

Surtronic S-100 series

Robust and portable surface roughness testers



Durable roughness testers for shop floor, industrial & inspection room applications

Working closely with manufacturers across a wide range of industries including precision bearings, automotive and aerospace engineering, Taylor Hobson have focussed on the key attributes that are most important for quality control in today's precision industries.

The new Surtronic S-100 series of instruments offer a versatile solution for all your roughness requirements with a variety of systems and application specific accessories along with fixtures that can be tailored to your specific need.

USB Connectivity

Through its industry standard Type A USB port and mini USB port the S-100 series instruments provide extensive connectivity options to many standard devices.

USB type A

The Type A USB port can be used to attach a portable printer (ESC/POS compatible), see 'Accessories' page or a standard USB storage device for recording results, raw data or screen images.

USB mini

The mini USB port can be used for charging (with any standard USB charger) and / or connection to a PC to provide further analysis and reporting functionality.



Surtronic® S-100 series

A range of roughness testers robust enough for the shop floor and flexible enough for any inspection room.

Measure

Tactile measurement button, great when device is being used overhead or inside pipes

Lift/lower

Supplied as standard providing 50 mm height adjustment, right angle measurement and 70 mm reach into bores

Anti-slip feet

Perfect for mounting on flat or curved surfaces. V design aligns measurement with cylinder axis

Comfort grip

Sits comfortably in the hand when reviewing results or changing settings

Rubberised moulding

Added protection and better grip in the hand invaluable in shop floor environments

- ✓ Improve throughput
- ✓ Reduce part scrappage
- ✓ Monitor tool wear
- ✓ Ensure traceability

Profile graph

Detailed graph shows measured area to help identify problem areas

Simple set up

Shortcuts provided for all the key settings to give instant access with just a single touch

USB 2.0 mini

for charging (with any standard USB charger) and / or connection to a PC for data transfer

USB 2.0 type A

attach a portable printer or USB storage device

Orientation

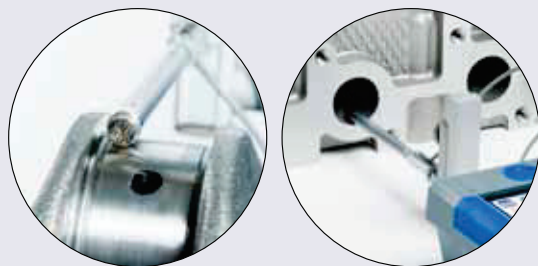
Rotate the display to any of of 4 orientations – perfect for awkward measurements



Features

Any surface, any height

The inclusion of a 50 mm stylus lift with right-angle attachment and more than 70 mm stylus reach means that even the most challenging surfaces can be measured without the need for expensive riser blocks, stands or fixtures. The anti-slip V-feet also mean the system can be used on flat or curved surfaces. The stylus can even measure upside down!



Standards and traceability

The reference standard supplied can be used both to calibrate the instrument and check for stylus wear to ensure the most accurate results are always being achieved.

| Measurement | Best capability |
|---|---------------------------------------|
| Roughness standards (Ra) | $\pm(2\% + 0.004 \mu\text{m})$ |
| Workpiece or component surface texture (Ra) | $\pm 3\%$ of measured value per trace |

UKAS Calibration and Testing

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.



0026



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Tough, fast and reliable handheld roughness testers...

Durable roughness testers for shop floor, industrial & inspection room applications



Fast and reliable

Simply press the measurement button and in a few seconds a full set of traceable measurement results including a detailed profile graph will be displayed or printed automatically, printer optional.

Built to last, by design...

Impact resistant rubberised mouldings surround a recessed, Mylar protected high durability touch screen and a solid stainless steel drive mechanism with anti-wear gears and bearings. System power is provided by a 3000 mAh heavy duty Li-Poly battery that can provide up to 2000 measurements from a single charge.

InstantOn

By utilising InstantOn technology these instruments are ready to measure in less than 1 second from standby and fully charged can remain in standby for more than 5000 hours!

In situ measurements

Monitor wear and roughness changes in situ during product's life. Eg. Monitoring changes in turbine blade roughness as an early warning sign for defects and efficiency losses.

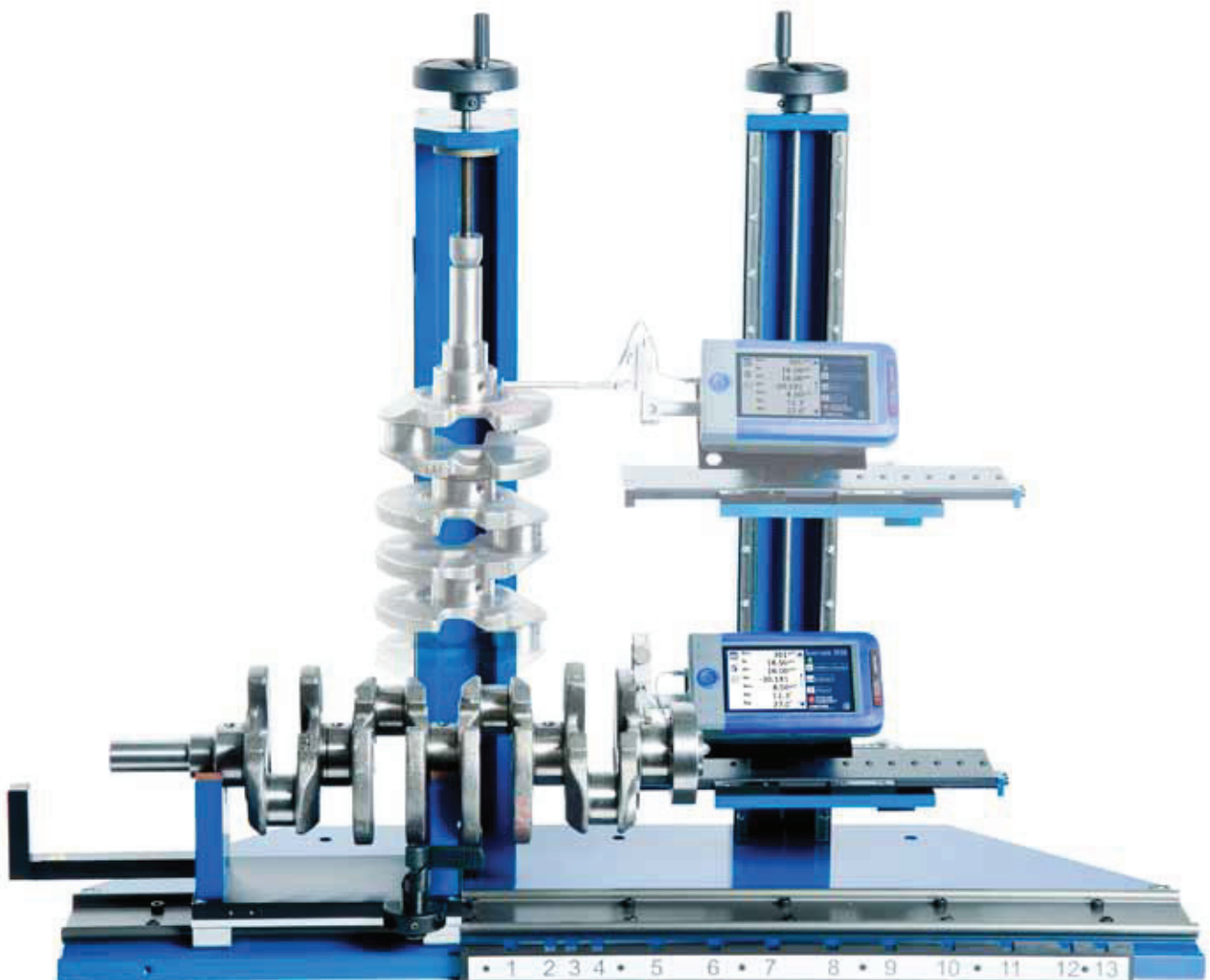
User-friendly, not user-hostile!

The Surtronic S-100 series systems are as easy to use as any SatNav (GPS) or SmartPhone with a 4.3" daylight readable industrial touch screen display. Results are displayed with up to 7 parameters per page as well as measurement settings and system information.

| |
|--|
| Process control Grinding, turning, milling, honing, polishing, extrusion |
| Automotive Gears, con rods, cylinders, blocks, crankshafts |
| Heavy industry Shipbuilding, pipelines, sheet steel |
| Aerospace Turbine blades, turbine shafts, wing composites |
| Other Print rollers, flooring, bonding |

Fully integrated measurement solution

By selecting a Surtronic S-100 series stand and printer (see 'Accessories' page) a fully integrated roughness measurement station can be realized. Roughness measurements can be easily made on multiple parts, results stored internally or on a standard USB memory device and printed to accompany the part to its next stage of manufacture or end user.



Talysurf

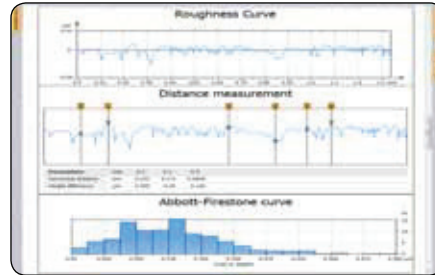
Advanced surface finish analysis

Talysurf is a dedicated PC based software package designed for use with Surtronic S-100 series instruments. Three versions are available. Talysurf "Lite" has all functions typically used for a shopfloor inspection, Talysurf "Silver" has enhanced features for R&W parameters, a statistics module and full report printing and Talysurf "Gold" has complete laboratory analysis functions:

| | Lite | Silver | Gold |
|--------------------------------|------|--------|------|
| Surtronic S-series acquisition | ✓ | ✓ | ✓ |
| Desktop publishing templates | ✓ | ✓ | ✓ |
| Multi-language support | ✓ | ✓ | ✓ |
| EN, FR, DE, ES, IT, PL, CN, KR | ✓ | ✓ | ✓ |
| Levelling | ✓ | ✓ | ✓ |
| Symmetries | ✓ | ✓ | ✓ |
| Zoom | ✓ | ✓ | ✓ |
| ISO 4287 | ✓ | ✓ | ✓ |
| Material Ratio Curve | ✓ | ✓ | ✓ |
| Area of a hole/peak | ✓ | ✓ | ✓ |
| Profile parameters & curves | ✓ | ✓ | ✓ |
| Roughness & waviness curves | ✓ | ✓ | ✓ |
| Distance measurement | ✓ | ✓ | ✓ |
| Multiple file format reports | | ✓ | ✓ |
| Report printing | | ✓ | ✓ |
| Form Talysurf data import | | ✓ | ✓ |
| Tolerance limits (pass/fail) | | ✓ | ✓ |
| Data file explorer | | ✓ | ✓ |
| ISO 13565 Automotive | | ✓ | ✓ |
| Interactive MR curve | | ✓ | ✓ |
| Step height measurement | | | ✓ |
| Form removal | | | ✓ |
| Filtering by FFT | | | ✓ |
| Thresholding | | | ✓ |
| Frequency spectrum | | | ✓ |
| Power spectrum density | | | ✓ |
| Retouch profile point | | | ✓ |
| Rk parameters | | | ✓ |
| Rk Parameters curves | | | ✓ |
| ISO 12085 R&W motifs | | | ✓ |

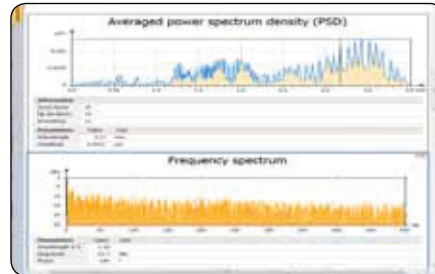
Outstanding graphics

The software is visually advanced and provides clear on screen profile images. Talysurf allows the user to take a basic measurement and create a full measurement report using the software's detailed analysis options and desktop publishing function (see screen displays opposite for examples).



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

Talysurf 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 Talysurf software or copied into other wordprocessing 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.

Full compatibility

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

PC specification

| | Minimum | Recommended |
|-------------------|------------|-------------|
| Operating system | Windows XP | Windows 8 |
| Memory (RAM) | 1 GB | 3 GB |
| CPU speed | 1 GHz | 2 GHz |
| Screen resolution | 1024 x 768 | 1920 x 1080 |
| USB port | 1.1 | 2.0 |

Talysurf parameters

Roughness parameters obtained by filtering: Ra, Rq, Rt, Rp, Ry, Rku, Rsk, RSm, Rz, RΔq, RTp, RHTp, Rlo, RΔq, RPC, RzJIS, 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, Rvk, Trc, HTrc.

*Only with gold or silver versions

**Talysurf Lite
is available to use
for FREE**



talsurf.com

Accessories

① USB Thermal Printer

Compact & highspeed 60 mm (24 in) / second. Includes USB lead and International Power Supply Outputs settings, results, and high resolution graph

code PR-60

② Thermal Paper

79 mm width, type. A single unit of paper is 20 x 12.5 metre rolls

code PR-61

③ Column and Stand

Granite base (400 x 250 mm) with manually operated column providing adjustment height of 260 mm

code SA-80

④ Precision Vice

High quality precision vice ideal for holding small components. Jaw width 63 mm, jaw depth 32 mm, jaw opening 85 mm

code SA-31

⑤ Ball Joint Vice

Comprising a surface mounted swivel base and a wide jaw vice. Suitable for holding irregular shaped components. Overall length 280 mm, Jaw Width 54 mm, Jaw Opening 160 mm

code SA-30

⑥ Support Stand

With 4 degrees of freedom. Max measuring height of 430 mm and a range of 115 mm at a horizontal reach of 305–420 mm.

code SA-85

⑦ Datum Support Stand

Provides an independent straight datum requires pick-up to be fitted with the detachable skid, see below

code SA-90

⑧ Detachable Skid

For use with Datum Support Stand, clamped to the pick up body, this accessory is required for use with the Datum Support Stand.

code SA-91

⑨ Pick-up Lift

For controlled lifting and lowering of the pickup to aid measurement setup.

code SA-20

⑩ Portable Base

Provides a support when used on machine tool applications.

code SA-40

⑪ S-series Mains Adaptor

International USB charger 5V 1A 110-240VAC 50/60Hz Recharges S116 / S128 in 4 hours

code SC-10

⑫ Deep Bore Extension Rods

Provides extension to pick-up for measurements in deep holes.

(100 mm extension) reach 160mm

code SA-25

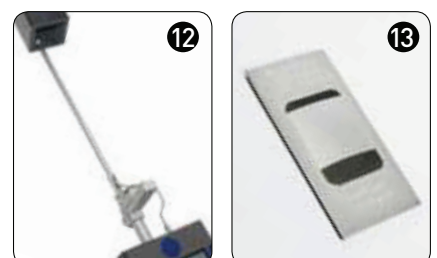
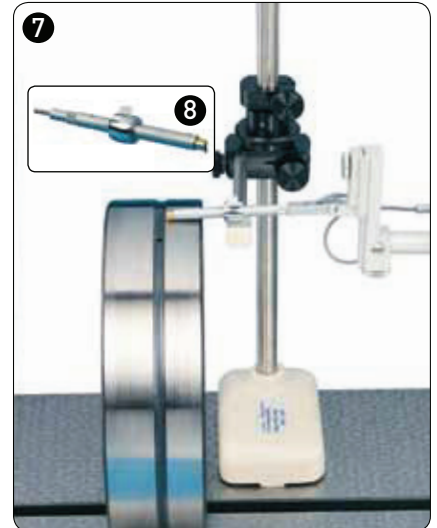
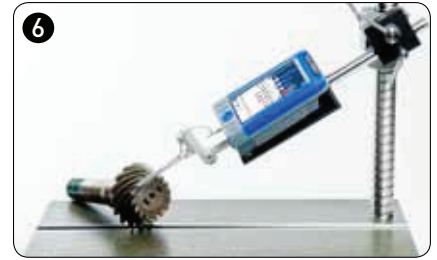
(200 mm extension) reach 260mm

code SA-28

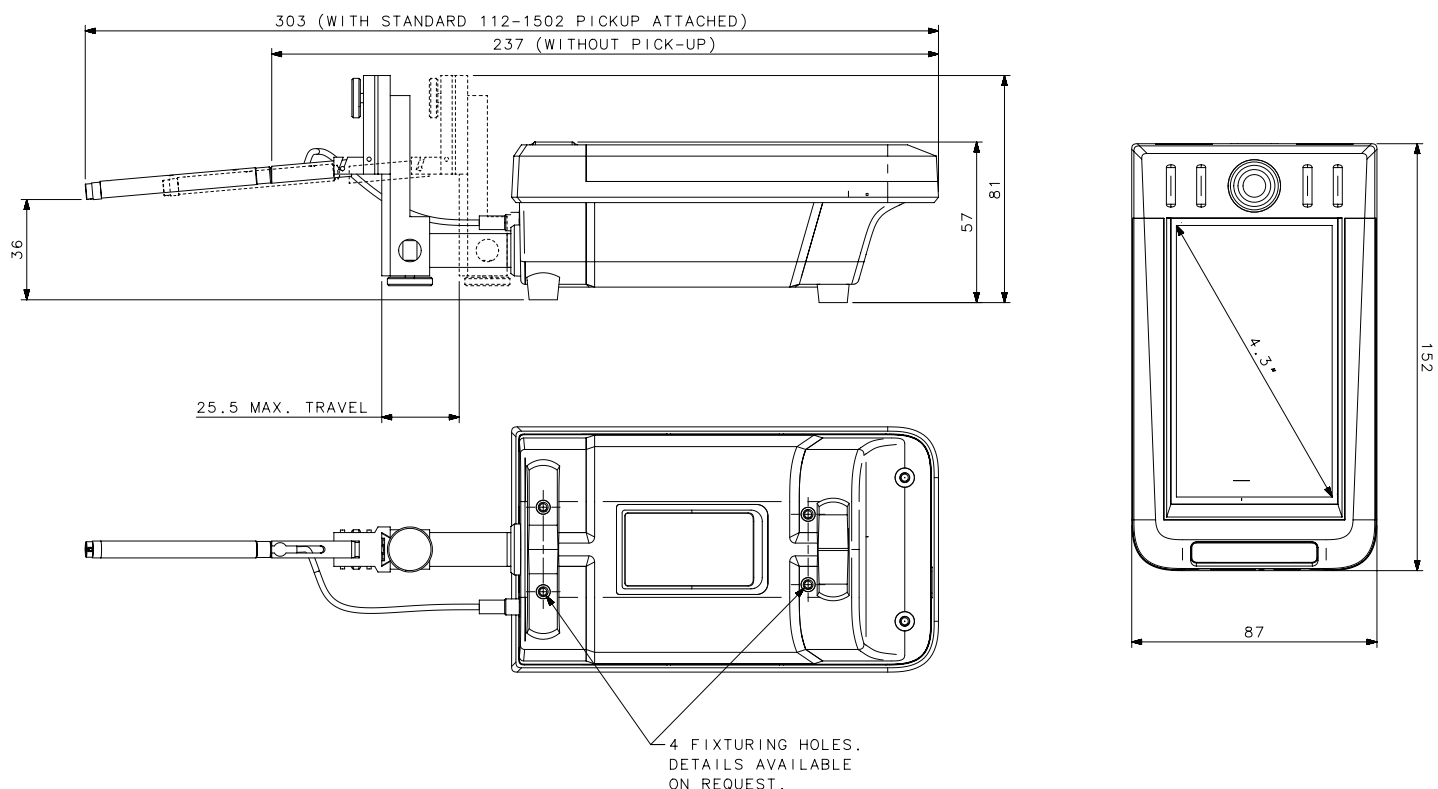
⑬ Calibration Standard

Ra 6.0um (236 uin)

code SC-20



Surtronic S-series dimensions

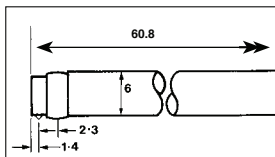


| Technical | | S-116 | S-128 |
|-------------------------|-------------------------|--|--|
| Languages | Basic | English, French, German, Italian, Spanish | |
| | Extended | | |
| | Asian | | |
| Data output | On-screen | up to 7 results per page, selectable on-screen graph with XZ axis | |
| | Printer | Output settings, results and high resolution profile graph | |
| Data storage | PC Connection | Full data analysis with Talyprofile | |
| | Internal | 100 measurement results, 1 raw profile | |
| | USB (4GB supplied) | >39,000 raw profiles, up to 100,000 results per batch (>70 batches) | |
| SPC / stats | PC connection | Unlimited data storage | |
| | Internal | Optional | Min, Max, Mean, StdDev of stored results |
| | USB (4GB supplied) | Optional | ASCII export of all results for SPC |
| Battery | PC connection | full SPC and tollerancing of all parameters using Talyprofile software | |
| | Charger | USB 5v 1A 110-240VAC 50/60Hz | |
| | Charging time | 4 hours | |
| | Battery life | 2000 measurements | |
| | Standby time | 5000 hours | |
| | InstantOn | max 1 sec from standby to ready to measure | |
| Component capacity | Auto sleep function | 30 sec - 6 hours | |
| | | S-116 | S-128 |
| Physical specifications | Weight including pickup | 0.5 Kg (1.1 lbs) | |
| | Power source | Li Poly rechargeable battery | |
| Operating conditions | Temperature | 5 - 40 °C (41 - 104 °F) | |
| | Humidity | 0 - 80 % non-condensing | |
| Storage conditions | Temperature | 0 - 50 °C (32 - 122 °F) | |
| | Humidity | 0 - 80 % non-condensing | |

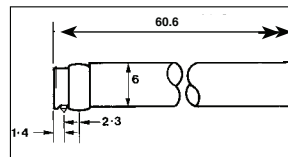
Specification

| Measurement capability | | S-116 | S-128 |
|------------------------|--------------------|--|---------------------------------------|
| Gauge | Range | 200 μ m 100 μ m 10 μ m | 400 μ m 100 μ m 10 μ m |
| | Resolution | 100 nm 20 nm 10 nm | 50 nm 10 nm 5 nm |
| | Noise floor (Ra) | 250 nm 150 nm 100 nm | 150 nm 100 nm 50 nm |
| | Repeatability (Ra) | 1 % of value + noise | 0.5 % of value + noise |
| | Pickup type | Inductive | |
| | Gauge force | 150-300 mg | |
| Calibration | Stylus tip radius | 5 μ m (200 μ in) default / 2 μ m (80 μ in) or 10 μ m (400 μ in) optional | |
| | Measurement type | Skidded | |
| | Process | Automated software calibration routine | |
| | Standards | Able to calibrate to ISO 4287 roughness standards | |
| Analysis | Filter cut-off | 0.25 mm / 0.8 mm / 2.5 mm | |
| | Filter type | 2CR / Gaussian | |
| | Evaluation length | 0.25 mm - 12.5 mm (0.01 in - 0.49 in) | 0.25 mm - 25.0 mm (0.01 in - 0.89 in) |
| | Max X axis range | 17.5 mm | 25.5 mm |
| Speed | Measuring speed | 1 mm / sec (0.04 in / sec) | |
| | Returning speed | 1.5 mm / sec (0.06 in / sec) | |

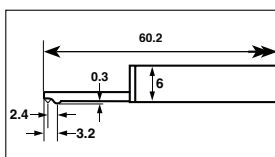
| Analysis capability | | S-116 | S-128 |
|---------------------|--------------|---|---|
| Parameters | Standards | ISO 4287, ISO 13565-1, ISO 13565-2, ASME 46.1, JIS 0601, N31007 | |
| | ISO basic | Ra, Rv, Rp, Rz, Rt, Rq, Rsk, Rmr, Rdq, Rpc, RSm, Rz1max | |
| | ISO advanced | Optional | Rk, A1, A2, Mr1, Mr2, Rpk, Rvk |
| | ASME | Ra, Rv, Rp, Rz, Rt, Rq, Rsk, Rdq, RSm, Rpm, Rda | |
| | JIS | Ra, Rv, Rp, Rz, Rt, Rq, Rsk, Rmr, Rdq, RSm, RzJIS, Rc, Rku, Rdc | |
| | Other | R3z (Daimler Benz) | |
| | ISO Primary | Optional | Pa, Pv, Pp, Pz, Pt, Pq, Psk, Pmr, Pdq, Ppc, PSm, Pz1max |
| | Units | μ m / μ in | |



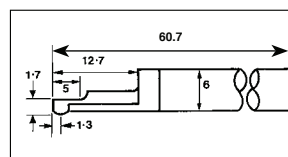
Standard Pick-up
For general surface roughness measurement
code PK-02 (5 μ m tip radius)
code PK-03 (10 μ m tip radius)



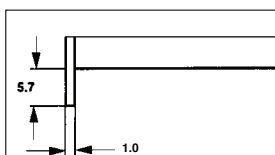
Chisel Edge Pick-up
For measuring along sharp edges or wire. Not for use on flat surfaces
code PK-24



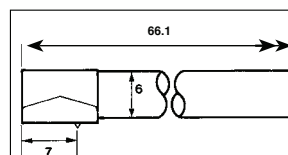
Small Bore Pick-up
For general use in small bores, grooves and on narrow surfaces
code PK-01



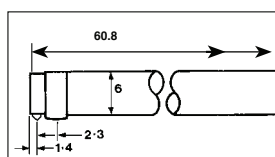
Side Skid Pick-up
For use on curved surfaces such as gear teeth
code PK-31



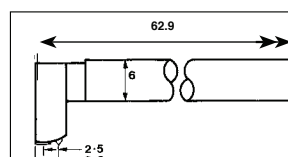
Narrow Gauge Stylus
For measuring in 'O' rings and narrow grooves up to a depth of 5.5 mm (0.22 in)
code PK-07



Shoe Pick-up
For measuring rougher surfaces, particularly with the 2.5 mm (0.1 in) cut-off
code PK-99

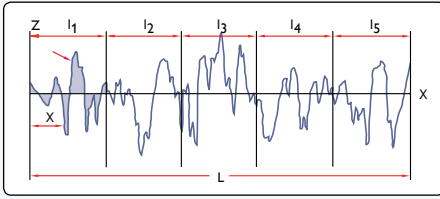


Right Angle Pick-up
For measurement at right angles to the direction of traverse
code PK-05



Recess Pick-up
For measuring into deep recesses
code PK-06 recess 5.7 mm (0.23 in) with 5 μ m tip radius
code PK-08 recess 25 mm (0.23 in) with 5 μ m tip radius
(Other depths and tip radii available)

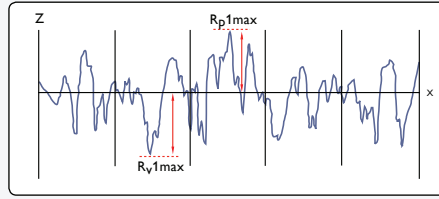
Analysis



$$Ra = \frac{1}{L} \int_0^L |z(x)| dx \quad Rq = \sqrt{\frac{1}{L} \int_0^L z^2(x) dx}$$

Ra is the most common parameter of roughness. It is the arithmetic mean of the absolute departures from the mean line.

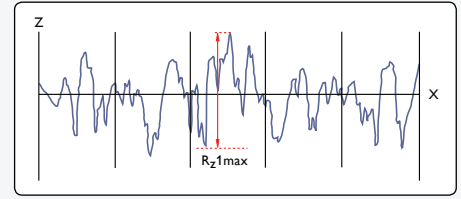
Rq is the rms parameter corresponding to Ra



***Rv** is the maximum depth of the profile below the mean line within the sampling length.

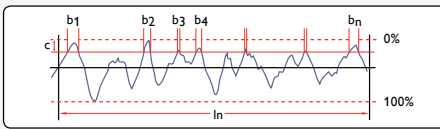
***Rp** is the maximum height of the profile above the mean line within the sampling length.

Rt is the maximum peak to valley height of the profile in the assessment length.



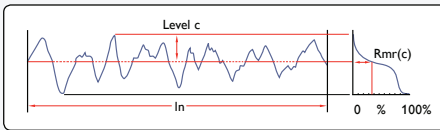
***Rz = Rp + Rv** and is the maximum peak to valley height of the profile within a sampling length.

Rz1max is the largest of the individual peak to valleys from each sample length.

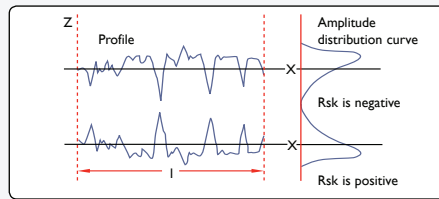


$$Rmr(c) = \frac{b1+b2+b3+b4+...+bn}{ln} \times 100 = \frac{100}{ln} \sum_{i=1}^n bi$$

Material Ratio Rmr (c) is the length of bearing surface (expressed as a percentage of the evaluation length at a depth c below the highest peak.



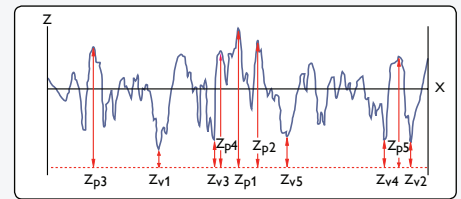
Material ratio curve above, shows how the ratio varies with level.



$$Rsk = \frac{1}{Rq^3} \left[\frac{1}{L} \int_0^L z^3(x) dx \right] \quad Rku = \frac{1}{Rq^4} \left[\frac{1}{L} \int_0^L z^4(x) dx \right]$$

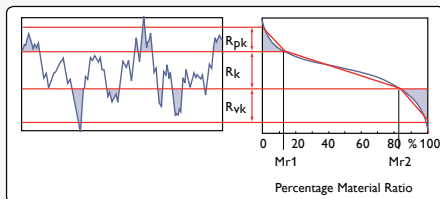
Rsk – Skewness – is the measure of the symmetry of the profile about the mean line. It will distinguish between asymmetrical profiles of the same Ra or Rq.

Rku – Kurtosis – is a measure of the sharpness of the surface profile.



$$Rz(JIS) = \frac{1}{5} \left(\sum_{i=1}^5 Zp1 - \sum_{i=1}^5 Zv1 \right)$$

Rz (JIS) also known as the ISO 10 point height in ISO 4287/1-1984, it is the average height difference between the five highest peaks and the five lowest valleys within the sampling length.



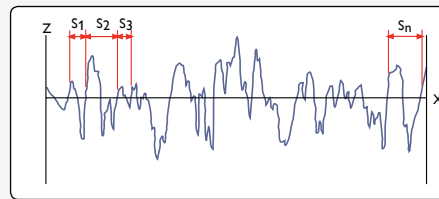
Rpk Reduced Peak Height is the top portion of the surface which will quickly be worn away when the engine begins to run.

Rk Kernel Roughness Depth is the long term running surface which will influence the performance and life of the cylinder.

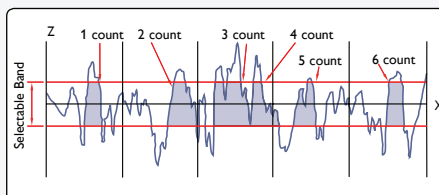
Rvk Trough Depth is the oil retaining capability of the deep troughs which have been machined into the surface.

Mr1 is Material ratio corresponding to the upper limit of the roughness.

Mr2 is Material ratio corresponding to the lower limit of the roughness.

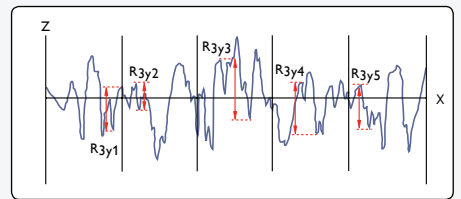


RSm is the mean spacing between profile peaks at the mean line within the sampling length.



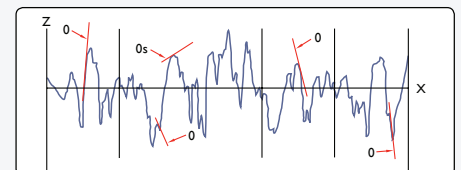
$$RPc = \frac{\text{Number of counts}}{\text{Assessment length (cm)}} = \text{Peaks/cm}$$

RPc is the peak count and is the number of local peaks which project through a selectable band centred about the mean line.



$$R3z = \frac{R3z1 + R3z2 + ... + R3zN}{N} = \frac{1}{N} \sum_{i=1}^N R3zi$$

R3z is the vertical mean from the third highest peak to the third lowest valley in a sample length over the assessment length. DB N31007 (1983)



$$R\Delta q = \sqrt{\frac{1}{L} \int_0^L [\theta(x) - \bar{\theta}]^2 dx} \quad \bar{\theta} = \frac{1}{L} \int_0^L \theta(x) dx$$

RΔq is the rms slope of the profile within the sampling length. θ is the slope of the profile at any given point

Surtronic® product range

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

- Ready to use out of the box
- Battery life more than 5000 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) |



Form Talysurf Intra measures roughness, waviness and contour. A low cost, portable system for high level surface texture analysis on the shop floor.

- 50mm (1.97in) traverse with straightness datum
- Automatic calibration over a sphere ensures that radius and form measurements are correct

| Features | |
|--------------------------|---|
| Gauge range / resolution | 16nm @ 1mm range (0.63 μin @ 0.04in) / 3nm @ 0.2mm range (0.12 μin @ 0.008in) |
| Straightness accuracy | 0.2 μm over any 20 mm (8 μin over any 0.78 in) |



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 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

- **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

For the above services, contact our Center of Excellence:

email: taylor-hobson.cofe@ametek.com
or call: **+44 116 276 3779**

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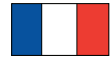
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