MICRO-EPSILON

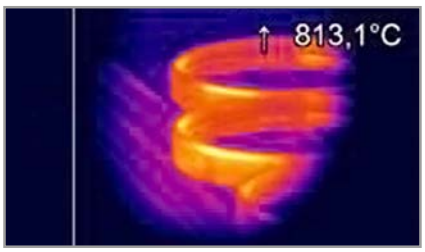
More Precision

thermoIMAGER TIM // Compact thermal imaging cameras

thermoIMAGER TIM M-1

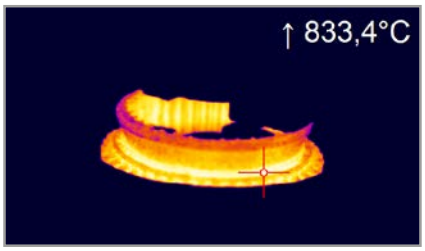
Compact infrared camera for short wavelengths in non-contact temperature measurements of metal surfaces

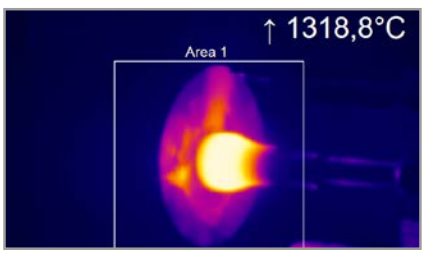
- Highly dynamic CMOS detector with optical resolution up to 764 x 480 pixels
- Very large temperature measuring range (without sub-ranges) from 450 °C to 1800 °C
- Frame rates up to 1 kHz for fast processes
- Real time output of the center pixel up to 1 kHz via process interface (PIF)
- License-free analysis software and complete SDK included

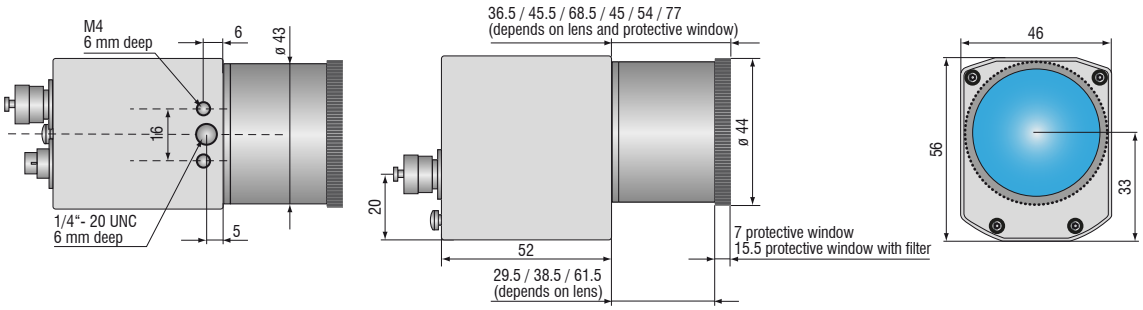


Software

- Display of the thermal image in real time with recording function (video, snapshot)
- Complete set up of parameters and remote control of the camera
- Detailed analysis of fast, thermodynamic processes
- Output of analog temperature or alarm values via the process interface
- Digital communication via RS232 or DLL for software integration







Model	TIM M-1	
Optical resolution	764 x 480 pixels @ 32 Hz 382 x 288 pixels @ 80 Hz (switchable to 27 Hz) 72 x 56 pixels @ 1 kHz [1] 764 x 8 pixels @ 1 kHz (fast line-scan mode) [1]	
Temperature ranges	450 [6] ... 1800 °C (27 Hz mode) 500 [6] ... 1800 °C (32 Hz mode) 500 [6] ... 1800 °C (80 Hz mode) 600 [6] ... 1800 °C (1 kHz mode)	
Spectral range	0.85 to 1.1 µm	
Frame rate	up to 1 kHz / 1 ms real-time analog output (0 - 10 V) from 8 x 8 pixels (freely selectable)	
System accuracy	±1 % of reading (object temperature < 1400 °C)	
Lenses	**FOV @ 764 x 480 px:** 39° x 25° (f = 16 mm) [2] 26° x 16° (f = 25 mm) [3] 13° x 8° (f = 50 mm) [4] 9° x 5° (f = 75 mm) [5]	**FOV @ 382 x 288 px:** 20° x 15° (f = 16 mm) [2] 13° x 10° (f = 25 mm) [3] 7° x 5° (f = 50 mm) [4] 4° x 3° (f = 75 mm) [5]
Thermal sensitivity (NETD)	< 1 K (700 °C) | < 2 K (1000 °C)	
Detector	CMOS (15 µm x 15 µm)	
Outputs/digital	USB 2.0 / optional GigE	
Standard process interface (PIF)	0 - 10 V input, digital input (max. 24 V), 0 - 10 V output	
Industry process interface (PIF)	2x 0 - 10 V inputs, digital input (max. 24 V), 3x 0(4) - 20 mA outputs, 3x relays (0 - 30 V / 400 mA), fail-safe relay	
Cable length (USB)	1 m (standard), 5 m, 10 m 5 m and 10 m also available as high temperature USB cable (180 °C or 250 °C)	
Power supply	USB powered	
Tripod mount	¼-20 UNC	
Protection class	IP67 [7]	
Ambient temperature	5 ... 50 °C	
Storage temperature	-40 ... 70 °C	
Relative humidity	20 to 80 %, non-condensing	
Vibration	IEC 60068-2-6 (sinus-shaped) / IEC 60068-2-64 (broadband noise)	
Shock	IEC 60068-2-27 (25 g and 50 g)	
Housing (size)	46 mm x 56 mm x 88 - 129 mm (depending on lens and focus position)	
Weight	245 - 311 g, incl. lens	

[1] Can be placed anywhere within the FOV
[2] Please note: measurement accuracy can be out of specification with distances below 200 mm
[3] Please note: measurement accuracy can be out of specification with distances below 500 mm
[4] Please note: measurement accuracy can be out of specification with distances below 1500 mm
[5] Please note: measurement accuracy can be out of specification with distances below 2000 mm
[6] +75 °C higher initial temperature with lenses providing a focal length of f=50 mm and f=75 mm
[7] Only applies when lens protection tube is used

Scope of supply

TIM M-1

- TIM process camera
  incl. a selectable lens
- Lens cap incl. protective window
- Operating instructions
- USB cable 1 m
- Software for real-time processing
  and analyzing thermal images
- Tripod mount
- PIF cable incl. terminal block (1 m)
- Transport case
- Optional: Cooling Jacket Advanced,
  high temperature cable

Lenses thermoIMAGER TIM M-1 / TIM M-08

TIM M-1 / TIM M-08 [1] 382 x 288 px	Focal length [mm]	Angle	Minimum measurement distance*		Distance to measurement object [m]										
					0.1	0.2	0.3	0.5	1	2	4	6	10	30	100
f=16 mm Wide angle lens	16	20° 15° 25° 0.94 mrad	0.2 m	HFOV [m] VFOV [m] DFOV [m] IFOV [mm]		0.07 0.05 0.09 0.2	0.11 0.08 0.13 0.3	0.18 0.14 0.22 0.5	0.36 0.27 0.45 0.9	0.72 0.54 0.90 1.9	1.43 1.08 1.79 3.8	2.15 1.62 2.69 5.6	3.6 2.7 4.5 9.4	10.7 8.1 13.5 28.1	35.8 27.0 44.9 93.8
f=25 mm Standard lens	25	13° 10° 16° 0.60 mrad	0.5 m	HFOV [m] VFOV [m] DFOV [m] IFOV [mm]	0.023 0.017 0.029 0.1	0.05 0.03 0.06 0.1	0.07 0.05 0.09 0.2	0.11 0.09 0.14 0.3	0.23 0.17 0.29 0.6	0.46 0.35 0.57 1.2	0.92 0.69 1.15 2.4	1.38 1.04 1.72 3.6	2.3 1.7 2.9 6.0	6.9 5.2 8.6 18.0	22.9 17.3 28.7 60.0
f=50 mm Telephoto lens	50	7° 5° 8° 0.30 mrad	1.5 m	HFOV [m] VFOV [m] DFOV [m] IFOV [mm]				0.06 0.04 0.07 0.2	0.11 0.09 0.14 0.3	0.23 0.17 0.29 0.6	0.46 0.35 0.57 1.2	0.69 0.52 0.86 1.8	1.1 0.9 1.4 3.0	3.4 2.6 4.3 9.0	11.5 8.6 14.4 30.0
f=75 mm Super telephoto lens	75	4° 3° 5° 0.20 mrad	2.0 m	HFOV [m] VFOV [m] DFOV [m] IFOV [mm]					0.08 0.06 0.10 0.2	0.15 0.12 0.19 0.4	0.31 0.23 0.38 0.8	0.46 0.35 0.57 1.2	0.8 0.6 1.0 2.0	2.3 1.7 2.9 6.0	7.6 5.8 9.6 20.0

[1] TIM M-08 only available with OF25 lens | Please note: the camera provides 382 x 288 px in the 80 Hz mode

* Please note: The measurement accuracy of the camera may lie outside of the specifications for distances below the defined minimum measurement distance.

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

Sensors and measurement devices for non-contact temperature measurement

Measuring and inspection systems for metal strips, plastics and rubber

Optical micrometers and fiber optics, measuring and test amplifiers

Color recognition sensors, LED analyzers and inline color spectrometers

3D measurement technology for dimensional testing and surface inspection

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