

Form Talysurf® PGI Bearings

Product specification



Unparalleled measurement capability

Complete trust in your metrology platform

The following specifications are fundamental to a systems performance

Noise

All measurement instruments must have a stable metrology frame. Noise is the measure of the influence on the result due to the measuring instrument and the environment in which it is sited.

Taylor Hobson quote total system noise floor where other manufacturers only quote gauge noise.

Repeatability

Repeatability is a true indication of the instruments measurement capability at reproducing a surface or profile.

Taylor Hobson's excellent repeatability value ensures measurement integrity and confidence in the measuring results; other manufacturers do not quote such specifications.

Straightness accuracy

Imperative to the measurement of form and radius is the integrity of the reference datum to which the measured surface is compared.

Taylor Hobson achieve exceptional straightness using a precision datum bar, which has been subject to in-house precision grinding and lapping processes to ensure optimum straightness.

Range to resolution

Range to resolution is the ratio between the measuring range and its resolution.

The Form Talysurf® PGI 2000S provides a 20mm range with 0.3nm resolution, delivering the ability to accurately measure sub-micron surface finish, large form and contour in a single trace.

Gauge performance

The linearity of the gauge is critical to any measurement system in evaluating form and surface deviations. Gauge accuracy refers to the relationship between stylus tip and gauge response and is the maximum error between indicated and true value of the gauge when displaced through its range.

The Form Talysurf® PGI has best in class performance ensuring accuracy over small or large ranges.

World's leading radius and form accuracy

Radius and form accuracy are the direct influences from the patented gauge calibration routine and the combination of all highlighted features above; noise, repeatability, straightness datum, range to resolution and linearity.

These specifications deliver the market-leading bearing measurement system.

System performance	2000E	2000S
Calibration Form Error (Pt) ¹	< 0.20 µm (8 µin)	
System noise ²	Rq < 2 nm (0.08 µin), Rz < 10 nm (0.39 µin)	
Radius measurement uncertainty ³	0.1 - 10mm (0.004 - 0.39in) - < 1µm of nominal 10 - 360mm (0.39 - 14.17in) - 0.01% to 0.006% of nominal	
Inclination measurement uncertainty ⁴	0.5 arc minute	
Repeatability of Z axis indication	Flat surface - 0.08 µm (3.1 µin) ⁵	
	Curved surface - 0.08 µm (3.1 µin) ⁶	

Horizontal performance	2000E	2000S
Traverse length – X max / min	120 mm / 0.1 mm (4.7 in / 0.004 in) or 200 mm / 0.1 mm (7.9 in / 0.004 in)	
Traverse speeds	13 mm/s (0.51 in/s) max	
Measuring speed ⁷	0.25 mm/s, 0.5 mm/s, 1 mm/s & 2 mm/s (0.01 in/s, 0.02 in/s, 0.04 in/s & 0.08 in/s)	
Minimum data sampling interval in X	0.125 µm (5 µin)	
Straightness accuracy (Pt) ⁸	120 mm Traverse unit - 0.08 µm (3.2 µin) / 200 mm Traverse unit - 0.110 µm (4.3 µin)	
X axis indication accuracy ⁹	(1 + 0.02 L) µm	

Vertical performance	2000E	2000S
Nominal measuring range (Z) ¹⁰	20 mm (0.79 in)	
Resolution (Z) ¹⁰	1.3 nm (0.05 µin)	0.3 nm (0.01 µin)
Range to resolution ¹⁰	15,384,615 : 1	66,666,666 : 1
Linearity accuracy ⁴	0.07 + 0.03 Z [mm] µm (3 + 30 Z[in] µin)	
Stylus arm length	Standard length 100mm	
Tip size	2µm radius conisphere diamond	
Force	< 1mN	

Measuring station	2000E	2000S
Motorized tilting of traverse unit	Optional ±9° from horizontal	
Instrument dimensions	See floor plan (page 6)	
Instrument weight	223 Kg (450 mm column) (optional 700 mm column 237 Kg)	
Motorized vertical column	450 mm (17.7 in) (optional 700 mm (29.5 in))	

Environment	
Storage temperature	5 °C to 40 °C (41 °F to 104 °F)
Storage humidity	10% to 80% relative, non condensing
Operating temperature	18 °C to 22 °C (64 °F to 72 °F)
Temperature gradient	< 2 °C per hour (< 3.6 °F / hour)
Operating humidity	45% to 75% relative, non condensing
Maximum RMS floor vibration	3 µm/s (120 µin/s) at < 50 Hz 6 µm/s (200 µin/s) at < 50 Hz

Laser classification	
Class 1 product to EN 60825-1 (2001), Continuous Wave (CW) output < 1 mW Max power for the laser, < 50 µW Max power for the product	

Electrical supply	
Supply type	Alternating supply, single phase with earth (3-wire system)
Instrument and computer voltage	90 V - 230 V
Frequency	47 Hz to 63 Hz
Supply voltage transients – width	EN 61000 - 4 - 4 : 1995
Power consumption	500 VA
Safety	EN 61010 - 1 : 2001
EMC	EN 61000 - 6 - 4 : 2001
	EN 61000 - 6 - 1 : 2001

The above quoted technical data is for measurements taken in a metrology laboratory controlled environment: 20°C ±1°C (68°F ± 1.8°F), draft free and isolated from low frequency floor borne vibration.

Uncertainties and maximum permissible errors (MPE's) are at 95% confidence in accordance with recommendation in the ISO guide to the expression of uncertainty in measurement (GUM:1993). All errors are expressed as MPE's.

Notes

1. LS Arc analysis on a 80mm (3.15in) radius glass standard (speed = 1mm/s, primary filter Ls = 0.25mm)
2. Average of five traces measured over a glass flat nominally parallel to the traverse datum using a 100mm stylus diamond stylus (speed = 0.25mm/s, Gaussian roughness filter, Lc 0.08mm, Ls 0.0025mm)
3. Assumes a calibration artefact of perfect radius
4. Measurements up and down a ±35° angled slope over 80% of the gauge range using a 100mm diamond stylus
5. Repeated measurements over a glass flat that is nominally parallel to the traverse datum using a 100mm diamond stylus (speed = 1mm/s, primary filter Ls = 0.025mm)
6. Repeated measurements over a 80mm (3.15in) radius glass standard using a 100mm diamond stylus (speed = 1mm/s, primary filter LS = 0.025mm)
7. For surface texture measurements, speeds of 0.5mm/s (0.02in/s) and less are recommended
8. Measured over a glass flat nominally parallel to the traverse datum using a 100mm diamond stylus (speed = 1mm/s, LS Line analysis, primary filter Ls = 2.5mm)
9. Where L is in mm
10. Using a 100mm diamond stylus

Taylor hobson pursues a policy of continual improvement due to technical developments. We therefore reserve the right to deviate from catalogue specifications.

System performance	1500E	1500S
Calibration Form Error (Pt) ¹	< 0.15µm (6µin)	
System noise ²	Rq < 2 nm (0.08 µin), Rz < 10 nm (0.39 µin)	
Radius measurement uncertainty ³	0.1 - 10mm (0.004 - 0.39in) - < 1µm of nominal 10 - 360mm (0.39 - 14.17in) - 0.01% to 0.006% of nominal	
Inclination measurement uncertainty ⁴	0.5 arc minute	
Repeatability of Z axis indication	Flat surface - 0.08 µm (3.1 µin) ⁵	
	Curved surface - 0.08 µm (3.1 µin) ⁶	

Horizontal performance	1500E	1500S
Traverse length – X max / min	120 mm / 0.1 mm (4.7 in / 0.004 in) or 200 mm / 0.1 mm (7.9 in / 0.004 in)	
Traverse speeds	13 mm/s (0.51 in/s) max	
Measuring speed ⁷	0.25 mm/s, 0.5 mm/s, 1 mm/s & 2 mm/s (0.01 in/s, 0.02 in/s, 0.04 in/s & 0.08 in/s)	
Minimum data sampling interval in X	0.125 µm (5 µin)	
Straightness accuracy (Pt) ⁸	120 mm Traverse unit - 0.08 µm (3.2 µin) / 200 mm Traverse unit - 0.110 µm (4.3 µin)	
X axis indication accuracy ⁹	(1 + 0.02 L) µm	

Vertical performance	1500E	1500S
Nominal measuring range (Z) ¹⁰	15 mm (0.59 in)	
Resolution (Z) ¹⁰	1.3 nm (0.05 µin)	0.3 nm (0.01 µin)
Range to resolution ¹⁰	11,538,461 : 1	50,000,000 : 1
Linearity accuracy ⁴	0.07 + 0.03 Z [mm] µm (3 + 30 Z[in] µin)	
Stylus arm length	Standard length 100mm	
Tip size	2µm radius conisphere diamond	
Force	< 1mN	

Measuring station	1500E	1500S
Motorized tilting of traverse unit	Optional ±9° from horizontal	
Instrument dimensions	See floor plan (page 6)	
Instrument weight	223 Kg (450 mm column) (optional 700 mm column 237 Kg)	
Motorized vertical column	450 mm (17.7 in) (optional 700 mm (29.5 in))	

Environment	
Storage temperature	5 °C to 40 °C (41 °F to 104 °F)
Storage humidity	10% to 80% relative, non condensing
Operating temperature	18 °C to 22 °C (64 °F to 72 °F)
Temperature gradient	< 2 °C per hour (< 3.6 °F / hour)
Operating humidity	45% to 75% relative, non condensing
Maximum RMS floor vibration	3 µm/s (120 µin/s) at < 50 Hz 6 µm/s (200 µin/s) at < 50 Hz

Laser classification	
Class 1 product to EN 60825-1 (2001), Continuous Wave (CW) output < 1 mW Max power for the laser; < 50 µW Max power for the product	

Electrical supply	
Supply type	Alternating supply, single phase with earth (3-wire system)
Instrument and computer voltage	90 V - 230 V
Frequency	47 Hz to 63 Hz
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Notes

1. LS Arc analysis on a 80mm (3.15in) radius glass standard (speed = 1mm/s, primary filter Ls = 0.25mm)
2. Average of five traces measured over a glass flat nominally parallel to the traverse datum using a 100mm stylus diamond stylus (speed = 0.25mm/s, Gaussian roughness filter; Lc 0.08mm, Ls 0.0025mm)
3. Assumes a calibration artefact of perfect radius
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5. Repeated measurements over a glass flat that is nominally parallel to the traverse datum using a 100mm diamond stylus (speed = 1mm/s, primary filter Ls = 0.025mm)
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7. For surface texture measurements, speeds of 0.5mm/s (0.02in/s) and less are recommended
8. Measured over a glass flat nominally parallel to the traverse datum using a 100mm diamond stylus (speed = 1mm/s, LS Line analysis, primary filter Ls = 2.5mm)
9. Where L is in mm
10. Using a 100mm diamond stylus

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System performance	1000E	1000S
Calibration Form Error (Pt) ¹	< 0.15µm (6µin)	
System noise ²	Rq < 2 nm (0.08 µin), Rz < 10 nm (0.39 µin)	
Radius measurement uncertainty ³	0.1 - 10mm (0.004 - 0.39in) - < 1µm of nominal 10 - 360mm (0.39 - 14.17in) - 0.01% to 0.006% of nominal	
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X axis indication accuracy ⁹	(1 + 0.02 L) µm	

Vertical performance	1000E	1000S
Nominal measuring range (Z) ¹⁰	10 mm (0.39 in)	
Resolution (Z) ¹⁰	1.3 nm (0.05 µin)	0.3 nm (0.01 µin)
Range to resolution ¹⁰	7,692,307 : 1	33,333,333 : 1
Linearity accuracy ⁴	0.07 + 0.03 Z [mm] µm (3 + 30 Z[in] µin)	
Stylus arm length	Standard length 100mm	
Tip size	2µm radius conisphere diamond	
Force	< 1mN	

Measuring station	1000E	1000S
Motorized tilting of traverse unit	Optional ±9° from horizontal	
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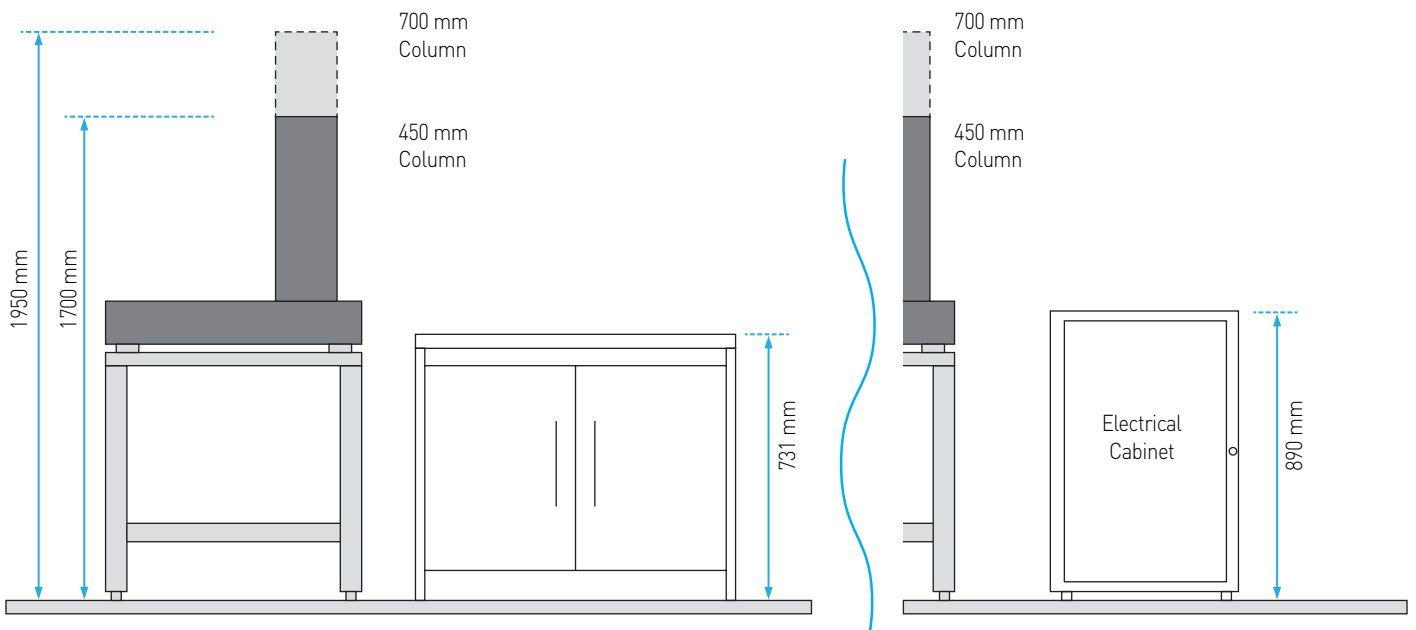
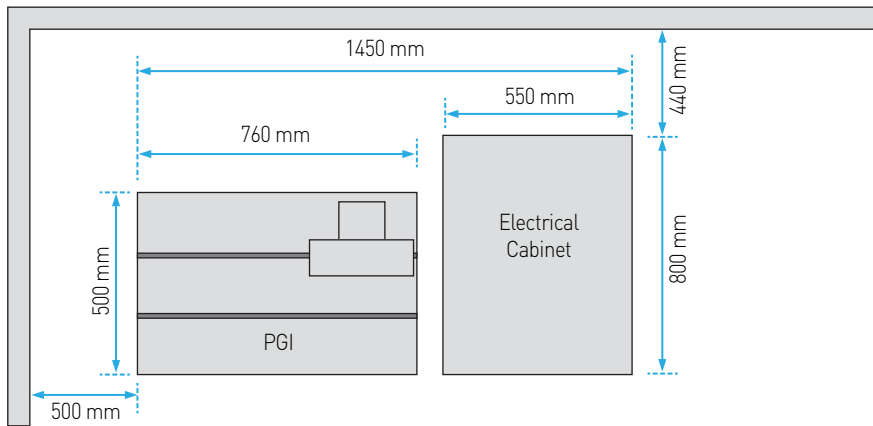
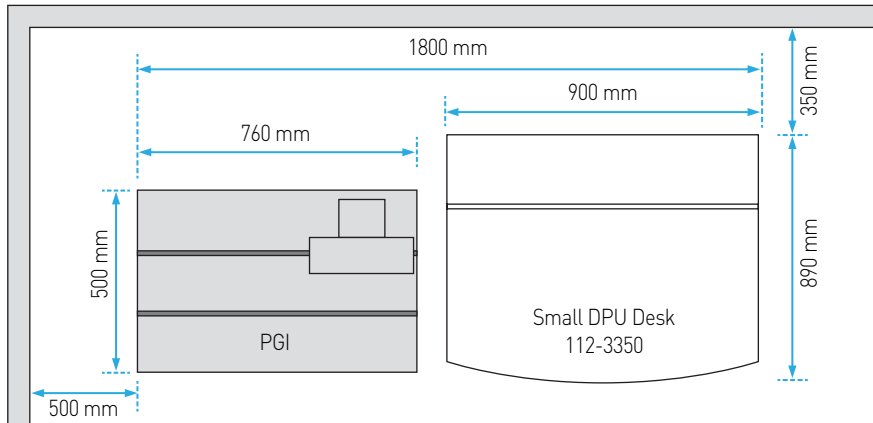
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- Where L is in mm
- Using a 100mm diamond stylus

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Form Talysurf® PGI Bearings floor plan

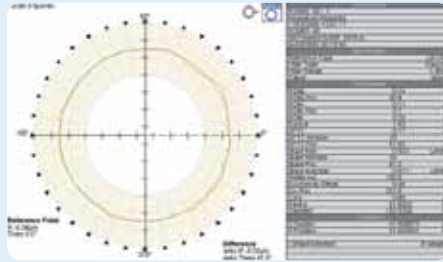


Diverse range of bearing solutions

Taylor Hobson's contact and non-contact measurement systems

Talyrond 500H

- Automated high precision roundness, surface finish, contour
- Powerful software tools help improve your process - harmonic analysis, cylindrical mapping, ball and lead screw analysis



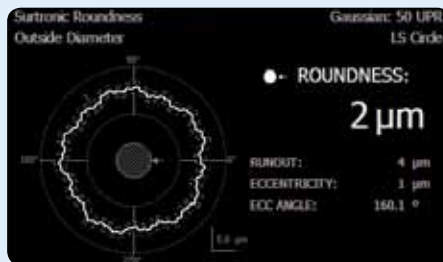
Talyrond NC

- Talyrond contact and non-contact measurements
- Ideal for miniature ball bearings
- Rapid measurements



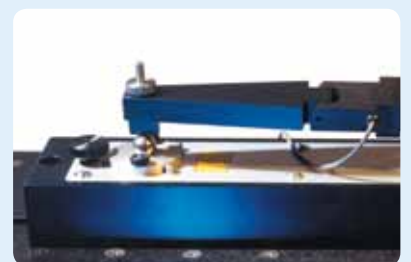
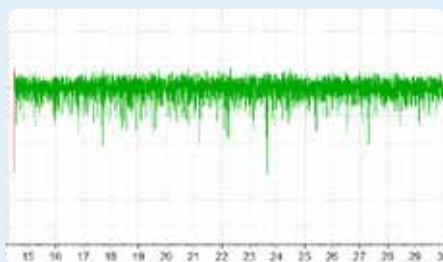
Surtronic R-Series

- Robust, fast and easy-to-use
- Includes Rapid Centre™ Centering attachment
- Throughput 3 parts / minute including set-up



Form Talysurf® Ball unit

- Surface finish
- Circumferential roughness measurement
- Precise and low-noise measurement



Talyrond R170 Raceway

- Fully active anti-vibration and active levelling
- Robustness - suitable for 24/7 operation
- Ease of use - touchscreen software



Serving a global market

Taylor Hobson is world renowned as a manufacturer of precision measuring instruments used for inspection in research and production facilities. Our equipment performs at nanometric levels of resolution and accuracy.

To complement our precision manufacturing capability we also offer a host of metrology support services to provide our customers with complete solutions to their measuring needs and total confidence in their results.

Contracted services from Taylor Hobson

Sales department

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- **Design engineering**
special purpose, dedicated metrology systems for demanding applications
- **Precision manufacturing**
contract machining services for high precision applications and industries

Service department

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Tel: **+44 (0)116 246 2900**

- **Preventative maintenance**
protect your metrology investment with an Amecare support agreement

Centre of Excellence department

Email: taylor-hobson.cofe@ametek.com

Tel: **+44 (0)116 276 3779**

- **Inspection services**
measurement of your production parts by skilled technicians using industry leading instruments in accord with ISO standards
- **Metrology training**
practical, hands-on training courses for roundness and surface finish conducted by experienced metrologists
- **Operator training**
on-site instruction will lead to greater proficiency and higher productivity
- **UKAS calibration and testing**
certification for artefacts or instruments in our laboratory or at customer's site



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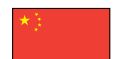
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