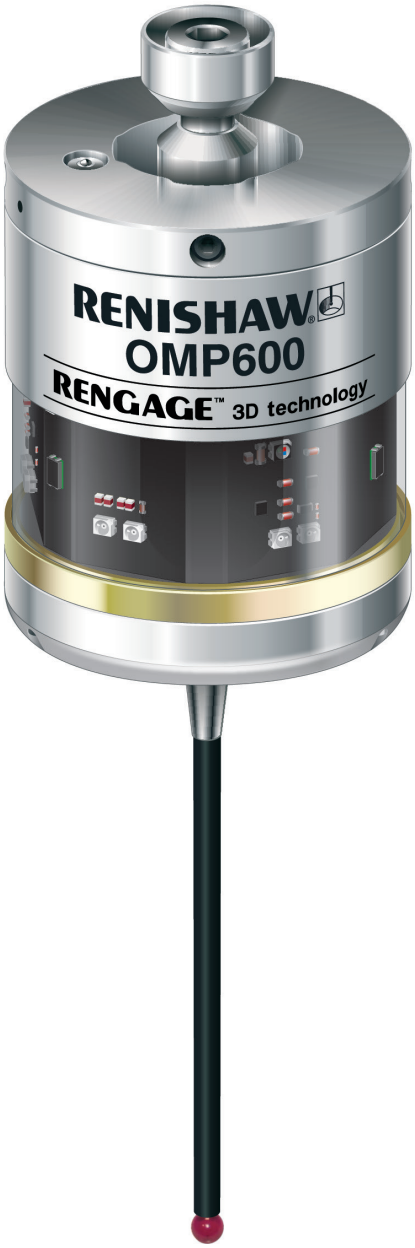
Installation guide
H-5180-8504-01-B

RENISHAW
apply innovation™

OMP600 high-accuracy optical machine probe



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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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Warranty

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.

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 OMP600 probe, and other similar Renishaw probes, are the subject of one or more of the following patents and/or patent applications:

CN 100416216
CN 101142461
CN 101171493
CN 101198836
CN 101476859

EP 1457786
EP 1613921
EP 1866602
EP 1880163
EP 1893937
EP 2154471

IN 234921
IN 305341
IN 307453
IN 364693
IN 8707/DELNP/2008

JP 4852411
JP 5283501
JP 5308811
JP 5357541
JP 5600072
JP 5611297

US 6860026
US 7285935
US 7316077
US 7486195
US 7603789
US 7689379
US 7792654
US 8140287
US 9157722

WO 2009/112819

Intended use

The OMP600 is an optical spindle probe that enables automated workpiece inspection and job set-up on multi-tasking machines, machining centres and gantry machining centres.

Safety

Information to the user

This product is supplied with non-rechargeable batteries that do not contain lithium. 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 batteries in a fire.
- Avoid forced discharge of the batteries.
- Do not short circuit the batteries.
- Do not disassemble, apply excessive pressure, pierce, deform or subject the batteries to impact
- Do not swallow the batteries.
- Keep the batteries out of the reach of children.
- If the batteries are swollen or damaged do not use them in the product and exercise caution when handling them.
- Dispose of waste batteries in accordance with your local environmental and safety laws.

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

Information to the machine supplier/ installer

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

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.

Optical safety

This product contains LEDs that emit both visible and invisible light.

The OMP600 is ranked Risk Group: Exempt (safe by design).

The product was evaluated and classified using the following standard:

BS EN 62471:2008 The photobiological safety of lamps and lamp systems.

Renishaw recommends that you do not stare at or look directly into any LED device, irrespective of its risk clarification.

OMP600 basics

Introduction

Welcome to OMP600, Renishaw's optical probe that offers an unrivalled combination of size, reliability, robustness and high-accuracy probing on medium and large machining centres.

Successfully combining patented RENGAGE™ strain gauge technology with the optical transmission system of the OMP60, the OMP600 provides existing probe users with a simple upgrade to solid-state strain gauge technology and all the associated benefits this brings:

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

In addition to providing high-accuracy measurement on your machine tool, the OMP600 also offers:

- Faster calibration:

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

  The OMP600 has almost no pre-travel variation, so a single calibration value may be used for any probing angle in 2D or 3D. This results in a vastly reduced calibration time. An additional benefit is a corresponding reduction in errors introduced by environmental changes within the machine during a long calibration cycle.

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

NOTE: The auto-reset function is required and recommendations should be followed for optimum metrology performance (see "Auto-reset function" later in this section).

Getting started

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

For example:

- switch-on and switch-off methods;
- probe status – triggered or seated;
- battery condition.

Batteries are inserted or removed as shown (see “Installing the batteries” in Section 3, “System installation” for further information).

On insertion of the batteries, the LEDs will begin to flash (see “Reviewing the probe settings” in Section 4, “Trigger Logic™”).

Modulated vs legacy optical transmission

The OMP600 can be operated in either **modulated** or **legacy** mode. Modulated mode has a higher resistance to light interference. Certain forms of light interference can cause false triggers or mimic a start signal and falsely activate the probe. These effects are much reduced when modulated transmission is selected.

Modulated mode

When set to modulated mode, the probe will only function with the OMI-2, OMI-2T, OMI-2H and OMI-2C interfaces, or with the OSI with OMM-2 interface system.

Legacy mode

When set to legacy mode, the probe will only function with an OMI or OMM with MI 12.

Multiple probe system

To operate a twin OMP600 probe system, one OMP600 probe needs to be set to PROBE 1 start and the other to PROBE 2 start. In applications where a third OMP600 is to be used, this should be set to PROBE 3 start. These settings are user configurable.

The Renishaw OMI-2T interface allows twin OMP600 applications. The Renishaw OSI with OMM-2 interface system allows up to three OMP600 probes to be used on the same machine tool.

NOTE: When used in conjunction with an OMI-2T, or with an OSI with OMM-2 interface system, the OMP600 switch-on method must be set to “optical on” (standard).

Trigger Logic™

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

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

or

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 OMP600 probe can be set in one of three modes:

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

Operational mode: activated by one of the switch-on methods described later in this section. In this mode the OMP600 is ready for use.

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

Configurable settings

Switch-on delay

When the standard switch-on is selected, the probe will be operational in less than 0.8 seconds. After being switched on, the OMP600 must remain operational for a minimum of 1 second before being switched off.

A second switch-on mode is available whereby a 3 second delay is invoked after the probe start signal is received. This feature is aimed at machines where “auto-start” is required, i.e. it will ensure that when the probe receives a start signal during a tool change that it will switch on correctly in the spindle. To ensure that the probe activates correctly, it is important that it is stationary when it is switched on. If the probe is not stationary during a start sequence, there is a possibility that the strain gauges could auto-zero in the incorrect position and produce a permanently triggered output. The 3 second delay ensures that the start sequence only occurs when the probe is safely located in the machine spindle (this assumes that the tool change process is completed in less than 3 seconds).

NOTES: The probing program on the machine will need to take account of the 3 second delay.

The 3 second delay is not compatible with the OMI-2T or OMI-2H.

When used in conjunction with an OSI with OMM-2 interface system, the OSI should be set to single probe mode.

Switch-on / switch-off methods

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

- Optical on / optical off
- Optical on / timer off
- Spin on / spin off
- Spin on / timer off
- Shank switch on / shank switch off.

NOTE: A visual indication of currently selected probe settings is provided, on battery insertion, by the three multicoloured LEDs located within the probe's window (see Section 4, "Trigger Logic™").

NOTE: After being switched on, the OMP600 must be on for 1 second before being switched off.

OMP600 switch-on method Switch-on options are configurable	OMP600 switch-off method Switch-off options are configurable	Switch-on time
Optical on Optical switch-on is commanded by machine input.	**Optical off** Optical switch-off is commanded by a machine input. A timer automatically switches the probe off 90 minutes after the last trigger, or reseat event, if it is not turned off by machine input.	When using either modulated transmission, or legacy transmission (start filter off), the switch-on time will be 0.8 seconds. When using legacy transmission (start filter on), the switch-on time will be 1.4 seconds.
Optical on Optical switch-on is commanded by machine input or auto start.	**Timer off (timeout)** Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reseat event. Please note that the issue of a further M-code will reset the timer.	
Optical on (3 second delay) Optical switch-on is commanded by machine input or auto start.	**Timer off (timeout)** Optical off or Timer off (timeout). See Optical off or Timer off (timeout), depending on switch-off configuration.	Optical start time plus 3 seconds.
Spin on Spin at 500 rev/min for 1 second minimum.	**Spin off** 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.	1 second.
Spin on Spin at 500 rev/min for 1 second minimum.	**Timer off (timeout)** Timeout will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reseat event. Please note that a spin event during the timeout period will reset the timer.	1 second.
Shank switch on	**Shank switch off**	3 seconds.

Enhanced trigger filter

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

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

Auto-reset function

In previous strain gauge products, the probe was required to be turned off during reorientation moves. The auto-reset function in the OMP600 can compensate for stylus forces, resulting from changes in probe orientation, that can cause the probe to trigger.

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

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

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

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

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

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

Optical transmission modes

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

The OMP600 can be operated in either "Modulated" or "Legacy" optical transmission mode.

Modulated mode

The OMP600 becomes compatible for use with the OMI-2, OMI-2T, OMI-2H, OMI-2C and OSI with OMM-2 interface sytem to provide substantially increased resistance to light interference.

Modulated transmission, in the OMP600, 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 OSI with OMM-2 interface system, respectively.

Legacy mode

A start filter improves the probe's resistance to spurious start signals.

When Legacy (start filter on) is enabled, an additional 1 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.

Twin or 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 to PROBE 2 start (OMI-2T or OSI with OMM-2 interface system) or PROBE 3 start (OSI with OMM-2 interface system 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 would 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 would be set to PROBE 1 and PROBE 2 start, respectively. The tool setter would be set to PROBE 3 start.

Optical power

Where the separation between the receiver/interface 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 battery life will be extended.

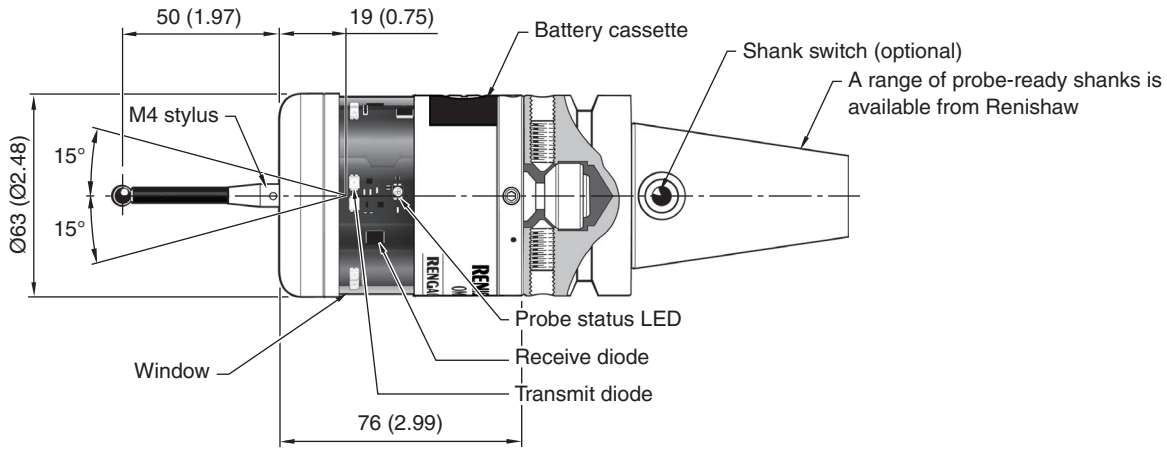
Dotted lines on the performance envelopes represent the OMP600 in low optical power.

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.

OMP600 dimensions



Dimensions given in mm (in)

Stylus overtravel limits		
Stylus length	**±X / ±Y**	**+Z**
50 (1.97)	18 (0.70)	11 (0.43)
100 (3.94)	32 (1.26)	11 (0.43)

OMP600 specification

Principal application	Workpiece inspection and job set-up on all sizes of machining centres and small to medium multi-tasking machines.	
Dimensions	Length Diameter	76 mm (2.99 in) 63 mm (2.48 in)
Weight (without shank)	With batteries Without batteries	1029 g (36.30 oz) 964 g (34.00 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, timer, spin off or shank switch	
Probe feedrate (minimum)	3 mm/min (0.12 in/min)	
Spindle speed (maximum)	1000 rev/min	
Operating range	Up to 6 m (19.7 ft)	
Receiver/interface	Legacy mode	OMI, OMM with MI 12 or MI 12-B
	Modulated mode	OMI-2, OMI-2T, OMI-2H, OMI-2C or OSI or OSI-D with OMM-2 or OMM-2C.system
Sense directions	±X, ±Y, +Z	
Unidirectional repeatability	0.25 µm (10 µin) 2σ – 50 mm stylus length *(see note 1)* 0.35 µm (14 µin) 2σ – 100 mm stylus length	
X, Y (2D) form measurement deviation	±0.25 µm (10 µin) – 50 mm stylus length *(see note 1)* ±0.25 µm (10 µin) – 100 mm stylus length	
X, Y, Z (3D) form measurement deviation	±1.00 µm (40 µin) – 50 mm stylus length *(see note 1)* ±1.75 µm (70 µin) – 100 mm stylus length	
Stylus trigger force *(see notes 2 and 5)* XY plane (typical minimum) +Z direction (typical minimum)	 0.15 N, 15 gf (0.54 ozf) 1.75 N, 178 gf (6.03 ozf)	
Stylus overtravel force XY plane (typical minimum) +Z direction (typical minimum)	 3.05N, 311gf (10.98 ozf) *(see note 3)* 10.69 N, 1090 gf (38.51 ozf) *(see note 4)*	
Stylus overtravel	XY plane +Z plane	±15° 11 mm (0.43 in)

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

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 (overtravel). The force value depends on related variables including measuring speed and machine deceleration. RENGAGE™ equipped probes offer ultra-low trigger forces.

Note 3 Stylus overtravel force in the XY plane typically occurs 126 µm after the trigger point and rises by 0.32 N/mm, 33 gf/mm (29.3 oz/in) until the machine tool stops (in the high force direction and using a carbon fibre stylus).

Note 4 Stylus overtravel force in the +Z direction typically occurs 50 µm after the trigger point and rises by 2.95 N/mm, 301 gf/mm (270 oz/in) until the machine tool stops.

Note 5 These are the factory settings, manual adjustment is not possible.

Environment	IP rating	IPX8, BS EN 60529:1992+A2:2013
	IK rating	IK01, 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 × AA 1.5 V alkaline or 2 × AA 3.6 V lithium-thionyl chloride (LTC)	
Battery reserve life	Approximately one week after a low battery warning is first given (based on 5% usage).	
Typical battery life	See the table on page 2.10.	
Low battery indication	Blue flashing LED in conjunction with normal red or green probe status LED.	
Dead battery indication	Constant red LED or flashing red LED.	
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.	

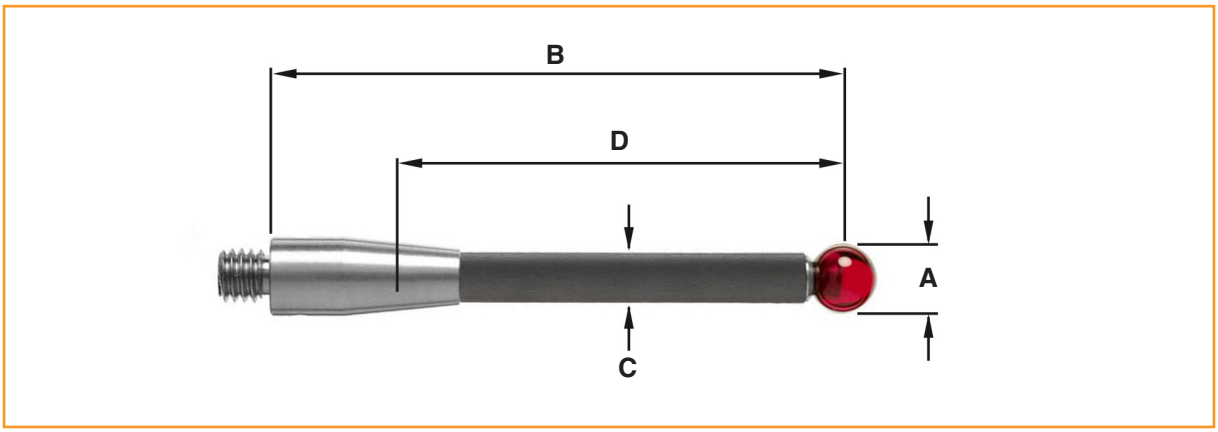
Typical battery life

Modulated transmission						
2 × 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	480 days		520 days		170 days	
5% usage	80 days	100 days	90 days	100 days	60 days	70 days
Continuous use	120 hours	140 hours	120 hours	140 hours	120 hours	140 hours
2 × 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	750 days		800 days		370 days	
5% usage	200 days	230 days	210 days	240 days	160 days	180 days
Continuous use	330 hours	380 hours	330 hours	380 hours	330 hours	370 hours

Legacy transmission						
2 × 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	480 days		520 days		170 days	
5% usage	90 days	100 days	90 days	100 days	70 days	80 days
Continuous use	120 hours	150 hours	120 hours	150 hours	120 hours	150 hours
2 × 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	750 days		800 days		370 days	
5% usage	210 days	240 days	220 days	250 days	170 days	190 days
Continuous use	340 hours	410 hours	340 hours	410 hours	340 hours	400 hours

Recommended styli

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



Part number		A-5003-7306 Carbon fibre	A-5003-6510 Carbon fibre	A-5003-6511 Carbon fibre	A-5003-6512 Carbon fibre
A	Ball diameter mm (inch)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)
B	Length mm (inch)	50.0 (1.97)	100.0 (3.94)	150.0 (5.91)	200.0 (7.88)
C	Stem diameter mm (inch)	4.5 (0.18)	4.5 (0.18)	4.5 (0.18)	4.5 (0.18)
D	EWL mm (inch)	36.0 (1.42)	88.0 (3.39)	138.0 (5.46)	186.0 (7.33)
	Mass g (oz)	4.1 (0.14)	6.2 (0.22)	7.5 (0.26)	8.7 (0.31)

Use of the solid carbon fibre styli featured above will guarantee the best possible measurement performance from the OMP600.

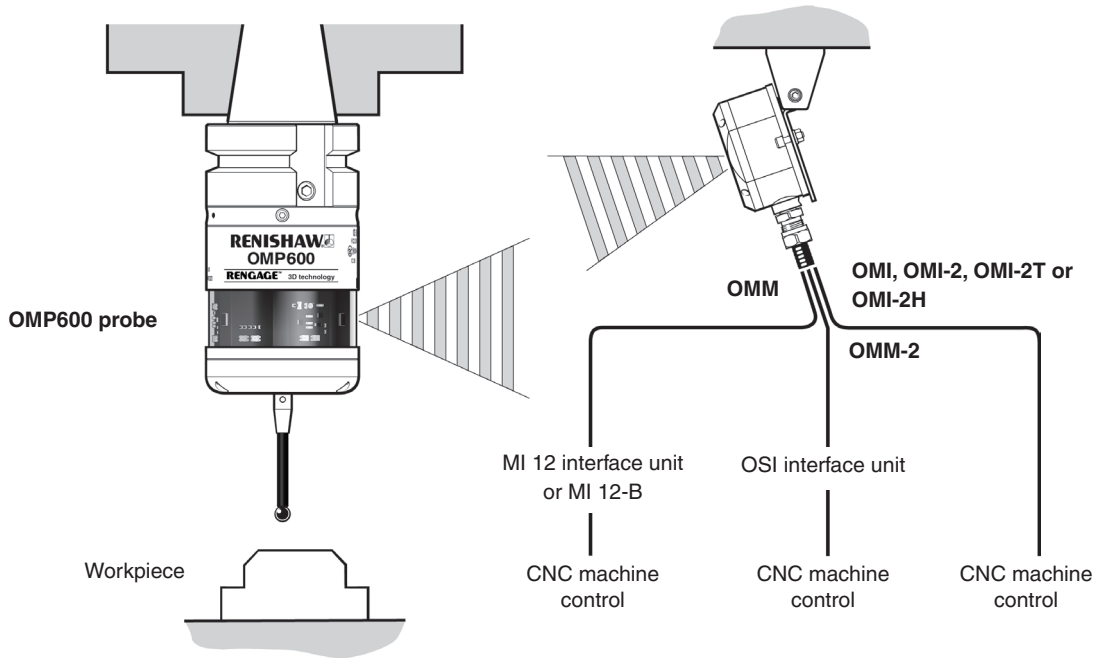
It is possible that the recommended styli may not be suitable for every OMP600 application and it may be necessary to select specialised styli configurations to meet specific application requirements.

In applications where specialised styli are to be used, it may be beneficial to reduce the speed of any probing moves. It has been observed that, in certain circumstances, specialist styli configurations will not exhibit the probing characteristics and performance that would have otherwise been expected and achieved when using the recommended styli. Reducing the speed of the probing moves may, in some instances, improve the performance of the probe.

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

System installation

Installing the OMP600



Operating envelopes

When used with the OMI or the OMM with MI 12 or MI 12-B, the OMP600 uses legacy transmission.

When used with the OMI-2, OMI-2T, OMI-2H or with the OSI with OMM-2 interface system, the OMP600 uses modulated transmission.

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

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

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

CAUTION: If two systems are operating in close proximity to each other, take care to ensure that the signals transmitted from the OMP600 on one machine are not picked up by the receiver on the other machine, and vice versa. When this is found to be the case, it is recommended that the OMP600 low optical power setting is selected, along with the low range setting on the receiver.

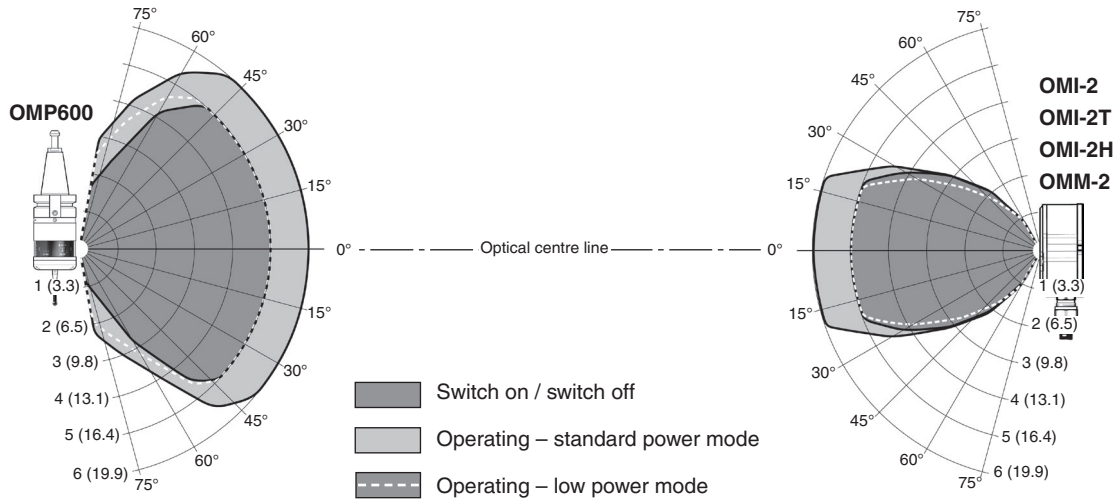
Performance envelope when using the OMP600 with an OMI-2, OMI-2T, OMI-2H or OMM-2 (modulated transmission)

The diodes of the OMP600 and the OMI-2, OMI-2T, OMI-2H or OMM-2 must be in each other's field of view and within the performance envelope shown. The OMP600 performance envelope is based on the optical centre line of the OMI-2, OMI-2T, OMI-2H or OMM-2 being at 0° and vice versa.

Positioning the OMI-2, OMI-2T, OMI-2H, OMI or OMM-2

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

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



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

Positioning the OMI-2C

WARNING: Ensure the machine tool is in a safe condition and power is removed before removing covers. Only qualified persons should adjust switches.

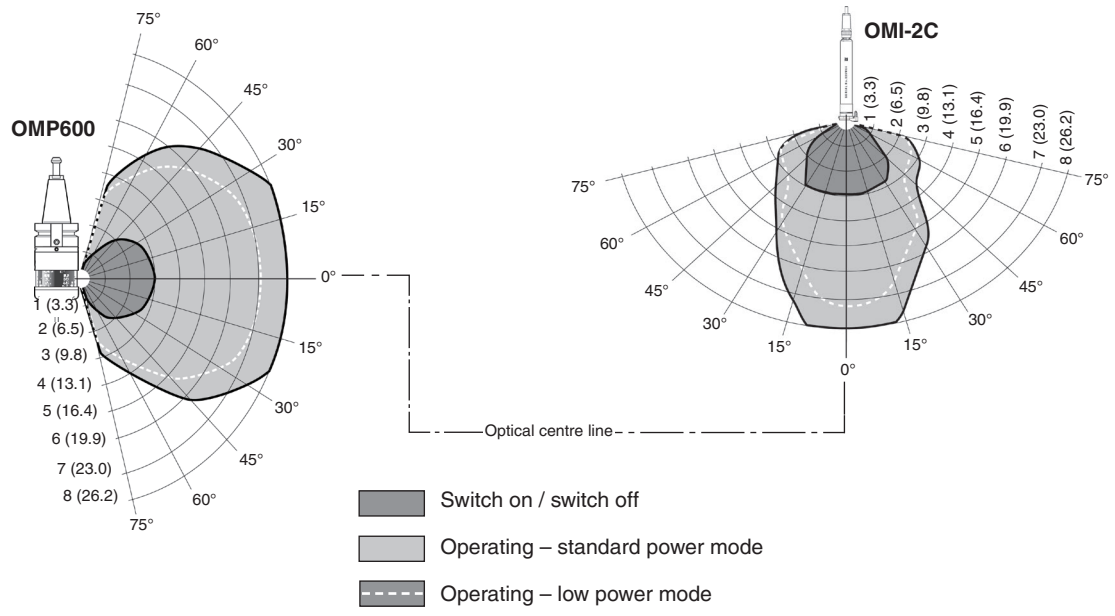
CAUTION: Different versions of the OMI-2C operate with specific machine controls. Prior to installation, ensure that the OMI-2C is compatible with the machine controller.

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.

Performance envelope when using the OMP600 with an OMI-2C (modulated transmission)

The diodes of both the OMP600 and the OMI-2C must be in each other's field of view, and within the performance envelope shown. The OMP600 performance envelope is based on the optical centre line of the OMI-2C being at 0° and vice versa.



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

Preparing the OMP600 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.

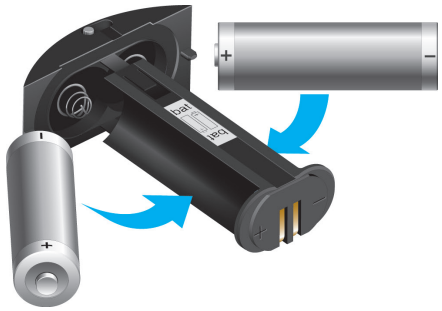
If dead batteries are inadvertently inserted, the LEDs will remain a constant red.

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 (for details, see Section 4, “Trigger Logic™”).

1

2



3

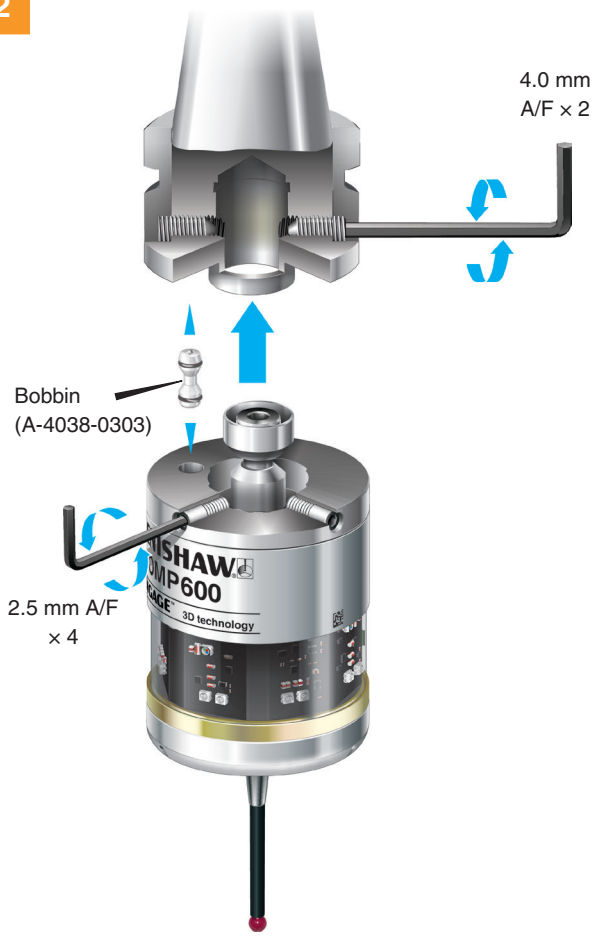
4

Mounting the probe on a shank

NOTE: In instances where the OMP600 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).

1

2



3

Stylus on-centre adjustment

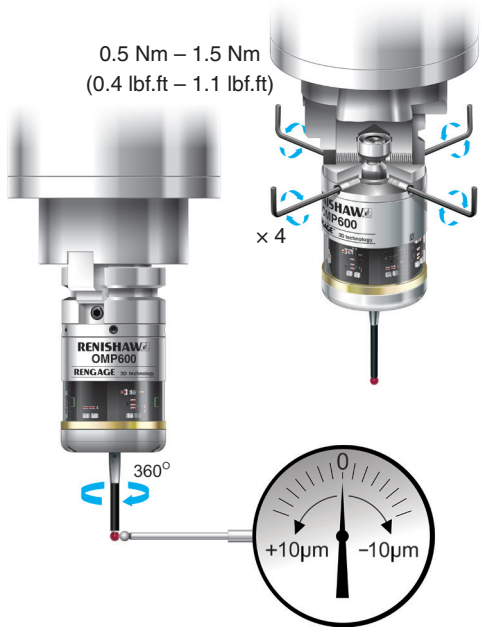
NOTES:

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

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

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

1



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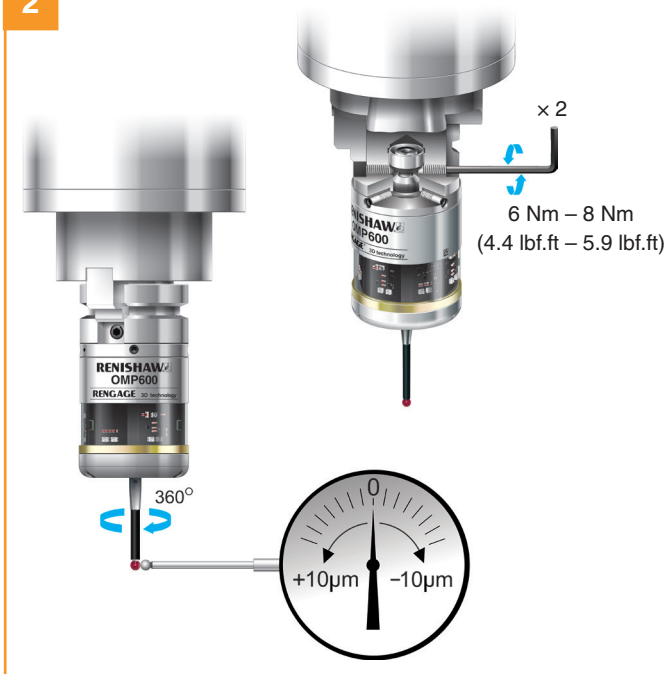
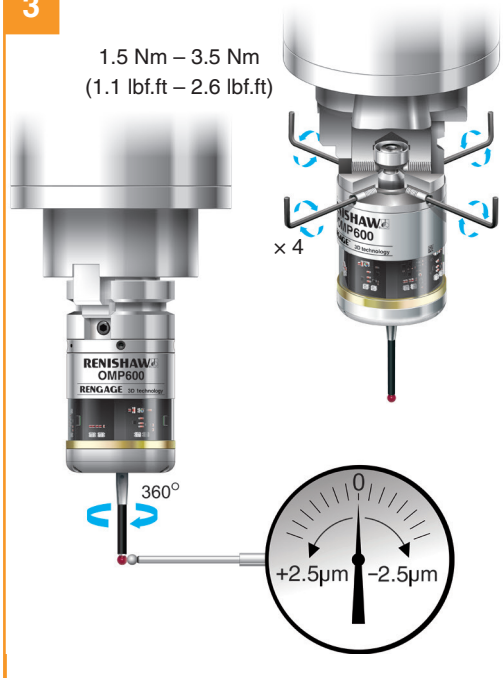


3



Calibrating the OMP600

Why calibrate a probe?

A spindle probe is just one component of the measurement system that 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. However, 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” earlier in this section). A small amount of run-out is acceptable, and can be compensated for, as part of the normal calibration process.

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

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

NOTE: Probing routines where the measurement point is taken coming off the feature are not possible with the OMP600.

Calibrating in a bored hole or on a turned diameter

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

Calibrating in a ring gauge or on a datum sphere

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

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

Calibrating the probe length

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

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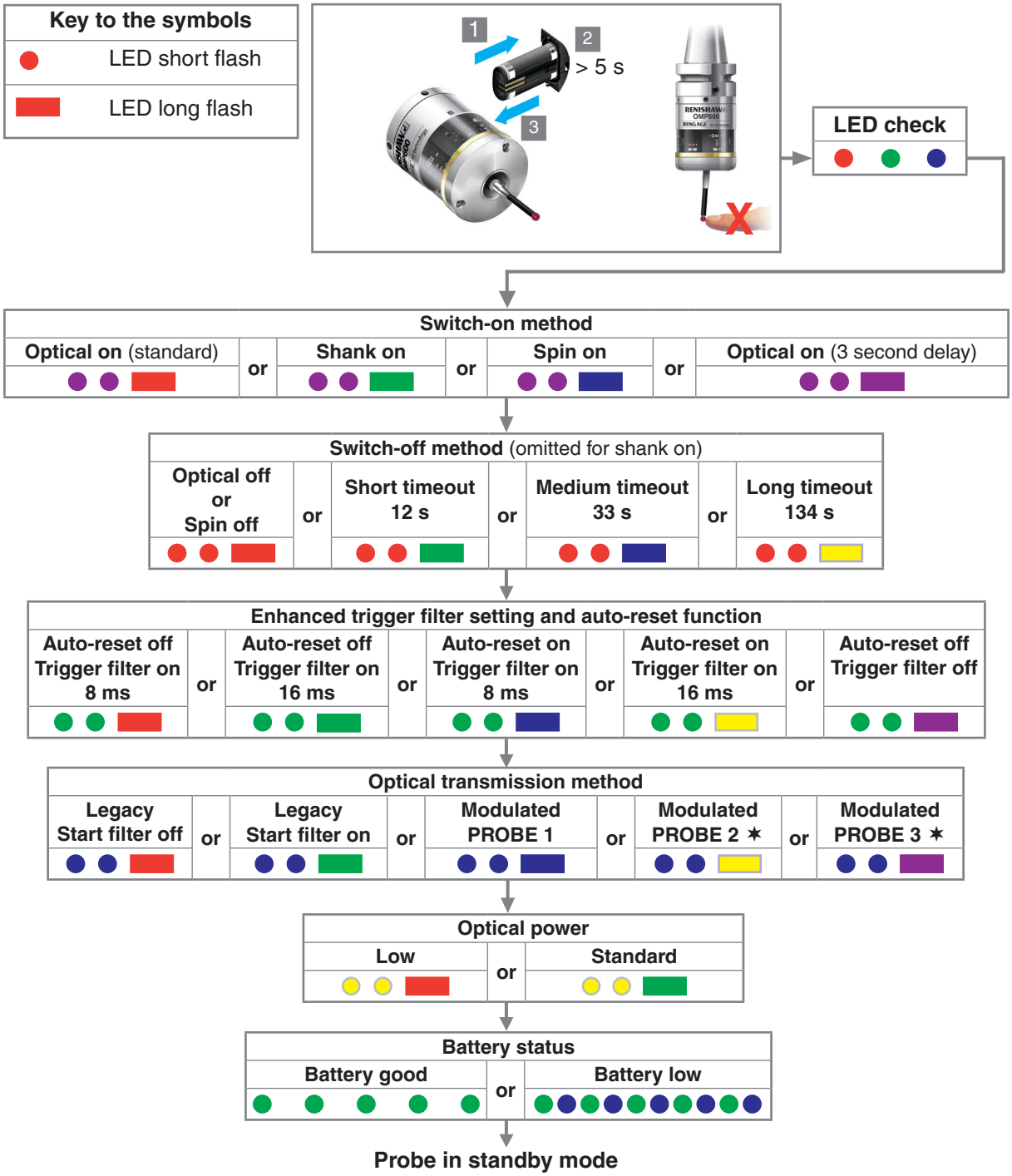
Trigger Logic™

Reviewing the probe settings



✶ Omitted if “Optical on (3 second delay)” switch-on method has been selected.

Probe settings record

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

			✓ tick Factory settings	✓ tick New settings
Switch-on method	Optical on (standard)	● ● ▬	✓	
	Shank on	● ● ▬		
	Spin on	● ● ▬		
	Optical on (3 second delay)	● ● ▬		
Switch-off method	Optical off or spin off	● ● ▬	✓	
	Short timeout (12 s)	● ● ▬		
	Medium timeout (33 s)	● ● ▬		
	Long timeout (134 s)	● ● ▬		
Enhanced trigger filter setting and spindle orientation capability	Auto-reset off / filter on (8 ms)	● ● ▬		
	Auto-reset off / filter on (16 ms)	● ● ▬		
	Auto-reset on / filter on (8 ms)	● ● ▬	✓	
	Auto-reset on / filter on (16 ms)	● ● ▬		
	Auto-reset off / filter off	● ● ▬		
Optical transmission type	Legacy (start filter off)	● ● ▬		
	Legacy (start filter on)	● ● ▬		
	Modulated PROBE 1	● ● ▬	✓	
	Modulated PROBE 2	● ● ▬		
	Modulated PROBE 3	● ● ▬		
Optical power	Low power	● ● ▬		
	Standard power	● ● ▬	✓	

Factory settings are for kit (A-5180-2001) only. **OMP600 serial no .....**

Changing the probe settings

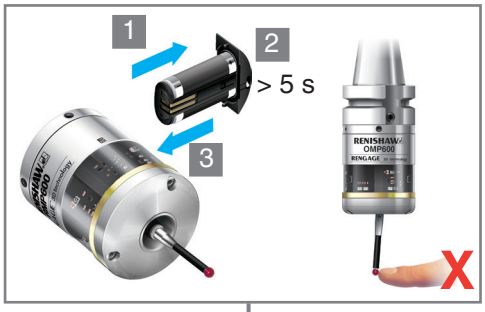
Insert the batteries or, if they have already been installed, remove them for 5 seconds and then refit them.

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 of the five red flashes will be followed by a blue flash).

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

CAUTION: Do not remove the batteries whilst in the configuration mode. Leave the stylus untouched for 20 seconds to exit.

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



LED check

●●●

Battery status

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

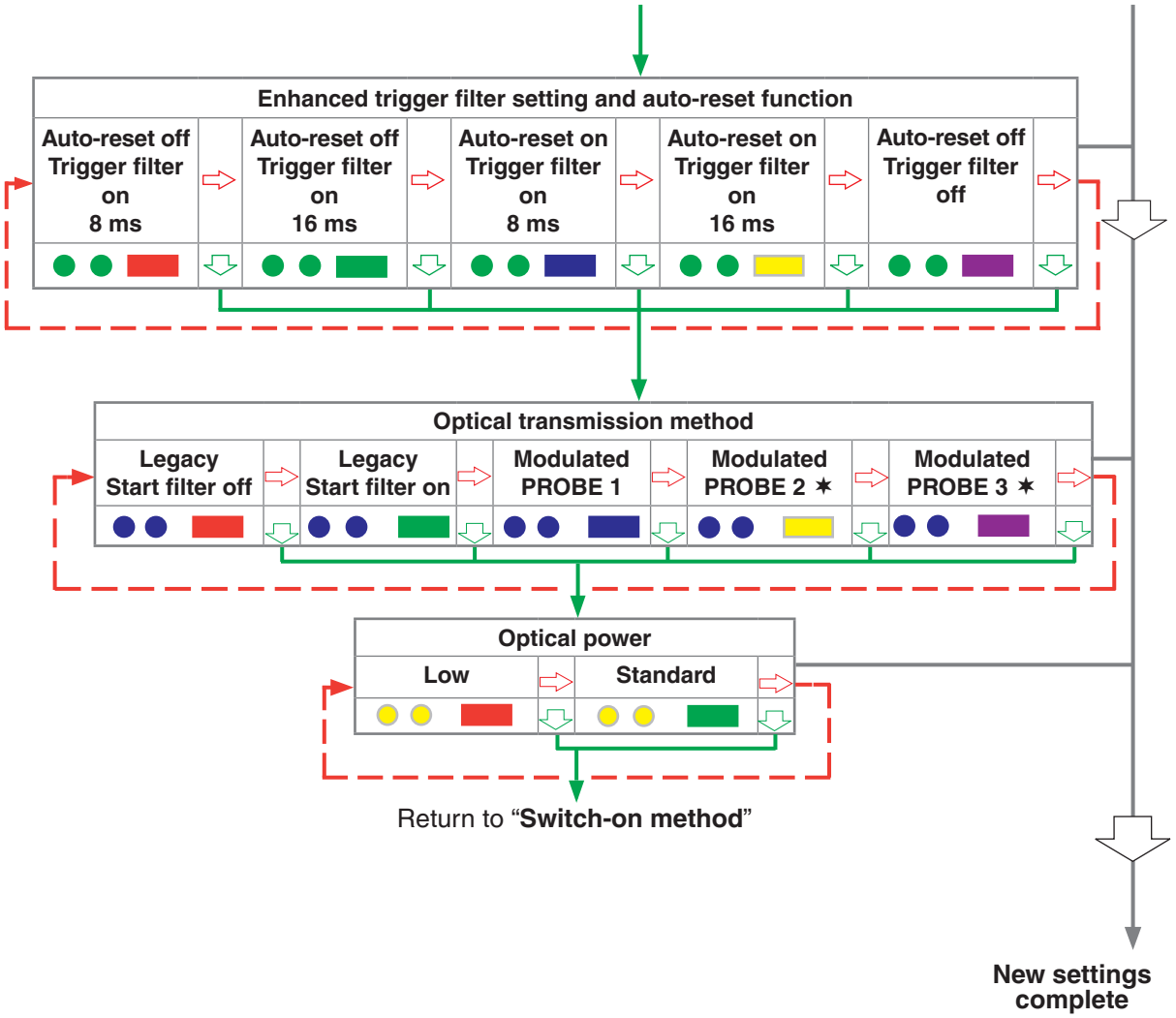
Switch-on method

Optical on (standard)	⇨	Shank on	⇨	Spin on	⇨	Optical on (3 second delay)	⇨
●● ▬	⇩	●● ▬	⇩	●● ▬	⇩	●● ▬	⇩

Switch-off method (omitted for shank on)

Optical off or Spin off	⇨	Short timeout 12 s	⇨	Medium timeout 33 s	⇨	Long timeout 134 s	⇨
●● ▬	⇩	●● ▬	⇩	●● ▬	⇩	●● ▬	⇩

continued on next page



✶ Omitted if "Optical on (3 second delay)" switch-on method has been selected.

Operating mode

Probe status LEDs

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

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

1. When the probe is active, the batteries discharge until battery power becomes too low for the probe to operate correctly.
2. The probe stops functioning, but then reactivates as the batteries recover sufficiently to provide the probe with power.
3. The probe begins to run through the LED review sequence (see “Reviewing the probe settings” earlier in this section).
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.

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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 OMP600 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.

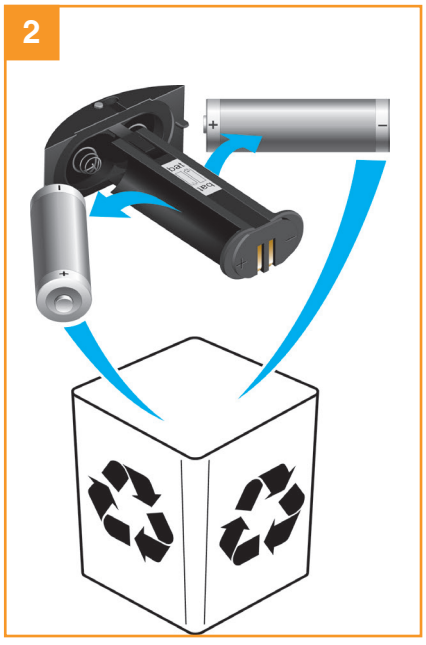
Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.

1

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

2



NOTES:

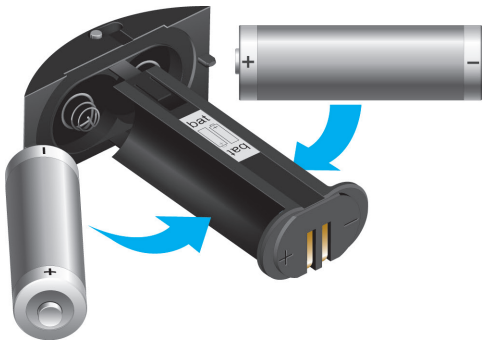
After removing the old batteries, wait more than 5 seconds before inserting the new batteries.

Do not mix new and used batteries, or different battery types, as this can result in reduced battery life and/or 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.

3



Battery types				
Alkaline × 2	**Lithium-thionyl chloride × 2**			**Nickel-cadmium / nickel-metal hydride × 2**
AA 1.5 V ✓	**Saft:**	LS 14500		**AA 1.2 V** ✓
	Tadrian:	SL-760/S, TL-2100/S, TL-5903/S	✓	
	Xeno:	XL-060F		

4

5

Diaphragm replacement

OMP600 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, renew 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 screws and remove the front cover.
3. Inspect the outer diaphragm for damage.
4. To remove the outer diaphragm, grip it by its outer edge and pull it from the inner diaphragm.

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 outer diaphragm over the probe centre.
2. Locate the outer edge of the new outer diaphragm such that it rests on the outer edge of the inner diaphragm.
3. Refit the front cover and three M3 screws.
4. Refit the stylus and recalibrate the probe.

Fault-finding

Symptom	Cause	Action
Probe fails to power up (no LEDs illuminated) or fails to indicate the current probe settings.	Dead batteries.	Renew the 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.
Probe fails to switch on.	Wrong transmission method selected.	Reconfigure transmission method.
	Dead batteries.	Renew the batteries.
	Unsuitable batteries.	Fit suitable batteries.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
	Optical/magnetic interference.	Check for interfering light sources or motors. Consider removing the source of the interference.
	Transmission beam obstructed.	Check the OMP600 and receiver windows are clean and remove any obstruction.
	No receiver start signal.	Check start signal by reviewing receiver start LED. Refer to the relevant user's guide.
	No power to interface or receiver.	Check if a stable power supply is available. Check all connections and fuses.
	Probe out of range or not aligned with receiver.	Check alignment and ensure receiver fixing is secure.
	Poor connection between the battery cassette mating surfaces and contacts.	Remove any debris and clean the contacts before reassembly.

Symptom	Cause	Action
Probe fails to switch on (continued).	Incorrect spin speed (spin on method only).	Check spin speed and duration.
	Malfunctioning shank switch (shank switch-on method only).	Check shank switch operation.
	Incorrect switch-on method configured.	Check configuration and alter as required.
	Incorrect multiple probe setting configured.	Check whether PROBE 1, PROBE 2 or PROBE 3 start is selected and alter as required.
	Spin on is within 1 second of spin off (spin on / spin off method only).	Check for 1 second dwell following spin off.
Machine stops unexpectedly during a probing cycle.	Optical communication obstructed.	Check interface/receiver and remove obstruction.
	Interface, receiver or machine fault.	Refer to interface, receiver or machine user's guide.
	Dead batteries.	Renew the batteries.
	Excessive machine vibration causing a 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.
	Adjacent probe.	Reconfigure adjacent probe to low power mode and reduce range of receiver.
	Stylus not given sufficient time to settle from a rapid deceleration or reorientation.	Add a short dwell before the probing move (length of dwell will depend on stylus length and rate of deceleration). Maximum dwell is 1 second.
	Transmission beam obstructed.	Check that the OMP600 and receiver window are clean and remove any obstruction.

Symptom	Cause	Action
Probe crashes.	In cases where there is more than one probe on the machine, incorrect probe activated.	Investigate interface wiring or probing software.
	Workpiece obstructing probe path.	Review the probing software.
	Adjacent probe.	Reconfigure adjacent probe to low power mode and reduce range of receiver.
	Probe length offset missing	Review the probing software.
Probe permanently triggered.	Probe orientation has changed, i.e. from horizontal to vertical.	Select probe “auto-reset” mode.
	New stylus has been fitted.	Turn probe off and back on again.
	Probe was switched on when stylus was deflected.	Turn probe off and back on again. Ensure stylus is seated during switch on.
	Probe has not settled before a trigger move occurs following a rotation or rapid move (auto-reset mode only).	Turn probe off and back on again. Add a 0.2 second dwell before taking a trigger point. A shorter stylus or slower probing speed could also solve the problem.
	Probe has collided with an object during a rotation or rapid move (auto-reset mode only).	Turn probe off and back on again.

Symptom	Cause	Action
Poor probe repeatability and/or accuracy.	Debris on part or stylus.	Clean part and stylus.
	Poor tool changer repeatability.	Redatum the 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 the probing software.
	Calibration and probing speeds not the same.	Review the probing software.
	Calibration feature has moved.	Correct the position.
	Measurement occurs as stylus leaves surface.	Review the probing software.
	Measurement occurs within the machine's acceleration and deceleration zone.	Review the probing software and the probe filter settings.
	Probing speed too high or too slow.	Perform simple repeatability trials at various speeds.
	Temperature variation has caused machine and/or workpiece movement.	Minimise temperature changes.
	Machine tool faulty.	Perform health checks on the machine tool.
	Insufficient dwell following a spin on (spin on method only).	Check that the probe is stationary for a minimum of 2.5 seconds after it has stopped spinning.
	Stylus not given sufficient time to settle from a rapid deceleration or reorientation.	Apply a 0.2 second dwell before taking a trigger point. A shorter stylus or slower probing speed could also solve the problem.

Symptom	Cause	Action
Probe fails to switch off.	Incorrect switch-off method configured.	Check configuration and alter as required.
	Optical/magnetic interference.	Check for interfering light sources or motors. Consider removing the source of the interference.
	Probe is inadvertently switched on by the receiver when using autostart.	Check the position of the receiver. Reduce the 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.
	Transmission beam obstructed.	Check the OMP600 and receiver windows are clean and remove any obstruction.
	Malfunctioning shank switch (shank switch-off method only).	Check switch operation.
	Probe placed in carousel (with timeout method selected) being triggered by machine movement.	Use a shorter timeout setting or use a different switch-on method.
	Incorrect spin speed duration (spin off method only).	Check spin speed.
	Spin off signal occurs within 1 second of probe spinning on (spin on / spin off method only).	Check for a 1 second dwell following a spin.
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.
Probe status LED shows a constant blue	Probe damaged beyond use.	Return the probe to your nearest Renishaw supplier for repair or replacement.

Symptom	Cause	Action
Probe triggers but the interface does not respond.	3 second switch-on method selected.	Reconfigure to the standard switch-on delay.
	Probe out of range.	Review performance envelopes.
	Transmission beam obstructed.	Check the OMP600 and receiver windows are clean and remove any obstruction.
	Wrong transmission method selected.	Reconfigure the transmission method.

Parts list

Item	Part number	Description
OMP600 probe	A-5180-0001	OMP600 probe with batteries, tools and product support card (set to optical on / optical off) – legacy transmission.
OMP600 probe	A-5180-0002	OMP600 probe with batteries, tools and product support card (set to optical on / timer off (134 seconds)) – legacy transmission.
OMP600 probe	A-5180-2001	OMP600 probe with batteries, tools and product support card (set to optical on / optical off) – modulated transmission, PROBE 1 start.
OMP600 probe	A-5180-2002	OMP600 probe with batteries, tools and product support card (set to optical on / timer off (134 seconds)) – 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-5003-7306	50 mm long carbon fibre stylus with Ø6 mm ball.
Stylus	A-5003-6510	100 mm long carbon fibre stylus with Ø6 mm ball.
Stylus	A-5003-6511	150 mm long carbon fibre stylus with Ø6 mm ball.
Stylus	A-5003-6512	200 mm long carbon fibre stylus with Ø6 mm ball.
Tools	A-4038-0304	Probe comprising Ø1.98 mm stylus tool, 2.0 mm AF hexagon key, 2.5 mm AF hexagon key (× 2), 4.0 mm AF hexagon key and shank grub screw (× 2).
Battery cassette	A-4038-0300	Battery cassette.
Battery cassette gasket	A-4038-0301	Gasket.
Diaphragm	A-5312-0302	Diaphragm.
Bobbin	A-4038-0303	Bobbin kit for shank switch.
OSI	A-5492-2000	OSI optical system interface (multiple probe mode).
OMM-2	A-5492-0050	OMM-2 optical machine module with 15 m (49.2 ft) cable.
OMI-2	A-5191-0050	OMI-2 optical machine interface with 15 m (49.2 ft) cable.
OMI-2T	A-5439-0050	OMI-2T optical machine interface with 15 m (49.2 ft) cable.
Mounting bracket	A-2033-0830	Mounting bracket with fixing screws, washers and nuts.
Styli tool	M-5000-3707	Tool for tightening and releasing styli.

Item	Part number	Description
Publications. These can be downloaded from our website at www.renishaw.com		
OMI-2T	A-5439-8510	Installation guide: for the set up of the OMI-2T
OSI with OMM-2	A-5492-8554	Installation guide: for the set up of the OSI with OMM-2
OMI-2	H-2000-5233	Installation and user's guide: OMI-2 optical machine interface.
Styli	H-1000-3200	Technical specification: styli and accessories.
Taper shanks	H-2000-2011	Data sheet: taper shanks for machine tool probes.
Probe software	H-2000-2298	Data sheet: probe software for machine tools - programs and features
Software list	H-2000-2298	Data sheet: probe software for machine tools – list of programs.

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