MICRO-EPSILON

More Precision

**thermoMETER** // Non-contact infrared temperature sensors

**thermoMETER CTM1/M2**

Miniaturized temperature sensor with 1.0 und 1.6 $\mu$m measuring wavelength

- Measuring range from 250 °C to 2200 °C
- Up to 125 °C ambient temperature without cooling
- For metal processing such as welding, soldering, forming, sintering and for measurements of metal oxides and ceramics
- Extended compensation for measuring errors using short measuring wavelength (e.g. with emissivity changes or misadjustment)
- High compatibility with electromagnetic fields e.g. with induction welding
- Compact sensor for installation in confined spaces
- Selectable and scalable analog output, optional digital interfaces

**Optical specifications thermoMETER CTM1/M2**

▫ =smallest spot size / focal point (mm)

| Standard Focus | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1SF40/2SF40 | 40:1 | 6.5 | 10.7 | 14.9 | 19.1 | 23.3 | 27.4 | 31.6 | 35.8 | 40 |
| 1SF75/2SF75 | 75:1 | 6.5 | 8.4 | 10.2 | 12.1 | 13.9 | 15.8 | 17.6 | 19.5 | 21.3 |
| distance in mm | | 0 | 200 | 400 | 600 | 800 | 1000 | 1200 | 1400 | 1600 |
| **Close Focus (integrated CF lens)** | | | | | | | | | | |
| 1CF40/2CF40 | 40:1 | 6.5 | 4.4 | 2.7 | 6 | 10.2 | 14.4 | 18.6 | 22.8 | 27 |
| 1CF75/2CF75 | 75:1 | 6.5 | 3.8 | 1.5 | 4.4 | 8 | 11.7 | 15.3 | 19 | 22.6 |
| distance in mm | | 0 | 60 | 110 | 150 | 200 | 250 | 300 | 350 | 400 |

| Model | CTM-1SF40-C3 | CTM-1SF75-C3 | CTM-1SF75H1-C3 | CTM-2SF40-C3 | CTM-2SF75-C3 | CTM-2SF75H1-C3 |
|---|---|---|---|---|---|---|
| Optical resolution | 40:1 | 75:1 | | 40:1 | 75:1 | |
| Temperature range [1] | 485 to 1050 °C | 650 to 1800 °C | 800 to 2200 °C | 250 to 800 °C | 385 to 1600 °C | 490 to 2000 °C |
| Spectral range | 1.0 $\mu$m | | | 1.6 $\mu$m | | |
| System accuracy [2], [3] | $\pm$(0.3 % of reading +2 °C) | | | | | |
| Repeatability [2] | $\pm$(0.1 % of reading +1 °C) | | | | | |
| Temperature resolution | 0.1 °C | | | | | |
| Response time [4] | 1 ms (90 %) | | | | | |
| Emissivity/gain [1] | 0.100 to 1.100 | | | | | |
| Transmissivity/gain [1] | 0.100 to 1.100 | | | | | |
| Signal processing [1] | peak hold, valley hold, average; extended hold function with threshold and hysteresis | | | | | |
| Certificate of calibration | optional | | | | | |
| Outputs/analog          channel 1 | 0/4 to 20 mA, 0 to 5/10 V, thermocouple J, K | | | | | |
| Outputs/analog          optional | relays: 2 x 60 VDC/42 VAC$_{eff}$; 0.4 A; electrically isolated | | | | | |
| Alarm output | open collector (24 V / 50 A) | | | | | |
| Outputs/digital          optional | USB, RS232, RS485, Modbus RTU, Profibus DP, Ethernet | | | | | |
| Output impedances       current output | mA max. 500 $\Omega$ (with 8 to 36 VDC) | | | | | |
| Output impedances       voltage output | min. 100 k$\Omega$ load impedance, thermocouple 20 $\Omega$ | | | | | |
| Inputs | programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger (reset of hold functions) | | | | | |
| Cable length | 3 m (standard), 8 m, 15 m | | | | | |
| Power supply | 8 to 36 VDC; max. 100 mA | | | | | |
| Protection class | IP65 (NEMA-4) | | | | | |
| Ambient temperature     sensor | -20 °C to 100 °C | | | -20 °C to 125 °C | | |
| Ambient temperature     controller | 0 °C to 85 °C | | | | | |
| Storage temperature     sensor | -40 °C to 100 °C | | | -40 °C to 125 °C | | |
| Storage temperature     controller | -40 °C to 85 °C | | | | | |
| Relative humidity | 10 to 95 %, non-condensing | | | | | |
| Vibration               sensor | IEC 68-2-6: 3 G, 11 to 200 Hz, any axis | | | | | |
| Shock                   sensor | IEC 68-2-27: 50 G, 11 ms, any axis | | | | | |
| Weight | sensor: 40 g; controller: 420 g | | | | | |

[1] adjustable via programming keys or software
[2] ambient temperature: 23 $\pm$5 °C
[3] $\varepsilon$=1, response time 1 s
[4] with dynamic adaption at low signal levels
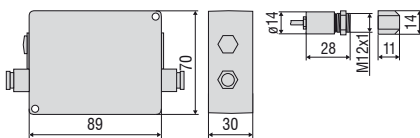
**Product identification**

| CTM- | 1 | SF40- | C3 |
|---|---|---|---|
| | | | Cable length [3 m (standard) / 8 m / 15 m] |
| | | Focus [SF40 / SF75 / CF40 / CF75] | |
| | Spectral range [1=1 $\mu$m / 2=1.6 $\mu$m] | | |
| thermoMETER CTM | | | |

## Accessories page 40 - 43

- Protective window
- Mounting bracket / mounting bolt
- Air purge collar
- Right angle mirror

- Rail mount adapter for controller
- Massive housing
- Protective tube
- Laser sighting aid

- Digital-interface kits
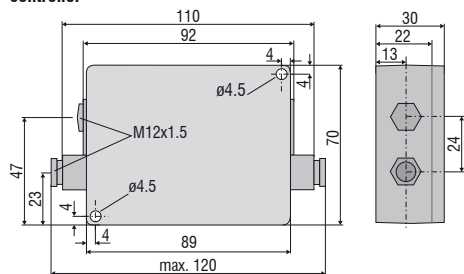- Certificate of calibration

## CT / CTfast / CTM1/M2/M3

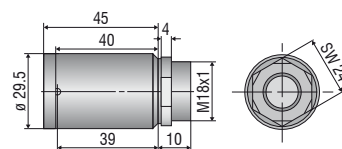**controller**
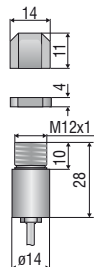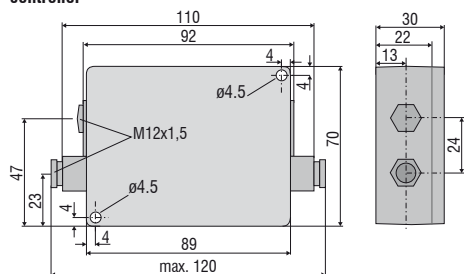


**ancillary CF lens (optional)**
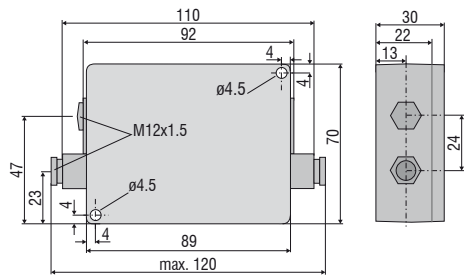
**sensor**

## CThot / CTP-3 / CTP-7

**controller**

**sensor with protective housing**



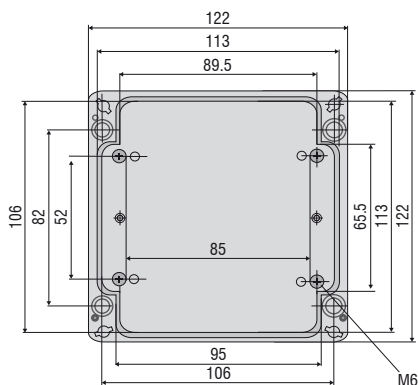## CTM3-XL

**controller**

**sensor**
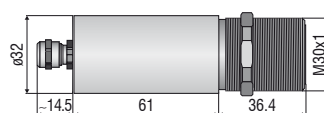


## CTex
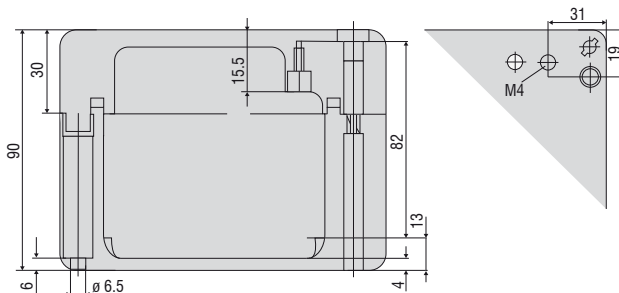
## Mechanical accessories

| Art. No. | Model | |
|---|---|---|
| 2970203 | TM-FB-CT | Mounting bracket, fixed |
| 2970325 | TM-FB2-CT | Mounting bracket, adjustable in one axis, for simultaneous assembly of CT sensor and laser sighting aid |
| 2970336 | TM-FBMH-CT | Mounting bracket, adjustable in one axis, for massive housing |
| 2970204 | TM-AB-CT | Mounting bracket, adjustable in 2 axes |
| 2970205 | TM-MB-CT | Mounting bolts with M12x1 thread |
| 2970206 | TM-MG-CT | Mounting fork, adjustable in 2 axes, with M12x1 fastening |
| 2970207 | TM-AP-CT | Air purge collar for sensors from 10:1 lens |
| 2970335 | TM-APS-CT | Air purge collar for sensors from 10:1 lens made from stainless steel |
| 2970208 | TM-AP2-CT | Air purge collar for sensor with 2:1 lens |
| 2970209 | TM-APL-CT | Air purge collar, laminar |
| 2970210 | TM-APLCF-CT | Air purge collar, laminar with integrated ancillary CF lens |
| 2970357 | TM-APLCFH-CT | Air purge collar, laminar with integrated ancillary CF lens for M1/M2/M3/M5 sensors |
| 2970386 | TM-APMH-CT | Air purge collar made from stainless steel for massive housing |
| 2970463 | TM-TAS-CT | Pivoted joint for CT sensors |
| 2970211 | TM-RAM-CT | Right angle mirror for measurements 90 °C to the sensor axis |
| 2970212 | TM-RAIL-CT | Rail mount adapter for CT controller |
| 2970213 | TM-COV-CT | Closed cover for controller |
| 2970214 | TM-MHS-CT | Massive housing made from stainless steel |
| 2970215 | TM-MHSCF-CT | Massive housing made from stainless steel with integrated ancillary CF lens |
| 2970358 | TM-MHSCFH-CT | Massive housing made from stainless steel with integrated ancillary CF lens for M1/M2/M3/M5 sensors |
| 2970216 | TM-MHA-CT | Massive housing made from anodized aluminum |
| 2970217 | TM-MHACF-CT | Massive housing made from stainless steel with integrated ancillary CF lens |
| 2970359 | TM-MHACFH-CT | Massive housing made from anodized aluminum with integrated ancillary CF lens for M1/M2/M3/M5 sensors |
| 2970326 | TM-PA-CT | Pipe adapter for the mounting of reflection protection tubes |
| 2970327 | TM-ST20-CT | Reflection protection tube, length 20 mm |
| 2970328 | TM-ST40-CT | Reflection protection tube, length 40 mm |
| 2970329 | TM-ST88-CT | Reflection protection tube, length 88 mm |
| 2970221 | TM-LST-CT | Laser sighting aid for CT sensors incl. batteries (2xAlkaline AA) |
| 2970300 | TM-LSTOEM-CT | OEM laser sighting aid, 635 nm, 3.5 m cable, for connection to CT controller |
| 2970300. 008 | TM-LSTOEM-CT(008) | OEM laser sighting aid, 635 nm, 8 m cable, for connection to CT controller |

## Optical accessories

| Art. No. | Model | |
|---|---|---|
| 2970201 | TM-CF-CT | Ancillary CF lens (only for SF models) |
| 2970202 | TM-PW-CT | Protective window (only for SF models) |
| 2970297 | TM-CFAG-CT | Ancillary lens with external thread |
| 2970330 | TM-CFH-CT | Ancillary lens for M1/M2/M3/M5 sensors |
| 2970331 | TM-CFHAG-CT | Ancillary lens with external thread for M1/M2/M3/M5 sensors |
| 2970299 | TM-PWAG-CT | Protective window with external thread |
| 2970332 | TM-PWH-CT | Protective window for M1/M2/M3/M5 sensors |
| 2970333 | TM-PWHAG-CT | Protective window with external thread for M1/M2/M3/M5 sensors |

## Interfaces

| Art. No. | Model | |
|---|---|---|
| 2970729 | TM-USBK-CT | USB-Interface-board, cable with Micro-USB plug and adapter for USB-C and USB-A, CompactConnect software (as download), Quick reference, second cable gland for controller |
| 2970224 | TM-RS232K-CT | RS232 interface: RS232 interface, computer cable, CompactConnect software, second cable gland for controller |
| 2970338 | TM-RS485USBK-CTL | RS485-USB-adapter, incl. PC cable, CompactConnect software and CTmulti, second cable gland for use with interface board TM-RS485B-CT |
| 2970226 | TM-RS485B-CT | RS485 interface board incl. second cable gland |
| 2970227 | TM-CANK-CT | CAN-Bus interface for thermoMETER CT/ protocol: CANopen presets: module address 20 (14H), 250 kBaud, 0-60 °C |
| 2970228 | TM-PFBDPK-CT | Profibus-DPv1 interface for thermoMETER CT with plug-in connection |
| 2970229 | TM-ETHNK-CT | Ethernet-Kit: interface board, external Ethernet adapter, CompactConnect software, second cable gland |
| 2970230 | TM-RI-CT | Relay interface: two electrically isolated relays, 60 VDC/ 42 VAC$_{eff}$, 0.4 A |

## Calibration

| Art. No. | Model | |
|---|---|---|
| 2970231 | TM-CERT-CT | Certificate of calibration |
| 2970310 | TM-HTCERT-CT | Certificate of calibration for CTM sensors |

## CTM3-XL

| Art. No. | Model | |
|---|---|---|
| 2970352 | TM-FBXL-CT | Mounting bracket, adjustable in one axis |
| 2970353 | TM-ABXL-CT | Mounting bracket, adjustable in 2 axes |
| 2970354 | TM-APXL-CT | Air purge collar, stainless steel |
| 2970361 | TM-XLCERT-CT | Certificate of calibration |

TM-FB-CT Mounting bracket, adjustable in one axis

TM-AB-CT Mounting bracket, adjustable in two axes

TM-MB-CT mounting bolt with M12x1 thread adjustable in one axis

TM-MG-CT Mounting fork with M12x1 thread, adjustable in two axes

TM-RAIL-CT rail mount adapter for controller

TM-KF40GE-CT KF40 Flange with Ge window
TM-KF40B270-CT KF40 Flange for CTM-1,-2,-3 with B270 window

TM-PA-CT Pipe adapter for reflection protection tube
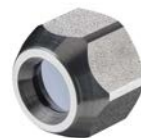
TM-CF-CT Ancillary CF lens (only for SF models)

TM-CFAG-CT Ancillary CF lens with external thread
TM-PWAG-CT Protective window with external thread

TM-APL-CT Air purge collar, laminar and
TM-MG-CT Mounting fork

TM-APLCF-CT
Ancillary CF lens/protective window - integrable variant for laminar air purge collar

TM-APMH-CT
Air purge collar made from stainless steel for massive housing

TM-ST40-CT Reflection protection tube

TM-LST-CT Laser sighting aid, battery-operated
(2x Alkaline AA), for alignment of CT sensors
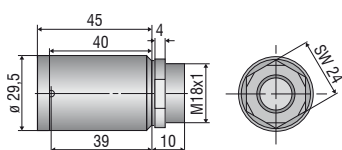(dimensions identical to CT sensor)



TM-FB2-CT

Mounting bracket for sensor and laser sighting aid



TM-RAM-CT

Right angle mirror



TM-MHS-CT Massive housing, stainless steel
TM-MHA-CT Massive housing, aluminum





TM-TAS-CT Pivoted joint for CT sensors



Dirt and deposit on the lens like smoke, steam and high air
humidity (condensation) are avoided or reduced by using
an air purge collar.



TM-AP-CT
Standard air purge collar for 10:1 / 15:1 / 22:1 lenses

TM-APS-CT
Air purge collar, stainless steel



TM-AP2-CT
Standard air purge collar for 2:1 lens

# Infrared thermal imagers from Micro-Epsilon



**thermoIMAGER TIM**
**Compact thermal imaging cameras for industrial temperature monitoring**

- Temperature range from -20 °C to 2450 °C
- Ideal for OEM
- Real-time thermography using license-free software
- Protective housing for harsh environments
- Special variants for the glass, metal and plastics industries

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