Installation guide
H-5514-8504-02-B

RENISHAW
apply innovation™

OTS optical tool setter

Renishaw part no: H-5514-8504-02-B

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Before you begin

Disclaimer

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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.

Patents

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

EP	0695926	JP	2994401
EP	0974208	JP	2004-522961
EP	1130557	JP	2004-530234
EP	1373995	JP	2005-502035
EP	1397637		
EP	1425550	US	5150529
EP	1503524 B	US	5669151
EP	1701234	US	6472981 B2
EP	1734426	US	6839563 B1
EP	1804020	US	6860026 B2
		US	6941671 B2
		US	7145468 B2

CE

EC DECLARATION OF CONFORMITY

Renishaw plc declares that the product:-

Name	OTS
Description	Optical tool setter

has been manufactured in conformity with the following standards:-

BS EN 61326-1:2006	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements Immunity to Table 2 - industrial locations. Emissions to Class A - industrial locations.
BS EN 60825-12:2004	Safety of laser products - Part 12: Safety of free space optical communication systems used for transmission of information

and that it complies with the requirements of the following directives: -

2004/108/EC	Electromagnetic compatibility
2006/95/EC	Low voltage

The above information is summarised from the full EC Declaration of Conformity. A copy is available from Renishaw on request.

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.

Safety

Information to the user

Handle and dispose of batteries in accordance with the manufacturer's recommendations. Use only the recommended batteries. Do not allow the battery terminals to contact other metallic objects.

The OTS 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 equipment installer

All Renishaw equipment is designed to comply with the relevant EEC 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 0V/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.

OTS basics

Introduction

The OTS is a tool setter probe with optical signal transmission, suitable for use on small to large machining centres. It is designed to resist optical interference, false triggering and shock.

OTS types

The OTS is available in two versions, one with ½ AA batteries and the other with AA batteries. This allows the use of a common battery type for both the OTS and the spindle probe.

i.e. OTS with ½ AA batteries with an OMP40-2/OMP400.
or
OTS with AA batteries with an OMP60.

Both versions work in conjunction with any modulated spindle probe.

Modulated transmission

To minimise the effects of light interference, the OTS operates using modulated transmission, and must be used with a modulated receiver.

Twin probe system with an OMI-2T/ OMI-2H

A twin probe system can accommodate a spindle probe with a tool setter probe or twin tool setter probes or twin spindle probes, see **Optical start configuration** page 2.4.

The OTS can be user configured to use one of three coded start commands, named Probe 1, Probe 2 and Probe 3.

NOTE:
Currently no interface is compatible with Probe 3.

Single probe system with an OMI-2T/ OMI-2/OMI-2H/OMI-2C

A single OTS can be used with an OMI-2T/ OMI-2/OMI-2H/OMI-2C receiver.

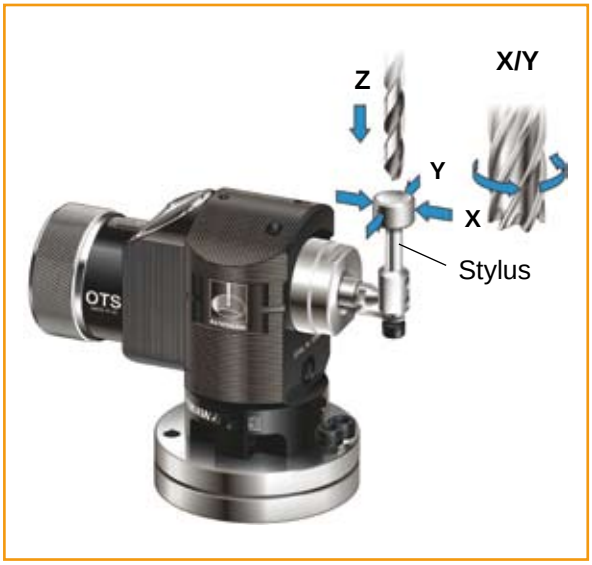
Trigger Logic™

All OTS settings are configured using the Trigger Logic™ technique.

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 configure 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.

Operation



Rotate tool in reverse direction for diameter setting

Operation

The tool is driven in the machine Z axis for tool length measurements and broken tool detection.

Rotating tools are set in the machine's X and Y axes for tool radius offsets.

Screw adjusters allow the stylus to be aligned with the machine's axes.

Software routines

Software routines for tool setting are available from Renishaw for various machine controllers and are described in data sheet H-2000-2289.

In addition data sheet H-2000-2298 lists available Renishaw software programs. Both data sheets can be downloaded from **www.renishaw.com/mtp**

Achievable set-up tolerances

The tolerances to which tools can be set depend upon the flatness and parallelism of the stylus tip setting. A value of 5 µm (0.0002 in) front to back and side to side is easily achievable over the flat portion of the stylus tip, and 5 µm (0.0002 in) parallelism is easily achievable with the axes of a square tip stylus. This setting accuracy is sufficient for the majority of tool setting applications.

Recommended rotating tool feed rates

Cutters should be rotated in reverse to the cutting direction. Renishaw tool setting software calculates the spindle speed and axis feed rates automatically using the following information.

First touch – machine spindle rev/min

Rev/min for the first move against the probe stylus:

Diameters below 24 mm, 800 rev/min is used.

Diameters from 24 mm to 127 mm, rev/min is calculated using a surface speed of 60 m/min (197 ft/min).

Diameters above 127 mm, 150 rev/min is used.

First touch – machine feed rate

The feed rate (f) is calculated as follows:

f = 0.16 × rev/min	f units mm/min (diameter set).
f = 0.12 × rev/min	f units mm/min (length set).

Second touch – machine feed rate

800 rev/min, 4 mm/min (0.16 in/min) feed rate.

Modes of operation

The OTS can be in one of three modes.

Stand-by mode: where the OTS is waiting for a switch-on signal.

Operational mode: The OTS is ready for use in the operational mode, it is activated using the switch-on method described on page 2.4.

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

- Optical start configuration
- Enhanced trigger filter setting
- Optical power

Configuration mode factory settings are given on page 2.4.

Configurable settings

Switch-on method

Typically optical probe systems turn on in less than 0.5 seconds. Please refer to the interface user's guide for full details.

Optical start configuration

The user can configure the OTS to either Probe 1, Probe 2 or Probe 3 identification, see **Changing the probe settings** page 4.3.

The OTS is factory set to Probe 2 so that it can be used in a system with modulated spindle probes.

Typically the OTS is used in Probe 2.

A twin tool setter application would require that one of the OTS probes is reconfigured to Probe 1.

A triple probe application would require one of the probes to be reconfigured to Probe 1 and another to Probe 3.

Switch-off method

A timer automatically switches the probe off 90 minutes after the last trigger if not turned off by an M code.

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

Enhanced trigger filter

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

When the filter is enabled, a constant nominal 7 ms delay is introduced to the probe output.

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

The OTS is factory set to Enhanced trigger filter off.

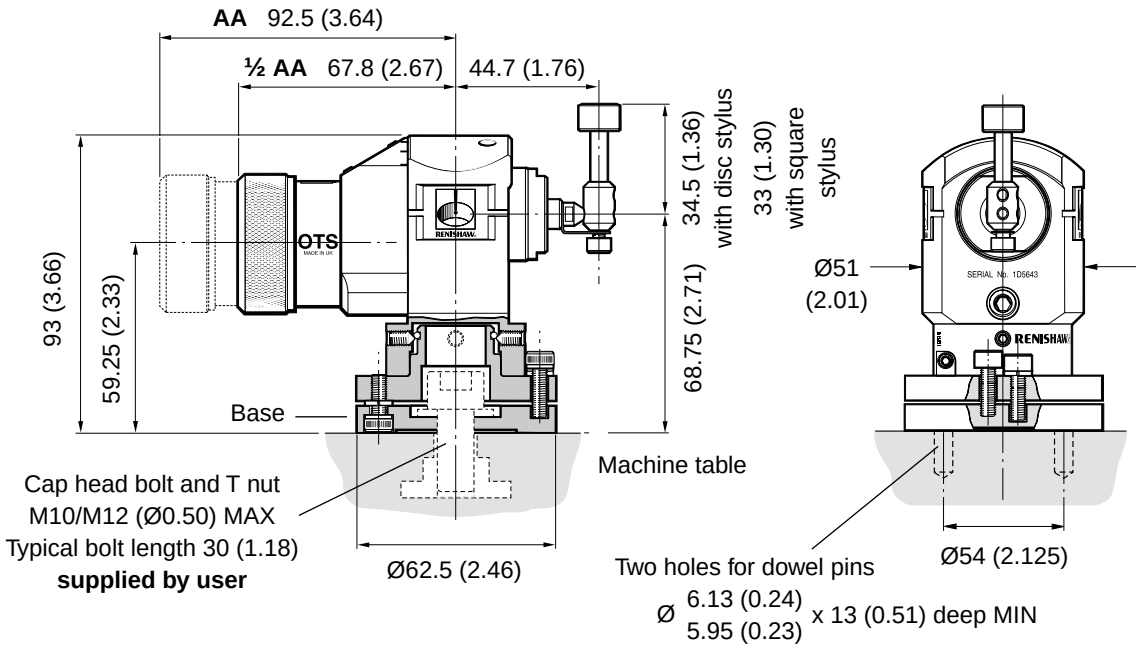
Optical power

Where the separation between the OTS and the receiver is small, the low optical power may be selected, see pages 3.2 and 4.3. In this setting the optical transmission operating range will be reduced by approximately 40%. Battery life will also be increased.

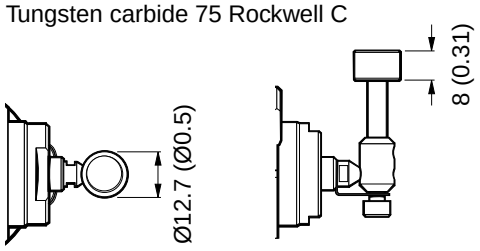
The OTS is factory set to standard optical power.

OTS dimensions

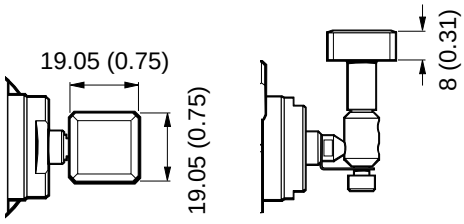
dimensions given in mm (in)



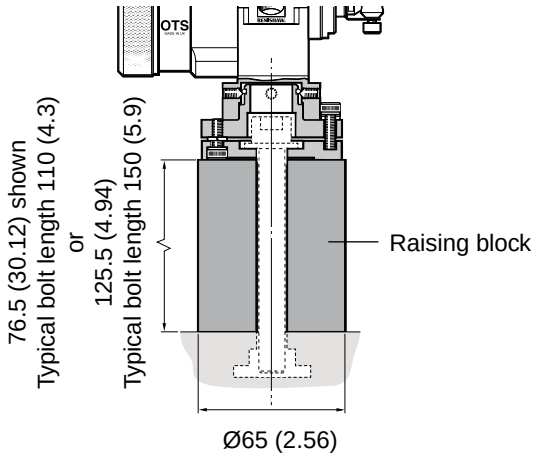
Disc stylus
Ø12.7 mm × 8 mm (Ø0.5 in × 0.31 in)
Tungsten carbide 75 Rockwell C



Square stylus
19.05 mm x 19.05 mm (0.75 in x 0.75 in)
Ceramic 75 Rockwell C

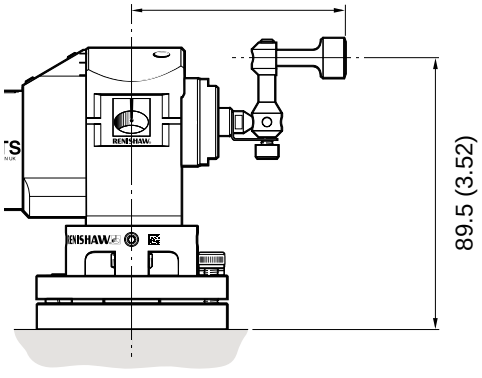


Raising block



Cranked horizontal stylus adaptor kit

Disc stylus 72 (2.83) shown
Square stylus 70.5 (2.78)



OTS specification

Principal application:	Tool setting on CNC machining centres	
Overall dimensions:		
½ AA battery type:	Length with square stylus	122.00 mm (4.08 in)
AA battery type:	Length with square stylus	143.55 mm (5.65 in)
All battery types:	Width	60.00 mm (2.36 in)
All battery types:	Height	103.25 mm (4.06 in)
Weight:		
½ AA battery type: (with disc stylus)	**with batteries** 870 g (30.69 oz)	**without batteries** 850 g (29.98 oz)
AA battery type: (with disc stylus)	**with batteries** 950 g (33.51oz)	**without batteries** 900 g (31.75 oz)
Operating:		
Signal transmission type:	Infra-red optical transmission	
Switch-on method:	Optical on	
Switch-off method:	Optical off	
Operating range:	Up to 5 m (16.4 ft)	
Receiver/interface:	OMI-2T, OMI-2 or OMI-2H	
Sense directions:	Omni-directional ±X, ±Y, +Z	
Uni-directional repeatability:	1.0 µm (0.00004 in) 2 sigma (2σ) *	
Stylus trigger force:	1.3 N to 2.4 N/130 gf to 240 gf (4.5 ozf to 8.5 ozf) § depending on the sense direction	
Stylus overtravel:	**XY plane** ±3.5 mm (0.14 in)	**+Z direction** 6 mm (0.23 in)

* Probe module results valid as tested with a 35 mm (1.38 in) straight stylus and a velocity of 480 mm/min (1.57 ft/min).

§ Factory set using 50 mm (1.97 in) straight stylus.

OTS specification

Batteries:

Battery type (½ AA LTC - standard**:**	Lithium Thionyl Chloride (3.6 V) x 2
Battery type (AA alkaline - standard)**:**	Alkaline (1.5 V) x 2
Battery type (AA LTC - optional)**:**	Lithium Thionyl Chloride (3.6 V) x 2
Battery reserve life:	Approximately 1 week after a low battery warning is first given. Replace the batteries as soon as possible
Low battery indication:	Blue flashing LED in conjunction with normal red or green probe status LED
Dead battery indication:	Constant red

Typical battery life

Battery type (x 2)	Standby life	5% usage (72 minutes/day)		Continuous use	
		Standard power mode	Low power mode	Standard power mode	Low power mode
½ AA LTC (standard)	320 days	140 days	170 days	300 hours	400 hours
AA Alkaline (standard)	530 days	210 days	250 days	400 hours	550 hours
AA LTC (optional)	730 days	300 days	350 days	600 hours	800 hours

Lithium Thionyl Chloride (LTC).
AA battery types are also designated as LR6 or MN1500.

Environment:

IP rating:	IPX8
Operating temperature:	5 °C to 50 °C (41 °F to 122 °F)
Storage temperature:	-10 °C to 70 °C (14 °F to 158 °F)

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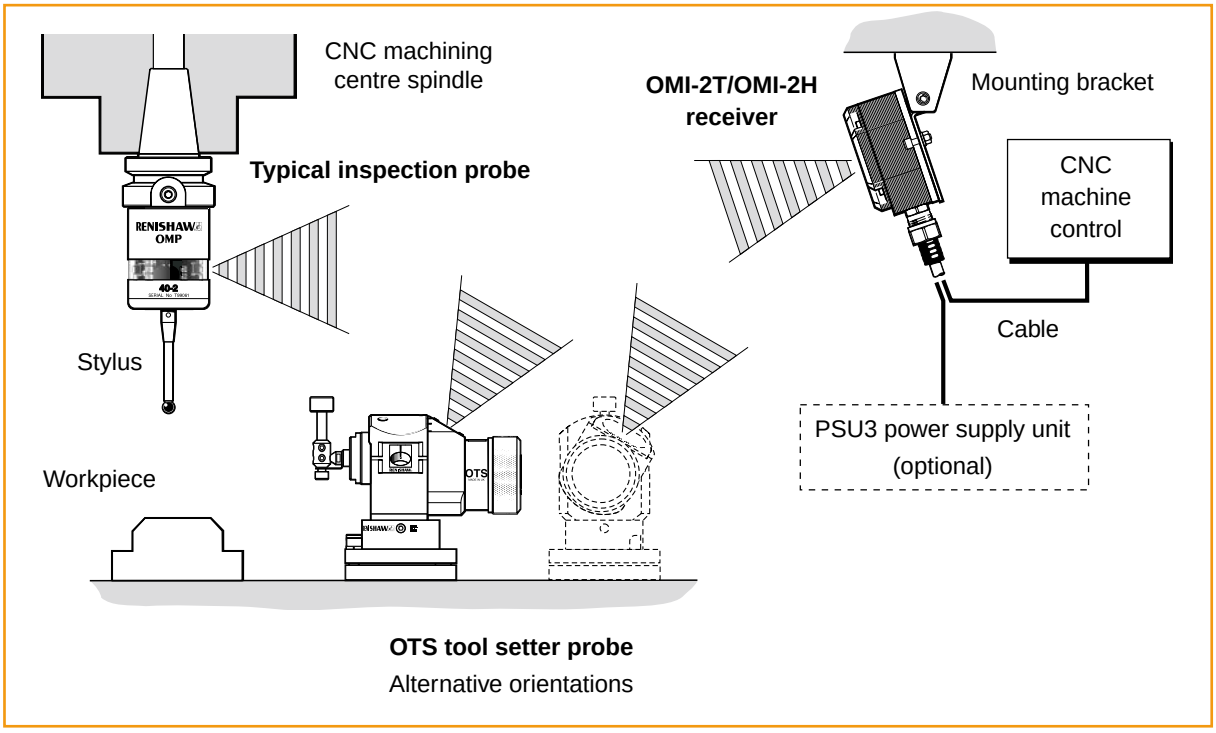
System installation

Typical probe system with an OMI-2T/OMI-2H



The spindle mounted inspection probe must use modulated transmission

Probe and optical receiver

The OTS probe and receiver diodes must be in the other's field of view and within the performance envelope shown (page 3.2). The OTS performance envelope is based on the receiver being at 0° and vice-versa.

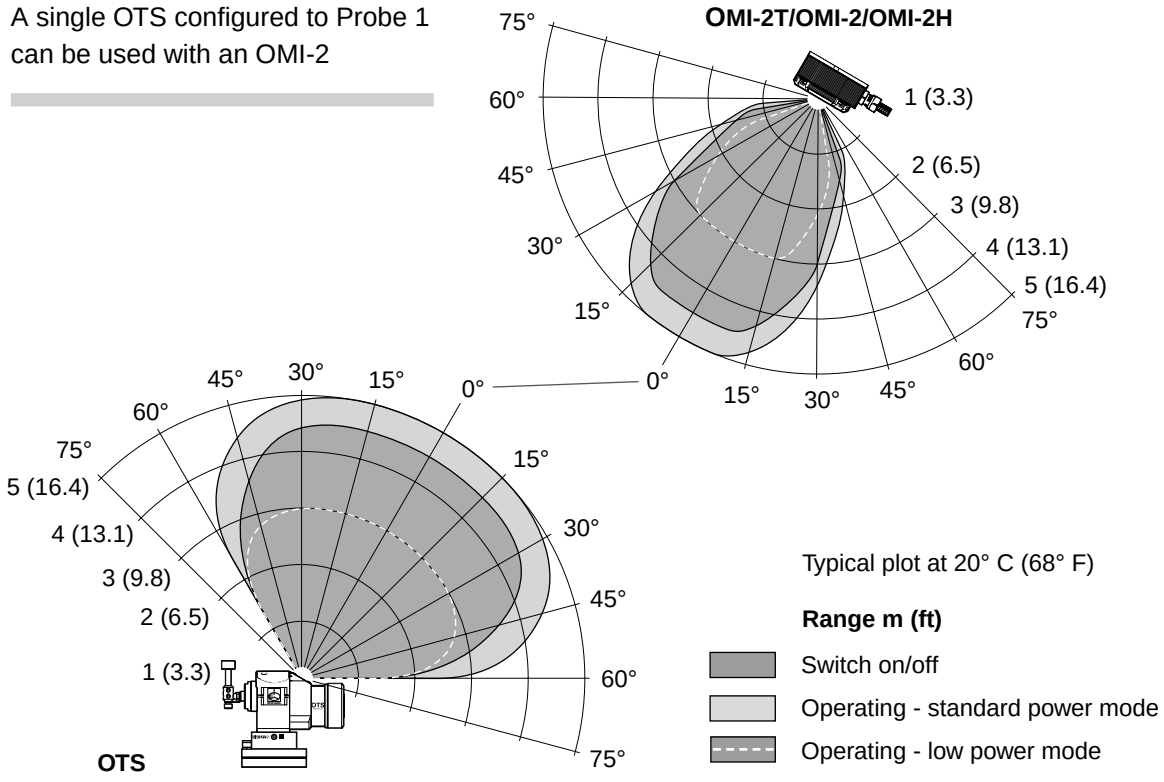
Natural reflective surfaces within the machine may increase the signal transmission range.

Coolant residue accumulating on the OTS or OMI-2T/OMI-2H/OMI-2 windows may reduce the signal transmission range. 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.

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

NOTE:
A single OTS configured to Probe 1 can be used with an OMI-2



Optical power setting

If two machines are operating in close proximity to each other, take care to ensure that signals transmitted from a probe on one machine are not received by the receiver on the other machine, and vice versa.

When this is the case, it is recommended that the low optical power setting on probes is used, and that the low range setting is used on the receiver.

Receiver position

To assist finding the optimum position for the installation, signal condition is displayed on the OMI-2T/OMI-2/OMI-2H receiver.

Please refer to the receiver User's Guide.

Preparing the OTS for use

Fitting the stylus, break stem and captive link

1

2

3

Stylus weak link break stem

A stylus weak link break stem is incorporated in the stylus mounting, to protect the probe mechanism from damage in the event of excessive stylus overtravel or a collision.

Captive link

In the event of the break stem breaking, the captive link ties the stylus to the probe, which prevents the stylus falling into the machine.

NOTE:
Always hold the support bar in position to counteract twisting forces and avoid over-stressing the stylus break stem.

Installing the batteries

1

2

3

NOTES:

Select suitable battery type, see page 5.3. If dead batteries are inadvertently inserted into the probe, the LEDs will remain a constant red, see page 4.4.

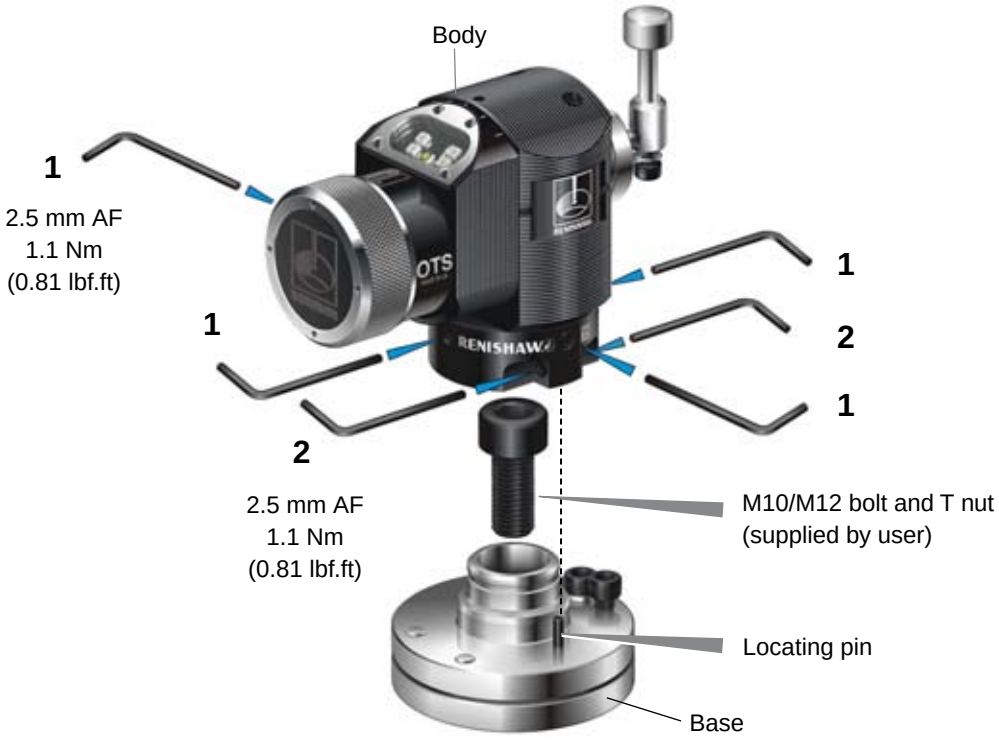
Do not allow coolant or debris to enter the battery compartment.

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 **Trigger Logic™** page 4.1).

Mounting the OTS on a machine table



1. Select a position for the OTS on the machine table. Position to minimise the possibility of collision and ensure the optical window faces towards the receiver.

2. Separate the base from the body by slackening four screws **1** and two screws **2** using a 2.5 mm AF hexagon key.

3. Fit the cap head bolt and T nut (not supplied by Renishaw) and tighten to secure the base to the machine table.

NOTE:
A smaller washer may be fitted for a smaller bolt by disassembling and separating the base plates.

4. Refit the body onto the base and tighten screws **1** and **2**. If a square stylus is fitted and fine rotational adjustment is required, see **Stylus rotational setting** pages 3.9 - 3.12, before tightening screws **2.**

5. Fit the stylus. See **Fitting the stylus, break stem and captive link** page 3.3.

Dowel pins (shown on page 2.5)

Two dowel pins (supplied in the tool kit) may be fitted on installations where there is a requirement to remove and remount the tool setter.

To fit the dowel pins, drill two holes in the machine table to correspond with the two probe base holes. Place the dowel pins in the holes and refit the probe base.

Positioning the optical module

The optical module can be set in one of seven positions at 15° increments, to allow the optical window to point towards the receiver.

1. To align the optical module, first slacken and partially pull out the clamp screw.
2. Rotate the optical module to line up a reference mark on the optical housing with the reference feature on top of the body.
3. Re-locate the clamp screw and tighten.

Stylus level setting

The top surface of disc and square styli must be set level, front to back and side to side.

Side to side level adjustment

1

Side to side level adjustment is obtained by alternately adjusting grubscrews, which causes the probe module to rotate and change the stylus level setting.

When a level stylus surface is obtained, tighten the grubscrews.

Stylus level setting

Front to back level adjustment

2

1 Height adjusting screw
4 mm AF

2 Adjusting/locking screw
4 mm AF
5.1 Nm
(3.76 lbf.ft)

To raise front

Slacken adjusting/locking screw **2** and adjust height adjusting screw **1** until the stylus is level.

Then fully tighten screw **2**.

To lower front

Keep slackening height adjusting screw **1** and adjusting/locking screw **2** until the stylus is level.

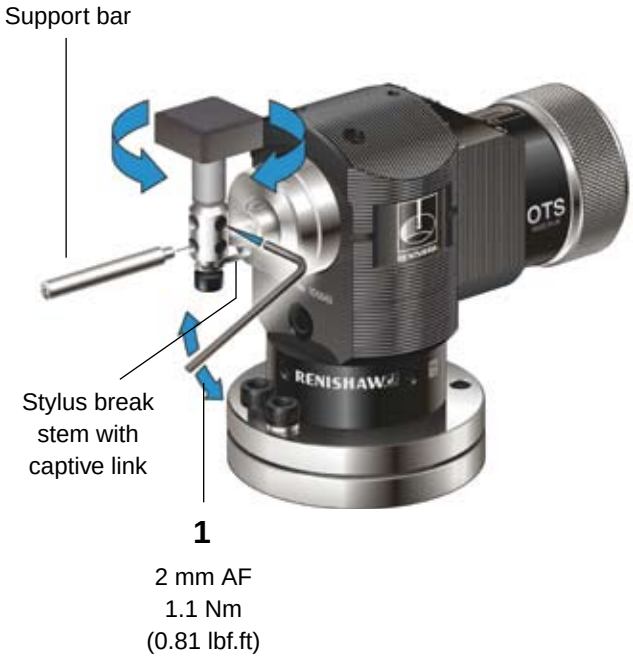
Then fully tighten screw **2.**

Square stylus only

Square stylus rotational adjustment allows the stylus to be aligned with the machine axes.

Coarse rotational adjustment

3



1

2 mm AF
1.1 Nm
(0.81 lbf.ft)

Slacken grubscrew **1** and rotate the stylus by hand to obtain alignment, then fully tighten the grubscrew.

NOTE:
Always hold the support bar in position to counteract twisting forces and avoid over stressing the stylus break stem.

Square stylus only

Fine rotational adjustment

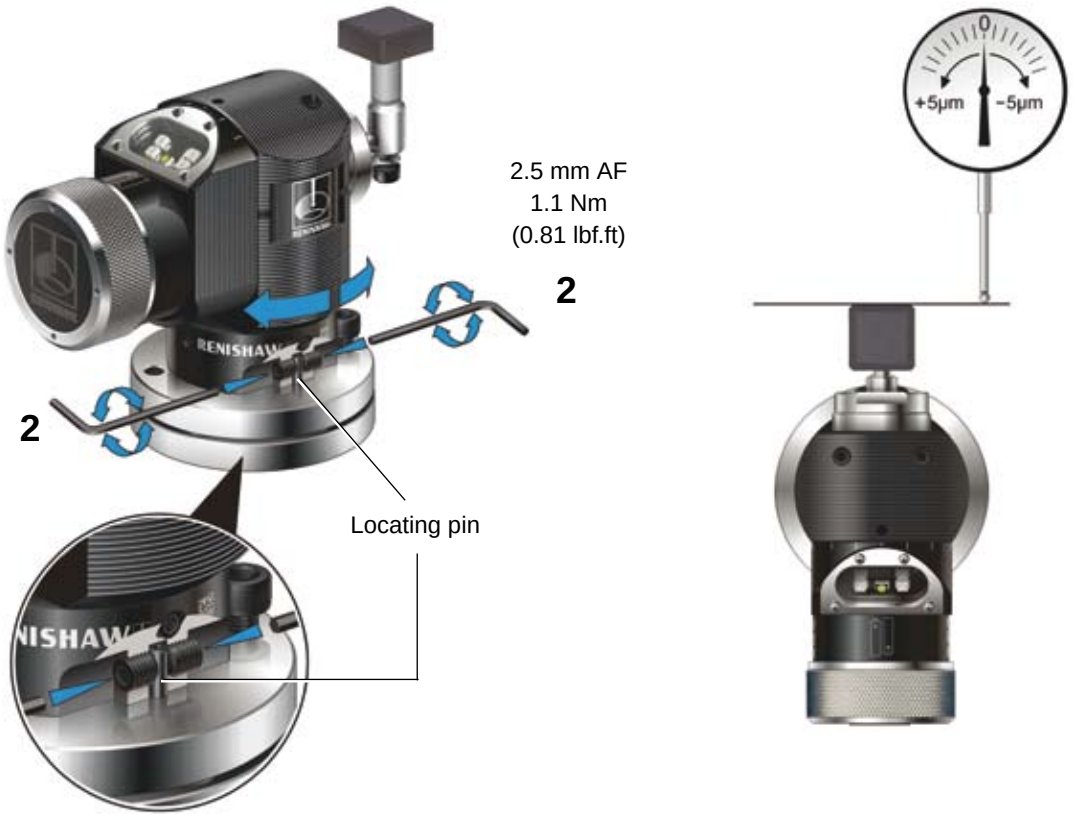
4

Slacken the four body locking screws **1**.

Square stylus only

Fine rotational adjustment

5



Opposing grubscrews **2** are tightened against a locating pin fixed to the base. By alternatively slackening and re-tightening these grubscrews, fine rotational adjustment of the stylus is achieved.

Then tighten both grubscrews.

Square stylus only

Fine rotational adjustment

6

Tighten the four body locking screws **1**.

Calibrating the OTS

Why calibrate a probe?

A 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 you calibrate your probe 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.

When your probe is assembled and mounted on the machine table, it is necessary to align the stylus faces with the machine axes to avoid probing errors when setting tools. It is worth taking care with this operation – you should try to get the faces aligned to within 0.010 mm (0.0004 in) for normal use. This is achieved by manually adjusting the stylus with the adjusting screws provided, and using a suitable instrument such as a DTI clock mounted in the machine spindle.

When the probe has been correctly set up on the machine, it is time to calibrate the probe. Calibration cycles are available from Renishaw for this task. The purpose is to establish the probe stylus measuring face trigger point values under normal measuring conditions.

The calibration values are stored in macro variables for computation of the tool size during tool setting cycles.

Values obtained are axis trigger positions (in machine co-ordinates). Any errors due to machine and probe triggering characteristics are automatically calibrated out in this way. These values are the electronic trigger positions under dynamic operating conditions, and not necessarily the true physical stylus face positions.

NOTE:
Poor repeatability of probe trigger point values indicates that either the probe/stylus assembly is loose or a machine/probe fault exists. Further investigation is required.

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Trigger Logic™

Reviewing the current probe settings

Key to the symbols	
●	LED short flash
▬	LED long flash

LED check ● ● ●

Enhanced trigger filter setting

Off	or	On
● ● ▬		● ● ▬

Probe identification

Probe 1	or	Probe 2	or	Probe 3
● ● ▬		● ● ▬		● ● ▬

Optical power

Low	or	Standard
● ● ▬		● ● ▬

Battery status

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

Probe in standby mode

Probe settings record table

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

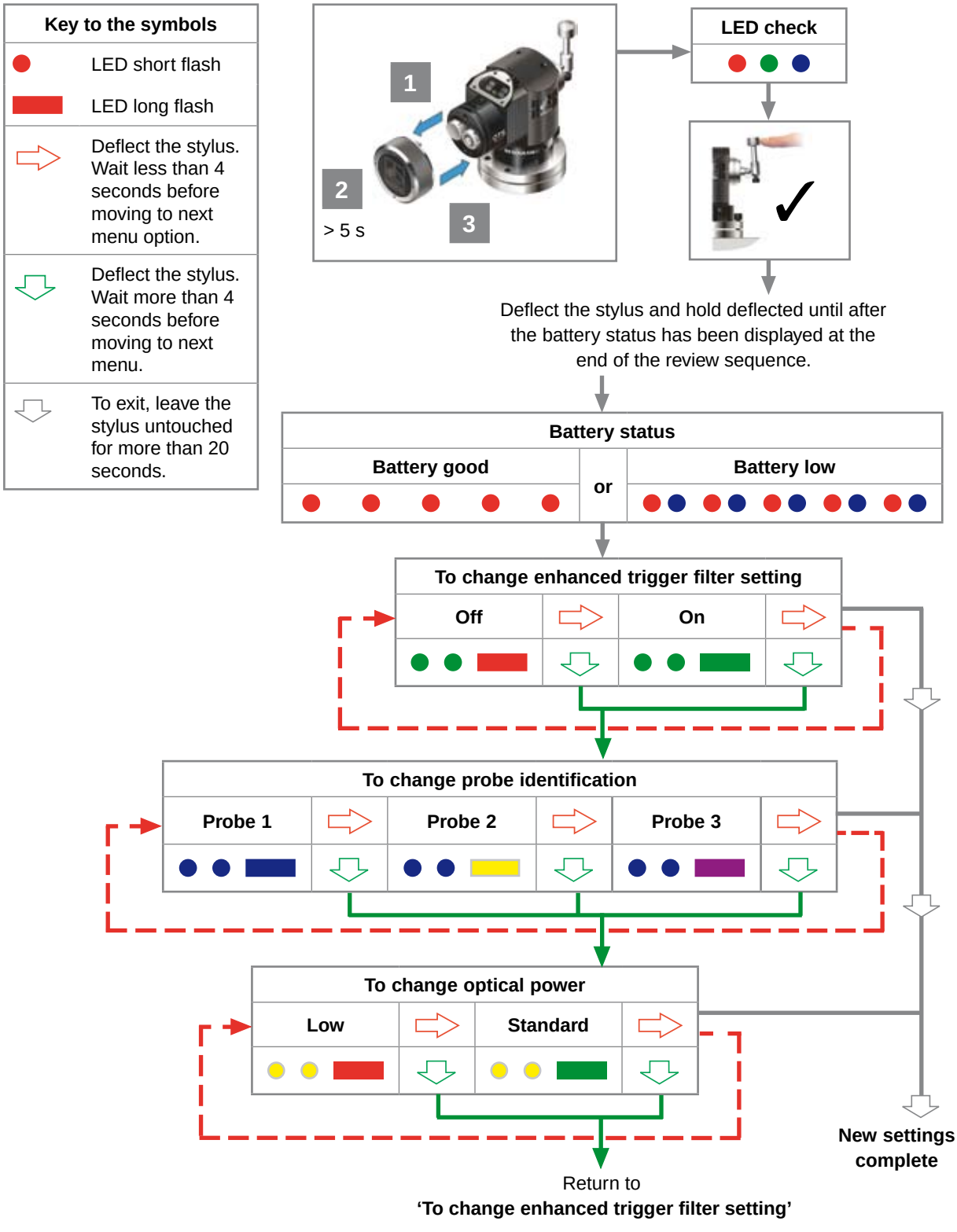
		✔ tick
Enhanced trigger filter	OFF 	
	ON 	
Optical start configuration	Probe 1 	
	Probe 2 	
	Probe 3 	
Optical power setting	Low power 	
	Standard power 	

OTS SERIAL No. (located on body, under stylus)

.....

Changing the probe settings

Insert batteries or, if already installed, remove for 5 seconds and replace. Following the LED check, immediately deflect the stylus and hold 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 'enhanced trigger filter' menu is displayed, then release the stylus. The probe is now in configuration mode and Trigger Logic™ is activated.



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	

NOTES:
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 re-activates 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

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

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

Changing the batteries

1

2

3

4

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 compartment gasket.

Only use specified batteries (page 5.3).

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

NOTES:

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 gasket and mating surfaces are clean and free from dirt before reassembly.

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

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

Battery types

½ AA (3.6 V) Lithium Thionyl Chloride (LTC) × 2 supplied with probe

✓

Ecocel: EB1426
Saft: LS14250, LS14250C
Tadiran: SL-750/S, SL-850/S
Xeno: XL-050F

✗

Dubilier: SB-AA02
Maxell: ER3S
Sanyo: CR14250SE
Tadiran: SL-350/S, SL-550/S, TL-4902, TL-5902, TL2150, TL-5101
Varta: CR 1/2 AA

★ AA (1.5 V) Alkaline × 2 supplied with probe

✓ **All AA alkaline batteries**

AA (3.6 V) Lithium Thionyl Chloride (LTC) × 2 (optional type)

✓

Minamoto: ER14505, ER14505H
RS: 596-602, 201-9438, 324-6748
Radio shack: 55025148
Saft: LS14500, LS14500C
Tadiran: SL-360/S, SL-760/S, SL-860/S, TL-5903/S, TLH-5903/S
Tekcell: SS-AA11
Xeno: XL-060F

✗

Maxell: ER6C
Minamoto: ER14505S
Tadiran: SL-560/S, TL-4903/S

★ AA battery types are also designated as LR6 or MN1500.

Routine maintenance

The probe is a precision tool and must be handled with care.

Ensure the probe is firmly secured to its mounting.

The probe requires minimal maintenance as it is designed to operate as a permanent fixture on CNC machining centres, where it is subject to a hot chip and coolant environment.

1. Do not allow excessive waste material to build up around the probe.

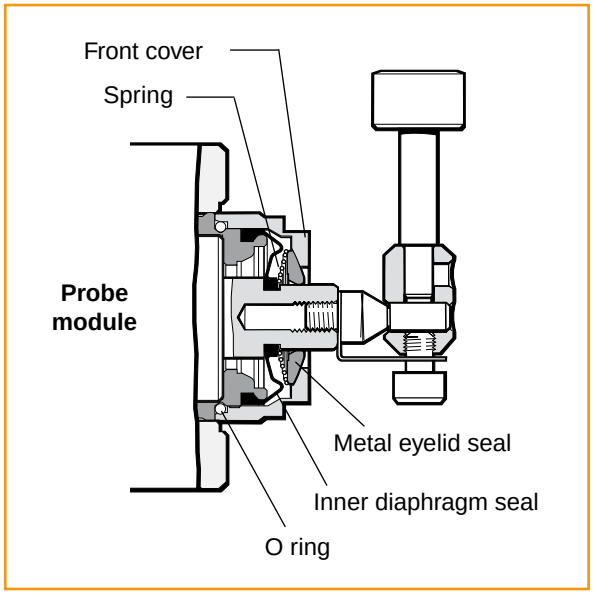
2 Coolant residue accumulating on the transmission window will have a detrimental effect on transmission performance, see page 5.1.

3. Keep all electrical connections clean.

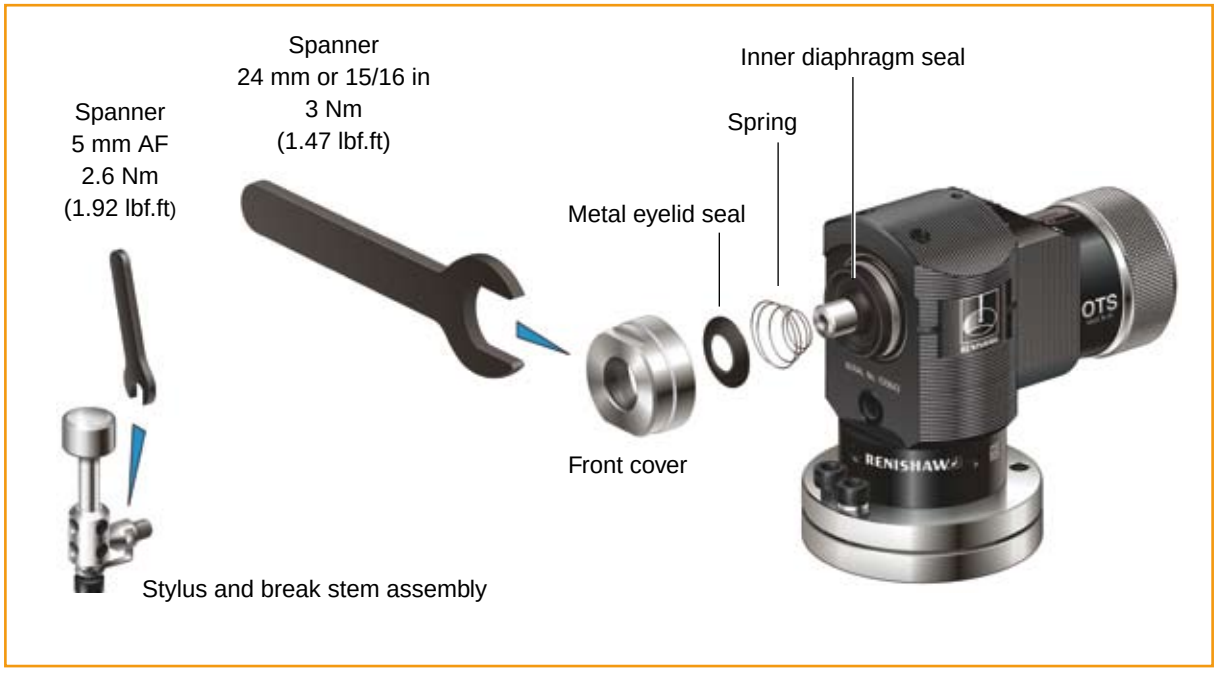
4. The probe mechanism is protected by an outer metal eyelid seal and an inner flexible diaphragm seal.

Approximately once a month, inspect the probe inner diaphragm seal, see page 5.5. If it is pierced or damaged please contact Renishaw.

The service interval may be extended or reduced depending on experience.



Inspecting the inner diaphragm seal



1. Remove the stylus/break stem assembly using the 5 mm AF spanner.
2. Use a 24 mm or 15/16 in spanner to remove the probe's front cover. This will expose the metal eyelid seal, spring and the inner diaphragm seal. Remove the metal eyelid and spring.

CAUTION:
Lose components may fall out.

3. Wash inside the probe, using clean coolant. (DO NOT use sharp metal objects to clean out debris).
4. Inspect the diaphragm seal for signs of piercing or damage. In the event of damage, return the probe to your supplier for repair, as coolant entering the probe mechanism could cause the probe to fail.
5. Refit the spring and metal eyelid (the spring's largest diameter is against the metal eyelid).
6. Refit the remaining components.

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Fault finding

Symptom	Cause	Action
Probe fails to power up (no LED illuminated, or fails to indicate current probe settings)	Dead batteries	Change batteries
	Wrong batteries	Change batteries
	Batteries inserted incorrectly	Check battery insertion
Probe fails to switch-on	Wrong optical start configuration selected	Reconfigure
	Dead batteries	Change batteries
	Wrong batteries	Change batteries
	Batteries inserted incorrectly	Check battery insertion
	Optical/magnetic interference	Check for interfering lights or motors Consider removing interfering source
	Transmission beam obstructed	Check that probe and receiver windows are clean, and remove any obstruction
	Probe out of range/not aligned with receiver	Check alignment and if receiver fixing is secure
	No receiver start signal	Refer to relevant user's guide Review installation wiring
Probe switches-on unexpectedly	Probe receiving switch-on signal from receiver on adjacent machine	Reduce switch-on range on receiver on adjacent machine

Symptom	Cause	Action
Machine stops unexpectedly during a probing cycle	Optical communication obstructed	Check interface/receiver and remove obstruction
	Interface/receiver/machine fault	Refer to interface/receiver/ machine User's guide
	Dead batteries	Change batteries
	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 to low power mode and reduce range of receiver
Probe crashes	Tool length offset incorrect	Review offsets
	Controller wired to respond to inspection probe instead of tool setter	Review installation wiring

Symptom	Cause	Action
Poor probe repeatability and/or accuracy	Debris on part or stylus	Clean tool and stylus
	Losoe probe mounting on machine bed or loose stylus	Check and tighten as appropriate
	Excessive machine vibration	Enable enhanced trigger filter
		Eliminate vibrations
	Calibration out of date and/or incorrect offsets	Review probing software
	Calibration and probing speeds not the same	Review probing software
	Measurement occurs as stylus leaves surface	Review probing software
	Measurement occurs within the machine's acceleration and deceleration zone	Review probing software and probe filter settings
	Probing speed too high	Perform simple repeatability trials at various speeds
	Temperature variation causes machine and workpiece movement	Minimise temperature changes
	Machine tool faulty	Perform health checks on machine

Symptom	Cause	Action
Probe fails to switch off	Optical/magnetic interference	Check for interfering lights or motors Consider removing the interfering source Check that the probe and receiver windows are clean, and remove any obstruction
	Probe out of range	Check position of receiver Increase receiver signal start range Review performance envelopes
Probe goes to Trigger Logic™ set up mode and cannot be reset	Probe was triggered when batteries were inserted	Do not touch the stylus during battery insertion

Parts list

Type	Part Number	Description
OTS (½ AA)	A-5401-2001	OTS probe with disc stylus, ½ AA LTC batteries, tool kit and Quick-start guide. Set to: optical on / optical off/filter off / Probe 2 start / standard power.
OTS (½ AA)	A-5401-2011	OTS probe with square stylus, ½ AA LTC batteries, tool kit and Quick-start guide. Set to: optical on / optical off/filter off / Probe 2 start / standard power.
OTS (AA)	A-5514-2001	OTS probe with disc stylus, AA alkaline batteries, tool kit and Quick-start guide. Set to: optical on / optical off /f ilter off / Probe 2 start / standard power.
OTS (AA)	A-5514-2011	OTS probe with square stylus, AA alkaline batteries, tool kit and Quick-start guide. Set to: optical on / optical off / filter off Probe 2 start / standard power.
Disc stylus	A-2008-0382	Disc stylus (tungsten carbide, 75 Rockwell C) Ø12.7 mm (Ø0.5 in).
Square stylus	A-2008-0384	Square tip stylus (ceramic tip, 75 Rockwell C) 19.05 mm x 19.05 mm (0.75 in x 0.75 in).
Break stem kit	A-5003-5171	Stylus protection kit comprising: break stem (x1), captive link (x1), support bar (x1), M4 screw (x2), M4 grubscrew (x3), hexagon keys: 2.0 mm (x1), 3.0 mm (x1) and spanner 5.0 mm (x1).
Stylus holder kit	A-2008-0389	Stylus holder kit comprising stylus holder and screws.
½ AA Batteries	P-BT03-0007	½ AA Lithium thionyl chloride (LTC) batteries (pack of two).
AA Battery	P-BT03-0005	One AA Alkaline battery (two required).
AA Battery	P-BT03-0008	One AA Lithium thionyl chloride (LTC) battery (two required).
Battery cap	A-5401-0301	OTS battery cap assembly.
Seal	A-4038-0301	Battery housing seal.

Type	Part Number	Description
Tool kit	A-5401-0300	Tool kit comprising : break stem (x1), captive link (x2), support bar (x1), M4 screw (x2), M4 grubscrew (x3), spirol pin (x2), hexagon keys: 2.0 mm (x1), 2.5 mm (x1), 3.0 mm (x1), 4.0 mm (x1) and spanner 5.0 mm (x1).
OMI-2T	A-5439-0049	OMI-2T complete with cable 8 m (26.25 ft) long.
OMI-2T	A-5439-0050	OMI-2T complete with cable 15 m (49 ft) long.
OMI-2	H-2000-5233	OMI-2 complete with cable 8 m (26.25 ft) long.
Mounting bracket	A-2033-0830	OMI-2T/OMI-2H/OMI-2 mounting bracket with fixing screws, washers and nuts.
Accessories		
Raising block	M-2033-7347	Raising block Ø65 mm (Ø2.55 in) x 76.5 mm (3.0 in) tall.
Raising block	M-2033-7189	Raising block Ø65 mm (Ø2.55 in) x 125.5 mm (4.94 in) tall.
Stylus adaptor kit	A-2008-0448	Adaptor kit to position stylus in horizontal attitude.
Publications. These can be downloaded from our web site at www.renishaw.com		
OTS	A-5514-8500	Quick-start guide for rapid set-up of the OTS, includes CD with OTS publications.
Styli	H-1000-3200	Catalogue Styli and accessories.
OMI-2T	A-5439-8500	Installation and user's guide Twin probe system optical machine interface.
OMI-2	H-2000-5233	Installation and user's guide Optical machine interface.
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.

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