

Intra Touch Intra Ultra

Precision shop floor solutions for
surface finish and contour measurement



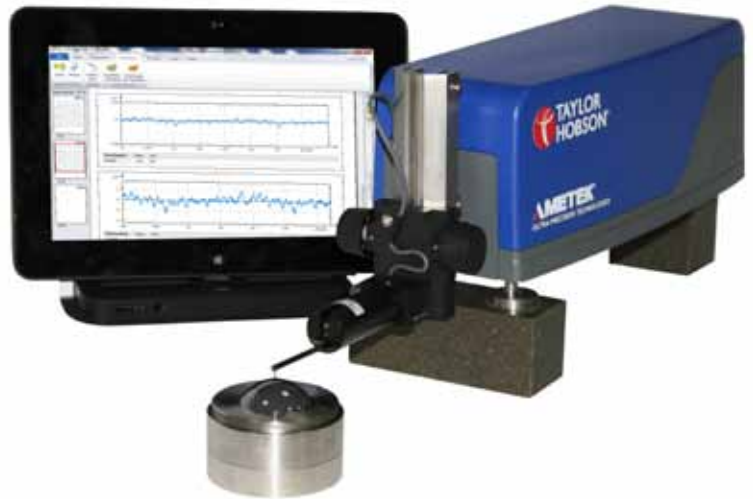
Intra Touch

Housed in a rugged enclosure, the Intra has a proven history of maintaining accuracy of measurement without the need for constant maintenance or support. Quality, flexibility and ease-of-use have enabled the Intra to become a shop-floor standard across a wealth of different industries.

Intra touch is a perfect choice. It combines industry leading specification with simplicity of operation for unbeatable practicality and value.

Intra touch features and benefits

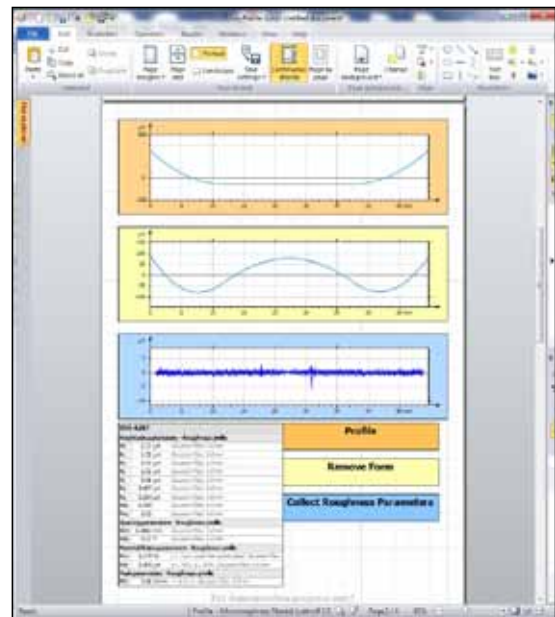
- **1 mm, 2 mm & 28 mm configurations**
Delivers form (contour) as well as surface finish measurement capability for precision metal forming and other applications.
- **50 mm horizontal traverse**
Ideal for the majority of shop floor applications. The unit combines both accuracy and portability.
- **0.40 μm / 50 mm straightness error**
The high accuracy traverse datum makes possible skidless measurement of waviness, form and contour, even on large components.
- **0.5 μm horizontal data spacing**
Small components and features can be measured more effectively than ever before. Reduced run-up and run-down length further improve usability
- **Manual column**
For large or tall components the available manual column provides a stable, dedicated work station for improved throughput.



Talysurf software – comprehensive surface finish analysis

The Intra touch system includes everything important to the measurement of surface finish. Fundamental roughness and waviness parameters are included, plus form error analysis, feature exclusion, zoom tool and full programmability for shop floor applications.

- **Form analysis**
Measure and evaluate radius, angle (slope) and dimension
- **Simple user interface**
Combines with system programmability to deliver a true shop floor solution; custom designs available.
- **Dual profile analysis***
Allows comparison of measurements for wear, tolerancing, etc.
- **Contour analysis†**
Software utility for dimensional applications, allowing design data and measurements to be directly compared, and error results obtained. Special hardware is also available for wide-range applications.
- **TalyMap 3D analysis**
Software utility for topography applications; special hardware is also required.



Taylor Hobson delivers an excellent investment

- Save money with flexible, modular system configurations
- Improve accuracy with our patented calibration routine
- Save time with multi-tasking measurement systems
- Increase productivity with automatic, unattended operation
- Prevent mistakes with programmed measurement routines

* Included with Talysurf Gold

† Included with Talysurf Contour

Talyprofile

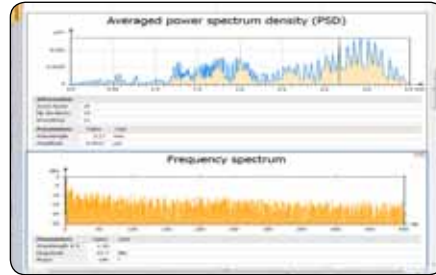
Advanced surface finish and contour analysis

Talyprofile is a dedicated Windows tablet-based software package designed for use with Intra touch. Two versions are available. Talyprofile "Silver" has all functions typically used for a shopfloor inspection, including R&W parameters, a statistics module and full report printing. Talyprofile "Gold" has all the benefits of Talyprofile "Silver" with the addition of complete laboratory analysis functions:

	Silver	Gold	Contour
Patented Ball Calibration	✓	✓	✓
Multi-language Support	✓	✓	✓
EN, FR, DE, ES, IT, BR, PL, CN, KR & JP	✓	✓	✓
Auto / Manual Levelling	✓	✓	✓
ISO 4287 / ASME B46.1 Parameters	✓	✓	✓
ISO 13565 Automotive Parameters	✓	✓	✓
ISO 12085 R&W motifs	✓	✓	✓
Area of Hole / Peak	✓	✓	✓
Profile Parameteres and Curves	✓	✓	✓
Roughness & Waviness Curves	✓	✓	✓
Distance and Height Measurement	✓	✓	✓
Interactive Material Ratio Curve	✓	✓	✓
Tolerance Limits Pass / Fail	✓	✓	✓
Auto Step Height Measurement	✓	✓	
Form Removal	✓	✓	
Filtering by FFT	✓	✓	
Thresholding	✓	✓	
Frequency Spectrum	✓	✓	
Power Spectrum Density	✓	✓	
Retouch / Edit Profile Points	✓	✓	
Rk Parameters	✓	✓	
Rk Parameter Curves	✓	✓	
Matlab Script Data Processing	✓	✓	
Horizontal / Vertical Dimension	✓		
Oblique Distance Dimension	✓		
Radius Dimension	✓		
Diameter Dimension	✓		
Angle Dimension	✓		
Create Segment from Profile	✓		
Create Arc from Profile	✓		
Create Circle from Profile	✓		
Define Origin	✓		
Align to Horizontal / Vertical	✓		
Auto-connect Elements	✓		
Add Label to Element	✓		
Auto-dimensioning	✓		

Advanced time-saving analysis templates

A 'template' can be created whereby a sequence of analysis functions can be saved and applied to future measurements, turning detailed reporting tasks into routine documents.



Desktop publishing facility

Talyprofile offers a comprehensive desktop publishing function which allows clear presentation of measurements, results and profiles. Graphs, profiles and results can be arranged from within the Talyprofile software or copied into other word processing documents giving complete flexibility in reporting.

In depth analysis

Profiles can be levelled and zoomed to remove unwanted features or defects from the analysis. Distance measurement between features of a profile are easily achieved and the information can be displayed graphically and numerically. Step height and the area of a valley or peak can also be calculated.

Filters and additional features

Filters: Gauss, ISO 2CR, Rk

Cut-offs (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 (VDA 2006)

Pass / Fail tolerances: All parameters can be assigned nominal, minimum and maximum values.

Full compatibility

Surface finish results from other Taylor Hobson surface roughness instruments can be imported to Talyprofile software, allowing a uniform report style to be used throughout your workshop or laboratory

Windows tablet specification

	Minimum
Operating system	Windows 8
Screen size	10.1 inch
Screen resolution	1366 x 768
Memory (RAM)	2 GB
CPU speed	1.8 GHz
Hard disc	64 GB
Weight	658 g

Talyprofile parameters

Roughness parameters obtained by filtering: Ra, Rq, Rt, Rp, Ry, Rku, Rsk, RSm, Rz, RΔq, RTp, RHTp, Rlo, RΔq, RPC, RzJS, R3z.

Parameters on the raw profile (unfiltered): Pa, Pq, Pt, Pp, Pv, Pku, Psk, PSm, Pz, PΔq, PΔq, PTp, PHTp, PLo, PPc.

Parameters obtained by double filtering (DIN 4776): Rk, Rpk, Rvk, MR1, MR2, A1, A2, Rpk, Rvk

Parameters obtained by the motifs method ("R&W"): R, AR, Pt, Rx, SR, SAR, Nr, Kr, W, AW, Wte, Wx, SW, SAW, Nw, Kw, Rke, Rpk, Rvke, Trc, HTrc.

Waviness parameters: Wa, Wc, Wda, Wdc*, Wdq, WHSC*, Wku, Wln, WLo, Wlq, Wmr(c)*, Wmr*, Wp, Wpc*, Wq, WS, Wsk, WSm, Wt, Wv, WVo*, Wz

R + W parameters: AR, AW, Pt, R, Rke, Rpk, Rvke, Rx, Sar, Saw, Sr, Sw, W, Wte, Wx

Intra Ultra

The Intra Ultra is the perfect instrument to complement any metrology laboratory. Combining the rugged Intra platform with the industry standard Ultra software analysis package is the perfect combination for lab based measurements or where a single software system is required to cover roundness and surface instruments. Able to deliver industry leading contour, form and roughness in a single instrument and with a range of gages and styli covering 3nm resolution to 28mm vertical measurement range.

Intra ultra features and benefits

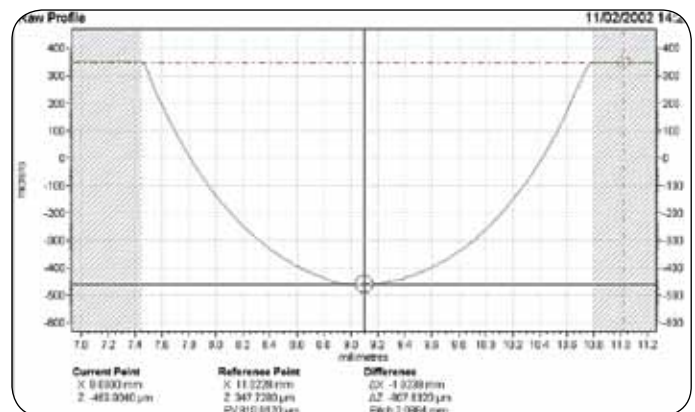
- **1mm vertical range / 16nm resolution**
Delivers form (contour) as well as surface finish measurement capability for precision metal forming and other applications.
- **50mm horizontal traverse**
Ideal for the majority of shop floor applications. The unit combines both accuracy and portability.
- **0.40um / 50mm straightness error**
The high accuracy traverse datum makes possible skidless measurement of waviness, form and contour, even on large components.
- **0.5um horizontal data spacing**
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- **Manual column**
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Ultra Software - comprehensive surface finish analysis

The Intra ultra System include everything important to the measurement of surface finish. Fundamental roughness and waviness parameters are included, plus form error analysis, feature exclusion, zoom tool and full programmability for shopfloor applications.

- **Form Analysis***
Measure and evaluate Radius, Angle (Slope) and Dimension
- **Simple User Interface***
Combines with system programmability to deliver a true shopfloor solution; custom designs available.
- **Dual Profile Analysis***
Allows comparison of measurements for wear, tolerancing, etc.
- **Ultra Contour Analysis**
Separate software utility for dimensional applications, allowing design data and measurements to be directly compared, and error results obtained. Special hardware is also available for wide-range applications.
- **Talymap 3D Analysis**
Separate software utility for topography applications; special hardware is also required.



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- Improve accuracy with our patented calibration routine
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Ultra Surface Finish Parameters

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 surface features such as edges is also available.

Alternatively, the absolute radius can be set to analyze the actual deviation from a design master. Other calculated parameters include the center 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 relationships of surface features can be assessed and compared by means of calculated X and Z coordinate positions.

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

Interactive curves

Material Ratio (mr)
Amplitude Distribution (ADK)

Dual Profile (optional)

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 analysis.

Surface finish parameters

Primary parameters

Pa, Pc, Pda, Pdc*, Pdq, PHSC*, Pku, Pln, PLo, Plq, Pmr(c)*, Pmr*, Pp, PPC*, Pq, PS, Psk, PSm, Pt, Pv, PVo*, Pz, Pz(JIS)

Roughness parameters

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

Waviness parameters

Wa, Wc, Wda, Wdc*, Wdq, WHSC*, Wku, Wln, WLo, Wlq, Wmr(c)*, Wmr*, Wp, WPC*, Wq, WS, Wsk, WSm, Wt, Wv, WVo*, Wz

Rk Parameters and Rk curve

A1, A2, Mr1, Mr2, Rk, Rpk, Rvk

R + W Parameters

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

Dominant Wavelength VDA 2004

(optional)

WD1Sm, WD1c, WD1t, WD2Sm, WD2c, WD2t

Filters and additional features

Filters

Gauss, ISO 2CR, Rk

Cut-offs (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 (VDA 2006)

Pass / Fail tolerances

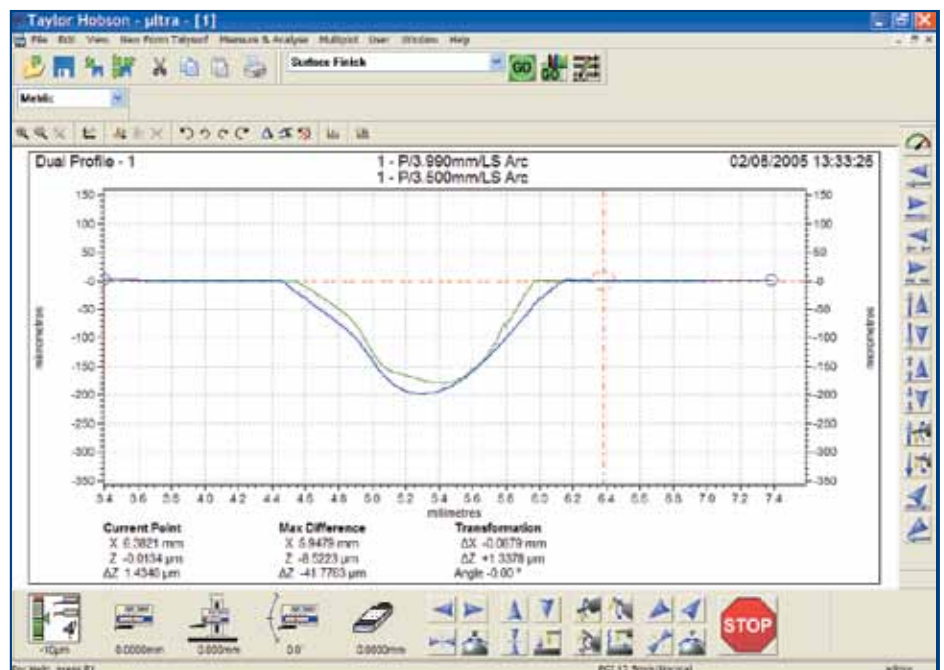
All parameters can be assigned nominal, minimum and maximum values.

* Qualifiers

All parameters marked with an asterisk 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 above parameters conform to and are named as per the standards ISO 4287-1997, ISO 13565-1-2 and ISO 12085.



Dual Profile analysis allows two sets of measurement data to be displayed at once with one set being used as the datum against which the other set is tested; a master profile or template may also be used for the comparison.

Unique patented ball calibration

Just as the three elements of surface texture function as one, each element of a measuring system is designed to complement the others. The specification of one component - no matter how outstanding - is meaningless out of context with the system. Intra optimizes system performance by means of calibration over a ball.

The calibration procedure

Like most instruments of this type, the stylus moves in an arcuate manner. A method to linearize data measured in this way was pioneered by Taylor Hobson.

With this method a polynomial is applied to the readings from the gauge. The coefficients of the polynomial are determined by means of calibration.

The accuracy of this calibration directly affects the accuracy of radius, form and surface texture measurement.

To obtain these coefficients, Taylor Hobson instruments are typically calibrated through the measurement of a high precision spherical artifact - a method of calibration patented by Taylor Hobson.

Verify processor functions

Intra uses powerful software to combine the data generated by vertical movement of the stylus with data collected from the linear scale and reading head in the horizontal traverse unit. The result is a grid array of as many as 120,000 data points, each with unique spatial characteristics.

Compensate correctly for arcuate stylus motion error

Patented algorithms are applied that compensate for arcuate stylus motion error. This error occurs because data is collected in X-Z coordinates even though the stylus arm is moving in an arc.

Automatic and powerful

Calibration is programmable and essentially automatic.

A positioning stage is used to manually locate the crest of the ball in the 'Y' axis. Positioning of the traverse to its start location and the actual measurement can all be automatic.

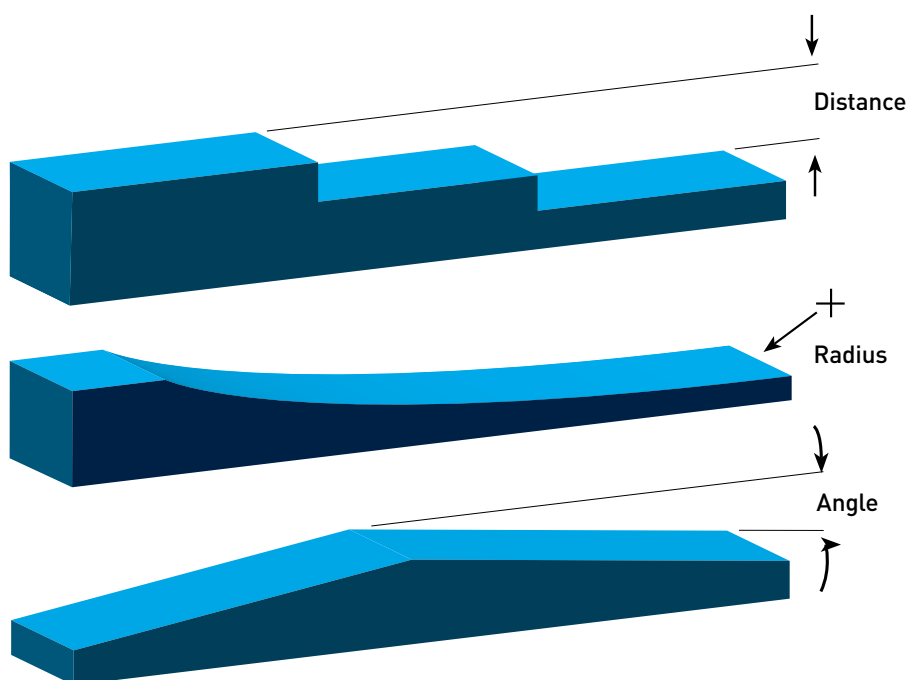
The result is a true system calibration; all elements that may influence the measurement have been checked:

- Arcuate stylus motion error
- Gauge non-linearity
- Stylus tip geometry
- Instrument stability
- Traverse datum and data logging
- Gauge / stylus mechanical stiffness
- Processor functions

Calibration frequency

Calibration is recommended whenever the stylus arm is changed. To simplify this process all stylus arm configuration dimensions are stored for easy recall.

Calibration history regarding operator, artifact and date is automatically stored and artifacts used for calibration can be identified and referenced to certification date.



Linearity and wide range assure accurate measurement of dimension, form and texture

Correlation of results

Manufacturers who outsource expect their suppliers to deliver parts that meet specification. You know the parts are good but the instrument your customer uses to inspect them says they are bad. Lack of correlation can occur even when the instruments are configured the same way as to filter, cut-off and length of trace.

Different suppliers, different results

In the case of mating pieces, one supplier makes part A, another makes B. Both say the roughness is acceptable but the end user may find that neither part meets the spec.

Some of the lack of correlation between different brands of instruments or even between instruments of the same brand can be partially attributed to three factors:

- Speed of traverse
- Condition of the stylus
- Gauge linearity

Speed of traverse

Most roughness checkers are time based, collecting data for a fixed period of time instead of a precise, constant distance.

Anything that affects speed of traverse – wear, dirt, slippage, etc. – affects the quantity and spacing of the collected data points which in turn affect the measurement results.

Intra touch utilises a glass scale and reading head to assure that data collection is accurate and consistent. Every measurement on every instrument is calculated from the exact same quantity of identically spaced data points.

Stylus condition

With many surface measuring systems, the size, shape and condition of the stylus tip are assumed to be constant in terms of data processing. In practice the stylus tip may vary due to manufacturing tolerance, routine wear or physical damage.

During calibration with a Intra touch the stylus is traversed over the spherical artifact to make contact at all points along the radius of the conisphere tip in the measurement direction.

By this method, the user can detect effects due to stylus damage or deviations of size and shape.

Gauge linearity

Intra touch is calibrated over a ball to check linearity of the entire 1 mm gauge range. Most other systems use a step master or an Ra patch that calibrates only over a very narrow band. The assumption is that if the gauge is linear over that band it is linear over the full range.

Unless your measurements are all taken within the same vertical position of the gauge range and never exceed the amplitude of the step height master; the data you collect may be non-linear which will cause incorrect results.



Calibration over a ball checks stylus condition, gauge range and linearity



Form errors cause assembly problems, inefficient operation and premature failure of the component



Measure dimension, form and texture at once with a single traverse over curved or straight surfaces

Expanding capability

Intra touch includes an inductive gauge which is suitable for most tasks. For contour measuring applications we also offer a wide range pick-up.

Inductive gauge

This traditional gauge head leads the industry with a full 1 mm (0.04 in) of range and an outstanding range to resolution ratio of 65,536:1. It has a pivoted and balanced beam to allow measurement in any attitude. (standard – code 112/2564)

Range / resolution

1.0 mm / 16 nm (0.04 in / 0.64 μ in)

0.2 mm / 3.0 nm (0.008 in / 0.12 μ in)

Right angle attachment

Code 112/2022 (Skidless applications)

Code 112/2040 (Skid applications)

Stylus stop attachment – code 112/2098

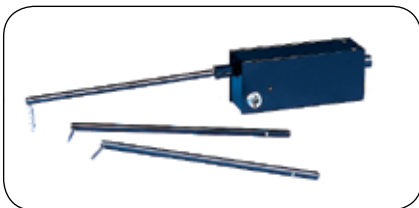
Wide range pick-up

Available as a plug-in accessory, the wide range pick-up provides 28 mm (1.1 in) of range with 426 nm (17 μ in) resolution. Suitable for form and contour measurements.

Wide range pick-up – code 112/2628

Three interchangeable stylus arms available

- Conical tip with 30° included angle
- Ball tip with 0.5 mm (0.02 in) radius
- Chisel tip with 15° included angle



Wide range pick-up for contour applications

Note: All stylus arms have 90° conisphere diamond styli with 2 μ m nominal radius tips unless otherwise stated.

Additional stylus arms

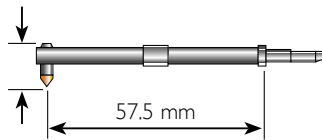
The stylus arms shown on these pages represent just some of the standard configurations. In addition, Taylor Hobson can provide customized stylus arms for specific applications.

Intra touch Pick-up Stylus Arms

1mm

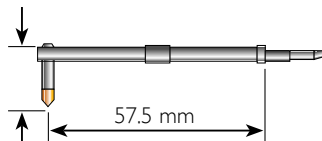
Standard Stylus Arm – code 112/2009

8.3 mm



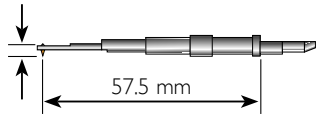
Recess Stylus Arm – code 112/2011

14.7 mm



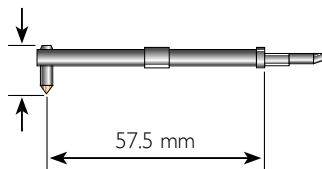
Small Bore Stylus Arm – code 112/2012

1.2 mm



Chisel Edge Stylus Arm – 2 μ m x 750 μ m
chisel diamond stylus – code 112/2013

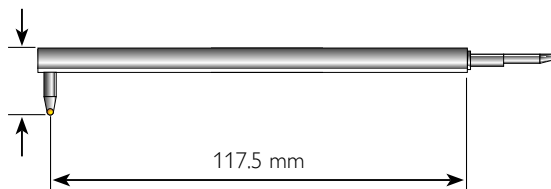
9.0 mm



2mm

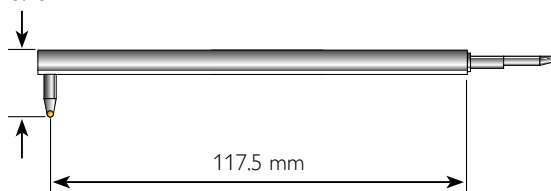
Ball Stylus Arm, nominal range 2 mm (0.078 in)
500 μ m radius sapphire ball stylus – code 112/2010

16.5 mm



Ball Stylus Arm – code 155-P37279

5.25 mm



Accessories

All the accessories you need to begin using Intra touch are supplied as standard. However, for more demanding measuring requirements, we have a range of accessories which may be ordered separately.

1 Universal Worktable

Complete stage assembly to provide X, Y, Z, rotary and tilting positioning moves. Includes vee block and location plate for mounting to the T slot in the granite base.

code 112/3064

2 X axis Stage Assembly

Simple stage assembly with X axis positioning, vee block and location plate for mounting to the granite base.

code 112/3067

3 Manual Column and Base

Granite base 800 x 400 mm (32x16 in) with Tee slot and manual granite column with hand wheel for 350 mm (14 in) height adjustment.

code 112/3116 (cradle mount)

code 112/3117 (fixed mount)

4 Ball Joint Vise

Provides universal positioning via 360° rotation and 180° tilt; especially for lightweight or small components

code 112/2695-01

5 Adjustable Worktable

Provides fine adjustment for rotational [$\pm 3^\circ$] and lateral [± 10 mm (0.4 in)] positioning of the workpiece. Work surface with T-slot = 120 mm x 120 mm (4.7 in x 4.7 in)

code 112/1644

6 Vee Blocks (Pair)

For the support of large, cylindrical components

code 112/1645

7 Ra and 3 Line Standard

An Ra verification patch with step height standard can be supplied with a Form Talysurf unit for calibration when surface texture only is to be analysed.

code 112/557

8 Radius Calibration Standard

For systems using form software, spherical calibration artifacts are a requirement.

9 80 mm (3.15 in) Radius

A glass artifact for systems using a wide range pick-up.

code 112/2028

10 22 mm (0.86 in) Radius

A mounted precision ball for systems using long stylus arms.

code 112/1844

11 12.5 mm (0.49 in) Radius

A mounted precision ball for standard Intra systems.

code 112/2062 (standard)

12 Ball and Roller Unit

Special fixture rotates ball or roller over stationary stylus for circumferential inspection of surface finish. Includes set of (4) plates for ball diameters

1 - 25 mm (0.04 - 0.98 in)

code 112/3219

13 Roller Plates

Set of (3) for 1 - 16 mm (0.04 - 0.63 in) diameter rollers

code 112/3248



Surtronic® product range

Surtronic® Duo measures surface roughness at the touch of a button and shows the result on a large colour screen. Cycle time is 5 seconds and the result is saved until another measurement is taken.

- Ready to use out of the box
- Battery life more than 10,000 measurements

Parameters	Range	Resolution
Ra:	40 µm (1600 µin)	0.01 µm (0.4 µin)
Rz, Rv, Rp, Rt:	199 µm (7800 µin)	0.1 µm (4 µin)



Surtronic® S-series is range of roughness testers robust enough for the shop floor and flexible enough for any inspection room.

- Unique stylus lift for total flexibility
- Long traverse length & extended pick-up reach
- Powerful PC software included

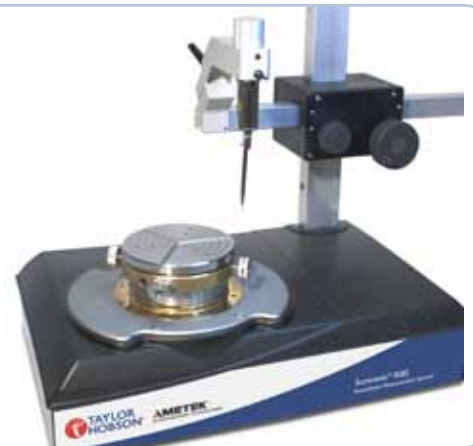
Inductive pick up	
Gauge range / resolution	400 µm (0.012 in) / 0.01 µm (0.4 µin)
Accuracy (5 µm diamond tip)	1% of reading + LSD µm



The Surtronic® R-80 is robust enough for the shop floor but accurate for any inspection area, giving a flexible solution for all roundness and form measurements.

- Patented gauge orientation
- Robust enough for 24/7 operation
- Easy-to-use touchscreen software

Feature	
Gauge resolution	30 nm (1.18 µin)
Spindle accuracy	±25 nm (0.98 µin)



Surtronic® R-100 Series builds on the robustness and ease-of-use of the R-80, offering a higher throughput and improved feature set that includes advanced harmonic analyses and a higher gauge resolution.

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

Feature	
Gauge resolution	6 nm (0.24 µin)
Spindle accuracy	±25 nm (0.98 µin)



* Centering attachment is supplied as standard with R-120/125 models, or available to purchase as an accessory on other models.

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

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



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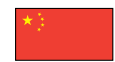
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