MICRO-EPSILON

More Precision

thermoMETER // Non-contact infrared temperature sensors

Non-contact temperature measurement - precise and reliable.

Temperature measurement with Micro-Epsilon

IR temperature sensors, thermal imaging cameras and handheld pyrometers from Micro-Epsilon are designed for measuring surface temperatures from -50°C to 2200°C. The infrared radiation emitted by a body is used for the measurement. As this measurement is a non-contact technology, the devices perform wear-free and can therefore be reliably used in the long term. Selectable models and optical systems enable to install the cameras in different distances from the surface. This enables measurements to the target from a safe distance in critical operation areas.

Large range of applications

Infrared sensors, hand-held devices and IR cameras are used in a variety of applications for non-contact temperature measurement within any industry from factory automation, R&D to maintenance and process monitoring.

Proven technology

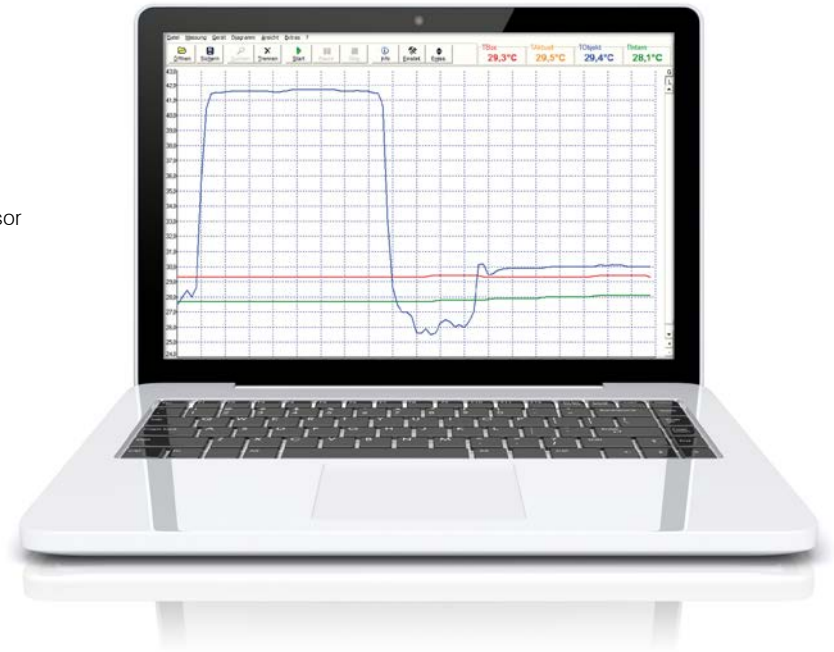
Infrared sensors developed and produced by Micro-Epsilon stand out due to their long service life, their robust construction and precise measurement results. These sensors are based on proven technologies which have been developed further by Micro-Epsilon. This is why these sensors also provide highly precise and reliable measurements in harsh environmental conditions.

Compact sensor design

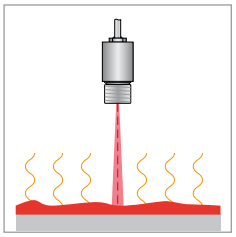
For applications in restricted spaces, the sensors of the CT series are perfectly suitable. Even the standard models are considered one of the smallest sensors. For extremely tiny installation environments, miniaturized IR sensors are used.

Software included
Sensors with digital interface include the specially programmed CompactConnect software for free.
- Graphic display and recording of temperature readings for subsequent analysis and documentation
- Complete set up of parameters and remote control of the sensor
- Sophisticated signal processing features
- Output scaling and parameter set up of functional inputs

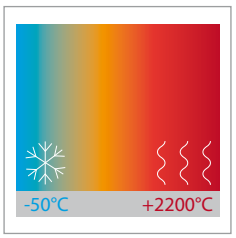
System requirements
- Windows XP / Vista / Windows 10
- USB 2.0 interface
- Hard drive with at least 30 MB of free disk space
- At least 128 MB of RAM
- CD-ROM drive



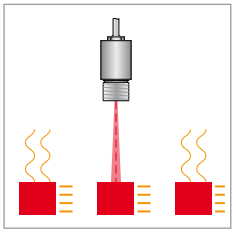
Non-contact measurement of the surface temperature
Each Micro-Epsilon IR sensor model incorporates different technologies that have a common denominator: non-contact temperature measurement. Due to this non-contact technology, measurement objects can be detected precisely and wear-free without physical influences.



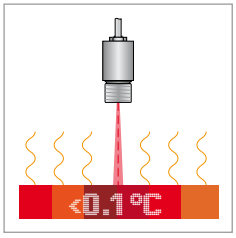
Large temperature measuring range
IR sensors from Micro-Epsilon are suitable for use across a wide measuring range. From low temperatures prevalent in cooling chains or laboratories, to the highest temperatures in hot melting materials or blast furnaces - the portable thermoMETER handheld products measure these temperatures precisely.



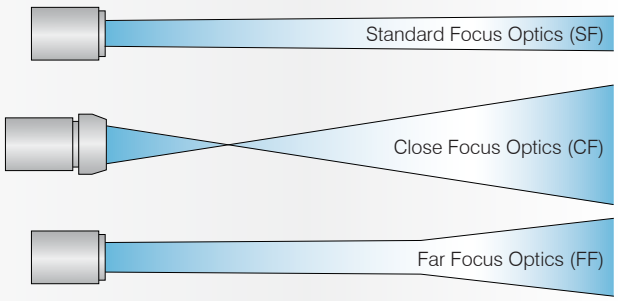
High speed measurements
For moving objects e.g. in transportation lines, thermoMETER sensors with extremely fast response times are available. These response times can only be achieved using high quality components.



Precise and stable measurements
The thermoMETER product group is renowned for its high accuracy and high resolution. Particularly in temperature-critical applications, IR sensors from Micro-Epsilon are the preferred choice for easy, precise measurements.



thermoMETER lenses
The measurement spot size with the desired working distance is a critical factor. In order to enable the ideal choice for any application, a large number of different lenses is available. These differ with respect to the relation between the target distance and the spot diameter.



SF lenses (Standard Focus) have an almost linear relation while the CF lenses (Close Focus) have a smaller measurement spot in sensor-close distances. FF lenses (Far Focus) are especially suitable for large distances from the measurement object with a comparatively small measurement spot.

Detection of smallest measurement objects
Often, conventional IR sensors can not detect tiny, temperature-critical parts e.g. on chips and circuit boards. Due to the comprehensive range of optical systems, even smallest measurement objects <1mm can be detected precisely.

Freely selectable distance from the measurement object
Depending on the application environment and the available installation space, the measurement distance of thermoMETER is freely selectable. Due to the large number of different lens types, small measurement diameters can also be detected with large distances.

High-Performance IR sensor with double laser sighting

Page	Model	Temperature range
6 - 7	CTratioM1	
8 - 9	CTLaser / FAST	
10 - 11	CTLaserGLASS	
12 - 13	CTLaserM1/M2	
14 - 15	CTLaserM3	
16 - 17	CTLaserM5	
18 - 19	CTLaser COMBUSTION	

-100°C 0°C 200°C 400°C 600°C 800°C 1000°C 1200°C 1400°C 1600°C 1800°C 2000°C 2200°C

Infrared sensor for general purpose applications

Page	Model	Temperature range
22 - 23	CT	
24 - 25	CTfast	
26 - 27	CThot	
28 - 29	CTM1/M2	
30 - 31	CTM3	
32 - 33	CTM3-XL	
34 - 35	CTP-3	
36 - 37	CTP-7	
38 - 39	CTex	

-100°C 0°C 200°C 400°C 600°C 800°C 1000°C 1200°C 1400°C 1600°C 1800°C 2000°C 2200°C

Compact infrared temperature sensor for OEM applications

Page	Model	Temperature range
44 - 45	CSLaser	
46 - 47	CS	
48 - 49	CSmicro	
50 - 51	CSmicro 2W	
52 - 53	CX	

High-Performance IR sensor with double laser sighting

	Spectral range	Ambient temperature	Description	Model	Page
	0.7 to 1.1µm	-20°C to +250°C	Ratio pyrometer for hot metal objects	CTratioM1	6 - 7
	8 to 14µm	-20°C to +85°C	Universal IR sensor with laser spot marking	CTLaser / FAST	8 - 9
	5.0µm	-20°C to +85°C	IR sensor with laser sighting for the glass industry	CTLaserGLASS	10 - 11
	1µm / 1.6µm	-20°C to +85°C	IR sensor with laser sighting for the metal production	CTLaserM1/M2	12 - 13
	2.3µm	-20°C to +85°C	IR sensor with laser sighting for metals & composite materials	CTLaserM3	14 - 15
	0.525µm	-20°C to +85°C	IR sensor with laser sighting for liquid metals	CTLaserM5	16 - 17
	3.9 / 4.24 / 4.64µm	-20°C to +85°C	IR sensor with laser sighting for measurements through and on flames	CTLaser COMBUSTION	18 - 19

Infrared sensor for general purpose applications

	Spectral range	Ambient temperature	Description	Model	Page
	8 to 14µm	-20°C to +180°C	Universal IR sensor for common applications	CT	22 - 23
	8 to 14µm	-20°C to +120°C	Temperature sensor for high speed measurements	CTfast	24 - 25
	8 to 14µm	-20°C to +250°C	Temperature sensor for extremely hot ambient temperature	CThot	26 - 27
	1µm / 1.6µm	-20°C to +125°C	Temperature sensor for metal processing	CTM1/M2	28 - 29
	2.3µm	-40°C to +85°C	Temperature sensor for metals & composite materials	CTM3	30 - 31
	2.3µm	-40°C to +85°C	Temperature sensor for laser welding processes	CTM3-XL	32 - 33
	3.43µm	0°C to +75°C	Temperature sensor for measurement of thin plastic film	CTP-3	34 - 35
	7.9µm	-20°C to +85°C	Temperature sensor for measurement of plastics	CTP-7	36 - 37
	8 to 14µm	-20°C to +60°C	Conversion kit for applications in hazardous EX environment	CTex	38 - 39

Compact infrared temperature sensor for OEM applications

	Spectral range	Ambient temperature	Description	Model	Page
	1.6µm / 8 to 14µm	-20°C to +85°C	Two-wire IR sensor with laser sighting & integrated controller	CSLaser	44 - 45
	8 to 14µm	-20°C to +80°C	OEM infrared sensor with integrated controller	CS	46 - 47
	8 to 14µm	-20°C to +120°C	Compact OEM infrared sensor with external controller	CSmicro	48 - 49
	1.6µm / 8 to 14µm	-20°C to +180°C	Compact two-wire OEM infrared sensor with external controller	CSmicro 2W	50 - 51
	8 to 14µm	-20°C to +75°C	Two-wire IR sensor for robust, industrial applications	CX	52 - 53

thermoMETER CTratioM1

Glass fiber ratio pyrometer provides extremely short response time with hot objects

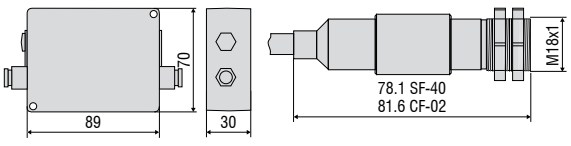
- Measuring range from 700°C to 1800°C
- Extremely short response times from 5ms
- Resistant to disturbances such as smoke, fog and partially concealed or moving objects
- Measurement depends only on the emissivity ratio but not on the absolute emissivity
- The measurement object can be smaller than the measurement spot
- Up to 250°C ambient temperature without cooling
- High optical resolution with selectable focal point
- Integrated sighting laser marks spot size
- Programmable 1- or/and 2-channel mode
- Separate controller with programming keys and backlit display

Optical specifications thermoMETER CTratioM1

Standard Focus										
SF40 lens	40:1	6.6	10.6	21.1	31.3	41.4	52	62.6	73.3	84
	distance in mm	102	305	762	1143	1524	1905	2286	2667	3048
Close Focus										
CF02 lens	2:1	5.1	6.4	7.7	23.6	50.1	77.6	104.1		
	distance in mm	102	200	305	762	1524	2286	3048		

Model		CTRM-1CF02-C3	CTRM-1SF40-C3
Optical resolution (95% energy)		40:1	
Temperature range		700°C to 1800°C	
Spectral range		0.7 to 1.1µm	
System accuracy [1,3]		±(1% of reading +1°C)	
Repeatability [1,3]		±(0.5% of reading +1°C)	
Temperature resolution (>900°C)		0.1°C	
Response time (95% signal) [2]		5ms - 10s	
Emissivity ratio [4]		0.800 to 1.200	
Emissivity [4]		0.100 to 1.100	
Signal processing [4]		1 color / 2 color mode; attenuation monitoring / alarms; peak hold, valley hold, average; extended hold function with threshold and hysteresis	
Outputs/analog		0/4 - 20mA, 0 to 5/10V	
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated	
Alarm output		2 x open collector (24V / 1A)	
Outputs/digital	optional	USB (only for sensor configuration)	
Output impedances	current output	mA max. 500Ω (with 5 to 36VDC)	
	voltage output	min. 100kΩ load impedance	
Inputs/outputs digital		2 programmable in-/ outputs, usable as: alarm output (open collector output [24V / 1A]), digital input for triggered signal output and peak hold function	
Fiber cable length		3m (standard), 6m, 10m, 15m , 22m; stainless steel armor, 400µm fiber diameter	
Power supply		8 to 36VDC or USB; max. 200mA	
Optical aiming		Laser 650nm, 1mW, ON/OFF via controller or software	
Protection class		IP65 (NEMA-4)	
Ambient temperature		sensor: -20°C to 250°C (70°C if Laser ON); controller: 0°C to 85°C	
Storage temperature		sensor: -40°C to 250°C; controller: -40°C to 85°C	
Relative humidity		10 to 95%, non-condensing	
Vibration	voltage output	IEC 68-2-6: 3 G, 11-200Hz, any axis	
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis	
Weight		fiber cable with sensor: 375g; controller: 420g	

[1] ε= 1, response time 1s
[2] with dynamic adaption at low signal levels
[3] ± ambient temperature 23±5°C
[4] adjustable via programming keys or software



Product identification

CTRM -	1	CF02-	C3

- C3: Fiber cable length [3m (standard) / 6 / 10 / 15 / 22m]
- CF02-: Focus [CF2 / SF40]
- 1: Spectral range [0.7 to 1.1µm]
- CTRM -: thermoMETER CTratio

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

thermoMETER CTLaser / CTLaserFAST

Innovative infrared temperature sensor with laser sighting

- Measuring range from -50°C to 975°C
- thermoMETER CTLaserFAST with response times of just 9ms
- Smallest spots from 0.9mm - even with low object temperatures
- Double laser sighting for exact measuring field marking and focusing
- Optical system 75:1 with selectable focus settings
- Separate controller with programming keys and backlit display
- Up to 85°C ambient temperature without cooling
- Automatic laser switch-off at 50°C
- Selectable and scalable analog output, optional digital interfaces

Optical specifications thermoMETER CTLaser
□ = smallest spot size / focal point (mm)

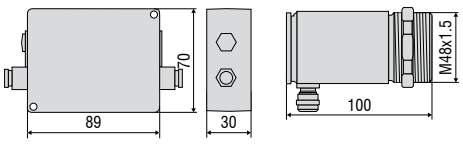
Standard Focus																	
SF75 lens	75:1	20	19.5	19	18.5	18	17.5	17	16.5	16	20.5	25	34	43	52		
	distance in mm	0	150	300	450	600	750	900	1050	1200	1350	1500	1800	2100	2400		
Close Focus																	
CF1 lens	75:1	20	9.1	6.4	0.9	9.9	24.8	39.7	54.6	69.6	84.5	99.4	114.4	129.3	159.1	189	218.9
CF2 lens	75:1	20	15.2	14	11.6	7.9	1.9	9.2	16.5	23.8	31.1	38.4	45.7	53	67.6	82.2	96.8
CF3 lens	75:1	20	16.6	15.7	14	11.4	7.1	2.75	8.4	14.1	19.8	25.5	31.2	36.9	48.3	59.6	71
CF4 lens	75:1	20	18.7	18.4	17.8	16.9	15.3	13.7	12.2	10.6	9	7.5	5.9	8.8	14.5	20.3	26
	distance in mm	0	40	50	70	100	150	200	250	300	350	400	450	500	600	700	800

Optical specifications thermoMETER CTLaserFAST
□ = smallest spot size / focal point (mm)

Standard Focus																	
SF50 lens	50:1	20	20.5	21	21.5	22	22.5	23	23.5	24	29.5	35	46	57	68		
	distance in mm	0	150	300	450	600	750	900	1050	1200	1350	1500	1800	2100	2400		
Close Focus																	
CF1 lens	50:1	20	9.4	6.7	1.4	10.6	25.9	41.1	56.4	71.7	87	102.3	117.6	132.9	163.4	194	224.6
CF2 lens	50:1	20	15.5	14.3	12.1	8.7	3	10.7	18.3	26	33.7	41.3	49	56.7	72	87.3	102.7
CF3 lens	50:1	20	16.8	16	14.4	12	8	4	10	16	22	28	34	40	52	64	76
CF4 lens	50:1	20	19	18.8	18.3	17.6	16.3	15.1	13.9	12.7	11.4	10.2	9	12.2	18.7	25.1	31.6
	distance in mm	0	40	50	70	100	150	200	250	300	350	400	450	500	600	700	800

Model		CTL-SF75-C3	CTLF-SF50-C3
Optical resolution		75:1	50:1
Temperature range [1]		-50°C to 975°C	
Spectral range		8 to 14µm	
System accuracy [2,3]		±1% or ±1°C	±1.5% or ±1.5°C
Repeatability [2]		±0.5% or ±0.5°C	±1% or ±1°C
Temperature resolution		0.1°C	0.5°C
Response time (90% signal)		120ms	9ms
Emissivity/gain [1]		0.100 to 1.100	
Transmissivity/gain [1]		0.100 to 1.000	
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 20mA, 0 to 5/10V, thermocouple J, K	
	channel 2	sensor temperature (-20 to 180°C as 0 to 5V or 0 to 10V), alarm output	
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated	
Alarm output		open collector (24V / 50A)	
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet	
Output impedances	current output	mA max. 500Ω (with 5 to 36VDC)	
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω	
Inputs		programmable functional inputs for external emissivity adjustment ambient temperature compensation, trigger (reset of hold functions)	
Cable length		3m (standard), 8m, 15m	
Power supply		8 to 36VDC; max. 160mA	
Laser		class II (635nm), 1mW, ON/OFF via controller or software	
Protection class		IP65 (NEMA-4)	
Ambient temperature		sensor: -20°C to 85°C (50°C if Laser ON) controller: 0°C to 85°C	
Storage temperature		sensor: -40°C to 85°C controller: -40°C to 85°C	
Relative humidity		10 to 95%, non-condensing	
Vibration	Sensor	IEC 68-2-6: 3 G, 11 to 200Hz, any axis	
Shock	Sensor	IEC 68-2-27: 50 G, 11ms, any axis	
Weight		sensor: 600g; controller: 420g	

[1] adjustable via programming keys or software
[2] ambient temperature: 23±5°C; whichever is greater
[3] temperature of the object >0°C



Product identification

CTL -	SF75-	C3
		Cable length [3m (standard) / 8m / 15m]
	Focus [SF75 / CF1 / CF2 / CF3 / CF4]	
thermoMETER CTLaser		

Product identification

CTLF -	SF50-	C3
		Cable length [3m (standard) / 8m / 15m]
	Focus [SF50 / CF1 / CF2 / CF3 / CF4]	
thermoMETER CTLaserFAST		

Accessories page 20 - 21

- Mounting bracket
- Air purge collar
- Rail mount adapter for controller
- Water cooled housing
- Interface kit
- CompactConnect software
- Certificate of calibration

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

thermoMETER CTLaserGLASS

Non-contact infrared temperature sensor for the glass industry

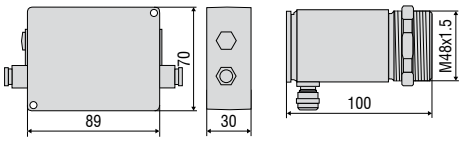
- Measuring range from 100°C to 1650°C
- Accurate glass temperature measurements on flat glass lines and container glass machines, e.g. with bulb manufacturing, car glass finishing and the production of solar panels and glass bottles
- Double laser marks the exact spot size from 1mm
- Optical systems 70:1 and 45:1 with selectable focus
- Compact sensor design
- Up to 85°C ambient temperature without cooling, laser switch-off at 50°C
- Cooling and protection accessories for harsh environmental conditions
- Selectable and scalable analog output, optional digital interfaces

Optical specifications thermoMETER CTLaserGLASS
□ = smallest spot size / focal point (mm)

Standard Focus																	
SF45L	45:1	20	20.9	21.8	22.6	23.5	24.4	25.3	26.1	27	32.9	38.8	50.5	62.3	74		
SF70H	70:1	20	19.6	19.3	18.9	18.5	18.1	17.8	17.4	17	21.6	26.3	35.5	44.8	54		
	distance in mm	0	150	300	450	600	750	900	1050	1200	1350	1500	1800	2100	2400		
Close Focus																	
CF1L	45:1	20	9.5	6.9	1.6	10.9	26.3	41.7	57.1	72.6	88	103.4	118.9	134.3	165.1	196	226.9
CF1H	70:1	20	9.1	6.4	1	10	25	40	55	70	85	100	115	130	160	190	220
CF2L	45:1	20	15.6	14.5	12.3	8.9	3.4	11.2	19	26.8	34.6	42.4	50.2	58	73.6	89.2	104.8
CF2H	70:1	20	15.3	14.1	11.7	8.1	2.2	9.6	17	24.4	31.8	39.2	46.6	54	68.8	83.6	98.4
CF3L	45:1	20	16.9	16.1	14.6	12.3	8.4	4.5	10.6	16.8	22.9	29	35.1	41.3	53.5	65.8	78
CF3H	70:1	20	16.6	15.7	14	11.5	7.2	2.9	8.6	14.3	20.1	25.8	31.5	37.3	48.7	60.1	71.6
CF4L	45:1	20	19.1	18.9	18.4	17.8	16.7	15.6	14.4	13.3	12.2	11.1	10	13.3	20	26.7	33.3
CF4H	70:1	20	18.8	18.5	17.9	17	15.5	14	12.5	11	9.5	8	6.5	9.4	15.3	21.2	27.1
	distance in mm	0	40	50	70	100	150	200	250	300	350	400	450	500	600	700	800

Model		CTLG-SF45L-C3	CTLGF-SF45H-C3	CTLG-SF70H-C3
Optical resolution		45:1		70:1
Temperature range [1]		100 to 1200°C	200 to 1650°C	250 to 1650°C
Spectral range		5.0µm		
System accuracy [2]		±1% or ±1.5°C		
Repeatability [2]		±0.5% or ±0.5°C		
Temperature resolution		0.1°C		
Response time (90% signal)		120ms	10ms	80ms
Emissivity/gain [1]		0.100 to 1.100		
Transmissivity/gain [1]		0.100 to 1.000		
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 20mA, 0 to 5/10V, thermocouple J, K		
	channel 2	sensor temperature (-20 to 180°C as 0 to 5V or 0 to 10V), alarm output		
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated		
Alarm output		open collector (24V / 50A)		
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet		
Output impedances	current output	mA max. 500Ω (with 5 to 36VDC)		
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω		
Inputs		programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger		
Cable length		3m (standard), 8m, 15m		
Power supply		8 to 36VDC; max. 160mA		
Laser		class II (635nm), 1mW, ON/OFF via controller or software		
Protection class		IP65 (NEMA-4)		
Ambient temperature		sensor: -20°C to 85°C (50°C if Laser ON); controller: 0°C to 85°C		
Storage temperature		sensor: -40°C to 85°C controller: -40°C to 85°C		
Relative humidity		10 to 95%, non-condensing		
Vibration	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis		
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis		
Weight		sensor: 600g; controller: 420g		

[1] adjustable via programming keys or software
[2] ambient temperature: 23±5°C; whichever is greater



Product identification

CTLG -	SF45L-	C3
		Cable length [3m (standard) / 8m / 15m]
	Focus [SF45L/ SF70H / CF1L/H / CF2L/H / CF3L/H / CF4L/H]	
thermoMETER CTLaserGLASS		

Accessories page 20 - 21

- Mounting bracket
- Air purge collar
- Rail mount adapter for controller
- Water cooled housing
- Interface kit
- Certificate of calibration

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

thermoMETER CTLaserM1/M2

Non-contact IR temperature sensor with laser sighting for metal processing

- Measuring range 250°C to 2200°C
- 1µm/1.6µm measuring wavelength for accurate temperature measurements in difficult emissivity conditions
- Response time of 1ms
- Double laser marks exact spot size from 0.45mm
- For metal processing and measurements of metal oxides and ceramics
- Optical resolution 300:1 and 150:1 with selectable focus
- Up to 85°C ambient temperature without cooling, automatic laser switch-off at 50°C, up to 315°C with water cooled housing
- Selectable and scalable analog output, optional digital interfaces

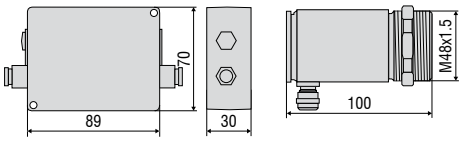
Optical specifications thermoMETER CTLaserM1/M2

□ = smallest spot size (mm) / focal point (mm)

Standard Focus															
1L/2L SF	150:1	20	18.3	16.5	14.8	13.1	11.3	9.6	8.5	7.3	9.8	13.5	17.2	23.4	29.6
1H/2H/H1 SF	300:1	12	10.9	9.7	8.6	7.5	6.3	5.2	4.5	3.7	5.1	7.3	9.4	13	16.5
distance in mm		0	150	300	450	600	750	900	1000	1100	1200	1350	1500	1750	2000
Close Focus															
1L/2L CF2	150:1	20	13.7	7.3	1	8	15	22	36	50	64	78	92		
1H/2H/H1 CF2	300:1	12	8.2	4.3	0.5	4.7	8.8	13	21.3	29.7	38	46.3	54.7		
1L/2L CF3	150:1	20	15.3	10.7	6	1.3	6.6	12	22.6	33.3	43.9	54.6	65.2		
1H/2H/H1 CF3	300:1	12	9.2	6.4	3.5	0.7	3.9	7	13.4	19.8	26.1	32.4	38.8		
distance in mm		0	50	100	150	200	250	300	400	500	600	700	800		
Close Focus															
1L/2L CF4	150:1	20	18.1	16.2	14.3	12.4	10.6	8.7	6.8	4.9	3	5.6	10.7	15.8	20.9
1H/2H/H1 CF4	300:1	12	10.8	9.7	8.5	7.3	6.2	5	3.8	2.7	1.5	3	6	9	12
distance in mm		0	50	100	150	200	250	300	350	400	450	500	600	700	800
Far Focus															
1L/2L FF	150:1	20	20.5	21	21.5	22	22.5	23	23.3	24	28.9	41.1	53.3	62.5	
1H/2H/H1 FF	300:1	12	12	12	12	12	12	12	12	12	14.7	21.3	28	33	
distance in mm		0	450	900	1350	1800	2250	2700	3000	3600	4000	5000	6000	6750	

Model		CTLM-1LSF150-C3	CTLM-1HSF300-C3	CTLM-1H1SF300-C3	CTLM-2LSF150-C3	CTLM-2HSF300-C3	CTLM-2H1SF300-C3
Optical resolution		150:1	300:1		150:1	300:1	
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		1µm			1.6µm		
System accuracy [2]		±(0.3% of reading +2°C)					
Repeatability [2]		±(0.1% of reading +1°C)					
Temperature resolution		0.1°C	0.2°C		0.1°C	0.2°C	
Response time (90% signal) [3]		1ms					
Emissivity/gain [1]		0.100 to 1.100					
Transmissivity/gain [1]		0.100 to 1.000					
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 20mA, 0 to 5/10V, thermocouple J, K					
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated					
Alarm output		open collector (24V / 50A)					
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet					
Output impedances	current output	mA max. 500Ω (with 5 - 36VDC)					
	voltage output	mV min. 100kΩ load impedance; thermocouple 20Ω					
Inputs		programmable functional inputs for external emissivity adjustment ambient temperature compensation, trigger (reset of hold functions)					
Cable length		3m (standard), 8m, 15m					
Power supply		8 to 36VDC; max. 160mA					
Laser		class II (635nm), 1mW, ON/OFF via controller or software					
Protection class		IP65 (NEMA-4)					
Ambient temperature		sensor: -20°C to 85°C (50°C if Laser ON); controller: 0°C to 85°C					
Storage temperature		sensor: -40°C to 85°C controller: -40°C to 85°C					
Relative humidity		10 to 95%, non-condensing					
Vibration	voltage output	IEC 68-2-6: 3 G, 11-200Hz, any axis					
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis					
Weight		sensor: 600g; controller: 420g					

[1] adjustable via controller or software
[2] ε=1, response time 1s; ambient temperature: 23±5°C
[3] with dynamic adaption at low signal levels



Product identification

CTLM -	1	L	SF150-	C3
				Cable length [3m (standard) / 8m / 15m]
			Focus [SF / CF2 / CF3 / CF4 / FF]	
		Temperature range [L / H/ H1]		
	Spectral range [1=1µm / 2=1.6µm]			
thermoMETER CTLaserM				

Accessories page 20 - 21

- Mounting bracket
- Air purge collar
- Rail mount adapter for controller
- Water cooled housing
- Interface kit
- Certificate of calibration

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

thermoMETER CTLaserM3

Non-contact IR temperature sensor with laser sighting for metals and composite material processing from 50°C

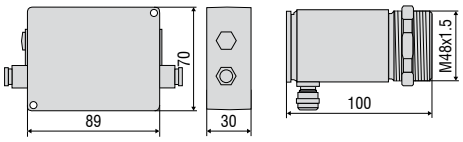
- Measuring range 50°C to 1800°C
- 2.3µm measuring wavelength for exact measurement in difficult emissivity conditions
- Response time of 1ms
- Double laser marks exact spot size from 0.5mm
- Optical resolution 300:1, 100:1 and 60:1 with selectable focus
- Up to 85°C ambient temperature without cooling, automatic laser switch-off at 50°C, up to 315°C with water cooled housing

Optical specifications thermoMETER CTLaserM3
□ = smallest spot size / focal point (mm)

Standard Focus															
3LSF	60:1	20	19.8	19.5	19.3	19.1	18.8	18.6	18.5	18.3	21.8	27	32.2	40.9	56.6
3HSF	100:1	20	18.8	17.5	16.3	15.1	13.9	12.6	11.8	11	13.8	18	22.3	29.3	42
3 H1/H2/H3 SF300	300:1	12	10.9	9.7	8.6	7.5	6.3	5.2	4.5	3.7	5.1	7.3	9.4	13	19.4
distance in mm		0	150	300	450	600	750	900	1000	1100	1200	1350	1500	1750	2200
Close Focus															
3LCF1	60:1	20	11.2	1.4	10.2	17.8	30.4	42.9	55.5	80.7	105.9	131.1	156.2	181.4	
3HCF1	100:1	20	11	0.9	9.5	16.9	29.2	41.5	53.8	78.4	102.9	127.5	152.1	176.7	
distance in mm		0	40	85	120	150	200	250	300	400	500	600	700	800	
Close Focus															
3LCF2	60:1	20	14.2	8.3	2.5	10	17.5	25	40	55	70	85	100		
3HCF2	100:1	20	13.8	7.7	1.5	8.7	15.8	23	37.3	51.7	66	80.3	94.7		
3 H1/H2/H3 CF2	300:1	12	8.2	4.3	0.5	4.7	8.8	13	21.3	29.7	38	46.3	54.7		
3LCF3	60:1	20	15.8	11.7	7.5	3.3	9.1	15	26.6	38.3	49.9	61.6	73.2		
3HCF3	100:1	20	15.5	11	6.5	2	7.5	13	24	35	46	57	68		
3 H1/H2/H3 CF3	300:1	12	9.2	6.4	3.5	0.7	3.9	7	13.4	19.8	26.1	32.4	38.8		
distance in mm		0	50	100	150	200	250	300	400	500	600	700	800		
Close Focus															
3LCF4	60:1	20	18.6	17.2	15.8	14.4	13.1	11.7	10.3	8.9	7.5	10.6	16.7	22.8	28.9
3HCF4	100:1	20	18.3	16.6	14.8	13.1	11.4	9.7	7.9	6.2	4.5	7.2	12.7	18.1	23.6
3 H1/H2/H3 CF4	300:1	12	10.8	9.7	8.5	7.3	6.2	5	3.8	2.7	1.5	3	6	9	12
distance in mm		0	50	100	150	200	250	300	350	400	450	500	600	700	800
Far Field															
3 H1/H2/H3 FF	300:1	12	12	12	12	12	12	12	12	12	14.7	21.3	28	33	
distance in mm		0	450	900	1350	1800	2250	2700	3000	3600	4000	5000	6000	6750	

Model		CTLM- 3LSF60-C3	CTLM- 3HSF100-C3	CTLM- 3H1SF300-C3	CTLM- 3H2SF300-C3	CTLM- 3H3SF300-C3
Optical resolution		60:1	100:1	300:1		
Temperature range [1,2]		50 to 400°C	100 to 600°C	150 to 1000°C	200 to 1500°C	250 to 1800°C
Spectral range		2.3µm				
System accuracy [3]		±(0.3% of reading +2°C)				
Repeatability [3]		±(0.1% of reading +1°C)				
Temperature resolution (digital)		0.1°C				
Response time (90% signal) [4]		1ms				
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 20mA, 0 to 5/10V, thermocouple J, K				
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated				
Alarm output		open collector (24V / 50A)				
Outputs/digital		USB, RS232, RS485, CAN, Profibus DP, Ethernet				
Output impedances	current output	mA max. 500Ω (with 5 - 36VDC)				
	voltage output	mV min. 100kΩ load impedance; thermocouple 20Ω				
Inputs		programmable functional inputs for external emissivity adjustment ambient temperature compensation, trigger (reset of hold functions)				
Cable length		3m (standard), 8m, 15m				
Power supply		8 to 36VDC; max. 160mA				
Laser		class II (635nm), 1mW, ON/OFF via controller or software				
Protection class		IP65 (NEMA-4)				
Ambient temperature		sensor: -20°C to 85°C (50°C if Laser ON); controller: 0°C to 85°C				
Storage temperature		sensor: -40°C to 85°C controller: -40°C to 85°C				
Relative humidity		10 to 95%, non-condensing				
Vibration	voltage output	IEC 68-2-6: 3 G, 11-200Hz, any axis				
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis				
Weight		sensor: 600g; controller: 420g				

[1] adjustable via controller or software
[2] target temperature > sensor temperature + 25°C
[3] ε=1, response time 1s; ambient temperature: 23±5°C
[4] with dynamic adaption at low signal levels



Product identification

CTLM -	3	L	SF60-	C3
				Cable length [3m (standard) / 8m / 15m]
			Focus [SF60/100 / CF1 / CF2 / CF3 / CF4]	
		Temperature range [L / H]		
	Spectral range [2.3µm]			
thermoMETER CTLaserM				

Accessories page 20 - 21

- Mounting bracket
- Air purge collar
- Rail mount adapter for controller
- Water cooled housing
- Interface kit
- Certificate of calibration

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

thermoMETER CTLaserM5

Non-contact IR temperature sensor with laser sighting for exact temperature measurement of molten metals

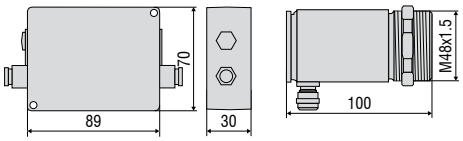
- Measuring range from 1000°C to 2000°C
- Short measuring wavelength of 525nm minimizes errors due to emissivity uncertainty and misadjustment
- Response time of 1ms
- Double laser marks the exact spot size from 1mm
- For metal processing and measurements of metal oxides and ceramics
- Optical resolution 150:1 with selectable focus
- Up to 85°C ambient temperature without cooling, automatic laser switch-off at 50°C
- Selectable and scalable analog output, optional digital interfaces

Optical specifications thermoMETER CTLaserM5
□ = smallest spot size / focal point (mm)

Standard Focus															
1L/2L SF	150:1	20	18.3	16.5	14.8	13.1	11.3	9.6	8.5	7.3	9.8	13.5	17.2	23.4	29.6
	distance in mm	0	150	300	450	600	750	900	1000	1100	1200	1350	1500	1750	2000
Far Focus															
1L/2L FF	150:1	20	20.5	21	21.5	22	22.5	23	23.3	24	28.9	41.1	53.3	62.5	
	distance in mm	0	450	900	1350	1800	2250	2700	3000	3600	4000	5000	6000	6750	

Model		CTLM-5SF150-C3
Optical resolution		150:1
Temperature range [1]		1000 to 2000°C
Spectral range		525nm
System accuracy [2]		±1% of reading (≤ 1100°C) | ± 0.3% of reading +2°C (> 1100°C)
Repeatability [2]		±0.5% of reading (≤ 1100°C) | ± 0.1% of reading +1°C (> 1100°C)
Temperature resolution		0.2°C
Response time (90% signal) [3]		1ms
Emissivity/gain [1]		0.100 to 1.100
Transmissivity/gain [1]		0.100 to 1.000
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 20mA, 0 to 5/10V, thermocouple J, K
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated
Alarm output		open collector (24V / 50A)
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet
Output impedances	current output	mA max. 500Ω (with 5 - 36VDC)
	voltage output	mV min. 100kΩ load impedance; thermocouple 20Ω
Inputs		programmable functional inputs for external emissivity adjustment ambient temperature compensation, trigger (reset of hold functions)
Cable length		3m (standard), 8m, 15m
Power supply		8 to 36VDC; max. 160mA
Laser		class II (635nm), 1mW, ON/OFF via controller or software
Protection class		IP65 (NEMA-4)
Ambient temperature		sensor: -20°C to 85°C (50°C if Laser ON); controller: 0°C to 85°C
Storage temperature		sensor: -40°C to 85°C controller: -40°C to 85°C
Relative humidity		10 to 95%, non-condensing
Vibration	Sensor	IEC 68-2-6: 3 G, 11-200Hz, any axis
Shock	Sensor	IEC 68-2-27: 50 G, 11ms, any axis
Weight		sensor: 600g; controller: 420g

[1] adjustable via controller or software
[2] ε=1, response time 1s; ambient temperature: 23±5°C
[3] with dynamic adaption at low signal levels



Product identification

CTLM -	5	SF150-	C3
			Cable length [3m (standard) / 8m / 15m]
		Focus [SF / FF]	
	Spectral range [525nm]		
thermoMETER CTLaserM			

Accessories page 20 - 21

- Mounting bracket
- Air purge collar
- Rail mount adapter for controller
- Water cooled housing
- Interface kit
- Certificate of calibration

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

thermoMETER CTLaserCOMBUSTION

Non-contact IR temperature sensor with laser sighting for measurements through flames and of flame gases in combustion processes from 200°C to 1450°C (optional up to 1650°C). The CTLC-4 is ideally suitable to monitor workpieces inside ovens, to measure inside chemical reactors and to inspect the brick temperature in combustion chambers.

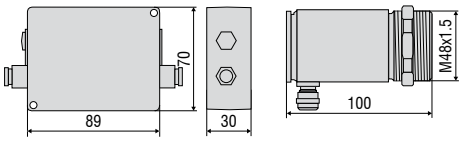
- Measuring range 200°C to 1450°C
- Double laser marks exact spot size from 1.6mm
- Usable in all modern applications where “size of spot matters”
- Optical system 45:1 with selectable focus
- Up to 85°C ambient temperature without cooling
- Automatic laser switch-off at 50°C
- Cooling and protection accessories for harsh environmental conditions

Optical specifications thermoMETER CTLasercombustion
□ = smallest spot size / focal point (mm)

Standard Focus																	
SF45 lens	45:1	20	20.8	21.7	22.5	23.4	24.2	25	25.9	26.7	32.5	38.4	50.1	61.7	73.4		
	distance in mm	0	150	300	450	600	750	900	1050	1200	1350	1500	1800	2100	2400		
Close Focus																	
CF1 lens	45:1	20	9.5	6.9	1.6	10.9	26.3	41.7	57.1	72.6	88	103.4	118.9	134.3	165.1	196	226.9
CF2 lens	45:1	20	15.6	14.5	12.3	8.9	3.4	11.2	19	26.8	34.6	42.4	50.2	58	73.6	89.2	104.8
CF3 lens	45:1	20	16.9	16.1	14.6	12.3	8.4	4.5	10.6	16.8	22.9	29	35.1	41.3	53.5	65.8	78
CF4 lens	45:1	20	19.1	18.9	18.4	17.8	16.7	15.6	14.4	13.3	12.2	11.1	10	13.3	20	26.7	33.3
	distance in mm	0	40	50	70	100	150	200	250	300	350	400	450	500	600	700	800

Model		CTLC-4SF45-C3	CTLC-2SF45-C3	CTLC-6SF45-C3
Optical resolution		45:1	45:1	45:1
Temperature range [1]		200°C to 1450°C (optional 400°C to 1650°C)		
Spectral range		3.9µm	4.24µm	4.64µm
Fields of application		through flames to monitor workpieces inside ovens, to measure inside chemical reactors, to observe the brick temperature in combustion chambers	CO_2 flame gases in combustion processes, garbage burning or processes inside chemical reactors	CO flame gases in combustion processes, garbage burning or processes inside chemical reactors
System accuracy [3, 4]		±1%		
Repeatability [3]		±0.5% or ±0.5°C		
Temperature resolution (digital)		0.1°C		
Response time (90% signal) [2]		10ms		
Emissivity/gain [1]		0.100 to 1.100		
Transmissivity/gain [1]		0.100 to 1.000		
Signal processing [1]		peak hold, valley hold, average; extended hold function with threshold and hysteresis		
Outputs/analog	channel 1	0/4 to 20mA, 0 to 5/10V; thermocouple J, K		
	channel 2	sensor temperature (-20°C to 180°C as 0 to 5V/10V), alarm output		
Alarm output		open collector (24V / 50A)		
Optional		relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated		
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet		
Output impedances	current output	mA max. 500Ω (with 8 to 36VDC)		
	voltage output	mV min. 100kΩ load impedance, thermocouple 20Ω		
Inputs		programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger		
Cable length		3m (standard), 8m, 15m		
Power supply		8 to 36VDC; max. 160mA		
Laser		class II (635nm), 1mW, ON/OFF via controller or software		
Protection class		IP65 (NEMA-4)		
Ambient temperature		sensor: -20°C to 85°C (50°C if Laser ON); controller: 0°C to 85°C		
Storage temperature		-40°C to 85°C		
Relative humidity		10 to 95%, non-condensing		
Vibration		IEC 68-2-6: 3 G, 11 to 200Hz, any axis		
Shock		IEC 68-2-27: 50 G, 11ms, any axis		
Weight		sensor: 600g; controller: 420g		

[1] adjustable via programming keys or software
[2] with dynamic adaption at low signal levels
[3] ambient temperature 23±5°C; whichever is greater; object temperature ≥ 0°C
[4] ε = 1, response time 1s



Product identification

CTLC -	4	SF45-	C3
			Cable length [3m (standard) / 8m / 15m]
		Focus [SF45 / CF1 / CF2 / CF3 / CF4]	
	Spectral range [4 = 3.9µm / 2 = 4.24µm / 6 = 4.64µm]		
thermoMETER CTLaserCOMBUSTION			

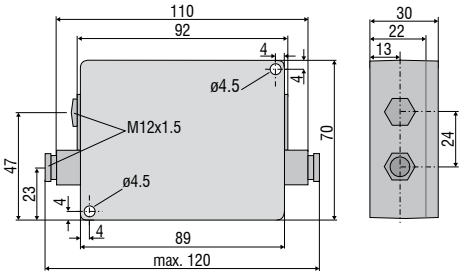
Accessories page 20 - 21

- Mounting bracket
- Air purge collar
- Rail mount adapter for controller
- Water cooled housing
- Interface kit
- Certificate of calibration

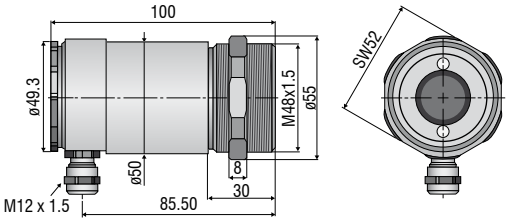
LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

CTLaser / CTLaserFAST / CTLaserGLASS / CTLaserM1/M2/M3/M5 / CTLaserCOMBUSTION

Controller

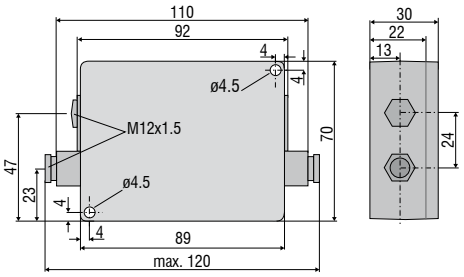


Sensor

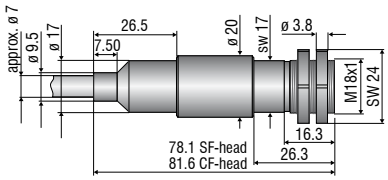


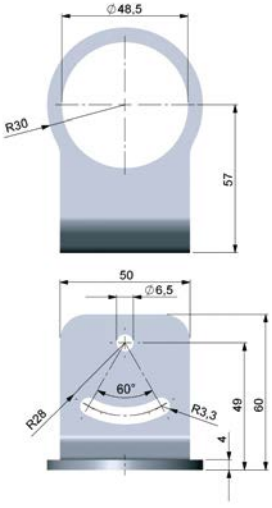
CTratioM1

Controller

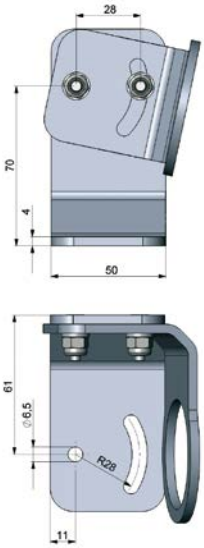


Sensor



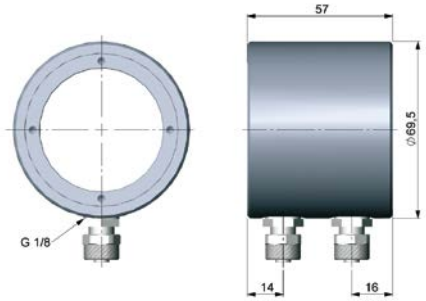


TM-FB-CTL Mounting bracket (fixed); included in CTL scope of supply

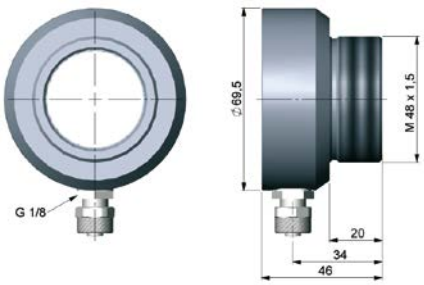


TM-AB-CTL Mounting bracket (adjustable)

TM-W-CTL Water cooled housing and air purge collar TM-AP-CTL, mounted on adjustable mounting bracket TM-AB-CTL



TM-W-CTL Water cooled housing



TM-AP-CTL Air purge collar

Mechanical accessories		
Art. No.	Model	
2970238	TM-AB-CTL	Mounting bracket, adjustable, stainless steel
2970239	TM-AP-CTL	Air purge collar, stainless steel
2970240	TM-W-CTL	Water cooled housing, stainless steel, for ambient temperatures up to 175°C
2970241	TM-RAIL-CTL	Rail mount adapter for CTLaser controller
2970242	TM-COV-CTL	Closed cover for controller
2970243	TM-MN-CTL	Mounting nut, stainless steel (spare)
2970244	TM-FB-CTL	Mounting bracket, fixed, stainless steel (spare)
2970298	TM-A20UN-CTL	Screw adapter M48x1.5 on 20UN-2A screw including mounting nut

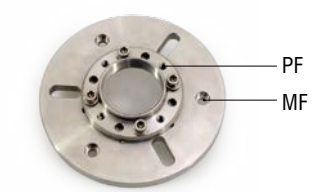
High temperature accessories		
2970366	TM-J-CTL	Cooling jacket (length 228mm, ø89mm) (conversion kit TM-CONK-CTL is required)
2970374	TM-CONK-CTL	Conversion kit for CTL on axial cable exit, for integration in cooling jacket
2970368	TM-JAB-CTL	Adjustable mounting bracket for cooling jacket
2970369	TM-MF-CTL	Mounting flange M48x1.5 for TM-PF-CTL
2970370	TM-AST300-CTL	Reflection protection tube M48x1.5, 300mm length
2970371	TM-PA-CTL	Pipe adapter M48x1.5
2970372	TM-RM-CTL	Furnace wall mount accessory for CTL (TM-MF-CTL, TM-AST300-CTL and TM-PA-CTL)
2970412	TM-PF-CTL	Pipe flange M48x1.5 for directly mounting a CTL sensor
2970487	TM-CJA-CTL	Cooling Jacket Advanced - universal cooling jacket for CSLaser, CTLaser and CTVideo / CSVideo up to 315°C

Calibration		
2970253	TM-CERT-CTL	Certificate of calibration
2970324	TM-HTCERT-CTL	Certificate of calibration for CTLaser M1-/M2-/M3-/M5-/G-sensors

Interfaces		
2970245	TM-USBK-CTL	USB interface, computer cable, CompactConnect software second cable gland for controller
2970246	TM-RS232K-CTL	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-CTL
2970248	TM-RS485B-CTL	RS485 interface board incl. second cable gland
2970249	TM-CANK-CTL	CAN-Bus interface; protocol: CANopen Presets: module address20 (14H), 250kBaud, 0-60°C
2970250	TM-PFBDPK-CTL	Profibus-DPv1 interface with plug-in connection
2970251	TM-ETHNK-CTL	Ethernet-Kit: interface board, external Ethernet adapter, CompactConnect software, second cable gland
2970252	TM-RI-CTL	Relay interface: two electrically isolated relays, 60VDC/ 42VAC$_{eff}$, 0.4A

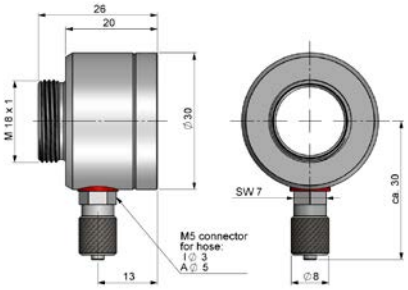
Sensor cables and high temperature cables for CTLaser		
2970374	TM-CONK-CTL	Connector-Kit for cables with connector
4800254.003	TM-CB3C-CTL	Sensor cable with connector (3m)
4800254.003H	TM-CB3HC-CTL	High-temperature sensor cable (up to 180°C) with connector (3m)
4800254.008	TM-CB8C-CTL	Sensor cable with connector (8m)
4800254.008H	TM-CB8HC-CTL	High-temperature sensor cable (up to 180°C) with connector (8m)
4800254.015	TM-CB15C-CTL	Sensor cable with connector (15m)
4800254.015H	TM-CB15HC-CTL	High-temperature sensor cable (up to 180°C) with connector (15m)

TM-J-CTL Cooling jacket (length 228mm, ø 89mm) with adjustable mounting bracket TM-JAB-CTL; suitable for ambient temperatures up to 180°C



TM-PF-CTL and TM-MF-CTL mounting flange M48x1.5 for directly mounting a CTL sensor

TM-RM-CTL Furnace wall mount accessory for CTLaser / CTratio: TM-MF-CTL, TM-PF-CTL, TM-AST300-CTL and TM-PA-CTL



TM-AP-CTR Air purge collar

CTratio		
Art. No.	Model	
2970348	TM-FB-CTR	Mounting bracket, stainless steel, adjustable in one axis
2970395	TM-AP-CTR	Air purge collar, stainless steel
2970373	TM-RM-CTR	Furnace wall mount
2970351	TM-CERT-CTR	Certificate of calibration

thermoMETER CT

Non-contact IR temperature sensor for common applications

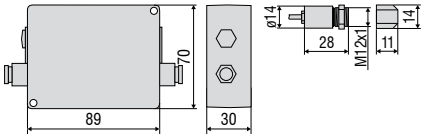
- Measuring range from -50°C to 975°C
- One of the smallest 22:1 infrared sensors worldwide
- Up to 180°C ambient temperature without cooling
- Separate controller with programming keys and backlit display
- Selectable and scalable analog output, optional digital interfaces
- Exchangeable sensors
- Best price sensor

Optical specifications thermoMETER CT
□ = smallest spot size / focal point (mm)

Standard Focus																
SF02	2:1	5	53.8	102.5	151.3	200	251.3	302.5	353.8	405						
	distance in mm	0	100	200	300	400	500	600	700	800						
SF15	15:1	6.5	10.3	14.1	17.9	21.7	25.4	30.9	37.1	43.3	49.5	55.8	62	68.2	74.4	80.7
	distance in mm	0	75	150	225	300	375	450	525	600	675	750	825	900	975	1050
SF22	22:1	6.5	10.9	15.2	19.5	23.9	28.3	32.6	37	41.3	45.7	50				
	distance in mm	0	110	220	330	440	550	660	770	880	990	1100				
Close Focus (with optionally available CF lens)																
CF02	2:1	5	3.9	2.8	2.5	4.8	6.4	8	11.3	14.6						
	distance in mm	0	10	20	23	30	35	40	50	60						
CF15	15:1	6.5	3.7	0.8	4.4	8.1	11.8	15.4	19.1	22.7						
CF22	22:1	7	3.8	0.6	4.4	8.2	12	15.8	19.6	23.4						
	distance in mm	0	5	10	15	20	25	30	35	40						

Model		CT-SF02-C3	CT-SF15-C3	CT-SF22-C3
Optical resolution		2:1	15:1	22:1
Temperature range [1]		-50°C to 600°C	-50°C to 600°C	-50°C to 975°C
Spectral range		8 to 14µm		
System accuracy [2]		±1% or ±1°C		
Repeatability [2]		±0.5% or ±0.5°C		
Temperature resolution		0.1°C		
Response time		150ms (95%)		
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 20mA, 0 to 5/10V, thermocouple J, K		
	channel 2	sensor temperature (-20 to 180°C as 0 to 5V or 0 to 10V), alarm output		
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC; 0.4A; electrically isolated		
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet		
Output impedances	current output	mA max. 500Ω (with 8 to 36VDC)		
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω		
Inputs		programmable functional inputs for external emissivity adjustment ambient temperature compensation, trigger (reset of hold functions)		
Cable length		1m, 3m (standard), 8m, 15m		
Power supply		8 to 36VDC; max. 100mA		
Protection class		IP65 (NEMA-4)		
Ambient temperature	voltage output	-20°C to 130°C	-20°C to 180°C	
	Controller	0°C to 85°C		
Storage temperature	voltage output	-40°C to 130°C	-40°C to 180°C	
	Controller	-40°C to 85°C		
Relative humidity		10 to 95%, non-condensing		
Vibration	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis		
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis		
Weight		sensor: 40g; controller: 420g		

[1] adjustable via programming keys or software
[2] ambient temperature 23±5°C; whichever is greater



Product identification

CT-	SF02-	C3
		Cable length [1m / 3m (standard) / 8m / 15m]
	Focus [SF02 / SF15 /SF22]	
thermoMETER CT		

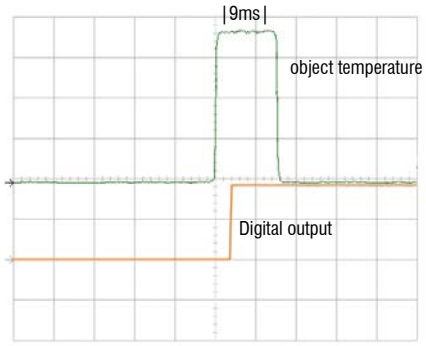
Accessories page 40 - 43

- Ancillary CF lens
- 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
- Accessories kit for use in Ex areas
- Certificate of calibration

thermoMETER CTfast

IR temperature sensor with extremely short response time

- Measuring range from -50°C to 975°C
- One of the smallest infrared sensors worldwide with extremely short response times from 3ms (50% signal) to 6ms (90% signal)
- Up to 120°C ambient temperature without cooling
- Fast and scalable analog output with intelligent real-time data processing
- Separate controller with programming keys and backlit display



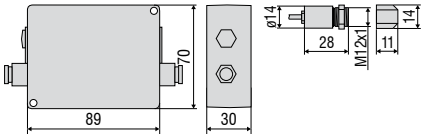
Switching output with a threshold of 50% of the signal (SF15 model)

Optical specifications thermoMETER CTfast
□ =smallest spot size / focal point (mm)

Standard Focus													
SF15	15:1	6.5	11.6	16.6	21.7	26.7	35	43.3	51.6	59.9			
SF25	25:1	6.5	9.9	13.3	16.7	20.1	23.5	27	30.4	33.8	37.2	40.6	44
	distance in mm	0	100	200	300	400	500	600	700	800	900	1000	1100
Close Focus (with optionally available CF lens)													
CF15	15:1	7	3.9	0.8	4.7	8.6	12.5	16.4	20.3	24.2			
	distance in mm	0	5	10	15	20	25	30	35	40			
CF25	25:1	6.5	3.5	0.5	4	7.5	11	15.4	19.8	24.1	28.5		
	distance in mm	0	4	8	12	16	20	25	30	35	40		

Model		CTF-SF15-C3	CTF-SF25-C3
Optical resolution		15:1	25:1
Temperature range [1]		-50°C to 975°C	
Spectral range		8 to 14µm	
System accuracy [2]		±1% or ±2°C	
Repeatability [2]		±0.75% or ±0.75°C	
Temperature resolution [3, 4]		0.2°C	0.4°C
Response time [5]		9ms (90%) at analog output 4ms (50%) at digital output	6ms (90%) at analog output; 3ms (50%) at digital output
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		0/4 to 20mA, 0 to 5/10V, thermocouple J, K	
Alarm output		open collector (24V / 50A)	
Outputs/digital		standard: 0/10V (10mA) optional: relays 2 x 60VDC/42 VAC; 0.4A; electrically isolated	
Digital Interface	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet	
Output impedances	current output	mA max. 500Ω (with 8 to 36VDC)	
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω	
Inputs		programmable functional inputs for external emissivity adjustment ambient temperature compensation, trigger (reset of hold functions)	
Cable length		1m, 3m (standard), 8m, 15m	
Power supply		8 to 36VDC; max. 100mA	
Protection class		IP65 (NEMA-4)	
Ambient temperature		sensor: -20°C to 120°C controller: 0°C to 85°C	
Storage temperature		sensor: -40°C to 120°C controller: -40°C to 85°C	
Relative humidity		10 to 95%, non-condensing	
Vibration	voltage output	IEC 68-2-6: 3 G, 11-200Hz, any axis	
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis	
Weight		sensor: 40g; controller: 420g	

[1] adjustable via programming keys or software
[2] ambient temperature 23±5°C; whichever is greater with dynamic noise compression
[3] temperature of the object ≥20°C
[4] with dynamic adaption at low signal levels
[5] with time constant of 100ms with adaptive averaging T_{Obj} 25°C



Product identification

CTF-	SF15-	C3
		Cable length [1m / 3m (standard) / 8m / 15m]
	Focus [SF15 / SF25]	
thermoMETER CTfast		

Accessories page 40 - 43

- Ancillary CF lens
- 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

thermoMETER CThot

Housed IR temperature sensor for harsh ambient conditions

- Measuring range from-40°C to 975°C
- Up to 250°C ambient temperature without cooling
- Pressure-resistant sensor head up to 10bar (autoclave applications)
- Integrated high temperature cable
- For a number of applications in dryers, kilns, heat treatment in the processing of metals, plastics, textiles and in the semiconductor industry
- Narrow-focused lenses enable diagonal alignment to the target (avoids influence by material thickness)
- Selectable and scalable analog output, optional digital interfaces

Optical specifications thermoMETER CThot

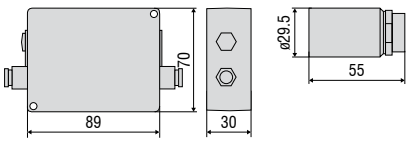
□ = smallest spot size / focal point (mm)

Standard Focus											
SF02	2:1	5	53.8	102.5	151.3	200	251.3	302.5	353.8	405	
SF10	10:1	6.5	14.9	23.3	31.6	40	51.6	63.3	74.9	86.5	
	distance in mm	0	100	200	300	400	500	600	700	800	
Close Focus (integrated CF lens)											
CF10	10:1	6.5	4.8	3	9.3	17.3	25.2	33.1	41	48.9	56.8
	distance in mm	0	15	30	50	75	100	125	150	175	200

Note: Do not use any external CF lens!

Model		CTH-SF02-C3H	CTH-SF10-C3H
Optical resolution		2:1	10:1
Temperature range [1]		-40 to 975°C	
Spectral range		8 to 14µm	
System accuracy [2]		±1% or ±1.5°C	
Repeatability [2]		±0.5% or ±0.5°C	
Temperature resolution		0.25°C	
Response time		100ms	
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 20mA, 0 to 5/10V, thermocouple J, K	
	channel 2	sensor temperature (-20 to 250°C as 0 to 5V or 0 to 10V), alarm output	
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated	
Ausgänge/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet	
Output impedances	current output	mA max. 500Ω (with 5 to 36VDC)	
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω	
Inputs		programmable functional inputs for external emissivity adjustment ambient temperature compensation, trigger (reset of hold functions)	
Cable length		3m (standard), 8m, 15m	
Power supply		8 to 36VDC; max. 100mA	
Protection class		IP65 (NEMA-4)	
Ambient temperature		sensor: -20°C to 250°C controller: 0°C to 85°C	
Storage temperature		sensor: -40°C to 250°C controller: -40°C to 85°C	
Relative humidity		10 to 95%, non-condensing	
Vibration	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis	
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis	
Weight		sensor: 40g (without massive housing), 200g (with solid case); controller: 420g	

[1] adjustable via programming keys or software
[2] ambient temperature 23±5°C and object temperatures ≥20°C; whichever is greater



Product identification

CTH-	SF02-	C3H
		Length high temperature cable [3m (standard) / 8m / 15m]
	Focus [SF02 / SF10 / CF10]	
thermoMETER CThot		

Accessories page 40 - 43

- Rail mount adapter for controller
- Digital-interface kits
- Certificate of calibration

thermoMETER CTM1/M2

Miniaturized temperature sensor with 1.0 und 1.6µm measuring wavelength

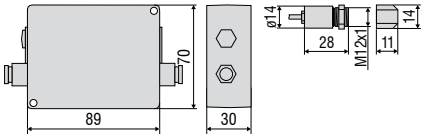
- Measuring range from 250°C to 2200°C
- Up to 125°C ambient temperature without cooling
- For metal processing such as welding, soldering, forming, sintering and for measurements of metal oxides and ceramics
- Extended compensation for measuring errors using short measuring wavelength (e.g. with emissivity 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		1.0µm			1.6µm		
System accuracy [2,3]		±(0.3% of reading +2°C)					
Repeatability [2]		±(0.1% of reading +1°C)					
Temperature resolution		0.1°C					
Response time [4]		1ms (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 20mA, 0 to 5/10V, thermocouple J, K					
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated					
Alarm output		open collector (24V / 50A)					
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet					
Output impedances	current output	mA max. 500Ω (with 8 to 36VDC)					
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω					
Inputs		programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger (reset of hold functions)					
Cable length		3m (standard), 8m, 15m					
Power supply		8 to 36VDC; max. 100mA					
Protection class		IP65 (NEMA-4)					
Ambient temperature	voltage output	-20°C to 100°C			-20°C to 125°C		
	controller	0°C to 85°C					
Storage temperature	voltage output	-40°C to 100°C			-40°C to 125°C		
	controller	-40°C to 85°C					
Relative humidity		10 to 95%, non-condensing					
Vibration	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis					
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis					
Weight		sensor: 40g; controller: 420g					

[1] adjustable via programming keys or software
[2] ambient temperature: 23±5°C
[3] ε=1, response time 1s
[4] with dynamic adaption at low signal levels



Product identification

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

thermoMETER CTM3

Miniaturized temperature sensor with 2.3µm measuring wavelength for measurements from 50°C

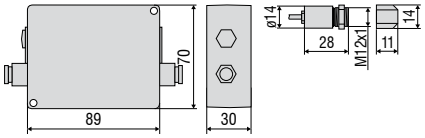
- Measuring range from 50°C to 1800°C
- Up to 85°C ambient temperature without cooling
- For metal and composite processing
- Extended compensation for measuring errors using short measuring wavelength (e.g. with emissivity changes or misadjustment)
- High compatibility with electromagnetic fields e.g. with induction welding
- Compact sensor for installation in confined spaces
- Selectable and scalable analog output, optional digital interfaces

Optical specifications thermoMETER CTM3
□ =smallest spot size / focal point (mm)

Standard Focus											
3SF22	22:1	6.5	14.4	22.3	30.2	38.1	46	55.1	65.4	75.7	
3SF33	33:1	6.5	11.8	17	22.3	27.5	32.8	38	43.3	48.5	
3SF75H1/H2/H3	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)											
3CF22	22:1	6.5	6	5.4	5	9.2	14.4	19.6	24.9	30.1	35.3
3CF33	33:1	6.5	5.4	4.2	3.4	7	11.5	16	20.5	25	29.5
	distance in mm	0	40	80	110	150	200	250	300	350	400
Close Focus (integrated CF lens)											
3CF75H1/H2/H3	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-3SF22-C3	CTM-3SF33-C3	CTM-3SF75H1-C3	CTM-3SF75H2-C3	CTM-3SF75H3-C3
Optical resolution [1]		22:1	33:1	75:1	75:1	75:1
Temperature range [2,3]		50 to 400°C	100 to 600°C	150 to 1000°C	200 to 1500°C	250 to 1800°C
Spectral range		2.3µm				
System accuracy [4,5]		±(0.3% of reading +2°C)				
Repeatability [4]		±(0.1% of reading +1°C)				
Temperature resolution (digital)		0.1°C				
Response time [6]		1ms (90%)				
Emissivity/gain [2]		0.100 to 1.100				
Transmissivity [2]		0.100 to 1.100				
Signal processing [2]		peak hold, valley hold, average; extended hold function with threshold and hysteresis				
Certificate of calibration		optional				
Outputs/analog	channel 1	0/4 to 20mA, 0 to 5/10V, thermocouple J, K				
Outputs/analog	optional	relays: 2 x 60VDC/42 VAC_{eff}; 0.4A; electrically isolated				
Alarm output		open collector (24V / 50A)				
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet				
Output impedances	current output	mA max. 500Ω (with 8 to 36VDC)				
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω				
Inputs		programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger (reset of hold functions)				
Cable length		3m				
Power supply		8 to 36VDC; max. 100mA				
Protection class		IP65 (NEMA-4)				
Ambient temperature		sensor: -40°C to 85°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	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis				
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis				
Weight		sensor: 40g; controller: 420g				

[1] 90% energy
[2] adjustable via programming keys or software
[3] target temperature > sensor temperature + 25°C
[4] ambient temperature: 23±5°C
[5] ε=1, response time 1s
[6] with dynamic adaption at low signal levels



Product identification

CTM-	3	SF22-	C3
			Cable length [3m]
		Focus [SF22 / SF33 / SF75 / CF22 / CF33 / CF75]	
	Spectral range [2.3µm]		
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

thermoMETER CTM-3XL

IR sensor for measurements in laser processing, laser welding and laser soldering

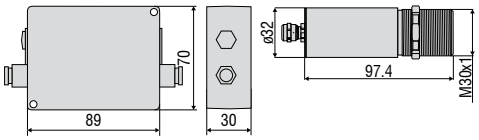
- Measuring range from 100°C to 1800°C
- Up to 85°C ambient temperature without cooling
- Special blocking filter against laser radiation of all conventional diode, semiconductor and CO_2 lasers (from VIS to 1800nm with 10.6µm)
- Far Focus version for use with laser collimators
- Measuring wavelength of 2.3µm minimizes errors due to emissivity uncertainty and misadjustment
- Sensor measures through glass lenses/sight glasses

Optical specifications thermoMETER CTM-3XL
□ = smallest spot size / focal point (mm)

Standard Focus															
SF100	100:1	20	18.8	17.5	16.3	15.1	13.9	12.6	11.8	11	13.8	18	22.3	29.3	42
SF300 H1/H2/H3	300:1	20	17.8	15.6	13.3	11.1	8.9	6.7	5.2	3.7	5.9	9.1	12.3	17.7	27.4
distance in mm		0	150	300	450	600	750	900	1000	1100	1200	1350	1500	1750	2200
Close Focus															
CF1-100	100:1	20	11	0.9	9.5	16.9	29.2	41.5	53.8	78.4	102.9	127.5	152.1	176.7	
distance in mm		0	40	85	120	150	200	250	300	400	500	600	700	800	
Close Focus															
CF2-100	100:1	20	13.8	7.7	1.5	8.7	15.8	23	37.3	51.7	66	80.3	94.7		
CF2-300 H1/H2/H3	300:1	20	13.5	7	0.5	7.3	14.2	21	34.7	48.3	62	75.7	89.3		
CF3-100	100:1	20	15.5	11	6.5	2	7.5	13	24	35	46	57	68		
CF3-300 H1/H2/H3	300:1	20	15.2	10.4	5.5	0.7	5.9	11	21.4	31.8	42.1	52.5	62.8		
distance in mm		0	50	100	150	200	250	300	400	500	600	700	800		
Close Focus															
CF4-100	100:1	20	18.3	16.6	14.8	13.1	11.4	9.7	7.9	6.2	4.5	7.2	12.7	18.1	23.6
CF4-300 H1/H2/H3	300:1	20	17.9	15.9	13.8	11.8	9.7	7.7	5.6	3.6	1.5	3.9	8.7	13.4	18.2
distance in mm		0	50	100	150	200	250	300	350	400	450	500	600	700	800
Far Focus															
FF100	100:1	20	22	24	26	28	30	32	33.3	36	42.2	57.8	73.3	85	
FF300 H1/H2/H3	300:1	20	19	18	17	16	15	14	13.3	12	15.6	24.4	33.3	40	
distance in mm		0	450	900	1350	1800	2250	2700	3000	3600	4000	5000	6000	6750	

Model		CTM-3SF100XL-C3	CTM-3SF300XLH1-C3	CTM-3SF300XLH2-C3	CTM-3SF300XLH3-C3
Optical resolution [1]		100:1	300:1	300:1	300:1
Temperature range [2,3]		100 to 600°C	150 to 1000°C	200 to 1500°C	250 to 1800°C
Spectral range		2.3µm			
System accuracy [4,5]		±(0.3% of reading +2°C)			
Repeatability [4]		±(0.1% of reading +1°C)			
Temperature resolution (digital)		0.1°C			
Response time [6]		1ms (90%)			
Emissivity/gain [2]		0.100 to 1.100			
Transmissivity [2]		0.100 to 1.100			
Signal processing [2]		peak hold, valley hold, average; extended hold function with threshold and hysteresis			
Certificate of calibration		optional			
Outputs/analog		0/4 to 20mA, 0 to 5/10V, thermocouple J, K; alarm			
Outputs/analog	optional	relays: 2 x 60VDC/42VAC$_{eff}$; 0.4A; electrically isolated			
Alarm output		open collector (24V / 50A)			
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet			
Output impedances	current output	mA max. 500Ω (with 8 to 36VDC)			
	voltage output	min. 100kΩ load impedance, thermocouple 20Ω			
Inputs		programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger (reset of hold functions)			
Cable length		3m			
Power supply		8 to 36VDC; max. 100mA			
Protection class		IP65 (NEMA-4)			
Ambient temperature		sensor: -40°C to 85°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	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis			
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis			
Weight		sensor: 150g; controller: 420g			

[1] 90% energy
[2] adjustable via programming keys or software
[3] target temperature > sensor temperature + 25°C
[4] ambient temperature: 23±5°C
[5] ε=1, response time 1s
[6] with dynamic adaption at low signal levels



Product identification

CTM-	3	SF100XL-	C3
			Cable length [3m]
		Focus [SF100 / SF300 / CF1 / CF2 / CF3 / CF4 / FF]	
	Spectral range [2.3µm]		
thermoMETER CTM			

Accessories page 40 - 43

- Mounting bracket
- Air purge collar
- Digital-interface kits
- Certificate of calibration

thermoMETER CTP-3

Exact temperature measurement of thin plastic film made from PE, PP, PS

- Measuring range from 50°C to 400°C
- Robust and applicable without cooling in ambient temperatures up to 75°C
- Transmissivity elimination due to polymer specific absorption band
- Separate controller with easy accessible programming keys and backlit LCD
- Selectable analog outputs 0/4-20mA, 0-5V, 0-10V, thermocouple type K or J
- Optional USB, RS485, RS232 interface, relay outputs (2x electrically isolated), CAN bus, Profibus DP, Ethernet

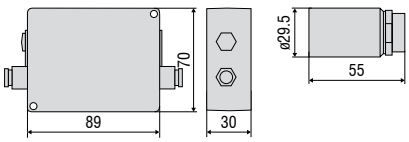
Optical specifications thermoMETER CTP-3

□ = smallest spot size / focal point (mm)

Standard Focus										
SF15	15:1	6.5	11.6	16.6	21.7	26.7	35	43.3	51.6	59.9
	distance in mm	0	100	200	300	400	500	600	700	800

Model		CTP-3SF15-C3
Optical resolution		15:1
Temperature range [1]		50 to 400°C
Spectral range		3.43µm
System accuracy [2]		±1% or ±3°C
Repeatability [2]		±1.5°C
Temperature resolution		0.1°C
Response time		100ms
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
Outputs/analog	channel 1	0/4 to 20mA, 0 to 5/10V, thermocouple J, K
	channel 2	sensor temperature (0 to 75°C as 0 to 5V or 0 to 10V), alarm
	optional	relays: 2 x 60VDC/42VAC$_{eff}$; 0.4A; electrically isolated
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet
Output impedances	current output	mA max. 500Ω (8 to 36VDC)
	voltage output	mV min. 100kΩ load impedance
		thermocouple 20Ω
Inputs		programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger (reset of hold functions)
Cable length		3m (standard), 8m
Power supply		8 to 36VDC; max. 100mA
Protection class		IP65 (NEMA-4)
Ambient temperature		sensor: 0°C to 75°C controller: 0°C to 75°C
Storage temperature		sensor: -40°C to 85°C controller: -40°C to 85°C
Relative humidity		10 to 95%, non-condensing
Vibration	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis
Weight		sensor with massive housing: 200g; controller: 420g

[1] adjustable via programming keys or software
[2] ambient temperature: 23±5°C; whichever is greater



Product identification

CTP-	3	SF15-	C3
			Cable length [3m (standard) / 8m]
		Focus [SF15]	
	Spectral range [3.43µm]		
thermoMETER CTP			

thermoMETER CTP-7

Exact temperature measurement of thin plastic film made from PES, PU, PTFE, PA

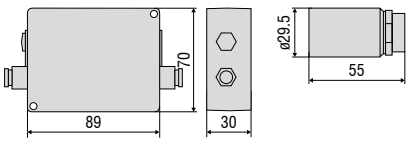
- Robust and applicable without cooling in ambient temperatures up to 85°C
- Transmissivity elimination due to polymer specific absorption band
- Separate controller with easy accessible programming keys and backlit LCD
- Selectable analog outputs 0/4-20mA, 0-5V, 0-10V, thermocouple type K or J
- Optional USB, RS485, RS232 interface, relay outputs (2x electrically isolated), CAN bus, Profibus DP, Ethernet

Optical specifications thermoMETER CTP-7
□ = smallest spot size / focal point (mm)

Standard Focus										
SF10	10:1	7	14.9	23.3	31.6	40	51.6	63.3	74.9	86.5
	distance in mm	0	100	200	300	400	500	600	700	800
Close Focus (with optionally available CF lens)										
CF10	10:1	7	5	1.2	8	16	24			
	distance in mm	0	5	10	15	20	25			

Model		CTP-7SF10-C3
Optical resolution		10:1
Temperature range [1]		0 to 710°C
Spectral range		7.9µm
System accuracy [2]		±1% or ±1.5°C
Repeatability [2]		±0.5% or ±0.5°C
Temperature resolution		0.5°C
Response time		150ms
Emissivity/gain [1]		0.100 or 1.100
Transmissivity/gain [1]		0.100 or 1.100
Signal processing [1]		peak hold, valley hold, average; extended hold function with threshold and hysteresis
Outputs/analog	channel 1	0/4 to 20mA, 0 to 5/10V, thermocouple J, K
	channel 2	sensor temperature (-20°C to 180°C as 0 to 5V or 0 to 10V), alarm
	optional	relays: 2 x 60VDC/42VAC$_{eff}$; 0.4A; electrically isolated
Outputs/digital	optional	USB, RS232, RS485, CAN, Profibus DP, Ethernet
Output impedances	current output	mA max. 500Ω (8 to 36VDC)
	voltage output	mV min. 100kΩ load impedance
		thermocouple 20Ω
Inputs		programmable functional inputs for external emissivity adjustment, ambient temperature compensation, trigger (reset of hold functions)
Cable length		3m (standard), 8m, 15m
Power supply		8 to 36VDC; max. 100mA
Protection class		IP65 (NEMA-4)
Ambient temperature		sensor: -20°C to 85°C controller: 0°C to 85°C
Storage temperature		sensor: -40°C to 85°C controller: -40°C to 85°C
Relative humidity		10 to 95%, non-condensing
Vibration	voltage output	IEC 68-2-6: 3 G, 11 to 200Hz, any axis
Shock	voltage output	IEC 68-2-27: 50 G, 11ms, any axis
Weight		sensor: 200g; controller: 420g

[1] adjustable via programming keys or software
[2] ambient temperature 23±5°C; whichever is greater



Product identification

CTP-	7	SF10-	C3
			Cable length [3m (standard) / 8m / 15m]
		Focus [SF10]	
	Spectral range [7.9µm]		
thermoMETER CTP			

thermoMETER CTex

Measurement system for use in EX areas

- Low cost solution due to easy concept
- Sensor as passive element can be easily used in Ex areas
- Energy limitation via Zener barriers from STAHL

Zener barriers

The Zener double barriers from type 9002/22-032-300-111 are included in the scope of supply.

Note: The functionality and the compliance with the factory calibration are only ensured with use of the recommended Zener barriers.

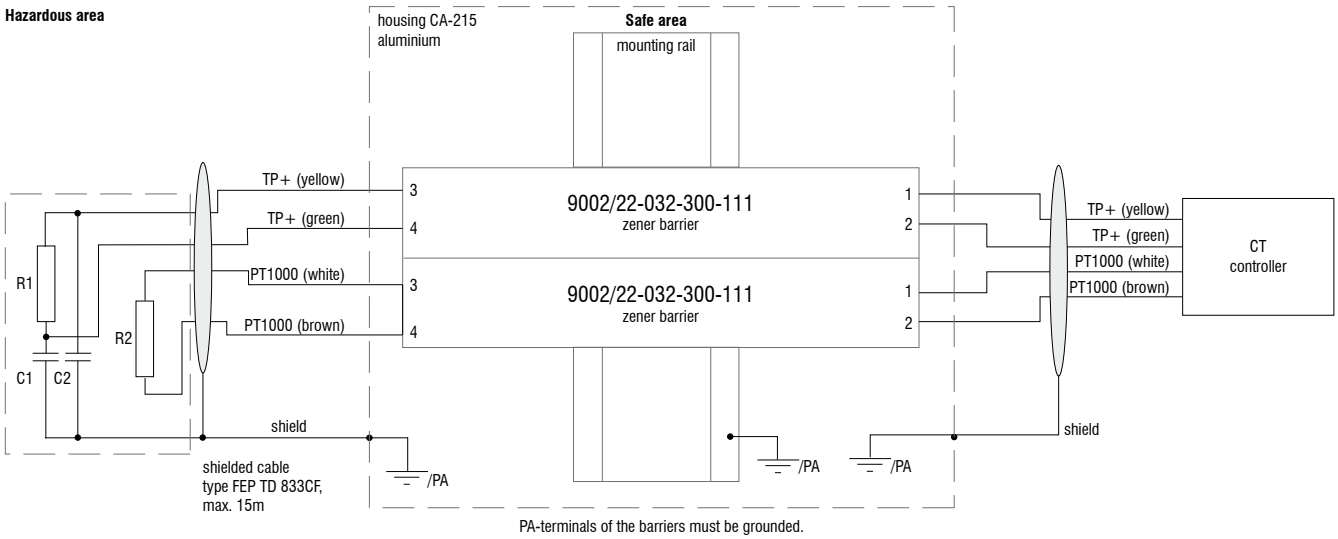
Optical specifications thermoMETER CT

□ = smallest spot size / focal point (mm)

Standard Focus																
SF02	2:1	5	53.8	102.5	151.3	200	251.3	302.5	353.8	405						
	distance in mm	0	100	200	300	400	500	600	700	800						
SF15	15:1	6.5	10.3	14.1	17.9	21.7	25.4	30.9	37.1	43.3	49.5	55.8	62	68.2	74.4	80.7
	distance in mm	0	75	150	225	300	375	450	525	600	675	750	825	900	975	1050
SF22	22:1	6.5	10.9	15.2	19.5	23.9	28.3	32.6	37	41.3	45.7	50				
	distance in mm	0	110	220	330	440	550	660	770	880	990	1100				
Close Focus (with optionally available CF lens)																
CF02	2:1	5	3.9	2.8	2.5	4.8	6.4	8	11.3	14.6						
	distance in mm	0	10	20	23	30	35	40	50	60						
CF15	15:1	6.5	3.7	0.8	4.4	8.1	11.8	15.4	19.1	22.7						
CF22	22:1	7	3.8	0.6	4.4	8.2	12	15.8	19.6	23.4						
	distance in mm	0	5	10	15	20	25	30	35	40						

Technical details of the Zener barriers [1] Type 9002/22-032-300-111		
Certifications	Europe (CENELEC)	for Zone 1: PTB 01 ATEX 2053
		for Zone 2: PTB 01 ATEX 2054
	USA	FM Approval 3010778
	Canada	CSA 1284580 (LR 43394)
Explosion protection	Europe (CENELEC)	for Zone 1: E-II (1/2) G [EEx ia/ib] IIC/IIB
		for Zone 2: E II 3 G EEx nA II T4
	USA	I.S. circuits for: Class I, II, III, Division 1, Groups A, B, C, D, E, F, G
		I.S. circuits for: Class I, Zone 0, Group IIC
		Class I, Division 2, Groups A, B, C, D
		Class I, Zone 2, Group IIC
	Canada	I.S. circuits for: Class I, Groups A, B, C, D; Class II, Groups E, F, G
		Class III
		Class I, Division 2, Groups A, B, C, D
		Class I, Zone 2, Groups IIC
Installation		in Zone 2, Division 2 and in the safe area
Protection class		according to IEC 60529/clamping carrier IP20/housing IP40
Ambient temperature		-20°C to 60°C
Technical data		Temperature measurement thermoMETER CT - controller/sensor - see page 22-23

[1] Source: company R. STAHL AG
We reserve the right to make changes due to further technical developments.



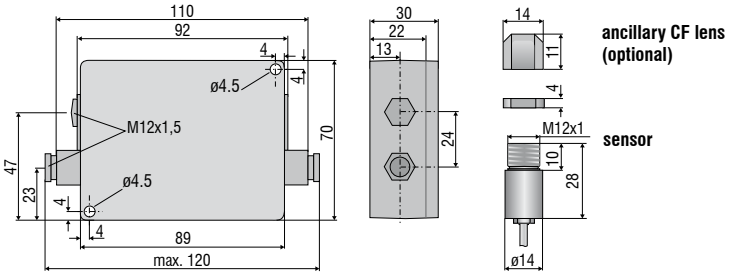
Sensor: "simple electrical device"
(according to EN 60079-11)

Scope of supply

- Alu housing with mounted Zener barrier (mounting rail) and CT controller
- Pre-assembled connection cable for CT controller
- Software tool for calibration of barrier resistance in the sensor code

CT / CTfast / CTM1/M2/M3

controller

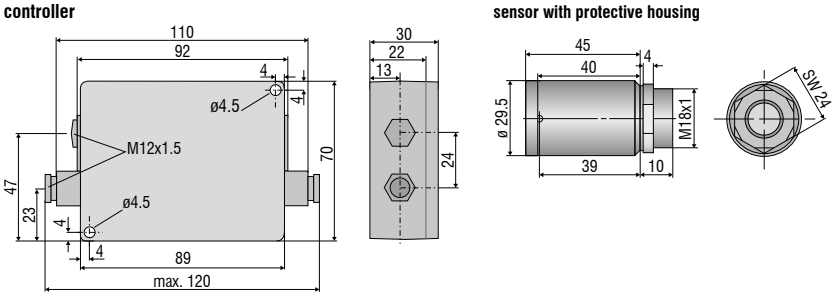


ancillary CF lens (optional)

sensor

CThot / CTP-3 / CTP-7

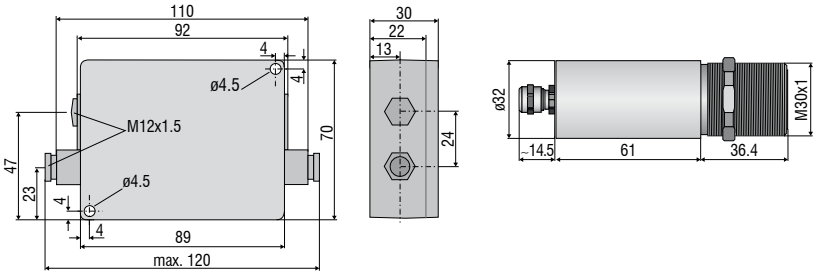
controller



sensor with protective housing

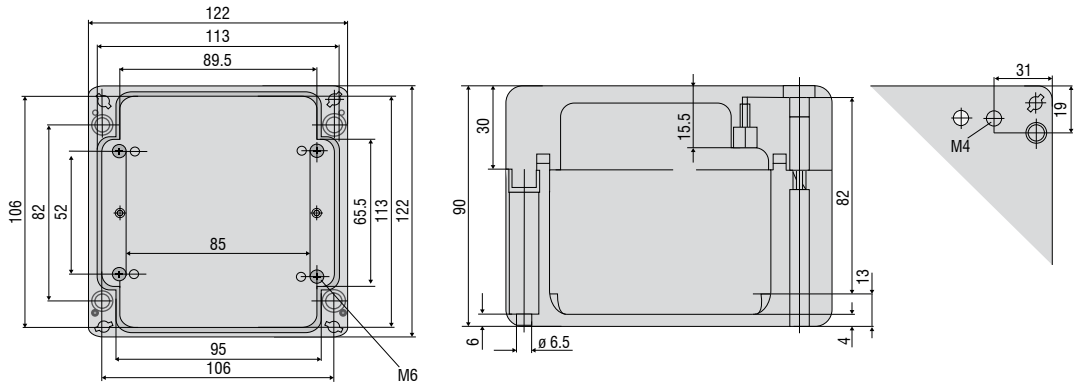
CTM3-XL

controller



sensor

CTex



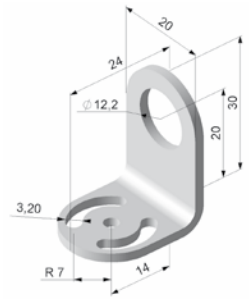
Mechanical accessories		
Art. No.	Model	
2970203	TM-FB-CT	Mounting bracket, fixed
2970325	TM-FB2-CT	Mounting bracket, adjustable in one axis, for simultaneous assembly of CT sensor and laser sighting aid
2970336	TM-FBMH-CT	Mounting bracket, adjustable in one axis, for massive housing
2970204	TM-AB-CT	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
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
2970218	TM-MHB-CT	Massive housing made from brass
2970219	TM-MHBCF-CT	Massive housing made from brass with integrated ancillary CF lens
2970360	TM-MHBCFH-CT	Massive housing made from brass with integrated ancillary CF lens for M1/M2/M3/M5 sensors
2970220	TM-PT-CT	Protective tube made from brass
2970326	TM-PA-CT	Pipe adapter for the mounting of reflection protection tubes
2970327	TM-ST20-CT	Reflection protection tube, length 20mm
2970328	TM-ST40-CT	Reflection protection tube, length 40mm
2970329	TM-ST88-CT	Reflection protection tube, length 88mm
2970221	TM-LST-CT	Laser sighting aid for CT sensors incl. batteries (2xAlkaline AA)
2970300	TM-LSTOEM-CT	OEM laser sighting aid, 635nm, 3.5m cable, for connection to CT controller
2970300.008	TM-LSTOEM-CT(008)	OEM laser sighting aid, 635nm, 8m cable, for connection to CT controller
2970222	TM-EX-CT	Accessories kit for using CT in Ex areas (Zone 1: PTB 01 ATEX 2053/ E II (1/2) G [EEx ia/ib] IIC/ IIB), pre-assembled EX box, without Zener barriers, applicable in combination with CT sensors (except for CTfast)

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

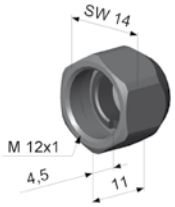
Interfaces		
2970223	TM-USBK-CT	USB interface kit: USB interface, USB cable, CompactConnect software, second cable gland for controller
2970224	TM-RS232K-CT	RS232 interface: RS232 interface, computer cable, CompactConnect software, second cable gland for controller
2970338	TM-RS485USBK-CTL	RS485-USB-adapter, 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), 250kBaud, 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, 60VDC/ 42VAC$_{eff}$, 0.4A

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

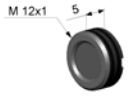
CTM3-XL		
2970352	TM-FBXL-CT	Mounting bracket, adjustable in one axis
2970353	TM-ABXL-CT	Mounting bracket, adjustable in 2 axes
2970354	TM-APXL-CT	Air purge collar, stainless steel
2970361	TM-XLCERT-CT	Certificate of calibration



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

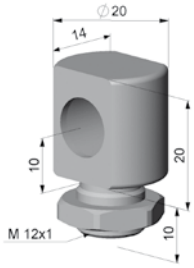


TM-CF-CT Ancillary CF lens (only for SF models)



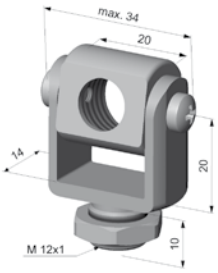
TM-CFAG-CT Ancillary CF lens with external thread
TM-PWAG-CT Protective window with external thread

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

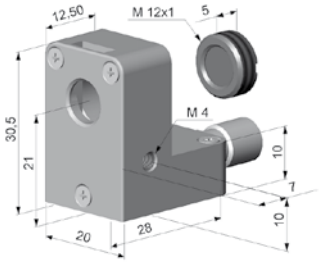


TM-MB-CT mounting bolt with M12x1 thread adjustable in one axis

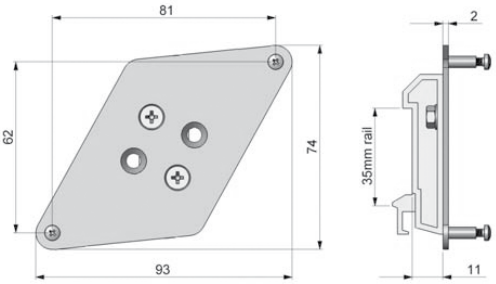
TM-APL-CT Air purge collar, laminar and
TM-MG-CT Mounting fork



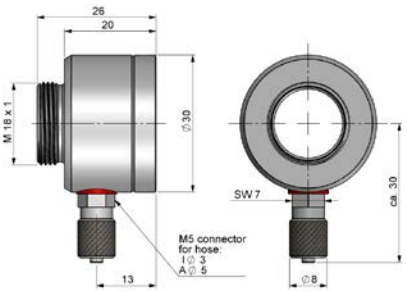
TM-MG-CT Mounting fork with M12x1 thread, adjustable in two axes



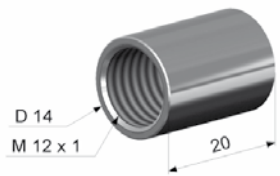
TM-APLCF-CT
Ancillary CF lens/protective window - integrable variant
for laminar air purge collar



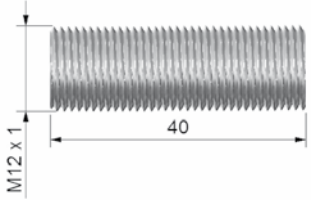
TM-RAIL-CT rail mount adapter for controller



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

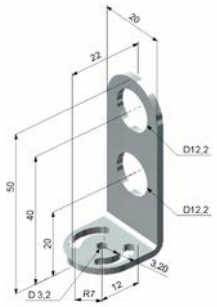


TM-PA-CT Pipe adapter for reflection protection tube



TM-ST40-CT Reflection protection tube

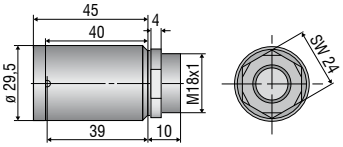
TM-LST-CT Laser sighting aid, battery-operated
(2x Alkaline AA), for alignment of CT sensors
(dimensions identical to CT sensor)

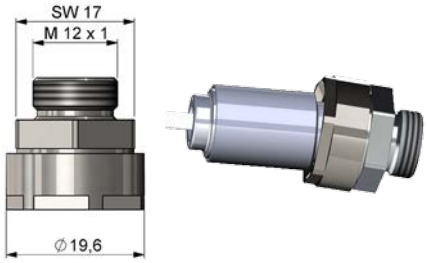


TM-FB2-CT
Mounting bracket for sensor and laser sighting aid

TM-RAM-CT
Right angle mirror

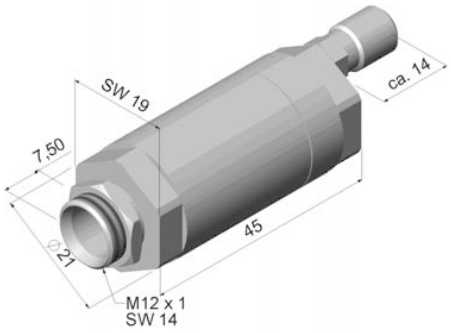
TM-MHS-CT Massive housing, stainless steel
TM-MHA-CT Massive housing, aluminum
TM-MHB-CT Massive housing, brass





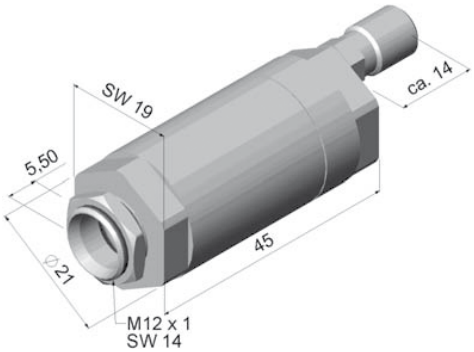
TM-TAS-CT Pivoted joint for CT sensors

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

thermoMETER CSLaser

Miniature IR sensor with integrated controller and laser sighting

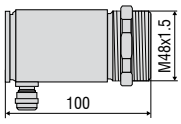
- Measuring range from -30 to 1600°C, measuring fields from 0.5mm and response times from 10ms
- Optical resolution up to 300:1 with selectable focus settings
- Double laser sighting with 2 rays for exact measuring field marking and focusing
- Scalable 4-20mA two-wire analog output and simultaneous alarm output
- Optional USB interface and software for programming
- Emissivity directly adjustable via rotary controller or software
- Protection against short circuit and polarity change
- Up to 85°C ambient temperature without cooling
- Automatic laser switch-off at 50°C
- Extensive supply voltage range: 5 - 28VDC

Optical specifications thermoMETER CSLaser
□ =smallest spot size / focal point (mm)

Standard Focus															
2H SF	300:1	12	10.9	9.7	8.6	7.5	6.3	5.2	4.5	3.7	5.1	7.3	9.4	13	19.4
2L SF	150:1	20	18.3	16.5	14.8	13.1	11.3	9.6	8.5	7.3	9.8	13.5	17.2	23.4	34.6
	distance in mm	0	150	300	450	600	750	900	1000	1100	1200	1350	1500	1750	2200
Close Focus															
2H CF2	300:1	12	8.2	4.3	0.5	4.7	8.8	13	17.2	21.3	25.5	29.7	38	46.3	54.7
2L CF2	150:1	20	13.7	7.3	1	8	15	22	29	36	43	50	64	78	92
2H CF3	300:1	12	9.2	6.4	3.5	0.7	3.9	7	10.2	13.4	16.6	19.8	26.1	32.4	38.8
2L CF3	150:1	20	15.3	10.7	6	1.3	6.6	12	17.3	22.6	27.9	33.3	43.9	54.6	65.2
2H CF4	300:1	12	10.8	9.7	8.5	7.3	6.2	5	3.8	2.7	1.5	3	6	9	12
2L CF4	150:1	20	18.1	16.2	14.3	12.4	10.6	8.7	6.8	4.9	3	5.6	10.7	15.8	20.9
	distance in mm	0	50	100	150	200	250	300	350	400	450	500	600	700	800
Far Focus															
2H FF	300:1	20	12	12	12	12	12	12	12	12	14.7	21.3	28	33	
2L FF	150:1	20	20.5	21	21.5	22	22.5	23	23.3	24	28.9	41.1	53.3	62.5	
	distance in mm	0	450	900	1350	1800	2250	2700	3000	3600	4000	5000	6000	6750	

Model	CSL-SF50	CSLHS-SF50	CSLM-2LSF150	CSLM-2HSF300
Optical resolution	50:1		150:1	300:1
Temperature range [1]	-30°C to 1000°C	-20°C to 150°C	250°C to 800°C	385°C to 1600°C
Spectral range	8 to 14µm		1.6µm	
System accuracy [3]	±1% or ±1°C		±(0.3% of reading +1°C) [4]	
Repeatability [3]	±0.5% or ±0.5°C		±(0.1% of reading + 1°C) [4]	
Temperature resolution	0.1°C	0.025°C	0.1°C	
Response time (90% signal)	150ms		10ms	
Emissivity/gain [1]	0.100 to 1.100			
IR window correction [2]	0.100 to 1.100			
Signal processing [2]	peak hold, valley hold, average; extended hold function with threshold and hysteresis			
Outputs/analog	4 to 20mA			
Output/alarms	0 to 30V / 500mA (open collector)			
Outputs/digital (optional)	mono-/bidirectional, 9.6kBaud, 0/3V level, USB			
Output/impedance	max. 1000Ω (depends on supply voltage)			
Power consumption (only laser)	45mA at 5V / 20mA at 12V / 12mA at 24V			
Power supply	5 to 28VDC			
Laser	class II, (635nm), 1mW, ON/OFF via software			
Protection class	IP65 (NEMA-4)			
Ambient temperature	-20°C to 85°C (50°C if Laser ON)			
Storage temperature	-40°C to 85°C			
Relative humidity	10 to 95%, non-condensing			
Vibration	IEC 68-2-6: 3 G, 11 to 200Hz, any axis			
Shock	IEC 68-2-27: 50 G, 11ms, any axis			
Weight	600g			

[1] adjustable via sensor or software
[2] adjustable via software
[3] ambient temperature 23±5°C; whichever is greater; ambient temperature ≥ 0°C
[4] ε = 1, response time 1s



Product identification

CSL -	SF50
	Focus [SF50 / CF1 / CF2 / CF3 / CF4]
thermoMETER CSLaser	

Product identification

CSLM -	2	H	SF300
			Focus [SF300 / CF1 / CF2 / CF3 / CF4]
		Temperature range [H]	
	Spectral range [1.6µm]		
thermoMETER CTLaserFAST			

Optical specifications thermoMETER CSLaser CSL-SF50 und CSLHS-SF50
□ = smallest spot size / focal point (mm)

Standard Focus																	
SF50 lens	50:1	20	20.5	21	21.5	22	22.5	23	23.5	24	29.5	35	46	57	68		
distance in mm		0	150	300	450	600	750	900	1050	1200	1350	1500	1800	2100	2400		
Close Focus																	
CF1 lens	50:1	20	9.4	6.7	1.4	10.6	25.9	41.1	56.4	71.7	87	102.3	117.6	132.9	163.4	194	224.6
CF2 lens	50:1	20	15.5	14.3	12.1	8.7	3	10.7	18.3	26	33.7	41.3	49	56.7	72	87.3	102.7
CF3 lens	50:1	20	16.8	16	14.4	12	8	4	10	16	22	28	34	40	52	64	76
CF4 lens	50:1	20	19	18.8	18.3	17.6	16.3	15.1	13.9	12.7	11.4	10.2	9	12.2	18.7	25.1	31.6
distance in mm		0	40	50	70	100	150	200	250	300	350	400	450	500	600	700	800

Accessories page 54 - 55

- Mounting bracket
- Air purge collar
- Rail mount adapter for controller
- Water cooled housing
- Certificate of calibration
- USB kit (TM-USBK-CS) p.55

LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER
DIN EN 60825-1:2007
1mW / 630-650nm

thermoMETER CS

Compact OEM sensor with integrated controller

- Measuring range from-40°C to 400°C
- Applicable in ambient temperatures up to 80°C without cooling
- Robust, silicon-coated lens
- Integrated controller with LED alarm display and intelligent sighting aid, alarm signal, temperature-code display or self-diagnostics
- Protection against short circuit and polarity change
- Programmable controller
- Different outputs: 0-10V or 0-5V freely scalable, thermocouple type K, alarm output, digital output
- Optional USB interface and software for programming, direct, serial 9.6kBaud interface
- Extensive supply voltage range: 5 - 30VDC
- Best price - ideal for OEM applications
- *Please note: available from 10 pieces*

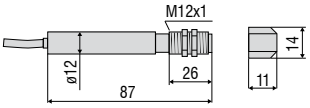
Optical specifications thermoMETER CS

□=smallest spot size / focal point (mm)

Standard Focus										
SF15	15:1	6.5	11.6	16.6	21.7	26.7	35	43.3	51.6	9.9
	distance in mm	0	100	200	300	400	500	600	700	800
Close Focus (with optionally available CF lens)										
CF15	15:1	7	3.9	0.8	4.7	8.6	12.5	16.4	20.3	24.2
	distance in mm	0	5	10	15	20	25	30	35	40

Model	CS-SF15-C1	CSTK-SF15-C1
Optical resolution	15:1	
Temperature range [1]	-40°C to 400°C	
Spectral range	8 to 14µm	
System accuracy [2]	±1.5% or ±1.5°C	
Repeatability [2]	±0.75% or ±0.75°C	
Temperature resolution [3]	0.1°C	
Response time	25ms to 999s (90%), adjustable	
Emissivity/Gain	0.100 to 1.100 (adjustable via 0 to 5VDC input or software)	
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	0 to 5V or 0 to 10V 1/10/100 mV/°C	additional thermocouple type K 0 to 5V or 0 to 10V
Alarm output	Alarm 0-30V/50mA (open collector)	
3-state alarm output	adjustable thresholds and voltage levels for: no alarm, pre-alarm, alarm	
Outputs/digital	mono-/bidirectional, 9.6kBaud, 0/3V level/USB optional	
LED functions	alarm display, automatic aiming aid, self-diagnostics, temperature display (via temp. code)	
Inputs	programmable functional inputs for external emissivity adjustment, ambient temperature compensation (0 to 5VDC), hold function or RS232 / USB (optional) communication	
Cable length	1m (standard), 3m, 8 m, 15m	
Power supply	4mA (without LED); 10mA (5 to 30VDC)	
Protection class	IP63 (NEMA-4)	
Ambient temperature	-20°C to 80°C	
Storage temperature	-20°C to 85°C	
Relative humidity	10 to 95%, non-condensing	
Vibration	IEC 68-2-6: 3 G, 11 to 200Hz, any axis	
Shock	IEC 68-2-27: 50 G, 11ms, any axis	
Weight	58g	

[1] adjustable via software
[2] ambient temperature: 23±5°C; whichever is greater; object temperature ≥ 0°C
[3] with object temperature <100°C and time constant of >0.2s



Product identification

CS -	SF15-	C1
		Cable length [1m (standard) / 3m / 8m / 15m]
	Focus [SF]	
thermoMETER CS / CSTK		

Accessories page 54 - 55

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

thermoMETER CSmicro

Miniature OEM infrared temperature sensor with controller integrated in the cable

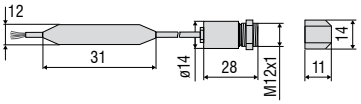
- Measuring range from-40°C to 1030°C
- Applicable in ambient temperatures up to 120°C without cooling (sensor)
- Robust, silicon-coated lens
- Integrated controller with LED alarm display and intelligent sighting aid, alarm signal, temperature-code display or self-diagnostics
- Integrated controller in the cable
- Scalable analog output and simultaneous alarm output
- Protection against short circuit and polarity change
- Programmable controller
- Optional USB interface and software for programming
- Best price - ideal for OEM applications

Optical specifications thermoMETER CSmicro
□ = smallest spot size / focal point (mm)

Standard Focus											
SF02	2:1	5	53.8	102.5	151.3	200	251.3	302.5	353.8	405	
SF15	15:1	6.5	11.6	16.6	21.7	26.7	35	43.3	51.6	59.9	
	distance in mm	0	100	200	300	400	500	600	700	800	
Close Focus (with optionally available CF lens)											
CF02	2:1	7	6	5	4.1	3.1	2.5	3.3	5.4	7.5	9.5
CF15	15:1	7	3.9	0.8	4.7	8.6	10.9	12.5	16.4	20.3	24.2
	distance in mm	0	5	10	15	20	23	25	30	35	40

Model	CSmi-SF02-C1	CSmi-SF15-C1	CSmiHS-SF15-C4
Optical resolution	2:1	15:1	15:1
Temperature range	-40°C to 1030°C [1]		-20°C to 150°C
Spectral range	8 to 14µm		
System accuracy	±1.0% or ±1.0°C [4]		
Repeatability	±0.5% or ±0.5°C [3]		±0.3% or ±0.3°C [4]
Temperature coefficient	± 0.05°C/°C or ± 0.05%°C [5]		
Temperature resolution	0.15°C [6]		0.025°C [6]
Response time (90%)	30ms (adjustable up to 999s via optional programming adapter)		150ms (adjustable up to 999s via optional programming adapter)
Emissivity/Gain	0.100 to 1.100 [2]		0.100 to 1.100 [1]
Transmissivity/gain [1]	0.100 to 1.100		
Signal processing [1]	peak hold, valley hold, average; extended hold function with threshold and hysteresis		
Dimensions of controller	length 35mm; ø12mm		
Outputs/analog	0 to 5V or 0 to 10V 1/10/100 mV/°C		4 to 20mA
Max. loop resistance	-		1000Ω 7
Outputs/alarm	Alarm (50mA/ 24V)		0-30V / 500mA (open collector)
Outputs/digital (optional)	mono-/bidirectional, 9.6kBaud, 0/3V level, alternative USB		
Inputs	programmable functional inputs for external emissivity adjustment (0 to 5VDC), hold function or USB communication		Programmable functional input for triggered signal output or peak hold function
LED functions	alarm display, automatic aiming aid, self-diagnostics, temperature display (via temp. code)		
Cable length	1m (standard length); 0.5m between sensor and controller; 0.4m between controller and terminal device		4m (0.5m sensor - controller); sensor incl. massive housing TM-MHS-CT (ø29.5mm x 55mm)
Power supply	9mA (5 to 30VDC)		4...20mA (5 to 30VDC)
Protection class	IP65 (NEMA-4) sensor head		
Ambient temperature	Sensor: -20°C to 120°C Controller: -20°C to 80°C		Sensor -20°C to 75°C Controller: -20°C to 75°C
Storage temperature	-40°C to 85°C (sensor and controller)		
Relative humidity	10 to 95%, non-condensing		
Vibration	IEC 68-2-6: 3 G, 11 to 200Hz, any axis		
Shock	IEC 68-2-27: 50 G, 11ms, any axis		
Weight	42g		200g

[1] adjustable via software
[2] adjustable via 0 to 5VDC input or software
[3] ambient temperature 23±5°C; whichever is greater; object temperature ≥ 0°C
[4] ambient temperature 23±5°C; whichever is greater; object temperature >20°C
[5] with object temperature <100°C; time constant from >0.2s
[6] with object temperature > 20°C; time constant from >0.2s
[7] depends on supply voltage



Product identification

CSmi -	SF15-	C1
		Cable length [1m (standard) other cable lengths on request]
	Focus [SF / CF]	
thermoMETER CSmicro		

Accessories page 54 - 55

- Ancillary CF lens
- Protective window
- Mounting bracket / mounting bolt
- Air purge collar
- Right angle mirror
- USB kit

thermoMETER CSmicro 2W

Miniature OEM two-wire IR temperature sensor with controller integrated in the cable

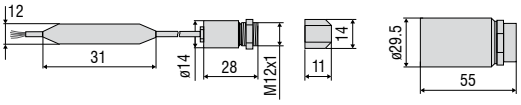
- Measuring range from-40°C to 1600°C
- Applicable in ambient temperatures up to 180°C without cooling (sensor)
- Robust, silicon-coated lens
- Integrated controller with LED alarm display and intelligent sighting aid, alarm signal, temperature-code display or self-diagnostics
- Integrated controller in the cable
- Scalable analog output and simultaneous alarm output
- Protection against short circuit and polarity change
- Programmable controller
- Optional USB interface and software for programming
- Best price - ideal for OEM applications

Optical specifications thermoMETER CSmicro 2W
□ = smallest spot size / focal point (mm)

Standard Focus										
SF15	15:1	6.5	11.6	16.6	21.7	26.7	35	43.3	51.6	59.9
SF22	22:1	6.5	10.5	14.4	18.4	22.3	26.3	30.2	34.2	38.1
	distance in mm	0	100	200	300	400	500	600	700	800
SF40	40:1	6.5	10.7	14.9	19.1	23.3	27.4	31.6	35.8	40
SF75	75:1	6.5	8.1	9.7	11.3	12.8	14.4	16	19.8	23.5
	distance in mm	0	200	400	600	800	1000	1200	1400	1600
Close Focus (with optionally available CF lens)										
CF15	15:1	7	3.9	0.8	4.7	8.6	12.5	16.4	20.3	24.2
CF22	22:1	7	3.8	0.6	4.4	8.2	12	15.8	19.6	23.4
	distance in mm	0	5	10	15	20	25	30	35	40
Close Focus (integrated CF lens in the sensor head)										
CF40	40:1	6.5	4.4	2.7	6	10.2	14.4	18.6	22.8	27
CF75	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	CSmi2W-SF15-C1	CSmi2W-SF15H-C1	CSmi2W-SF22H-C1	CSmi2WM-2SF40-C1	CSmi2WM-2SF75-C1
Optical resolution	15:1		22:1	40:1	75:1
Temperature range	-40°C to 1030°C [1]			250°C to 800°C [1]	385°C to 1600°C [1]
Spectral range	8 to 14µm			1.6µm	
System accuracy	±1.0% or ±1.0°C [3]			±(0.3% of reading +2°C) [4]	
Repeatability	±0.5% or ±0.5°C [3]			±(0.1% of reading +1°C) [4]	
Temperature coefficient	± 0.05°C/°C or ± 0.05%°C [5]				
Temperature resolution	0.1°C [6]				
Response time (90%)	30ms	150ms		10ms	
Emissivity/Gain	0.100 to 1.100 [2]				
Transmissivity/gain [1]	0.100 to 1.100				
Signal processing [1]	peak hold, valley hold, average; extended hold function with threshold and hysteresis				
Dimensions of controller	length 35mm; ø12mm				
Outputs/analog	4 to 20mA				
Max. loop resistance	1000Ω 7				
Outputs/alarm	0-30V / 500mA (open collector)				
Outputs/digital (optional)	mono-/bidirectional, 9.6kBaud, 0/3V level, alternative USB				
Inputs	Programmable functional input for triggered signal output or peak hold function				
LED functions	alarm display, automatic aiming aid, self-diagnostics, temperature display (via temp. code)				
Cable length	1m (standard length); 0.5m between sensor and controller; 0.4m between controller and terminal device				
Power supply	4...20mA (5 to 30VDC)				
Protection class	IP65 (NEMA-4) sensor head				
Ambient temperature	Sensor: -20°C to 120°C Controller: -20°C to 75°C	Sensor: -20°C to 180°C Controller: -20°C to 75°C		Sensor: -20°C to 125°C Controller: -20°C to 75°C	
Storage temperature	-40°C to 85°C (sensor and controller)				
Relative humidity	10 to 95%, non-condensing				
Vibration	IEC 68-2-6: 3 G, 11 to 200Hz, any axis				
Shock	IEC 68-2-27: 50 G, 11ms, any axis				
Weight	42g				

[1] adjustable via software
[2] adjustable via 0 to 5VDC input or software
[3] ambient temperature 23±5°C; whichever is greater; object temperature ≥ 0°C
[4] ε = 1, response time 1s, object temperature >450°C
[5] with object temperature <100°C; time constant from >0.2s
[6] with object temperature > 20°C; time constant from >0.2s
[7] depends on supply voltage



Product identification

CSmi2W -	SF15-	C1
		Cable length [1m (standard) / 3m / 8m / 15m]
	Focus [SF / CF]	
thermoMETER CSmi2W (TwoWire)		

Accessories page 54 - 55

- Ancillary CF lens
- Protective window
- Mounting bracket / mounting bolt
- Air purge collar
- Right angle mirror
- USB kit

thermoMETER CX

OEM temperature sensor with integrated controller

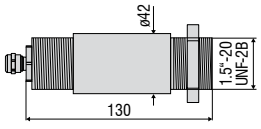
- Measuring range from -30°C to 900°C
- High resolution model available (CX-SF15-C8 with 0.025°C)
- Easy two-wire installation
- Optional USB interface and software for programming
- Large supply voltage range: 5-30VDC
- Optical resolution from 15:1, 22:1
- Simultaneous two-wire output and digital communication
- Alarm output (0-30V / 500mA)
- Connection dimension 1.5“ for easy replacement of present sensors

Optical specifications thermoMETER CX
□ = smallest spot size / focal point (mm)

Standard Focus										
SF15	15:1	6.5	11.5	6.6	21.6	26.6	34.9	43.2	51.4	59.7
SF22	22:1	6.5	10.5	14.4	18.4	22.3	26.3	30.2	34.2	38.1
	distance in mm	0	100	200	300	400	500	600	700	800
Close Focus										
CF15	15:1	7	3.9	0.8	4.7	8.6	12.5	16.4	20.3	24.2
CF22	22:1	7	3.8	0.6	4.4	8.2	12	15.8	19.6	23.4
	distance in mm	0	5	10	15	20	25	30	35	40

Model	CX-SF15-C8	CX-SF22-C8
Optical resolution	15:1	22:1
Temperature range [1]	-20°C to 150°C	-30°C to 900°C
Spectral range	8 to 14µm	
System accuracy [2]	±1% or ±1°C	±1% or ±1.4°C
Repeatability [2]	±0.3% or ±0.3°C	±0.5% or ±0.7°C
Temperature resolution	0.025°C [3]	0.1°C
Response time	150ms (95%)	
Emissivity/gain [1]	0.100 to 1.100	
Transmissivity [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	4 to 20mA	
Output/alarms	0 to 30V / 500mA (open collector)	
Outputs/digital (optional)	USB	
Output/impedance	max. 1000Ω (depends on supply voltage)	
Cable length	8m	
Power supply	5 to 30VDC	
Protection class	IP65 (NEMA-4)	
Ambient temperature	-20°C to 75°C	
Storage temperature	-40°C to 85°C	
Relative humidity	10 to 95%, non-condensing	
Vibration	IEC 68-2-6: 3 G, 11 to 200Hz, any axis	
Shock	IEC 68-2-27: 50 G, 11ms, any axis	
Weight	350g	

[1] adjustable via software
[2] ambient temperature 23±5°C; whichever is greater; object temperature ≥ 0°C;
[3] with object temperature <100°C; time constant from >0.2s



Product identification

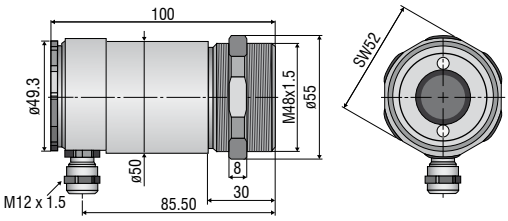
CX -	SF15-	C8
		Cable length [8m]
	Focus [SF / CF]	
thermoMETER CX		

Accessories page 54 - 55

- Ancillary CF lens
- Protective window
- Air purge collar
- USB kit

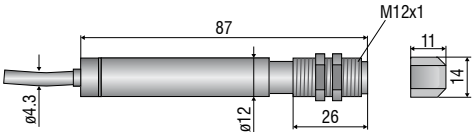
CSLaser

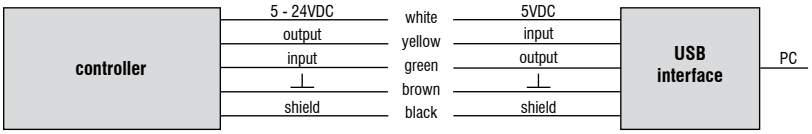
sensor



CS

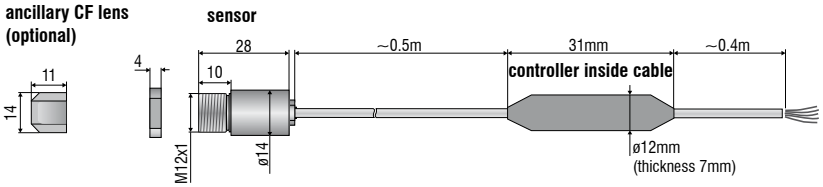
sensor with integrated controller **ancillary CF lens (optional)**

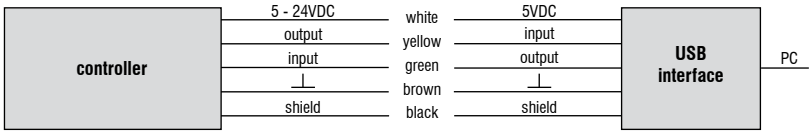




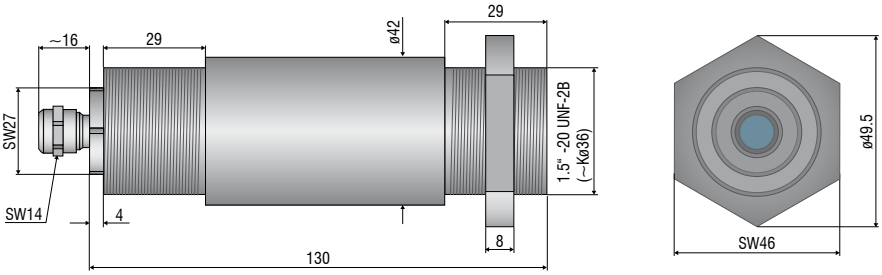
CSmicro / CSmicro 2W

ancillary CF lens (optional) **sensor**





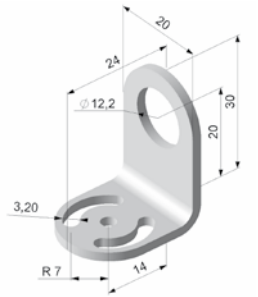
CX



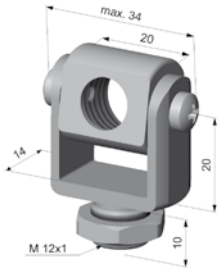
Mechanical accessories CS / CSmicro / CSmicro 2W		
Art. No.	Model	
2970279	Emissivity	Mounting bracket, fixed
2970280	TM-AB-CS	Mounting bracket, adjustable
2970281	TM-MB-CS	Mounting bolts with M12x1 thread
2970282	TM-MG-CS	Mounting fork, adjustable in 2 axes, with M12x1 fastening
2970283	TM-AP-CS	Air purge collar for 10:1 sensors
2970284	TM-APL-CS	Air purge collar, laminar
2970285	TM-APLCF-CS	Air purge collar, laminar with integrated ancillary CF lens
2970286	TM-RAM-CS	Right angle mirror for measurements 90°C to the sensor axis
2970287	TM-USBK-CS	USB kit: USB programming adapter, CompactConnect software
Optical accessories CS / CSmicro / CSmicro 2W		
2970277	TM-CF-CS	Ancillary CF lens for CS models
2970278	Aluminum	Protective window for CS models

Calibration CS / CSmicro / CSmicro 2W		
2970288	TM-CERT-CS	Certificate of calibration

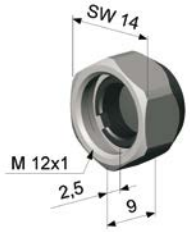
Mechanical accessories CX		
Art. No.	Model	
2970307	TM-AP-CX	Air purge collar, aluminum (anodized)
2970321	TM-FB-CX	Mounting bracket, adjustable in 1 axis, stainless steel
2970322	TM-AB-CX	Mounting bracket, adjustable, in 2 axes, stainless steel
2970311	TM-USBK-CX	USB kit: USB programming adapter, CompactConnect software
Optical accessories CX		
2970302	TM-CF-CX	Ancillary CF lens for CX models
2970303	TM-PW-CX	Protective window for CX models
Calibration CX		
2970323	TM-CERT-CX	Certificate of calibration



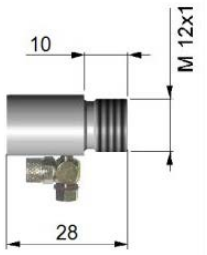
TM-FB-CS mounting bracket, fixed



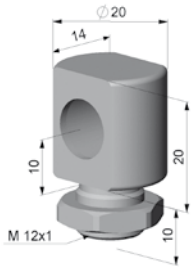
TM-MG-CS Mounting fork
with M12x1 thread, adjustable in two axes



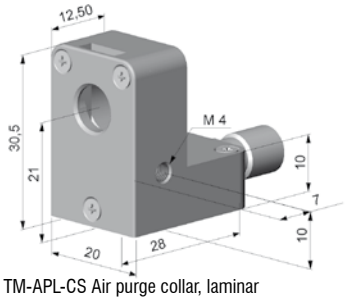
TM-CF-CS Ancillary CF lens
(only for LT models)



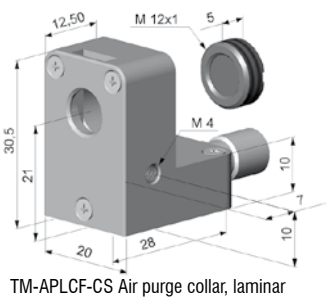
TM-AP-CS Air purge collar for
10:1 sensors



TM-MB-CS Mounting bolts with
M12x1 thread adjustable in one axis

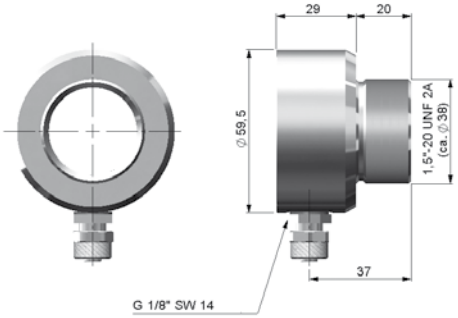


TM-APL-CS Air purge collar, laminar

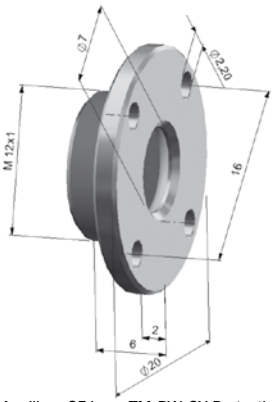


TM-APLCF-CS Air purge collar, laminar
with integrated ancillary CF lens

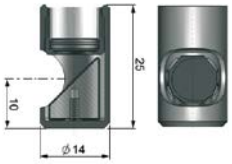
TM-APL-CS Air purge collar, laminar
TM-MG-CS Mounting fork



TM-AP-CX Air purge collar for CX sensors



TM-CF-CX Ancillary CF lens, TM-PW-CX Protective
window



TM-RAM-CS Right angle mirror

Further IR temperature measurement devices from Micro-Epsilon

thermoIMAGER TIM
Compact USB thermal imaging cameras for precise thermography

thermoMETER CTVideo/CSVideo
Infrared temperature sensors with crosshair laser sighting and video output

thermoMETER Handheld
Innovative handheld pyrometer with laser sighting for inspection and maintenance

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