

OMP400 optical machine probe systems



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Renishaw part no: H-5069-8504-05-A

First issued: January 2008

Revised: May 2008
January 2009
October 2009
March 2011

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Before you begin

1.1

Before you begin

Disclaimer

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Trademarks

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apply innovation™, RENGAGE™ and Trigger Logic™ are trademarks of Renishaw plc.

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

Warranty

Equipment requiring attention under warranty must be returned to your equipment supplier. No claims will be considered where Renishaw equipment has been misused, or where repairs or adjustments have been attempted by unauthorised persons. Prior consent must be obtained in instances where Renishaw equipment is to be substituted or omitted. Failure to comply with this requirement will invalidate the 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.

OMP400 installation guide

Patents

Features of the OMP400 probe, and other similar Renishaw probes, are subject of one or more of the following patents and / or patent applications:

CN 101142461B	US 2009-0130987-A1
CN 101171493A	US 5,671,542
CN 101198836A	US 6,776,344 B2
EP 0641427	US 6,839,563 B1
EP 0974208	US 6,860,026 B2
EP 1130557	US 6472981 B2
EP 1185838	US 7145468 B2
EP 1373995	US 7285935
EP 1457786	US 7441707
EP 1477767	US 7486195
EP 1477768	US 7603789
EP 1503524 B	US 7689679
EP 1701234	US 7792654
EP 1734426	US 7812736
EP 1866602	
EP 1880163	
EP 1893937	
EP 1988439	
EP 2154471	
IN 6963/DELNP/2007A	
IN 8669/DELNP/2007A	
IN 9914/DELNP/2007A	
JP 2004-279,417	
JP 2004-522,961	
JP 2006-313567	
JP 2008-203270	
JP 2008-537107	
JP 2008-541081	
JP 2008-544244	
JP 3,634,363	
JP 3967592	
JP 4294101	

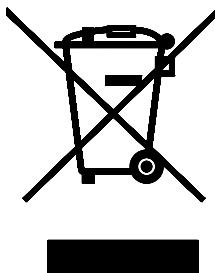


EC declaration of conformity

Renishaw PLC declares that the OMP400 complies with the applicable standards and regulations.

Contact Renishaw plc at
www.renishaw.com/omp400 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 declaration (USA)

FCC 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.

FCC 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.

FCC 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.

OMP400 installation guide

Safety

Information to the user

The OMP400 is supplied with two non-rechargeable ½AA lithium metal batteries. Once the charge in these batteries is depleted, please dispose of them in accordance with your local environmental and safety laws. Do not attempt to recharge these batteries.

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 OMP400 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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OMP400 basics

2.1

Introduction

Welcome to the OMP400, Renishaw's ultra compact probe for small to medium machining centres that sets new standards for reliability and robustness in the harshest of machine tool environments.

Successfully combining the miniaturisation of the popular OMP40 with the high accuracy of the MP700, the OMP400 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;
- low pre-travel variation to provide high accuracy, even when used with long styli;
- a proven ten-fold improvement in life (10 million triggers);
- the elimination of reseat failures;
- high resistance to machine tool vibration;
- a 360° optical 'switch-on' facility, allowing the probe to be turned on / reset in any position;
- resistance to shock and false triggering through the use of digital filtering;
- full compatibility with Renishaw's industry proven optical transmission systems.

In addition to providing high accuracy measurement on your machine tool, the OMP400 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 OMP400 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.

OMP400 installation guide

Optical transmission method

The OMP400 can be operated in either **legacy** or **modulated** mode. The 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.

Legacy mode

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

If start problems are experienced in legacy mode, activate the Legacy Start Filter ON option. This introduces a 1 second delay to the probe switch on time, and improves the probe's resistance to false starts caused by light interference.

NOTE: The probing program on the machine will need to take account of this delay.

Modulated mode

When set to modulated mode, the probe will only function with an OMI-2, OMI-2T OMI-2H or OMI-2C interface.

Modulated transmission is capable of providing two different coded start signals. This allows the use of two probes with one interface. Twin probe installations require an OMI-2T interface.

Twin probe system

To operate a twin probe system, one probe needs to be set to PROBE 1 start and the other set to PROBE 2 start. 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.

NOTE: When used in conjunction with an OMI-2T, the OMP400 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 deflection (triggering) to systematically lead the user through the available choices to allow selection of the required mode options.

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

Modes of operation

The OMP400 probe can be in one of three modes.

Stand-by 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 OMP400 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 OMP400 must remain operational for a minimum of 1 second before being switched off.

A second switch-on mode is available where 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, it will switch-on correctly in the spindle. To ensure that the probe activates correctly, it is important to make sure 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 this delay.

When used in conjunction with an OMI-2T, the OMP400 switch on method must be set to optical on (standard).

OMP400 installation guide

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.

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™**).

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

NOTES:

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

Whilst there is also a 0 ms setting, this is for Renishaw's use only. Renishaw does not recommend that you use this setting as false triggering is likely to occur.

OMP400 switch-on method	OMP400 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 machine input. A timer automatically switches the probe off after 90 minutes from last trigger if not turned off by machine input. Timer off (time out) Time out will occur (12, 33 or 134 seconds - user configurable) after the last probe trigger or reseat.	Legacy filter off: Legacy filter on: Modulated	0.8 seconds 1.6 seconds 0.7 seconds.
Optical on (3 second delay) Optical switch-on is commanded by machine input.	Timer off (time out) Time out will occur (12, 33 or 134 seconds - user configurable) after the last probe trigger or reseat.	3 seconds.	

NOTE: After being switched on, the OMP400 must be on for 1 second before being switched off.

Auto-reset facility

The Auto-reset function in the OMP400 compensates for stylus forces, due to high accelerations and changes in probe orientation, that can cause the probe to trigger when using long styli (>100 mm).

This feature is suitable for radial rotations (e.g. vertical to horizontal). It is selectable using Trigger Logic™.

NOTE: The Auto-reset function cannot compensate for rotations around the probe's axis when horizontal with long styli (>100 mm). A manual reset will be required in this situation.

When a manual reset is required, the method used will depend on the probe's switch-off setting:

- In optical off mode, the probe must be switched off then on again.
- In timer off mode, the probe must be switched on using an M code start signal.

Optical transmission method and probe identity

The OMP400 can be operated in either **legacy** or **modulated** mode. The 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.

Legacy mode

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

If start problems are experienced in legacy mode, activate the Legacy Start Filter ON option. This introduces a 1 second delay to the probe switch on time, and improves the probe's resistance to false starts caused by light interference.

NOTE: The probing program on the machine will need to take account of this delay.

Modulated mode

When set to modulated mode, the probe will only function with an OMI-2, OMI-2T OMI-2H or OMI-2C interface.

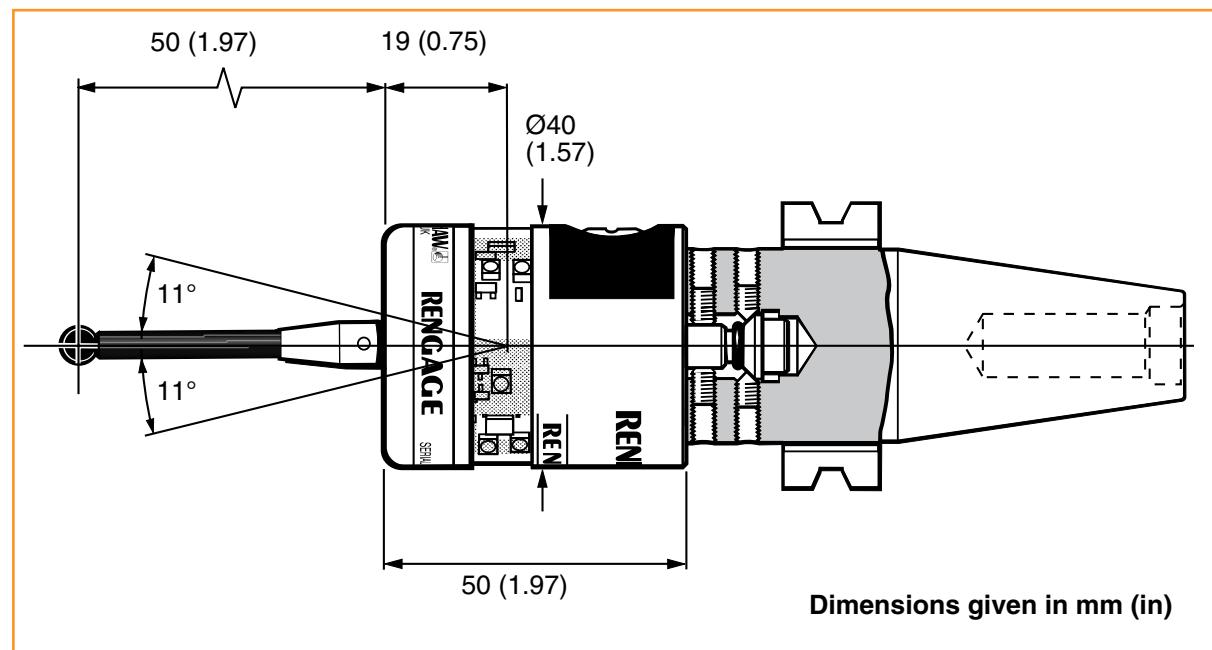
For most applications, the spindle probe should be set to PROBE 1 start.

PROBE 2 start should only be selected for a secondary spindle probe in a twin probe application.

Optical power

Where the separation between the OMP400 and the receiver is small (no more than 2 m), the low optical power setting may be selected. This setting reduces the optical transmission range and extends battery life.

OMP400 dimensions



Stylus overtravel limits

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

OMP400 specification

Principal application	Small to medium machining centres and mould and die applications	
Dimensions	Length	50 mm (1.97 in)
	Diameter	40 mm (1.57 in)
Weight (without shank)	With batteries	262 g (9.24 oz)
	Without batteries	242 g (8.53 oz)
Transmission type	360° infra-red optical transmission	
Switch-on methods	Machine M code or Auto-start	
Switch-off methods	Machine M code or timer	
Operating range	Up to 5 m (16.4 ft)	
Receiver/interface	OMI-2T, OMI-2, OMI-2H, OMI-2C, OMI or OMM / MI 12	
Sense directions	Omni-directional $\pm X$, $\pm Y$, $+Z$	
Repeatability	0.25 μm (10 μin) 2 sigma – 50 mm stylus length* 0.35 μm (14 μin) 2 sigma – 100 mm stylus length	
2D lobing in X, Y	$\pm 0.25 \mu\text{m}$ (10 μin) 2 sigma – 50 mm stylus length* $\pm 0.25 \mu\text{m}$ (10 μin) 2 sigma – 100 mm stylus length	
3D lobing in X, Y, Z	$\pm 1.00 \mu\text{m}$ (40 μin) 2 sigma – 50 mm stylus length* $\pm 1.75 \mu\text{m}$ (70 μin) 2 sigma – 100 mm stylus length	
Stylus trigger force XY plane + Z direction	0.06 N, 6 gf (0.22 ozf) typical minimum 2.55 N, 260 gf (9.17 ozf) typical minimum	The stylus trigger force is the force exerted on the component when the probe triggers. However, the maximum force applied to the component will occur after the trigger point and will be greater than the trigger force. The magnitude depends on a number of factors affecting probe overtravel including measuring speed and machine deceleration. If the forces applied to the component are critical, contact Renishaw for further information.
Stylus overtravel force XY plane + Z direction	1.04 N, 106 gf (3.74 ozf) typical minimum § 5.5 N, 561 gf (19.78 ozf) typical minimum †	
Stylus overtravel	XY plane +Z plane	$\pm 11^\circ$ 6 mm (0.23 in)

* Performance specification is for a test velocity of 240 mm/min (9.45 in/min) with a 50 mm carbon fibre stylus. Test velocity does not constrain performance in application.

§ Stylus overtravel force in XY plane occurs 70 μm after the trigger point and rises by 0.1 N/mm, 10 gf/mm (9.1 oz/in) until the machine tool stops (in the high force direction and using a 50 mm carbon fibre stylus).

† Stylus overtravel force in + Z direction occurs 10 μm to 11 μm after the trigger point and rises by 1.2 N/mm, 122 gf/mm (109.6 oz/in) until the machine tool stops.

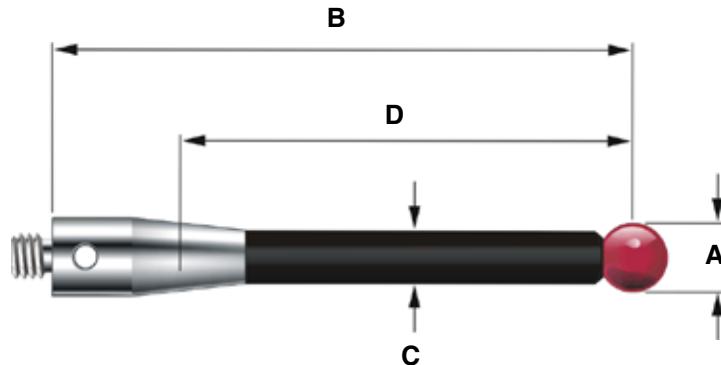
OMP400 installation guide

Environment	IP rating	IPX8
	Storage temperature	-10 °C to +70 °C (+14 °F to +158 °F)
	Operating temperature	+5 °C to +50 °C (+41 °F to +122 °F)
Battery types	2 x 1/2 AA (3.6 V) Lithium Thionyl Chloride	
Battery reserve life	Approximately one week after a low battery warning is first given.	
Typical battery life	See table below.	

LEGACY optical transmission mode					
Stand-by life (typical)		5% usage = 72 minutes/day (days-typical)		Continuous use (hours-typical)	
Standard power mode	Low power mode	Standard power mode	Low power mode	Standard power mode	Low power mode
One year	One year	75	90	95	110
MODULATED optical transmission mode					
Stand-by life (typical)		5% usage = 72 minutes/day (days-typical)		Continuous use (hours-typical)	
Standard power mode	Low power mode	Standard power mode	Low power mode	Standard power mode	Low power mode
One year	One year	70	85	85	105

Recommended styli

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



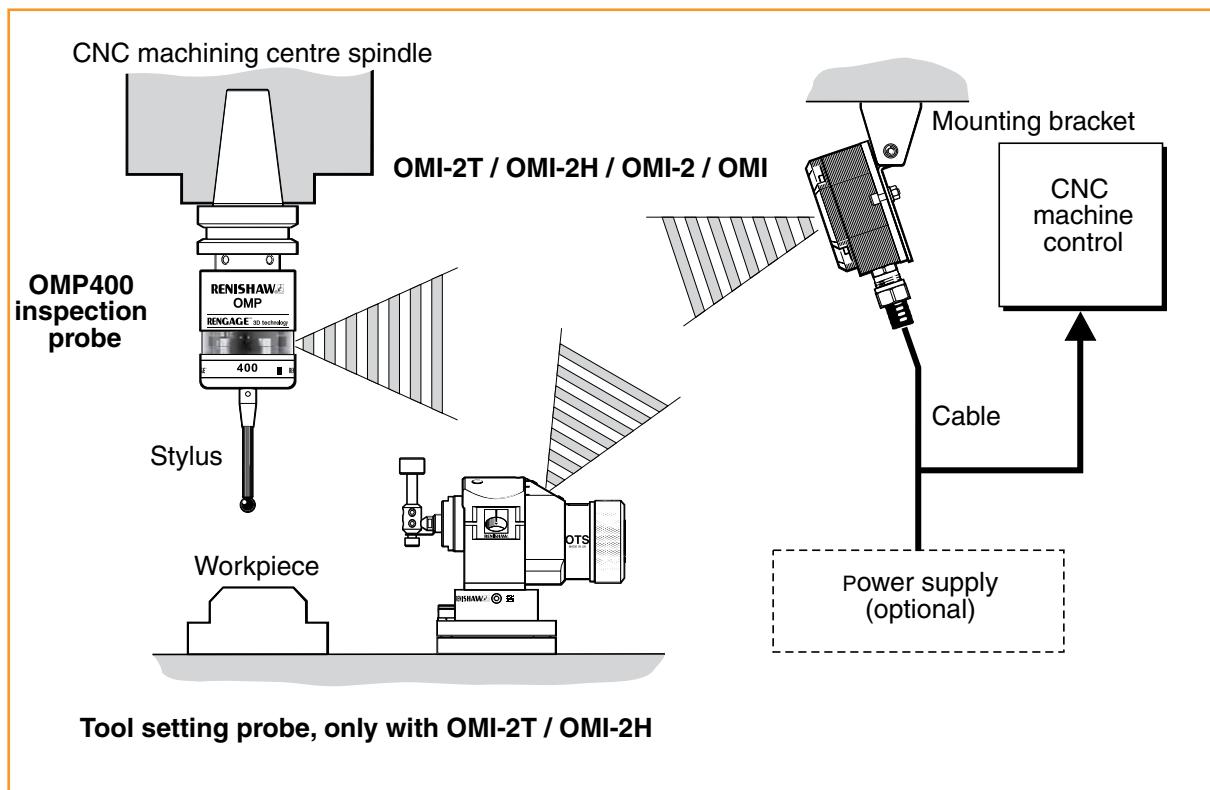
Part number		A-5003-7306 Carbon fibre	A-5003-6510 Carbon fibre	A-5003-6511 Carbon fibre	A-5003-6512 Carbon fibre
A	Ball diameter mm (inch)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)
B	Length mm (inch)	50.0 (1.97)	100.0 (3.94)	150.0 (5.91)	200.0 (7.88)
C	Stem diameter mm (inch)	4.5 (0.18)	4.5 (0.18)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

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System installation

3.1

Installing the OMP400 with an OMI-2T / OMI-2 / OMI-2H / OMI



The probe and OMI-2T / OMI-2H / OMI-2 / OMI diodes must be in the others field of view or line of site, and within the performance envelope shown. The OMP400 performance envelope is based on the receiver being at 0°, and vice-versa.

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

Coolant residue accumulating on the OMP400 or receiver windows will have a detrimental effect on transmission performance. Wipe clean as often as is necessary to maintain unrestricted transmission.

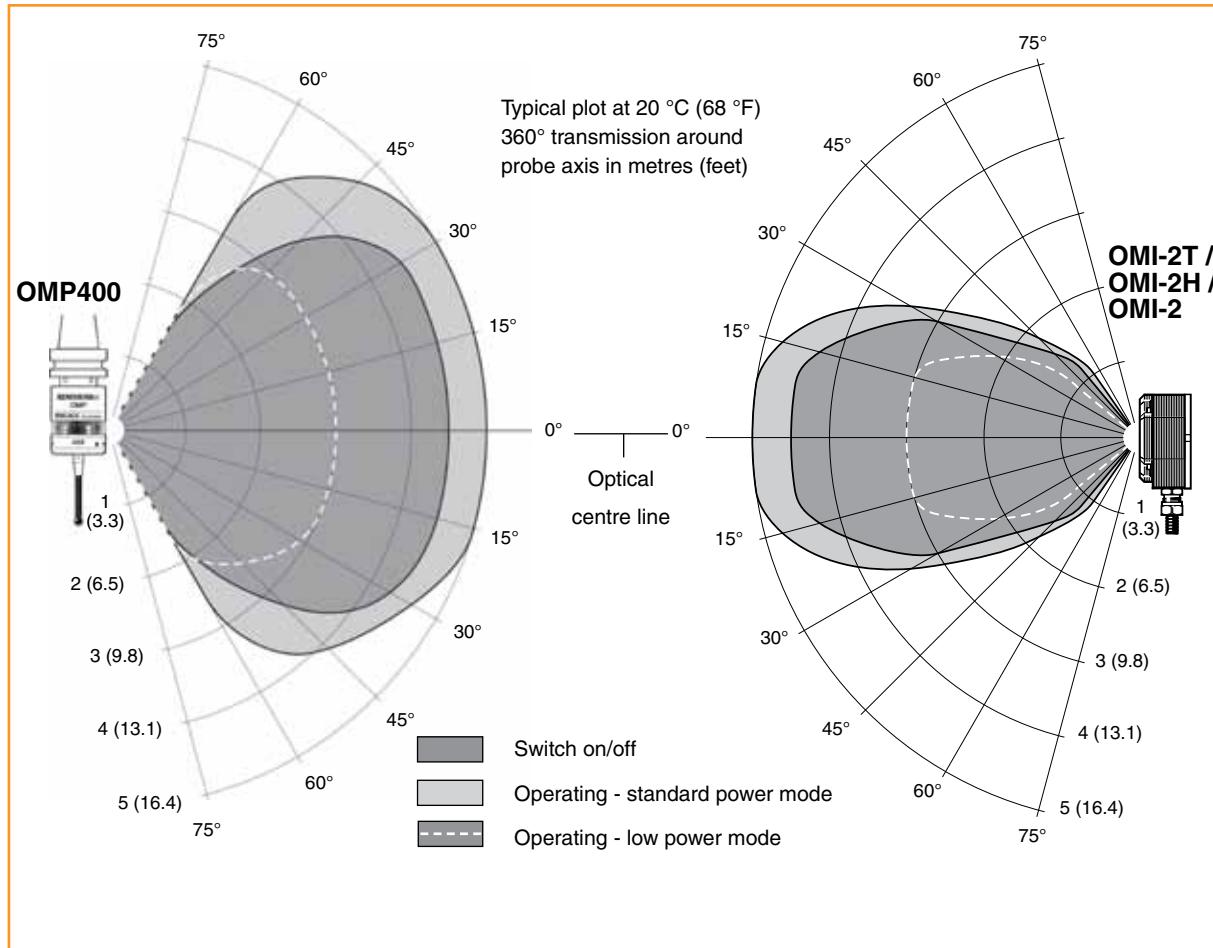
Operation in temperatures of 0 °C to 5 °C or 50 °C to 60 °C (32 °F to 41 °F or 122 °F to 140 °F) will result in some reduction in range.



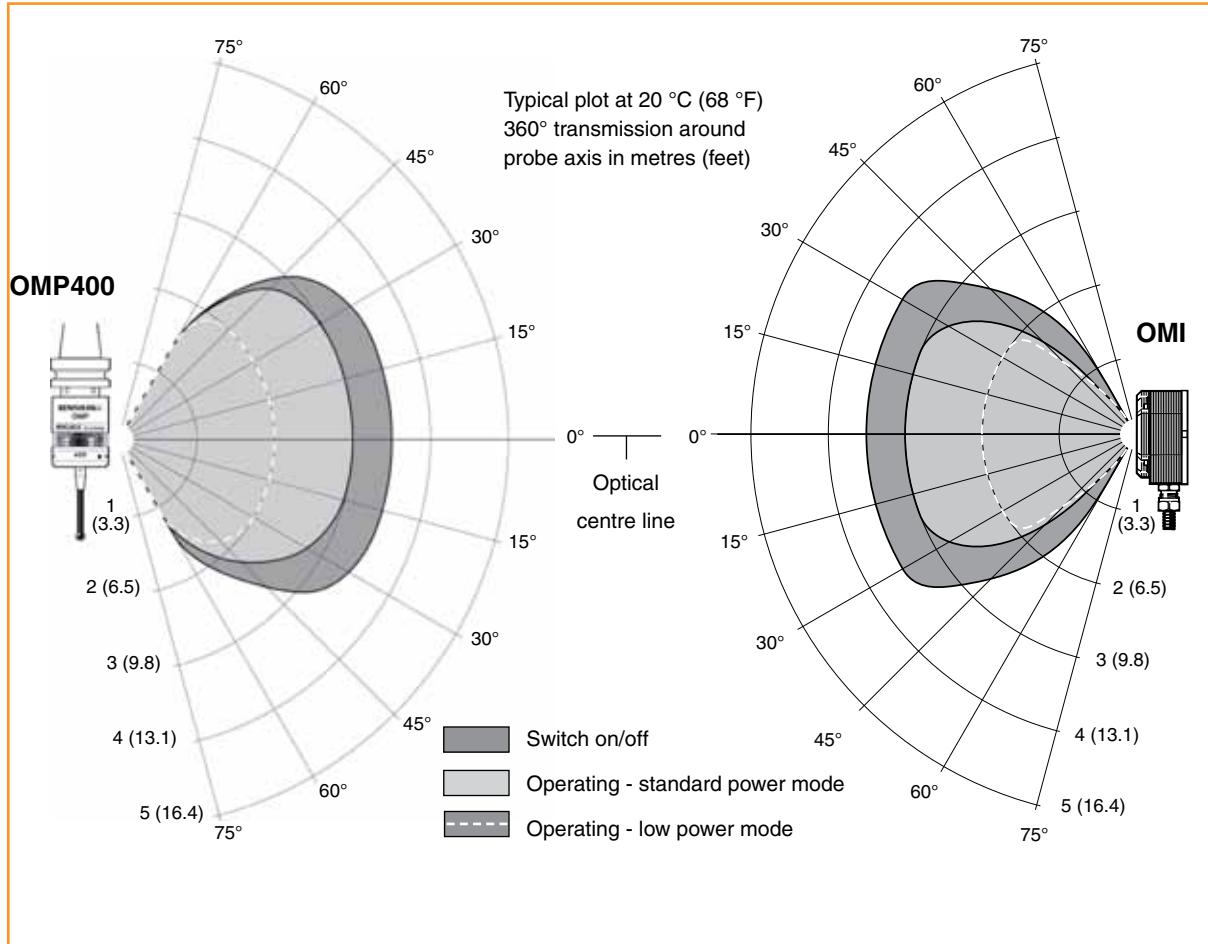
CAUTION: If two systems are operating in close proximity to each other, take care to ensure that signals transmitted from the OMP400 on one machine are not received by the receiver on the other machine, and vice versa. When this is the case, use of the probe's low power mode or receiver's low range setting.

Performance envelope with an OMI-2T / OMI-2H / OMI-2 (modulated transmission)

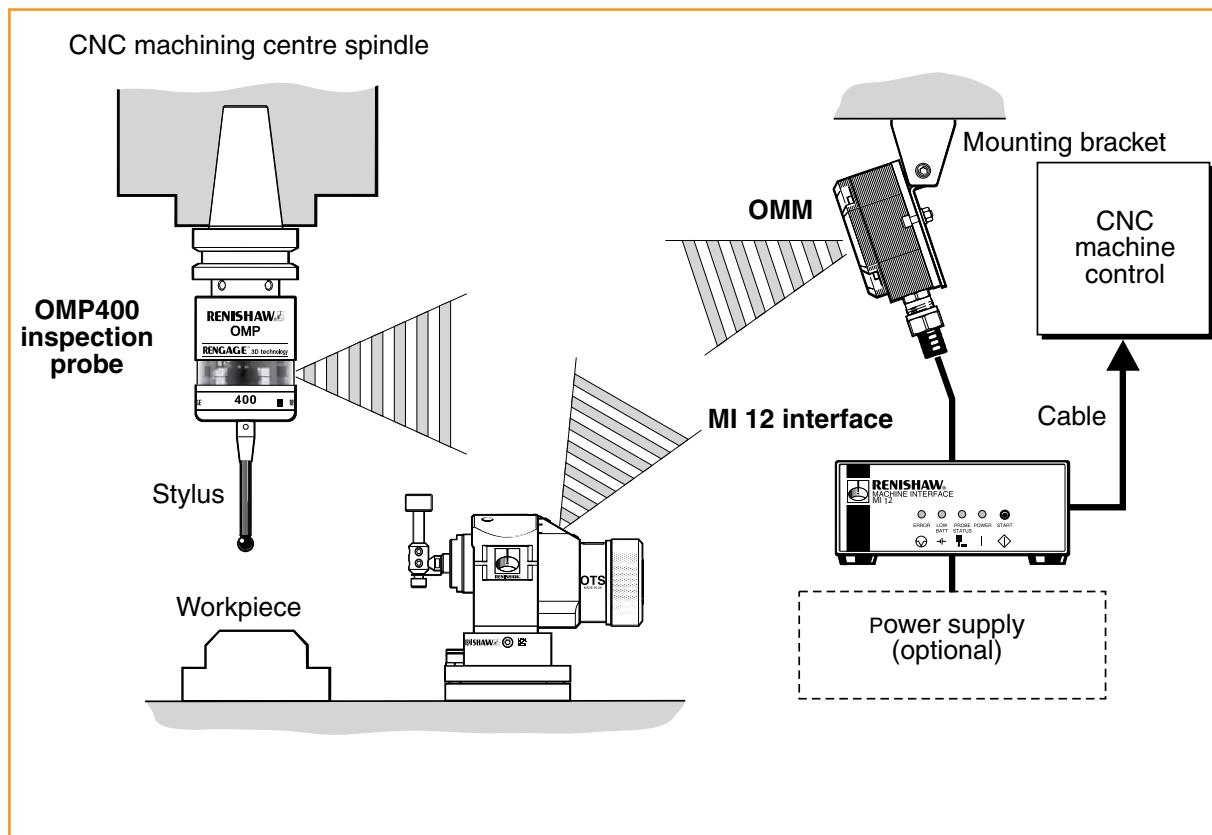
3.2



**Performance envelope when using
the OMP400 with the OMI (legacy
transmission)**



Installing the OMP400 with an OMM and MI 12



The probe and OMM diodes must be in the others field of view, and within the performance envelope shown. The OMP400 performance envelope is based on the OMM being at 0°, and vice-versa.

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

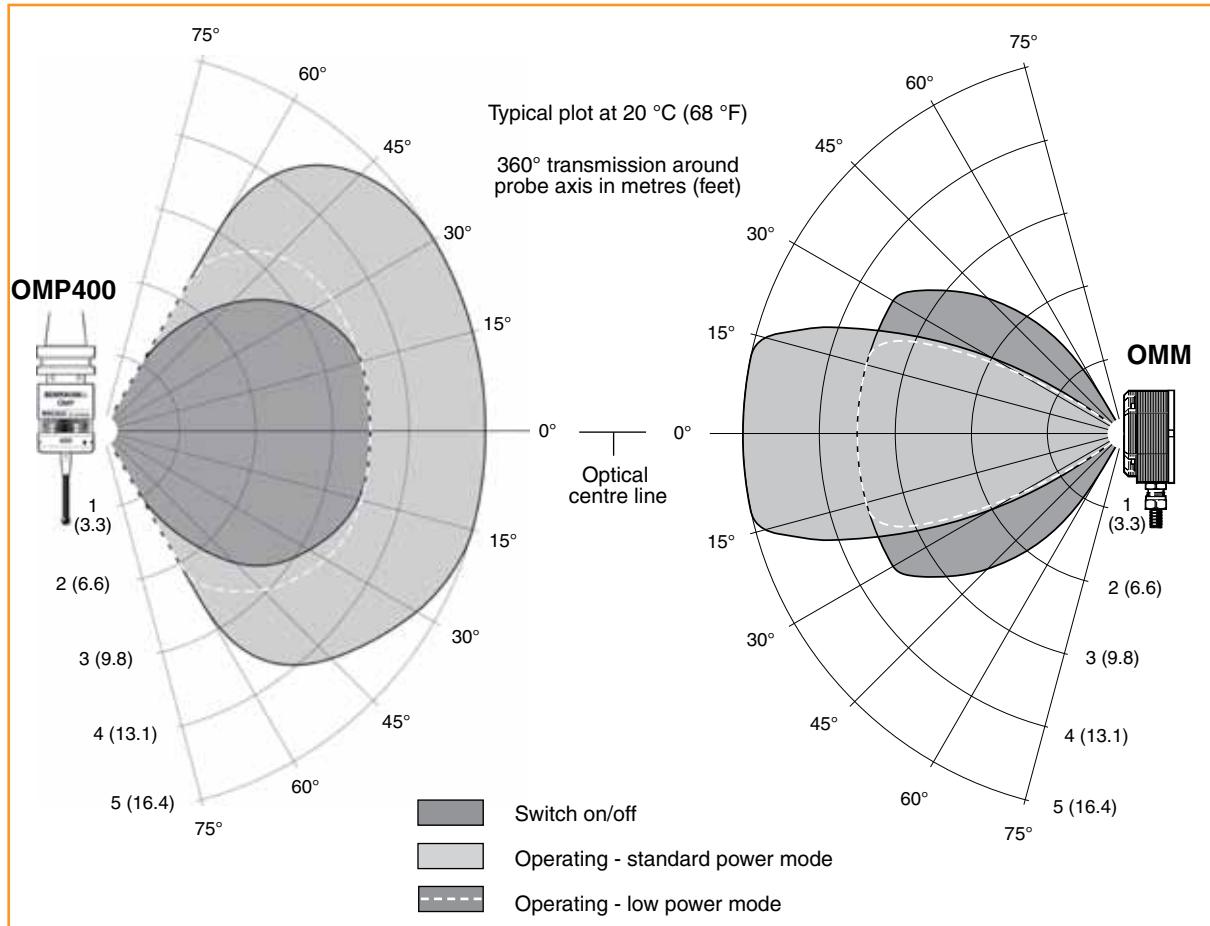
Coolant residue accumulating on the OMP400 or OMM windows will have a detrimental effect on transmission performance. Wipe clean as often as is necessary to maintain unrestricted transmission.

Operation in temperatures of 0 °C to 5 °C or 50 °C to 60 °C (32 °F to 41 °F or 122 °F to 140 °F) will result in some reduction in range.

On large machine tools, it is possible to provide greater reception coverage by mounting two OMMs connected to a single MI 12 interface.

CAUTION: If two systems are operating in close proximity to each other, take care to ensure that signals transmitted from the OMP400 on one machine are not received by the receiver on the other machine, and vice versa. When this is the case, use of the probe's low power mode or OMM low range setting

**Performance envelope with an OMM
(legacy transmission)**



Preparing the OMP400 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 into the probe, 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 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)**

3.8



Stylus on-centre adjustment

NOTES:

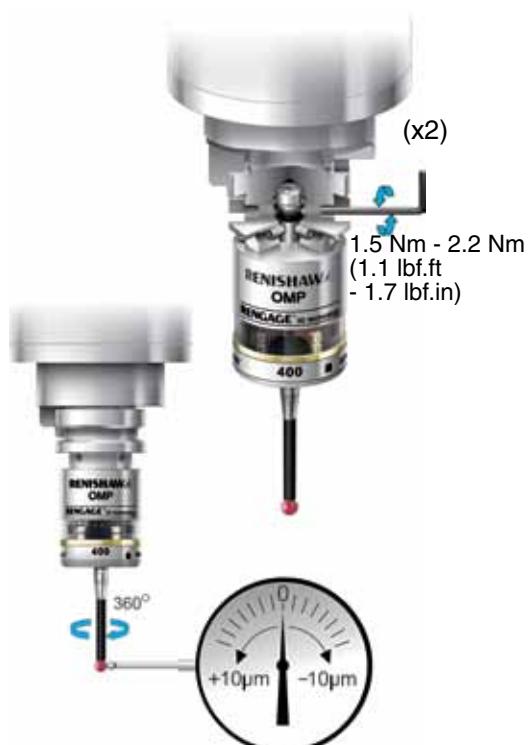
If a probe and shank assembly is dropped, it must be rechecked for correct on-centre adjustment.

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

1



2



3



Calibrating the OMP400

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 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 page 3.9). 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 in either a bored hole or on a turned diameter of known size;

- calibrating either in a ring gauge or on a datum sphere;
- calibrating the probe length.

Calibrating in a bored hole or on a turned diameter

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

Calibrating in a ring gauge or on a datum sphere

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

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

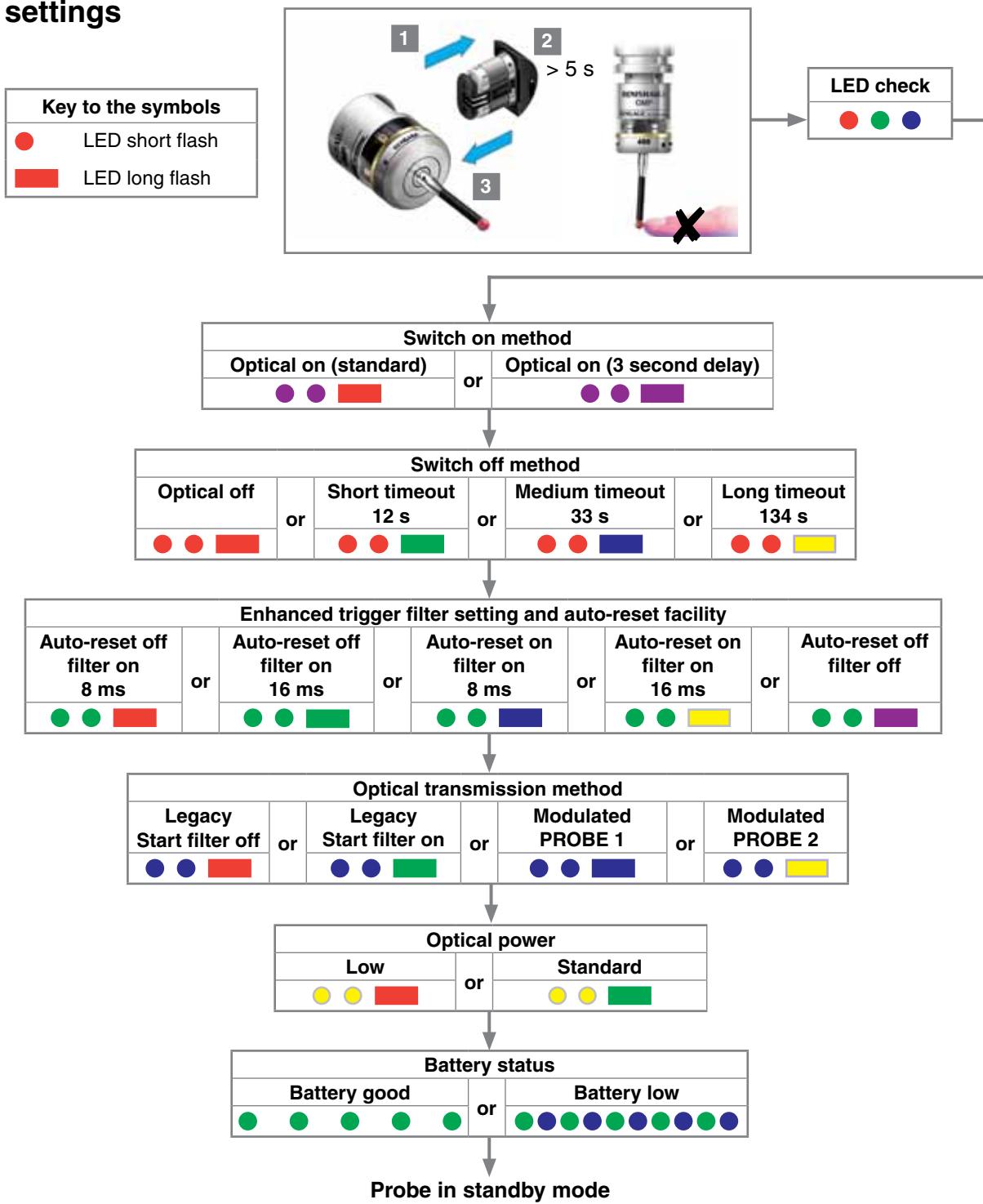
Calibrating the probe length

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

Trigger Logic™

4.1

Reviewing the current probe settings



Probe settings record

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

		✓ tick	✓ tick
		Factory settings	New settings
Switch on method	Optical on (standard)		
	Optical on (3 second delay)		
Switch off method	Optical 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 off)		
	Modulated (PROBE 1)		
	Modulated (PROBE 2)		
Optical power setting	Low power		
	Standard power		

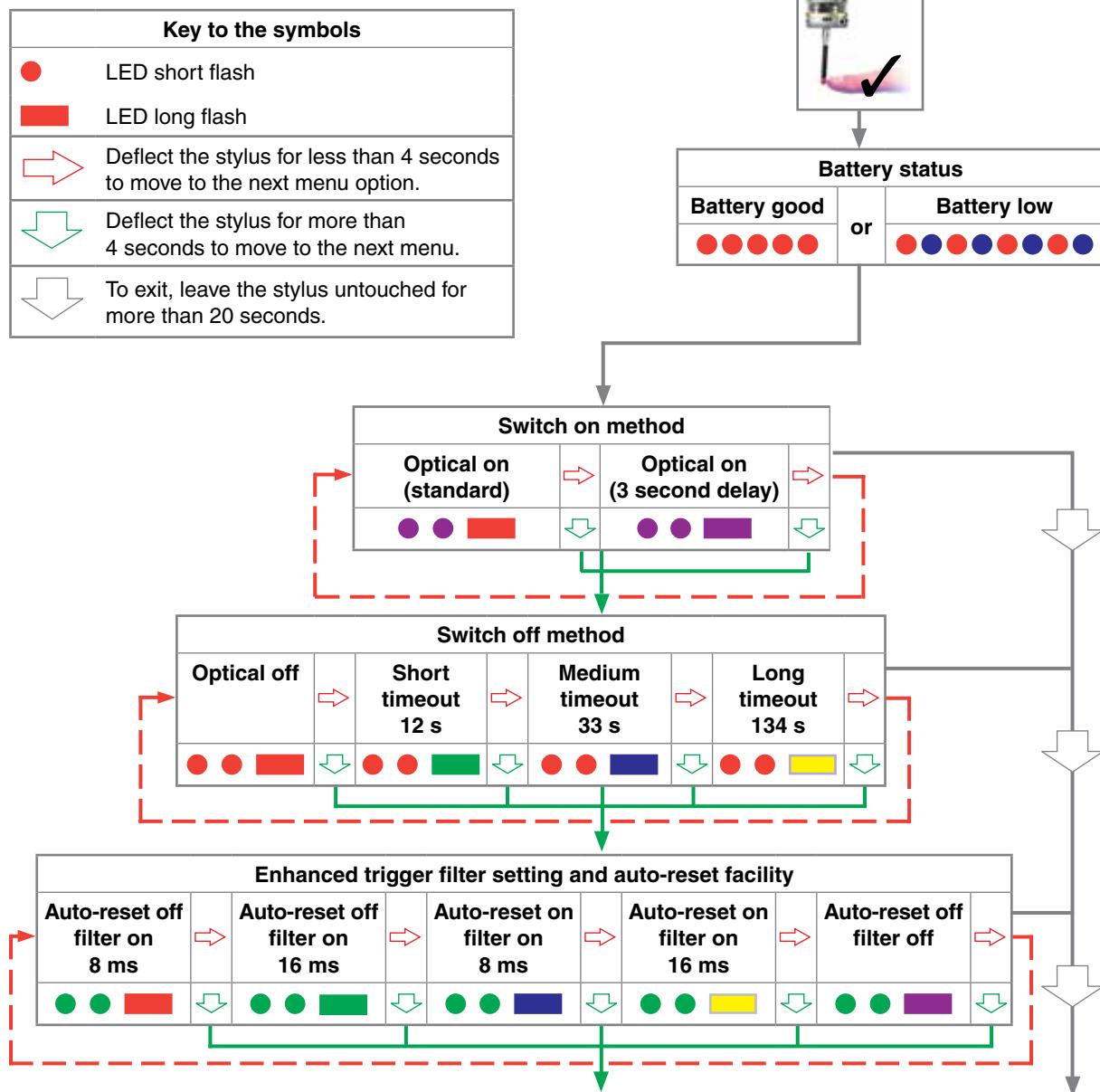
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Changing the probe settings

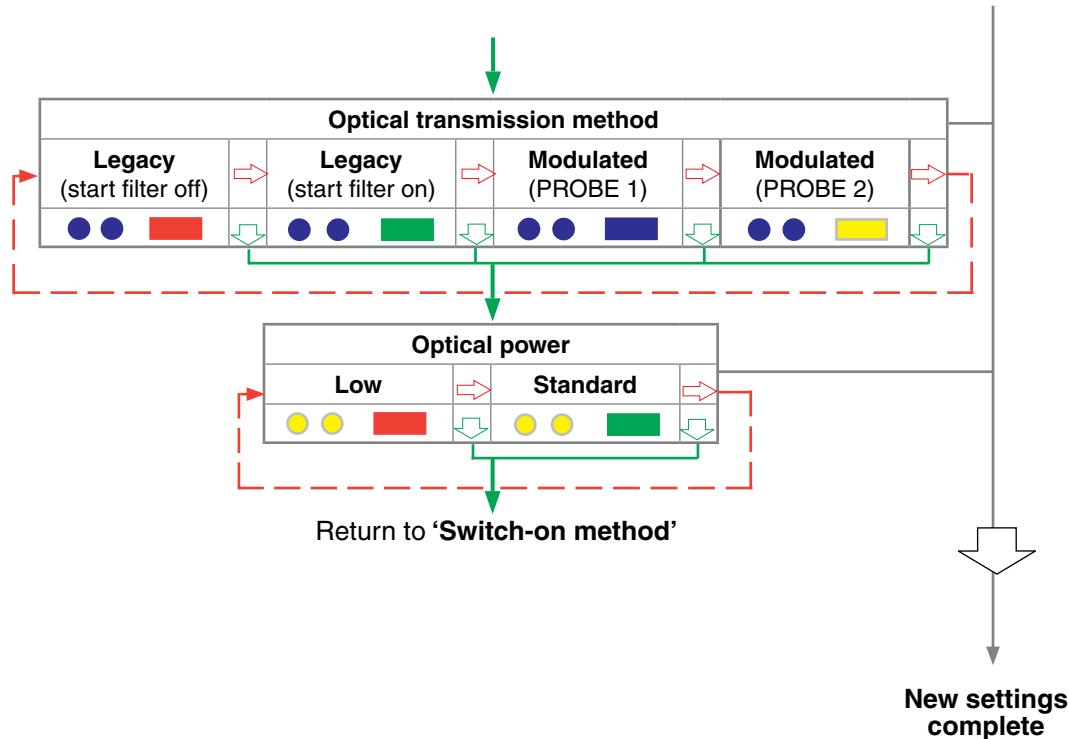
Insert the batteries or, if they have already been installed, remove them for five seconds and then refit them.

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.



Changing the probe settings (continued)



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 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 recharge sufficiently to provide the probe with power.
3. The probe begins to run through the LED review sequence (see page 4.1).
4. Again, the batteries discharge and the probe ceases to function.
5. Again, the batteries recharge sufficiently to provide the probe with power, and the sequence repeats itself.

Maintenance

5.1

Maintenance

You may undertake the maintenance routines described in these instructions.

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

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

Cleaning the probe

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

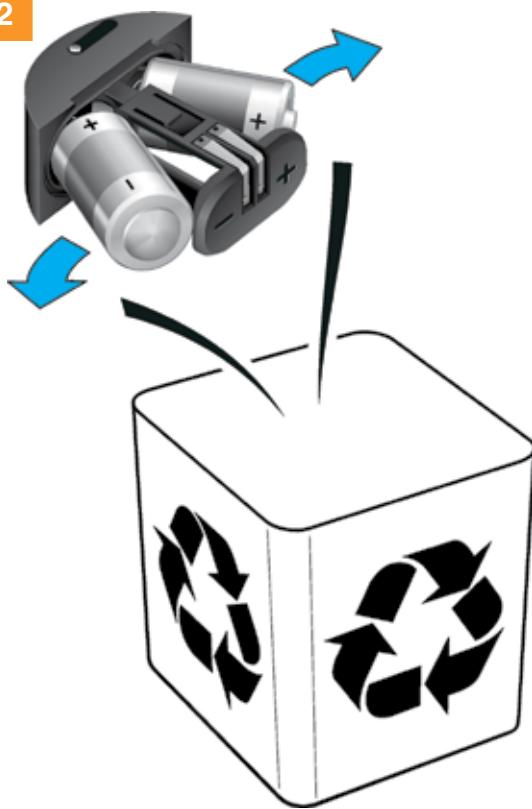


Changing the batteries

1



2



CAUTIONS:

Do not leave exhausted batteries in the probe.

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

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

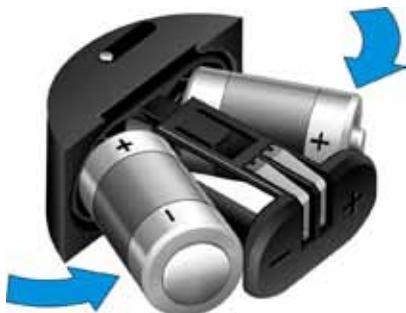
Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.



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

3



NOTES:

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

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

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

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

Battery type: 1/2 AA Lithium Thionyl Chloride (3.6 V) x 2



Ecocel: EB 1425, EB1426
Saft: LS 14250 C, LS 14250
Sonnenschein: SL-750
Xeno: XL-050F



Dubilier: SB-AA02
Maxell: ER3S
Sanyo: CR 14250 SE
Sonnenschein: SL-350, SL-550
Tadiran: TL-4902 TL-5902, TL-2150, TL-5101 SL-750
Varta: CR 1/2 AA

4



5



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Fault finding

6.1

Symptom	Cause	Action
Probe fails to power up (No LEDs illuminated, or fails to indicate current probe settings).	Dead batteries. Wrong batteries. Batteries inserted incorrectly. Batteries removed for too short a time and probe has not reset.	Change batteries. Change batteries. Check battery insertion. Remove batteries for a minimum of 5 seconds.
Probe fails to switch-on.	Wrong transmission mode selected. Dead batteries. Wrong batteries. Batteries inserted incorrectly. Optical / magnetic interference. Transmission beam obstructed. No receiver start signal.	Reconfigure transmission mode. Change batteries. Change batteries. Check battery insertion. Check for interfering lights or motors. Consider removing interfering source. Check the OMP400 and receiver windows are clean, and remove any obstruction. Check start signal by reviewing receiver start LED. Refer to the relevant user's guide.
	No power to MI 12 or receiver. Probe out of range / not aligned with receiver.	Check if stable 24 V supply is available. Check connections and fuses. Check 'M' code is operating. Check alignment and if receiver fixing is secure.

Symptom	Cause	Action
Machine stops unexpectedly during a probing cycle.	Optical communication obstructed. Interface / receiver / machine fault. Dead batteries. Excessive machine vibration causing a false probe trigger. Probe unable to find target surface. Adjacent probe. Stylus not given sufficient time to settle from a rapid deceleration. Transmission beam obstructed.	Check interface / receiver and remove obstruction. Refer to interface / receiver / machine user's guide. Change batteries. Enable enhanced trigger filter. Check that part is correctly positioned and that stylus has not broken. Reconfigure adjacent probe to low power mode and reduce range of receiver. 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. Check that the OMP400 and receiver windows are clean, and remove any obstruction.
Probe crashes.	Inspection probe using tool setting probe signals. Workpiece obstructing probe path. Adjacent probe. Probe length offset missing.	When two systems are active, isolate tool setting probe. Review probing software. Reconfigure adjacent probe to low power mode and reduce range of receiver. Review probing software.

Symptom	Cause	Action
Poor probe repeatability and / or accuracy.	Debris on part or stylus. Poor tool change repeatability. Loose probe mounting on shank or loose stylus. Excessive machine vibration. Calibration out of date and/or incorrect offsets. Calibration and probing speeds not the same. Calibration feature has moved. Measurement occurs as stylus leaves surface. Measurement occurs within the machine's acceleration and deceleration zone. Probing speed too high or too slow. Temperature variation causes machine and workpiece movement. Machine tool faulty.	Clean part and stylus. Re-datum probe after each tool change. Check and tighten as appropriate. Enable enhanced trigger filter. Eliminate vibrations. Review probing software. Review probing software. Correct position. Review probing software. Review probing software and probe filter settings. Perform simple repeatability trials at various speeds. Minimise temperature changes. Perform health checks on machine tool.
Probe permanently triggered.	Probe orientation has changed - i.e. from horizontal to vertical. New stylus has been fitted. Horizontal probe has rotated about its own axis.	Select probe Auto-reset function. Ensure stylus is seated during switch on. Turn probe off, then on again.

Symptom	Cause	Action
Probe fails to switch-off (where optical off is required).	<p>Wrong switch-on mode selected.</p> <p>Optical / magnetic interference.</p> <p>Probe is inadvertently switched on by the receiver when using autostart.</p> <p>Probe out of range.</p> <p>Probe is regularly falsely switched on by light interference.</p> <p>Transmission beam obstructed.</p>	<p>Reconfigure to optical off mode.</p> <p>Check for interfering lights or motors.</p> <p>Consider removing the source of the interference.</p> <p>Check position of receiver.</p> <p>Reduce receiver signal strength.</p> <p>Review performance envelopes.</p> <p>Enable optical transmission legacy mode (start filter on), or consider upgrading to a modulated system.</p> <p>Check the OMP400 and receiver windows are clean, and remove any obstruction.</p>
Probe fails to switch-off (where time out is required).	<p>Wrong switch off mode selected.</p> <p>Probe placed in carousel when in time out mode. Timer can be reset by carousel activity.</p>	<p>Reconfigure to time out mode.</p> <p>Ensure that carbon fibre styli are being used.</p> <p>Enable enhanced trigger filter.</p> <p>Shorten time out setting.</p> <p>Consider use of optical on / optical off setting.</p>
Probe goes into Trigger Logic™ setup mode and cannot be reset.	<p>Probe was triggered when batteries were inserted.</p> <p>Probe has moved during battery changing procedure (where stylus greater than 50 mm in length is fitted).</p>	<p>Do not touch the stylus or stylus mounting face during battery insertion.</p> <p>Ensure probe is not allowed to move during battery insertion.</p>
Probe status LED shows a constant blue.	<p>Probe damaged beyond use.</p>	<p>Return to your nearest Renishaw supplier for repair / replacement.</p>

Symptom	Cause	Action
Probe triggers but the OMI-2T does not respond.	<p>3 second switch-on mode selected.</p> <p>Probe out of range.</p> <p>Transmission beam obstructed.</p> <p>Probe set to legacy transmission.</p>	<p>Reconfigure to the standard switch-on delay.</p> <p>Review performance envelopes.</p> <p>Check the OMP400 and receiver windows are clean, and remove any obstruction.</p> <p>Reconfigure to modulated transmission.</p>

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Parts list

7.1

Type	Part number	Description
OMP400 probe	A-5069-0001	OMP400 probe (factory set to operate in legacy mode using optical on / optical off settings).
OMP400 probe	A-5069-0002	OMP400 probe (factory set to operate in legacy mode using optical on / time out settings).
OMP400 probe	A-5069-2001	OMP400 probe (factory set to operate in modulated mode using optical on / optical off settings).
OMP400 probe	A-5069-2002	OMP400 probe (factory set to operate in modulated mode using optical on / time out settings).
OMP400 / OMI-2 kit	A-5069-3031	OMP400 probe (factory set to operate in modulated mode using optical on / optical off settings) with OMI-2 receiver with 8 m of cable.
OMP400 / OMI-2 kit	A-5069-3032	OMP400 probe (factory set to operate in modulated mode using optical on / time out settings) with OMI-2 receiver with 8 m of cable.
OMP400 / OMI-2 kit	A-5069-3041	OMP400 probe (factory set to operate in modulated mode using optical on / optical off settings) with OMI-2 receiver with 15 m of cable.
OMP400 / OMI-2 kit	A-5069-3042	OMP400 probe (factory set to operate in modulated mode using optical on / time out settings) with OMI-2 receiver with 15 m of cable.
OMP400 / OMI kit	A-5069-3021	OMP400 probe (factory set to operate in legacy mode using optical on / optical off settings) with OMI receiver.
OMP400 / OMI kit	A-5069-3022	OMP400 probe (factory set to operate in legacy mode using optical on / time out settings) with OMI receiver.
OMP400 / OMM / MI 12 kit	A-5069-3011	OMP400 probe (factory set to operate in legacy mode using optical on / optical off settings) with OMM receiver and MI 12 interface.
OMP400 / OMM / MI 12 kit	A-5069-3012	OMP400 probe (factory set to operate in legacy mode using optical on / time out settings) with OMM receiver and MI 12 interface.

OMP400 installation guide

Type	Part number	Description
Battery	P-BT03-0007	1/2 AA battery (pack of 2).
Stylus	A-5003-7306	50 mm long carbon fibre with Ø6 mm ball.
Stylus	A-5003-6510	100 mm long carbon fibre with Ø6 mm ball.
Stylus	A-5003-6511	150 mm long carbon fibre with Ø6 mm ball.
Stylus	A-5003-6512	200 mm long carbon fibre with Ø6 mm ball.
Tool kit	A-4071-0060	Probe tool kit comprising Ø1.98 mm stylus tool, 2.0 mm AF hexagon key and shank grub screw (x 6).
Mounting bracket	A-2033-0830	OMM / OMI / OMI-2 mounting bracket with fixing screws, washers and nuts.
Software	-	Probe software for machine tools - see data sheet (H-2000-2289).
Shank adaptor assembly	A-4071-0031	Adaptor assembly for mounting to MP10, MP12, MP700 type shanks.
Battery cassette	A-4071-1166	Battery cassette kit.
Gasket	A-4038-0301	OMP400 battery cap gasket.
MI 12	A-2075-0142	MI 12 interface unit.
MI12-B	A-2075-0141	MI 12 interface panel mount kit.
Panel mount kit	A-2033-0690	MI 12 interface panel mount kit.
OMM	A-2033-0576	OMM complete with cable Ø4.85 mm x 25 m (Ø0.19 in x 82 ft).
OMI	A-2115-0001	OMI complete with cable Ø4.75 mm x 8 m (Ø0.18 in x 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.
Styli tool	M-5000-3707	Tool for tightening / releasing styli.
Adaptor	A-5069-0720	MP700 to OMP400 adaptor.

Type	Part number	Description
Publications. These can be downloaded from our web site at www.renishaw.com		
OMP400	A-5069-8500	Quick start guide: for rapid setup of the OMP400, includes CD with installation guide.
Styli	H-1000-3200	Technical specification: Styli and accessories.
Taper shanks	H-2000-2011	Data sheet: Taper shanks for machine tool probes.
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.
OMI-2T	H-2000-5439	Installation and user's guide: OMI-2T optical machine interface.
OMI-2	H-2000-5233	Installation and user's guide: OMI-2 optical machine interface.
OMI	H-2000-5062	Installation and user's guide: Optical machine interface.
OMM	H-2000-5044	Installation and user's guide: Optical machine module.
MI 12	H-2000-5073	Installation and user's guide: MI 12 machine interface.

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