

## VICKERS HARDNESS TESTERS

### VICKERS HARDNESS TEST

The Vickers hardness test was developed in 1924 by Smith and Sandland at Vickers Ltd as an alternative to the Brinell method to measure the hardness of materials.

The Vickers test is often easier to use than other hardness tests, since the required calculations are independent of the size of the indenter, and the indenter can be used for all materials irrespective of hardness.

The basic principle, as with all common measures of hardness, is to observe the questioned material's ability to resist plastic deformation from a standard source.

The Vickers test can be used for all metals and has one of the widest scales among hardness tests. The unit of hardness given by the test is known as the Vickers Pyramid Number (HV) or Diamond Pyramid Hardness (DPH).

The hardness number can be converted into units of Pascals, but should not be confused with a pressure, which also has units of Pascals. The hardness number is determined by the load over the surface area of the indentation and not the area normal to the force, and is therefore not a pressure.

The hardness number is not really a true property of the material and is an empirical value that should be seen in conjunction with the experimental methods and hardness scale used.

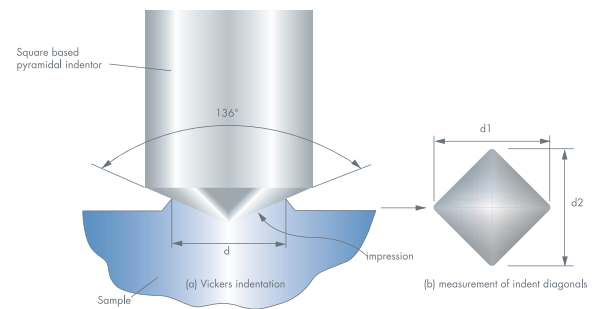
When doing the hardness tests the distance between indentations must be more than 2.5 indentation diameters apart to avoid interaction between the work-hardened regions.

#### Implementation

An indentation left in case-hardened steel after a Vickers hardness test. It was decided that the indenter shape should be capable of producing geometrically similar impressions, irrespective of size; the impression should have well-defined points of measurement; and the indenter should have high resistance to self-deformation. A diamond in the form of a square-based pyramid satisfied these conditions. It had been established that the ideal size of a Brinell impression was  $\frac{3}{8}$  of the ball diameter. As two tangents to the circle at the ends of a chord  $\frac{3d}{8}$  long intersect at  $136^\circ$ , it was decided to use this as the included angle of the indenter. The angle was varied experimentally and it was found that the hardness value obtained on a homogeneous piece of material remained constant, irrespective of load. Accordingly, loads of various magnitudes are applied to a

flat surface, depending on the hardness of the material to be measured.

The HV number is then determined by the ratio  $F/A$  where  $F$  is the force applied to the diamond in kilograms-force and  $A$  is the surface area of the resulting indentation in square millimetres.  $A$  can be determined by the formula which can be approximated by evaluating the sine term to give where  $d$  is the average length of the diagonal left by the indenter.



Vickers hardness numbers are reported as  $xxxHVyy$ , e.g. 440HV30, or  $xxxHVyy/zz$  if duration of force differs from 10s to 15s, e.g. 440Hv30/20, where:

440 is the hardness number,  
 HV gives the hardness scale (Vickers),  
 30 indicates the load used in kg.  
 20 indicates the loading time if it differs from 10s to 15s  
 Vickers values are generally independent of the test force: they will come out the same for 500gf and 50kgf, as long as the force is at least 200gf.

Examples of HV values for various materials

Material	Value
316L stainless steel	140HV30
347L stainless steel	180HV30
Carbon steel	55–120HV5
Iron	30–80HV5

**VICKERS HARDNESS TESTERS**

Micro / Macro Vickers  
with digital eyepiece



Micro / Macro Vickers with INNOVAVIEW™  
machine Vision system





**412A/413A**

ANALOGUE MICROSCOPE, 1KGF TEST FORCE

**Micro-Vickers & Knoop**

- Motorized turret, 2 objectives or 3 objectives
- Test loads 10gr-1kgf
- Analogue microscope
- Built-in hardness calculator
- Shows calculated values on display
- Large workpiece accommodation
- RS-232 output
- Built-in printer



**412D/413D**

ELECTRONIC MICROSCOPE, 1KGF TEST FORCE

**Micro-Vickers & Knoop**

- Motorized turret, 2 objectives or 3 objective
- Test loads 10gr-1kgf
- Electronic microscope, digital value transfer
- Large LCD display shows measured values, on-line statistics, memory overview, tester settings
- Large workpiece accommodation
- RS-232 output
- Built-in printer



**422A/423A**

ANALOGUE MICROSCOPE, 2KGF TEST FORCE

**Micro-Vickers & Knoop**

- Motorized turret, 2 objectives or 3 objectives
- Test loads 10gr-2kgf
- Analogue microscope
- Built-in hardness calculator
- Shows calculated values on display
- Large workpiece accommodation
- RS-232 output
- Built-in printer



**422D/423D**

DIGITAL MICROSCOPE, 2KGF TEST FORCE

**Micro-Vickers & Knoop**

- Motorized turret, 2 objectives or 3 objectives
- Test loads 10gr-2kgf
- Electronic microscope, digital value transfer
- Large LCD display shows measured values, on-line statistics, memory overview, tester settings
- Large workpiece accommodation
- RS-232 output
- Built-in printer



**NEXUS 4300 SERIES**

CLOSED LOOP 20GF TO 31.25KGF

**Micro-Vickers, Vickers, Knoop & low force Brinell**

- Load cell, closed loop, force feed back system
- Motorized turret with 2 or 3 objectives
- Test loads 20gr-31.25kgf
- Conversion to other hardness scales including Tensile Strength
- Digital eyepiece and camera adaptor
- Large LCD display shows measured values, on-line statistics, memory overview, tester settings
- Large workpiece accommodation
- RS-232 output
- Built-in printer

**Available force configurations:**

- **NEXUS 4300**  
1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30kgf
- **NEXUS 4301**  
1 - 2 - 2.5 - 3 - 4 - 5 - 6.25 - 10 - 15.625 - 20 - 31.25kgf
- **NEXUS 4302**  
0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30kgf
- **NEXUS 4303 (most common)**  
0.02 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30kgf
- **NEXUS 4304**  
As 4303 + additional 2.5 - 6.25 - 15.625 - 31.25kgf



**NEXUS 4500 SERIES**

CLOSED LOOP 100GF TO 62.5KGF

**Micro-Vickers, Vickers, Knoop & low force Brinell**

- Load cell, closed loop, force feed back system
- Motorized turret with 2 or 3 objectives
- Test loads 100gr-62.5kgf
- Conversion to other hardness scales including Tensile Strength
- Digital eyepiece and camera adaptor
- Large LCD display shows measured values, on-line statistics, memory overview, tester settings
- Large workpiece accommodation
- RS-232 output
- Built-in printer

**Available force configurations:**

- **NEXUS 4500**  
1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30 - 50kgf
- **NEXUS 4501**  
1 - 2 - 2.5 - 3 - 4 - 5 - 6.25 - 10 - 15.625 - 20 - 31.25 - 62.5kgf
- **NEXUS 4502**  
0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30 - 50kgf
- **NEXUS 4503 (most common)**  
0.1 - 0.2 - 0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30 - 50kgf
- **NEXUS 4504**  
As 4503 + additional 2.5 - 6.25 - 15.625 - 31.25 - 62.5kgf



**MICRO-VICKERS**

**400, MOTORIZED X-Y STAGE**



**INNOVAVIEW™ INV1 (Basic system)**

- Basic vision indent measuring system with advanced capabilities.
- Manual measurement of the indent on the LCD screen
- Case Hardness Depth, store, file, handle images and data on the harddisk
- Auto indent measuring optional



**INNOVAVIEW™ INV2 (Basic system, digital X-Y stage)**

- The same as INV1 plus digital micrometer(s) on the X-Y stages to measure stage displacement
- Control accurate indent coordinate
- Auto indent measuring optional



**INNOVAVIEW™ INV3 (Semi Automatic, motorized X-Y stage)**

- INV1 plus motorized X-Y stage (small or large)
- Automatic pattern and traverse system
- Workpiece position control over PC operation
- High resolution CCD system shows real time measurement.
- Auto indent measuring optional



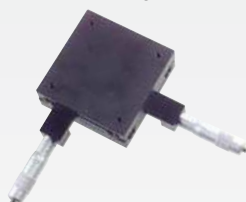
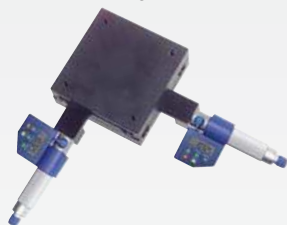


**INNOVAVIEW™ INV4 (Fully automatic, auto focus, auto measure)**

- Equals to INV 3
- Full options including automatic indent measuring
- Automatic focussing Z-axis (Built-in system)
- Allows a series of automatic test with storage of test results and test images without operator interference
- Saves time and money.



**REGULAR VICKERS**

**NEXUS 4000, MOTORIZED X-Y STAGE**

<p>Analogue</p>  <p>INV1</p>	<p>Digital</p>  <p>INV2</p>	<p>Motorized, small</p>  <p>INV3 &amp; INV4</p>	<p>Motorized, large</p>  <p>INV3 &amp; INV4</p>
<p><b>INNOVAVIEW™ INV1 (Basic system)</b></p> <ul style="list-style-type: none"> <li>• Basic vision indent measuring system with advanced capabilities</li> <li>• Manual measurement of the indent on the LCD screen</li> <li>• Case Hardness Depth, store, file, handle images and data on the harddisk</li> <li>• Auto indent measuring optional</li> </ul>	<p><b>INNOVAVIEW™ INV2 (Basic system, digital X-Y stage)</b></p> <ul style="list-style-type: none"> <li>• The same as INV1 plus digital micrometer(s) on the X-Y stages to measure stage displacement</li> <li>• Control accurate indent coordinate</li> <li>• Auto indent measuring optional</li> </ul>	<p><b>INNOVAVIEW™ INV3 (Semi Automatic, motorized X-Y stage)</b></p> <ul style="list-style-type: none"> <li>• INV1 plus motorized X-Y stage (small or large)</li> <li>• Automatic pattern and traverse system</li> <li>• Workpiece position control over PC operation</li> <li>• High resolution CCD system shows real time measurement.</li> <li>• Auto indent measuring optional</li> </ul>	<p><b>INNOVAVIEW™ INV4 (Fully automatic, auto focus, auto measure)</b></p> <ul style="list-style-type: none"> <li>• Equals to INV 3</li> <li>• Full options including automatic indent measuring</li> <li>• Automatic focussing Z-axis (Built-in system)</li> <li>• Allows a series of automatic tests with storage of test results and test images without operator interference</li> <li>• Saves time and money</li> </ul>





**400 ANALOGUE**  
MICRO-VICKERS & KNOOP



**400 DIGITAL**  
MICRO-VICKERS & KNOOP

**FEATURES**

**400A series**

- Motorized turret
- Analogue microscope
- Motorized load control
- Statistics and conversions
- X-Y stage with 0.01mm resolution
- Built-in high speed printer
- Second optical or Video path

**FEATURES**

**400D series**

- Motorized turret
- High resolution electronic microscope, digital value transfer
- Conversion to other hardness scales
- Motorized load control
- Statistics and conversions
- X-Y stage with 0.01mm resolution
- Built-in high speed printer
- Second optical or Video path

## MICRO-VICKERS

## 400 SERIES

### 400A SERIES - ANALOGUE EYEPIECE READING

A traditional hardness testing system using a high precision load application mechanism. The 400 series is available in different configurations starting at 10gf ranging to 2kgf maximum force. The standard motorized single objective turret can be completed with a second indenter or 3 objectives to ensure maximum flexibility. The 400 series has an analogue eyepiece (15x magnification) with bright micrometer reading to determine the indent diagonals. The values obtained from the micrometer can be keyed in to the graphic user interface. The automatically calculated Vickers or Knoop hardness will be shown on the bright display.



### 400D SERIES - DIGITAL EYEPIECE READING

As an alternative to the standard 400 series, the series 400D offers a digital electronic microscope with enhanced functionality and high resolution readings. Obtained diagonal measurements are transferred automatically to the CPU system and calculated to the actual Vickers or Knoop value. The 400D has more advanced display functions. The system shows realtime statistic values, converts to Rockwell, Brinell, Leeb and UTS (tensile strength). The 423D the top model of the range, is one of the most advanced traditional Micro-Vickers systems currently available.



## FORCE RANGING FROM 10GF UP TO 2KGF WITHOUT CHANGING WEIGHTS

The 400 series allows testing workpieces of a wide variety. The test force can be selected with the help of an easy to operate selector knob on the side of the tester. Replacing any weights is not necessary. The tester does the full range up to 2kg by just turning the selector knob to the required force position. The test range of the 400 series is quite unique for a traditional micro-hardness tester.

High accuracy, flexibility and pure efficiency are synonyms for the 400 series.

400A ANALOGUE EYEPIECE



400D DIGITAL EYEPIECE





## AVAILABLE FORCE CONFIGURATIONS

**412A** 1kg Analogue, 2 objectives for measuring/observation  
**413A** 1kg Analogue, 3 objectives for measuring/observation

**412D** 1kg Digital, 2 objectives for measuring/observation  
**413D** 1kg Digital, 3 objectives for measuring/observation

**422A** 2kg Analogue, 2 objectives for measuring/observation  
**423A** 2kg Analogue, 3 objectives for measuring/observation

**422D** 2kg Digital, 2 objectives for measuring/observation  
**423D** 2kg Digital, 3 objectives for measuring/observation

**ALL MODELS HAVE A MOTORIZED TURRET.  
 DUAL INDENTOR POSITION ON REQUEST.**

## STAGES

Manual X-Y-Z stage, Motorized X-Y stage, Motorized X-Y-Z stage  
 INNOVAVIEW™ CCD system with Video filar INV-1, 2 or 3  
 INNOVAVIEW™ CCD system with auto focus and Video filar, INV-4

## TURRET CONFIGURATION

Fully automatic 4 position turret for Micro-Vickers / Macro Vickers, Knoop measurements, 2 or 3 objectives at choice, all 3 objectives can be used for measuring and observation, 1 or 2 indentor positions (Vickers & Knoop)

## INDENTORS

Vickers or Knoop

## EYEPIECE

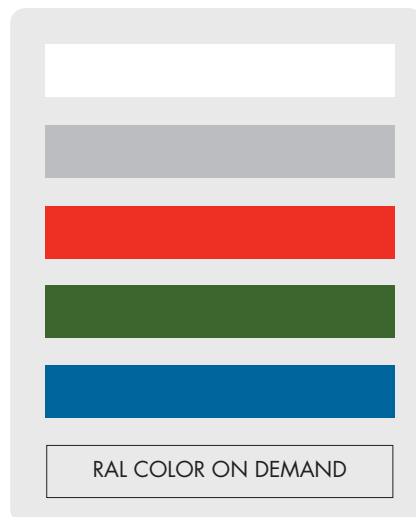
Electronic eyepiece microscope with high resolution encoder  
 (Standard 15x magnification, optional 10x magnification)

## OBJECTIVES

5x for 75x	magnification
10x for 150x	magnification
20x for 300x	magnification
40x for 600x	magnification
60x for 900x	magnification

## TESTER COLORS

INC-1LW	Laboratory White
INC-2CGM	Charcoal Grey Metallic
INC-3FR	Ferrari Red
INC-4BRG	British Racing Green
INC-5ABL	Atlantic Blue
INC-RAL XXXX	Any RAL color on demand



## TECHNICAL SPECIFICATIONS

Test force selection	Manual
Test procedure	Automatic, loading/dwell/unloading
Hardness value	5 digits
Turret	4 positions over 360°, fully automatic, memorized start position, option for 2 indentors and 2 objectives or 1 indentor and 3 objectives
Test force accuracy	<1% for test force 200gr to 2kg, <1.5% for test force below 100gr
User display	Length of diagonals, hardness value, converted value, test force, online statistics
Display resolution	0.1 HV, HK
Hardness conversion	Rockwell, Rockwell Superficial, Brinell, Leeb & Tensile (D models)
Standardization	EN, ISO 6507, EN ISO 6506, ASTM E-384, ASTM E-10-08
Statistics	Total test, max, min, average, range, standard deviation, all in real time after each test
Control panel	Start test, stop test, light intensity, dwell time, print, clear. Menu operation for date, time, scale and load settings, language (D models)
Firmware	V2.01, German, English, French (standard) V2.02, English, Italian, Spanish
Memory	Memory for batch testing results
Data output	RS-232 Bi-Directional
Dwell time setting	Default 10 seconds, user defined 0 to 60 seconds
Printer	Built-in, silent high speed thermal printer
Eyepiece microscope	Bright Dual line filar eyepiece with 15x magnification, 0.1µm reading
Light source	Halogen 12V, 30 Watt, green filter, dimmable
Optical path	2 way, eyepiece / CCD camera
Vertical capacity	90mm (maximum specimen height)
Horizontal capacity	130mm (from center-line)
Stage dimensions	100mm x 100mm, travel 25mm x 25mm, reading 0.01mm
Operating temperature	5°C to 40°C (+/-20° for force 25gr & 50gr)
Humidity	10% to 90% non condensing
Machine dimensions	420mm x 250mm x 490mm
Machine weight	37.5kg
Power requirements	100VAC to 240VAC, 50/60Hz, single phase
Power consumption	390W
Guarantee	2 years limited guarantee

## STANDARD DELIVERY

- Manual X-Y-Z stage
- Objectives according to model (10x and 20x or 10x, 20x and 40x)
- Analogue or Electronic microscope 15x
- Vickers test block
- Built-in silent thermal printer
- RS-232 data output
- Set of workpiece fixtures, vice, chuck, clamp
- Level gauge
- 4 adjustable feet
- Spare halogen lamp
- Installation & user manual
- Quality certificate
- Color: Laboratory White

## OPTIONAL ACCESSORIES

- Objectives at choice
- INNOVAVIEW™ Vision manual or automatic measuring and filing systems
- Motorized X-Y stage (small or large)
- Motorized X-Y-Z stage (auto focus)
- Indentors & hardness test blocks
- Certified indentors
- Reference hardness blocks
- Solid tester table & storage cabinet
- Customized tester color

## ORDER DETAILS

**412A** Analogue, 2 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1kgf (HV)

**413A** Analogue, 3 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1kgf (HV)

**412D** Digital, 2 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1kgf (HV)

**413D** Digital, 3 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1kgf (HV)

**422A** Analogue, 2 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1 - 2kgf (HV)

**423A** Analogue, 3 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1 - 2kgf (HV)

**422D** Digital, 2 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1 - 2kgf (HV)

**423D** Digital, 3 objectives, 0.01 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1 - 2kgf (HV)



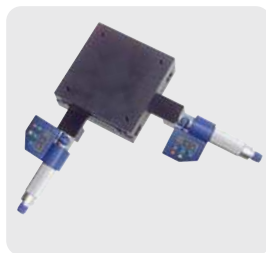
**MICRO-VICKERS**



**INV VISION SYSTEM**



**TABLE OPTION 1**  
ANALOGUE STAGE MICROMETERS



**TABLE OPTION 2**  
DIGITAL STAGE MICROMETERS



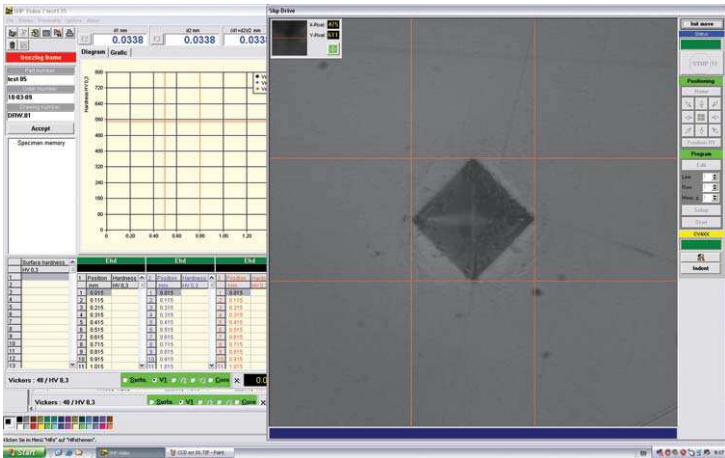
**TABLE OPTION 3**  
SMALL MOTORIZED STAGE



**TABLE OPTION 4**  
LARGE MOTORIZED STAGE

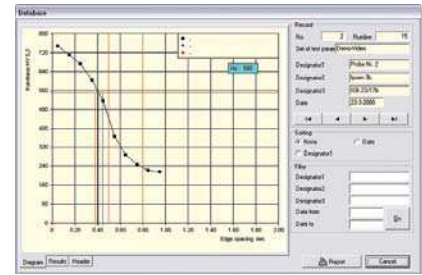
**FEATURES**

- High resolution 2 mega pixels video camera creating crisp indent images
- Manual & automatic image measuring mode
- Save, print and store image
- Report generator
- Data export to Excel or other MS applications
- Pattern programming, saving and recall
- Return to position and re-measure option
- Variable distance point plotting



### INV-1

PC-based camera indent measuring system.  
Manual measurement of the indent on the LCD screen.  
Store, file, handle images and data on the hddisk.



Distance	Hardness	Distance	Hardness	Distance	Hardness	Surface Hardness
0.000	1424.0	0.000	1424.0	0.000	1424.0	1424.0
0.100	1700.0	0.100	1700.0	0.100	1700.0	1700.0
0.200	1976.0	0.200	1976.0	0.200	1976.0	1976.0
0.300	2252.0	0.300	2252.0	0.300	2252.0	2252.0
0.400	2528.0	0.400	2528.0	0.400	2528.0	2528.0
0.500	2804.0	0.500	2804.0	0.500	2804.0	2804.0
0.600	3080.0	0.600	3080.0	0.600	3080.0	3080.0
0.700	3356.0	0.700	3356.0	0.700	3356.0	3356.0
0.800	3632.0	0.800	3632.0	0.800	3632.0	3632.0
0.900	3908.0	0.900	3908.0	0.900	3908.0	3908.0
1.000	4184.0	1.000	4184.0	1.000	4184.0	4184.0

### INV-2

INV-1 plus digital micrometers to measure stage displacement to control accurate indent coordinates and to ease case depth measurement.  
Automatic measuring optional.

### INV-3

INV-2 plus motorized X-Y stage, automatic pattern and traverse system, workpiece position control over external or built-in PC.  
Indent vision system shows real time measurement.  
Semi-Automatic system. Automatic measuring optional.

### INV-4

INV-3 plus motorized Z-axis for auto focus, X-Y table controlled by external or internal computer. Fully automatic system, including automatic measurement.  
Allows a series of automatic test with storage of test results without operator interference. Saves time and money.

## ORDER DETAILS

- CCD INV1** Manual measurement
- CCD INV2** Manual measurement with digital micrometers
- CCD INV3** Motorized, X-Y stage (choose stage size)
- CCD INV4** Fully automatic, auto focus X-Y-Z stage (choose stage size)



**NEXUS 4000**  
LOAD CELL, CLOSED LOOP SYSTEM

## FEATURES

High-end Vickers/Knoop/Brinell tester with low and high force ranging from HV0.02 to HV50. Closed Loop, Load Cell, Force Feedback technology for a reliable fast measurement procedure. Modular design, fits to almost any budget.

The NEXUS 4000 series of Micro/Macro Vickers, Knoop & Brinell hardness testers combines a practical design with universal specifications. State-of-the-art closed loop, load cell technology and a - Patent Pending - force feedback system, assure fast test results at the highest possible accuracy.

Unmatched consistency, repeatability and reliability now become affordable.

The closed loop system applies force, calculates, filters and controls digital data in a 32-bits embedded CPU system.

The tester has a 4 position turret which can be customized by using different indentors, objectives, stages or Vision systems, meeting your particular request and budget.

The NEXUS 4000 series meets all applicable EN, ISO and ASTM standards.

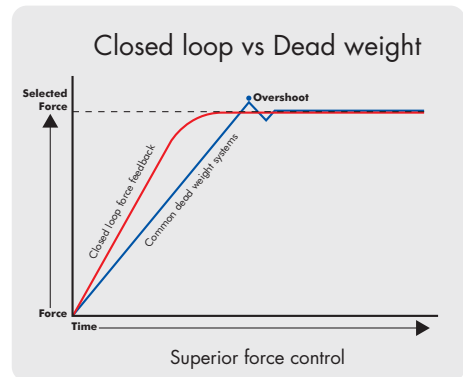
## NEXUS

## VICKERS 4000 SERIES

### TEST PROCEDURE CONTROL

Traditional hardness testing systems use a “dead weight” mechanical design or inaccurate spring force mechanism to apply the test force. Such systems are lacking test control, as there is no feed-back on the actual applied force.

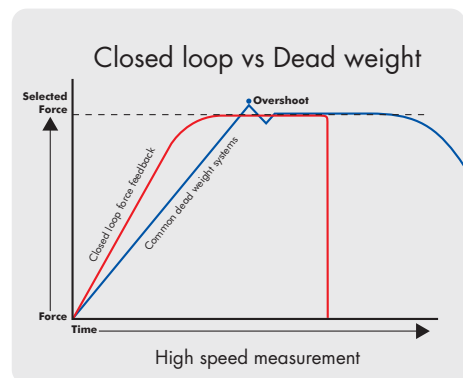
The Closed Loop technology with a force feedback system, as applied in the NEXUS 4000 Series, constantly measures and controls the applied force on the tester’s indenter and tested surface. Consequently, this superior control system offers an almost unlimited selection of test loads and test rates for virtually any test condition imaginable.



### ACCURACY, RELIABILITY & EFFICIENCY

Elimination of overshoot due to sophisticated algorithms detecting contact between the indenter and the object’s surface.

The application and removal of the test force is fully automatic, as well as the positioning of the indenter and the positioning of the pre-determined objective. The result is a flawless absolute vibration free operation while reducing the operator’s efforts to a minimum.



### UPGRADE YOUR NEXUS LATER

The NEXUS series offers upgrades on request. For instance, your budget and your requirements allow a Vickers tester. Your choice could be a NEXUS Vickers / Knoop tester 4300. At any moment after your purchase you can upgrade your tester from for instance Vickers to Macro, Micro-Vickers or even to Brinell at fixed prices. The upgrades are possible in the 4300 or 4500 range. It requires simply a phone call to your distributor or to INNOVATEST® and the upgrade does not take more than a couple of hours, including calibration. Investing in a NEXUS series tester guarantees access to almost any load application in the Vickers, Knoop and Brinell range up to 62.5kg.

High accuracy, flexibility and pure efficiency are synonyms for the NEXUS 4000 series.





## AVAILABLE FORCE CONFIGURATIONS

<b>NEXUS 4300</b>	1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30kgf
<b>NEXUS 4301</b>	1 - 2 - 2.5 - 3 - 4 - 5 - 6.25 - 10 - 15.625 - 20 - 31.25kgf
<b>NEXUS 4302</b>	0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30kgf
<b>NEXUS 4303</b>	0.02 - 0.025 - 0.05 - 0.1 - 0.2 - 0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30kgf
<b>NEXUS 4304</b>	As 4303 + additional 2.5 - 6.25 - 15.625 - 31.25kgf
<b>NEXUS 4500</b>	1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30 - 50kgf
<b>NEXUS 4501</b>	1 - 2 - 2.5 - 3 - 4 - 5 - 6.25 - 10 - 15.625 - 20 - 31.25 - 62.5kgf
<b>NEXUS 4502</b>	0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30 - 50kgf
<b>NEXUS 4503</b>	0.1 - 0.2 - 0.3 - 0.5 - 1 - 2 - 2.5 - 3 - 4 - 5 - 10 - 20 - 30 - 50kgf
<b>NEXUS 4504</b>	As 4503 + additional 2.5 - 6.25 - 15.625 - 31.25 - 62.5kgf

## STAGES

Manual X-Y-Z stage, Motorized X-Y stage, Motorized X-Y-Z stage  
 INNOVAVIEW™ CCD system with Video filar level INV-1, 2 or 3  
 INNOVAVIEW™ CCD system with auto focus and Video filar INV-4

## TURRET CONFIGURATION

Fully automatic 4 position turret for Micro-Vickers / Macro Vickers, Knoop or Brinell measurements.

Featuring 3 objectives at choice, all 3 objectives can be used for measuring and observation. Optional, 2 indenter positions.

## INDENTORS

Vickers, Knoop or Brinell or 2 of these simultaneously

## EYEPIECE

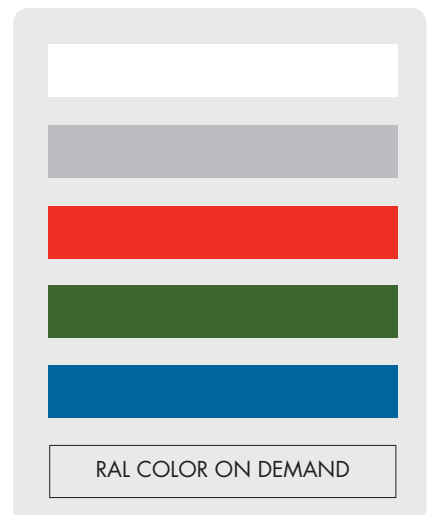
Electronic digital microscope with precision encoder providing 15x magnification

## OBJECTIVES

5x for 75x	magnification
10x for 150x	magnification
20x for 300x	magnification
40x for 600x	magnification
60x for 900x	magnification

## TESTER COLORS

INC-1LW	Laboratory White
INC-2CGM	Charcoal Grey Metallic
INC-3FR	Ferrari Red
INC-4BRG	British Racing Green
INC-5ABL	Atlantic Blue
INC-RAL XXXX	Any RAL color on demand



## TECHNICAL SPECIFICATIONS

Test force selection	Test force selectable over menu operation
Test procedure	Automatic, loading/dwell/unloading
Hardness value	5 digits
Loading speed	Variable, depending on load application
Turret	4 positions over 360°, fully automatic, memorized start position, option for 2 indentors and 2 objectives or 1 indentor and 3 objectives
Test force accuracy	<1% for test force from 100gr to 30kg, < 1.5% for test force below 100gr
User display	Length of diagonals, hardness value, converted value, test force, online statistics
Display resolution	0.1 HV, HK and HB
Hardness conversion	Rockwell, Rockwell Superficial, Brinell, Leeb & Tensile
Standardization	EN, ISO 6507, EN ISO 6506, EN ISO 4545, ASTM E-384, ASTM E-10-08, ASTM E-384
Statistics	Total test, max, min, average, range, standard deviation, all in real time after each test
Control panel	Start test, stop test, light intensity, dwell time, print, clear, menu operation for date, time, scale and load settings, language
Firmware	V2.01, German, English, French (standard) V2.02, English, Italian, Spanish
Memory	Memory for batch testing results
Data output	RS-232 Bi-Directional
Loading mechanism	Fully automatic, closed loop, force feedback, loading, dwell, unloading
Dwell time setting	Default 10 seconds, user defined 0 to 60 sec.
Printer	Built-in, silent high speed thermal printer
Electronic microscope	Bright Dual line filar eyepiece with 15x magnification, 0.01µm reading
Light source	Halogen 12V, 30 watt, green filter, dimmable
Optical path	2 way, eyepiece / video/ccd/cmos camera
Vertical capacity	160mm (maximum specimen height)
Horizontal capacity	135mm (from center-line)
Stage dimensions	100mm x 100mm, travel 20mm x 20mm, reading 0.01mm
Operating temperature	5°C to 40°C (+/-20° for force 25gr & 50gr)
Humidity	10% to 90% non condensing
Dimensions and weight	220mm x 540mm x 650mm, 51kg
Power requirements	100VAC to 240VAC, 50/60Hz, single phase
Power consumption	390W
Guarantee	3 years limited guarantee

## ORDER DETAILS

- NEXUS 4300** Vickers / Knoop, 30kgf
- NEXUS 4301** Brinell, 31.25kgf
- NEXUS 4302** Macro Vickers / Knoop, 30kgf
- NEXUS 4303** Micro/Macro Vickers / Knoop, 30kgf
- NEXUS 4304** Micro/Macro Vickers / Knoop / Brinell, 31.25kgf
- NEXUS 4500** Vickers / Knoop, 50kgf
- NEXUS 4501** Brinell, 61.5kgf
- NEXUS 4502** Macro Vickers / Knoop, 50kgf
- NEXUS 4503** Micro/Macro Vickers / Knoop, 50kgf
- NEXUS 4504** Micro/Macro Vickers / Knoop / Brinell, 61.5kgf

## STANDARD DELIVERY

- Manual X-Y-Z stage
- Flat anvil 60mm
- Objectives 5x, 10x, 20x or 10x, 20x, 40x
- Electronic digital eyepiece 15x
- Vickers test block
- Set of workpiece fixtures, vice, chuck, clamp
- Built-in thermal printer
- RS-232 data output
- 4 adjustable feet
- Spare halogen lamp
- Fuse
- Installation & user manual
- Quality certificate
- Color: Laboratory White

## OPTIONAL ACCESSORIES

- Objectives 5x, 40x, 60x
- INNOVAVIEW™ Vision measuring and filing systems
- Motorized X-Y stage (small or large)
- Motorized X-Y-Z stage (auto focus)
- Indentors & hardness test blocks
- Certified indentors
- Reference hardness blocks
- Solid tester table & storage cabinet
- Color according to demand





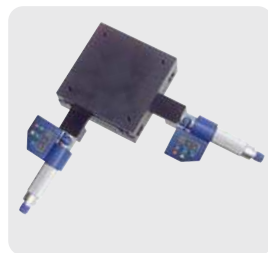
**REGULAR VICKERS**



**INV VISION SYSTEM**



**TABLE OPTION 1**  
ANALOGUE STAGE MICROMETERS



**TABLE OPTION 2**  
DIGITAL STAGE MICROMETERS



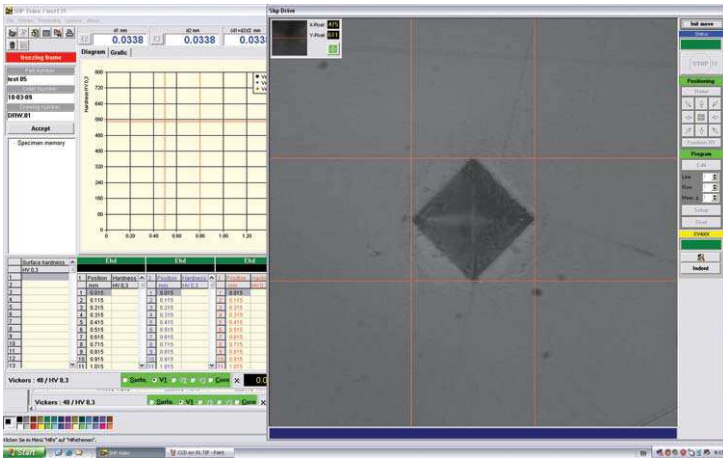
**TABLE OPTION 3**  
SMALL MOTORIZED STAGE



**TABLE OPTION 4**  
LARGE MOTORIZED STAGE

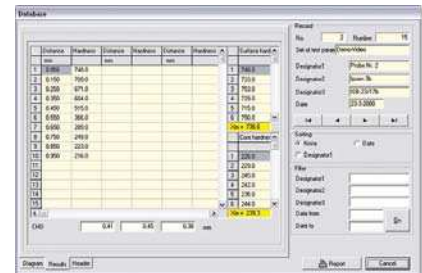
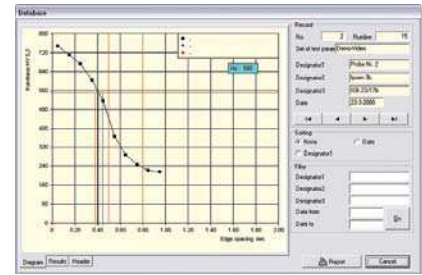
**FEATURES**

- High resolution 5 mega pixels video camera allowing crisp indent images
- Manual & automatic image measuring mode
- Save, print and store image
- Report generator
- Data export to Excel or other MS applications
- Pattern programming, saving and recall
- Return to position and re-measure option
- Variable distance point plotting



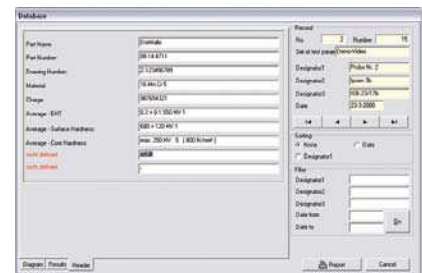
### INV-1

PC-based camera indent measuring system.  
Manual measurement of the indent on the LCD screen.  
Store, file, handle images and data on the harddisk.



### INV-2

INV-1 plus digital micrometers to measure stage displacement to control accurate indent coordinates and to ease case depth measurement.  
Automatic measuring optional.



### INV-3

INV-2 plus motorized X-Y stage, automatic pattern and traverse system, workpiece position control over external or built-in PC.  
Indent vision system shows real time measurement.  
Semi-Automatic system. Automatic measuring optional.

### INV-4

INV-3 plus motorized Z-axis for auto focus, X-Y table controlled by external or internal computer. Fully automatic system, including automatic measurement.  
Allows a series of automatic test with storage of test results without operator interference. Saves time and money.

## ORDER DETAILS

- CCD INV1** Manual measurement
- CCD INV2** Manual measurement with digital micrometers
- CCD INV3** Motorized, X-Y stage (choose stage size)
- CCD INV4** Fully automatic, auto focus X-Y-Z stage (choose stage size)
- CCD AUTO** Automatic measurement option for INV1, 2, 3