

Form Talysurf® i-Series

A high resolution instrument range offering
automated surface and contour inspection



The Form Talysurf i-Series

A high range high resolution system for contour and surface finish measurement

Ideally suited for automotive, bearings, gears and many other applications

Surface and Contour in One

The Form Talysurf i-Series is a high accuracy instrument range capable of simultaneous surface finish and contour measurement. The system's low noise axes and high resolution gauge ensures measurement integrity with choice of gauge ranges providing versatility for a variety of applications.

Reproducible measurement results

Decades of experience, ultra precision machining expertise and FEA optimized design combine to provide low noise and near flawless mechanical execution of the measuring axes. Further enhancement via the use of traceable standards and exclusive algorithms effectively eliminates instrument influence from the measurement results.



1 2 5

Gauge

Gauge Range
Up to 5 mm

Resolution
Down to 0.4 nm



Roughness

Noise
Less than 6 nm Rq



Contour

LS Arc Measurement
Less than 3.3 μm

Pt Less than 0.25 μm



Temperature

Temperature compensation
ensures consistent system
performance

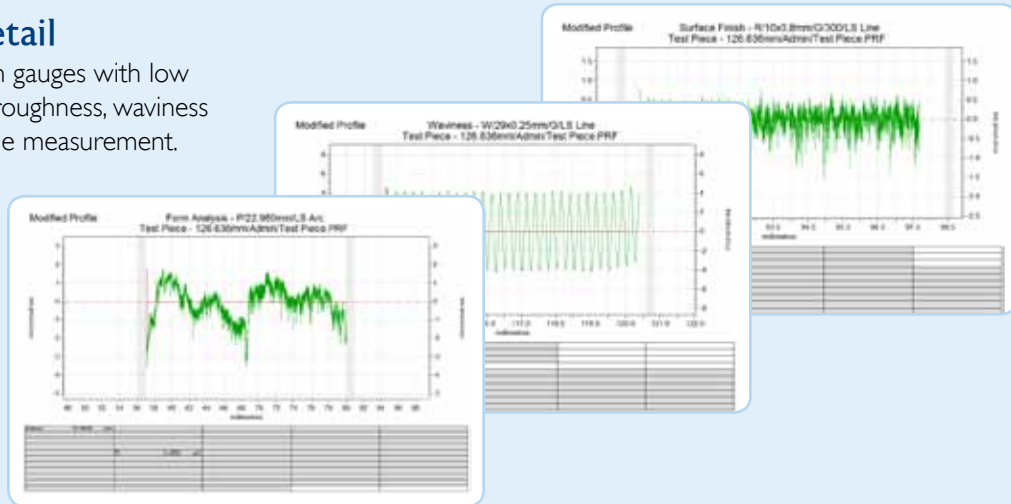
Unparalleled measurement capability

Surface finish, Contour and 3D

1

Surface detail

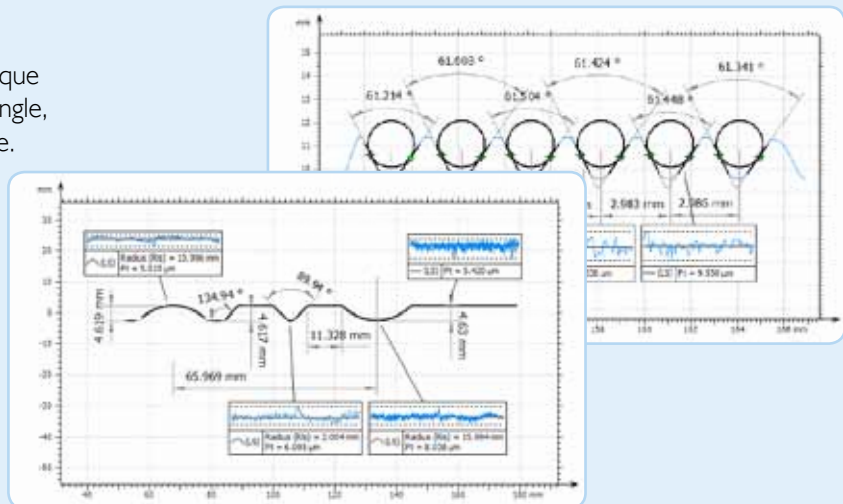
High resolution gauges with low noise enables roughness, waviness and form in one measurement.



2

Contour

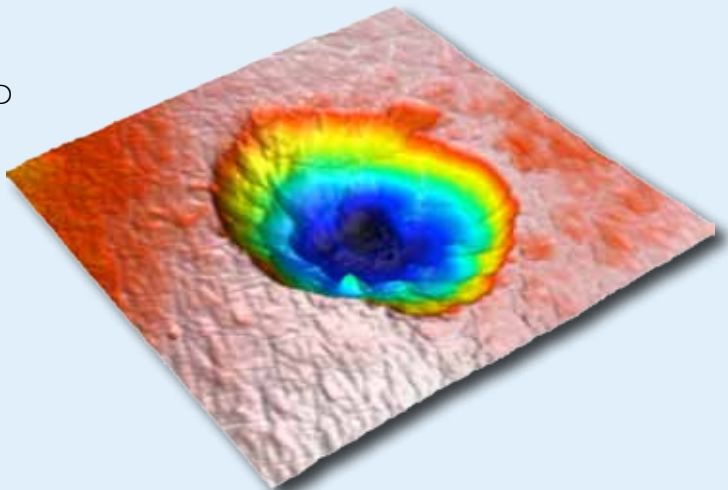
Our patented calibration technique enables measurement of radii, angle, height, length, distance and more.



3

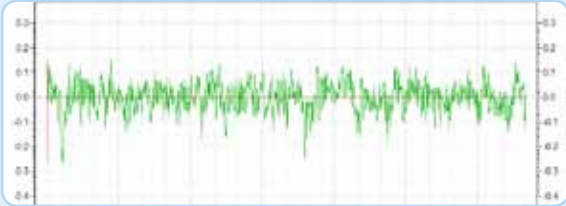
3D

Using an optional motorized Y-stage and Talymap, transform your conventional 2D measurement in to a 3D analysis tool.

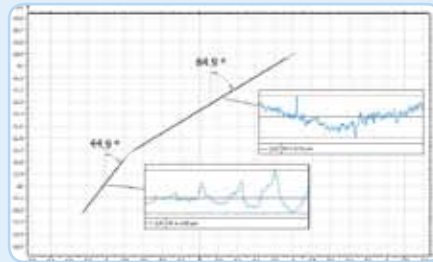


Applications

Cylinder heads



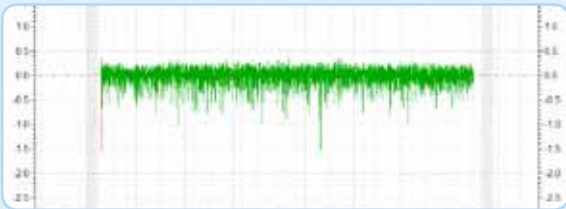
Valve surface finish



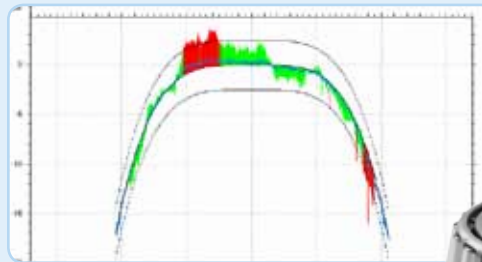
Valve angle



Roller bearings



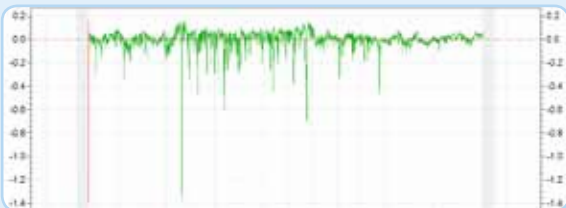
Surface finish



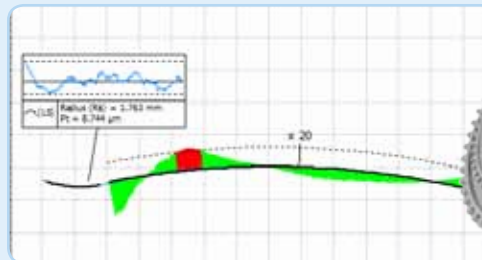
Form error and DXF comparison



Gears



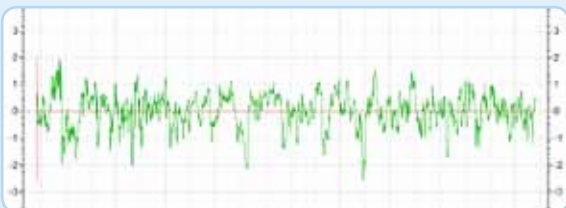
Surface finish



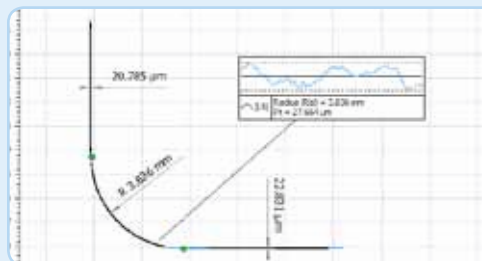
Root radius and form deviation



Crankshafts



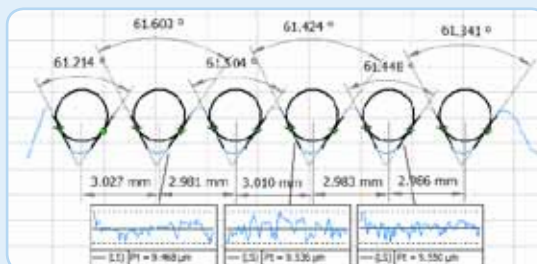
Surface finish



Fillet radii and DXF comparison

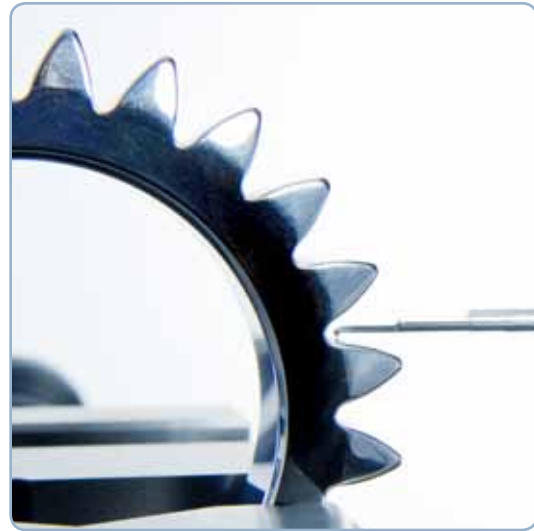


Ball screw



Pitch, angle, form and Linear dimensions





Tailored to suit your application

From screw threads to crankshafts or engine block to valve guides select the configuration that suits your requirements...

Gauge range	1	2	5
60 mm traverse unit	•	•	✘
120 mm / 200 mm traverse unit	•	•	•
Contour	•	•	✓
Temperature compensation	✓	✓	✓

✓ Standard • Option ✘ Not available

Temperature compensation

Standard across all i-Series models, this unique system monitors and feeds back changes in ambient temperature, ensuring consistent system performance and high measurement integrity, regardless of environmental effects.



Ultra surface finish parameters

Powerful software for the analysis of surface finish and form

Form removal and analysis functions

Form error

Deviation from nominal form is calculated with reference to a best fit straight line, best fit circular arc or best fit conic section

Form deviation may also be calculated with reference to a minimum zone straight line (the minimum separation between two parallel lines containing the data set).

Radius

Using a least squares best fit, the radius of concave or convex circular arcs can be automatically calculated from selected data. The option to exclude any unwanted features such as edges is also available

Alternatively, the absolute radius can be set to analyse the actual deviation from a design master. Other calculated parameters include the centre coordinate.

Angle (slope)

Surface tilt can be determined and removed prior to parameter analysis by means of a straight line or minimum zone algorithm. Other calculated values include intercept and pitch

Dimension

The linear relationship of surface features can be assessed and compared by means of calculated X & Z coordinate positions.

- Datum slope
- Delta slope
- Pitch (between centres)
- Intercept X / Intercept Z
- Slope

Dual profile

This analysis function enables comparison of one measured profile to another or even to a master profile which has been saved as a template. A 'difference' profile can be displayed at the touch of a button and used for further analyses.

Surface finish parameters

Primary parameters

DFTF, LSLP Ave, LSLP Max, Pa, Pc, PCf, PCI, PCr, Pda*, Pdc*, Pdq*, PHSC*, Pku, Pln, PLo, Plq, Pmr*, Pmr(C)*, Pp, Ppc*, Pq, PS, Psk, PSm, Pt, Pv, PVo*, Pz, Pz(JIS)

Roughness parameters

R3y, R3z, Ra, Rc, RCf, RCI, RCr, Rda*, Rdc*, Rdq*, RHSC*, Rku, Rln, RLo, Rlq, Rmr*, Rmr(C)*, Rp, Rp1max, Rpc*, Rq, RS, Rsk, RSm, Rt, Rv, Rv1max, RVo*, Rz, Rz(DIN), Rz(JIS), Rz(n)*, Rz1max

Waviness parameters

Wa, Wc, Wcf, WCI, WCr, Wda*, Wdc*, Wdq*, WHSC*, Wku, Wln, WLo, Wlq, Wmr*, Wmr(C)*, Wp, Wpc*, Wq, WS, Wsk, WSm, Wt, Wv, WVo*, Wz

Rk parameters and Rk curve

A1, A2, APH, AVH, CV, Mr1, Mr2, Rk, Rpk, Rvk, Rvk/Rk

R & W parameters

AR, AW, Pt, R, Rke, Rn, Rpke, Rvke, Rx, Sar, Saw, Sr, Sw, W, Wn, Wte, Wx

Dominant wavelength

WD1c, WD1Sm, WD1t, WD2c, WD2Sm, WD2t, WDSmMax, WDSmMin

Filters and additional features

Filters

Gaussian, Robust Gaussian, Robust Gaussian VDA, Morphological, ISO 2CR, 2CR PC, Rk

Cut-off (Lc)

0.08, 0.25, 0.8, 2.5, 8mm and 25mm

Bandwidth

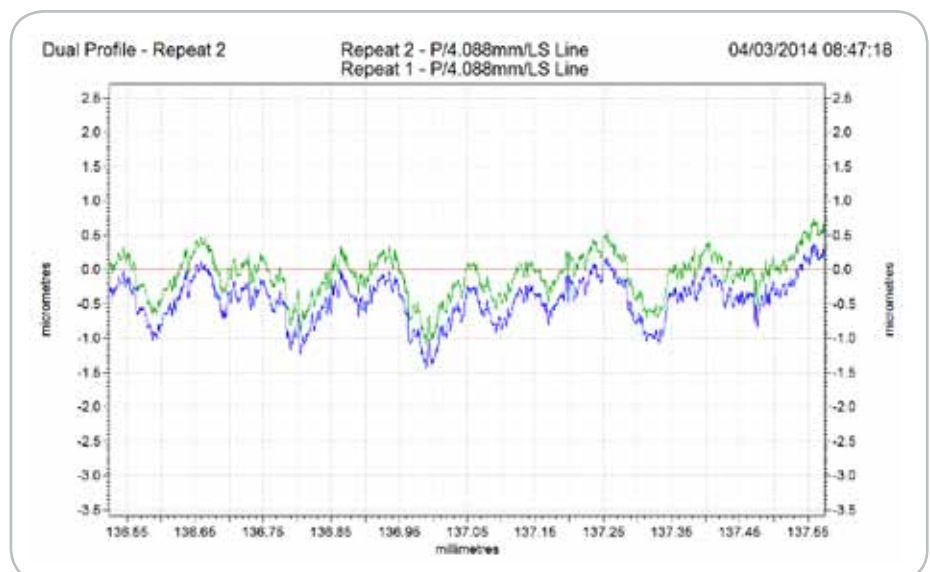
10:1, 30:1, 100:1, 300:1 and 1000:1 or as defined by data spacing(VDA2006)

Qualifiers

All parameters marked with an asterix require user assigned single or multiple qualifiers. For example, material ratio (mr) may be assessed at one or more slice levels within a single measurement.

Note

Where applicable the parameters conform to and are named as per the standards ISO4287-1997, ISO13565-1-2 and ISO 12085.



Dual Profile analysis allows two sets of measurement data to be displayed at once and is ideal for testing system noise and repeatability

Key features in Talymap Contour

Powerful software for the analysis of length, radius, angle and more...

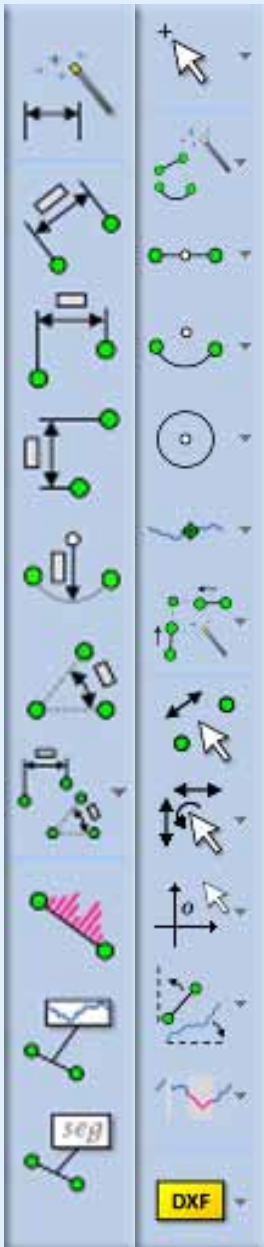
Desktop publishing

Quick and instant report generation



Ease of use

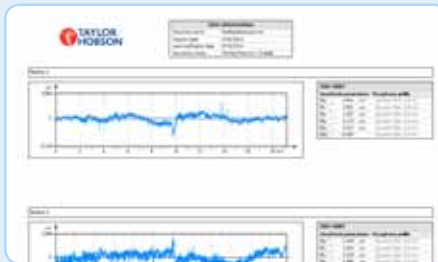
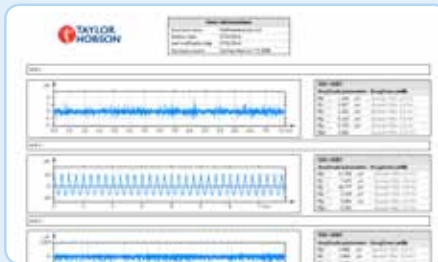
Contour software is easy to use and requires minimal training. Intuitive icon based tools allow the user to define and modify elements and dimensions with the click of a button.



Automation

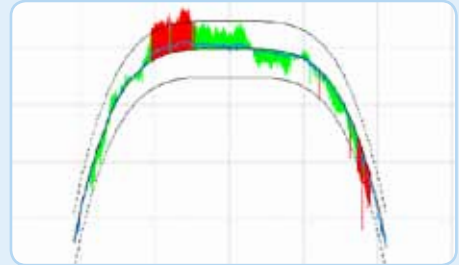
Reports and analysis routines can be saved as single templates and re-applied to component batches.

Special software routines allow full automation regardless of part variation or positional set up ensuring repeatable results.



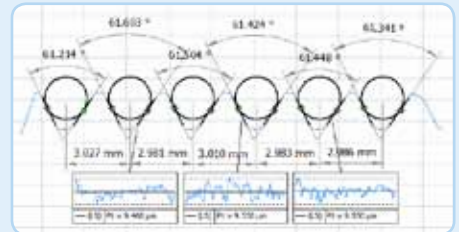
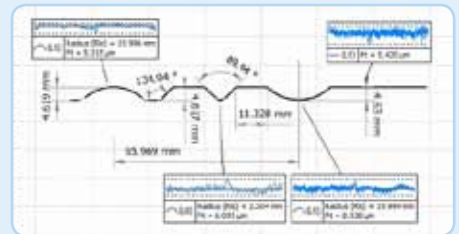
Comparison with CAD models

Load DXF models and automatically fit to the measured profile, results will display deviations, tolerance limits and deviation parameters.



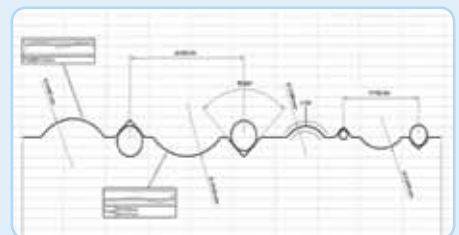
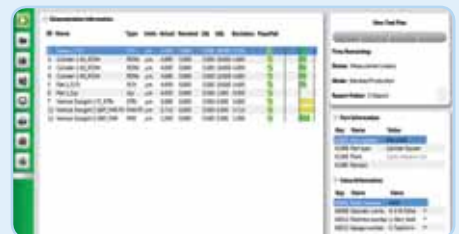
Full dimensional analysis

Linear, Angular, Radial and more



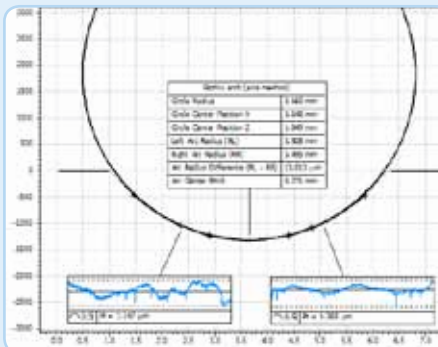
Q-Link Compatible

Take advantage of automatic reporting and exporting in Q-Das or text format.



Further analyses

Gothic arch profile analysis as standard

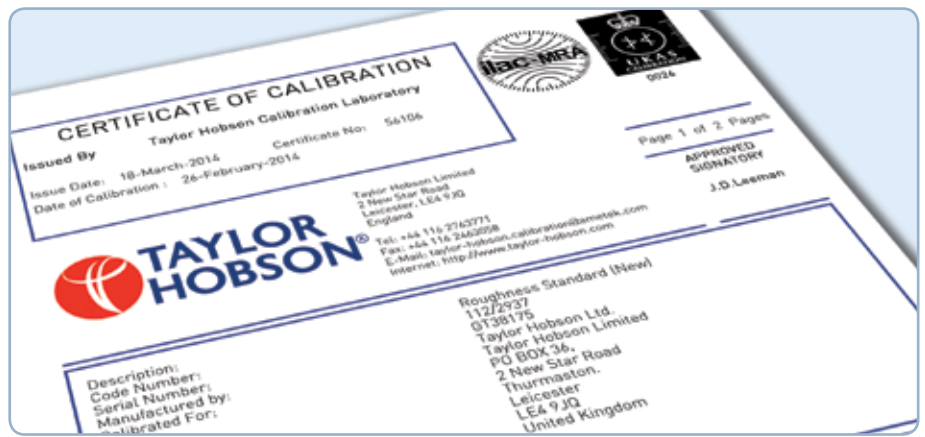


Q-Link Production Interface

A simplified interface designed specifically for production environments

- Q-DAS accredited
- Compatible with all instruments
- Simple operation
- User levels
- Traceable fields
- Simple tolerancing
- Automatic summary reports
- Automatic statistical studies





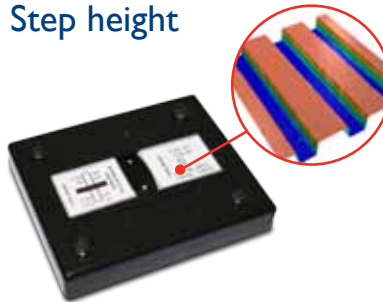
Traceability

Full traceability to international standards

Grating correction

All our traverse units are tested and enhanced using interferometric techniques ensuring accurate dimensional and surface texture measurement in the x direction.

Step height



To ensure the correct gain setting of your instrument, high precision step height standards are available; calibrated uncertainties down to $\pm 4\text{nm}$

Traceability



All calibration standards can be provided with traceability to international standards using Taylor Hobson's own UKAS laboratory.

Arcuate correction



Patented ball calibration routine

The Form Talysurf systems use a patented ball calibration routine to ensure that both dimensional measurement capability and gauge linearity are dealt with in a single, automated operation.

This fast and simple process uses high-precision spherical calibration artefacts that have been produced to exacting standards and then calibrated for radius and form traceable to international standards.

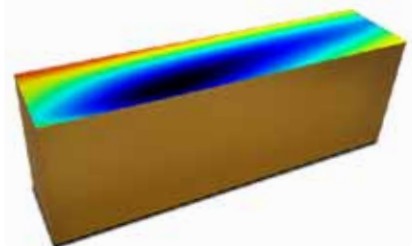
Surface finish



Taylor Hobson can provide glass or metal roughness standards calibrated to an uncertainty of $\pm(2\% + 4\text{ nm})$ providing measurement confidence and compliance for peak parameters with respect to ISO standards.

Spacing standards are also available to an uncertainty of $\pm 0.6\text{ }\mu\text{m}$

Datum straightness



To ensure the traverse unit conforms to specifications Taylor Hobson can supply Zerodur straightness standards. These standards provide certainty in the traverse direction and are combined with special software routines enhance the measuring axis for correct geometrical form.

Form Talysurf i-Series specification

System performance	Applicable to all models		
Calibration Pt ¹	< 0.25 µm (10 µin)		
System noise - Rq ²	< 6 nm (0.24 µin)		
Radius measurement uncertainty ³	0.1 - 22mm (0.004 - 0.87in) - 1% to 0.015% of nominal 22 - 1000mm (0.87 - 39.4in) - 0.015% to 0.1% of nominal		
Inclination measurement uncertainty ⁴	0.5 arc minute (±35° Maximum Range)		

Horizontal performance			
Traverse length – X max / min ⁵	60 mm / 0.1 mm (2.4 in / 0.004 in)	120 mm / 0.1 mm (4.7 in / 0.004 in)	200 mm / 0.1 mm (7.9 in / 0.004 in)
Traverse speeds	13 mm/s (0.51 in/s) max		
Measuring speed ⁶	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) ⁷	0.15 µm (5.9 µin)		0.18 µm (7.1 µin)
X axis indication accuracy ⁸	(1 + 0.02 L) µm		

Vertical performance			
Nominal measuring range (Z) ⁹	1 mm Gauge Range	2 mm Gauge Range	5 mm Gauge Range
Range 1	1 mm (0.04 in)	2 mm (0.08 in)	5 mm (0.20 in)
Range 2	0.2 mm (0.008 in)	1 mm (0.04 in)	2.5 mm (0.10 in)
Range 3	0.04 mm (0.002 in)	0.2 mm (0.008 in)	0.5 mm (0.02 in)
Range 4	Not applicable	0.04 mm (0.002 in)	0.1 mm (0.004 in)
Resolution (Z) ⁹			
Range 1	4 nm (0.16 µin)	8 nm (0.32 µin)	20 nm (0.79 µin)
Range 2	0.8 nm (0.03 µin)	4 nm (0.16 µin)	10 nm (0.39 µin)
Range 3	0.16 nm (0.006 µin)	0.8 nm (0.03 µin)	2 nm (0.079 µin)
Range 4	Not applicable	0.16 nm (0.006 µin)	0.4 nm (0.016 µin)
Range to resolution	262144 : 1		
Stylus arm length, tip size, force	60 mm stylus 2 µm radius conisphere diamond, 1mN Force		120 mm stylus 2 µm radius conisphere diamond, 1mN Force
Z axis non-linearity (Z = gauge displacement)	Resolution + (0.05 Z[mm])µm (Resolution + (50 Z[inches])µin) after calibration		
Repeatability of Z axis indication ⁹	Flat Surface 0.05µm (2.0µin) ¹⁰		Flat Surface 0.10µm (3.9µin) ¹⁰
	Curved Surface 0.05µm (2.0µin) ¹¹		Curved Surface 0.10µm (3.9µin) ¹¹

Measuring station	Applicable to all models		
Motorized tilting of traverse unit	Optional ±9° from horizontal		
Instrument dimensions	See floor plan		
Instrument weight	223 Kg (450 mm column) (optional 700 mm column 237 Kg)		
Motorized vertical column	450 mm (17.7 in) (optional 700 mm (27.6 in))		

Environment		Electrical (alternating supply, single phase with earth, 3-wire)	
Storage temperature	5 °C to 40 °C (41 °F to 104 °F)	Supply type	Alternating supply, single phase with earth (3-wire system)
Storage humidity	10 % to 80 % relative, non condensing	Instrument & computer voltage	90V - 230V
Operating temperature	18 °C to 22 °C (64 °F to 72 °F)	Frequency	47 Hz to 63 Hz
Temperature gradient	< 2 °C / hour (< 3.6 °F / hour)	Supply voltage transients – width	EN 61000-4-4
Operating humidity	45 % to 75 % relative, non condensing	Power consumption	500 VA
Maximum RMS vertical	2.5 µm/s (100 µin/s) at < 50 Hz 5.0 µm/s (200 µin/s) at < 50 Hz	Safety	EN 61010-1
		EMC	EN 61000-6-3 EN 61000-6-1

Notes

1. LS Arc analysis (primary filter Ls = 0.25 mm)

2. Measured over a glass flat nominally parallel to the traverse datum using a 60 mm stylus (i1 & i2), 120 mm stylus (i5) with a diamond stylus (speed = 0.5 mm/s, Gaussian roughness filter, 0.08 mm cut-off, 30:1 bandwidth) in Range 3

3. Assumes a calibration artefact of perfect radius, and use of Gauge Range 1

4. Measurements up and down a ±35° angled slope over 95% of the gauge range using a 60 mm stylus (i1 & i2), 120 mm stylus (i5) with a diamond stylus

5. 60 mm traverse unit not available for i5 system

6. For surface texture measurements, speeds of 0.5 mm/s (0.02 in/s) and less are recommended.

7. Measured over a glass flat nominally parallel to the traverse datum using a 60mm stylus (i1 & i2), 120 mm stylus (i5) with a diamond stylus (speed = 2 mm/s, LS Line analysis, Cubic Filter 0.8 mm)

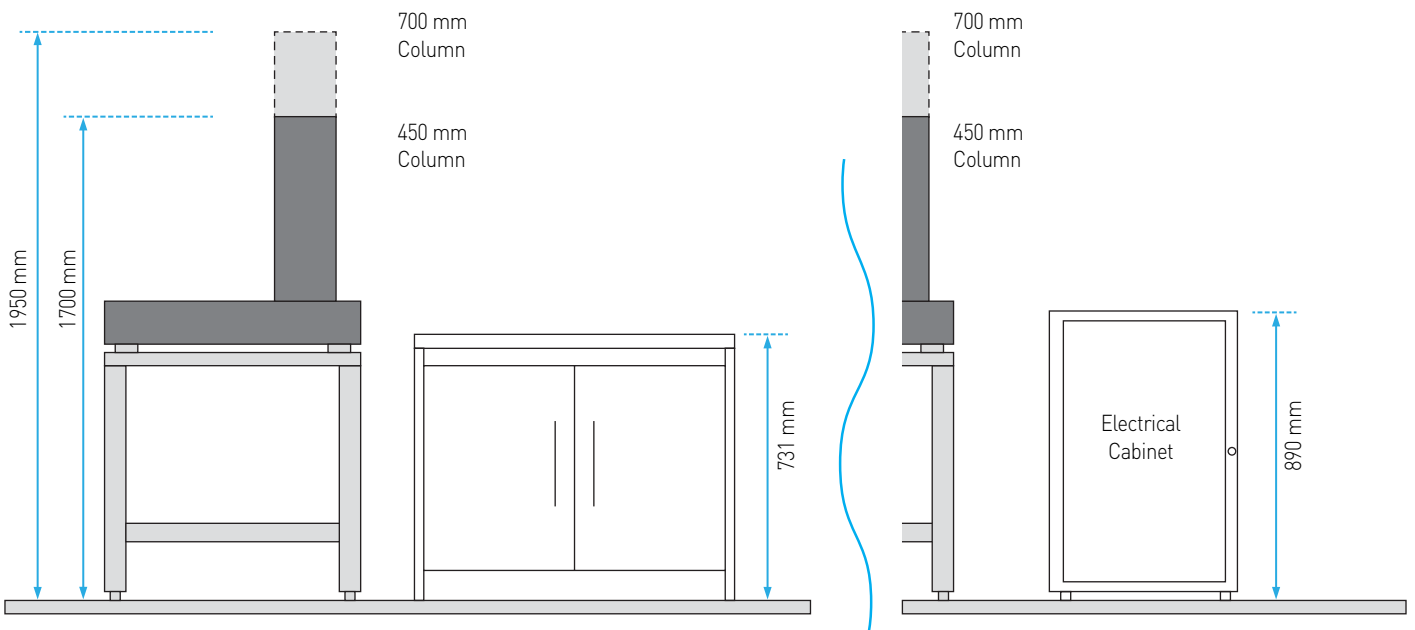
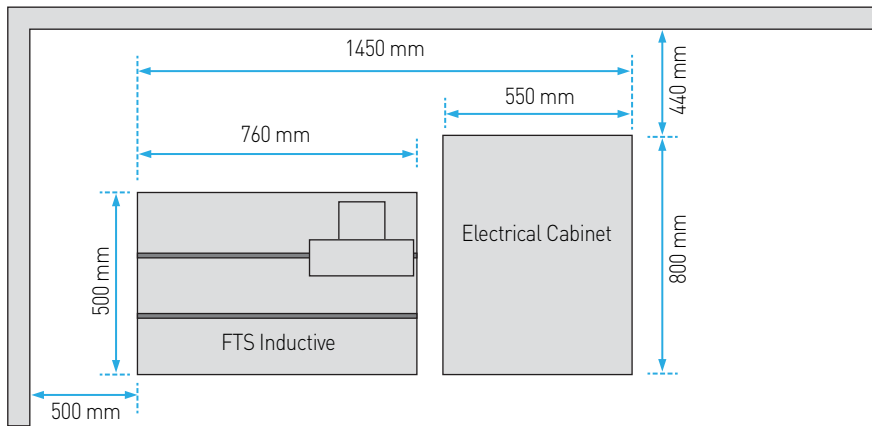
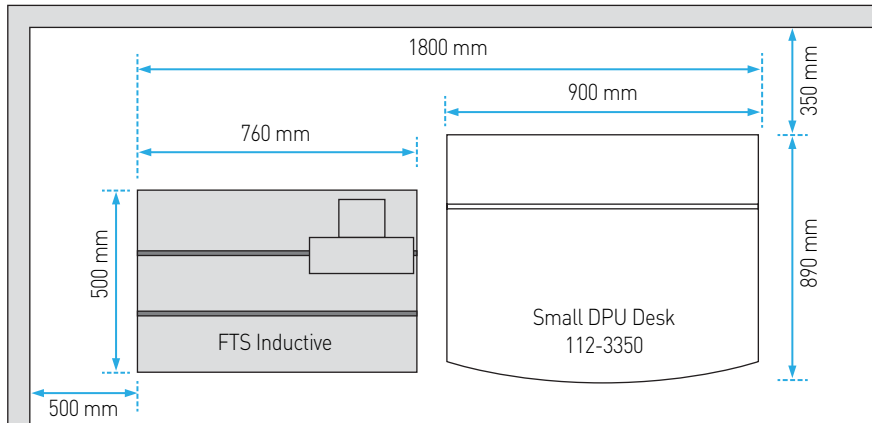
8. Where L is in mm

9. Using a 60 mm stylus (i1 & i2), 120 mm stylus (i5) with a diamond stylus

10. Repeated measurements over a glass flat that is nominally parallel to the datum (full traverse length, primary filter Ls = 0.8 mm)

11. Repeated measurements over a 12.5 mm radius standard (i1 & i2), 22.5 mm radius standard (i5) (primary filter LS = 0.25 mm)

Form Talysurf i-Series floor plan



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

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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 artifacts or instruments in our laboratory or at customer's site



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