

OMP400 high accuracy optical machine probe

www.renishaw.com/omp400

OMP400 - unique 3D measurement technology for machine tools

OMP400 is the latest ultra compact probe from Renishaw and is ideally suited for use on small to medium machines. It combines the miniaturisation of the highly successful OMP40 probe with new advances in strain gauge technology pioneered by Renishaw's high accuracy MP700 probe.

The ideal probe for measuring complex parts.

Benefits

Ultra compact

At only 40 mm in diameter and 50 mm in length, the OMP400 is the ideal solution for the growing family of small to medium sized machines that were previously unable to benefit from the high accuracy of strain gauge performance.

Robust and reliable

The OMP400 sets new standards for reliability and is designed to resist the harshest machine conditions. Solid-state strain gauge technology removes the effects of mechanical wear resulting in up to 10 times the life of traditional probes.

High accuracy

Incorporates RENGAGE™ technology to provide even lower pre-travel variation than that found in Renishaw's industry leading MP700. This, combined with an extremely high level of repeatability, makes the OMP400 the best solution for measurement of mould, die and other complex parts.

Twin probing

The OMP400 probe can be designated either as PROBE 1 or PROBE 2 for use on twin probe systems.

Simple upgrade

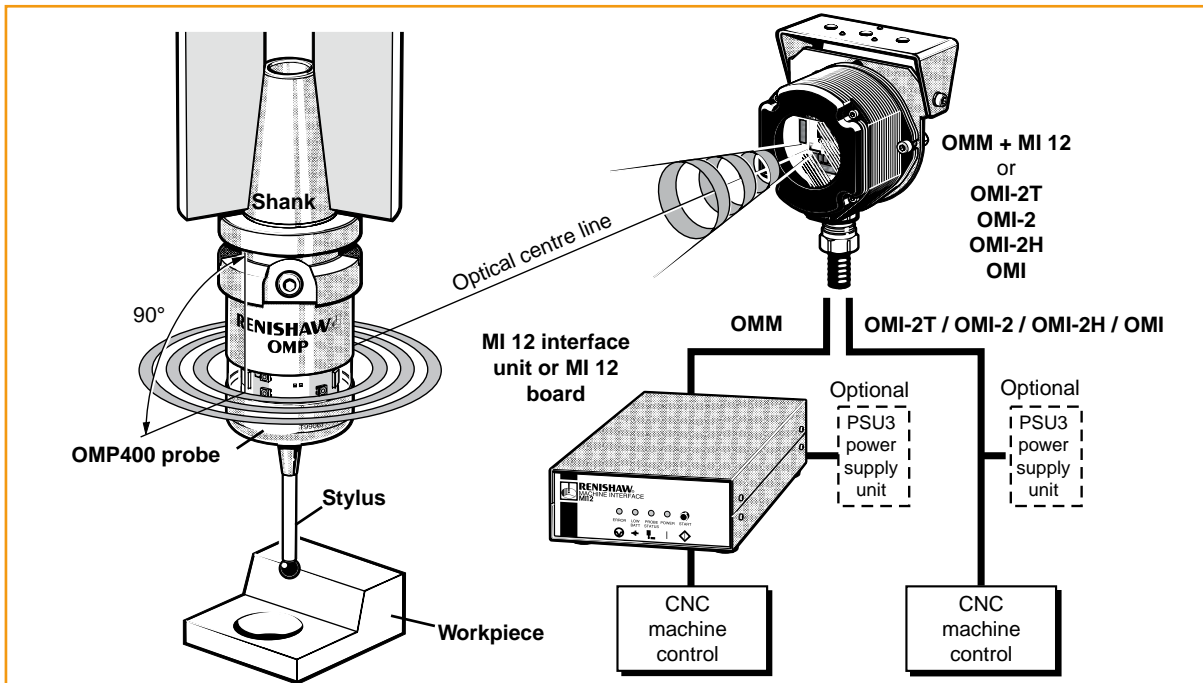
Utilising the same shank mounting arrangement as the OMP40, this new product gives existing users a simple upgrade path to the new technology.



Features

- Probe repeatability of $\pm 0.25 \mu\text{m}$ ($10 \mu\text{in}$) 2σ , 2D pre-travel variation of $0.25 \mu\text{m}$ ($10 \mu\text{in}$) 2σ and 3D pre-travel variation of $\pm 1.00 \mu\text{m}$ ($40 \mu\text{in}$) 2σ are certified with a 50 mm carbon fibre stylus at 240 mm/min.
- Increased stylus lengths can be supported without a significant decrease in probe performance.
- Compatible with all Renishaw optical machine interfaces and modules (OMI-2T, OMI-2, OMI-2H, OMI and OMM / MI12).
- Incorporates Renishaw's new modulated transmission method, allowing use with the new OMI-2T, OMI-2 and OMI-2H receivers to offer increased resistance to light interference.
- Incorporates Renishaw's Trigger Logic™, which allows configurable probe settings to be changed by deflecting the stylus until the correct colour configuration is observed on the LED display.
- Powered by two $\frac{1}{2}$ AA Lithium Thionyl Chloride (3.6 V) batteries. Battery life is in excess of 70 hours continuous use, or in excess of 85 days at 5% usage. Battery life is increased when low power mode is selected.
- Transmits through a full 360° at an angle of 90° to the spindle axis, with a range of up to 4 metres (13 feet).
- Probe turn-on method is configurable between M code and autostart. The probe turn-off method is configurable between M code and timer-off.
- Probe and receivers are sealed to IPX8 and designed for the machine tool environment.

Typical probe system



Probe modes

The OMP400 operates in three modes:

- Standby mode:** The OMP400 is waiting for a switch-on signal to be received.
- Operating mode:** Activated by one of the switch-on methods described below. In this mode the OMP400 is ready for use.
- Configuration mode:** The Trigger Logic™ configuration method allows the following settings to be configured.

Probe settings

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.

Auto-reset function

The Auto-reset function in OMP400 compensates for stylus forces, resulting from high accelerations and changes in probe orientation, that can cause the probe to trigger when using long styli (>100mm.). This feature is suitable for radial rotations (e.g. vertical to horizontal) and is selectable using Trigger Logic™.

Optical transmission start mode

The OMP400 can be operated in either legacy or modulated optical transmission modes.

In modulated mode, the OMP400 becomes compatible for use with an OMI-2T, OMI-2 or OMI-2H, to provide substantially increased resistance to light interference.

In modulated mode it is possible to define the probe ID. This is factory set to PROBE 1 but can be changed to PROBE 2 for use with twin probe systems.

In legacy mode the OMP400 is compatible with OMI and OMM / MI 12.

In legacy mode a selectable start filter improves the resistance to false turn on/off.

Probe switch on/switch off method

Switch on/switch off methods are configurable:

- Optical on/optical off**
- Optical on/timer off**

These options are detailed in the table below.

Low optical power

Where the separation between the OMP400 and the receiver is small, no more than 2 m (6.6 ft), the low optical power setting may be selected. This setting reduces the optical transmission range and extends battery life.

Switch-on / switch-off methods

Switch-on method	Switch-off method
Optical on (When commanded by a machine input)	Optical off (When commanded by machine input) A timer automatically switches the probe off after 90 minutes from the last trigger. Timer off (time out) Time out will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset.
Optical on (3 second delay) (When commanded by Auto Start)	Timer off (time out) Time out will occur 12, 33 or 134 seconds (user configurable) after the last probe trigger or reset.

Performance envelope

The OMP400 has a 360° transmission envelope over the ranges shown below.

The probe system should be positioned so that the optimum range is maintained over the full travel of the machine axes.

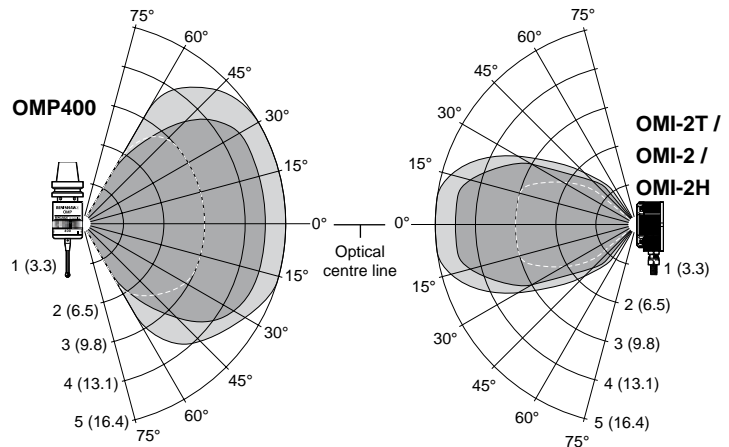
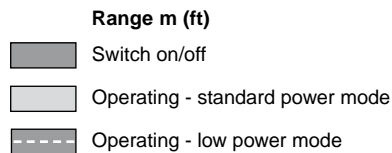
The OMP400 and optical receivers may deviate from the optical centre line, provided opposing light cones always overlap, with transmitters and receivers in the others field of view (eye to eye).

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

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

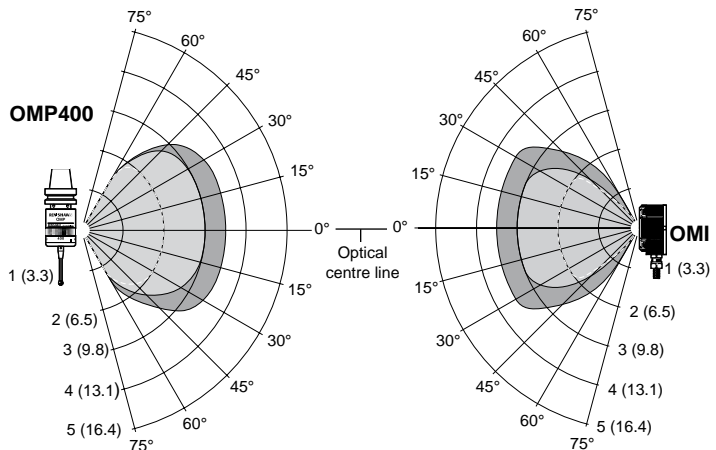
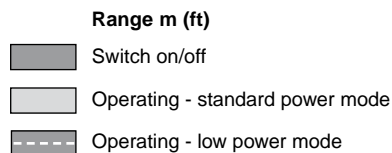
OMP400 performance envelope with OMI-2T/OMI-2/OMI-2H (modulated transmission)

Typical plot at 20 °C (68 °F)
 360° transmission around probe axis in metres (feet)



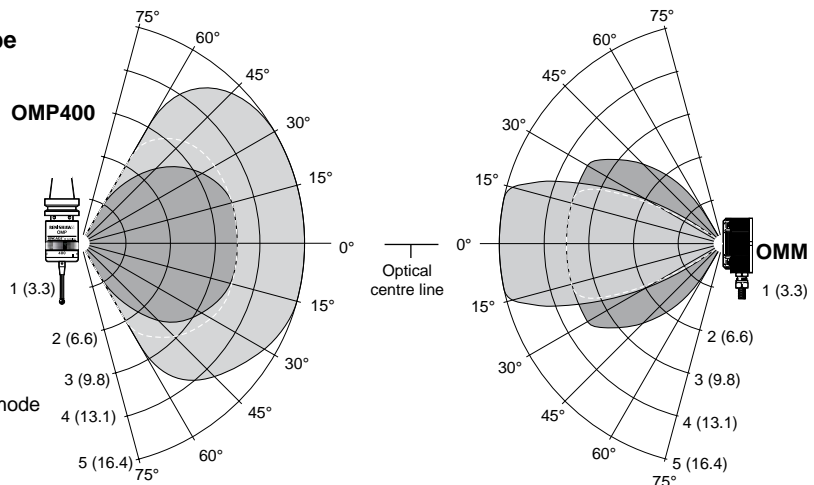
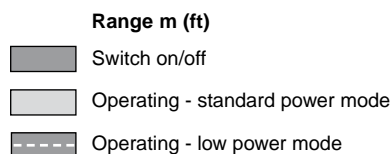
OMP400 performance envelope with OMI (legacy transmission)

Typical plot at 20 °C (68 °F)
 360° transmission around probe axis in metres (feet)

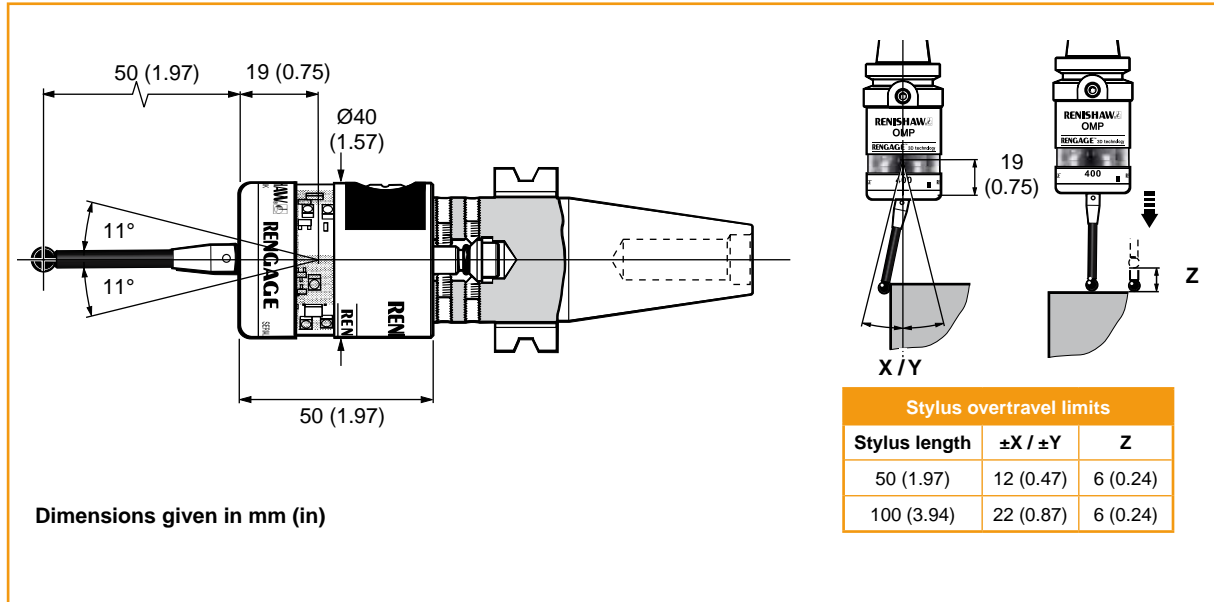


OMP400 performance envelope with OMM (legacy transmission)

Typical plot at 20 °C (68 °F)
 360° transmission around probe axis in metres (feet)



Dimensions



Specification

Principal application	Small to medium machining centres and mould and die applications	
Operating range	Up to 5 m (16.4 ft)	
Weight (without shank in g) with batteries without batteries	262 g (9.24 oz) 242 g (8.53 oz)	
Sense directions	Omni-directional ± X, ± Y, + Z	
Uni-directional 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	± 0.25 µm (10 µin) 2 sigma - 50 mm stylus length* ± 0.25 µm (10 µin) 2 sigma - 100 mm stylus length	
3D lobing in X, Y, Z	± 1.00 µm (40 µin) 2 sigma - 50 mm stylus length* ± 1.75 µm (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 direction	±11° 6 mm (0.23 in)	
Sealing	IPX8 (BS 5490), IEC 529) 1 atmosphere	

* 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.

Battery life

Typical battery life

Using the 1/2 AA lithium thionyl chloride (LTC) batteries at 5% usage, the probe will continue to operate for approximately one week, after a low battery warning is first indicated. Replace the batteries as soon as possible.






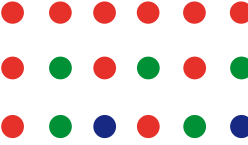

After batteries are inserted into the OMP400, flashing LEDs will indicate the current settings.

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

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

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

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	

Parts list

Please quote the part number when ordering equipment.

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)
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)
Battery cassette	A-4071-1166	Battery cassette kit
Gasket	A-4038-0301	OMP400 battery cap gasket
Styli tool	M-5000-3707	Tool for tightening / releasing styli
Shank adaptor assembly	A-4071-0031	Adaptor assembly for mounting to MP10, MP12, MP700 type shanks
Adaptor	A-5069-0720	MP700 to OMP400 adaptor
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
PSU3 user's guide	H-2000-5057	Installation and user's guide: PSU3 power supply unit

For worldwide contact details, please visit our main website at www.renishaw.com/contact

