Microhardness Tester

www.walteruhl.de

Test forces

All the instruments offer 12 steps of test force: 1, 5, 10, 15, 25, 50, 100, 200, 300, 500, 1000, 2000 p (gf) covering the range of test forces required by the standards ASTM E-384, EN ISO 6507 and EN ISO 4545. At the touch of a button, the test force is automatically selected. The test force can also be changed by the computer when running automated measurement cycles and as a consequence allowing different test forces in the inspection.

Focus finder

The newly introduced focus finder is available with all 3 Leica Plan objectives and enables the operator to detect the focus position very quickly. This is particularly helpful in cases of highly polished samples with few details such as steel etc.

Approach velocity

For specific applications depending on elastic and plastic properties of the material, the approach velocity of the indenter can be selected between 25 and 60 µm/s.

Optics

The infinity corrected Leica Plan objectives 10x and 50x are used according to International Standards, objective 100x is optional. The measuring eyepiece with field of view 16 mm offers an optimized, ergonomic working position. Easily exchangeable aperture diaphragms enable the operator to optimize the contrast according to his applications. The high quality of the optics ensures that indentations of small loads can be measured.

Printer/PC interfaces

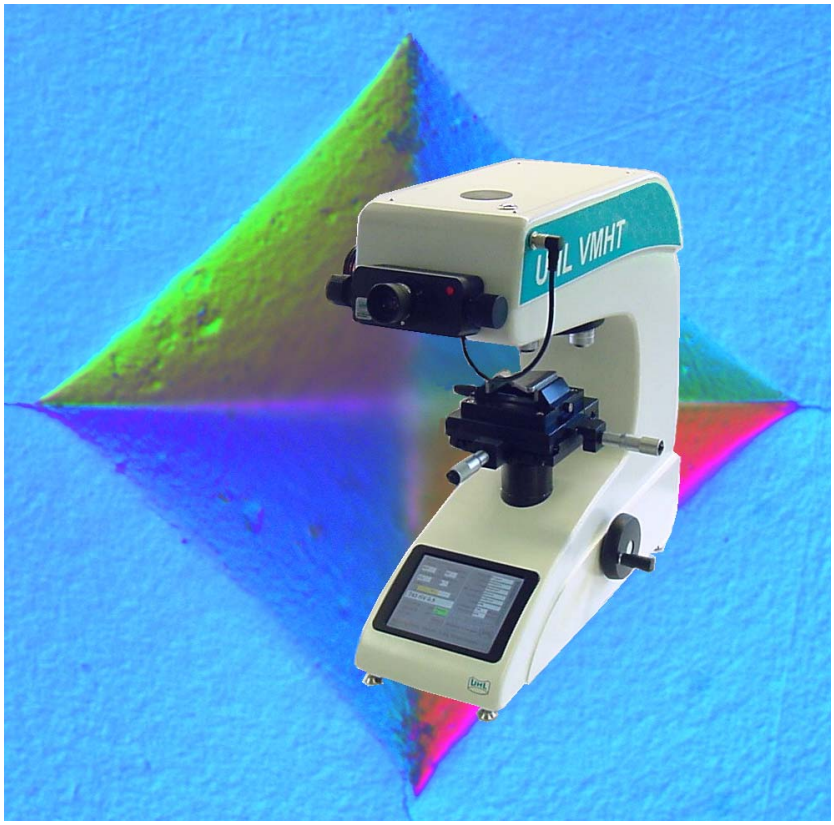
According to the desired peripheral instrument (PC or printer), RS 232 and Centronics or USB and ethernet interfaces are offered.

Results and data storage

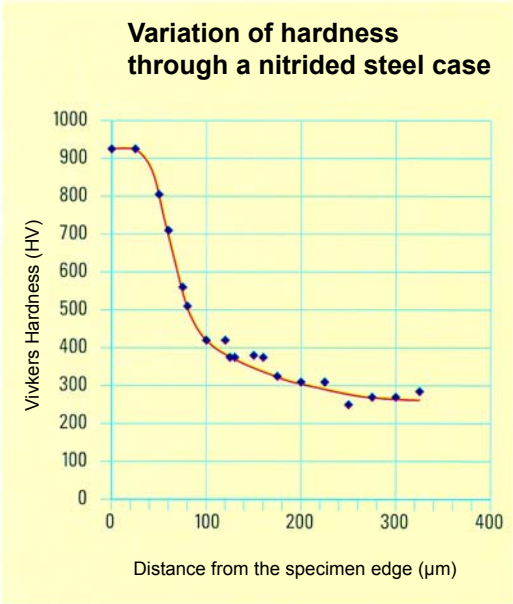
For each test, the measured diagonal lengths and the hardness value with test force are given as well as tolerance judgement, statistics (mean value, maximum/minimum, standard deviation). The test results can be stored as well as the specimen description and operator name.

Motorized turret

All of the models are equipped with a motorized turret. After choosing the indentation spot, the indenter is brought into its working position at the touch of the button “Start indentation”. After finishing the indentation process, the previously chosen objective is automatically swiveled in and measurement (either by the operator with measuring eyepiece or by PC with image analysis) can immediately start.



Applications



Metallography

Surface phenomena – surface treatment

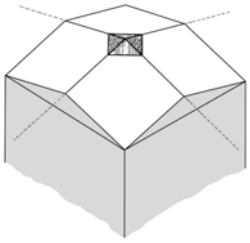
- Case-hardening of steels
- Surface hardening of titanium
- Electrodeposited coating: hardness, brittleness, adhesion
- Effects of various mechanical and thermal treatments on the surface layers

Study of Alloys and Alloy Constitution

- Quantification of transition areas

Determination of the Effect of Thermal Treatment

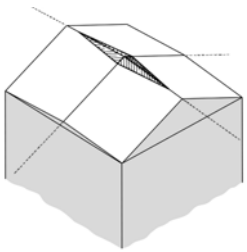
- Heat treatment of steels, non ferrous alloys, precipitation treatments and age-hardening
- Segregation and coring, rates of diffusion
- Recrystallisation



Vickers indenter

Materials science

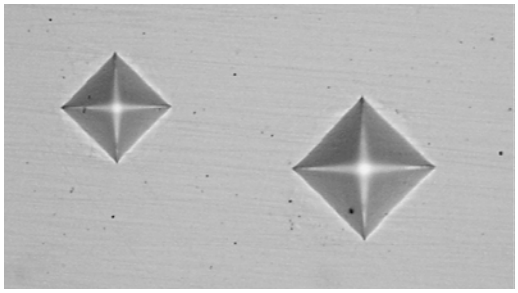
- Brittleness: ratio hardness/toughness
- Plastic properties
- Paint films – hardness of painted surfaces



Knoop indenter

Tribology Research

- Work hardening
- Estimate mild wear losses
- Correlation hardness number – wear resistance



Metal Powder Particles

- Mechanical properties
- Durability and performance of alloy components

Ceramics

- Determination of the hardening degree of glaze

Toolmakers Microscope

Technical data:

Measuring stage:

Measuring range:	25 x 25 mm (optional 50 x 50 mm)
Measuring system:	digital micrometer
Resolution::	1 µm
Max. height of work-piece:	157 mm

Optics:

Monocular tube:	monocular, upright and accurate to side image
Eyepiece:	build-in crosshair, dioptric compensation
Objective:	2:1
Integrated angle measurement:	division 1° appricable to 12’
Monocular angle:	45°
Total magnification:	40x
Free working distance:	62 mm
Illumination:	integrated transmitted light and ring-light illumination (LED), stepless brightness control for both kinds of illumination

General:

Dimensions:	see drawing
Weight:	25 kg
Working temperature:	20 ± 5° C
Power Supply:	115/230 VAC, 50/60 Hz

- accurate to side and upright image
- integrated angle measurement in eyepiece
- long working distance
- changeable objectives
- ergonomic design
- focus movement through double-sided, smooth-running drive
- max. workpiece height up to 210 mm
- rotating support plate for workpiece
- customized version with larger measuring range, coaxial incident illumination, digital read-out or image processing available on request

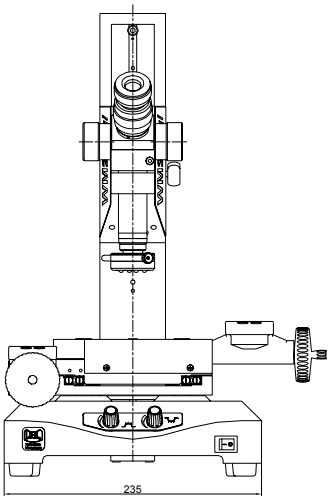
Fields of application:

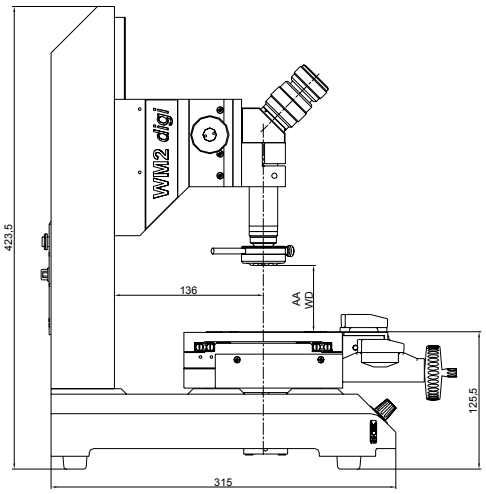
- Measuring laboratories and workshops
- Quality management
- small parts vendors (automotive indus-try and mechanical engineering)
- measurement of isolated and unisolated wires
- plastic and casting parts

Achromatic Objectives

Order No.:	Magnification	Working Distance W.D. (mm)	Object Diameter (mm)	Maximum Object Height (mm)
OP1-A01	20x	118	8,5	101
OP1-A02*	40x	62	4,4	157
OP1-A03	60x	28	2,9	191
OP1-A04	80x	9	2,2	210
OP1-A05	100x	9	1,8	210
OP1-A06	120x	9	1,5	210

* included in the extent of supply





Measuring microscope

Measuring on high speed and Viewing with 1000x magnification- the VMM can do both.

Exact and versatile in measuring

- The measuring stage grants an accuracy ≤ 6 µm for over 100 mm measuring length.
- Optical inspection, i.e. non-contact inspection of sizes and forms of metal, plastic and ceramic parts.
- Optical inspection also include the free-force measuring test of deformable parts e.g. rubber.
- Usable for checking primary samples, spot tests and even up to series inspection of moulds, bended and diecasting parts.
- Inspection of profile gauges, templates, cutting tools, springs etc.

The VMM detects everything

- Changeable micro objectives with up to 1000x magnification.
- For metallurgical examination, plus the observation of material fractures.
- Coaxial incident light provides the perfect illumination.
- Digital image processing by means of an assembled video camera.

Top - the performance

- Developed from practical experience for practical usage.
- Guided roll bearing measuring stage with a measuring range of 100 x 50 mm.
- Optical system with telecentric ray path.
- Changeable objectives.
- Upright and laterally true image.
- Opto-electronic measuring system with a failure-free readable numerical display.
- 0.0005 mm resolution.
- Incremental-divided steel scale.
- Fast and fine adjustability of the measuring stage.
- Swivel stage (optional) for mechanical alignment of workpiece.
- Transmitted and coaxial incident lights plus additionally oblique incident light.
- Stepless brightness control.

The VMM universally applicable in

- The production of sub-contracting parts for the automobile industry.
- Production branches of electrical engineering and electronic industry.
- Aeronautical and aerospace industries, test laboratories, universities etc.
- Research and development divisions of the different industries.

Digital Readout QC200

For two axises (coordinates X and Y, 7 decades) with alphanumeric display for functions, computerized functions for geometrical combination of the measured values, memorized values, digital output RS232 and parallel port for printer 120/230 VAC, 50/60 Hz.

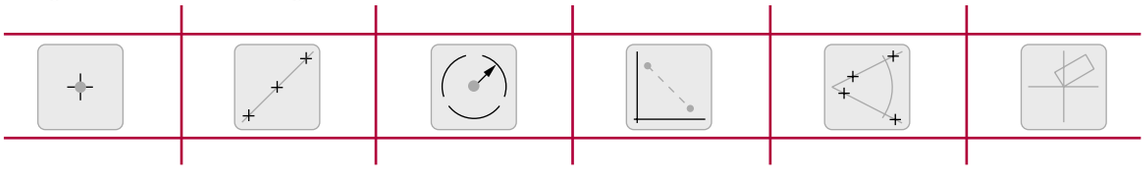
Digital readout for three axises (X, Y and Z)

Ready-packed for delivery with following standard accessories:

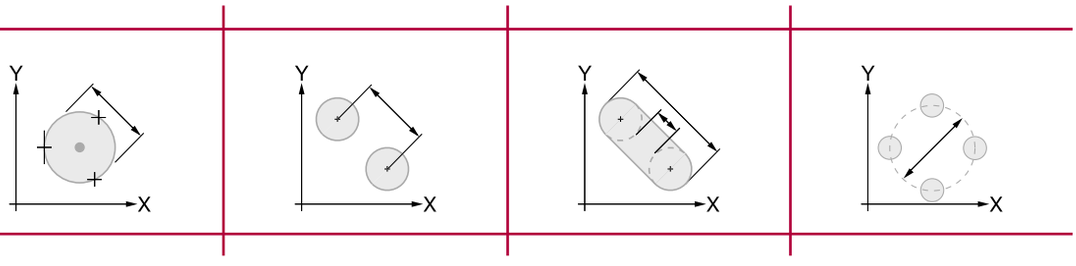
1 Cable

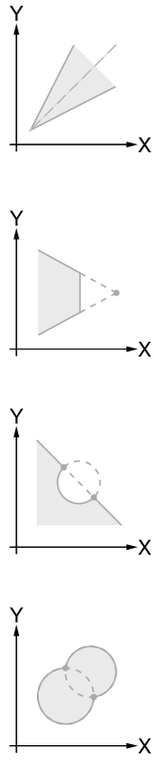
1 Operations manual

Programmed Measuring Functions



- No manual calculation necessary.
- No mechanical workpiece alignment owing to the calculated transformation of coordinates.
- Measuring of diameters on pitch circles of 3 to 50 points.
- Right-angled cartesian and polar coordinate systems.
- Combination of up to 50 measured values per geometrical element.
- Location of origin points at the user's choice.
- PRESET function
- Programmable measuring sequences (max. 250 measuring steps).





Spinneret inspection with UHL microscopes

PR4

PM4

PR7

PR5 - „PROMIK“

PR5-RH

PR5-RMI

Introduction

The high mechanical stability of UHL spinneret inspection microscopes ensures a high inspection quality as well as a production quality for a long time.

An excellent optical image is responsible for untiring working conditions.Different lenses with fixed magnification stand for high accuracy and reliable dirt detection.

Semi- and fully automatic inspection with the IMS-SpinLight or IMS-Spin software, in combination with motorized axises, increases the effectivity and reduces the influence of the operator.

UHL spinneret inspection microscopes are based on a modular system to be flexible for customer specific modifications and to simplify the maintainance.

The PM4, PR5 and PR7 inspection microscopes are having the unique feature to inspect the capilliary and the counterbore simultaneously or alternatively without touching or moving the spinneret.

The counterbore tube uses a special optic with integrated ring illumination in the lens.

All microscopes are designed, manufactured and assembled by UHL in Asslar - Germany. The software is completely developed by UHL as well.

The manual „PROMIK“ inspection microscope

The manual standard equipment for visual inspection of small quantities. Improved by more than 30 years presence at the market, this inspection microscope is used world wide in more than 350 plants because of its high stability.

The combination of a high resolution video screen and latest camera technology (replaces the formerly used profile projector) with a binocular microscope, it is possible to inspect the hole, using incident and transmitted light, within one process without changing the spinneret position.

Main unit with base and x/y stage

Base:	- Stable welded-steel construction - Integrated transformers for incident and transmitted illumination
X/Y stage:	- Generous designed 6 mm roll bearings for long lasting durability with no backlash - Smooth running fine adjustment with with a knurled knob, coarse movement by

Optical system and illumination

The transmitted illumination for the capilliary and the tube for the counterbore can be moved mutually into the parth of rays with a swinging slide.

Video tube for the capilliary:	12.5x - 75x magnification on the screen with zoom lens. Longlife LED illumination.
Tube for the counterbore:	Binocular with 10x widefield eye-piece. Special lens with integrated ring light for the counterbore sink. 6 V 5 W filament lamp.

Angular fibre optic illumination on the exit side of the spinneret: 11 V 30 W.

The manual „PROMIK“ inspection microscope PR5-RH for ring-spinnerets (staple fiber spinnerets)

Consistent further development of the „Promik“ PR5 with latest high-resolution video technology.

With this hand driven device the counterbore and the capillary can be viewed simultaneously without switching.

Video images of the capillary and the counterbore are shown vertically on a flat screen.

Due to the video technology, an ergonomic and fatigue-proof workflow is possible. The capillary can be viewed by multiple users in meetings.

The microscope is used to inspect ring spinnerets with a pitch circle diameter from 210 to 410 mm..

The spinneret is fixed on a stable rotary stage by handwheel. The linear movement is also done by handwheel driving a roll bearing guided slider.

Motorized axises are available optionally.

A compact embedded PC displays the video images. with VMS-SPIN software.

LEDs with a long lifetime are used for the illumination. The transformers are integrated in the base.

- Integrated LED transformers for incident and transmitted illumination,

Linear axis:
- Optimal designed 3 mm roll bearings for long lasting durability with no backlash
- Smooth running fine adjustment with ball screw and handwheel
- 200 mm travel range

Rotary axis:
rotation by backlash free assembled ball bearings

Optical system and illumination

Tube for the counterbore: 2:1 magnification on the high resolution CMOS color chip, (140:1 on screen), coaxial LED illumination.

Tube for the capillary: 2:1, 5:1 and 10:1 magnification (140:1, 340:1, 680:1 on screen) at a lens turret, high resolution CMOS color chip, coaxial LED illumination.

The motorized modular inspection microscope PM4 for nonwoven spinnerets

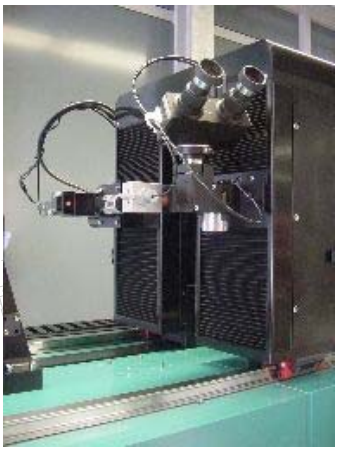
The motorized version of the PM4 consists of a cassette module and aluminium profile base elements construction.

This flexible configurable (in its length) unit is specially designed to inspect long spinnerets with e.g. 17.000 capilliaries fully automatic.

PM4-6ZMI

Measuring computer, motor control, printer and light sources are built in a industry usable tower case for 19“ components.
The cables are guided by a solid cable carrier along the linear axis.

A portal construction is assembled on precise grinded linear bearings. Due to the usage of an optic linear scale, the portal can be positioned very precisely.



Both y-axises for the mutual inspection of capilliary and counterbore with a video tube and a binocular tube are moved with two precise gear belt driven ball screw spindles and a central stepper motor.
The video microscope is motorized and can compensate the bending of a spinneret with a video autofocus.

Software: IMS-SPIN

The motorized inspection microscope PR4

For semi- and fully automatic spinneret inspection of round and rectangular spinnerets, even in high quantities, the PR4 microscope is availiable. The size of the spinnerets can be up to 250 x 200 mm.

Possible options:

- Blowing device for cleaning with compressed air
- Special ring light optic to illuminate the counterbore sink

Alternatively a motorized turret to change the magnifications by software (as shown in the images) can be used.

Suitable for flat (2D) or cap / pot type spinnerets.

Base:

Stable welded steel construction with surface coated countertop. Integrated: industrial PC and motor control.

Microscope stand:

Solid body from grey cast iron with 200 mm coarse z-adjustment with hand wheel.

X/Y stage and z-axis for the microscope tube:

Precise, with roll bearings manufactured axises. The drives consists of grinded ball screw spindles with no backlash and stepper motors or wear-free linear drives. The entire construction is designed for rough daily usage.

- X/Y range of movement: 250 x 200 mm
- Z-focus range: 50 mm
- Positioning repeatablility: 5µm

Optic / illumination:

- Modular built up tube with infinite path of rays.
- Bayonet socket for the lenses to change the magnification fast and easily.
- Fibre optic for incident and transmitted light with LED cold light source (PC remote controlled).
- High quality 2x 5x 10x and 20x lenses with long working distance for capilliary diameters from 0.050 mm to 1.0 mm
- Special optic to inspect and illuminate the counterbore is availiable as option.

Software: IMS-SPINSCAN

The motorized inspection microscope PR4Spheric (for spheric spinnerets)

For fully automatic spinneret inspection of single round spinnerets with spheric shape, the PR4Spheric microscope is availiable. The diameter of the hole arrangement can be up to 90 mm.

Suitable for spheric cap / pot type spinnerets used for eample in the carbon fibre production.

Base:

Stable welded steel construction with surface coated countertop.
Integrated: industrial PC and motor control.

Microscope stand:

Solid body from grey cast iron with 200 mm coarse z-adjustment with hand wheel.

Rotation- and swiveling axis.

Backlash-free ball bearings with stepper motor drive.
The rotation axis has a 3 point fixture and is mounted in 90° angle on the swiveling axis.

Z-axis for the microscope tube:

Precise, with roll bearings manufactured axis. The drives consists of a grinded ball screw spindle with no backlash and stepper motor. The entire construction is designed for rough daily usage.

- Z-focus range: 50 mm
- Positioning repeatablility: 1µm

Optic / illumination:

- Modular built up tube with infinite path of rays.
- Motorized turret to change the magnification by software.
- Fibre optic for incident and transmitted light with LED cold light source (PC remote controlled).
- High quality 2x 5x 10x and 20x lenses with long working distance for capilliary diameters from 0.050 mm to 1.0 mm

Software: IMS-SPINSCAN

The motorized inspection microscope PR5-RMI for ring-spinnerets (staple fiber spinnerets)

Motorized further development of the PR5-RH with latest high-resolution video technology and integrated measuring computer.

The capillary or counterbore can be viewed alternately by switching.

The inspection is done fully automatic. The capillaries are positioned according to a previously defined pattern using a comforatble assistant.

The microscope is used to inspect ring spinnerets with a pitch circle diameter from 210 to 410 mm..

The spinneret is fixed on a stable rotary stage with stepper motor. The linear movement is also done by stepper motor driving a roll bearing guided slider.

A compact embedded PC does the imaging and calculation.

LEDs with a long lifetime are used for the illumination. The transformers are integrated in the base.

A pneumatic driven diffusor reduces light reflection along the capillary wall and increases the detection rate.

A blow unit cleans the capillary from loose dirt.

Revisionsstand: 05

Main unit with base and axises

Base:	- stable welded-steel construction - integrated LED transformers for incident and transmitted illumination, integrated embedded PC and flat screen
Linear axis:	- optimal designed 3 mm roll bearings for long lasting durability with no backlash - ball screw and stepper motor - 200 mm travel range
Rotary axis:	- backlash free worm drive with stepper motor, rotation by backlash free assembled ball bearings

Optical system and illumination

Tube for the counterbore:	special lens with halogen ring illumination, (125:1 on screen), high resolution color USB camera, coaxial LED illumination.
Tube for the capillary:	2:1, 5:1 and 10:1 magnification (100:1, 250:1, 500:1 on screen) high resolution monochrome USB camera, coaxial LED illumination, side LED illumination for a stable surface autofocus.

Software: IMS-SPIN

The motorized inspection microscope PR7

Due to the generous and stable portal construction, the UHL PR7 inspection microscope is ideal for fully automaitc spinneret inspection in high quantities.

The spinneret is put in the equipment with the capilliary facing to the bottom, so that the capilliary can be cleaned on screen directly through the counterbore. The position is indicated by laser lines on the spinneret for the operator.

Base:

Stable welded steel construction with integrated industrial pc, light control and motion controller. Support arm for keyboard, mouse and monitor.

Axises:

x-axises: backlash free linear roller guides and ballscrews, stepper motor, belt drive for the upper axis,

y-axis: backlash free linear roller guides and ballscrew, frame for the holderplates,

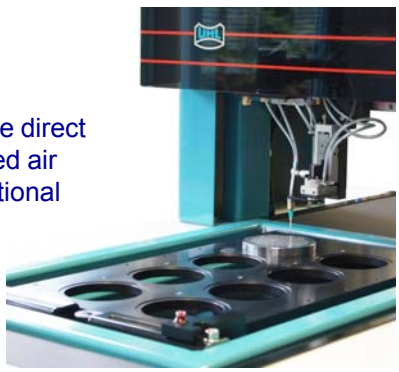
z-axises: respectively backlash free linear roller guides and ballscrews, stepper motors, the bottom axis is used for autofocus

Optic / illumination:

Tube for the capillary: 2:1, 5:1 and 10:1 magnification (100:1, 250:1, 500:1 on screen) high resolution monochrome USB camera, coaxial LED illumination, LED ring-illumination for a stable surface autofocus.

Scanning microscope: automatic detection of the hole positions and pre-classification

A blowing device for the direct cleaning by compressed air during inspection is optional availiable.



Software: IMS-SPINSCAN

Technical data

general:

working temperature:	20 ± 3°C
storage temperature:	-10°C to 60°C
power supply:	120/230 Vac, 50/60 Hz
CE-conformity:	EU machine guideline 89/392/EWG VBG4 (VDE 0113) and VBG5 (DIN 31001)

PR3

width:	480 mm	X/Y inpsektion range: 200 x 100 mm
depth:	570 mm	max. spinneret size: Ø 200 or 280 x 200 mm
height:	600 mm	
weight (net):	30 kg	

PR5 - „Promik“

width:	1250 mm	X/Y inpsektion range: 300 x 150 mm
depth:	745 mm	max. spinneret size: Ø 240 or 380 x 240 mm
table- / max. height:	750 / 1400 mm	
weight (net):	120 kg	

PR5-RH

width:	800 mm	Y inpsektion range: 200 mm
depth:	700 mm	max. spinneret size: Ø 500 (pitch circle-Ø 210 - 410 mm)
height:	1400 mm	
weight (net):	100 kg	

PR5-RMI

width:	800 mm	Y inpsektion range: 200 mm
depth:	700 mm	max. spinneret size: Ø 500 (pitch circle-Ø 210 - 410 mm)
height:	1400 mm	
weight (net):	100 kg	

PM4-4ZMI motorized

width:	3200 mm	X/Y inpsektion range: 2500 x 250 mm
depth:	600 mm	max. spinneret size: 2600 x 300 mm
height:	1700 mm	
weight (net):	400 kg	

PM4-6ZMI motorized

width:	4700 mm	X/Y inpsektion range: 3800 x 250 mm
depth:	600 mm	max. spinneret size: 4000 x 300 mm
height:	1700 mm	
weight (net):	500 kg	

Technical data

PM4-8ZMI motorized

width:	6300 mm	X/Y inpsektion range: 5400 x 250 mm
depth:	600 mm	max. spinneret size: 5600 x 300 mm
height:	1700 mm	
weight (net):	600 kg	

PM4-11ZMI motorized

width:	8600 mm	X/Y inpsektion range: 7700 x 250 mm
depth:	600 mm	max. spinneret size: 7900 x 300 mm
height:	1700 mm	
weight (net):	750 kg	

PR4

width:	1200 mm	X/Y inpsektion range:	250 x 200 mm
depth:	750 mm	max. spinneret size:	330 x 280 mm
height:	1500 mm		
weight (net):			

PR4Spheric

width:	1200 mm	max. pitch circle-Ø 90
depth:	750 mm	
height:	1500 mm	
weight (net):		

PR7

width:	1200 mm	X/Y inpsektion range:	250 x 480 mm
height:	1450 mm	max. spinneret size:	370 x 520 mm
weight (net):			