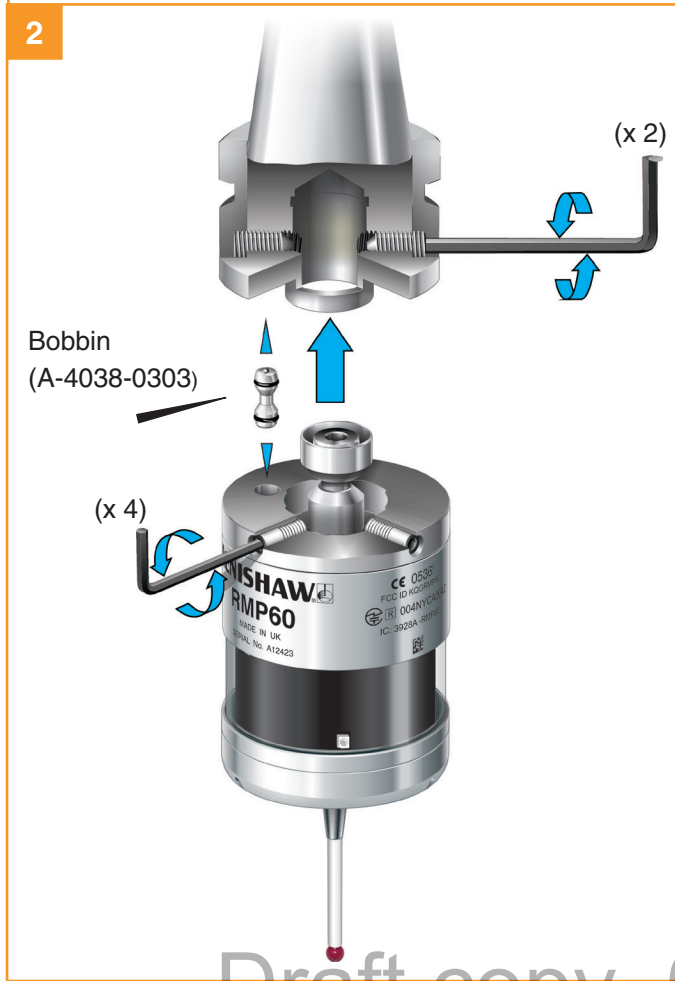
4



### 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).





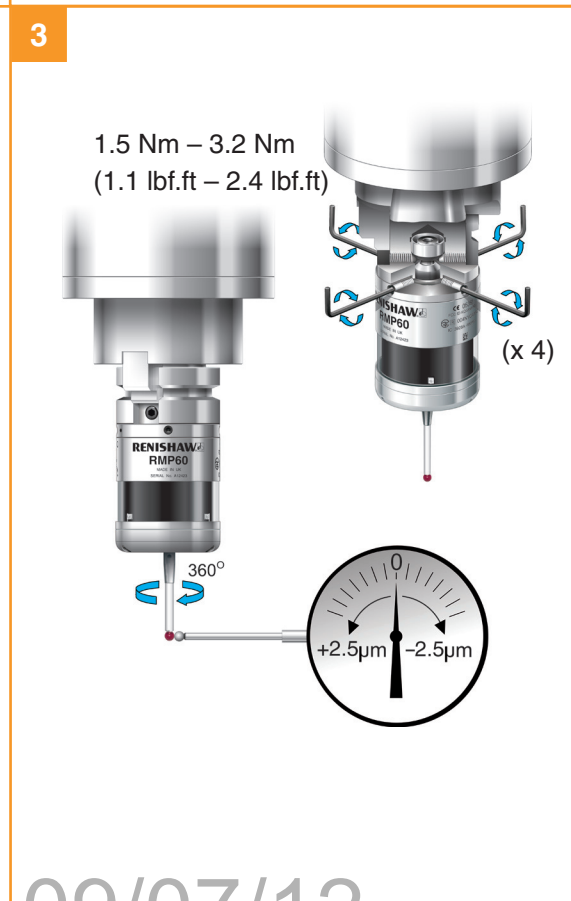
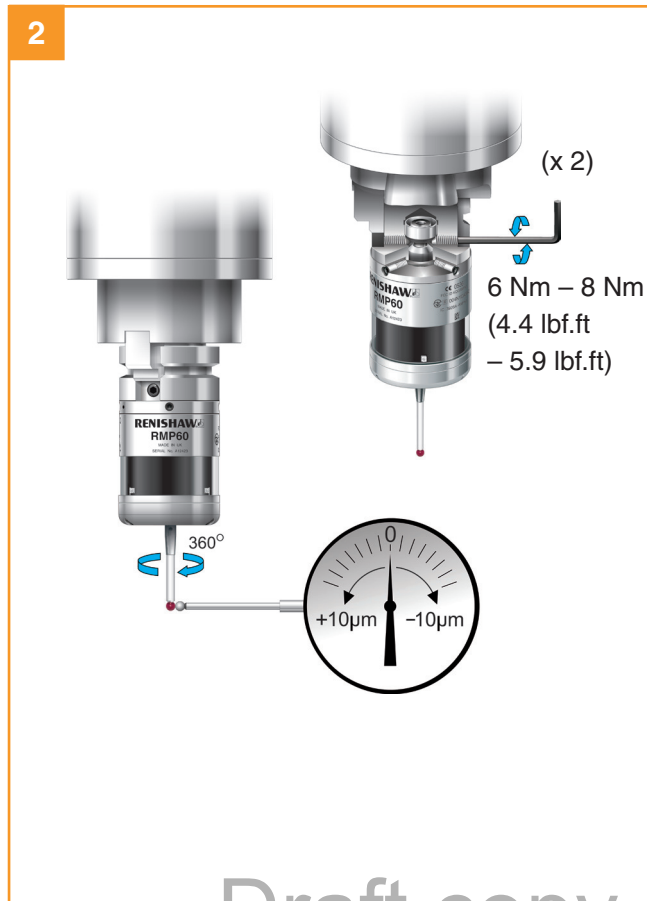
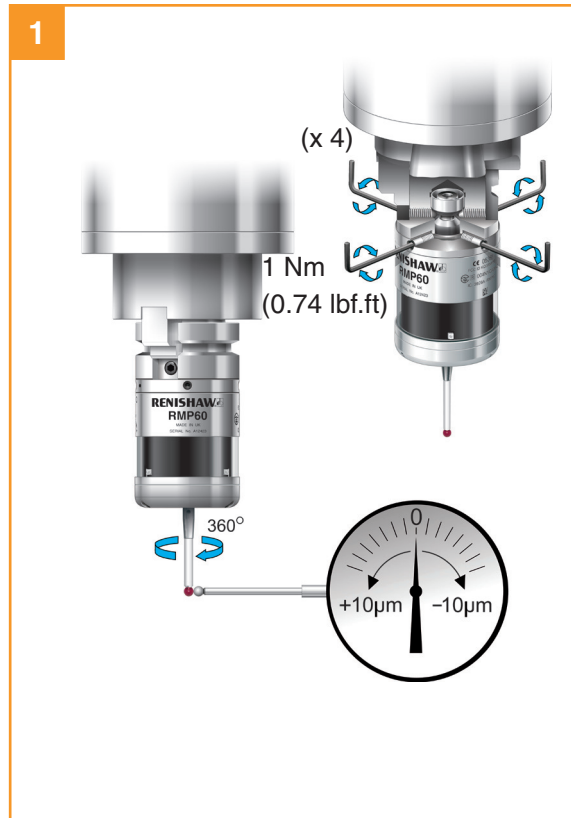
## Stylus on-centre adjustment

### 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.



## 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

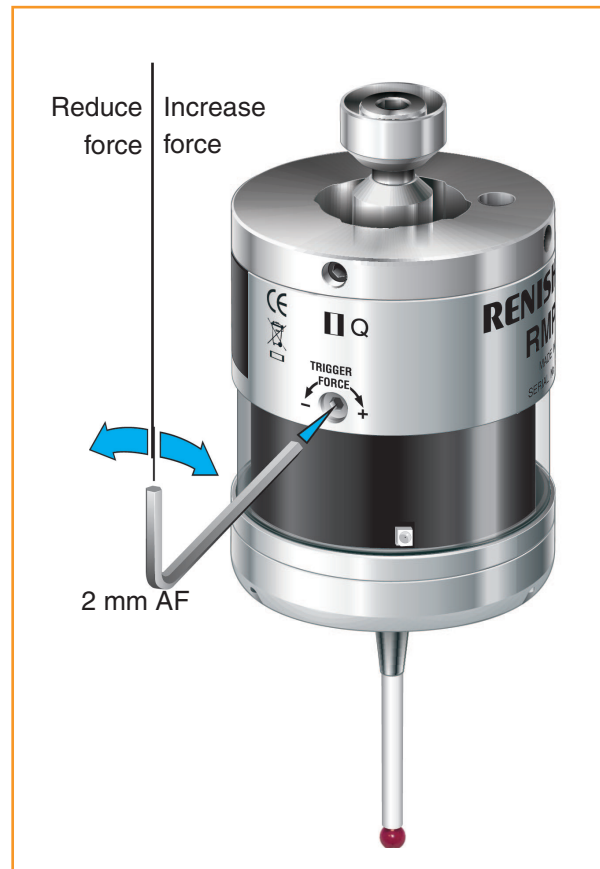
XY low force	0.7 N, 75 gf (2.64 ozf)
XY high force	1.4 N, 140 gf (4.92 ozf)
Z	5.30 N, 530 gf (18.69 ozf)

### Maximum setting

XY low force	2 N, 200 gf (7.0 ozf)
XY high force	3.5 N, 350 gf (12.3 ozf)
Z	14 N, 1400 gf (49.38 ozf)

### Minimum setting

XY low force	0.5 N, 50 gf (1.7 ozf)
XY high force	0.9 N, 90 gf (3.2 ozf)
Z	3.5 N, 350 gf (12.35 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 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' in **Section 3 - System Installation**). A small amount of run-out is acceptable, and can be compensated for as part of the normal calibration process.

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

- calibrating either in a bored hole or on a turned diameter of known position;
- calibrating either in a ring gauge or on a datum sphere;
- calibrating the probe length.

### Calibrating in a bored hole or on a turned diameter

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

### Calibrating in a ring gauge or on a datum sphere

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

---

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

---

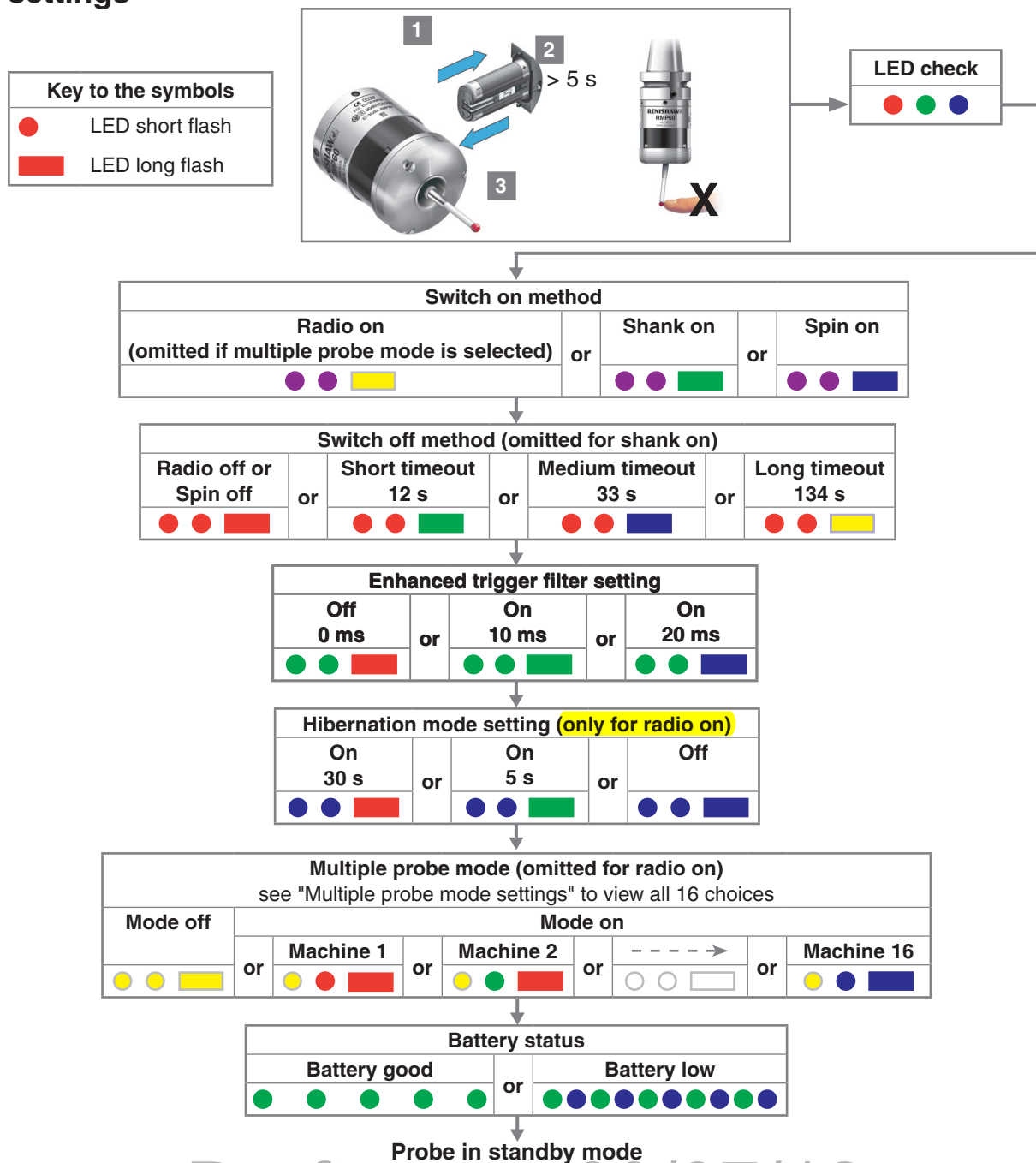
### Calibrating the probe length

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

This page left intentionally blank

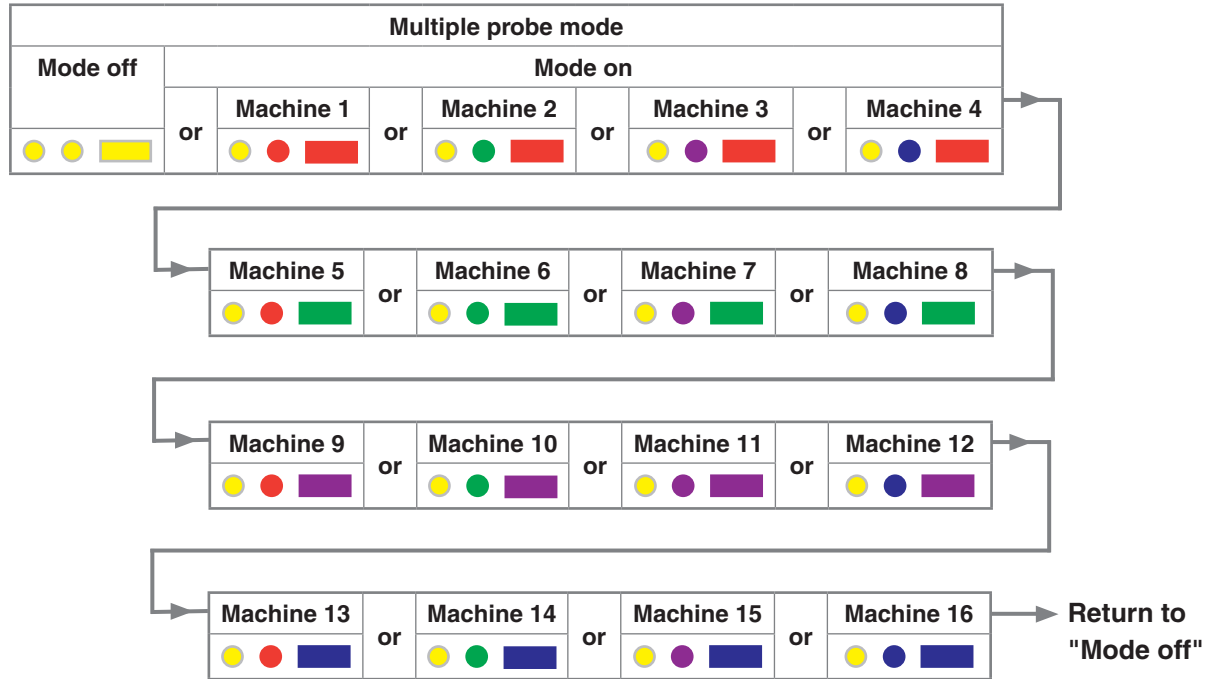
# Trigger Logic™

## Reviewing the current probe settings



## Multiple probe 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    ✓ tick

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

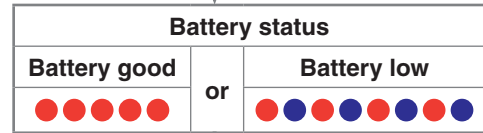
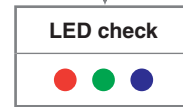
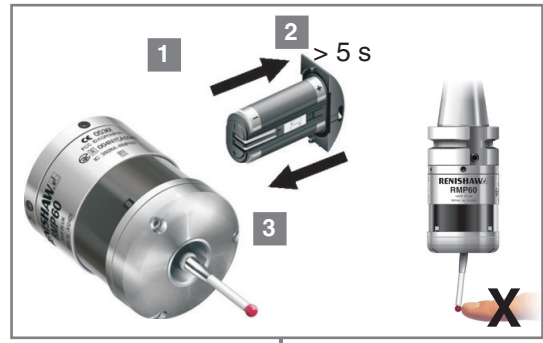
Factory settings are for kit (A-5742-0001) only.

## Changing the probe settings

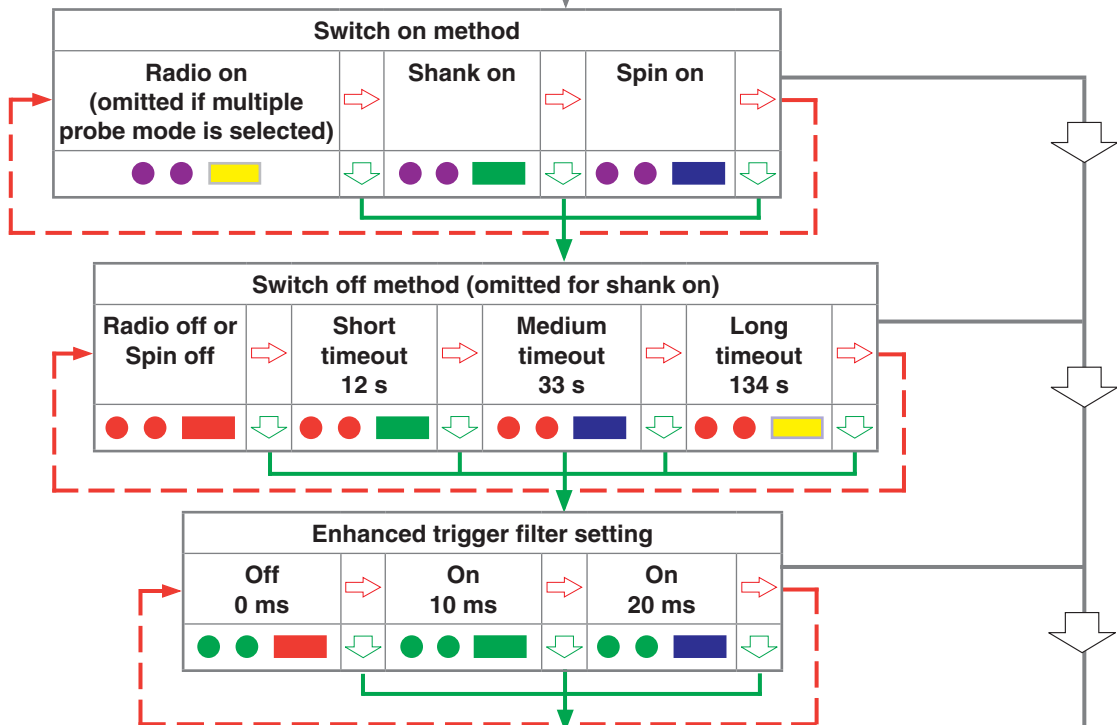
Insert the batteries or, if they have already been installed, remove them for five seconds and then refit them.

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.

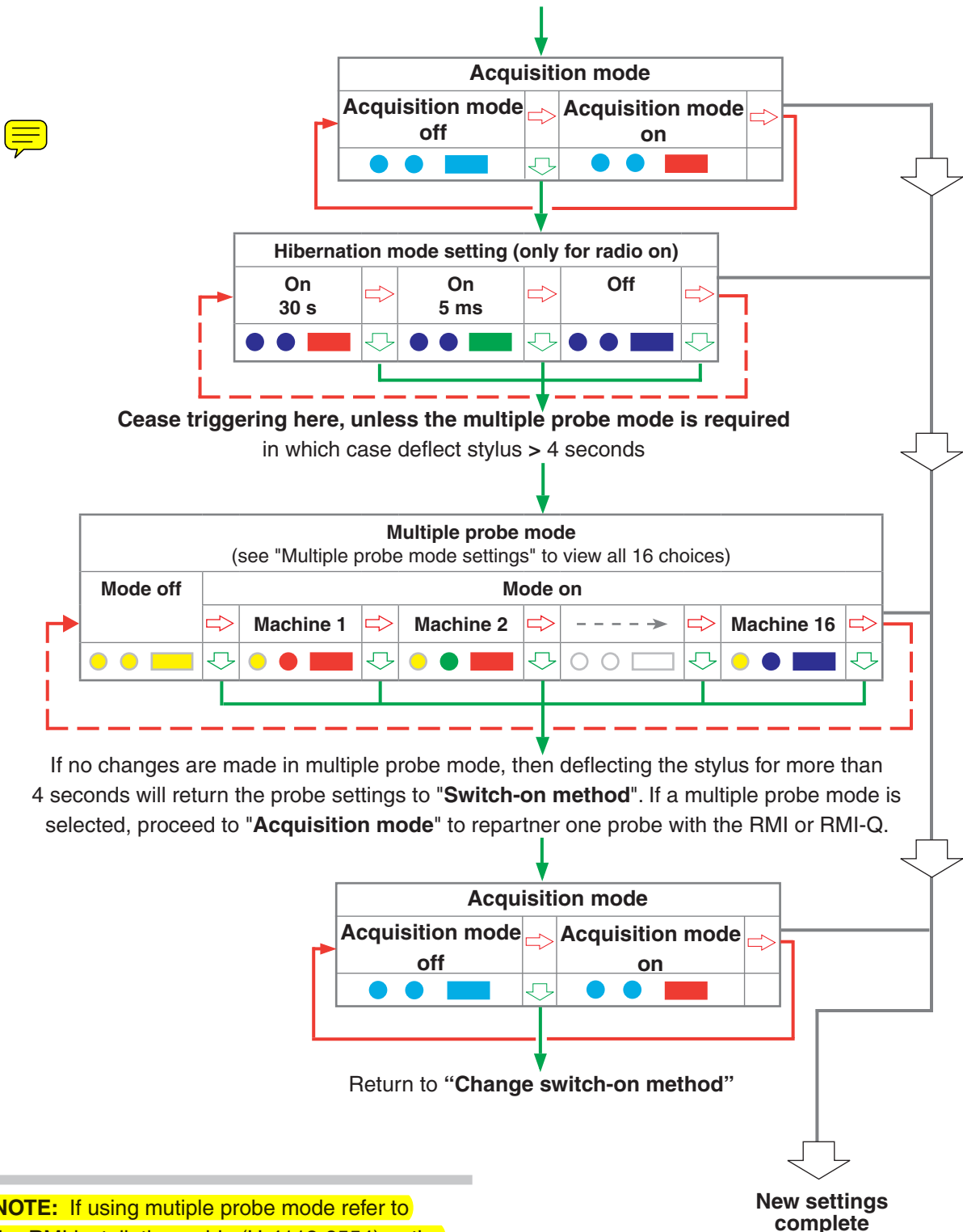


Key to the symbols	
●	LED short flash
■	LED long flash
⇨	Deflect the stylus for less than 4 seconds to move to the next menu option.
⇩	Deflect the stylus for more than 4 seconds to move to the next menu.
⇩	To exit, leave the stylus untouched for more than 20 seconds.



continued on next page





Cease triggering here, unless the multiple probe mode is required in which case deflect stylus > 4 seconds

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

**NOTE:** If using mutiple probe mode refer to the RMI installation guide (H-4113-8554) or the RMI-Q installation guide (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".

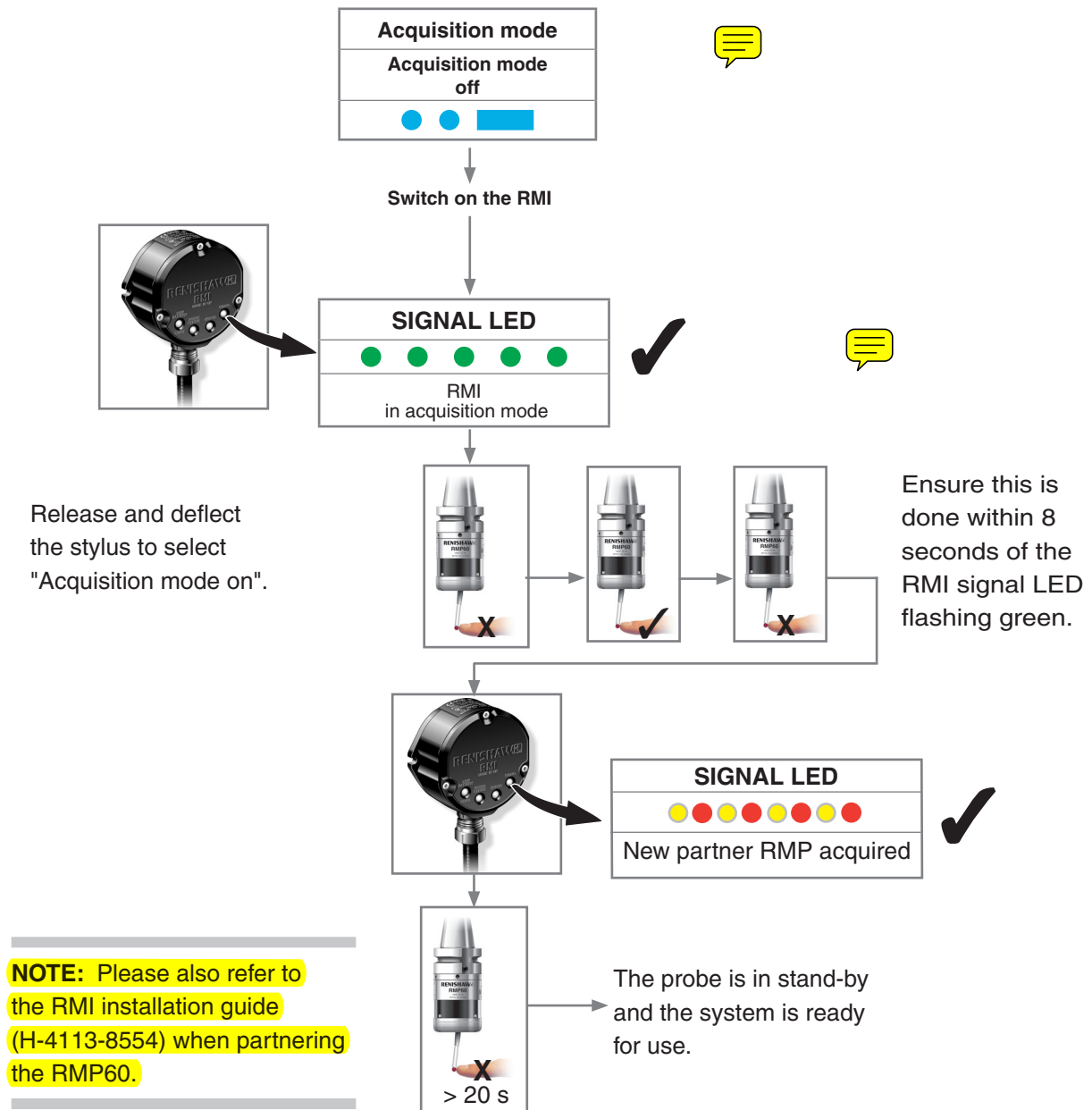
**NOTE:** To partner an RMP60 with an RMI-Q please see "RMP60 – RMI-Q partnership". Once acquisition has been successful, the RMP60 will revert to "Acquisition mode off".

## 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 is only 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".



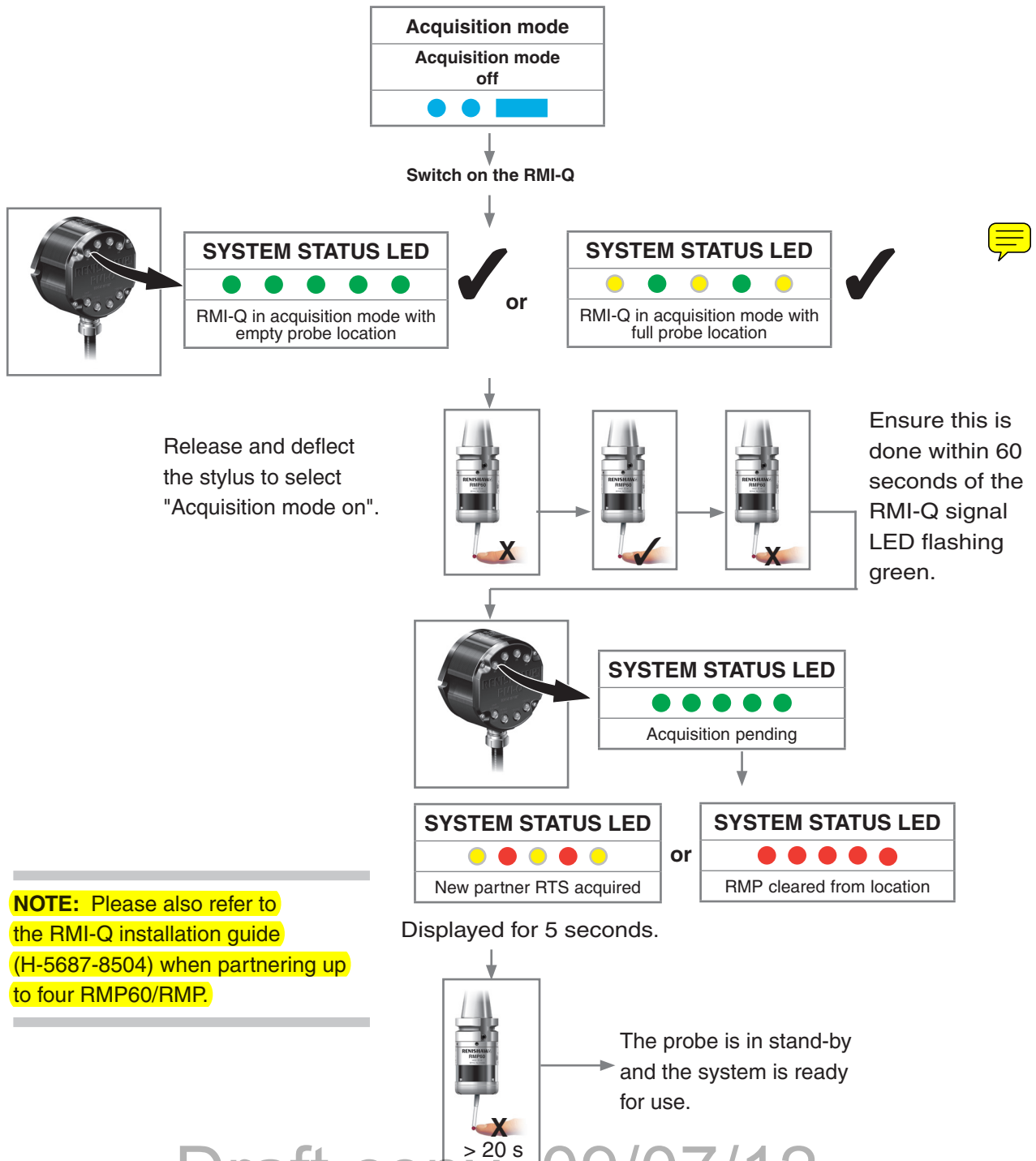
## RMP60 – RMI-Q partnership

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.

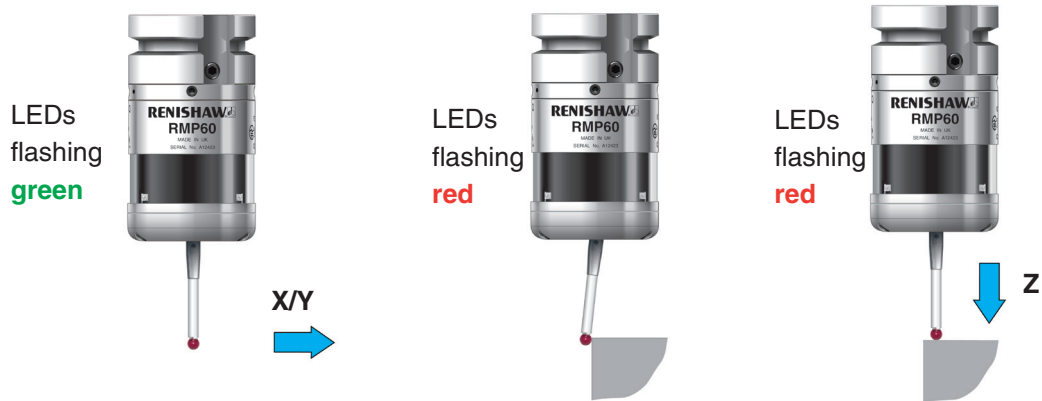
Partnering will not be lost by reconfiguring the probe settings or when changing batteries. Partnering can take place anywhere within the operating envelope.

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 (H-5687-8504) when partnering up to four RMP60/RMP.

## 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	<b>Battery exhausted</b>	■
<b>Fast flashing red</b> or Flashing red and green or Sequence when batteries are inserted	<b>Exhausted battery or unsuitable battery</b>	● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●

**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 current probe settings' in **Section 4 - Trigger Logic™**).
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

5.1

## 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 exhausted batteries in the probe.

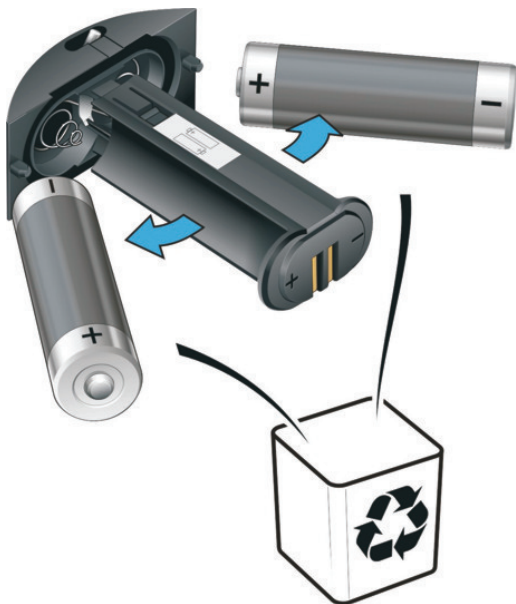
When changing batteries, do not allow coolant or debris to enter the battery compartment.

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 exhausted 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 x 2	Lithium Thionyl Chloride x 2		Nickel Cadmium/Nickel Metal Hydride x2
AA 1.5 V  ✓	<b>RS:</b> <b>Radio shack:</b> <b>Saft:</b> <b>Sonnenschein:</b> <b>Tadrian:</b> <b>Xeno:</b>	596-602, 201-9438 23-037 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

1. Fit the new diaphragm over the centre.
2. Locate the outer edge of the diaphragm to rest on the outer edge of the inner diaphragm.
3. Refit the front cover and M3 screws.
4. Refit the stylus and recalibrate the probe.



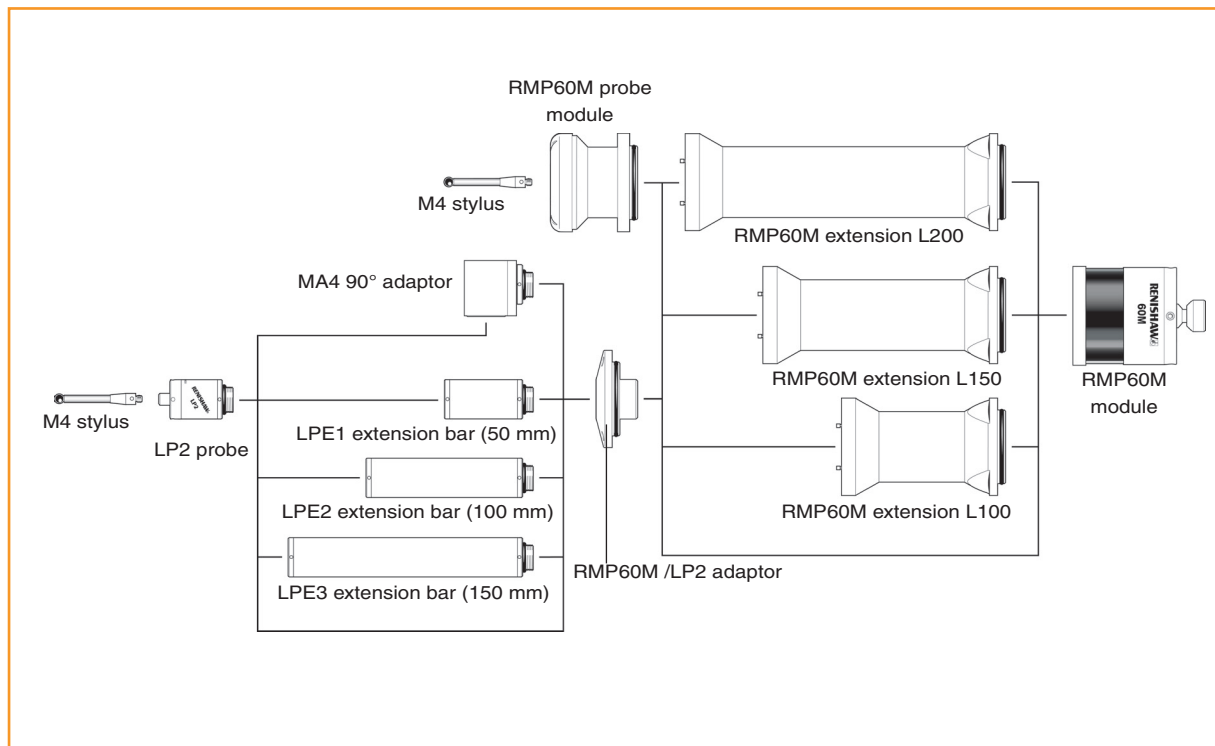


# RMP60M system

## RMP60M system

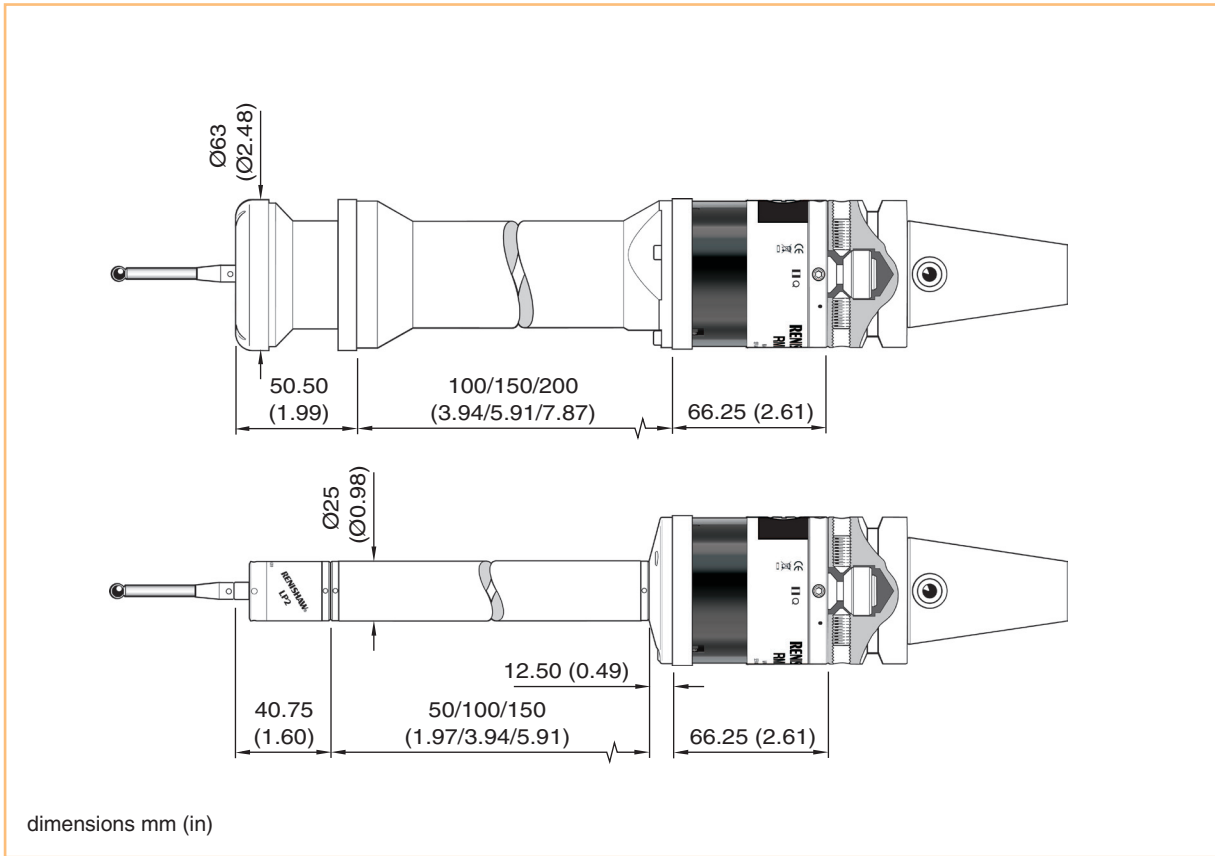
RMP60M is a special modular version of RMP60. It enables probe inspection of part features inaccessible to RMP60, by fitting selected adaptors and extensions as shown below.

See Chapter 8, "Parts list".



**The above drawing has changed to show the same orientation as other probe views (i.e. right to left).**

### RMP60M dimensions



### RMP60M screw torque values

