Installation guide
H-5627-8504-07-B

RENISHAW
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RLP40 radio lathe probe

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

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

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Before you begin

Disclaimer

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Unless you and Renishaw have agreed and signed a separate written agreement, the equipment and/or software are sold subject to the Renishaw Standard Terms and Conditions supplied with such equipment and/or software, or available on request from your local Renishaw office.

Renishaw warrants its equipment and software for a limited period (as set out in the Standard Terms and Conditions), provided that they are installed and used exactly as defined in associated Renishaw documentation. You should consult these Standard Terms and Conditions to find out the full details of your warranty.

Equipment and/or software purchased by you from a third-party supplier is subject to separate terms and conditions supplied with such equipment and/or software. You should contact your third-party supplier for details.

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 RLP40 and RLP40H, and other similar Renishaw products, are the subject of one or more of the following patents and/or patent applications:

CN	100466003	JP	4575781
CN	101482402	JP	5238749
EP	1425550	JP	5390719
EP	1457786	KR	1001244
EP	1576560	TW	I333052
EP	1804020	US	7285935
EP	1931936	US	7665219
EP	2216761	US	7821420
IN	215787	US	9140547
WO	2004/057552		

RLP40 software notices

The RLP40 and RLP40H product includes embedded software (firmware) to which the following notices apply:

US government notice

NOTICE TO UNITED STATES GOVERNMENT CONTRACT AND PRIME CONTRACT CUSTOMERS

This software is commercial computer software that has been developed by Renishaw exclusively at private expense. Notwithstanding any other lease or licence agreement that may pertain to, or accompany the delivery of, this computer software, the rights of the United States Government and/or its prime contractors regarding its use, reproduction and disclosure are as set forth in the terms of the contract or subcontract between Renishaw and the United States Government, civilian federal agency or prime contractor respectively. Please consult the applicable contract or subcontract and the software licence incorporated therein, if applicable, to determine your exact rights regarding use, reproduction and/or disclosure.

Renishaw software EULA

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Intended use

The RLP40 and RLP40H are radio lathe probes that enable automated workpiece inspection and job set-up on multi-tasking machines and lathes.

Safety

Information to the user

This product is supplied with non-rechargeable lithium metal batteries. Refer to the battery manufacturer's literature for specific battery operating, safety and disposal guidelines.

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

Ensure that you comply with international and national battery transport regulations when transporting the batteries or this product with the batteries inserted. Lithium metal batteries are classified as dangerous goods for transportation and require labelling and packaging in accordance with the dangerous goods regulations before being offered for transportation. To reduce the risk of shipment delays, should you need to return this product for any reason, do not return any batteries.

In all applications involving the use of machine tools, eye protection is recommended.

The RLP40 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.

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

Information to the equipment installer

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

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

Equipment operation

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

RLP40 basics

Introduction

At only 40 mm diameter, the compact RLP40 job set-up and inspection probe sets industry standards for functionality, reliability and robustness in the harshest of machine tool environments.

The RLP40 forms part of Renishaw's family of new generation radio transmission probes. It is ideally suited to multi-tasking machines and lathes where line-of-sight between probe and receiver is difficult to achieve or where Z travel is limited.

The RLP40 complies with FCC regulations and operates in the 2.4 GHz band. It delivers interference-free transmission through the use of frequency-hopping spread spectrum (FHSS), which allows several systems to operate in the same machine shop without risk of cross-interference.

All RLP40 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:

- Radio on / Radio off
- Radio on / Timer off
- Spin on / Spin off
- Spin on / Timer off
- Filter on / Filter off
- Multiple probe mode on / Multiple probe mode off

RLP40H

The RLP40H variant is configured with high stylus trigger forces, making it particularly suitable for application on machines that produce high levels of shock and vibration.

Getting started

Three multicolour 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 RMI and RMI-Q integrated interfaces/receivers are used to communicate between the RLP40 probe and the machine controller.

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 Trigger Logic app is available that simplifies this process with clear, interactive instructions and informative videos and is available for download on the following stores:

or

Current probe settings can be reviewed by removing the batteries for a minimum of 5 seconds, and replacing them to activate the Trigger Logic review sequence (for more information, see page 4.1, **“Reviewing the probe settings”**).

Probe modes

The RLP40 probe can be in one of three modes:

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

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

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

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

RLP40 switch-on method Switch-on options are configurable	RLP40 switch-off method Switch-off options are configurable	Switch-on time
Radio on Radio switch on is commanded by machine input.	**Radio off** Radio switch off is commanded by machine input. A timer automatically switches the probe off 90 minutes after the last trigger if it is not turned off by machine input. **Timer off (timeout)** Timeout will occur 12, 33 or 134 seconds (user-configurable) after the last probe trigger or reseat.	1 second maximum **NOTE:** This assumes a good radio communication link. In a poor radio frequency (RF) environment this may rise to a maximum of 3 seconds.
Spin on Spin at 500 r/min for 1 second minimum (6 seconds maximum).	**Spin off** Spin at 500 r/min for 1 second minimum (6 seconds maximum). 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 seconds maximum. **NOTE:** The 2 seconds starts from the moment the spindle reaches 500 r/min.

NOTE: After being switched on, the RLP40 must be on for 1 second minimum. When using spin on / spin off, ensure that the probe is stationary for 1 second minimum after it has stopped spinning before using spin on.

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 10 ms delay is introduced to the probe's output.

The RLP40 is factory-set to trigger filter off.

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

Multiple probe mode

The RLP40 can be configured, using Trigger Logic, to allow multiple radio probes to be used with a single RMI or RMI-Q.

NOTES:

The **"radio on"** switch-on method cannot be used in **"multiple probe mode"**. **"Multiple probe mode"** will not appear as an option if the **"radio on"** option has been selected.

RLP40 probes which are set to **"multiple probe mode on"** can coexist alongside any number of RLP40 probes set to **"multiple probe mode off"**.

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

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

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; 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 as long as they all have the same **"mode on"** colour choice.

All RLP40 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 repartnered with the RMI or RMI-Q.

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

Acquisition mode

System set-up is achieved by using Trigger Logic and powering-on the RMI or RMI-Q, or applying ReniKey. Partnering is only required during initial system set-up. Further partnering will be required if the RLP40, RMI or RMI-Q is changed.

NOTES:

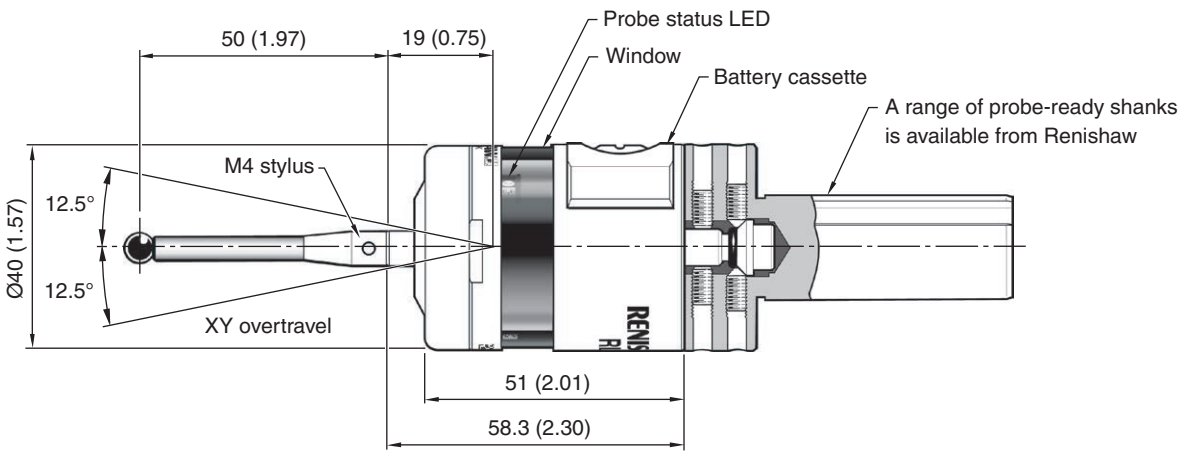
Systems using the RMI-Q can be partnered with up to four RLP40 probes manually. Alternatively this can be achieved by using ReniKey: a Renishaw machine macro cycle which does not require the RMI-Q to be power cycled.

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 reconfiguring the probe settings or changing the batteries, except where "**multiple probe mode**" is selected. Partnering can take place anywhere within the operating envelope.

RLP40 dimensions



Dimensions given in mm (in)

Stylus overtravel limits		
Stylus length	**±X/±Y**	**Z**
50 (1.97)	12 (0.47)	6 (0.24)
100 (3.94)	22 (0.87)	6 (0.24)

RLP40 and RLP40H specification

Principal application	Workpiece inspection and job set-up on multi-tasking machines and lathes.	
Dimensions	Length Diameter	58.3 mm (2.30 in) 40 mm (1.57 in)
Weight (without shank)	With batteries Without batteries	260 g (9.17 oz) 240 g (8.47 oz)
Transmission type	Frequency-hopping spread spectrum (FHSS) radio	
Radio frequency	2400 MHz to 2483.5 MHz	
Switch-on methods	Radio M-code, spin	
Switch-off methods	Radio M-code, spin, timeout	
Spindle speed (maximum)	1000 r/min	
Operating range	Up to 15 m (49.2 ft)	
Receiver/interface	RMI or RMI-Q combined antenna, interface and receiver unit	
Sense directions	Omni-directional ±X, ±Y, +Z	
Unidirectional repeatability Maximum 2σ value in any direction	**RLP40** 1.00 µm (40 µin) 2σ [1]	**RLP40H** 2.00 µm (80 µin) 2σ [1]
Stylus trigger force [2 3] XY low force XY high force Z	 0.60 N, 61 gf (2.15 ozf) 0.97 N, 99 gf (3.49 ozf) 6.23 N, 635 gf (22.41 ozf)	 1.58 N, 161 gf (5.68 ozf) 3.17 N, 323 gf (11.40 ozf) 10.62 N, 1083 gf (38.20 ozf)
Maximum setting: XY low force XY high force Z	 0.83 N, 85 gf (2.99 ozf) 1.60 N, 163 gf (5.76 ozf) 10.00 N, 1020 gf (35.97 ozf)	Not applicable
Minimum setting: XY low force XY high force Z	 0.30 N, 31 gf (1.08 ozf) 0.60 N, 61 gf (2.16 ozf) 4.00 N, 408 gf (14.39 ozf)	Not applicable
Stylus overtravel XY plane +Z plane	 ±12.5° 6 mm (0.24 in)	 ±12.0° 5 mm (0.20 in)

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

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

3 These are the factory settings; manual adjustment is not possible on the RLP40H.

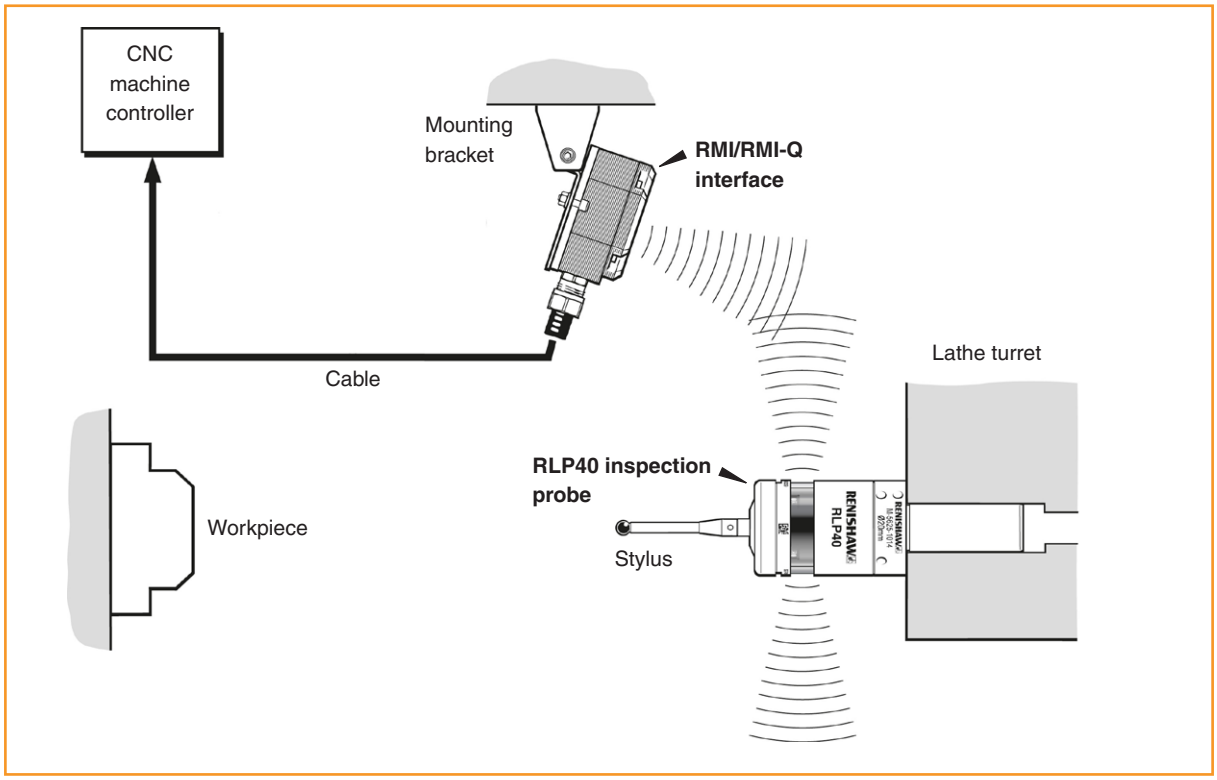
Environment	IP rating	IPX8, BS EN 60529:1992+A2:2013
	IK rating	IK02 (BS EN 62262:2002+A1:2021) [for glass window]
	Storage temperature	–25 °C to +70 °C (–13 °F to +158 °F)
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)
Battery types	2 × ½AA 3.6 V lithium-thionyl chloride (LTC)	
Battery reserve life	Approximately one week after a low battery warning is first given (based on 5% usage)	
Low battery indication	Blue flashing LED in conjunction with normal red or green probe status LED	
Dead battery indication	Constant or flashing red	
Typical battery life	See the table below	

Typical battery life

Spin switch on		Radio switch on		Continuous use
Standby life	5% usage (72 minutes/day)	Standby life	5% usage (72 minutes/day)	
240 days	150 days	290 days	170 days	450 hours

System installation

Installing the RLP40 with an RMI or RMI-Q



Radio transmission does not require line-of-sight between the probe and interface as it 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 RLP40 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 RLP40 and RMI or RMI-Q

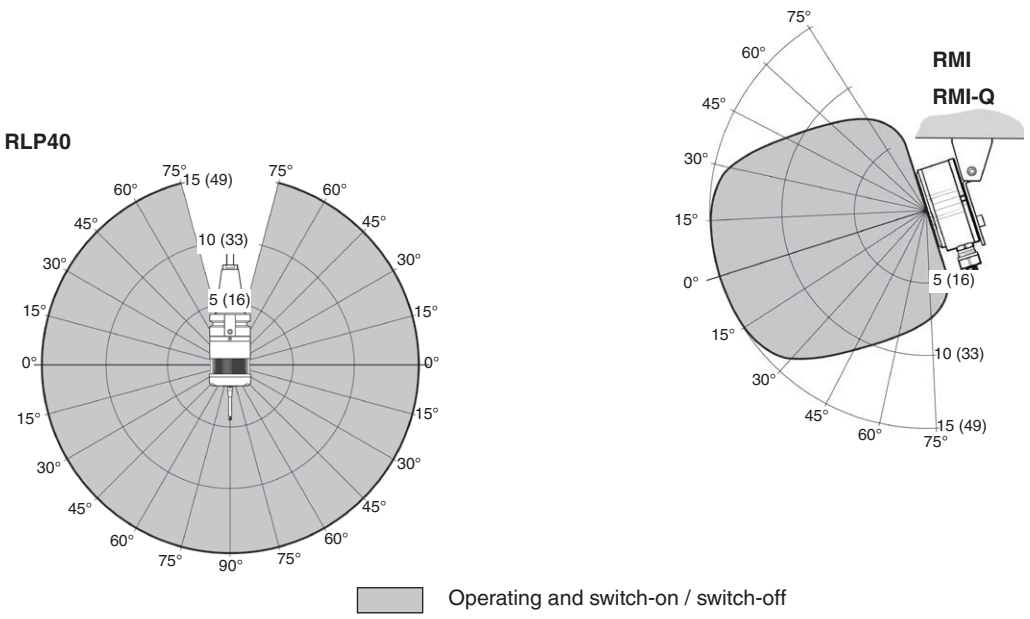
The probe system should be positioned so that the optimum range can be achieved over the full travel of the machine's axes. Always face the front cover of the RMI or RMI-Q in the general direction of the machining area and the tool magazine, ensuring both are within the performance envelope shown below. 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 RLP40 and RMI or RMI-Q with the RLP40 in "radio-on" configuration

The RLP40 has a built-in "**hibernation mode**" (battery-saving mode) that saves battery life when the RMI or RMI-Q is unpowered in "**radio-on**" (radio-off or timer-off) configurations. The RLP40 goes into "**hibernation mode**" 30 seconds after the RMI or RMI-Q is unpowered (or the RLP40 is out of range). When in "**hibernation mode**", the RLP40 checks for a powered RMI or RMI-Q every 30 seconds. If found, the RLP40 goes from "**hibernation mode**" to "**standby mode**", ready for "**radio-on**".

Performance envelope

The RLP40 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.



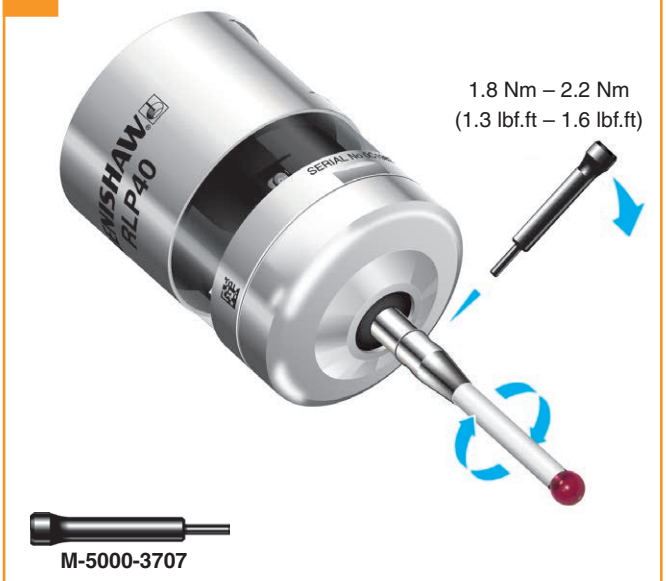
Typical plot at +20 °C (+68 °F)
360° around probe axis in m (ft)

Preparing the RLP40 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.

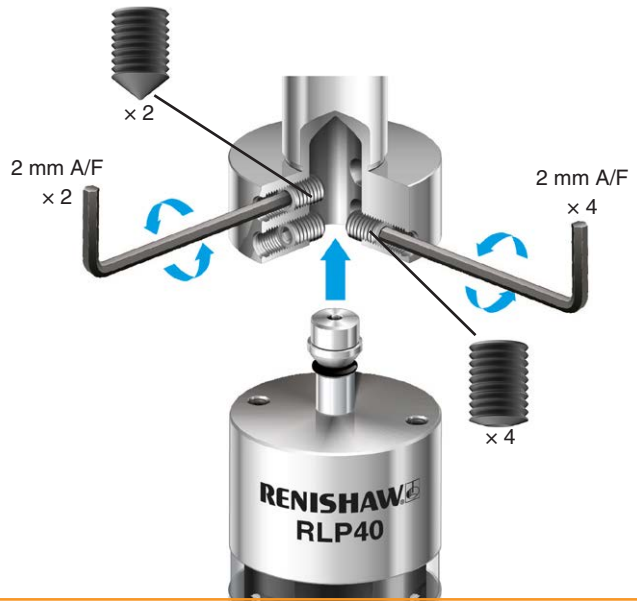
If dead batteries are inadvertently inserted, the LEDs will remain a constant red.

Do not allow coolant or debris to enter the battery compartment. When inserting batteries, check that the battery polarity is correct.

After the batteries have been inserted, the LEDs will display the current probe settings (see page 4.1, **"Reviewing the probe settings"**, for further information).

Mounting the probe on a shank

1



2

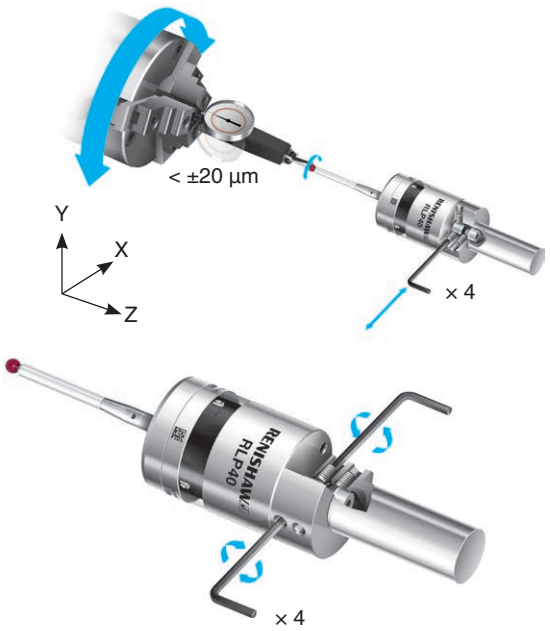
Stylus on-centre adjustment

NOTES:

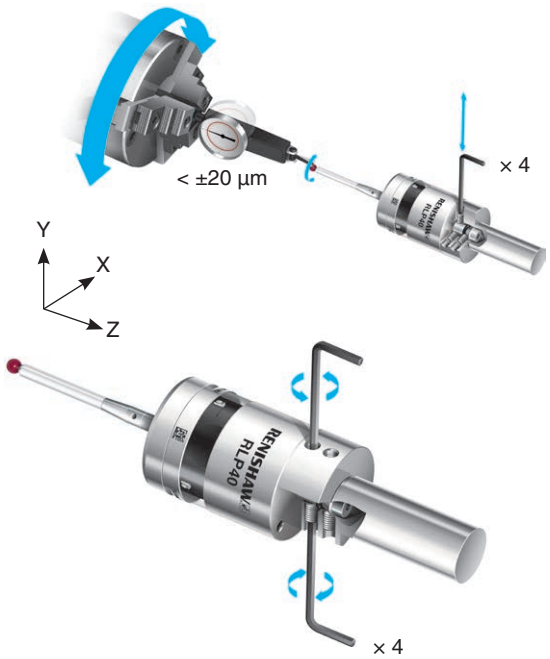
If a probe and shank assembly is dropped, it must be rechecked for correct on-centre adjustment.

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

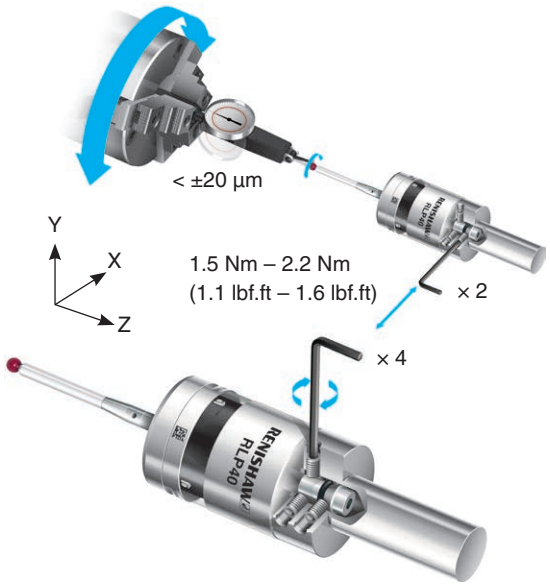
1 **Adjust in X axis**



2 **Adjust in Y axis**



3



Stylus trigger force and adjustment (RLP40 only)

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

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

To adjust the trigger force, turn the adjusting screw counterclockwise (as shown) to reduce the force (more sensitive); eventually it reaches a stop. Turn the adjusting screw clockwise (as shown) to increase the force (less sensitive). If the internal screw becomes disengaged, remove any pressure on the stylus and turn the key counterclockwise to re-engage the thread.

Trigger forces in the XY plane vary around the stylus and depend on trigger direction.

Stylus trigger force adjustment and use of styli other than test stylus types may cause probe repeatability to differ from the calibration certificate results.

Factory setting

RLP40

XY low force	0.60 N, 61 gf (2.15 ozf)
XY high force	0.97 N, 99 gf (3.49 ozf)
Z	6.23 N, 635 gf (22.41 ozf)

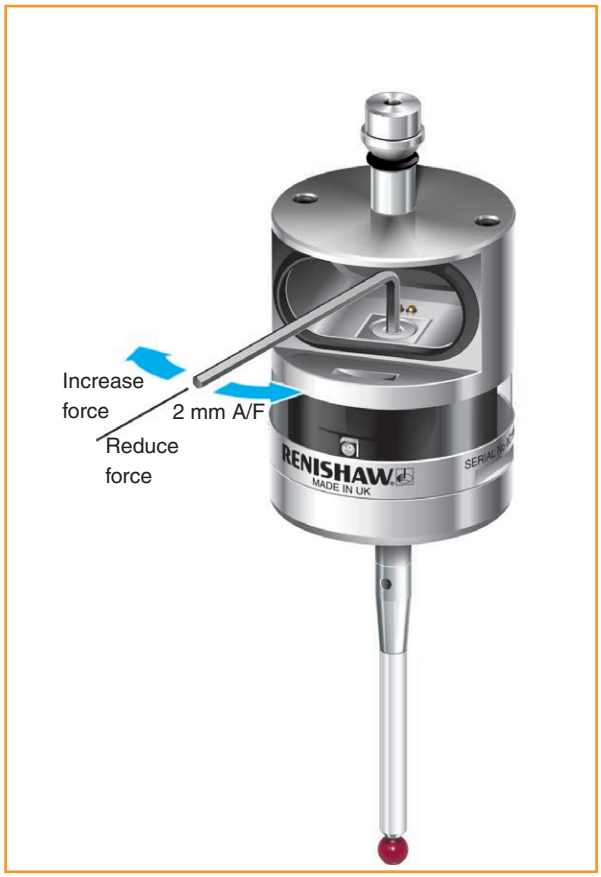
Maximum setting

XY low force	0.83 N, 85 gf (2.99 ozf)
XY high force	1.60 N, 163 gf (5.76 ozf)
Z	10.00 N, 1020 gf (35.97 ozf)

Minimum setting

XY low force	0.30 N, 31 gf (1.08 ozf)
XY high force	0.60 N, 61 gf (2.16 ozf)
Z	4.00 N, 408 gf (14.39 ozf)

NOTE: The RLP40H does not have trigger force adjustment.



Calibrating the RLP40

Why calibrate a probe?

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

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

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

It is good practice to set the tip of the stylus on-centre, because this reduces the effect of any variation in spindle and tool orientation (see page 3.6, **"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.

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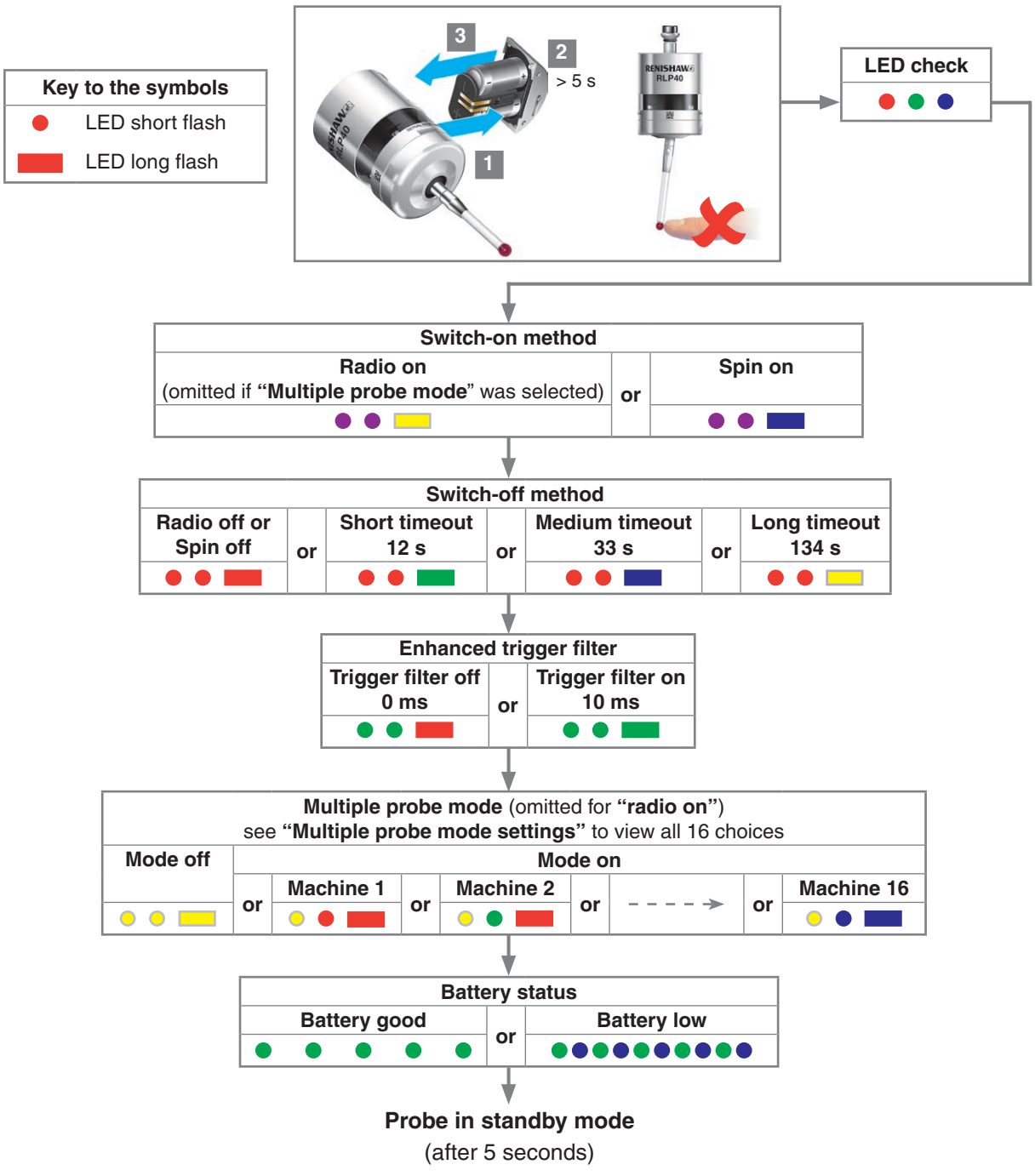
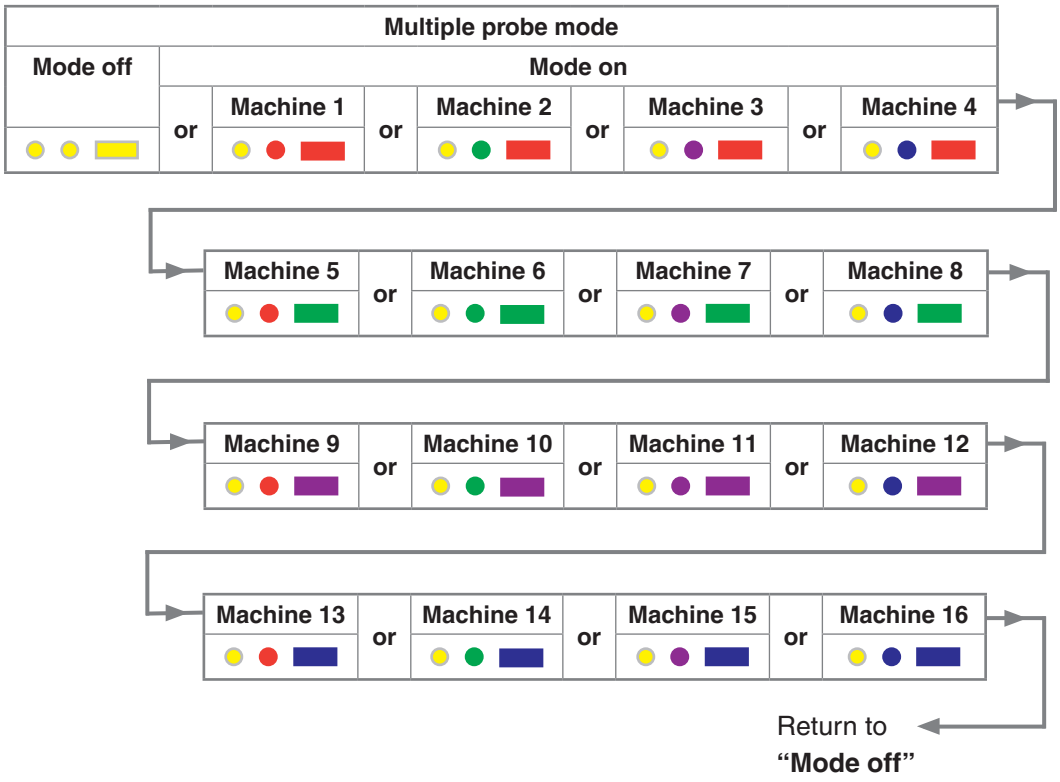
Trigger Logic™

Reviewing the probe settings



Multiple probe mode settings

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



Probe settings record

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

			✓ tick Factory settings	✓ tick New settings
Switch-on method	Radio on	● ● ▬	✓	
	Spin on	● ● ▬		
Switch-off method	Radio or spin	● ● ▬	✓	
	Short timeout (12 s)	● ● ▬		
	Medium timeout (33 s)	● ● ▬		
	Long timeout (134 s)	● ● ▬		
Enhanced trigger filter	Trigger filter off (0 ms)	● ● ▬	✓	
	Trigger filter on (10 ms)	● ● ▬		
Multiple probe mode	Off (factory set)	○ ○ ▬	✓	
	On (machine number)	See **"Multiple probe mode settings"**		

RLP40 serial no .....

Changing the probe settings

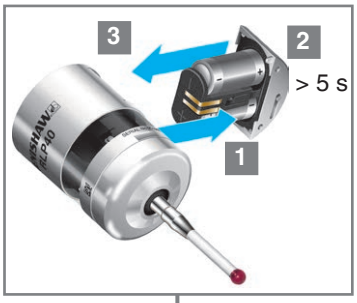
Insert the batteries or, if they have already been installed, remove them for 5 seconds and then refit them.

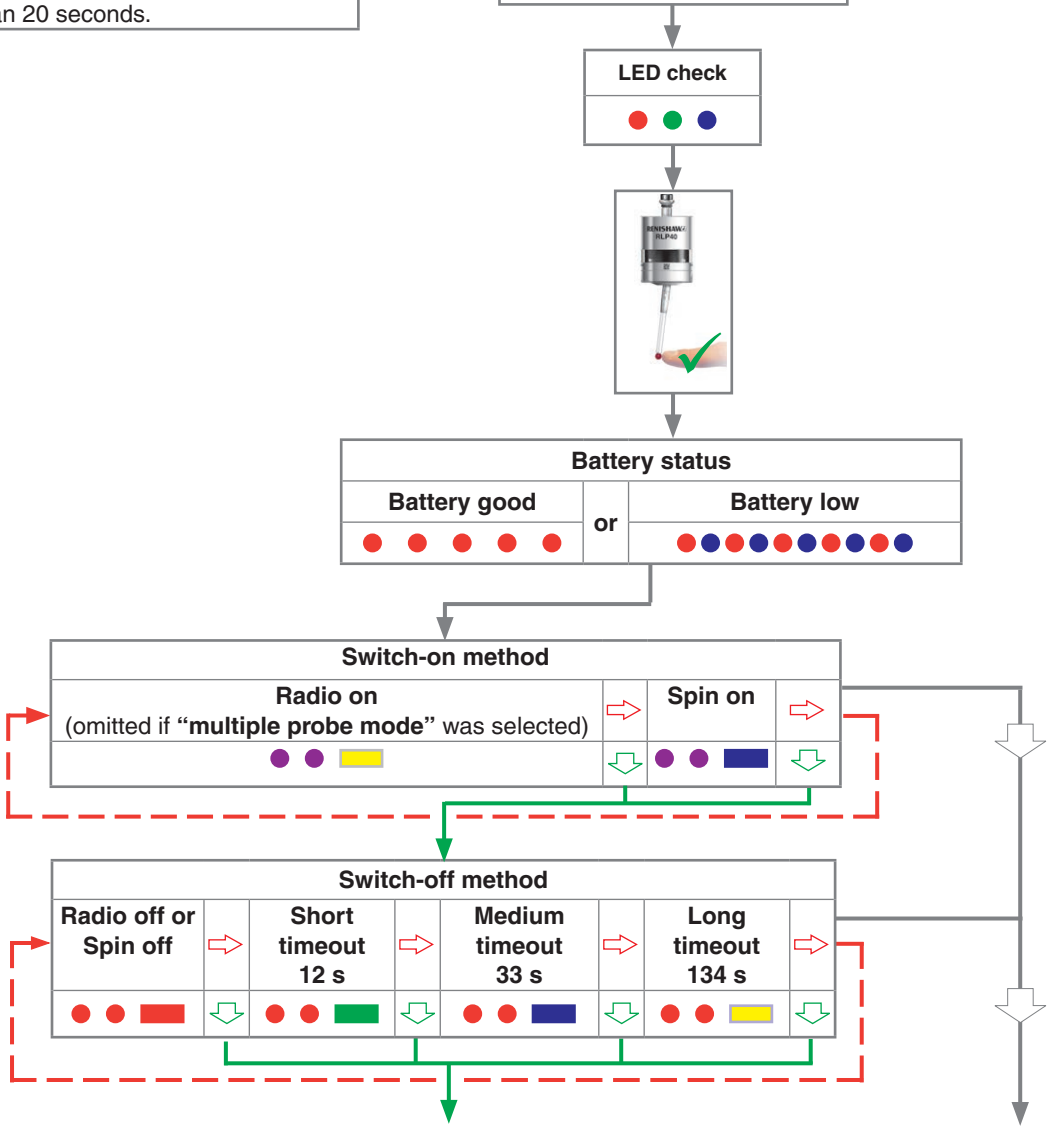
Following the LED check, immediately deflect the stylus and hold it deflected until five red flashes have been observed (if the battery power is low, each red flash will be followed by a blue flash).

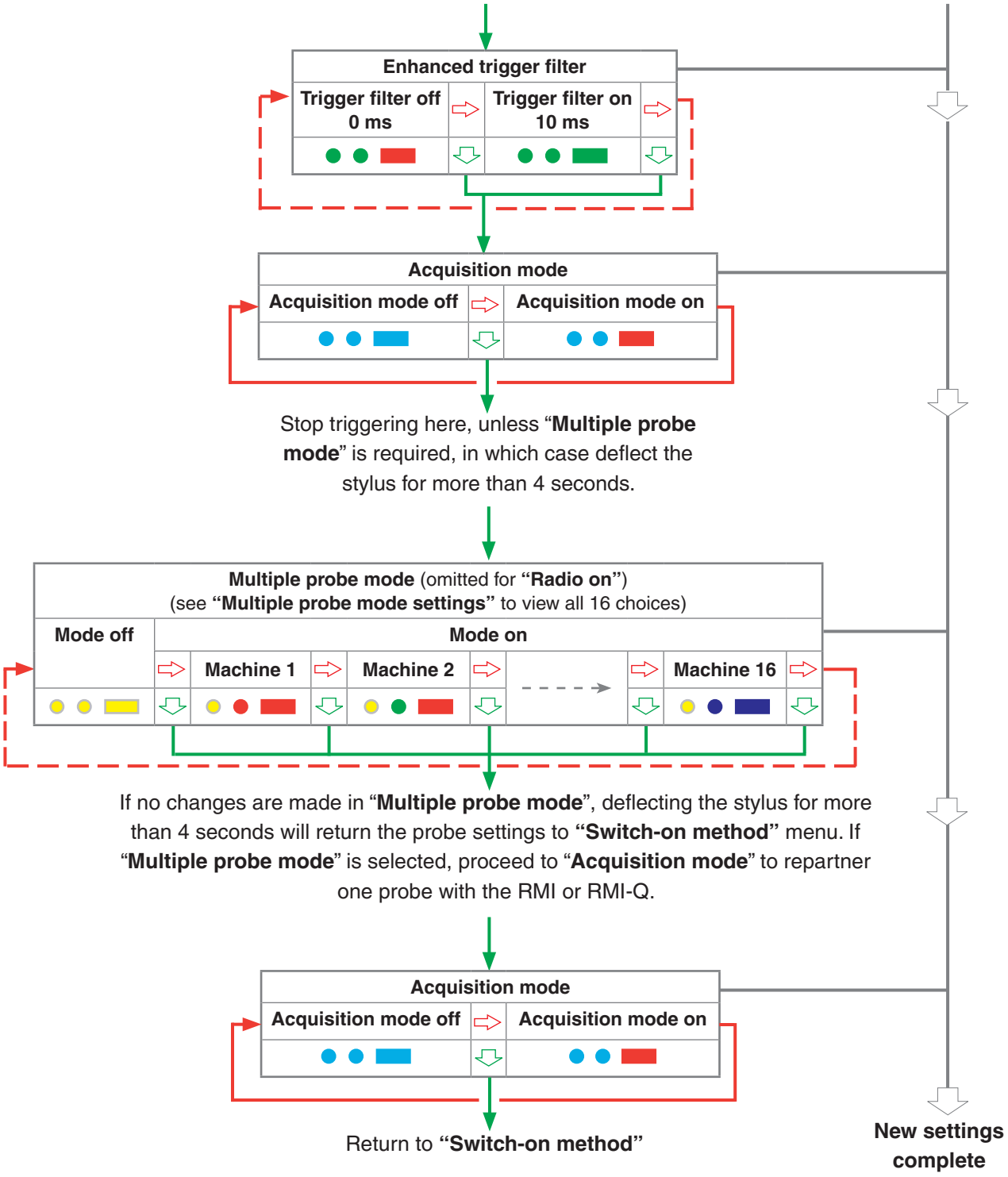
Keep the stylus deflected until the "**Switch-on method**" setting is displayed, then release it. The probe is now in configuration mode and Trigger Logic is activated.

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.

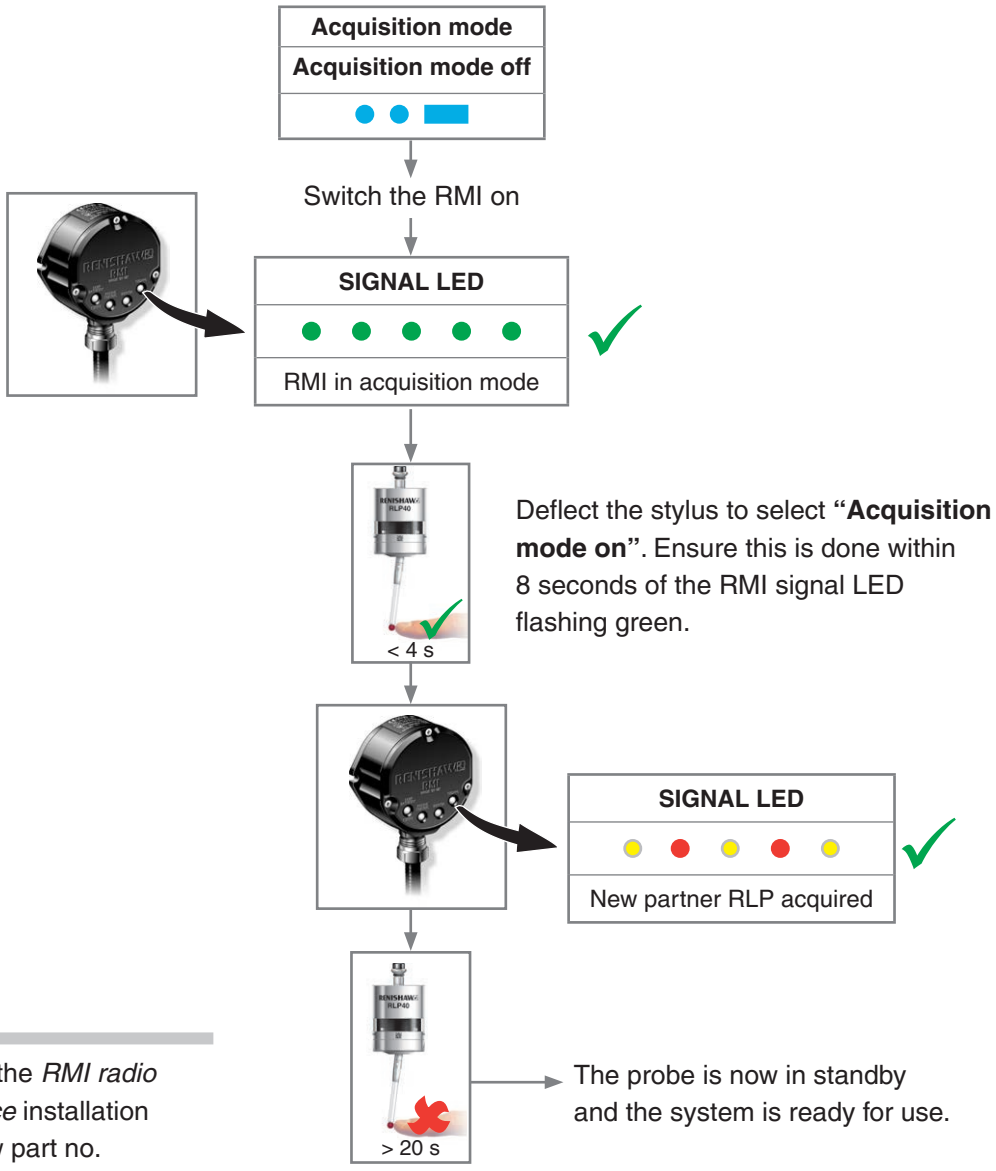
To partner an RLP40 with an RMI see page 4.6, **"RLP40 – RMI partnership"**, or with an RMI-Q see page 4.7, **"RLP40 – RMI-Q partnership"**, for further information. Once acquisition has been successful, the RLP40 will revert to "**Acquisition mode off**".

RLP40 – 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 RLP40 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 RLP40.

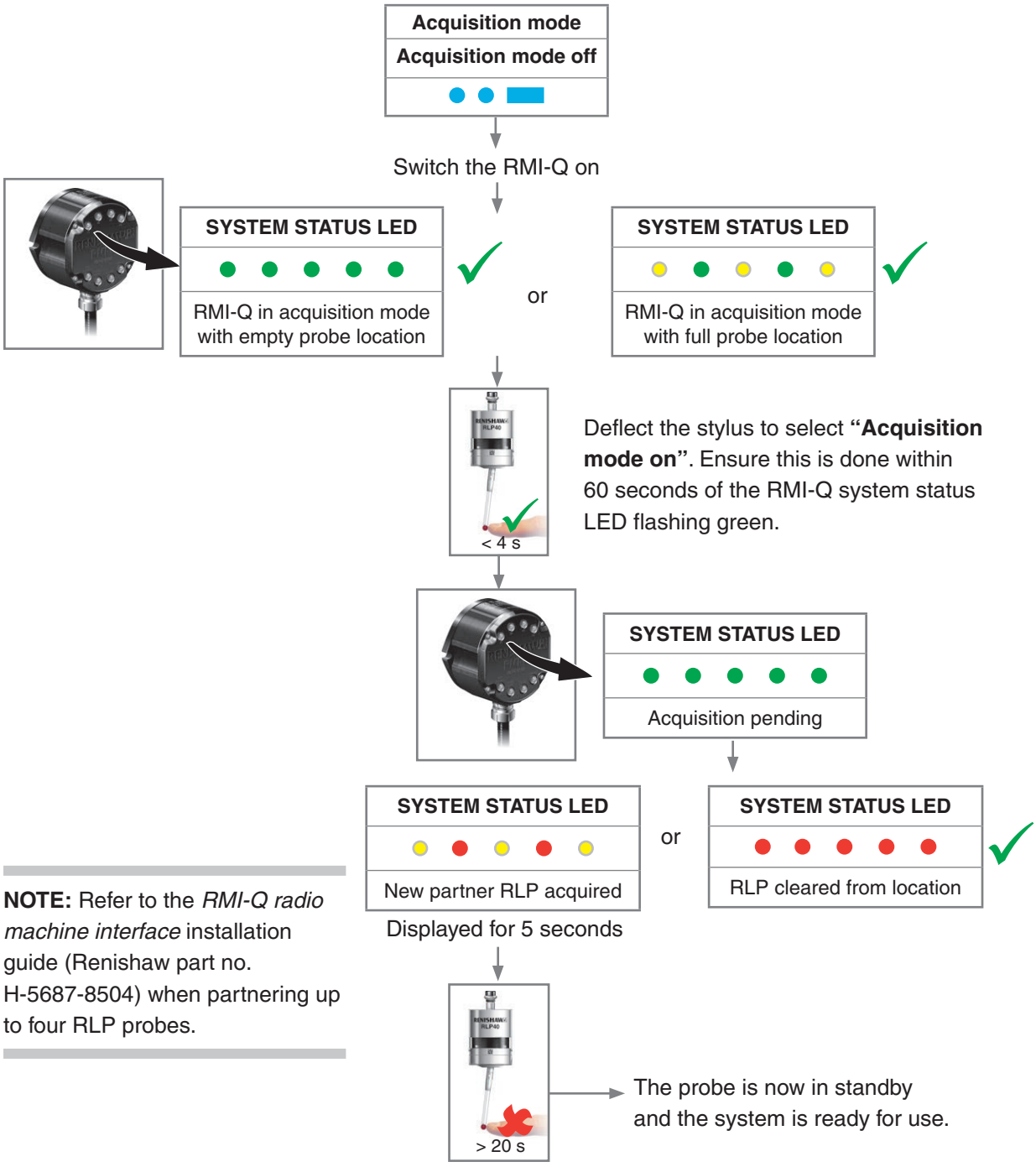
RLP40 – RMI-Q partnership

System set-up is 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 RLP40 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 RLP40 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 RLP probes.

Operating mode

Probe status LEDs

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

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

1. When the probe is active, the batteries discharge until battery power becomes too low for the probe to operate correctly.
2. The probe stops functioning, 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 RLP40 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 type					
½ AA lithium-thionyl chloride (3.6 V) × 2					
✓	**Saft:** **Tadiran:** **Xeno:**	LS 14250 SL-750 XL-050F	✗	**Dubilier:** **Maxell:** **Sanyo** **Tadiran:** **Varta:**	SB-AA02 ER3S CR 14250SE SL-350, SL-550, TL-4902, TL-5902, TL-2150, TL-5101 CR ½AA

NOTE: Lithium-thionyl chloride batteries are available from other manufacturers. However, these are untested by Renishaw so correct operation of the probe cannot be guaranteed.

4

5

RLP40 eyelid

The RLP40 is fitted with a metal eyelid that protects the internal components of the probe from hot chip and coolant environment. Dirt may accumulate in the cavity underneath the metal eyelid seal.

To remove this dirt, once a month, remove the front cap (using a coin or flat blade screwdriver) and then remove all the residue with a low-pressure jet of coolant.

Do not use a sharp tool or a degreasing agent. The cleaning interval may be extended or reduced, depending on the rate dirt accumulates. If the inner diaphragm is damaged, return the probe to your supplier for repair.

Reassembling the probe

Do not use the probe with the cap removed. Check that the probe is firmly secured in its mounting.

1

Apply a coin or flat blade screwdriver to both sides to sequentially lever the front cap from the probe body.

2

3

4

Fault-finding

Symptom	Cause	Action
Probe fails to power up (no LEDs illuminated or fails to indicate current probe settings).	Dead batteries.	Change batteries.
	Unsuitable batteries.	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.
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-on mode”** only).	Check spin speed and duration.
	Incorrect **“switch-on mode”** configured.	Check configuration and alter as required.
	Incorrect **“multiple probe mode”** setting configured.	Check configuration and alter as required.

Symptom	Cause	Action
Machine stops unexpectedly during a probing cycle.	Radio link failure/RLP40 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.	Enable enhanced trigger filter.
	Probe unable to find target surface.	Check that part is correctly positioned and that stylus has not broken.
	Stylus not given sufficient time to settle from a rapid deceleration.	Add a short dwell before the probing move (length of dwell will depend on stylus length and rate of deceleration). Maximum dwell is one second.
Probe crashes.	Workpiece obstructing probe path.	Review probing software.
	Probe length offset missing	Review probing software.
	In cases where there is more than one probe on a machine, incorrect probe activated.	Review interface wiring or part program.

Symptom	Cause	Action
Poor probe repeatability and/or accuracy.	Debris on part or stylus.	Clean part and stylus.
	Poor tool change repeatability.	Redatum probe after each tool change.
	Loose probe mounting on shank or loose stylus.	Check and tighten as appropriate.
	Excessive machine vibration.	Enable enhanced trigger filter. Eliminate vibrations.
	Calibration out of date and/or incorrect offsets.	Review probing software.
	Calibration and probing speeds not the same.	Review probing software.
	Calibration feature has moved.	Correct the position.
	Measurement occurs as stylus leaves surface.	Review probing software.
	Measurement occurs within the machine's acceleration and deceleration zone.	Review probing software and probe filter settings.
	Probing speed too high or too slow.	Perform simple repeatability trials at various speeds.
	Temperature variation causes machine and workpiece movement.	Minimise temperature changes.
	Machine tool faulty.	Perform health checks on machine tool.
RLP40 status LEDs do not correspond to RMI or RMI-Q status LEDs.	Radio link failure – RLP40 out of RMI or RMI-Q range.	Check position of RMI or RMI-Q; see operating envelope.
	RLP40 has been enclosed/ shielded by metal.	Remove from obstruction.
	RLP40 and RMI or RMI-Q are not partnered.	Partner RLP40 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.	Fit new batteries.
	RLP40 and RMI or RMI-Q are not partnered.	Partner RLP40 with RMI or RMI-Q.
	Probe selection error.	Verify that one RLP40 is working and is correctly selected on the RMI or RMI-Q.
	0.5 second turn-on error.	Ensure that all RLPs are "Q" marked probes, or change the RMI-Q turn-on time to 1 second.
RMI or RMI-Q low battery LED lit.	Low batteries.	Change batteries soon.
Reduced range.	Local radio interference.	Identify and remove.
Probe fails to switch off.	Incorrect **"switch-off mode"** 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"** method.
	Incorrect spin speed (**"spin-on mode"** only).	Check spin speed.
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.

Parts list

Type	Part number	Description
RLP40	A-5627-0001	RLP40 probe with batteries, tools and support card (factory-set to radio on / radio off, trigger filter off).
RLP40H	A-5627-0120	RLP40H probe with batteries, tools and support card (factory-set to radio on / radio off, trigger filter off).
Battery	P-BT03-0007	½AA battery – lithium-thionyl chloride (two required).
Stylus	A-5000-3709	PS3-1C ceramic stylus 50 mm long with Ø6 mm ball.
Weak link kit	A-2085-0068	Weak link (Part no. M-2085-0069 × 2) and 5 mm A/F spanner.
Tool kit	A-4071-0060	Kit comprising: Ø1.98 mm stylus tool, 2 mm A/F hexagon key, M4 × 6 mm cone point grub screw (× 2), and M4 × 6 mm flat point grub screw (× 4).
Service kit	A-5625-0005	RLP40 eyelid service kit.
Battery cassette	A-5625-1166	RLP40 metal battery cassette kit.
Cassette seal	A-4038-0301	Battery cassette housing seal.
RMI-Q	A-5687-0049	RMI-Q (side exit) with 8 m (26.2 ft) cable, tools and support card.
RMI-Q	A-5687-0050	RMI-Q (side exit) with 15 m (49.2 ft) cable, tools and support card.
Mounting bracket	A-2033-0830	Mounting bracket with fixing screws, washers and nuts.
Styli tool	M-5000-3707	Tool for tightening/releasing styli.
Shank	A-5625-1003	Parallel shank kit 25 mm diameter.
Shank	A-5625-1007	Parallel shank kit 1 in diameter.
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 Online store at **www.renishaw.com/shop**.
Probe software	H-2000-2298	Data sheet: *Probe software for machine tools – programs and features*.
Taper shanks	H-2000-2011	Data sheet: *Taper shanks for machine tool probes*.

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