Functions

The thermoMETER UC sensors are non-contact infrared temperature measurement sensors. They measure the infrared radiation emitted by objects and calculate the surface temperature based on this.

Unpacking, Included in Delivery

1 Sensor with sensor cable and protective cap

1 Controller

1 Mounting nut (M12x1)

1 Blue protective cap

1 Setup guide

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

Avoid shocks and impacts to 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

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 22 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 in ambient temperature.
> Inaccurate or incorrect measurements

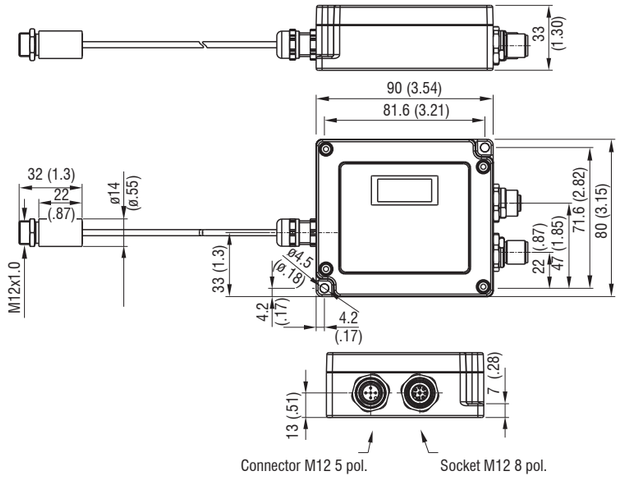
Mechanical Installation

The sensors have a metric M12x1-thread and can be attached to available mounting equipment either directly via this sensor thread or by means of the nut included. Various mounting brackets and fixtures are available as accessories.

i Mount the sensor via the provided thread.

NOTICE Avoid rough mechanical force on the sensor.

> Destruction of the sensor



Dimensional drawing thermoMETER UC, dimensions in mm (inches, rounded off)

Sensor Cable

The sensor is supplied with a ready-made sensor cable.

NOTICE The sensor cable must not be shortened under any circumstances.

> Inaccurate or incorrect measurements

i Never bend the sensor cable more tightly than the bending radius. The minimum bending radius is 22 mm.
With all UC sensor models, the sensor cable must not be moved during the measurement.

Plug-In Connections

For the plug-in connections, you can choose either the analog version with one cable or the digital version with one or both cables as follows:

- Connect an 5-pin M12 analog cable [1] to the 5-pin M12 connector on the controller.
- Connect an 8-pin M12 digital cable [1] to the 8-pin M12 socket on the controller.

Connection Options for Digital and Analog Cables

Cables	Type	Connection possibilities
Digital cable with M12-plug, 8-pin Art. no. 2904054	Open ends	Supply voltage connection
		USB programming adapter for connection to PC
		RS485
		Interface module for Industrial Ethernet connection (IF2035)
with M12-plug, 8-pin. Art. no. 2904053	USB	Connection to PC (sensorTOOL)
Analog cable with M12 socket, 5-pin Art. no. 2904051	Open ends	Interface module for Ethernet and EtherCAT connection (IF1032)
		Supply voltage connection
		Analog output current/voltage

1) Micro-Epsilon recommends using the 5-pin M12 analog cable or the 8-pin M12 digital cable from the optional accessories

Notes on Product Marking

The product meets the requirements of CE and UKCA. All specifications and safety instructions described in the operating instructions must be observed.

You can find more information about the sensor in the operating instructions. They are available online at
https://www.micro-epsilon.com/download-file/man--thermoMETER-UC--en.pdf
or with the QR code at right:

MICRO-EPSILON MESSTECHNIK GmbH & Co. KG
Koenigbacher Str. 15
94496 Ortenburg / Germany
Tel. +49 8542 / 168-0 / Fax +49 8542 / 168-90
info@micro-epsilon.de
www.micro-epsilon.de
Your local contact: www.micro-epsilon.com/contact/worldwide/

X9771484-A012025HDR

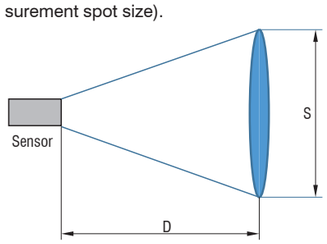
Optical Specifications

Standard Focus (in mm)												
SF02	2:1	7	53.8	102.5	151.3	200	251.3	302.5	353.8	405		
Distance		0	100	200	300	400	500	600	700	800		
SF15	15:1	7	11.5	14	18	23.5	29.5	35.5				
Distance		0	100	200	300	400	500	600				
SF22	22:1	7	14	12	18.5	23	28	33	36.5	38.5	40	41.5
Distance		0	60	110	210	310	410	510	610	710	810	910

Close Focus (when using the screwable CF lens, in mm)								
CF02	2:1	6.5	3.9	2.8	2.5	4.8	6.4	8
Distance		0	10	20	25	30	35	40
CF15	15:1	6.5	3.7	0.8	4.1	5	6.8	8.8
CF22	22:1	6.5	3.4	0.6	4	4.5	6.2	8
Distance		0	5	10	15	20	25	30

= smallest spot size / focal point (mm)

The ratio D:S (example 2:1, see table) describes the ratio Distance (distance from the front edge of the sensor to the measuring object) to Spot size (measurement spot size).

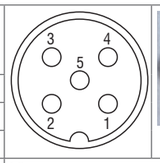


D = Distance
S = Spot size

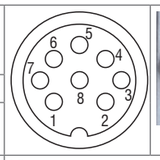
Optical diagram

Electrical Installation

Pin Assignment

Pin	Wire color 5-pol M12 Analog cable [1]	Signal	
1	Brown	*V*CC	 
2	White	I_OUT	
3	Blue	GND	
4	Black	V_OUT	View: 8-pin M12 connector on controller
5	Gray	Laser (3.3 V)	

Pin assignment analog connection 5-pin M12 connector

Pin	Wire color 8-pol M12 Digital cable [1]	Signal	
1	White	Relay 1	 
2	Brown	*V*CC/USB (5 V)	
3	Green	RX	View: 8-pin M12 socket on controller
4	Yellow	TX	
5	Gray	D+ (RS485)	
6	Pink	D- (RS485)	
7	Blue	GND	
8	Red	Relay 2	
Housing	Shield		

Pin assignment digital connection 8-pin M12 socket

Power Supply

i Use a power supply unit with a stabilized output voltage of 5 ... 36 VDC, which supplies a minimum current of 100 mA. Residual ripple should be no more than 200 mV.

NOTICE Never apply voltage to the analog output.

> Destruction of the output

The sensor is not a two-wire sensor!

MICRO-EPSILON

Setup Guide
thermoMETER UC

Outputs

The sensor has one analog output channel and two alarm outputs.

NOTICE Never apply voltage to the analog output.

> Destruction of the output

Available outputs	
Analog output	Voltage
	Current
Alarm output	Alarm output 1
	Alarm output 2

Overview of outputs

Analog Output

The analog output is used to output the object temperature. The output signal is selected using the programming buttons or the sensorTOOL. Both alarm outputs can also be programmed in the same way.

Analog output	Range
Voltage	0 ... 5 V
	0 ... 10 V
Current	0 ... 20 mA
	4 ... 20 mA

Overview of analog outputs

Alarm Outputs

The sensor features the following alarm functions:
- Alarm output 1 with relay; preconfigured as minimum alarm
- Alarm output 2 with relay; preconfigured as maximum alarm

The alarm limits and the alarm configuration can be changed using the programming buttons or the sensorTOOL.

Quick Guide

Operation via the sensorTOOL Software

sensorTOOL by Micro-Epsilon is a piece of software that you can use to apply settings to the sensor and to view and document measurement data.

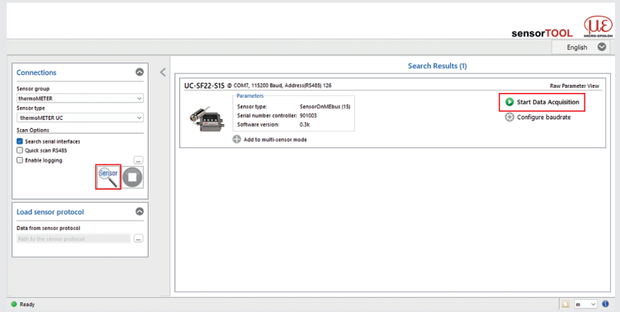
- Connect the sensor to the USB interface of a PC/notebook using the 8-pin M12 digital cable with USB plug [1] or:
- Connect the sensor to the USB interface of a PC/notebook using the 8-pin M12 digital cable in combination with the USB adapter with terminal block [1].

The supply voltage is supplied via the USB interface.

- Start the sensorTOOL program.

You can find this program online at https://www.micro-epsilon.com/fileadmin/download/software/sensorTool.exe.

- Select thermoMETER in the Sensor group drop-down menu and select thermoMETER UC in the Sensor type drop-down menu.



First interactive site after calling the sensorTOOL

- Select the required sensor from the list.
- Check the box Search serial interfaces.
- Click on the Sensor button with the magnifying glass icon in order to start the search.

1) See chapter Optional Accessories in the operating instructions.

All available channels will now be displayed in the Search Results (x) overview.

- Click on the Start Data Acquisition button or the Sensor icon to start the measurement.

Installation of USB Driver

- Install the corresponding TM-USBA-adapter-driver before you use the USB adapter for the first time.

You can find the current driver at:
https://www.micro-epsilon.com/fileadmin/download/software/tm-usba-adapter-driver.zip

Operation via Programming Keys

You can operate and configure the sensor using 4 programming keys.

Key	Explanation
☰	This button takes you to the desired function or the last function called up.
▲	This allows you to change function parameters and thus settings in the sensor.
▼	This allows you to change function parameters and thus settings in the sensor.
F	Selection of the entry or function

There are 9 different function parameters available for setting and measuring, see adjacent table and table below.

Function Parameters

Display	Selections	Explanation
Infrared	Epsilon	Setting the emissivity. The emissivity (ε - epsilon) is a material constant that describes the ability of a body to emit infrared energy.
	Transm.	Setting the transmittance. If a protective window or additional lens is mounted between the sensor and the measuring object, the resulting signal loss can be compensated for with this entry.
	Amb.Head	The ambient temperature of the sensor can falsify the measurement result. This influence can be reduced/minimized by activating compensation. The OFF, Auto and Fixed functions are available for this purpose.
Average	Avg.Time	This entry defines the time constant for averaging. The signal is smoothed using an arithmetic algorithm.
	Avg.Mode	Depending on the selection, an arithmetic mean value is calculated with the separately set time constant. You can choose between the Normal and Smart functions.

Display	Selections	Explanation
Holdmode	Off	Off deactivates the extended signal processing functions. The advanced functions are activated via the other entries.
	Peak	The Peak Hold function is used to search for the maximum value. The respective signal maximum is held for the set time. After the hold time has elapsed, the signal drops to the second highest value or decreases by 1/8 of the difference between the previous maximum value and the minimum value during the hold time. This value is in turn held for the set time. The signal then falls with a slow time constant and follows the course of the object temperature.
	Valley	Valley Hold is used to search for the minimum value. The respective signal minimum is held for the set time. This algorithm is the inverse of that for the maximum search.
	A.Peak	In the extended maximum search, this algorithm searches for local maximum values. Maximum values that are lower than their predecessors are only accepted if the temperature had previously fallen below the threshold value. If hysteresis is set, a maximum value must also have dropped by the hysteresis value before it is accepted as the new maximum.
	A.Valle	In the extended minimum search, this algorithm searches for local minimum values; minimum values that are greater than their predecessors are only accepted if the temperature previously exceeded the threshold value. If hysteresis is set, a minimum value must also have risen by the value of the hysteresis before it is accepted as the new minimum.

Display	Selections	Explanation
Output	Disabled	The Disabled setting deactivates all analog outputs.
	Voltage	Setting the upper and lower temperature limit for scaling the analog output. Setting the upper and lower limit for the output scaling of the voltage output.
	Current	Setting the upper and lower temperature limit for scaling the analog output. Setting the upper and lower limit for the output scaling of the current output.
Alarm 1 **Alarm 2**	Off	Off deactivates alarm output 1 / 2. The other entries are used to define the alarm source for alarm output 1 / 2. The temperature determines when the alarm is triggered and the alarm relay 1 / 2 changes its switching state.
	TProces	Setting the temperature and the alarm source [TProces] Process temperature = temperature value with signal processing functions
	TAverag	Setting the temperature and the alarm source [TAverag] Averaged temperature = temperature value with averaging function
	TActual	Setting the temperature and the alarm source [TAverag] Averaged temperature = temperature value without signal processing functions
	TBox	Setting the temperature and the alarm source Controller temperature
	THead	Setting the temperature and the alarm source Sensor temperature
	Diffmod	Setting the temperature and the alarm source Differential temperature between TActual - THead

Display	Selections	Explanation
Aiming	Off	No aiming aid
	Valley	Optical aiming aid via the LCD backlight to find the position with the lowest temperature
	Peak	Optical aiming aid via the LCD backlight to find the position with the highest temperature
	Laser	Activation of the power supply for an optional laser sighting
Display	Row 1	Selection for displaying the temperature TProcess, TAverage, TCurrent, Tbox, THead, THead for the first display line
	Row 2	Selection for displaying the temperature TProcess, TAverage, TCurrent, Tbox, THead, THead for the second display line
	AutoOFF	Deactivation of the automatic switch-off of the display backlight. Activation of automatic switch-off of the display backlight after 1 ... 10 minutes.

Display	Selections	Explanation
System	FactRes.	This entry is used to reset the sensor to the factory parameters.
	Baud rate	Setting the baud rate for digital communication with the sensor to 9600 ... 115200 baud
	T. Unit	Setting the temperature unit for the display and data output. You can choose between °C and °F.
	485 Term	Activation or deactivation of the integrated 120 Ohm terminating resistor of the RS485 interface
	485 Adr.	Setting the RS485 bus address via which the sensor can be addressed on an RS485 bus. The preset bus address is 126, which is the usual standard address for Micro-Epsilon sensors.
	Protocol	ME-Bus: This entry is used to switch digital communication to the ME-Bus protocol. It enables the digital readout and setting of all sensor functions conveniently with the Micro-Epsilon sensorTOOL.
		Binary: This entry is used to switch digital communication to the simplified binary protocol. This protocol enables the digital setting of a limited selection of sensor functions.

For further fine adjustment and the value range, please refer to the detailed description in the Function parameters chapter of the operating instructions.