



# More Precision

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





### thermoMETER CTM2

Miniaturized temperature sensor with 1.6  $\mu\text{m}$  measuring wavelength

- Measuring range from 250 °C to 1600 °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 CTM2

□ = smallest spot size / focal point (mm)

| Standard Focus                   |      |     |      |      |      |      |      |      |      |      |
|----------------------------------|------|-----|------|------|------|------|------|------|------|------|
| 2SF40                            | 40:1 | 6.5 | 10.7 | 14.9 | 19.1 | 23.3 | 27.4 | 31.6 | 35.8 | 40   |
| 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) |      |     |      |      |      |      |      |      |      |      |
| 2CF40                            | 40:1 | 6.5 | 4.4  | 2.7  | 6    | 10.2 | 14.4 | 18.6 | 22.8 | 27   |
| 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  |

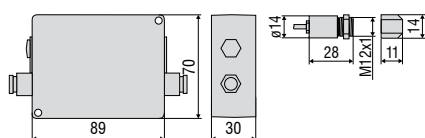
| Model                             | CTM-2SF40-C3                                                                                                                           | CTM-2SF75-C3                                                            |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Optical resolution                | 40:1                                                                                                                                   | 75:1                                                                    |
| Temperature range <sup>1)</sup>   | 250 to 800 °C                                                                                                                          | 385 to 1600 °C                                                          |
| Spectral range                    | 1.6 µm                                                                                                                                 |                                                                         |
| System accuracy <sup>2), 3)</sup> | ± (0.3 % of reading + 2 °C)                                                                                                            |                                                                         |
| Repeatability <sup>2)</sup>       | ± (0.1 % of reading + 1 °C)                                                                                                            |                                                                         |
| Temperature resolution            | 0.1 °C                                                                                                                                 |                                                                         |
| Response time <sup>4)</sup>       | 1 ms (90 %)                                                                                                                            |                                                                         |
| Emissivity/gain <sup>1)</sup>     | 0.100 to 1.100                                                                                                                         |                                                                         |
| Transmissivity/gain <sup>1)</sup> | 0.100 to 1.100                                                                                                                         |                                                                         |
| Signal processing <sup>1)</sup>   | 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 <sub>eff</sub> ; 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 Ω (with 8 to 36 VDC)                                        |
|                                   | voltage output                                                                                                                         | min. 100 kΩ load impedance, thermocouple 20 Ω                           |
| 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 125 °C                                                        |
|                                   | controller                                                                                                                             | 0 °C to 85 °C                                                           |
| Storage temperature               | sensor                                                                                                                                 | -40 °C to 125 °C                                                        |
|                                   | 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                                                                                                        |                                                                         |

<sup>1)</sup> adjustable via programming keys or software

<sup>2)</sup> ambient temperature: 23 ± 5 °C

<sup>3)</sup> ε = 1, response time 1 s

<sup>4)</sup> with dynamic adaption at low signal levels

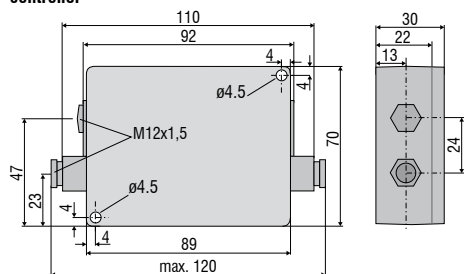


#### Product identification

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

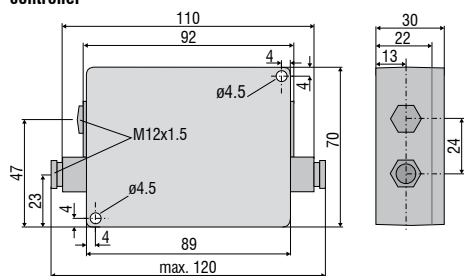
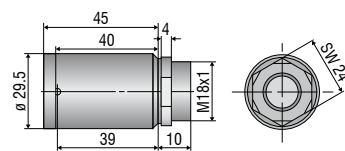
#### Accessories page 20 - 23

- 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 / CTM2/M3****controller**

14  
11  
4  
M12x1  
10  
28  
 $\phi 14$

**ancillary CF lens  
(optional)**

**sensor****CThot****controller****sensor with protective housing**

**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 M 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 M 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 M 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 M sensors                         |
| 2970331  | TM-CFHAG-CT | Ancillary lens with external thread for M sensors    |
| 2970299  | TM-PWAG-CT  | Protective window with external thread               |
| 2970332  | TM-PWH-CT   | Protective window for M sensors                      |
| 2970333  | TM-PWHAG-CT | Protective window with external thread for M sensors |

**Interfaces**

|         |                 |                                                                                                                                                                           |
|---------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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-CT | 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                                                                                                                            |
| 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 <sub>eff</sub> , 0.4 A                                                                                  |
| 2970719 | TM-MBRTU-CT     | Modbus-RTU-interface board incl. second cable gland                                                                                                                       |

**Calibration**

|         |              |                                            |
|---------|--------------|--------------------------------------------|
| 2970231 | TM-CERT-CT   | Certificate of calibration                 |
| 2970310 | TM-HTCERT-CT | Certificate of calibration for CTM sensors |





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



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



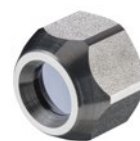
TM-MB-CT mounting bolt with M12x1 thread adjustable in one axis



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-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 threadTM-APL-CT Air purge collar, laminar and  
TM-MG-CT Mounting forkTM-APLCF-CT  
Ancillary CF lens/protective window - integrable variant  
for laminar air purge collarTM-APMH-CT  
Air purge collar made from stainless steel  
for massive housing

TM-PA-CT Pipe adapter for reflection protection tube



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)



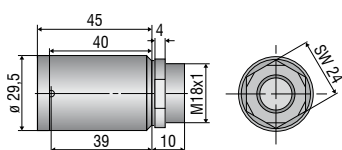
TM-FB2-CT  
Mounting bracket for sensor and laser sighting aid



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 1900 °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