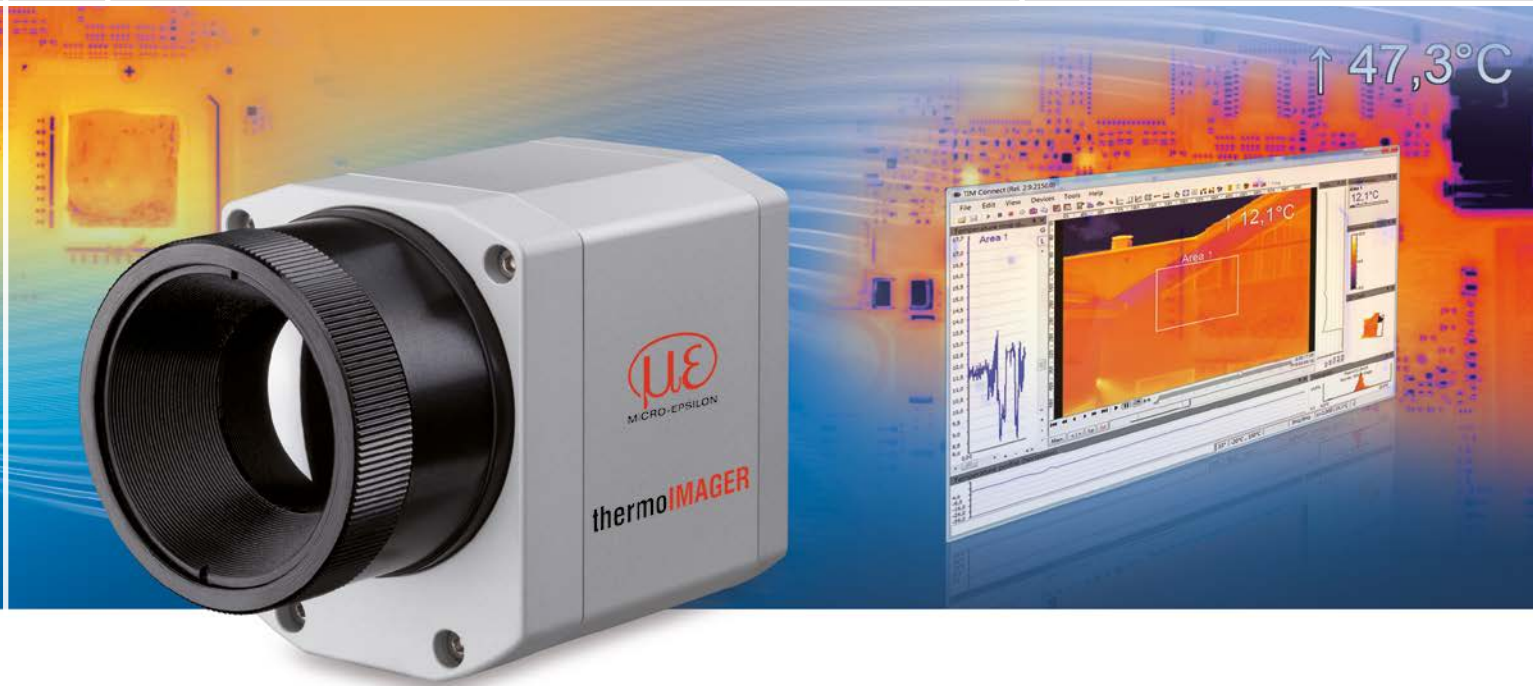




# More Precision

**thermoIMAGER TIM** // Compact thermal imaging cameras





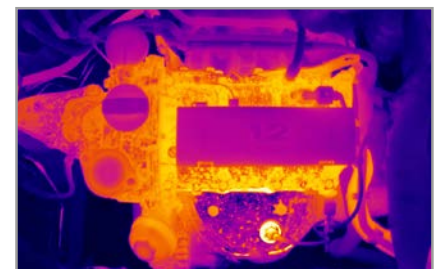
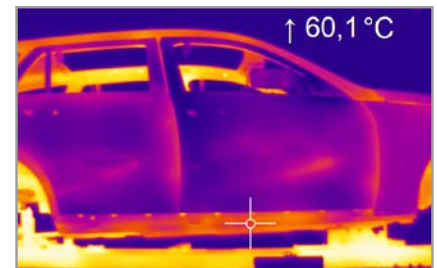
### thermoIMAGER TIM 640

Miniature infrared camera with VGA resolutions

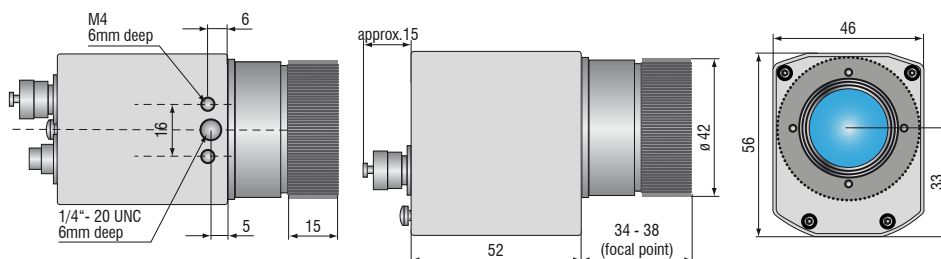
- Thermography in VGA resolution
- 640 x 480 pixels
- Measuring range from -20°C to 900°C (special model up to 1500°C)
- Radiometric video recording with 32Hz, 125Hz in the subframe mode (640x120 pixels)
- Compact design (46 x 56 x 90mm) with USB interface
- Lightweight (320g incl. lens)
- Exchangeable lenses & industrial accessories
- Software TIMConnect included
- Software Developer Kit and LabVIEW examples included

### Software

- Display of the thermal image in real time (32Hz) 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



Razor-sharp infrared pictures and videos for process optimization e.g. in the automotive industry



Model	TIM 640
Optical resolution	640 x 480 pixels
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)
Spectral range	7.5 to 13 $\mu$ m
Frame rate	32Hz / 125Hz in the subframe mode (640x120 pixels)
System accuracy	$\pm 2^\circ\text{C}$ or $\pm 2\%$ , whichever is greater
Lenses	15° x 11° FOV / f = 41.5mm or 33° x 25° FOV / f = 18.7mm or 60° x 45° FOV / f = 10.5 mm or 90° x 64° FOV / f = 7.7mm <sup>1)</sup>
Thermal sensitivity (NETD)	75mK
Detector	FPA, uncooled (17 $\mu$ m x 17 $\mu$ m)
Outputs/digital	USB 2.0 / optional GigE
Standard process interface (PIF)	0-10V input, digital input (max. 24V), 0-10V output
Industry process interface (PIF)	2x 0-10V inputs, digital input (max. 24V), 3x 0-10V outputs, 3x relays (0-30V/ 400mA), fail-safe relay
Cable length (USB)	1m (standard), 5m, 10m 5m and 10m also as high temperature USB cable (180°C)
Power supply	USB powered
Tripod mount	¼-20 UNC
Protection class	IP67
Ambient temperature range	0°C to 50°C
Storage temperature	-40°C to 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 (25g and 50g)
Housing (size)	46mm x 56mm x 90mm
Weight	320g, incl. lens

PC requirements: minimum 1.5GHz, 1GB RAM, Windows XP SP 2 or Windows 7

<sup>1)</sup> Please note: measurement accuracy can be out of specification with distances below 200mm

## Scope of supply

### TIM 640

- TIM process camera  
incl. a selectable lens
- Instruction Manual
- USB cable 1m
- Software for real-time processing  
and analyzing thermal images
- Tripod mount
- PIF cable incl. terminal block (1m)
- Transport case



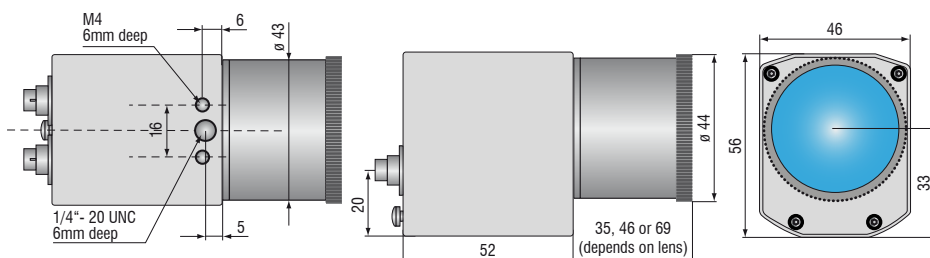
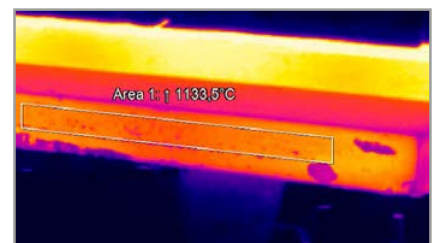
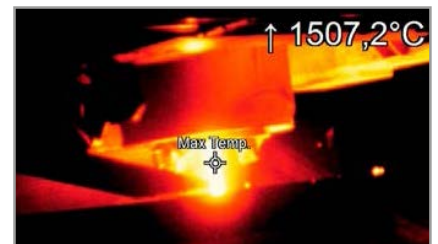
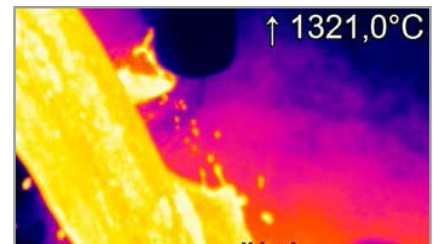
### thermoIMAGER TIM M05

Compact infrared camera for the short-wave range for non-contact temperature measurement of molten metal and metallic surfaces from 900°C to 2000°C

- Highly dynamic CMOS detector with resolution up to 764 x 480 pixels
- Special wavelength range from 500nm to 540nm minimizes errors due to unknown emissivity
- Wide measuring range from 900°C to 2000°C (without sub-ranges)
- Frame rates up to 1kHz for fast processes
- Real-time analog output with 1ms response time
- Comprehensive software package and SDK
- Ideally suitable for laser processing applications as radiation above 540 nm is blocked excellently

### 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 M05	
Optical resolution	764 x 480 pixels @ 32Hz   382 x 288 pixels @ 80Hz (switchable to 27Hz) 72 x 56 pixels @ 1kHz <sup>1)</sup>   764 x 8 pixels @ 1 kHz (fast line-scan mode) <sup>1)</sup>	
Temperature ranges	900°C to 2000°C (27Hz mode)   950°C up to 2000°C (80Hz and 32Hz mode)   1100°C up to 2000°C (1kHz mode)	
Spectral range	500 to 540nm	
Frame rate	Up to 1kHz / 1ms real-time analog output (0 - 10V) from 8 x 8 pixels (freely selectable)	
System accuracy	±1.5% of reading	
Lenses	<b>FOV @ 764 x 480 px:</b> 26° x 16° (f = 25mm) <sup>3)</sup>	<b>FOV @ 382 x 288 px:</b> 13° x 10° (f = 25mm) <sup>3)</sup>
Thermal sensitivity (NETD)	< 2K (1400°C) for 27Hz, 32Hz and 80Hz   < 2.5K (1400°C) for 1kHz	
Detector	CMOS (15µm x 15µm)	
Outputs/digital	USB 2.0 / optional GigE	
High-speed analog output (@ 1kHz mode)	1ms real-time analog output (0 – 10V) of 8 x 8 pixels (freely selectable positions)	
Standard process interface (PIF)	0-10V input, digital input (max. 24V), 0-10V output	
Industry process interface (PIF)	2x 0-10V inputs, digital input (max. 24V), 3x 0-10V outputs, 3x relays (0-30V/ 400mA), fail-safe relay	
Cable length (USB)	1m (standard), 5m, 10m 5m and 10m also as high temperature USB cable (180°C)	
Power supply	USB powered	
Tripod mount	¼-20 UNC	
Protection class	IP67 <sup>2)</sup>	
Ambient temperature range	5°C to 50°C	
Storage temperature	-40°C to 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 (25g and 50g)	
Housing (size)	46mm x 56mm x 90mm	
Weight	320g, incl. lens	

PC requirements: minimum 1.5GHz, 1GB RAM, Windows XP SP 2 or Windows 7

<sup>1)</sup> Can be placed anywhere within the FOV

<sup>2)</sup> Only applies when lens protection tube is used

<sup>3)</sup> Please note: measurement accuracy can be out of specification with distances below 500mm

## Scope of supply

### TIM M05

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



### thermoIMAGER TIM LightWeight

Extra light thermoIMAGER mini PC for flight applications

- Fully-radiometric IR inspection with up to 640x480 pixels
- 380g two-piece design: independent, additional use of the IR camera with any Windows PC or tablet PC
- Simultaneous 32Hz video signal generation in real time in parallel to "on-board" records in VGA resolution (125Hz in the VGA subframe mode)
- GPS and GoPro support
- Comprehensive TIMConnect analysis software included
- Automatic transfer of flight video data (IR and GoPro) to USB stick



#### Photovoltaic thermography from the air

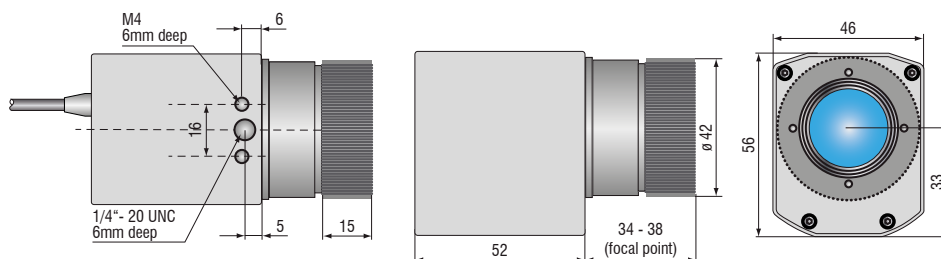
The 380-gram thermal imaging camera can be mounted to a quadcopter to carry out defect analysis on solar cells.



Possible extension with GoPro Hero camera,  
GPS USB flash drive and 2.4GHz flight control receiver

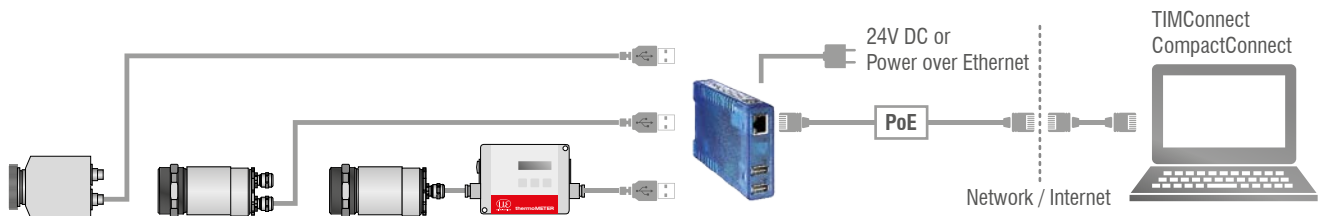


Temperature monitoring for building thermography



**thermoIMAGER TIM USB Server Gigabit****Simple cable extension for the thermoIMAGER TIM series and pyrometers**

- Fully compatible with USB 2.0, data transfer rate 1.5/ 12/ 480Mbps,  
USB transfer modes: Control, Bulk, Interrupt, Isochronous
- For all models in the thermoIMAGER TIM series 1x TIM640, 1x TIM4xx, 2x TIM160, 1x TIM200
- Full TCP/IP support incl. routing and DNS
- Two independent USB ports
- Galvanic isolation 500V<sub>RMS</sub> (network connection)
- Remote configuration via web-based management



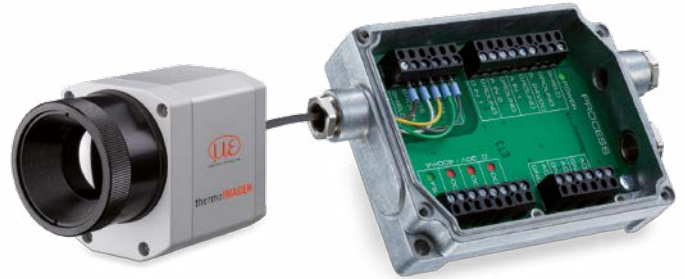
Model	TIM USB Server Gigabit
USB ports	Two independent USB ports
USB speed	480Mbit/s
Network	10/100/1000 BaseT (max. 1000Mbit/s)
Power supply	Power over Ethernet (PoE) class 3 (6.49 - 12.95W) or via screw terminal DC 24V ... 48V ( $\pm 10\%$ )
Power consumption	External power supply (24V DC) without USB devices: typ. 120mA External power supply (24V DC) with 2 USB devices each 2.5W: typ. 420mA
Ambient temperature range	Storage: -40 ... 85°C In operation, individually assembled: 0 ... 50°C
Permissible relative humidity	0 - 95% (non-condensing)
Housing	Compact plastic housing for DIN rail mount, 105 x 75 x 22mm
Weight	200g
Scope of supply	1 x USB Server Gigabit 24V DC power supply unit Quick guide <sup>1)</sup>
USB protocols	USB 1.0 / 1.1 / 2.0 Control / Bulk / Interrupt / Isochronous
Protocols for direct network connection	TCP/IP: Socket Auxiliary protocols: ARP, DHCP, HTTP, PING Inventory keeping, group management

<sup>1)</sup> TIMConnect CD or Compact Connect CD: USB redirector | WuTility Management Tool | Operating instructions (DE/EN)

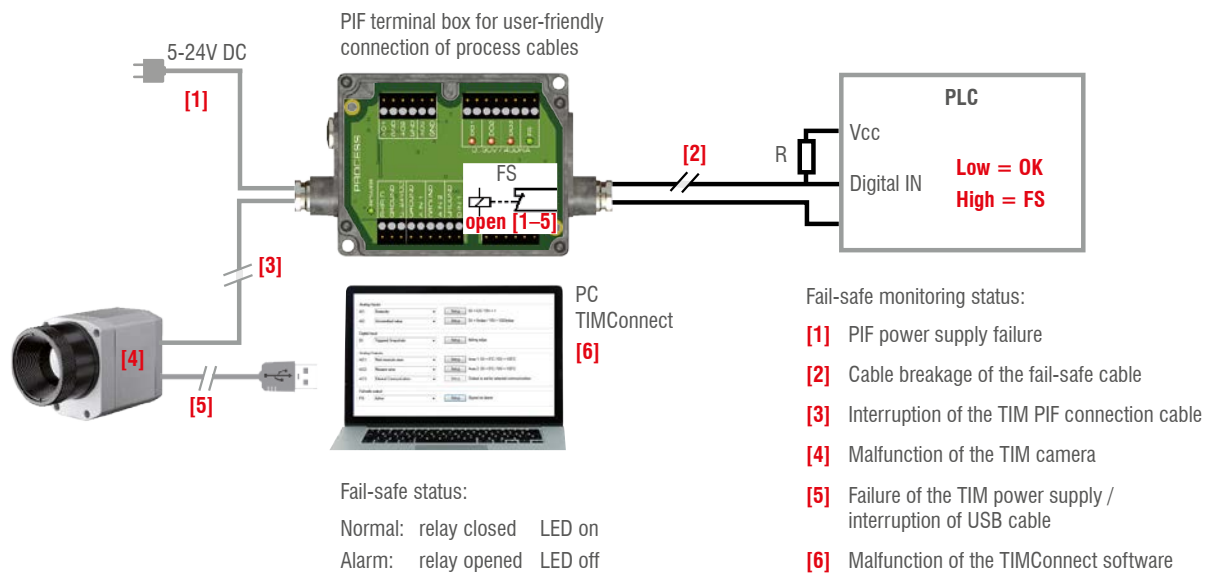
**Industrial process interface**

**Camera and process control for use in industrial environments**

- Industrial process interface with 3 analog / alarm outputs, 2 analog inputs, 1 digital input, 3 alarm relays
- 500V AC<sub>RMS</sub> galvanic isolation between TIM camera und process
- Separate fail-safe relay output
- TIM hardware with all cable connections and the TIMConnect software are permanently monitored during operation



**Exemplary fail-safe monitoring of the TIM camera with connected PLC**



Model	Industrial process interface
Protection class	IP65 (NEMA-4)
Ambient temperature range	-30°C to 85°C
Storage temperature	-30°C to 85°C
Relative humidity	10 to 95%, non-condensing
Vibration resistance	IEC 60068-2-6 (non-condensing)/ IEC 60068-2-64 (broadband noise)
Shock	IEC 60068-2-27 (25g and 50g)
Weight	610g (with 5m cable)
Cable length	5m, optional 10m and 20m or HT cable (180°C or 250°C)
Power supply	5 to 24VDC
LED indicators	2 green LEDs for voltage and fail safe / 3 red LEDs for alarm relay status
Insulation	500V AC <sub>RMS</sub> between TIM camera und process
Outputs	3 analog / alarm outputs   3 alarm relays <sup>1)</sup>
Inputs	2 analog inputs   1 digital input
Ranges	0 – 10V (for AO 1 – 3) <sup>2)</sup>   0 – 30V / 400mA (for alarm relays DO1 – 3)   0 – 10V (for AI 1 – 2)   24V (for DI)
Analog inputs	Emissivity setting   Ambient temperature compensation   Reference temperature   Uncommitted value Flag control   Triggered snapshots, triggered recordings, triggered line scan camera
Digital input	Flag control   Triggered snapshots, triggered recordings, triggered line scan camera
Analog outputs	Main measuring range   Measuring range   Internal temperature   Flag status Alarm   Frame synchronization   Fail safe   External communication

<sup>1)</sup> active when AO1, 2 or 3 is / are programmed as alarm output <sup>2)</sup> depends on supply voltage



TIM M1 / TIM M05 <sup>1)</sup>	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
382 x 288 px	16	20° 15° 25° 0.94mrad	0.2m	HFOV [m]		0.07	0.11	0.18	0.36	0.72	1.43	2.15	3.6	10.7	35.8
				VFOV [m]		0.05	0.08	0.14	0.27	0.54	1.08	1.62	2.7	8.1	27.0
				DFOV [m]		0.09	0.13	0.22	0.45	0.90	1.79	2.69	4.5	13.5	44.9
				IFOV [mm]		0.2	0.3	0.5	0.9	1.9	3.8	5.6	9.4	28.1	93.8
f=25mm standard lens	25	13° 10° 16° 0.60mrad	0.5m	HFOV [m]	0.023	0.05	0.07	0.11	0.23	0.46	0.92	1.38	2.3	6.9	22.9
				VFOV [m]	0.017	0.03	0.05	0.09	0.17	0.35	0.69	1.04	1.7	5.2	17.3
				DFOV [m]	0.029	0.06	0.09	0.14	0.29	0.57	1.15	1.72	2.9	8.6	28.7
				IFOV [mm]	0.1	0.1	0.2	0.3	0.6	1.2	2.4	3.6	6.0	18.0	60.0
f=50mm telephoto lens	50	7° 5° 8° 0.30mrad	1.5m	HFOV [m]				0.06	0.11	0.23	0.46	0.69	1.1	3.4	11.5
				VFOV [m]				0.04	0.09	0.17	0.35	0.52	0.9	2.6	8.6
				DFOV [m]				0.07	0.14	0.29	0.57	0.86	1.4	4.3	14.4
				IFOV [mm]				0.2	0.3	0.6	1.2	1.8	3.0	9.0	30.0
f=75mm Super telephoto lens	75	4° 3° 5° 0.20mrad	2.0m	HFOV [m]					0.08	0.15	0.31	0.46	0.8	2.3	7.6
				VFOV [m]					0.06	0.12	0.23	0.35	0.6	1.7	5.8
				DFOV [m]					0.10	0.19	0.38	0.57	1.0	2.9	9.6
				IFOV [mm]					0.2	0.4	0.8	1.2	2.0	6.0	20.0

<sup>1)</sup> TIM M05 only available with OF25 lens | Please note: the camera provides 382 x 288 px in the 80Hz mode

TIM M1 / M05 with VGA <sup>1)</sup> Resolution	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
764 x 480 px	16	39° 25° 46° 0.94mrad	0.2m	HFOV [m]		0.14	0.21	0.36	0.72	1.43	2.87	4.30	7.2	21.5	71.6
				VFOV [m]		0.09	0.14	0.23	0.45	0.90	1.80	2.70	4.5	13.5	45.0
				DFOV [m]		0.17	0.25	0.42	0.85	1.69	3.38	5.08	8.5	25.4	84.6
				IFOV [mm]		0.2	0.3	0.5	0.9	1.9	3.8	5.6	9.4	28.1	93.8
f=25mm standard lens	25	26° 16° 30° 0.60mrad	0.5m	HFOV [m]	0.046	0.09	0.14	0.23	0.46	0.92	1.83	2.75	4.6	13.8	45.8
				VFOV [m]	0.029	0.06	0.09	0.14	0.29	0.58	1.15	1.73	2.9	8.6	28.8
				DFOV [m]	0.054	0.11	0.16	0.27	0.54	1.08	2.17	3.25	5.4	16.2	54.1
				IFOV [mm]	0.1	0.1	0.2	0.3	0.6	1.2	2.4	3.6	6.0	18.0	60.0
f=50 mm telephoto lens	50	13° 8° 15° 0.30mrad	1.5m	HFOV [m]				0.11	0.23	0.46	0.92	1.38	2.3	6.9	22.9
				VFOV [m]				0.07	0.14	0.29	0.58	0.86	1.4	4.3	14.4
				DFOV [m]				0.14	0.27	0.54	1.08	1.62	2.7	8.1	27.1
				IFOV [mm]				0.2	0.3	0.6	1.2	1.8	3.0	9.0	30.0
f=75 mm Super telephoto lens	75	9° 5° 10° 0.20mrad	2.0m	HFOV [m]					0.15	0.31	0.61	0.92	1.5	4.6	15.3
				VFOV [m]					0.10	0.19	0.38	0.58	1.0	2.9	9.6
				DFOV [m]					0.18	0.36	0.72	1.08	1.8	5.4	18.0
				IFOV [mm]					0.2	0.4	0.8	1.2	2.0	6.0	20.0

<sup>1)</sup> TIM M05 is only available with OF25 lens | Please note: the camera provides 764 x 480 px in the 32Hz mode