

OMP60 – optical machine probe



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Before you begin

Before you begin

Disclaimer

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Trade marks

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

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

Warranty

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

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

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

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

Changes to equipment

Renishaw reserves the right to change equipment specifications without notice.

CNC machines

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

Care of the probe

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

Patents

Features of the OMP60 probe, and other similar Renishaw probes, are subject of one or more of the following patents and/or patent applications:

CN 100416216	JP 3967592
CN 101476859	JP 4237051
EP 0695926	JP 4294101
EP 0974208	JP 4754427
EP 1130557	JP 4773677
EP 1185838	JP 4851488
EP 1373995	JP4852411
EP 1425550	US 5669151
EP 1457786	US 6,776,344 B2
EP 1477767	US 6472981
EP 1477768	US 6839563
EP 1503524	US 6860026
EP 1613921	US 6941671
EP 1701234	US 7145468
EP 1734426	US 7285935
EP 1804020	US 7316077
EP 1988439	US 7441707
IN 234921	US 7486195
IN 8707/DELNP/2008	US 7812736

EC declaration of conformity



Renishaw plc declares that the OMP60 optical machine probe complies with the applicable standards and regulations.

Contact Renishaw plc or visit www.renishaw.com/omp60 for the full EC declaration of conformity.

WEEE directive



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

FCC information to the user (USA only)

47 CFR Section 15.19

This device complies with Part 15 of the FCC rules.

Operation is subject to the following two conditions:

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

47 CFR Section 15.21

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

47 CFR Section 15.105

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

Safety

Information to the user

The OMP60 is supplied with two non-rechargeable AA alkaline batteries. Lithium Thionyl Chloride non-rechargeable AA batteries may also be used in the OMP60 (see 'Changing the batteries' in Section 5 – Maintenance"). Lithium batteries must be approved to IEC 62133. Once the charge in the batteries is depleted, do not attempt to recharge them.



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

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

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

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

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

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

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

The OMP60 has a glass window. Handle with care if broken to avoid injury.

Information to the machine supplier/installer

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

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

Information to the equipment installer

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

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

Equipment operation

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

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OMP60 basics

Introduction

The OMP60 is an optical machine tool probe suitable for use on medium to large machining and multi-tasking centres. It is designed to resist optical interference, false triggering and shock.

The OMP60 can be operated in either 'Legacy' or 'Modulated' optical transmission modes – see probe settings for further details.

When operating in 'Legacy' mode, the OMP60 is compatible with an OMM receiver and an MI 12 interface, or with an OMI receiver/interface.

In 'Modulated' mode, the OMP60 becomes compatible for use with an OMM-2 receiver and an OSI interface, or with an OMI-2, OMI-2T, OMI-2H, OMI-2C receiver/interface, to provide substantially increased resistance to light interference.

In 'Modulated' mode, it is possible to define the probe ID. This is factory set to PROBE 1, but can be changed to PROBE 2 for use with twin probes or PROBE 3 for use with multiple probe systems.

All OMP60 settings are configured using 'Trigger Logic™'. This technique enables the user to review and subsequently change probe settings by deflecting the stylus whilst observing the LED display.

Configurable settings are:

- Switch-on / switch-off method
- Enhanced trigger filter setting
- Optical transmission method
- Optical power

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

System interface

The interface conveys and processes signals between the probe and CNC machine control.


OMI-2 / OMI-2T / OMI-2H / OMI-2C / OMM-2 with OSI (modulated transmission)

The OMI-2T or OMM-2 with OSI are the recommended interfaces for use with the OMP60 as they provide substantially increased resistance to light interference whilst providing the user greater flexibility to operate a multiple probe system.

OMI or OMM with MI 12 (legacy transmission)

Alternative interfaces are the OMI or OMM with the MI 12 interface unit.

MI 7 interface unit

 **CAUTION:** Systems using the earlier MI 7 interface in place of the MI 12 interface are not compatible with OMP60.

Trigger Logic™

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

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

Probe modes

The OMP60 probe can be in one of three modes:

Standby mode – Probe is waiting for 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 – Ready to change the probe settings using Trigger Logic™.

Configurable settings

Switch-on / switch-off methods

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

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

OMP60 switch-on method Switch-on options are configurable	OMP60 switch-off method Switch-off options are configurable	Switch-on time
<p>Optical on</p> <p>Optical switch-on is commanded by machine input.</p>	<p>Optical off</p> <p>Optical switch-off is commanded by machine input. A timer automatically switches the probe off 90 minutes after the last trigger if it is not turned off by machine input.</p>	<p>Legacy (start filter off): 0.5 seconds</p> <p>Legacy (start filter on): 1 second</p> <p>Modulated: 0.5 seconds</p>
<p>Optical on</p> <p>Optical switch-on is commanded by machine input or auto start.</p>	<p>Timer off (timeout)</p> <p>Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset. Please note that the issue of a further M-code during the time out period, will also reset the timer.</p>	
<p>Spin on</p> <p>Spin at 500 rev/min for 1 second minimum.</p>	<p>Spin off</p> <p>Spin at 500 rev/min for 1 second minimum. A timer automatically switches the probe off 90 minutes after the last trigger if it is not spun.</p>	1 second maximum
<p>Spin on</p> <p>Spin at 500 rev/min for 1 second minimum.</p>	<p>Timer off (timeout)</p> <p>Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset.</p>	1 second maximum
<p>Shank switch-on</p>	<p>Shank switch-off</p>	Approximately 0.5 seconds.

Enhanced trigger filter

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

When the filter is enabled, a constant nominal 10, 20 or 40 ms delay is introduced to the probe output.

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

Factory set to OFF.

Optical transmission method

Probes subjected to particular forms of light interference may accept spurious start signals.

The OMP60 can be operated in either 'Legacy' or 'Modulated' optical transmission mode.

Legacy mode

A start filter improves the probe's resistance to these effects.

When Legacy (start filter on) is enabled, an additional one second delay is introduced to the probe activation (switch on) time.

It may be necessary to revise the probe program software to allow for the increased activation time.

Modulated mode

The OMP60 becomes compatible for use with the OMI-2 / OMI-2T / OMI-2H / OMI-2C and OMM-2 with OSI to provide substantially increased resistance to light interference.

Modulated transmission in the OMP60, is capable of providing three different coded start signals. This allows the use of two probes with an OMI-2T and up to three probes with an OMM-2/OSI system respectively.

Twin/multiple probe system

To operate in a twin or multiple probe system, one probe needs to be set to PROBE 1 start and the other probe needs to be set to PROBE 2 start (OMI-2T or OMM-2 / OSI) or PROBE 3 start (OMM-2 / OSI only). These settings are user configurable.

In a twin probe system, such as a spindle probe and an optical tool setting probe, the spindle probe needs to be set to PROBE 1 start and the tool setter to PROBE 2 start.

In a multiple probe system, with two spindle probes and one optical tool setting probe, the two spindle probes needs to be set to PROBE 1 and PROBE 2 start, respectively, and the tool setter would be set to PROBE 3 start.

Optical power

Where the separation between the OMP60 and the OMI-2 / OMI-2T / OMI-2H / OMI-2C / OMM with MI 12 or OMM-2 with OSI is small, low optical power may be used. In this setting, the optical transmission range will be reduced as shown on the performance envelopes so that battery life will be extended.

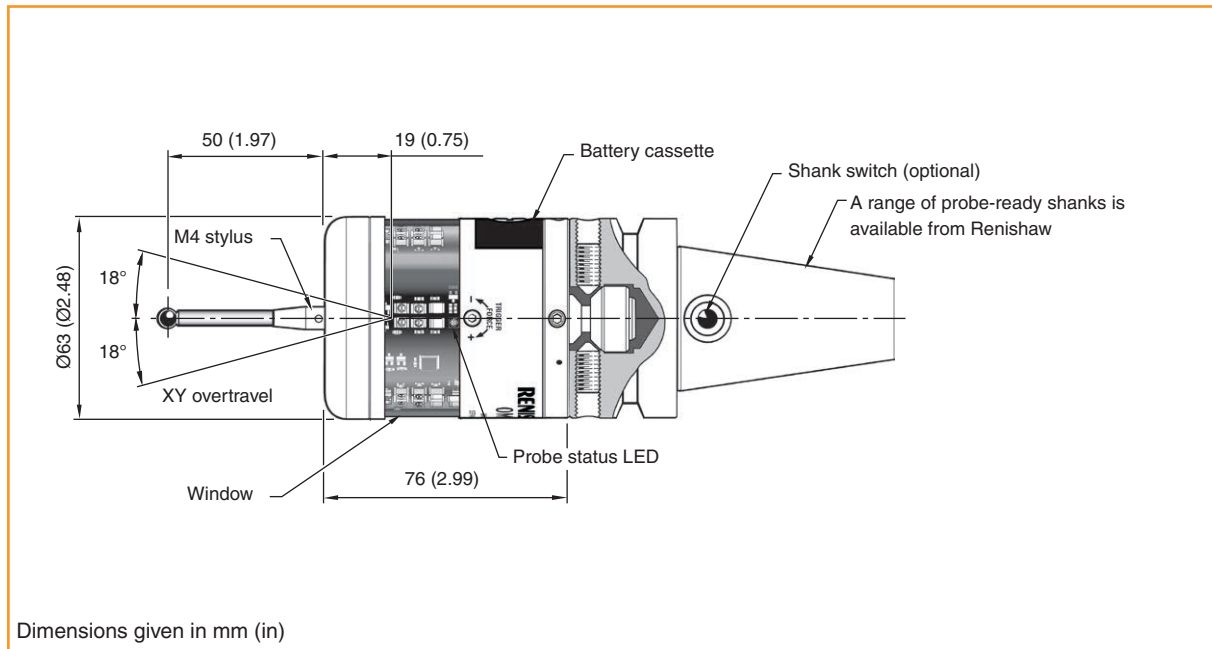
Dotted lines on the performance envelopes represent the OMP60 in low optical power.

Low optical power should be used whenever possible for increased battery life.

Maximum battery life is achieved when Lithium Thionyl Chloride (LTC) batteries are used in conjunction with low power mode.

The probe is factory set to standard optical power.

OMP60 dimensions



Stylus overtravel limits		
Stylus length	±X/±Y	+Z
50 (1.97)	21 (0.82)	11 (0.43)
100 (3.94)	37 (1.45)	11 (0.43)

OMP60 specification

Principal application	Workpiece inspection and job set-up on medium to large-sized machining centres and multi-tasking centres.	
Dimensions	Length	76 mm (2.99 in)
	Diameter	63 mm (2.48 in)
Weight (without shank)	With batteries	885 g (31.22 oz)
	Without batteries	836 g (29.49 oz)
Transmission type	360° infrared optical transmission (modulated or legacy)	
Switch-on methods	Optical M-code, spin-on or shank switch	
Switch-off methods	Optical M-code, timeout, spin-off or shank switch	
Spindle speed (maximum)	1000 rev/min	
Operating range	Up to 6 m (19.7 ft)	
Compatible receiver / interface	Modulated OMI-2, OMI-2T, OMI-2H, OMI-2C or OSI / OMM-2	Legacy OMI or OMM / MI 12
Sense directions	±X, ±Y, +Z	
Unidirectional repeatability	1.00 µm (40 µin) 2σ – 50 mm stylus length (see note 1)	
Stylus trigger force (see notes 2 and 3) Factory setting:		
XY low force	0.75 N, 76 gf (2.70 ozf)	
XY high force	1.40 N, 143 gf (5.04 ozf)	
Z	5.30 N, 540 gf (19.06 ozf)	
Maximum setting:		
XY low force	2.00 N, 204 gf (7.19 ozf)	
XY high force	3.50 N, 357 gf (12.59 ozf)	
Z	14.00 N, 1428 gf (50.36 ozf)	
Minimum setting:		
XY low force	0.50 N, 51 gf (1.80 ozf)	
XY high force	0.90 N, 92 gf (3.24 ozf)	
Z	3.50 N, 357 gf (12.59 ozf)	
Stylus overtravel	XY plane	±18°
	+Z plane	11 mm (0.43 in)

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

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

Note 3 Tests were carried out using a 50 mm (1.97 in) straight stylus.

Environment	IP rating	IPX8 (EN/IEC 60529)
	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)
Battery types	2 x AA 1.5 V alkaline or 2 x AA 3.6 V Lithium Thionyl Chloride (LTC)	
Battery reserve life	Approximately one week after a low battery warning is first given.	
Typical battery life	See page 2.8	
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.	

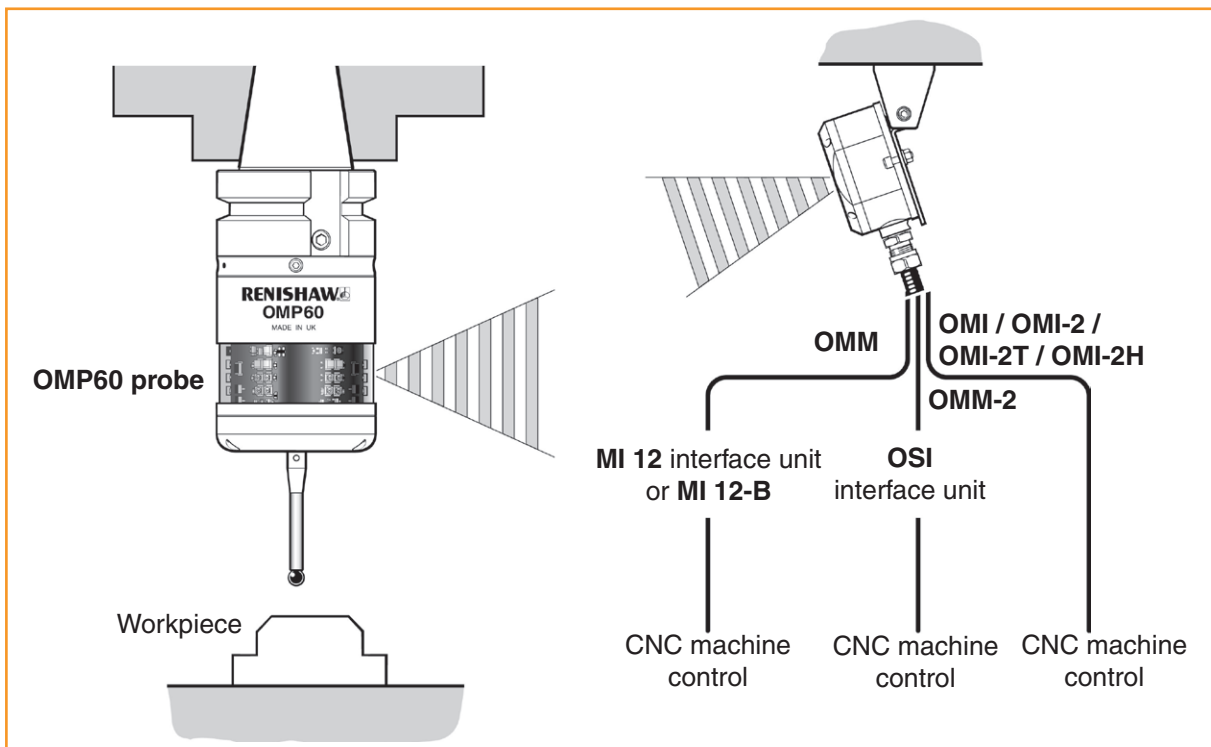
Typical battery life

Modulated transmission						
2 x AA 1.5V alkaline batteries (typical)	Optical on/off		Shank on/off		Spin on/off	
	Standard power	Low power	Standard power	Low power	Standard power	Low power
Standby	818 days		940 days		304 days	
5% usage	134 days	162 days	136 days	165 days	105 days	121 days
Continuous use	190 hours	240 hours	190 hours	240 hours	190 hours	240 hours
2 x AA 3.6V LTC batteries (typical)	Optical on/off		Shank on/off		Spin on/off	
	Standard power	Low power	Standard power	Low power	Standard power	Low power
Standby	1597 days		1767 days		722 days	
5% usage	359 days	430 days	364 days	438 days	283 days	325 days
Continuous use	550 hours	690 hours	540 hours	690 hours	540 hours	680 hours

Legacy transmission						
2 x AA 1.5V alkaline batteries (typical)	Optical on/off		Shank on/off		Spin on/off	
	Standard power	Low power	Standard power	Low power	Standard power	Low power
Standby	818 days		940 days		304 days	
5% usage	133 days	195 days	135 days	199 days	104 days	139 days
Continuous use	190 hours	300 hours	190 hours	300 hours	190 hours	300 hours
2 x AA 3.6V LTC batteries (typical)	Optical on/off		Shank on/off		Spin on/off	
	Standard power	Low power	Standard power	Low power	Standard power	Low power
Standby	1597 days		1767 days		722 days	
5% usage	355 days	511 days	360 days	523 days	280 days	369 days
Continuous use	540 hours	880 hours	540 hours	880 hours	530 hours	860 hours

System installation

Installing the OMP60



Operating envelope

The OMP60 / OMI or OMM with MI 12 system uses legacy transmission. The OMP60 / OMM-2 with OSI or OMI-2T or OMI-2H or OMI-2 system uses modulated transmission.

Natural reflective surfaces within the machine may increase the signal transmission range.

Coolant and swarf residue accumulating on the probe or receiver / interface windows will have a detrimental effect on transmission performance. Wipe clean as often as necessary to maintain unrestricted transmission.

CAUTION: If two or more systems are operating in close proximity to each other, take care to ensure that signals transmitted from the OMP60 on one machine are not received by the receiver on the other machine, and vice versa. When this is the case it is recommended that the OMP60 low optical power is used and that the low range setting is used on the receiver.

OMM-2 / OMI-2T / OMI-2H / OMI-2 / OMI or OMM positioning

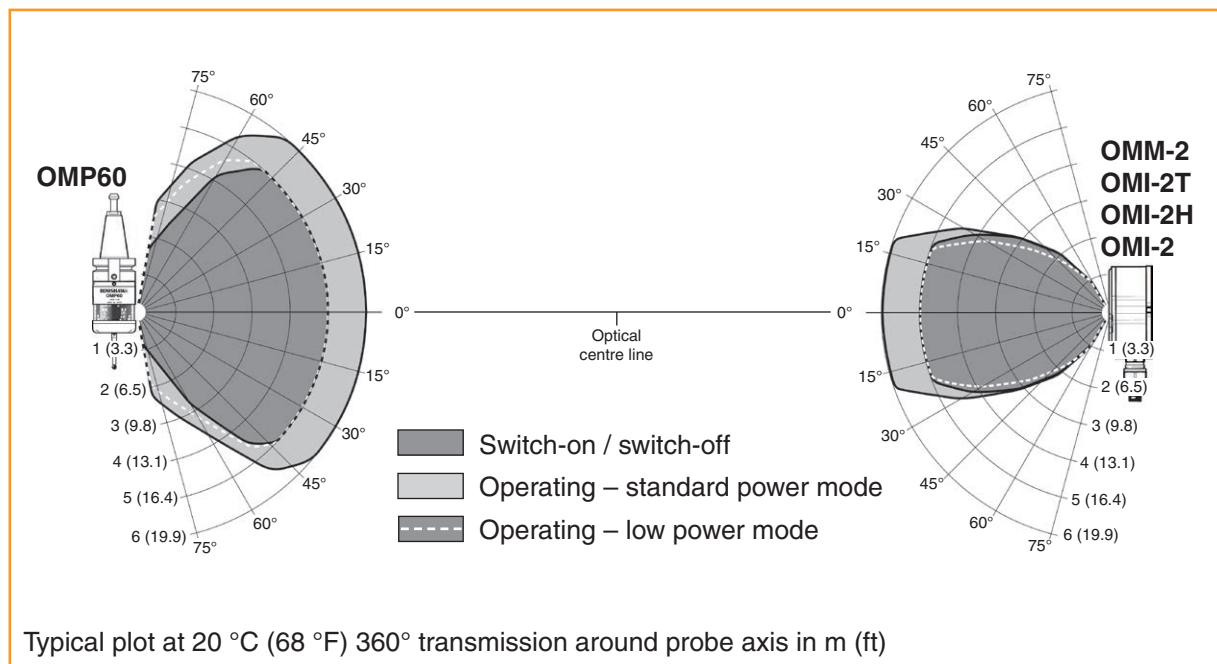
To assist finding the optimum position for the OMM-2 / OMI-2T / OMI-2H / OMI-2, the signal condition is displayed on a multi-coloured LED.

To assist finding the optimum position for the OMI, the signal strength is displayed on an OMI multi-coloured LED.

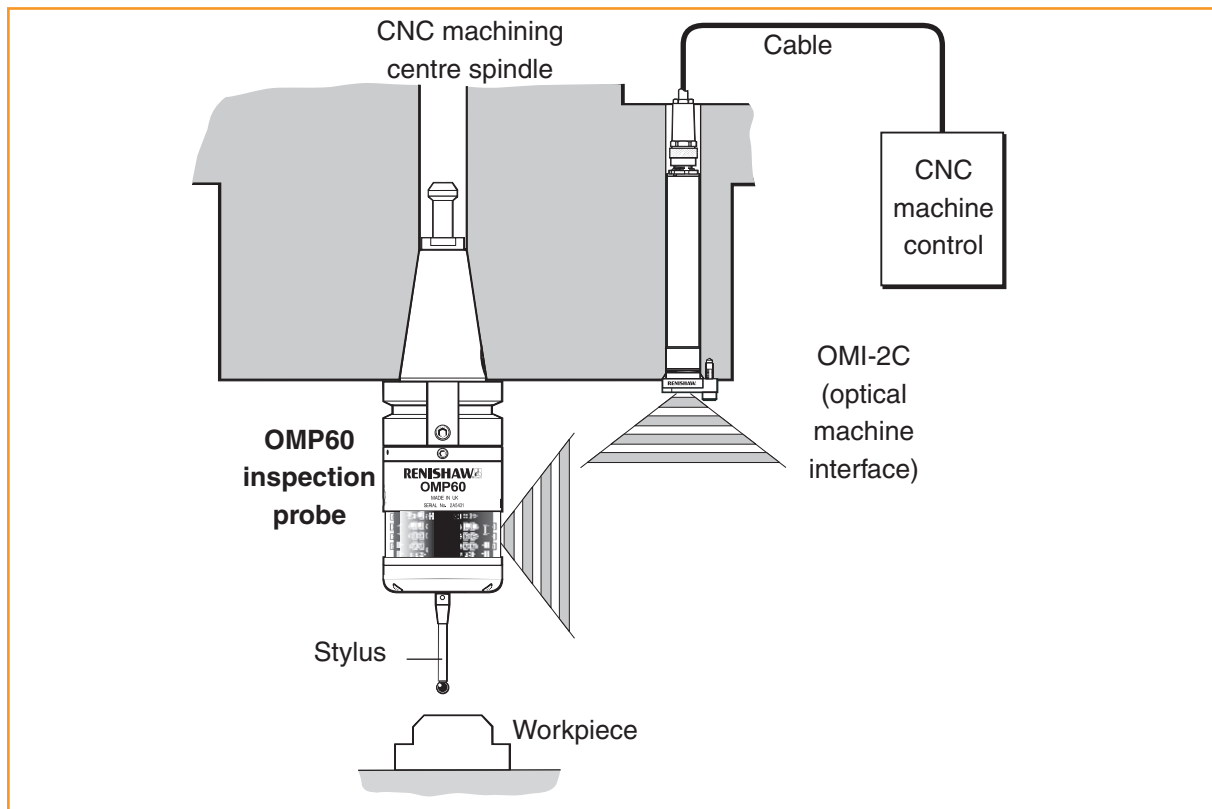
To assist finding the optimum position of the OMM during system installation, signal strength outputs are available on the MI 12 interface.

Performance envelope when using the OMP60 with an OMM-2 / OMI-2T / OMI-2H / OMI-2 (modulated transmission)

The probe and OMM-2 / OMI-2T / OMI-2H / OMI-2 diodes must be in each other's field of view and within the performance envelope shown. The OMP60 performance envelope is based on the OMM-2 / OMI-2T / OMI-2H / OMI-2 being at 0° and vice versa.



Installing the OMP60 with an OMI-2C



Operating envelope

Reflective surfaces within the machine cabinet may increase the signal transmission range.

Coolant residue accumulating on the windows of the OMI-2C and OMP60 will have a detrimental effect on transmission performance. Wipe the windows clean as often as is necessary to maintain unrestricted transmission.

For best system performance, ensure that the OMI-2C is mounted in a position which is not directly in front of a light source.

CAUTION: If two or more systems are operating in close proximity to each other, take care to ensure that signals transmitted from the OMP60 on one machine are not received by the receiver on the other machine, and vice versa. When this is the case it is recommended that the OMP60 low optical power is used.

OMI-2C position

WARNING: Ensure the machine tool is in a safe condition and power is removed before removing covers.

CAUTION: Different versions of the OMI-2C operate with specific machine controls. Prior to installation, ensure that the OMI-2C is compatible with the machine controller.

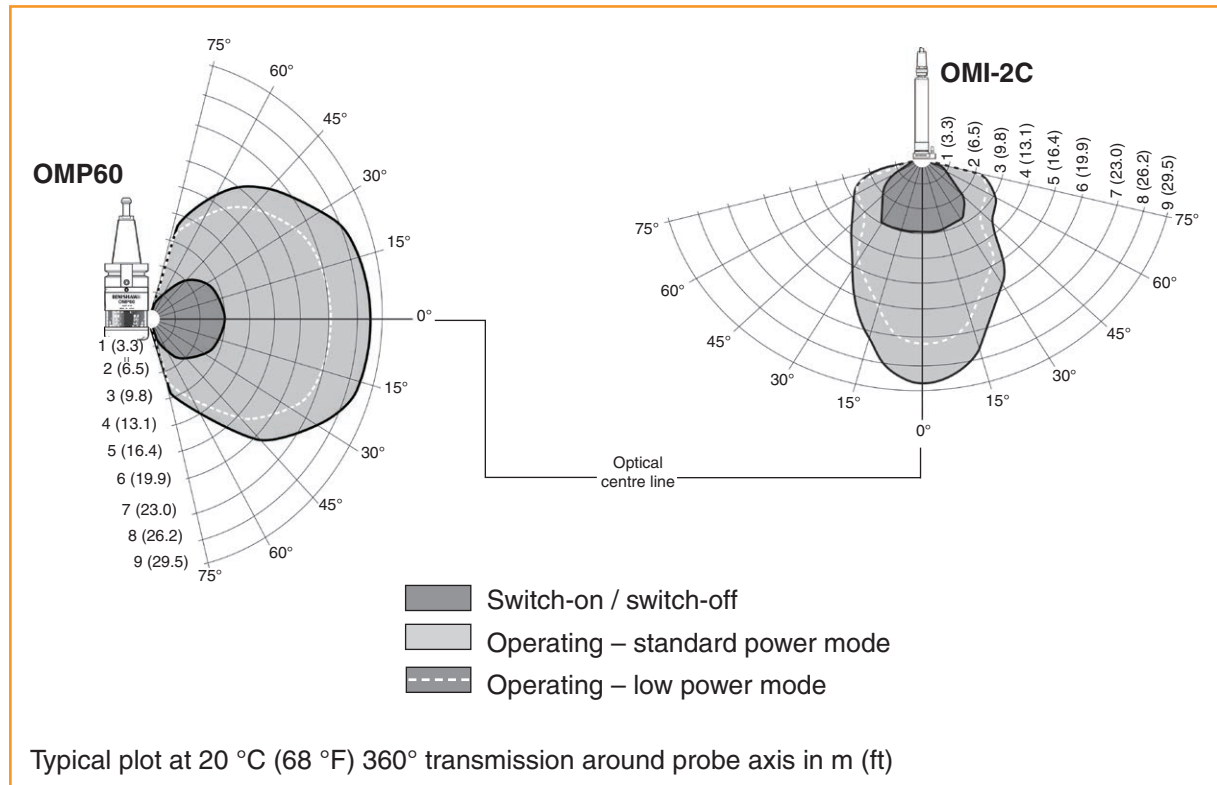
The OMI-2C should be mounted as near to the machine spindle as possible.

To achieve the best possible transmission range and performance envelope, it is recommended that the mounting screw is positioned on the far side of the OMI-2C, relative to the expected probe position.

When mounting the OMI-2C, it is important that the sealing ring forms a tight seal around the rim of the bore into which the body of the OMI-2C is to be located.

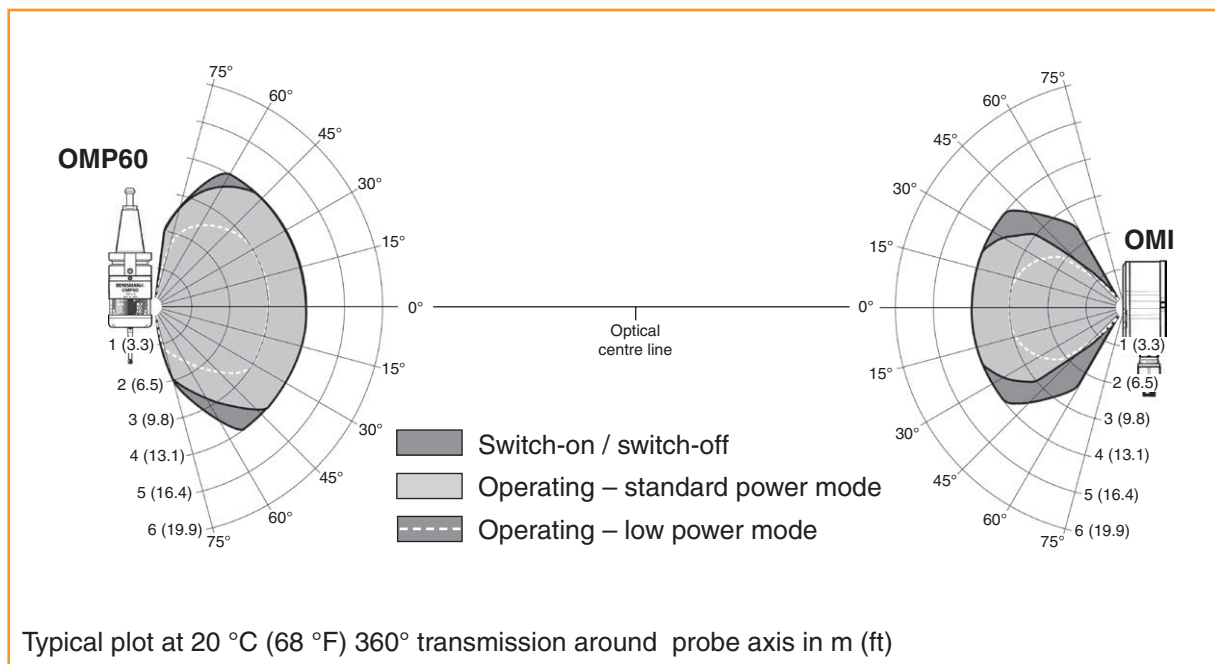
Performance envelope when using the OMP60 with an OMI-2C (modulated transmission)

The probe and OMI-2C diodes must be in each other's field of view, and within the performance envelope shown. The OMP60 performance envelope is based on the OMI-2C being at 0° and vice versa.



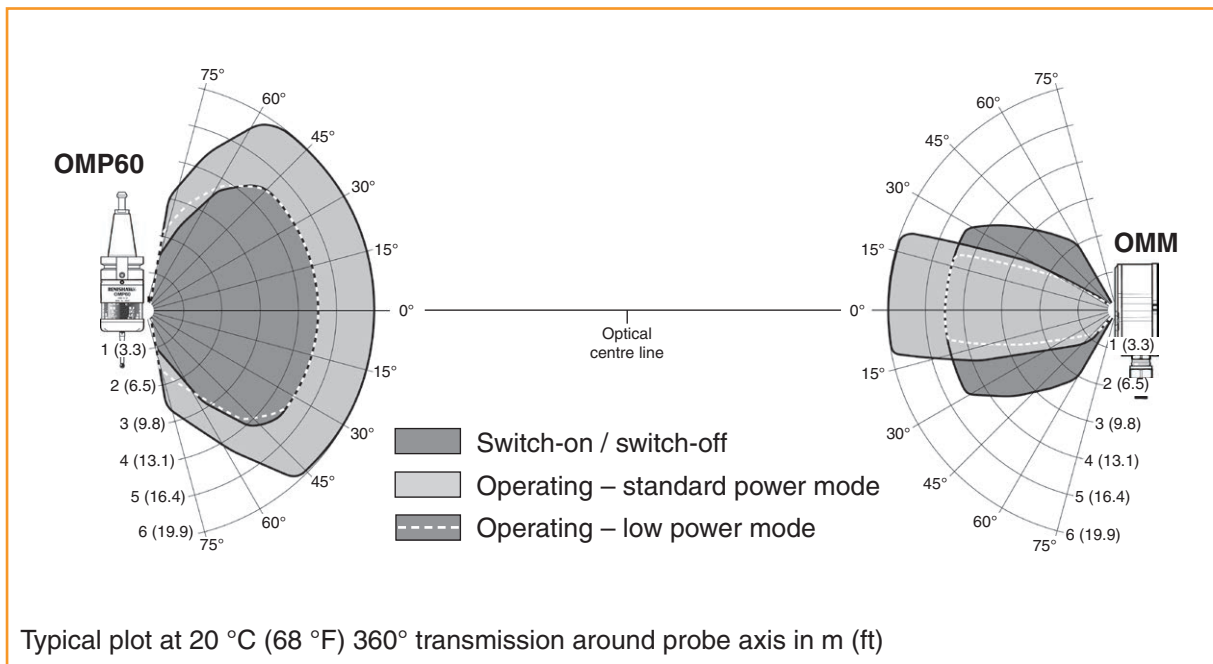
Performance envelope when using the OMP60 with an OMI (legacy transmission)

The probe and OMI diodes must be in each other's field of view, and within the performance envelope shown. The OMP60 performance envelope is based on the OMI being at 0° and vice versa.



Performance envelope when using the OMP60 with an OMM (legacy transmission)

The probe and OMM diodes must be in each other's field of view, and within the performance envelope shown. The OMP60 performance envelope is based on the OMM being at 0° and vice versa.



Preparing the OMP60 for use

Fitting the stylus



Stylus weak link

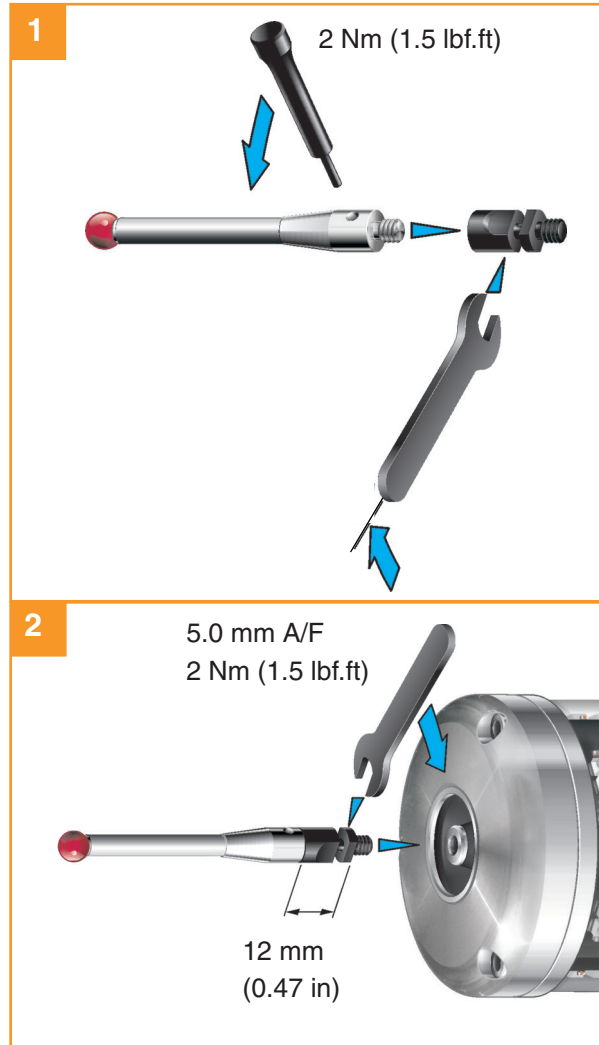
NOTE: Must be used with steel styli. For optimum metrology performance do not use a weak link with ceramic or carbon fibre styli.

Fitting a stylus with a weak link onto the OMP60

In the event of excessive stylus overtravel, the weak link is designed to break, thereby protecting the probe from damage.

Take care to avoid stressing the weak link during assembly.

Removing a broken weak link



Installing the batteries



NOTES:

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

Ensure the product is clean and dry before inserting batteries.

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

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

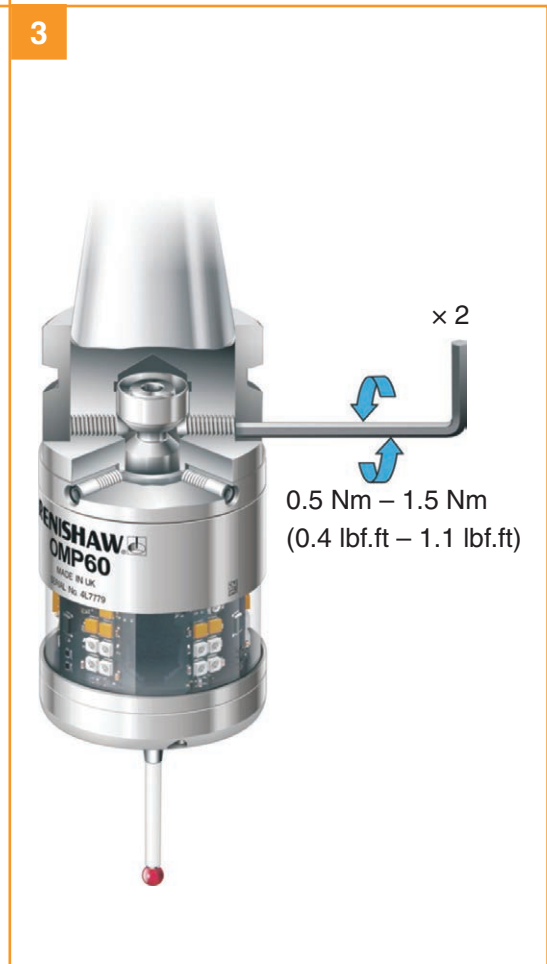
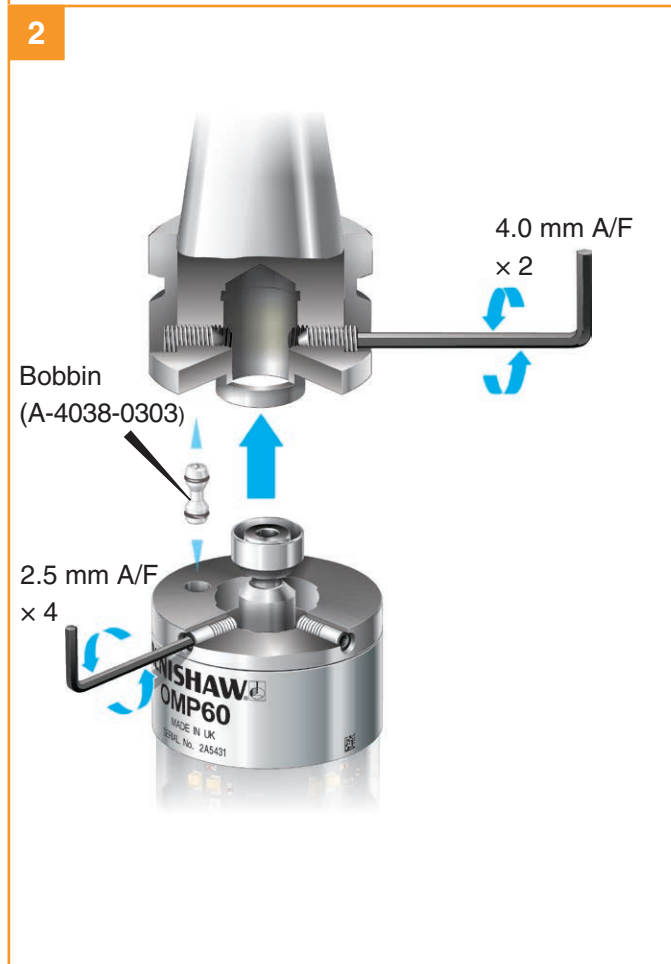
After inserting the batteries, the LEDs will display the current probe settings (for details, see Section 4 – “Trigger Logic™”).



Mounting the probe on a shank (or machine table)



NOTE: In instances where the OMP60 is to be used with a shank switch, it will be necessary to remove the plug from the rear of the probe using pliers. This should then be substituted with the bobbin (A-4038-0303).



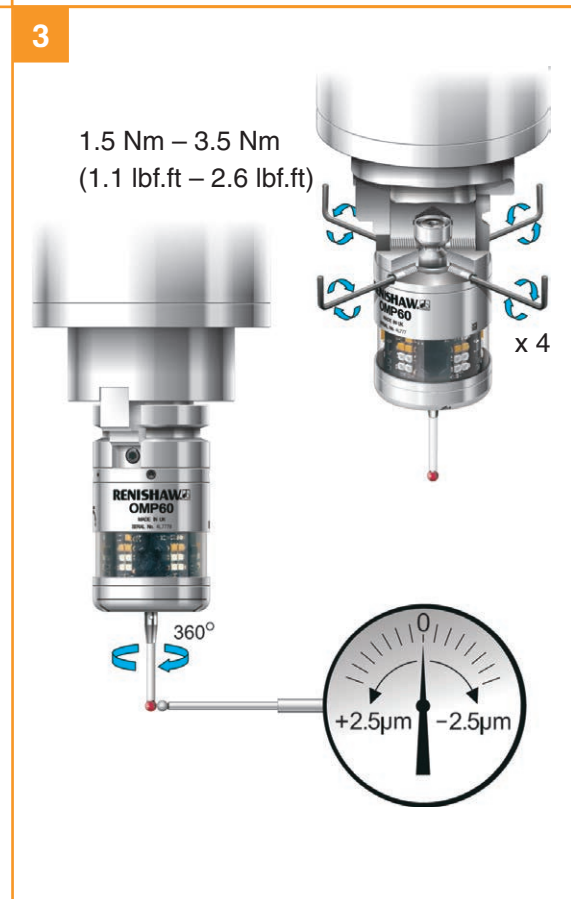
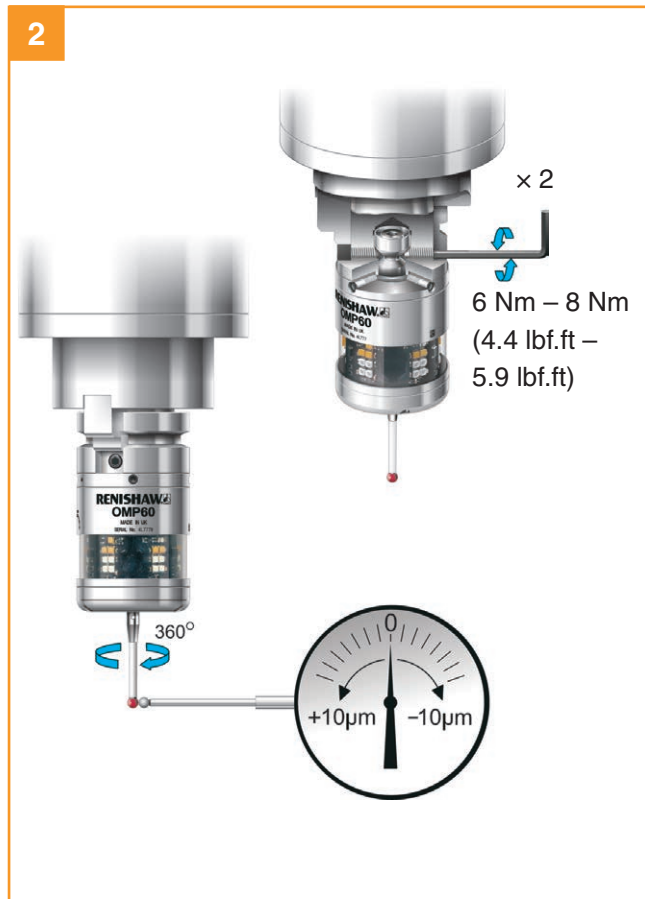
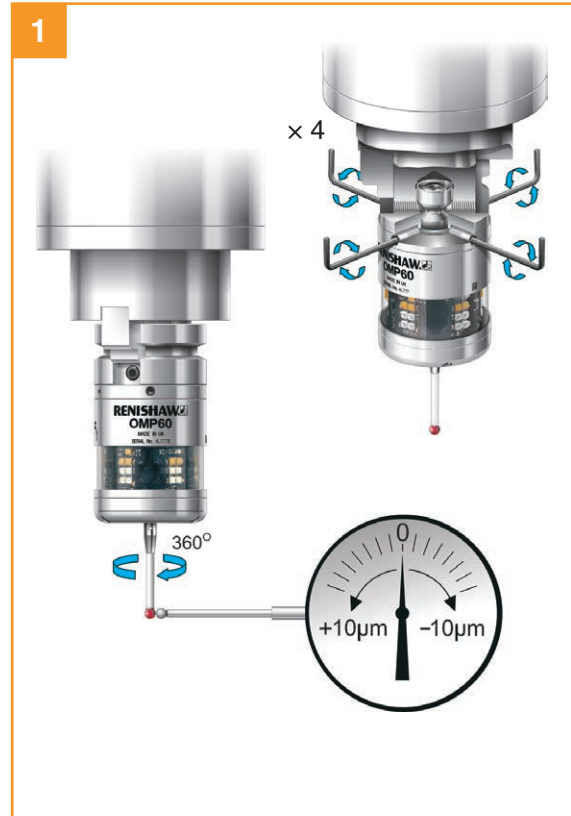
Stylus on-centre adjustment

NOTES:

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

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

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



Stylus trigger force and adjustment

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

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

To adjust the trigger force, turn the adjusting screw anticlockwise to reduce the force (more sensitive) or clockwise to increase the force (less sensitive). A stop helps to prevent damage which could be caused by overtightening the adjusting screw.

XY trigger forces vary around the stylus seating.

Factory setting

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

Maximum setting

XY low force	2.00 N, 204 gf (7.19 ozf)
XY high force	3.50 N, 357 gf (12.59 ozf)
Z	14.00 N, 1428 gf (50.36 ozf)

Minimum setting

XY low force	0.50 N, 51 gf (1.80 ozf)
XY high force	0.90 N, 92 gf (3.24 ozf)
Z	3.50 N, 357 gf (12.59 ozf)



Calibrating the OMP60

Why calibrate a probe?

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

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

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

It is good practice to set the tip of the stylus on-centre, because this reduces the effect of any variation in spindle and tool orientation (see ‘Stylus on-centre adjustment’ in Section 3 – “System Installation”). A small amount of run-out is acceptable, and can be compensated for as part of the normal calibration process.

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

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

Calibrating in a bored hole or on a turned diameter

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

Calibrating in a ring gauge or on a datum sphere

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

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



















Calibrating the probe length

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

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Probe settings record

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

			✓ tick	✓ tick
			Factory settings	New settings
Switch-on method	Optical on		✓	
	Shank on			
	Spin on			
Switch-off method	Optical off or spin off		✓	
	Short timeout (12 s)			
	Medium timeout (33 s)			
	Long timeout (134 s)			
Enhanced trigger filter setting	Off (0 ms)		✓	
	On (10 ms)			
	On (20 ms)			
	On (40 ms)			
Optical transmission method	Legacy (start filter off)			
	Legacy (start filter on)			
	Modulated PROBE 1		✓	
	Modulated PROBE 2			
	Modulated PROBE 3			
Optical power	Low			
	Standard		✓	

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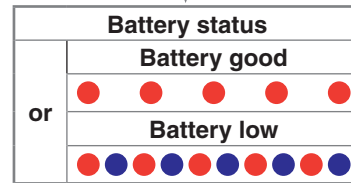
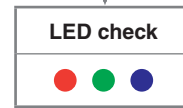
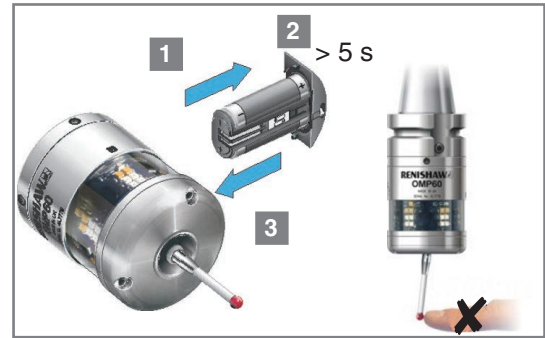
Changing the probe settings

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

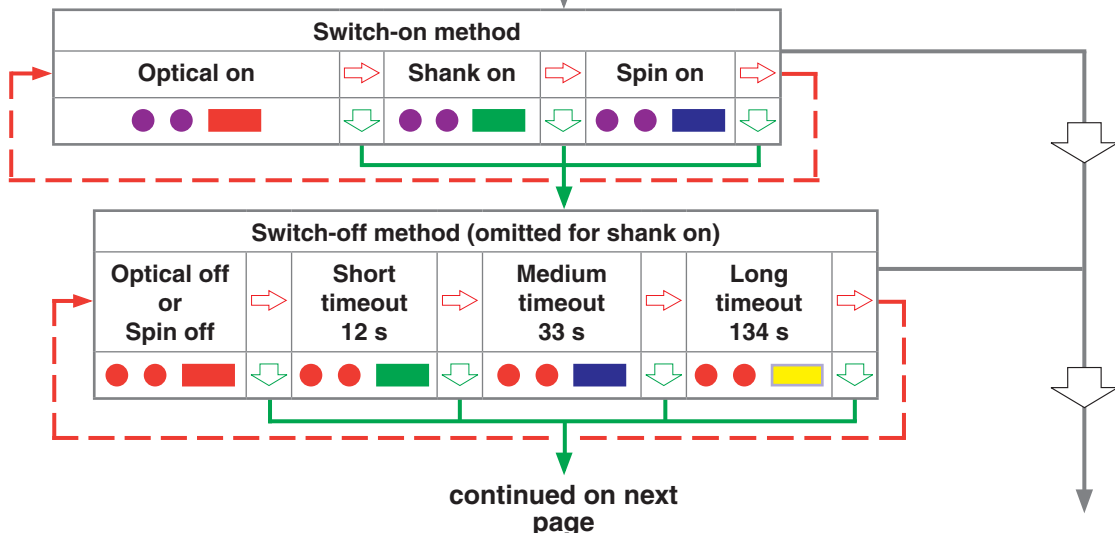
Following the LED check, immediately deflect the stylus and hold it deflected until five red flashes have been observed (if the battery power is low then each of the five red flashes will be followed by a blue flash).

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

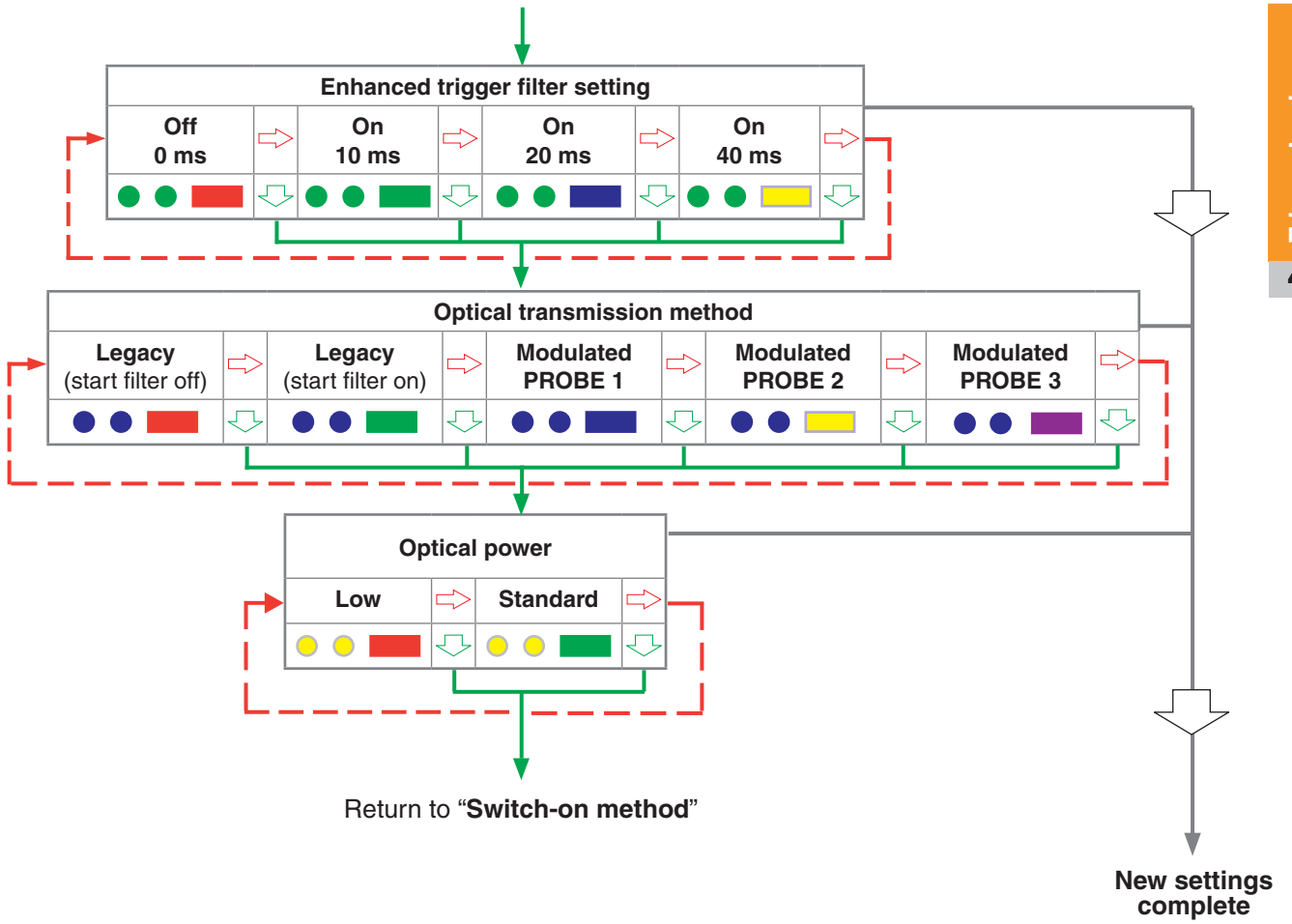
CAUTION: Do not remove the batteries whilst in the configuration mode. To exit, leave the stylus untouched for > 20 seconds.



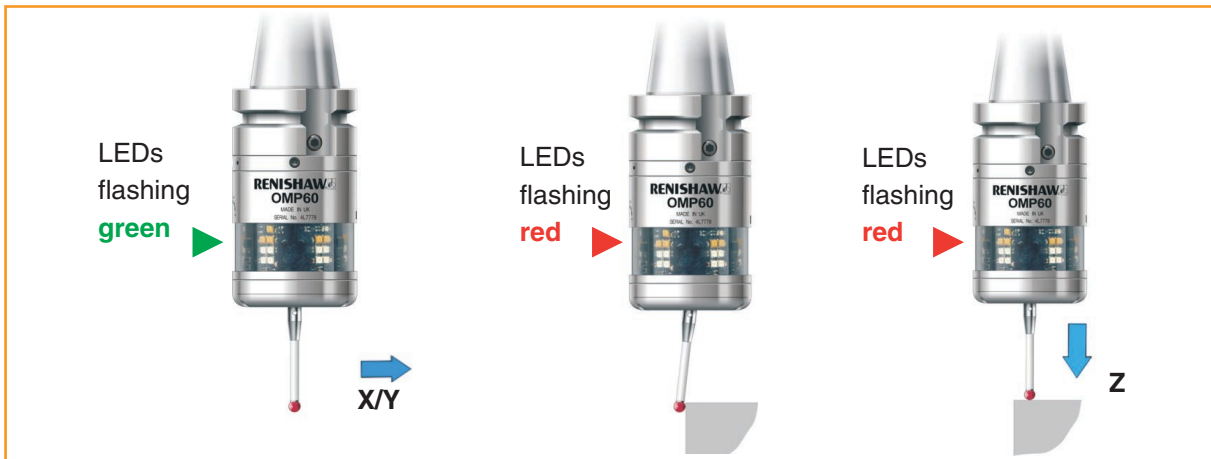
Key to the symbols	
●	LED short flash
	LED long flash
➡	Deflect the stylus for less than 4 seconds to move to the next menu option.
➡	Deflect the stylus for more than 4 seconds to move to the next menu.
➡	To exit, leave the stylus untouched for more than 20 seconds.



continued on next page



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	Dead battery or unsuitable battery	● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●

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

1. When the probe is active, the batteries discharge until battery power becomes too low for the probe to operate correctly.
2. The probe stops functioning, but then reactivates as the batteries recover sufficiently to provide the probe with power.
3. The probe begins to run through the LED review sequence (see ‘Reviewing the current probe settings’ in Section 4 – “Trigger Logic™”).
4. Again, the batteries discharge and the probe ceases to function.
5. Again, the batteries recover sufficiently to provide the probe with power, and the sequence is repeated.

Maintenance

Maintenance

You may undertake the maintenance routines described in these instructions.

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

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

Cleaning the probe

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



⚠ CAUTION: The OMP60 has a glass window, handle with care if broken to avoid injury.

Changing the batteries

1



⚠ CAUTIONS:

Do not leave dead batteries in the probe.

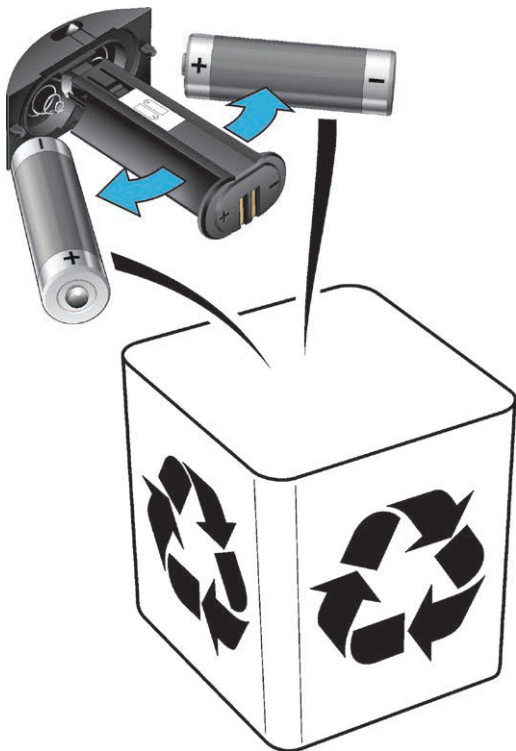
When changing batteries, do not allow coolant or debris to enter the battery compartment.

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

Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.

2



⚠ **CAUTION:** Please dispose of dead batteries in accordance with local regulations. Never dispose of batteries in a fire.



NOTES:

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

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

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

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

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



Diaphragm replacement

OMP60 diaphragms

The probe mechanism is protected from coolant and debris by two diaphragms. These provide adequate protection under normal working conditions.

You should periodically check the outer diaphragm for signs of damage. If this is evident, replace the outer diaphragm.

Do not remove the inner diaphragm. If it is damaged, return the probe to your supplier for repair.

Outer diaphragm inspection

1. Remove the stylus.
2. Undo the three M3 front cover screws and remove the front cover.
3. Inspect the outer diaphragm for damage.
4. To remove the outer diaphragm, grip by the outer edge and pull off.

Inner diaphragm inspection

Inspect the inner diaphragm for damage. If it is damaged, return the probe to your supplier. **DO NOT REMOVE THE INNER DIAPHRAGM AS YOUR WARRANTY WILL BE INVALIDATED.**

Outer diaphragm replacement

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



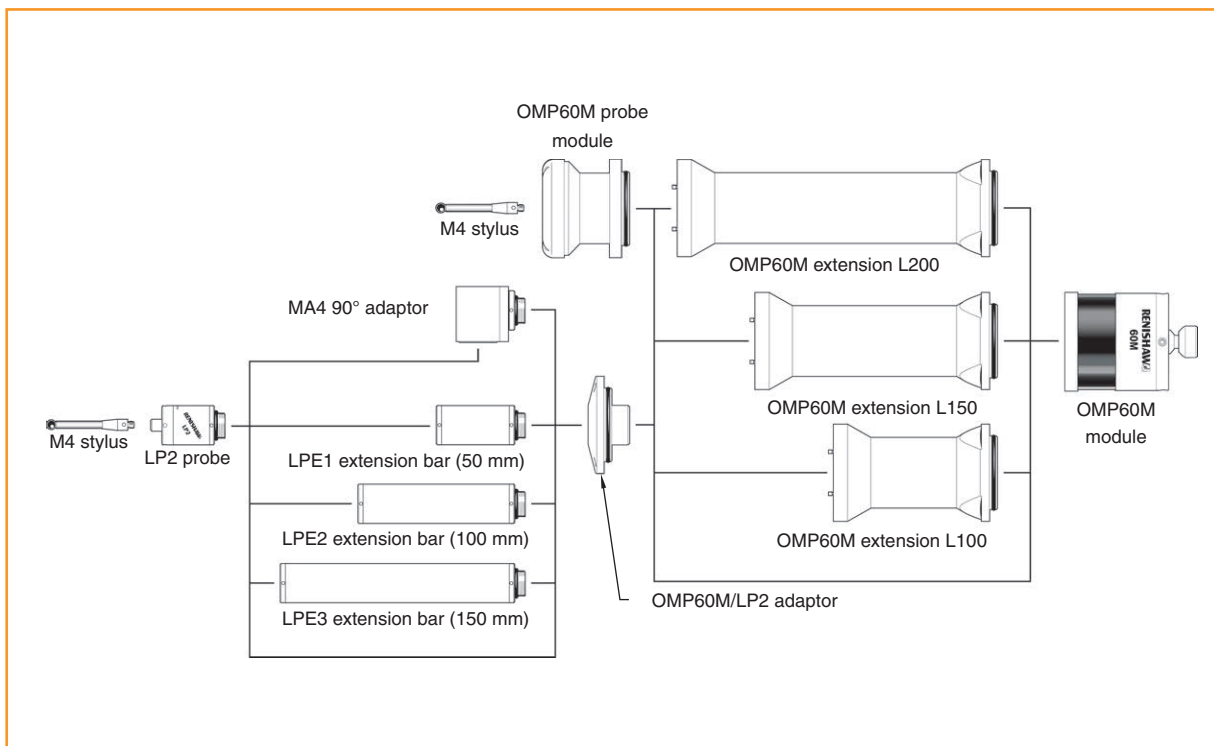
OMP60M system

OMP60M system

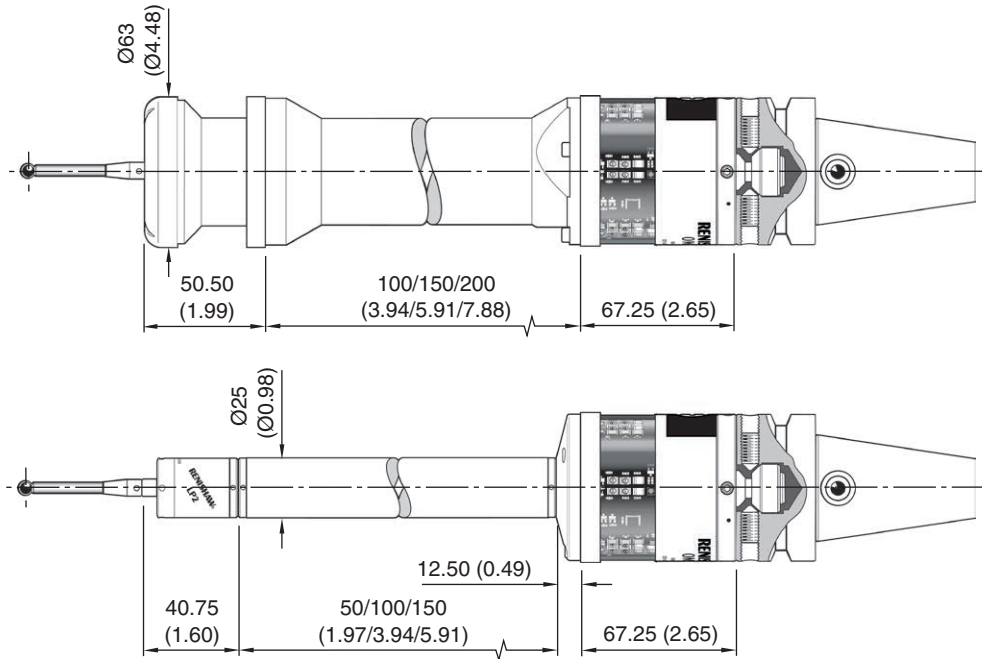
OMP60M is a special modular version of OMP60. It enables probe inspection of part features inaccessible to OMP60, by fitting selected adaptors and extensions as shown below.

See Chapter 8 – “Parts list”.

NOTE: Maximum spindle speed 750 rev/min.

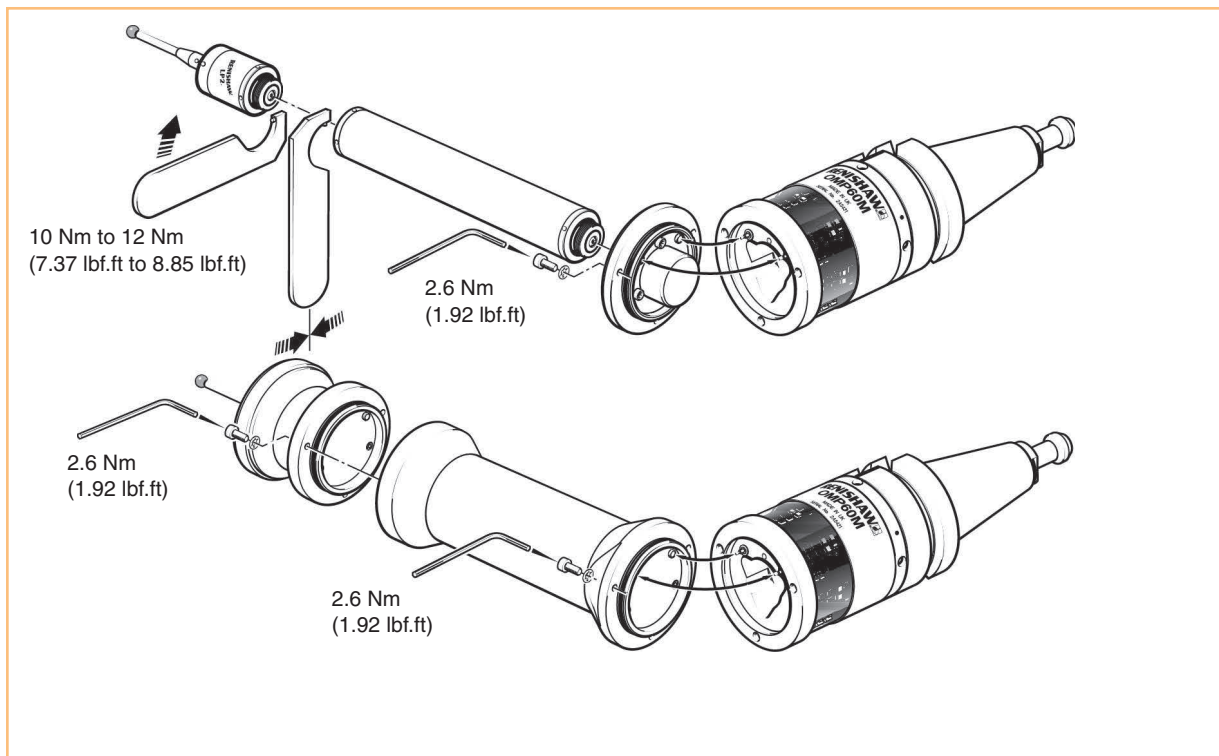


OMP60M dimensions



Dimensions given in mm (in)

OMP60M screw torque values



Fault-finding

Symptom	Cause	Action
Probe fails to power up (no LEDs illuminated or fails to indicate current probe settings).	Dead batteries.	Change batteries.
	Unsuitable batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion / polarity.
	Batteries removed for too short a time and probe has not reset.	Remove batteries for a minimum of 5 seconds.
Probe fails to switch on (optical-on is required).	Wrong transmit mode selected.	Reconfigure transmit mode.
	Wrong switch-on mode selected.	Reconfigure to optical-on mode.
	Dead batteries.	Change batteries.
	Unsuitable batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion / polarity.
	Optical/magnetic interference.	Check for interfering lights or motors. Consider removing source of interference.
	Probe out of range / not aligned with receiver.	Check configuration and alter as required.
	Transmission beam obstructed.	Check OMP60 and receiver windows are clean and remove any obstruction.
	No receiver start signal.	Check start signal by reviewing receiver LED. Refer to relevant user's guide.
No power to interface or receiver.	Check if stable 24 V supply is available. Check connections and fuses.	

Symptom	Cause	Action
Probe fails to switch on (shank-on is required).	Wrong switch-on mode is selected.	Reconfigure to shank-on mode.
	Dead batteries.	Change batteries.
	Unsuitable batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion.
	Malfunctioning shank switch.	Check switch operation.
	No bobbin installed.	Install bobbin.
Probe fails to switch on (spin-on is required).	Wrong switch-on mode is selected.	Reconfigure to spin-on mode.
	Dead batteries.	Change batteries.
	Unsuitable batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion.
	Incorrect spindle speed selected.	Program correct spindle speed / duration.
	Excessive spindle vibration.	Review probing software.
Machine stops unexpectedly during a probing cycle.	Optical communication obstructed.	Check interface / receiver and remove obstruction.
	Interface / receiver / machine fault.	Refer to interface / receiver / machine user's guide.
	Dead batteries.	Change batteries.
	Probe unable to find target surface.	Check that part is correctly positioned and that stylus has not broken.
	False probe trigger.	Adjust stylus trigger force and / or enable enhanced trigger filter.
	Adjacent probe.	Reconfigure to low power mode and reduce range of receiver.

Symptom	Cause	Action
Probe crashes.	Inspection probe using tool setting probe signals.	When two systems are active, isolate tool setting probe.
	Workpiece obstructing probe path.	Review probing software.
	Adjacent probe.	Reconfigure to low power mode and reduce range of receiver.
	Probe length offset missing.	Review probing software.
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.
	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 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.	

Symptom	Cause	Action
Probe fails to switch off (optical-off is required).	Wrong switch-off mode selected.	Reconfigure to optical-off mode.
	Optical / magnetic interference.	Check for interfering lights or motor.
	Probe is inadvertently switched on by the receiver when using autostart.	Check position of receiver. Reduce receiver signal strength.
	Probe out of range.	Review performance envelopes.
	Probe is regularly falsely switched on by light interference.	Enable optical transmission legacy mode (start filter on), or consider upgrading to a modulated receiver.
Probe fails to switch off (shank-off is required).	Malfunctioning switch.	Check switch operation.
Probe fails to switch off (spin-off is required).	Wrong switch-off mode selected.	Reconfigure to spin-off mode.
	Incorrect spindle speed is selected.	Program correct spindle speed / duration.
	Excessive spindle vibration.	Consider use of optical or shank switch-on.
Probe fails to switch off (timeout is required).	Incorrect switch-off method configured.	Reconfigure to timeout mode.
	Probe placed in carousel; when in timeout mode timer can be reset by carousel activity.	Use lighter styli.
Probe fails to communicate with interface after spin or shank on.	Wrong transmit mode selected; optical / magnetic interference.	Reconfigure transmit mode. Check for interfering lights or motors. Consider removing source of interference.

Parts list

Type	Part number	Description
OMP60	A-4038-0001	OMP60 probe with batteries, tool kit and quick-start guide (set to optical on / optical off) – legacy transmission.
OMP60	A-4038-0002	OMP60 probe with batteries, tool kit and quick-start guide (set to optical on / time off 134 sec) – legacy transmission.
OMP60	A-4038-2001	OMP60 probe with batteries, tool kit and quick-start guide (set to optical on / optical off) – modulated transmission, PROBE 1 start.
OMP60	A-4038-2002	OMP60 probe with batteries, tool kit and quick-start guide (set to optical on / time off 134 sec) – modulated transmission, PROBE 1 start.
Battery	P-BT03-0005	AA battery – alkaline type – supplied as standard with probe (two required).
Battery	P-BT03-0008	AA battery – Lithium Thionyl Chloride (two required).
Stylus	A-5000-3709	PS3-1C ceramic stylus 50 mm long with Ø6 mm ball.
Weak link kit	A-2085-0068	Weak link (Part no. M-2085-0069 × 2) and 5 mm A/F spanner.
Tool kit	A-4038-0304	Probe tool kit comprising Ø1.98 mm stylus tool, 2.0 mm A/F hexagon key, 2.5 mm A/F hexagon key (× 2), 4.0 mm A/F hexagon key (× 2) and shank grub screw (× 2).
Battery cassette	A-4038-0300	OMP60 battery cassette assembly.
Cassette seal	A-4038-0301	Battery cassette housing seal.
Diaphragm kit	A-4038-0302	OMP60 diaphragm kit.
External eyelid kit	A-4038-0305	External eyelid kit for OMP60.
Bobbin kit	A-4038-0303	Bobbin for shank switch (supplied with shank).
OMM	A-2033-0576	OMM complete with cable Ø4.85 mm × 25 m (Ø0.19 in × 82 ft).
OMI	A-2115-0001	OMI complete with cable Ø4.35 mm × 8 m (Ø0.17 in × 26.25 ft).
OMI-2	A-5191-0049	OMI-2 complete with cable 8 m (26.25 ft) long.
OMI-2T	A-5439-0049	OMI-2T complete with cable 8 m (26.25 ft) long.
OMI-2C	A-5314-0015	OMI-2C complete with cable 8 m (26.25 ft) long.

Type	Part number	Description
OMM-2	A-5492-0049	OMM-2 with 8 m (26 ft) cable, tool kit and quick-start guide.
MI 12 interface	A-2075-0142	MI 12 interface unit.
MI 12B	A-2075-0141	MI 12B interface unit.
Mounting kit	A-2033-0690	Panel mounting kit for MI 12 interface unit
OSI interface	A-5492-2000	OSI (Multiple Probe Mode) with DIN rail mounting, terminal block and quick-start guide.
OSI interface	A-5492-2010	OSI (Single Probe Mode) with DIN rail mounting, terminal block and quick-start guide.
Mounting bracket	A-2033-0830	Mounting bracket with fixing screws, washers and nuts.
Styli tool	M-5000-3707	Tool for tightening / releasing styli.
OMP60M module	A-4038-1003	OMP60M module with batteries, tool kit and quick-start guide (set to optical on / optical off) – legacy transmission.
OMP60M module	A-4038-0368	OMP60M module with batteries, tool kit and quick-start guide (set to optical on / time off 134 sec) – legacy transmission.
OMP60M module	A-4038-0369	OMP60M module with batteries, tool kit and quick-start guide (set to optical on / optical off) – modulated transmission, PROBE 1 start.
OMP60M module	A-4038-0370	OMP60M module with batteries, tool kit and quick-start guide (set to optical on/time off 134 sec) – modulated transmission, PROBE 1 start.
LP2	A-2063-6098	LP2 probe complete with two C spanners and TK1 tool kit.
Extension L100	A-4038-1010	OMP60M extension – 100 mm long.
Extension L150	A-4038-1027	OMP60M extension – 150 mm long.
Extension L200	A-4038-1028	OMP60M extension – 200 mm long.
OMP60/OMP60M probe module assembly	A-4038-1002	OMP60M probe module assembly.
OMP60M/LP2 adaptor	A-4038-0212	OMP60M LP2 adaptor assembly.
LPE1	A-2063-7001	LPE1 extension bar – 50 mm long.
LPE2	A-2063-7002	LPE2 extension bar – 100 mm long.
LPE3	A-2063-7003	LPE3 extension bar – 150 mm long.
MA4	A-2063-7600	MA4 90° adaptor assembly.

Type	Part number	Description
Publications. These can be downloaded from our website at www.renishaw.com		
OMP60	A-4038-8501	Quick-start guide: for rapid set-up of the OMP60 probe, includes CD with installation guides.
OMM	H-2000-5044	Installation and user's guide: OMM – optical module machine.
MI 12	H-2000-5073	Installation and user's guide: MI 12 – machine interface unit.
OMI	H-2000-5062	Installation and user's guide: OMI – optical machine interface.
OMI-2	H-2000-5233	Installation and user's guide: OMI-2 – optical machine interface.
OMI-2T	A-5439-8500	Quick-start guide: for rapid set-up of the OMI-2T, includes CD with installation guides.
OMI-2C	H-2000-5256	Installation and user's guide: OMI-2C – optical machine interface.
OMM-2	A-5492-8550	Quick-start guide: for rapid set-up of the OMM-2, includes CD with installation guides.
OSI	A-5492-8500	Quick-start guide: for rapid set-up of the OSI, includes CD with installation guides.
Software features	H-2000-2289	Data sheet: Probe software for machine tools – illustrated features.
Software list	H-2000-2298	Data sheet: Probe software for machine tools – list of programs.
Taper shanks	H-2000-2011	Data sheet: Taper shanks for machine tool probes.
Styli	H-1000-3200	Technical specification: Styli and accessories.

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