



**GAGE AMPLIFIERS, HARDNESS TESTERS, SURFACE TESTERS**

# GAGE AMPLIFIERS

## 717 ELECTRONIC GAGE AMPLIFIER

Starrett has made electronic gaging easier with the 717 Electronic Gage Amplifier. The large analog display is easy to read and shows real-time change in measurements.

The 717 Gage Amplifier is flexible and has an accuracy within  $\pm 2\%$  of full scale. Ranges vary from  $\pm 0.10"$  to  $\pm 0.0001"$  ( $\pm 0.200\text{mm}$  to  $\pm 0.002\text{mm}$ ), with gage graduations from  $.0005"$  to  $.000005"$  ( $0.01\text{mm}$  to  $0.0001\text{mm}$ ).

717	67001	Amplifier with Power Supply Charger
715-1Z	64479	Lever-Type Gaging Head Range $\pm 0.10"$ (0.25mm)
715-2Z	64480	Cartridge-Type Gaging Head Length 2-1/2" (64mm) Range $\pm 0.020"$ (0.50mm)
715-6	64186	Cartridge-Type Gaging Head Pneumatic-Push, Length 2-3/4" (70mm) Range $\pm 0.040"$ (0.100mm)
715-7	64187	Cartridge-Type Gaging Head Length 1-3/8" (35mm) Range $\pm 0.020"$ (0.50mm)
715-8	64188	Cartridge-Type Gaging Head Length 2-1/2" (64mm) Range $\pm 0.040"$ (0.100mm)
715-9	64189	Cartridge-Type Gaging Head Length 3-5/8" (92mm) Range $\pm 0.080"$ (0.200mm)
PT99441	52991	Height Gage and Comparator Attachment 1/4 x 1/2" (6.3 x 13.5mm) (Adapts Gaging Heads to Height Gages, Magnetic Base Indicator Holders, Dial Comparators and Test Indicator Stands.) .375" (9.5mm) Snug Hole
PT60636	63839	Power Supply Charger for USA and Canadian Configuration – 115/120 Volts/60 Cycle
PT99353	66456	Power Supply Charger for United Kingdom Configuration – 100-240 VAC, 47-63Hz
PT99340	66455	Power Supply Charger for European Configuration – 100-240 VAC, 47-63Hz
PT60642	72499	Cable to Computer (9-Pin to 9-Pin)
728-3	66662	Shop Floor Pro™ Software
719	66490	Software Wedge™ Program for Interfacing to Spreadsheets

Ranges/Graduations	
Range in	Each Gage Graduation
$\pm 0.10$	.0005
$\pm 0.02$	.0001
$\pm 0.01$	.00005
$\pm 0.002$	.00001
$\pm 0.001$	.000005
mm	
$\pm 0.200$	0.01
$\pm 0.100$	0.005
$\pm 0.020$	0.001
$\pm 0.010$	0.0005
$\pm 0.002$	0.0001

### FEATURES

- Dual inputs for cumulative/differential measurements
- Selectable inch or millimeter ranges
- Selectable digital or analog output
- Simple "push-button" calibration
- Mirrored gage display for parallax-free readability
- Rugged metal case can be used anywhere in the shop
- Uses standard Starrett lever and cartridge-type probes
- Remote zero using PC
- Front panel data send button
- Single and continuous data send modes
- Serial Data Output via front panel button, PC or optional foot switch

### ACCURACY

- Within  $\pm 2\%$  of full scale

### POWER REQUIREMENTS

- 110 volt VAC/60Hz (AC adapter furnished)

### DATA OUTPUT

- Digital: ASCII serial data
- Analog:  $\pm 2.5\text{VDC}$ /Full scale

### SIZE

- Dimensions: 9-1/4" Height x 5-1/2" Width x 5-1/2" Depth (235 x 140 x 140mm)
- Weight: 6 lb (2.7kg)



717 Electronic Gage Amplifier with 252 Transfer Gage and 715-1Z Gaging Head

# GAGE AMPLIFIERS

## RMS REMOTE DISPLAY

The Remote Display allows for the connection of up to four gages and displaying their current measurements into an Android application. In addition, the Remote Display can connect to up to two external data consumers (desktop computer, laptop, PLC, or any generic serial device) over RS-232 and USB.

The Remote Display has been designed to work with nearly any gauge that outputs data in Digimatic format. This includes all 2700 Indicators. In addition, devices that output raw quadrature can be used as well.

As a standalone measurement system, the Remote Display provides a very intuitive and user-friendly way to configure and monitor several gages at once. Connecting the Remote Display to a computer or other serial device makes data collection and statistical process control (SPC) simple and easy.

Electronic Measurement System						
Cat No.	EDP	Description				
RMS2704	72954	RMS4 readout/data collection system with tablet, software MUX box				
Probes						
Cat No.	EDP	Description/Range		Resolution		AGD Size
		in	mm	in	mm	
P27300-1	72955	.060	1.5	.0001	.002	2
P27300-0	72956	.060	1.5	.00005	.001	2
P27400-1	72957	.150	3.8	.0001	.002	2
P27400-0	72958	.150	3.8	.00005	.001	2
P27500-1	72959	.250	6.35	.0001	.002	2
P27500-0	72960	.250	6.35	.00005	.001	2
P27600-1	72961	.600	15	.0001	.002	2
P27600-0	72962	.600	15	.00005	.001	2
P27211-1	72963	1.0	25.4	.0001	.002	3
P27211-0	72964	1.0	25.4	.00005	.001	3
P27720-1	72965	2.0	50	.0001	.002	RECT
P27820-1	72966	4.0	101.6	.0001	.002	RECT
Accessories						
Part No.	EDP	Description				
PT05937	72967	Push button remote global data send cable for MUX Box with 2.5mm plug				
PT05679	68752	6' Extension Cable				

Complementary Electronic Equipment		
Cat No.	EDP	Description
EC799BSCM	46000	SmartCable Gage MUX - EC799B Slide Caliper
798SCM	69894	SmartCable Gage MUX - 798 Slide Caliper
795.1SCM	01124	SmartCable Gage MUX - 795.1 Micrometer
733SCM	69893	SmartCable Gage MUX - 733 Micrometer
2900SCM	68751	SmartCable Gage MUX - 2900 Indicator
2700SCM	69896	SmartCable Gage MUX - 2700 Indicator
2000SCM	69907	SmartCable Gage MUX - 2000-24 Height Gage

Backs/Lever*		
Part No.	EDP	Description
PT26406	65886	Flat Back
PT26407	65887	Offset Lug Back
PT26411	65891	Adjustable Lug Back
PT26408	65888	Adjustable Back
PT26409	65889	Post-Type Back
PT26410	65890	Screw Bracket Back
PT26848	66293	Adjustable Mounting Bracket Back
PT26405	65885	Lifting Lever

\*Other backs, styles and accessories also available by request. To order contact points individually, see previous pages.

## FEATURES

- 7" Android tablet with intuitive software application for easy process monitoring, setup, and data export
- Flexible data requesting and logging (.CSV to Micro SD Card, E-mail, PC transfer) with programmable auto logging and collection
- Simultaneous connection of up to four devices (Indicators, Calipers, Micrometers, Probes, etc.)
- Supports both Digimatic and Quadrature gaging systems
- "Send All" or "Request All" data to/from all gages
- TIR, Max., Min. and Freeze Hold, Travel Reverse
- USB Type A and B, RS232 connection
- High quality, low profile enclosure
- Bright LED power indication
- IN, MM and No Units setting
- Programmable Ratios
- Four channel view



RMS2704

NEW!

GAGE AMPS, HARDNESS AND SURFACE TESTERS





## GAGE AMPLIFIERS

### 776 GAGE-CHEK™ MULTI-AXIS MEASURED VALUE DISPLAY

The Gage-Chek™ 776 is a multi-axis measured value display that accepts up to eight probe inputs. It features intuitive visual display, helpful audio cues and user-defined formulas. GAGE-CHEK also reports dynamic Min/Max measurements, provides SPC analysis from an integrated database, and includes connectivity to PCs and other Starrett tools.

Specifications 776 Gage-Chek Multi-Axis Measured Value Display	
LCD	6" color
Display Digit Size	.45"
Resolution Down To	.000004"/.0001mm
Operating Temperature	32° - 115 °F
Enclosure (W x H x D)	11.5 x 7.5 x 2.75"
Base Width (W x H x D)	10 x 2 x 7.5"
Enclosure Weight	3.5 lbs
Base Weight	7 lbs
Input Voltage Range	85 VAC - 264 VAC
Input Frequency	43 Hz - 63 Hz
Inputs	1-, 4- and 8-axis input available
External Connections	Foot Switch, Remote Keypad, Touch Probe, RS232C Serial Port, Parallel Port
Outputs	2 Relay Outputs

### FEATURES

- Large (6") color flat-panel LCD screen built into a compact ergonomically designed case with an adjustable tilt base allows comfortable positioning for the operator
- Supports 1, 4 or 8 input channels. These can be mathematically combined to display dimensions such as flatness, volume or runout.
- Screens include individual readings with the capacity to display four lines simultaneously (each line 9/16" high), bar and dial position style displays, graphs and histograms of measurement statistics, and tables of measurement and SPC data
- Supports Starrett 776 LVDT probes and Heidenhain Spectro style 12mm and 30mm range digital probes
- Measurements can be taken by the operator or in a semi-automated manner
- Large comfortable buttons allow easy selection of measurement functions, display screen changes, data entry and zeroing the screen
- Speaker and external jack outputs can be adjusted to compensate for noisy work environments. Earphones can be plugged into speaker jack for silent operation.
- Two 3 x 1/2" keys placed over the screen can be programmed as hot keys for frequently used functions
- Optional foot switch available



776



The 776 accepts multiple gage inputs simultaneously – invaluable for applications such as this Starrett special gage fixture



776 LVDT Probes



715-2Z



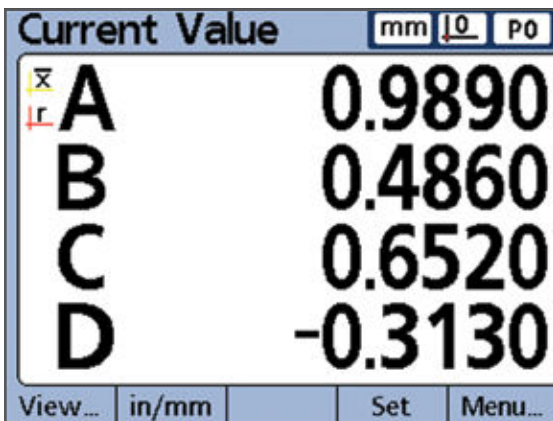
715-7



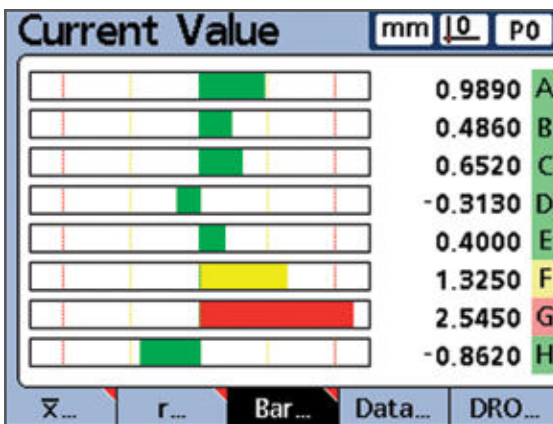
715-8



715-9



DRO View: Gage-Chek™ 776 features large, easy-to-read numerical display with custom dimension labels. Out of tolerance conditions are quickly identified by a change to red. Icons indicate that a process study has been performed, complete with in/out of tolerance alert. Mode switches include inch/metric, absolute/incremental, decimal degree/degrees, minutes, seconds.



Displays all gages plugged into the gage chek at one time. It automatically displays marginal and error indications with multi-color display.

776 Gage-Chek Multi-Axis Measured Value Display

Cat. No.	EDP	Description
776A	68635	Gage-Chek – 140-SP with 4 Inputs, Specto
776B	68636	Gage-Chek – 180-SP with 8 Inputs, Specto
776C	68761	Gage-Chek – 110-ST with 1 Input, LVDT
776D	68762	Gage-Chek – 140-ST with 4 Inputs, LVDT
776E	68763	Gage-Chek – 180-ST with 8 Inputs, LVDT
719	66490	Software Wedge RS232 for Windows
PT99530	68637	Two-Function Foot Switch
PT62514	68638	Eight-Function Remote Keypad
PT62515	68639	Gage-Chek Instruction Manual
776-12	68640	.472" (12mm) Length Probe, Specto
776-12R	68796	.472" (12mm) Length Probe Radial Exit, Specto
776-30	68641	1.180" (30mm) Length Probe, Specto
776-30R	68797	1.180" (30mm) Length Probe Radial Exit, Specto
PT05713	68172	9.849" (3 meter) Extension Cable for Specto Probe
PT05727	68773	32.89" (10 meter) Extension Cable for Specto Probe
776-1Z	68817	±.010" (0.25mm) Lever Type Probe, LVDT
776-2Z	68818	±.020" (0.50mm) Traditional Probe, LVDT
776-7	68819	±.020" (0.50mm) Short Probe, LVDT
776-8	68820	±.040" (0.100mm) Probe, LVDT
776-9	68821	±.100" (2.54mm) Probe, LVDT
PT05414	68828	6' (1.82 meter) Extension Cable for LVDT
PT05415	68829	13' (4.5 meter) Extension Cable for LVDT



Heidenhain Specto Length Probes



# GAGE AMPLIFIERS

## 715 ELECTRONIC GAGE AMPLIFIER GAGE HEADS

### 715-1Z LEVER-TYPE HEAD

- Mounts directly in place of dial indicators with dovetail or AGD lug-type backs
- .078" (2mm) diameter contact standard .031" (0.8mm) and .062" (1.6mm)
- Diameter carbide contacts are available

### 715-2Z\* CARTRIDGE-TYPE HEADS

- Hardened steel contact with radius tip. Head will accept all standard AGD contact points.
- .375" (9.5mm) mounting diameter allows replacement of standard AGD dial indicators

### 715-6, 715-7, 715-8, AND 715-9 CARTRIDGE-TYPE HEADS

- Tungsten carbide ball contacts
- Head will accept any AGD style contact\*\*
- Half-bridge construction, stainless steel body
- .375" (9.5mm) mounting diameter allows replacement of standard AGD dial indicators



715-1Z

715 Electronic Gage Amplifier Gage Heads				
Cat. No.	EDP	Spindle Range	Length	Contact Pressure
715-1Z	64479	±.010" (0.25mm) measuring range		8-12 grams
715-2Z*	64480	±.020" (0.50mm)	2-1/2" (64mm)	25-35 grams
715-6	64186	±.040" (1.02mm)	2-3/4" (70mm)	70 grams
715-7	64187	±.020" (0.51mm)	1-3/8" (35mm)	
715-8	64188	±.040" (1.02mm)	2 -/2" (64mm)	
715-9	64189	±.080" (2.03mm)	3-5/8" (92mm)	

715-1Z, -2Z, -6, -7, -8, -9 Gaging Heads come with a 6' (1.8m) cable and male connector.

\* Longer range cartridge-type gaging heads are available, quoted on application.

\*\* 715-9 head will accept all standard AGD contacts.



715-2Z



715-6



715-7



715-8



715-9



# BENCH HARDNESS TESTERS

## 3814 ANALOG BENCH HARDNESS TESTER

The 3814 Hardness Tester provides reliable Rockwell Hardness values on all types of metal and alloys, hard or soft, and in many shapes. This reliable bench hardness tester has a high quality casting, is ergonomically designed for easy operation and is engineered to ensure accurate results. It is an ideal basic hardness solution, economically priced to suit a variety of lab, workshop, toolroom and inspection department applications. The 3814 conforms to ASTM E-18 standard. The tester is furnished with a diamond indenter, a 1/16" (1.6mm) ball indenter, three certified test blocks, four test tables – 5.87" (149mm) and 2.5" (63.5mm) flat anvils, 5/8"(15.9mm) spot anvil and a standard vee anvil – and an accessory case.

### 3814 Hardness Testers

Cat. No.	EDP	Description
3814	67754	Analog hardness tester
3814E	72974	Digital readout replacement
PT06145	72519	Hardness tester stand

### Specifications

<b>Minor Load</b>	10Kgf
<b>Major Load</b>	A: 60Kgf, B: 100Kgf, C: 150Kgf
<b>Test Force Application</b>	(Dead weight applies test force)
<b>Test Force Control</b>	Hydraulic Dashpot System
<b>Results Display</b>	Analog – Dial Gage
<b>Throat Depth</b>	6.6" (168mm)
<b>Maximum Test Height</b>	6.69" (169.9mm) *
<b>Unit Height/Width/Depth</b>	30 x 8.5 x 20" (762 x 216 x 508mm)
<b>Unit Weight</b>	261lb (118kg)

\* Requires bench alteration.

### FEATURES

- Ability to handle Rockwell Scales A through H and K
- Stable cast iron construction
- Ideal basic hardness testing for many typical applications
- Digital readout available



NEW!

CAST IRON, HARDNESS AND SURFACE TESTERS



## BENCH HARDNESS TESTERS

### 3815 TWIN ANALOG BENCH HARDNESS TESTER

#### MEASURES ROCKWELL & SUPERFICIAL ROCKWELL HARDNESS

The 3815 Twin Analog Hardness Tester features state-of-the-art design and rugged construction. It is engineered to provide highly sensitive, accurate readings and excellent repeatability in all Rockwell and Superficial Rockwell hardness scales.

The 3815 is ideal for heat treatment facilities, tool rooms, workshops, laboratories and inspection labs.

#### 3815 Twin Analog Bench Hardness Tester

Cat. No.	EDP	Description
3815	12800	3815 Bench Hardness Tester, diamond conical and 1/16" ball indentors, HRC, HRB, HR15N, HR30N and HR45T test blocks, 5.87" (150mm) test table, 2.5" flat anvil, standard vee anvil, accessory case and dust cover
PT06145	72519	Hardness Tester Stand

A broad range of test blocks and other hardness tester accessories are available.

#### Specifications

Minor Load	10 Kgf
Minor Load – Superficial	3 Kgf
Major Load	60/100/150 Kgf
Major Load – Superficial	15/30/45 Kgf
Test Force Application	Dead Weight
Test Force Control	Manual
Results Display	Dual Scale Dial
Vertical Capacity	6.0" (15.2mm)
Throat Depth	5.5" (14mm)
Height	26.0" (66mm)
Width	18.2" (46.2mm)
Depth	9.4" (23.9mm)
Weight	250 lbs (113kg)

#### FEATURES

- Direct analog dial reading
- Advanced design provides Rockwell and Rockwell Superficial testing
- Easy to operate
- Engineered to provide highly sensitive and accurate readings
- Conforms to ASTM E-18
- Tests Rockwell Scales: A, B, C, D, E, F, G, H, K, L, M
- Tests Superficial Rockwell Scales: HR15N, HR15T, HR30N, HR30T, HR45N, HR45Ts
- Includes a diamond conical indenter, 1/16" ball indenter, HRC, HRB, HR15N, HR30N and HR45T test blocks, 5.87" (150mm) test table, 2.5" (63mm) flat anvil, standard vee anvil, accessory case and dust cover





# BENCH HARDNESS TESTERS

## 3816B Digital Motorized Bench Hardness Tester

The 3816B Bench Hardness Tester offers easy, fully automated testing procedures and provides highly sensitive and accurate readings. The 3816B measures the full regular Rockwell Scales according to ASTM and SAE guidelines and accommodates all types of hard or soft metals and alloys, in numerous configurations. The tester is furnished with a diamond indenter, a 1/16" (1.6mm) ball indenter, three certified test blocks, four test tables – 5.87" (149mm) and 2.5" (63.5mm) flat anvils, 5/8"(15.9mm) spot anvil and a standard vee anvil and an accessory case.

## FEATURES

- Fully automated routines reduce operator involvement and speeds measurements
- Large touch screen display
- Programmable scale conversions, dwell times and sample counter
- Sample averaging is automatically calculated
- RS232C output
- Built in mini-printer for outputting readings
- USB output

3816 Hardness Testers		
Cat. No.	EDP	Description
3816B	72972	Digital bench hardness tester
PT06145	72519	Benchtop level stand for tester
Accessories* for 3816 Digital Bench Hardness Tester		
Cat. No.	EDP	Description
PT05245	67944	C Regular
PT05249	67948	1/16" (1.6mm) Ball Unit
PT05069	67897	RA Test Block (Rockwell A Scale 80)
PT05059	67888	RB Test Block (Rockwell B Scale 90)
PT05050	67879	RC Test Block (Rockwell C Scale 63)
PT05272	67969	Master Block Set, Rockwell C Scale

\* For additional listings of test blocks and accessories, refer to the following pages in this section.

Specifications	
Minor Load	10Kgf
Major Load	A: 60Kgf, B: 100Kgf, C: 150Kgf
Test Force Application	(Dead weight applies test force)
Test Force Control	Motorized
Results Display	Hi-def LCD digital readout
Throat Depth	6.50" (165mm)
Maximum Test Height	6.87" (175mm) **
Unit Height/Width/Depth	28 x 8.9 x 20.6" (711 x 226 x 523mm)
Unit Weight	187 lb (85kg)

\*\* Requires bench alteration.



3816B



# HARDNESS TESTING

## TEST BLOCKS AND ACCESSORIES FOR HARDNESS TESTERS

Starrett blocks can be used to test Rockwell, Brinell or Vickers scales. They are available in steel, brass and aluminum. Each block is serialized, with a certificate detailing the environmental conditions used to test the block.

Actual readings are given, with the averages of these readings: min. reading, max reading and a repeatability figure. The blocks are calibrated according to ASTM E-18 standards, ANSI (NCSL) Z540-1, (ISO) 10012-1, ISO/IEC 17025 and Mil-std 45662A.

Starrett hardness test blocks are manufactured from square steel or brass plates, as opposed to the more common round bar stock. The use of the plate gives a more accurate and consistent surface for inspection. Metallurgical tests have proven that during the production of round bar stock, suspended carbides in the mix migrate to the center of the rod. The scientific name for this condition is carbide segregation and results in different readings being found in the center of a rod rather than at its outer edges. Some manufacturers remedy this situation by removing the centers from their blocks.

Hardness test blocks are designed to be used only on one side and the indents should be more than .010" from the centers of two indents or no closer to the block's edge than .040".

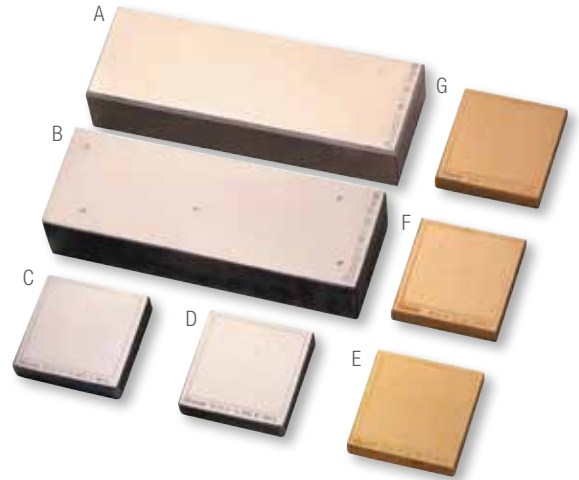
Calibration kits are also available from Starrett. No facility with a hardness tester in use should be without a calibration kit. These kits come with from 3 to 20 calibrated test blocks and the serialized penetrator that was used to inspect each of the blocks in the set. When a discrepancy is detected in a tester, these kits allow you to determine the direction to proceed to resolve the issue.

Rockwell Test Blocks	
Part No.	Description †
PT05050	RC63 Test Block
PT05051	RC60 Test Block
PT05052	RC55 Test Block
PT05053	RC50 Test Block
PT05054	RC45 Test Block
PT05055	RC40 Test Block
PT05056	RC35 Test Block
PT05057	RC30 Test Block
PT05058	RC25 Test Block
PT05059	RB90 Test Block
PT05060	RB80 Test Block
PT05061	RB70 Test Block
PT05062	RB60 Test Block
PT05063	RB50 Test Block
PT05064	RB40 Test Block
PT05065	RB30 Test Block
PT05067	RB20 Test Block
PT05068	RB10 Test Block
PT05069	RA80 Test Block
PT05091	RA70 Test Block
PT05092	RA60 Test Block
PT05100	RF100 Test Block
PT05101	RF90 Test Block
PT05102	RF80 Test Block
PT05103	RF70 Test Block
PT05104	RF60 Test Block
PT05105	RF50 Test Block
PT05106	RE100 Test Block
PT05107	RE90 Test Block
PT05108	RE80 Test Block
PT05112	RE70 Test Block
PT05113	RE60 Test Block

† Values expressed are not exact but will range within acceptable limits

Rockwell Test Blocks	
Part No.	Description †
PT05114	RE50 Test Block
PT05115	HR30N80 Test Block
PT05122	HG30N70 Test Block
PT05123	HR30N60 Test Block
PT05124	HR30N50 Test Block
PT05125	HR30N40 Test Block
PT05127	HR30T80 Test Block
PT05128	HR30T70 Test Block
PT05129	HR30T60 Test Block
PT05130	HR30T50 Test Block
PT05177	HR30T40 Test Block
PT05178	HR30T30 Test Block
PT05179	HR30T20 Test Block
PT05180	HR30T10 Test Block
PT05181	HR15N90 Test Block
PT05182	HR15N80 Test Block
PT05183	HR15N70 Test Block
PT05184	HR15T90 Test Block
PT05185	HR15T80 Test Block
PT05186	HR15T70 Test Block
PT05187	HR15T60 Test Block
PT05188	HR45T70 Test Block
PT05189	HR45T60 Test Block
PT05191	HR45T50 Test Block
PT05192	HR45T40 Test Block
PT05193	HR45T20 Test Block
PT05194	HR45T10 Test Block
PT05195	HRH90 Test Block
PT05196	HRH80 Test Block
PT05197	HRR120 Test Block
PT05198	HR30Y Test Block
PT05199	HRM Test Block
PT05200	HR15W Test Block

† Values expressed are not exact but will range within acceptable limits



Rockwell and Brinell test blocks at a variety of hardness levels. (A) Aluminum Brinell, (B) Steel Brinell, (C) Vickers, (D) Rockwell, (E) 187.5kg/2.5mm Brinell, (F) Extra-Soft Rockwell and (G) Brass Rockwell.



# HARDNESS TESTING

## TEST BLOCKS AND ACCESSORIES FOR HARDNESS TESTERS

Brinell Test Blocks		
Part No.	EDP	Description
PT05257	67956	3000kg High Brinell Test Block
PT05258	67957	3000kg Low Brinell Test Block
PT05259	67958	500kg High Brinell Test Block
PT05260	67959	500kg Low Brinell Test Block

Master Calibration Kits		
Part No.	EDP	Description
PT05272	67969	HRC 3-Block Master Calibration Kit
PT05273	67970	HR30N 3-Block Master Calibration Kit
PT05276	67971	HRB 3-Block Master Calibration Kit
PT05277	67972	C&B Scale 20-Block Master Calibration Kit
PT05278	67973	C&30N Scale 6-Block Master Calibration Kit



PT05272 HRC 3-Block Master Calibration Kit



Anvils and Table			
Letter	Part No.	EDP	Description
A	PT05267	67964	Pedestal Anvil
B	PT05268	67965	2-1/2" Flat Anvil
C	PT05269	67966	Small "V" Anvil
D	PT05270	67967	Large "V" Anvil
E	PT05271	67968	8" Anvil Testing Table

Standard and special anvils

Penetrators			
Letter	Part No.	EDP	Description
E	PT05245	67944	C Regular, No Thread
E	PT05246	67945	Indentron with Internal Thread
G	PT05247	67946	Versitron/New Age with External Thread
E	PT05248	67947	N Regular, No Thread
D	PT05249	67948	1/16" (1.6mm) Ball with Holder
C	PT05250	67949	1/8" (1.7mm) Ball Complete with Holder
B	PT05251	67950	1/4" (6.4mm) Ball Complete with Holder
A	PT05252	67951	1/2" (12.7mm) Ball Complete with Holder
	PT05253	67952	1/16" (1.6mm) Carbide Ball Only, with Certification
	PT05254	67953	1/8" (1.7mm) Carbide Ball, with Certification
	PT05255	67954	1/4" (6.4mm) Carbide Ball, with Certification
	PT05256	67955	1/2" (12.7mm) Carbide Ball, with Certification
	PT05261	67960	Heavy Load 5kg, 110RV5 Vickers Test Block
F	PT05264	67961	Heavy Load Indentor Vickers
	PT05265	67962	Min. Brinell 2 1/2mm Ball
	PT05266	67963	Min. Brinell Block 187 1/2kg, 2-1/2mm Ball



Penetrators - Contact Starrett for more information





Includes base instrument, impact device D, calibrated test block, custom carry case, cleaning brush and operation manual

**SPECIFICATIONS**

- Accuracy:  $\pm 0.5\%$  (referred to L=800)
- Repeatability accuracy:  $\pm 4L$  units (L=Leeb)
- Measuring range: 200-960 HL
- For steel and cast steel, alloy tool steel, stainless steel, grey cast iron, spheroidal iron, cast aluminum, brass, bronze, wrought copper alloy
- Tool steel should be about 1" thick solid material or larger
- Operating temperature: 5-104 °F
- Dimensions: 5.96 x 2.938 x 1.270" (150 x 74 x 32mm)
- Weight: 8.6 oz. (245 grams)

**FEATURES**

- Leeb style tester designed for large, hard parts – load the impact body and place the impact device on your test piece
- Easy to use keypad operation – push the button to begin testing and obtain reading
- Auto identification of impact device
- Large LCD display with back light
- USB output
- Automatic conversions to Rockwell, Brinell, Vickers and Shore
- Automatic mean value as well as Min and Max values
- Uses two AA alkaline batteries with low power indicator
- Memory capacity (100 groups)
- Optional impact devices and special support rings

**HARDNESS TESTERS**

**3811A COMPACT HARDNESS TESTER**

The 3811A is a state of the art, digital portable hardness tester, designed to test the hardness of large, hard metal parts.

The 3811A combines fast test speeds with ample memory and output. It performs tests that easily convert to most popular hardness scales such as Rockwell, Brinell, Vickers and Shore.

This compact hardness tester is loaded with useful functions usually found only on high priced models.

**3811A Hardness Tester and Accessories**

Cat. No.	EDP	Description
3811A	69881	Digital portable hardness tester with impact device D, calibrated test block, cleaning brush and carry case
HT-1800-110	20940	D+15 Impact Device
HT-1800-115	20941	DL Impact Device
HT-1800-125	20942	G Impact Device
HT-1800-130	20943	C Impact Device
HT-1800-120	20944	DC Impact Device
HT-1800-100	20945	Replacement D Impact Device
HT-1800-102	20946	Replacement Cable For All Impact Devices
HT-2500-105	20947	Replacement Impact Body
HT-1300-01	20948	Leeb D Test Block
HT-1100G-01	20949	Leeb G Test Block
S38R	67285	Support Ring Set

**3811A Portable Hardness Tester with Integrated, Multi-functional Features**

Style	Applications
D+15	Very narrow contact area with a set backed measurement coil. Measures hardness in grooves and recesses. Weight: 80g
DC	Extremely short impact device. Used for very confined spaces such as, holes, cylinders and internal measurements
C	Reduced impact energy probe (2 ft-lb) for measuring hardness of coatings, surface hardened, thin wall or impact sensitive components. Applies superficial indentation. Weight: 75g
G	Enlarged test tip and increased impact energy range (72 ft-lb – approx. 9 times the D). For lower quality finishes measuring in the Brinell range only (max. 650 HB). Designed for components like heavy castings, forgings. Weight: 250g
DL	Needle front section with 4mm diameter and 50mm length. Ideal for testing in confined spaces, the base of grooves and special components like gear wheels. Steel/Cast steel



Optional Remote Impact Devices





# HARDNESS TESTERS

## 3810A DIGITAL PORTABLE HARDNESS TESTER

The 3810A is a state-of-the-art digital instrument designed to test the hardness of large hard metal parts. Loaded with useful functions such as USB output and a built in printer, the 3810A is an ideal choice for fast, accurate hardness testing.

This versatile tester can perform tests that easily convert to the most popular hardness scales, including Rockwell, Brinell, Vickers and Shore.

The tester is easy to use. Simply load the impact body, place the impact body on your test piece, then push the button to begin testing.

The 3810A is designed to test large hard parts that cannot be brought to a bench top machine. For example, tool steel should be close to 1" thick of solid material. The 3810A comes with a D impact device, calibration block, cleaning brush, manual and a carrying case.



### SPECIFICATIONS

- Accuracy:  $\pm 0.5\%$  (referred to L=800)
- Repeatability accuracy:  $\pm 4L$  units (L=Leeb)
- Measuring range: 200-960 HL
- Materials: steel & cast steel, alloy tool steel, stainless steel, grey cast iron, spheroidal iron, cast aluminum, brass, bronze, wrought copper alloy
- Battery type: AA alkaline (4)
- Operating temperature: 5-104 °F
- Dimensions: 150 x 74 x 32mm
- Weight: 245 grams
- Includes 3810A tester, impact device D, calibration test block, cleaning brush, operation manual, custom carry case
- Available options include DC, D+15, DL, G, C impact devices, and special support rings

### FUNCTIONS

- Easy to use keypad operation
- Auto identification of impact device
- Large LCD display with back light
- USB output
- Automatic conversions to: Brinell, Rockwell B & C, Vickers and Shore
- Automatic mean value as well as Min & Max values
- Battery indicator
- Memory capacity (100 groups)

### 3810A Hardness Tester and Accessories

Cat. No.	EDP	Description
3810A	69871	Tester, D impact device, calibration block, cleaning brush, operation manual, custom carry case
HT-1800-110	20940	D+15 impact device. Very narrow contact area with set backed measurement coil. Measures hardness in grooves and recesses.
HT-1800-115	20941	DL impact device. Needle front section with 4mm diameter and 50mm length. For testing in confined spaces such as groove bases and special components such as gear wheels.
HT-1800-125	20942	G impact device. For components such as heavy castings and forgings. Enlarged test tip and increased impact energy range. For lower quality finishes measuring in the Brinell range only. G block required.
HT-1800-130	20943	C impact device. Reduced impact energy probe for measuring hardness of coatings and surface hardened, thin wall or impact-sensitive components. Applies superficial indentation.
HT-1800-120	20944	DC impact device. Very short for confined areas such as internal bores for various inside measurements.
HT-1800-100	20945	Replacement D impact device. Universal standard probe for a wide variety of applications.
HT-1800-102	20946	Replacement cable for all impact devices
HT-2500-105	20947	Replacement impact body D
HT-1300-01	20948	Leeb D test block
HT-1100G-01	20949	Leeb G test block
S38R	67285	Support ring set



3810A



# HARDNESS TESTERS

## TECHNICAL DATA FOR STARRETT HARDNESS IMPACT DEVICES

Technical Data for Impact Devices		D/DC/DL	D+15	C	G
Impact Energy		11 Nmm	11 Nmm	3 Nmm	90 Nmm
Mass of the Impact Body		5.5g	7.8g	3.0g	20g
Test Tip	Hardness	1600 HV	1600 HV	1600 HV	1600 HV
DL: 7.3 g	Diameter	3mm	3mm	3mm	5mm
	Material	Tungsten carbide	Tungsten carbide	Tungsten carbide	Tungsten carbide
	Impact Device	Diameter	20mm	20mm	20mm
	Length	147/86mm	162mm	141mm	254mm
	Weight	75/50 g	80 g	75 g	250 g
	Max. Hardness of Sample	940 HV	1000 HV	650 HB	
Preparation of Surface	Roughness class ISO	N7	N7	N5	N9
	Max. roughness depth Rt	10µm	10µm	2.5µm	30µm
	Average roughness Ra	2µm	2µm	0.4µm	7µm
Min. Weight of Sample	Of compact shape	5kg	5kg	1.5kg	15kg
	On solid support	2kg	2kg	0.5kg	5kg
	Coupled on plate	0.1kg	0.1kg	0.02kg	0.5kg
Min. Thickness of Sample	Coupled	3mm	3mm	1mm	10mm
	Min. thickness of layers	0.8mm	0.8mm	0.2mm	—
Indentation of Test Tip with 300 HV	Diameter	0.54mm	0.54mm	0.38mm	1.03mm
	Depth	24µm	24µm	12µm	53µm
Indentation of Test Tip with 600 HV	Diameter	0.45mm	0.45mm	0.32mm	0.90mm
	Depth	17µm	17µm	8µm	41µmC
Indentation of Test Tip with 800 HV	Diameter	0.35mm	0.35mm	0.30mm	—
	Depth	10µm	10µm	7µm	—

## APPLICATION AND HARDNESS RANGES FOR STARRETT HARDNESS IMPACT DEVICES

Optional Impact Devices					
Material	HRC	HRB	HB	HV	HSD
<b>Impact Device – D, DC Measuring Range 200-900<sup>†</sup></b>					
Steel	20.0-67.9	59.6-99.5	80-647	80-940	32.2-99.5
C.W. Tool Steel	20.4-67.1			80-898	
Gray Cast Iron			93-334		
Nodular Cast Iron			131-387		
Cast Aluminum			30-159		
Brass		13.5-95.3	40-173		
Bronze			60-290		
Copper			45-315		
<b>Impact Device – D+15, Measuring Range 300-900<sup>†</sup> (not shown)</b>					
Steel and Cast Steel	19.3-67.9		80-638	80-937	33.3-99.3
<b>Impact Device – C, Measuring Range 350-950<sup>†</sup></b>					
Steel and Cast Steel	20.0-69.5		80-683	80-996	31.9-99.6
<b>Impact Device – G, Measuring Range 300-750<sup>†</sup></b>					
Steel and Cast Steel		47.7-99.9	90-646		
Gray Cast Iron			92-326		
Nodular Cast Iron			127-364		
<b>Impact Device – DL, Measuring Range 300-900<sup>†</sup></b>					
Steel and Cast Steel	20-68	37-100	80-650	80-940	30-97

<sup>†</sup> Leeb Measuring Range

# ROUGHNESS TESTERS



NEW!

## SURFACE ROUGHNESS TESTERS

### SR160, SR300 AND SR400

The SR160 is the latest to join a line of unique equipment to compliment the SR300 and SR400. Starrett surface roughness testing equipment is simple, accurate and of high quality. These units are tough, shock tested, and capable of withstanding the demands of a shop environment. Our surface roughness testers meet the increasing requirements across industries like safety, aerospace, automotive, precision bearings, and general manufacturing.



SR300/SR400

CASE /MP/5, HARDNESS AND SURFACE TESTERS

#### Surface Roughness Testers

Cat. No.	EDP	Description
SR160	72584	SR160 display with 5mm traverse unit, pick-up, diamond stylus, calibration standards, manual, carrying case, and international power adaptors.
SR300	21000	SR300 display with 17.5mm traverse unit, TalyProfile Lite software, pick-up, diamond stylus, calibration standard, manual and carrying case.
SR400	21001	SR400 display with 25mm traverse unit, TalyProfile Lite software, pick-up, diamond stylus, calibration standard, manual and carrying case.

#### Accessories - SR160

Cat. No.	EDP	Description
SR-112-3188	72667	Magnetic base
SR-112-4545	20220	USB charger
SR-112-5085	72666	Hard transport case
SR-112-2937	20968	Extra reference standard

#### Accessories - SR300 and SR400

Cat. No.	EDP	Description
SR-112-1534	20962	Reference standard
SR-112-2693	20964	Column and stand
SR-112-4545	20220	USB charger
SR-112-1517	20963	Support stand
SR-112-4570	20998	USB thermal printer
SR-112-4571	20999	Thermal paper
SR-112-1645	73033	Pair of 115mm (5.85") vee blocks
SR-112-2694	73036	Precision vise
SR-112-2695	73037	Ball joint vise

#### Software

Cat. No.	EDP	Description
SR-112-3680	20952	TalyProfile Gold - 2D analysis
SR-112-3681	20953	TalyProfile Silver - 2D analysis

#### Parameters

Cat. No.	EDP	Description
SR-112-4607	73038	AN-10 ISO 13565 automotive parameters for S116
SR-112-4608	73039	AN-11 statistics module for S116
SR-112-4609	73040	AN-12 ISO primary parameter set for S116

#### Pick-Ups

Cat. No.	EDP	Description
SR-112-1510	20961	7.875" (200mm) extension rod with lead
SR-112-1502	20956	Standard pick-up with 200µin (5µm) stylus
SR-112-1503	20957	Standard pick-up with 400µin (10µm) stylus
SR-115-P28495	21004	Small bore pick-up
SR-112-1505	20959	Right angle pick-up
SR-112-1506	20960	Recess pick-up
SR-112-1524UB	73028	Pick-up with chisel edge stylus
SR-112-1525	73029	Pick-up lift mechanism
SR-112-1531UB	73030	Pick-up with slide skid
SR-112-1599UB	73032	Pick-up with shoe
SR-112-2672UB	73034	Recess pick-up (2µm, 80µin, tip radius)
SR-112-2673UB	73035	Small bore pick-up (2µm, 80µin, tip radius); SR-112-4701 is preferred
SR-112-4707	73041	O-Ring pick-up
SR-112-4708	73042	25mm recess pick-up
SR-112-4709	73043	15mm recess pick-up
SR-12-4710	73044	O-Ring pick-up narrow
SR-112-4712	73046	O-Ring pick-up; deep 25mm
SR-112-4713	73047	O-Ring pick-up; deep 25mm with 2µm tip
SR-112-4714	73048	Flat skid pick-up
SR-112-4715	73049	Standard 112/1502 pick-up with 2.5µm tip
SR-112-4716	73050	Side skid pick-up 112/1531 with 2µm tip

All accessories listed above are available for order. Please contact your local Starrett representative for additional or special requirements.



SR160

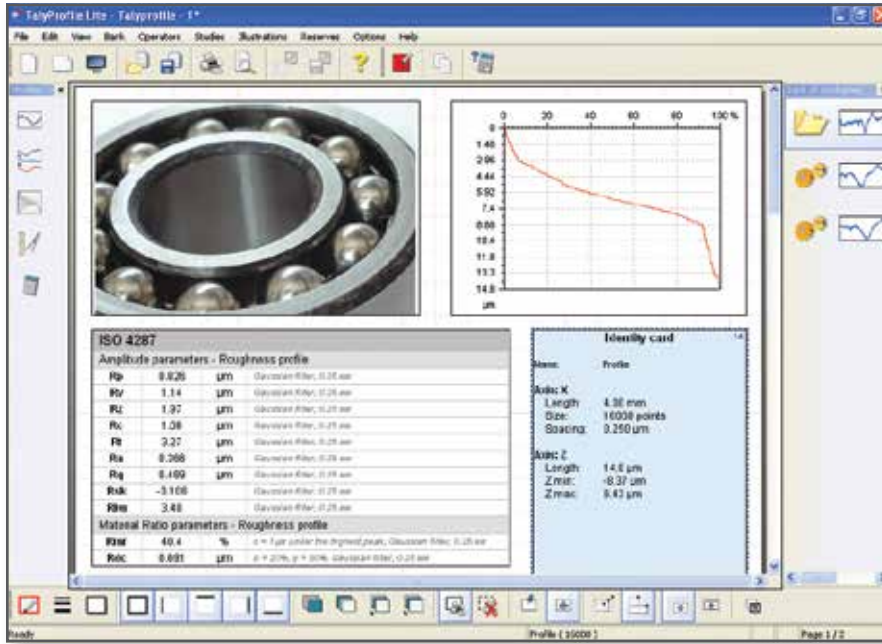


# ROUGHNESS TESTERS

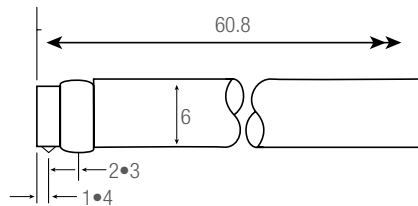
## TALYPROFILE

### ADVANCED SURFACE FINISH ANALYSIS

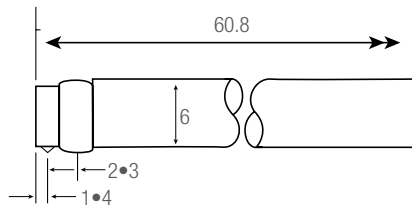
TalyProfile is a dedicated PC based software package designed for use with the SR300 and SR400 instruments. Three versions are available. TalyProfile "Lite" has all functions typically used for a shopfloor inspection. TalyProfile "Silver" has enhanced features for R&W parameters, a statistics module and full report printing. TalyProfile "Gold" has complete laboratory analysis functions.



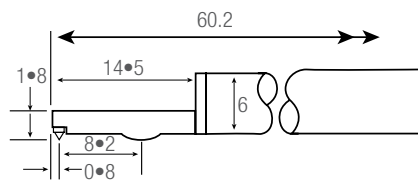
TalyProfile	Lite	Silver	Gold
Surtonic S-series acquisition	x	x	x
Desktop publishing templates	x	x	x
Multi-language support	x	x	x
EN, FR, DE, ES, IT, PL, CN, KR	x	x	x
Leveling	x	x	x
Symmetries	x	x	x
Zoom	x	x	x
ISO 4287	x	x	x
Material Ratio Curve	x	x	x
Area of a hole/peak	x	x	x
Profile parameters and curves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



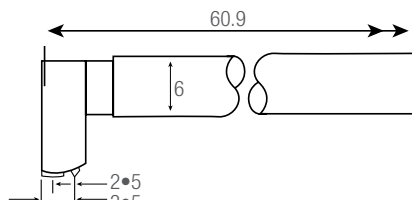
**Standard Pick-Up**  
for general surface roughness measurement  
Code SR-112-1502 (5µm tip radius)  
Code SR-112-1503 (10µm tip radius)



**Right Angle Pick-Up**  
for measurement at right angles to the direction of traverse  
Code SR-112-1505



**Small Bore Pick-Up**  
for general use in small bores, grooves and on narrow surfaces  
Code SR-155-P28495



**Recess Pick-Up**  
for measuring into deep recess  
Code SR-112-1506 recess 5.7mm (0.23")

### TALYPROFILE PARAMETERS

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

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

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

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, Rpke, Rvke, Trc, HTrc

\* Only with gold or silver versions



## ELECTRONIC DUROMETERS

### 3805B ELECTRONIC DUROMETER

The 3805B meets ASTM D2240-05, "Standard Method For Rubber Properties - Durometer Hardness". It is designed to fit comfortably and firmly in your hand. Its large LED display and simple three button control make the 3805B Durometer easy to use.

The 3805B measures Shore A values for a wide variety of soft materials including: rubber: soft vulcanized (i.e. tire), natural nitrile; elastomeric materials (rubber and rubber-like): GR-S, GR-1, neoprene, thiokol, flexible polyacrylic esters; other softer materials including wax, felt, leather, etc. (materials that would normally yield under fingernail pressure).

#### FEATURES AND SPECIFICATIONS

- Meets ASTM standards for durometer hardness
- Extra large LED display
- Simple 3-button control
- Auto Hold feature
- Measuring range: 0-100 HSA
- Deviation: <1% H
- Resolution: 0.5 H
- Accurate and repetitive deviation = 20~90HSA
- HSA <math>\pm 1</math> grade
- Custom carrying case



3805B Electronic Durometer		
Cat. No.	EDP	Description
3805B	69882	3805B Electronic Durometer in plastic case
SRB-3	68200	3 Rubber Test Block Certified Set



## THICKNESS GAGES

### 3812 ULTRASONIC THICKNESS GAGE

The 3812 Ultrasonic Thickness Gage is a state-of-the-art digital ultrasonic thickness gage packed with features typically found only on high end models.

It measures the thickness of metallic and non-metallic materials such as steel, aluminum, titanium, plastics, ceramics, glass and any other good ultrasonic wave conductor that has parallel top and bottom surfaces.

This dynamic ultrasonic thickness gage accurately displays readings in either inch or millimeter units after a simple calibration to a known thickness or sound velocity.

#### 3812 Ultrasonic Thickness Gage and Accessories

Cat. No.	EDP	Description
3812	67668	3812 Ultrasonic Thickness Gage, software, USB cable, couplant gel and carry case
UTG2800-400	72686	Replacement probe (straight) for 3812

#### FEATURES AND SPECIFICATIONS

- 4 digit LCD display with back light
- Upper/Lower limit preset alarm
- Measurement and scanning capabilities
- Adjustable sound velocity
- Extended memory
- 20 memory groups (100 files/group)
- Minimum display unit: 0.001" (0.01mm) selectable
- .040-12.0" measuring range (in steel with standard probe)
- 3280-32805ft/s (1000-9999m/s) sound velocity range
- 32-122 °F operating temperature
- 5MHz Frequency
- 4Hz update range
- USB output
- Power supply: Two 3V AA alkaline batteries with approximately 100 hours of life (with the backlight off)
- Power consumption: Working current is less than 3V
- Accuracy:  $\pm$  (0.5% thickness + .001")
- Dimensions: 5.90 x 2.91 x 1.30" (150 x 74 x 33mm)
- Weight: 8.6oz (245g)
- Includes tester and cables, software, USB cable, couplant gel and a rugged, form fit carrying case



3812



# THICKNESS GAGES

## 3813 COATING THICKNESS GAGE

The 3813 Coating Thickness Gage is a state-of-the-art coating thickness gage that utilizes the characteristics of both eddy current and magnetic induction to perform two types of thickness calculation.

The gage uses an integrated probe to automatically determine whether the substrate is ferrous or non-ferrous. Then, it either detects the thickness of non-magnetic coating on a magnetic substrate (ferrous) or the insulating coating on a non-magnetic conductive substrate (non-ferrous).

Testing performance is non-destructive and extremely accurate. The 3813 is ideal for a broad range of applications in manufacturing, engineering and commercial inspection.

## FEATURES AND SPECIFICATIONS

- Measuring range: 0-40mils (0-1000 $\mu$ m) max.
- Resolution: 0.1 $\mu$ m/0.1mils (0-99 $\mu$ m) or 1 $\mu$ m (over 100 $\mu$ m)
- Guaranteed tolerance (after one-point calibration):  $\pm 1-3\%$ n or 2 $\mu$ m (whichever is greater)
- 4-digit display, .40" (10mm) height,
- Minimum measuring area: .20 x .20" (5 x 5mm)
- Minimum radius of curvature: Convex: .12" (3mm), Concave: 1.2" (30mm)
- Minimum substrate thickness: Ferrous: 20 mils (0.5mm), Non-ferrous: 2 mils (50 $\mu$ m)
- Zero calibration
- Foil calibration
- Maximum surface temperature of test object: 302 °F (maximum contact time 2 seconds)
- Power source: Four AA batteries
- Includes steel and aluminum substrate samples
- Includes four calibrated thickness samples
- Dimensions: 6.39 x 2.74 x 1.27" (161 x 69 x 32mm)
- Weight: 9oz. (260g)

3813 Thickness Gage		
Cat. No.	EDP	Description
3813	69883	Coating Thickness Gage with steel and aluminum substrate samples, four calibrated thickness samples, batteries, manual and case

