

OPTIV PERFORMANCE 663/664



Product description

The Optiv Performance 663 / 664 combines optical and tactile measurement in one system. The system supports multi-sensor measurements using the Vision sensor, the touch-trigger and scanning probe, the TTL laser (Through-The-Lens) 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. Measurement software is PC-DMIS.

Fields of application

- Use on shop floor
- Versatile geometry measurements, GD&T analysis with standard accuracy

Design

- Design principle:
 - » Low-vibration granite construction with a fixed bridge and a moving table
 - » Integrated subframe with optional vibration dampers
- Guides:
 - » Precision mechanical linear 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)

⁽¹⁾ Vision sensor <—> Touch-probe (see pages 9 and 10)

⁽²⁾ 405 mm (16 in.) with the model Optiv Performance 664

	Vision sensor, touch-probe	Mutual measuring range ⁽¹⁾
X	610 mm (24 in.)	495 mm (19 in.)
Y	610 mm (24 in.)	610 mm (24 in.)
Z ⁽²⁾	305 mm (12 in.) / 405 mm (16 in.)	305 mm (12 in.) / 405 mm (16 in.)

Measuring accuracy ⁽³⁾

⁽³⁾ The conditions of acceptance of Hexagon Metrology Vision apply.

⁽⁴⁾ E is valid for a stylus of Ø 5 mm, L = 50 mm.

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

L = measurement length in mm

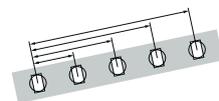
At 20°C, acc. to ISO 10360-7, with Vision sensor, at highest zoom magnification ⁽³⁾

Length measuring error

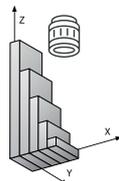
Ex, Ey = (1.5 + L/250) µm
 Exy = (1.9 + L/250) µm
 Ez = (1.9 + L/250) µm

Probing error

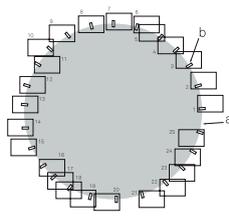
P_{F2D} = 1.9 µm
 P_{FV2D} = 1.9 µm



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.



a Test circle
 b Measuring window

P_{F2D} / P_{FV2D}:
 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 P_{FV2D} is determined at standstill of the CMM, P_{F2D} is determined with movement of the CMM.

At 20°C, acc. to ISO 10360-2 / -4, with the HP-S-X1C probing system ⁽³⁾

Volumetric length measuring error ⁽⁴⁾

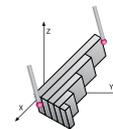
MPE_E = (2.9 + L/250) µm

Volumetric probing error ⁽⁵⁾

MPE_P = 2.1 µm

Volumetric scanning probing error ⁽⁵⁾

MPE_{THP} = 2.9 µm (t = 78 sec)

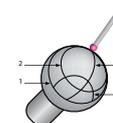


A set of 5 gauges has to be measured 3 times with one probing at each end, in 7 different directions in space. All measuring results must be within "E".



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

P = R_{max} - R_{min} = 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} = sphere form, scanning

Loading capacity

- Load-bearing capacity of the glass plate up to 50 kg

Dimensions in mm and weights in kg

- Dimensions see machine layouts on pages 7 and 8
- Machine weight 2100 kg

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 $< 5 \text{ } \mu\text{m}$ at 5 Hz
- Air humidity 40 % - 70 % RL, non-condensing
- Environmental temperature $20 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$
- Permissible temperature gradient $0.8 \text{ }^\circ\text{C/h}$, $1.0 \text{ }^\circ\text{C/d}$, $0.6 \text{ }^\circ\text{C/m}$
- Max. installation height 2000 m above sea level

Throughput

- Max. traversing speed
 - » 200 mm/s (per axis)
 - » 280 mm/s (in a plane)
 - » 340 mm/s (in space)

Supply data

- Input voltage power supply 115-230 V \pm 10%
- Frequency 50/60 Hz \pm 5%
- Power consumption 1000 VA
- Air supply (optional vibration damping system):
 - » Air pressure connection with 1/2-inch quick-connect coupling
 - » Air pressure at least 400000 pascal (Pa), max. 600000 pascal (Pa)
 - » Air consumption approx. 5-20 NL/min (dynamic), 0.5-1 NL/min (static)
 - » Pre-cleaned air according to ISO 8573-1 class 1

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
- 12-segment LED ring light (white LEDs)
 - » 3 rings with 3 different angles of incidence (27 °, 35 °, 45 °) and 4 segments each

CNC zoom

- 10x motorised zoom, for a continuous adjustment of field of view and resolution
- High resolution 1/1.8-inch CMOS camera (H 1280 x V 1024 pixels) monochrome (standard) or colour (optional) with Gigabit Ethernet interface

Magnification variants of the 10x CNC zoom ⁽¹⁾

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 ⁽²⁾
Standard	0.64x to 6.4x	86	0 to 300	10.6 x 8.5	1.06 x 0.85	8.3 to 0.83	43x to 427x

⁽¹⁾ Values rounded

⁽²⁾ 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 1:3.3
- Camera #1: 1/3-inch CCD camera (monochrome)
 - » H 752 x V 582 pixel
- Camera #2: 2/3-inch CCD camera (monochrome)
 - » H 752 x V 582 pixel
- Available lenses: 3x, 5x, 10x

Magnification variants of the Optiv Dual Camera optics (camera #1, detail mode / camera #2, overview mode) ⁽³⁾

Optical magnification of the lens	Working distance (mm)	Pixel size (µm/pixel)	Field of view H x V (mm)	Screen magnification ⁽⁴⁾
3x	75	2.12 / 7.03	1.6 x 1.2 / 5.3 x 4.1	278x / 84x
5x	64	1.27 / 4.22	1.0 x 0.7 / 3.2 x 2.5	463x / 138x
10x	48	0.64 / 2.11	0.5 x 0.4 / 1.6 x 1.2	925x / 281x

⁽³⁾ Values rounded

⁽⁴⁾ On a 22-inch (16:9) monitor, PC-DMIS "Scale to Fit" —> OFF

Chromatic White Light Sensor (CWS, optional)

⁽⁵⁾ Measuring range CWS: see pages 9 and 10

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

	10 mm ⁽⁵⁾	3 mm ⁽⁵⁾	600 µm ⁽⁵⁾	300 µm ⁽⁵⁾
Working distance	70 mm	22.5 mm	6.5 mm	4.5 mm
Resolution in Z direction	300 nm	100 nm	20 nm	10 nm
Diameter of the CWS spot	24 µm	12 µm	4 µm	5 µm

**Through-The-Lens laser
(TTL laser, optional)**

Technical description

- Available only for systems equipped with Optiv Dual Camera
- Available for 5x and 10x lens
- Coaxial reflection into the optical path of the Vision sensor
- Measuring principle: Foucault and triangulation method
- Functionality:
 - » Autofocus sensor for quick focussing of the Vision sensor and measuring heights, bore depths and flatness
 - » Scanning sensor for the contour and surface scanning
- Laser safety class 2, average output < 1 mW
- Red laser, wavelength 650 nm to 680 nm
- Spot size approx. 100 µm at 5x lens and accordingly approx. 50 µm at 10x lens
- Resolution ± 0.1 µm
- Measuring accuracy within E1 (at 10x lens)
- Average focus speed 0.2 s
- Scanning feature in conjunction with PC-DMIS CAD++

**Touch-trigger probes
TP200, HP-TM (optional)**

⁽¹⁾ Mutual measuring range
Vision-Sensor ↔ Touch-trigger probe
in X direction = 495 mm
(see pages 9 and 10)

	TP200 ⁽¹⁾	HP-TM ⁽¹⁾
Technical description	<ul style="list-style-type: none"> • 6-way touch-trigger probe • Using innovative micro strain gauge technology • Allows for small trigger forces and offers advanced triggering accuracy as well as long reliable operation 	<ul style="list-style-type: none"> • 5-way touch-trigger probe • Sensor body and stylus holding module are magnetically connected to each other • Stylus holding modules available in four versions with different trigger forces
Measuring accuracy (at 20°C, according to ISO 10360-2)	MPE _P = 2.5 µm	MPE _P = 3.4 µm
Mounting	M8 thread (probe body), M2 thread (styli)	
Stylus holding modules	LF low force SF standard force	LF low force SF standard force MF medium force EF extended force
Trigger force	X, Y: 0.02 N / Z: 0.07 N (all modules)	0.055 N (LF module) 0.08 N (SF module) 0.10 N (MF module) 0.10 N (EF module)
Optional stylus module changing rack	With 3 or 6 slots	HR-P4 or HR-P6 (with 4 or 6 slots)

**Scanning probe
HP-S-X1C**

⁽¹⁾ Mutual measuring range
Vision-Sensor ↔ HP-S-X1C
in X direction = 495 mm
(see pages 9 and 10)

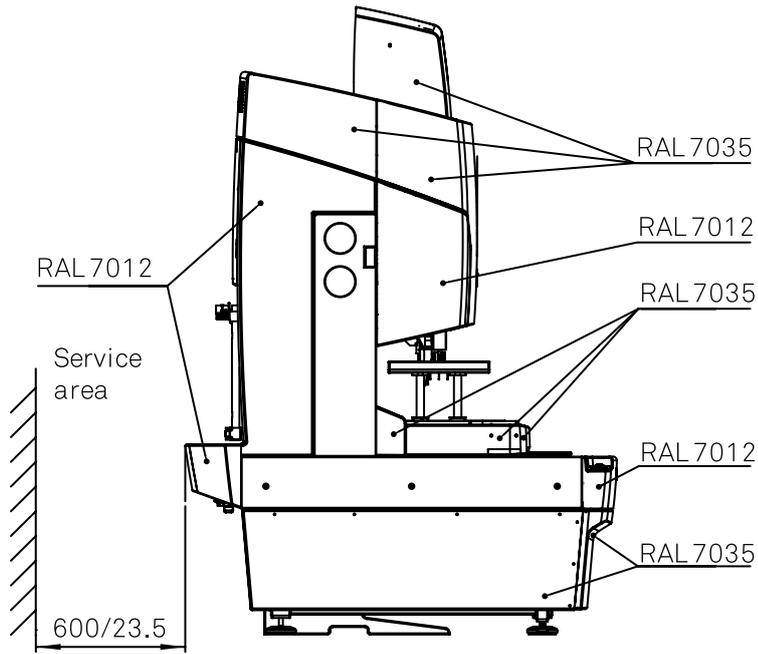
	HP-S-X1C ⁽¹⁾
Technical description	High accuracy 3D scanning probe head that supports single point probing, self-centring as well as continuous high-speed-scanning for fast and accurate form and profile measurements
Probe head type	Analog
Stylus joint	M3
Resolution	< 0.1 µm
Measuring range	± 2 mm in all axes
Linear stiffness	1.2 N/mm
Stylus length range	Vertical: up to 225 mm Horizontal: up to 100 mm
Stylus module changing rack	HR-X1 with 3 or 6 slots

Other optional equipment

⁽²⁾ From quarter 3/2016,
only for Optiv Performance 664

- Vibration damping system
- Mechanical bearing CNC rotary table
- Mechanical bearing CNC stacked rotary tables (Optiv Dual Rotary) ⁽²⁾
- Stylus module changing rack
- Periphery:
 - » Worktable, printers, monitors
 - » Uninterruptible power supply (UPS)
- Machine control unit
 - » DELL computer system with Microsoft Windows 7 Professional (64 bit)
- CNC controller:
 - » Microprocessor CNC with vector path control
- Safety equipment:
 - » Emergency-Stop circuit with Emergency-Stop button
 - » Scale signal monitoring
 - » Safety limit switches
 - » Protective covers for the axes' drives
 - » Collision protection for touch-trigger probes
- Safety regulations:
 - » DIN EN ISO 12100-1 and -2 (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 61000-4-2 and -4 (Electromagnetic compatibility EMC, immunity of machines)
 - » DIN EN 55011 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics)

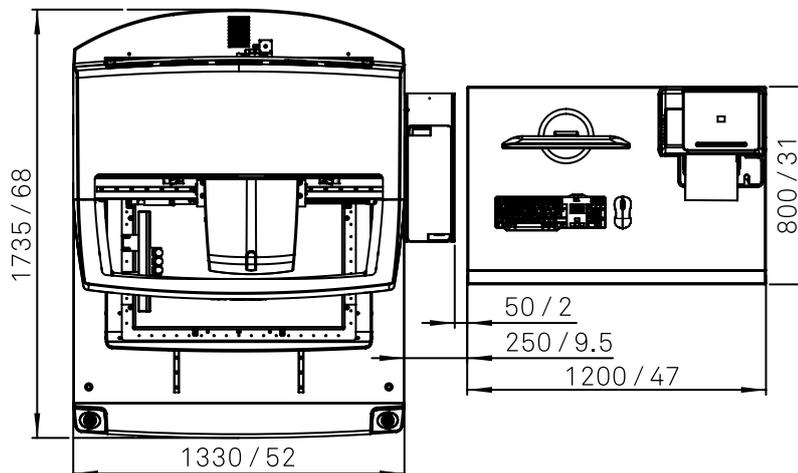
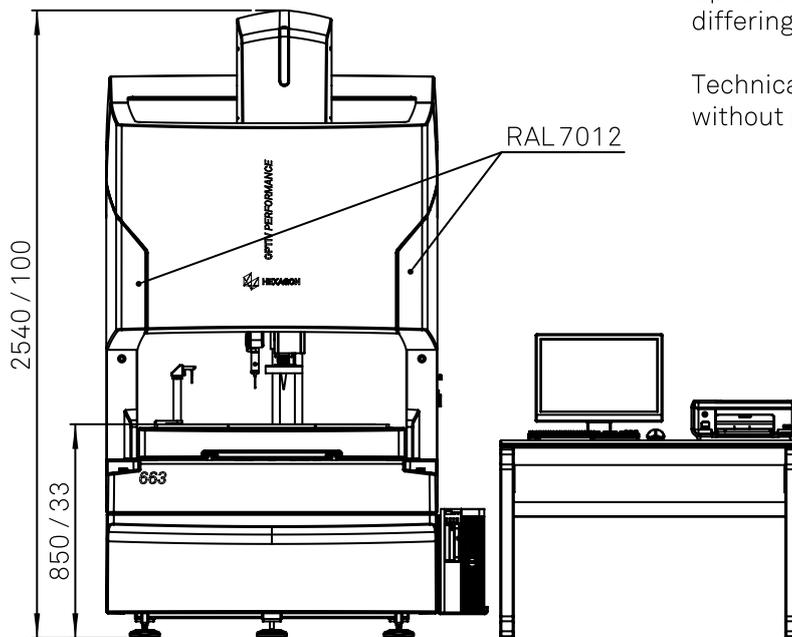
**Control system and
safety regulations**

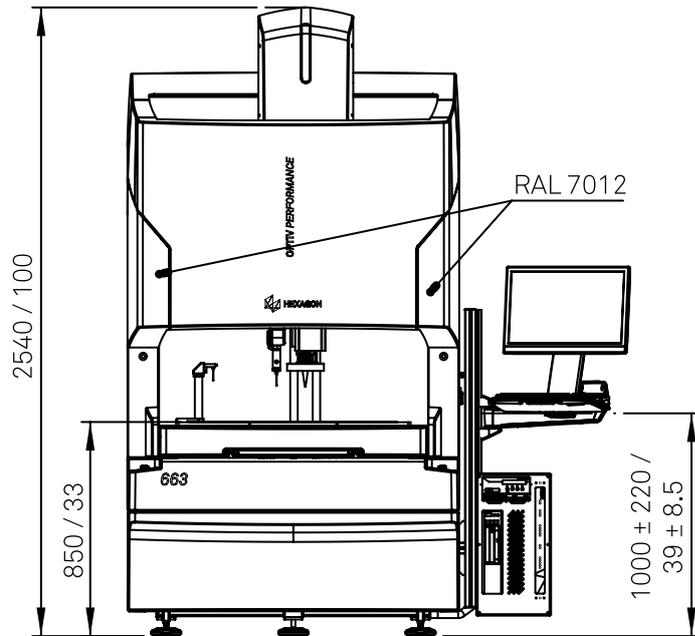
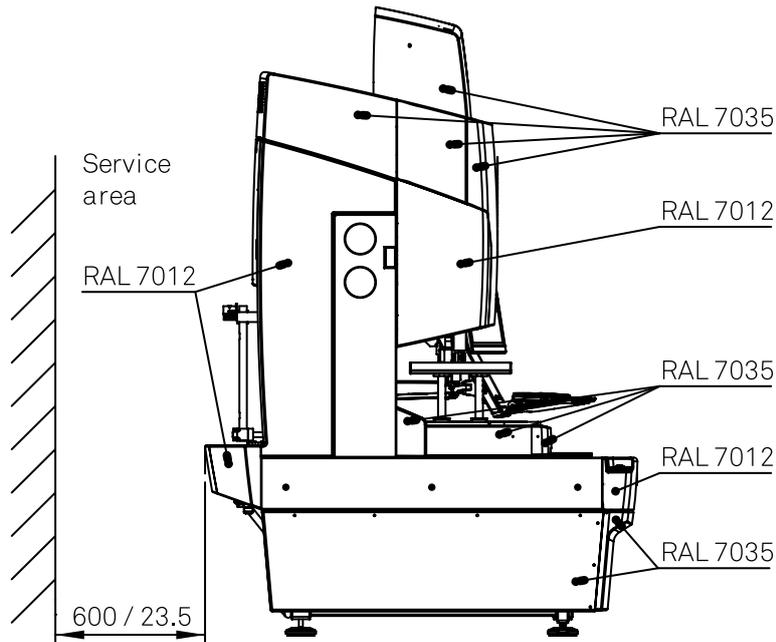


Dimensions in mm / inch

Optional worktable and monitor(s), differing variants possible.

Technical details subject to change without prior notice.

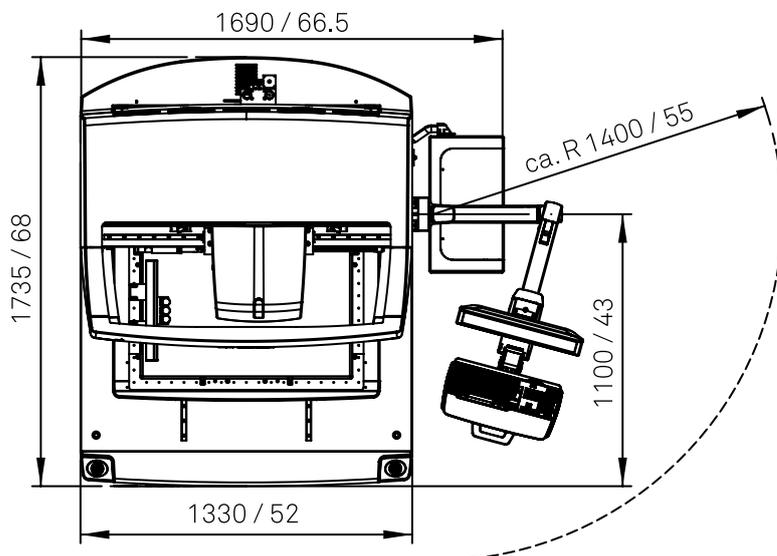




Dimensions in mm / inch

Optional swivelling arm and monitor, differing variants possible.

Technical details subject to change without prior notice.



Performance 663 / 664

Dimensions in mm / inch

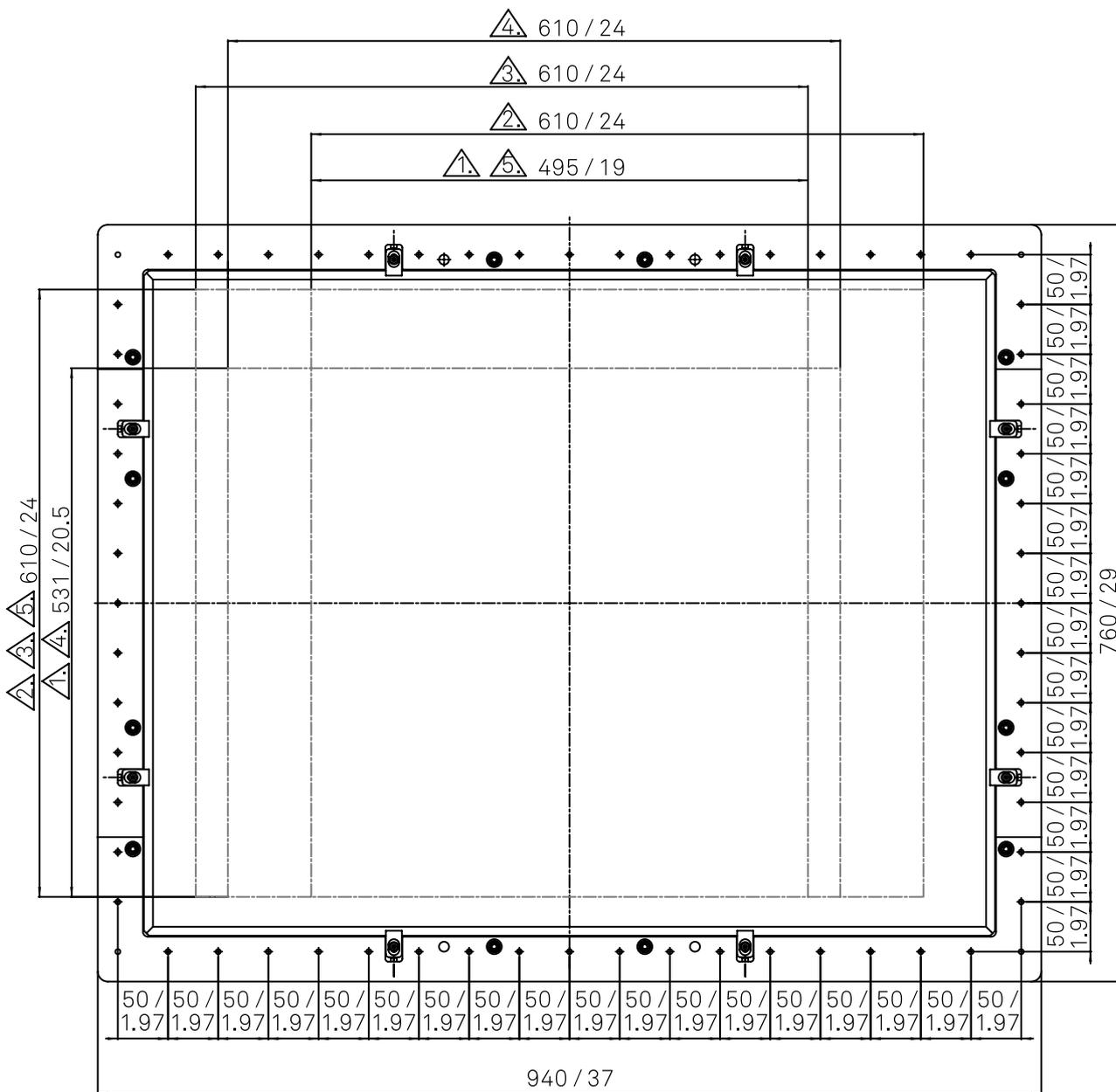
Technical details subject to change without prior notice.

Size of all threads M6 - 12 deep

Offset camera + touch-probe 115 mm / 4.5 inch

Offset camera + CWS 83 mm / 3 inch

-  1. Mutual measuring range of all sensors
-  2. Measuring range camera
-  3. Measuring range touch-probe
-  4. Measuring range CWS
-  5. Mutual measuring range camera + touch-probe





HEXAGON

MANUFACTURING INTELLIGENCE

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