

## New paths in mobile hardness testing

### Extensive fields of application

The Krautkramer TIV sets new standards in mobile hardness testing: tests are not only independent of the test position and direction of testing but in this case also of the test object's material and mass or geometry. Consequently the TIV opens up a large variety of new application fields which were previously not open to portable hardness testers.

### Some application examples

Examples of possible application areas for the TIV hardness tester are as follows:

- Heat treat shops – easy and fast determination of surface hardness, no calibration required
- Aviation – on-site hardness testing on thin-walled components and on different alloys without any additional calibration
- Manufacturers of coils – at last reliable mobile hardness testing on sheet metal
- Testing companies – on-site measurement by means of a universal, portable unit
- Research institutes, labs, and training companies – "view through the diamond": observation of the indentation process, and measurement control

## Specifications and Accessories

### Test method

"Through Indenter Viewing": optical hardness testing method according to Vickers under test load; with an optical system including CCD camera for the automatic or manual determination of diagonal lengths through the diamond; optical control of the diamond indentation by means of display image.

### Probes

Hand-held probe TIV 105; test load 5 kgf (50 N), Hand-held probe TIV 101; test load 1 kgf (10 N), size approx. 220 mm x 52 mm / 8.7" x 2.0" (L x dia.)

### Materials tested

Static load application enables hardness testing on the most different materials without any additional calibration, e.g.: steel, nonferrous metals, carbide metals, ceramics, glass, plastics

### Range of measurement

Depends on the probe;  
for TIV 105: approx. 100 HV – 1000 HV,  
for TIV 101: approx. 30 HV – 500 HV

### Display

1/4 VGA color TFT display, 5.7" visible range;  
115.2 mm x 76.8 mm / 4.5" x 3.0",  
240 x 320 pixels, backlight

### Dialog languages

For example: German, English, French

### Conversion scales and resolution

HV (1.0); HB (1.0); HS (1.0/0.5/0.1);  
HRC (1.0/0.5/0.1); HRB (1.0/0.5/0.1);  
N/mm<sup>2</sup> (5.0)

### Conversion

Automatically according to DIN 50150,  
ASTM E140

### Evaluation

Representation of test data as a curve, histogram, or in tabular form;  
Calculation of statistical data, e.g.: average, standard deviation, range

### Automatic instrument switchoff

After a freely selectable period of time with automatic storage of test data and instrument settings

### Keyboard

Membrane keypad with an integrated touch screen

### Power supply

Line adapter (100V – 240V), NiMH battery pack MIC 20-BAT, 4.5 Ah (internal charging), or 6 commercially available C-cells (NiCad or NiMH)

### Operating time

With battery pack MIC 20-BAT approx. 1,000 measurements in continuous operation

### Battery charge indicator

Low-Batt indicator, instrument switchoff with undervoltage

### Operating system

WinCE

### Interfaces

RS 232 bidirectional, Ethernet 10 Mbits

### Housing

Injection-molded plastics

### Temperature ranges

Operation: -0° C to +50° C / 32° F to 122° F  
Storage: -20° C to +70° C / -4° F to 158° F

### Weight

Approx. 1.4 kg / 3.1 lb  
including MIC 20-BAT

### Size

78 mm x 215 mm x 180 mm /  
3.1" x 8.5" x 7.1" (H x W x D)

### Test attachments

Test attachment for standard applications and measurements using a support

### Other accessories

Carrying case, diamond cleansing cloth, hardness reference blocks with certificate, battery-driven grinding set for surface treatment, printer cable, different test supports and probe attachments, application software UltraDAT

# Krautkramer TIV

## Optical Hardness Tester - Mobile and Direct



GE imagination at work



## Mobile hardness testing - with the special view

### The method

Innovative Krautkramer technology ensures another step forward in mobile hardness testing: the TIV method (Through Indenter Viewing), based on hardness testing according to Vickers, makes it possible to "see through" the Vickers diamond by means of special optics. The hardness is measured under load; as soon as the test load is reached, the image of the test indentation is transferred and evaluated directly, automatically, and quickly.

### The advantages – your benefit

The TIV hardness tester can be used irrespective of the material – without any additional calibration. You can use the same instrument to measure the hardness of all sorts of materials without any reference specimens and without any laborious settings: from steel and nonferrous metals through plastics, carbide metals, glass, and ceramics up to different coatings.

The static application of the test load reduces the vibration of the test object and therefore the influence of the test material's elastic properties on the test result.

Yet another benefit: you can use the TIV to measure even very thin test objects, such as coils or sheet metal and metal foils, on which stationary or mobile hardness testers have previously failed, without any problem. Consequently, hardness testing becomes independent not only of the material but also of the mass and geometry of the test object. This means that the TIV opens up new application fields for mobile hardness testing.

It goes without saying that all the advantages you already know from our proven hardness testers remain or were improved, e.g. direction independence, user friendliness, data management. Plus a lot more.



## Measurement and evaluation: direct, automatic, fast

### Another Krautkramer innovation

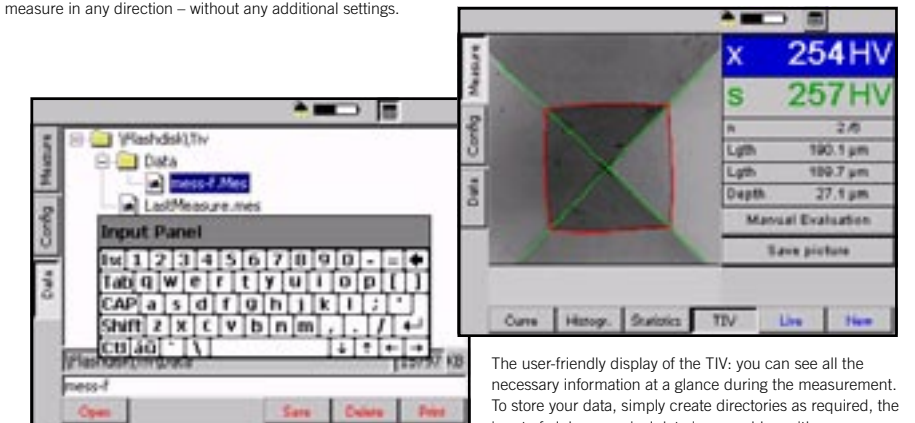
As the first portable instrument ever, the TIV does not determine the size of the indentation of the Vickers diamond, and consequently the hardness of the material, indirectly but directly: "Through Indenter Viewing" means that you can see the indentation of the Vickers diamond "grow" on the surface of the test object at the same time as the test load is applied – this is ensured by special optics and a CCD camera. As soon as the test load is reached, the indentation is automatically evaluated and transferred, which means that the diagonals are directly determined, without making a detour via a measuring microscope. Your benefits: the measurement is not only faster but also excludes subjective errors in the determination of diagonal lengths. Plus: by representation on the display, the TIV is the only hardness tester to enable direct control and immediate evaluation of the measurement quality. In addition, the image of the indentation enables direct recognition of the diamond's condition.

### The special instrument

The color LCD of the TIV hardness tester does not only show you the image of the diamond's indentation but also the directly displayed reading in the selected hardness scale. The graphic user interface shown on the display is adapted to the known Windows standard. In this way, you will swiftly have a good grasp of how the instrument should be operated, irrespective of if you want to configure, measure, evaluate, or store. The special extra: You do not need a mouse to select functions because the instrument has a touch screen capability using a pen. However, as an alternative, conventional pushbuttons are also available for most of the functions.



The TIV hardness tester with probe and hardness reference block. The probe contains high-tech features – the optical system and the CCD camera enable viewing through the diamond. Direction independence is also a proof of the patented Krautkramer technology: you can measure in any direction – without any additional settings.



The user-friendly display of the TIV: you can see all the necessary information at a glance during the measurement. To store your data, simply create directories as required, the input of alphanumerical data is no problem either.

### The easy operation

Three main menus make it easier for you to access the most important instrument functions – and you'll always reach your destination by just a few "screen clicks". Do you want to see your test series as a curve, histogram, or statistics? A click is all it takes. The conversion is just as easy for you by selecting another hardness scale. In the menu "Data", you can store your results plus image of the indentation in an easy and straightforward way.

### The mobile practice

You can operate the TIV both with a mains connection and with standard cells, or by means of our rechargeable battery pack which allows charging inside the instrument. After a certain period of time, the display goes off, and it can be re-activated by simply touching the touch screen. An automatic switch-off function is triggered after any variable period of time – all data and settings are of course maintained.