Basler Accessories

Technical Specification

BASLER LENS C23-1616-2M

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2200000180

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1 Key Features

Key Features	
• Cost-effective 2 megapixel lens for machine vision / factory automation • Part of the Basler C23 lens series: 12, 16, 25, 35, and 50 mm focal length models available • Metal housing • C-Mount interface • Locking screws for iris and focus	
Optimum working distance	0.9 m
Aperture range	f/1.6 to f/22
Focal length	16 mm
Order number	2200000180

2 Terms and Conventions

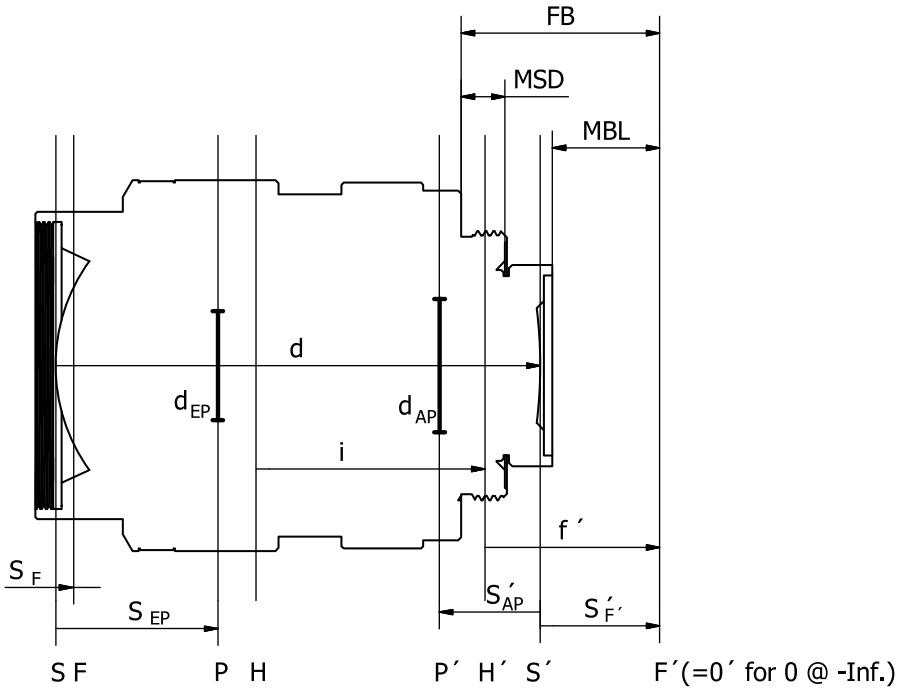

Figure 1: Terms for Lenses

Designations according to DIN 1335			
O	Object position	f' (=H′F′)	Focal length
O′	Image position	k (=f'/d_{EP})	f-number (indicated as "f/k")
H	Front principal plane	i (=HH′)	Principal point separation
H′	Back principal plane	s_F (=SF)	Front focal length
F	Front focal plane	$s'_{F'}$ (=S′F′)	Back focal length
F′	Back focal plane	s_{EP} (=SP)	Entrance pupil position
P	Entrance pupil plane	s'_{AP} (=S′P′)	Exit pupil position
P′	Exit pupil plane	d (=SS′)	Overall optical length
S	Vertex of first lens surface	d_{EP}	Entrance pupil diameter
S′	Vertex of last lens surface	d_{AP}	Exit pupil diameter
		β'_P (=d_{AP}/d_{EP})	Pupil magnification
Other Designations			
FB	Flange back	MOD	Minimum object distance
MSD	Maximum screw-in depth	CRA	Chief ray angle
MBL	Mechanical back length	Inf.	Infinity
WD	Working distance	MTF	Modulation transfer function
		SFR	Spatial frequency response

3 Mechanical Specifications and Environmental Requirements

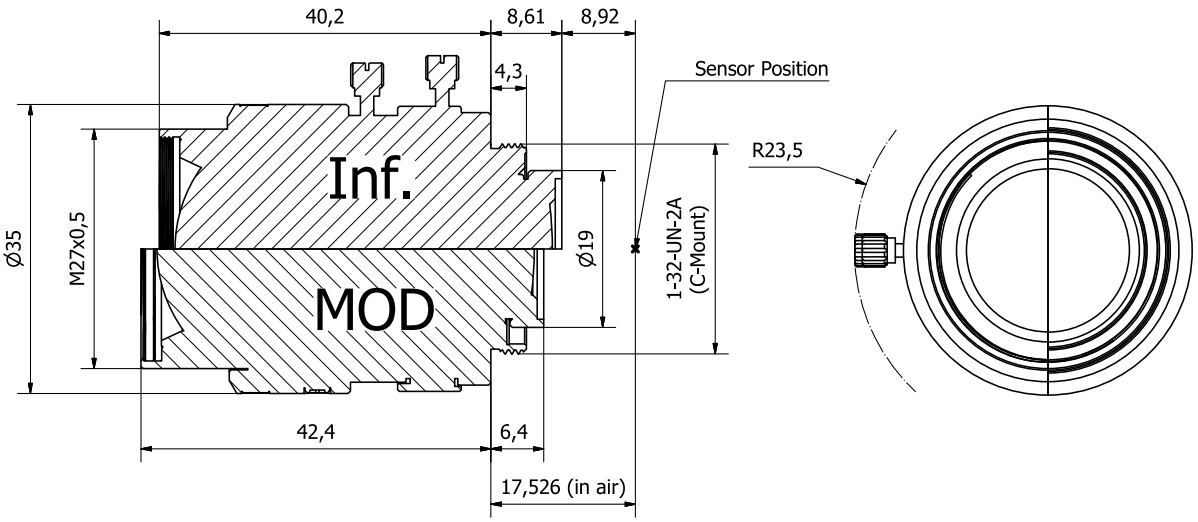

Figure 2: Mechanical Dimensions (in mm)

Mechanical Specifications	
Storage conditions	−20–70 °C, 20–70 % relative humidity, non-condensing
Environmental requirements	−10–60 °C, 20–80 % relative humidity, non-condensing (For best results, please focus when a steady operating temperature has been reached.)
Flange back	17.526 mm
Weight	Approx. 104 g
Focus operation	Manually Operating angle: 144°

4 Optical Specifications

Optical Specifications		
Focal length *f'*		16.5 mm ± 5 %
Aperture range		f/1.6 to f/22
Image circle		11 mm (2/3" image format)
Focus range		0.2 m to infinity
Optimum working distance		0.9 m
Optimum magnification		−0.018
Relative illumination at full aperture		At least 80 % (see Figure 3 and *)
Resolution (25 % MTF, center, full aperture)		Designed for 90 LP/mm (5.5 µm pixel size, see Figure 5)
Optical distortion		Typical −1.1% (barrel distortion, see Figure 4)
Angle of view, 1/1.8" format (using an IMX265 sensor)	horizontal	21.7° (@ MOD) to 23.4°
	vertical	16.5° (@ MOD) to 17.9°
Angle of view, 2/3" format (using a PYTHON 2000 sensor)	horizontal	27.3° (@ MOD) to 29.4°
	vertical	17.8° (@ MOD) to 19.3°
Wavelength range		Visible (400 to 700 nm)
Pupil magnification β'_P		1.22
Chief ray angle, CRA		15.3°
Front focal length, s_F		1.7 mm
Back focal length, $s'_{F'}$		8.4 mm
Principal point separation, HH′		21.6 mm
Entrance pupil position, s_{EP}		15.3 mm
Exit pupil position, s'_{AP}		−9.5 mm
Overall optical length, *d*		45.7 mm

*Due to the large chief ray angle of this lens, the relative illumination on the peripheral regions might be lower for 2/3" image sensors.

5 Performance Charts

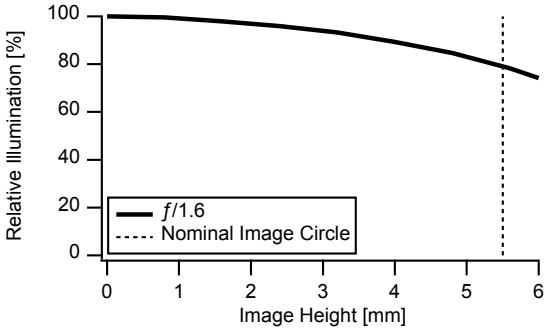

Figure 3: Simulated Relative Illumination vs. Image Height

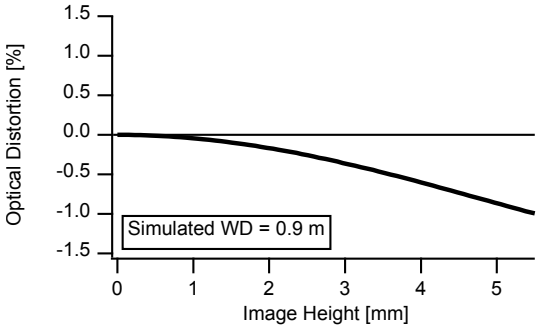

Figure 4: Simulated Distortion vs. Image Height

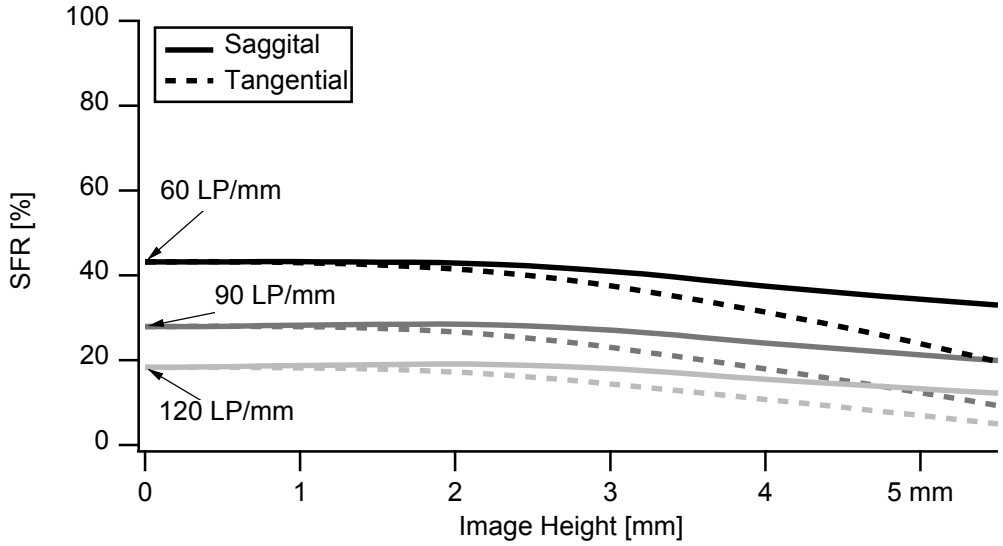

Figure 5: Measured Resolution vs. Image Height

Conditions for SFR measurements: ƒ/1.6, polychromatic, WD 0.5 m, average result from 10 samples.

The technical data shown in chapters 1 to 5 are Nominal Design Values. The real values of the delivered products may deviate from the Nominal Design Values.

Revision History

Document Number	Date	Changes
DG00191301000	17 Jan 2018	Initial release of this document.