Information leaflet
H-6034-8100-01-A

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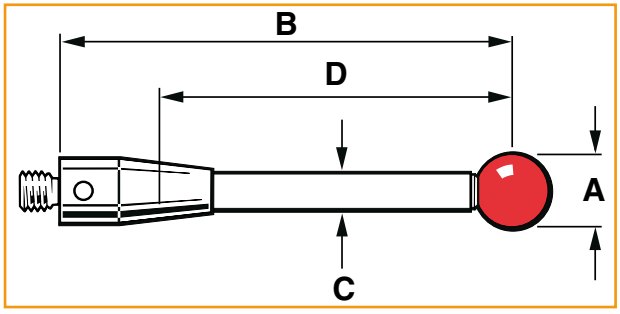
Styli recommendations for kinematic inspection probes

A range of factors combine to provide the right styli for the right job. Successful gauging depends very much on the ability of the probe's stylus to access a feature and then maintain accuracy at the point of contact. The choice of materials for the stylus tip and stem is critical.

For kinematic inspection probes, Renishaw recommends the standard range of ceramic stem, ruby ball styli (as featured in the table below).

Ceramic stems offer stiffness comparable to steel and are significantly lighter than tungsten carbide. The ruby ball material offers exceptional surface smoothness, excellent compressive strength and a high resistance to mechanical corrosion.



	Part number	A-5000-3709 Ceramic	A-5003-2764 Ceramic	A-5000-3712 Ceramic	A-5000-8156 Ceramic
A	Ball dia. mm (inch)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)	6.0 (0.24)
B	Length mm (inch) *	50.0 (1.97)	75 (2.96)	100.0 (3.94)	150.0 (5.91)
C	Stem dia. mm (inch)	4.5 (0.18)	4.5 (0.18)	4.5 (0.18)	4.5 (0.18)
D	EWL mm (inch) †	38.5 (1.52)	63.5 (2.50)	88.5 (3.48)	135 (5.31)
	Mass (grammes)	4.8	5.64	6.3	7.9
	OMP60	✓	✓	✓	✓
	OMP40-2	✓	✓	✓	✓
	OLP40	✓	✓	✓	✓
	RMP60	✓	✓	✓	✓
	RMP40	✓	✓	✓	✓
	RLP40	✓	✓	✓	✓
	LP2 range §	✓	✓	✓	✓

* The overall length is measured from the rear mounting face of the stylus, to the centre of the ball.

† Effective working length (EWL). This is measured from the centre of the ball to the point at which the stem will foul against the feature when measuring 'normal' to the part.

§ The LP2 range consists of the LP2, LP2DD, LP2H and LP2H DD.

It is possible that the featured range of ceramic styli may not be suitable for every kinematic inspection probe application. Therefore, it may be necessary to select a star, swivel or specialised styli configuration to meet the specific application requirement.

In applications where star, swivel or specialised styli configurations are to be used, it may be beneficial to reduce the speed of the probing moves. Reducing the speed of the probing move may, in some cases, improve the measurement accuracy.

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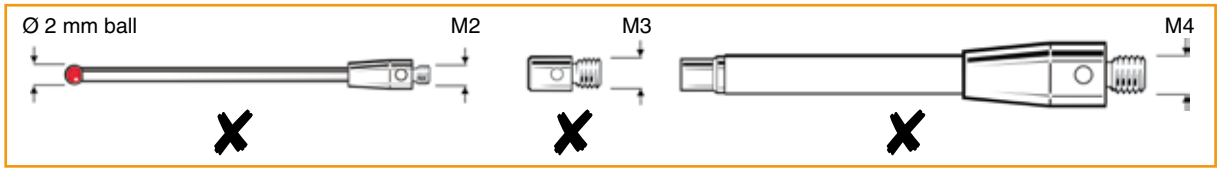
General rules when selecting a stylus

By choosing from our comprehensive range of genuine Renishaw styli, you can be sure that the design and materials of your stylus will be optimised. However, your choice of stylus configuration can have a significant effect on the accuracy of the measurements you take.

A few simple rules for stylus selection can be applied to maximise accuracy for most probing applications:-

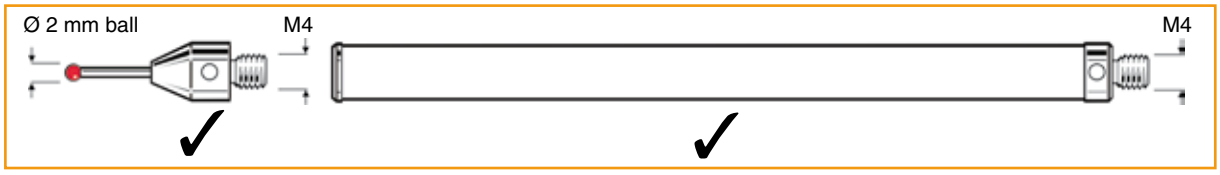
- **Keep styli short** - The more the stylus bends or deflects, the lower the accuracy. Probing with the minimum stylus length for your application will give the optimum results.
- **Minimise the number of joints** - Every time you join styli and extensions, you introduce potential bending and deflection points. Try, wherever possible, to keep to the minimum number of pieces possible for your application.

  The stylus assembly shown below is an example of an application specific stylus, with a 2 mm ball.



The assembly comprises of several components reducing in diameter. A stylus assembly of this design should be avoided if possible as there are multiple screw joints that are known to contribute to unusual flexibility of the stylus.

An alternative stylus assembly is shown below. This is a more robust example of a 2 mm ball application specific stylus.



The stem has a shorter length of reduced diameter and the M4 screw joint connecting the components is much stiffer.

- **Keep the stem diameter as large as possible** - The more the stylus bends or deflects, the lower the accuracy. Increasing the stem diameter will increase the stiffness of the stylus.
- **Keep the stylus ball as large as possible** - There are several reasons for this:

  1. It maximises your ball/stem clearance, thereby reducing the chance of false triggers caused by 'shanking out' on the stylus stem, and increasing the EWL.
  2. A larger ball allows a larger stem diameter, increasing the stiffness of the stylus.
  3. The larger ruby ball reduces the effect of the surface finish of the component being inspected.

- **Verify specialist styli configurations** - If a specialist styli configuration is to be used, it is recommended that the most robust solution is selected and that trials are conducted to verify that the required metrology performance is achieved.

All the issues discussed in this leaflet are explored in more detail in Renishaw's Styli and accessories technical specification (document H-1000-3200), which can be downloaded from www.renishaw.com/styli

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We currently stock the most popular styli and accessories from Renishaw's extensive range. However if you are unable to find what you are looking for at www.RenishawDirect.com, then contact us and we will endeavour to find you a solution from the full range of 6,000 styli items offered by Renishaw.

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H-6034-8100-01
Issued March 2010
Part no. H-6034-8100-01-A