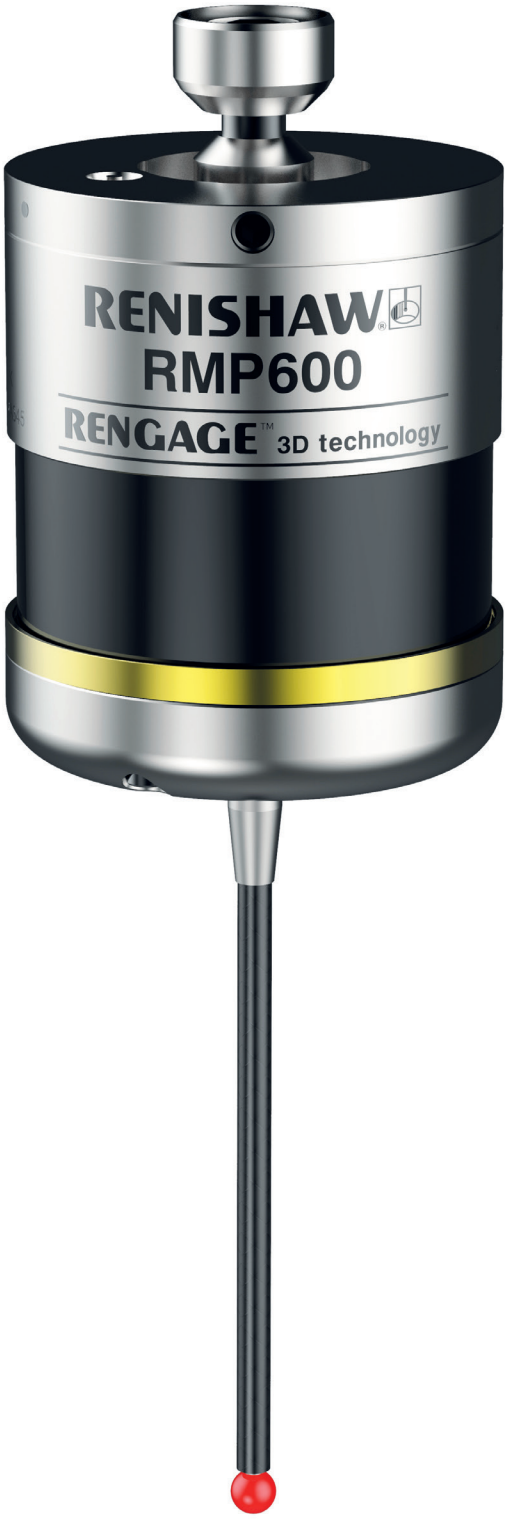
Installation guide
H-5312-8503-08-B

RENISHAW
apply innovation™

RMP600 high-accuracy radio machine probe



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Renishaw part no: H-5312-8503-08-B
First issued: 01.2008
Revised: 08.2022

Contents

Before you begin

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CNC machines

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

Care of the probe

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

Patents

Features of the RMP600, and other similar Renishaw products, are the subject of one or more of the following patents and/or patent applications:

CN 100416216
CN 100466003
CN 101142461
CN 101171493
CN 101198836
CN 101476859
CN 101482402
CN 111133272
EP 1425550
EP 1457786
EP 1576560
EP 1613921
EP 1804020
EP 1866602
EP 1880163
EP 1893937
EP 1931936
EP 2154471
EP 2216761
EP 3688405
IN 215787
IN 234921
IN 305341
IN 307453
IN 364693
IN 8707/DELNP/2008
WO 2004/057552
JP 2020-535419
JP 4237051
JP 4575781
JP 4852411
JP 5238749
JP 5283501
JP 5308811
JP 5357541
JP 5390719
JP 5611297
KR 1001244
TW I333052
US 2020-0191564
US 6941671
US 7285935
US 7316077
US 7486195
US 7603789
US 7665219
US 7689379
US 7792654
US 7821420
US 8140287
US 9140547
WO 2019/063991

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Intended use

The RMP600 is a radio spindle probe that enables automated workpiece inspection and job set-up on multi-tasking machines, machining centres and gantry machining centres.

Safety

Information to the user

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

- Do not attempt to recharge the batteries.
- Replace the batteries only with the specified type.
- Do not mix new and used batteries in the product.
- Do not mix different types or brands of batteries in the product.
- Ensure that all batteries are inserted with the correct polarity in accordance with the instructions in this manual and indicated on the product.
- Do not store the batteries in direct sunlight.
- Do not expose the batteries to water.
- Do not expose the batteries to heat or dispose of batteries in a fire.
- Avoid forced discharge of the batteries.
- Do not short circuit the batteries.
- Do not disassemble, apply excessive pressure, pierce, deform or subject the batteries to impact
- Do not swallow the batteries.
- Keep the batteries out of the reach of children.
- If the batteries are swollen or damaged do not use them in the product and exercise caution when handling them.
- Dispose of waste batteries in accordance with your local environmental and safety laws.

Ensure that you comply with international and national battery transport regulations when transporting batteries or this product with the batteries inserted. To reduce the risk of shipment delays, should you need to return this product to Renishaw for any reason, do not return any batteries.

Information to the machine supplier/installer

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

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

Information to the equipment installer

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

- any interface MUST be installed in a position away from any potential sources of electrical noise, (for example power transformers, servo drives):
- all 0 V/ground connections should be connected to the machine “star point” (the “star point” is a single point return for all equipment ground and screen cables). This is very important and failure to adhere to this can cause a potential difference between grounds;
- all screens must be connected as outlined in the user instructions;
- cables must not be routed alongside high current sources (for example, motor power supply cables), or be near high-speed data lines;
- cable lengths should always be kept to a minimum.

Equipment operation

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

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RMP600 basics

Introduction

The RMP600 probe offers an unrivalled combination of size, accuracy, reliability and robustness and, for the first time, allows high-accuracy probing on large machining centres or other machines where line-of-sight problems affect optical signal transmission.

Successfully combining patented RENGAGE™ strain gauge technology with the patented frequency hopping radio transmission system of the RMP60, the RMP600 provides existing probe users with a simple upgrade to solid-state strain gauge technology and all the associated benefits this brings:

- excellent 3D performance to allow probing of contoured surfaces;
- improved repeatability in all probing directions;
- a low triggering force combined with low pre-travel variation to provide high-accuracy, even when used with long styli;
- a proven ten-fold improvement in life (10 million triggers);
- the elimination of reseat failures;
- high resistance to machine tool vibration;
- resistance to shock and false triggering through the use of solid state accelerometers.

In addition to providing high-accuracy measurement on your machine tool, the RMP600 also offers:

- Faster calibration:

  On complex 3D parts, it is common to measure in several different directions. Each direction of a standard mechanical probe must be calibrated, to ensure that the pre-travel variation is compensated in the measurement. Performing this calibration for every 3D direction can be time-consuming.

  The RMP600 has almost no pre-travel variation, so a single calibration value may be used for any probing angle in 2D or 3D. This results in a vastly reduced calibration time. An additional benefit is a corresponding reduction in errors introduced by environmental changes within the machine during a long calibration cycle.

- The ability to be used in applications where axial and radial reorientations are used, enabled by the use of solid state accelerometers:

  The auto-reset function is required and recommendations should be followed for optimum metrology performance.

Getting started

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

For example:

- Switch-on and switch-off methods
- Probe status – triggered or seated
- Battery condition

Batteries are inserted or removed as shown (for more information, see page 3.4, “Installing the batteries”).

On insertion of batteries, the LEDs will begin to flash (for more information, see page 4.1, “Reviewing the probe settings”).

System interface

The radio machine interface (RMI-Q) is an integrated interface/receiver used to communicate between the RMP600 probe and the machine controller. For more details, refer to the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504).

RMP600 is also compatible with the older radio machine interface (RMI) integrated interface/receiver. For more details, refer to the *RMI radio machine interface* installation guide (Renishaw part no. H-4113-8554).

Trigger Logic™

Trigger Logic™ (for more information, see page 4.1 “Reviewing the probe settings”) is a method that allows the user to view and select all available mode settings in order to customise a probe to suit a specific application. Trigger Logic is activated by battery insertion and uses a sequence of stylus deflections (triggering) to systematically lead the user through the available choices to allow selection of the required mode options.

A Probe Setup app is available that simplifies this process with clear, interactive instructions and informative videos and is available for download on the following app stores.

Download on the App Store

or

GET IT ON Google Play

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

Probe modes

The RMP600 probe can be in one of three modes:

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

NOTE: The RMP600 will enter **"hibernation mode"** should the system interface be powered off or out of range for a period of 30 seconds (**"hibernation mode"** is only applicable to "**radio on mode**").

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

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

Configurable settings

Switch-on / switch-off methods

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

- Radio on / Radio off
- Radio on / Timer off
- Spin on / Spin off
- Spin on / Timer off
- Shank switch on / Shank switch off

RMP600 switch-on method Switch-on options are configurable	RMP600 switch-off method Switch-off options are configurable	Probe ready time
Radio on Radio switch on is commanded by machine input.	**Radio off** Radio switch off is commanded by machine input. A timer automatically switches the probe off 90 minutes after the last trigger or reseat if it is not turned off by machine input. **Timer off (timeout)** Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reseat.	1.7 seconds maximum.
Spin on Spin at 500 r/min for 1 second minimum.	**Spin off** Spin at 500 r/min for 1 second minimum. A timer automatically switches the probe off 90 minutes after the last trigger if it is not spun. **Timer off (timeout)** Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reseat.	2.5 seconds minimum. (The probe must be stationary for 2.5 seconds minimum after it has stopped spinning.)
Shank switch on	**Shank switch off**	3 seconds maximum.

NOTES:

In “**radio on mode”**, the switch-on time is user selectable “fast” or “standard” when using RMI-Q (selection is made in RMI-Q). Otherwise, the switch-on time 1.7 seconds.

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

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

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

The RMP600 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 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 8 ms or 16 ms delay is introduced to the probe's output. The factory setting is 8 ms. If false triggering is noticed, then consider increasing the filter delay to 16 ms.

Auto-reset function

In previous strain gauge products, the probe was required to be turned off during reorientation moves. The auto-reset function in the RMP600 can compensate for stylus forces, resulting from changes in probe orientation, that can cause the probe to trigger.

This feature is controlled by solid state accelerometers and is suitable for applications where axial and radial reorientation of the probe is applied.

To achieve optimum metrology performance when the auto-reset function is turned on, a dwell is recommended before making a programmed move that follows any reorientation of the probe.

When using a stylus of up to 150 mm long, a 0.2 second dwell is necessary. In most applications the machine response time will adequately provide this.

When using a 200 mm long stylus or heavy stylus configurations, a 1 second dwell is required. This will necessitate edits to the machine probing programme.

When in **"auto-reset mode"**, the probe will not trigger when moved below a speed of 3 mm/min.

NOTE: Speeds below 3 mm/min commonly occur when manually moving the probe using the handwheel with a very fine feedrate.

Multiple probe mode

The RMP600 can be configured, using Trigger Logic, to allow multiple radio probes in **"spin on / spin off"** or **"shank on / shank off"** to be used with a single RMI or RMI-Q.

Up to four RMP600s can be used with a single RMI-Q in **"radio on / radio off mode"**. For further details of this functionality, refer to the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504).

NOTES:

"Multiple probe mode" is a function of the RMP600. As such, the option will not appear when the **"radio on mode"** has been selected.

RMP600 probes which are set to **"multiple probe on mode"** can coexist alongside any number of RMP600 probes set to **"multiple probe off mode"**.

To allow multiple radio probes to work in close proximity, and with a single RMI or RMI-Q, 16 choices of "**mode on**" colours are available, each representing a different machine tool installation. (for more information, see page 4.2, "Multiple probe mode settings").

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

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

The probe is partnered after selecting the **"multiple probe mode setting"** and choosing the "**mode on**" option. (for more information, see page 4.4, "Changing the probe settings").

There is no limit to the number of probes that can be used with a single RMI or RMI-Q so long as they all have the same **"mode on"** colour choice. All RMP600 probes are factory set to **"mode off"**.

The addition of any further probe(s) into a single probe installation will require that all probes are reconfigured to the same "**mode on**" colour choice and that one of the probes is then repartnered with the RMI or RMI-Q.

The addition of any further probe(s), or replacements, into a multi-probe installation can be achieved through the reconfiguration of the probe to the same "**mode on**" colour choice and that one of the probes is then repartnered with the RMI or RMI-Q.

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 the RMP600, RMI or RMI-Q is changed.

NOTES:

Systems using the RMI-Q can be partnered with up to four RMP600s 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.

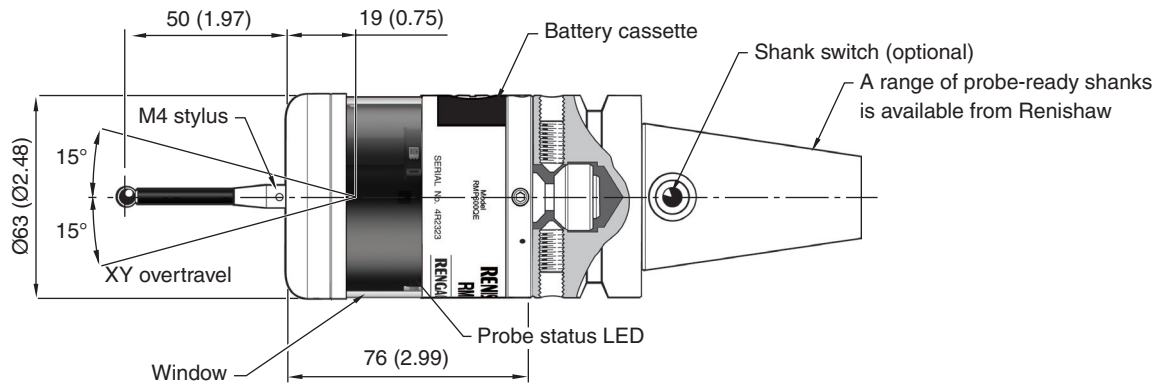
For more information or to download ReniKey free of charge visit:
www.renishaw.com/mtpsupport/renikey

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.

RMP600 dimensions



Dimensions given in mm (in)

Stylus overtravel limits		
Stylus length	**±X/±Y**	**Z**
50 (1.97)	18 (0.70)	11 (0.43)
100 (3.94)	31 (1.22)	11 (0.43)

RMP600 specification

Principal application	Workpiece inspection and job set-up on multi-tasking machines, machining centres and gantry machining centres.	
Dimensions	Length Diameter	76 mm (2.99 in) 63 mm (2.48 in)
Weight (without shank)	With batteries Without batteries	1010 g (35.65 oz) 940 g (33.18 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	
Probe feedrate (maximum)	3 mm/min (0.12 in/min) with auto-reset	
Spindle speed (maximum)	1000 r/min	
Operating range	Up to 15 m (49.2 ft)	
Receiver/interface	RMI or RMI-Q combined interface and receiver unit	
Sense directions	±X, ±Y, +Z	
Repeatability	0.25 µm (10 µin) 2σ – 50 mm stylus length [1] 0.35 µm (14 µin) 2σ – 100 mm stylus length	
X, Y (2D) form measurement deviation	±0.25 µm (10 µin) – 50 mm stylus length [1] ±0.25 µm (10 µin) – 100 mm stylus length	
X, Y, Z (3D) form measurement deviation	±1.00 µm (40 µin) – 50 mm stylus length [1] ±1.75 µm (70 µin) – 100 mm stylus length	
Stylus trigger force [2 and 3] XY plane (typical minimum) +Z plane (typical minimum)	 0.20 N, 20 gf (0.72 ozf) 1.90 N, 194 gf (6.83 ozf)	
Stylus overtravel force XY plane (typical minimum) +Z plane (typical minimum)	 2.8 N, 285 gf (10.07 ozf) typical minimum [4] 9.8 N, 999 gf (35.25 ozf) typical minimum [5]	
Stylus overtravel	XY plane +Z plane	±15° 11 mm (0.43 in)

1 Performance specification is tested at a standard test velocity of 240 mm/min (9.45 in/min). Significantly higher velocity is possible depending on application requirements.

2 Trigger force, which is critical in some applications, is the force exerted on the component by the stylus when the probe triggers. The maximum force applied will occur after the trigger point (overtravel). The force value depends on related variables including measuring speed, machine deceleration and latency.
RENGAGE equipped probes offer ultra-low trigger forces.

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

4 Stylus overtravel force in the XY plane occurs 80 µm (3149.61 µin) after the trigger point and rises by 0.35 N/mm, 36 gf/mm (32 ozf/in) until the machine tool stops (in the high force direction and using a carbon fibre stylus).

5 Stylus overtravel force in +Z direction occurs 7 µm to 8 µm (275.59 µin to 314.96 µin) after the trigger point and rises by 1.5 N/mm, 153 gf/mm (137 ozf/in) until the machine tool stops.

Environment	IP rating	IPX8, BS EN 60529:1992+A2:2013
	IK rating	IK01, BS EN 62262:2002+A1:2021 [for glass window]
	Storage temperature	–10 °C to +70 °C (+14 °F to +158 °F)
	Operating temperature	+5 °C to +50 °C (+41 °F to +122 °F)
Battery types	2 × AA 1.5 V alkaline or 2 × AA 3.6 V lithium-thionyl chloride (LTC)	
Battery reserve life	Approximately one week after a low battery warning is first given.	
Typical battery life	See table below.	
Rechargeable batteries	Either Nickel Cadmium (NiCd) or Nickel Metal Hydride (NiMh) can be used. However, when these battery types are fitted, expect a battery life of approximately 50% less than that quoted for alkaline batteries together with a reduced low battery warning period.	

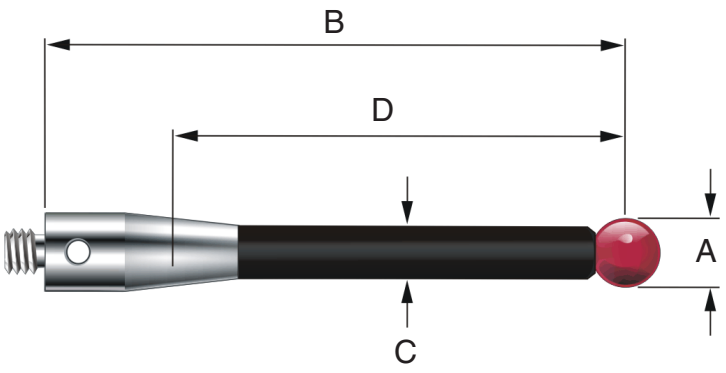
Typical battery life

Battery type	Shank or spin switch on		Radio switch on		Continuous use
	Standby life	5% usage (72 minutes/day)	Standby life	5% usage (72 minutes/day)	
Alkaline	650 days	100 days	130 days	60 days	115 hours
Lithium-thionyl chloride	1300 days	200 days	260 days	120 days	230 hours

NOTE: Using RMP600 with **"fast radio on mode"** will result in a 5% reduction in usage and standby battery life.

Recommended styli

High modulus carbon fibre styli are designed to minimise pre-travel and improve accuracy, as the stem material is extremely stiff. This inherent stiffness makes the following styli most suitable for strain gauge applications.



Part number		A-5003-7306 Carbon fibre	A-5003-6510 Carbon fibre	A-5003-6511 Carbon fibre	A-5003-6512 Carbon fibre
A	Ball diameter mm (in)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)
B	Length mm (in)	50.0 (1.97)	100.0 (3.94)	150.0 (5.91)	200.0 (7.88)
C	Stem diameter mm (in)	4.5 (0.18)	4.5 (0.18)	4.5 (0.18)	4.5 (0.18)
D	EWL mm (in)	38.5 (1.52)	88.5 (3.48)	138.5 (5.45)	188.5 (7.42)
	Mass g (oz)	4.1 (0.14)	6.2 (0.22)	7.5 (0.26)	8.7 (0.31)

The featured range of solid carbon fibre styli ensure the best possible performance of the RMP600.

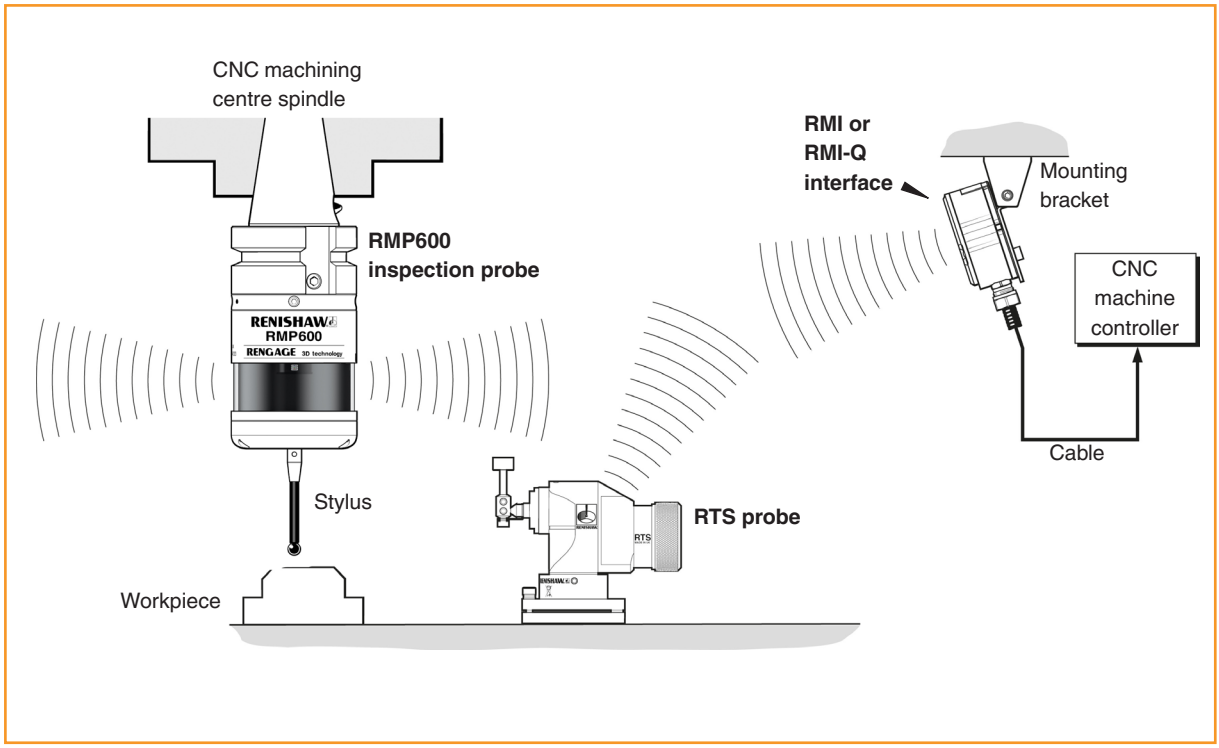
It is possible that the featured range of solid carbon fibre styli may not be suitable for every RMP600 application and that it may be necessary to select specialised styli configurations to meet specific application requirements.

In applications where specialised styli are to be used, it may be beneficial to reduce the speed of probing moves. It has been seen in some cases that specialist styli configurations do not exhibit the probing characteristics and performance that would have otherwise been expected and achieved when using standard styli. Reducing the speed of the probing move may, in some cases, improve the performance of the probe.

When selecting components for an application specific stylus, it is recommended that a configuration with the least number of components is chosen. The stylus diameter should always be as large as possible and the overall stylus length kept to a minimum. If a stem with a reduced diameter is required, then it is recommended that an M4 stem with a short length and reduced diameter is selected.

System installation

Installing the RMP600 with an RMI or RMI-Q



Operating envelope

Radio transmission does not require line-of-sight between the probe and transmitter, and will pass through very small gaps and machine tool windows. This allows easy installation, either inside or outside the machine enclosure, as long as the probe and RMI or RMI-Q are kept within the performance envelope shown overleaf.

Coolant and swarf residue accumulating on the RMP600 and RMI or RMI-Q may have a detrimental effect on transmission performance. Wipe clean as often as is necessary to maintain unrestricted transmission.

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

Positioning the RMP600 and RMI or RMI-Q

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

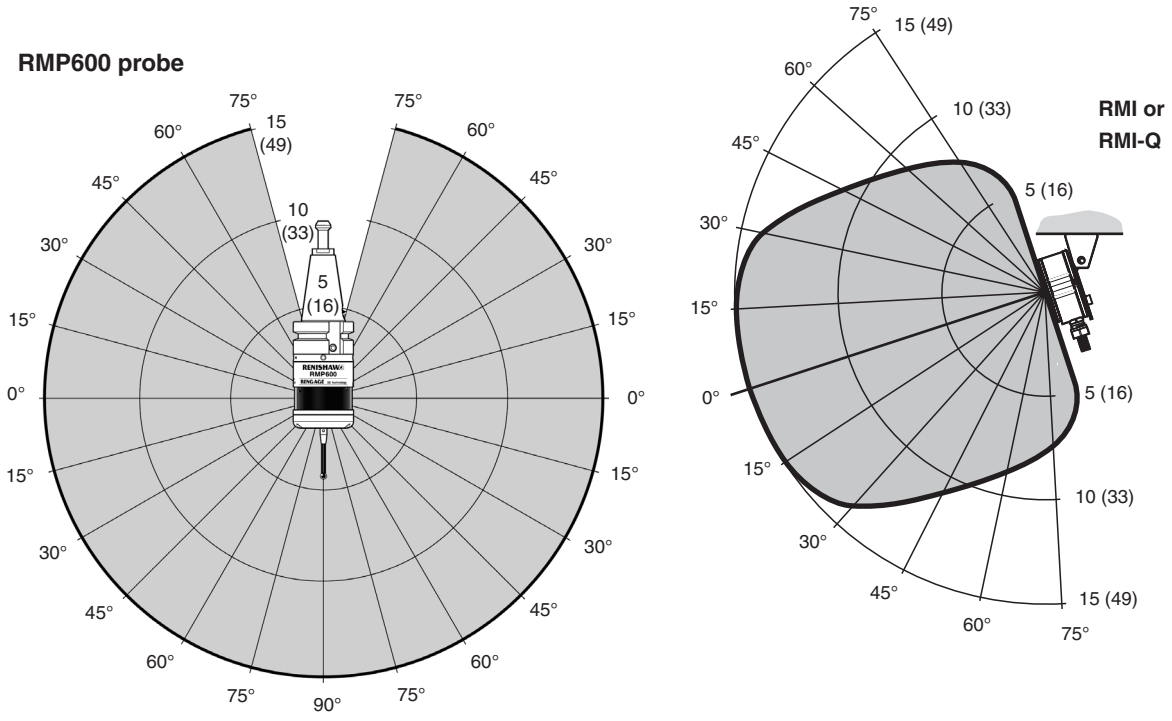
NOTE: Installing the RMP600 and RMI or RMI-Q with the RMP600 in **"radio-on"** configuration

The RMP600 has a built-in **"hibernation mode"** (battery-saving mode) that saves battery life when the RMI or RMI-Q is unpowered in **"radio-on mode"** (**"radio-off"** or **"timer-off"**) configurations. The RMP600 goes into **"hibernation mode"** 30 seconds after the RMI or RMI-Q is unpowered (or the RMP600 is out of range). When in **"hibernation mode"**, the RMP600 checks for a powered RMI or RMI-Q every 30 seconds. If found, the RMP600 goes from **"hibernation mode"** to **"standby mode"**, ready for **"radio-on"**.

Performance envelope

The RMP600 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, this is not necessary for the RMP600 radio transmission as it will operate with any reflected radio path provided that the reflected path length does not exceed the 15 m (49.2 ft) operating range.

Performance envelope when using the RMP600 with the RMI or RMI-Q

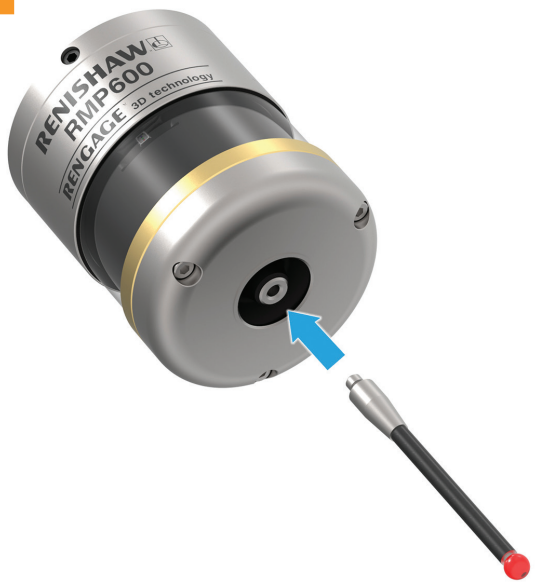


Typical plot at +20 °C (+68 °F)
360° around probe axis in m (ft)

Preparing the RMP600 for use

Fitting the stylus

1



2

M-5000-3707

Installing the batteries

NOTES:

See Section 5, “Maintenance” for a list of suitable battery types.

Ensure the product is clean and dry before inserting batteries.

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

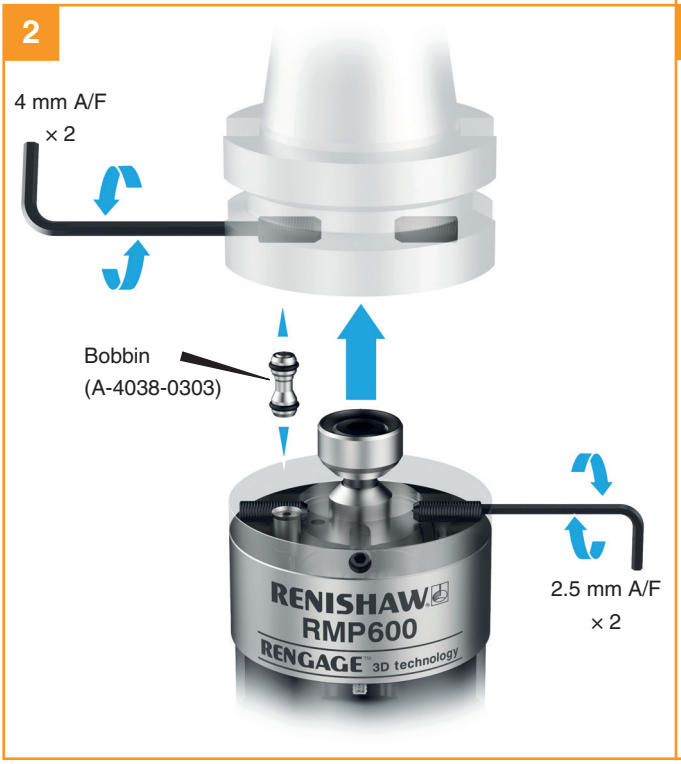
After inserting the batteries the LEDs will display the current probe settings (for more information, see page 4.1 “Reviewing the probe settings”).

Mounting the probe on a shank

NOTE: Where the RMP600 is to be used with a shank switch, remove the plug from the rear of the probe using pliers and replace it with the bobbin (A-4038-0303).

1

2



3

Stylus on-centre adjustment

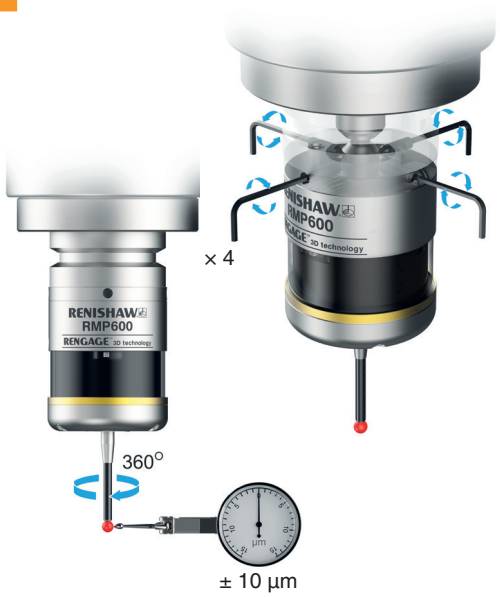
NOTES:

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

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

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

1



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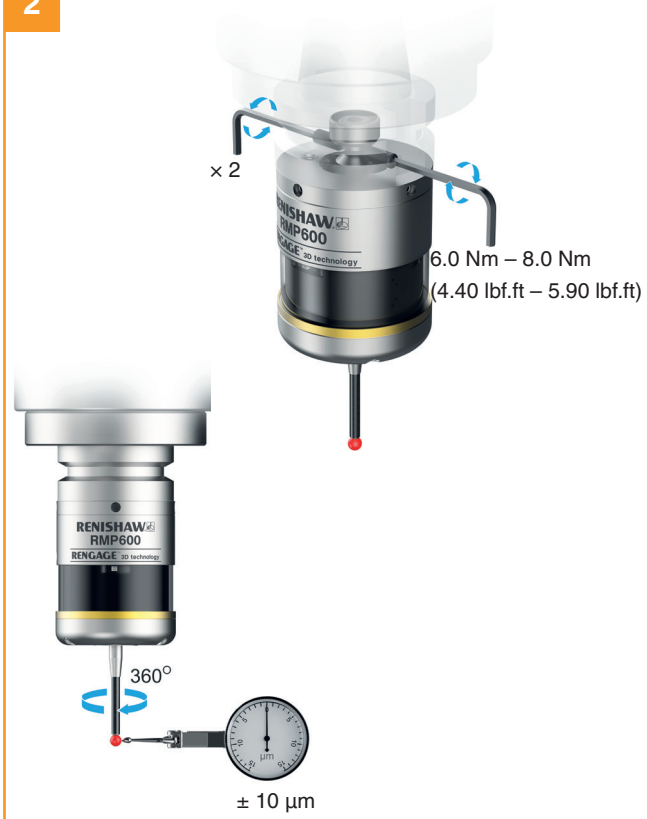


3

Calibrating the RMP600

Why calibrate a probe?

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

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

- when a probe system is to be used for the first time;
- when the enhanced trigger filter is changed;
- when a new stylus is fitted to the probe;
- when it is suspected that the stylus has become distorted or that the probe has been crashed;
- at regular intervals to compensate for mechanical changes of your machine tool;
- if repeatability of relocation of the probe shank is poor. In this case, the probe may need to be recalibrated each time it is selected.

It is good practice to set the tip of the stylus on-centre, because this reduces the effect of any variation in spindle and tool orientation (see page 3.6, “Stylus on-centre adjustment”, for further information). A small amount of run-out is acceptable, and can be compensated for as part of the normal calibration process.

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

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

Calibrating in a bored hole or on a turned diameter

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

Calibrating in a ring gauge or on a datum sphere

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

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

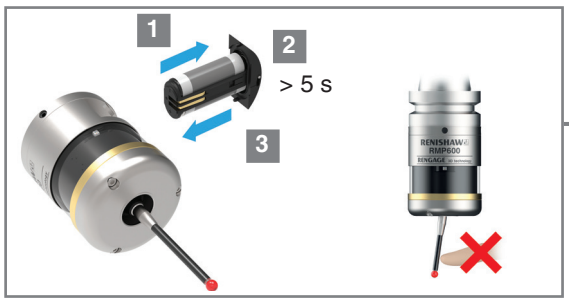
Calibrating the probe length

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

Trigger Logic™

Reviewing the probe settings

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



LED check ● ● ●

Switch-on method

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

Switch-off method (omitted for shank on)

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

Enhanced trigger filter setting and auto-reset facility

Auto reset off Trigger filter on 8 ms	or	Auto reset off Trigger filter on 16 ms	or	Auto reset on Trigger filter on 8 ms	or	Auto reset on Trigger filter on 16 ms	or	Auto reset off Trigger filter off
● ● ▬		● ● ▬		● ● ▬		● ● ▬		● ● ▬

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

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

Battery status

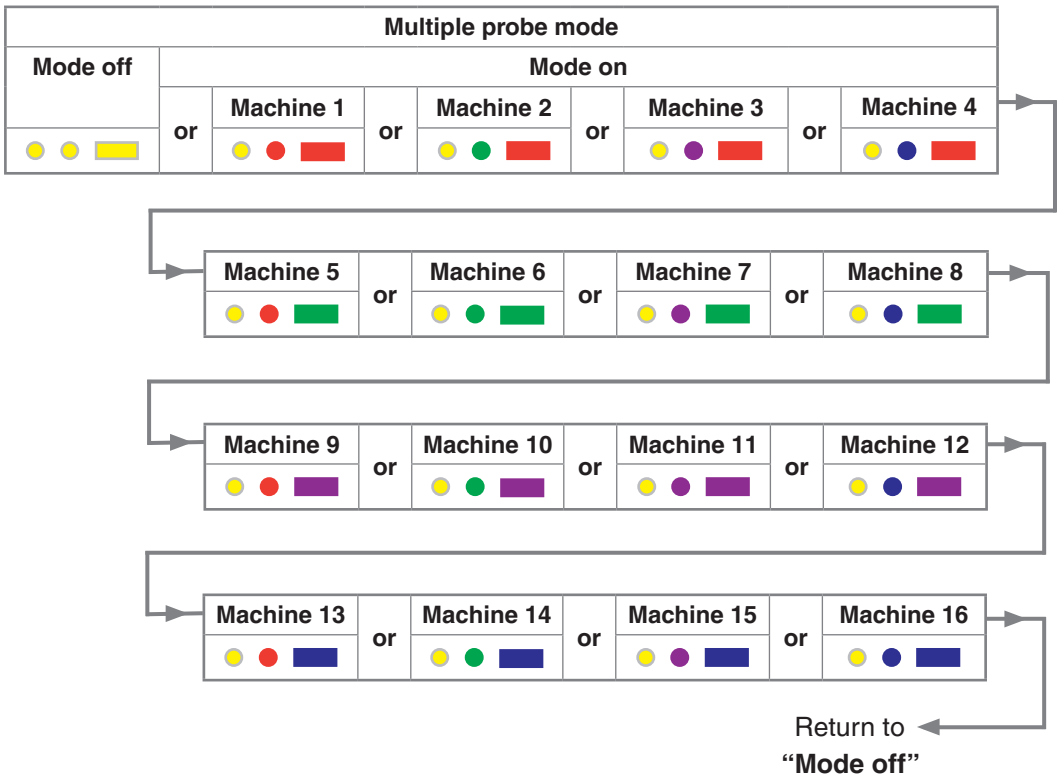
Battery good	or	Battery low
● ● ● ● ●		● ● ● ● ● ● ● ● ●

Probe in standby mode (after 5 seconds)

Multiple probe mode settings

(RMI-Q application only)

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



Probe settings record

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

			✓ tick Factory settings	 New settings
Switch-on method	Radio on	● ● ▭	✓	
	Shank on	● ● ▬		
	Spin on	● ● ▬		
Switch-off method	Radio off or spin off or shank off	● ● ▬	✓	
	Short timeout (12 s)	● ● ▬		
	Medium timeout (33 s)	● ● ▬		
	Long timeout (134 s)	● ● ▭		
Enhanced trigger filter setting and auto-reset facility	Auto reset off / Filter on (8 ms)	● ● ▬		
	Auto reset off / Filter on (16 ms)	● ● ▬		
	Auto reset on / Filter on (8 ms)	● ● ▬	✓	
	Auto reset on / Filter on (16 ms)	● ● ▭		
	Auto reset off / Filter off	● ● ▬		
Multiple probe mode (**RMI-Q** only)	Off (factory set)	○ ○ ▭	✓	
	On (machine number)	See **"Multiple probe settings"**		

Factory settings are for kit (A-5312-0001) only.

RMP600 serial no .....

Changing the probe settings

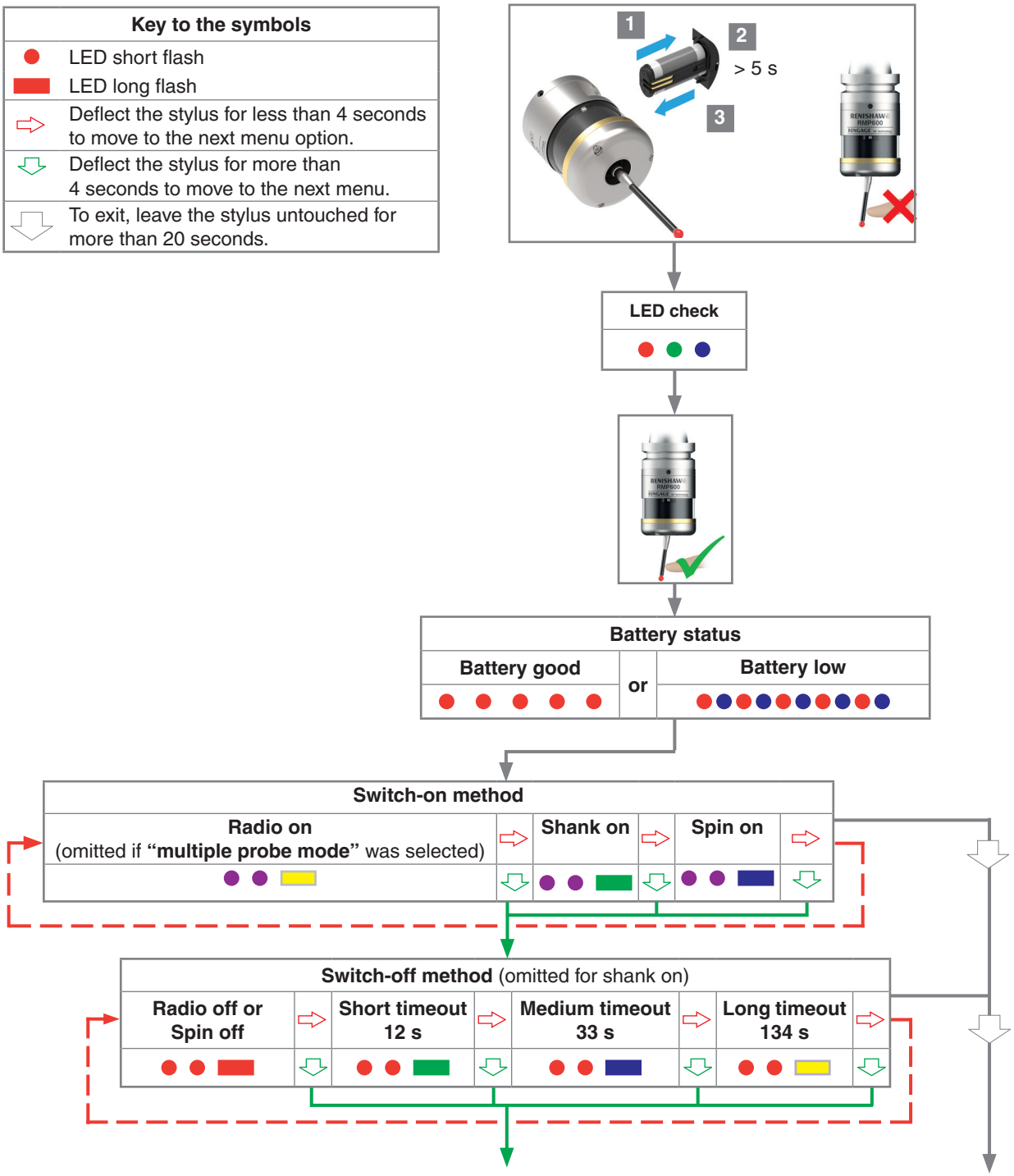
Insert the batteries or, if they have already been installed, remove them for five seconds and then refit them.

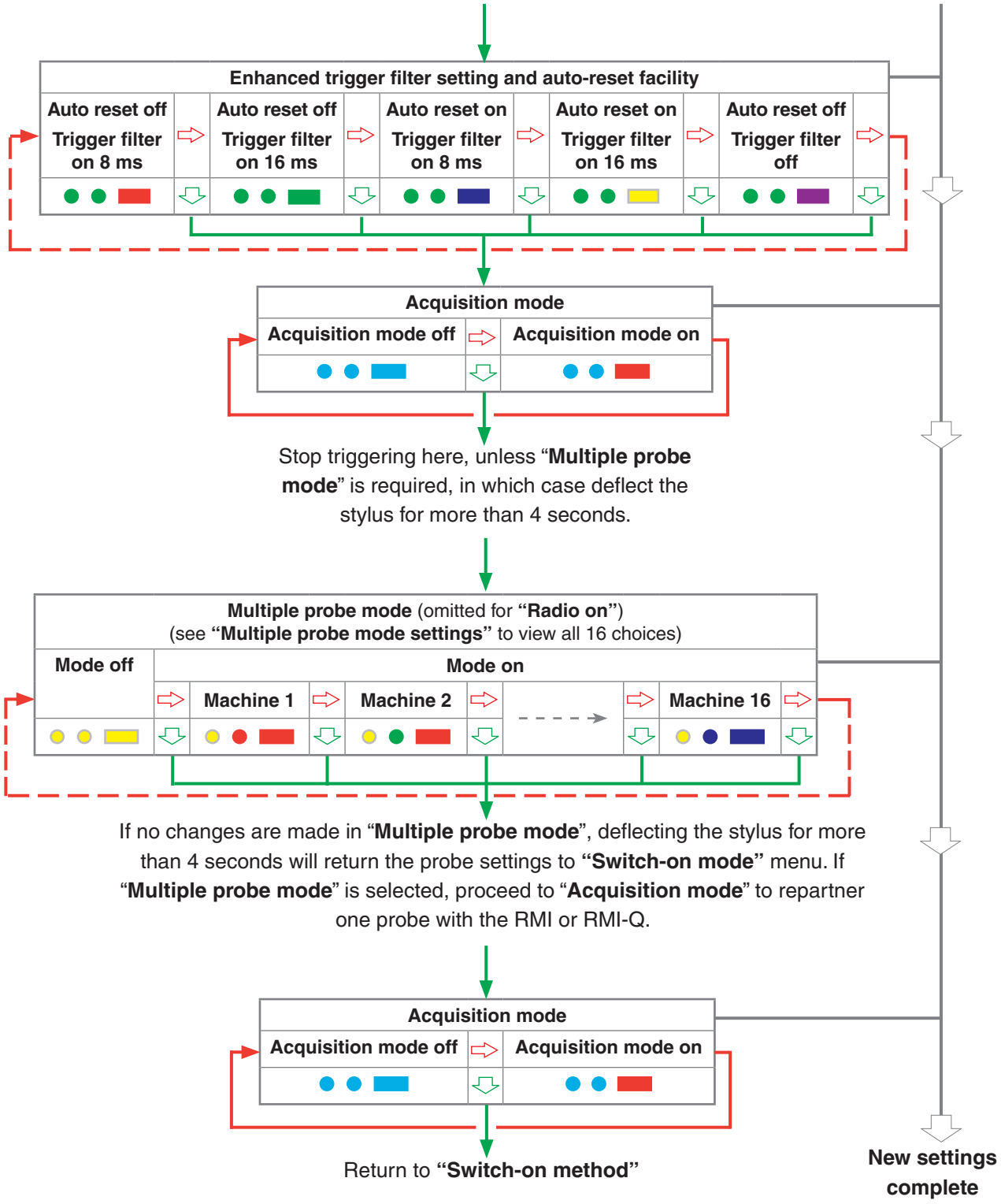
Following the LED check, immediately deflect the stylus and hold it deflected until five red flashes have been observed (if the battery power is low, each red flash will be followed by a blue flash).

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

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

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.





NOTES:

If using "**Multiple probe mode**", refer to the *RMI radio machine interface* installation guide (Renishaw part no. H-4113-8554) or the *RMI-Q radio machine interface* installation guide (Renishaw part no. H-5687-8504).

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

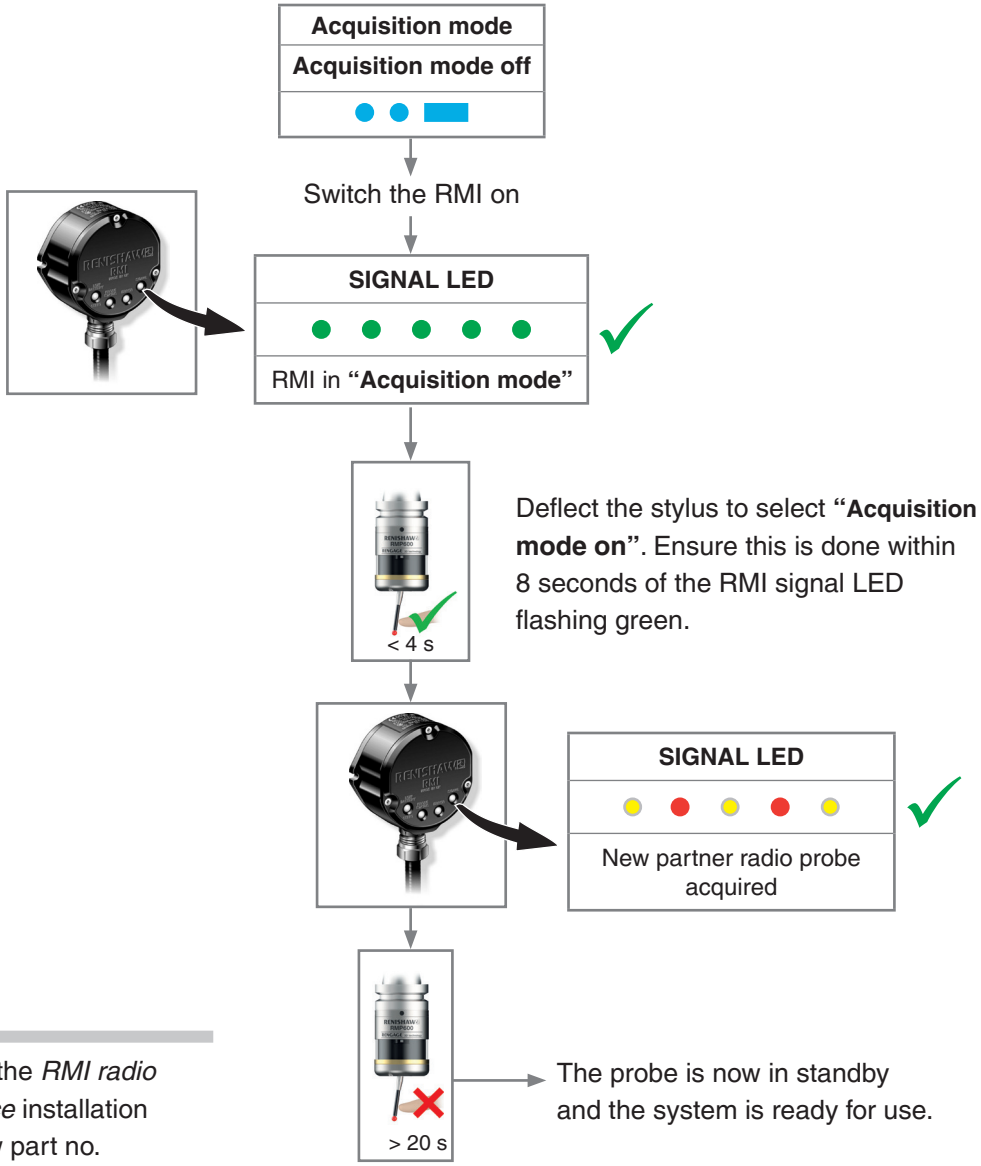
To partner an RMP600 with an RMI, see page 4.6, "RMP600 – RMI partnership", or with an RMI-Q see page 4.7, "RMP600 – RMI-Q partnership", for further information. Once acquisition has been successful, the RMP600 will revert to "**Acquisition mode off**".

RMP600 – 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 RMP600 or RMI is changed, or if 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"**.



NOTE: Refer to the *RMI radio machine interface* installation guide (Renishaw part no. H-4113-8554) when partnering the RMP600.

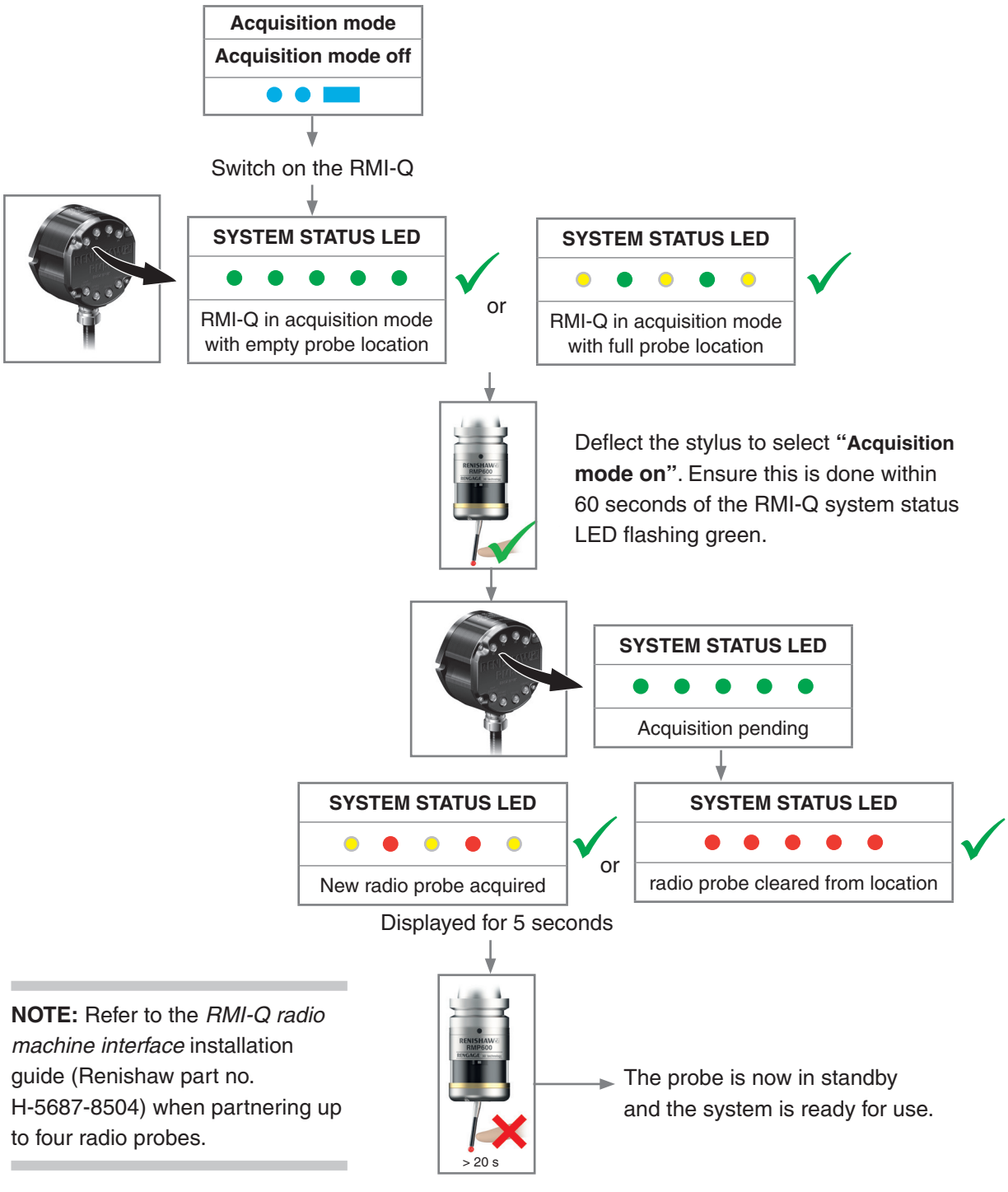
RMP600 – RMI-Q partnership

System set-up can be achieved by 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 RMP600 or RMI-Q is changed.

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

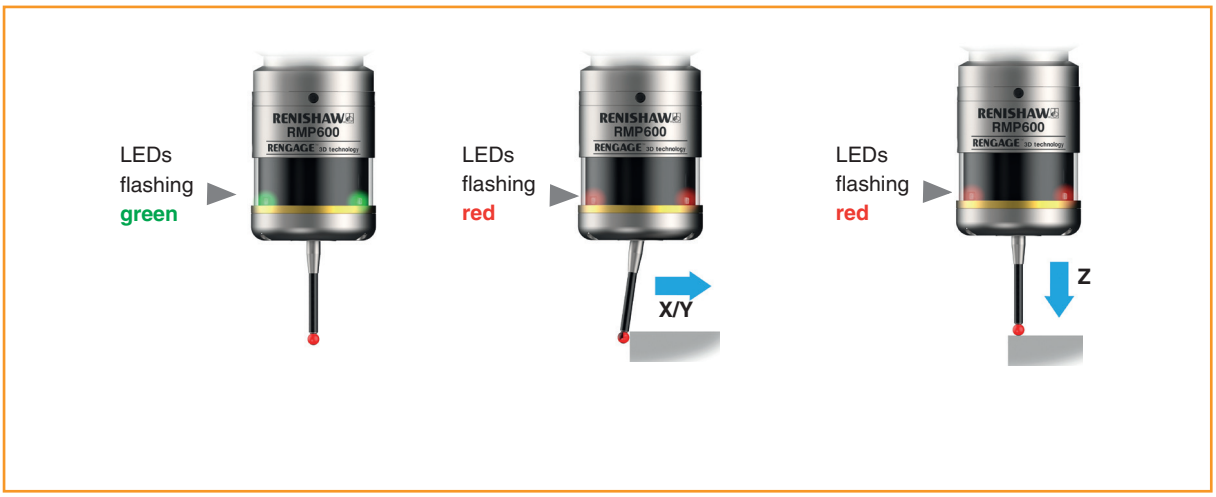
An RMP600 that is partnered with the RMI-Q, but then used with another system will need to be repartnered before being used again with the RMI-Q.

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



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

Operating mode



Probe status LEDs

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

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

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

Maintenance

Maintenance

You may undertake the maintenance routines described in these instructions.

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

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

Cleaning the probe

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

CAUTION: The RMP600 has a glass window. Handle with care if broken to avoid injury.

Changing the batteries

CAUTIONS:

Do not leave dead batteries in the probe.

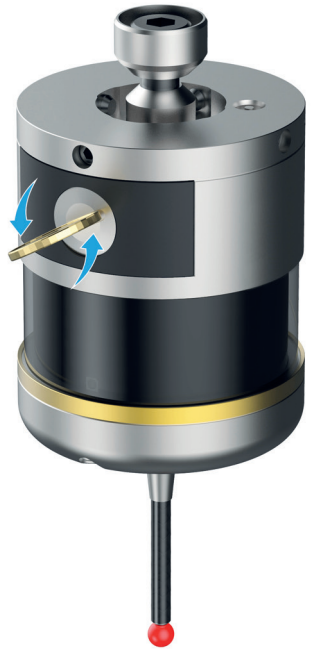
When changing batteries, do not allow coolant or debris to enter the battery compartment.

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

Take care to avoid damaging the battery cassette gasket.

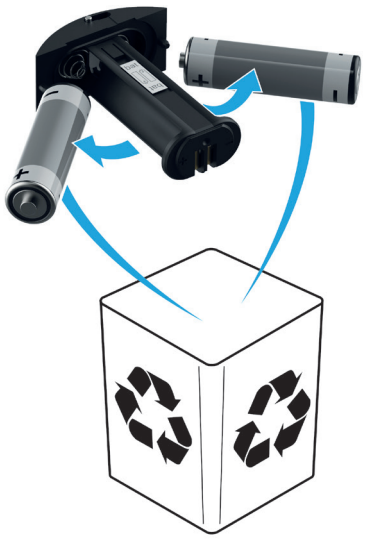
Only use specified batteries.

1



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

2



3

NOTES:

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

Do not mix new and used batteries or battery types, as this will result in reduced life and damage to the batteries.

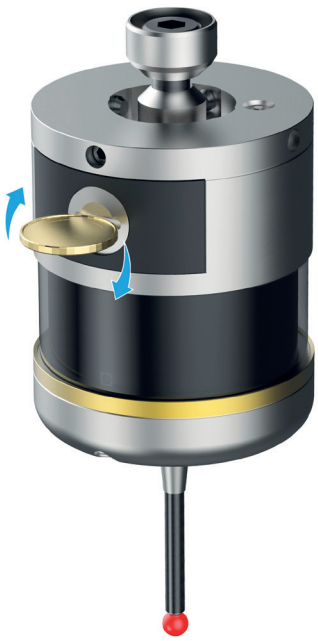
Always ensure that the cassette gasket and mating surfaces are clean and free from dirt before reassembly.

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

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

4

5



Diaphragm replacement

RMP600 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.

CAUTION: 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.

Fault-finding

Symptom	Cause	Action
The probe fails to power up (no LEDs illuminated or fails to indicate current probe settings).	Dead batteries.	Change batteries.
	Unsuitable batteries.	Fit suitable batteries.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
	Batteries removed for too short a time and probe has not reset.	Remove batteries for a minimum of 5 seconds.
	Poor connection between battery cassette mating surfaces and contacts.	Remove any dirt and clean the contacts before reassembly.
The probe fails to switch on.	Dead batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
	Probe out of range.	Check position of RMI or RMI-Q, see operating envelope.
	No RMI or RMI-Q “start/stop” signal (**“radio on mode”** only).	Check RMI or RMI-Q for green start LED.
	Incorrect spin speed (**“spin switch on mode”** only).	Check spin speed and duration.
	Malfunctioning shank switch (**“shank switch mode”** only).	Check switch operation.
	Incorrect switch on method configured.	Check configuration and alter as required.
	Incorrect **“multiple probe mode”** setting configured.	Check configuration and alter as required.
	RMP600 in **“hibernation mode”** (**“radio on mode”** only).	Ensure probe is in range and wait up to 30 seconds, then resend switch-on signal. Check position of RMI or RMI-Q, see operating envelope.
	Spin on is within 1 second of spin off.	Check for 1 second dwell following spin off.

Symptom	Cause	Action
The machine stops unexpectedly during a probing cycle.	Radio link failure/RMP600 out of range.	Check interface/receiver and remove obstruction.
	RMI or RMI-Q receiver/machine fault.	Refer to receiver/machine user's guide.
	Dead batteries.	Change batteries.
	Excessive machine vibration causing false probe trigger.	Change enhanced trigger filter setting.
	Probe unable to find target surface.	Check that part is correctly positioned and that stylus has not broken.
	Adjacent probe.	Reconfigure adjacent probe to low power mode and reduce range of receiver.
	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). Maximum dwell is 1 second.
The probe crashes.	Workpiece obstructing probe path.	Review probing software.
	Probe length offset missing	Review probing software.
	In cases where there is more than one probe on a machine, incorrect probe activated.	Review interface wiring or part program.
The probe is permanently triggered.	Probe orientation has changed, (for example from horizontal to vertical).	Select probe **"Auto-reset"** function.
	New stylus has been fitted.	Turn probe off and on again.
	Probe was switched on when stylus was deflected.	Turn probe off and on again. Ensure stylus is seated during switch on.
	Probe has not settled before a trigger move occurs following a rotation or rapid move (**"Auto-reset mode"** only).	Turn probe off and on again, and increase the dwell from 0.2 to 0.5 second dwell before probing move.
	Probe has collided with an object during a rotation or rapid move (**"Auto-reset mode"** only).	Turn probe off and on again.

Symptom	Cause	Action
Poor probe repeatability and/or accuracy.	Debris on part or stylus.	Clean part and stylus.
	Poor tool change repeatability.	Redatum probe after each tool change.
	Loose probe mounting on shank or loose stylus.	Check and tighten as appropriate.
	Excessive machine vibration.	Enable enhanced trigger filter. Eliminate vibrations.
	Calibration out of date and/or incorrect offsets.	Review probing software.
	Calibration and probing speeds not the same.	Review probing software and make speeds the same.
	Calibration feature has moved.	Correct the position.
	Measurement occurs as stylus leaves surface.	Review probing software.
	Measurement occurs within the machine's acceleration and deceleration zone.	Review probing software and probe filter settings.
	Probing speed too high or too low.	Perform simple repeatability trials at various speeds.
	Temperature variation causes machine and workpiece movement.	Minimise temperature changes.
	Machine tool faulty.	Perform health checks on machine tool.
RMP600 status LEDs do not correspond to RMI or RMI-Q status LEDs.	Radio link failure – RMP600 out of RMI or RMI-Q range.	Check position of RMI or RMI-Q, see operating envelope.
	RMP600 has been enclosed/ shielded by metal.	Remove from obstruction.
	RMP600 and RMI or RMI-Q are not partnered.	Partner RMP600 and RMI or RMI-Q.

Symptom	Cause	Action
RMI or RMI-Q error LED lit during probing cycle.	Probe not switched on or probe timed out.	Change setting. Review **"switch-off"** method.
	Probe out of range.	Check position of RMI or RMI-Q, see operating envelope.
	Dead batteries.	Change batteries.
	RMP600 and RMI or RMI-Q are not partnered.	Partner RMP600 with RMI or RMI-Q.
	Probe selection error.	Verify that one radio probe is working and is correctly selected.
	"Fast" second turn-on error.	Ensure that all RMPs are 'Q' marked probes, or change the RMI-Q turn-on time to "standard".
RMI or RMI-Q low battery LED lit.	Low batteries.	Change batteries soon.
Reduced range.	Local radio interference.	Identify and remove.
The probe fails to switch off.	Incorrect **"switch-off"** method configured.	Check configuration and alter as required.
	No RMI or RMI-Q "start/stop" signal (**"radio on mode"** only).	Check RMI or RMI-Q for green start LED.
	Probe in **"timeout mode"** and placed in tool magazine and being triggered by movement.	Use shorter timeout setting or use different **"switch-off mode"**.
	Malfunctioning shank switch (**"shank switch mode"** only).	Check switch operation.
	Incorrect spin speed (**"spin switch on"** only).	Check spin speed.
	Spin off is within 1 second of a spin-on.	Check for a 1 second dwell following a spin on.
The probe goes into Trigger Logic™ configuration mode and cannot be reset.	Probe was triggered when batteries were inserted.	Do not touch the stylus or stylus mounting face during battery insertion.
The probe status LED shows a constant blue	Probe damaged beyond use.	Return the probe to your nearest Renishaw supplier for repair/ replacement.

Parts list

Item	Part number	Description
RMP600	A-5312-8503	RMP600 probe with batteries, tools and product support card (factory-set to radio on / radio off).
Battery	P-BT03-0005	AA battery – alkaline – supplied as standard with probe (pack of two).
Battery	P-BT03-0008	AA battery – lithium-thionyl chloride (pack of two).
Stylus	A-5003-7306	50 mm long carbon fibre stylus with Ø6 mm ball.
Stylus	A-5003-6510	100 mm long carbon fibre stylus with Ø6 mm ball.
Stylus	A-5003-6511	150 mm long carbon fibre stylus with Ø6 mm ball.
Stylus	A-5003-6512	200 mm long carbon fibre stylus with Ø6 mm ball.
Tool kit	A-4038-0304	Probe tool kit comprising Ø1.98 mm stylus tool (× 1), 2 mm A/F hexagon key (× 1), 2.5 mm A/F hexagon key (× 2), 4 mm A/F hexagon key (× 1) and shank grub screw (× 2).
Battery cassette	A-4038-0300	Battery cassette assembly.
Battery gasket	A-4038-0301	Battery cap gasket kit.
Diaphragm kit	A-5312-0302	RMP600 diaphragm kit.
Bobbin kit	A-4038-0303	Bobbin for shank switch (supplied with shank).
RMI	A-4113-0050	RMI (side exit) with 15 m (49.2 ft) cable, tools and product support card
RMI-Q	A-5687-0050	RMI-Q (side exit) with 15 m (49.2 ft) cable, tools and product support card
Mounting bracket	A-2033-0830	Mounting bracket with fixing screws, washers and nuts.
Styli tool	M-5000-3707	Tool for tightening / releasing styli.
Publications. These can be downloaded from our website at **www.renishaw.com**.		
RMI-Q	H-5687-8504	Installation guide: for set-up of the RMI-Q.
Styli	H-1000-3200	Technical specifications guide: Styli and accessories – or visit our Web shop at **www.renishaw.com/shop**.
Probe software	H-2000-2298	Data sheet: Probe software for machine tools – programs and features.
Taper shanks	H-2000-2011	Data sheet: taper shanks for machine tool probes.

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Issued: 09.2022

Part no. H-5312-8503-08-B