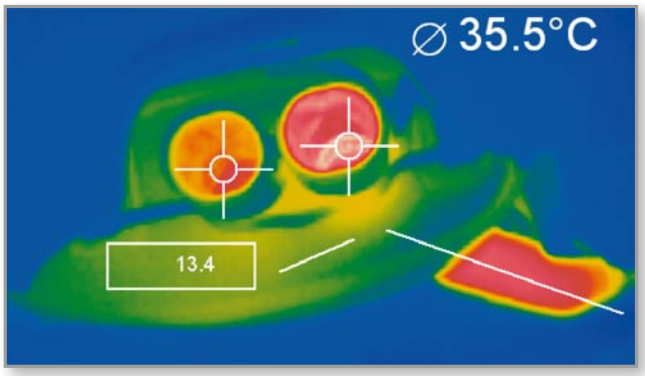
MICRO-EPSILON

More Precision.

thermoIMAGER TIM Features

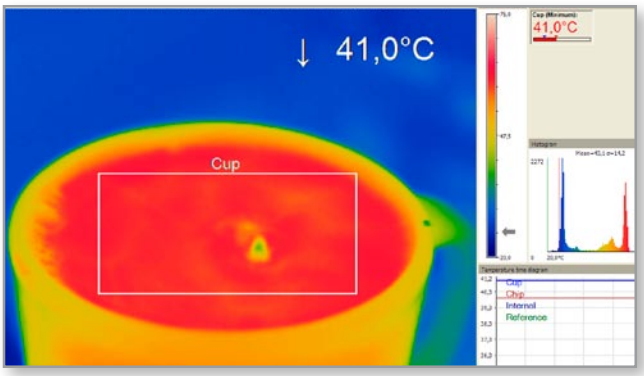
Automatic hot spot detection

Objects can be examinated thermally and hot or cold positions (hot or cold spots) can be found automatically.



Fast measurements

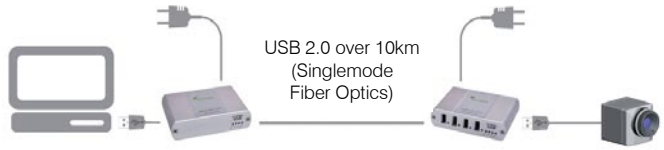
Temperature distributions at surfaces can be captured precisely within an millisecond intervall.



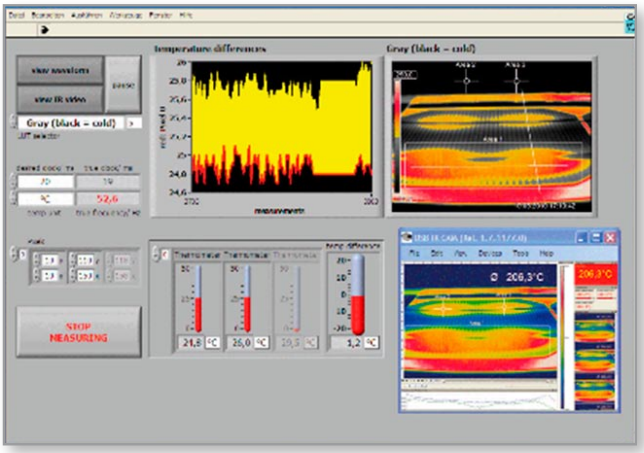
Easy process integration

Advanced interface concepts allow the integration within networks and automated systems:

- ➔ USB cable extension up to 100m (over Ethernet) or 10km (over fibre)
- ➔ Process interface (PIF) at the camera as analog input / output (0 to 10V) and digital input (low and high-level)
- ➔ Software interface via Dynamic-link Library (DLL), Computer-Port (ComPort)
- ➔ RS232 Serial data communication
- ➔ incl. LabVIEW interface/port



NATIONAL INSTRUMENTS LabVIEW



Software Features

Automatic process and quality control

- ➔ Individual setup of alarm levels depending on the process
- ➔ BI-SPECTRAL process monitoring (IR and VIS) for easy orientation at point of measurement
- ➔ Line-scan camera function to control processes of moving measurement objects
- ➔ Definition of visual or acoustic alarms and analog data output via the process interface
- ➔ Analog and digital signal input (process parameter)
- ➔ External communication of software via Comports, DLL and LabVIEW driver
- ➔ Compatible with Windows XP and 7 as well as LabVIEW

Microsoft Windows xp

Windows 7

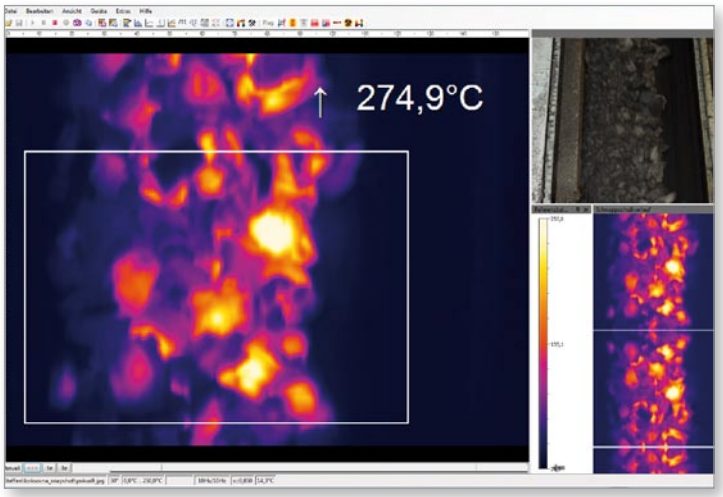
thermoIMAGER TIM 200

BI-SPECTRAL technology

With the help of BI-SPECTRAL technology, a visual image (VIS) can be combined with a thermal image (IR). Both can be finally captured time synchronously:

Monitoring modus:

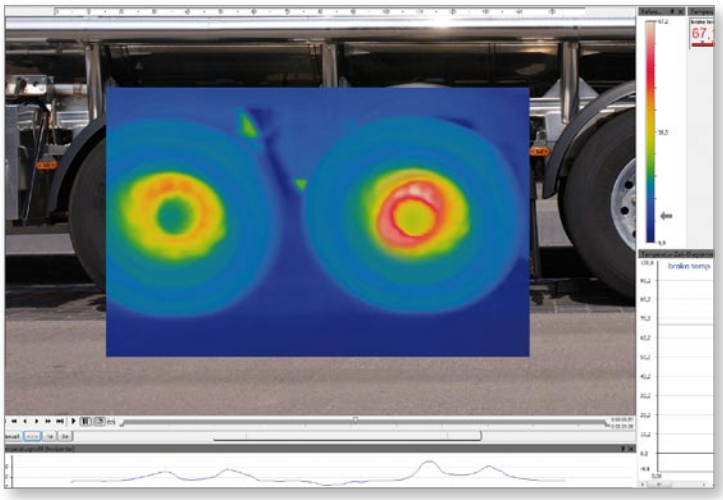
Easy orientation at point of measurement



thermoIMAGER TIM Connect Software - conveyor of living embers

Cross-fading modus:

Highlighting of critical temperatures



thermoIMAGER TIM Connect Software - tires

thermoIMAGER TIM 160

thermoIMAGER TIM 160

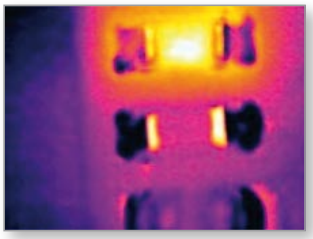
Miniature real time thermal imager with USB interface

- ➔ Measuring range from -20°C to 900°C (special edition 1500°C)
- ➔ Excellent thermal sensitivity of 0.08K (NEDT)
- ➔ Exchangeable lenses with 6°FOV, 23°FOV, 48°FOV and 80°FOV
- ➔ Real time video recording at 120Hz frame rate with slow motion playback capability
- ➔ Power supply and operation via USB 2.0 interface
- ➔ Extremely lightweight (195g) and rugged (IP67)
- ➔ Very compact 45x45x62mm
- ➔ Analogue input and output, trigger interface
- ➔ Software developer kit and Labview driver are included as standard

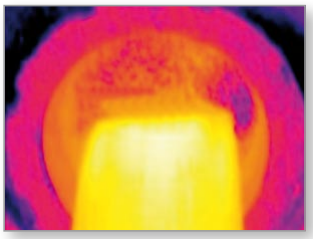
Software

- ➔ Display of the thermal image in real time (120Hz) with recording function (video, snap shot)
- ➔ Complete set up of parameters and remote control of the camera
- ➔ Detailed analysis of fast thermodynamic processes
- ➔ Output of analogue temperature or alert values via the process interface
- ➔ Digital communication via RS232 or DLL for software integration

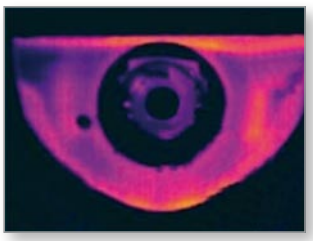
Applications - Examples



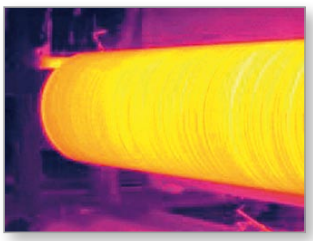
R&D electronic



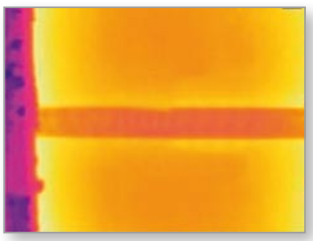
Process control extrusion



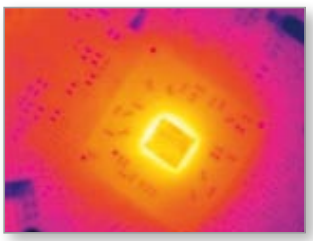
R&D mechanical components



Process control calendering



Production of solar panels



R&D electronic devices

Technical data

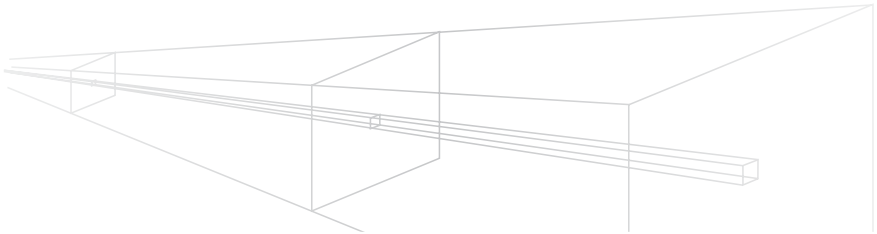
thermoIMAGER TIM 160

Optical resolution	160x120 pixel
Temperature ranges	-20°C to 100°C / 0°C to 250°C / 150°C to 900°C
Spectral range	7.5 to 13µm
Frame rate	120Hz
System accuracy	±2% or ±2°C
Resolution (Display)	±0.1°C
Lenses	80° / f = 3.1mm (min. distance 20mm); 48° / f = 4.5mm (min. distance 20mm); 23° / f = 10mm (min. distance 20mm); 6° / f = 35.5mm (min. distance 500mm)
Emissivity	0.10 to 1.00 adjustable
Thermal Sensitivity	0.1K with 48° FOV and 80° FOV [1] / 0.08K with 23° FOV [1] / 0.3K with 6° FOV [2]
Detector	Focal Plane Array (FPA) - uncooled micro bolometer 25x25µm²
Measurement modes	Flexible spot with crosshair marking, fixed measurement field with automatic display of maximum-, minimum- or average value
Colour palettes	Iron, rainbow, black-white, black-white inverted
Set up controls (via menu)	Mesurement modes, full automatic, manual, colour palettes, emissivity, file management, date/time, °C/ °F, language

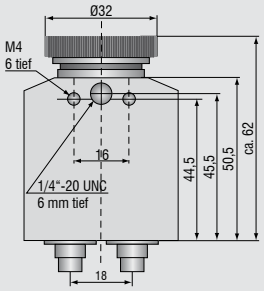
Outputs/digital	USB 2.0
Process interface (electrically isolated)	0-10 V output, 0-10 V input, trigger input
Digital communication	via RS232 of PC / DLL interface
Cable length	1m (standard), 5m, 10 m, 20m
Power supply	USB powered
Tripod mount	1/4-20 UNC

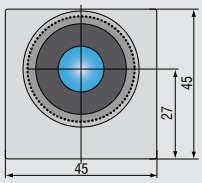
Environmental rating	IP 67
Ambient temperature	0°C to 50°C (up to 240°C with cooling jacket)
Storage temperature	-40°C to 70°C
Relative humidity	20 to 80%, non-condensing
Vibration	2G, IEC 68-2-6 11-200Hz each axis
Shock	25G, IEC 68-2-29 11ms each axis
Weight	195g; incl. lens

PC requirements: minimum 1.5GHz, 1GB RAM, Windows XP SP2, Windows 7
[1] Caution: at distances below 200mm measurement accuracy can be out of specification
[2] Caution: at distances below 500mm measurement accuracy can be out of specification

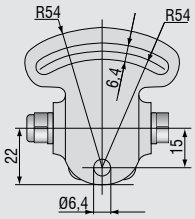


Dimensions

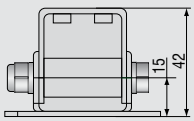




Accessories



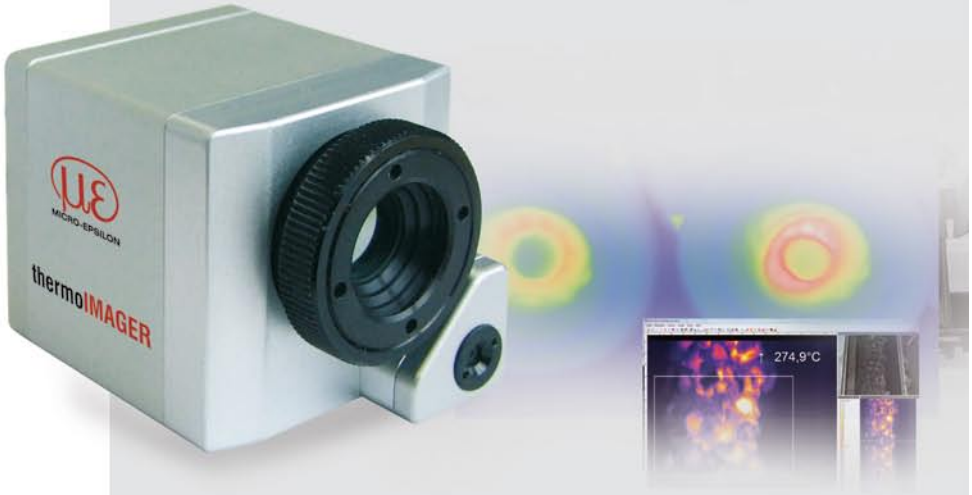
TM-MB-TIM Mounting base, adjustable



TM-PH-TIM Protective housing incl. mounting base

TM-J-TIM Cooling jacket
(length 228mm, ø89mm) with adjustable mounting bracket TM-JAB-TIM;
recommended high temperature cable TM-USBC5H-TIM (up to 240°C)

thermoIMAGER TIM 200



thermoIMAGER TIM 200

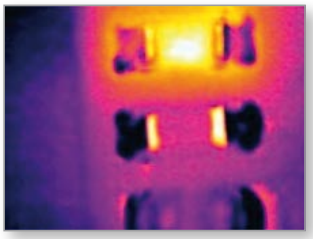
Themal imager with BI-SPECTRAL technology

- **NEW:** BI-SPECTRAL technology
- Measuring range from -20°C to 900°C (special edition 1500°C)
- Excellent thermal sensitivity of 0.08K (NEDT)
- Exchangeable lenses with 6°FOV, 23°FOV, 48°FOV and 80°FOV
- Thermal images in real time with 128Hz via USB 2.0 interface
- Time synchronic visual image recording (VIS) with 32Hz (640 x 480 pixel)
- Power supply and operation via USB 2.0 interface
- Extremely lightweight (215g) and rugged (IP67)
- Very compact 45x45x62mm
- Analogue input and output, trigger interface
- Software developer kit and Labview driver are included as standard

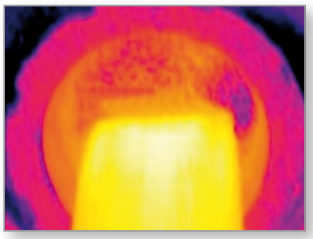
Software

- Display of the thermal image (128Hz) and the real time image (32 Hz) in real time with recording function (video, snap shot)
- Complete set up of parameters and remote control of the camera
- Detailed analysis of fast thermodynamic processes
- Output of analogue temperature or alert values via the process interface
- Digital communication via RS232 or DLL for software integration

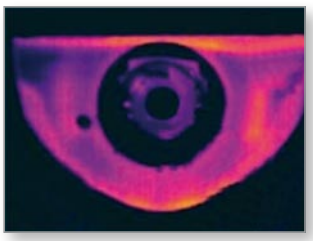
Applications - Examples



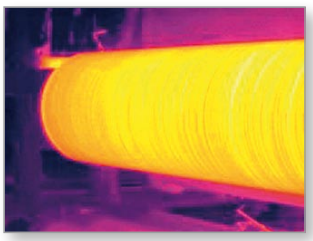
R&D electronic



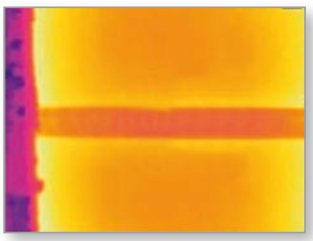
Process control extrusion



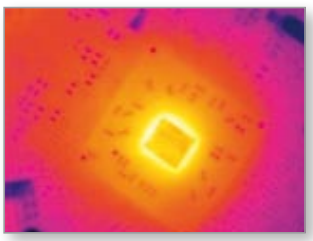
R&D mechanical components



Process control calendering



Production of solar panels

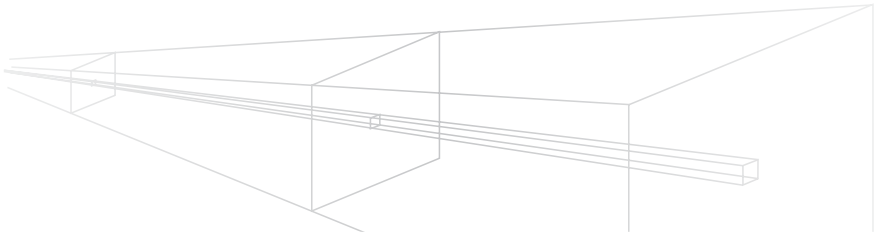


R&D electronic devices

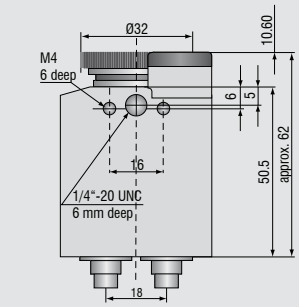
Technical data

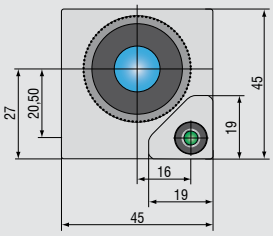
thermoIMAGER TIM 200	
Optical resolution	160x120 pixel
Temperature ranges	-20°C to 100°C / 0°C to 250°C / 150°C to 900°C
Spectral range	7.5 to 13μm
Frame rate	128Hz
System accuracy	±2% or ±2°C
Resolution (Display)	±0.1°C
Lenses	80° / f = 3.1mm (min. distance 20mm); 48° / f = 4.5mm (min. distance 20mm); 23° / f = 10mm (min. distance 20mm); 6° / f = 35.5mm (min. distance 500mm)
Emissivity	0.10 to 1.00 adjustable
Thermal Sensitivity	0.1K with 48° FOV and 80° FOV [1] / 0.08K with 23° FOV [1] / 0.3K with 6° FOV [2]
Detector	Focal Plane Array (FPA) - uncooled micro bolometer 25x25μm^2
Measurement modes	Flexible spot with crosshair marking, fixed measurement field with automatic display of maximum-, minimum- or average value
Colour palettes	Iron, rainbow, black-white, black-white inverted
Set up controls (via menu)	Mesurement modes, full automatic, manual, colour palettes, emissivity, file management, date/time, °C/ °F, language
Data of visual camera	Optical resolution: 640 x 480 Pixel Frame rate: 32Hz Lenses (FOV): 54° x 40°
Outputs/digital	USB 2.0
Process interface (electrically isolated)	0-10 V output, 0-10 V input, trigger input
Digital communication	via RS232 of PC / DLL interface
Cable length	1m (standard), 5m, 10 m, 20m
Power supply	USB powered
Tripod mount	1/4-20 UNC
Environmental rating	IP 67
Ambient temperature	0°C to 50°C (up to 240°C with cooling jacket)
Storage temperature	-40°C to 70°C
Relative humidity	20 to 80%, non-condensing
Vibration	2G, IEC 68-2-6 11-200Hz each axis
Shock	25G, IEC 68-2-29 11ms each axis
Weight	215g; incl. lens

PC requirements: minimum 1.5GHz, 1GB RAM, Windows XP SP2, Windows 7
[1] Caution: at distances below 200mm measurement accuracy can be out of specification
[2] Caution: at distances below 500mm measurement accuracy can be out of specification

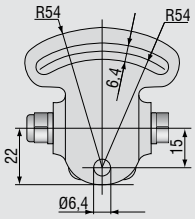


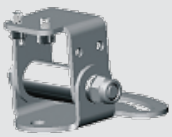
Dimensions



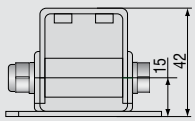


Accessories





TM-MB-TIM Mounting base, adjustable



TM-PH-TIM Protective housing incl. mounting base

TM-J-TIM Cooling jacket
(length 228mm, ø89mm) with adjustable mounting bracket TM-JAB-TIM;
recommended high temperature cable TM-USBC5H-TIM (up to 240°C)

thermoIMAGER TIM 400/450

thermoIMAGER TIM 400/450

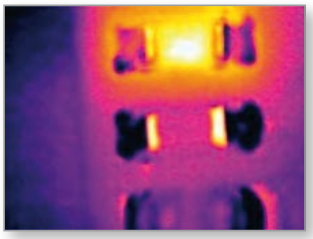
Miniaturised real time thermal imager with high resolution

- ➔ NEW: Detector with 382 x 288 pixels
- ➔ Fast real-time thermal imager with up to 80Hz
- ➔ Very high thermal sensitivity with 80mK (TIM 400) and 40mK (TIM 450)
- ➔ Smallest camera in its class (46 x 56 x 90mm³)
- ➔ Lightweight (320g incl. optics)
- ➔ Exchangeable lenses & industrial accessories
- ➔ Software TIMConnect included in the scope of delivery
- ➔ Including Software Developer Kit and LabView Interface

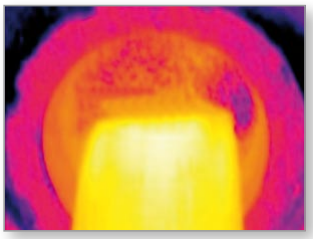
Software

- ➔ Representation of the thermal image in real time (80Hz) with record function (video, snapshots)
- ➔ Complete set up of parameters and remote control of the camera
- ➔ Detailed analysis of fast thermodynamic processes
- ➔ Output of analogue temperature or alert values via the process interface
- ➔ Digital communication via RS232 or DLL for software integration

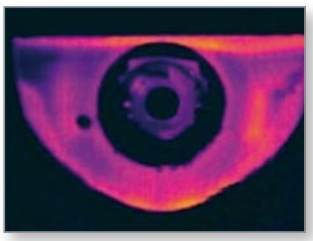
Applications - Examples



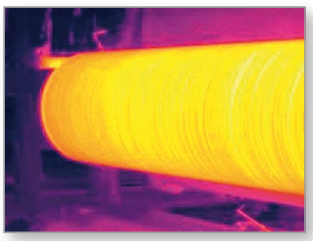
R&D electronic



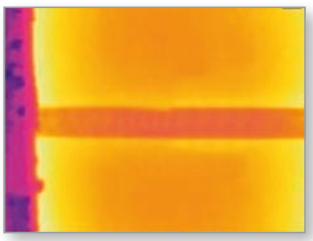
Process control extrusion



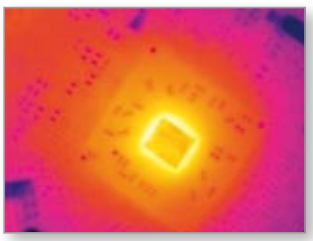
R&D mechanical components



Process control calendering



Production of solar panels



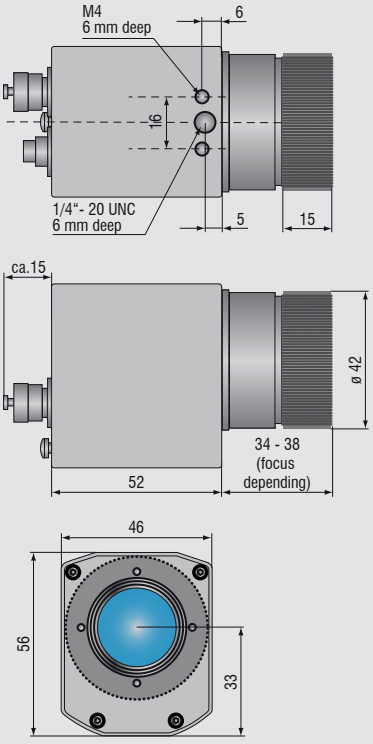
R&D electronic devices

Technical data

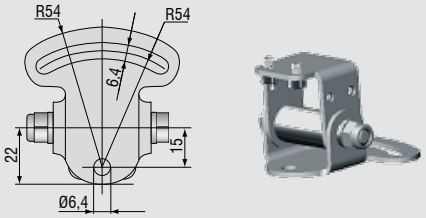
Modell	TIM 400	TIM 450
Detector	FPA, uncooled (25µm x 25µm)	
Optical resolution	382 x 288 pixel	
Temperature ranges	-20°C...100°C, 0°C...250°C, 150°C...900°C, additional range: 200°C...1500°C (Option only for TIM 400)	
Spectral range	7.5 - 13µm	
Frame rate	80Hz	
System accuracy	±2% or ±2°C	
Lenses	30° x 23° FOV / f = 17 mm <u>or</u> 13° x 10° FOV / f = 40 mm	
Thermal Sensitivity	0.08K with 30° x 23° FOV / F = 0.7 0.1K with 13° x 10° FOV / F = 1.0	0.04K with 30° x 23° FOV / F = 0.7 0.06K with 13° x 10° FOV / F = 1.0
Outputs/digital	USB 2.0	
Process interface (electrically isolated)	0-10V output, 0-10V input, trigger input	
Power supply	USB powered	
Tripod mount	1/4-20 UNC	
Environmental rating	IP 67	
Ambient temperature	0°C to 50°C	0°C to 70°C
Storage temperature	-40°C to 70°C	-40°C to 85°C
Relative humidity	20 to 80%, non-condensing	
Vibration	2G, IEC 68-2-6 11-200Hz each axis	
Shock	25G, IEC 68-2-29 11ms each axis	
Housing (Dimensions)	46mm x 56mm x 90mm	
Weight	320g; incl. lens	

PC requirements: minimum 1.5GHz, 1GB RAM, Windows XP SP2, Windows 7
[1] Caution: at distances below 200mm measurement accuracy can be out of specification
[2] Caution: at distances below 500mm measurement accuracy can be out of specification

Dimensions



Accessories



TM-MB-TIM Mounting base, adjustable

The right optics for many applications

thermoIMAGER TIM 160/200

Objective 80° x 60° wide angle; focal distance 3.1mm; min distance 0.1m												
HFOV	m	0.13	0.26	0.39	0.65	1.55	2.58	5.16	7.7	12.9	38.7	129.0
VFOV	m	0.09	0.19	0.29	0.48	1.16	1.94	3.87	5.8	9.7	29.0	96.8
IFOV	mm	0.81	1.61	2.42	4.03	9.68	16.13	32.26	48.4	80.7	241.9	806.5
Distanz in m		*0.1*	*0.2*	*0.3*	*0.5*	*1.2*	*2*	*4*	*6*	*10*	*30*	*100*

Objective 48° x 37° wide angle; focal distance 4.5mm; min distance 0.02m												
HFOV	m	0.09	0.18	0.27	0.44	1.07	1.78	3.56	5.3	8.9	26.7	88.9
VFOV	m	0.07	0.13	0.20	0.33	0.80	1.33	2.67	4.0	6.7	20.0	66.7
IFOV	mm	0.56	1.11	1.67	2.78	6.67	11.11	22.22	33.3	55.6	166.7	555.6
Distance in m		*0.1*	*0.2*	*0.3*	*0.5*	*1.2*	*2*	*4*	*6*	*10*	*30*	*100*

Objective 23° x 17° wide angle; focal distance 10mm; min distance 0.02m												
HFOV	m	0.04	0.08	0.12	0.20	0.48	0.80	1.60	2.40	4.00	12.00	40.00
VFOV	m	0.03	0.06	0.09	0.15	0.36	0.60	1.20	1.80	3.00	9.00	30.00
IFOV	mm	0.25	0.50	0.75	1.25	3.00	5.00	10.00	15.00	25.00	75.00	250.00
Distance in m		*0.1*	*0.2*	*0.3*	*0.5*	*1.2*	*2*	*4*	*6*	*10*	*30*	*100*

Objective 6° x 5° wide angle; focal distance 35.5mm; min distance 0.5m												
HFOV	m	-	-	-	0.06	0.14	0.23	0.45	0.7	1.1	3.4	11.3
VFOV	m	-	-	-	0.04	0.10	0.17	0.34	0.5	0.8	2.5	8.5
IFOV	mm	-	-	-	0.35	0.85	1.41	2.82	4.2	7.0	21.1	70.4
Distance in m		*0.1*	*0.2*	*0.3*	*0.5*	*1.2*	*2*	*4*	*6*	*10*	*30*	*100*

FOV = Field of view; HFOV = Horizontal field of view; VFOV = Vertical field of view; IFOV = Indicated field of view

- ➔ Standard-, tele- and wide angle lens for different applications
- ➔ High quality germanium lenses and a special antireflective coating
- ➔ Factory calibrated lenses allowing the easy exchange of optics without recalibration

thermoIMAGER TIM 400/450

Objective 30° x 23°; focal distance 17mm; min distance 0.2m											
HFOV	m	0.11	0.17	0.28	0.67	1.12	1.60	3.4	5.6	16.9	56.2
VFOV	m	0.08	0.13	0.21	0.51	0.84	1.20	2.5	4.2	12.7	42.4
IFOV	mm	0.29	0.44	0.74	1.76	2.94	5.88	8.8	14.7	44.1	147.1
Distance in m		*0.2*	*0.3*	*0.5*	*1.2*	*2*	*4*	*6*	*10*	*30*	*100*

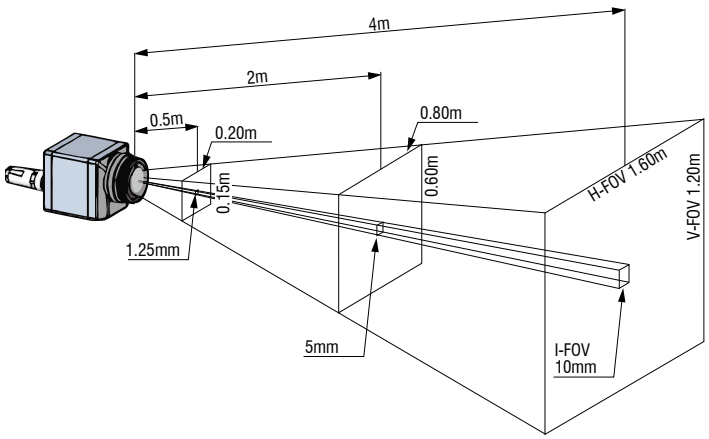
Objective 13° x 10° Tele; focal distance 40mm; min distance 0.5m											
HFOV	m			0.12	0.29	0.48	0.96	1.5	2.4	7.2	23.9
VFOV	m			0.09	0.22	0.36	0.72	1.1	1.8	5.4	18.0
IFOV	mm			0.31	0.75	1.25	2.50	3.8	6.3	18.8	62.5
Distance in m				*0.5*	*1.2*	*2*	*4*	*6*	*10*	*30*	*100*

FOV = Field of view; HFOV = Horizontal field of view; VFOV = Vertical field of view; IFOV = Indicated field of view

Note: The accuracy of measurement can be outside of the specifications for distances below 0.2m.

Precise measurement values can be calculated on
www.micro-epsilon.com/optikkalkulator

Dependence between field of view (FOV) and distance
Example: (lens 23° x 17°)



Scope of supply

TIM 160/200

- TIM process camera including one selected lens
- Operation manual
- USB cable 1m
- Processing and analysing software
- Tripod mount
- PIF cable 1m

TIM 160/200 /DK

- TIM process camera including 6°, 23°, 48° optics
- Certificate of calibration, matched with the optics
- Tripod mount 200 to 1000mm
- Rugged transport case
- Operation manual
- USB cable 1m and 10m
- Processing and analysing software
- PIF cable 1m

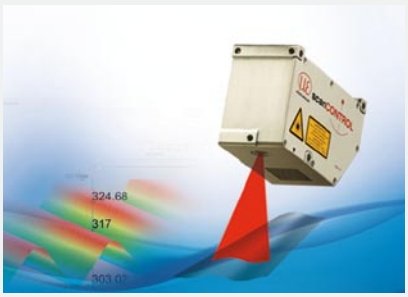
TIM 400/450

- TIM process camera including one selected lens
- USB cable 1m
- Processing and analysing software
- Tripod mount
- PIF cable 1m
- Aluminium case

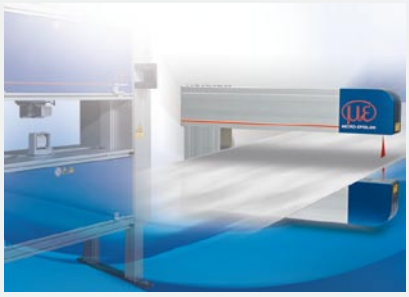
High performance sensors made by Micro-Epsilon

Sensors and systems for displacement and position

Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Measurement and inspection systems for quality assurance

Optical micrometers, fiber optic sensors and optical fibers

Color recognition sensors, LED analyzers and color online spectrometer

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