

opto *TOP-HE* THE MEASURING RANGES

For the opto *TOP-HE* system we offer a large number of measuring ranges:

- standard FOV's
- extended FOV's
- customized FOV's

All fields of view (FOV) can be realised with the same basic components, camera and projector, just by changing the lenses of camera / projector and - if necessary - the sensor base.

The measuring ranges are identified by their base length L and the FOV, e.g.

L100-100 base length 100 mm, FOV 100 mm, standard lenses

L300-425 base length 300 mm, FOV 425 mm, wide angle lenses

(the identifier of the FOV is an approximated value for the image diagonal)

To simplify the setup and calibration of the standard measuring ranges, they will be offered only with a special set of lenses for each FOV. The lenses will be delivered with a factory setting for the aperture and focal depth, which is optimized for the corresponding FOV and which should not be changed by the user.

To use the whole flexibility of our opto *TOP* system, including the extended FOV's, we strongly recommend special training and certification.

standard fields of view with triangulation angle of 30 degrees				
base length L	operating distance	image diagonal [mm]		
100 mm	320 mm	50	100	200
300 mm	700 mm	200	325	425
600 mm	1250 mm	375	600	775
focal length identifier		Tele	Standard	Wide angle
Recommended combinations of standard measuring ranges				
Small FOV's :	L100-50	L100-200	L300-325	
Medium FOV's :	L300-200	L300-425	L600-775	

extended fields of view with triangulation angle of 30 degrees			
base length L	operating distance	image diagonal [mm]	
50 mm	250 mm	30	200
300 mm	700 mm	125	600
600 mm	1250 mm	250	1050
focal length identifier		eXtreme Tele (XT)	eXtreme Wide angle (XW)

extended fields of view for large objects (triangulation angle 20 degrees)						
base length L	operating distance	image diagonal [mm]				
600 mm	2000 mm	400	600	900	1200	1700
focal length identifier		XT	T	S	W	XW

opto *TOP-HE*-sensors with customized FOV's (3 x 2 mm² up to 2500 x 1800 mm²) on inquiry.

opto TOP-HE SPECIFICATIONS

light source	100 W halogen lamp
number of projected fringes	128
min. measuring time	980 ms
sensor weight	2 - 3 kg
digitisation (x,y)	1380 x 1040 pixel
size of measuring range	about 0.8 x 0.6 of image diagonal
depth of measuring volume	typically 1 / 2 of image diagonal
X,Y resolution	typically 1 / 1.500 of image diagonal
feature accuracy	typically 1 / 15.000 of image diagonal
noise (Z)	typically 1 / 20.000 of image diagonal

specifications of typical fields of view						
image diagonal*	[mm]	50	100	200	400	800
X,Y resolution*	[μ m]	30	60	120	240	480
resolution limit (Z)*	[μ m]	1	2	4	8	16
noise (Z)*	[μ m]	± 5	± 7	± 10	± 20	± 40
feature accuracy*	[μ m]	± 7	± 10	± 15	± 30	± 60

* The measurement specifications given above are average values for the central field of view, which are achieved under defined measurement conditions and after precise calibration of the sensor. All details concerning accuracy and resolution are possibly dependent on the surface of the object and the environment.

The resolution limit is defined as the theoretical limit using a phase evaluation of 10 bit.

The feature accuracy is defined as the difference of the measured positions of index marks towards the target-values (2σ value).

The noise is measured as deviation of the measured points towards a best-fit curve.

The data given above are valid for a single view only.

The accuracy of a complete measurement cycle depends strongly on the measuring strategy. In combination with photogrammetry or CMM, the overall accuracy is given by those systems. The gap between two adjacent images is minimised approx. to the noise level of the sensor by using advanced 3D-alignment and merging techniques.