

# OPTIV PERFORMANCE 322



## PRODUCT DESCRIPTION

The Optiv Performance 322 is based on a technology- and future-ready platform, which allows a modular measuring machine configuration (Future Ready Concept). The system supports multi-sensor measurements using the Vision sensor, the touch-trigger and scanning probe as well as the innovative Chromatic White Light Sensor (CWS). The basic machine with Vision sensor can be expanded with all the available sensors on a modular basis. The dynamic machine concept offers a high volumetric positioning accuracy and is designed for fast measuring point acquisition and high-performance 3D scanning. Measurement software is PC-DMIS.

## FIELDS OF APPLICATION

- Versatile geometry measurements and GD&T analysis

## DESIGN

### Design principle :

- Benchttop machine with a fixed bridge and a moving measuring table, long-term stable and torsion-resistant granite construction
- Integrated parametric temperature compensation

**Guides :** Precision recirculating ball bearing guides on all axes

**Drives :** DC servo motors, power transmission via backlash free circulating ball screws

**Length measuring system :** Incremental optoelectronic length measuring system

**Resolution of the scales :** 5 nm

## MEASURING RANGE (X x Y x Z)

### MEASURING RANGE OPTIV PERFORMANCE 322

	Vision sensor	Touch-probe	Mutual measuring range (Vision sensor <-> Touch-probe) <sup>(1)</sup>	Mutual measuring range of all sensors <sup>(1)</sup>
X	300 mm (11.5 in.)	300 mm (11.5 in.)	240 mm (9 in.)	158 mm (6 in.)
Y	200 mm (7.5 in.)	200 mm (7.5 in.)	200 mm (7.5 in.)	200 mm (7.5 in.)
Z	200 mm (7.5 in.)	200 mm (7.5 in.)	200 mm (7.5 in.)	200 mm (7.5 in.)

(1) Mutual measuring ranges, see page 8.

## LOADING CAPACITY

- Load-bearing capacity of the glass plate up to 20 kg

## DIMENSIONS IN MM AND WEIGHTS IN KG

- Dimensions see machine layout on page 7
- Machine weight 180 kg

## MEASURING ACCURACY<sup>(2)</sup>

At 20°C, acc. to ISO 10360-7,  
with Vision sensor, at highest zoom magnification<sup>(2)</sup>

Length measuring error  
Ex, Ey = (1.5 + L/250) µm  
Exy = (1.9 + L/250) µm  
Ez = (1.9 + L/250) µm

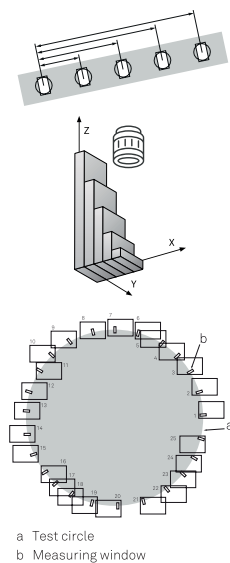
Probing error  
PF2D = 1.9 µm  
PFV2D = 1.2 µm

At 20°C, acc. to ISO 10360-2 / -4,  
with the HP-S-X1C probing system<sup>(2)</sup>

Volumetric length measuring error<sup>(3)</sup>  
MPEE = (1.9 + L/250) µm

Volumetric probing error<sup>(4)</sup>  
MPEP = 1.9 µm

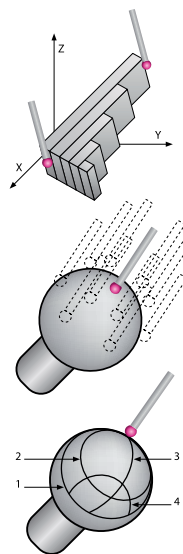
Volumetric scanning probing error<sup>(4)</sup>  
MPETHP = 2.9 µm (t = 75 sec)



Ex, Ey, Exy:  
On a glass artefact, 5 measurement lengths  
are measured with 3 repetitions.

Ez:  
The length measurement error Ez for the  
vertical axis will be measured on a step  
gauge block on the basis of 5 measurement  
lengths with the optical lateral sensor by  
means of video focus.

PF2D / PFV2D:  
25 points are measured, which are equally  
distributed on a circle. A best-fit circle  
calculated from these measurements is the  
basis to determine the range of deviations as  
a result. The parameter PFV2D is determined  
at standstill of the CMM, PF2D is determined  
with movement of the CMM.



A set of 5 gauges has to be measured  
3 times with one probing at each end, in  
7 different directions in space.  
All measuring results must be within „E“.

A precision sphere has to be measured with  
25 probeings. P is the range of all radii.

$P = R_{max} - R_{min} = \text{sphere form.}$

A precision sphere has to be scanned with  
4 defined lines. THP is the range of all radii.

$THP = R_{max} - R_{min} = \text{sphere form,}$   
scanning.

(2) The conditions of acceptance of Hexagon Metrology Vision apply. (3) E is valid for a stylus of Ø 6 mm, L = 30 mm.

(4) P and THP are valid for a stylus of Ø 5 mm, L = 20 mm. L = measurement length in mm.

## AIRBORNE NOISE EMISSIONS

- The A-weighted emission sound pressure level at operator's position is less than 70 db(A).

## ENVIRONMENTAL REQUIREMENTS

- Limits of permissible floor vibration  $< 5 \times 10^{-3} \text{ m/s}^2$  corresponds to an amplitude of  $< 5 \text{ µm}$  at 5 Hz
- Air humidity 40 % - 70 % RL, non-condensing
- Environmental temperature  $20 \text{ °C} \pm 2 \text{ °C}$
- Permissible temperature gradient 0.8 °C/h, 1.0 °C/d, 0.6 °C/m
- Max. installation height 2000 m above sea level

## THROUGHPUT

- Max. traversing speed: 300 mm/s (per axis), 500 mm/s (vector)

## SUPPLY DATA

- Input voltage power supply 115-230 V ± 10%
- Frequency 50/60 Hz ± 5%
- Power consumption 600 VA

## VISION SENSOR

### Technical description :

- Sensor for non-contact measurement of smallest and closely toleranced features
  - High resolution camera, for interference-free, low noise image reproduction
  - Maximum optical precision due to low distortion optics
    - > Motorised CNC zoom
    - > Optiv Dual Camera
  - Powerful image processing
    - > Fast, precision video autofocus
    - > Automatic feature detection, geometry and bad pixel video filters
    - > Contour scanning mode : Sophisticated set of user-selectable algorithms to setup edge detection, intelligent, automatic selection of the most suitable setting for the measurement
    - > Best fit routines
    - > AutoTune : Transferability of measuring programs between machines of the same type
    - > MultiCapture : MultiCapture allows all 2D features within a field of view to be captured simultaneously, regardless of the feature type. Inspection speeds can be increased by 35 % or more, depending on the feature size and density. The capture sequence for groups of features using MultiCapture is also automatically optimised, creating the most efficient possible path with the fewest number of stage movements.
    - > RGB Sensitivity Adjustments for colour cameras : Software controls for Red/Green/Blue (RGB) sensitivity in images from a colour camera allow for fine control adjustment over image contrast. This capability improves overall consistency in vision inspection in general and is especially useful for coloured parts where edges can be difficult to capture with grayscale or lighting modifications alone.

### Illumination for Vision sensor :

- Coaxial LED top light
- Telecentric LED back light
- 8-segment LED ring light (white LEDs)
  - 2 rings with 2 different angles of incidence (28.21°, 37.88°) and 4 segments each

### CNC zoom :

- Motorised zoom, for a continuous adjustment of field of view and resolution
  - Magnification: 6x (standard)
  - Magnification: 10x (optional)
- High resolution 1/1.8-inch CMOS camera (H 1280 x V 1024 pixels) with Gigabit Ethernet interface
  - Colour (standard)
  - Monochrome (optional)

## MAGNIFICATION VARIANTS OF THE 6X CNC ZOOM<sup>(1)</sup>

Lens	Magnification	Working distance (mm)	Max. workpiece height (mm)	Max. field of view (mm)	Min. field of view (mm)	Pixel size (µm/pixel)	Screen magnification <sup>(2)</sup>
Standard	0.74x to 4.4x	92	0 to 200	9.2 x 7.3	1.53 x 1.22	7.2 to 1.2	49x to 295x

(1) Values rounded. (2) On a 22-inch (16:9) monitor, PC-DMIS "Scale to Fit" → OFF.

MAGNIFICATION VARIANTS OF THE 10X CNC ZOOM<sup>(3)</sup>

Lens	Magnification	Working distance (mm)	Max. workpiece height (mm)	Max. field of view (mm)	Min. field of view (mm)	Pixel size (µm/pixel)	Screen magnification <sup>(4)</sup>
Standard	0.64x to 6.4x	86	0 to 200	10.6 x 8.5	1.06 x 0.85	8.3 to 0.83	43x to 427x

(3) Values rounded. (4) On a 22-inch (16:9) monitor, PC-DMIS "Scale to Fit" → OFF.

**Optiv Dual Camera (optional) :**

- In two steps electronically switchable magnification by factor 1:2.6
- Camera #1: 1/3-inch CCD camera (monochrome) : H 752 x V 582 pixels
- Camera #2: 1/2-inch CCD camera (monochrome) : H 752 x V 582 pixels
- Available lenses: 3x, 5x, 10x

MAGNIFICATION VARIANTS OF THE OPTIV DUAL CAMERA OPTICS  
(CAMERA #1, DETAIL MODE / CAMERA #2, OVERVIEW MODE)<sup>(5)</sup>

Optical magnification of the lens	Working distance (mm)	Pixel size (µm/pixel)	Field of view H x V (mm)	Screen magnification <sup>(6)</sup>
3x	75	2.12 / 5.6	1.6 x 1.2 / 4.3 x 3.3	278x / 104x
5x	64	1.27 / 3.4	1.0 x 0.7 / 2.6 x 2	463x / 170x
10x	48	0.64 / 1.7	0.5 x 0.4 / 1.3 x 1	925x / 345x

(5) Values rounded. (6) On a 22-inch (16:9) monitor, PC-DMIS "Scale to Fit" → OFF.

## CHROMATIC WHITE LIGHT SENSOR CWS (OPTIONAL)

**Technical description :**

- Optical sensor for focussing and scanning purposes according to the principle of chromatic length aberration of white light
- Surface independent and robust measurement with a resolution in the nanometer range
  - CWS measuring head 2 mm<sup>(7)</sup>
  - Working distance 14.1 mm
  - Resolution in Z direction 100 nm
  - Diameter of the CWS spot 12 µm

(7) Measuring range CWS, see page 8.

## TOUCH-TRIGGER PROBE HP-TM (OPTIONAL)

Technical description	Measuring accuracy (at 20°C, according to ISO 10360-2)	Mounting	Stylus holding modules	Trigger force	Optional stylus module changing rack
<b>HP-TM</b> <ul style="list-style-type: none"> <li>• 5-way touch-trigger probe: Sensor body and stylus holding module are magnetically connected to each other</li> <li>• Stylus holding modules available in four versions with different trigger forces</li> </ul>	MPEP = 2.9 µm	M8 thread (probe body), M2 thread (styli)	<b>Four:</b> <ul style="list-style-type: none"> <li>• LF low force</li> <li>• SF standard force</li> <li>• MF medium force</li> <li>• EF extended force</li> </ul>	0.055 N at 10 mm (LF module), 0.08 N at 10 mm (SF module), 0.10 N at 25 mm (MF module), 0.10 N at 50 mm (EF module)	HR-P2 or HR-P4 with 2 or 4 slots

Mutual measuring range Vision sensor ↔ HP-TM in X direction = 240 mm, see page 8.

## SCANNING PROBE HP-S-X1C (OPTIONAL)

	Technical description	Probe head type	Stylus joint	Resolution	Measuring range	Linear stiffness	Stylus length range	Optional stylus module changing rack
HP-S-X1C	High accuracy 3D scanning probe head that supports single point probing, self-centring as well as continuous high-speed-scanning for fast and accurate form and profile measurements	Analog	M3	< 0.1 µm	± 2 mm in all axes	1.2 N/mm	Vertical: up to 225 mm Horizontal: up to 100 mm	HR-X1 with 3 slots

Mutual measuring range Vision sensor ↔ HP-S-X1C in X direction = 240 mm, see page 8.

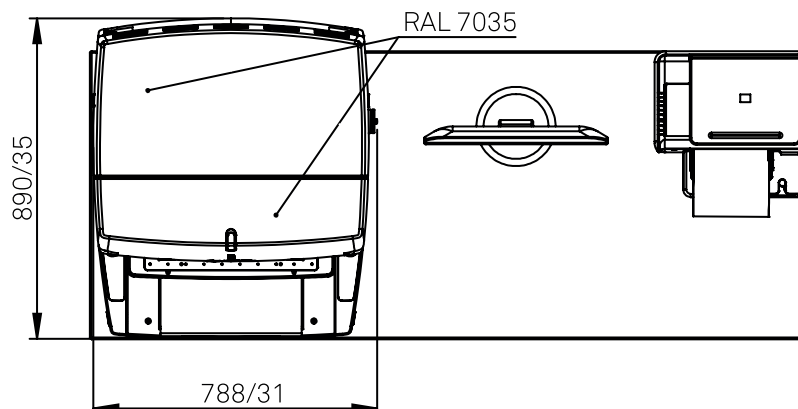
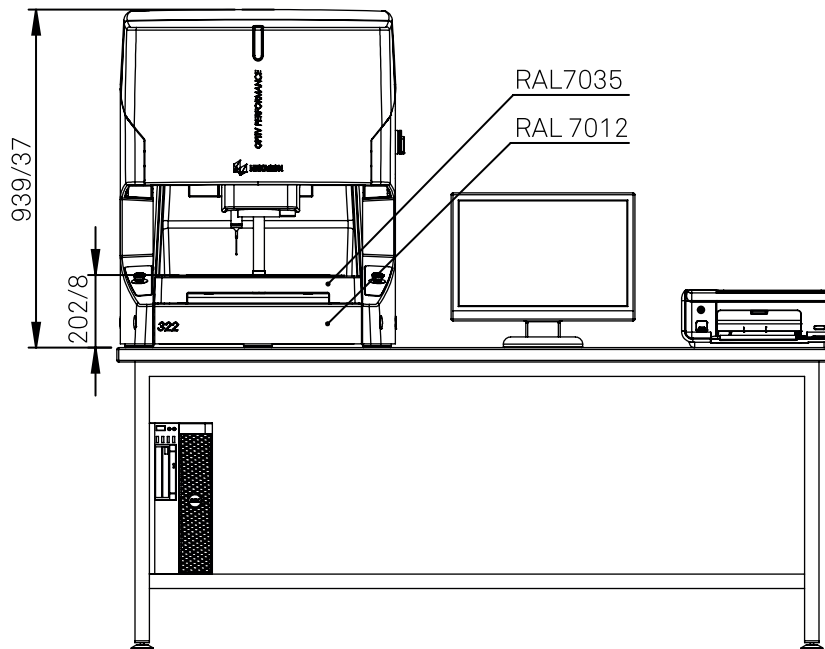
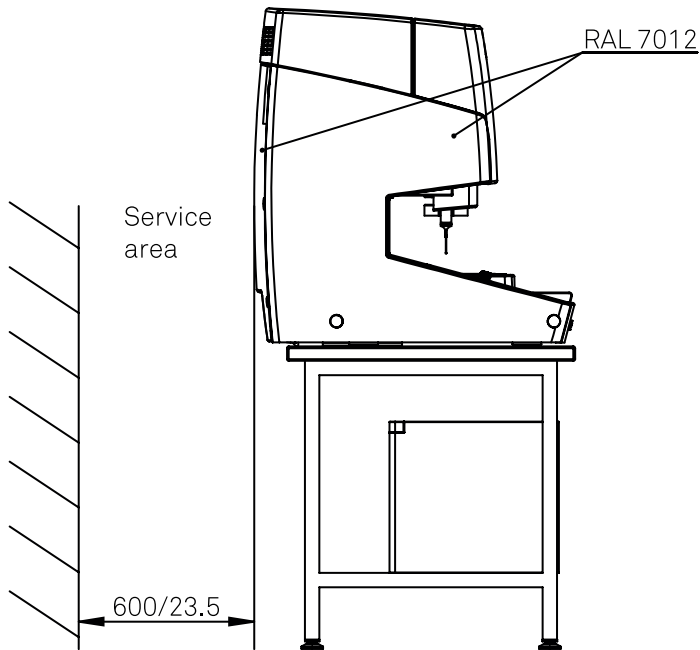
## CONTROL SYSTEM AND SAFETY REGULATIONS

- Machine control unit: DELL computer system with Microsoft Windows 10 Professional (64 bit)
- CNC controller: Microprocessor CNC with vector path control
- Safety equipment:
  - Emergency-Stop circuit with Emergency-Stop button
  - Scale signal monitoring
  - Protective covers for the axes' drives
  - Collision protection for touch-trigger probes
- Safety regulations:
  - DIN EN ISO 12100 (Safety of machinery)
  - DIN EN 60204-1 (Safety of machinery - Electrical equipment of machines)
  - DIN EN ISO 13849-1 (Safety of machinery - Safety-related parts of control systems)
  - DIN EN 61000-6 (Electromagnetic compatibility EMC, immunity / emission of machines)
  - DIN EN 55011 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics)

## OPTIONAL EQUIPMENT

- Stylus module changing rack
- Rotary indexing table
- Printers, monitors
- Uninterruptible power supply (UPS)

## MACHINE LAYOUT








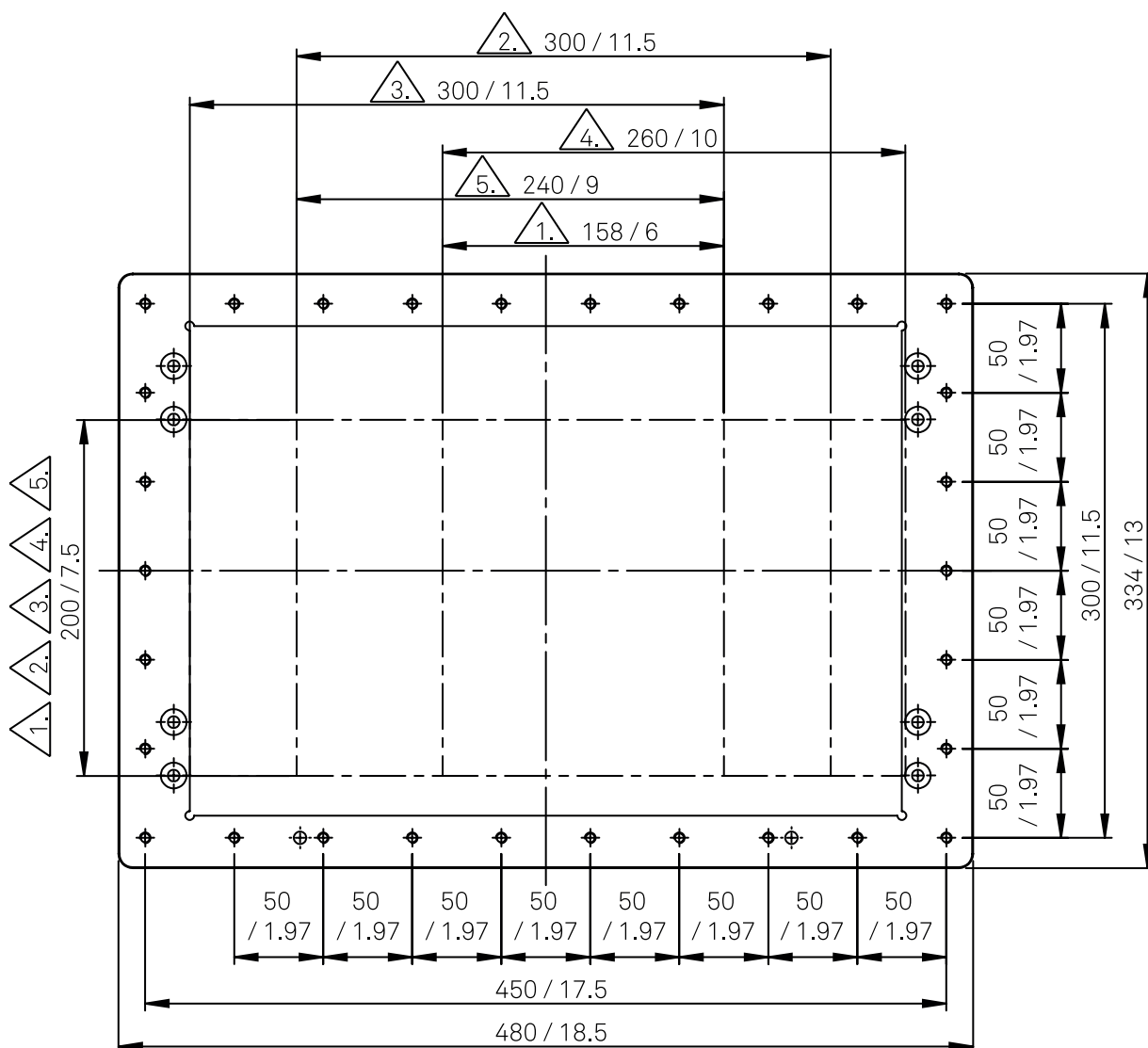
# STAGE LAYOUT

## Optiv Performance 322

Dimensions in mm / inch  
 Technical details subject to change  
 without prior notice.

Size of all threads M6-15 deep  
 Offset camera + probe 60 mm / 2.36 inch  
 Offset camera + CWS 82 mm / 3.23 inch

-  Mutual measuring range of all sensors
-  Measuring range camera
-  Measuring range probe
-  Measuring range CWS
-  Mutual measuring range camera + probe





# ROTARY INDEXING TABLE (OPTIONAL)

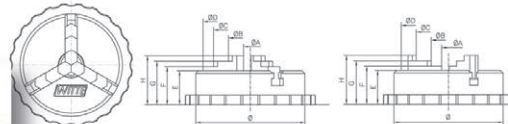


ROTARY INDEXING TABLE FOR OPTIV CLASSIC 322, 432, 443 AND OPTIV PERFORMANCE 322



DATA SHEET

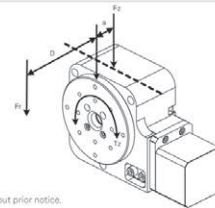
### CLAMPING RANGES WITH 3-JAW CHUCK Ø 50 MM



	Diameter	A	B	C	D	E	F	G	H
Clamp normal	50 mm	1-32 mm	15-46 mm	29-60 mm	41-72 mm	17,3 mm	18,4 mm	21 mm	23,4 mm
Clamp reversed	50 mm	1-34 mm	13-46 mm	27-60 mm	41-74 mm	17,3 mm	18,4 mm	21 mm	23,4 mm

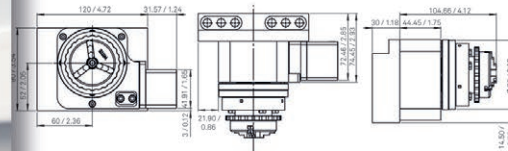
### LOAD CHARACTERISTICS

- 1. normal centred load = 200 N
- 2. distance from the face plate to the load in mm
- 3. off-centre load = 650 (12D+42.5)/42.5
- 4. distance between bearing centre and face plate
- 5. max. torque



### DIMENSIONS

With 3-jaw clamping chuck Ø 50 mm.  
Dimensions in mm / inch. Technical details subject to change without prior notice.



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### OPTIV PERFORMANCE 322 WITH ROTARY INDEXING TABLE

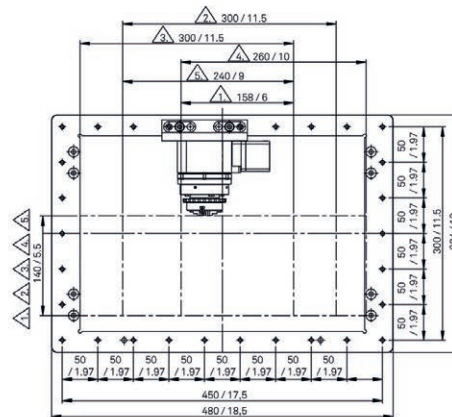
#### Optiv Performance 322

Dimensions in mm / inch  
Technical details subject to change without prior notice.

- Size of all threads M6-15 deep
- Offset camera + probe 60 mm / 2.36 inch
- Offset camera + CWS 82 mm / 3.23 inch

The mounting position shown here is an example. The rotary indexing table can also be mounted on the other holes of the table (with the same hole spacing).

- ▲ Mutual measuring range of all sensors
- ▲ Measuring range camera
- ▲ Measuring range probe
- ▲ Measuring range CWS
- ▲ Mutual measuring range camera + probe



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## ROTARY INDEXING TABLE FOR OPTIV CLASSIC 322, 432, 443 AND OPTIV PERFORMANCE 322



In this separate data sheet, you will find further information on the optionally available rotary indexing table.



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-  PORTABLE MEASURING ARMS
-  SERVICES
-  LASER TRACKERS & STATIONS
-  MULTISENSOR & OPTICAL SYSTEMS
-  WHITE LIGHT SCANNERS
-  METROLOGY SOFTWARE SOLUTIONS
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