RENISHAW

apply innovation™

Machine tool probing systems

Contents

How to use icons

The icon example on the right denotes a probe system for machining centres with a #30 taper, used for automated workpiece set-up, measurement and inspection.

A: Yellow / blue / green = Machine type

B: Location to fit probe and spindle taper size

C: Probing task

30

A: Grey = Supported applications

B: Icon application type

Key to icons (used on pages 10 to 25)		
Icons	Type / Category	Description
A: Icon colour	Yellow	Probes for machining centres
	Blue	Probes for multi-tasking machines and lathes
	Green	Probes for CNC grinders
	Grey	Supported probing applications
B: Location to fit a probe		Machine spindle taper size #30–50 (diagram shown at bottom of page)
		Machine table
		CNC lathe turret
		On-machine / around lathes spindle
		Inside CNC grinder
C: Probing task		For workpiece measuring / inspection
		For tool setting

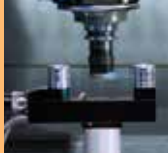| Key to application icons		
Application	Automated part set-up workpiece measuring / inspection	Workpiece measuring / inspection indexing angle measuring / setting	Workpiece measuring / inspection
Icons			
Application	Rotating tool measuring / setting	Lathe tool measuring / setting	Grind wheel measuring / setting
Icons			

Renishaw process control

Process control for manufacturing

Building on its own experiences developing robust manufacturing processes, Renishaw has developed a simple framework to explain how metrology solutions can deliver successful processes through the application of process control.

Renishaw's solutions improve machining performance and increase manufacturing capability. Renishaw's process control solutions can be applied in advance of, just before, during and after metal cutting.

- Increase throughput from existing assets
- Reduce rework, concessions and scrap
- Increase automation and reduce human intervention
- Enhance production capability and take on more work
- Reduce total cost of ownership

Application examples

Programming	Tool setting	Workpiece set-up	Broken tool detection	Tool offset	Pass / Fail logic builder / decision making
Programming on PC	Tool length and diameter	Clamp error setting up	High-speed broken tool detection	Compensation for finish cutting depth	3D Feature Pass / Fail logic builder
Create probing program on machine	Edge / tip position detection	Rotary (axis) error setting	Chipping / missing tool tip detection	Thermal deformation compensation	In-cycle Pass / Fail logic builder

Probing advantages

Probing is an established best practice for maximising the efficiency, quality, capability and accuracy of machine tools. The integration of Renishaw probing hardware and software is widely adopted within machining processes.

- A portfolio of probing system from over 18 probes and over 100 different styli to fit different application
- High-accuracy strain gauge probes to provide unparalleled accuracy for free-form surface and deep bore feature measurement
- Worldwide support from Renishaw local subsidiaries and channel partners

Informative controls applied **after** machining is complete — **Post-process monitoring**

Active controls applied **during** metal cutting — **In-process control**

Predictive controls applied **just before** cutting — **Process setting**

Preventative controls applied in **advance** — **Process foundation**

Productive Process Pyramid™
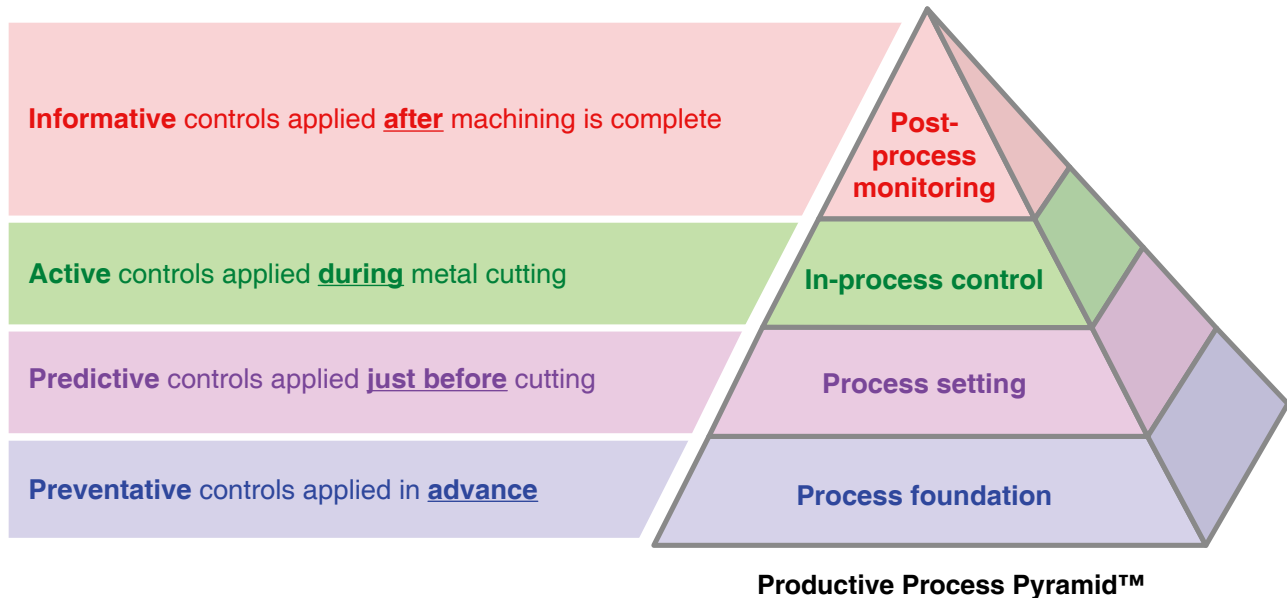
Renishaw's probing system: eliminate errors to improve quality and productivity

Operator		Machine		Material	
Skill level	Missing instruction	Positioning accuracy	Stiffness	Clamp stress	Hardness
Measurement error	Missing procedure	Repeatability	Vibration	Sagging, distortion	Hard spot
Data input error	Set-up error	Maintenance	Squareness	Stress removal	Stress relaxation
Tool selection	Jig	State of measuring device	Temperature	Ambient temperature	Temperature fluctuation
Tool setting up	Work procedure	Running in / warming up time	Measurement error	Work temperature	Humidity
Broken tool	Process delay	Gauge R&R	Dirt / dust / swarf	Coolant flow	Swarf
Method		**Probing / measurement**		**Environment**	

Before — **Error**

Process control

After — Quality and productivity / Traceability / Reliability / Cost
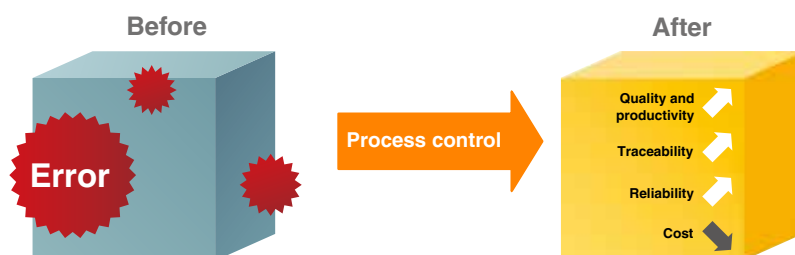
How a probe works

Touch-trigger probes

Machine mounted probes are often referred to as touch-trigger probes because they use switches that are triggered upon contact between the probe's stylus and the component being measured or set. Switching is highly repeatable.

When triggered, the probe signals the control via an interface and the control (almost simultaneously) automatically captures the machine tool position via its encoders (feedback system).
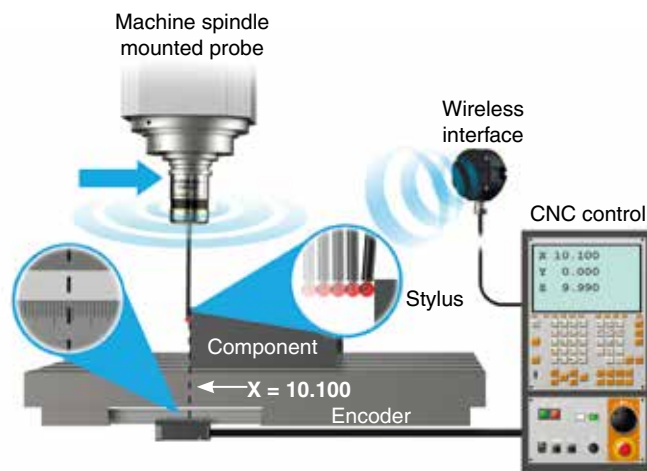
With a co-ordinate point captured, the probe moves on to trigger at a different location. When multiple points are found, shapes and features take form. The minimum number of points needed to measure each type of feature (shown left) is based on each feature's known degrees of freedom.

Measurement is taken by substituting a feature on the component with its theoretical equivalent, for example, a circle or 3D corner. The comparison between the actual and the expected dimension, measures deviation and enables accurate, detailed inspection.

The resultant feedback is at the foundation of the preventative, predictive, active and informative controls that are essential to effective process control.
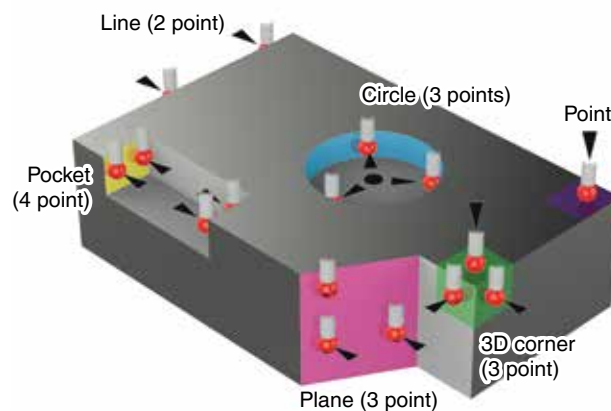
Tool setting probes

Probes used for tool setting are normally attached to the machine table or frame. Commonly referred to as tool setters, these devices use either contact or non-contact methods to trigger a signal.

Contact tool setters use a stylus to detect, measure and automatically set cutting tools using the touch-trigger principle. Non-contact tool setters perform the same function, using a laser system where the tool passing through the laser beam acts as the trigger. Renishaw probes are used across the broadest spectrum of machine tool applications.

Probes and transmission methods

The suitability of transmission methods varies depending on the machine. Please select the appropriate method after taking into consideration cabling, transmission range and environment.

Optical (infrared) communication

- The most commonly used with an inspection probe for machining centres
- Communication using coded infrared signals for enhanced resistance to optical and electromagnetic noises
- The maximum range is 5 m for OMP40-2 / OLP40 and OMP400. The maximum range is 6 m for OMP60 and OMP600.

Touch-trigger probe
Receiver/interface
CNC control
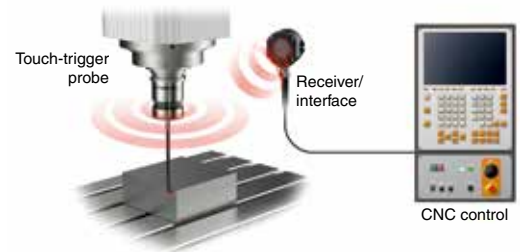
Radio communication

- Recommended for applications where line of sight between probe and receiver is not possible and on larger machines
- It is suitable for five-face machines where the direction of a measuring move varies and multi-tasking machines of which spindles rotate
- No communication errors due to dirt build-up on a probe or receiver when used in coolant or mist filled environment
- Renishaw's unique FHSS (Frequency Hopping Spread Spectrum) system has a strong resistance against radio interference and does not suffer interference from probes on nearby machines
- The maximum communication range is 15 m for RMP40, RMP400, RLP40, RMP60, RMP600

Touch-trigger probe
Receiver/interface
CNC control
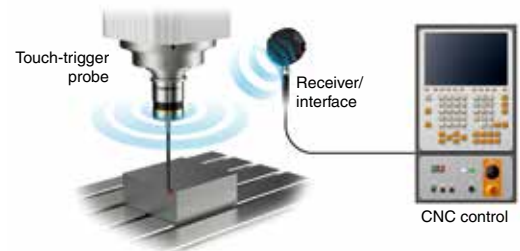
Hard-wired (wired) communication

- The simplest system with affordable cost
- No batteries needed and maintenance-free

Interface
Touch-trigger probe
CNC control
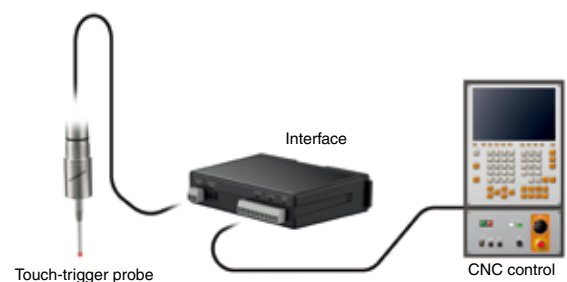
The difference between probes for machining centres and probes for lathes

Probes for machining centres:
When a probe does not get directly hit by high temperature swarf during machining, having been stored inside a tool magazine, please select a probe with diaphragms.

Probes for lathes:
When swarf hits a probe directly, please select a probe with metal eyelid.

Probes with a metal eyelid
OLP40, RLP40, LP2 *, LP2H *, HPPA, HPRA, HPMA

*LP2, LP2H can be fitted with diaphragms.

Stylus
C spanner
Front cap
Metal eyelid
Spring
Probe
"O" Ring
Metal eye lid specification

Stylus
Chip protection (option)
Double diaphragm
Front cover
Outer diaphragm
Probe
"O" Ring
Diaphragm specification
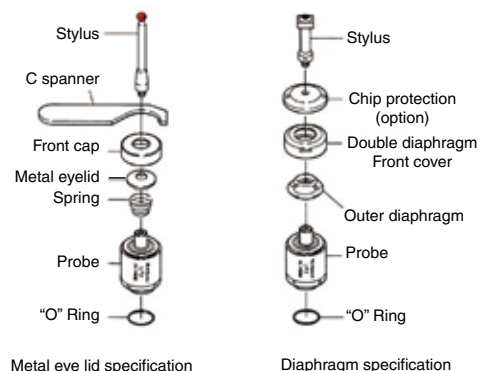
Machine tool applications and Renishaw products

Cutting machine tools fall into the following broad categories:

- Manually operated
- Controlled – computer numerical control (CNC)

Most machine tools used in the production environment today are CNC machines and these can be further categorised into:

- Machining centres for milling, drilling and tapping prismatic parts
- Lathes for turning round parts
- Multi-tasking (mill–turn) machines that combine processes
- Grinding machines for fine finishing
- Drilling and routing machines for PCBs

Diverse application

Machine tool variety is significant with options for vertical spindles, horizontal spindles, multiple spindles, automatic tool changers and so on. Machine sizes, speeds, accuracy and overall performance also vary greatly.

Arguably the most diverse, the Renishaw range of hardware and software products, can be integrated within virtually all known machine tool applications and processes.

- Spindle and turret probes
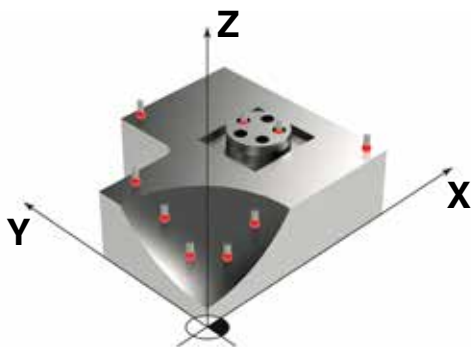
In-process gauging of a prismatic part on a vertical machining centre (VMC)

In-process gauging of a turned part on a turning centre

- Tool setting and broken tool detection

Contact tool setting

Laser-based non-contact tool setting

Tool setting and broken tool detection technologies explained

Tool setting products are referred to as 'contact' or 'non-contact', depending on the technology they employ. The two technologies – kinematic touch probe or optical (laser) based – both use an interface to communicate with the machine tool control. Renishaw products cover a multitude of applications, from simple, quick, tool setting to the complex digitising of ground tools. The technologies are introduced below.

Kinematic tool setters

Renishaw contact tool setters use the same kinematic technology as workpiece inspection probes.

Proven over four decades, this design has been the main choice for the majority of machine builders and end users to ensure accuracy and reliability.

The ability of the probe mechanism to reseat after triggering to within 1.00 µm is fundamental for repeatability and good metrology.

From simple length and radius checking to broken tool detection, this technology is available in all Renishaw's contact tool setters.

Broken tool detection   Thermal growth

Tool wear
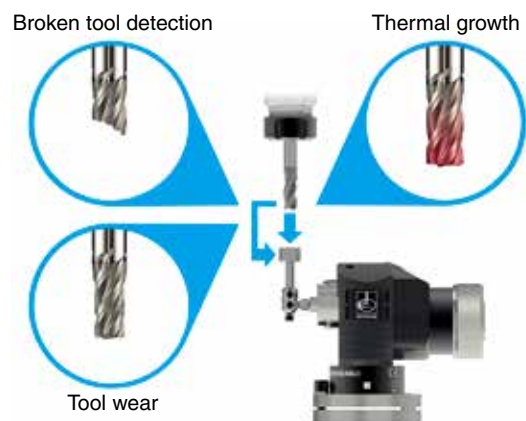
Non-contact laser-based tool setting

Non-contact systems employ laser technology to capture tool geometric information.

Being capable of radial and linear profile checking as well as cutting edge condition monitoring, this technology provides fast cycle times and advanced functionality.

Non-contact tool setting can facilitate even greater benefits from most types of machine tool.

Broken tool detection

Tool wear   Thermal growth
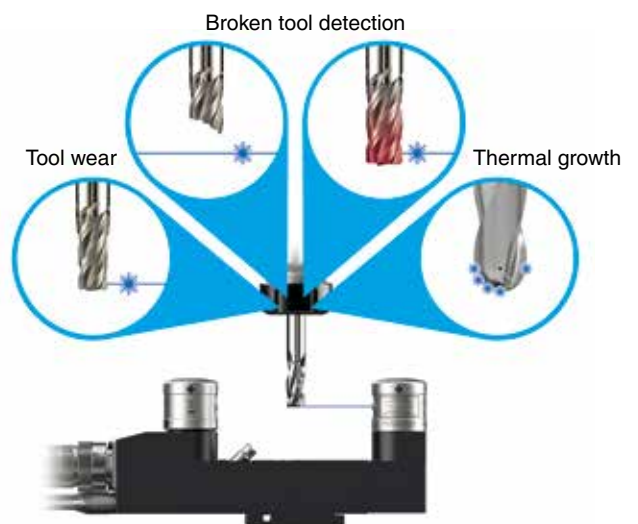
Single-sided laser-based broken tool detection

The groundbreaking TRS2 technology employs a single-sided laser-based design to allow swift and reliable detection of broken tools.

The patented Toolwise™ electronics analyse the reflected laser light and allow detection at a range of spindle speeds.

Laser-based broken tool detection can provide great benefits in reducing scrap and costs with a minimal addition to cycle time.

Broken tool detection

Explore the machine tool probing possibilities

Customer : SuMax Enterprises Pvt Ltd.	
Products and services:	Manufacturer of high-precision parts for the automotive, machine tool and other industries
Challenge:	Reduce scrap and costs — SuMax experienced a 12% scrap rate on finished parts due to wall thickness variation. With parts located on the machine using mechanical fixtures only, it was discovered that the root cause of failure was due to part-to-part size variation of the supplied pump body castings. This highlighted the need for on-machine probing.
Solution:	Primo™ Radio Part Setter to establish an accurate part datum, prior to machining, in order to reduce the scrap rate
Result:	• Reduce part set-up time by 90% • 100% reduction on scrap rate • 15% throughput on parts daily production

"Primo is worth recommending to other SMEs as it is worry-free probing because it helped us in reducing our part setting time and scrap on our components."

SuMax Enterprise (India)

Customer : ODK UMPO PAO	
Products and services:	The company designs, manufactures and services high performance gas turbine engines for both fixed and rotary wing aircraft and gas and oil producing sectors.
Challenge:	Increasing the accuracy and efficiency of bladed disk milling process
Solution:	OSP60 on-machine 3D scanning probe and Productivity+ software
Result:	• Reduce part set-up time by 90% • 100% reduction on scrap rate • 15% throughput on parts daily production

"The results we have gained from the investment have far exceeded our expectations. Our accuracy in fine milling of bladed disks is more than four times better and the related labour costs have been halved."

ODK UMPO PAO (Russia)

Customer : Hartford / She Hong Industrial Co. Ltd.	
Products and services:	Machine tool manufacturer supplies high quality machines to 65 countries around the world
Challenge:	Strives to provide Intelligent HMI and easy-to-use machining experience
Solution:	Intelligent CNC controllers integrated with Set and Inspect on-machine probing apps
Result:	Increasing processing efficiency by 20% as operators using Hartford HMI no longer need to commit machine code instruction to memory, therefore reducing data entry error and programming times.

"The new Hartrol Plus controller has been designed to make our machines easy to use. Set and Inspect is the perfect addition as its graphical user interface means that operators can program machine tool probing routines with ease."

Hartford (Taiwan)

Customer : Katsa Oy and Flexmill Oy	
Products and services:	Gear and gearbox manufacturer (Katsa Oy) machines and deburrs gears ranging in size from 50 mm to 1.5 m diameter.
Challenge:	Eliminate inconsistent finish across batches of gears caused by manual deburring
Solution:	Flexmill Oy built a robotised deburring cell comprising an ABB robot with Renishaw RMP60 probe, which enabled automated set-up and part checking
Result:	The automated solution provided a consistent finish across the batch, while simultaneously removing a hazardous, manual deburring operation.

"The Renishaw RMP60 probe has been working very well and it makes it possible for the Flexmill software to generate a full deburring programme for every one of the gears we manufacture."

Katsa Oy (Finland)

Probes for machining centres

Radio probes for component setting and inspection

Key points

- Long-range communication allows probing on large / multi-axis machines
- Secure and stable communication in mist and dust filled environments
- Wireless ATC can be used
- Simple configuration for easy retrofit
- FHSS technology removes risk of radio interference
- Communication status displayed with LEDs on RMI-Q

	Small standard accuracy probe	Small high accuracy probe	Standard accuracy probe	High accuracy probe
Probe type	RMP40	RMP400	RMP60	RMP600
Repeatability (2σ, 50 mm stylus) (feedrate)	1.00 µm (480 mm / min)	0.25 µm (240 mm / min)	1.00 µm (480 mm / min)	0.25 µm (240 mm / min)
Sensing method	Kinematic resistive	Strain gauge	Kinematic resistive	Strain gauge
Sense direction	±X, ±Y, +Z			
Trigger force (50 mm stylus)	XY low force: 0.5 N 51 gf XY high force: 0.9 N, 92 gf +Z: 5.85 N, 597 gf	0.09 N, 9 gf (0.32 ozf) 3.34 N, 341 gf (12.01 ozf)	XY low force: 0.75 N, 76 gf XY high force: 1.40 N, 143 gf +Z: 5.30 N, 540 gf	XY plane: 0.20 N, 20 gf (typical minimum) +Z plane: 1.90 N, 194 gf (typical minimum)
Overtravel distance	XY:±12.5° +Z: 6 mm	XY:±11° +Z: 6 mm	XY:±18° +Z: 11 mm	XY:±15° +Z: 11 mm
Sealing	IPX8 (EN/IEC 60529)			
Weight without shank (including batteries)	250 g	262 g	876 g	1010 g
Compatible receiver	RMI-Q			
Maximum operating range	15 m			
Size	Ø40 mm × 50 mm	Ø40 mm x 50.5 mm	Ø63 mm × 76 mm	Ø63 mm × 76 mm

RMP40

- The smallest frequency-hopping radio spindle probe in the world
- Ideal for automated part set-up and inspection on small dedicated machines and multi-tasking machines
- Renishaw's unique FHSS technology prevents interference from nearby / external devices

Recommended machines and applications: Small dedicated machines for automated workpiece set-up and inspection for features such as circle and pocket

RMP400

- Offers an unrivalled combination of size, accuracy, reliability and robustness
- Allows high-accuracy probing on small to medium machining centres
- Delivers high accurate and long life with RENGAGE™ technology

Recommended machines and applications: Small to medium sized multi-tasking machines and 5-axis machining centres

RMP60

- Various activation options and adjustable trigger force
- Provides stable communication for an area where optical transmission is not possible
- Ideal for automated part set-up / inspection on middle-sized to large machines

Recommended machines and applications: Gantry machining centres and multi-tasking machines for automated workpiece set-up and inspection for features such as circle and pocket

RMP600

- The highest specification model with high accuracy and long-range communication
- Brings probing to large machines such as gantry machining centres
- Delivers high accuracy and long life with RENGAGE™ technology
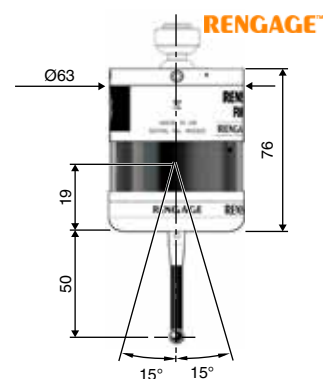- Highly accurate and repeatable even when a 200 mm long stylus is used

Recommended machines and applications: Gantry machining centres, multi-tasking machines and machines for mould and die machining. Suitable for inspection of curved and tilted surfaces using a long stylus

See page 3 for key for icons.

Dimensions given in mm
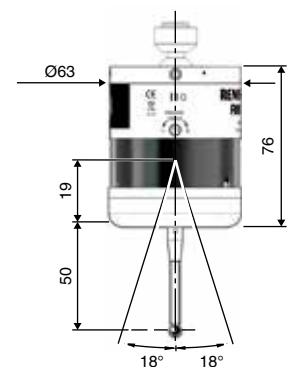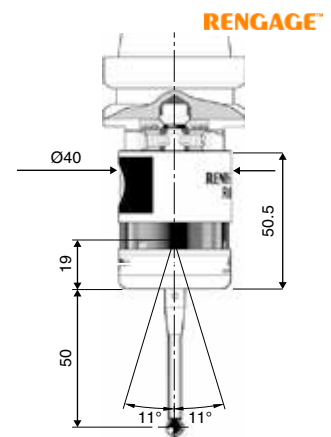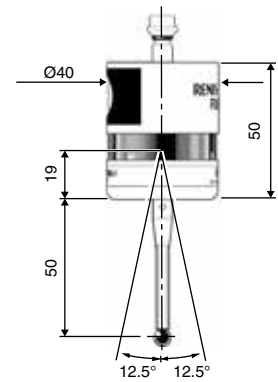
Optical probes for component setting and inspection

Key points

- World-leading deployment
- Extensive product range and options
- Wireless ATC can be used
- Simple configuration for easy retrofit

	Small standard accuracy probe	Small high accuracy probe	Standard accuracy probe	High accuracy probe
Probe type	OMP40-2	OMP400	OMP60	OMP600
Repeatability (2σ, 50 mm stylus) (feedrate)	1.00 µm (480 mm/min)	0.25 µm (240 mm/min)	1.00 µm (480 mm/min)	0.25 µm (240 mm/min)
Sensing method	Kinematic resistive	Strain gauge	Kinematic resistive	Strain gauge
Sense direction	±X, ±Y, +Z			
Trigger force (50 mm stylus)	XY low force: 0.5 N 51 gf XY high force: 0.9 N, 92 gf +Z: 5.85 N, 585 gf	XY plane: 0.06 N, 6 gf (typical minimum) +Z plane: 2.55 N, 260 gf (typical minimum)	XY low force: 0.75 N, 76 gf XY high force: 1.40 N, 143 gf +Z: 5.30 N, 540 gf	XY plane: 0.15 N, 15 gf (typical minimum) +Z plane: 1.75 N, 178 gf (typical minimum)
Overtravel distance	XY: ±12.5° +Z: 6 mm	XY: ±11° +Z: 6 mm	XY: ±18° +Z: 11 mm	XY: ±15° +Z: 11 mm
Sealing	IPX8 (EN/IEC 60529)			
Weight without shank (including batteries)	250 g	262 g	885 g	1029 g
Compatible receiver / Transmission method[1] — OMI-2 Modulated / OMI-2T Modulated / OMM-2 OSI Modulated (Multi-probe)	•	•	•	•
Maximum operating range	5 m	5 m	6 m	6 m
Size	Ø40 × 50 mm	Ø40 × 50 mm	Ø63 × 76 mm	Ø63 × 76 mm

[1] Can be used in legacy mode.

OMP40-2

- Ultra-compact body for use in a #30 spindle machine
- Ideal for automated part set-up and inspection on small machines
- Exceptional resistance to light interference with modulated transmission
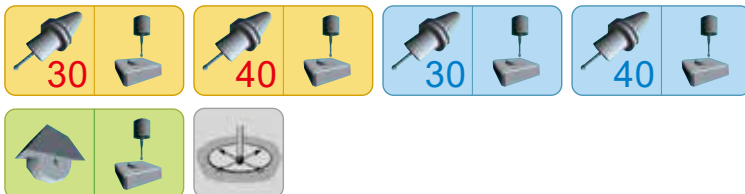
Recommended machines and applications: Small machining centres for automated workpiece set-up and feature inspection such as circle and pocket

OMP400

- Delivers high accuracy and long life with RENGAGE™ technology
- Ideal for automated part set-up, high-accuracy inspection and free-form probing on small machines
- Delivers excellent repeatability even when a 200 mm long stylus is used
- 3D performance ideal for 5-axis machines

Recommended machines and applications: Machines for fine machining and high-accuracy finishing, and surface grinder. Suitable for the inspection of curb and tilted surfaces using a long stylus

OMP60

- Compact body, industry standard probe with world-leading deployment
- Ideal for automated part set-up and inspection on small / medium machines
- 360° transmission envelope

Recommended machines and applications: Medium-sized machining centres for workpiece set-up and feature inspection such as circle and pocket

OMP600

- Strain gauge technology provides higher accuracy and longer life
- Ideal for automated part set-up, high-accuracy inspection and free-form inspection / probing on medium-sized machines
- Delivers excellent repeatability even when 200 mm long stylus is used

Recommended machines and applications: Machines for fine machining for inspection of curb and tilted surfaces using a long stylus

See page 3 for key to icons.

Dimensions given in mm

15
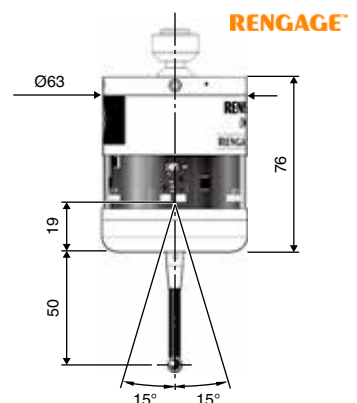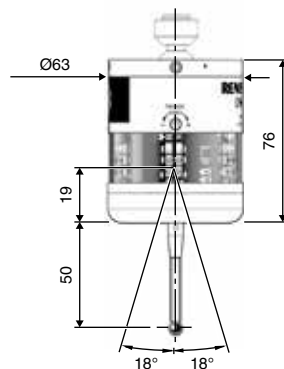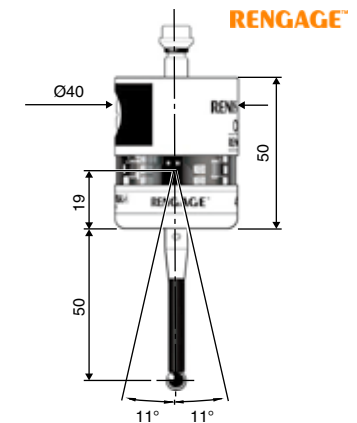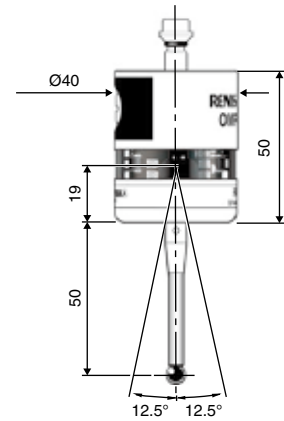
SPRINT™ technology with Productivity+™ Scanning Suite

Next-generation high-speed, high-accuracy 3D scanning system

With the unique 3D sensor technology, the OSP60 probing systems with SPRINT technology provide exceptional, high-speed, high accuracy, probing to CNC machine tools.

SPRINT™ technology can be used with the Productivity+™ Scanning Suite for advanced measurement of free-form surfaces, such as turbine blades and mould tools. The Suite comprises a variety of application-specific toolkits that can be programmed using Productivity+™ Active Editor Pro software.

2D and 3D	-	measure both complex 2D and 3D surfaces at high speed
Accuracy	-	absolute XYZ surface data with 1,000 points per second
High speed	-	up to six times faster than touch-trigger systems
	-	scanning speed up to 15,000 mm/minute

Specification

System principal application	High-speed scanning system for on-machine process control.
OSP60 (probe)	Analogue scanning probe for machine tools, capable of both 3D scanning and 3D discrete point measurements.
OMM-S (receiver)	Optical receiver specific to the SPRINT system.
OSI-S (interface)	Interface that processes data from the OMM-S and provides input / output communication with the machine tool.
Transmission type	Infrared optical transmission: up to 1000 3D points per second.
Probe transmission range	360°. Up to 4.5 m with one receiver, or up to 9 m with two receivers.
Probe turn-on time	Less than 0.5 seconds
Probe weight (without shank) with batteries	1080 g
Scanning measurement range *(see note 1)*	±X, ±Y, ±Z 0.50 mm
Sensor type	Full 3D (simultaneous XYZ data output)
Sense directions	Omnidirectional ±X, ±Y, ±Z.
Sensor resolution (µm / digit) *(see note 2)*	XY 0.025 µm; Z 0.004 µm
Maximum scanning speed	Up to rapid (G0) feedrate dependent on machine tool performance and application.
Stylus length range	75 mm to 150 mm recommended.
Stylus ball diameter range	2 mm to 8 mm typical.

Stylus force	**Spring rate** *(see note 2)*	**Measuring force** *(see notes 2 and 3)*
XY (typical)	0.8 N / mm	0.1 N 10 gf
Z (typical)	1.5 N / mm	0.2 N 20 gf

Sealing OSP60 / OMM-S OSI-S	BS EN 60529:1992+A2:2013 (IEC 60529:1989+A1:1999+A2:2013). IPX8 IP20
Operating temperature	+5 °C to +55 °C
OMM-S cable	The OMM-S is supplied with either 8 m or 15 m of cable. Cable specification: Ø6.1 mm, 8-core, twisted pair, screened cable, each core 7 × 0.146 mm. Maximum cable length 30 m.

Note 1   Maximum allowed distance between the nominal scan line and the actual scan line. Full 3D performance on a vertical machining centre with a 75 mm stylus. In some applications, this range can be extended. Contact your local Renishaw representative for more information.

Note 2   Typical for a 100 mm stylus

Note 3   Force at which the status signal changes for touch trigger. Assumes a trigger threshold of 0.125 mm.

Productivity+™ Scanning Suite components

OSP60 probe

The OSP60 scanning probe has an analogue sensor with exceptional resolution in three dimensions to provide high-accuracy data and the greatest understanding of workpiece form.

Productivity+™ CNC plug-in

The Productivity+™ CNC plug-in controls the OSP60 scanning probe, the machine tool, and the PC-based data tools, enabling more advanced data processing than traditional methods. Real-time data processing during measuring or cutting minimises cycle time and results in a high-speed, accurate, and capable process.

The software provides exceptional ease-of-use for machine operators and programmers, with its on-line editor allowing the measurement program to be updated on the machine.

OMM-S receiver: optical transmission for high-speed communication

The OSP60 probe and OMM-S receiver unit communicate via a high-speed optical link. The unique communication protocol provides reliable, high-speed and robust data communication

OSI-S interface: data link to machine control

The OSI-S interface passes data between the OSP60 and the Productivity+ CNC plug-in software.

DPU-2 data processing unit

The DPU-2 data processing unit optionally hosts the Productivity+™ CNC plug-in software and any associated application toolkits.

Installation of these software applications to an external device provides high-speed data analysis of measurement results and ensures that the system runs quickly and smoothly.

Productivity+™ Active Editor Pro

Productivity+™ Active Editor Pro provides a simple-to-use environment for incorporating measurement and inspection probe routines and in-process decision making into machining cycles.

OSP60 dimensions

Battery cassette. A range of probe-ready shanks are available from Renishaw. M4 stylus. Probe status LED. Window. 100. 13.6. 100.6. Ø62. 4.8°. 4.8°.
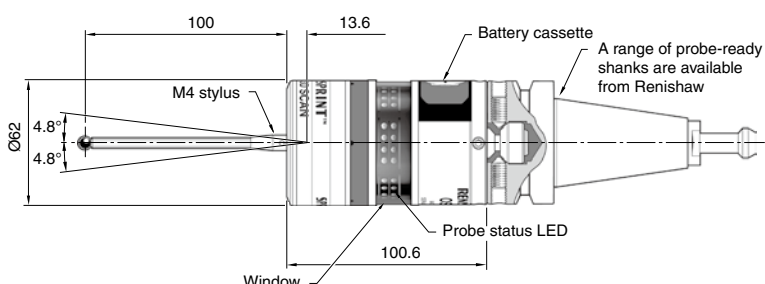
Stylus overtravel limits			
Stylus length	±X / ±Y	+Z	−Z
75	7	6	2.2
100	9	6	2.2
150	13.5	6	2.2

Dimensions given in mm

Primo™ system

Introducing Renishaw's Primo system – the automated workpiece setting and tool setting solution!

Key points

- Primo Radio Part Setter automatically sets the workpiece datum prior to cutting
- Primo Radio 3D Tool Setter sets the length and diameter of a tool and perform in-process broken tool detection
- The Primo LTS single-axis tool setter updates tool offsets, reduces the tool setting time up to 90% compared with manual methods.
- Free self-study training kit and GoProbe: new, simplified, probing software.

	Workpiece measuring / inspection probe	3D tool setting probe	Tool length measuring probe / plunger
Probe type	Primo radio part setter	Primo radio 3D tool setter	Primo LTS
Repeatability (2σ, 50 mm stylus) (feedrate)	1.00 µm (480 mm/min)	1.00 µm (480 mm/min)	0.75 µm (480 mm/min)
Sensing method	Kinematic resistive	Kinematic resistive	Optical
Sense direction	±X, ±Y, +Z	±X, ±Y, +Z	+Z
Trigger force (50 mm stylus)	XY low force: 0.5 N 51 gf XY high force: 0.9 N, 92 gf +Z: 5.85 N, 597 gf	1.30 N to 2.40 N, 133 gf to 245 gf (depending on sense direction)	3 N / 306 gf (Z direction)
Overtravel distance	XY: 12.5° Z: 6 mm	XY: 3.5° Z: 6 mm	7.5 mm: Switch detection 12 mm: Stroke / Travel end
Sealing for water and dust	IPX8 (EN/IEC 60529)	IPX8 (EN/IEC 60529)	IPX6/8 (EN/IEC 60529)
Weight without shank (including batteries and cable)	350 g	660 g	726 g
Maximum operating range	10 m	10 m	
Size (mm)	51 × 61.25	93.4 × 56 × 101.75	100 × 60 × 50

Primo radio part setter

- Combines radio communication to Renishaw's renowned miniaturisation technology
- Ideal for automated part set-up and inspection on small dedicated machines and multi-tasking machines
- Fitted with Renishaw's unique FHSS technology which prevents interference from nearby / external devices

Recommended machines and applications: Small machining centres and multi-tasking machines for automated workpiece set-up and feature inspection such as circle and pocket
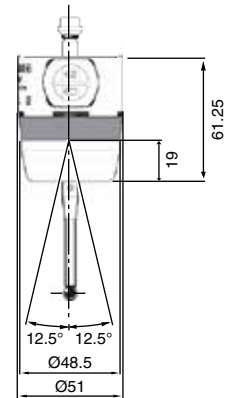
Primo radio 3D tool setter

- Designed with a crank stylus to prevent damage to the probe body in the event of a crash
- Controlled independently of the part setter using the Primo interface
- Easy alignment with simple adjustment mechanism

Recommended machines and applications: Small machining centres and multi-tasking machines for rotating tool setting / measuring
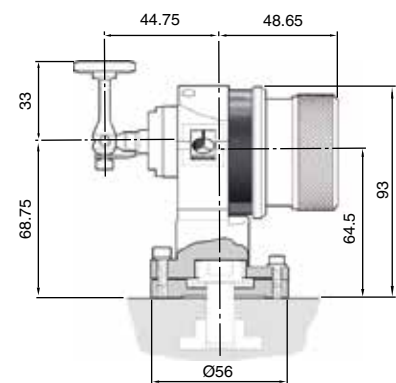
Primo LTS (optional)

- Single-axis length tool setter
- With its built-in interface, it can be hard-wired to the machine's controller directly
- Connecting to Primo interface is also possible (select either Primo LTS or Primo radio 3D tool setter)
- Air blast fitted as standard
- Overtravel output to prevent damage due to operational mistakes
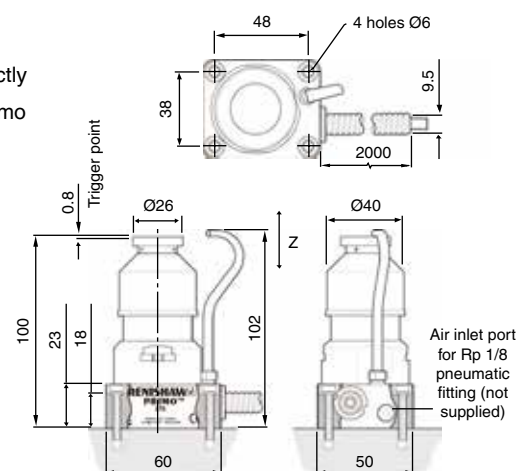
Recommended machines and applications: Small machining centres and multi-tasking machines for static tool length measuring

Modular type probe systems

OMP40M, OMP60M, RMP40M and RMP60M: Modular versions enable the probe to access features for inspection or part setting otherwise inaccessible by the standard probe.
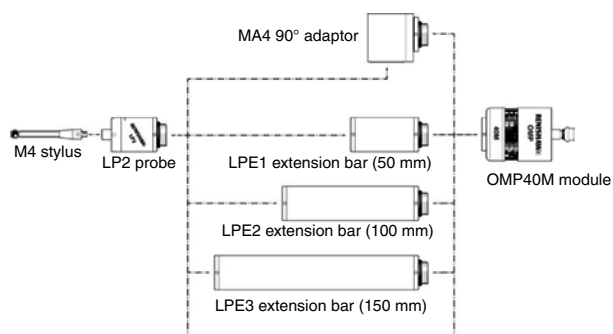
Key points

- Fit to all communication modules
- Wide range of features can be inspected when combined with options
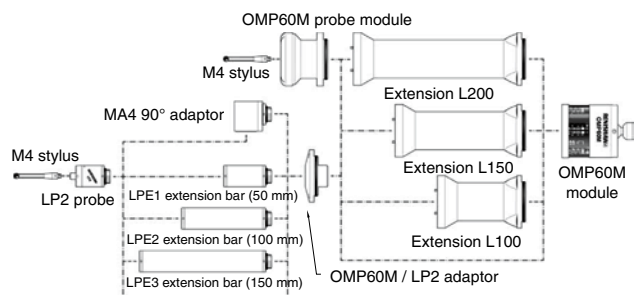- Compact design

		Miniature probe	Miniature high trigger force probe	Miniature high accuracy probe
Probe type		LP2 / LP2DD	LP2H / LP2HDD	MP250
Repeatability (2σ sigma 35 mm stylus)		1.00 µm	2.00 µm	0.25 µm
(feedrate)		(480 mm/min)	(480 mm/min)	(240 mm/min)
Sensing method		Kinematic resistive	Kinematic resistive	Strain gauge
Sense direction		±X, ±Y, +Z		
Trigger force (35 mm stylus)		XY low force: 0.5 N 51 gf XY high force: 0.9 N, 92 gf +Z: 5.85 N, 597 gf	XY low force: 2.00 N, 204 gf XY high force: 4.00 N, 408 gf +Z: 30.00 N, 3059 gf	XY plane: 0.08 N, 8.2 gf (typical minimum) +Z plane: 2.6 N, 265 gf (typical minimum)
Overtravel distance		±X / ±Y: 12.5° Z: 6.5 mm (DD XY: 15°)	±X / ±Y: 12.5° Z: 5 mm (DD XY: 15°)	±X / ±Y: 13° Z: 6.5 mm
Sealing		IPX8 (EN / IEC 60529)		
Weight		65 g	65 g	64 g
Communication method	Optical communication *	•	•	
	Radio communication *	•	•	
	Hard-wired communication *	•	•	•
Size		Ø25 × 40.8 mm	Ø25 × 40.8 mm	Ø25 × 40.7 mm

* Requires a separate communication module or socket for each communication type.

OMP40M / RMP40M modular system

MA4 90° adaptor

M4 stylus

LP2 probe

LPE1 extension bar (50 mm)

OMP40M module

LPE2 extension bar (100 mm)

LPE3 extension bar (150 mm)

OMP60M / RMP60M modular system

OMP60M probe module

M4 stylus

MA4 90° adaptor

M4 stylus

LP2 probe

LPE1 extension bar (50 mm)

Extension L200

Extension L150

OMP60M module

LPE2 extension bar (100 mm)

Extension L100

LPE3 extension bar (150 mm)

OMP60M / LP2 adaptor

Dimensions given in mm

LP2 / LP2H / LP2DD / LP2HDD

- Enhanced protection against hot chips / swarf with metal eyelid (LP2 / LP2H)

- 1.00 to 2.00 µm 2σ repeatability (dependent on probe)

- Can be used for both workpiece inspection and tool setting using different configurations / combinations

- 'H' series model with high trigger force available depending on environment

Recommended machines: CNC lathes, CNC grinders, all sized machining centres

LP2DD or LP2HDD with OMP40M/RMP40M
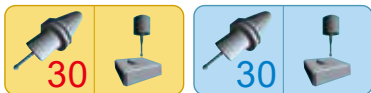
LP2DD or LP2HDD with OMP60M/RMP60M
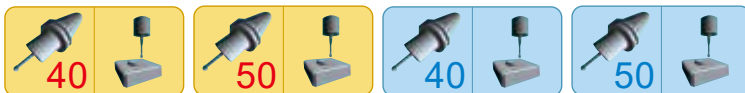
LP2 or LP2H with OMP40M/RMP40M

With LP2 or LP2H

Recommended applications: Tool setting for rotating tools / tool on lathe, automated workpiece set-up and feature inspection such as circle and pocket
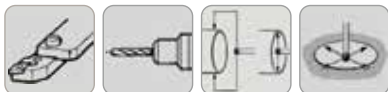
MP250

- Renishaw's smallest miniature body fitted with RENGAGE™ technology

- 3D performance ideal for 5-axis machines

- 0.25 µm 2σ repeatability

Recommended machines and applications: CNC tool grinders and CNC grinders for workpiece inspection and tool setting

Tool setting systems

Key points

- Highly robust and suitable for installation in machining area
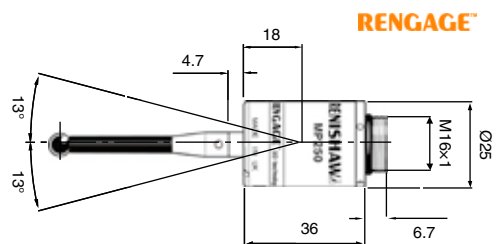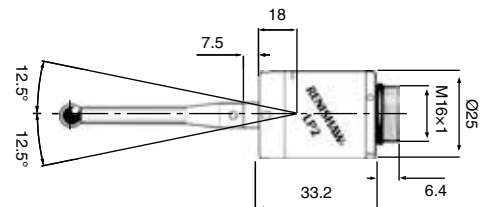- Tool setting with rotating tool (using Renishaw CTS software)
- Broken tool detection

	Tool setting ONLY probe		Tool setting probes with automatic protection covers
Probe type	TS27R / OTS / RTS	TS34	APCA-45
Repeatability (2σ at feedrate 480 mm/min) (stylus length)	1.00 µm* (35 mm)	1.00 µm (50 mm)	1.50 µm (60 mm)
Sensing method	Kinematic resistive	Kinematic resistive	Kinematic resistive
Sense direction	±X, ±Y, +Z		
Trigger force (50 mm stylus)	1.3 N to 2.4 N / 133 gf to 245 gf (depending on sense direction)	XY low force: 0.65 N, 66 gf XY high force: 1.42 N, 145 gf +Z: 5.50 N, 561 gf	XY low force: 0.49 N, 50.25 gf XY high force: 0.9 N, 92.21 gf +Z: 6.79 N, 692.88 gf
Overtravel distance	XY: 10° Z: 5.5 mm	XY: 9° Z: 4 mm	
Sealing	IPX8 (EN/IEC 60529)		IPX6 and IPX8 (EN/IEC 60529)
Weight	1055 g / 870 g / 870 g	660 g	1200 g
Communication method / Optical	OTS		
Communication method / Radio	RTS		
Communication method / Hard-wired	TS27R	●	●
Size		Ø60 × 133 mm	45 x 45 x 190 mm

*TS27R / OTS / RTS when standard crank stylus is used.

TS27R / OTS / RTS

- 1.00 µm 2σ repeatability
- Designed with a crank stylus to minimise damage to the probe body in the event of a crash
- Simple adjustment mechanism for easy alignment
- TS27R – simple hard-wired communication
- OTS – optical communications
- RTS – radio communication

Recommended machines and applications: All size machining centres and multi-tasking machines for tool setting with rotating tools
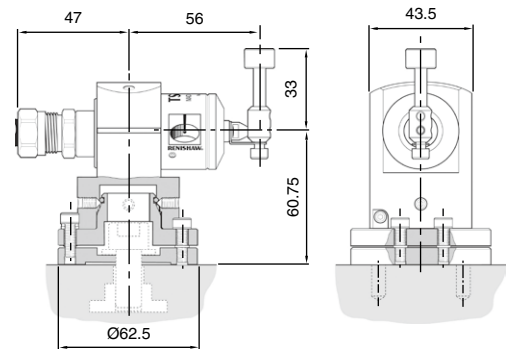
TS34

- Protects a probe from hot chips and swarf using a chip shield
- Easy alignment with simple adjustment mechanism

Recommended machines and applications: All size machining centres and multi-tasking machines for tool setting with rotating tools
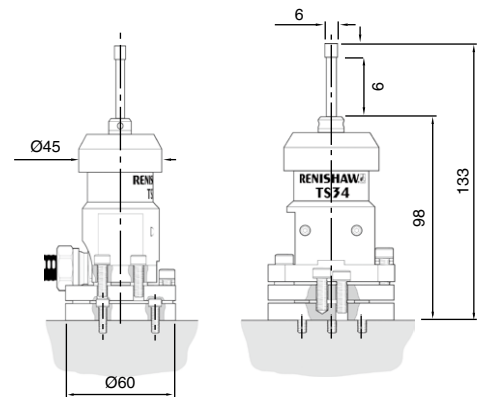
APCA-45

- A pneumatic cover ensures the stylus is fully protected when not in use.
- Rapid measurement of turning, parting, grooving, threading and boring tools.
- A robust and compact stainless steel body provides installation flexibility, enabling fitment in areas of the machine previously unsuitable for tool setters.
- An integrated air-bleed helps the stylus remain free of debris, for accurate and reliable measurement (optional air-blast for tool cleaning also available).

Recommended machines and applications: lathes and multi-tasking machines.

See page 3 for key to icons.

Dimensions given in mm
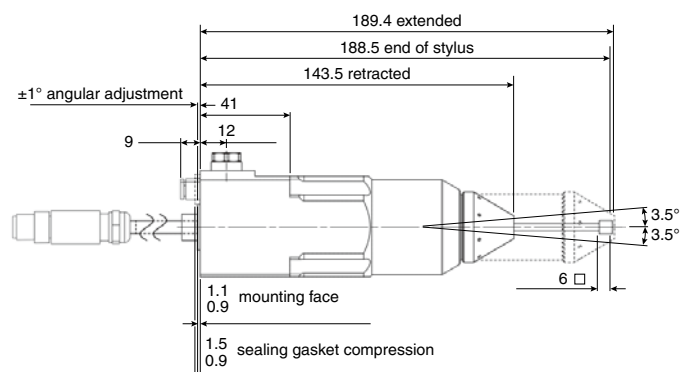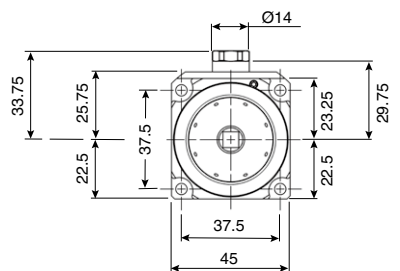
Non-contact tool setting systems

NC4 Integral Air Blast and NC4+ Blue

Key points

- 'Dual measurement' mode reduces cycle time and ensures robust performance in wet conditions
- Integrated air blast enables swift and efficient removal of machining debris and coolant to ensure accurate results
- Rapid sensing by a tool blocking specific amount of laser beam

	Tool length / diameter measuring / setting probe	
Probe type	NC4 Integral Air Blast	NC4+ blue
Color of laser	Red laser	Blue laser
Repeatability (2s) (minimum tool diameter diameter)	±1.0 µm	
Sensing method	Blocking laser beam	
Sense direction	Length / Diameter direction	
Sealing for water and dust	IPX6 and IPX8 (EN/IEC 60529)	
Communication method	Hard-wired communication	
Size	Various sizes available	
Air blast pneumatic supply	6.0 bar maximum	

Recommended machines and applications: All size machining centres and multi-tasking machines for rotating tool setting / measuring

Dimensions
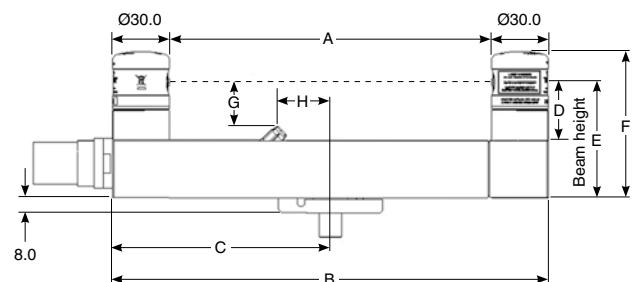
NC4+ Blue

While conventional laser tool setting systems feature a red laser beam, NC4+ Blue is the industry's first blue laser tool setter.

Blue lasers have a shorter wavelength, resulting in improved diffraction effects and optimised laser beam geometry. It enables the measurement of very small tools, whilst minimising tool-to-tool measurement errors.

As a result, NC4+ Blue delivers a step change in tool measurement accuracy:

Conventional lasers

NC4+ Blue

Visible light

Standard accuracy

Higher accuracy
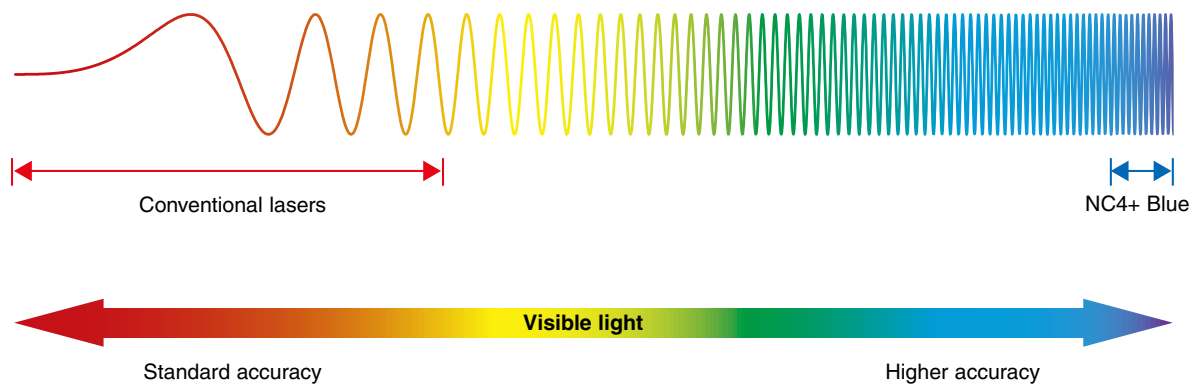
Models

Model	Blue laser	Red laser	Dimensions							
			A	B	C	D	E	F	G	H
F115		✔	55.0 (2.17)	115.0 (4.53)	57.5 (2.26)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	18.0 (0.71)	13.7 (0.54)
F115 (raised)		✔	55.0 (2.17)	115.0 (4.53)	57.5 (2.26)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	35.6 (1.40)	12.6 (0.50)
F145		✔	85.0 (3.35)	145.0 (5.71)	72.5 (2.85)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	20.4 (0.80)	24.5 (0.96)
F145 (raised)		✔	85.0 (3.35)	145.0 (5.71)	72.5 (2.85)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	37.5 (1.48)	25.0 (0.98)
F230		✔	170.0 (6.69)	230.0 (9.06)	115.0 (4.53)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	21.3 (0.84)	25.3 (1.00)
F230 (raised)		✔	170.0 (6.69)	230.0 (9.06)	115.0 (4.53)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	40.3 (1.59)	44.3 (1.74)
F300		✔	240.0 (9.45)	300.0 (11.81)	150.0 (5.91)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	21.4 (0.84)	25.4 (1.00)
F300 (raised)		✔	240.0 (9.45)	300.0 (11.81)	150.0 (5.91)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	40.4 (1.59)	44.4 (1.75)

Model	Blue laser	Red laser	Dimensions							
			A	B	C	D	E	F	G	H
F115C	✔	✔	55.0 (2.17)	155.0 (6.10)	97.3 (3.83)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	18.1 (0.71)	13.8 (0.54)
F115C (raised)	✔	✔	55.0 (2.17)	155.0 (6.10)	97.3 (3.83)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	35.1 (1.38)	12.3 (0.48)
F145C	✔	✔	85.0 (3.35)	185.0 (7.28)	112.3 (4.42)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	21.3 (0.84)	25.3 (1.00)
F145C (raised)	✔	✔	85.0 (3.35)	185.0 (7.28)	112.3 (4.42)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	37.1 (1.46)	24.7 (0.97)
F230C		✔	170.0 (6.69)	270.0 (10.63)	155.0 (6.10)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	21.3 (0.84)	25.3 (1.00)
F230C (raised)		✔	170.0 (6.69)	270.0 (10.63)	155.0 (6.10)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	40.3 (1.59)	44.3 (1.74)
F300C		✔	240.0 (9.45)	340.0 (13.39)	190.0 (7.48)	31.0 (1.22)	61.0 (2.40)	77.0 (3.03)	21.3 (0.84)	25.3 (1.00)
F300C (raised)		✔	240.0 (9.45)	340.0 (13.39)	190.0 (7.48)	50.0 (1.97)	80.0 (3.15)	96.0 (3.78)	40.3 (1.59)	44.3 (1.74)

Dimensions given in mm

TRS2 broken tool detection probe

Key points

- Cost-effective, fast and reliable
- The latest ToolWise™ tool recognition technology
- Ultra-quick detection: typically the tool spends approximately one second in the laser beam
- Simple installation and set-up
- Broken tools detected by reflected laser beam from rotating tool
- Average detection time of only one second
- Simple structure with built-in interface

	Broken tool detection probe
Probe type	TRS2
Repeatability (2σ) (minimum tool diameter)	N/A (Ø0.2 mm)
Sensing method	Reflecting laser beam
Sense direction	Broken tool detection only
Sealing for water and dust	IPX8 (EN/IEC 60529)
Communication method	Hard-wired communication
Size	38 × 73 × 83 mm

Recommended machines applications: All size machining centres and multi-tasking machines for rotating tool broken tool detection
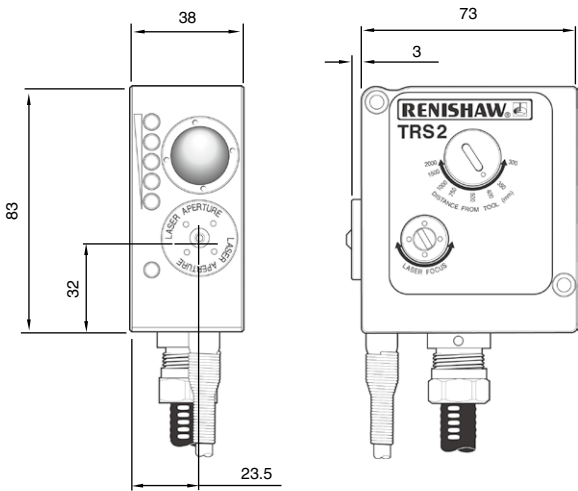
Probes for lathes

Tool setting arms

HPRA / HPPA / HPMA / HPGA

Key points

- Custom design available for different machine dimensions
- Removable or machining area installation options (auto / manual foldaway arms)
- Designed for CNC lathe tool setting
- Fully-customisable design for a wide range of sizes of chucks and installation
- A variety of products available ranging from removable arm HPRA to HPMA, automatic foldaway arm by M-code

Recommended machines and applications: CNC lathes and multi-tasking machines for lathe tool measuring / setting

	Removable arm	Foldaway arm	Automatic foldaway arm	
Probe type	HPRA	HPPA	HPMA	HPGA
Repeatability (2σ at measuring feedrate 36 mm / min) (with 15 inch chuck)[1]	5.00 μm	5.00 μm	5.00 μm	3.00 μm[2]
Sensing method	Kinematic	Kinematic	Kinematic	Kinematic[3] (strain gauge)
Sense direction	Probe ±X, ±Y, +Z Machine ±X, ±Z, +Y	Probe ±X, ±Y, +Z Machine ±X, ±Z, +Y	Probe ±X, ±Y, +Z Machine ±X, ±Z, +Y	Probe ±X, ±Y, +Z Machine ±X, ±Z, +Y
Trigger force (35 mm stylus)	XY low force: 1.50 N, 153 gf XY high force: 3.50 N, 357 gf +Z: 12.00 N, 1224 gf	XY low force: 1.50 N, 153 gf XY high force: 3.50 N, 357 gf +Z: 12.00 N, 1224 gf	XY low force: 1.50 N, 153 gf XY high force: 3.50 N, 357 gf +Z: 12.00 N, 1224 gf	XY low force: 0.50 N, 51 gf XY high force: 0.90 N, 92 gf +Z: 5.85 N, 597 gf
Overtravel distance	XY: 9° Z: 2 mm	XY: 9° Z: 2 mm	XY: 9° Z: 2 mm	XY: 12.5° Z: 6.5 mm
Sealing for water and dust	IPX8 (EN/IEC 60529)	IPX8 (EN/IEC 60529)	IPX8 (EN/IEC 60529)	IPX8 (EN/IEC 60529)
Communication method	Hard-wired	Hard-wired	Hard-wired	Hard-wired

[1] Can be used with a chuck larger than 15 inches. Please contact Renishaw for advice.
[2] When LP2 probe is used.
[3] Both kinematic probe and strain gauge probe can be selected.

HPMA dimensions (side view)
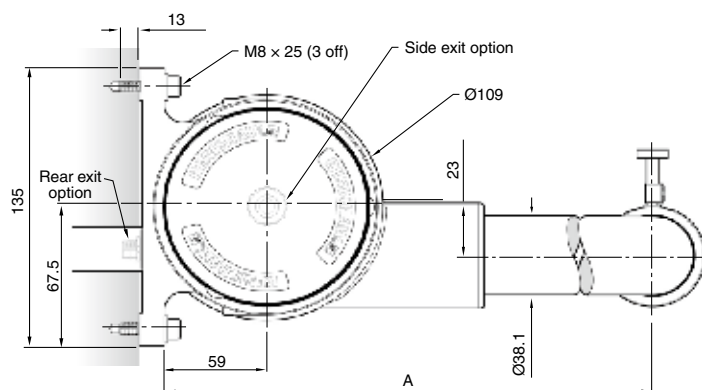
Arm dimensions	
Dimension	**A***
Maximum	555
Minimum	250

See page 3 for key to icons.

Dimensions given in mm

Optical and radio probes for component setting and inspection

Key points

- Workpiece indexing angle positioning on lathe
- Compact design
- Simple structure / configuration makes retrofit easy

	Small probe	
Probe type	OLP40	RLP40
Repeatability (2σ feedrate 480 mm/min) (stylus length)	1.00 μm (50 mm)	1.00 μm (50 mm)
Sensing method	Kinematic resistive	Kinematic resistive
Sense direction	±X, ±Y, +Z	±X, ±Y, +Z
Trigger force (stylus length)	XY low force: 0.4 N, 41 gf +Z: 5.30 N, 540 gf (50 mm)	XY low force: 0.4 N, 41 gf XY high force: 0.8 N, 82 gf +Z: 5.30 N, 540 gf (50 mm)
Overtravel distance	XY: 12.5° / Z: 6 mm	XY: 12.5° / Z: 6 mm
Sealing	IPX8 (EN/IEC 60529)	IPX8 (EN/IEC 60529)
Weight without shank (including batteries)	277 g	260 g
Compatible receiver / Transmission method	OMI-2	Modulated	•	
	OMI-2T	Modulated Multi-probe	•	
	OMM-2+OSI			
	RMI-Q	Radio		•
Communication method	Optical	Radio
Maximum operating range	5 m	15 m
Size	Ø40 × 58.3 mm	Ø40 × 58.3 mm

OLP40 / OMP40M+LP2

- Robust design for turret mounting
- 360° communication range; much greater than the existing probes' range
- 90° position change adapter for extensive applications (OMP40M only)

Recommended machines and applications: CNC lathes and multi-tasking machines for indexing angle measuring and workpiece inspection
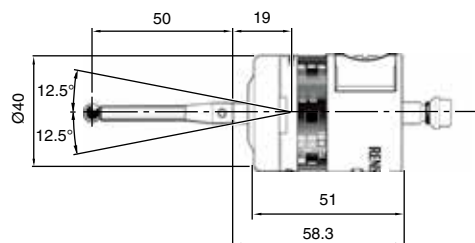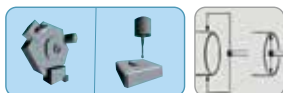
RLP40 / RMP40M+LP2

- Proven kinematic design
- Stable communication using radio communication
- 90° position change adapter for extensive applications (RMP40M only)
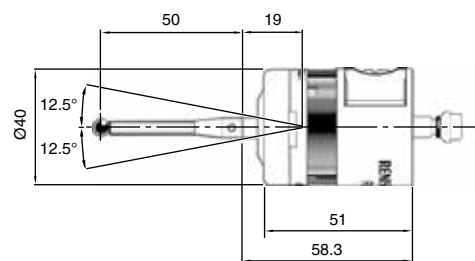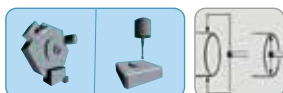
Recommended machines and applications: CNC lathes and multi-tasking machines for indexing angle measuring and workpiece inspection

See page 3 for key to icons.

Dimensions given in mm

Interface modular systems

OMI-2, OMI-2T and OMM-2C / OSI

- For optical probes (modulated transmission only)
- Compact integrated receiver / interface (OMI-2, OMI-2T)
- OSI / OMM-2C allows extended communication range when fitted with an additional second OMM-2C receiver. Common receiver size across the range (OMI-2, OMI-2T, OMM-2C and OMM-S)
- OSI interface is the same size as HSI
- Can be used in twin / multi-probe systems (OMI-2T up to two probes, OMM-2C / OSI up to three probes)

OMI-2 – Output signals:
Probe status 1, low battery, error
Voltage-free solid-state relay (SSR) outputs, configurable normally open or normally closed.
Probe status 2a
5 V isolated driven output, invertible.
Probe status 2b
Power supply voltage driven output, invertible.

OMI-2 – input signal: Pulsed or level.

OMI-2T – output signals:
Probe status 1, probe status 2, low battery, error
Voltage-free solid-state relay (SSR) outputs, configurable normally open or normally closed.
OMI-2T – input signal: Level

OSI / OMM-2C – output signals:
Probe status 1, probe status 2, probe status 3, low battery, error
Voltage-free solid-state relay (SSR) outputs, configurable normally open or normally closed.
OSI / OMM-2C – input signal: Pulsed or level.

OMI-2, OMI-2T and OSI / OMM-2C – compatible products: OMP400, OMP40-2, OMP40M, OLP40, OMP600, OMP60, OMP60M and OTS
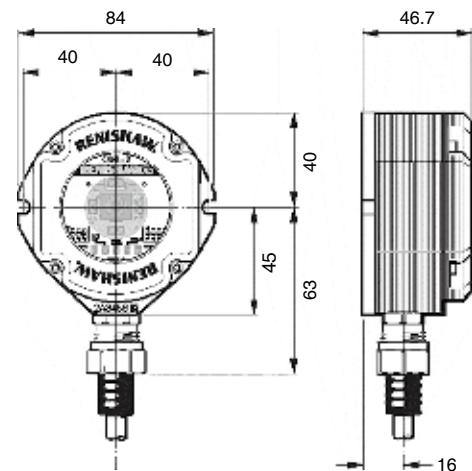
RMI-Q

- For radio transmission probes
- Up to four probes with one interface
- Individual radio M-code turn on and operation of up to four second-generation probes
- Globally available 2.4 GHz frequency band – compliant with radio regulations in all major markets
- Frequency-hopping spread spectrum (FHSS) transmission
- Negligible interference from other radio sources means a consistent and reliable performance

Outputs:
Probe status 1, low battery, error
Voltage-free solid-state relay (SSR) outputs, configurable normally open or normally closed.
Probe status 2a
5 V isolated driven output, invertible.
Probe status 2b
Power supply voltage driven output, invertible.

Machine start inputs (P1, P2, P3, P4):

P1:	Dedicated start – level	**P2, P3, P4:**	Dedicated start – level
	Common start – pulsed / level		Common start / level

Compatible products: RMP40, RMP60 RMP600, RLP40, RTS, RMP40M and RMP60M
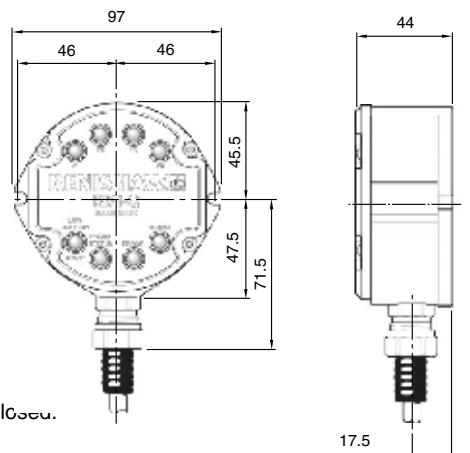
Bore

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Software and apps

Renishaw provides a selection of software solutions and mobile apps to complement our range of measurement and process control hardware.

On-machine programming

On-machine programming packages, which are installed and resident on the CNC machine tool control, are best suited to 'on the fly' shop floor programming. Programming is typically performed at the machine using traditional G-code or one of our growing range of graphical user interfaces (GUIs).

Inspection Plus

Inspection Plus is an integrated macro software package for part setting and inspection which supports a comprehensive range of cycles from basic part set-up through to more complex vector and angular measurement.

Experienced users can create and execute cycles using traditional G-code techniques. Renishaw's range of user-friendly interfaces – including GoProbe and Set and Inspect – supports new and less experienced users.

Key points

- Automated updates of tool and work offsets
- Choice of automated or manual (jog) modes
- Full system optimisation using SupaTouch technology
- Integrated configuration wizard

Tool setting

Tool setting software allows users to set length and diameter offsets for single point and multiple point tools, perform in-cycle broken tool detection and manual or automatic positioning.

Tool setting software is available for all Renishaw contact and non-contact tool setting hardware technologies.

Key points

- Significant time savings
- Automated tool length and diameter setting
- Reduced scrap
- Eliminate manual setting errors
- In-cycle tool breakage detection

Set and Inspect

Set and Inspect is a simple, on-machine probing app for use on a Microsoft® Windows®-based control – or on a Windows®-based tablet connected to the control via Ethernet.

An intuitive interface guides the user through the process of creating a probing cycle, automatically generates the required machine code for the probing cycle and loads it to the control, eliminating data entry errors while reducing programming times.

Single cycles allows users to manually position the probe and quickly program and run individual cycles. Program builder allows users to program multiple probing cycles in a single program that can be automatically run as part of the manufacturing process.

Key points

- User-friendly interface for use with Inspection Plus and tool setting software
- No probing experience or machine code knowledge required
- Embedded help text and images
- Immediately view results data for single measurements
- Compatible with a range of 3-axis and 5-axis machines

Reporter

Reporter is an easy-to-use, real-time process monitoring app for customers who wish to view component and tool measurement data. Measurement data can be viewed on the machine tool or exported externally for analysis by using the Data export licence option. The app is installed onto a Windows®-based CNC control or a Windows tablet connected to the control via Ethernet.

Key points

- Quickly view pass and fail measurement data at the machine
- Displays measurement trends for every probed part
- Results can be viewed live, as the part is measured
- Reporter can collect and share on-machine measurement data using the Data export licenced option
- Compatibility with Inspection Plus means that this single app can be used across a wide range of machine tools and CNC controls

Off-machine (PC-based) programming

Off-machine (PC-based) programming packages enable a wide variety of tasks to be performed using post processors configured for individual machine tools. Probe routines can be programmed alongside CAM programs or on a standalone PC, providing exibility and control when integrating probing into the various stages of a production process.

Productivity+™

Productivity+™ software provides users with a simple-to-use environment for incorporating in-cycle probe routines into machining cycles, with no requirement for G-code programming experience.

Calculation of measurement results, logic decisions and machine tool updates are all performed on the CNC itself, eliminating the need for external communications.

Key points

- Automatic, real-time, adaptation of cutting programs
- Program using component solid models (or manually where no model exists)
- Probe cycle visualisation, including crash detection
- Multi-axis support for a wide range of machine tool controls

**Productivity+ can assist in three core areas of a machining process:**

- Predictive process-setting tasks – such as job set-up, part and tool identification
- Active in-process control tasks – such as tool condition monitoring, tool dimension updates and re-machining based on measurement results
- Informative post-process reporting tasks – providing users with information about a completed process and helping to influence decisions for subsequent operations and processes

Productivity+ software is available in below application versions:

Active Editor Pro

Allows process control tasks to be integrated into existing cutting code. Solid model programming and toolpath visualisation make it easy to create probe cycles. Post processing merges the cutting and process control code, resulting in a single machine program.
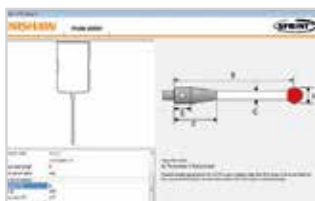
CNC plug-in

With an online editor allowing measurement programs to be updated on the machine, this software controls the OSP60 SPRINT™ probe and enables significantly enhanced data processing. Optionally, programs can be created offline using Productivity+™ Active Editor Pro.

Mobile apps

Renishaw smartphone apps provide information at a user's fingertips in a simple, convenient format for users of our machine tool probing hardware. Available globally in a wide range of languages, our free-of-charge apps are perfect for new and less experienced users.

Download on the App Store

GET IT ON Google Play

GoProbe

GoProbe is a unique combination of user-friendly probing cycles, self-study training materials (training part, pocket guide, quick-reference tool and e-learning course), and an intuitive smartphone app that enables users to get up and running with their Renishaw machine tool probing system in minutes.

Key points

- Embedded into latest Inspection Plus and contact tool setting software
- No probing experience required
- Comprehensive self-study training materials

Trigger Logic™ app

The Trigger Logic™ app simplifies the process of configuring a Renishaw machine tool probe. It provides users with a simplified method of reviewing, configuring and changing their Renishaw probe settings.

Key points

- For both optical and radio probes – including tool setters
- Can be used to acquire and partner radio probes with their respective interface
- Help text, images and animations provide further assistance

NC4 app

The NC4 app makes configuring and supporting the range of NC4 non-contact tool setters simple. A single installation of the app supports code generation for a range of machine tool configurations and control types, and can easily be switched into any of the supported languages.

Key points

- Clear instructions to simplify NC4 configuration and troubleshooting
- Animations to clearly explain common maintenance tasks

HP arms app

The HP arms app provides engineers with an interactive support app for use with Renishaw's range of high precision tool setting arms. The app makes configuration, maintenance and troubleshooting tasks simple, with easy-to-follow animations and step-by-step instructions.

Key points

- Supports HPMA, HPPA and HPRA high precision tool setting arms
- Easy-to-follow animations and step-by-step instructions
- Includes arm and RP3 configuration, maintenance and troubleshooting tasks

Machine tool diagnostics

AxiSet™ Check-Up

A complete solution for checking the alignment and positioning performance of rotary axes. In just a few minutes, users of multi-axis machining centres and multi-tasking machines can identify and – where possible – automatically correct for poor machine alignments and geometry.

Providing a fast and accurate check of rotary axis pivot points, AxiSet™ Check-Up helps users to maintain a stable machining environment. When used alongside Renishaw's QC20-W ballbar system and laser interferometers, AxiSet Check-Up gives an unparalleled machine diagnosis solution.

Key points

- Determine pivot point and lathe centre-line errors
- Measure and report critical errors quickly
- Reliably check and track machine performance trends
- Automatically update machine pivot points

Note:

The QC20-W wireless ballbar system offers fast and effective analysis of CNC machine tool performance. For further information, please see **www.renishaw.com/qc20**
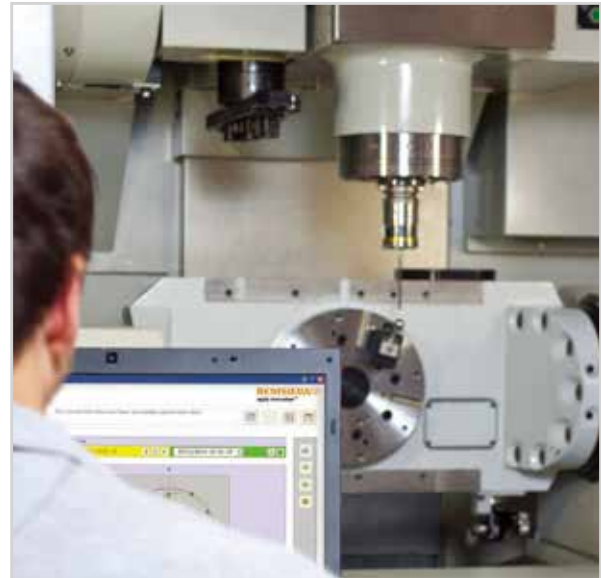
About Renishaw

Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Products include:

- Additive manufacturing and vacuum casting technologies for design, prototyping, and production applications
- Dental CAD/CAM scanning systems and supply of dental structures
- Encoder systems for high-accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High-speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications

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