

# MEASURING TOOLS HARDNESS TESTING MACHINES

## Micro Vicker Hardness Testing Machines

|        |       |
|--------|-------|
| HM-200 | P-002 |
| HM-100 | P-002 |

## Vicker Hardness Testing Machines

|        |       |
|--------|-------|
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| AVK-C0 | P-003 |

## Rockwell hardness Testing Machines

|                    |       |
|--------------------|-------|
| HR-530             | P-004 |
| HR-100/200/300/400 | P-005 |
| HR-500             | P-006 |

## Portable Hardness Testing Instruments

|   |            |
|---|------------|
| Rebound Type Portable Hardness Testing Instrument, HH-411           | P-007      |
| Hardness Testing Instrument for Sponge, Rubber, and Plastic, HH-300 | P-007      |
| Compliance with JIS K6253 standard                                  | P-008      |
| Deep Hole / Long Leg Type   | P-009      |
| Pocket Type   | P-009      |
| Compliance with JIS K7215 Standard                                  | P-010      |
| Compliance with JIS K7312 Standard                                  | P-010      |
| Compliance with ASTM D2240 Standard                                 | P-011      |
| Original Standard Durometer   | P-011      |
| Compliance with JIS K6301 Standard                                  | P-012      |
| Simplified Micro-Hardness Tester for Thin Sheet Hardness            | P-012      |
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| Film Thickness For Fe and Non-Fe Materials                          | P-021      |

## Standard Blocks For Hardness

|                                       |       |
|---------------------------------------|-------|
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|---------------------------------------|-------|

# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง

## Mitutoyo

เครื่องวัดความแข็ง

**HM-200**

**SERIES 810 — Micro Vickers Hardness Testing Machines**

- The latest electromagnetic force motor used in the loading mechanism enables the test force to be freely selected.
- In addition to Vickers hardness testing, Knoop (HK)\*1 and Fracture toughness (K<sub>IC</sub>) tests can also be performed.

### System A (HM-210A/220A)

All-in-one model with simple color touch-panel operation

### System B (HM-210B/220B)

A system equipped with automatic reading function with AVPAK software

### System C (HM-210C/220C)

In addition to the functions of System B, System C is equipped with an electric stage

### System D (HM-210D/220D)

In addition to the functions of System B and System C, System D is equipped with the auto focus function

CAUTION: The **AVPAK-20** software package is not for use within, or export to, the United States of America  
The **AVPAK-10** software package is for the United States of America



System A (HM-210A/220A)



| Order No.   | 810-401, 810-404   | 810-406, 810-409                                      |
|---|--|---|
| Model   | HM-210   | HM-220  |
| Applicable standards  | JIS B 7725, ISO 6507-2   |   |
| Test force  | mN (gf)  | 0.4903 to 19610 (0.05 to 2000)                        |
| Arbitrary test force  | 98.07 to 9807 (10 to 1000)   |   |
| External dimensions (excluding protrusions and stage); Main unit mass | One setting can be saved, default is HV0.025.  |   |
| Power supply (main unit)  | System A: 315(W)x671(D)x595(H) mm / 38.5 kg<br>System B/C/D: 315(W)x586(D)x741(H) mm / 37.4 kg |   |
|   | AC100 V 50/60 Hz<br>System A: 31 W System B/C/D: 30 W  | AC100 V 50/60 Hz<br>System A: 44 W System B/C/D: 43 W |

Note: **810-401, 810-406**: System A, **810-404, 810-409**: System B/C/D  
\*1: For Knoop hardness testing, Knoop indenter (optional) is required.

เครื่องวัดความแข็ง

**HM-100**

**SERIES 810 — Micro Vickers Hardness Testing Machines**

- This entry-level series of microhardness testers is suited for mechanical characteristic evaluation and quality control of electric/electronic components where test forces no smaller than 98.07 mN/10gf are sufficient.



| Order No.   | 810-124*                               | 810-125                   | 810-959                             |
|---|--|---------------------------|-------------------------------------|
| Model   | HM-101                                 | HM-102                    | HM-103                              |
| Applicable standards  | JIS B 7725, ISO 6507-2                 |                           |                                     |
| Test force  | mN (gf)                                | 490.3 to 2942 (50 to 300) | 4903 to 9807 (500 to 1000)          |
| External dimensions (excluding protrusions and stage); Main unit mass | 380x600x590 mm / 42 kg                 |                           |                                     |
| Power supply (main unit)  | Control panel: 165x235x125 mm / 1.5 kg |                           |                                     |
|   | —                                      | —                         | TV monitor: 232x227x415 mm / 4.4 kg |
|   | AC100 V 50/60 Hz                       |                           |                                     |
|   | Less than 20 W                         | Less than 60 W            | Less than 90 W                      |

\*Cannot be connected to the measurement data network system MeasurLink

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo

## เครื่องวัดความแข็ง

## HV-100

## SERIES 810 — Vickers Hardness Testing Machines



- Vickers hardness testers have a wide application in testing metals, especially small heat-treated parts, and are also suitable for making special-purpose tests such as carburized case hardness, maximum hardness of spot welds, high-temperature hardness, and fracture toughness of ceramic materials.
- In addition to Vickers hardness testing, Knoop (HK)<sup>\*1</sup> / Brinell (HB)<sup>\*2</sup> / Fracture toughness (Kc) tests can also be performed.

**System A (HM-110A/120A)**

All-in-one model with simple color touch-panel operation

**System B (HM-110B/120B)**

A system equipped with automatic reading function with AVPAK software

**System C (HM-110C/120C)**

In addition to the functions of System B, System C is equipped with an electric stage

**System D (HM-110D/120D)**

In addition to the functions of System B and System C, System D is equipped with the auto focus function

CAUTION: The **AVPAK-20** software package is not for use within, or export to, the United States of America  
The **AVPAK-10** software package is for the United States of America



System A (HV-110A/120A)

| Order No.  | 810-440, 810-443   | 810-445, 810-448           |
|--|--|----------------------------|
| Model  | HV-110   | HV-120                     |
| Applicable standards   | JIS B 7725, ISO 6507-2                                   |                            |
| Test force<br>mN (gf)  | 9.807 to 490.3 (1 to 50)                                 | 2.942 to 294.2 (0.3 to 30) |
| External dimensions (excluding protrusions and stage);<br>Main unit mass | System A: 307x696x786 mm<br>System B/C/D: 307x627x875 mm |                            |
| Main unit mass   | HV-110: Approx. 60 kg HV-120: Approx. 58 kg              |                            |
| Power supply<br>(main unit)  | AC100 V 50/60 Hz<br>System A: 24 W System B/C/D: 22 W    |                            |

Note: 810-440, 810-445: System A, 810-443, 810-448: System B/C/D

\*1: For Knoop hardness testing, Knoop indenter (optional) is required.

\*2 For Brinell hardness testing a Brinell indenter (optional) and additional weight are required.

Micro Vickers  
Hardness  
Testing  
Machines  
เครื่องวัดความแข็งVickers  
Hardness  
Testing  
Machines  
เครื่องวัดความแข็งRockwell  
Hardness  
Testing  
Machines  
เครื่องวัดความแข็งPortable  
Hardness  
Testing  
Instruments  
เครื่องวัดความแข็งStandard Blocks  
for Hardness  
เหล็กมาตรฐานสำหรับ  
ทดสอบความแข็ง

## เครื่องวัดความแข็ง

## AVK-C0

## SERIES 810 — Vickers Hardness Testing Machines



- A basic Vickers hardness testing machine that is easy to use and economical.

| Order No.  | 810-160                          |
|--|----------------------------------|
| Model  | AVK-C0                           |
| Applicable standards   | JIS B 7725, ISO 6507-2           |
| Test force<br>mN (gf)  | 2.942 to 294.2 (0.3 to 30)       |
| External dimensions (excluding protrusions and stage);<br>Main unit mass | 210x580x705 mm / Approx. 49 kg   |
| Power supply<br>(main unit)  | AC100 V 50/60 Hz<br>Approx. 45 W |



# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง

**Mitutoyo**

เครื่องวัดความแข็ง

**HR-530**

**SERIES 810 — Rockwell Hardness Testing Machines**

**MeasurLink<sup>®</sup> ENABLED**

Data Management Software by Mitutoyo

- Unique electronic control makes the HR-530 series of hardness testers extremely versatile by enabling Brinell hardness testing as well as load-sequence hardness testing of plastics, plus Rockwell and Rockwell Superficial hardness testing.
- This series can test the hardness of the inside wall of a ring, a test that is only possible using ordinary hardness testers by cutting the ring into pieces. (All models.)
- The touch-panel display unit can be mounted on top of the tester, providing significant convenience if the machine installation space is restricted. (All models.) Use the optional display mounting bracket to mount the unit.

- This series allows numeric display of statistical analysis results such as maximum and minimum values, mean value and graphic display of X-R control charts and histograms required for hardness evaluation.



**HR-530  
(810-237)**  
Maximum specimen size:  
Height 250 mm, Depth 150 mm



**HR-530L  
(810-337)**  
Maximum specimen size:  
Height 395 mm, Depth 150 mm



## Metric

| Order No.                  |   | 810-231*1  | 810-236*2 | 810-331*1   | 810-336*2 |
|----------------------------|---|--|-----------|---|-----------|
| Model                      | HR-530  |  | HR-530L   |   |           |
| Applicable standards       | JIS B 7726, ISO 6508-2                                  |  |           |   |           |
| Hardness testing methods   | Rockwell/Rockwell Superficial/Brinell/Plastics hardness |  |           |   |           |
| Initial test force N (kgf) | 29.42 (3) 98.07 (10)                                    |  |           |   |           |
| Test force N (kgf)         | Rockwell Superficial                                    | 147.1 (15) 294.2 (30) 441.3 (45)   |           |   |           |
|                            | Rockwell  | 588.4 (60) 980.7 (100) 1471 (150)  |           |   |           |
|                            | Brinell   | 61.29 (6.25) 98.07 (10) 153.2 (15.625) 245.2 (25) 294.2 (30)<br>306.5 (31.25) 612.9 (62.5) 980.7 (100) 1226 (125) 1839 (187.5) |           |   |           |
| Power supply               | AC100 V, 120 V, 220 V, 240 V Auto-selection             |  |           |   |           |
| External dimensions        | Main unit   | 250(W)x667(D)x621(H) mm  |           | 300(W)x667(D)x766(H) mm                             |           |
|                            | Touch-panel display unit                                | 191(W)x147(D)x71(H) mm   |           |   |           |
| Mass                       | Main unit: Approx. 60 kg<br>Display: Approx. 1.1 kg     |  |           | Main unit: Approx. 69 kg<br>Display: Approx. 1.1 kg |           |

## Inch/Metric

| Order No.                |                          | 810-232*1  | 810-237*2 | 810-332*1   | 810-337*2 |
|--------------------------|--------------------------|--|-----------|---|-----------|
| Model                    |                          | HR-530   |           | HR-530L   |           |
| Applicable standards     |                          | JIS B 7726, ISO 6508-2   |           |   |           |
| Hardness testing methods |                          | Rockwell/Rockwell Superficial/Brinell/Plastics hardness  |           |   |           |
| Initial test force       | N (kgf)                  | 29.42 (3) 98.07 (10)   |           |   |           |
| Test force<br>N (kgf)    | Rockwell Superficial     | 147.1 (15) 294.2 (30) 441.3 (45)   |           |   |           |
|                          | Rockwell                 | 588.4 (60) 980.7 (100) 1471 (150)  |           |   |           |
|                          | Brinell                  | 61.29 (6.25) 98.07 (10) 153.2 (15.625) 245.2 (25) 294.2 (30)<br>306.5 (31.25) 612.9 (62.5) 980.7 (100) 1226 (125) 1839 (187.5) |           |   |           |
| Power supply             |                          | AC100 V, 120 V, 220 V, 240 V Auto-selection  |           |   |           |
| External dimensions      | Main unit                | 250(W)x667(D)x621(H) mm  |           | 300(W)x667(D)x766(H) mm                             |           |
|                          | Touch-panel display unit | 191(W)x147(D)x71(H) mm   |           |   |           |
| Mass                     |                          | Main unit: Approx. 60 kg<br>Display: Approx. 1.1 kg  |           | Main unit: Approx. 69 kg<br>Display: Approx. 1.1 kg |           |

Note: Plastic testing may not be enabled depending on the material.  
For the test of Brinell hardness, indentation Brinell hardness, and plastic hardness, other special accessories are required.  
\*1: 1/16 in steel ball indenter is equipped as a standard accessory.  
\*2: 1/16 in carbide ball indenter is equipped as a standard accessory.

เครื่องวัดความแข็ง

HR-100/200/300/400

SERIES 963 — Rockwell Hardness Testing Machines



• A series of economical Rockwell hardness testing machines. The lineup consists of 5 models including a digital display type and an analog display type.



963-210  
HR-110MR

963-220  
HR-210MR

963-231  
HR-320MS

963-240  
HR-430MR

963-241  
HR-430MS

| Order No.   |                     | 963-210*                          | 963-220*                                 | 963-240  | 963-231                          | 963-241  |
|---|---------------------|-----------------------------------|--|----------|----------------------------------|----------|
| Model   |                     | HR-110MR                          | HR-210MR                                 | HR-430MR | HR-320MS                         | HR-430MS |
| Applicable standards                                  |                     | JIS B 7726, ISO 6508-2            |  |          |                                  |          |
| Supported hardnesses                                  |                     | Rockwell hardness                 |  |          |                                  |          |
|   |                     | —                                 |  |          | Rockwell Superficial hardness    |          |
| Preliminary test force N (kgf)                        |                     | 98.07 (10)                        |  |          | 29.42 (3) 98.07 (10)             |          |
| Test force  | Rockwell N (kgf)    | 588.4 (60) 980.7 (100) 1471 (150) |  |          |                                  |          |
|   | Superficial N (kgf) | —                                 |  |          | 147.1 (15) 294.2 (30) 441.3 (45) |          |
| External dimensions (excluding protrusions and stage) |                     | 296(W)x512(D)x780(H) mm           | 214(W)x512(D)x780(H) mm                  |          |                                  |          |
| Main unit mass  |                     | 49 kg                             | 46 kg                                    | 49 kg    | 47 kg                            | 50 kg    |
| Power supply  |                     | No power required                 | AC100-240 V 1.2A (DC adapter DC12V 3.5A) |          |                                  |          |

\* Cannot be connected to the measurement data network system MeasurLink.

Rockwell Hardness  
Testing Machines  
เครื่องวัดความแข็ง

Micro Vickers  
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Vickers  
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เครื่องวัดความแข็ง

Rockwell  
Hardness  
Testing  
Machines  
เครื่องวัดความแข็ง

Portable  
Hardness  
Testing  
Instruments  
เครื่องวัดความแข็ง

Standard Blocks  
for Hardness  
เหล็กมาตรฐานสำหรับ  
ทดสอบความแข็ง

# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง

**Mitutoyo**

เครื่องวัดความแข็ง

**WiZhard HR-500**

**SERIES 810 — Rockwell Hardness Testing Machines**

**MeasurLink<sup>®</sup> ENABLED**

Data Management Software by Mitutoyo



810-204  
HR-523



• With the **HR-500**, the hardness of even the inside wall of a pipe-shaped specimen can be tested without cutting the specimen in half. What is more, the **HR-500** can perform 3 types of hardness tests, not only Rockwell and Rockwell superficial but also Brinell<sup>2</sup>, by introducing our proprietary electronic control technology and providing the Brinell hardness testing load sequence.

| Order No.                                 | 810-202*1   |  | 810-205*1                     |  | 810-206*1                     |  | 810-204*1                     |  | 810-207*1   |  |
|---|---|--|-------------------------------|--|-------------------------------|--|-------------------------------|--|---|--|
| Model                                     | HR-521  |  | HR-521L                       |  | HR-522                        |  | HR-522L                       |  | HR-523  |  |
| Supported hardnesses                      | Rockwell hardness/Rockwell Superficial hardness/Brinell hardness*2  |  |                               |  |                               |  |                               |  |   |  |
| Preliminary test force (N)                | 29.42   |  |                               |  | 98.07                         |  |                               |  |   |  |
| Total test force (N)                      | 147.1   |  |                               |  | 294.2                         |  | 441.3                         |  |   |  |
| Superficial                               |   |  |                               |  |                               |  |                               |  |   |  |
| Rockwell                                  | 588.4   |  |                               |  | 980.7                         |  | 1471                          |  |   |  |
| Brinell                                   | 1839  |  |                               |  | 61.29                         |  | 98.07                         |  | 153.2   |  |
|   |   |  |                               |  | 306.5                         |  | 612.9                         |  | 980.7   |  |
| Test force control                        | Auto (load, duration, unload)   |  |                               |  |                               |  |                               |  |   |  |
| Table up/down mechanism                   | Manual (automatic brake for the preliminary test force)   |  |                               |  |                               |  |                               |  | Motor driven (manual operation is also available) |  |
| Operation unit                            | Membrane switch operation panel   |  |                               |  |                               |  |                               |  |   |  |
| Test force switching                      | Switch operation  |  |                               |  |                               |  |                               |  |   |  |
| Test force duration time                  | 0 to 120s (Can be set to any value in units of 1s.)   |  |                               |  |                               |  |                               |  |   |  |
| Maximum specimen dimensions               | Height: 250mm<br>Depth: 150mm   |  | Height: 395mm<br>Depth: 150mm |  | Height: 250mm<br>Depth: 150mm |  | Height: 395mm<br>Depth: 150mm |  | Height: 250mm<br>Depth: 150mm                     |  |
| Allowable inner diameter of pipe specimen | Minimum hole diameter: 34mm (When the special specification indenter is used: 22mm)   |  |                               |  |                               |  |                               |  |   |  |
| Display                                   | Hardness value, test condition, OK/NG judgment result, statistical calculation result, X—R control chart, hardness conversion value                         |  |                               |  |                               |  |                               |  |   |  |
| Function                                  | Conversion function [HV, HK, HR (Rockwell hardness A, B, C, D, F, G / Rockwell Superficial 15T, 30T, 45T, 15N, 30N, 45N), HS, HB, Tensile strength]         |  |                               |  |                               |  |                               |  |   |  |
|   | OK/NG judgement function  |  |                               |  |                               |  |                               |  |   |  |
|   | Continuous measurement function (for specimens of the same thickness)   |  |                               |  |                               |  |                               |  |   |  |
|   | Cylindrical correction, spherical correction, offset correction, multi-point correction functions   |  |                               |  |                               |  |                               |  |   |  |
|   | Statistical calculation function<br>(Maximum value, minimum value, mean value, standard deviation, upper and lower limit values, OK count, range, NG count) |  |                               |  |                               |  |                               |  |   |  |
| Languages                                 | 6 languages are supported: Japanese, English, German, French, Italian, and Spanish.   |  |                               |  |                               |  |                               |  |   |  |
| External connection interface             | For printer: Serial interface (compatible with the RS-232C standard), Digimatic interface, Centronics interface   |  |                               |  |                               |  |                               |  |   |  |
| Power supply                              | 100V AC, approx. 40VA or less, (120/220/240V AC set on shipment from factory.)  |  |                               |  |                               |  |                               |  |   |  |
| External dimensions                       | Body: Approx. 250(W) x 670(D) x 605(H)mm, (Long types: 750(H)mm), Operation panel: Approx. 165 (W) x 260 (D) x 105 (H)mm                                    |  |                               |  |                               |  |                               |  |   |  |
| Mass                                      | Approx. 65kg (Long types: Approx. 75kg)   |  |                               |  |                               |  |                               |  |   |  |

\*1 To denote your AC power cable add the following suffixes to the order No.:

A for UL/CSA, D for CEE, DC for CCC, E for BS, K for KC, C and No suffix are required for PSE.

\*2 For Brinell hardness testing, an indenter (option) and a measurement microscope are required.

Note: Please be advised that some plastic materials are not testable with this equipment. Contact Mitutoyo for details if in doubt.



## เครื่องวัดความแข็ง

## HARDMATIC HH-411

## SERIES 810 — Rebound Type Portable Hardness Tester



- Excellent operability that performs hardness tests with the touch of a key and a compact body allows users to measure hardness in the field. This instrument is best suited for on-site hardness tests such as large molds, railroad track, and welded spots in structures.

**MeasurLink® ENABLED**  
Data Management Software by Mitutoyo


|  |   |
|--|---|
| Order No.  | 810-299-10, 810-299-11, 810-298-10, 810-298-11  |
| Model  | HH-411  |
| Detector   | Impact hammer with integrated detector and carbide-ball tip (D type: conforming to ASTM A 956)  |
| Display unit   | 7-segment LCD   |
| Hardness display range   | Leeb hardness: 1 to 999 HL  |
| Display range<br>(This display range varies depending on the conversion table used.) | Vickers hardness: 43 to 950 HV<br>Brinell hardness: 20 to 894 HB<br>Rockwell hardness (C scale): 19.3 to 68.2 HRC<br>Rockwell hardness (B scale): 13.5 to 101.7 HRB<br>Shore hardness: 13.2 to 99.3 HS<br>Tensile strength: 499 to 1996 MPa |
| Power supply   | Alkaline AA battery 2 pcs or optional AC adapter (battery life: 70 hours)   |
| External dimensions/Mass   | Detector: ø28 175 mm in length, 120 g<br>Display: 70(W)x110(D)x35(H) mm, Approx. 100 g  |

Note: Order No. 810-298-10/810-299-10 includes two AA alkaline batteries and Order No. 810-298-11/810-299-11 excludes these batteries.

**Micro Vickers  
Hardness  
Testing  
Machines**  
เครื่องวัดความแข็ง

**Vickers  
Hardness  
Testing  
Machines**  
เครื่องวัดความแข็ง

**Rockwell  
Hardness  
Testing  
Machines**  
เครื่องวัดความแข็ง

**Portable  
Hardness  
Testing  
Instruments**  
เครื่องวัดความแข็ง

**Standard Blocks  
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เหล็กมาตรฐานสำหรับ  
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## เครื่องวัดความแข็ง

## HARDMATIC HH-300

## SERIES 811 — Durometers for Sponge, Rubber, and Plastics

- Hardness measurement by durometer is simply performed by holding the instrument against the surface of a specimen and reading the indicated value. This type of hardness tester is most widely used for hardness testing of sponge, rubber, plastics and other soft materials.

**MeasurLink® ENABLED**  
Data Management Software by Mitutoyo


## Optional Accessories for Dual-purpose Stand CTS Series

|            |             |                       |             |
|------------|-------------|-----------------------|-------------|
| Order No.  | 811-019     | 811-012               | 811-013     |
| Model      | CTS-101     | CTS-102               | CTS-103     |
| able model | HH-331, 332 | HH-333, 334, 337, 338 | HH-335, 336 |

|                                 |  |                                  |  |                                  |                                    |                                  |   |                                  |                                    |                                  |  |
|---------------------------------|--|----------------------------------|--|----------------------------------|------------------------------------|----------------------------------|---|----------------------------------|------------------------------------|----------------------------------|--|
| Order No.                       | 811-329-10                                   | 811-330-10                       | 811-331-10   | 811-332-10                       | 811-333-10                         | 811-334-10                       | 811-335-10  | 811-336-10                       | 811-337-10                         | 811-338-10                       |  |
| Model No.                       | HH-329*1                                     | HH-330                           | HH-331*1   | HH-332                           | HH-333*1                           | HH-334                           | HH-335*1  | HH-336                           | HH-337*1                           | HH-338                           |  |
| Type                            | Compact                                      |                                  | Long   |                                  |                                    |                                  | Compact   |                                  |                                    |                                  |  |
| Display specification           | Analog                                       | Digital                          | Analog   | Digital                          | Analog                             | Digital                          | Analog  | Digital                          | Analog                             | Digital                          |  |
| Measurement target              | Soft rubber, sponge, felt, hard film, winder |                                  | General rubber, soft plastic   |                                  | hard rubber, hard plastic, ebonite |                                  | General rubber, soft plastic  |                                  | hard rubber, hard plastic, ebonite |                                  |  |
| Classification by specification | Type E                                       |                                  | Type A   |                                  | Type D                             |                                  | Type A  |                                  | Type D                             |                                  |  |
| Needle shape                    | Shaft diameter                               | —                                |  | ø1.25 mm                         |                                    |                                  |   |                                  |                                    |                                  |  |
|                                 | Tip shape                                    | Semi-sphere                      |  | Circular truncated cone          |                                    | Cone                             |   | Circular truncated cone          |                                    | Cone                             |  |
|                                 | Tip angle                                    | —                                |  | 35°                              |                                    | 30°                              |   | 35°                              |                                    | 30°                              |  |
|                                 | Tip diameter                                 | ø5 mm                            |  | ø0.79 mm                         |                                    | —                                |   | ø0.79 mm                         |                                    | —                                |  |
|                                 | Tip curvature                                | —                                |  | —                                |                                    | 0.1 mm                           |   | —                                |                                    | 0.1 mm                           |  |
| Power supply                    | —  | Button silver oxide battery SR44 | —  | Button silver oxide battery SR44 | —                                  | Button silver oxide battery SR44 | —   | Button silver oxide battery SR44 | —                                  | Button silver oxide battery SR44 |  |
| External dimensions (WxDxH)     | 68x34x146 mm                                 | 59x40x147 mm                     | Analog, long type : 68x35x188 mm<br>Digital, compact type: 59x41x1907 mm |                                  |                                    |                                  | Analog, long type : 68x34x146 mm<br>Digital, compact type: 59x40x147 mm |                                  |                                    |                                  |  |
| Mass                            | 300 g  | 290 g                            | 320 g  | 310 g                            | 320 g                              | 310 g                            | 300 g   | 290 g                            | 300 g                              | 290 g                            |  |

\* Cannot be connected to the measurement data network system MeasurLink.

# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง

TECLOCK

เครื่องวัดความแข็ง

**Compliance with JIS K 6253 standard**

**for Hardness test of vulcanized or thermoplastic rubber**

This is Durometer to comply with JIS K 6253 (new JIS) standard established in 1993 for the purpose of conforming to ISO (International Standard Organization). Durometers consist of 3 types namely, Type A for medium hardness, Type D for high hardness and Type E for low hardness. Type A tends to indicate higher value by 1~2 points compared with former Type A durometers. Type D is suitable for hard rubber having more than 90 hardness measured by type A durometer and Type E is suitable for soft rubber of which hardness is 20 and below measured by Type A durometers.

## Standard Type



**GS-719N**  
Type A Durometer  
General rubber



**GSD-719K**  
Type A Durometer  
Digital type  
With peak detection

## Digital Durometer with Peak Hold Function

This is the model for which peak hold (Maximum value is held) function is mounted. This is effective to measure hardness of Elastomer of which maximum value is unreadable due to relaxation phenomenon.

Minimum read value is 0.5 and it is a half of analog type.

Measured data can be treated as statistics by connecting with optional printer SD-763P.

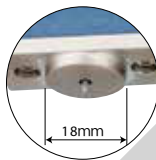


**GS-719R**  
Type A Durometer  
Stand mounting compatible  
type Peak pointer type



**GSD-719K-R**  
Type A Durometer  
Digital type  
Stand mounting compatible  
type Peak pointer type

**Pressurized Face Ø18mm Durometer mounted to Stand**  
Pressurized face diameter of type A and type D durometer mounted to a stand is defined 18mm by JIS standard and ISO standard. Ø18mm type A (GS-719R) and type D (GS-720R) can be used as they are for measuring by pushing by hand.



|         | Order No.  | Type                         | Application / Materials          | Conform Standards                                      | Spring Load Value 0-100   | Indenter Shape (mm)                    | Indenter Height (mm) | Weight (g) |
|---------|------------|------------------------------|----------------------------------|--|---------------------------|--|----------------------|------------|
| Analog  | GS-719N    | Type A                       | General rubber (Medium hardness) | JIS K 6253<br>ISO 7619<br>ISO 868<br>ASTM D 2240       | 550-8050mN (56.1-821.1gf) | Truncated Cone of Ø0.79 with 35° angle | 2.50                 | 200        |
|         | GS-719G    | Type A (Peak Pointer Type)   | General rubber (Medium hardness) |  | 550-8050mN (56.1-821.1gf) | Truncated Cone of Ø0.79 with 35° angle | 2.50                 | 208        |
|         | GS-719R    | Type A 18mm / stand combined | General rubber (Medium hardness) |  | 550-8050mN (56.1-821.1gf) | Truncated Cone of Ø0.79 with 35° angle | 2.50                 | 213        |
|         | GS-720N    | Type D                       | Hard rubber (High hardness)      |  | 0-44450mN (0-4533gf)      | Conical Cone of R0.1 with 30° angle    | 2.50                 | 200        |
|         | GS-720G    | Type D (Peak Pointer Type)   | Hard rubber (High hardness)      |  | 0-44450mN (0-4533gf)      | Conical Cone of R0.1 with 30° angle    | 2.50                 | 208        |
|         | GS-720R    | Type AØ18mm / stand combined | Hard rubber (High hardness)      |  | 0-44450mN (0-4533gf)      | Conical Cone of R0.1 with 30° angle    | 2.50                 | 213        |
|         | GS-721N    | Type E (AO)                  | (High hardness) Soft rubber      | JIS K 6253<br>ISO 7619<br>ASTM D 2240                  | 550-8050mN (56.1-821.1gf) | Hemisphere of SR2.50                   | 2.50                 | 200        |
|         | GS-721G    | Type A (Peak Pointer Type)   | (High hardness) Soft rubber      |  | 550-8050mN (56.1-821.1gf) | Hemisphere of SR2.50                   | 2.50                 | 208        |
|         | GS-719P    | Type A (Pocket Type)         | General rubber (Medium hardness) | JIS K 6253   | 550-8050mN (56.1-821.1gf) | Truncated Cone of Ø0.79 with 35° angle | 2.50                 | 125        |
| Digital | GSD-719K   | Type A                       | General rubber, soft plastic     | JIS K 6253, JIS K 7215, ISO 7619, ISO 868, ASTM D 2240 | 550-8050mN (56.1-821.1gf) | Truncated Cone of Ø0.79 with 35° angle | 2.50                 | 313        |
|         | GSD-720K   | Type D                       | Hard rubber, Plastic             |  | 0-44450mN (0-4533gf)      | Conical Cone of R0.1 with 30° angle    | 2.50                 | 313        |
|         | GSD-721K   | Type E (AO)                  | Very soft rubber                 | JIS K 6253, ISO 7619<br>ASTM D 2240                    | 550-8050mN (56.1-821.1gf) | Hemisphere of SR2.50                   | 2.50                 | 313        |
|         | GSD-719K-R | Type AØ18mm / Stand combined | General rubber (Medium hardness) | JIS K 6253, ISO 7619<br>ISO 868, ASTM D 2240           | 550-8050mN (56.1-821.1gf) | Truncated Cone of Ø0.79 with 35° angle | 2.50                 | 320        |
|         | GSD-720K-R | Type AØ18mm / Stand combined | Hard rubber (High hardness)      |  | 0-44450mN (0-4533gf)      | Conical Cone of R0.1 with 30° angle    | 2.50                 | 320        |



## เครื่องวัดความแข็ง

TECLOCK

## Portable Hardness Testing Instruments

### Deep Hole / Long Leg Type

**GS-720H**

Type D Durometer

Deep hole type  
Peak pointer type

**GS-719L**

Type A Durometer

Long leg type  
Peak pointer type

**GSD-719K-H**

Type A Durometer

Digital type  
Deep hole type  
With peak detection



**GSD-719K-L**

Type A Duromete

- Digital type
- Long leg type
- With peak detection

## Micro Vickers Hardness Testing Machines

## Vickers Hardness Testing Machines

## Rockwell Hardness Testing Machines

## Portable Hardness Testing Instruments

### Standard Blocks for Hardness

เหล็กมาตรฐานสำหรับ  
ทดสอบความแข็ง

### Pocket Type

[illegible]

※Dimensions of the GS-755 is 000 pages.  
※Dimensions of the GS-779G.



Comparison with standard type. (Left)



**GS-719P**

**GS-709P**

Type A Durometer

Peak pointer type

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## เครื่องวัดความแข็ง



## เครื่องวัดความแข็ง

## Compliance with JIS K 7215 standard Durometers for hardness test of plastic

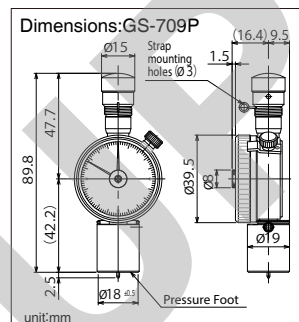
This standard is prescribed by plastic industry in Japan apart from testing method of hardness of rubber. This is basically equal to Durometer of JIS K 6253, as only its round up method of spring load value etc. is different. But we distinguish model name as another Durometer according to the view of conformity to standard.

**GS-702N**

Plastics  
Hard rubber

**GS-709N**

General rubber  
Soft plastic

**GS-709P**Peak pointer type  
Pocket type

| Order No. |          | Type                       | Application / Materials       | Conform Standards  | Spring Load Value<br>0-100   | Indenter Shape (mm)                       | Indenter Height<br>(mm) | Weight (g) |
|-----------|----------|----------------------------|-------------------------------|--|------------------------------|---|-------------------------|------------|
| Analog    | GS-702N  | Type D                     | Plastics / Hard rubber        | JIS K 7215<br>ISO 868<br>ASTM D 2240                         | 0-44483mN<br>(0-4536gf)      | Conical Cone of R0.1<br>with 35° angle    | 2.50                    | 200        |
|           | GS-702G  | Type D (Peak pointer type) | Plastics / Hard rubber        |  | 0-44483mN<br>(0-4536gf)      | Conical Cone of R0.1<br>with 35° angle    | 2.50                    | 208        |
|           | GS-709N  | Type A                     | Soft plastic / General rubber |  | 549-8061mN<br>(56-822gf)     | Truncated Cone of Ø0.79<br>with 35° angle | 2.50                    | 200        |
|           | GS-720L  | Type A (Peak pointer type) | Soft plastic / General rubber |  | 549-8061mN<br>(56-822gf)     | Truncated Cone of Ø0.79<br>with 35° angle | 2.50                    | 208        |
|           | GS-709P  | Type A (Pocket type)       | Soft plastic / General rubber | JIS K 7215   | 550-8050mN<br>(56.1-821.1gf) | Truncated Cone of Ø0.79<br>with 35° angle | 2.50                    | 125        |
| Digital   | GSD-719K | Type A                     | Soft plastic / General rubber | JIS K 6253, JIS K 7215, ISO<br>7619, ISO 868,<br>ASTM D 2240 | 549-8061mN<br>(55-822gf)     | Truncated Cone of Ø0.79<br>with 35° angle | 2.50                    | 313        |
|           | GSD-720K | Type D                     | Plastics / Hard rubber        |  | 0-44450mN<br>(0-4533gf)      | Conical Cone of R0.1<br>with 35° angle    | 2.50                    | 313        |

## เครื่องวัดความแข็ง

## Compliance with JIS K 7312 standard

**GS-701N**

Type C (ASKER)

Soft rubber  
for Windings yarn

Standard about physical test method of polyurethane Elastomer. One of the test items is hardness test and rubber industry generally calls type A durometer "shore-A" and type D durometer "shore- D". In addition, type C for low hardness range is called ASKER and GS-701(N)G is the same product ASKER-C. It complies with hardness test of JIS S 6050 "Plastic eraser". Furthermore, SRIS 0101 (ex Society of Rubber Industry, Japan standard of Measure) which was the base of these standard was already discontinued, but only type name is remained.

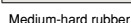
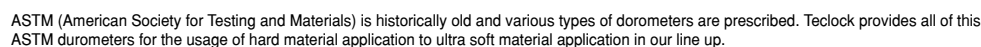
| Order No. |          | Type                       | Application / Materials                        | Conform Standards        | Spring Load Value<br>0-100 | Indenter Shape (mm)     | Indenter Height<br>(mm) | Weight (g) |
|-----------|----------|----------------------------|--|--------------------------|----------------------------|-------------------------|-------------------------|------------|
| Analog    | GS-701N  | Type C                     | Soft rubber, Foam rubber Eraser, Windings yarn | JIS K 7312<br>JIS S 6050 | 539-8385mN<br>(55-855gf)   | Hemisphere of<br>SR5.08 | 2.54                    | 200        |
|           | GS-701G  | Type C (Peak pointer type) |  |                          | 539-8385mN<br>(55-855gf)   | Hemisphere of<br>SR5.08 | 2.54                    | 208        |
| Digital   | GSD-701K | Type C                     |  |                          | 539-8385mN<br>(55-855gf)   | Hemisphere of<br>SR5.08 | 2.54                    | 313        |

## เครื่องวัดความแข็ง

TECLOCK

## Portable Hardness Testing Instruments

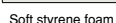
### Durometers for hardness test of rubber characteristic



หลักมาตรฐานสำหรับ  
ทดสอบความแข็ง

## TECLOCK Original Standard Durometer

Hardness is measured by placing GS-744G on the sponge sheet. Dispersion of polystyrene level can be judged.



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# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง

TECLOCK

เครื่องวัดความแข็ง

**Compliance with JIS K 6301 standard**

**Vulcanized Rubber Physical Test (discontinued in 1998 August)**



**GS-703N**

JIS C (old type)

Hard rubber  
Ebonite



**GS-706N**

JIS A (old type)

General rubber

JIS K 6301 was established in 1950 and had sustained base of rubber industry of our country but was discontinued in 1998 because it did not comply with ISO and also JIS K 6253 was prescribed on its behalf. However, it had been used for 60 years as "Rubber hardness tester" and even now it is used as test data between certain parties in charge with mutual consensus although movement to new JIS has progressed and standard is discontinued. There are 2 models such as Spring type A and type C for hard rubber.

|         | Order No. | Type                                   | Application / Materials | Conform Standards | Spring Load Value<br>0-100  | Indenter Shape (mm)                                    | Indenter<br>Height (mm) | Weight (g) |
|---------|-----------|--|-------------------------|-------------------|-----------------------------|--|-------------------------|------------|
| Analog  | GS-703N   | JIS C (old type)                       | Hard rubber             | JIS K 6301        | 980-44100mN<br>(100-4500gf) | Truncated Cone of $\varnothing 0.79$<br>with 35° angle | 2.54                    | 200        |
|         | GS-703G   | Type C (old type)<br>Peak Pointer type | Hard rubber             | JIS K 6301        | 980-44100mN<br>(100-4500gf) | Truncated Cone of $\varnothing 0.79$<br>with 35° angle | 2.54                    | 208        |
|         | GS-706N   | JIS A (old type)                       | General rubber          | JIS K 6301        | 539-8385mN<br>(55-855gf)    | Truncated Cone of $\varnothing 0.79$<br>with 35° angle | 2.54                    | 200        |
|         | GS-706G   | Type A (old type)<br>Peak Pointer type | General rubber          | JIS K 6301        | 539-8385mN<br>(55-855gf)    | Truncated Cone of $\varnothing 0.79$<br>with 35° angle | 2.54                    | 208        |
| Digital | GSD-706K  | Type A (old type)                      | General rubber          | JIS K 6301        | 539-8385mN<br>(55-855gf)    | Truncated Cone of $\varnothing 0.79$<br>with 35° angle | 2.54                    | 313        |

เครื่องวัดความแข็ง

**Simplified Micro-Hardness Tester for Thin Sheet Hardness**

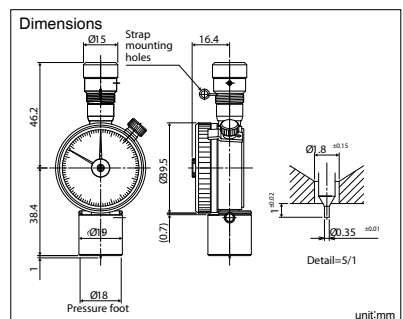


**GS-779G**

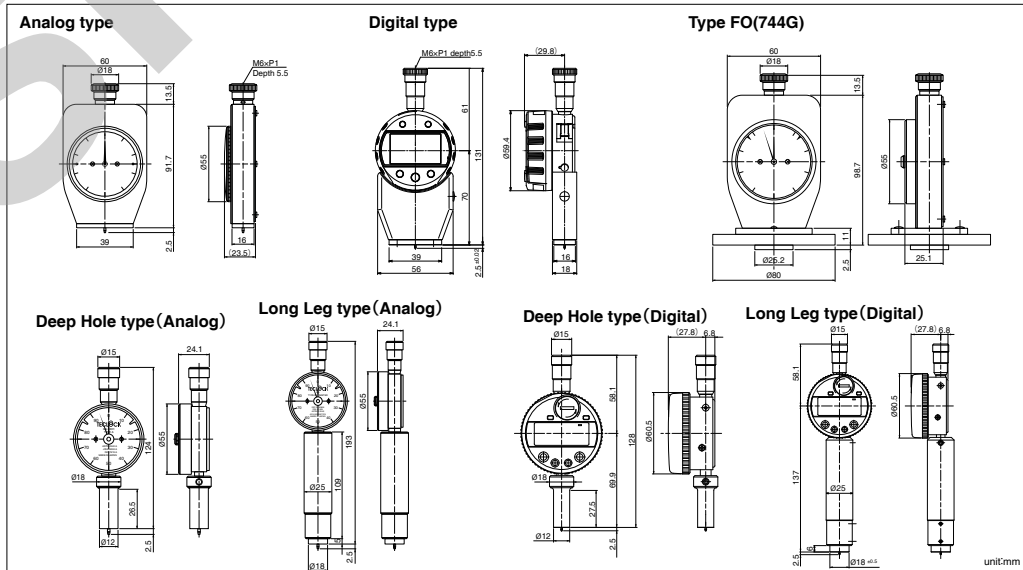
Peak pointer type

This is simplified micro-hardness tester which measures hardness of thin sheet such as rubber and Estolamer. Height of indenter is 1mm that is 1per 2.5 of that of normal durometer. It is effective for dispersiveness of sheet hardness and its relative comparison. It is original standard of Teclock and designed so as to obtain the value similar to type A durometer.

| Order No.      | Type                  | Spring Load Value<br>0-100 | Indenter Shape<br>(mm) | Indenter<br>Height (mm) | Weight<br>(kg) |
|----------------|-----------------------|----------------------------|------------------------|-------------------------|----------------|
| <b>GS-779G</b> | Type A<br>approximate | 388-1288mN<br>(9-131gf)    | $\varnothing 0.35$     | 1                       | 125            |



Dimensions





## ฐานสำหรับเครื่องวัดความแข็ง

### Measuring Stand for Durometer

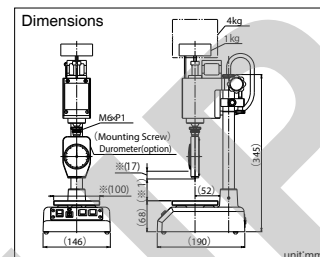
In case of measuring with durometer by pushing by hand, measuring values vary in some degree due to individual difference. Therefore, Measuring stand is materialized as measuring method for high reproducibility, which is prescribed in JIS and ISO.

#### Automatic type Motor Driving Durometer Stand

- Hardness can be measured by durometer with load and speed prescribed as standard only by operating switch.
- Varying in some degree of data measured by pushing by hand has been dramatically improved due to adopting stepping motor driving system.
- Alignment unit which realizes high contact between indenter (contact point) of durometer and test piece is mounted.
- 1kg can be measured by type A and type E durometer as they are. Measuring by type D needs optional weight ZY-046 for measuring 5kg.. Digital durometer GSD series needs optional weight ZY-090 for measuring 1kg..
- Calibration certificate can be issued.



- ※ 1 Opening dimension by motor
  - ※ 2 The maximum thickness of test piece
- When an analog type durometer is used : 47mm  
When a digital type durometer is used : 21mm  
L-type is not usable.



| Pressure Value |         | Weight Code-No.   | Applicable Durometer Model         |
|----------------|---------|-------------------|------------------------------------|
| 1kg            | Analog  | ZY-089(Accessory) | A, B, E, A(Old), TypeC(ASKER C), O |
|                | Digital | ZY-090(Optional)  |                                    |
| 4kg            |         | ZY-046(Optional)  | D, ASTM C, DO, JIS C(old type)     |

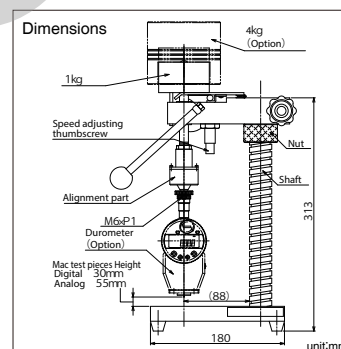
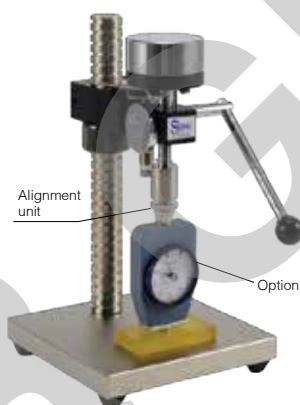
Lowering speed adjustable range: 1[mm/sec] – 19[mm/sec], by 1[mm/sec]

Power: 100 - 240 VAC (AC adapter accessory)

Weight: Approx. 9kg

#### Manual Operation type Durometer Stand with Speed Controller

- Speed controller with high reliability is adopted for moving down speed adjustment unit.
- Alignment unit which realizes high contact between indenter (contact point) of durometer and test piece is mounted.
- 65mm for analog and 40mm for digital are obtained for possible measuring range.
- Shaft with square thread is adopted that can prevent holder falling down and moving up and down.
- 1kg can be measured by type A and type E durometer as they are. Measuring by type D needs optional weight ZY-046 for measuring 5kg.. Digital durometer GSD series needs optional weight ZY-090 for measuring 1kg..
- Calibration certificate of mass (with durometer) can be issued, which are prescribed in ISO / JIS.

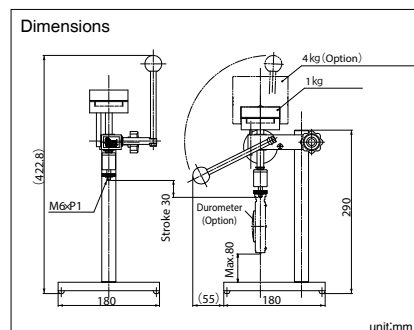
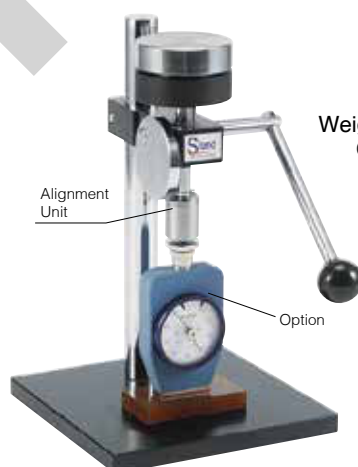


| Pressure Value |         | Weight Code-No.   | Applicable Durometer Model         |
|----------------|---------|-------------------|------------------------------------|
| 1kg            | Analog  | ZY-089(Accessory) | A, B, E, A(Old), TypeC(ASKER C), O |
|                | Digital | ZY-090(Optional)  |                                    |
| 4kg            |         | ZY-046(Optional)  | D, ASTM C, DO, JIS C(old type)     |

Weight 8.5kg

#### Manual Operation type Durometer Stand

- Hardness can be measured by durometer with load prescribed by JIS by mounting durometer and manual operation.
- Adopting cam has realized easy operation and cost performance.
- Alignment unit which realizes high contact between indenter (contact point) of durometer and test piece is mounted.
- 1kg can be measured by type A and type E durometer as they are. Measuring by type D needs optional weight ZY-046 for measuring 5kg.. Digital durometer GSD series needs optional weight ZY-079 for measuring 1kg..
- Calibration certificate can be issued (Operation speed certificate can not be issued.).



| Pressure Value |         | Weight Code-No.   | Applicable Durometer Model         |
|----------------|---------|-------------------|------------------------------------|
| 1kg            | Analog  | ZY-078(Accessory) | A, B, E, A(Old), TypeC(ASKER C), O |
|                | Digital | ZY-079(Optional)  |                                    |
| 4kg            |         | ZY-046(Optional)  | D, ASTM C, DO, JIS C(old type)     |

Weight 3.9kg

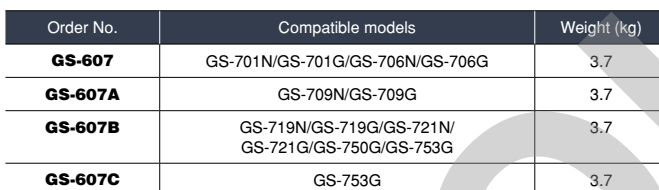
## เครื่องวัดความแข็ง

เครื่องตรวจสอบ / คาริเปอร์ชั้น เครื่องวัดความแข็ง

Durometer is a testing machine. In case that it corresponds to "Monitoring Machine" and "Measuring Machine" of ISO 9001 (JIS G 9001), controlling machines along with it is needed. Teclock is one of a few manufacturers of durometer which has obtained the authentication of ISO 9001 and can originally issue 3 kinds of traceability system diagram, calibration certificate and inspection report that are needed for calibration documents. In addition, Teclock can issue 3 kinds of documents for durometer tester and indenter height gauge, that are needed for internal inspection. Use these for control based on internal calibration standard.

This is inspection machine which simply checks spring load value of analog type durometer. Putting defined load with 3 pieces of standard weight to the inverted durometer and inspecting whether graduation of 25, 50 and 75 correctly point out. Calibration certificate can be issued. (Digital type durometer and other makes products can not be calibrated.)

In addition, in the standard of overseas and also domestic, inspection method by using mechanism of even balance and with normal position of durometer is introduced.



Type D durometer for tester does not manufacture.  
Calibration certificate is possible.



Height of indenter (contact point) of durometer is simply checked. ZY-119 is for JIS K 6301 and ZY-120 is for JIS K 6253. Products of other makes can be checked.

[illegible]

Calibration certificate is possible.

This is not rubber test piece. It is used for easy checking to find out failure of durometer. Measuring hardness when it is purchased and use it for daily control of durometer.

ZY-107

ZY-108

ZY-109

ZY-110

\*Durometers complying with these test pieces are Type A, Type D, Type E, which are compliant with JIS K 6253.  
\*Calibration Certificate about test pieces can not be issued.



## ขาตั้งสำหรับเครื่องวัดความแข็ง Measuring Stand for Durometer

In case of measuring with durometer by pushing by hand, measuring values vary in some degree due to individual difference. Therefore, Measuring stand is materialized as measuring method for high reproducibility, which is prescribed in JIS and ISO.

### Outline

This product is the automatic hardness meter. The hardness measurement is able to be done with the button-touch by a built-in motor. This product is dedicated for Digital durometer sensor [GSS-619/GS-620/GSS-621]. The product equips the measuring modes of 3 types. The control part pursues the clarity and easiness of use by adopting a touch panel.

### Main features

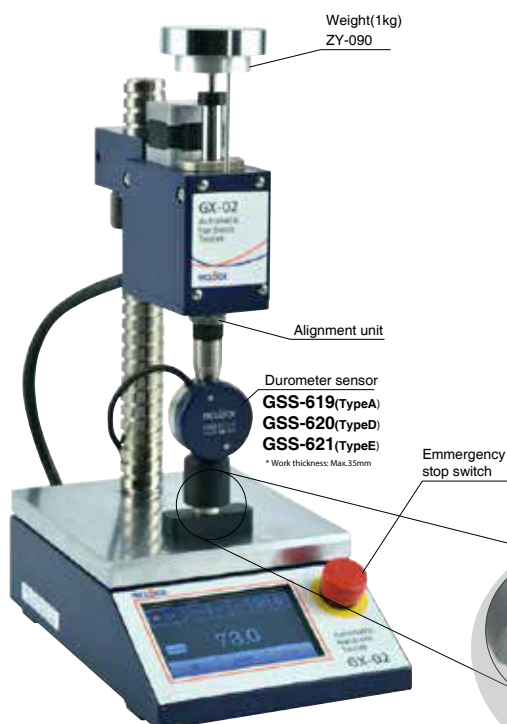
Measuring modes: 3 types  
Normal mode (the maximum value is acquirable), Test time mode (the median value and mean value are calculated), PC mode (operable by PC by using the dedicated software)

### Features

•Tolerance judging feature

### Specifications

|                    |   |
|--------------------|---|
| Standards          | ISO 7619 / JIS K 6253 compliance  |
| Minimum indication | 0.1   |
| System features    | Peak-holding function, Timer-holding function (Timer value 0.5, 1 to 99sec), Tolerance judging function, Mean value outputting function (n=1 to 30), Data output (PC printer), Outer functions control output |
| Outside interface  | RS-232C   |
| Power              | AC100~240V(ACAdapter)   |
| Dimensions         | 170(W)x160(L)x470(H)mm  |
| Weight             | 11kg (Including weight 1kg)   |
| Sensor unit        | Model : GSS-619 (Type A) GSS-620 (Type D)<br>GSS-621 (Type E)<br>Pressing-surface diameter : Ø18mm<br>(ESS-621, type E is 127mm)<br>Code length : 2m<br>Dimensions : 50(W)x35(L)x124(H)mm<br>Weight : 320g    |



| Order No. | Body                         | 1kg for weight (Accessories)   | Sensor unit | Measuring object             |
|-----------|------------------------------|--------------------------------|-------------|------------------------------|
| GX-02A    | Display unit<br>(with stand) | ZY-090                         | GSS-619     | Normal rubber & soft plastic |
| GX-02D    |                              | ZY-090+ZY-046 (5kg for weight) | GSS-620     | Hard rubber & plastic        |
| GX-02E    |                              | ZY-090                         | GSS-621     | Soft rubber                  |
| GX-02F0   |                              | -                              | GSS-644     | Urethane foam                |

# HARDNESS TESTING MACHINES

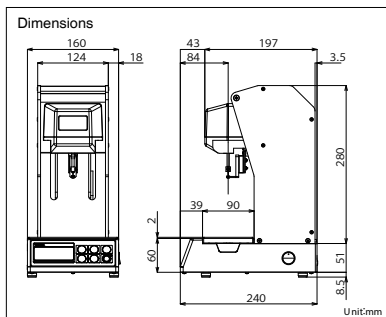
เครื่องวัดความแข็ง

TECLOCK

เครื่องวัดความแข็ง

## Totally Automatic type IRHD / M method Micro – size International Rubber Hardness Tester

- Micro-hardness can be measured by 8/1 scale each durometer of type A, E, E2, OO, FO in addition to IRHD / M method.
- Hardness of O ring and small rubber parts can be measured with totally automatic.
- Voice coil motor is adopted for load system. Friction and reproducibility of inner mechanism is improved, which is different from weight system.
- It is plug-in type that plunger (contact point) can be easily changed and recalibration on test method change is not needed.
- As test piece table is wide, various measuring jigs can be set up.



GS-680sel

### Specifications

|                                   |   |   |
|-----------------------------------|---|---|
| Hardness testing method           | IRHD-M-method   | Durometer Hardness  |
| Compliance standards              | ISO 48/JIS K 6253   | ISO 7619/JIS K 6253<br>TECLOCK Standards/ASTM D 2240                                |
| Measuring accuracy                | 0.1 IRHD  | Type A/E ±1 JIS K 6253<br>Type E2/FO ±1 TECLOCK Standards<br>Type OO ±1 ASTM D 2240 |
| Measuring range                   | 30 ~100 IRHD  | 0 ~ 100   |
| Minimum indication unit           | 0.1   |   |
| Measurement part movable distance | 100mm   |   |
| Measurable test-piece dimensions  | W=160 / D=110 / H=100mm   |   |
| Conformity standards              | EC Directive (EN61326)  |   |
| Outside interface                 | RS-232C   |   |
| Power                             | AC100~200V / AdapterDC24V   |   |
| Weight                            | 7.8kg (Main unit)/0.6kg (Power unit)  |   |
| Accessories                       | PC application CD (for Windows XP & 7)<br>PC connecting cables/AC adapter<br>Spare plunger (x1) (ZS-121) for IRHD |   |
| Rubber specimen                   | ZY-917 6 types set (w/Inspection table)   | -   |

Other functions: Measurement time extension, Return-measurement function, Self-diagnosis function, Statistical processing (Relaxation curve, Average value, Median value etc)

## O Ring Measuring Device for GS-680

This is the device for centering of O ring of which wire diameter is 0.5mm-10mm. The pin at stage center which fixes position of O ring slightly moves up/down and left/right independently and fixes the position. In addition, it is possible to rotate it to an arbitrary position.

### Specifications

|                            |             |
|----------------------------|-------------|
| Order No.                  | ZY-921      |
| Stage dimensions           | 90x86mm     |
| Applicable O-ring diameter | Ø0.5~ Ø10mm |
| Weight                     | 2.9kg       |



ZY-921



## Comparison of Measured Value by Durometer

It is the comparison list of measured data by each durometer based on type A. As hardness values fluctuate owing to various factors temperature and humidity on measuring, dimension and shape, and vulcanizing condition in a certain range, it is impossible to verify complete relative relation between each type. However, refer to the list in right side for comparison value.

|   |   |    |    |    |    |    |    |    |    |    |     |    |    |
|---|---|----|----|----|----|----|----|----|----|----|-----|----|----|
| TYPE A<br>JIS K6253<br>JIS K7215                | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |    |    |
| (Old A)<br>JIS K6301<br>(Discontinued standard) |   | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |     |    |    |
| TYPE E<br>JIS K6253                             |   | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |    |     |    |    |
| JIS S 6050<br>(Old SRIS)                        |   | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |    |     |    |    |
| TYPE E2<br>TECLOCK E2                           |   | 30 | 40 | 50 | 60 | 70 | 80 | 90 |    |    |     |    |    |
| TYPE D<br>JIS K6253<br>JIS K7215                |   |    |    |    |    | 10 |    | 20 | 30 | 40 | 50  |    |    |
| TYPE DO<br>ASTM D2240                           |   |    | 10 |    | 20 |    | 30 | 40 | 50 | 60 | 70  | 80 | 90 |
| TYPE O<br>ASTM D2240                            |   | 20 | 30 | 40 | 50 | 60 | 70 | 80 |    |    |     |    |    |
| TYPE OO<br>ASTM D2240                           |   | 50 | 60 | 70 | 80 | 90 |    |    |    |    |     |    |    |
| TYPE B<br>ASTM D2240                            |   | 10 |    | 20 |    | 30 | 40 | 50 | 60 | 70 | 80  | 90 |    |
| TYPE C<br>ASTM D2240                            |   |    |    |    | 10 | 20 | 30 | 40 | 50 | 60 | 70  | 80 |    |

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Standard Blocks  
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## Durometer Standard Table

| Name of standard                            | JIS K 6253-2012                        |  |                           | JIS K 6301-1995 (1998 Abolition)             |  |
|---|--|--|---------------------------|--|--|
|   | Type A                                 | Type D   | Type E ※Note1             | Type A                                       | Type C   |
| Presser foot dimension                      | More than 12mm                         |  |                           | More than Diameter 10mm , Approx. 3.2mm hole |  |
| Indenter shaft diameter                     |  |  |                           |  |  |
| Indenter tip diameter                       |  |  |                           |  |  |
| Indenter tip angle                          |  |  |                           |  |  |
| Indenter amount exceeding from presser foot |  |  |                           |  |  |
| Weight at 0                                 | 550mN (56.1gf)                         | 0 mN (0gf)                                     | 550mN (56.1gf)            | 539.5mN (55gf)                               | 981mN (100gf)  |
| Weight at 100                               | 8,050mN (821.1gf)                      | 44,450mN (4,533gf)                             | 8,050mN (821.1gf)         | 8,385mN (855gf)                              | 44,130mN (4,500gf)   |
| Load  | ±75mN (8.16gf)                         | ±445mN (44.9gf)                                | ±75mN (8.16gf)            | ±8gf   | ±20gf  |
| Load allowance value                        |  |  |                           |  |  |
| Indicating tolerance value                  | ±1                                     | ±1   | ±1                        | ±1   | ±1   |
| Other standards                             | ASTM D 2240 - ISO 7619                 |  |                           | -  |  |
| Test Piece and Measuring Condition          | Test pieces                            | Flat area dimension                            | -                         | More than pressurized surface                |  |
|   | Thickness                              | More than 6mm                                  | More than 10mm            | More than 12mm                               | More than 6mm  |
|   | Measuring position                     | More than 12mm                                 | More than 15mm            | -  |  |
|   | Time to read                           | -  |                           |  | Read at once (Or after regulating time)                                |
|   | Number of measurement and data summary | 5-points median more than 6mm off              |                           |  | 5-points average value   |
|   |  | Test report (Example):A45                      | Test report (Example):D50 | Test report (Example):E 60                   | Test report (Example):Hs(JIS A)50<br>Test report (Example):Hs(JIS C)50 |
|   | Weight of constant pressure weight     | 1 ±0.1<br>0 kg                                 | 1 ±0.5<br>0 kg            | 1kg(Preferable) ±0.1<br>0                    | 1kg<br>5kg   |
|   | Temperature condition                  | 23±2 °C / More than 3 hours                    |                           |  | 20°~30°C / One hour  |
|   | Acclimate time of specimen             | More than A90 Use TypeD<br>Under D20 Use TypeA |                           |  | A>70 Use C type<br>C type is preferable for range of 30-90             |
|   | Use range                              |  |                           |  |  |
| Suitable specimen to the standards          |  | Normal Rubber                                  | Normal Rubber(Hard)       | Soft Rubber                                  | Normal Rubber<br>Hard Rubber   |
| Our original durometers                     | Standard                               | GS-719N  | GS-720N                   | GS-721N                                      | GS-706N<br>GS-703N   |
|   | Peak Pointer                           | GS-719G  | GS-720G                   | GS-721G                                      | GS-706G<br>GS-703G   |
| Our original digital durometers             |  | GSD-719K Series                                | GSD-720K Series           | GSD-721K Series                              | GSD-706K<br>-  |

Note1 ISO 7619 is referred to as a type A Note2 For stand 500mm² more

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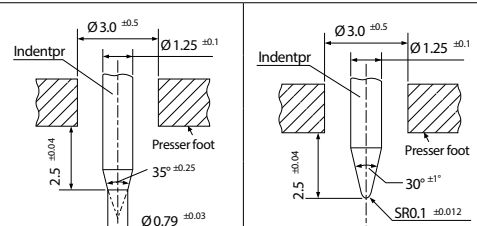
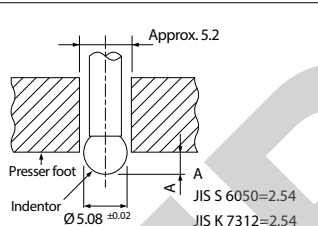
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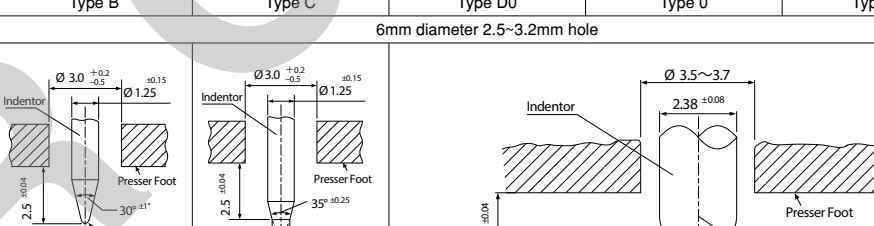
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| Name of standard                            | JIS K 7215-1986   |  | JIS S 6050 / JIS K 7312  |
|---|---|--|--|
|   | Type A  | Type D   |  |
| Presser foot dimension                      | More than diameter 12mm, diameter $3\pm 0.5$ mm hole Center                       |  | About 14x50mm Approx. 5.2mm hole in Center   |
| Indenter shaft diameter                     |  |  |   |
| Indenter tip diameter                       |   |  | Approx. 5.2  |
| Indenter tip angle                          |   |  | JIS S 6050=2.54<br>JIS K 7312=2.54   |
| Indenter amount exceeding from presser foot |   |  | 0 -0.05<br>±0.02   |
| Weight at 0                                 | 549mN (56gf)  | 0 mN (0gf)   | 0.54N (55,185gf)   |
| Weight at 100                               | 8,061mN (822gf)   | 44,483mN (4,536gf)   | 8.39N (855,595gf)  |
| Load accuracy                               | Load allowance value<br>Indicating tolerance value                                | ±78mN (±8gf)<br>±1   | ±8gf<br>±1   |
| Other standards                             | ASTM D 2240 / ISO 868 (SHORE A) (DIN 53505)                                       | ASTM D 2240 / ISO 868 (SHORE D) (DIN 53505)                                      | JIS S 6050 (Plastics Erasers)  |
| Test Piece and Measuring Condition          | Test pieces   | Flat area dimension<br>Thickness   | Width : about 25mm or more<br>6mm or more, 2mm acceptable for HDD 40 pr above<br>More than 10mm  |
|   | Measuring position  | 12mm or more from edge   | -  |
|   | Time to read  | 1sec or less (Time to be specified for over 1sec)                                | At first weighing and 30sec later  |
|   | Number of measurement and data summary  | 5 or preferably 10meas, at 6mm or more   | Average value of 3initial and 30sec later measurement. JIS S 6050<br>Average value of 5initial and 30sec later measurement. JIS K 7312 |
|   | Weight of constant pressure weight  | Approx. 1kg  | Approx. 5kg  |
|   | Temperature condition   | 23±2°C   | 50±5% (humidity)   |
|   | Acclimate time of specimen  | 88h (Time can be shortened if measured value does not vary)                      | 20   |
|   | Use range   | As a rule, use in range 20-90<br>Use D for A>90, Use A for D<20                  | 1kg  |
|   | Suitable specimen to the standards  | Plastic<br>(Plastic Film, Tape and Foam Plastic Excluded) (Usable for Elastomer) | Expanded rubber  |
|   | Our original durometers   | Standard<br>Peak Pointer   | GS-709N<br>GS-709G<br>GS-702N<br>GS-702G<br>GS-701N<br>GS-701G   |
| Our original digital durometers             |   | GSD-719K Series  | GSD-720K Series<br>GSD-701K  |

| Name of standard                            | ASTM D 2240-05   |   |  |                   |                      |
|---|--|---|--|-------------------|----------------------|
|   | Type B   | Type C  | Type D0  | Type 0            | Type 00              |
| Presser foot dimension                      | 6mm diameter 2.5~3.2mm hole  |   |  |                   |                      |
| Indenter shaft diameter                     |  |   |  |                   |                      |
| Indenter tip diameter                       |  |   |  |                   |                      |
| Indenter tip angle                          |  |   |  |                   |                      |
| Indenter amount exceeding from presser foot |  |   |  |                   |                      |
| Weight at 0                                 | 550mN (56.1gf)   | 0 mN (0gf)  | 550mN (56.1gf)   | 203mN (20.7gf)    |                      |
| Weight at 100                               | 8,050mN (821.1gf)  | 44,450mN (4,533gf)  | 8,050mN (821.1gf)  | 1,111mN (113.3gf) |                      |
| Load accuracy                               | Load allowance value<br>Indicating tolerance value                                   | ±0.075N<br>±1   | ±0.4445N<br>±1   | ±0.075N<br>±2     | ±0.182N<br>±2        |
| Other standards                             |  |   |  |                   |                      |
| Test Piece and Measuring Condition          | Test pieces  | Flat area dimension<br>Thickness  | More than radius 6mm than<br>More than 6mm               |                   |                      |
|   | Measuring position   | More than 12mm (Length and Width)   |  |                   |                      |
|   | Time to read   | Within 1-sec.   |  |                   |                      |
|   | Number of measurement and data summary   | 5-points of average value or medium 6mm off   |  |                   |                      |
|   | Weight of constant pressure weight   | 1kg Recommendation  | 5kg  | 1kg               | -                    |
|   | Temperature condition  | 23±2 °C   |  |                   |                      |
|   | Acclimate time of specimen   | 20~90   |  |                   |                      |
|   | Use range  | Rubber, Cellular, Elasticity material, Thermoplastic elastomers, Hard plastic, Soft plastic |  |                   |                      |
|   | Suitable specimen to the standards   |   |  |                   |                      |
|   | Our original durometers  | Standard<br>Peak Pointer  | -<br>GS-750G<br>GS-751G<br>GS-752G<br>GS-753G<br>GS-754G |                   |                      |
| Our original digital durometers             |  | GSD-750K  | GSD-751K   | GSD-752K          | GSD-753K<br>GSD-754K |

# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง

**JSR Group Seiki**

Portable Hardness  
Testing Instruments  
เครื่องวัดความแข็ง

เครื่องวัดความแข็ง

## DUROMETER

Measure hardness of rubber or plastic. Conforms to JIS, ISO standards.



### USE

- Checking hardness of material such as rubber or plastic

### MATERIAL

- Body : Aluminum
- Presser foot : HM35 (SKH55) tool steel

### FEATURES

- Presser foot geometry and spring force in compliance with the following standards:
- JIS K 6253-3: 2012 (Rubber, vulcanized or thermoplastic -- Determination of hardness)
- ISO 7619-1 : 2010

### ACCESSORIES

- B lock to check wear (ADM-A, ADM-D)



ADM-A

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Standard Blocks  
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| Order No.          | ADM-A   | ADM-D  | ADM-E   |
|--------------------|---|--|---|
| Hardness Range     | A20 ~ A90   | Greater than A90   | Less than A20   |
| Material for test  | Rubber, Soft plastic, Tires, Medium hardness elastomers | Hard rubber, Plastic, Ebonite rubber, High hardness elastomers | Soft rubber, Eraser, Roll film, Low hardness elastomers |
| Specimen thickness | 6.0mm or greater  | 6.0mm or greater   | 10.0mm or greater                                       |
| Display accuracy   | ± 1 gradation   |  |   |

| Order No. | Model No. | Weight |
|-----------|-----------|--------|
| ADM-A     | 151721    | 160g   |
| ADM-D     | 151722    | 160g   |
| ADM-E     | 151723    | 170g   |

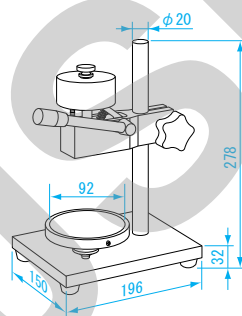
ขาตั้งเครื่องวัดความแข็ง

## DUROMETER STAND

Stand to provide stable measurements for durometer testing

### DIMENSIONS

Units : mm



### USE

- Stand for holding durometer

### MATERIAL

- Stem & weight: Iron
- Base: Cast iron

### FEATURES

- When durometer is attached, provides constant pressure for consistent measurements



DMS-AE

| Order No. | Model No. | Applicable Durometer | Weight |
|-----------|-----------|----------------------|--------|
| DMS-AE    | 151713    | ADM-A, ADM-E         | 5.5kg  |
| DMS-D     | 151714    | ADM-D                | 9.5kg  |

# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง

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## LEEB HARDNESS TESTER

Portable hardness tester for measuring hardness of metals.

Automatic angle correction function enables to measure full 360°.

Portable Hardness  
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เครื่องวัดความแข็ง

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Rockwell  
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Standard Blocks  
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ทดสอบความแข็ง



### USE

- Measuring hardness of metal

### MATERIAL

- Body: ABS resin
- Probe: Tungsten (hardness HV 1600)

### FEATURES

- For general metal hardness testing.
- Wide measuring range which is especially suitable for testing hardness of large objects.
- Can be converted to display in any of 7 hardness scale-HRC, HV, HL, HRB, HS, HB and B
- Average can be automatically calculated for between 2 to 8 measurements
- Measured value recorded can be easily edited on the computer by connecting the USB cable

### SPECIFICATIONS

- Material for test: -Steel, cast steel -Alloy tool steel -Stainless steel, high temperature steel
- Cast iron -Ductile iron -Aluminum alloy -Brass -Bronze -Copper

### ACCESSORIES

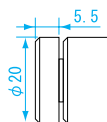
- Master block • AC adapter • USB cable • Cleaning brush • Measuring ring (small)

### POWER

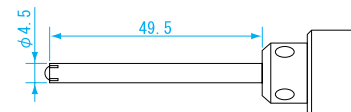
- AC adapter rechargeable battery

### DIMENSIONS

Units : mm



PROBE (LHT-400)



DL TYPE PROBE (LHT-DL-S)

| Order No.      | Model No. | Measuring Range       | Accuracy           | Weight |
|----------------|-----------|-----------------------|--------------------|--------|
| <b>LHT-400</b> | 151753    | Min. 174 ~ Max. 900HL | Within $\pm 17$ HL | 9.5kg  |

■ DL TYPE PROBE (separately sold) : Suitable for measuring hardness in narrow space such as bottom of groove or in a large gear

| Order No.       | Model No. | Weight |
|-----------------|-----------|--------|
| <b>LHT-DL-S</b> | 151754    | 25g    |



# HARDNESS TESTING MACHINES

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## เครื่องวัดความหนาฟิล์ม

### FILM THICKNESS METER FOR Fe AND NON-Fe MATERIALS

Compact and lightweight for coating thickness measurement.  
Can rotate 90° for measuring tight spaces such as inside pipe.



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Vickers  
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Testing  
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Rockwell  
Hardness  
Testing  
Machines  
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Standard Blocks  
for Hardness  
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ทดสอบความแข็ง

| Order No.                                       | Measurable basis material  | Measurable coating material   |
|---|--|---|
| <b>FTM-50FE<br/>for Fe materials</b>            | <ul style="list-style-type: none"> <li>Ferrous material thickness more than 300μm (Magnetic material such as iron except nickel)</li> </ul>  | <ul style="list-style-type: none"> <li>Measurable max. 5.0mm of all kind of non-magnetic coating on ferrous material (paints, varnish, synthetic coating, enamel, rubber, ceramic, zinc plating and etc.)</li> </ul>  |
| <b>FTM-52FN<br/>for Fe&amp;Non-Fe materials</b> | <ul style="list-style-type: none"> <li>Ferrous material thickness more than 300μm (Magnetic material such as iron except nickel)</li> <li>Non-ferrous material thickness more than 50μm (Conductive material such as aluminum, brass, bronze, zinc, lead, copper etc)</li> </ul> | <ul style="list-style-type: none"> <li>Measurable max. 5.0mm of all kind of non-magnetic coating on ferrous material (paints, varnish, synthetic coating, enamel, rubber, ceramic, zinc plating and etc.)</li> <li>Measurable max. 2.0mm of non-conductive coating on non-ferrous material (paints, varnish, synthetic coating, almite, rubber and etc.)</li> </ul> |

#### USE

- Thickness measurement of coated surface

#### MATERIAL

- Probe: Ruby

#### FEATURES

- Automatically determines the object to be measured
- Probe rotates and it allows to measure inside of pipe or measure a part that is difficult to measure
- It can be easily operated with one hand at high places and narrow places
- Auto power off function.

#### SPECIFICATIONS

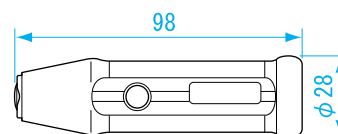
- Accuracy - - Under 300μm: ±2μm  
300~1000μm: ±1%  
1000~2000μm: ±3%

#### POWER

- One AA battery (not included)

#### DIMENSIONS

Units : mm



| Order No.       | Model No. | Measurement Method                                    | Measuring Range (μm)                                   | Method   | Weight |
|-----------------|-----------|---|--|--|--------|
| <b>FTM-50FE</b> | 152081    | Electromagnetic Induction                             | Fe materials : 0 ~ 5000                                | Under 100μm : 0.1μm<br>Under 1000μm : 1μm<br>1.00mm or over : 0.01mm | 72g    |
| <b>FTM-52FN</b> | 152082    | Dual Type<br>(Eddy Current/Electromagnetic Induction) | Fe materials : 0 ~ 5000<br>Non-Fe materials : 0 ~ 2000 |  |        |

# HARDNESS TESTING MACHINES

เครื่องวัดความแข็ง



เหล็กมาตรฐานสำหรับทดสอบความแข็ง

## STANDARD BLOCKS FOR HARDNESS



### YAMAMOTO Standard Blocks for Hardness

To verify hardness testers to be in good working, with a given standard (ISO, JIS...)

1. Standard Blocks
2. ISO 9001 Quality System
3. Characteristics of Our Hardness Blocks
  - 3.1 Materials and manufacturing process
  - 3.2 Hardness measurement of standard blocks
4. Integrated Precision of Hardness Testers and Hardness Blocks
5. Best Use Test Blocks
  - 5.1 Choice of test blocks
  - 5.2 Notes
6. Durability of Our Blocks

### BLOCKS FOR RELIABLE HARDNESS TEST

Table 1 Specification of Standard blocks

| Assortment                  | Hardness value                                      | Tolerance | Calibration number(n) | Variation (R=Max.-Min)     | Materials (JIS notation)       | Dimension (mm)  | Finished surface | Standard based |
|-----------------------------|---|-----------|-----------------------|----------------------------|--------------------------------|-----------------|------------------|----------------|
| HMV (1, 0.1)                | 1600  | ±10%      | 4 (2x2)               | 2% (HV1)                   | Si <sub>3</sub> N <sub>4</sub> | □10x5           | □                | JIS B 7735     |
| HMV (1, 0.1, 0.01)          | 900, 800, 700, 600, 500, 400, 300                   | ±15       | 6 (3x2)               | 5% (HV0.1)                 | SK85                           | □25x6           | □                | JIS B 7735     |
| "                           | 200 (Be Copper)                                     | ±15       | "                     | "                          | C1720P                         | □25x6(2)        | □                | "              |
| "                           | 100 (C2600P), 40(C1020P)                            | ±10       | "                     | 7(100HV0.1), 4(40HV0.1)    | ←                              | □25x5 ※         | □                | "              |
| HMV (0.1, 0.01, 0.001)      | 30 (AU)   | ±10       | "                     | 4(HV0.1)                   | Au                             | □25x5(0.8)      | □                | "              |
| UMV (0.01, 0.002)           | 900, 700, 500 (Berkovich 9.8mN tested)              | ±20%      | 6 (3x2)               | 10% (HV0.01)               | SK85                           | □25x6           | ■                | JIS B 7735     |
| " (0.01, 0.002)             | 200 ( " )   | "         | "                     | "                          | C1720P                         | □25x6(2)        | ■                | "              |
| ★ HV-W for Nano indentation | 1000(SK120), 900, 800, 700                          |           | 6(3x2 HV,Nano)        |                            | Single Crystal Tungsten        | □25x6 (W:0.9x6) | ■                | JIS B 7735     |
|                             | Approx.400HV (HV0.01, 0.001 Berkovich 9.8mN tested) |           |                       |                            |                                |                 |                  |                |
| HV (30, 1)                  | 1000(SK120), 900, 800, 700                          | ±15       | 10(5x2)/HV30,10       | 1.5%                       | SK85                           | □64x15          | ○                | JIS B 7735     |
| HV (10, 1)                  | 600, 500, 400, 300, 200, 150, 100                   | "         | 6(3x2)/HV1            | "                          | SK85, etc.                     | □64x10          | ○                | "              |
| "                           | 40  | ±10       | "                     | (150HV and below 2.2%)     | C1020P                         | □64x10          | ○                | "              |
| HS                          | 100(SK120), 95, 90, 80, 70, 60, 50, 40, 30          | ±2        | HV10 (5x2)            | VHS≤1.5(70HS and below1.2) | SK85                           | □64x15          | ○                | JIS B 7731     |
| "                           | 20 (S20C), 7(C1020P □64x10)                         | "         | HS10 (5x2)            | ∠HS (HS-VHS)≤0.5           | ←                              | □64x15          | ○                | "              |
| HL                          | HLE (Dia) 850, 800, 700, 600, 500                   | ±15       |                       |                            | SK85                           | □115x33         | ○                | JIS B 7731     |
| "                           | HLD (WC) 880, 830, 730, 630, 520                    | "         | (HV Calibration)      |                            | "                              | "               | ○                | Related        |
| HR C                        | 70(SK120), 67, 64, 62, 60                           | ±1        | 10 (5x2)              | 0.2                        | SKS3                           | □64x15          | ○                | JIS B 7730     |
| "                           | 57, 55, 50, 45, 40, 35, 30, 25, 20, 10              | "         | "                     | (40HRC and below 0.3)      | SK85                           | "               | ○                | "              |
| HR A                        | 87, 85, 83, 81, 78, 75, 71, 65, 56                  | "         | "                     | 0.3                        | Same as HRC                    | "               | ○                | "              |
| HR30N                       | 83, 81, 78, 73, 67, 60, 55, 50, 41                  | "         | "                     | 0.6                        | "                              | "               | ○                | "              |
| HR15N (45N)                 | 92, 90, 87, 85, 80, 75 (43) (23)                    | "         | "                     | "                          | "                              | "               | ○                | "              |
| HRB W                       | 100, 95, 90   | ±2        | 10(5x2)               | 0.8                        | SK85                           | □64x10          | △                | JIS B 7730     |
| "                           | 82, 72  | "         | "                     | "                          | Other steel                    | □64x15          | △                | "              |
| "                           | 62, 52, 42, 32                                      | "         | "                     | (50HRB and below 1.0)      | C2600P                         | □64x10          | △                | "              |
| HR30T W                     | 78, 72  | "         | "                     | 1.0                        | Other steel                    | □64x15          | ○                | "              |
| "                           | 62, 52, 42, 38, 32                                  | "         | "                     | "                          | C2600P                         | □64x10          | ○                | "              |
| HR15T W                     | 87  | "         | "                     | "                          | S35C                           | □64x15          | ○                | "              |
| "                           | 82, 78  | "         | "                     | "                          | C2600P                         | □64x10          | ○                | "              |
| HR (E+M+L+R+F+S) W          | HRE90 HRM107 HRL118 HRR123 HRF90                    | "         | "                     | "                          | (100HV)                        | "               | ○                | JIS K 7202     |
| "                           | HRM67 HRL92 HRR105 HRS90                            | "         | "                     | "                          | (40HV)                         | "               | ○                | "              |
| HBW (10/3000)               | 600, 550, 500, 450, 400, 350                        | ±15       | 6(3x2)                | 1.5%                       | SK85                           | □115x18         | ●                | JIS B 7736     |
| "                           | 300, 250, 229 (d=4mm), 200, 180                     | "         | "                     | "                          | "                              | "               | ●                | "              |
| "                           | HBW(10/3000)150, HBW(10/500)125                     | "         | "                     | 2.5%                       | S45C                           | "               | ●                | "              |
| "                           | HBW(10/500)100                                      | "         | "                     | 3%                         | S10C                           | "               | ●                | "              |

Finished test surface; ● Fine grinding, △ plate lapping, ○ buffing, □ Super finish, ■ Super finish(fine).

The appearance and specifications of these products are subject to change without notice for improvement purposes.

※ To be changed to □25x6