



More Precision.

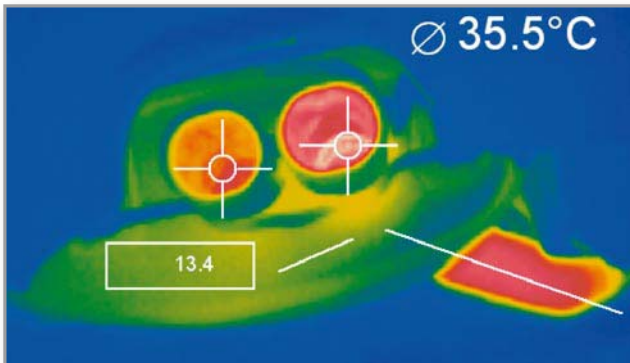
thermoIMAGER TIM
Compact Thermal Imager



thermoIMAGER TIM Features

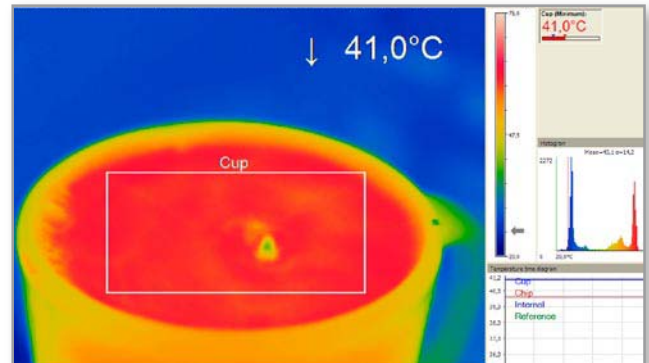
Automatic hot spot detection

Objects can be examined 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 interval.



Easy process integration

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

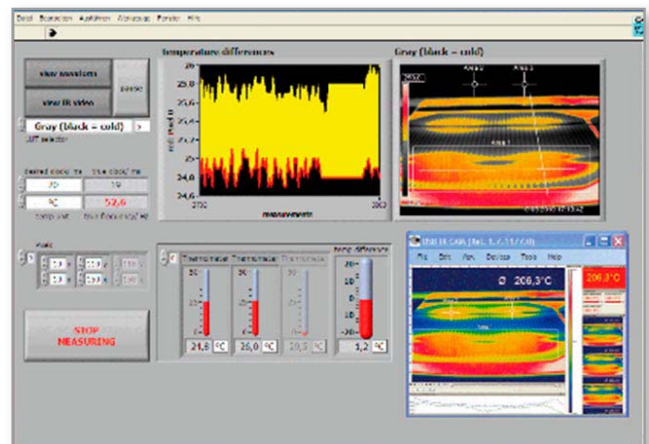
- USB cable extension up to 100m (Ethernet)
- Process interface (PIF) at the camera as analogue input / output (0 to 10V) and digital input (low and high-level)
- Software interface via Dynamic-link Library (DLL),
- Serial data communication via RS232 Computer-Port (COMPort)
- incl. LabVIEW interface



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 (TIM 200/230)
- Line-scan camera function to control processes of moving measurement objects
- Definition of visual or acoustic alarms and analogue data output via the process interface
- Analogue and digital signal input (process parameter)
- External communication of software via COMports, DLL and LabVIEW driver
- Compatible with Windows XP and Windows 7





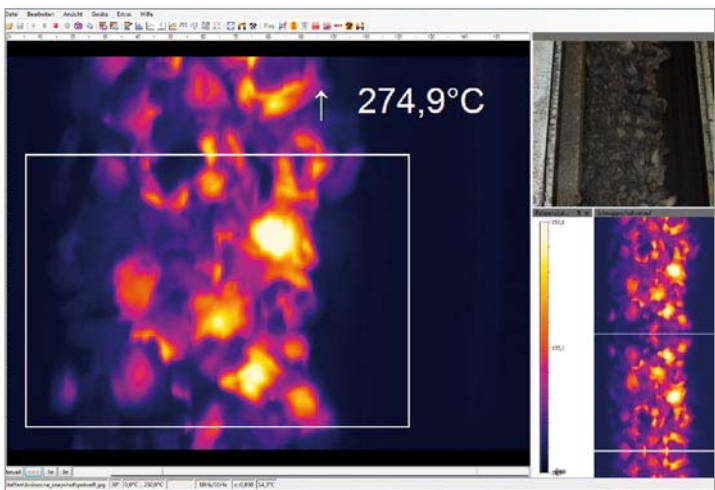
thermoIMAGER TIM 200/230

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:

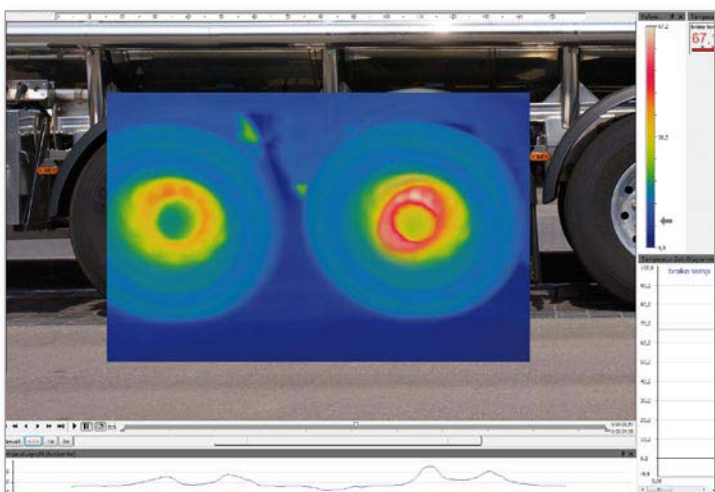
Easy orientation at point of measurement



thermoIMAGER TIM Connect Software - conveyor of living embers

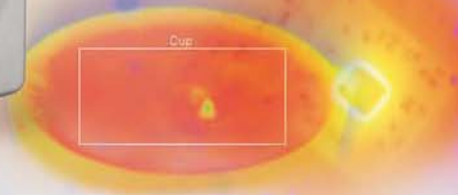
Cross-fading modus:

Highlighting of critical temperatures by cross-fading



thermoIMAGER TIM Connect Software - tires

thermoIMAGER TIM 160



thermoIMAGER TIM 160

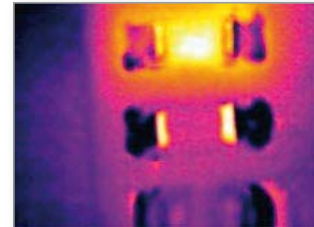
Miniature real time thermal imager with USB interface

- 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 72°FOV
- Real time video recording at 120Hz frame rate with slow motion playback capability
- Power supply and data transfer 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

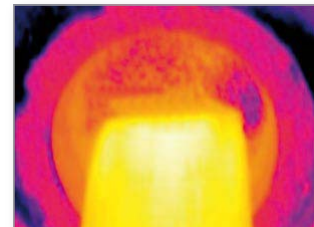
Software

- 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

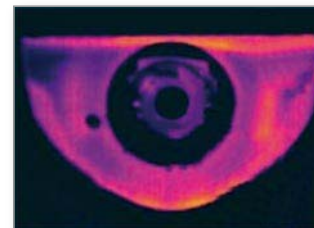
Applications - Examples



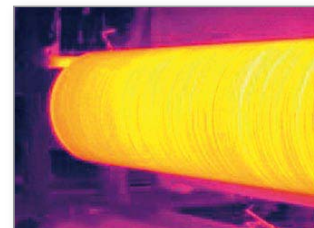
R&D electronic



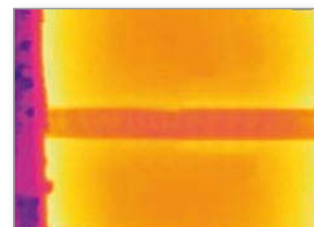
Process control extrusion



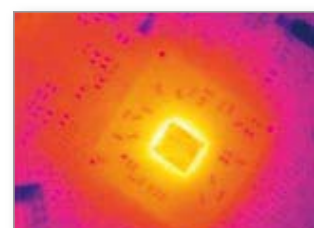
R&D mechanical components



Process control calendering



Production of solar panels



R&D electronic devices

Technical data

Model	TIM 160
Optical resolution	160x120 pixel
Temperature ranges	-20°C to 100°C / 0°C to 250°C / 150°C to 900°C additional range: 200°C to 1500°C
Spectral range	7.5 to 13µm
Frame rate	120Hz
System accuracy	±2% or ±2°C
Resolution (Display)	±0.1°C
Lenses	72° / f = 3.3mm (min. distance 20mm); 48° / f = 5.7mm (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 72° 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 etc.
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

Scope of supply

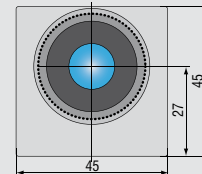
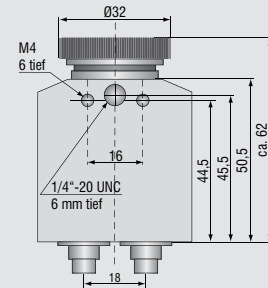
TIM 160

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

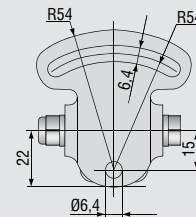
TIM 160/DK

- ▶ 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

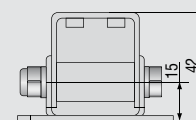
Dimensions



Accessories



TM-MB-TIM Mounting base, adjustable



TM-PH-TIM Protective housing incl. mounting base



TM-J-TIM; TM-J72-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 200/230



thermoIMAGER TIM 200/230

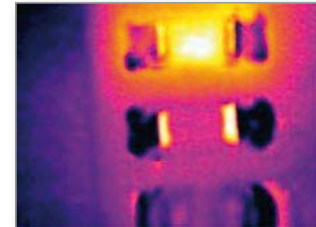
Thermal imager with BI-SPECTRAL technology

- 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 72°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

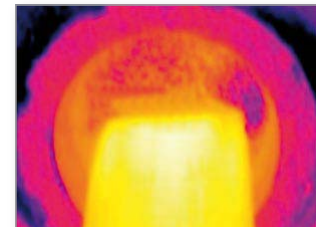
Software

- 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

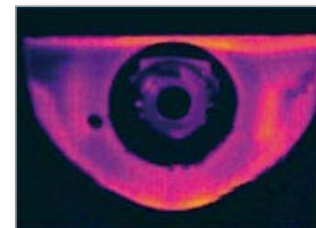
Applications - Examples



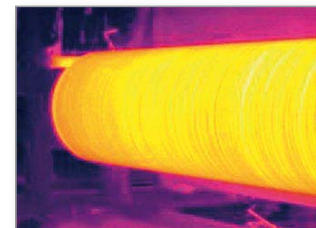
R&D
electronic



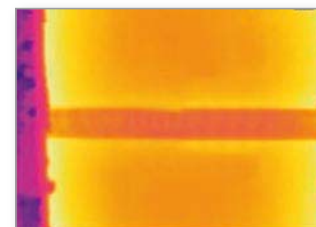
Process control
extrusion



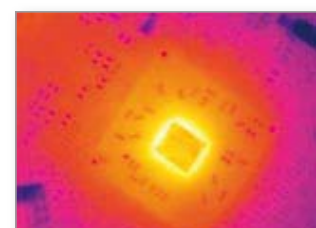
R&D mechanical
components



Process control
calendering



Production of
solar panels



R&D electronic
devices

Technical data

Model	TIM 200	TIM 230
Visual camera	Optical resolution: 640 x 480 Pixel; Frame rate: 32Hz	
Optical resolution	Lenses (FOV): 54° x 40°	Lenses (FOV): 30° x 23°
Temperature ranges	-20°C to 100°C / 0°C to 250°C / 150°C to 900°C additional range: 200°C to 1500°C	
Spectral range	7.5 to 13µm	
Frame rate	128Hz	
System accuracy	±2% or ±2°C	
Resolution (Display)	±0.1°C	
Lenses	72° / f = 3.3mm (min. distance 20mm); 48° / f = 5.7mm (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 72° 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 etc	
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	215g; incl. lens	

PC requirements: minimum 1.5GHz, 1GB RAM, Windows XP SP2, Windows 7

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²⁾ Caution: at distances below 500mm measurement accuracy can be out of specification

Scope of supply

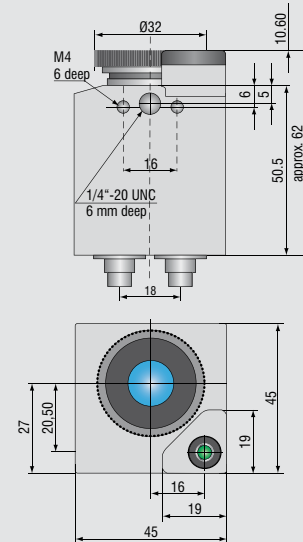
TIM 200/230

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

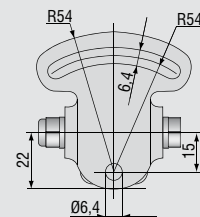
TIM 200/DK

- ▶ 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

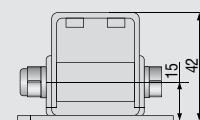
Dimensions



Accessories



TM-MB-TIM Mounting base, adjustable



TM-PH-TIM Protective housing incl. mounting base

thermoIMAGER TIM 400/450



thermoIMAGER TIM 400/450

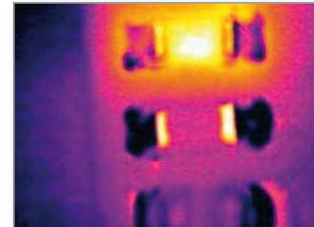
Miniature real time thermal imager
with high resolution and sensitivity

- **NEW:** Detector with 382 x 288 pixels
- Measuring range from -20°C to 900°C (special edition 1500°C)
- 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

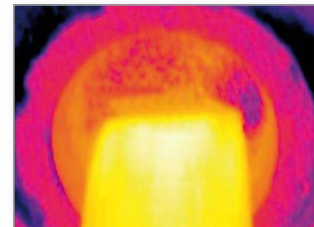
Software

- Real time visualisation (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

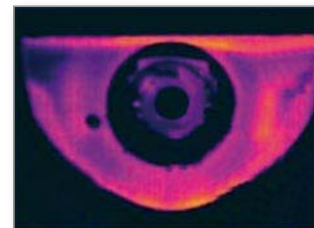
Applications - Examples



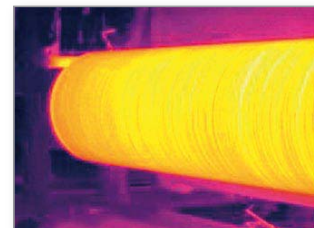
R&D
electronic



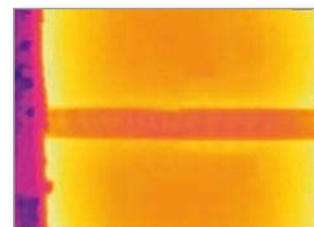
Process control
extrusion



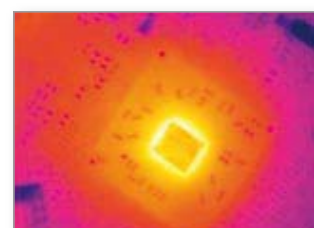
R&D mechanical
components



Process control
calendering



Production of
solar panels



R&D electronic
devices

Technical data

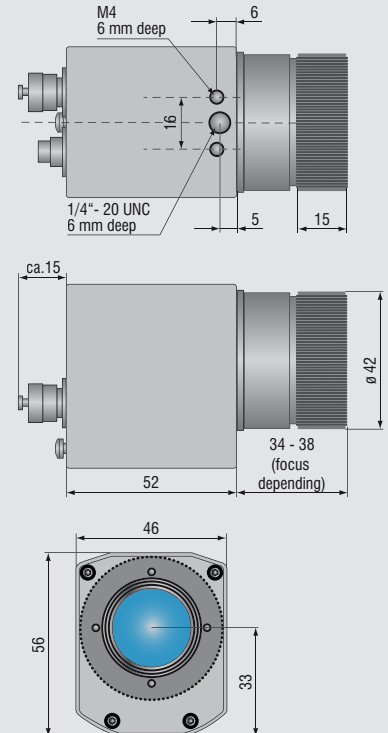
Model	TIM 400	TIM 450
Optical resolution	382 x 288 pixel	
Temperature ranges	-20°C to 100°C, 0°C to 250°C, 150°C to 900°C, additional range: 200°C to 1500°C (Option only for TIM 400)	
Spectral range	7.5 - 13µm	
Frame rate	80Hz	
System accuracy	±2% or ±2°C	
Lenses	38° x 29° FOV / f = 15mm ¹ <u>or</u> 62° x 49° FOV / f = 8mm ¹ <u>or</u> 13° x 10° FOV / f = 41mm ²	
Thermal Sensitivity	0.08K with 62° x 49° FOV / F = 0.8 0.08K with 38° x 29° FOV / F = 0.8 0.1K with 13° x 10° FOV / F = 1.0	0.04K with 62° x 49° FOV / F = 0.8 0.04K with 38° x 29° FOV / F = 0.8 0.06K with 13° x 10° FOV / F = 1.0
Detector	FPA, uncooled (25µm x 25µm)	
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

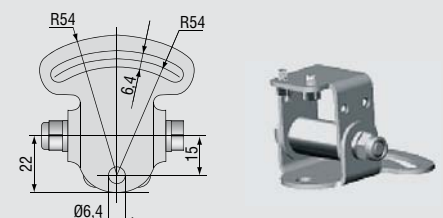
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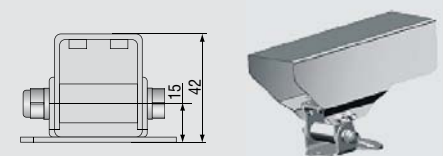
Dimensions



Accessories



TM-MB-TIM Mounting base, adjustable



TM-PH-TIM Protective housing incl. mounting base



TM-Jxx-TIM Cooling jacket for TIM 4x0 (length 228mm, ø89mm) with adjustable mounting bracket TM-JAB-TIM; recommended high temperature cable TM-USBC5H-TIM (up to 240°C)

Scope of supply

TIM 400/450

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

The right optics for many applications

Precise measurement values can be calculated on

www.micro-epsilon.com/optikkalkulator

thermoIMAGER TIM 160/200/230

Objective 72° x 52°; 95° wide angle; focal distance 3.3mm; min measuring distance 0.02m ¹													
HFOV	m	0.029	0.15	0.29	0.44	0.73	1.45	2.91	5.81	8.72	14.5	43.6	145.3
VFOV	m	0.020	0.10	0.20	0.29	0.49	0.98	1.95	3.90	5.85	9.8	29.3	97.5
DFOV	m	0.043	0.22	0.43	0.65	1.09	2.17	4.34	8.68	13.02	21.7	65.1	217.0
IFOV	mm	0.182	0.91	1.82	2.72	4.54	9.08	18.16	36.33	54.49	90.8	272.5	908.2
Distance in m		0.02	0.1	0.2	0.3	0.5	1	2	4	6	10	30	100

Objective 48° x 31°; 52° wide angle; focal distance 5.7mm; min measuring distance 0.02m ¹													
HFOV	m	0.015	0.08	0.15	0.23	0.38	0.76	1.51	3.02	4.53	7.6	22.7	75.6
VFOV	m	0.011	0.05	0.11	0.16	0.27	0.55	1.09	2.19	3.28	5.5	16.4	54.7
DFOV	m	0.019	0.10	0.19	0.29	0.49	0.97	1.95	3.90	5.85	9.7	29.2	97.5
IFOV	mm	0.094	0.47	0.94	1.42	2.36	4.72	9.45	18.89	28.34	47.2	141.7	472.3
Distance in m		0.02	0.1	0.2	0.3	0.5	1	2	4	6	10	30	100

Objective 23° x 17°; 29° standard; focal distance 10mm; min measuring distance 0.02m ¹													
HFOV	m	0.008	0.04	0.08	0.12	0.20	0.40	0.81	1.61	2.42	4.0	12.1	40.3
VFOV	m	0.006	0.03	0.06	0.09	0.15	0.30	0.60	1.20	1.79	3.0	9.0	29.9
DFOV	m	0.010	0.05	0.10	0.15	0.26	0.51	1.02	2.04	3.06	5.1	15.3	51.1
IFOV	mm	0.050	0.25	0.50	0.76	1.26	2.52	5.04	10.08	15.12	25.2	75.6	252.0
Distance in m		0.02	0.1	0.2	0.3	0.5	1	2	4	6	10	30	100

Objective 6° x 5°; 8° tele; focal distance 35.5mm; min measuring distance 0.5m ²													
HFOV	m	-	-	-	-	0.06	0.11	0.23	0.45	0.68	1.1	3.4	11.3
VFOV	m	-	-	-	-	0.04	0.08	0.17	0.34	0.50	0.8	2.5	8.4
DFOV	m	-	-	-	-	0.07	0.14	0.28	0.56	0.84	1.4	4.2	14.1
IFOV	mm	-	-	-	-	0.35	0.71	1.41	2.82	4.23	7.1	21.2	70.5
Distance in m		0.02	0.1	0.2	0.3	0.5	1	2	4	6	10	30	100

FOV = Field of view; HFOV = Horizontal field of view; VFOV = Vertical field of view;
DFOV = Diagonal dimension of the total measuring field at the object level; IFOV = Indicated field of view

thermoIMAGER TIM 400/450

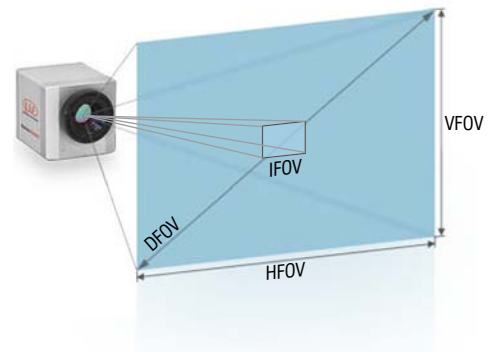
Objective 62° x 49°; 74° wide angle; focal distance 8mm; min measuring distance 0.02m ¹													
HFOV	m	0.024	0.12	0.24	0.36	0.60	1.20	2.40	4.80	7.20	12.0	36.0	119.9
VFOV	m	0.018	0.09	0.18	0.27	0.45	0.90	1.80	3.60	5.41	9.0	27.0	90.1
DFOV	m	0.030	0.15	0.30	0.45	0.75	1.50	3.00	6.00	8.99	15.0	45.0	149.9
IFOV	mm	0.063	0.31	0.63	0.94	1.57	3.14	6.28	12.56	18.84	31.4	94.2	314.0
Distance in m		0.02	0.1	0.2	0.3	0.5	1	2	4	6	10	30	100

Objective 38° x 29°; 49° standard; focal distance 15mm; min measuring distance 0.02m ¹													
HFOV	m	0.014	0.07	0.14	0.21	0.35	0.69	1.39	2.77	4.16	6.9	20.8	69.3
VFOV	m	0.010	0.05	0.10	0.15	0.25	0.51	1.02	2.03	3.05	5.1	15.2	50.8
DFOV	m	0.018	0.09	0.18	0.28	0.46	0.92	1.84	3.68	5.52	9.2	27.6	92.0
IFOV	mm	0.036	0.18	0.36	0.54	0.91	1.81	3.63	7.25	10.88	18.1	54.4	181.3
Distance in m		0.02	0.1	0.2	0.3	0.5	1	2	4	6	10	30	100

Objective 13° x 10°; 17° tele; focal distance 41mm; min measuring distance 0.5m ²													
HFOV	m	-	-	-	-	0.12	0.23	0.47	0.94	1.40	2.3	7.0	23.4
VFOV	m	-	-	-	-	0.09	0.17	0.35	0.70	1.05	1.7	5.2	17.5
DFOV	m	-	-	-	-	0.15	0.29	0.58	1.17	1.75	2.9	8.8	29.2
IFOV	mm	-	-	-	-	0.31	0.61	1.22	2.45	3.67	6.1	18.4	61.2
Distance in m		0.02	0.1	0.2	0.3	0.5	1	2	4	6	10	30	100

FOV = Field of view; HFOV = Horizontal field of view; VFOV = Vertical field of view;
DFOV = Diagonal dimension of the total measuring field at the object level; IFOV = Indicated field of view

¹ Note: The accuracy of measurement can be outside of the specifications for distances below 0.2m.
² Note: The accuracy of measurement can be outside of the specifications for distances below 0.5m.



- 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 NetBox

Miniature PC for thermoIMAGER

- ➔ Miniaturised PC for TIM 160/ 4x0 stand-alone operation or for cable extension
- ➔ Supports 120Hz (TIM 160) up to 70Hz (TIM 4x0) frame rate
- ➔ Integrated watchdog feature
- ➔ Additional operation of customer specific software
- ➔ Processor: Intel® Atom™ Z530 @ 1.6GHz 2GB SSD, 512MB RAM
- ➔ Ports: 3x USB 2.0, 1x Mini-USB in slave mode, VGA/ Video, Gigabit Ethernet, SD-Card (up to 32 GB)
- ➔ Operating system: Windows XP Professional
- ➔ Wide power range: 8-48VDC or Power over Ethernet (PoE)
- ➔ Low power consumption 9.5W (additional 2.5W for the TIM camera)
- ➔ Option: up to 20m USB cable, high temperature cable, up to 100m ethernet cable (PoE possible)

Technical data

Model	TIM NetBox
Ambient temperature	0 - 50°C
Storage temperature	-20...75°C
Relative humidity	10...95%, non-condensing
Material (housing)	Anodized aluminium
Dimensions	113 x 57 x 39mm
Weight	280g
Vibration	IEC-2-6: 3G, 11 - 200Hz, each axis
Shock	IEC-2-27: 50G, 11ms, each axis
Operating system	Windows XP Professional
Power supply	8...48VDC or power over ethernet (PoE/ 1000BASE-T)
Power consumption	9.5W (+ additional 2.5W for TIM camera)
Cooling	Active with integrated fan
Board	COM Express® mini embedded board
Processor	Intel® Atom™ Z530/ 1.6GHz
Hard disc drive	2GB SSD
RAM	512MB (DDR2, 533MHz)
Ports	3x USB 2.0 1x Mini-USB 2.0 (slave mode) VGA/ TV _{out} Ethernet (Gigabit Ethernet)
Extensions	MicroSDHC Cart (up to 32GB)
Additional functions	6x status LEDs (L1-L6)

TIM LightWeight

Special edition: Miniature lightweight PC for flight applications with thermoIMAGER series

Camera information
see TIM 400/450 (Page 8 - 9)

Lightweight-PC information
see table TIM NetBox, but:

- ➔ Total weight 350g incl. camera
- ➔ Recording button on camera housing



TIM LightWeight



TIM NetBox

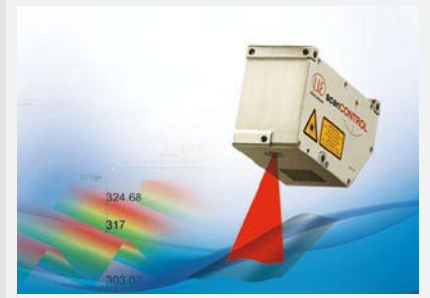
High performance sensors made by Micro-Epsilon



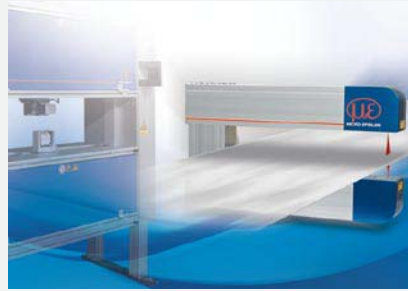
Sensors and systems for displacement and position



Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Measurement and inspection systems for quality assurance



Optical micrometers, fibre optic sensors and fibre optics



Colour recognition sensors, LED analysers and colour online spectrometer



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