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RENISHAW
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OTS optical tool setter

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Compliance information for this product is available by scanning the QR code or visiting **www.renishaw.com/mtpdoc**

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Before you begin

Disclaimer

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Warranty

Unless you and Renishaw have agreed and signed a separate written agreement, the equipment and/or software are sold subject to the Renishaw Standard Terms and Conditions supplied with such equipment and/or software, or available on request from your local Renishaw office.

Renishaw warrants its equipment and software for a limited period (as set out in the Standard Terms and Conditions), provided that they are installed and used exactly as defined in associated Renishaw documentation. You should consult these Standard Terms and Conditions to find out the full details of your warranty.

Equipment and/or software purchased by you from a third-party supplier is subject to separate terms and conditions supplied with such equipment and/or software. You should contact your third-party supplier for details.

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

None applicable.

Microchip software licensing agreement

This product's firmware has been developed by Renishaw with the use of the Microchip libraries, under the following licensing terms:-

This software is developed by Microchip Technology Inc. and its subsidiaries ("Microchip"). Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

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Intended use

The OTS and OTS-AA are optical tool setting probes that enables automated broken tool detection and rapid measurement of the tool length and diameter of a wide range of tools on small to medium machining centres.

Safety

Information to the user

This product is supplied with either non-rechargeable lithium metal batteries or non-rechargeable batteries that do not contain lithium. Refer to the battery manufacturer's literature for specific battery operating, safety and disposal guidelines.

- Do not attempt to recharge the batteries.
- Replace the batteries only with the specified type.
- Do not mix new and used batteries in the product.
- Do not mix different types or brands of batteries in the product.
- Ensure that all batteries are inserted with the correct polarity in accordance with the instructions in this manual and indicated on the product.
- Do not store the batteries in direct sunlight.
- Do not expose the batteries to water.
- Do not expose the batteries to heat or dispose of batteries in a fire.
- Avoid forced discharge of the batteries.
- Do not short circuit the batteries.
- Do not disassemble, apply excessive pressure, pierce, deform or subject the batteries to impact
- Do not swallow the batteries.
- Keep the batteries out of the reach of children.
- If the batteries are swollen or damaged do not use them in the product and exercise caution when handling them.
- Dispose of waste batteries in accordance with your local environmental and safety laws.

Ensure that you comply with international and national battery transport regulations when transporting the batteries or this product with the batteries inserted. Lithium metal batteries are classified as dangerous goods for transportation and require labelling and packaging in accordance with the dangerous goods regulations before being offered for transportation. To reduce the risk of shipment delays, should you need to return this product to Renishaw for any reason, do not return any batteries. In all applications involving the use of machine tools or CMMs, eye protection is recommended.

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.

If the probe fails, 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 UK, EU 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 (for example, power transformers, servo drives).
- 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 (for example, motor power supply cables), or be near high-speed data lines.
- Cable lengths should always be kept to a minimum.

Equipment operation

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

Optical safety

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

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

The product was evaluated and classified using the following standard:

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

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

OTS basics

Introduction

The OTS is a tool setter probe with optical signal transmission, suitable for use on small to medium 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.

OTS with ½ AA batteries with an OMP40-2 / OMP400.

or

OTS with AA batteries with an OMP60 / OMP600.

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.

Multi probe system

The OMM-2 with an OSI or OSI-D, OMI-2T or OMI-2H are the recommended interfaces to use with the OTS, as they provide substantially increased resistance to light interference whilst providing the user with greater flexibility to operate a muti-probe system.

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

Single probe system

A single OTS can be used with an OMM-2 with an OSI or OSI-D interface or OMI-2T / OMI-2H / OMI-2 interface/receiver.

NOTE: When used with an OMI-2, the OTS must be reconfigured as Probe 1.

Trigger Logic™

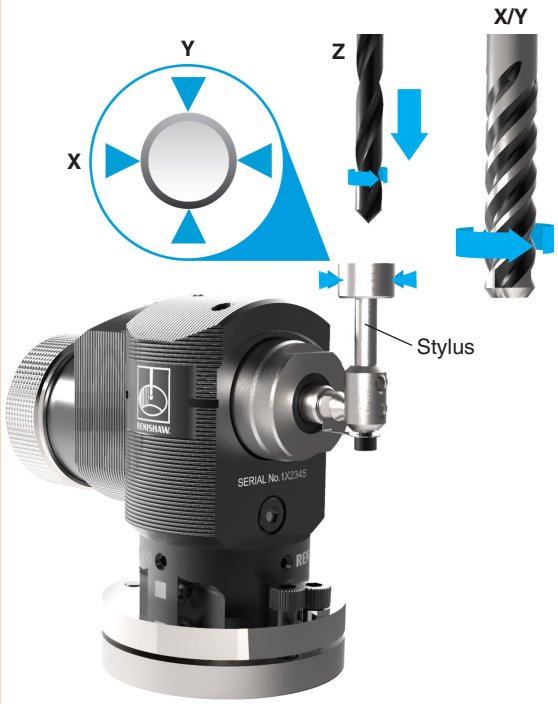
Trigger Logic™ (see Trigger Logic™) is a method that allows the user to view and select all available mode settings in order to customise a probe to suit a specific application. Trigger Logic is activated by battery insertion and uses a sequence of stylus deflections (triggering) to systematically lead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

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

or

Current probe settings can be reviewed by removing the batteries for a minimum of 5 seconds, and then replacing them to activate the Trigger Logic review sequence (see page 4.1, “Reviewing the probe settings”, for further infomation).

Operation



Rotate tool in reverse direction for diameter setting

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 and software programs for tool setting are available from Renishaw for various machine controllers: see the *Probe software for machine tools – programs and features* data sheet (Renishaw part no. H-2000-2298).

This data sheet 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 feedrates

Cutters should be rotated in reverse to the cutting direction. Renishaw tool setting software calculates the spindle speed and axis feedrates 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 feedrate

The feedrate (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 feedrate

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

Probe modes

The OTS probe has three modes:

Standby mode – Probe is waiting for a switch-on signal.

Operational mode – OTS is ready for use. It is activated using the switch-on method (see “Switch-on method” on page 2.5).

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

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

For more information, see “Configurable settings” on page 2.5.

NOTE: A visual indication of currently selected probe settings is provided on battery insertion, by the multicolour LED located within the probe window see Section 4, “Trigger Logic™”.

Configurable settings

Switch-on method

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

Optical start configuration

The OTS can be configured to either Probe 1, Probe 2 or Probe 3 identification. For more information, see "Changing the probe settings" on 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 one of the OTS probes to be reconfigured to Probe 1.

A triple tool setter application would require one of the OTS 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 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 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.

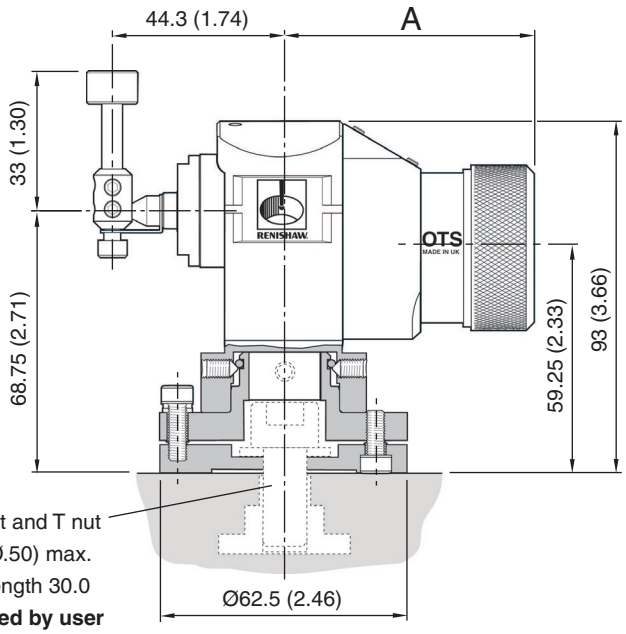
NOTE: Filter on is only compatible with on-centre length measurement. It should be turned off if measuring radius/diameter or length off-centre.

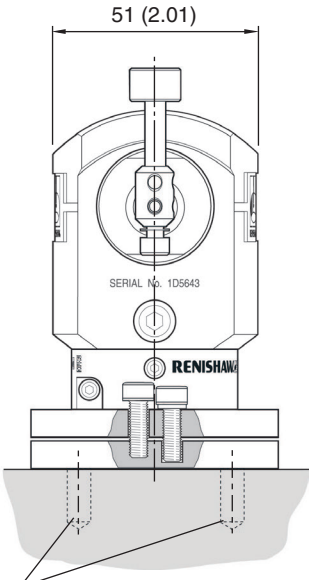
Optical power

Where the separation distance between the OTS and the receiver is small, low optical power may be selected (see page 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

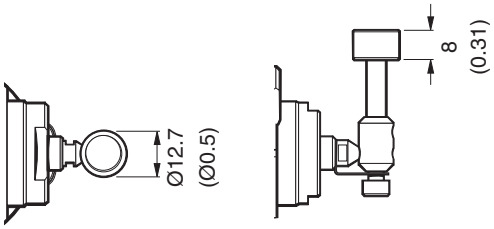




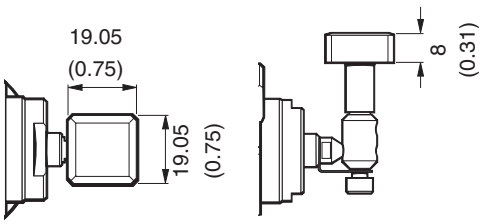
Stylus overtravel limits	
±X / ±Y	+Z
±3.5 (0.14)	6 (0.24)

Battery type	Dimension A
½ AA	67.8 (2.67)
AA	92.5 (3.64)

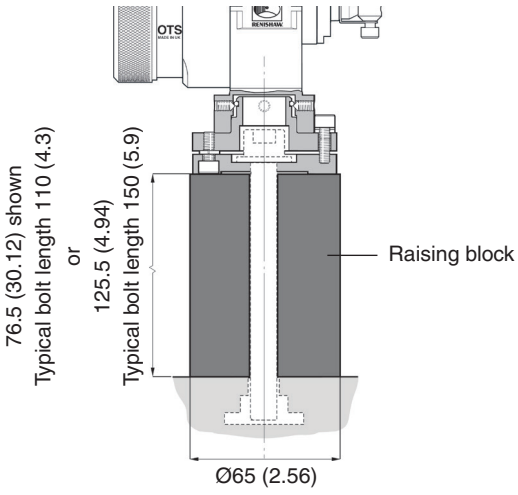
Disc stylus
Ø12.7 mm × 8 mm (Ø0.5 in × 0.31 in)
Tungsten carbide 75 Rockwell C



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

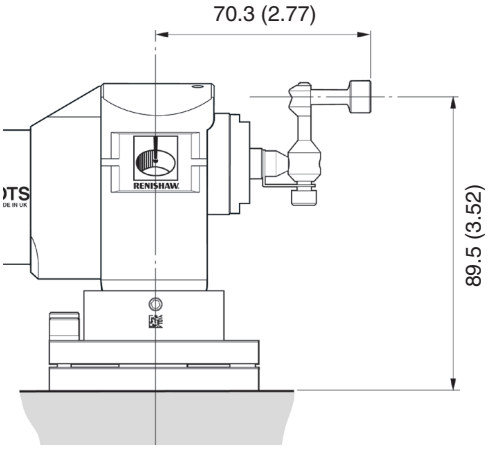


Raising block



Cranked horizontal stylus adaptor kit

Disc and square stylus



Dimensions given in mm (in)

OTS specification

Variant		½ AA OTS	AA OTS
Principal application		Tool measuring and broken tool detection on small to medium machining centres.	
Dimensions	Length Diameter Height	122.0 mm (4.08 in) 60.0 mm (2.36 in) 103.3 mm (4.06 in)	143.6 mm (5.65 in) 60.0 mm (2.36 in) 103.3 mm (4.06 in)
Weight with disc stylus	With batteries Without batteries	870 g (30.69 oz) 850 g (29.98 oz)	950 g (33.51 oz) 900 g (31.75 oz)
Transmission type		Infrared optical transmission (modulated)	
Compatible interfaces		OMI-2, OMI-2T, OMI-2H, OMM-2C / OMM-2 with OSI or OSI-D	
Switch-on methods		Optical on	
Switch-off methods		Optical off	
Operating range		Up to 5 m (16.4 ft)	
Sense directions		±X, ±Y, +Z	
Unidirectional repeatability		1.0 µm (40 µin) 2σ (see note 1)	
Stylus trigger force (see notes 2 and 3)		1.30 N to 2.40 N, 133 gf to 245 gf (4.68 ozf to 8.63 ozf depending on the sense direction	
Stylus overtravel		XY plane +Z plane	±3.5 mm (0.14 in) 6 mm (0.23 in)
Environment	IP rating	IPX8, BS EN 60529:1992+A2:2013	
	IK rating	IK01, BS EN 62262:2002+A1:2021[for glass window]	
	Storage temperature	–10 °C to +70 °C (+14 °F to +158 °F)	
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)	
Battery types	½ AA type - standard	2 × ½AA 3.6 V lithium-thionyl chloride (LTC)	
	AA type - standard	2 × AA Alkaline	
	AA type - optional	2 × AA 3.6 V lithium-thionyl chloride (LTC)	
Low battery indication	Blue flashing LED in conjunction with normal red or green probe status LED		
Dead battery indication	Constant red		
Typical battery life	See the table on page 2.8.		

Note 1 Performance specification is tested at a standard test velocity of 480 mm/min (18.9 in/min) with a 35 mm stylus. Significantly higher velocity is possible depending on application requirements.

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

Note 3 These are the factory settings: manual adjustment is not possible.

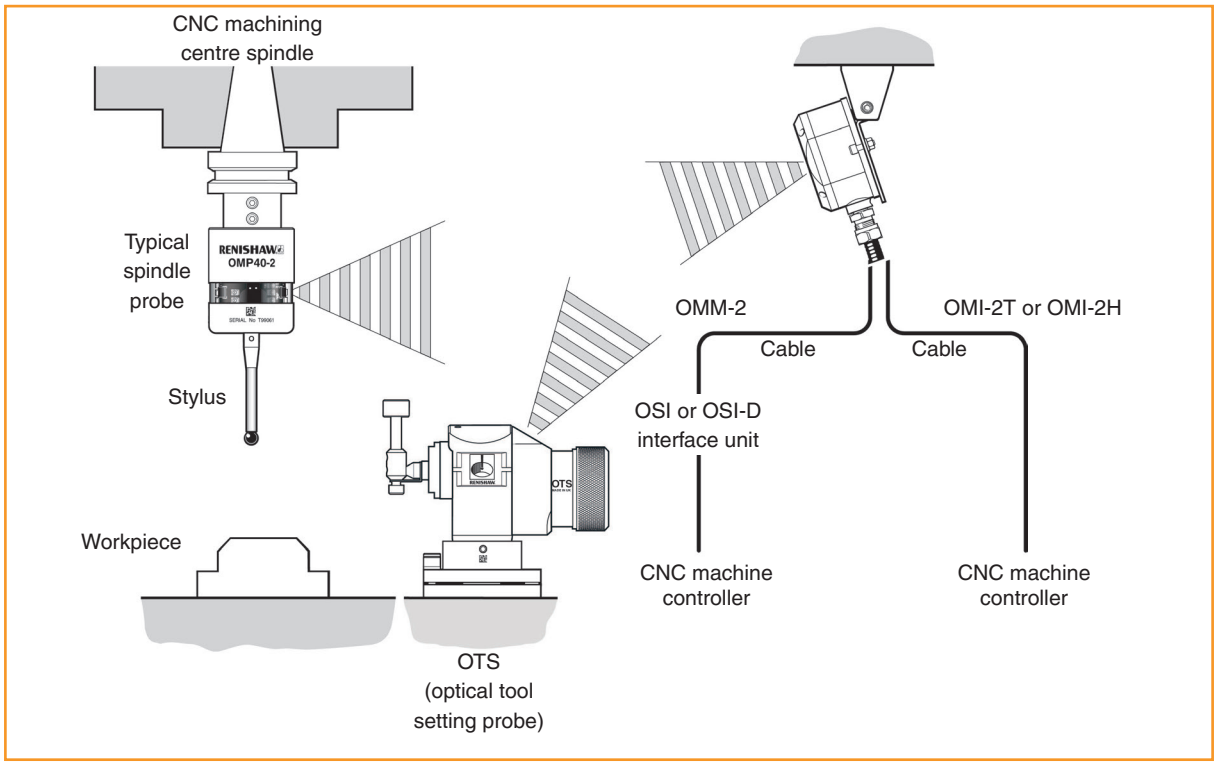
Typical battery life

Battery type (× 2)	Standby life	5% usage (72 minutes/day)		Continuous use	
		Standard power	Low power	Standard power	Low power
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

System installation

Typical probe system with an OMM-2 with OSI or OSI-D interface or OMI-2T / OMI-2H interface/receiver



Operating envelopes

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

Coolant residue accumulating on the OTS or OMM-2, OMI-2T, OMI-2H or OMI-2 windows may reduce the signal transmission range. Wipe clean as often as is necessary to maintain unrestricted transmission.

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

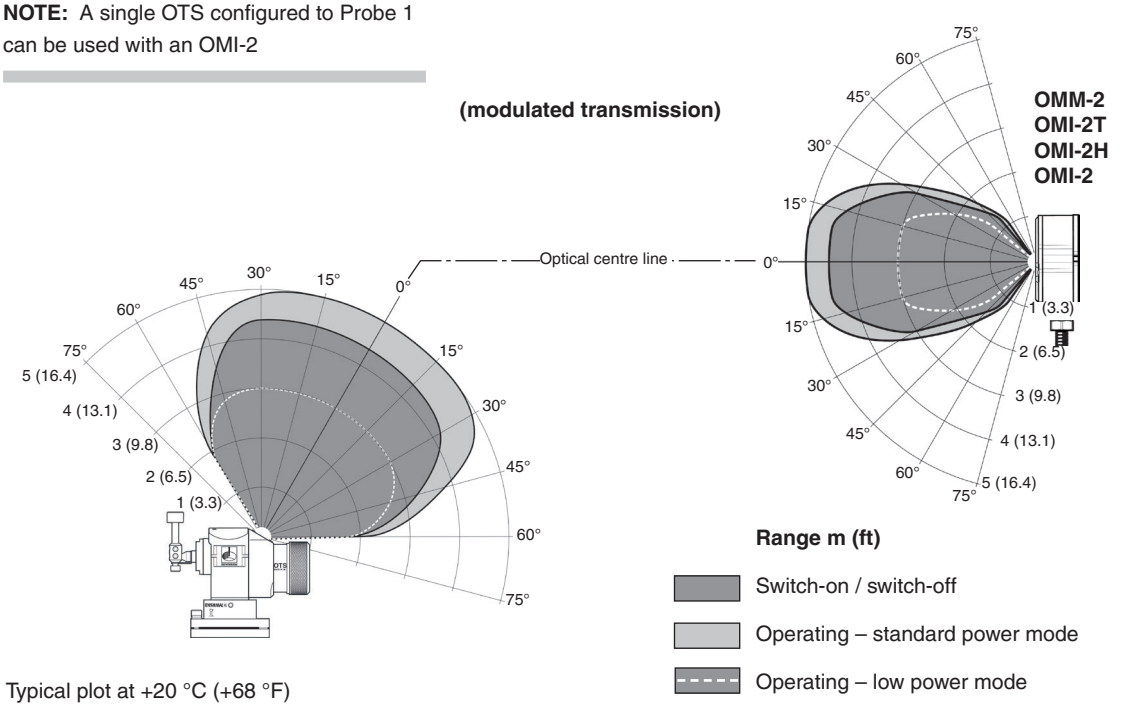
CAUTION: If two systems are operating in close proximity to each other, take care to ensure that the signals transmitted from the OTS on one machine are not picked up by the receiver on the other machine, and vice versa. When this is found to be the case, it is recommended that the OTS low optical power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

Positioning and performance envelope for the OMM-2, OMI-2T, OMI-2H or OMI-2

To assist in finding the optimum position for the OMM-2, OMI-2T, OMI-2H or OMI-2, signal strength is displayed on the OMM-2 / OMI-2T / OMI-2H / OMI-2 multicoloured LED.

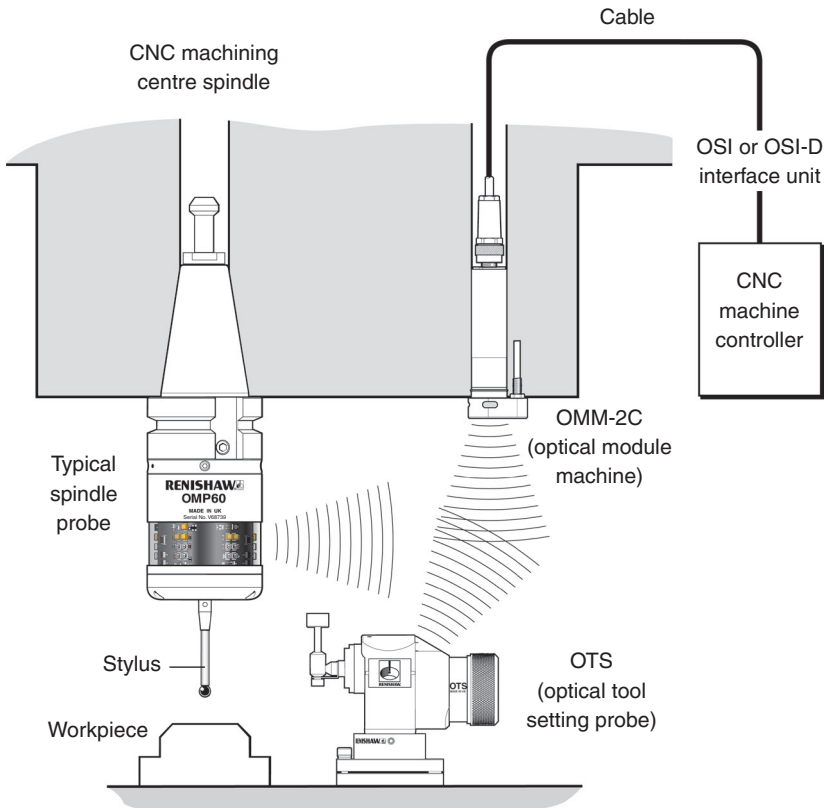
The diodes of the OTS and the OMM-2 / OMI-2T / OMI-2H / OMI-2 must be in each other's field of view and within the performance envelope shown. The OTS performance envelope is based on the optical centre line of the OMM-2, / OMI-2T or OMI-2H / OMI-2 being at 0° and vice versa.

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



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

Typical probe system with an OMM-2C with OSI or OSI-D interface



Introduction

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

The OMM-2C should be mounted as near to the machine spindle as possible (as shown above).

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

CAUTION: Make sure the sealing ring and air fitting screw (if applicable) are clean and lubricated prior to being mounted in the machine spindle.

NOTE: Do not overtighten the mounting screw. Maximum torque is 1.5 Nm (1.11 lbf.ft.).

Performance envelope of OMM-2C with OTS

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

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

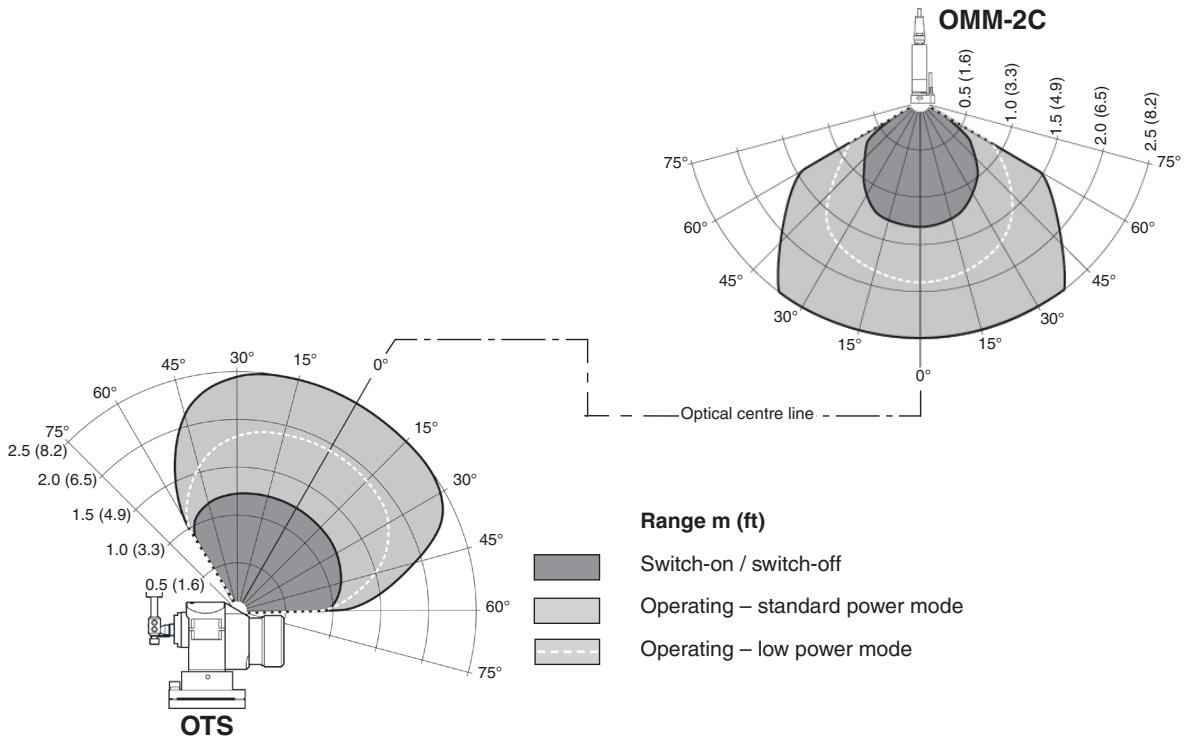
For best system performance, ensure the OMM-2C is mounted in a position which is not directly in front of a light source.

The probe system should be positioned so that the signal transmission is maintained when the OTS is positioned below the machine spindle.

The OTS and OMM-2C may deviate from the optical centre line, provided opposing light cones always overlap, with transmitters and receivers in the other's field of view (eye-to-eye).

In multiple probe mode applications, OTS may be configured as Probe 1, Probe 2 or Probe 3.

CAUTION: If two systems are operating in close proximity, take care to ensure that the signals transmitted from the OTS on one machine are not received by the OMM-2C on another machine and vice versa. When this is found to be the case it is recommended that the OTS low power setting is selected.

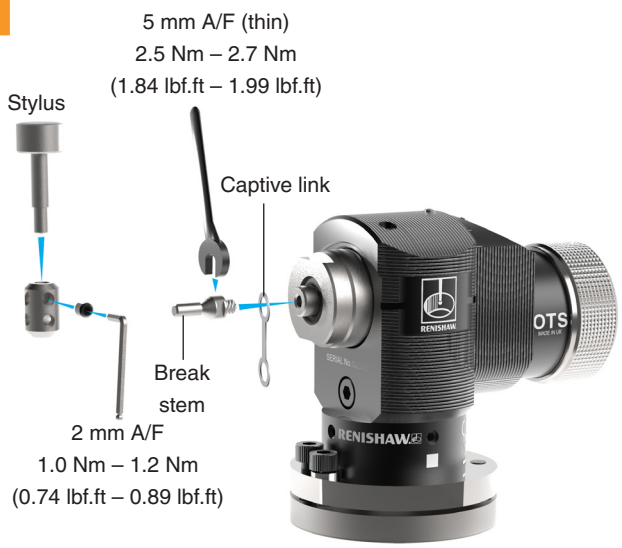


Typical plot at 20° C (68° F)
Transmission around probe axis
in metres (feet)

Preparing the OTS for use

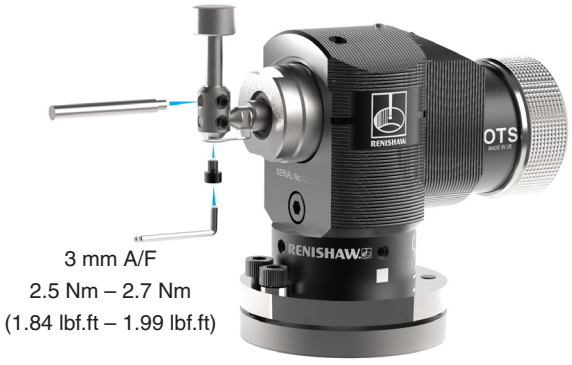
Fitting the stylus, break stem and captive link

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 ½AA batteries

NOTES:

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

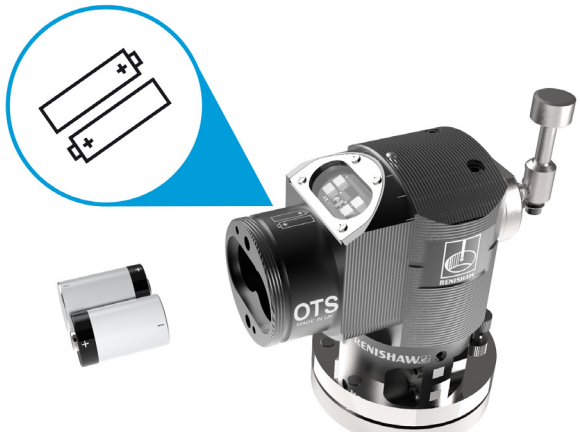
If dead batteries are inadvertently inserted, the LEDs will remain a constant red.

Do not allow coolant or debris to enter the battery compartment. When inserting batteries, check that the battery polarity is correct.

After the batteries have been inserted, the LEDs will display the current probe settings (for details, see Section 4, “Trigger Logic™”..

1

2



3

Remove the battery isolation device from the battery compartment before use.

4

Installing the AA batteries

NOTES:

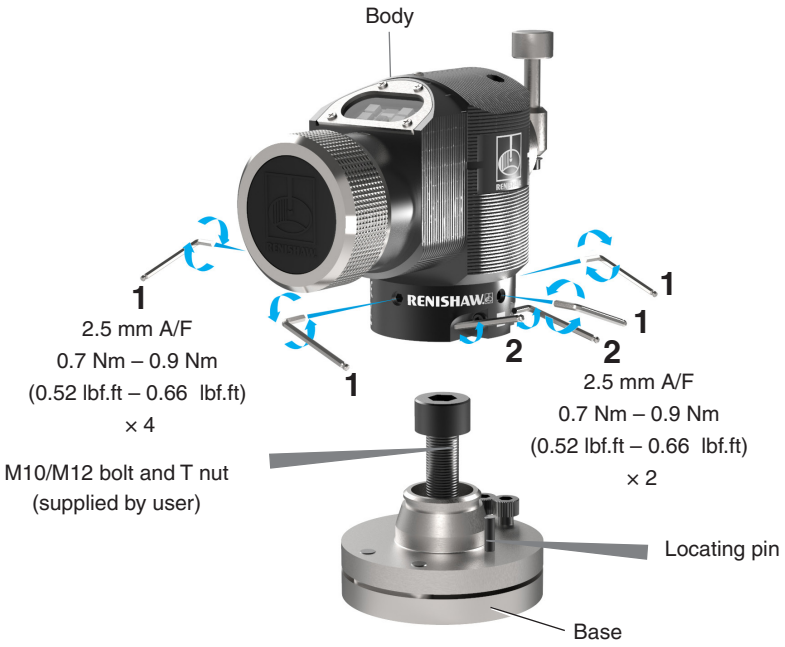
See Section 5, “Maintenance”, for a list of suitable battery types.

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

Do not allow coolant or debris to enter the battery compartment. When inserting batteries, check that the battery polarity is correct.

After the batteries have been inserted, the LEDs will display the current probe settings (for details, see Section 4, “Trigger Logic™”.

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 A/F 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**.

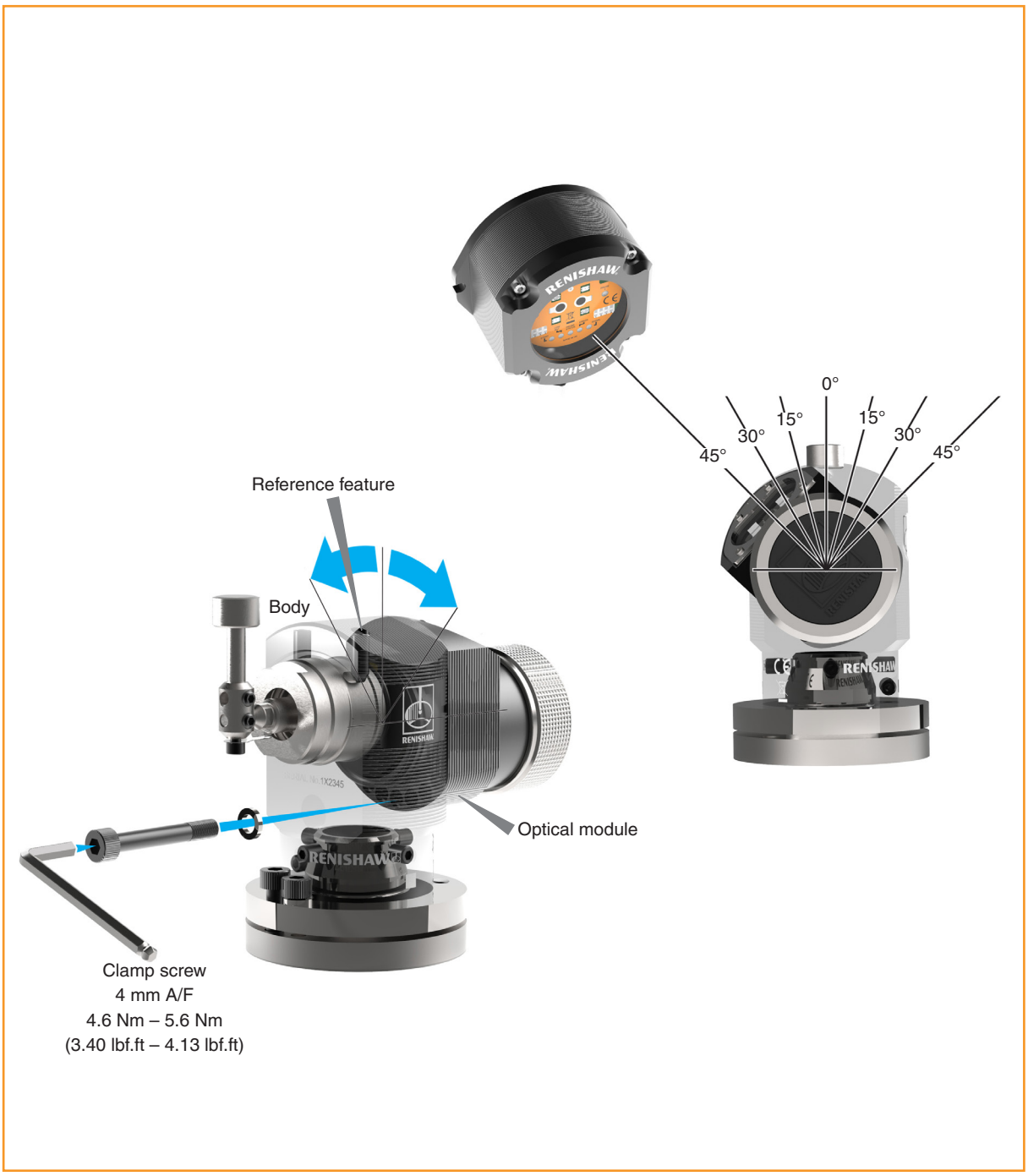
NOTE: If a square stylus is fitted fine rotational adjustment is required. For more information on square stylus rotational adjustment see “Square stylus only” on page 3.12.

Dowel pins

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. For more information on fitting the dowel pins see “OTS dimensions” on page 2.6.

Aligning the modules



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. Relocate the clamp screw and tighten.

Stylus adjustment

The top surface of the stylus must be set level, front to back and side to side.

Key to the symbols	
	Round stylus
	Square stylus

Side-to-side level adjustment

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

When a level stylus surface is obtained, tighten the grub screws.

Front-to-back level adjustment

To raise front

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

Fully tighten screw **2**.

To lower front

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

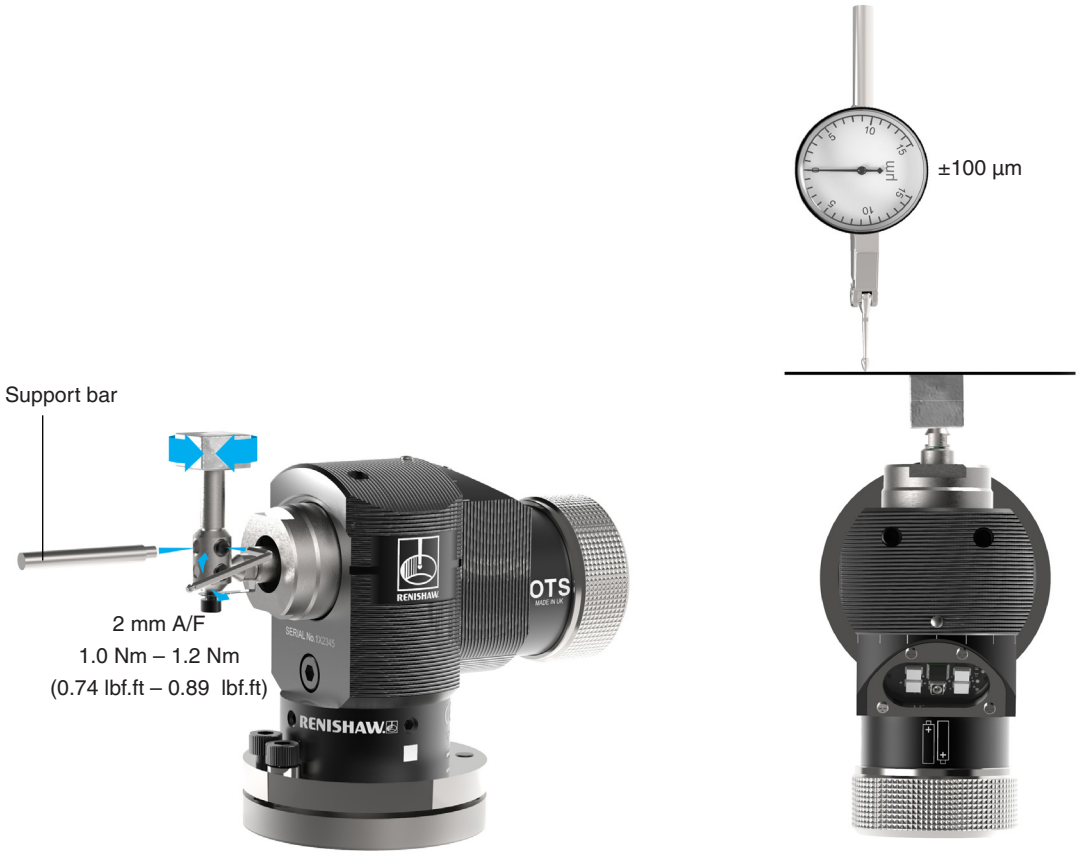
Fully tighten screw **1**.

Square stylus only

Rotational adjustment allows the stylus to be aligned with the machine axes.

Coarse rotational adjustment

3



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

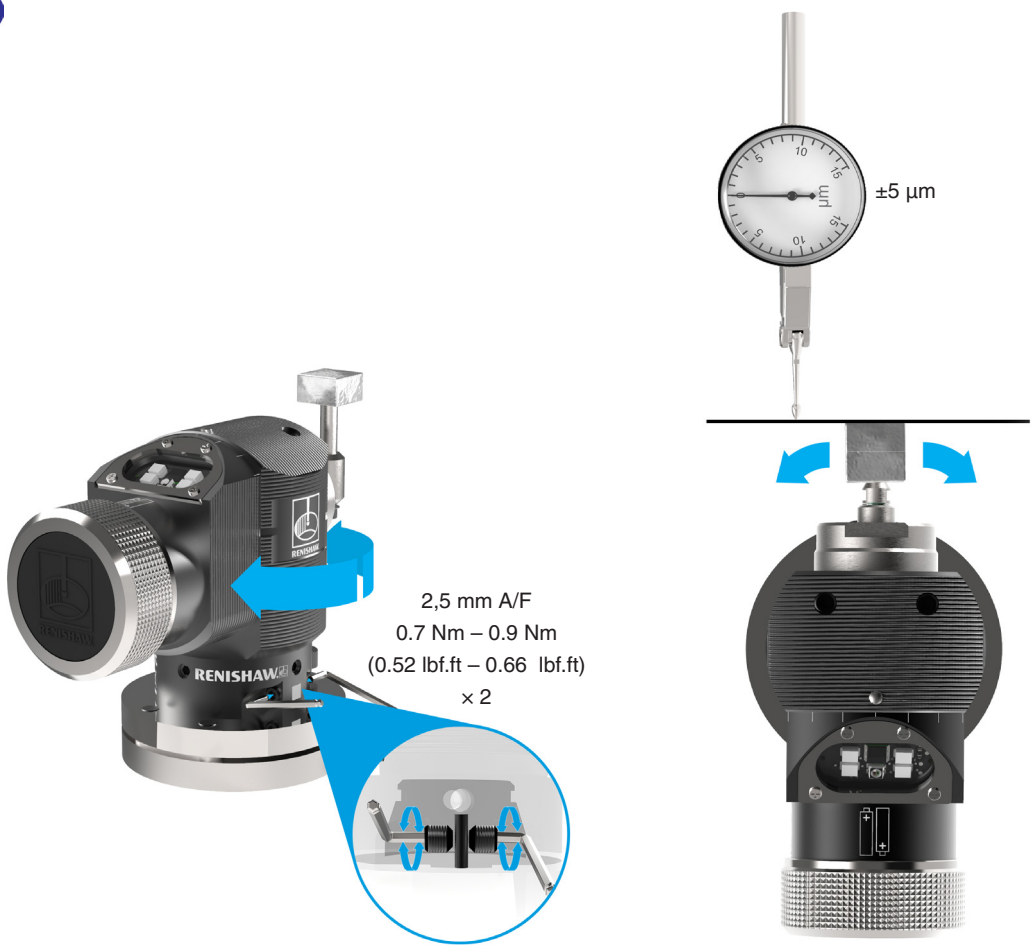
NOTE: Always hold the support bar in position to counteract twisting forces and avoid over-stressing the stylus break stem.

Fine rotational adjustment

4

Slacken the four body locking screws **2**.

5



Tighten the opposing grub screws **3** against a locating pin fixed to the base.

Alternately slacken and retighten these grub screws to achieve fine rotational adjustment of the stylus.

Lightly tighten the grub screws.

6

Fully retighten the four body locking screws **2**.

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 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 been 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, the probe must be calibrated. 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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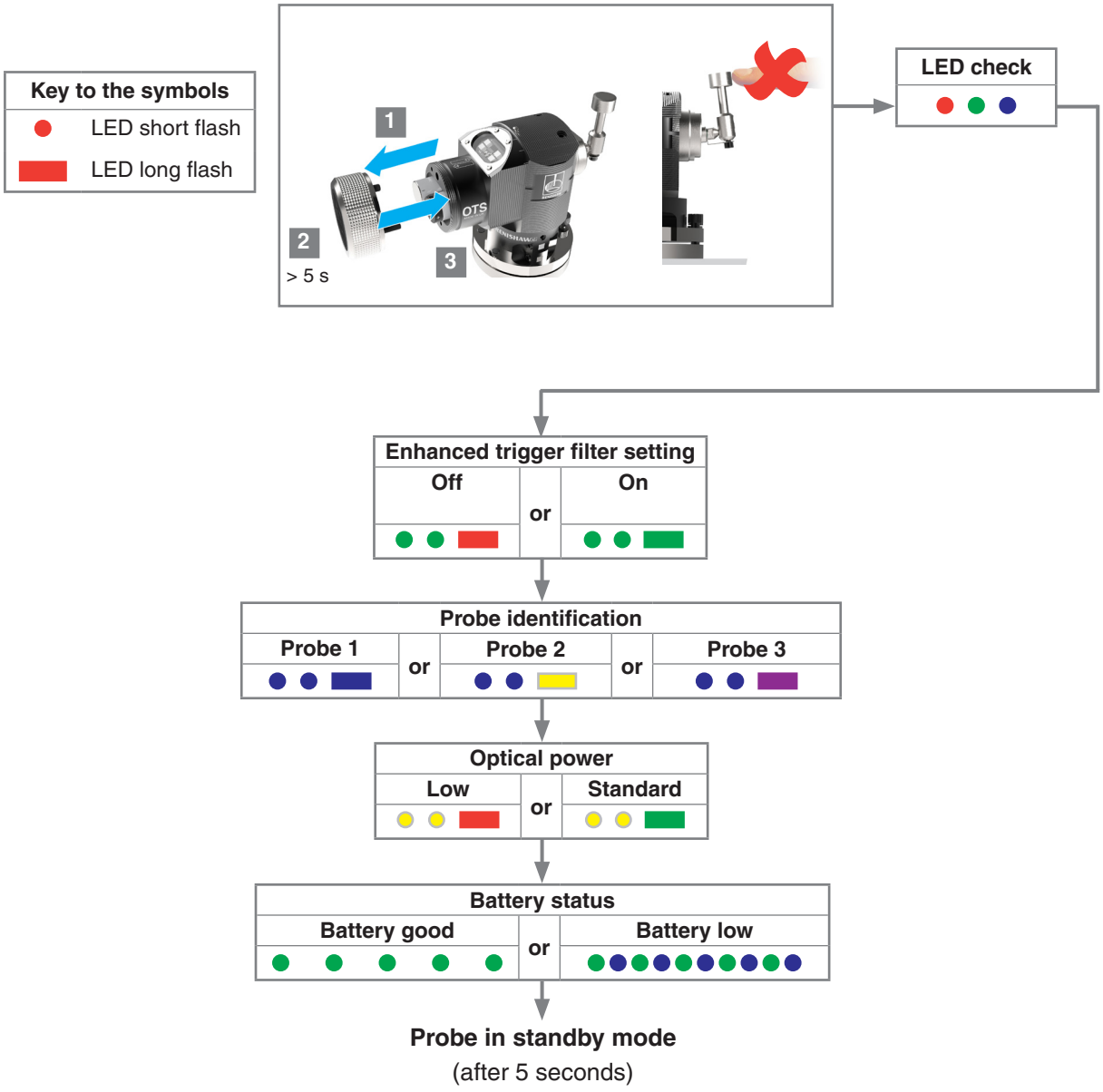
Trigger Logic™

Reviewing the probe settings



Probe settings record

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

			✓ tick: Factory settings	New settings
Enhanced trigger filter	Off	● ● ▬	✓	
	On	● ● ▬		
Probe identification	Probe 1	● ● ▬		
	Probe 2	● ● ▬	✓	
	Probe 3	● ● ▬		
Optical power setting	Low power	● ● ▬		
	Standard power	● ● ▬	✓	

Factory settings only for kits:-
A-5401-2001
A-5401-2011
A-5514-2001
A-5514-2011

OTS serial no .....

Changing the probe settings

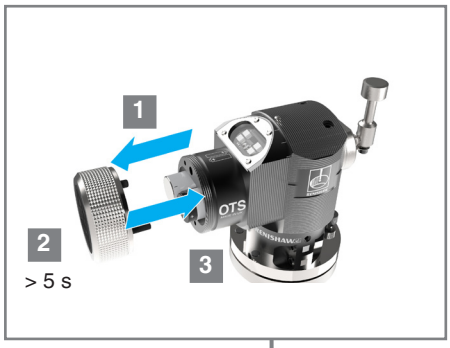
Insert the batteries or, if they have already been installed, remove them for five seconds and then refit them.

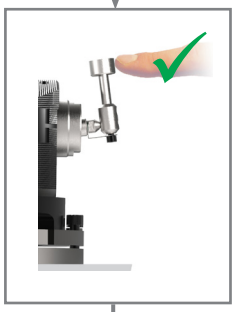
Following the LED check, immediately deflect the stylus and hold it deflected until five red flashes have been observed (if the battery power is low, each red flash will be followed by a blue flash).

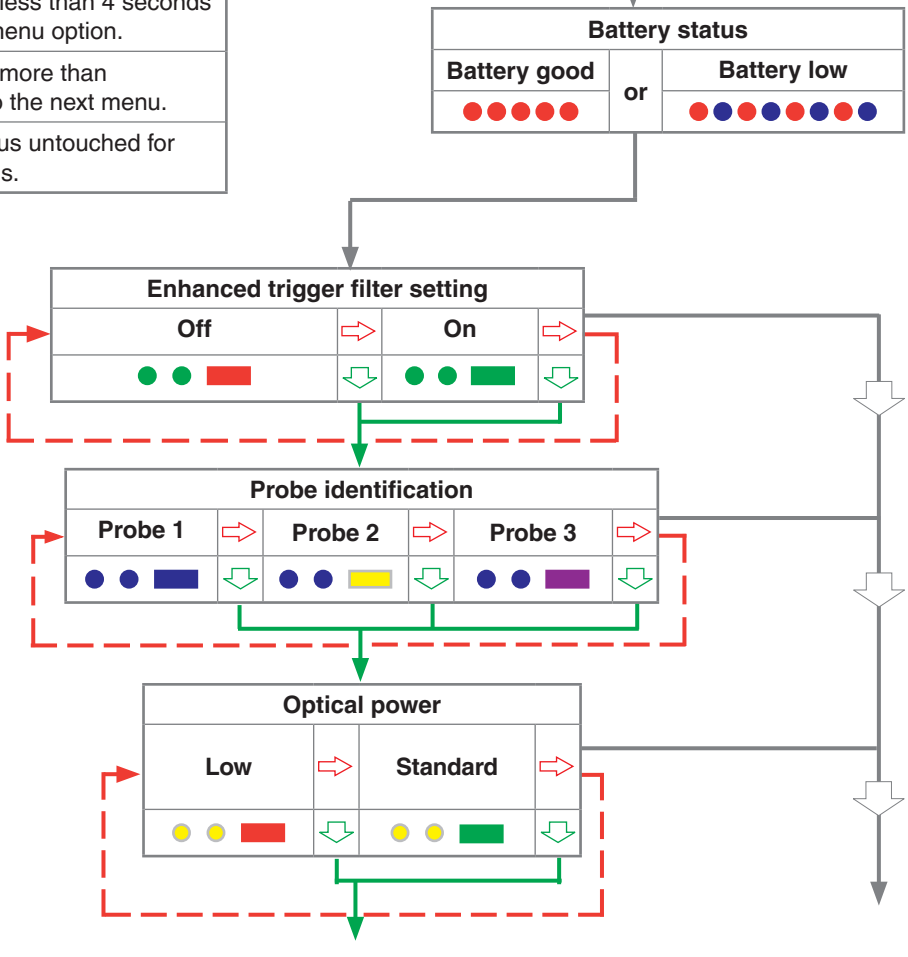
Keep the stylus deflected until the "**Enhanced trigger filter**" setting is displayed, then release it. The probe is now in configuration mode and Trigger Logic™ is activated.

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

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

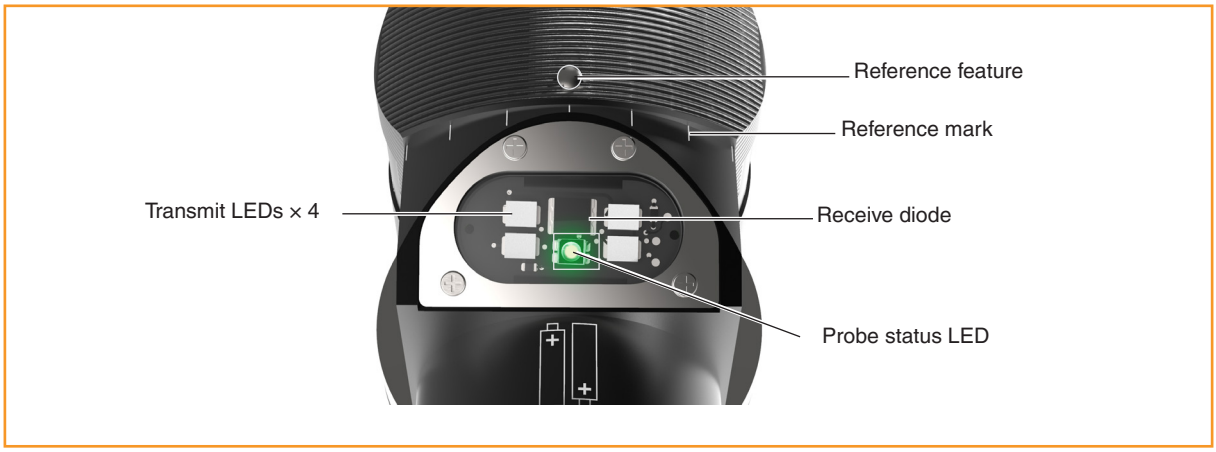






Return to
"Enhanced trigger filter setting"

Operating mode



Probe status LED

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	

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

1. When the probe is active, the batteries discharge until battery power becomes too low for the probe to operate correctly.
2. The probe stops functioning, but reactivates as the batteries recover sufficiently to provide the probe with power.
3. The probe begins to run through the LED review sequence (see “Reviewing the probe settings” on page 4.1).
4. Again, the batteries discharge and the probe ceases to function.
5. Again, the batteries recover sufficiently to provide the probe with power, and the sequence repeats itself.

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 an authorised Renishaw Service Centre.

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

Cleaning the probe

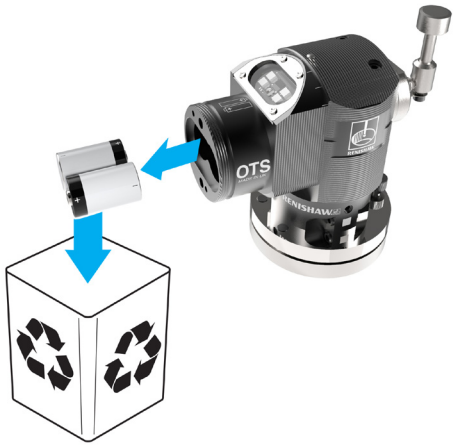
Wipe the window of the probe with a clean cloth to remove machining residue. This should be done on a regular basis to maintain optimum transmission.

CAUTION: The OTS has a glass window. Handle with care if broken to avoid injury.

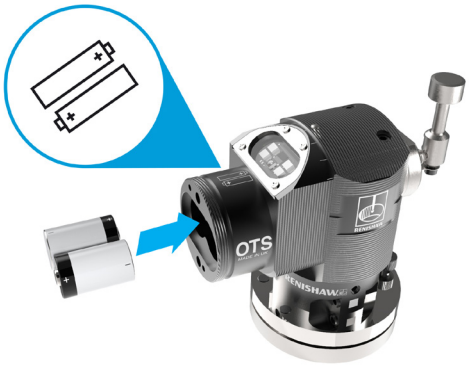
Changing the ½AA batteries

1

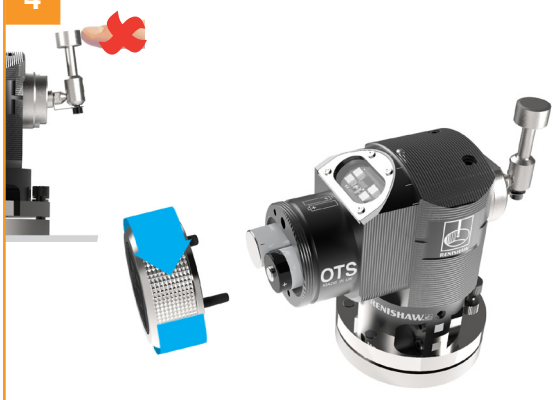
2



3



4



CAUTIONS:

Do not leave dead batteries in the probe.

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

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

Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.

Dispose of dead batteries in accordance with local regulations. Never dispose of batteries in a fire.

NOTES:

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

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

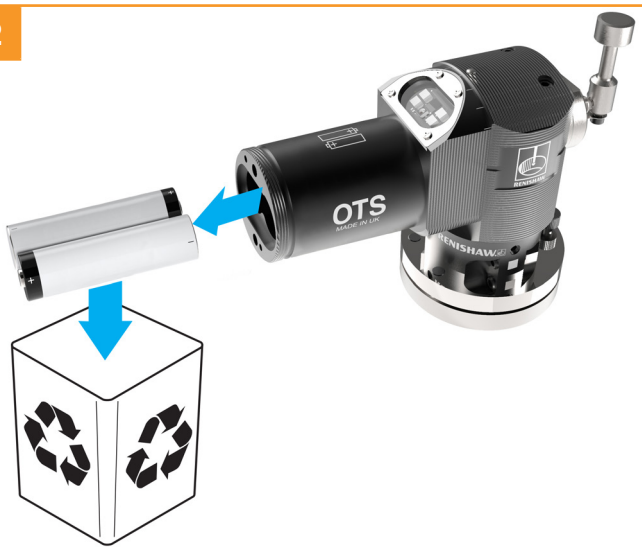
Always ensure that the cassette gasket and mating surfaces are clean and free from dirt before reassembly.

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

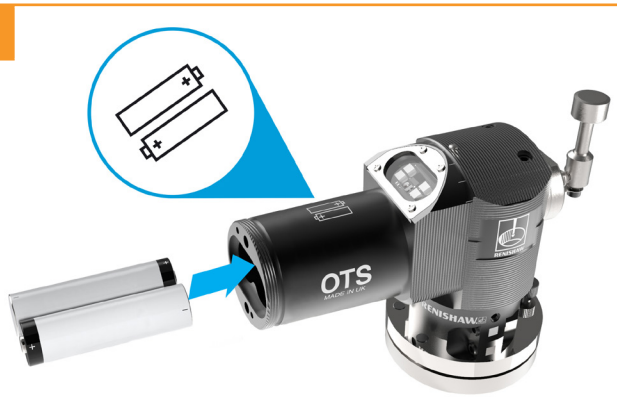
Changing the AA batteries

1

2



3



4

CAUTIONS:

Do not leave dead batteries in the probe.

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

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

Take care to avoid damaging the battery cassette gasket.

Only use specified batteries.

Dispose of dead batteries in accordance with local regulations. Never dispose of batteries in a fire.

NOTES:

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

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

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

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

Battery types

½ AA lithium-thionyl chloride (3.6 V) × 2 supplied with probe

✓

Saft: LS14250
Tadiran: SL-750
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 Alkaline (1.5 V) × 2 supplied with probe

✓ **All AA alkaline batteries**

AA lithium-thionyl chloride (3.6 V) × 2 (optional type)

✓

Saft: LS14500
Tadiran: SL-760/S,
TL-5903/S
Xeno: XL-060F

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

NOTE: Maximum battery life is achieved when lithium-thionyl chloride batteries are used.

Routine maintenance

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

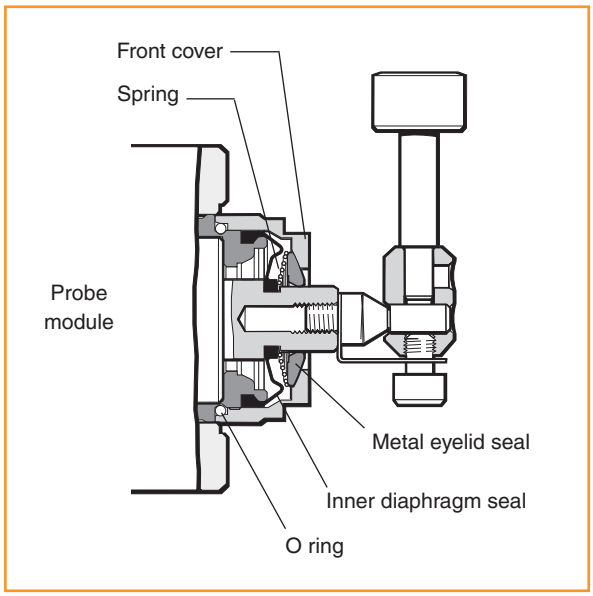
Ensure the probe is firmly secured to its mounting.

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.

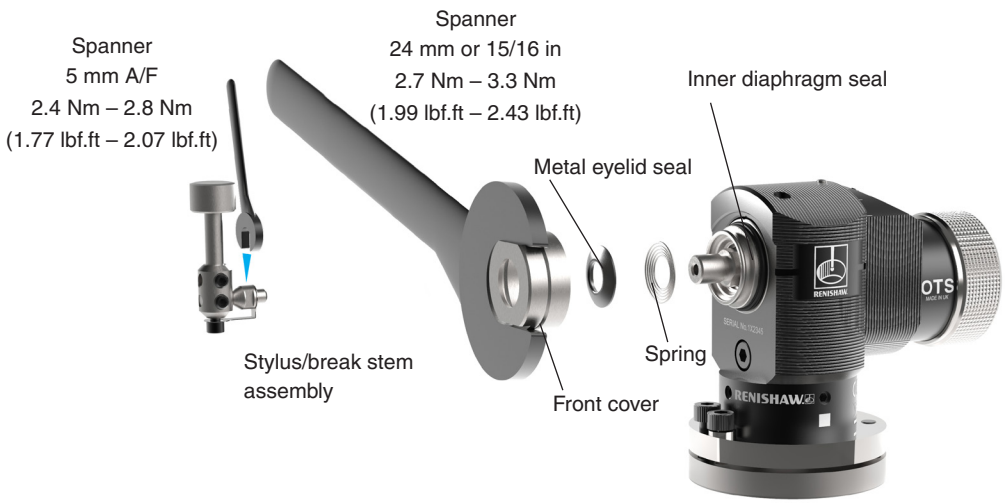
- Do not allow excessive waste material to build up around the probe.
- Coolant residue accumulating on the transmission window will have a detrimental effect on transmission performance (see “Cleaning the probe” on page 5.1).
- Keep all electrical connections clean.
- The probe mechanism is protected by an outer metal eyelid seal and an inner flexible diaphragm seal.

Approximately once a month, inspect the probe inner diaphragm seal (see “Eyelid removal/ replacement” on page 5.6). If it is pierced or damaged, contact Renishaw.

The service interval may be extended or reduced depending on usage and operating environment.



Eyelid removal/replacement



1. Remove the stylus/break stem assembly using the 5 mm A/F 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 inner diaphragm seal. Remove the metal eyelid and spring.

   CAUTION: The eyelid and spring may fall out.

3. Wash inside the probe using clean coolant.

   CAUTION: DO NOT use sharp 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.

Fault-finding

Symptom	Cause	Action
Probe fails to power up (no LEDs illuminated or fails to indicate current probe settings).	Dead batteries.	Change batteries.
	Unsuitable batteries.	Fit suitable batteries.
	Batteries inserted incorrectly.	Check battery insertion / polarity.
	Batteries removed for too short a time and probe has not reset.	Remove batteries for a minimum of 5 seconds.
	Poor connection between battery cassette mating surfaces and contacts.	Remove any dirt and clean the contacts before reassembly.
Probe fails to switch on.	Wrong optical start configuration selected.	Reconfigure.
	Dead batteries.	Change batteries.
	Unsuitable batteries.	Fit suitable batteries.
	Batteries inserted incorrectly.	Check battery insertion / polarity.
	Optical/magnetic interference.	Check for interfering lights or motors. Consider removing interfering source.
	Transmission beam obstructed.	Check that probe 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 the 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.
	Unable to find target surface.	Check that the tool has not broken.
	Adjacent probe.	Reconfigure adjacent probe 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 part and stylus.
	Loose 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 or too slow.	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 tool.

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 into Trigger Logic™ configuration mode and cannot be reset.	Probe was triggered when batteries were inserted.	Do not touch the stylus or stylus mounting face during battery insertion.

Parts list

Type	Part number	Description
OTS (½ AA)	A-5401-2001	OTS probe with disc stylus, ½ AA lithium-thionyl chloride batteries, tool kit and product support card. 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 lithium-thionyl chloride batteries, tool kit and product support card. 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 product support card. Set to: optical on / optical off / filter off /Probe 2 start / standard power.
OTS (AA)	A-5514-2011	OTS probe with square stylus, AA alkaline batteries, tool kit and product support card. Set to: optical on / optical off / filter off Probe 2 start / standard power.
½ AA batteries	P-BT03-0007	½ AA battery – lithium-thionyl chloride – supplied as standard with probe (pack of two).
AA battery	P-BT03-0005	AA battery – alkaline – supplied as standard with probe (two required).
AA battery	P-BT03-0008	AA battery – lithium-thionyl chloride (two required).
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	A-5003-5171	Stylus protection kit comprising: break stem (× 1), captive link (× 1), support bar (× 1), M4 screw (× 2), M4 grubscrew (× 3), hexagon keys: 2.0 mm (× 1), 3.0 mm (× 1) and spanner 5.0 mm (× 1).
Stylus holder	A-2008-0389	Stylus holder kit comprising stylus holder and screws.
Battery cap	A-5401-0301	OTS battery cap assembly.
Seal	A-4038-0301	Battery housing seal.
Tools	A-5401-0300	Comprising: break stem (× 1), captive link (× 2), support bar (× 1), M4 screw (× 2), M4 grub screw (× 3), spirol pin (× 2), hexagon keys: 2.0 mm A/F (× 1), 2.5 mm A/F (× 1), 3.0 mm A/F (× 1), 4.0 mm A/F (× 1) and spanner 5.0 mm A/F (× 1).

Type	Part number	Description
OMI-2	A-5191-0049	OMI-2 with 8 m (26.25 ft) cable, tools and product support card.
OMI-2	A-5191-0050	OMI-2 with 15 m (49 ft) cable, tools and product support card.
OMI-2T	A-5439-0049	OMI-2T with 8 m (26.25 ft) cable, tools and product support card.
OMI-2T	A-5439-0050	OMI-2T with 15 m (49 ft) cable, tools and product support card.
OMM-2	A-5492-0049	OMM-2 with 8 m (26.25 ft) cable, tools and product support card.
OMM-2	A-5492-0050	OMM-2 with 15 m (49 ft) cable, tools and product support card.
OMM-2C (standard non-airblast)	A-5991-0001	OMM-2C (non-integrated airblast) with 7-way socket and product support card.
OMM-2C (optional airblast)	A-5991-0005	OMM-2C (integrated airblast) with 7-way socket and product support card.
OSI interface	A-5492-2000	OSI (multiple probe mode) with DIN rail mounting, terminal block and product support card.
OSI interface	A-5492-2010	OSI (single probe mode) with DIN rail mounting, terminal block and product support card.
OSI-D interface	A-5492-3000	OSI-D (multiple probe mode) with DIN rail mounting, terminal block and product support card.
OSI-D interface	A-5492-3010	OSI-D (single probe mode) with DIN rail mounting, terminal block and product support card.
Mounting bracket	A-2033-0830	OMI-2T/OMI-2H/OMI-2 mounting bracket with fixing screws, washers and nuts.
Raising block	M-2033-7347	Raising block Ø65 mm (Ø2.55 in) × 76.5 mm (3.0 in) tall.
Raising block	M-2033-7189	Raising block Ø65 mm (Ø2.55 in) × 125.5 mm (4.94 in) tall.
Stylus adaptor	A-2008-0448	Adaptor kit to position stylus in horizontal attitude.

Type	Part number	Description
Publications. These can be downloaded from our website at **www.renishaw.com.**		
OMI-2	H-5191-8504	Installation guide: for set-up of the OMI-2.
OMI-2T	H-5439-8510	Installation guide: for set-up of the OMI-2T.
OSI with OMM-2	H-5492-8504	Installation guide: for set-up of the OSI with OMM-2.
OSI/OSI-D with OMM-2C	H-5991-8504	Installation guide: for set-up of the OSI/OSI-D with OMM-2C.
Styli	H-1000-3200	Technical specifications guide: Styli and accessories – or visit our Web shop at **www.renishaw.com/shop**.
Software list	H-2000-2298	Data sheet: *Probe software for machine tools – programs and features*.

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