

Warnings

Connect the power supply and the display/output device according to the safety regulations for electrical equipment.
 > Risk of injury, damage to or destruction of the sensor and/or the controller

Avoid shocks and impacts to the sensor and controller.
 > Damage to or destruction of the sensor and/or the controller

Avoid rough mechanical force on the sensor.
 > Damage to or destruction of the sensor

The supply voltage must not exceed the specified limits.
 > Damage to or destruction of the sensor and/or the controller.

Protect the sensor cable against damage.
 > Destruction of the sensor, failure of the measuring device

Never fold the sensor cable and do not bend it in tight radii. The minimum bending radius is 14 mm (static). Dynamic movement is not permitted.
 > Damage to the sensor cable, failure of the measuring device

Avoid exposure of sensor (both optics and housing) to cleaning agents that contain solvents.
 > Damage to or destruction of the sensor

Avoid abrupt changes of the operating temperature.
 > Inaccurate or incorrect measurements

Notes on CE Marking

The following apply to the thermoMETER CTM-4 measuring system:

- EU Directive 2014/30/EU
- EU Directive 2011/65/EU

The sensor satisfies the requirements if the guidelines in the operating instructions are maintained in installation and operation.

Proper Environment

- Protection class:
 - Sensor: IP65 (NEMA 4)
 - Controller: IP65 (NEMA 4)
- Operating temperature:
 - Sensor: 0 ... +70 °C (+32 ... +158 °F)
 - Controller: 0 ... +70 °C (+32 ... +158 °F)
- Storage temperature:
 - Sensor: -40 ... +85 °C (-40 ... +185 °F)
 - Controller: -40 ... +85 °C (+32 ... +158 °F)
- Humidity: 10 ... 95 %, non-condensing

Unpacking/Included in Delivery

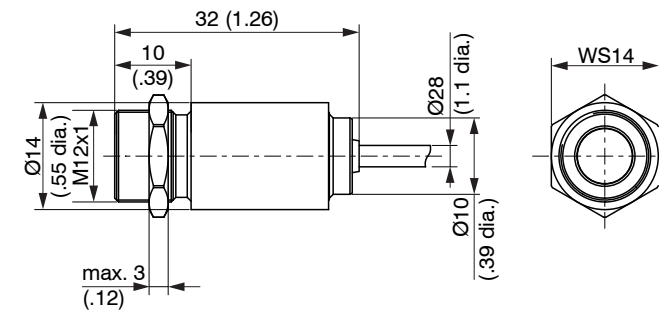
- 1 thermoMETER CTM-4 sensor and sensor cable
- 1 Controller
- 1 Mounting nut
- 1 Assembly instructions
- 1 Micro-USB cable

You can download a PDF of the detailed operating instructions from our website:

<http://www.micro-epsilon.de/download/manuals/man--thermoMETER-CT--en.pdf>

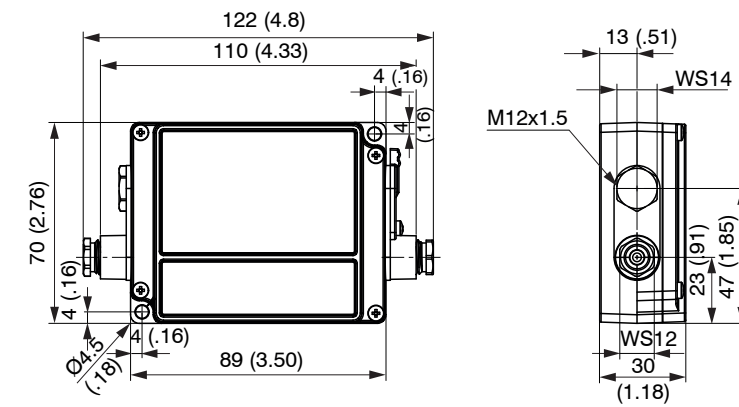
Mechanical Installation

The thermoMETER CTM-4 sensors feature a metric M12x1-thread and can be directly installed into existing mounting devices by using the sensor thread or by using the mounting nut included. Various mounting brackets are available as accessories to facilitate the alignment of the sensor to the object, see also operating instructions.



Dimensional drawing of thermoMETER CTM-4 sensor, dimensions in mm, not to scale

- The sensor and the controller cannot be exchanged arbitrarily within the thermoMETER CT sensor group.



Dimensional drawing of controller, dimensions in mm, not to scale

Shortening the Sensor Cable

With the thermoMETER CTM-4, the sensor cable can be shortened if necessary.

- Shortening the cable will cause an additional measuring error of about 0.1 K/m.

Ratio D = Distance From Device Front Edge to Measuring Object/S = Spot Size

The size of the object to be measured and the optical resolution of the IR thermometer determine the maximum distance between sensor and object. To avoid measuring errors, the measuring object should completely fill the field of vision of the sensor's optical system. This means, the spot must always be at least as large as or smaller than the measuring object.

CTM-4SF10	D:S = 10:1	6.5	14.9	23.3	31.6	40	51.6	63.3	74.9	86.5	S
	Distance (mm)	0	100	200	300	400	500	600	700	800	D

Optical specifications

Power Supply

Please use a power supply unit with an output voltage of 8 ... 30 VDC that provides at least 100 mA current. Residual ripple should be no more than 200 mV.

Never apply voltage to the analog outputs.
 > Destruction of the output

thermoMETER CTM-4 is not a two-wire sensor!

Ground Connection

On the left-hand side of the mainboard, you will find a slide switch which connects the ground terminals (GND supply voltage/output) to the housing ground of the controller by default.

To prevent ground loops and related signal interference, it may be necessary to separate this connection in an industrial environment. This requires to change the slide switch position.



Slide switch on the mainboard

Electrical Installation

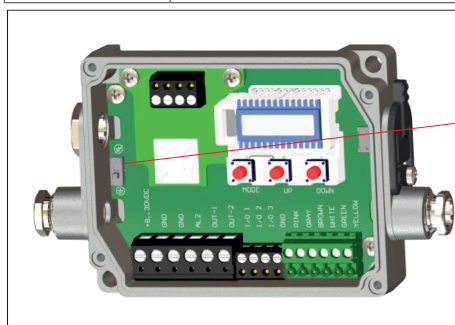
Cable Connections

➡ For the electrical installation of the thermoMETER CTM-4, please open at first the cover of the controller (4 screws).

The screw terminal connections for connecting the cables are located in the bottom of the controller.

Pin Assignments for CTM-4 Models

Pin	Explanation
+8 ... 30 VDC	Power supply
GND	Power supply ground (0 V)
GND	Internal input and output ground (0 V)
AL2	Alarm 2 (open collector output)
OUT-1	Analog output mA, mV, TCK
OUT-2	Analog output mA, mV, TCK
I/O1, I/O2, I/O3	Inputs and outputs
GND	Ground (0 V)
PINK	3 VDC, switchable for laser sighting tool
GRAY	Ground for PINK pin
BROWN	Temperature probe for sensor (NTC)
WHITE	Sensor ground
GREEN	Power supply (sensor)
YELLOW	Detector signal



Slide switch, see also chapter Ground Connection

Open CTM-4 controller with terminal connections

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Assembly Instructions
thermoMETER CTM-4



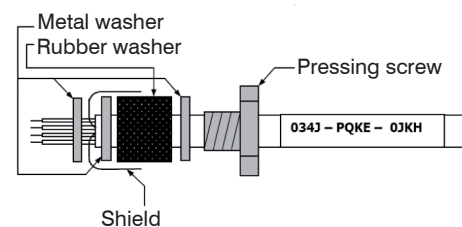
Sensor Cable Installation

Mounting

The controller's M12x1.5 cable gland is suitable for cables with an outer diameter of 3 to 5 mm.

- Remove the cable insulation (40 mm power supply, 50 mm signal outputs, 60 mm function inputs).
- Shorten the shielding braid to approx. 5 mm and unravel the shielding wires.
- Remove approx. 4 mm of the individual core insulations and tin the core ends.
- Push the compression screw, washers and the cable screw connection's rubber seal one after another onto the prepared cable end.
- Spread the shielding braids and affix the cable shield between two metal discs.
- Insert the cable into the cable gland until the stop.
- Tightly screw on the cap.

Individual cores can now be attached to the appropriate screw terminal connections based on their colors.



Cable installation

- Only use shielded cables!
The sensor must be grounded!

Operation

After the supply voltage is applied, the sensor starts an initialization routine and shows INIT on the display for a few seconds. Next, the object temperature is displayed. The color of the display lighting changes depending on the alarm settings.

Configuring the Sensor

The programming keys **O**, **^** and **v** allow the configuration of the sensor on site. The display shows the current measurement or the selected function. The **O** key moves you to the desired function, **^** and **v** change the function parameters - a settings change is applied immediately. If no key is pressed for more than 10 seconds, the display automatically switches to showing the calculated object temperature (according to the selected signal processing).



When the **O** key is pressed, you automatically reach the last function called.

The maximum search and minimum search signal processing functions cannot be selected concurrently.

Display and programming keys

Restoring Factory Setting

- To reset the thermoMETER CTM-4 to factory-set parameters, first press the **v** key and then the **O** key and hold both for 3 seconds.

For confirmation, RESET appears on the display.

Inputs and Outputs

Analog Outputs

You can freely choose output 1 or 2 with the thermoMETER CTM-4.

Never apply voltage to the analog outputs.
The thermoMETER CTM-4 is not a two-wire sensor!
> Destruction of the output

Output channel 1 / 2 (both channels)

This output is used to output the object temperature. The programming keys are used to select the output signal. Output channel 1 can also be programmed as an alarm output by using the CompactPlus Connect software.

Output signal	Range	Connection pin on CTM-4 board
Voltage	0 ... 5 V	OUT-mV/mA
Voltage	0 ... 10 V	OUT-mV/mA
Current	0 ... 20 mA	OUT-mV/mA
Current	4 ... 20 mA	OUT-mV/mA
Thermocouple	TC K	OUT-TC

- Please note that, depending on the output used, different connection pins (OUT-mV/mA or OUT-TC) are used.

I/O Pins

The thermoMETER CTM-4 has three I/O pins, which can be programmed as output (digital) as well as input (digital or analog) using the CompactPlus Connect software. The following functions are possible:

Function	I/O Pin is a	Description
Alarm	Digital output	Open-collector output/ Definition as High or Low alarm via normally open/normally closed in the software dialog
Valid Low	Digital input	The output follows the object temperature as long as a Low level is present at the I/O pin. If there is no more Low level, the last value is held.
Valid High	Digital input	The output follows the object temperature as long as a High level is present at the I/O pin. If there is no more High level, the last value is held.
Hold Low-High	Digital input	With rising edge at the I/O pin, the last value is held.
Hold Low-High	Digital input	With falling edge at the I/O pin, the last value is held.
Reset Low	Digital input	Resetting the search for the maximum or minimum (High-Low)
External emissivity	Analog input	The emissivity can be set at the I/O pin via a 0-10 V signal (scaling possible via software).
Uncommitted value	Analog input	Display of an uncommitted value
Laser at Low	Digital input	Switch on laser (Low signal)
Laser at High	Digital input	Switch on laser (High signal)
External ambient compensation	Analog input	Voltage at the I/O pin [0 – 10 V; scalable range] sets the ambient temperature.
External transmitted radiation	Analog input	Voltage at the I/O pin [0 – 10 V; scalable range] sets the ambient temperature.

Low/High level: adjustable via software

Function Parameters

Display	Mode (example)	Settings range
T PROC 320.9	Process temperature (after signal processing) [320.9 °C]	Cannot be changed
T INT 50.1	Detector temperature [50.1 °C]	Cannot be changed
T BOX 38.6	Controller temperature [38.6 °C]	Cannot be changed
EMISS 1.000	Emissivity [1.000]	0.100 ... 1.100
Trans 1.000	Emissivity [1.000]	0.100 ... 1.100
AVG 0.020	Mean signal output [0.020 s]	0.100 ... 1.100
HOLD	OFF	OFF/ PEAK/ VALL/ APEAK/ AVALL
H TIM	PEAK/ VALL	0...65 s (65 = infinite)
H TH	APEAK/ AVALL	Initial temperature... End temperature
H HY	APEAK/ AVALL	Hysteresis setting in °C/°F
U °C	Temperature unit [° C]	°C/ °F
M 01	Multidrop address [1] (only with RS485 interface) RS422 mode	01 ... 32 RS422 (Press v button at M01)
BAUD 115.2K	Baud rate in kBaud [115]	115.2 / 921.6 kBaud
S ON	Laser sighting	ON/OFF

Peak Picker Function

For an acquisition of fast hotspots (response time 90 μs), the averaging time must be set to 0.0 s. In addition, the HOLD function must be set to PEAK.

Digital Interfaces

The description of the optional digital interfaces is available in the operating instructions. The following interfaces are available: RS232, RS485 or Ethernet.

Alarms

Output channels 1 and 2

To be activated, the corresponding output channel must be switched to digital mode. You can do so only by using the CompactPlus Connect software.

- You can freely choose between both outputs with the thermoMETER CTM-4. You can select analog mA/mV, Alarm mA/mV and TCK.

Visual alarms

These alarms cause the color of the LCD display to change and are available by using the optional relay interface. Alarm 2 can additionally be used on pin AL2 (on the mainboard) as open collector output [24 V/50 mA].

The factory default definitions of the alarms are:

Alarm 1	Normally closed/low alarm
Alarm 2	Normally open/high alarm

Both alarms affect the color settings of the LCD display:

BLUE	Alarm 1 active
RED	Alarm 2 active
GREEN	No alarm active

For advanced settings, such as defining them as low or high alarm (by changing normally open/closed) or selecting the signal source [T_{Proc}, T_{Head}, T_{Box}], a digital interface (e.g., USB, RS232) and the CompactPlus Connect software are required.

- With the thermoMETER CTM-4, visual alarms are independent of the alarm settings. You can define those in the CompactPlus Connect software.

CompactPlus Connect Software

You can find the CompactPlus Connect software online on our website at: <https://www.micro-epsilon.de/download/software/thermoMETER-Compact-PlusConnect/>.

- Download the software, unzip it, open the program and start the CDsetup.exe.

- Please follow the instructions in the wizard until the installation has been completed.

After installation, the CompactPlus Connect software is available on your desktop (as a program icon) and in the start menu under:

[Start]\Programs\CompactPlus Connect.

The downloaded software package includes a detailed software description.

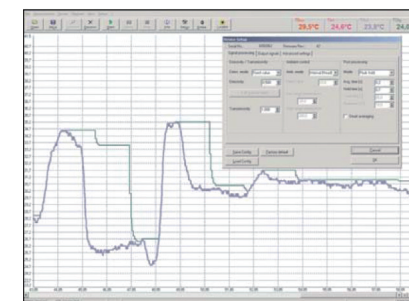
Uninstalling

If you want to uninstall the software, please use the Uninstall function in the Windows settings.

System Requirements

- Windows 7, 8 and 10
- At least 128 MByte RAM
- USB interface
- Hard drive with at least 30 MByte storage space

Main Functions



- Visual depiction and recording of temperature measurements for later analysis and documentation
- Setting all sensor parameters and remote sensor monitoring
- Programming signal processing functions
- Scaling outputs and setting parameters for function inputs