USER'S MANUAL FOR HARDMATIC HH-300 SERIES

No.99MBG154B4

•Introduction

WARNING

Read this manual thoroughly prior to use in order to fully understand all of the functions of the product and use the product properly. Furthermore, keep this manual at hand after reading it.
The specifications of the product or/and the contents of this manual may be subject to change without notice. If a defect due to our production and distribution is identified in the product within one year from the date of purchase, we offer free-of-charge repair. In this case, contact your dealer or a Mitutoyo sales office nearest to you.

• Types of Notes

The following types of notes are used in this manual to help the operator obtain reliable measurement data through correct instrument operation.

IMPORTANT An *important note* provides information essential to use the product. You cannot disregard this note.
An *important note* is a type of precaution, which if neglected could result in degraded performance or accuracy, or instrument malfunction/failure.

NOTE A *note* provides information to be especially noted or supplemented to use the product.
A *note* also supplies information to be noted for specific operations (e.g., memory limitation, instrument configuration, or details that apply to specific versions of a program)

• Using conditions

Operation conditions	Temperature range 0 to 40 °C Humidity 30 to 70 %RH
Accuracy assurance condition:	Temperature range 23±2 °C Humidity 50±5 %RH
Storage condition:	Temperature range -10 to 60 °C Humidity 0 to 85 %RH

Power Source: SR44 silver oxide battery (1pc.)

• Electromagnetic Compatibility (EMC)

This product complies with the EMC Directive. Note that in environments where electromagnetic interference exceeds EMC requirements defined in this directive, appropriate countermeasures are required to assure the product performance.
• A display value on this product may flicker or disappear temporarily due to electromagnetic interference caused by electrostatic discharge. However, this product will return to normal after removing the interference.

• CE marking

EMC Directive: EN 61326-1
Immunity test requirement: Clause 6.2 Table 2
Emission limit: Class B
RoHS Directive: EN 50581

• Battery-Related Warnings

The misuse of the battery can result in the leakage of its electrolyte, the generation of heat or the damage to the battery itself, leading to unexpected hazards and/or injuries. Furthermore, the instrument may malfunction. In order to avoid such problems, observe the following precautions without fail.
• Do not disassemble, make alterations to, short-circuit, charge, heat to 100°C or over, or throw the battery into a fire.
• Pay attention to the electrodes (+ and -) of the battery when putting it in the instrument.
• Always use a recommended type of battery.
• When the instrument is out of use for more than three months, remove the battery from it and store them separately.
• When discarding or storing the battery, cover its positive (+) and negative (-) electrodes with insulating tapes to prevent them from contacting other metals or batteries. Furthermore, especially when discarding it, follow the ordinances or regulations of your local government.
• Keep the battery away from direct sunlight/ high temperature/ high humidity and out of reach of children.
• Do not swallow the battery removed from the instrument. If mistakenly having swallowed it, consult a physician with great urgency.
• If the electrolyte of the battery contacts your eye (eyes) / skin or enters your mouth, immediately rinse it with water and then consult a physician. Furthermore, if it adheres to clothing, wash it with water.

•Disposal Warnings

• A liquid crystal display and a silver oxide battery are used in this product. When disposing of the instrument, follow the ordinances or regulations of the local government.
• The liquid crystal display contains an irritating substance.
Should the liquid content contact an eye or skin, flush with clean, flowing water. If the substance enters the mouth, immediately rinse the mouth, drink plenty of water, induce vomiting, and then consult a physician.

• Precautions on Use

Observe the operational conditions, storage conditions and all the following precaution. Furthermore, in order to make the product show its specified accuracy, use the product indoors and observe the accuracy assurance conditions and all the following precautions.

• Do not use the instrument for any purpose other than testing the hardness of rubbers or plastics.
• Do not hit anything against the instrument or drop the instrument.
• Do not press the keys with a pointed object (such as screwdriver or ballpoint pen).
• Do not use or store the instrument under direct sunlight, or in an excessively hot or cold environment.
• Be alert for malfunction due to material deterioration if it is used in an environment with low or high atmospheric pressure.
• Do not use high-voltage equipment, such as an electric marking pen, near the instrument. Electronic parts may be damaged by such equipment. Be alert for malfunction if it is used in the vicinity of electric noise.
• Do not apply excessive force (torsion or tension) to the instrument.
• Do not push the instrument against a specimen with force substantially exceeding its own hardness reading range; otherwise, measurement errors or damage to the instrument may result.
• Do not push the instrument against a specimen with drastic pressure. Furthermore, do not displace the instrument transversely keeping it pushed against a specimen.
• Do not push the instrument against hard materials (such as metal or glass) for any purpose other than hardness testing or inspection.
• Do not disassemble or make alterations to the instrument. Furthermore, do not loosen its screws, etc.
• Do not injure yourself or damage anything with the pressure foot or indenter of the instrument.
• Do not store the instrument in a high-humidity environment.
Do not use the instrument where it could be splashed with coolant.
• Do not use the instrument in a dusty environment.
• Correctly push the instrument against a specimen to the downward direction.
Measurement errors result if the instrument is pushed against a specimen to the sidling, transverse and upward direction.
• It is recommended to experimentally push the instrument against a specimen (approx.10 times) before actual hardness testing.
• Wipe stains from the instrument panel by using a soft cloth or a cotton swab that is dry or moistened with diluted neutral detergent. Do not use an organic solvent such as thinner and benzene, which may cause the instrument panel to deform or malfunction.
• Be alert for measurement errors caused by thermal expansion of the component parts and the fixtures, resulting from a significant temperature fluctuation. Use the instrument in a temperature-controlled room that has minimum temperature fluctuation. Allow sufficient time for the instrument to thermally stabilize if it is moved to an environment with a different temperature.

• Export Control Compliance

This Product falls into the Listed-Controlled Goods and/or Listed-Controlled Technologies (including Programs) under Category 1 through 15 of Separate Table 1 of Export Trade Control Order or under Category 1 through 15 of Separate Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Law of Japan.

If you intend re-exporting the product from a country other than Japan, re-selling the product in a country other than Japan, or re-providing the technology (including program), you shall observe the regulations of your country. Please contact Mitutoyo prior to such re-exporting, re-selling or re-providing.

• Notes on Export to EU Member Countries

When you intend exporting this product to any of the EU member countries, it may be required to provide User's Manual(s) in English and EU Declaration of Conformity in English (under certain circumstances, User's Manual(s) in the destination country's official language and EU Declaration of Conformity in the destination country's official language). For detailed information, please contact Mitutoyo in advance.

• Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. To reduce the environmental impact of WEEE (Waste Electrical and Electronic Equipment) and minimize the volume of WEEE entering landfills, please reuse and recycle. For further information, please contact your local dealer or distributors.

• Disposal of waste batteries and accumulators (as applied in the European Union and other European countries with separate Collection systems)

EU
Hg

Batteries and accumulators containing heavy metals such as mercury, lead and cadmium may contaminate the environment if improperly discarded. When incinerated, certain chemicals are released into the air or concentrated in the ash residue from the combustion process; this may lead to a health risk to humans, animals and the environment in general. In compliance with legal requirements, the symbol of a 'crossedout wheeled bin' is either applied on the battery or on its packaging. This symbol indicates that disposal of the batteries in household waste is strictly prohibited; instead the batteries have to be disposed of by separate collection and recycling means. Additional marking identifies the heavy metal content (i.e. Cd =cadmium, Hg = mercury, Pb = lead) as contained within the battery if over prescribed levels.
End users are obliged by law to comply with the discarding procedure for waste batteries. At Mitutoyo facilities, or at its appointed distributors, receptacles will be provided to accept, at no charge, the disposal of previously supplied batteries.

• Warranty

In the event that this product should prove defective in workmanship or material, within one year from the date of original purchase for use, it will be repaired or replaced, at Mitutoyo's option, free of charge upon its prepaid return to Mitutoyo, without prejudice to the provisions of the Mitutoyo Software End User License Agreement.

If this product fails or is damaged for any of the following reasons, it will be subject to a repair charge, even if it is still under warranty.
(a) Failure or damage owing to fair wear and tear.
(b) Failure or damage owing to inappropriate handling, maintenance or repair, or to unauthorized modification.
(c) Failure or damage owing to transport, dropping, or relocation of the instrument after purchase.
(d) Failure or damage owing to fire, salt, gas, abnormal voltage, lightning surge, or natural disaster.
(e) Failure or damage owing to use in combination with hardware or software other than those designated or permitted by Mitutoyo.
(f) Failure or damage owing to use in ultra-hazardous activities.

This warranty is effective only where the instrument is properly installed and operated in conformance with the instructions in this manual within the original country of the installation.

EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES OF ANY NATURE WHATSOEVER INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR WARRANTY ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE MAXIMUM EXTENT ALLOWED BY APPLICABLE LAW.

You assume all responsibility for all results arising out of its selection of this product to achieve its intended results.

• Disclaimer

IN NO EVENT WILL MITUTOYO, ITS AFFILIATED AND RELATED COMPANIES AND SUPPLIERS BE LIABLE FOR ANY LOST REVENUE, PROFIT, OR DATA, OR FOR SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY ARISING OUT OF THE USE OF OR INABILITY TO USE THIS PRODUCT EVEN IF MITUTOYO OR ITS AFFILIATED AND RELATED COMPANIES AND/OR SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

If, notwithstanding the foregoing, Mitutoyo is found to be liable to you for any damage or loss which arises out of or is in any way connected with use of this product by you, in no event shall Mitutoyo's and/or its affiliated and related companies' and suppliers' liability to you, whether in contract, tort (including negligence), or otherwise, exceed the price paid by you for the product only.

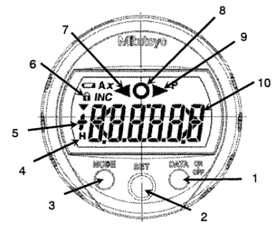
BECAUSE SOME COUNTRIES, STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR THE LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, IN SUCH COUNTRIES, STATES OR JURISDICTIONS, MITUTOYO'S LIABILITY SHALL BE LIMITED TO THE EXTENT PERMITTED BY LAW.

0. Features

Hardness measurement by HH-300 series is simply performed by holding the instrument against the surface of a specimen and reading the indicated value.
This type of hardness is most widely used for hardness testing of Sponge, rubber, plastic and other soft materials.

1. Part Names and Operating Procedures

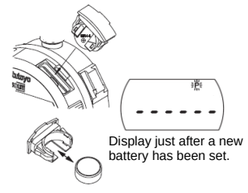
(1) Tightly grip the instrument, and push it against a specimen.
(2) Make sure that the pressure foot of the instrument securely contacts the specimen, and read the indicated value.
(3) The indicated value is the hardness value of the specimen.



1. DATA ON/OFF key
2. SET key
3. MODE key
4. Hold display
5. Sign display
6. Function lock display
7. Tolerance judgment (-NG)
8. Tolerance judgment (OK)
9. Tolerance judgment (+NG)
10. Measured value display (enlarged display)

2. Setting (or Replacing) the Battery

The instrument needs one silver oxide battery (SR44).
(1) Remove the battery holder with a screwdriver or the like.
(2) If the battery needs to be replaced with a new one, remove it from the instrument.
(3) Put a new battery in the battery holder with its positive (+) electrode facing forward.
(4) Set the battery holder back to its original position. ([------] is displayed.)
(5) Press the SET key twice.
(6) Set the functions as required.



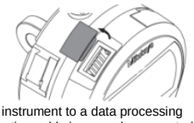
Display just after a new battery has been set.

IMPORTANT
• If the battery holder is not set properly in the instrument, the instrument may display an incorrect value or the instrument itself may malfunction.
• If the measurement mode does not become effective even after the above procedure, set the battery in the instrument again.
• If the instrument is out of use for more than three months, remove the battery from the instrument and store them separately in order to prevent the instrument from being damaged by the leakage of the battery electrolyte.
• Do not use a sharp-pointed tool to remove the battery holder from the instrument. Furthermore, do not forcibly pull out it. Otherwise, it may be damaged.
• All of the settings are cleared after the battery is replaced. Configure them again.

3. Data Output

3.1 Cable Connection

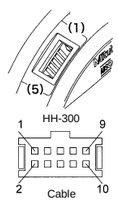
The use of the (optional) connecting cable allows the instrument to be connected to a data processing device such as the digimatic miniprocessor DP-1VR. As a result, measured values can be transferred, summed up and recorded.



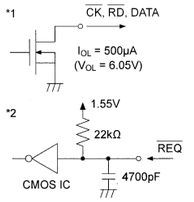
• Remove the cap of the output connector, and connect the instrument to a data processing device with the connecting cable. Make sure that the connecting cable is securely connected.

IMPORTANT
• Keep the cap of the output connector at hand after its removal in order not to lose it.
• When the connecting cable is out of use, surely put the cap of the output connector back to its original position.

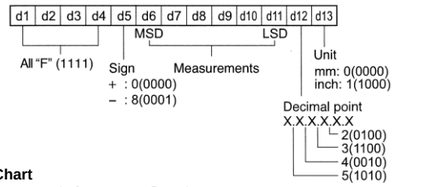
3.2 Output Connector



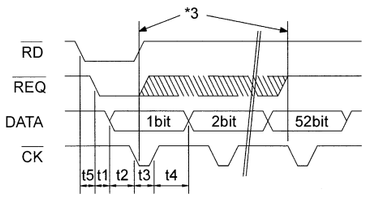
Pin No.		Signal	I/O
HH-300	Cable		
1	1	GND	------
2*1	2	DATA	O
3*1	3	CK	O
4*1	4	RD	O
5*2	5	REQ	I
------	6 - 10	N.C.	------



3.3 Output Format



3.4 Timing Chart



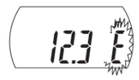
10ms ≤ t1 < 150ms
0.1ms ≤ t2 < 0.2ms
0.1ms ≤ t3 < 0.2ms
0.1ms ≤ t4 < 0.2ms
t5:Depends on the instrument being use.

*3: Hold the REQ signal in the "low" state until "CK" is output. Furthermore, return it to the "high" state before the output of the final CK (52ndbit) is completed.

4. Error Messages and Corrective Measures

ABS Composition error

If this error code appears (soon disappears) while the spindle is being moved, it does not mean the malfunction of the instrument, but just its internal processing. Meanwhile, if this error code appears while the movement of the spindle is stopped, it means the malfunction of the internal sensor.
[Corrective Measure]
• The instrument needs to be repaired. Contact your dealer or a Mitutoyo sales office nearest to you.

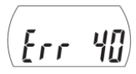


Low voltage

The battery has been drained.
[Corrective Measure]
• Replace the battery with a new one.

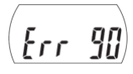
Sensor contamination detection error

Condensation due to rapid temperature change has been built up in the detector, or the detector has been contaminated by some other causes.
[Corrective Measures]
• Power the instrument off, and then adjust it to a surrounding temperature for approx. two hours.
• If the instrument is not restored even after it has been adjusted to the surrounding temperature, contact your dealer or a Mitutoyo sales office nearest to you.



Tolerance setting error

An upper limit value is smaller than its lower limit value.
[Corrective Measure]
• Press the SET key to set an upper limit value again to be bigger than its lower limit value.

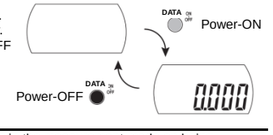


5. Functions and Operating Procedure

Key pressing method: Two ways of pressing the keys are used in the following illustration.
Press (within 2 sec.)
Press and hold (2 sec. or more)

5.1 Power On/ OFF

The instrument is powered ON/OFF as follows.
• To power it ON: Press the DATA ON/OFF key.
• To power it OFF: Hold down the DATA ON/OFF key for several seconds.



NOTE
• The instrument always starts up in the measurement mode on being powered ON.
• If the instrument is not powered on by the DATA key, it means that the battery has been drained. Replace the battery with a new one.
• If the instrument is powered off while various settings are still being configured, all of the settings being configured are canceled and the default settings are restored.

5.2 Measurement Mode

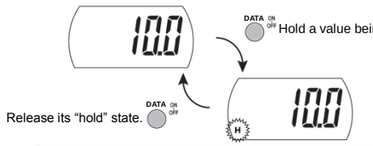
5.2.1 Zero-setting a Displayed Value

Hold down the SET key for several seconds, so that a value being displayed is set to zero.

Zero-set a displayed value.

5.2.2 Holding a Displayed Value (with no external device connected)

Press the DATA key in the measurement mode, so that "H" appears and a value being displayed is then held. To release the "hold" state of the value, press the DATA key again.



NOTE

- When a result of tolerance judgment is zoomed in on the display, a value being displayed cannot be held by the DATA key.

5.2.3 Externally Outputting a Value Being Displayed (with an external device connected)

A value being displayed can be output to the external device connected to the instrument. For information on the connection of the connecting cable, see Section 3.1 "Cable Connection".

- Outputting a value being displayed

  Press the DATA key in the measurement mode, so that a value being displayed is output to the external device.

  See Section 3 "Data Output" for information on cable connection, pin assignment, output data format, timing chart.

NOTE

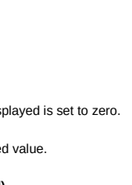
- When a result of tolerance judgment is zoomed in on the display, a value being displayed cannot be output by the DATA key. Only when an output request (REQ) is made from the external device, a measured value can be output to it.
- Before outputting a measured value, read the instruction manual of the data processing device for proper use
- Stop the movement of the spindle when making an output request (REQ) from the external device. Otherwise, an incorrect value may be output or the output of a measured value may fail.
- When an output request (REQ) is made after a short interval from the previous output request, the output of a measured value may fail.

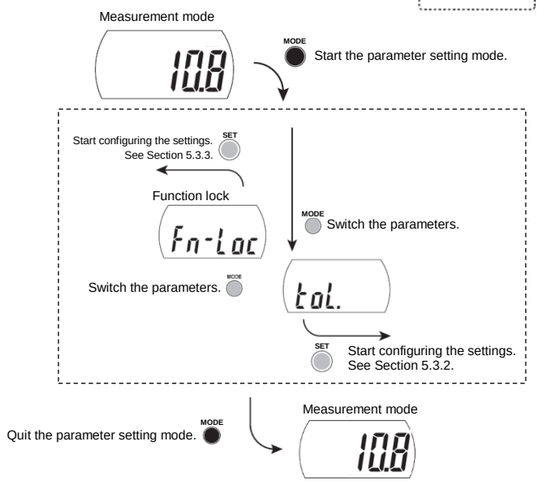
5.3 Parameter Setting Mode

Various settings can be configured in this mode.

5.3.1 Starting/Quitting Parameter Setting Mode

(1) Starting the parameter setting mode
Hold down the MODE key for several seconds in the measurement mode.
(2) Selecting/setting the parameter
(See the description of each parameter.)
(3) Quitting the parameter setting mode
Hold down the MODE key for several seconds, so that the measurement mode is restored.





NOTE

- When the function lock is enabled, any operation other than releasing the function lock cannot be performed. If other operations need to be performed, disable the function lock. (See Section 5.3.3.)
- To stop setting the functions halfway, hold down the MODE key for several seconds.
  Note that undetermined settings are not reflected.
- All of the settings are held even after the instrument is powered off. However, they are cleared after the battery is replaced, and thus need to be configured again.

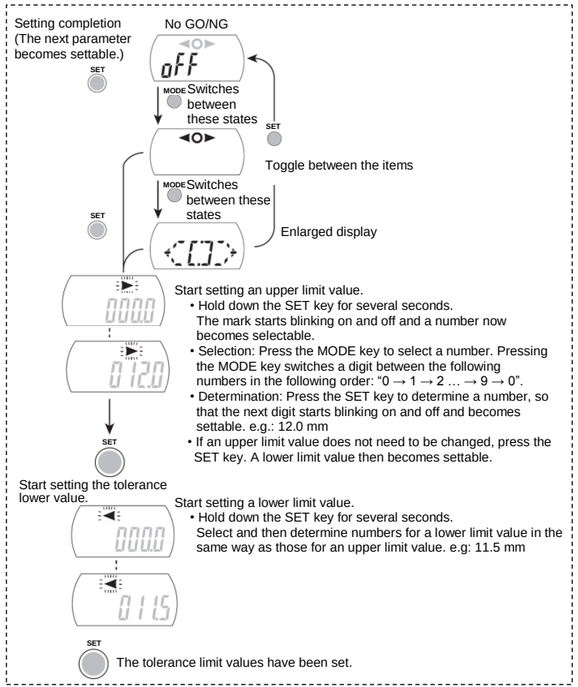
5.3.2 Setting the Tolerance Judgment Function

The GO/NG judgment of measured values can be performed by setting tolerance limit values.

(1) Start the parameter setting mode. (See Procedure 1 in Section 5.3.1.)
(2) Select the parameter. (See Procedure 2 in Section 5.3.1.)
The tolerance judgment function then becomes enabled.
(3) Set the tolerance judgment function.

- Selection: Press the MODE key to select one of the following states of the tolerance judgment function.
  Pressing the MODE key switches the function between the following states in the following order: "No GO/NG indication" → "Tolerance judgment (normal display) → "Tolerance judgment (enlarged display)".
- Determination: Press the SET key to determine the state of the tolerance judgment function selected.
  When either "normal display" or "enlarged display" is selected, the mark ► starts blinking on and off, and the tolerance upper limit value then becomes settable.
  When "No GO/NG indication" is selected, the next parameter becomes settable.

Start setting the tolerance judgment function.



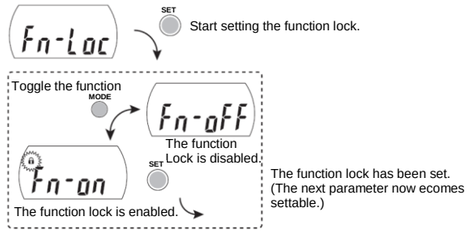
NOTE

- If a lower limit value is larger than its upper limit value, "Err 90" appears and both values are cleared. Press the SET key to cancel the error and set a tolerance from an upper limit value again.
  (For more details, see Section 4. Error Messages and Corrective Measures.)
- A different tolerance cannot be set separately for the normal display and the enlarged one.
- Tolerance limit values are automatically converted whenever the unit system or the resolution are changed. In this case, a conversion error may occur. It is therefore recommended to check tolerance limit values after the unit system and the resolution are changed.

5.3.3 Enabling / Disabling the Function Lock

The function lock, (whose setting is prohibited to be changed,) can be either enabled or disabled according to the following procedure.
Once the function lock has been enabled, any operation other than powering the instrument on/off, holding/ releasing a value being displayed, outputting a value being displayed or disabling the function lock cannot be performed.
(1) Start the parameter setting mode. (See Procedure 1 in Section 5.3.1.)
(2) Select the parameter. (See Procedure 2 in Section 5.3.1.)
The function lock then becomes settable.
(3) Either enabling or disabling the function lock can be selectable.

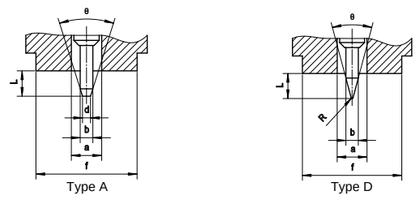
- Selection: Press the MODE key to select whether to enable or disable the function lock. Pressing the MODE key toggles the function on (enabled) or off (disabled).
- Determination: Press the SET key to determine whether to enable or disable the function lock.



NOTE

- The function lock does not become effective until the parameter setting mode is quitted and the measurement mode is then restored.

6-1. Nose geometry



6. Specifications

Code No.		811-330-10	811-332-10	811-334-10	811-336-10	811-338-10	811-336-11	811-338-11
Model		HH-330	HH-332	HH-334	HH-336	HH-338	HH-336-01	HH-338-01
Appearance configuration								
Nose geometry		Type E	Type A	Type D	Type A	Type D	Type A	Type D
Display system		Digital						
Indenter	b	Φ5 mm	Φ1.25 mm	Φ1.25 mm	Φ1.25 mm	Φ1.25 mm	Φ1.25 mm	Φ1.25 mm
	d	-	Φ0.79 mm	-	Φ0.79 mm	-	Φ0.79 mm	-
	R	-	-	R0.1	-	R0.1	-	R 0.1
	θ	-	35 °	30 °	35 °	30 °	35 °	30 °
Pressure foot	a	Φ5.4mm	Φ3 mm	Φ3 mm	Φ3 mm	Φ3 mm	Φ3 mm	Φ3 mm
	f	44x18mm	Φ18 mm	Φ18 mm	44x18 mm	44x18 mm	Φ18 mm	Φ18 mm
Indenter protrusion		2.5 mm						
Hardness		HE	HA	HD	HA	HD	HA	HD
Spring force WE, WA, WD		WE=550+75HE [mN]	WA=550+75HA [mN]	WD=444.5HD [mN]	WA=550+75HA [mN]	WD=444.5HD [mN]	WA=550+75HA [mN]	WD=444.5HD [mN]
Accuracy of spring force		±68.6 mN	±68.6 mN	±392.3 mN	±68.6 mN	±392.3 mN	±68.6 mN	±392.3 mN
Functions		Data hold, Zero-setting, Tolerance judgment, Function lock						
Output		SPC						
Mass		0.29 kg	0.31 kg	0.31 kg	0.29 kg	0.29 kg	0.26 kg	0.26 kg
Dimensions		147x59x40 mm	190x59x41 mm	190x59x41 mm	147x59x40 mm	147x59x40 mm	147x59x40 mm	147x59x40 mm

China RoHS Compliance Information

This product meets China RoHS requirements.

电器电子产品有害物质限制使用管理办法

产品名称： 用于橡胶和塑料的硬度计

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
本体	×	○	○	○	○	○
配件	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。
○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

环保使用期限标识，是根据电器电子产品有害物质限制使用管理办法以及，电子电气产品有害物质限制使用标识要求(SJ/T11364-2014)，制定的适用于中国境内销售电子电气产品的标识。
电子电气产品只要按照安全及使用说明内容，正常使用情况下，从生产月期算起，在此期限内，产品中含有的有毒有害物质不致发生外泄或突变，不致对环境造成严重污染或对其人身，财产造成严重损害。
产品正常使用后，要废弃在环保使用年限内或者刚到年限的产品时，请根据国家标准采取适当的方法进行处置。
另外，此期限不同于质量/ 功能的保证期限。

For the EU Directive

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