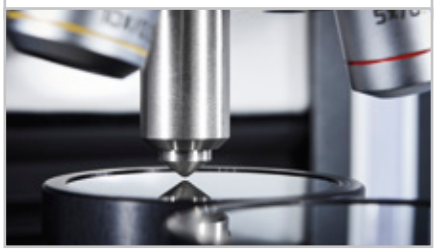
STABLE CONSTRUCTION

The vibration-damped cast aluminum body comprises a robust basis for the high load-bearing Carat table with automatic X/Y axis and automatic Z axis with 8-times objective revolver (LED illumination). Plane parallel samples in the Carat sample clamping system and the fast lock vice 50 can be changed quickly and precisely using the "easy-clamp function".



CARAT 930/950

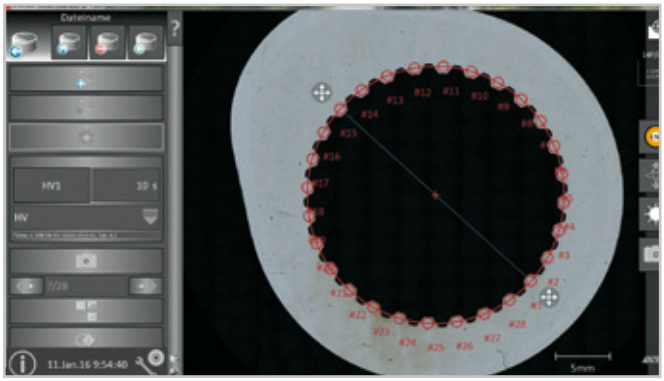
The latest technology and intuitive application make the CARAT 930/950 an extraordinary product for micro-hardness testing and optical evaluation. Our robust basic unit, which executes measurements very precisely, can be suited to your requirements with our own in-house software modules and the CARAT sample clamping system can be applied to meet various custom needs.

INTUITIVE OPERATION

Software has been developed to accommodate either touch or mouse in a 64-bit-Version (WIN 7/8/10).
All axes can be travelled via control module at the basic unit. Even the X & Y axes are controllable per joystick, adapting their speed to the individual objective.
A scrolling wheel facilitates the especially fine dynamic travel of the Z axis.
A button is available for rapid scroll.

FULLY AUTOMATIC HARDNESS TESTING

Automated hardness tests according to Vickers or Knoop can be parametrized according to standards.
In addition, it is possible to position individual projects on different samples and process them successively in succession.
The report template linked to the project displays the results in tabular and/or graphical form; the output is made individually with values tables and hardness curves in the dynamic report generator.



SOFTWARE

The dynamic live image presents a clearly arranged and flexible image of the sample via objective-independent image-in-image function and periphery-scan.
The automatic brightness regulation and auto-focus support a rapid image result which can be accelerated even more by the automatic level recognition with automatic quick-focusing.
In case of unevenness, focus on the sample can be reconstructed through planar scan. For optimum image quality the device is equipped with **Köhler Illumination**.

BASIC MODULE

HARDNESS TESTER CARAT

CARAT 930 Order No.: M0600000 **CARAT 950*** Order No.: M0600005

» basic equipment for hardness testing and optical appraisal
» automatic Z axis
» integrated joystick with dynamic speed control for X-/Y-axis with high-speed switches and fine dynamic scroll wheel for the Z-axis
» cast-Aluminium body
» safety concept
» integrated levelling & transport assistant
» force transducer with microprocessor-controlled force regulation for total load ranges 0.0098 - 294.20 N or 0.0098 - 490.33 N*
» test method HV 0.05 - HV 50 or HK 0.05 - HK 2
» including Vickers indenter HV 0.2 - HV 50 (with Dakks-certificate), Micro-Vickers on request

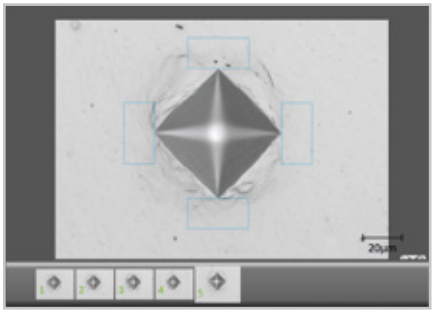
» Optics
- motor-driven Carat-8x objective revolver
- up to 6 objectives in the objective revolver
- Köhler LED illumination
- homogeneously illuminated image field
- contrasty image by reducing of glare and scattered light
- aperture for individual adjustment of relationship contrast/depth of field
- overview optics integrated in the objective revolver (5 MP)*
- size of overview image 42 x 42 mm*
- USB 3.0 CMOS camera (to be ordered separately)

SOFTWARE (included in basic module)

» Win 7/8/10 (64-bit)
» intuitive operation with touch & mouse function
» force transducer with microprocessor-controlled
» fully-automatic and manual image appraisal and hardness calculation acc. to Vickers or Knoop* (DIN EN ISO 6507, DIN EN ISO 4545, ASTM E-384)
» automatic brightness control
» automatic focus
» multifocus with sharper construction
» periphery scan for overview images (dynamic real-time frame is integrated)
» dynamic live screen with image-in-image function independent of objective
» overview scan with semiautomatic contour detection
» brightness correction of the partial images of the overview scans
» live image acquisition (image saved and pasted into clipboard), images loaded default image formats: jpg, png, tif etc.
» correcting the tilt of a sample by scanning and focusing of several measuring points
» creating,saving and loading individual test programs
» freely configurable sample places (size, number, position) in the table menu with large overview image
» use of remote diagnostics and online operator-support (assuming Internet access)

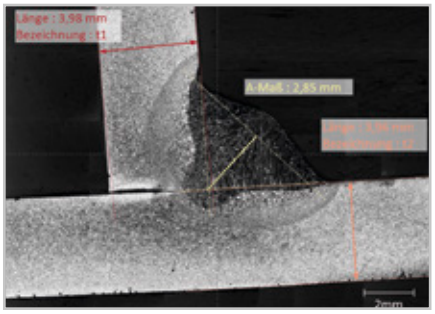
BASIC MODULE

SOFTWARE (included in basic module)



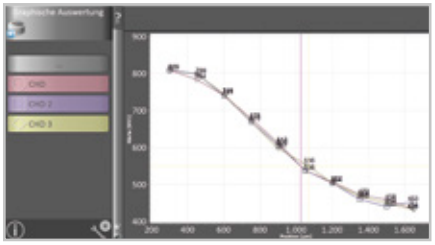
Planning objects for hardness testing

- compilation of single measurement points and definable measurement series
- align of test objects visually or parametrically
- angle handles for easy rotating of the CHD, NHD or SHD measurement series
- single measurement points can be attributed to different status (planned, indented, ignored)
- saving and uploading of configured measurement series
- CHD-SHD or NHD measurement series: points offset defined single or double row
- define tolerance band for hardness curve
- circle or circle segment with concentric auxiliary circuits
- point group
- grid function for surface analysis (max. 6000 points)
- sinter measurement series
- hardness curve along a free setted polyline (distance and offset adjustable)
- display of hardness ranges in color in overview image



Measurement capabilities

- measurement functions: distance, angle, areas, circles, polygon with dimensioning
- define grid pattern
- lock individual metrics
- magnetic reference points and lines
- define zero point of coordinates
- align measuring elements using coordinates
- add movement coordinates with „Enter“ gradually repeated
- edit color and font of the measuring objects
- image analysis Software add-ons orderable



Presentation and output of measuring results

- report generator
- output of overview images, value tables and diagrams
- dynamic overview screen, e.g. when changing the live image section
- update all items in the report for changes in the program
- selection of parameters of a table and different compilation for multiple tables in a report
- templates for hardness testing report acc. DIN EN ISO 6507
- insert character elements such as rectangles and lines
- define form fields
- output format: PDF, EXCEL and clipboard
- optional interface modules: Q DAS, ODBC/SQL
- laying existing forms in the background

EQUIPMENT

CARAT TABLE

» highly load bearing Carat-table with automatic X-/Y-axis

Equipment 1
Order No.: A0600031
» for max. 3 Carat-clamping plates 25-50

X-axis	160 mm
Y-axis	100 mm
max. load	80 kg

Equipment 2
Order No.: A0600032
» for max. 4 Carat-clamping plates 25-50

X-axis	250 mm
Y-axis	100 mm
max. load	80 kg

PC

Equipment 1
without PC
Order No.: A0600004

Equipment 2
PC
Order No.: A0600006
» Micro-PC-System mit Touch-LED-TFT inkl. Maus/Tastatur

CAMERA

Equipment 1
Standard USB-camera
Order No.: A0600017

1280 x 1024 px

Equipment 2
High resolution USB-camera
Order No.: A0600018

2560 x 1920 px

OPTION

AUTOMATIC CARAT-LEVEL RECOGNITION

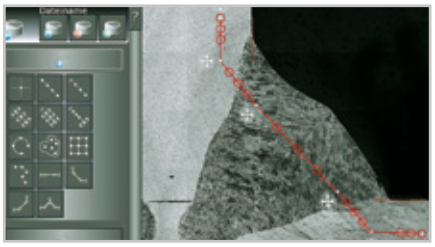
Order No.: A0600015
» for Carat 930
» fully-automatic rapid focus

» hardness test blocks and micrometers for calibration on request

SOFTWARE (WIN7/8/10, 64

ATM CARAT SOFTWARE UPDATE

Order No.: A0600025
» ATM Carat software update to latest version



WELD MODULE

Order No.: A0600027
» series of measurements for testing of welds for butt-, fillet- and double fillet weld
» setting of the 5 zones of inspection: number of points, length and orientation (left, right, center)
» display of standard tolerance of the edge distance with edge helpline
» exterior angle changeable in fillet weld tool
» output of results with zones in the evaluation

ATM SOFTWARE MODULE ODBC INTERFACE

Order No.: A0600029
» direct connection to database by ODBC
» requires customer supply of data base structure information
» incl. 5 hours order discussion/IBN

QDAS CONNECTION

Order No.: A0600023
» QDAS interface
» connection of QDAS-interface to company's network/QDAS-data base
» incl. 5 hours requirement information/start-up
» further services are charged according to timesheet

CARAT SOFTWARE MODULE AMS INTERFACE

Order No.: A0600036
» requires AMS testing software
» reads AMS input files from user-defined folder
» takes testing parameters from input files automatically
» processing input data in report possible
» output of measurements to user-defined folder for further processing by AMS
» transfer files archived automatically

SOFTWARE (WIN7/8/10, 64 BIT)

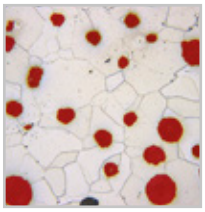
BARCODE SCANNER

Order No.: A0600030
» to capture barcodes on accompanying documents
» gives the opportunity to import batch numbers of accompanying documents and to load a test sample template via QDAS file

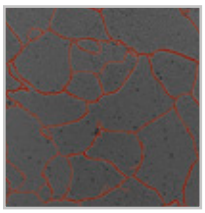
CARAT INSPECT

» Live image capturing / loading and recalibraton of stored images (PNG, JPG, TIFF, BMP)
» Preprocessing filters (e.g. Blurring, Sharpen, Normalize)
» Object definition by grey and color thresholding
» Morphological filters
» Selection of image objects by predefined measures

Carat Inspect Thickness Measurement
Order No.: A0600033
» measurement of layer thickness according to DIN EN ISO 1463
» semi-automatic measurement of horizontally and vertically aligned coatings and curved layers
» output of the layer thickness in terms of statistical quantities (e.g. mean, standard deviation, median, minimum, maximum) in tabular or graphical fashion
» two preinstalled layer thickness measurements as favorites



Carat Inspect Phase Analysis
Order No.: A0600034
» automatized image object measurement
» measurement of phase fractions according to ISO 9042 and ASTM E562-11
» output of analysis results in terms of the relative/absolute area in tables or graphs
» statistical quantities (e.g. mean, standard deviation, median, minimum, maximum)
» preinstalled phase analysis as favorite



Carat Inspect Grain Size Analysis
Order No.: A0600035
» measurement of the grain size according to DIN EN ISO 643 and ASTM E112-13 including lineal and circular intercept procedures as well as the planimetric procedure
» output of analysis results in terms of tables and graphs
» acquisition of statistical quantities of the grain size as well as of the grain intercept lengths (e.g. mean, standard deviation, median, minimum, maximum)
» two preinstalled grain size analyses as favorites

OBJECTIVES

Overview objective	2.5x	5x	10x	20x	40x	50x	100x
N Plan	Z0600012	Z0600013	Z0600014	Z0600015	Z0600016	Z0600017	Z0600018

INDENTER (spare part)

Load A ≥ HV 0,01
Order No.: Z0600020

Load B ≥ HV 0,2
Order No.: Z0600021

Load C ≥ HV 5
Order No.: Z0600022

CARAT CLAMPING SYSTEM 25-50

CARAT CLAMPING SYSTEM 50-70

Carat clamping plate
» base plate for Carat table with Easy-clamping function

25-50
Order No.: Z0600030

50-70
Order No.: Z0600040

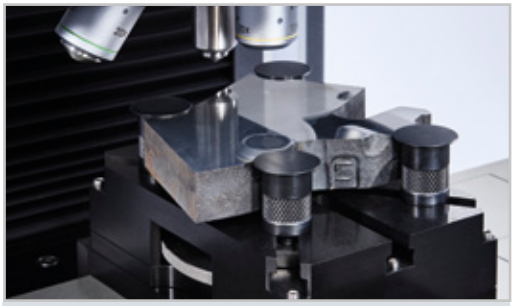
Carat sample clamping device
** please order required sample clamping devices and clamping rings separately*

25-50
Order No.: Z0600031
» up to 2 Carat sample clamps*

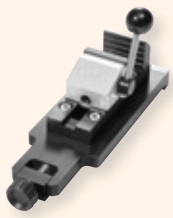
50-70
Order No.: Z0600041
» 1 Carat sample clamp*

Carat clamping rings

Ø 25,5 mm Order No.: Z0600032	Ø 30 mm Order No.: Z0600036	Ø 32 mm Order No.: Z0600033	Ø 50 mm Order No.: Z0600043	Ø 60 mm Order No.: Z0600044	Ø 70 mm Order No.: Z0600045
Ø 38 mm Order No.: Z0600038	Ø 40 mm Order No.: Z0600034	Ø 50 mm Order No.: Z0600035	*» other sizes on request*		
Ø 1″ Order No.: Z0600046	Ø 1,25″ Order No.: Z0600047	Ø 1,5″ Order No.: Z0600048			
Ø 2″ Order No.: Z0600049					



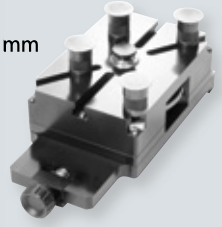
Fast lock vice 50



Clamping range 50 mm
Order No.: Z2270002 (lever left)
Order No.: Z2270000 (lever right)

Clamping range 100 mm
Order No.: Z2270003 (lever left)
Order No.: Z2270001 (lever right)

Universal clamping device
Order No.: Z0600050
» for unmounted, rectangular or rectangular mounted samples (15x27–48x75 mm)
» for circular or circular mounted samples (Ø 35-95 mm)
» max. sample height 21 mm



SPECIFICATIONS

CARAT 930/950*

Test method (DIN EN ISO 6507, DIN EN ISO 4545, ASTM E-384)	Vickers HV 0,05 - HV 30 Vickers HV 0,05 - HV 50* Knoop HK 0,05 - HK 2
Total load range	0.0098 - 294.20 N (1 gf - 30 kgf) 0.0098 - 490.33 N (1 gf - 50 kgf)*

** Information valid for Carat 950*

CARAT TABLE

X-axis	1	160 mm
	2	250 mm - Observe the equipment variant
Y-axis		100 mm
max. load		80 kg
Z-axis		150 mm
Power supply		100 - 240 V 50/60 Hz (1 Ph/N/PE)
WxHxD ~		375 x 650 x 670 mm
Weight ~		65 kg