TAYLOR HOBSON®
AMETEK®

FORM TALYSURF®
PGI VESTA

High range, high resolution system for
surface finish, form and contour measurement

powered by Metrology 4.0® SMART SOFTWARE

FORM TALYSURF® **PGI VESTA**

The Form Talysurf® PGI VESTA
Results you can trust

High range, high resolution system for surface finish, form and contour measurement

The Form Talysurf® PGI Vesta is a great new addition to Taylor Hobson's surface profiler product range.

The PGI gauge provides the ability to measure surface finish, form and contour with high speed and accuracy.

Through this development, Taylor Hobson has addressed challenges faced day-to-day by bearings, injectors and precision component manufacturers.

Buy with confidence

When you purchase from Taylor Hobson, you are investing in the most accurate, stable and repeatable measurement system on the market.

The Form Talysurf® PGI Vesta delivers class-leading:

- Angle
- Radius
- Form

Instrument shown
0.8 nm resolution,
8 or 14 mm range,
Powered by Metrology 4.0

Unique benefits for both design and production

One measurement, multiple results, instant feedback

Surface finish - High resolution gauges with low noise enable roughness, waviness and form in one measurement.

Step Height - Evaluate step heights with higher resolution gauge ranges to ISO standards and more.

Contour - Our patented calibration technique enables measurement of radii, angle, height, length, distance...

Topography* - Using an optional motorized Y-stage and Metrology 4.0 software, transform your conventional 2D measurements into 3D.

Powerful metrology instruments

Unparalleled measurement capability

Taylor Hobson designs, manufactures, and supports a broad array of high-precision contact and non-contact products for many challenging measurement applications.

These instruments measure surface texture, shape and roundness, dimensions that are critical in many industries including, automotive, aerospace, gears, bearings, medical and optics.

Taylor Hobson's class-leading product ranges include:

- Form Talysurf® i-Series PRO
- Form Talysurf® PGI NOVUS
- Talyrond®
- Surtronic®
- LUPHOScan
- TALYScan

* Optional.

Metrology 4.0®
SMART SOFTWARE

In so many ways, it's a first
Advanced metrology, made simple

SMART Move in action

Metrology 4.0 User Interface

Metrology 4.0 - Smart Software

Cutting-edge technology

The advancement in metrology software design that the market has been waiting for...

Taylor Hobson's new advanced software enables dimensioning in accordance with part drawings and provides an exact reflection of the Part Co-ordinate System (PCS) delivering the final link in the manufacturing loop.

Metrology 4.0 software is easy to use with an intuitive user-interface, virtual display and real time control. The state-of-the-art point and move axis control function (SMART Move) delivers precise positioning and accurate measurement.

Operator benefits

Virtual display - simulation of the measurement process with 'at-a-glance' status, on-screen indicators, real-time feedback and remote system control.

SMART Move - intuitive operation for moving and measuring. Once a part has been set-up, the user can then zoom to a detail that the eye cannot see and program around the virtual part.

Variable programming* - enables users to automate measurements of a multitude of part sizes without the need for a multitude of programs.

* Optional.

SMART **Factory**

The future of modern manufacturing

Industry 4.0 supported by Metrology 4.0

Taylor Hobson has developed the Production Interface* and Pallett of Parts Interface to support automation, data exchange and process control in manufacturing environments.

The Q-DAS accredited production interface is designed for shop floor environments and provides direct communication with SPC software, which delivers feedback to your manufacturing process.

This form of monitoring is used widely in automotive and aerospace component manufacturing, where data and strict standard operating procedure control is mandatory.

User benefits

- Programs reduce operator mistakes
- Programmed measurement routines reduce cycle times and increase throughput.
- Display traceable pass/fail results and automatic summary reports
- Historic traceability is made possible via data exchange and part tracking
- Control can be managed by barcode scanners or tracking/auditing system
- Statistics such as automatic R&R studies
- Tolerancing - Visually identifies the parameter and tolerance band

Remotely monitor results in Metrology 4.0 production interface

> Metrology 4.0 customers are praising the software for its functionality and ease of use

> Metrology 4.0 is a quantum leap in measurement and analysis software

* Optional.

Industry 4.0 in action

All of the critical components for the Form Talysurf® PGI Vesta are manufactured in-house at our UK facility, with unique serial numbers for worldwide traceability.

Taylor Hobson has invested in the latest machining techniques to deliver measurement integrity through manufacturing excellence.

"Our strong investment meets the demands of high technology manufacturing"

Tim Garner, Operations Director. – Taylor Hobson Ltd.

Taylor Hobson's latest investment includes the Mazak Integrex i-200S with 10 axis, twin spindle, in cycle probing, tool break detection, unmanned running, temperature control, zero set up times, auto re-loading, high accuracy glass scales and 110 tool capacity.

FORM TALYSURF® **PGI VESTA**

Designed to meet your measurement needs
Performance in all environments

Complete trust in your measurements and results

Fundamental to any metrology system is the integrity and reproducibility of the results it delivers.

The foundation of accurate measurements is the system's noise floor capability. Taylor Hobson take great pride in boasting the worlds best noise floor.

Our product design is underpinned by decades of measurement experience, ultra-precision manufacturing expertise and FEA optimised design.

These attributes provide low noise and near flawless mechanical execution of the measuring axes.

Internal raceway, form and roughness

Class-leading range with the PGI gauge

The Form Talysurf® PGI Vesta delivers 8 or 14 mm gauge range with a standard 60 mm stylus.

The PGI gauge has been designed to provide the user with greater measurement flexibility. Small, medium and large complex parts can be measured on a single system.

Buy with confidence and future-proof your investment. Using a 120 mm stylus provides an class-leading 28 mm gauge range with full surface finish capability.

Verification of system measurement accuracy

Taylor Hobson is the only company that can prove radius accuracy and form capability over the **full** gauge range.

This is to certify the integrity and reproducibility of the results the system produces.

Other manufacturers quote less radius accuracy and form capability over a significantly reduced gauge range, indicating less confidence in their measurement results.

Low-noise system

Instrument noise levels, often overlooked, wield a significant influence on measurement reliability.

The low-noise capability of the Form Talysurf® PGI Vesta is indispensable for maintaining measurement integrity and delivering dependable, accurate results.

Other manufacturers often don't specify their noise level capability, indicating less confidence in measurement accuracies.

Gauge Range	Resolution	Roughness	Software
Gauge range, up to **14 mm**	Resolution, down to **0.8 nm**	Low noise floor **<2 nm Rq, <10 nm Rz**	Powered by **Metrology 4.0**

Easy access into bores with 200 mm stylus

Surface, waviness and primary analysis

Discontinuous measurement*

High precision surface finish

Force control to ISO standards

The PGI Vesta gauge maintains an ISO recommended tip pressure of <75 mgf while using a 60 mm stylus with 2 µm diamond tip.

- Force control maintained throughout the measurement cycle
- For softer materials, the stylus force can be adjusted to suit the application
- Force control adheres to ISO standard 3274

Automatic lift-lower

The lift-lower function minimises gauge movement and reduces the measurement time while also providing safe and automatic clearance of the part.

The lift-lower excels during many different modes of measurement:

- Batch
- Internal/external bearing
- Small bore

Class-leading resolution

Large range coupled with a high resolution gives flexibility in measuring large scale profiles while also ensuring small surface details are not lost.

* Optional.

Metrology 4.0®
SMART SOFTWARE

In so many ways, it's a first
Advanced metrology, made simple

Designed with the operator in mind

Powerful, intuitive and easy-to-use.

The user interface provides at a glance monitoring of the measurement process.

Real time simulation and true part co-ordinates enable monitoring and control to a level unprecedented in the industry.

Real time display

The TV view allows the user to track the measurement in real time through the on-screen profile.

This is most beneficial if any dirt, marks or obscurities are seen, as the measurement can be stopped at any point, without any loss of data.

Part Co-ordinate System (PCS)

Metrology 4.0 has two co-ordinate systems; instrument and part.

The part co-ordinate system allows the user to control measurement and movement around any component according to the part drawing.

The on-screen view provides an exact simulation of the real instrument, allowing remote monitoring and at a glance confidence in the measurement process.

Macros

A new software feature that enables the user to define icon-based functions.

These functions can be set to run custom measurement programs, media messages, instructions, warnings, calibration routines, and much more.

The user has instant and configurable access to all macro functions directly from the instrument control ribbon.

Calibration

One hit patented calibration routines provide accurate and precise measurements in both single and dual bias mode.

These routines are fast and do not require operator intervention ensuring maximum performance.

Media messages

Include text, images and videos as operator prompts during programs.

Icon-driven interface

Metrology 4.0 enables simulation of the measurement process with 'at-a-glance' status, on-screen indicators, real-time feedback and remote system control.

A range of different measurement modes are available via intuitive icons on the measurement tool bar. Tool tips give a detailed overview of the measurement.

Metrology 4.0 advanced measurement types

- Discontinuous measurement*
- Crest measurement
- Crest analysis - LS Arc, highest point, lowest point
- Alignment routines - Cylinder alignment, axial alignment and auto levelling

Measurement of ball screw

Simulation of real-time ball screw measurement

Ball screw measurement using SMART Move

Programming

A range of different modes that offer basic elements such as recordable part programming and an advanced toolbox of programmable features including variables*.

The use of variables reduces the time it takes to create and maintain multiple part programs. This function allows one program to be created for a set of parts of differing sizes.

User Levels

Tailor your instrument to suit the operator, from basic production mode to advanced administration use.

The password protected modes provide complete control of a user's access, resulting in a tamper-proof software interface for use in the most secure environments.

SMART Move

A clever tool that allows the user to create points around a part for movement and measurement.

- Simply click on the screen to create a point.
- The instrument will then move the stylus tip to that point
- The instrument moves using either the traverse, column, Y-stage or a combination of these axes.
- Pre-flight path, allowing the user to predict and control the axes of movement to avoid any obstructions
- Measurements are made between pre-defined points or from points fed back from the analysis process
- Improved accuracy and repeatability can be achieved via the unique feedback process
- A perfect tool for offline programming

* Optional.

Metrology 4.0®
SMART SOFTWARE

In so many ways, it's a first
Advanced metrology, made simple

Dedicated software analysis packages

One software platform does all

Metrology 4.0 includes desktop publishing, automated feedback, roughness, contour, and 3D analysis.

Critical analysis types

Surface finish

- Roughness, waviness and primary
- Form error and radius
- Rk parameter set
- R & W parameter set
- Dominant wavelength
- Slope analysis
- Step height
- Departure from true form (DFTF)
- Localised slope (LSLP)

Topography*

- 3D mapping
- Structured surfaces

Contour*

- Gothic arch
- Roller profile and drops
- Angle
- Distance measurement
- DXF fitting

Critical analysis functions

- Morphological filtering
- Dual Profile
- Data fusion
- Helix angle correction
- Profile patching

Contour analysis*

An essential tool for geometric dimensioning, tolerancing of profiles and full form deviation analysis.

Save time and increase productivity with automation features within Contour analysis.

Topography analysis*

Transform your 2D measurement in to a powerful 3D analysis to view surface and defects in greater detail using Metrology 4.0 analysis 3D software and a motorised Y-stage.

DXF creator*

A utility that allows creation of DXF data, enabling comparison of design profile to part profile.

- Logarithmic equation
- Free form equations
- Tolerance zones

Data fusion*

Where components profiles are demanding in angle and form, complete analysis can be made by fitting several measured profiles together into one profile using the patented data fusion process.

* Optional.

Desktop publishing

The software allows users to create templates and use them in the analysis process, which vastly simplifies the measurement process.

The desktop publishing features are powerful and simple to use allowing customisation of result layouts and ensuring a more professional and personalised look to your brand.

Benefits

- Generate interactive reports
- Compose multi-page documents
- Multiple documents can be displayed on screen, which enables visual comparison of multiple results at once
- Build a professional report in a matter of minutes

Feedback measurement control

Repeatability and reproducibility are key to any production process. Metrology 4.0 closes the loop between measurement and analysis by feeding positional information back to the movement or measurement process in order to improve process control.

Movement or measurement can react or be controlled via defined features on a part such as intersections.

Feedback process

- Measure profile
- Create datum points for critical features
- Add datum points to instrument view
- SMART Move to start position
- Measure between specified points
- Apply template to the analysis

Customised analysis*

Our strategy for success is simple, instead of just selling products, we provide solutions. If our standard software analysis packages do not satisfy your needs, we can customise a solution to match your requirement as an advanced module.

Alternatively Metrology 4.0 has built-in access to execute MATLAB™ files. This enables the user to writing their own scripts and execute them by loading an 'm' file.

Design and program your own...

- Custom filters
- Custom analyses
- Custom parameters

MATLAB™ software purchased separately from external source.

Metrology 4.0®
SMART SOFTWARE

Taylor Hobson Advanced Module (THAM)
Tailored to your application

Advanced form removal

Introducing our Unique Advanced Form Removal THAM software, an unparalleled solution that revolutionizes data manipulation and analysis.

Our one-of-a-kind Advanced Form Removal THAM goes beyond conventional data removal by excelling in form fit, data removal and auto scale adjustments, ensuring a seamless extraction process. Operators have the power to zoom in on the minutest details, focusing on edges with unparalleled precision.

The Advanced Form Removal THAM enables the extraction of exact relative data, providing a level of accuracy unmatched in the industry. What sets our software apart is its seamless integration into existing workflows, delivering newly processed data for further analyses.

Standard within the product, this Unique Advanced Form Removal THAM software delivers efficiency and innovation, making possible manual and programmable data processing and analysis. With advanced capabilities in form fit, auto scale adjustments, and data removal, our software ensures a comprehensive approach to data manipulation.

LS Arc Auto

Introducing our revolutionary software designed to streamline and enhance your bearing surface analysis process.

Our unique software goes beyond traditional methods by automatically identifying the bearing race areas, ensuring accurate results everytime.

Even if the part moves, our software seamlessly extracts the same profile, eliminating the need for manual adjustments and saving you valuable time. Furthermore, these features are seamlessly integrated into a contour package, providing comprehensive analysis capabilities.

Delivering newly processed data directly into your workflow for further analysis, our software acts as a catalyst for efficiency and precision. As an optional package within our product suite, it offers flexibility to tailor your solution to your specific needs. Experience the future of bearing surface analysis with our unique software solution.

Full traceability to international standards
Critical results, trust Taylor Hobson

Traceability

Taylor Hobson provides full certification for artefacts and instruments in our purpose built ISO graded clean room UKAS facility.

Our UKAS laboratory is able to measure all of the parameters associated with surface texture, including French, German, USA and Japanese derivatives.

Arcuate correction

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.

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 to enhance the measuring axis for correct geometrical form.

Surface finish

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

Spacing standards are also available to an uncertainty of ±0.6 µm.

Step height

To ensure the correct gain setting of your instrument, high precision step height standards are available; calibrated with uncertainties down to ±4 nm.

Grating correction

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

For further information please visit our website or contact our worldwide Centre of Excellence.

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FORM TALYSURF® **PGI NOVUS**

More advanced measurement and analysis required, **The Form Talysurf® PGI NOVUS is a great solution**

Introducing, the most advanced system for surface finish, contour, 3D and diameter measurement

At the heart of the new Form Talysurf® PGI NOVUS is a ground-breaking dual bias gauge.

The NOVUS gauge provides the ability to measure diameter, included angle, surface finish in a normal and inverted direction with the same speed and accuracy.

Through this development, Taylor Hobson has addressed challenges faced day-to-day by bearings, injectors and precision component manufacturers.

Buy with confidence

When you purchase from Taylor Hobson, you are investing in the most accurate, stable and repeatable measurement system on the market.

The Form Talysurf® PGI NOVUS delivers class-leading:

- Angle
- Diameter
- Radius
- Form
- Range
- Resolution

Instrument shown
0.2 nm resolution,
20 mm range, Dual bias
Powered by Metrology 4.0

World-leading range with the PGI NOVUS gauge

The Form Talysurf® PGI NOVUS delivers 20 mm gauge range with a standard 100 mm stylus.

The PGI NOVUS gauge has been designed to provide the user with greater measurement flexibility. Small, medium and large complex parts can be measured on a single system.

Buy with confidence and future-proof your investment. Using a 200 mm stylus provides an industry-leading 40 mm gauge range with full surface finish capability.

Verification of system measurement accuracy

Taylor Hobson is the only company that can prove radius accuracy and form capability over the **full** gauge range.

This is to certify the integrity and reproducibility of the results the system produces.

Other manufacturers quote less radius accuracy and form capability over a significantly reduced gauge range, indicating less confidence in their measurement results.

Diameter & angle capability with reverse bias gauge

The dual bias NOVUS gauge combined with the new high precision column delivers unparalleled diameter measurements to sub-micron accuracies. This capability is critical to manufacturers of components such as bearings, injectors and ball screws.

The above attributes coupled with the instrument's ability to measure internal or external angle make the Form Talysurf® PGI NOVUS a truly versatile system.

Gauge Range	Resolution	Bias	Software
20 15 10	S E		
Gauge range, up to **20 mm**	Resolution, down to **0.2 nm**	Bias options **Dual or single**	Powered by **Metrology 4.0**

Internal raceway diameter, form and roughness

Reverse bias for PCD analysis along with gothic form and dimensions

Unparalleled diameter measurements to sub-micron accuracies

Easy access to gear teeth using dual tipped small bore stylus

Automated force control to ISO standards

The PGI NOVUS gauge maintains an ISO recommended tip pressure of <75 mgf while using a 200 mm stylus with 2 µm diamond tip.

- Force control is automated and maintained throughout the measurement cycle.
- For softer materials, the stylus force can be adjusted to as low as 30 mgf.
- Automated force control adheres to ISO standard 3274.

Automatic lift-lower

The precise lift-lower function minimises gauge movement and reduces the measurement time while also providing safe and automatic clearance of the part.

Coupled with closed loop feedback, the lift-lower excels during many different modes of measurement:

- Batch.
- Discontinuous (interrupted features).
- Diameter.
- Internal/external bearing.
- Small bore.

World-leading resolution

Large range coupled with a high resolution gives flexibility in measuring large scale profiles while also ensuring small surface details are not lost.

Gauge protection system

Protect your investment from accidental damage and reduce down time by utilising the built-in rapid collision detection system.

The system stops movement in any direction under automatic or manual mode to prevent collision.

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TAYLOR HOBSON / AMETEK

Sales

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- **Design Engineering –** Special purpose and dedicated metrology systems for demanding applications.
- **Precision Manufacturing –** Contract machining services for high precision applications and industries.

Service

Email: **taylor-hobson.service@ametek.com**
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- **Preventative Maintenance –** Protect your metrology investment with an AMECare support agreement.
- **Upgrades –** Carried out by Taylor Hobson accredited service engineers and include installation and calibration to ensure your system runs at peak performance.

Metrology Support

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- **Contract Measurement –** A cost effective option to capital expenditure, simply send in first article or production components for measurement.

  Measurement of your parts is carried out 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 & Testing –** Certification for artifacts or instruments in our laboratory or at customer's site.

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TAYLOR HOBSON®
AMETEK®

FORM TALYSURF®
PGI VESTA

System specification

powered by Metrology 4.0® SMART SOFTWARE

System specification

System performance	8 mm Gauge	14 mm Gauge
Form uncertainty (Pt) [1]	<0.15 µm (5.9 µin)	<0.20 µm (7.9 µin)
System noise [2]	Rq <2 nm (<0.08 µin), Rz <6 nm (<0.24 µin)	
Radius measurement uncertainty [3]	0.1 mm - 80 mm = 1 % - 0.005% of nominal 80 mm - 1000 mm = 0.005 % - 0.1% of nominal	

Horizontal performance	
Traverse length – X max / min	0.1 mm - 120 mm (0.004 - 4.7 in) / 0.1 mm - 200 mm (0.004 - 7.9 in)
Traverse speeds	13 mm/s (0.51 in/s) Max.
Measuring speed [4]	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	0.100 µm (3.9 µin)
Maximum data points in X	120 mm Traverse Unit - 1,200,000 points / 200 mm Traverse Unit - 2,000,000 points
Straightness accuracy (Pt) [5]	120 mm Traverse unit - 0.08 µm (3.2 µin) / 200 mm Traverse unit - 0.11 µm (4.3 µin)

Gauge performance		
Nominal measuring range (Z) [6]	8 mm	14 mm
Resolution (Z) [6]	0.8 nm (0.03 µin)	
Range to resolution [6]	10,000,000 : 1	17,500,000 : 1
Stylus arm length	Standard length - 60 mm	
Tip size	2 µm radius conisphere diamond	
Force	75 mgf	

Column performance		
Motorized vertical column	450 mm (17.7 in)	700 mm (29.5 in)
Usable height	380 mm (14.9 in)	630 mm (24.8 in)
Positioning speeds	0.10 mm/s to 40 mm/s	

Measuring station	
Motorized tilting of traverse unit	±9° from horizontal*
Instrument dimensions	See floor plan (Page 3)
Instrument weight [7]	420 kg (450 mm column) / 431 kg (700 mm column)

Environment	
Operating temperature (recommended)	18 °C to 22 °C (64 °F to 72 °F)
Temperature gradient	< 2 °C per hour (< 3.6 °F per 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

* Optional.

Electrical (alternating supply, single phase with earth, 3-wire)		
Instrument and computer voltage	Standard	100 V to 230 V
	Active AV	115 V to 230 V
Frequency		47 Hz to 63 Hz
Power consumption		1000 VA (Inc. PC, etc.)

Laser classification

Class 1 Laser product to EN 60825-1:2014.
Compliant with 21CFR 1040.10 and 1040.11 of the United States FDA
(except for deviations pursuant to Laser Notice 50, dated June 24, 2007)

Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU, Machinery Directive 2006/42/EC, RoHS Directive 2011/65/EU

Compliance to directives is demonstrated using applicable European standards and sections therein.

Notes

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.

The above specification has been derived at 75 mgf.

All uncertainties are at 95% confidence in accordance with recommendation in the ISO guide to the expression of uncertainty in measurement (GUM:1993).

Qualifiers

1. LS Arc analysis on a 49 mm radius (speed = 1 mm/s, primary filter Ls = 0.25 mm).
2. Measured over a glass flat nominally parallel to the traverse datum using a 60 mm diamond stylus (speed = 0.5 mm/s, Gaussian roughness filter, Lc 0.08 mm, Ls 0.0025 mm).
3. Assumes a calibration artefact of perfect radius.
4. For surface texture measurements, speeds of 0.5 mm/s (0.02 in/s) and less are recommended.
5. Measured over a glass flat nominally parallel to the traverse datum (speed = 1 mm/s, LS Line analysis, primary filter Ls = 2.5 mm). Does not take in to account the form error of the calibrated glass flat artefact.
6. Using a 60 mm diamond stylus
7. System includes 200 mm traverse unit, column, instrument surround and environmental chamber.

System floor plans are a visual representation and may differ slighty. System floor plan displayed for Form Talysurf® PGI VESTA without surround and environmental chamber. Taylor Hobson pursues a policy of continual improvements due to technical developments. We therefore reserve the right to deviate from catalogue specifications.

System floor plan

Metrology 4.0®
SMART SOFTWARE

Advanced metrology, made simple

- Powerful, intuitive and easy-to-use
- Real-time virtual display
- Variable programming
- Dedicated analysis software

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