KELLER
infrared temperature solutions ITS

IO-Link

Pyrometer
CellaTemp PR xx

Ident-Nr.: 1110968 11/2021

Content

1 General

1.1 Information about this manual

The Operating Manual shall enable the user to properly install the pyrometer and the required accessories.

Before starting installation, be sure to read and understand this entire manual, in particular the chapter on safety! The instructions contained in this manual, especially those concerning safety, as well as site specific regulations governing UV radiation must be complied with at all times. It is imperative to comply with the safety instructions and the accident protection regulations valid for the area of application.

1.2 Explanation of symbols

Important safety-related references in this manual are marked with a symbol.

⚠ ATTENTION

This symbol points out guidelines. If you do not observe them, the device might be damaged, malfunctioning or even fail to operate.

! CAUTION
This symbol points out hints and information which should be heeded for efficient and trouble-free operation

▶ Action
This symbol instructs the operator to take action.

> Reaction, Result
This symbol indicates the result of the action taken.

1.3 Liability and Warranty

All information compiled in this manual is in accordance with applicable regulations. The statements made are based on state-of-the-art technology and reflect our extensive knowledge and many years of experience.

! Always carefully read this Operating Manual before beginning any work on or with the instrument, especially prior to installation and initial setup! The Manufacturer shall not be held liable for any damages or malfunctions arising from a disregard of the warnings and instructions contained herein.

1.4 Copyright

This Operating Manual should be treated as confidential. It is solely intended for use by persons involved with the instrument. This manual may not be made available to a third party without prior Manufacturer's consent. Please contact the Manufacturer if the need should arise.

2 Safety

This chapter outlines all important safety aspects to be considered for optimum employee protection and to ensure safe and reliable operations.

2.1 Intended use

The pyrometer is solely intended for use as described in this manual. Operational safety can only be ensured when the instrument is used for its intended purpose.

! The use of the pyrometer for any other purpose beyond what is specified in this manual is prohibited. Using the instrument in any other manner will be considered as improper.

The manufacturer is only liable for damage that occurs during correct use. The prerequisite for any liability, however, is that the cause of the damage is due to a defective product and the defect in the product was caused by the manufacturer.

2.2 User's responsibility

The pyrometer may only be used when it is in perfect working condition.

2.3 Safety requirements

The instrument operates at low voltage (18 – 34 V DC). The power supply unit must conform to directive EN50178, SELV, PELV.

2.4 Electromagnetic Compatibility

The devices comply with the essential safety requirements of the Electromagnetic Compatibility Directive 2014/30/EU (EMC Act).

When connecting a power supply unit, make sure that is also conforms to these standards. Radio interference may arise if the pyrometer is interconnected with such peripheral devices which have not been properly interference-suppressed. This may necessitate additional interference suppression measures.

3 General Description

The pyrometer optically detects temperatures and monitors temperature ranges.

The sensor detects the infrared radiation emitted by objects and converts it into an electrical switching signal, an analogue signal and a digital signal.

The advantage of this technique is that there is no mechanical contact between the sensor and the hot object.

The instrument is suitable for the following applications:

- Measurements at moving or hard-to-reach objects
- Measurements at surface-treated or voltage-carrying objects
- Measurements at sticky materials such as dough or aggressive chemicals
- Applications requiring fast response times.

The rugged stainless steel housing enables the instrument to be used in harsh industrial environments. The instruments are splash-proof according to IP65 (DIN 40050). The pyrometer has an analog output, an IO-Link switching output and a switch contact that can be used depending on the configuration as opener or closer.

4 Models

Compact pyrometer		
Model	**Temp. range**	**Application**
PR 11	0 - 1000 °C	nonmetals
PR 18	0 - 500 °C	nonmetals in aggressive measurement surroundings
PR 21	250 - 1600 °C	metals, ceramics, molten glass

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5 Function

The pyrometer measures the temperature optically.

The infrared sensor is equipped with an analogue output and an open collector output. The instrument's display panel shows the measured temperature.

- It generates 2 output signals according to the configured function:

OUT1	Switching threshold
OUT2	Analogue output 0/4...20mA

5.1 Switching threshold

OUT1 changes its switching status when the configured upper and lower thresholds (SP_FH1, rPFL1) are exceeded.

First set the upper temperature value of the switching point [SP_FH1]. The temperature can be defined in °C or °F according to the unit setting. Then set the lower threshold [rPFL1]. The minimum distance between [SP_FH1] and [rPFL1] is 1 K.

Parameter	**Ldx.**	**Subindex / bitOffset**	**Value range**	**Slope**
Out1	580	0	3: N/O 4: N/C	
dS1	581	0	0 … 100	0.1
dr1	582	0	0 … 100	0.1
SP_FH1	583	0	10 … 10000	0.1
rP_FL1	584	0	0 … 9990	0.1

! If the distance falls below the minimum of 1 K, the parameters are not accepted.

5.2 Output signal

The following switching functions can be selected:

- Normally closed contact: [Out1] → [3] = normally open
- Normally open contact: [Out1] → [4] = normally closed

5.3 Upper threshold delay

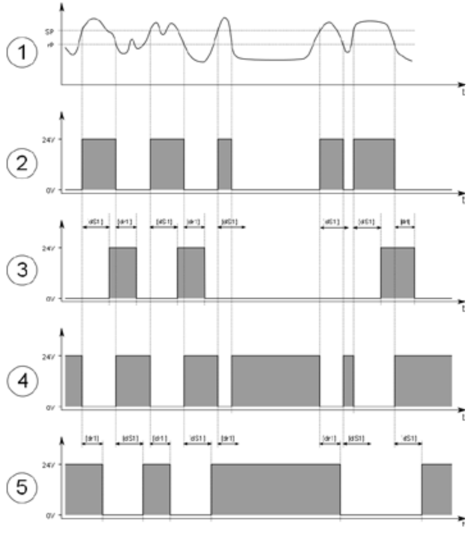
Once the sensor has detected a temperature which exceeds the switching threshold [SP_FH1] the time delay [dS1] starts running. When this delay period has elapsed, the output OUT1 activates switching. This status is sustained until the lower threshold [rP_FL1] is violated. If this occurs before the time delay has elapsed, the delay will reset. This function can be used, for example, to suppress spurious impulse signals at the output.

- Upper threshold delay: [dS1] = 0...10 sec.

5.4 Lower threshold delay

- To make sure the output impulse is correctly identified, e.g. by a downstream control system, the output impulse can be lengthened.
- Ausschaltverzögerung: [dr1] = 0...10 sec.

5.5 Switching functions



1: Temperature profile

2: Switch signal Hno

3: Switch signal Hno with upper- and lower threshold delay

4: Switch signal Hnc

5: Switch signal Hnc with upper- and lower threshold delay

5.6 Internal signal processing

Temperature
↓
Switch point → no / nc → Lower- / upper threshold delay
↓
Switching

5.7 Analogue output

The pyrometer is equipped with an analogue output OUT2 0/4...20 mA. The maximum load is 500 Ω. The output current is linear to the measured temperature. Within the overall measuring range, the required measuring range can be set to °C or °F using parameter [ASP2] (scale beginning) and parameter [AEP2] (scale end). There is also the possibility, to switch OUT2 between 0 - 20 mA and 4 - 20 mA.

Scale beginning [ASP2]

Scale end [AEP2]

Change 0/4 - 20 mA [Ao2] = 0: 0 … 20 mA
1: 4 … 20 mA

Parameter	Ldx.	Subindex/ bitOffset	Value range	Slope
Ao2	629	0	0: 0 … 20 mA 1: 4 … 20 mA	
ASP2	630	0	Start of measuring range * 10	0.1
AEP2	631	0	End of measuring range * 10	0.1

5.8 Emissivity of materials

The pyrometer reacts to the thermal energy (infrared radiation) emitted by an object. The ability to radiate heat depends on the type of material and its surface properties. A description of the calculation of emissivity is in Chapter 16/ Page 30. The ability of a body to emit infrared radiation is expressed by a material constant called emissivity coefficient or just emissivity. This coefficient lies between 0 and 100 %. A body with ideal radiation (black body) has a coefficient of 100 %. At the same temperature, bodies with real radiation emit a lower radiation. Therefore, the emissivity coefficient is < 100%. For this reason, adjust the emissivity coefficient of the target object on the pyrometer to be able to determine the exact temperature.

With the configured lower emissivity coefficient, the pyrometer automatically compensates for the lower radiation.

- Emissivity: 10...110%

! For instructions on setting the emissivity, see chapter 9.

5.9 IO-Link

This device has an IO-Link communication interface, which requires an IO-Link-capable module (IO-Link master) for operation. The IO-Link interface allows direct access to process and diagnostic data and offers the possibility to parameterize the device during operation.

With a PC, IO-Link software and an IO-Link cable, parameterization is possible outside of ongoing operation. IO-Link masters and parameterization software are offered by a wide range of manufacturers. With ongoing IO-Link communication, Bluetooth modules, for example, can also be used for parameterization.

The IO Device Description (IODD) required for configuring the IO-Link device as well as detailed information on process data set-up, diagnostic functions and parameter addresses are available in the download area at www.keller.de/its.

! A 3-wire cable port Class A (Type A) must be used for IO-Link operation.

6 Electrical connection

⚠ ATTENTION

The pyrometer may only be installed by a skilled, qualified electrician. Do not connect the instrument while the voltage supply source is turned on. Please observe international safety regulations at all times.

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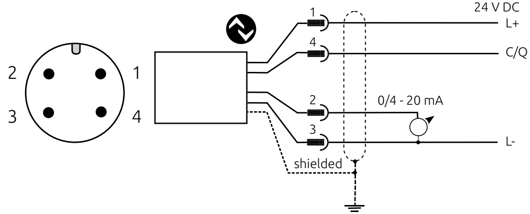
▶ Switch to neutral and verify absence of voltage

▶ Connect the instrument according to the following schematic:



Pin 1	BN (brown)	L+ (Power supply 24V)
Pin 2	WH (white)	Analogue output; 0/4 ... 20mA
Pin 4	BK (black)	Open Collector switching output; I_{max} = 150 mA or IO-Link
Pin 3	BU (blue)	L- (Shield)

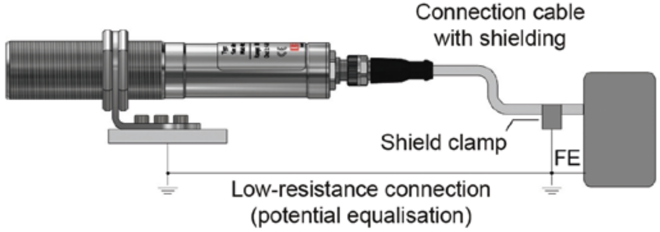
! The pyrometer must be protected against high voltage and strong electromagnetic fields. Use a shielded cable, connecting it via connector casing to the device housing.

! Use a flyback diode when switching inductive loads.

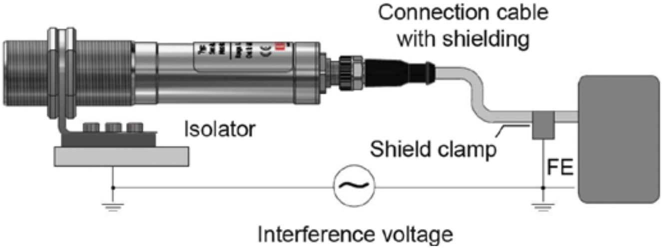
7 Shielding and Grounding

7.1 Equipotential bonding

The pyrometer housing is connected to the shielding via the cable connector!



Differences in ground potentials might cause an equalising current to flow between devices through a cable shielded at both ends. In this case, be sure to install an additional equipotential bonding line.



Unless a low-current connection between the pyrometer and the electrical cabinet of the installation can be ensured, the pyrometer must be mounted in an insulated manner to avoid equalising currents. The shielding must be connected to the plant's earthing system.

! If the pyrometer is installed without an insulator and without potential equalisation, the interference voltage may not exceed 32V.

8 Parameter explanation

The description of the parameters can be found in the data sheet. The data sheet is included in the IOOD files (zip file).

The IODD files can be found on our homepage under the respective pyrometer type.

! The parameters are set exclusively via the IO-Link interface.

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9 Setup

The pyrometer uses the intensity of infrared radiation for optical temperature measurements. It is necessary to configure the pyrometer to the emissivity coefficient of the measuring object to obtain exact measuring results (→ 15 Emissivity coefficient tables). An incorrectly set emissivity coefficient leads to wrong temperature readings.

Set the emissivity coefficient after connecting the supply voltage or resetting the parameters to factory settings.

Parameter	**Ldx.**	**Subindex / bitOffset**	**Value range**	**Slope**
EPSI	6100	0	100 … 1100	0.1

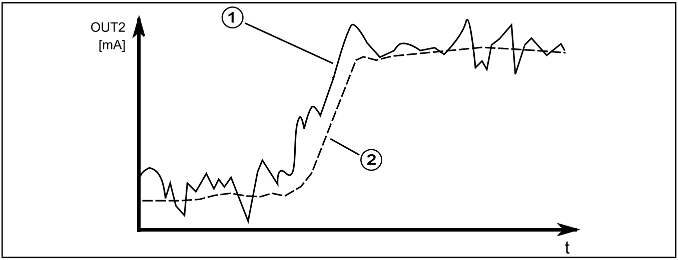
10 Parameterizing

Parameters can be set via the IO-Link interface before installation and commissioning of the unit or during ongoing operation.

Changing the parameters during operation will affect the functioning of the system. Before parameters are changed, it must be ensured that no malfunction occurs in the system.

10.1 Damping function

When the target object‘s temperature is erratic, the damping function smoothens these temperature fluctuations in order to stabilize the measuring signal. The greater the time constant [dAP], the lower the effect of these fluctuations on the yielded temperature reading.



1: Output signal without smoothing function
2: Output signal with smoothing function

Parameter	Ldx.	Subindex / bitOffset	Value range	Slope
dAP	6120	0	0 … 9999	0.1

10.2 Peakhold-Funktion

It might often be desirable to determine the peak temperature during a defined time period, for example when the objects to be measured move past the pyrometer, resulting in temperature readings which would appear to be cyclical. In this mode,

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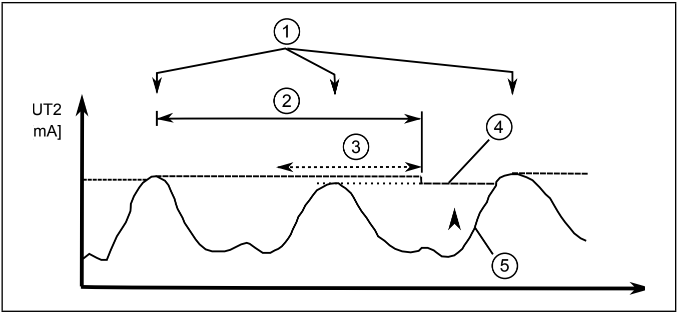
the displayed temperature reading will not drop between targeted objects. The peak temperature reading will be held for a preset time period.

The hold time [PhLd] can be set from 0.1 to 999.9 sec. The maximum temperature sampled during the defined hold time will be saved. It makes sense to choose a hold time which is approximately 1.5 times as long as the cycle of the moving targets. This avoids temperature drops. Any changes are recognised at once.



1: Measuring object in front of pyrometer
2: Hold time
3: second internal hold time
4: Measuring readings with peak hold function
5: Measuring readings without peak hold function

Parameter	Ldx.	Subindex / bitOffset	Value range	Slope
PhLd	6110	0	0 … 9999	0.1

10.3 Reset all parameters to factory settings

Resetting to factory settings is done via system command [Index 2] -> [Wert 130]

! After a reset to factory settings configure the emissivity coefficient [EPS1] again (→ 9 Setup) to obtain exact measuring results.

11 Operation

After connecting the supply voltage the pyrometer will be automatically initialized and will perform a self-diagnosis. After approx. 0.5 sec the sensor is ready to operate and the instrument runs the signal processing.

11.1 Ambient temperature

The maximum permissible ambient operating temperature for the pyrometer is 65 °C. If the instrument is used in ambient temperatures above 65 °C, it must be either cooled or shielded from excess radiant heat by means of a deflector plate.

11.2 Device status

Status value	State	Triggering event	Measures
0	Normal operation		
1	Mainte-nance required	–	
2	Out of specifica-tion	Maximum permissible internal temperature exceeded	Cool down the unit
		Calibration data incom-plete	Perform calibration
		Supply voltage unstable	Check supply voltage
3	Function test	Temperature simulation function active	Check measured value
4	Non re-coverable error	EEPROM memory data corrupt	Replace unit

11.3 Error codes / events

Code	Typ	Name	Note
0x1800	Warning	EEPROM memory error	Memory error occurred - data restored
0x1810	Warning	Calibration data invalid	Calibration data not complete - Perform calibration procedure
0x4210	Warning	Internal temperature exceeded	Maximal zulässige Innentemperatur überschritten - Gerät abkühlen!
0x5000	Error	Hardware error occurred	Measured values invalid - Replace unit
0x5111	Warning	Supply voltage unstable	Check supply voltage
0x8C01	Warning	Temperature simulation active	Measuring temperature is simulated - Check measured values
0x8DFE	Warning	Testevent 1	Event 1 for IO-Link device test
0x8DFF	Warning	Testevent 2	Event 2 for IO-Link device test

12 Theory of optical temperature measurements

All materials radiate thermal energy in all states of aggregation above absolute zero. This radiation is mainly caused by atomic or molecular oscillations.

This temperature radiation is only a limited sector within the total electromagnetic radiation spectrum. It extends from the visible range starting at wavelengths of approx. 0.5 µm to the infrared range with wavelenghs of more than 40 µm. Radiation pyrometers detect infrared radiation for optical temperature measurement.

12.1 Advantages of optical temperature measurement

- Non-contact temperature detection means cost-effective temperature measurement because this technique only requires a single in-vestment in an instrument without any follow-up costs for consumables such as thermocouples.
- This method enables temperature detection of moving objects - quick temperature measurements within milliseconds - for example at automatic welding processes.
- Small objects with medium and high temperatures can also be easily and accurately measured.
- When measuring materials with low specific heat, a non-contact method does not induce heat loss which would distort the temperature reading (as is the case with contact temperature probes). Non-contact temperature detection is ideal with corrosive molten materials for which the use of thermocouples is hardly feasible.
- Voltage-carrying objects can also be measured.

12.2 Measurements at Black Bodies (Cavity Radiators)

A black body or a black radiator is used to calibrate radiation pyrome-ters. This black body is designed in a way that its radiation does not

depend on material characteristics, but only on its temperature. A black body emits at any wavelength the maximum energy possible for the specific temperature. Real bodies do not have this ability. In other words, a black body completely absorbs the radiation without reflection or transmission losses. The spectral emissivity coefficient e(*) of a black body is equal to 1 or 100 %. The emissivity coefficient indicates the ratio of radiation of a real body (target) to the radiation of an ideal black body.

$$\varepsilon(\lambda) = \frac{M}{M_S}$$

$\varepsilon(\lambda)$: Emissivity coefficient of the object's surface (targeted spot) at wavelengh λ

M: radiant energy actually emitted by a real object

M_S: radiant energy emitted by a black body (perfect radiator)

Most burning, annealing and hardening furnaces emit a radiation of nearly ‚1' which corresponds to the conditions of a black body if the aperture through which the measurement is made is relatively small.

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12.3 Measurements of Real Radiators

Real radiation sources are specified by the relation of the emitted radiation to the radiation of a black body with the same temperature. Measurements outside a furnace - which applies to all other self-contained targets - always show a reading which is too low if the emissivity is not taken into account. Considerable errors can occur at targets with reflecting, polished or bright surfaces, e.g. molten steel and metal without oxide layer and ceramic materials. Exact results can only be obtained when the emissivity of the target is correctly adjusted on the pyrometer.

The spectral emissivity coefficient of a body does not represent an exact material constant, but depends on the surface properties of the object to be measured (→ 16 Ways to determine emissivity).

12.4 Measurements errors

The cause of measurement errors in the use of pyrometers is often an incorrectly determined or wrong emissivity.

Another source of error is the reflected „background radiation".

If the measurement object has a low emissivity and there are hotter objects in the surrounding area, measurement results can be affected. These objects then have to be shaded. This effect is particularly to be observed in the measurement of a colder object within a hot oven.

13 Ways to determine emissivity

Technical literature or operating manuals often contain data on the emissivity of various materials. This information should be used with caution, however. It is important to know for which temperature and which wavelength the emissivity value is applicable. Furthermore, the stated emissivity values were obtained under ideal conditions. In actual practice, the total emissivity of the target object will vary, depending on the amount of extraneous radiation transmitted through the object from the background or reflected onto the object from the foreground.

The emissivity can be determined using one of the following methods:

Contact measurements

Measure the temperature with a contact thermocouple and measure the surface temperature with a pyrometer. Adjust the emissivity coefficient on the pyrometer until both devices show the same temperature. When measuring with the thermocouple, make sure to have good thermal contact and low heat dissipation.

Using a reference emissivity coefficient

Apply matte black colour to a part of the surface to be measured. This part has an emissivity of 94 %. At first, measure the temperature of the coloured part. Then make a comparative measurement right next to the coloured part and adjust the emissivity on the pyrometer until it displays the previous measurement reading again.

13.1 Emissivity coefficient tables

List of emissivity coefficients of different materials in %.

Model	**PR 11 / PR 18**
Wavelength λ	**8 - 14 µm**
„Black body“	100
Aluminium oxide	76
Asphalt	90...98
Baking oven, dark colour	96
Concrete	55...65
Bitumem (roofing paper)	96

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Model	PR 11 / PR 18
Bread in baking oven	88
Ferrous oxide	85...89
Enamel	84...88
Earth	92...96
Paint and varnish, bright	92
Paint and varnish, pale	96
Gypsum	80...90
Glass	85...95
Graphite	98
Rubber, black	94
Skin, human	98
Wood	80...90
Radiator	80...85
Lime cast	91
Clinker bricks, glazed	75
Cooking plate	95
Synthetic material, nontransparent	65...95
Copper, oxidized	78
Leather	75...80
Marble	94
Brass, oxidized	56...64
Paper	70...94
Sand	90
Fireclay	75
Steel, stainless	45
Steel, rusty	69
Textiles	75...88
Water	92...98
Cement	90
Bricks	93...96

Model	**PR 21**
Wavelength λ	**1.0 - 1.7 µm**
„Black body“	100
Aluminium, polished	5
Aluminium, filed smooth	10
Asbestos cement	60
Bronze, polished	1
Bronze, filed smooth	15
Chromium, polished	15
Iron, heavily scaled	90
Iron, rolling skin	75
Iron, liquid	15
Gold and silver	1
Graphite, filed smooth	85
Copper, oxidised	70
Brass, oxidised	50
Nickel	8
Porcelain, glazed	50
Porcelain, rough	75
Soot	90
Fireclay	40
Slag	80
Pottery, glazed	85
Bricks	85
Zinc	40

14 Maintenance

14.1 Cleaning the pyrometer lens

A false temperature reading will be given when the lens is dirty. Therefore, check the lens periodically and clean it, if necessary. Dust can be removed by simply blowing it away or by using a soft brush. A special lens cleaning cloth is ideal, but any soft, clean, lint-free cloth will be suitable. If the lens is quite dirty, use a very mild liquid detergent and rinse carefully with clear water while holding the device pointed down. Apply as little pressure as possible to avoid scratching the lens.

15 Shipping, packaging and disposal

15.1 Inspection after shipping

Unpack and inspect the entire shipment immediately upon receipt to make sure it is complete and undamaged. If the container/package shows visible signs of damage, please refuse the shipment. If this is not possible, accept the shipment on the condition that the freight carrier’s delivery record is noted with the extent of the damage in order to file a claim. Should you discover a concealed loss or damage, report it to the shipper or freight carrier immediately. If the period for filing claims has expired, you will no longer be able to make any claims for compensation of damage or loss.

15.2 Packaging

The packages used are made of carefully selected, environmentally compatible materials and are thus recyclable. Please ensure that they are disposed of in an ecologically sound manner.

15.3 Disposal of the old devices

Old electrical and electronic devices frequently still contain valuable materials. These devices can be returned for disposal to the manufacturer or they must be disposed properly by the user. For the improper disposal of the device by the user, the company KELLER HCW is not responsible.

16 Accessories

Device	Type	Ident no.
shielded cable	VK 02/L AF 1: 5 m	1043813
shielded cable	VK 02/L AF 2: 10 m	1047718
air purge	PS 01/A	560951
air purge	PS 01/A AF 2	561553
Oscillating mirror	PZ 20/X AF 5	561630
Thermal insulating tube	PS 01/K	513522
Cooling jacket	PS 01/B AF 2	561922
Bayonet coupling	PS 11/N AF 4	561585
90° Deflection mirror	PS 11/W	561955
Supplementary tube	ZA 01/Q-35	514234
Intermediate tube	ZA 01/M	513807
Intermediate tube	ZA 01/B	513596
Intermediate tube	ZA 01/Q AF 2	515528
Clamping collar with angle	PS 11/K-35 AF 2	561558
Mounting bracket	PS 11/U	561537
Flange	PS 01/N	513303
Flange	ZA 01/I	513533
Flange	ZA 01/W	514831
Flange	DN 50	515087
Tube cap	ZA 01/A	513415
Bracket	PS 11/P	1044060
Ball flange	ZA 01/D	513431
Quarz window	PS 01/I AF 2	561487
Saphir window	PS 15/I	1023960
ZnS-screen-adapter	PS 11/D AF 2	561488

17 General technical data

Load	max. 500 Ω
Switching output OUT1	Open Collector Ausgänge 24 V, ≤ 150 mA Schaltpunkt [°C]/ Rückschaltpunkt [°C], Hysterese ≥ 2 K, Ein-/Ausschaltverzögerung, NC/ NO
Ambient temperature	0 - 65 °C
IO-Link revision	V1.1, downward compatible to V1.01
SIO mode	yes, supported
Transmission rate	COM2 (38.400 Baud)
Storage temperature	-20 - 80 °C
Permissible humidity	95 % r.H. max. (non condensing)
Power requirement	24 V DC +10 % / -20 % Ripple ≤ 200 mV
Housing material	Stainless steel
Weight	approx. 0.4 kg
Connectivity	5-pin connection M12 (A coded)
Protection	IP 65 according to DIN 40050 with screwed plug
Configuration parameters	Emissivity ε 10 - 110 % Smoothing function t_{98} 0.1 - 999.9 s Peak hold function 0.1 - 999.9 s Switching point / reset point Switch-on or switch-off delay 0 - 10 s

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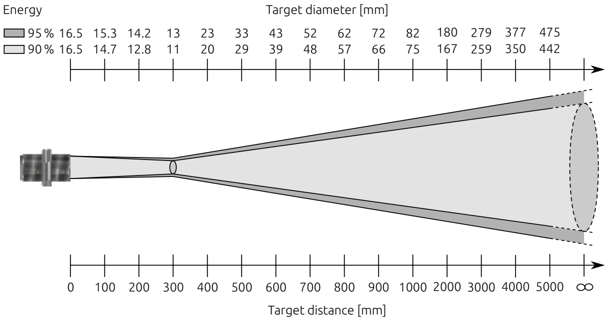
18 Device-specific technical data and field of view diagrams

PR 11 AF 1 / PR 18 AF 1*	
Temperature range	0 - 1000 °C
Sensor	Thermopile
Spectral sensitivity	8 - 14 µm
Focus distance Target of spot diameter	300 mm 11 mm
Analogue output OUT2	0(4) - 20 mA linear, switchable, scalable (≥ 15 K)
Resolution current output	0.2 K + 0.03 % of selected range
Resolution temp. reading	0.1 K < 200 °C,1 K ≥ 200 °C
Response time t_{90}	≤ 60 ms
Repeatability #	1 K
Measurement uncertainty #	0.75 % of temp. reading [°C] plus 2.0 K
Temperature coefficient #	0.1 K/K (for T<250°C), 0.04 %/K (for T>250°C) of temp. reading / K
Dimensions	M30 x 165 mm (without plug)



* CellaTemp PR 18 has a special resistant lens. This allows the use even in extreme environmental conditions, such as in asphalt and concrete mixing plants, without the lens is damaged by aggressive vapors and dusts.

Data applies to a thermally stabilised state.

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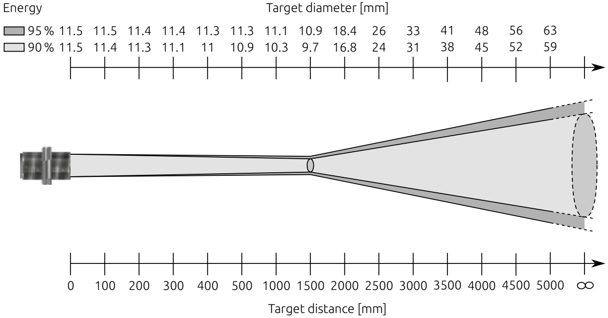
PR 21 AF 1	
Temperature range	250 - 1600 °C
Sensor	InGaAs
Spectral sensitivity	1.0 - 1.7 µm
Focus distance Target of spot diameter	1500 mm 10 mm
Analogue output OUT2	0(4) - 20 mA linear, switchable, scalable (≥ 50 K)
Resolution current output	0.2 K + 0.03 % of selected range
Resolution temp. reading	1 K
Response time t_{90}	≤ 2 ms T > 600 °C
Repeatability	1 K
Measurement uncertainty	0.3 % of temp. reading [°C] plus 2.5 K (at ε =1.0 and Ta = 23 °C)
Temperature coefficient	0.07 %/K of temp. reading / K (deviation to Ta = 23 °C)
Dimensions	M30 x 210 mm (without plug)



19 Factory settings

Die Werkseinstellungen finden Sie in der IOOD-Beschreibung. Die IODD-Beschreibung finden sie auf unsere Homepage unter dem jeweiligen Pyrometer-Typ.

More information at www.keller.de/its

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The device software contains portions of the avr-libc library.

Please note:
Unless otherwise stated in this instruction manual, the instruments described herein are subject to change without prior notice, particularly modifications for the sake of technological advancement.

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infrared temperature solutions ITS