

# HARDNESS TESTING

# DUROLINE V SERIES





# MACRO VICKERS

AUTOMATIC HARDNESS TESTING

File: MacroMeasurement - File Window - Help - Function - Search

550.0

HVT  
Diagonal 1: 0.0853 mm  
Diagonal 2: 0.0865 mm

Measurement	Unit	Minimum	Maximum
HVT	HVT	HVT	HVT

Macro Measurement Data Table

Material	Hardness	Diagonal 1	Diagonal 2
Steel	550.0	0.0853 mm	0.0865 mm

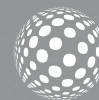
40

Macro Measurement Data Table

Material	Hardness	Diagonal 1	Diagonal 2
Steel	550.0	0.0853 mm	0.0865 mm

3D diamond pyramid model

0.001



# DUROLINE V1

Smart hardness testing with smashing performance  
- NEW GENERATION -

## Main system features

- Versatile Macro load range for HV/HK scales from 300gf up to 30kgf
- Closed-Loop Controlled load application by load cell technology
- Auto Measurement with Zoom Window for more accurate measurement
- Flexible Windows 10 based hardness test & measurement program METKON N-Sure
- Database generating test results and reports
- 22" Full HD Capacitive 10-point Multi-Touch desktop monitor
- Integrated high-res camera 5.0 MP with USB3.0 interface with zoom capability
- Integrated LED light source with controller
- Integrated Windows operated mini-pc, Intel, SSD specs
- Interface network USB [x4], Displayport [x2], LAN [x1] and Wireless LAN
- Very robust opto-mechanical system
- New generation electronics and motors in full system integration ensuring reliable performance
- Service friendly, remote accessibility
- Meets latest ISO, ASTM and JIS standards



## DESIGN

DUROLINE V Series are ideal instruments for quality assurance, quality control, research and metallurgical departments to monitor the hardness during fabrication and after heat treatment or welding as well as for the performance analysis on metal parts and new alloys. Typical applications are determining the Vickers macro-hardness of steel alloys and metal components, small precision parts, thin material or wire, coatings and performing case depth determinations (CHD, EHT, NHT) on cross sections.

Recently developed by an international multi-disciplinary team with a wide hardness testing experience, the DUROLINE V-Series are based on the latest technology available, focused on fast cycle time with high reproduceable accuracy within international standards. The system features a smart and very service-friendly synergy of a robust and proven mechanical construction with load cell force control and integrated electronics system control featured by a fast CANBUS technology and a high-quality Windows based mini-pc. Monitoring the hardness testing process significantly improved by using modern user interfacing technology such as 10-point multi-touch screen operation supported by a fast & secure display connection. Combined with top quality components and a high performance mini-pc, this system guarantees customers a solid and accurate performance over many years to come. In this way, the DUROLINE V Vickers hardness tester series offers a highly functional and reliable automated indentation test & measurement system.

### Versatile macro-load range for HV/HK scales from 300gf to 30kgf

By selecting between 9 loads steps for macro-hardness testing in Vickers or Knoop, any specimen can be tested and measured within the applicable standards. Fast and easy setting of loads by touch screen monitor menu icon.



DUROLINE V-Series Macro Vickers Hardness Tester



Robust Mechanical Design



22" Full HD Capacitive 10-point Multi-Touch desktop monitor

### Magnification range

Combining the excellent performance of the digital camera, LED illumination and software with a series of available objectives, the DUROLINE V Series provide correct measurement under any test load within the international standards.



# N-Sure TEST & MEASUREMENT SOFTWARE

The METKON N-Sure software program features a flexible Windows based user interface that increases productivity and operator efficiency by automating the test & measurement process. Since the application and removal of the test loads and measurement are fully automatic, repeatability is excellent, testing time is reduced and throughput is increased. As a result, costly and time-consuming rework is eliminated.

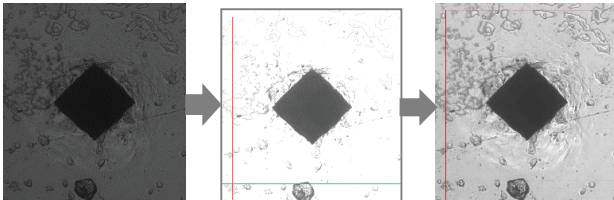
For high-volume mounted sample testing, multi-sample mount holders are available to further increase the productivity and throughput of samples.



METKON N-Sure Advanced User Interface Software

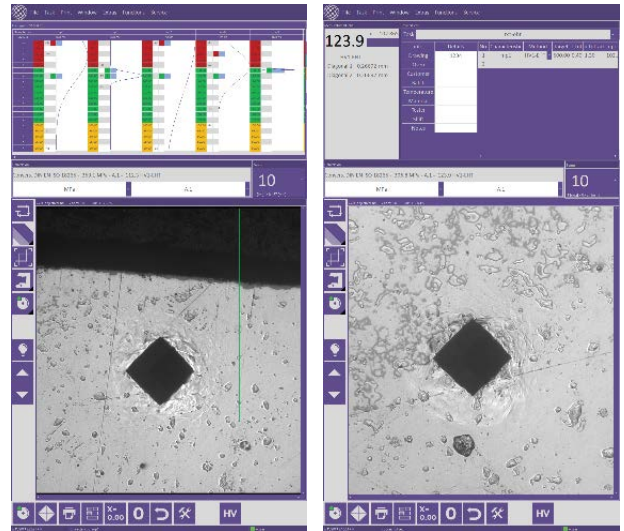
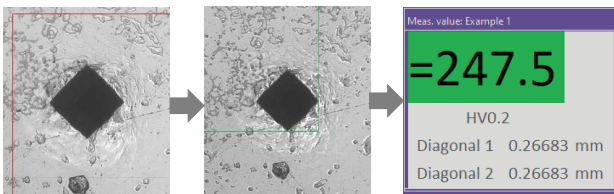
## Automatic Light Brightness

The light brightness is automatically adjusted for the best image quality and the most accurate auto measurements.



## Automatic Evaluation

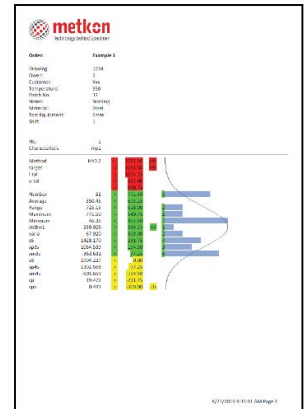
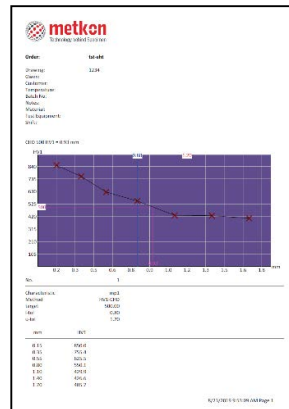
Diagonals of indentation are measured automatically and hardness value appear on the screen.



The easy-to-operate test & measurement program, clear images captured by integrated camera and high-resolution display on 22" touch screen monitor provide the lab staff easy access and shared visibility of indent results to analyze and discuss together. Operators are guided by the user-friendly program logic combined with quick system settings such as fast and easy setting of loads by touch screen monitor menu icon. Vickers or Knoop hardness values are automatically generated on screen by use of the standard provided Auto-measurement function.

## Database generating test results and reports

METKON N-Sure software program provides advanced database management of test results, report generation and printing functions. Saving and retrieving measurement data is an absolute requirement when it comes to testing hardness results of critical components in various industrial segments. The N-Sure program ensures that data is safely stored and presented in standard or customized reporting form.



No.	Date	Time	Characteristics	1	2	3	4
1	10/10/2010	10:10:10	Hardness	100	100	100	100
2	10/10/2010	10:10:10	Temperature	100	100	100	100
3	10/10/2010	10:10:10	Load	100	100	100	100
4	10/10/2010	10:10:10	Time	100	100	100	100

No.	Date	Time	Characteristics	1	2	3	4
1	10/10/2010	10:10:10	Hardness	100	100	100	100
2	10/10/2010	10:10:10	Temperature	100	100	100	100
3	10/10/2010	10:10:10	Load	100	100	100	100
4	10/10/2010	10:10:10	Time	100	100	100	100

# FULLY AUTOMATIC TEST & MEASUREMENT



Distance between measurements, distance between edge and number of measurements can be set easily. The measurement pattern can be placed easily on the sample and easily aligned according to edge angle. CHD graphic is generated and updated automatically after each measurement completed.



NHT Testing

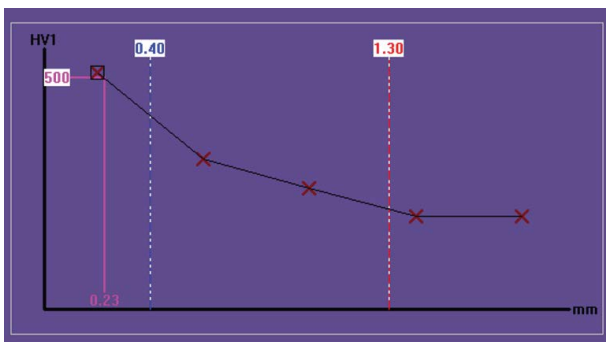
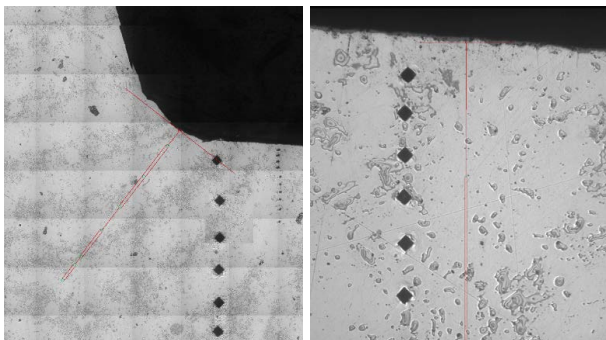
CHD Testing

## Case Hardening Depth (CHD) Testing

Case Hardening Depth Module is optionally available for DUROLINE V-series.

DUROLINE V-series can be equipped with a Digital Manual XY-Stage that includes one Slynac digital micrometer and one analogue micrometer. Readings from Slynac micrometer is transferred to N-Sure software simultaneously. In this way, automatic features of CHD software module can be used.

After all measurements are done, it is possible to generate test results in report format.



**Order:** tst-eh  
**Drawing:** 1234  
**Customer:**  
**Temperature:**  
**Batch No:**  
**Notes:**  
**Material:**  
**Test Equipment:**  
**Shift:**

CHD 500 HV1 = 0.93 mm

No.	1
Characteristic	mp1
Method	HV1-CHD
target	500.00
l-tol	0.80
u-tol	1.20

mm	HV1
0.15	850.0
0.35	755.4
0.55	625.5
0.80	550.1
1.10	429.9
1.40	426.6
1.70	405.7

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**Factory Certificated Direct and Indirect Calibration Report**

All DUROLINE V-Series testers are calibrated in Metkon Factory according to DIN EN ISO 6507-2:2018 Vickers hardness test standard.

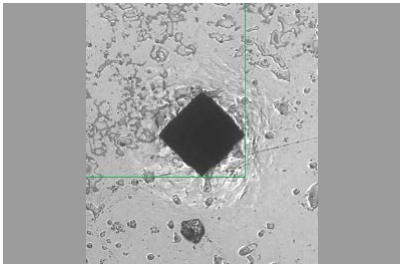
**Comes with ISO/DaKKs Certificated Vickers Indenter (Made in Germany)**

An ISO/DaKKs Certificated Vickers Diamond Indenter is included as standard for all DUROLINE V-Series Hardness Testers.





# GENERAL FEATURES HIGHLIGHT



## Automatic Test & Measurement

The measurement program provided as standard the Auto-measurement function for fast and repeatable results. This provides extra convenience and time saving. Manual measurement is always possible, as well as re-measurement or deleting single hardness values.



## N-Sure Advanced User Interface Software

The METKON N-Sure software program features a flexible Windows based user interface that increases productivity and operator efficiency by automating the test & measurement process. The User Interface has an immediate recognition and provides a user-friendly flexibility in settings and daily operation.



## 22" Full HD Multi-Touch Desktop Monitor

The easy-to-operate test & measurement program, clear images capture by integrated camera and high-resolution display on 22" touch screen monitor provide the lab staff easy access and shared visibility of indent results to analyze and discuss together.



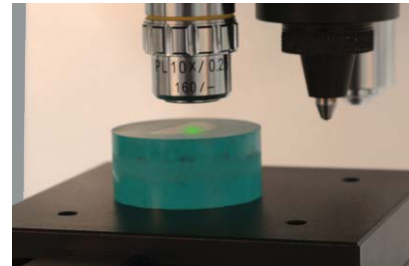
## Integrated Windows Operated Mini-PC

A Windows operated industrial mini-pc is hidden inside the hardness tester. Thus, no additional space is required for your laboratory. It is capable to work 24/7 thanks to its compact, robust design. Equipped with powerful Intel processor and SSD drive to provide smooth and fast operation.



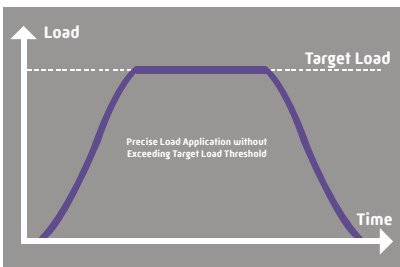
## Integrated High Resolution CCD Camera

A high resolution CCD camera is hidden inside the hardness tester. It has 5.0 MP resolution which provides to capture very clear indentation image for accurate auto measurement. It has USB 3.0 interface to transfer image to monitor without any delay. This means; when you move the specimen that under the objective, the image on the monitor also moves very smoothly and quickly at the same time.



## Automatic Light Brightness

The light brightness is automatically adjusted by the user interface software for the best image quality and the most accurate auto measurements. The hardness tester equipped with powerful LED light source and compact optic system to provide excellent image quality.



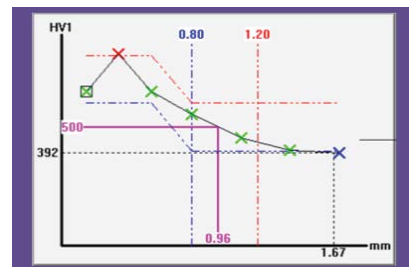
## Closed-Loop Controlled Load Application by Load Cell Technology

All DUROLINE V-Series testers equipped high technology closed-loop load cell system. Load cell system provides maximum accuracy and repeatability for all test loads without exceeding target load threshold.



## High precision spindle

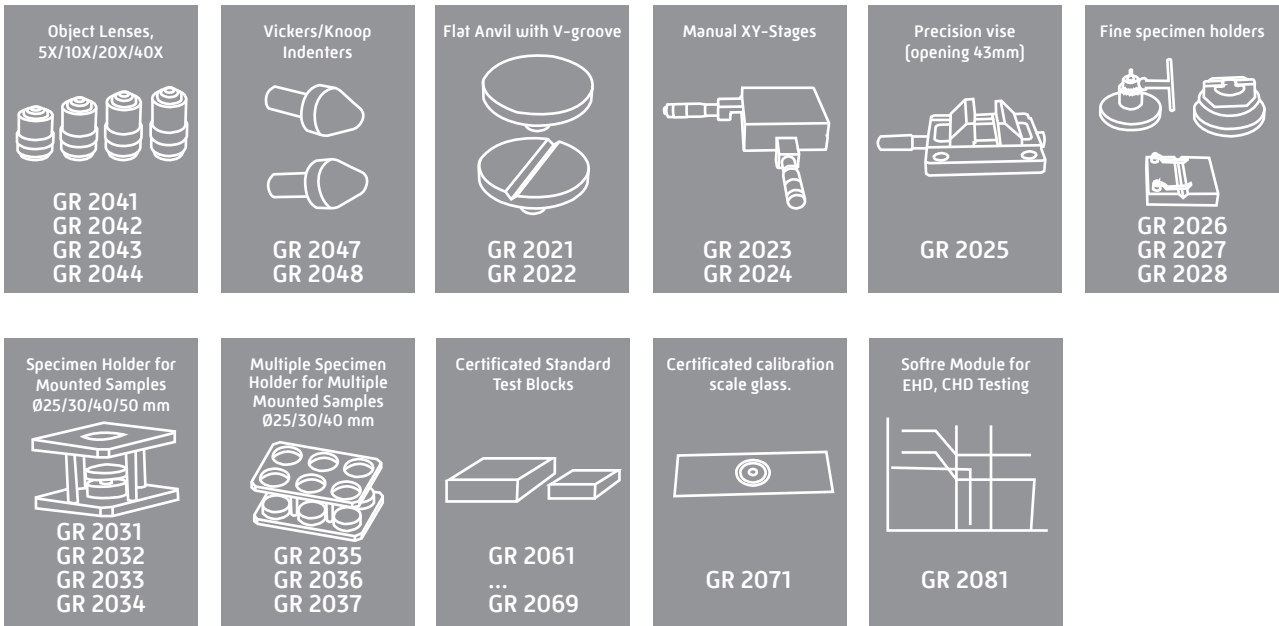
For accurate Vickers hardness testing, the elevating speed and backlash of the spindle are critical. By using quality components and design experience, the DUROLINE V Series spindles guarantee long life without loss of accuracy due to wear and friction, even for large and heavy specimens.



## EHT - CHD Testing

XY-stage with one Slyvac digital micrometer and software module for EHT-CHD testing are optionally available for all DUROLINE V-Series. Possibility to direct reading of Slyvac micrometer signals by N-Sure software and generate case hardening depth graph.

## ACCESSORIES



### Test stages

The DUROLINE V Series feature various stages and fixtures that fit any application. Starting with the basic manual XY-stage with either mechanical or digital micrometers. The hardness tester can also be equipped with single or multi-sample holders to fix mounted specimens. To fix various geometries of specimen that are not mounted, there are several clamping devices available to finish job quick and precise.



High Precision Manual XY Stages



High Precision Test Anvils

### Object Lenses

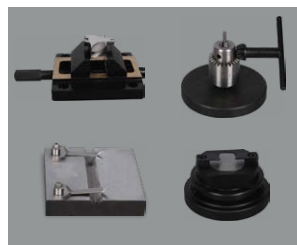
DUROLINE V equipped with 10x and 20x high quality German made object lenses for maximum image sharpness. 5x and 40x objectives are also optionally available for all kind of testing needs.

### Test Blocks

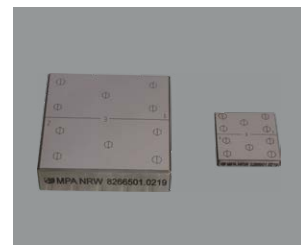
ISO/DaKKS certificated German made test blocks are optionally available for Indirect verification of tester.

### Indenters

ISO/DaKKS certificated German made Vickers and Knoop indenters are optionally available for most accurate and reliable testing.



High Precision Sample Holders



ISO/DaKKS Certificated Test Blocks



ISO/DaKKS Certificated Vickers and Knoop Indenters



High Quality Object Lenses with 5X, 10x, 20x and 40x Magnification



# SPECIFICATIONS

ORDER NO	72 11	
MODEL NO	V1	
	Vickers HV as per ISO 6507, ASTM E384, E92	HV0,3 - HV0,5 - HV1 - HV2 - HV3 - HV5 - HV10 - HV20 - HV30
Hardness Scales	Knoop HK as per ISO 4545, ASTM E384, E92	HK0,3 - HK0,5 - HK1 - HK3
	Hardness conversions to other scales	As per ISO 18265
Test Loads	Test Loads (gf)	300gf - 500gf - 1kgf - 2kgf - 3kgf - 5kgf - 10kgf - 20kgf - 30kgf
	Test Loads (N)	2,942N - 4,904N - 9,807N - 19,631N - 29,420N - 49,033N - 98,067N - 196,033N - 294,200N
	Test Load Accuracy	All loads within +/- 1,0% As per ISO standard (and ASTM E-384, ASTM E-92-17, JIS B7725, JIS B7734)
	Test Load Dwell Time	"from 5 - 99 sec with 1 sec increments As per ISO standard (and ASTM E-384, JIS B7725, JIS B7734)"
	Test Load Application Speed	For all loads not more than 0.200 mm/s As per ISO standard (and ASTM E-384, JIS B7725, JIS B7734)
	Load Force Application	Motorized force application with closed loop load cell control, Automatic load, dwell, unload
	Load Selection	By METKON N-Sure test settings
Turret	Turret Configuration	Motorized 3-mount turret: 1 indenter, 2 objectives Position Auto-indication
	Indenter	Including 1 Vickers Diamond Indenter (ISO/DaKks certified, Made in Germany)
	Objectives	"Standard objectives 10X, 20X, optional 5X, 40X (Made in Germany) Image capture by integrated CCD-camera (no eyepiece)"
Optic System	Sample Image Capture	By Integrated CCD Camera, 5.0 MP, USB 3.0 (Made in Germany)
	Indent Measurement Resolution	0,00002 mm (0,02 µm)
Illumination	Illumination Source	Built-in LED Light Source
	Automatic Brightness Control	Standard for highest contrast and sharpnes
Spindle	Z-axis (Spindle Vertical Movement)	Manual
Controller System	Controller	"Built-in Windows operated mini-PC, communicates the hardness tester electronics by CANBUS Protocol"
	Interface Network	Interface network USB (x4), Displayport (x2), LAN (x1) and Wireless LAN
	Auxilliary	Optional Keyboard, Mouse (wireless)
	Monitor	"External 22" Full HD Capacitive 10-point Multi-Touch Desktop Monitor, IPS Panel, Antistatic Shield, Tilttable, Integrated Power Adaptor"
User Interface	Operating System	Windows 10
	User Interface Software	METKON N-Sure
	Test Settings	Scale, Load Dwell Time, Start, Turret positioning, Hardness Conversion, Illumination, Screen preference settings, Alerts for errors
	Measurement Settings	Surface Image capture, Indentation capture, Manual measurement and Auto-measurement, Single indents, Manual pattern, Preset pattern, CHD, EHT, NHT, GO/NG judgement, Statistics, Conversion, Cylindrical correction, Language, Database, Test Reports with image analysis data, Data export, User management, Service and Calibration Settings
Tester Body	Operational Environmental Conditions	"Ambient Operating Temperature Range: 23°C +/- 5°C Ambient Humidity Range: RH 40% to 70% relative humidity, non-condensing"
	Dimensions, WxDxH	240x560x735 mm
	Specimen Accommodation	Vertical 223 mm, Horizontal (throat depth) 164 mm
	Weight	75 kgs
	Mains	100-240 V, 1-phase, 50/60 Hz, autsetting

# SPECIFICATIONS

72 11

## — DUROLINE V1

Vickers/Knoop Macro-Hardness Tester with Test & Measurement software Windows 10 "N-Sure" including Auto-Measurement module, closed loop load cell controlled force application  
Test Loads: 300gf, 500gf, 1kgf, 2kgf, 3kgf, 5kgf, 10kgf, 20kgf, 30kgf  
HV0,3-HV0,5-HV1-HV2-HV3-HV5-HV10-HV20-HV30  
HK0,3-HK0,5-HK1-HK3 in compliance with standard ISO 6507, ASTM E-384, ASTM E92-17 User Interface by 22" full HD 10-point multi-touch desktop monitor, integrated high resolution 5.0 MP USB 3.0 CCD camera, automatic measurement with zoom capability and automatic light brightness, with automatic test sequence by motorized turret and load motor force control by closed loop load cell system, adjustable internal LED illumination, large sample accommodation area, emergency stop. Automatic voltage setting 100-240 V, 1-phase, 50/60 Hz.

### Standard delivery includes:

Hardness Tester equipped with macro-spindle, Desktop Monitor on solid stand, METKON N-Sure software incl. Auto-Measurement module, ISO/Dakks Certified Vickers diamond indenter, Objective 10x, Objective 20x, flat anvil dia. 80mm, 4 adjustable tester feet, Water level indicator, Indenter protection nose, Dust Cover, Power Cable, Monitor Interface Cable, Factory Test Certificate with ISO/ASTM verifications, solid accessories box.

Note: Select below the additional XY-stage, anvils, sample fixtures and test blocks.

GR 2041  
GR 2042  
GR 2043  
GR 2044

### Object Lenses for Vickers/Knoop Hardness Testing

- Object lens 5x
- Object lens 10x
- Object lens 20x
- Object lens 40x

GR 2047  
GR 2048

### Indenters for Vickers/Knoop Hardness Testing

- ISO/ASTM Certificated Vickers diamond indenter
- ISO/ASTM Certificated Knoop diamond indenter

GR 2021  
GR 2022  
GR 2023

### Anvils and XY-Stages for Vickers/Knoop Hardness Testing

- Flat anvil diameter 80mm
- Flat Anvil with V-groove, diameter 80mm
- Analogue XY-stage 100x100mm, travel 25x25mm, with two analogue micrometers
- Digital Manual XY-stage 100x100mm, travel 25x25mm, with one digital Slyvac micrometer incl. cable and one analogue micrometer  
(GR 2081 Software Module is required for CHD/EHT testing)  
(To be ordered simultaneously with the machine order)

GR 2024

### Software Modules for Vickers/Knoop Hardness Testing

- Software Module for CHD Testing [EHT]  
(Digital XY-Stage [GR2024] or Motorized stage is required)  
(To be ordered simultaneously with the machine order)

GR 2081

GR 2025  
GR 2026  
GR 2027  
GR 2028  
GR 2031  
GR 2032  
GR 2033  
GR 2034  
GR 2035  
GR 2036  
GR 2037

### Specimen Holders for Vickers/Knoop Hardness Testing

- Precision vise (opening 43mm)
- Thin specimen holder
- Fine specimen holder (Horizontal type)
- Fine specimen holder (Vertical type)
- Specimen holder for Ø25 mm specimens
- Specimen holder for Ø30 mm specimens
- Specimen holder for Ø40 mm specimens
- Specimen holder for Ø50 mm specimens
- Multiple specimen holder for 6xØ25 mm specimens
- Multiple specimen holder for 6xØ30 mm specimens
- Multiple specimen holder for 6xØ40 mm specimens

GR 2061  
GR 2062  
GR 2063  
GR 2064  
GR 2065  
GR 2066  
GR 2067  
GR 2068  
GR 2069  
GR 2071

### Verification Tools for Vickers/Knoop Hardness Testing

- ISO Dakks Germany Certified standard block 200HV0.3 (30x30x6mm)
- ISO Dakks Germany Certified standard block 450HV0.3 (30x30x6mm)
- ISO Dakks Germany Certified standard block 700HV0.3 (30x30x6mm)
- ISO Dakks Germany Certified standard block 200HV1 (30x30x6mm)
- ISO Dakks Germany Certified standard block 450HV1 (30x30x6mm)
- ISO Dakks Germany Certified standard block 700HV1 (30x30x6mm)
- ISO Dakks Germany Certified standard block 200HV5 (60x60x6mm)
- ISO Dakks Germany Certified standard block 450HV5 (60x60x6mm)
- ISO Dakks Germany Certified standard block 700HV5 (60x60x6mm)
- ISO Certificated calibration scale glass.

\*Other standard test blocks are on request

\* Other voltages and frequencies available upon request. Please state when ordering. All specifications are subject to change without notice.

# DIMENSIONS

