

HARDNESS TESTING EQUIPMENT

PRE 1306



Stationary and mobile hardness testing equipment
for all areas of application.

Mitutoyo

Hardness Testing Equipment

CONTENTS

Rockwell hardness testing equipment

Overview	4
Durotwin	5
AR, ARK and ATK overview	7
AR-10 / AR-20	8
ARK-600 / ATK-600	9
WIZHARD	10
Special accessories	12

Vickers hardness testing equipment

Overview	14
AVK-C0	15
HV-100	16
Special accessories	18

Mikrovickers hardness testing equipment

Overview	19
HM-100	20
HM-200	23
Special accessories	25

Measuring program for automatic indentation measurement - VLPAK	28
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Brinell hardness testing equipment

ABK-1	29
-------	----

Mobile hardness testing equipment

Rebound hardness testing equipment	
HARDMATIC HH-411	30
Special accessories for HARDMATIC HH-411	32

Hardness testing equipment for foam, rubber and plastic

HARDMATIC HH-300 overview	33
HH-300 long version	34
HH-300 compact version	35
Special accessories for HARDMATIC HH-300	36

Conversion tables	38
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Additional information	40
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INDEX

Code No.	Model	Page
963-102 R	DUROTWIN DT10	4
963-103	DUROTWIN-PLUS DT20	
810-200D	AR-10	7
810-201D	AR-20	
810-218D	ARK-600	9
810-257D	ATK-600	
810-208D	Wizhard HR-511	10
810-202D	Wizhard HR-521	
810-203D	Wizhard HR-522	
810-204D	Wizhard HR-523	
810-160D	AVK-C0	14
810-163D	HV-112	16
810-981D	HV-113	
810-165D	HV-114	
810-985D	HV-115	
810-124D	HM-101	19
810-125D	HM-102	
810-959D	HM-103	
810-126D	HM-112	
810-969D	HM-113	
810-128D	HM-114	
810-352D	HM-211	23
810-353D	HM-221	
VLPAK		28
810-265-1	ABK-1	29
810-298	HH-411	30
811-335-1	HH-300	33
811-337-1		
811-336-1		
811-338-1		
811-331		
811-333		
811-332		
811-336		

Rockwell Hardness Testing Equipment

963-102R : DT10 Durotwin
963-103: DT20 Durotwin Plus

- Sturdy and simple manual operation: Rockwell, Super Rockwell (scale N, T) and *Brinell hardness testing equipment.



810-200D: AR-10

- Basic model with analog display. Automatic application and retraction of the additional test force.



810-201D: AR-20

- Basic model with analog display. Force is changed using the handwheel.



810-218D: ARK-600

- The large and very clear digital display reduces reading errors.



810-257D: ATK-600

- A cost-efficient testing device that performs 2 different hardness tests: Rockwell and Super Rockwell (scale N, T).



810-208D: HR-511 Wizhard
810-202D: HR-521 Wizhard
810-203D: HR-522 Wizhard
810-204D: HR-523 Wizhard

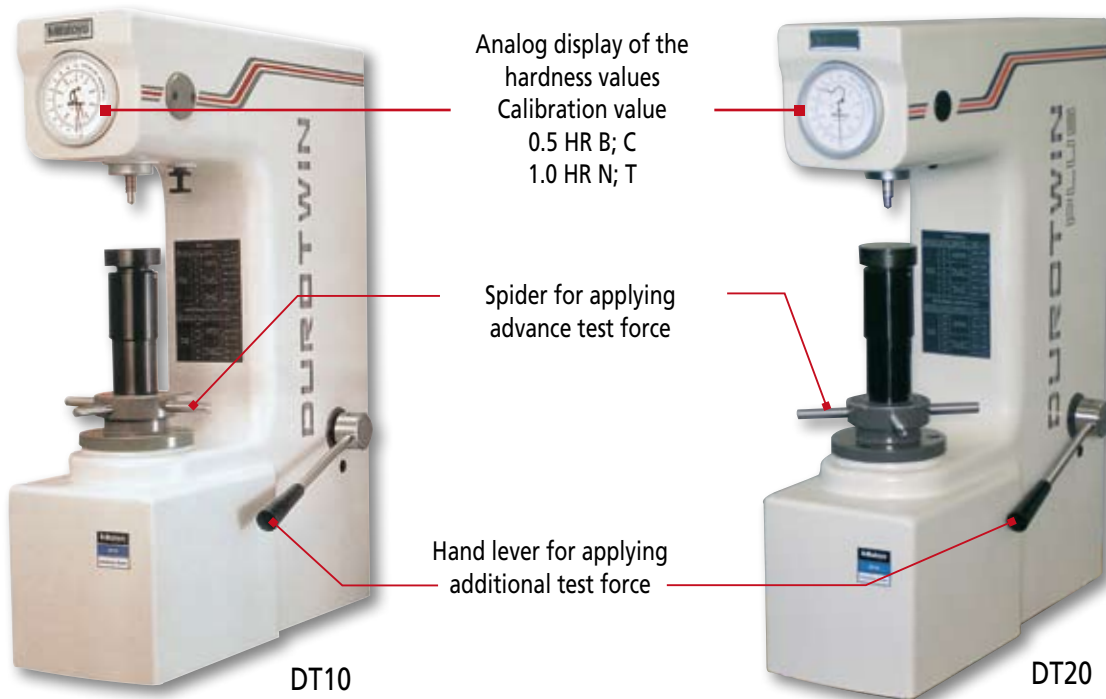
- Three different types of hardness test: Rockwell, Super Rockwell (scale N, T) and Brinell* with one device. With extension arm for measuring inaccessible points.



Rockwell Hardness Testing Equipment Model DT DUROTWIN

Equipment features

- Sturdy and easy-to-operate manual device
- Applicable for both Rockwell and Super Rockwell (scale N, T) testing
- Standard or optional use for Brinell hardness testing
(external optosensoric measurement of the Brinell imprint)



Technical specifications

Model	Durotwin DT10		Durotwin Plus DT20		
Code No.	963-102 R		963-103		
Test method	Rockwell	Super Rockwell (scale N, T)	Rockwell	Super Rockwell (scale N, T)	Brinell
Advance test force (N)	98,07	29,42	98,07	29,42	-
Total test force (N)	588,4 / 980,7 / 1471	147,1 / 294,2 / 441,3	588,4 / 980,7 / 1471	147,1 / 294,2 / 441,3	294,2 / 306,5 / 612,9 / 1226 / 1839
Test force regulation	Manual regulation of test force + additional test force (load, duration, disengagement)				
Display	Analog				Microscope*
Max. height of workpiece	105 mm (with spindle cover) 107 mm (without spindle cover)				
Max. depth of workpiece	150 mm (from the center of the penetrating object)				
Weight	44 kg		48 kg		

* Special accessory

Overview of test devices

Model	Durotwin	Durotwin with Brinell retrofit package	Durotwin Plus
Code No.	963-102 R	963-102 R + 56AAE552	963-103
Rockwell	Scales A – D – C (diamond indenter)	Scales A – D – C (diamond indenter)	Scales A – D – C (diamond indenter)
	Scales F – B – G (1/16" steel ball indenter)	Scales F – B – G (1/16" steel ball indenter)	Scales F – B – G (1/16" steel ball indenter)
	Scales H – E – K* (1/8" steel ball indenter)	Scales H – E – K* (1/8" steel ball indenter)	Scales H – E – K* (1/8" steel ball indenter)
Super Rockwell (scale N, T)	Scales 15N – 30N – 45N (diamond indenter)	Scales 15N – 30N – 45N (diamond indenter)	Scales 15N – 30N – 45N (diamond indenter)
	Scales 15T – 30T – 45T (1/16" steel ball indenter)	Scales 15T – 30T – 45T (1/16" steel ball indenter)	Scales 15T – 30T – 45T (1/16" steel ball indenter)
Brinell	–	Scale HBW1/30 (1 mm carbide ball)	Scale HBW5/125* (5 mm carbide ball)
	–	Scale HBW2.5/187.5 (2.5 mm carbide ball)	Scale HBW2.5/187.5 (2.5 mm carbide ball)
	–	–	Scale HBW2.5/62.5 (2.5 mm carbide ball)
	–	–	Scale HBW2.5/31.25 (2.5 mm carbide ball)

* Special accessory

Standard accessories

Code No. 19BAA072	Diamond indenter
Code No. 19BAA074	Steel ball indenter 1/16" – Steel balls 1/16" (5 balls) – Flat table Ø 64 mm – V-Anvil Ø 41 mm, opening 25 mm – Dust protection cover – Hardness test block 60-65 HRC – Hardness test block 60-64 HR30N – Adjusting level
Additional standard accessories for Durotwin Plus	
Code No. 19BAA279	Carbide indenter Ø 2.5 mm
Code No. 19BAA283	Replacement carbide indenter Ø 2.5 mm (1 indenter) – Hardness test block 350 HBW 2.5/187.5

Special accessories

Code No. 19BAA072 D	Diamond indenter (incl. MPA certificate)
Code No. 19BAA075	Steel ball indenter 1/8"
Code No. 19BAA082	Steel balls 1/16" (10 balls)
Code No. 19BAA083	Steel balls 1/8" (10 balls)
Code No. 075202	Round table Ø 200 mm

For further special accessories, see pages 12 and 13

Additional special accessories for Durotwin Plus

Code No. 19BAA280	Carbide indenter Ø 5 mm
Code No. 19BAA162	Replacement carbide indenter Ø 5 mm (1 indenter)
Code No. 19BAA318 D	Microscope 40 x
Code No. 19BAA319 D	Microscope 100 x



Code No. 56AAE552
Brinell retrofit package for 963-102 R

Standard accessories for Brinell retrofit package

Code No. 19BAA277	Carbide Indenter Ø 1 mm
Code No. 19BAA279	Carbide Indenter Ø 2.5 mm – Hardness test block 350 HBW 2.5/187.5 – Additional weight 187.5

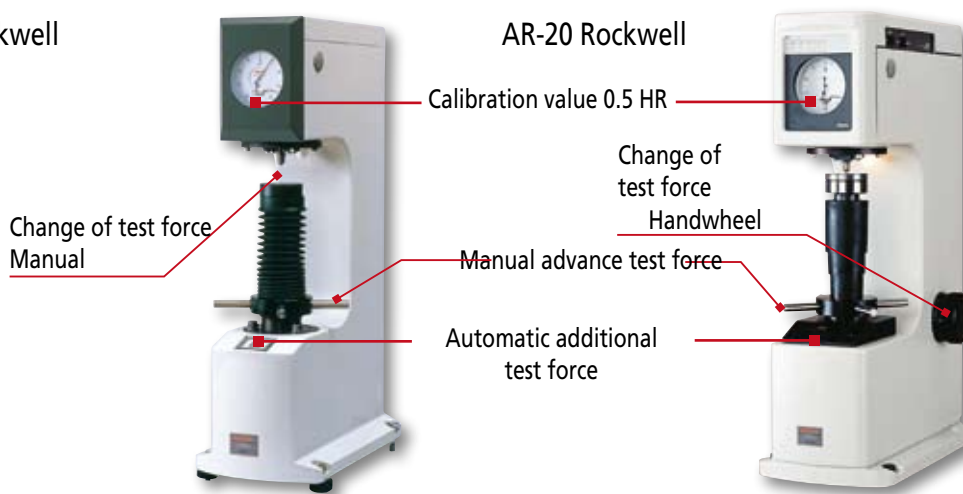
Rockwell Hardness Testing Equipment Model AR, ARK, ATK

Equipment features

- Analog standard models with automatic loading, duration and disengagement of additional test force
- Test methods HRA, HRC, HRD (diamond cone) HRF, HRB, HRG (steel ball 1/16")
- Automatic zero positioning of the analog gauge when applying test forces with the spindle wheel

AR-10 Rockwell

AR-20 Rockwell

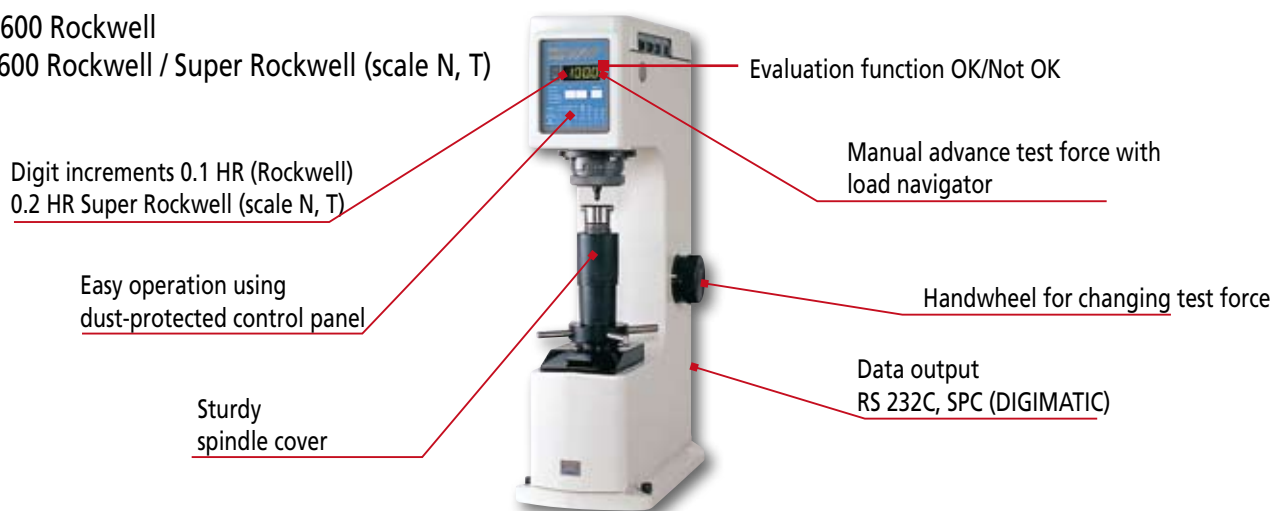


Equipment features

- Digital standard models with automatic loading, duration and disengagement of additional test force
- ATK-600 with Rockwell and Super Rockwell (scale N, T) testing
- Large LED display with tolerance evaluation function

ARK-600 Rockwell

ATK-600 Rockwell / Super Rockwell (scale N, T)



Rockwell Hardness Testing Equipment

Model AR-10 / AR-20



AR-10



AR-20

Standard accessories

Code No. 19BAA072	Diamond Indenter AR-10, AR-20
Code No. 19BAA074	1/16" Steel ball Indenter
Code No. 810-039	Flat table (Ø 64 mm)
Code No. 19BAA111	Dust protection cover
Code No. 19BAA123	Hardness test block (30 - 35HRC)
Code No. 19BAA125	Hardness test block (60 - 65HRC)
Code No. 19BAA126	Hardness test block (90 - 95HRB)

Technical specifications

Code No.	810-200D	810-201D
Model	AR-10	AR-20
Advance test force	N	98,07
Total test force	N	588,4; 980,7; 1471
Conversion of total test force	Advance testforce: fixed, otherwise manual (Set by removing weights)	Advance testforce: fixed, using handwheel
Test force regulation	Advance test force: Manual adjustment Additional testforce: Automatic (load, duration, disengagement)	
Test force application time	Automatic: 3 - 5 s Manual: At operator's discretion	
Display Function	Pointer display on scale; smallest calibration value: 0.5 HR Automatic gauge: No need for zero positioning.	
Max. size of workpiece	Height: 0 - 165 mm (standard flat table) Depth: 115 mm (from the center of the indenter shaft)	Height: 0 - 140 mm (standard flat table) Depth: 122 mm (from the center of the indenter shaft)
Dimensions	approx. 215 (W) x 455 (D) x 682 (H) mm	approx. 210 (W) x 486 (D) x 680 (H) mm
Weight	approx. 38 kg	approx. 40 kg
Power supply	230V AC, approx. 30VA or less, 20VA or less for AR-10	

Rockwell Hardness Testing Equipment

Model AR-600 / ATK-600



ARK-600



ATK-600

Standard accessories

Code No. 19BAA072	Diamond Indenter ARK-600
Code No. 19BAA073	Diamond Indenter ATK-600
Code No. 19BAA074	1/16" steel ball Indenter
Code No. 810-039	Flat table (Ø 64 mm)
Code No. 19BAA111	Dust protection cover
Code No. 19BAA123	Hardness test block (30 - 35HRC)
Code No. 19BAA125	Hardness test block (60 - 65HRC)
Code No. 19BAA126	Hardness test block (90 - 95HRB)
Code No. 19BAA128	Hardness test block (64 - 69HR30N) ATK-600
Code No. 19BAA129	Hardness test block (70 - 79HR30N) ATK-600

Technical specifications

Code No.	810-218D	810-257D:
Model	ARK-600	ATK-600
Advance test force	N 98,07	29,42, 98,07
Total test force	N 558,4; 980,7; 1471	147,1; 294,2; 441,3; 588,4; 980,7; 1471
Conversion of total test force	Advance testforce: fixed, otherwise rotary control	
Test force regulation	Advance test force: Manual, with advance test force monitored by navigator for load application Additional testforce: Automatic (load, duration, disengagement)	
Test force application time	Automatic 3 - 5 s Manual: At operator's discretion	
Display	Digital 4-digit LED display Resolution: 0.1 HR	Digital 4-digit LED display Resolution: Rockwell / 0.1 HR Super Rockwell (scale N, T) / 0.2 HR
Function	OK/Not OK evaluation function/Navigator function for force application / Correction function for hardness value	
External output	RS-232C / SPC (DIGIMATIC)	
Max. size of workpiece	Height: 0 - 140 mm (standard flat table) 10 - 150 mm (optional round table) Depth: 122 mm (from the center of the indenter shaft)	
Dimensions	approx. 210 (W) x 486 (D) x 680 (H) mm	approx. 210 (W) x 486 (D) x 720 (H) mm
Weight	approx. 40 kg	approx. 42 kg
Power supply	230V AC, approx. 30VA or less	

Rockwell Hardness Testing Equipment

Model HR Wizhard

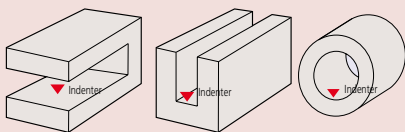
The HR-500 series comprises the latest hardness testing equipment fitted with special electronic control to measure 3 different types of hardness: Rockwell, Super Rockwell (scale N, T) and the indenting process for Brinell hardness testing.

Equipment features

- Various test forces for Rockwell, Super Rockwell (scale N, T) and Brinell
- Electronic real-time load control for precise setting
 - this prevents the application of excessive test force
- Auto-stop elevator with automatic application of advance test force
- Spout-shaped extending arm for better access to inner and outer surfaces
- Graphic presentation of statistical results and a wide range of statistics.
- OK/Not OK evaluation function
- Automatic test force selection:
 - The required hardness test is defined in advance and the test force selected automatically.



- The machine allows hardness testing on inner surfaces, which was previously not possible without causing damage. The smallest measurable diameter is 34 mm (standard) using the special diamond indenter (19BAA292 optional accessory)



- The control panel can be installed on top of the test machine, which is very useful in cramped spaces. This installation requires a special mounting plate (19BAA295 optional accessory)



Control unit with membrane keypad



With touch screen (Touch-sensitive control panel)

Control unit with membrane keypad

- Simple control panel offering only the most important basic functions.

With touch screen

- Control panel offering a wide range of functions, various statistical calculation models and graphic presentation of the test results in addition to the basic functions.

Technical specifications

Code No.	810-208D	810-202D	810-203D	810-204D
Model	HR-511	HR-521	HR-522	HR-523
Advance test force (N)	29.42; 98.07			
Total test force (N) Super Rockwell (scale N,T)	147,1; 294,2; 441,3			
Total test force (N) Rockwell (N)	588,4; 980,7; 1471			
Brinell (ball Ø / kg)	HBW 2.5/187.5		HBW 1/10; HBW 1/30; HBW 2.5/6.25; HBW 2.5/15.625; HBW 2.5/31.25; HBW 2.5/62.5; HBW 2.5/187.5; HBW 5/25; HBW5/62.5; HBW 5/125; HBW 10/100	
Test force regulation	Automatic (load, duration, disengagement)			
Vertical table elevation	Manual (advance test force with automatic brake)			Motor-driven (manual operation also possible)
Control panel	Control unit		Touch screen	
Test force reversal	Switch operated			
Test force application time	0 - 120S (in increments of 1 s.)			
Max. size of workpiece	Height: 250 mm (long version: 395 mm)* Depth: 150 mm (from the center of the indenter shaft)			
Min. diameter of pipe-shaped or ring-shaped sample	Min. caliper: 35mm (if the optional indenter is used: 22 mm)			
Display	Hardness value, test conditions, OK/Not OK evaluation result		Hardness value, test conditions, OK/Not OK evaluation result, statistical evaluation, XR control chart, translation of a hardness value	
Function	Rockwell hardness testing, Super Rockwell (scale N, T) hardness testing, Brinell hardness testing (optional measuring microscope and optional indenter required)			
	—		Conversion function [HV, HK, HR (Rockwell hardness A, B, C, D, F, G / Super Rockwell (scale N, T) 15T, 30T, 45T, 15N, 30N, 45N) tensile strength]	
	OK/Not OK evaluation			
	Continuous measuring function (for samples of the same thickness)			
	Offset correction		Cylindrical, spherical, offset, multi-point offset	
	Statistical calculations (max./min., average, standard deviation, upper/lower limit, Code No. of OK/Not OK parts) Model HR-511 only via data output (no display available)			
Language versions	6 languages are supported: German, English, French, Italian, Spanish and Japanese (except HR-511).			
Output	RS-232, Centronics, SPC (DIGIMATIC)			
Power supply	AC 230 V			
Main unit dimensions	approx. 250 (W) x 670 (D) x 605 (H) mm, approx. 60 kg			
Weight	Control panel (width x depth x height): approx. 165 (W) x 260 (D) x 105 (H) mm, approx. 0.75 kg			

*Long versions for larger workpieces available on request.

Standard accessories

Designation	Technical specifications	Code No.	Designation	Technical specifications	Code No.	Designation
Diamond Indenter	Rockwell Super Rockwell (scale N, T)	19BAA073	Plastic dust protection cover		19BAA517	Fuse
Steel ball Indenter	1/16"	19BAA074	Hardness test block	30 - 35HRC	19BAA123	Accessories storage box
Replacement steel ball	1/16" 10 balls	19BAA082	Hardness test block	60 - 65HRC	19BAA125	Instruction manual
Flat table	Ø 64mm	810-039	Hardness test block	90 - 95HRB	19BAA126	Warranty card
V-Anvil	Ø 40mm 120° opening	810-040	Hardness test block	64 - 69HR30N	19BAA128	
			Hardness test block	70 - 79HR30T	19BAA129	
			Adjusting level		19BAA098	

Additional information for Brinell testing

The relation between test force and indenter for Brinell testing is indicated below.
The following Indenter (optional accessory) and a measuring microscope are needed to test Brinell hardness.

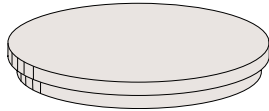
	Brinell							
	HBW1/10		HBW1/30		HBW2.5/31.25	HBW2.5/62.5	HBW5/125	HBW2.5/187.5
19BAA277: Ø1 Indenter for Brinell hardness testing								
19BAA279: Ø2.5 Indenter for Brinell hardness testing	HBW2.5/6.25		HBW2.5/15.625					
19BAA280: Ø5 Indenter for Brinell hardness testing				HBW5/25		HBW5/62.5		
19BAA284: Ø10 Indenter for Brinell hardness testing							HBW10/100	

Special Accessories

Special accessories for Rockwell hardness testing equipment

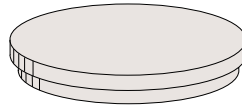
810-038

Round table (only for the HR series)
Outer diameter \varnothing 250 mm
For large specimen up to 85 kg
(machine must be firmly fixed to the base)



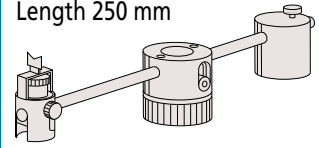
810-037

Round table
Outer diameter \varnothing 180 mm
For large specimen



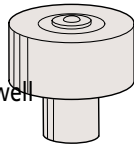
810-027

Variable support arm
(only for the HR series)
Length 250 mm



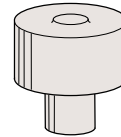
810-030

Point anvil, diamond
(Outer diameter \varnothing 10mm)
For sheet specimen (Super Rockwell tests only: DT series, ATK-600, R series)



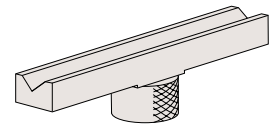
810-043

Point anvil
(Outer diameter \varnothing 12mm)
For sheet specimen



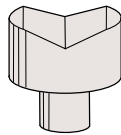
810-029

V-Anvil
Length 400 mm
Opening 50 mm; 120°



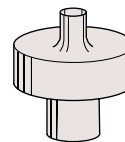
810-040

V-Anvil (large)
(Outer diameter \varnothing 40 mm,
Opening 30 mm; 120°)
For cylindrical specimen



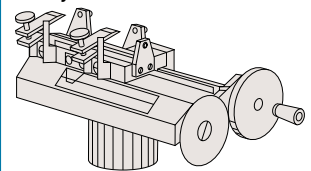
810-044

Point anvil
(Outer diameter \varnothing 5.5 mm)
For sheet specimen



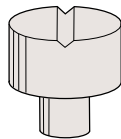
810-026

Fine adjusting table for Jominy hardness testing
(Jominy test)
(Length 400mm
slot width 50mm)
For cylindrical samples
(only for the HR series)



810-041

V-Anvil (small)
(Outer diameter \varnothing 40mm)
Opening 6 mm; 90°
For cylindrical specimen



264-504-5D

Digimatic Mini Processor DP-1VR

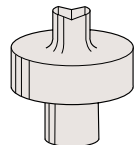
*The DP-1VR is supplied without a connecting cable (must be ordered separately).

Signal line (1m)
ARK-600, ATK-600 (937386)
HR series (937387)

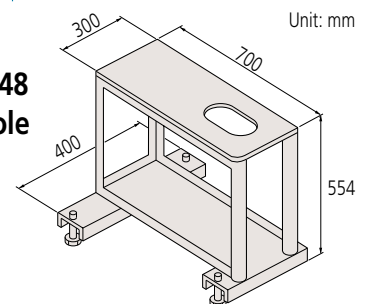


810-042

V-Anvil (small)
(Outer diameter \varnothing 10mm,
Opening 8 mm; 120°)
For cylindrical specimen



810-048 Console



For digital hardness testing equipment only.

Special accessories: Hardness test blocks with DKD/MPA certificate

Code No.	Designation
19BAA031D	Hardness test block 60HRB
19BAA034D	Hardness test block 90HRB
19BAA037D	Hardness test block 30HRC
19BAA038D	Hardness test block 40HRC
19BAA039D	Hardness test block 50HRC
19BAA040D	Hardness test block 60HRC
19BAA044D	Hardness test block 63.6 HR30N
19BAA046D	Hardness test block 81, 2HR30N
19BAA047D	Hardness test block 76.2HR15N
19BAA048D	Hardness test block 84.7HR15N
19BAA049D	Hardness test block 89.9HR15N
19BAA054D	Hardness test block 77.3HR30T
19BAA027D	Hardness test block 200HBW 2.5 / 187.5
19BAA166D	Hardness test block 200HBW 10 / 1000
56AAE498D	Hardness test block 350HBW 2.5/187.5
56AAE501D	Hardness test block 100HBW 5/125 Alu
19BAA123D	Hardness test block approx. 30HRC*
19BAA124D	Hardness test block approx. 40HRC*
19BAA125D	Hardness test block approx. 60HRC*
19BAA126D	Hardness test block approx. 90HRB*
19BAA127D	Hardness test block approx. 30HRB Alu*
19BAA128D	Hardness test block approx. 64HR30N*
19BAA129D	Hardness test block approx. 74HR30T*



* with factory certificate
Further hardness test blocks available on request.

Special accessories: Penetrating objects

Rockwell Indenters	Code No.	For type
Diamond cone indenter	19BAA072D*	all
Diamond cone indenter for small bores	19BAA292	1, 2, 3, 4
1/8" steel ball indenter	19BAA075	all
1/16" steel ball indenter	19BAA074	all
10 replacement 1/8" steel balls	19BAA083	all
10 replacement 1/16" steel balls	19BAA082	all



Brinell Indenters	Code No.	For type
1 mm carbide indenter	19BAA277	2, 3, 4, 5
5 replacement 1 mm carbide balls	19BAA281	2, 3, 4, 5
2.5 mm carbide indenter	19BAA279	1, 2, 3, 4, 5, 6
5 replacement 2.5 mm carbide balls	19BAA283	1, 2, 3, 4, 5, 6
5 mm carbide indenter	19BAA280	2, 3, 4, 6
1 replacement 5 mm carbide ball	19BAA162	2, 3, 4, 6
10 mm carbide indenter	19BAA284	2, 3, 4
1 replacement 10 mm carbide ball	19BAA163	2, 3, 4

- Replacement balls can be supplied with DKD/MPA certificate on request.

* with DKD/MPA certificate

- 1 Wizhard HR-511
- 2 Wizhard HR-521
- 3 Wizhard HR-522
- 4 Wizhard HR-523
- 5 Durotwin DT-10 with Brinell retrofit package
- 6 Durotwin Plus DT-20

Vickers Hardness Testing Equipment

These models offer a wide selection - from low-cost manual to multi-purpose devices with automatic revolver for switching from objective to indenter.

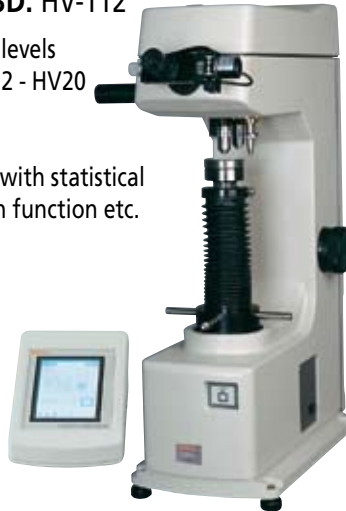
810-160D: AVK-C0

Low-cost manual model



810-163D: HV-112

- Test force levels from HV0.2 - HV20
- motorized revolver
- Equipped with statistical calculation function etc.



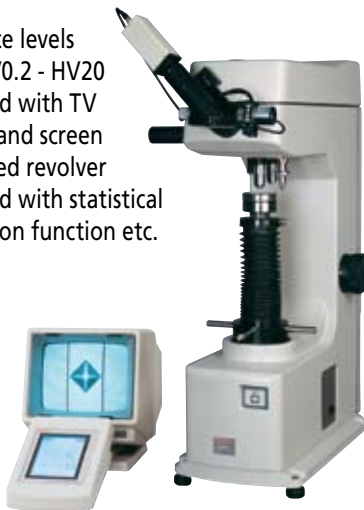
810-165D: HV-114

- Test force levels from HV1 - V50
- motorized revolver
- Equipped with statistical calculation function etc.



810-981D: HV-113

- Test force levels from HV0.2 - HV20
- Equipped with TV camera and screen
- motorized revolver
- Equipped with statistical calculation function etc.



810-985D: HV-115

- Test force levels from HV1 - HV50
- Equipped with TV camera and screen
- motorized revolver
- Equipped with statistical calculation function etc.

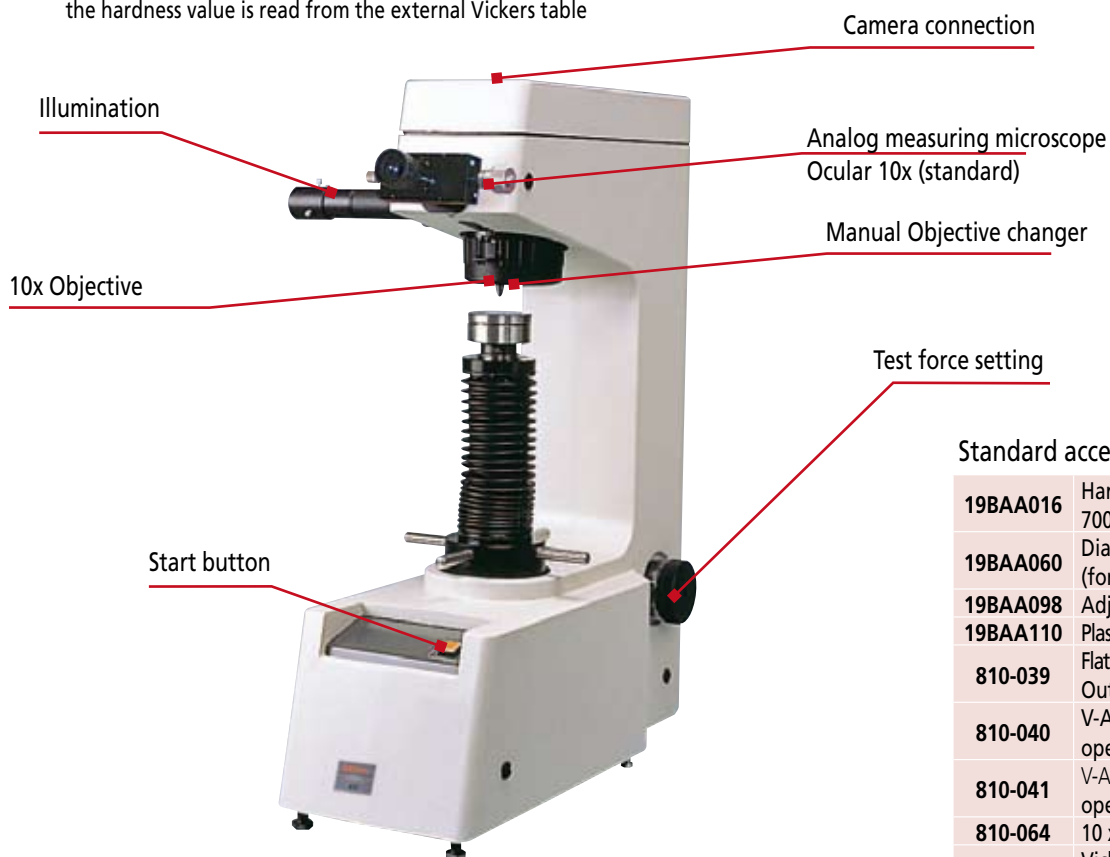


Vickers Hardness Testing Equipment

AVK-CO

Equipment features

- The basic Vickers hardness testing machine - cost-efficient and simple!
- Analog microscope to measure the diagonals, the hardness value is read from the external Vickers table



Standard accessories

19BAA016	Hardness test block 700HV10
19BAA060	Diamond Indenter (for Vickers)
19BAA098	Adjusting level
19BAA110	Plastic dust protection cover
810-039	Flat table Outer Ø 64 mm
810-040	V-Anvil (large) Ø 40 mm, opening 30 mm/120°
810-041	V-Anvil (small) Ø 40 mm, opening 6 mm/90°
810-064	10 x Objective
-	Vickers table

Technical specifications

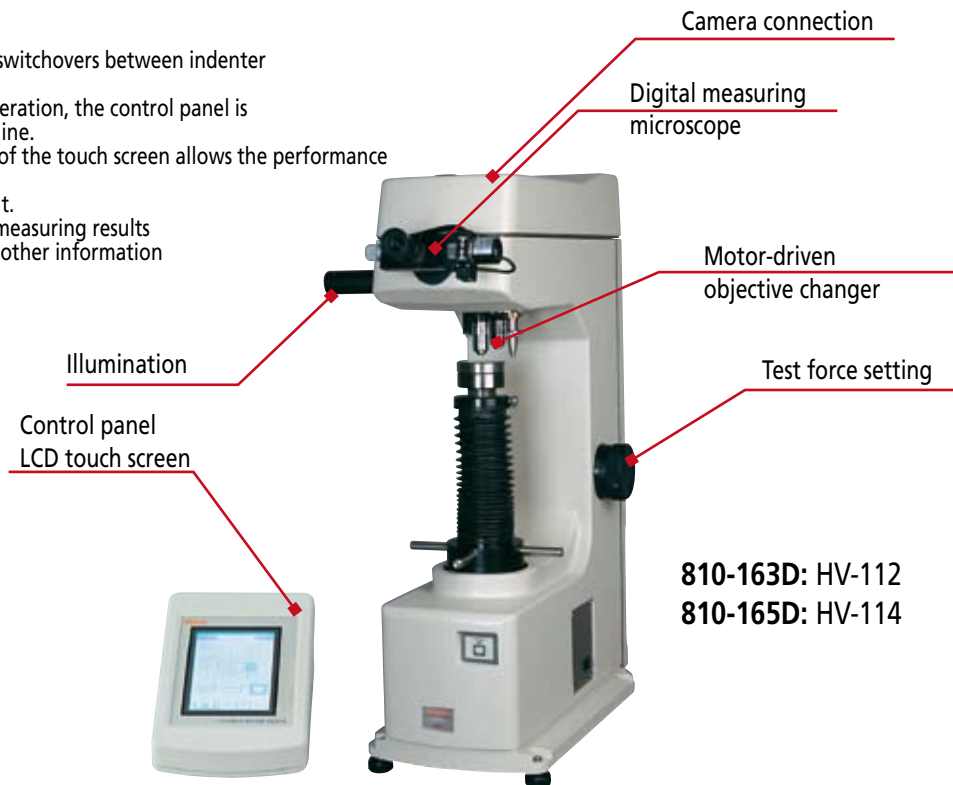
Code No.		810-160D					
Model		AVK-CO					
Test force	N	9,807	49,03	98,07	196,1	294,2	490,3
Loading process	Automatic (load, duration, disengagement)						
Test force application time	5, 10, 15, 20, 30s switchable						
Speed of test force application	Reduced speed for final test force application						
Objective	10 x						
Magnification	100 x						
Smallest digit increments	1 µm						
Max. size of workpiece	Height 205 mm, Depth 165 mm (from the center of the indenter shaft)						
Power supply	230V, 60VA max.						
Dimensions (W x H x D)	200 x 705 x 600 mm						
Weight	50 kg						

Vickers Hardness Testing Equipment

Model HV-100

Equipment features

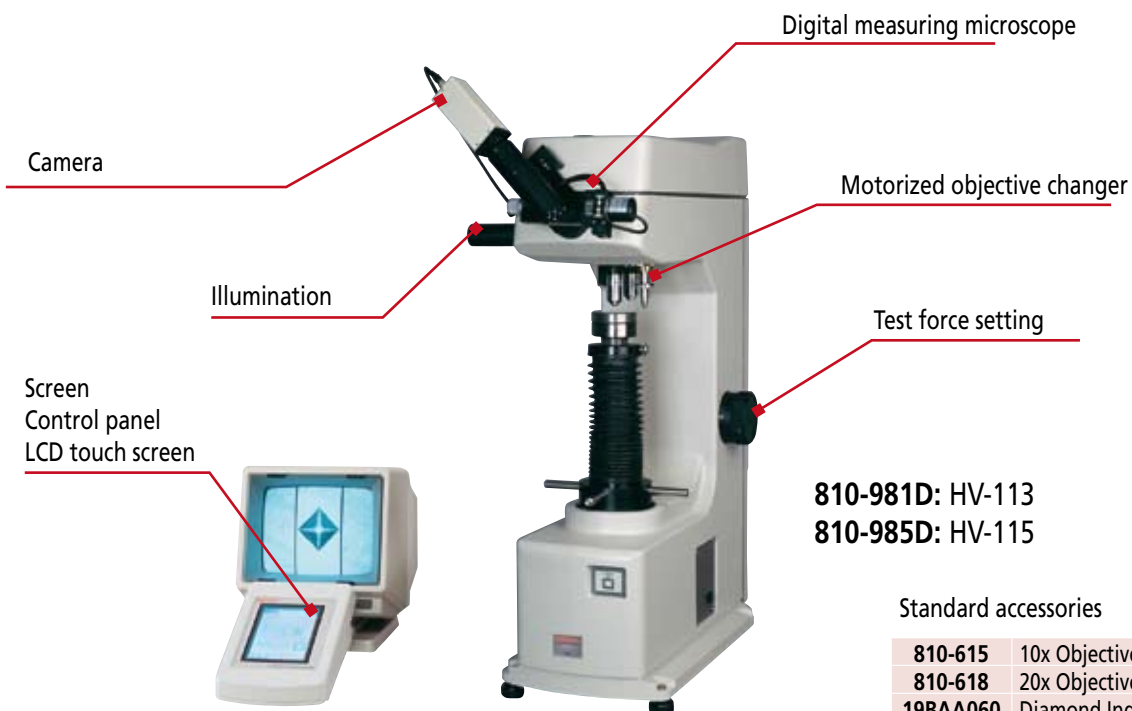
- The motor-driven revolver enables switchovers between indenter and objective via control panel.
- For ergonomic and user-friendly operation, the control panel is detached from the actual test machine.
- The simple and intuitive operation of the touch screen allows the performance of all important functions.
- Use of 2 objectives for measurement.
- Fast and easy statistical analysis of measuring results
- Convenient display of imprints and other information on the TV screen (HV-113/HV-115)



810-163D: HV-112
810-165D: HV-114

Technical specifications

Code No.	810-163D	810-981D	810-165D	810-985D
Model	HV-112	HV-113	HV-114	HV-115
Test force	1,961 / 2,942 / 4,903 / 9,807 /		9,807 / 19,61 / 29,42 / 49,03 /	
N	24,51 / 49,03 / 98,07 / 196,1		98,07 / 196,1 / 294,2 / 490,3	
Observation and measurement	Ocular	Screen	Ocular	Screen
Loading process	Automatic (load, duration, disengagement)			
Application time	5 - 99 s			
Speed of force application	20 / 50 / 100 / 150 μ m/s			
Max. size of workpiece	Max. height 210 mm (if using a flat anvil), max. depth 170 mm			
Optical path	Beam split ocular/camera output 50/50			
Objective	10 x , 20 x			
Resolution	0.1 μ m			
Max. measurement length	10 x : 700 μ m, 20 x : 350 μ m			
Conversion of hardness values	Soft: HV, HK, tensile strength, HRA, HRB, HRF, HRG, HR15T, HR30T, HR45T			
Objective changer	Hard: HV, HK, HS, HRB, tensile strength, HRA, HRC, HRD, HR15N, HR30N, HR45N			
Output	Motor-driven			
Outer dimensions	RS-232C, Centronics, SPC (DIGIMATIC), external			
Weight	Main unit: approx. 245 (W) x 515 (D) x 770 (H) mm Display: approx. 165 (W) x 260 (D) x 105 (H) mm			
Power supply	approx. 50 kg 230V 50/60Hz approx. 70VA max.			

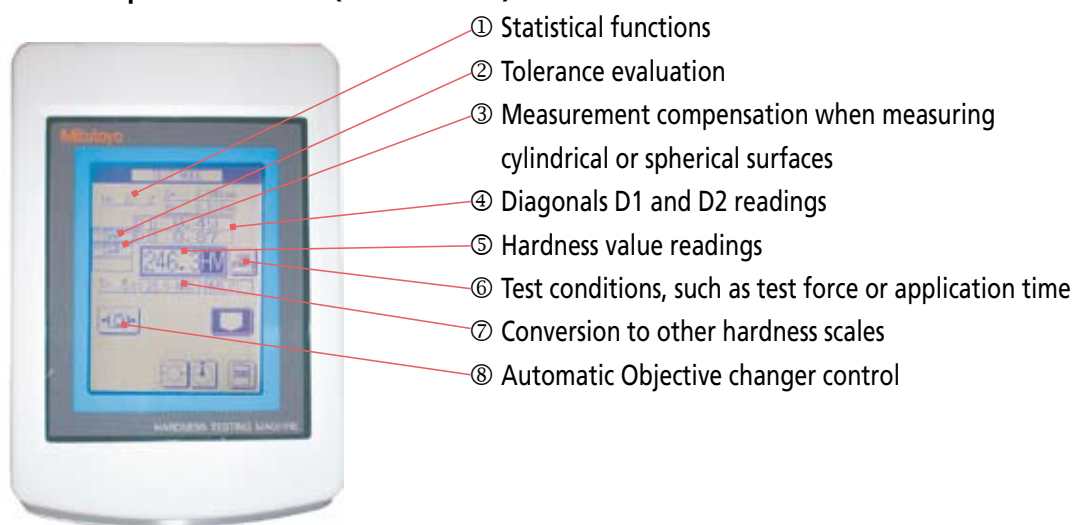


810-981D: HV-113
810-985D: HV-115

Standard accessories

810-615	10x Objective
810-618	20x Objective
19BAA060	Diamond Indenter
810-039	Flat table Ø 64 mm
810-040	V-Anvil Ø 40 mm Opening 30 mm; 120°
810-041	V-Anvil Ø 40 mm Opening 30 mm; 90°
19BAA219	Halogen lamp (6V/20W) installed
19BAA016	Hardness test block (700HV10)
19BAA110	Dust protection cover

Control panel functions (touch screen)



- ① Statistical functions
- ② Tolerance evaluation
- ③ Measurement compensation when measuring cylindrical or spherical surfaces
- ④ Diagonals D1 and D2 readings
- ⑤ Hardness value readings
- ⑥ Test conditions, such as test force or application time
- ⑦ Conversion to other hardness scales
- ⑧ Automatic Objective changer control

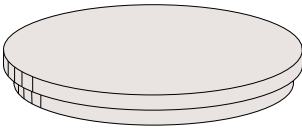
Special Accessories

Special accessories for Vickers hardness testing equipment

810-038

Round table

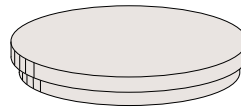
Outer diameter Ø 250 mm
For large specimen



810-037

Round table

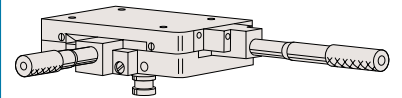
Outer diameter Ø180 mm
For large specimen



810-012

XY table 50 x 50 mm

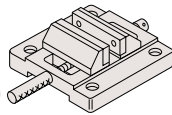
Table dimensions 125 x 125 mm



810-016

Vise

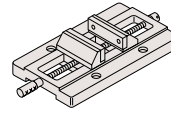
(opening width 45mm)



810-017

Vise

(opening width 100mm)



19BAA219D

Halogen lamp 6V20W

264-504-5D

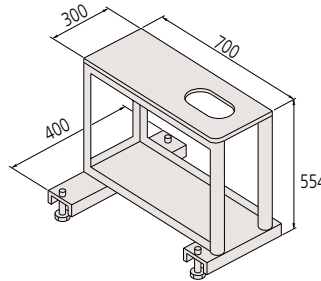
Digimatic Mini Processor DP-1VR

*Cable not included
Signal cable (1m)
HM series (937387)



Console

810-048



Code No.	Designation
19BAA060D	Diamond Indenter Vickers (incl. DKD/MPA certificate)
19BAA0063	Diamond Indenter Knoop
19BAA0445	Camera adapter for CCD camera to camera output

Hardness test blocks with DKD/MPA certificate

Code No.	Designation
19BAA002D	Hardness test block 240HV 0.3
19BAA003D	Hardness test block 300HV 0.3
19BAA004D	Hardness test block 400HV 0.3
19BAA005D	Hardness test block 540HV 0.3
19BAA006D	Hardness test block 620HV 0.3
19BAA007D	Hardness test block 720HV 0.3
19BAA008D	Hardness test block 840HV 0.3
19BAA011D	Hardness test block 240HV10
19BAA012D	Hardness test block Macro 300HV10
19BAA014D	Hardness test block Macro 540HV10
19BAA015D	Hardness test block 620HV10
19BAA016D	Hardness test block 720HV10

Additional hardness test blocks available on request.

Objectives*

	Objective 5 x AVK-C	810-063
	Objective 5 x HV	810-616
	Objective 10 x AVK-C	810-064
	Objective 10 x HV	810-617
	Objective 20 x AVK-C	810-065
	Objective 20 x HV	810-618
	Objective 40 x AVK-C	810-066
	Objective 50 x HV	810-619

* Installation by Mitutoyo

Mikrovickers Hardness Testing Equipment

810-124D: HM-101

- Manual model, hardness values read from an external table.



810-125D: HM-102

- Digital model with simple control panel.



810-959D: HM-103

- Measurement on an external screen and display on a simple control panel.



810-969D: HM-113

- Measurement on an external screen and display on a multi-purpose control panel.



810-126D: HM-112

810-128D: HM-114

- Digital model with multi-purpose control panel.
HV 0.01 - HV 1 resp.
HV 0.001 - HV 2



810-126D: HM-211

810-128D: HM-221

- With motorized revolver and option for connecting up to 4 objectives.
• Measurements from HV 0.01 - HV 1 resp.
HV 0.00005 - HV 2

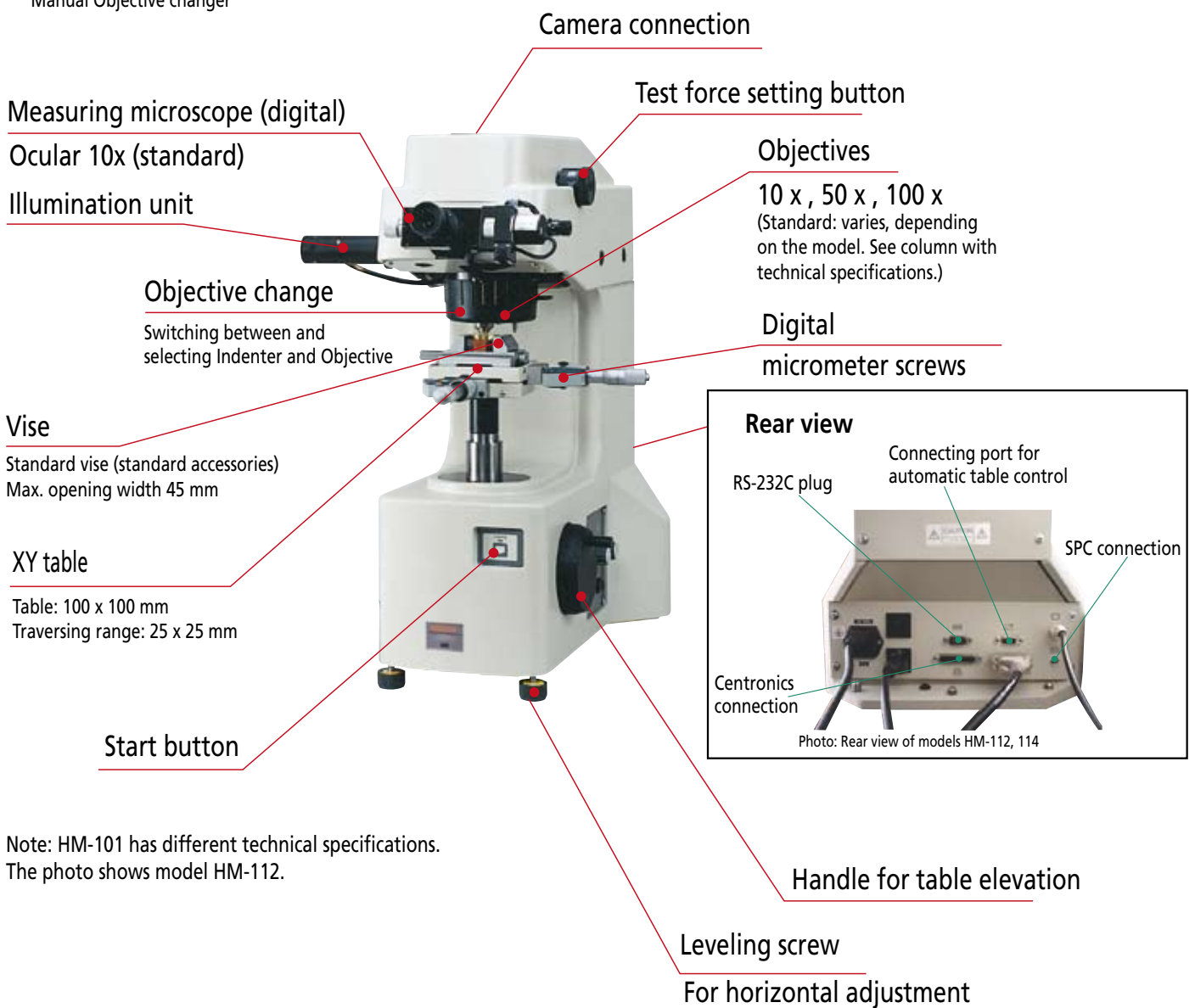


Mikrovickers hardness testing equipment

Model HM-100

Equipment features

- Hardness testing machine in acc. with ISO 6507-1 and JIS B7725
- Mikrovickers hardness testing machine with Vickers testing from HV 0.001 - HV2 (depending on the type of machine)
- Option to connect up to 3 Objectives, that can all be used for indentation measurement (except HM-101)
- Additional option to connect a Knoop Indenter
Manual Objective changer



Note: HM-101 has different technical specifications.
The photo shows model HM-112.

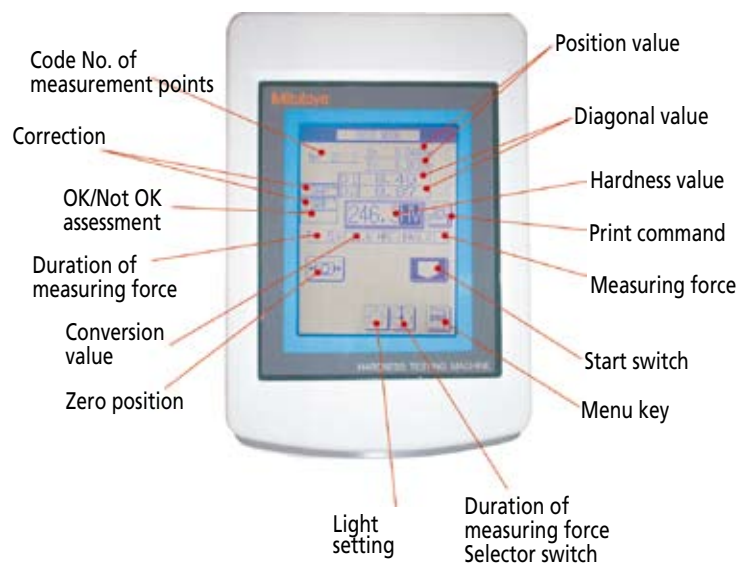
Control panel for optimal user comfort

Control panel with membrane keys (control unit)



- The control panel with membrane keys is simple and intuitive to operate and only offers the basic functions needed for hardness testing, such as diagonal and hardness value display, OK/NG assessment setting, display of results and start button for applying test force.

Touch screen (touch-sensitive control panel)



- The touch panel uses symbol keys and is therefore easy to understand and operate while offering a wide range of functions. Various additional functions are available alongside the basic hardness testing functions, such as conversion of measurement results into other hardness scales, setting mismatch values, operating the lighting system and displaying the position coordinates of the XY table.

Test force application locking function

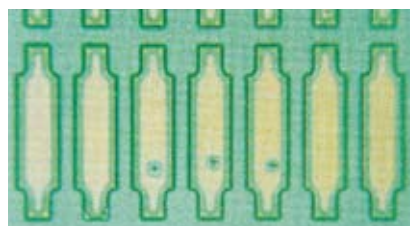
- A safety function prevents the application of test force if the lens changer is not in indenting position, thus preventing damage to the indenter if malfunctions occur.

High level of positioning accuracy

- The repetition accuracy when switching between indenter and objective is very high, enabling you to identify and test the required position with a high level of accuracy. As such, targets in microranges can be measured easily and very precisely.

Large test force range

- The test force ranges between HV 0.001 and HV 2 (HM-114), enabling hardness testing in the widest range of applications - from relatively soft films to hard materials.



*Imprint in a solid-state image



Technical specifications

Code No.	810-124D	810-125D	810-126D	810-128D
Model	HM-101	HM-102	HM-112	HM-114
Test force	mN	98.07; 245.2; 490.3; 980.7		9.807; 19.61; 29.42; 49.03; 98.07; 245.2; 490.3
	gf	10; 25; 50; 100		1; 2; 3; 5; 10; 25; 50
	mN	1961; 2942; 4903; 9807		980.7; 1961; 2942; 4903; 9807; 19610
	gf	200; 300; 500; 1000		100; 200; 300; 500; 1000; 2000
Loading process	Automatic (load, duration, disengagement)			
Application time	5 - 30 sec. (any setting)	5 - 60 sec.		5 - 99 sec.
Speed of force application	approx. 60 µm/s		1, 3, 10, 33 µm/s (245 mN or less), approx. 60 µm/s or more	
Max. size of workpiece	Height: 95 mm Depth: 150 mm			
Optical path	Beam split ocular/camera output 50/50			
Objectives	10 x (observation) 50 x (measurement)	10 x, 50 x (measurement possible with both objectives)		10 x, 50 x, 100 x measurement possible with all objectives
Smallest digit increments	0.2 µm	0.1 µm		0.01 µm (0.1 µm for 10 x and 50 x Objectives)
Max. measurement length	140 µm	140 µm	10 x : 700 µm, 50 x : 140 µm	10 x : 700 µm, 50 x : 140 µm, 100 x : 70 µm
XY table	with analog micrometer		with digital micrometer	
Table top	100 x 100 mm			
Traversing range	25 x 25 mm			
Smallest calibration Micrometer screw	10 µm		1 µm	
Position input for fine adjustment table	—			
Objective calibration	For each objective			
Control panel functions	—	LEDdisplay	Touch screen operation D1 and D2 diagonal readings; hardness value readings; XY table position reading; test conditions, such as test force or application time; tolerance evaluation; measurement value compensation when measuring on cylindrical or spherical surfaces; translation to other hardness scales: Soft: HV, HK, HBS, tensile strength, HRA, HRB, HRF, HRG, HR15T, HR30T, HR45T Hard: HV, HK, HS, HBS, tensile strength, HRA, HRC, HRD, HR15N, HR30N, HR45N Statistical functions: Code No. of values, max., min., average, range, upper limit, lower limit, standard deviation, Code No. of OK/Not OK evaluations, storage and editing of 256 values.	
Data output	—		SPC output DIGIMATIC RS-232C output Centronics output I/O for X-Y auto. measuring table	
Dimensions	Main unit (width x depth x height): approx. 410 x 600 x 590 mm (without control panel)			
Weight	approx. 42 kg			
Power supply	230 V			
Power consumption	approx. 60VA or less (approx. 20VA or less for HM-101, approx. 105 VA or less with camera system)			

System configuration

Code No.	Model	Main unit	810-629 CCD camera TV screen
810-124D	HM-101	●	—
810-125D	HM-102	●	●
810-959D	HM-103	● See technical specifications for HM-102)	●
810-126D	HM-112	●	●
810-969D	HM-113	(See technical specifications for HM-112)	●
810-128D	HM-114	●	●

●: Standard accessories ●: Special accessories

Standard accessories

810-617	10x Objective for measurement (WD 5.6 mm)
810-619	50x Objective for measurement (WD 0.4 mm)
810-620	100x Objective for measurement (WD 0.3 mm)
19BAA058	Diamond Indenter (HM-101, 102, 103, 112, -113)
19BAA059	Diamond Indenter (HM-114)
810-074	XY measuring table (digital) 100 x 100 mm, measuring range 25 x 25 mm HM-112, 113, 114
810-011	XY measuring table (digital) 100 x 100 mm,
19BAA133	Spacer/Cleaner (material: bakelite)
19BAA007	Hardness test block 700HV0.3
810-016	Vise, opening: 51 mm
19BAA445	Camera adapter for CCD camera
19BAA109	Dust protection cover
19BAA219	Halogen lamp, 6V, 20W (installed)
	Vickers hardness table for determining the hardness value (HM-101)

Mikrovickers Hardness Testing Equipment Model HM-200

Equipment feature

- Hardness testing machine in acc. with ISO 6507-2 and JIS B 7725
- Multi-purpose
- Built-in LCD color display with touch screen operation
- Standard motorized/manual Objective changer
- This machine works without weights, only by applying electromagnetic test force
- Objective changer can be fitted with up to 4 objectives and up to 2 indenters (Knoop/Vickers)
- Objectives with very good working distance
- Standard camera connection
- Test forces from 0.05 - 2000 gf

1. Measuring microscope (digital)

2. Illumination unit

3. Automatic revolver button (manual operation possible!)

- For automatic switching between indenter and objectives
- Objectives: Can hold up to 4
Standard: 10X, 50X (HM-211)
10X, 50X, 100X (HM-221)
- Indenter mount:
up to 2
standard indenter:
Vickers Indenter (1)

4. Vise

Standard vise
Max. opening: 51 mm

5. XY table (digital)

Table surface: 100 x 100 mm
Traversing range: 25 x 25 mm
Standard equipped with digital micrometer screws!

6. Touch-sensitive control panel

Don't just track the test process, but also check the hardness values in different scales or the test conditions.

7. Optical path (camera)

8. Path selector

9. Rear view

- **Objective with very good working distance**

The use of these special objectives ensures a comfortable working distance between objective and test specimen, thus dramatically reducing the risk of the components colliding during focusing.

- **With integrated, adjustable aperture diaphragm**

Use this function to set the best possible contrast for capturing indentation diagonals.

- **Energy saving function**

The integrated energy saving function automatically switches off the illumination and control panel if the appliance is not operated for a specific period of time (between 1 and 60 minutes, can be set at minute increments).

Technical specifications

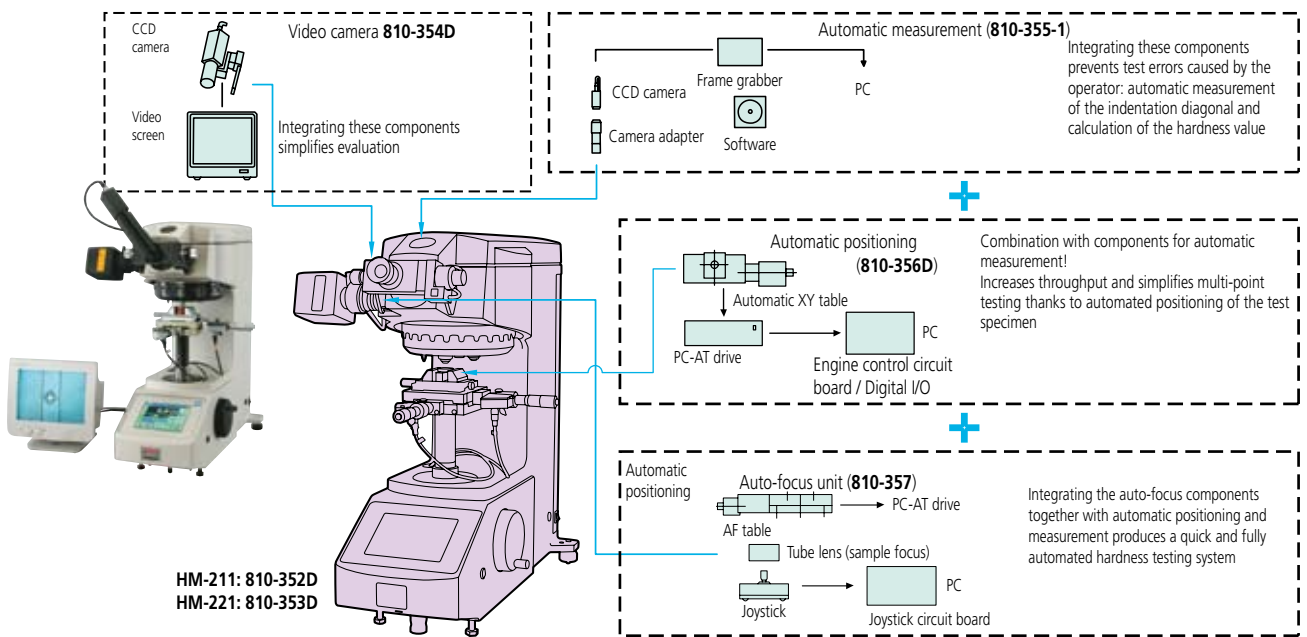
Code No.	810-352D						810-353D									
Model	HM-211						HM-221									
Test force	mN	98.07	196.1	294.2	490.3	980.7	0.4903	0.9807	1.961	2.942	4.903	9.807	19.61	29.42	49.03	98.07
	gf	10	20	30	50	100	0.05	0.1	0.2	0.3	0.5	1	2	3	5	10
	mN	1961	2942	4903	9807		196.1	294.2	490.3	980.7	1961	2942	4903	9807	19610	
	gf	200	300	500	1000		20	30	50	100	200	300	500	1000	2000	
Variable test force (1 setting can be stored)	Test forces of up to 980.7 mN (100 gf) can be set in increments of 9.807 mN (1 gf)						At a test force of less than 0.9807 mN (0.1 gf) can only be set at 0.4903 mN (0.05 gf)									
	Test forces of more than 980.7 mN (100 gf) can be set in increments of 98.07 mN (10 gf)						Test forces from 0.9807 mN (0.1 gf) up to 9.807 mN (1 gf) can be set in increments of 0.9807 mN (0.1 gf)									
Loading process	Electromagnetic generation of test force with automatic control (application of force, application time and disengagement)															
Application time	can be set from 0 - 999 seconds															
Max. size of workpiece	133 mm (height), 160 mm (depth - from the center of the penetrating object)															
Optics	Infinitely corrected, halogen light source, variable diaphragm opening, path change for optics: microscope/camera															
Objective	10X for measuring, 50X for measuring (up to 4 objectives can be mounted)						10X for measuring, 50X for measuring, 100X for measuring (up to 4 objectives can be mounted)									
Max. measuring length	Objectives: 10X: 700 µm, 50X: 140 µm						10X Objectives: 700µm, 50X: 140 µm, 100 X: 70µm									
Revolver rotation	Mechanical, can also be operated manually															
XY table	With digital micrometer, size 100x100 mm/ traversing range: 25x25 mm/ digit increments: 1 µm															
Data display functions	Display on touch-sensitive color LCD															
	Diagonal length: max. 5-digits, min. 0.01µm (Objectives with at least 50X magnification) Hardness values: max. 4-digit, min. 0.1															
Compensation functions	Force application, application time and disengagement, OK/Not OK evaluation (OK/±NG), translation, Indenter (HV/HK), XY table position															
Hardness translation	Cylindrical and spherical shape, reading errors															
Hardness translation	choice of SAE / ASTM / BSi860 / DIN / Mitutoyo															
Assistant for test conditions	Calculates test forces based on material thickness and expected Vickers hardness															
Statistics output	Code No. of measured values, Max. measured value, Min. measured value, average, range, upper tolerance, lower tolerance, Code No. of OK parts, Code No. of +Not OK and -Not OK															
	Standard deviation (n-1), standard deviation(n)															
Data output	SPC DIGIMATIC, Centronics, RS232C															
Dimensions (WxHxD)	Outer dimensions: approx. 400 x 625 x 600 mm, mounted: at least 600 x 780 x 1000 mm															
Weight	approx. 43 kg															
Energy consumption	230V AC, 50/60Hz, 90VA															

Special Accessories

Standard accessories HM-200

Code No.	Designation	Description	Units	Code No.	Designation	Description	Units
19BAA407	Ocular measurement	Digital version, Ocular 10X	1	19BAA133	Spacer/ Cleaner	Material: bakelite	1
810-617	Objective	10X, for measuring, W.D. 5.6 mm, standard for HM-211/221	1	19BAA007	Hardness test block	700HMV0.3, Ø 25 mm x 6 mm	1
19BAA439	Objective	50X, W.D. 1.1 mm, standard for HM-211/221	1	810-016	Vise	Opening: 51 mm	1
19BAA440	Objective	100X, for measuring, W.D. 2.5mm, standard for HM-221	1	938905	Optical filter	green	1
19BAA058	Diamond Indenter	Vickers for HM-211	1	11BAA961	Protective cap	for ocular	1
19BAA059	Diamond Indenter	Vickers for HM-221		19BAA522	Camera adapter		1
11BAA578	Mounting shaft	38 mm with two clamping screws	1	02DEA471	Dust protection cover		
02DEA204	Mounting shaft	76 mm with two clamping screws	1	19BAA207	Halogen lamp	12V 50W (installed)	1
810-074	XY measuring table (digital)	100 x 100 mm table, Measuring range: 25 x 25 mm	1	11BAB908	Fuse	250V AC, 2A	2

Special accessories for enhancing and optimizing the HM-200 test system



Code No.	Designation	Description
810-352D	CCD video camera with external screen	Simplified measurement of indentation diagonals on an external screen
810-355-1	CCD video camera for connection to a computer and evaluation software VL-Pak	Simplified measurement of indentation diagonals on a PC screen using VL-Pak software support. This software supports automatic measurement of the hardness indentation, for example.
810-356D	Automatic XY table	Automatic movement to preset positions using VL-Pak software
810-357	Auto-focus unit to enhance the XY table	Automatic focus on the workpiece surface for fully automatic measurement

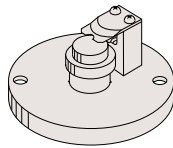
Special Accessories

Special accessories for Mikrovickers hardness testing equipment

810-013

Thin sheet holder

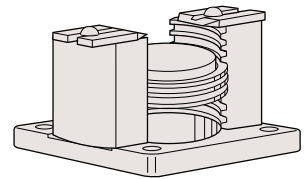
Prevents measurement distortions due to bending when testing the hardness of sheets with a thickness of 5 mm and less.
(e.g.: scalpel blades etc.)



810-020

Universal sample holder

(sample thickness max. 30 mm)
For precise alignment of the test surface and indenter axis if the test specimen is not exactly parallel.
Cannot be used with automated hardness testing machines.

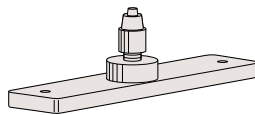


810-015

Wire holder

(vertical version)

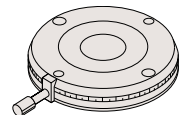
For wire or balls with a \varnothing of between 0.4 mm and 3 mm for end measurements (e.g.: wire, piano strings etc.)



810-018

Rotating table (smallest increment 1°)

Specimen can be rotated into different positions for measuring on this test table.

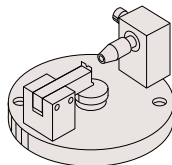


810-014

Wire holder

(horizontal version)

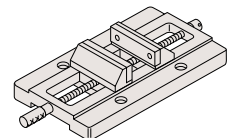
For thin wires with a \varnothing of between 0.4 and 3 mm for side measurements. (e.g.: wire, piano strings etc.)



810-017

Vise

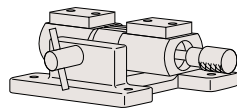
For samples up to 100 mm.



810-019

Special slewing vise

For aligning the test surface, with an opening width of 37 mm, a slewing angle of $\pm 150^\circ$ and a rotating angle of $\pm 25^\circ$.

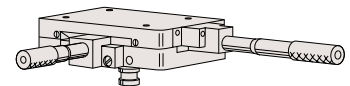


810-012

XY table

(50 mm X/Y elevation)

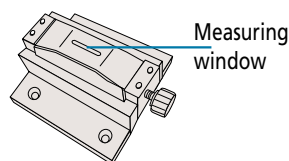
For positioning the specimen by up to 50 mm in X and Y direction.



810-085

Sample holder for thin sheets etc.

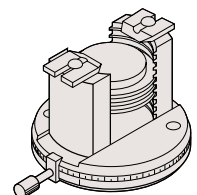
Measuring window:
25 x 10 mm
Max. thickness of workpiece: 3 mm



810-084

Rotating universal sample holder

(sample thickness max. 30 mm)
For precise alignment of the test surface and Indenter axis if the test specimen is not exactly parallel. Cannot be used with automated hardness testing machines.



Special accessories for Mikrovickers hardness testing equipment

Indenter

Code No.	Designation
19BAA058D	Vickers Indenter incl. DKD/MPA certificate for HM-101, 102, 103, 112, 113, 211
19BAA059HD	Vickers Indenter incl. DKD/MPA certificate for HM-114, 221
19BAA061	Knoop Indenter for HM-101, 102, 103 -112, -113, -211
19BAA062	Knoop Indenter for HM-114, 221

Code No. 264-504-5D Digimatic Mini Processor DP-1VR

For printing hardness values, statistics

*The signal line for the DP-1VR is not included and must be ordered separately (see below)

Signal line (1m)

Code No. 937387 for Model HM (except HM-101)



Hardness test blocks incl. DKD/MPA certificate

Code No.	Designation
19BAA002D	Hardness test block 240HV 0.3
19BAA003D	Hardness test block 300HV 0.3
19BAA004D	Hardness test block 400HV 0.3
19BAA005D	Hardness test block 540HV 0.3
19BAA006D	Hardness test block 620HV 0.3
19BAA007D	Hardness test block 720HV 0.3
19BAA008D	Hardness test block 840HV 0.3
19BAA011D	Hardness test block 240HV10
19BAA012D	Hardness test block 300HV10
19BAA014D	Hardness test block 540HV10
19BAA015D	Hardness test block 620HV10
19BAA016D	Hardness test block 720HV10

Objectives for Vickers and Microvickers

Special accessories (installation by Mitutoyo) / possibly standard accessories (already installed)

Code No.	Designation	Magnification	Working distance	Remarks
810-063	Objective	5x		AVK-C
810-064	Objective	10x		AVK-C
810-065	Objective	20x		AVK-C
810-066	Objective	40x		AVK-C
810-616	Objective	5x	13.5 mm	HM-100/HM-200/HV-100
810-617	Objective	10x	5.6 mm	HM-100/HM-200/HV-100
810-618	Objective	20x	1.8 mm	HM-100/HM-200/HV-100
810-619	Objective	50x	0.4 mm	HM-100
810-620	Objective	100x	0.3 mm	HM-100
19BAA439	Objective	50x	1.1 mm	HM-200
19BAA440	Objective	100x	2.5 mm	HM-200
19BAA158-2	Objective holder			HM-100/HV-100
02DEA052	Objective holder			HM-200
11AAB412	Objective set, holder and Objective	5x		HM-200
11AAB413	Objective set, holder and Objective	20x		HM-200
11AAB414	Objective set, holder and Objective	100x		HM-200
11AAB250	13 corrector plates, 0.8 - 2 mm			HM-100/HM-200/HV-100

VLPAK Measuring Program for Automatic Indentation Measurement

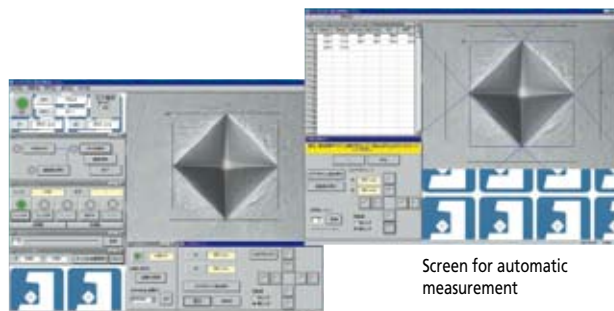
Reduces operator influence on the hardness measurement.

Detection time just 0.3 seconds, i.e. dramatic increase in measuring performance and throughput.



**Automatic detection in just 0.3 seconds.
(when using a PC with the recommended
performance specifications)**

This very fast automatic measuring software detects the indentation in 0.3 seconds, displays the hardness and thus considerably shortens the required measuring time.



Screen for manual measurement

Screen for automatic
measurement

During hardness measurement, the indentation diagonal is measured on the TV screen; critical factors include the measurement deviations caused by the operator and the worktime savings.

The VLPAK automatic length measuring program automatically measures the indentation diagonal and converts the result into a hardness value; thus reducing measuring errors caused by operator measuring deviations. It also determines the hardness in a flash, in just 0.3 seconds, thus dramatically increasing performance and throughput during hardness testing.

You can easily combine it with your hardness testing machine (*HM-112, 114 etc.) without any problems and take advantage of its additional functions.

The software is user friendly and allows you to perform settings and data processing on a Windows PC, where it demonstrates its superb efficiency and ability to perform.

**Equipped with automatic measuring
function for Vickers and Knoop hardness
testing**

Fully automatic measurement of Vickers and Knoop hardness is possible. The software also has a template function that you can use to measure indentations manually right on the PC screen.

**Measurements are easily performed using
the mouse**

Operators can perform all operations - from setting to measurement - on a PC (Windows operating system). MS-Excel can be used for various measurement result processing tasks.

Brinell Hardness Testing Equipment ABK-1



Suitable for testing workpieces with up to 3000 kgf.

Hydraulic Brinell hardness testing machine ABK-1

ABK-1 is a hardness testing machine that is easy to operate and extremely accurate. It is used for testing raw materials, cast/forged parts and special steel.

- A large indentation can create a smooth surface even when measuring rough surfaces.
- The handle for vertical table operates on a special bearing to ensure even and soft upward and downward movements.
- By distributing weights appropriately test forces between 4903N (500kgf) and 29420N (3000kgf) may be generated. Two different size carbide indenters (10 mm and 5 mm) can be used, depending on the sample.

Technical specifications

Code No.	810-265-1	
Model	ABK-1	
Test force	N	4903 7355 9807 14710 19614 24517 29420
	kgf	500 750 1000 1500 2000 2500 3000
Test force conversion	Manual (selection by replacement)	
Test load regulation	Manual (load, duration, disengagement)	
Test force application time	Manual (any setting)	
Max. size of workpiece	Max. height	0 - 200 mm
	Max. depth	155 mm
Outer dimensions	approx. 430 (W) x 510 (D) x 1100 (H) mm	
Weight	approx. 180 kg	

Standard accessories

Designation	Technical specifications	Quantity
Weight	For 4903N (500kgf)	1
Weight	For 2452N (250kgf)	2 sets
Weight	For 9807N (1000kgf)	2 sets
Indenter	5mm (carbide ball)	1
Indenter	10 mm (carbide ball)	1
Measuring microscope	20 x	1
Dust protection cover	Plastic	1
Hardness calculation table		1
Accessories storage box		1
Operators' manual		1

Mobile Rebound Hardness Testing Device HARDMATIC HH-411

Equipment features

- The HH-411 hardness tester uses the rebound method and is used to test metals; it is particularly compact and easy and intuitive to operate. Hardness is measured in Leeb values.



810-298: HH-411

Wide range of detectors

In addition to the standard universal hydraulic impactor (type D), users can choose from a wide range of special hydraulic impactors for special measuring tasks.

- Type DC: For cramped spaces, e.g. measuring in pipes
- Type D+15: Narrow design for measuring in slots
- Type DL: For measurements in the tightest ranges, such as welded seams or gear wheels

With automatic alignment correction

When using rebound hardness testers, gravity influences the measurement result - depending on the orientation of the hydraulic impactor relative to the vertical when pressing against the sample surface.

Equipped with data storage function

Up to 1800 measuring results can be stored - the ideal device for on-site control measurements.

Free choice of hardness scale, depending on your individual measurement application

The HL hardness value (L value: acc. to ASTM A 956) can be converted into Vickers, Brinell, Rockwell C, Rockwell B and Shore hardness values and tensile strength. The conversion can be performed following the test resp. even during the test in conversion mode.

Extremely simple to operate

The hydraulic impactor is simply pressed against the sample surface and the button triggered (biro principle) - hardness testing does not get any easier than this.

Technical specifications

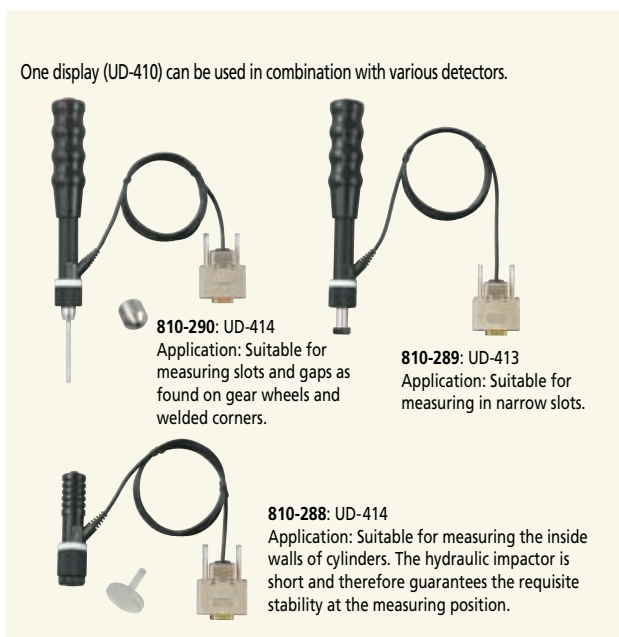
Code No.	810-298	
Model	HH-411	
Hydraulic impactor	Carbide ball on the tip of the impactor (Type D: ASTM A 956 specification)	
Display	7 segments, LED display	
Display range (varies, depending on the conversion table used)	Leeb hardness: 1 - 999HL	Digit increments 1HL
	Vickers hardness: 43 - 950HV	Digit increments 1HV
	Brinell hardness: 20 - 894HB	Digit increments 1HB
	Rockwell hardness (C scale): 19.3 - 68.2HRC	Digit increments 0.1HRC
	Rockwell hardness (B scale): 13.5 - 101.7HRB	Digit increments 0.1HRB
	Shore hardness: 13.2 - 99.3HRS	Digit increments 0.1HS
Function	Tensile strength: 499 - 1996 MPa	Digit increments 1MPa
	Automatic angle correction, mismatch; OK/Not OK evaluation	
	Data storage: 1800 test values; Conversion (see "display range" for details)	
	Statistical calculations (average, min./max., scatter range, standard deviation)	
Sample requirements	Auto-sleep; Display of Code No. of measurements	
	Min. sample thickness 5 mm, min. weight 5 kg (Samples weighing between 0.1 and 5 kg are securely fixed to a massive block weighing at least 5 kg for measuring purposes.) Test position: min. 5 mm from the edge of the sample, min. space between test points 3 mm Sample surface quality: within Ra 10 µm	
Output	RS-232C, SPC (DIGIMATIC)	
Power supply	Two LR 6 batteries, AC adapter (special accessory)	
Operating environment	Temperature: 0 - 40°C Air humidity: 95% (without condensation)	
Outer diameters and weight	Display: approx. 70 (W) x 110 (D) x 35 (H) mm, approx. 200g	
	Hydraulic impactor: approx. Ø 28 x 175 mm, approx. 120g	

Note: The rebound testing device cannot be used for measuring the hardness of elastic materials - such as rubber. The rigidity of the sample affects the measuring result. Thin sheets, in particular, may not be tested using this device.

Standard accessories

Code No.	Designation	Technical specifications	Quantity
19BAA450-01	UD-410 display	—	1
—	LR 6 battery	—	2
—	Operators' manual	—	1
—	Belt	—	1
810-287	UD-41 hydraulic impactor1	Type D approx. Ø 28 x 175mm, approx. 120 g (stop cap Ø 22 mm)	1
—	Impactor	—	1
19BAA457	Carbide ball	in the impactor	1
19BAA459	Wrench	For replacing the carbide ball	1
19BAA460	Hydraulic impactor cable	—	1
19BAA451	Stop cap	Ø 22 mm	1
19BAA452	Stop cap (small)	Ø 14 mm	1
—	Test machine storage and transport container	Display and hydraulic impactor storage and transport container	1
19BAA265	Hardness comparison block	corresponds to 800HLD	1
—	Hardness comparison block storage and transport container	—	1

Special Accessories



Special Accessories

Code No.		Technical specifications	Quantity
264-504-5D	Digimatic Mini Processor DP1-VR	For printing measurement data, various statistics, etc.	1
937387	Signal line	For connecting DP-1VR and display (1 m)	1
09EAA069D	Printing roll	For DP-1VR (1 roll)	1
19BAA238	Signal line	For connecting PC and display RS-232C (for DOS/V PC)	1
526688D	AC adapter		1
19BAA243	Hardness test block	880HLD (Ø 115 mm, t33 mm, 3.7 kg)	1
19BAA244	Hardness test block	830HLD (Ø 115 mm, t33 mm, 3.7 kg)	1
19BAA245	Hardness test block	730HLD (Ø 115 mm, t33 mm, 3.7 kg)	1
19BAA246	Hardness test block	620HLD (Ø 115 mm, t33 mm, 3.7 kg)	1
19BAA247	Hardness test block	520HLD (Ø 115 mm, t33 mm, 3.7 kg)	1
19BAA248	Stop capcylinder (3)	For measuring convex cylindrical surfaces (R10 to 20 mm): for types D and DC	1
19BAA249	Stop caphollow cylinder (4)	For measuring concave cylindrical surfaces (R14 to 20 mm): for types D and DC	1
19BAA250	Stop cap ball (5)	For measuring convex spherical surfaces (R10 to 27.5 mm): for types D and DC	1
19BAA251	Stop cap hollow ball (6)	For measuring concave spherical surfaces (R13.5 to 20 mm): for types D and DC	1
19BAA457	Carbide ball	For types D, DC and D+15	1
19BAA458	Impactor	For type DL	1
810-287	UD-411 detector	Type D approx. Ø 28 x 175 mm, approx. 120 g (stop cap Ø 22 mm)	1
810-288	UD-412 detector	Type DC approx. Ø 22 x 85 mm, approx. 50 g (stop cap Ø 22 mm)	1
810-289	UD-413 detector	Type D+15 approx. Ø 28 x 190 mm, approx. 130 g (stop cap Ø 11 mm)	1
810-290	UD-414 detector	Type DL approx. Ø 28 x 230 mm, approx. 140 g (stop cap Ø 4 mm)	1

Application Examples



810-289



810-290



810-288

Hardness Testing Equipment for Foam, Rubber and Plastic

Hardmatic Model HH-300

Hardmatic HH-300 models are slimline and easy to operate, and compactly designed for easy handling. Both types are available with analog or digital display.

Compact design

HH-333, 334
HH-337, 338

Long version

HH-331, 332
HH-335, 336

HARD

Plastic

Hard rubber

SOFT

General types of rubber

Elastomers

Hard foam

Soft foam

Overview

Code No.	811-332	811-334	811-336-01	811-338-01	811-331	811-333	811-335-01	811-337-01
Model	HH-332	HH-334	HH-336	HH-338	HH-331	HH-333	HH-335	HH-337
Process	Shore A	Shore D	Shore A	Shore D	Shore A	Shore D	Shore A	Shore D

Hardmatic Model HH-300

Long version

Equipment features

- The head on the long version has a narrow cylindrical shape (Ø24 x 85mm). This enables it to measure hardness both in slots or bore holes and on open surfaces. In addition, the operator can perform measurements without bringing his hands close to the sample surface. This is helpful when surface temperatures are high: for example immediately after the molding process.



To perform a measurement, simply press the hardness testing device against the sample and read the displayed value.

Technical specifications

Code No.	811-331	811-332	811-333	811-334
Model	HH-331	HH-332	HH-333	HH-334
Type	Long version			
Display	Analog	Digital	Analog	Digital
Type of sample	Rubber/soft plastic		Hard rubber, hard plastic	
Shore hardness	Type A		Type D	
Prevailing standard	JIS K 6253, JIS K 7215, ASTM D 2240, ISO 868, ISO 7619			
Needle shape	Shaft diameter	Ø 1.25 ± 0.15 mm		
	Shape of needle tip	Truncated cone		Cone
	Tip angle	35° ± 0,25°		35° ± 1°
	Tip diameter	Ø 0.79 ± 0.01mm		—
	Tip curvature	—		Ø 0 ± 0.01mm
Pressure surface	Ø18mm			
Protrusion of test needle over pressure surface	2.5mm			
Scale divisions	1 hardness unit (HH-329, 331, 333, 335, 337)		0.5 hardness unit (HH-330, 332, 334, 336, 338)	
Test force application	Coil spring			
Functions	Analog pointer	"Hold" function, DIGIMATIC data output	Analog pointer	"Hold" function, DIGIMATIC data output
Outer dimensions	Analog approx. 56 (W) x 33.5 (D) x 186 (H) mm		Digital approx. 60 (W) x 28.5 (D) x 193 (H) mm	
Weight	320 g	310 g	320 g	310 g
Power supply	—	Silver oxide cell battery SR 44	—	Silver oxide cell battery SR 44
Standard accessories	•Hardness testing device, main unit • Instruction manual • Silver oxide cell battery SR44 (HH-332, 334) • Storage and transport container • Warranty card			

Compact version

Hardmatic Model HH-300

Equipment features

- The compact design fits easily into your hand, thus permitting very comfortable measurements.

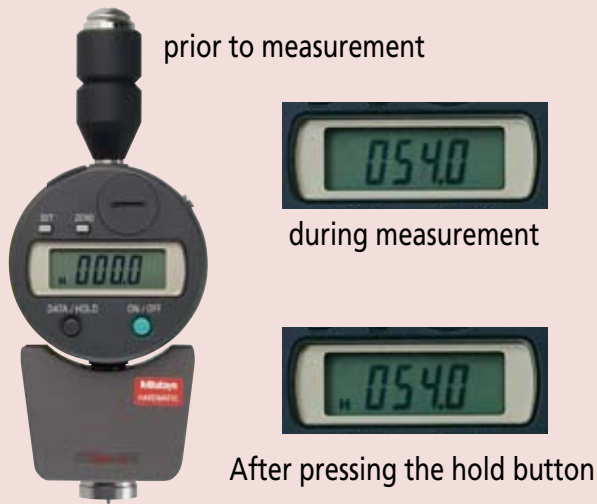


Technical specifications

Code No.	811-335-1	811-336-1	811-337-1	811-338-1
Model	HH-335	HH-336	HH-337	HH-338
Type	Compact version			
Display	Analog	Digital	Analog	Digital
Type of sample	Rubber/soft plastic		Hard rubber/hard plastic	
Shore hardness	Type A		Type D	
Applicable standards	JIS K 6253, JIS K 7215, ASTM D 2240, ISO 868, ISO 7619			
Needle shape	Shaft diameter $\varnothing 1.25 \pm 0.15$ mm			
Shape of needle tip	Truncated cone		Cone	
Tip angle	$35^\circ \pm 0,25^\circ$		$30^\circ \pm 0,25^\circ$	
Tip diameter	$\varnothing 0.79 \pm 0.01$ mm		—	
Tip curvature	—		0.1 ± 0.01 mm	
Pressure surface \varnothing	$\varnothing 18$ mm			
Protrusion of test needle over pressure surface	2.5 mm			
Scale divisions	1 hardness unit (HH-331, 333, 335, 337)		0.5 hardness unit (HH-332, 334, 336, 338)	
Test force application	Coil spring		Coil spring	
Functions	Analog pointer	“Hold” function DIGIMATIC data output	Analog pointer	“Hold” function DIGIMATIC data output
Outer dimensions	approx. 56 (B) x 33.5 (T) x 144 (H) mm approx. 60 (W) x 28.5 (D) x 151 (H) mm			
Weight	300 g	290 g	300 g	290 g
Power supply	—	Silver oxide cell battery SR 44	—	Silver oxide cell battery SR 44
Standard accessories	•Hardness testing device, main unit • Instruction manual • Silver oxide cell battery SR44 (HH-336, 338) • Storage and transport container • Warranty card			



Digital devices - Hold function



Holds the display value at all times during measuring so that you always have the measurement results available at a glance.

Analog devices - Analogue pointer



The slave pointer in the analog display is ideal for measuring peak values.

Special accessories

Digimatic Mini Processor DP-1VR (special model) HH-332, 334, 336, 338

The HH-300 series can also print out hardness measurement results and statistics - such as min./max. values, standard deviations and averages - via the Digimatic interface. A special DP-1VR model and the process-oriented RS-232C interface can transfer measuring results to your PC.

19BAA406
DP-1VR (special model)



MODE-1	
1	64.0
2	58.5
3	61.0
4	60.5
5	61.0
6	60.5
7	59.5
8	62.0
9	59.0
10	61.0
PORT NO.	
DATE/TIME	
NAME	
RESULT	
N	10
MAX	64.0
MIN	58.5
R	5.5
S	60.700
σn	1.486
σn-1	1.567

Mounting shaft HH-329, 335, 336, 337, 338

The optional mounting shaft can be used to tension a test machine in a conventional box column drill and thus keep the measuring position stable. If you additionally fit the shaft with electronic scales, the measuring results will be as stable as if you had used the measurement stand from the CTS series.



19BAA180

Test sample set Code No. 64AAA964

Made of rubber
Hardness 30, 60, 90 Shore "A"



One unit - 3 applications

Measurement / Test stand for various applications

- For measuring hardness
- For testing the spring force of the main unit.
- More stable results with fewer deviations can be achieved when measuring hardness by attaching the supplied weight directly to the hardness testing device than when applying force manually.

All 4 models can be used for the listed applications by purchasing the corresponding optional accessory



Technical specifications

Code No.	811-019	811-012	811-013	811-014
Suitable models	HH-331, 332	HH-333, 334	HH-335, 336	HH-337, 338
Application				
Hardness measurement				
Test force	9.81 N	49.05 N	9.81 N	49.05 N
Weight	①	①+③+④	①	①+③+④
Application				
Manual measurement at firm pressure				
Test force	9.81 N	49.05 N	9.81 N	49.05 N
Weight	①+⑥	①+③+⑥	①+⑥	①+③+⑥
Application				
Testing spring force				
Weight	L: — / H: ①	L: ①+⑤ / H: ③	L: — / H: ①+②	L: ①+⑤ / H: ③
Weights	①CTS-101, 102, 103, 104 Measuring / Testing k103 Measuring ③CTS-102, 104 Measuring / Testing			
Weight attachment	④102, 104 Measuring ⑤CTS-102, 104 Measuring / Testing ⑥101, 102, 103, 104 Measuring			
Outer diameter (unit: mm)	①Ø 64x23,5 ⑥Ø40x13	①Ø64x23,5 ③Ø78x110 ④Ø20x25 ⑤Ø40x25 ⑥Ø40x13	①Ø64x23,5 ②Ø20x19 ⑥Ø40x13	①Ø64x23,5 ③Ø78x110 ④ Ø20x25 ⑤Ø40x25 ⑥Ø40x13
Weight, main unit	①580 g ②34.8 g ③3950 g ④50 g ⑤187,4 g ⑥130 g			
Stand				
Outer dimensions	Ø 148 x height (max.) 420 mm			
Vertical elevation	12 mm			
Max. sample thickness	approx. 90 mm			
Sample table dimensions	Ø 90 mm			
Weight, total	approx. 9 kg	approx. 13 kg	approx. 9 kg	approx. 13 kg

Standard accessories for measurement and test stands

Designation	Technical specifications	Quantity	811-019	811-012	811-013	811-014
Main unit	—	1	●	●	●	●
Tool kit	—	1	●	●	●	●
Weight ①	Measuring / Testing	1	●	●	●	●
Weight ②	Testing	1	—	—	●	—
Weight ③	Measuring / Testing	1	—	●	—	●
Weight ④	Measuring / Testing	1	—	●	—	●
Weight ⑤	Testing	1	●	●	—	●
Weight ⑥	Testing	2	●	●	●	●
Operators' manual	—	1	●	●	●	●
Warranty card	—	1	●	●	●	●



1) Hardness measurement



2) Testing spring force



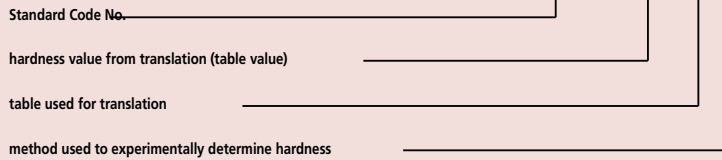
3) Manual measurement

Conversion table for hardness values

This table is for reference purposes to allow the approximate translation of hardness values determined on one and the same metal sample using different hardness testing methods into other hardness values. In view of the strongly differing test methods, the values determined using the method indicated in the product specification should be used - and not values translated from other test methods - for quality assurance purposes.

Conversion of hardness values for non-alloyed and low-alloy steel and cast steel acc. to DIN EN ISO 18265 table A.1

Tensile strength MPa	Vickers hardness HV10	Brinell hardness HB*	Rockwell hardness							
			HRB	HRF	HRC	HRA	HRD	HR15N	HR30N	HR45N
255	80	76,0	—	—	—	—	—	—	—	—
270	85	80,7	41,0	—	—	—	—	—	—	—
285	90	85,5	48,0	82,6	—	—	—	—	—	—
305	95	90,2	52,0	—	—	—	—	—	—	—
320	100	95,0	56,2	87,0	—	—	—	—	—	—
335	105	99,8	—	—	—	—	—	—	—	—
350	110	105	62,3	90,5	—	—	—	—	—	—
370	115	109	—	—	—	—	—	—	—	—
385	120	114	66,7	93,6	—	—	—	—	—	—
400	125	119	—	—	—	—	—	—	—	—
415	130	124	71,2	96,4	—	—	—	—	—	—
430	135	128	—	—	—	—	—	—	—	—
450	140	133	75,0	99,0	—	—	—	—	—	—
465	145	138	—	—	—	—	—	—	—	—
480	150	143	78,7	(101,4)	—	—	—	—	—	—
495	155	147	—	—	—	—	—	—	—	—
510	160	152	81,7	(103,6)	—	—	—	—	—	—
530	165	156	—	—	—	—	—	—	—	—
545	170	162	85,0	(105,5)	—	—	—	—	—	—
560	175	166	—	—	—	—	—	—	—	—
575	180	171	87,1	(107,2)	—	—	—	—	—	—
595	185	176	—	—	—	—	—	—	—	—
610	190	181	89,5	(108,7)	—	—	—	—	—	—
625	195	185	—	—	—	—	—	—	—	—
640	200	190	91,5	(110,1)	—	—	—	—	—	—
660	205	195	92,5	—	—	—	—	—	—	—
675	210	199	93,5	(111,3)	—	—	—	—	—	—
690	215	204	94,0	—	—	—	—	—	—	—
705	220	209	95,0	(112,4)	—	—	—	—	—	—
720	225	214	96,0	—	—	—	—	—	—	—
740	230	219	96,7	(113,4)	—	—	—	—	—	—
755	235	223	—	—	—	—	—	—	—	—
770	240	228	98,1	(114,3)	20,3	60,7	40,3	(69,6)	(41,7)	(19,9)
785	245	233	—	—	21,3	61,2	41,1	70,1	42,5	21,1
800	250	238	99,5	(115,1)	22,2	61,6	41,7	70,6	43,4	22,2
820	255	242	—	—	23,1	62,0	42,2	71,1	44,2	23,2
835	260	247	(101)	—	24,0	62,4	43,1	71,6	45,0	24,3
850	265	252	—	—	24,8	62,7	43,7	72,1	45,7	25,2
865	270	257	(102)	—	25,6	63,1	44,3	72,6	46,4	26,2
880	275	261	—	—	26,4	63,5	44,9	73,0	47,2	27,1
900	280	266	(104)	—	27,1	63,8	45,3	73,4	47,8	27,9
915	285	271	—	—	27,8	64,2	46,0	73,8	48,4	28,7
930	290	276	(105)	—	28,5	64,5	46,5	74,2	49,0	29,5
950	295	280	—	—	29,2	64,8	47,1	74,6	49,7	30,4
965	300	285	—	—	29,8	65,2	47,5	74,9	50,2	31,1
995	310	295	—	—	31,0	65,8	48,4	75,6	51,3	32,5
1030	320	304	—	—	32,2	66,4	49,4	76,2	52,3	33,9
1060	330	314	—	—	33,3	67,0	50,2	76,8	53,6	35,2
1095	340	323	—	—	34,4	67,6	51,1	77,4	54,4	36,5
1125	350	333	—	—	35,5	68,1	51,9	78,0	55,4	37,8



Example of a translation:

In the case of a result produced by means of translation, this notation must indicate which method was used to directly determine hardness.

Table left (continued)

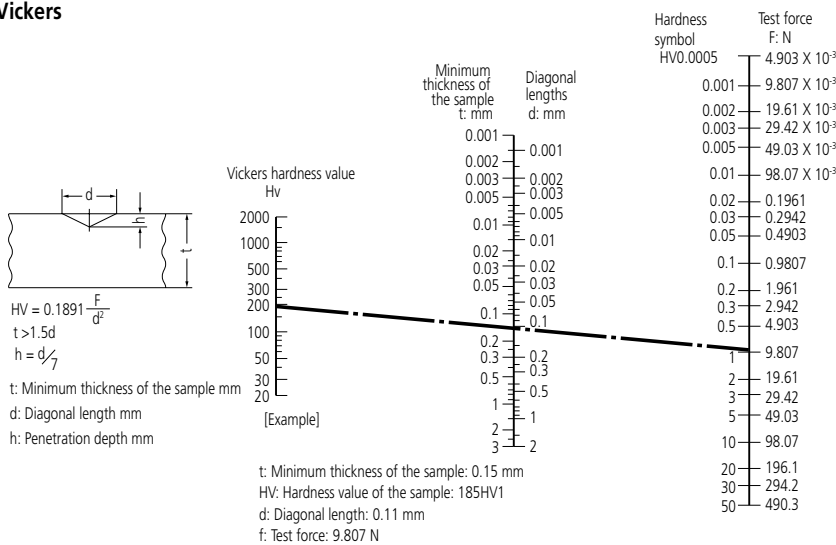
Tensile strength MPa	Vickers hardness HV10	Brinell hardness HB*	Rockwell hardness							
			HRB	HRF	HRC	HRA	HRD	HR15N	HR30N	HR45N
1155	360	342	—	—	36,6	68,7	52,8	78,6	56,4	39,1
1190	370	352	—	—	37,7	69,2	53,6	79,2	57,4	40,4
1220	380	361	—	—	38,8	69,8	54,4	79,8	58,4	41,7
1255	390	371	—	—	39,8	70,3	55,3	80,3	59,3	42,9
1290	400	380	—	—	40,8	70,8	56,0	80,8	60,2	44,1
1320	410	390	—	—	41,8	71,4	56,8	81,4	61,1	45,3
1350	420	399	—	—	42,7	71,8	57,5	81,8	61,9	46,4
1385	430	409	—	—	43,6	72,3	58,2	82,3	62,7	47,4
1420	440	418	—	—	44,5	72,8	58,8	82,8	63,5	48,4
1455	450	428	—	—	45,3	73,3	59,4	83,2	64,3	49,4
1485	460	437	—	—	46,1	73,6	60,1	83,6	64,9	50,4
1520	470	447	—	—	46,9	74,1	60,7	83,9	65,7	51,3
1555	480	456	—	—	47,7	74,5	61,3	84,3	66,4	52,2
1595	490	466	—	—	48,4	74,9	61,6	84,7	67,1	53,1
1630	500	475	—	—	49,1	75,3	62,2	85,0	67,7	53,9
1665	510	485	—	—	49,8	75,7	62,9	85,4	68,3	54,7
1700	520	494	—	—	50,5	76,1	63,5	85,7	69,0	55,6
1740	530	504	—	—	51,1	76,4	63,9	86,0	69,5	56,2
1775	540	513	—	—	51,7	76,7	64,4	86,3	70,0	57,0
1810	550	523	—	—	52,3	77,0	64,8	86,6	70,5	57,8
1845	560	532	—	—	53,0	77,4	65,4	86,9	71,2	58,6
1880	570	542	—	—	53,6	77,8	65,8	87,2	71,7	59,3
1920	580	551	—	—	54,1	78,0	66,2	87,5	72,1	59,9
1955	590	561	—	—	54,7	78,4	66,7	87,8	72,7	60,5
1995	600	570	—	—	55,2	78,6	67,0	88,0	73,2	61,2
2030	610	580	—	—	55,7	78,9	67,5	88,2	73,7	61,7
2070	620	589	—	—	56,3	79,2	67,9	88,5	74,2	62,4
2105	630	599	—	—	56,8	79,5	68,3	88,8	74,6	63,0
2145	640	608	—	—	57,3	79,8	68,7	89,0	75,1	63,5
2180	650	618	—	—	57,8	80,0	69,0	89,2	75,5	64,1
—	660	—	—	—	58,3	80,3	69,4	89,5	75,9	64,7
—	670	—	—	—	58,8	80,6	69,8	89,7	76,4	65,3
—	680	—	—	—	59,2	80,8	70,1	89,8	76,8	65,7
—	690	—	—	—	59,7	81,1	70,5	90,1	77,2	66,2
—	700	—	—	—	60,1	81,3	70,8	90,3	77,6	66,7
—	720	—	—	—	61,0	81,8	71,5	90,7	78,4	67,7
—	740	—	—	—	61,8	82,2	72,1	91,0	79,1	68,6
—	760	—	—	—	62,5	82,6	72,6	91,2	79,7	69,4
—	780	—	—	—	63,3	83,0	73,3	91,5	80,4	70,2
—	800	—	—	—	64,0	83,4	73,8	91,8	81,1	71,0
—	820	—	—	—	64,7	83,8	74,3	92,1	81,7	71,8
—	840	—	—	—	65,3	84,1	74,8	92,3	82,2	72,2
—	860	—	—	—	65,9	84,4	75,3	92,5	82,7	73,1
—	880	—	—	—	66,4	84,7	75,7	92,7	83,1	73,6
—	900	—	—	—	67,0	85,0	76,1	92,9	83,6	74,2
—	920	—	—	—	67,5	85,3	76,5	93,0	84,0	74,8
—	940	—	—	—	68,0	85,6	76,9	93,2	84,4	75,4

* The Brinell hardness values to 450 HB were determined using the steel ball as Indenter, and above this level using the carbide ball.

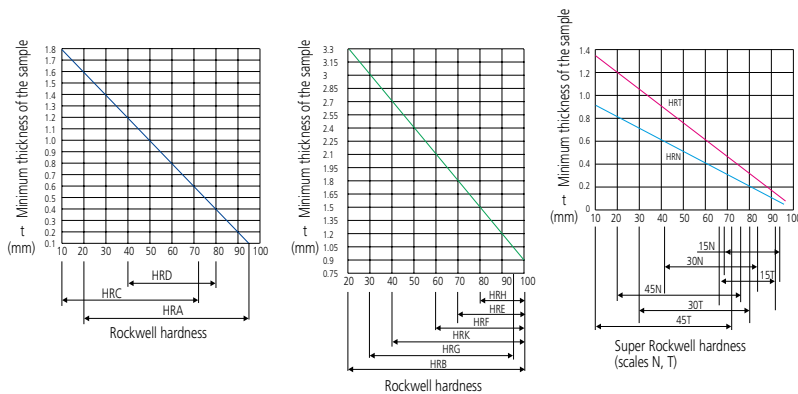
NOTE: The figures in brackets indicate hardness values that are outside the definition range of the standardized hardness testing method, but which are practically used as approximate values in many cases.

Additional information

Vickers



Rockwell Super Rockwell (scale N, T) hardness



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