Pyrometer CellaTemp

PA 80, PA 81, PA 83

Mat. No.: 103 398410/2018

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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830-hm / 810-het
PA83_PA81_PA80_en.doc
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Contents

1 Miscellaneous

1.1 Informationen about this manual

The purpose of the Operating Manual is to provide the user with all necessary information to be able to install the pyrometer and any necessary 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!

1.2 Explanation of symbols

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

CAUTION!

This symbol indicates important information which, if neglected, might result in pyrometer damage, malfunction or breakdown.

NOTE !

This symbol points out guidelines which should be followed for efficient and trouble-free operation.

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.

NOTE !

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.

This Operating Manual must be retained for future use. Please ensure that all persons who wish to operate the instrument have access to this manual.

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.

NOTE !

The data, texts, charts, drawings, images or other representations contained in this manual are copyright-protected and furthermore, subject to intellectual property rights. Violators will be prosecuted. Unauthorised use and copyright infringement will be subject to penalty by law.

Reproductions of any kind, in whole or in part, as well as the exploitation or disclosure of this manual's content without the explicit written approval of the Manufacturer are expressly prohibited by law. Violations shall be subject to compensation claims by the Manufacturer. The right to claim additional indemnities remains reserved.

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 non-contact measurement of temperatures as described in this manual. Any other use is not intended. Operational safety can only be ensured when the instrument is used for its intended purpose.

CAUTION !

It is prohibited to use the pyrometer for any other purpose beyond what is specified in this manual. 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 works with an operating voltage of 24 VDC. The voltage required for operation must be supplied by a separate power supply. This power supply unit must conform to directive DIN IEC 61010.

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.

2.5 Quality Management Certification

The KELLER HCW Quality Management System meets the DIN EN ISO 9001 standards for design, production, repairs and service for non-contact infrared temperature measuring equipment.

2.6 Environmental Management

Sustainable environmental management is more important than ever.
KELLER HCW's corporate environmental management system complies with DIN EN 14001/50001 standards.

3 General Description

CellaTemp PA 8x was specially developed to measure the temperature of molten metal pouring stream at continuous and discontinuous casting lines or at casting channels. CellaCast features an intelligent ATD function (automatic temperature detection) which automatically produces a temperature reading for each mould. Thanks to ATD, the pyrometer starts measuring just as the ladle starts pouring. Interferences such as flames or molten metal drip (as opposed to a pour stream) will not impede the measurement or impair the signal. When monitoring a continuous molten stream such as at the casting channel or with extended pouring cycles, the system computes a temperature reading periodically at user-defined intervals and saves the data.

The two-colour pyrometer CellaTemp PA 8x measures the intensity of infrared radiation at two different wavelengths. The ratio of these two intensities is proportional to the temperature. Thus a two-colour pyrometer supplies a constant measurement signal even with weakened signals, caused, for example, by vapour and dirt in the sighting path.

To indicate the exact measurement spot, CellaTemp PA features through-the-lens sighting or, as an alternative, laser sighting or an integrated camera.

The instruments have rugged stainless steel housings which make them ideal for use in hostile industrial environments. PA pyrometers are splash water proof according to IP65 (DIN 40050)

All PA pyrometers with through-the-lens sighting feature an interchangeable, focussable lens. Through-the-lens sighting with target marker facilitates easy alignment to the target. PA instruments with laser sighting feature an integrated laser which produces a laser dot image on the target object to indicate the precise measurement spot.

The adjustable emissivity factor makes it easy to adapt the pyrometer to the specific radiation characteristics of the particular material measured.

All pyrometers of the PA series have two analogue current outputs, each is switchable from 0 - 20 mA to 4 - 20 mA.

The output currents are linear to the measured temperature. The required temperature range can be set at the pyrometer.

When ambient temperatures are higher than the admissible working temperature, the output current is > 20.5 mA.

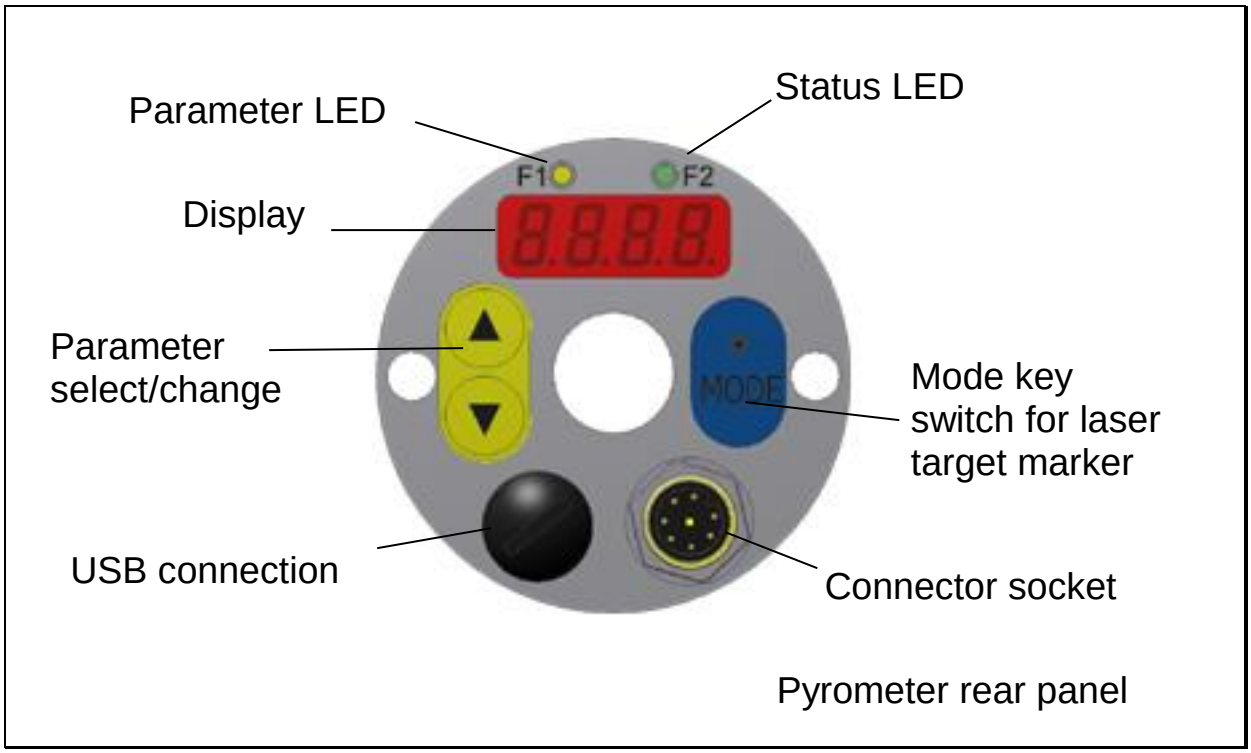
CellaTemp PA also features an analogue voltage input which can be used as an alternative to current output 2. The emissivity factor or a correction for reflected ambient temperature can be controlled using this voltage input.

Two serial interfaces (USB and RS485) are available. They enable the user to change all operating parameters such as emissivity setting, temperature range, smoothing function or output current range during running operations.

CellaTemp PA allows for continuous temperature data output in a user-configured cycle time.

3.1 Integrated Digital Display

The rear panel of the CellaTemp PA has a 4-digit display and 3 push-buttons. The display shows the current temperature or, during configuration using the push-buttons, the display will show the corresponding parameter.
Whenever the display shows a parameter, the F1 Parameter LED (yellow) will light up. The function of the F2 Status LED (green) is user-configurable. In its initial state when supplied to the customer the F2 LED indicates current status for the switch able output Do1 as ready for operation.

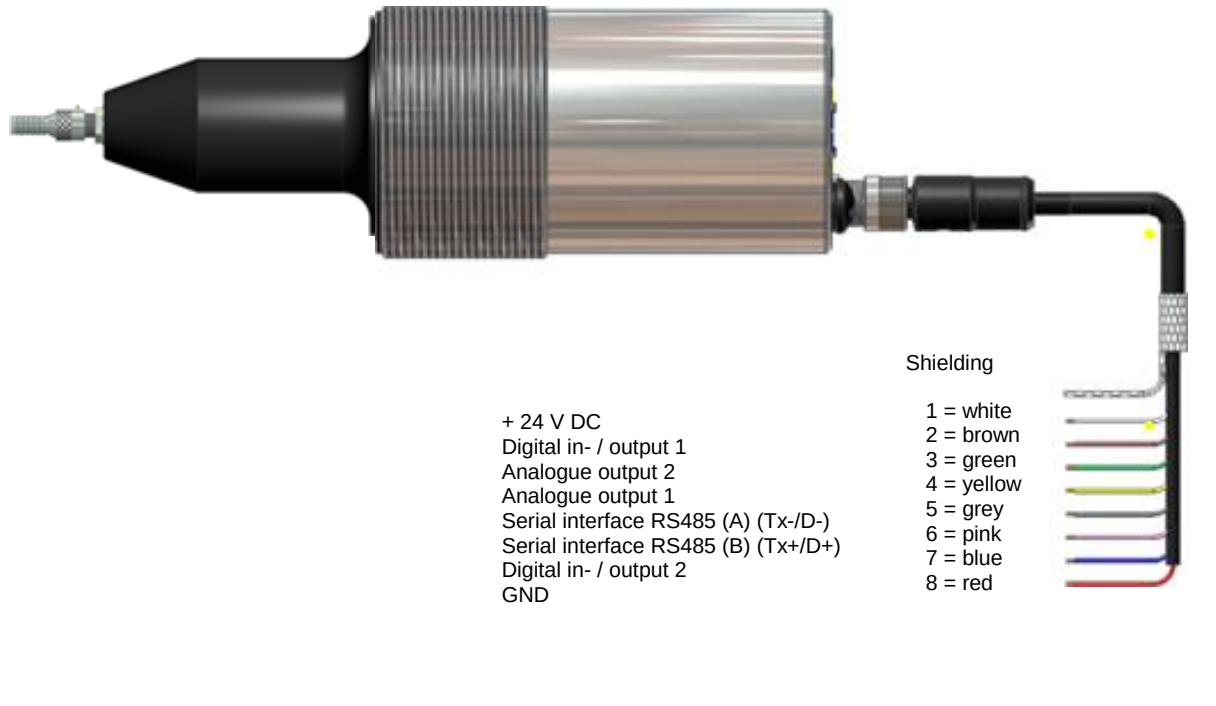


Pyrometer rear panel

4 Quick Reference Guide

4.1 PA 80/83 Connector Pin Assignment

4.2 PA 81 Connector Pin Assignment



CAUTION!

The pyrometer housing is connected to the signal ground via a 0.1µ F/50V capacitor. Isolate any unused wires in order to avoid the display of erroneous data.

4.3 Assembly fibre optic cable (PA 81)

One end of the optical fibre has a name plate showing the serial number of the corresponding basic pyrometer. This is the end which must be screwed onto the pyrometer. For proper connection, the arrow on the name plate of the fibre optic cable and the arrow on the pyrometer should point toward each other. The serial number of the measuring head should also correspond to the pyrometer.

General Remarks:
The fibre optic cable must not be exposed to tensile load and must not be twisted. The minimum bending radius is 125 mm.

4.4 Power Requirement 24 V DC

The instrument works with an operating voltage of 24 V DC. The voltage required for operation must be supplied by a separate power supply. This power supply unit must conform to directive DIN IEC 61010.

The supply voltage is ≤ 135 mA for standard design, ≤150mA for models with laser sighting. CellaTemp PA is equipped with inverse polarity protection. The output currents and voltages share one ground connection via pin 8 of the connector.

A self-test is performed when the instrument is switched on. The display will briefly indicate the software version and after that the emissivity setting. When the self-test is completed the pyrometer is ready for operation and the display will show the current temperature reading.

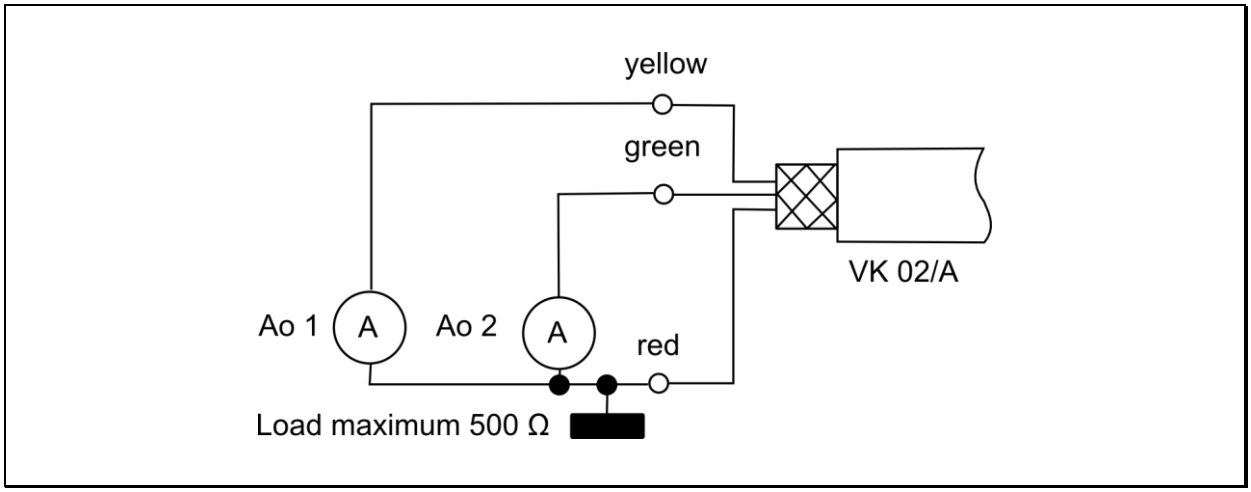
☞ NOTE !

In order to achieve a high degree of measurement accuracy and repeatability it is important to allow the pyrometer time to warm up. Turn the power supply on about 10 minutes before starting. We recommend that you protect the feed line to the pyrometer against short circuit by using a 250 mA microfuse.

4.5 Current Outputs 0/4 - 20mA

CellaTemp PA features two current outputs. Both of these outputs are active current sources which supply linear output current. The user can select between two scales: either 0 - 20 mA or 4 - 20 mA. Maximum load is 500 Ω.

The two current outputs are factory preset to 4 - 20 mA !

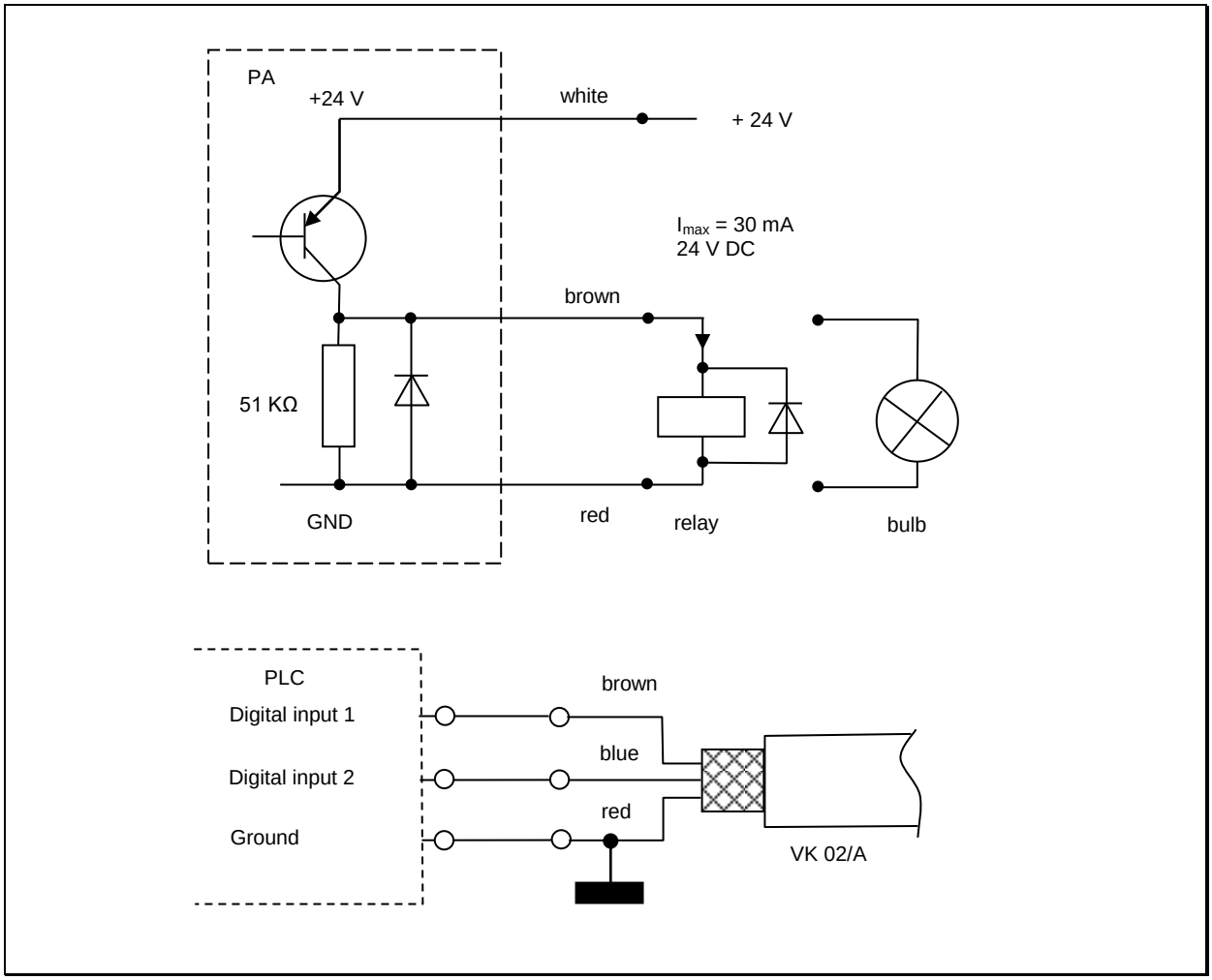


For all pyrometers of the PA Series the current outputs are short-circuit-proof and share one ground connection via pin 8 of the connector. Each current output can be individually scaled and can be set either at the display or via interface.

When only one current output is required, Output 1 should be selected (Pin 4)

4.6 Switching output

All pyrometers of the PA Series feature two switching outputs which can be configured as digital outputs or digital inputs. The open collector outputs allow for a voltage of +24 V DC. For signal processing a pull-down resistor can be applied to the ground connection of the supply voltage. The maximum current of each open collector output is 30 mA.



See Chapter 10.2 for more information configuration.

5 Getting Started

5.1 General installation tips

Install the pyrometer in a location where it will not be unnecessarily exposed to smoke, ambient heat or water vapour.

The pyrometer's optical path must remain unobstructed. Any interference or obstacle may lead to measurement errors.

5.2 Pyrometer Alignment to Target

For accurate temperature measurement, it is essential that the pyrometer is correctly aimed and focused on the target object. Make sure that the optical path is not obscured because this would most likely impair accuracy.

5.2.1 Aiming PA 80/83

When aiming the pyrometer with through-the-lens sighting to a target, both the targeted object and the target marker (distinctly marked rectangular spot in the viewfinder) must appear in sharp focus simultaneously.

☞ NOTE !

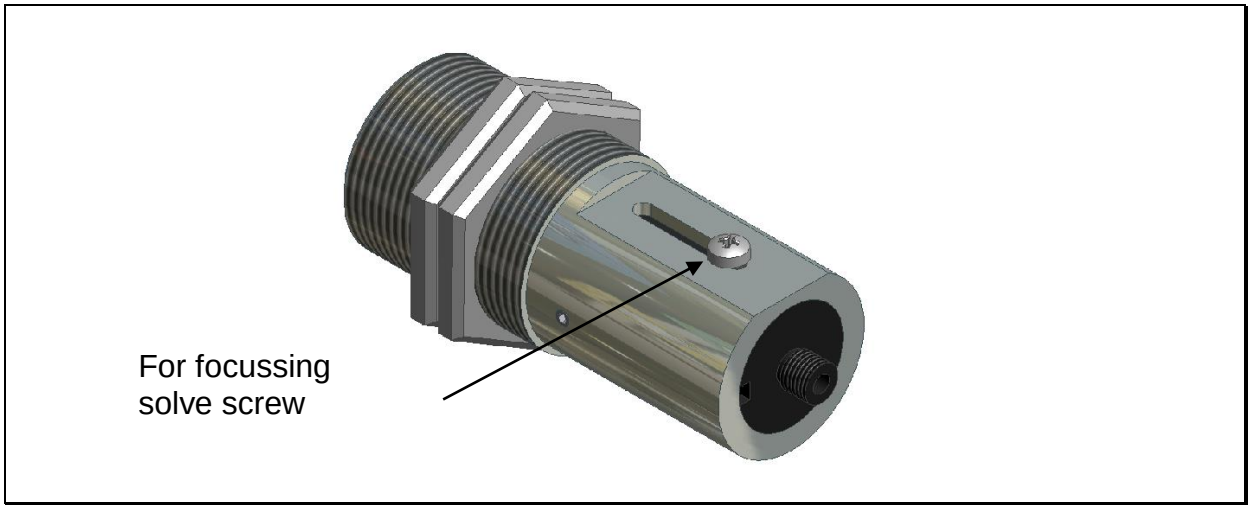
The PA 80/83 is equipped with a variable polarising filter to control brightness and provide eye protection. Aiming PA 81

A laser spot light, which can be switched on and off by means of a mode-button for 2 s on the rear side of the pyrometer, serves as a sighting aid. It will automatically switch off after configured time.

For focal adjustment loosen the shown socket screw (hexagon socket screw DIN 916) with a wrench (DIN 911) and shift the internal body of the tube towards the lens tube.

Due to the O-ring sealing between the internal body of the tube and the lens tube the focal adjustment must be carried out very slowly so that the air pressure in the space between lens and internal body of the tube can be be equalised.

Focus the sensing head until the spot light is shown as a sharp round laser spot in the target area. In bright daylight or in an excessively lit environment it is recommendable to dim the area around the target.



5.3 Pyrometers with laser sighting

The pyrometer model PA 83 /L feature a laser spot light which can be activated to facilitate instrument alignment to the target spot.

Under normal operating conditions the laser will be off. To activate the laser, press the MODE button on the rear panel for 2 seconds. Alternatively, the laser can be switch on via switching input or PC. The laser will automatically deactivate after 1- 15 minutes.

The pyrometer should be aimed and focused in such a way that—at the proper distance to the target object—the laser beam produces a razor-sharp round dot.

☞ NOTE !

For pyrometers featuring an integrated laser spot light, the light may, when activated, influence the instrument's temperature reading. This influence will vary, depending on the instrument model and the temperature. To ensure an accurate and reliable temperature reading, the laser spot light will automatically deactivate after approximately 1- 15 minutes. The time is adjustable.

The laser is automatically protected against capacity overload by a protective circuit. When the pyrometer's internal temperature exceeds 40 °C the laser will blink. Blinking becomes more rapid as the temperature increases. The laser will automatically shut off and cannot be reactivated when internal temperatures exceed 65 °C. The F1 LED will light up to indicate that the laser is activated. Likewise, the LED will extinguish when the laser is deactivated.

5.4 Safety instructions and precautions

The user must be familiar with following safety instructions.

5.4.1 Laser Radiation Hazard

Laser radiation can be harmful to the eye!

CellaTemp PA operates with a class 2 red light laser. Direct prolonged viewing of a laser beam can injure the retina. Therefore, the following safety precautions must be strictly observed, otherwise the laser may not be operated!

- Only use the laser to align and focus the pyrometer. Deactivee the laser immediately afterwards. Alternatively, the laser will automatically switch off after 1 - 15 minutes.

- Never look directly into the laser beam path.
- Do not leave the instrument unattended when the laser is activated.
- Do not point the laser beam at any person.
- During pyrometer installation and alignment, make sure to avoid the possibility of laser light reflections caused by reflective surfaces.
- All currently valid laser safety standards must be observed.

5.4.2 Laser Power

The laser operates at a wavelength of 630 - 680 nm (visible red light). The emitted power of the laser beam at the lens opening is max. 1.0 mW. Under normal operating conditions, the emitted radiation is not hazardous to human skin. This laser product is classified according to laser class 2, EN60825-1, IEC60825-1.

5.4.3 Laser Warning Label

The black and yellow laser warning label is affixed next to nameplate of the instrument. An arrow indicates the laser emission path (lens opening).

Fig. 5.2 Laser warning label affixed to the pyrometer

5.4.4 Laser warning label must be visible!

If the pyrometer is installed within a machine or equipment in such a way that the instrument's warning label is visibly blocked, additional laser warning labels (not included in scope of delivery) must be affixed to the equipment or accessory in immediate vicinity to the laser beam emission path opening.

5.5 Pyrometer with camera

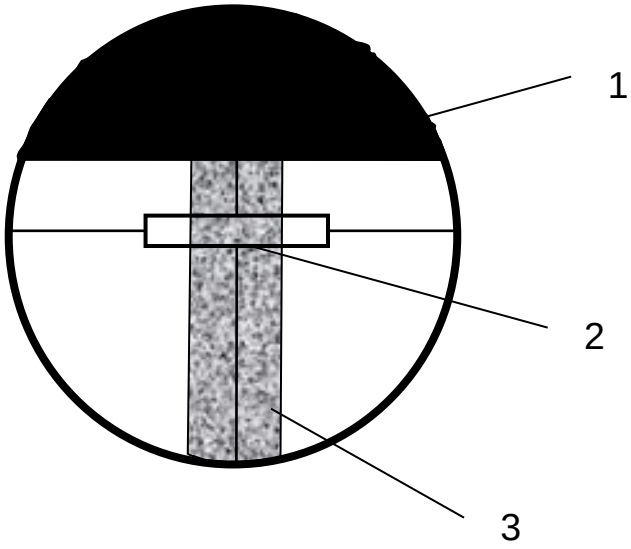
The models PA xx AF xx /C features an integrated camera.

The video feed simplifies the optical alignment of the pyrometer and allows for continuous observation of the measuring point.

When aiming the pyrometer focus the sensing head until the video images is sharp. (Technical data see chapter 25)

5.6 Alignment of the pyrometer

When aiming the pyrometer, make sure that the targeted object (the molten metal stream) is in the center of the rectangular measurement area. The pour stream must be wide enough so that it fills up at least 30% of the measurement area.



1) discharge spout
2) measurement area
3) target object (molten stream)

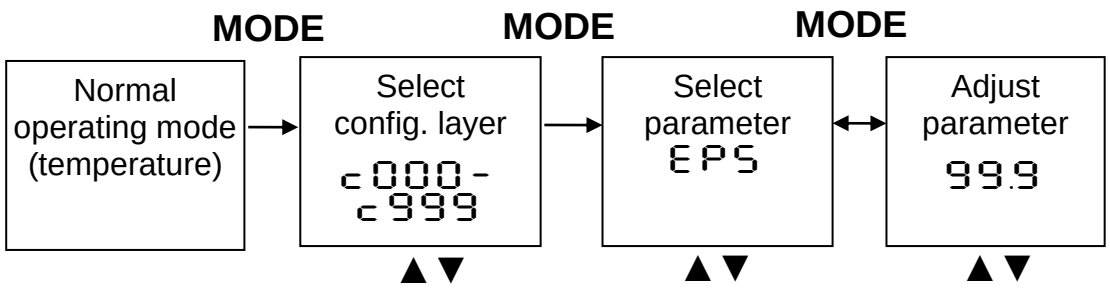
6 Setting parameters at the pyrometer (basic configuration)

Use the buttons ▲▼ and the „MODE" button on the rear panel to access and configure parameters. With these buttons you can view and adjust all settings required for operating the pyrometer. (See Chap. 3.1).

☞ NOTE

The pyrometers are configured for the respective measurement task. You can find the parameters set in the chapter default settings.

Menu structure:



1. Press the MODE button while in normal operating mode to switch to "configuration layer" mode.
2. Use ▲▼ to select the configuration layer for the parameter you wish to set.
3. Press MODE to confirm. Press ▲▼ to select the particular parameter.
4. Press MODE to confirm. Press ▲▼ to adjust the parameter value.
5. Press MODE again to end. Press ▲▼ to select End/SAvE.

6. Now use MODE to either apply the changes you have made to the settings [SAvE] or to close without saving these changes [End]. After that, the display panel will resume showing the temperature reading.

Parameter	**configuration layer**	**Explanation**
EPS.9	c001	Ratio correction (see chapter 6.1)
Ao1._	c010	Lower limit of temperature span analogue output Ao1 (see chapter 6.2)
Ao1.¯	c010	Upper limit of temperature span analogue output Ao1 Ao1 (see chapter 6.2)
Ao1.4	c010	Hardware configuration of the analogue output 0-20 mA, 4-20 mA Ao1 (see chapter 6.2)
Ao1.t	c100	Temperature measurement simulation to verify signal transmission. Ao1 (see chapter 6.3)

NOTE !

Key lock may have been activated at the terminal. When selecting the configuration layer you will be prompted to enter an access code with P000 . To obtain full access to parameter settings, enter P 100 otherwise you will only be able to view parameters but not change them.

6.1 Setting the Emissivity Ratio (two-colour/ratio mode)

Use the emissivity correction feature to make sure the pyrometer's temperature reading indicates the actual amount of infrared energy emitted by the target object.

Use a thermocouple to verify the temperature reading and adjust the emissivity until the pyrometer indicates that temperature.

NOTE !

During normal operating mode, the emissivity ratio can be set at the pyrometer using the ▲▼ buttons. When simultaneously pressing the MODE key, the display shows the current measuring temperature while the emissivity ratio coefficient continues to be adjusted in the background. This is an easy way to determine the emissivity ratio when the object temperature is known. The modified values are directly adopted.

CAUTION!

Once you have configured the emissivity ratio parameter, the pyrometer will maintain this specific setting. The pyrometer will always operate with this value unless you change the setting.

6.2 Output current range

For the pyrometer's two analogue current outputs, select the current loop scale – (0 - 20 or 4 – 20 mA)—which matches that of the downstream signal processing equipment (PLC, display device, controller, etc.). At the pyrometer and at the controller, set the upper and lower limits of the temperature range and the current loop output signal. Access this setting using configuration layer c0 10 .

6.3 Simulated current signal for functional testing

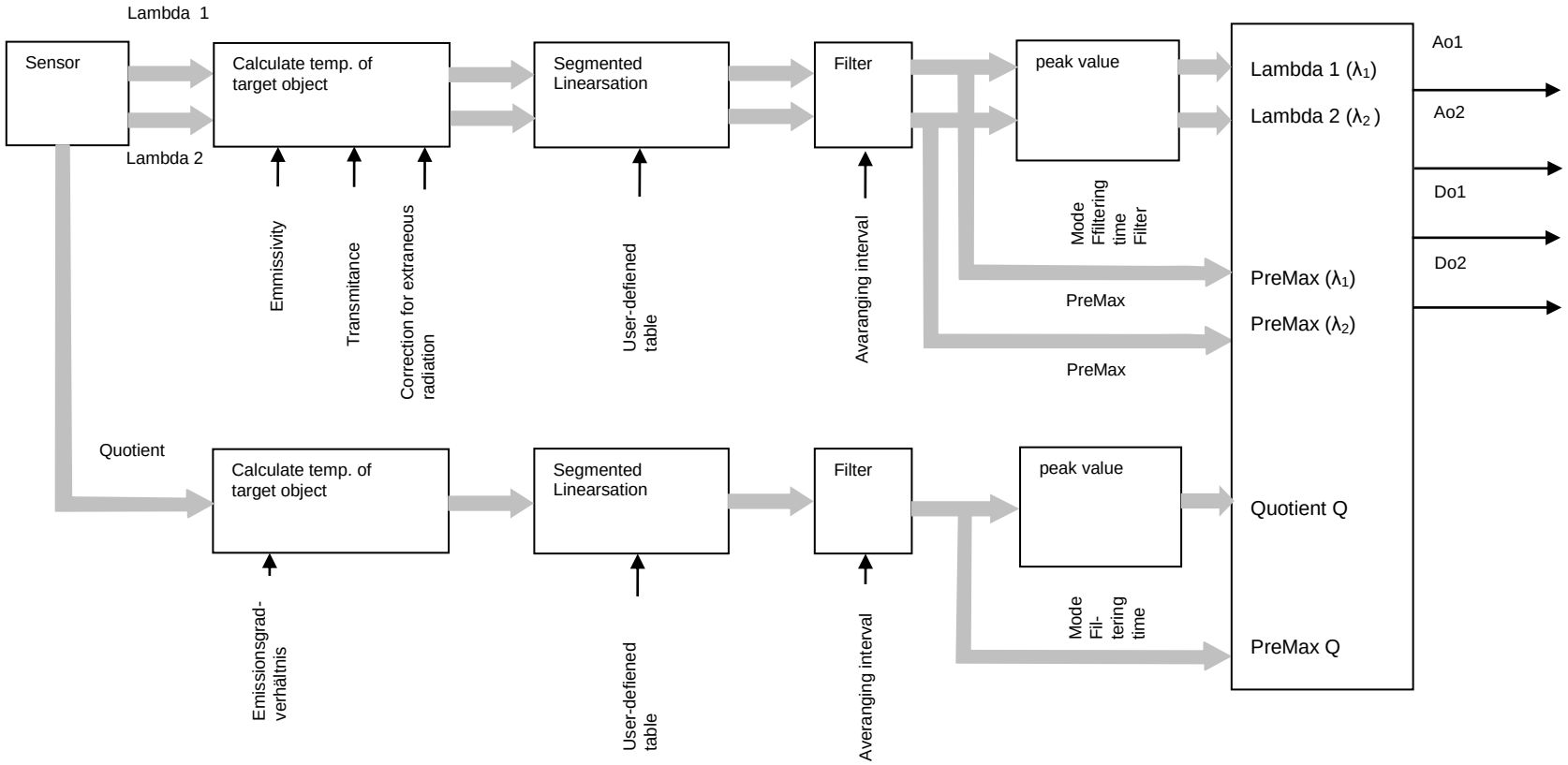
After initial installation, you should perform a function test to verify that temperature data is correctly transmitted to the controller. To do so, use the push-buttons on the pyrometer rear panel to simulate a temperature reading, which is applied as an output current signal scaled to the selected current range. The appropriate parameter can be accessed via configuration layer c 100

If the pyrometer is set up correctly, the downstream controller should indicate the values you have entered (only within the scaled range). If there is a discrepancy, please check the current range scale or the cable connection.

When you have completed the function test, exit by pressing "ESc" and return to normal operating mode.

7 Functioning of the pyrometer

7.1 Internal signal processing



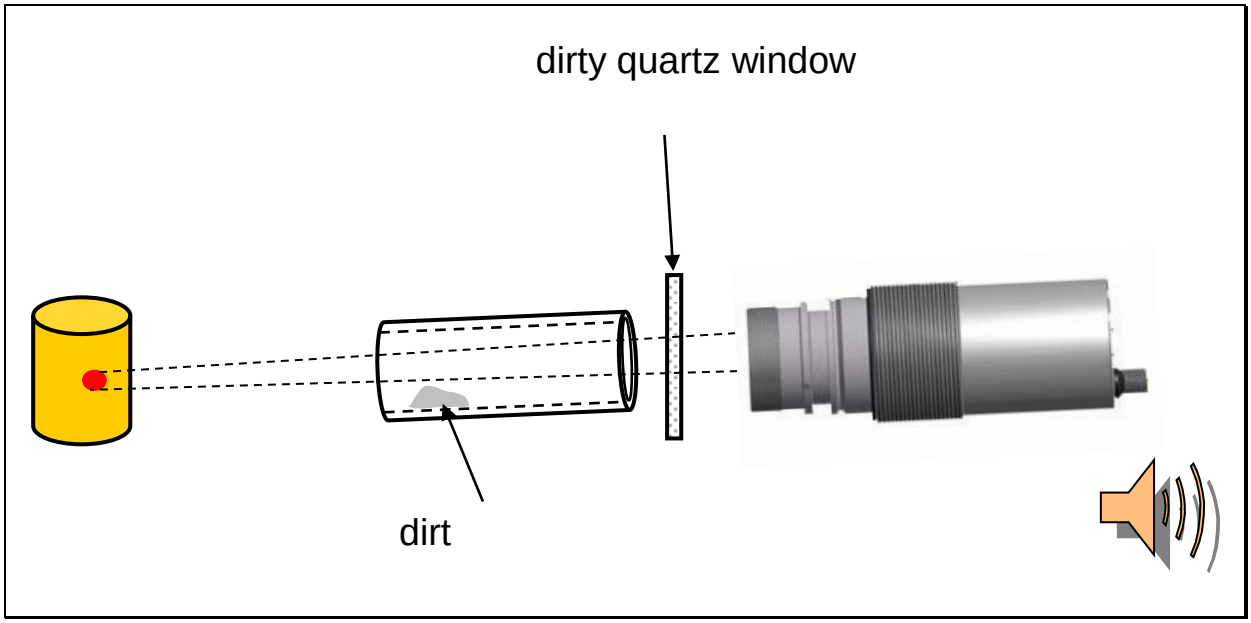
8 Configuration and Setup

8.1 Dirt Alert (two-colour/ratio mode)

CellaTemp PA 8x pyrometers feature an integrated contamination detection function. The pyrometer detects when the lenses of the optical system become too dirty or the field of view is impaired. Parameter d i r t activates this function. (‚Dirt Alert'). If signal attenuation exceeds a user-defined threshold, an alarm will trigger.

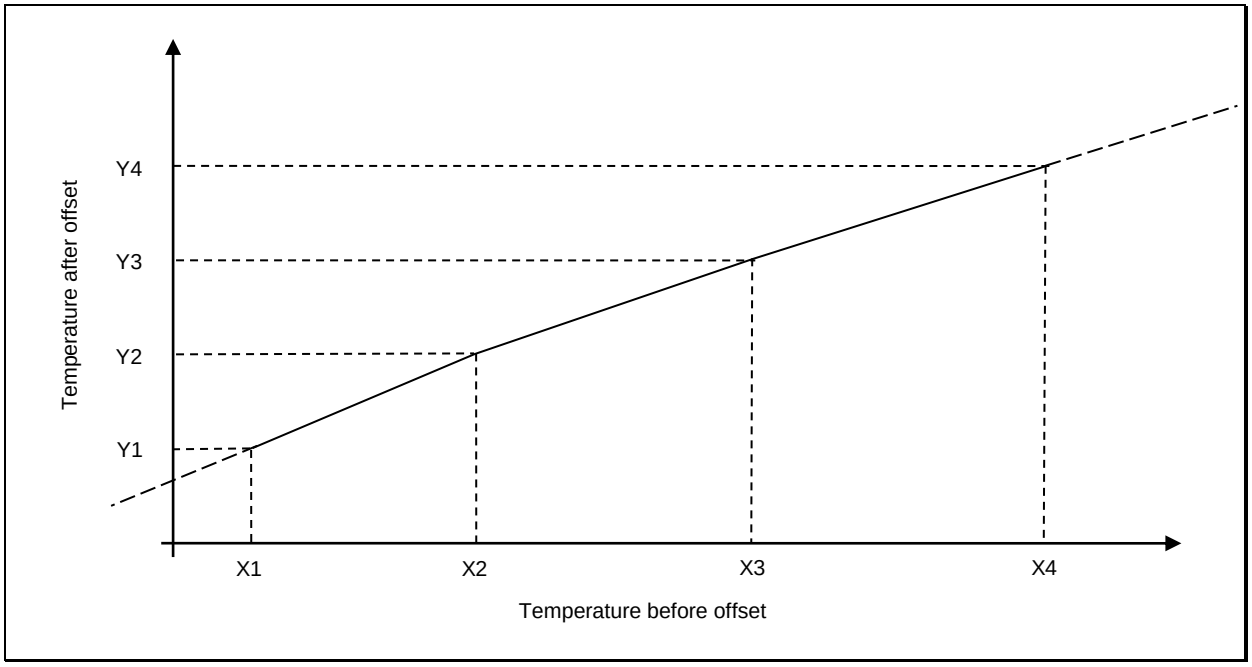
NOTE !

The ‚Dirt Alert' parameter should be set to 0.5 * signal-intensity.



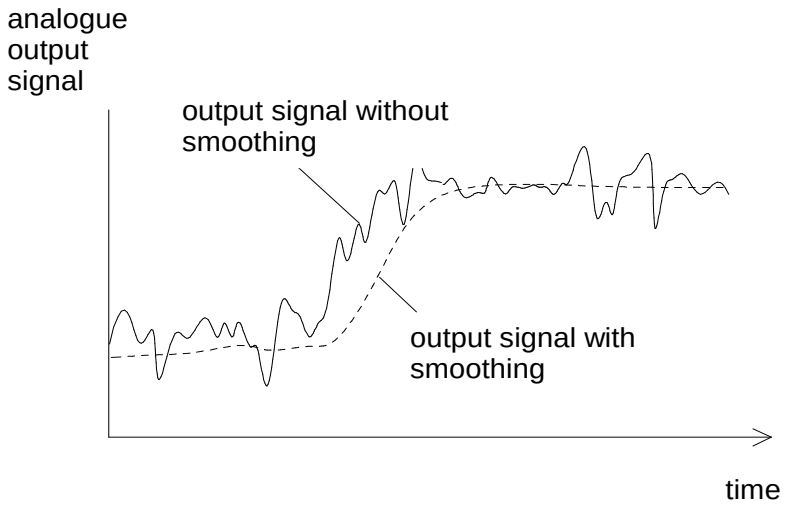
8.2 Temperature offset using linear interpolation

When necessary, CellaTemp PA allows you to program an offset for the temperature reading reported. The offset correction can be configured individually with a minimum of 2 and a maximum of 10 interpolating points (X/Y nodes). This information is stored in a user-defined temperature-indexed lookup table and used for signal conditioning. For values lower than the 1st node and higher than the last node, the first and last linear segments are extrapolated. Enter the nodes in ascending order. Use the rear panel display to access this function via c O O 1 / L i n.9.



8.2.1 Signal Smoothing Filter

When the target object's temperature is erratic, it makes sense to smooth these temperature fluctuations in order to stabilize the signal. The greater the time constant $t_{98,}$ (user definable), the lower the effect of these fluctuations on the yielded temperature reading. The pyrometer's response time is proportional to the time constant. Set for example signal smoothing via parameter c001/F.L9 for two quotient temperature.



9 Automatic temperature detection (ATD) function

9.1 Measurement at the pouring stream

This function serves to automatically detect the temperature during manufacturing processes with discontinuous or intermittent material flow, for example molten metal casting at foundries. First, define the sampling time and the upper and lower temperature limits. These limits or thresholds define the temperature range within which you wish to detect the temperature. It is also possible to determine the average temperature value over the course of multiple measuring cycles.

The start of a measuring cycle is determined automatically and is dependent on the following variables.

Limit 1 (L 1)	Before beginning the measurement, the temperature reading must have been lower than Limit 1 at least once. If Auto reset (ArSt = on) the limit 1 will be ignored
Limit 2 (L 2)	Limit 2 must be exceeded at least for the duration of the time delay (t.del).
Time Delay (t.dEL):	See above

When the conditions are fulfilled, the sampling time will begin. (t.Act).

Sampling time (t.Act)	During the sampling time the temperature is detected and stored as a temperature value.


NOTE !

If the parameter t.Act = 0 the algorithm of the ATD function will detect automatically the end of the discontinuous process. At the parameter t.Act is shown “auto” instead of the time.

The configuration of the Normal Display Mode (Ano) determines which temperature value is saved during sampling

Display mode (Ano)	„t=0“ displays the lower temperature range limit during the measurement. „t.hLd“ indicates the previous temperature reading during the current measurement.

As an option, the green Status LED can light up or the digital output can be used to indicate sampling.

When the sampling time has ended, an average value is calculated for recorded measuring cycles. The temperature reading is weighted with the previously saved average value and added.

Weighted average (F-Pr)	Factor for average weighting. If you choose 100%, averaging will be off.

The smaller you set the F-Pr factor, the stronger the weighting will be.

When the averaging function is activated (F-Pr <100%) a plausibility check will be performed. The difference in temperature between the current reading and the previously stored average is determined. If this deviation is higher than the plausibility threshold tSP, the transmitted data will be „0“ and the average value will remain unchanged.

Plausibility (tSP_)	Lower threshold for permissible deviation

Plausibility (tSP¯)	Upper threshold for permissible deviation

When sampling is completed, the average temperature value or „0“ will be output. At the same time, an impulse is generated which can be used for the digital outputs. Enter MAn.9 as the source and set the hold time to 0.5 s.

A cut-off interval (time lag) begins after the sampling time has ended. This cut-off interval must expire before the next measurement can start with the cycle starting conditions described above.

Cut-off interval (t.d .S)	The interval between one completed sampling and the start of a new sampling..

If a measuring cycle does not start during the period t.out, the saved average will be deleted and reinitialized when the next cycle begins.

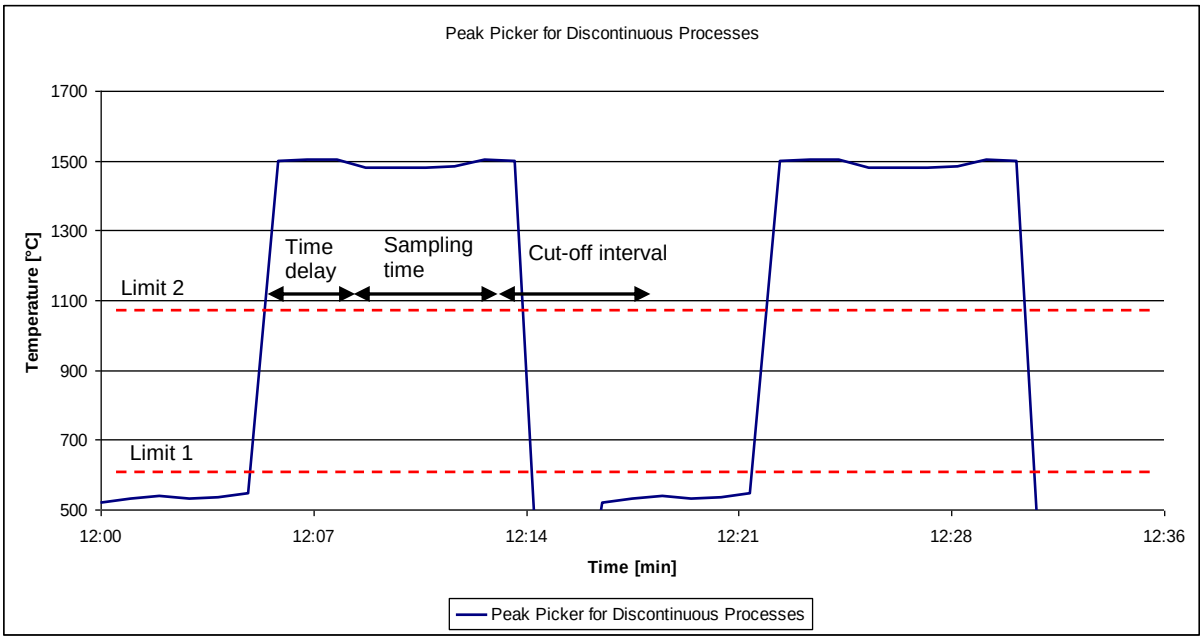
Timeout (t.oUt):	Time cycle for deleting average value (in minutes)

Activate auto reset for the ATD function to run cyclically. Limit 1 will then be ignored. Measurement continues when the Limit 2 is exceeded for the period configured with t.dEL .

Auto reset (A.rSt):	Auto reset on/off

If, during the measurement, the temperature reading falls below Limit 2, the measurement will be dismissed.

Set Li2 check on tAct (chL.2)	on/off



9.1.1 Standard Configuration

Function	**Parameter**	**Value**
Measure range /scaling I a1		650 – 1700 °C

Source Ao1	Ao 1.S	9 Quotient
Ao1 define lower limit of temp. span	Ao 1._	650 °C
Ao1 define upper limit of temp. span	Ao 1.^	1700 °C
Ao1 ➔ 0/4..20mA	Ao 1.4	4-20 (4-20 mA)
Function green status-LED	LEd.6	tAc9 indicates running measurement in ATD quotient function

9.1.2 Configuration during initial operation

		Stationary measurement		Mobile measure-ment
		Discontinuous pour < 60 s	Continuous pour > 60 s	
Function	**Parameter**	**Value**		
Display mode during der Sampling time	Ano	t = 0 lower limit of temp. span	t.hLd last temp. reading	t = 0 lower limit of temp. span
Auto reset	A.rSt	off	on	off
Average weighting	F-Pr	90 %	75 %	99 %
Sampling time	t.Act	0 s *1	0 s *1	0 s *1
Time delay	t.dEL	1 s		0.5 s
Li2 check on tAct	chL.2	oFF (off)		on (on)
Timeout	t.oUt	2 min *2 (< interval between two ladles)		

*1 Paramter t.Act = 0 only available from software version 1.69. Applies to older version Sampling time = shortest pour time - time delay - 1 sec. Ideally, sampling should be finished before the end of the pour. When pour times vary, set the sampling time commensurate to the shortest pour time likely to occur.

*2 Timeout must be shorter than the interval between two ladles.

9.1.3 Material-specific parameter settings

Set parameters either using the buttons on the instrument's rear panel, or at a PC using CellaMevis software.

Function	Parameter	Default value
Emissivity ratio correction e1/e2	EPS.9	101 (grey pig iron) 104 (spheroidal graphite iron)

Perform a comparison measurement using a thermocouple to determine the exact temperature. Use this value to set emissivity.

Lower limit of range for switch signal (only available for "range" function)	do 1._	To be set via PC or rear panel
Upper limit of range for switch signal (only available for "range" function)	do 1.¯	To be set via PC or rear panel

9.2 Further ATD configuration

Function	Parameter	Value
Smoothing time	F iLt	500 ms
Plausibility check ratio mode	chr.9	M in
Relative limit min.	chr._	5 %

Min/Max memory	MEM.9	Atd (ATD function)
Cut-off interval	td iS	0 s
Limit Li 1	L i. 1	1100 °C
Limit Li 2	L i. 2	1200 °C
Plausibility threshold lower limit	tSP_	50 K
Plausibility threshold upper limit	tSP¯	100 K

9.2.1 Configuration of limit switches

Switching output 1

Switching output 1 (activates when temp. reading is higher or lower than limit)	do 1.	on (on)
Source	do 1.S	9 Quotient (ratio)
Function	do 1.F	rnG. Switch direction of “Range” function (output actived if limit is exceeded)

Switching output 2

Switching output 2 (active during sampling)	do2.	on (On)
Source	do2.S	AAc9 Measuring time ATD
Function	do2.F	LuL. Switch direction of “Level” function (output is actived if limit is exceeded)
Hold time	do2.n	0.2 s

9.3 Measurement of a runner or in the furnace

Function for automatic measurement of molten metal in a runner or in a furnace.

Parameter	Function	Default	User configuration
EPS.9	Ratio correction	100 %	
chr.9	Plausibility check ratio mode	n in	
chr._	Relative limit Min.	5 %	
F iL.9	Smoothing filter	On	
F iL.t	Smoothing time	500 ms	
nEn.9	Min/Max memory	dbL.n double maximum	
nEn.t	Hold time for Min/Max	20 s	
F iL.n	Smoothing filter for min/max	on An	
F iL.t	Smoothing time	10 s	

10 I/O Configuration

10.1 Selectable current output range

You will need to define the current loop scale and define a source for an analogue output signal. For a spectral pyrometer, you can select one of the following signal sources for analogue output Ao1:

- Quotient
- Lambda 1
- Lambda 2

In the normal operating mode, the selected source for Ao1 will be the current object temperature.

The second analogue output Ao2 offers additional the following option:

- Quotient temperature before Min/Max memory
- Lambda 1 temperature before Min/Max memory
- Lambda 2 temperature before Min/Max memory
- Signal intensity
- Internal device temperature

Configure the scale of each of the two analogue outputs separately. Define the temperature span by adjusting the upper and lower limits of the measuring range. Select either 0 – 20 mA or 4 – 20 mA as the current output range. The temperature to current conversion is linear.

The desired current output range of either 0 – 20 mA or 4 – 20 mA can be configured as an absolute setting. Alternatively, the current range can be coupled to the specific voltages of Switching Output 1 or 2 .

- 0 V -> 0—20 mA
- 24 V -> 4—20 mA

Make these settings in configuration layer `c0 10` with parameters `Ao 1.S`, `Ao 1._`, `Ao 1.-` und `Ao 1.4` for analogue output 1, and in the same manner for analogue output 2.

Configuration example PA 83:
Ao1: temperature reading of Lambda 1
650 - 1700 °C ≡ 4 - 20 mA

Ao2: internal device temperature
0 - 100 °C ≡ 4 - 20 mA

It is also possible to configure analogue output 2 with a sub-range which covers a portion of the temperature span assigned to analogue output 1:

Configuration example PA 83:
Ao1: temperature reading of Lambda 1
650 - 1700 °C ≡ 4 - 20 mA

Ao2: temperature reading of Lambda 1
1000 - 1500 °C ≡ 4 - 20 mA

10.2 Digital outputs

One of the following functions can be assigned to each of the digital outputs:

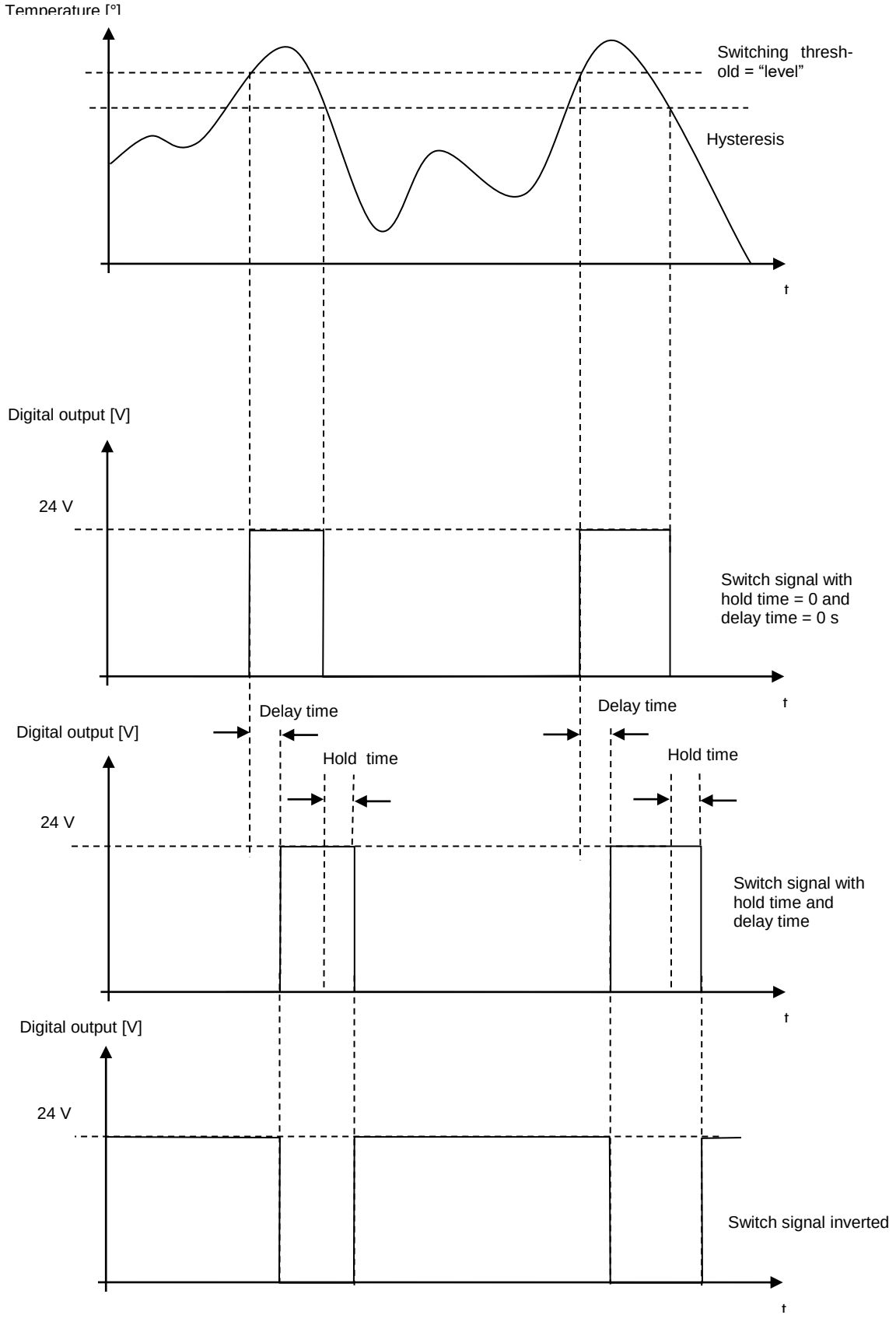
- **Deactivate** (This is required when you want to use the digital output as digital input).
- **Status LED** lights up to indicate that the temperature reading of Lambda 1 lies within the pyrometers available temperature range.
- **Limit switch** with adjustable signal threshold:
  - Quotient
  - Quotient before Min/Max before memory
  - Lambda 1
  - Lambda 1 before Min/Max
  - Lambda 2
  - Lambda 2 before Min/Max
  - Dirt Alert
  - Signal intensity
  - Internal device temperature

- **Status Signal** ATD function.
  - Triggered by ATD function Lambda 1 at the end of the measuring time
  - Triggered by ATD function Lambda 2 at the end of the measuring time
  - Triggered by ATD function ratio mode at the end of the measuring time
  - ATD function Lambda 1 indicate the measuring time
  - ATD function Lambda 2 indicate the measuring time
  - ATD function ratio mode indicate the measuring time

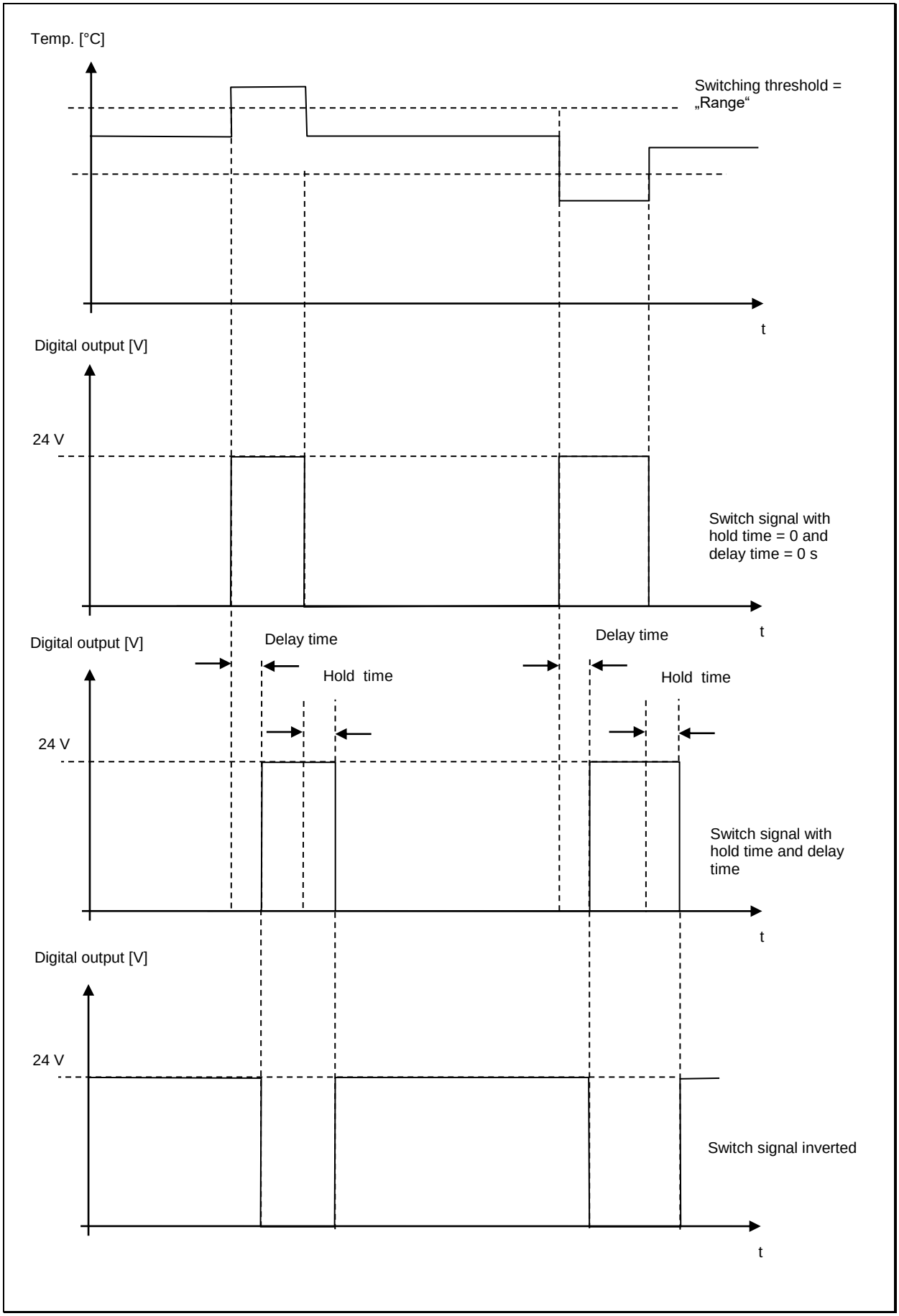
When the digital output is to be used as a limit switch, you can configure the following parameters:

- Signal source
- Signal function and direction
- Limit and hysteresis at function „level“
- Lower / upper limit at function = “Range”
- Delay time
- Hold time

10.2.1 Function „Level“



10.2.2 “Range” Function



10.3 Digital inputs

If you want to use the digital output as an input, you must first manually deactivate the digital output and configure the following parameters:

- Select a current output range (either 0 – 20 mA or 4 – 20 mA) for Ao1/Ao2
- Delete the temperature readings in Min/Max or DoubleMax
- Define whether the laser will be event-triggered This only applies to models with built-in laser.

10.4 Analogue input to control emissivity ratio (two-colour/ratio mode)

Sometimes particular process conditions will require that the ratio of the two emissivies be changed from a remote source such as by external control. This can be achieved using the analogue input. First, manually deactivate the current output 2. Then go to configuration layer c0 10 and assign parameter A.Fn with your selected application.

10.5 General functions (configuration layer c0 11)

10.5.1 Green Status LED

You can assign specific functions to the LED:

- LED is continuously lit to indicate 24 V operating voltage
- LED indicates status of switching output 1
- LED indicates status of switching output 2
- LED indicates the sampling time of the ATD function

Set the function using parameter LEd.6.

10.5.2 Activate Laser

To activate the built-in laser, there are several ways in which it can be activated. Configure parameter P.Lo with the particular method you have selected:

- Activate using button on rear panel
- Permanently off
- Edge-triggered: based on signal input (0 -> 24V transition)

☞ NOTE !

Do not attempt to operate the laser continuously. The built-in laser is not designed for continuous use. When the user-defined laser auto-shutoff time is reached (maximum programmable duration = 15 minutes) the laser will automatically switch off. When the ambient temperature exceeds 55°C the laser will automatically deactivate.

10.5.3 Video camera settings

Pyrometer models with an integrated video camera feature the following operating modes.

Target Brightness Control (TBC) settings

- Exposure control only applies to the measurement area. (cLbc = on)
- Exposure control applies to the entire field of view. (cLbc = off)

As a standard, the target brightness control feature works in the target area to show bright objects against a dark background or dark objects against a bright background with an ideal brightness.

White Balance

White balance basically means colour balance. It is a function which gives the camera a reference to "true white" — it tells the video camera what the colour white looks like, so the camera will record it correctly. Since white light is the sum of all other colours, the camera will then display all colours correctly. If the video camera does not find a neutral reference, it might produce an image with a colour imbalance. (setting cCoL = „Automatic“).

The video camera can compensate for ambient illumination conditions. The camera’s light sensitivity adapts dynamically to the brightness of the actual target object captured within the rectangular measurement area.

The user can manually select the colour temperature of the light source. In that case the video camera will not perform automatic white balance (cCoL = dAyL daylight).

Superimposed Temperature Reading

The current temperature reading can be superimposed on the video camera's image. Use the setting c.oUL. to select or deselect this function.

10.6 Simulate current signals for analogue output Ao1 and Ao2 (configuration layer: c 100)

CellaTemp PA features a function to simulate a temperature reading. This is especially useful after initial setup to verify that temperature data is correctly transmitted to the controller. Use the push-buttons on the pyrometer rear panel to simulate a temperature reading, which is applied as an output current signal scaled to the selected current range. The appropriate parameter can be accessed via configuration layer c 100. If the pyrometer is set up correctly, the downstream controller should indicate the values you have entered (only within the scaled range). If there is a discrepancy, please check the current range scale or the cable connection. When you have completed the function test, exit by pressing "ESc" and return to normal operating mode.

11 Setting Parameters at the device

11.1 Configuration level

In addition to the configuration possibilities described in Chapter 7, many parameters can be adjusted at the rear panel using push buttons. These settings can be accessed via configuration layers. The configuration layers are structured as follows:

- c001 Temperature measurement via two-colour/ratio mode
- c002 Temperature measurement via Lambda 1
- c003 Temperature measurement via Lambda 2
- c010 I/O configuration
- c011 General functions
- c020 Display temperature readings
- c100 Simulated current signal for outputs Ao1 and Ao2

The following chart lists all parameters. Certain parameters will be suppressed at the rear panel display if the prerequisite function is deactivated. For example: the smoothing time cannot be configured when signal smoothing is not activated.

11.1.1 Temperature measurement using two-colour/ratio mode (Configuration layer: c001)

Parameter	Function	Explanation
EPS.9	Ratio correction	Emissivity Ratio
chr.9	Plausibility check ratio mode	oFF off Min deactivation when below limit MinMA deactivation when below or above limit
chr._	Relative limit min.	Relative lower limit [%] , two-colour temp. reading invalid (signal intensity)
chr.¯	Relative limit max.	Relative upper limit [%] , two-colour temp. reading invalid (signal intensity)
chAt	Absolute min. temp.	Absolute lower limit, two-colour temp. reading invalid
chA'i	Absolute minimum Emissivity	Absolute lower limit [%], two-colour temp. reading invalid
Lin.9	Temperature offset using linear interpolation (user configurable table)	oFF off 2- 10: number of nodes used
L. x 1	Node x 1 - 10	Signal input (initial value) node n
L. y 1	Node y 1 - 10	Signal output (resulting value) node n
FiL.9	Smoothing filter	oFF on
FiLt	Smoothing time	Time in seconds t98
MEM.9	Min/Max memory	oFF Off Min lowest (min.)temperature, single MAX highest (max.) temperature, single dbLM double maximum dbLc Double Peak picker Combined diSM ATD function **
MEMt	Hold time for Min/Max	Hold time in sec. (only avaiable, if Double Maximum memory filter is active)
FiLM	Smoothing filter for min/max *	oFF off on on
FiLt	Smoothing time *	Time in seconds t98
cLrM	external delete for Min/Max memory	oFF no external deletion EXt.1 delete when 0-24V for switching output 1 EXt.2 delete when 0-24V for switching output 2
t.dEL	Time delay	For ATD function, see Chap. 9
t.Act	Sampling time	For ATD function, see Chap. 9
t.di.S	Cut-off interval	For ATD function, see Chap. 9
t.oUt	Timeout	For ATD function, see Chap. 9
Li. 1	Limit 1	For ATD function, see Chap. 9
Li. 2	Limit 2	For ATD function, see Chap. 9
F-Pr	Average weighting	For ATD function, see Chap 9
tSP_	Plausibility Threshold	For ATD function, see Chap. 9
tSP-	Plausibility Threshold	For ATD function, see Chap. 9

Ano	Display mode during der Sampling time	t=0 show lower limit of temp. range during running measurement thLd Hold previous temp. reading during running measurement
A.rSt	Auto reset	For ATD function, see Chap 9
chL2	Set Li2 check on tAct	For ATD function, see Chap. 9
SAvE	Save	Save changes / exit menu
ESc	Escape	Discard changes / exit menu

* Only available with Min/Max and Double Max modes

11.1.2 Temperature measurement using one-colour/spectral channel (configuration layer: c002/c003)

Parameter	Function	Explanation
EPS.1	Emissivity factor L1	
tAU.1	Transmission factor L1	
bAc.1	Ambient temperature compensation	
bAct	Temperature of ambient source of radiation	
bAc.1	Influence of ambient IR radiation	The reflected thermal radiation from the surroundings as a portion of the total IR radiation collected by the sensor in %
L in.1	Temperature offset using linear interpolation	oFF off 2 - 10: number of nodes used
L. x 1	node x 1..10	Signal input (initial value) node n
L. y 1	node y 1..10	Signal output (resulting value) node n
F.L.1	Smoothing filter	oFF smoothing not activated on simple smoothing AUto subsequent smoothing (only model PA1x)
F.Lt	Smoothing time	time t98 in sec.for simple smoothing
MEM.1	Min/Max memory	oFF off M.in lowest (min.)temperature, single MAX highest (max.) temperature, single dbLM double maximum d.SM ATD function
MEMt	Hold time for Min/Max	Hold time in sec.
F.LM	Smoothing filter for min/max*	oFF Off on On
F.Lt	Smoothing time*	Time t98 in sec.
clrM	external delete for Min/Max memory*	oFF no external deletion EHt.1 delete when 0-24V for switching output 1 EHt.2 delete when 0-24V for switching output 1

tdEL	time delay	For ATD function, see Chap. 9
tAct	meas. time activee	For ATD function, see Chap. 9
td iS	cut-off interval	For ATD function, see Chap. 9
toUt	timeout	For ATD function, see Chap. 9
L i. 1	Limit 1	For ATD function, see Chap. 9
L i. 2	Limit 2	For ATD function, see Chap. 9
F-Pr	Average weighting	For ATD function, see Chap. 9
tSP_	Plausibility threshold	For ATD function, see Chap. 9
tSP¯	Plausibility threshold	For ATD function, see Chap. 9
Ano	Mode of display	t=0 show lower limit of temp. range during running measurement tHLd Hold previous temp. reading during running measurement
ArSt	Auto reset	For ATD function, see Chap 9
chL2	Set Li2 check on tAct	For ATD function, see Chap. 9
SAvE	Save	Save changes / exit menu
ESc	Escape	Discard changes / exit menu

* Only available with Min/Max and Double Max modes

☞ NOTE !

L1 stands for Lambda 1, meaning the temperature reading from Lambda 1

11.1.3 Configuration I/O (configuration layer: c0 i0)

Parameter	Function	Explanation
Ao1S	Ao1 select source	L1 Lambda 1 L2 Lambda 2 q ratio mode (quotient) (the selected temp. reading source will be shown on the display)
Ao1_	Ao1 define lower limit of temp. span	
Ao1¯	Ao1 define upper limit of temp. span	
Ao14	Ao1 0/4 - 20mA	0-20 0-20mA 4-20 4-20mA EHt1 digital input 1: 0V=0-20mA 24V=4-20mA EHt2 digital input 2: 0V=0-20mA 24V=4-20mA
Ao2.	Analogue output 2	oFF off on on
Ao2S	Ao2 select source	L1 Lambda 1 L1Pr. Lambda 1 without peak picker L2 Lambda 2 L2Pr. Lambda 2 without peak picker q Two-colour/ratio mode q. Pr. Two-colour/ratio mode without peak picker tU internal device temperature

		tEPS Emissivity Ratio
Ao2.L	Ao2 define lower limit of temp. span	
Ao2.H	Ao2 define upper limit of temp. span	
Ao24	Ao2 0 / 4 - 20mA	0-20 0-20mA 4-20 4-20mA EHt.1 Switch. input 1: 0V=0-20mA 24V=4-20mA EHt.2 Switch. input 2: 0V=0-20mA 24V=4-20mA
do 1.	Switching output 1	oFF Off on On
do 1S	Do1 select source	rdY Status LED indicates 'ready' L 1 Lambda 1 L 1Pr Lambda 1 without peak picker L2 Lambda 2 L2Pr. Lambda 2 without peak picker 2 Two-colour/ratio mode 2. Pr. Two-colour/ratio mode without peak picker tU Internal device temperature Inty. Signal intensity ntr.1 Triggered by ATD function Lambda 1 ntr.2 Triggered by ATD function Lambda 2 ntr.2 Triggered by ATD function two-colour/ratio mode dirt Dirt Alert AAc.1 Measuring time ATD Lamda 1 AAc.2 Measuring time ATD Lamda 2 AAc.2 Measuring time ATD two colour/ratio mode
do 1F	Do1 function	LoL. Switch direction "Level" (output actived if limit is exceeded) LoL.- Switch direction "Level" / output inverted rnG. Switch direction "Range" (output activated if limit is exceeded) rnG- Switch direction "Range" / output inverted
do 1t	Do 1 switching threshold	Switching threshold (only available at function "Level")
do 1h	Do1 signal threshold	Hysteresis +/- relative to signal threshold (only aviable at function "Level")
do 1.L	Do1 lower limit of range	Lower limit of range for switch signal (only available function "range")
do 1.H	Do1 upper limit of range	Upper limit of range for switch signal (only available function "range")
do 1L	Do1 delay time	See Chap. 10.2
do 1n	Do1 Hold time	See Chap. 10.2
do2.	Switching output 2	oFF Off onon
do2S	Do2 select source	rdY Status LED indicates 'ready' L 1 Lambda 1 L 1Pr Lambda 1 without peak picker L2 Lambda 2 L2Pr. Lambda 2 without peak picker 2 Two-colour/ratio mode 2. Pr. Two-colour/ratio mode without peak pick-

		er tU Internal device temperature Inty. Signal intensity Mtr.1 Triggered by ATD function Lambda 1 Mtr2 Triggered by ATD function Lambda 2 Mtr.9 Triggered by ATD function two-colour/ratio mode** d irt Dirt Alert AAc.1 Measuring time ATD Lamda 1 AAc2 Measuring time ATD Lamda 2 AAc.9 Measuring time ATD two colour/ratio mode
do2F	Do2 function	LoL. Switch direction “Level” (output active if limit is exceeded) LU.- Switch direction “Level” / output inverted rnG. Switch direction “Range” (output active if limit is exceeded) rnG- Switch direction “Range” / output inverted
do2t	Do 2 switching threshold	Switching threshold (only available at function “Level”)
do2h	Do2 signal threshold	Hysteresis +/- relative to signal threshold (only available at function “Level”)
do2_	Do2 lower limit of range	Lower limit of range for switch signal (only available function “range”)
do2-	Do2 upper limit of range	Upper limit of range for switch signal (only available function “range”)
do2L	Do2 delay time	See Chap. 10.2
do2M	Do2 Hold time	See Chap. 10.2
A.Fn	Analogue input function	oFF Analogue input deactivated EPS. Emmisivity for Lambda 1 via analogue input bAcE. Temp. ambient radiation via analogue input EPS.9 emissivity ratio
A.U1	Analogue in upper and lower voltage values	Define lower limit of voltage for input voltage (0 - 10V)
A.U2	Analogue in upper and lower voltage values	Define upper limit of voltage for input voltage (0 - 10V)
A.u1	Analogue in upper and lower input var-iables	Input of lower voltage value (example 100% for emissivity ratio)
A.u2	Analogue in upper and lower input var-iables	Input of upper voltage value (example 105% for emissivity ratio)
SAuE	Save	Save changes / exit menu
ESc	Escape	Discard changes / exit menu

NOTE !

Ao1 and Ao2 stand for Analogue Output 1 and Analogue Output 2
Do1 and Do2 stand for Switching Output 1 and Switching Output 2
Ain stands for Analogue Input

11.1.4 General Functions (configuration layer: c0 1 1)

Parameter	Function	Explanation
LEd.6	Green status LED	on LED indicates 24V do 1 LED indicates digital output 1 do2 LED indicates digital output 2 tAc 1 LED indicates running measurement in ATD function L1 tAc2 LED indicates running measurement in ATD function L2 tAc9 LED indicates running measurement in ATD function Quotient
P .Lo.	Activate laser*	.nt keypress oFF laser disabled t.d .1 edge-triggered, switching input 1 t.d .2 edge-triggered, switching input 2
P .L.t	Laser ON-time	1- 15: select auto laser shut-off in minutes
t.r.n.	Assign Interface	oFF non-terminal mode USb terminal mode at USB interface r485 Terminal mode at RS485 (Halbduplex)
A.Str.	Automatic temperature data output	oFF automatic temp. data output is off. on temp. data output at PC terminal
A.cy.c.	Cycle for automatic temp. data output	Select cycle time in s
Addr.	Device address	Enter address of device for non-terminal mode
d .SP.	Display panel	''on'' the display panel indicates “on“ .A 1 indicate temperature of source Ao1
Un .t	temperature scale	°C degrees Celsius °F degrees Fahrenheit
c.ouL.	Screen insert temperature reading**	on On oFF Off
c.t.b.c.	TBC exposure metering**	“on” spot weighted “oFF” average
c.c.o.L.	White balance**	“dAyL.” daylight “AUto.” automatic
SAvE	Save	Save changes / exit menu
ESc	Escape	Discard changes / exit menu

* only available for models with laser sighting
** only available for models with camera

11.1.5 Displayed temperature readings

(Configuration layer: c020)

Parameter	Function	Explanation
q.	two-colour/ratio temp. reading	Shows current temperature reading in two-colour mode
L1.	Temp. reading Lambda1	Shows current temperature reading for L1
L2.	Temp. reading Lambda2	Shows current temperature reading L2
q. Pr.	Reading two-colour mode without peak picker	Shows current temperature reading in two-colour/ratio mode prior to peak picker
L1Pr.	Reading Lambda1 without peak picker	Shows current temperature reading for L1 prior to peak picker
L2Pr.	Reading Lambda2 without peak picker	Shows current temperature reading for L2 prior to peak picker
inty.	Signal-Intensity	Calculated signal intensity
t.int.	Internal temperature	Current internal temp. of device
A in	Initial value at analogue input	Current value of analogue input when activated
ESc	Escape	Exit menu

11.1.6 Simulated current signal for outputs Ao1 and Ao2

(configuration layer: c 100)

Parameter	Function	Explanation
Ao 1.	Current output 1	Enter a value in mill ampere to simulate a current signal for Ao1
Ao 1t	Current output 1 incl. scaled temperature	Enter a temperature value to simulate a temperature reading for Ao1 (based on linear scale).
Ao2.	Current output 2*	Enter a value in mill ampere to simulate a current signal for Ao2
Ao2t	Current output 2 incl. scaled temperature*	Enter a temperature value to simulate a temperature reading for Ao2 (based on linear scale).
ESc	Escape	Exit menu

* Function only available when Current Output 2 is activated.

12 CellaView software

The CellaView software displays, evaluates and stores the temperature readings of your pyrometer.

Download the CellaView software here:

www.keller.de/its/

13 Installation of the USB driver

The PA pyrometer can be addressed via a special driver. On systems with Windows 7, 8 or 10 the driver installs a virtual COM interface which allows access to the serial port of the pyrometer.

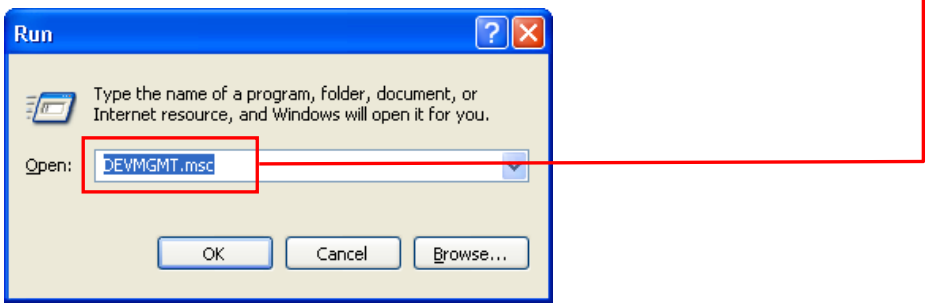
Use the link below to download the driver

www.prolific.com.tw (PL2303 Prolific Driverinstaller.zip v1.x.x)

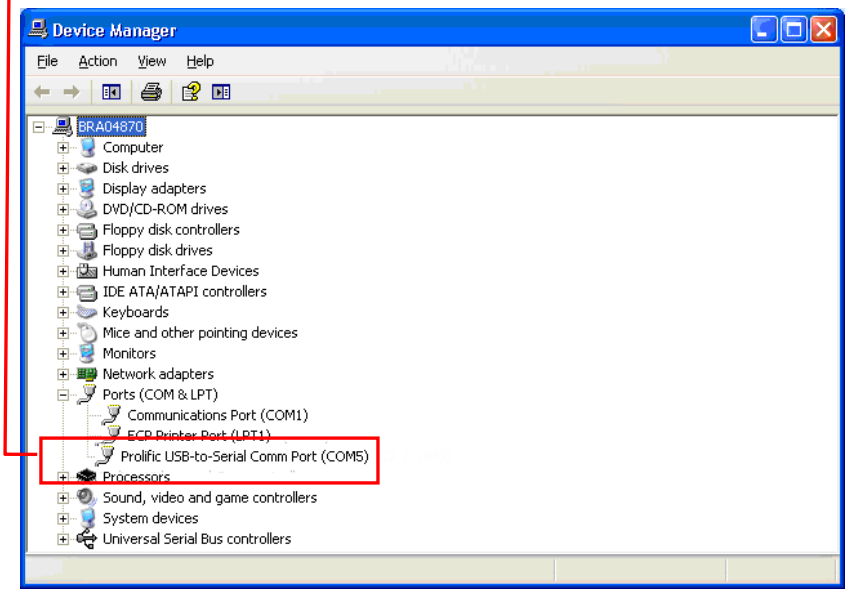
Alternatively, the USB driver can be downloaded from our website in the CellaView download area.

Install the driver and connect the pyrometer to the PC (USB cable is included in the scope of delivery). Windows will recognise the new hardware. Windows automatically assigns a virtual COM port. To determine the COM port number assigned to the adapter, check the Device Manager as follows:

First, open the Run dialog box by using the Windows key + R key combination. Then enter the command “devgmt.msc.”



and click OK to open the Device Manager. Then click



Ports (COM and LPT). You will see a listing of ports and should now be able to see which COM Port the PA USB connection assigned to. The PA USB connection will be indicated as a USB-to-Serial Comm Port. In this example, COM Port 5 has been assigned to the adapter. You will need to select this particular COM Port in the software settings.

14 How to operate the pyrometer with the CellaView software

It is not necessary to change settings when using the CellaView software. The CellaView software both works via USB and RS485 interface. The interface can be operated either as a point-to-point connection to connect a device or as a bus to connect up to 31 pyrometers.

14.1 CellaView via USB point-to-point connection

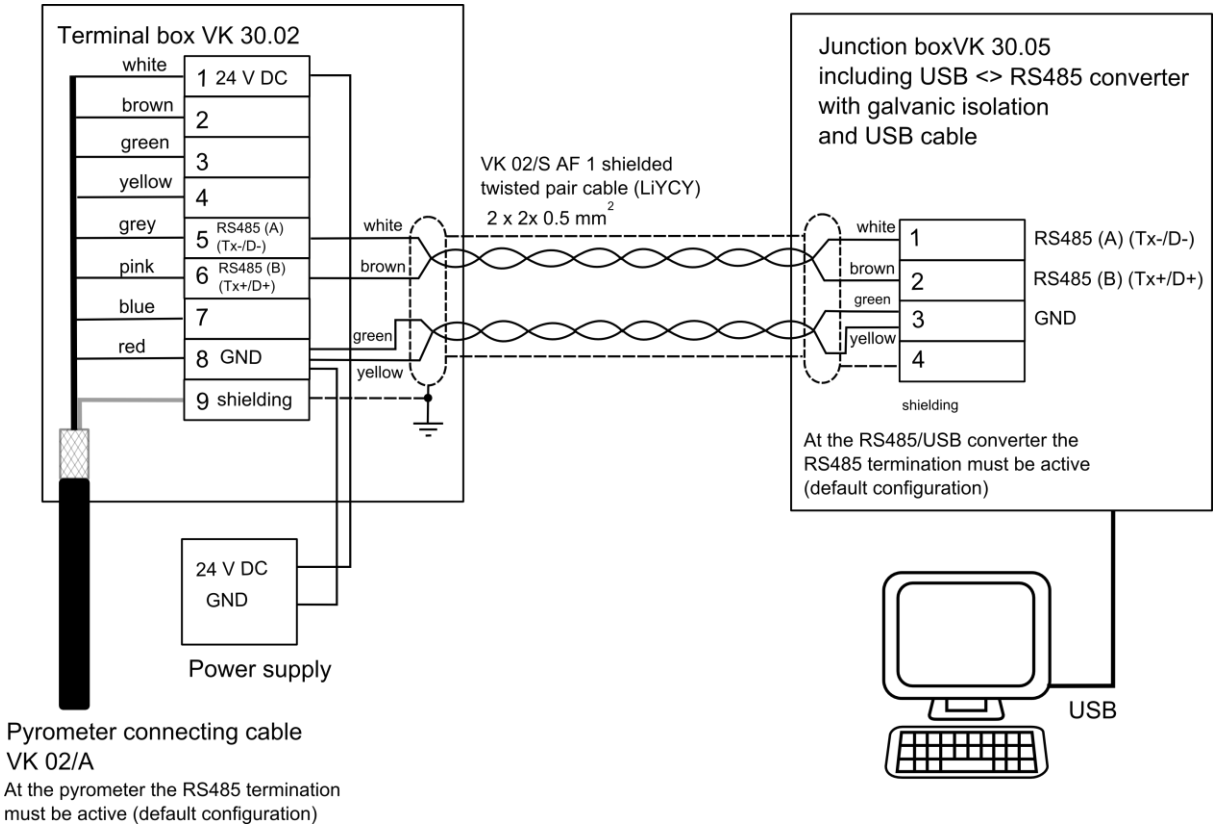
- Install the USB driver
- Connect the pyrometer to the PC
- Start CellaView
- Select the correct COM port or use the CellaView search function.

For more information on how to work with CellaView read the separate CellaView manual.

14.2 CellaView via RS485 point-to-point connection

A USB/RS485 converter is needed when working with the RS485 interface. The pyrometer can be directly connected if the PC has an integrat-

ed RS485 Interface board. The distance between pyrometer and PC can be up to 1200 m.
In order to prevent reflections on the RS485 connection, it is absolutely necessary to terminate the connection at the pyrometer and at the converter. The termination is integrated in the PA pyrometer and is active when delivered from the factory.



Moreover, use a converter with galvanic isolation (e.g. W&T 38211) to avoid problems with ground loops.

Caution !

If the supply voltage or current output are conducted via this cable, then make sure to consider the voltage drop if the cable length is greater than 100 m..

- Disconnect the pyrometer from any voltage source
- Install all required electric connections
- Connect the converter with the PC
- Install the converter according to instructions
- Connect the voltage supply for the pyrometer
- Start CellaView
- Select the correct COM port or use the CellaView search function.

For more information on how to work with CellaView read the separate CellaView manual.

14.3 CellaView via RS485 bus connection

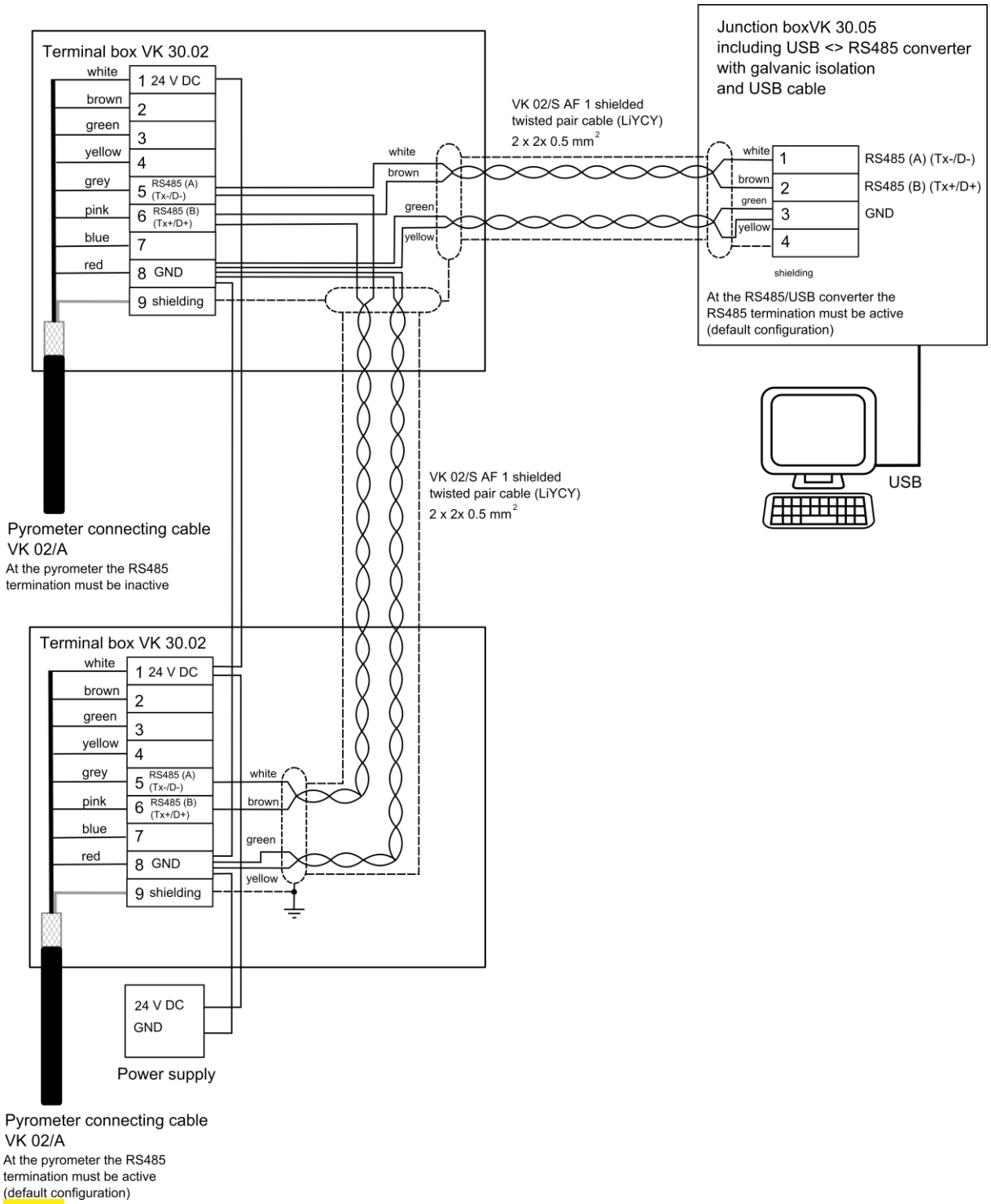
The RS485 two-wire bus consists of the bus cable itself with a maximum length of 1200 m. The participants are connected to this cable via a branch line with a length of 5 m max.
Up to 31 pyrometers can be connected to the RS485 bus. CellaView controls the communication on the bus and prompts allocated pyrometers to send or to receive data. Each participant will be addressed by a unique address. Configure this address during setup of each pyrometer using the keyboard.

Configuration layer: c01

Addr.	Device address	Enter address of device for protocol mode

A USB/RS485 converter is needed when working with the RS485 interface. The pyrometer can be directly connected if the PC has an integrated RS485 Interface board.

In order to prevent reflections on the RS485 connection, it is absolutely necessary to terminate the bus system with termination network. The termination can be activated or deactivated by a DIP switch on the PA pyrometer. The termination is active when delivered from the factory.
Moreover, use a converter with galvanic isolation (e.g. W&T 38211) to avoid problems with ground loops.



Caution !

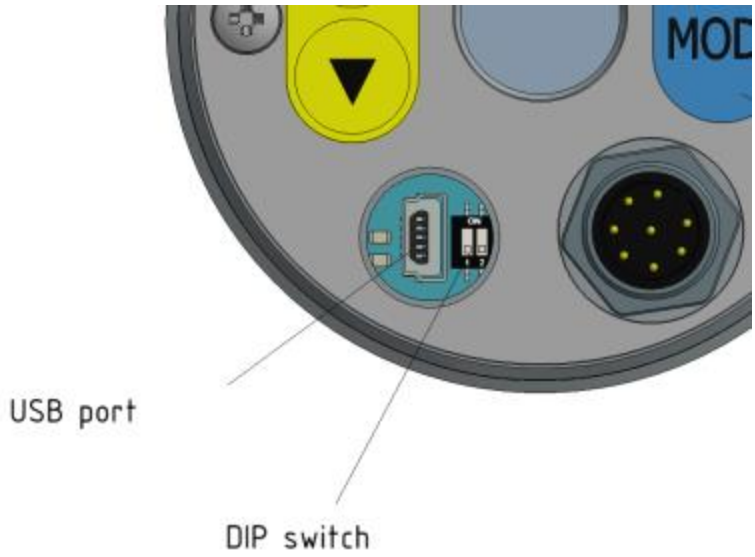
All pyrometers must be connected to the same voltage supply. The maximum length of the branch lines to the pyrometer is 5 m.

- Disconnect the pyrometer from any voltage source
- Activate or deactivate the termination of the respective participant (see termination of RS485 bus)
- Install all required electric connections

- Connect the converter with the PC
- Install the converter according to instructions
- Connect the voltage supply for the pyrometers
- Adapt the addresses of the participants
- Start CellaView
- Select the correct COM port or use the CellaView search function.

14.4 Termination of RS485 bus

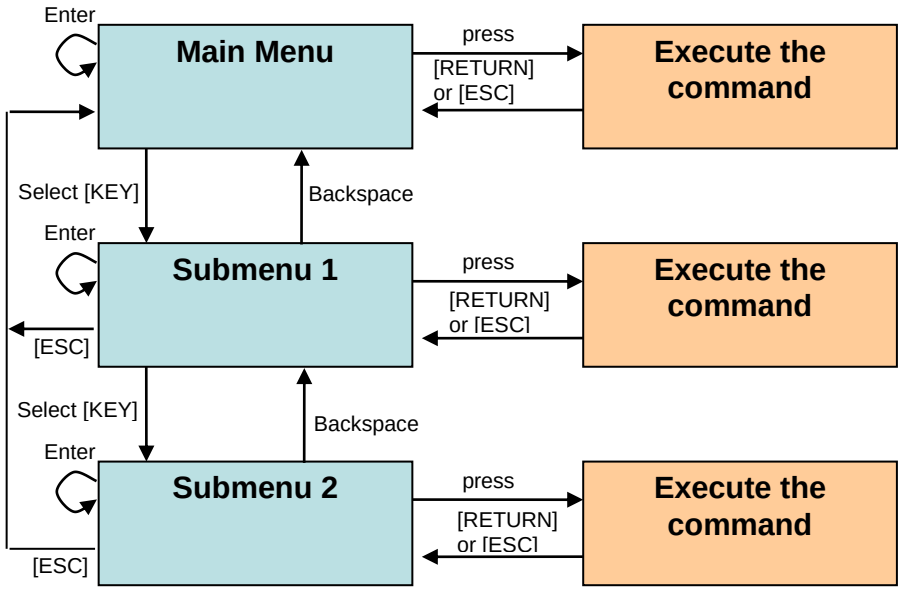
The terminal resistor of the pyrometer must be activated on the relevant bus end. For this purpose set the DIP switches to ON. Deactivate the termination with the remaining pyrometers.



15 Operation of the pyrometer via terminal program

By default, the pyrometer has fully integrated communications software to the point-to-point connection with a PC. As an alternative to the CellaView software, all parameters that are required for a measurement data acquisition or a general configuration of the pyrometer can be configured via a simple terminal connection using the terminal program.

Most key parameters are directly available in the main menu. Further functions are contained in submenus. Navigation within the menus is explained in the following graphics:



To set the pyrometer to the terminal mode, simultaneously hold down the **Ctrl key** and press the **E key** twice in rapid succession.

Direct commands have an assigned key. Example: E for emissivity (epsilon). Submenu settings are shown in brackets. Example: `[LAMBDA 1]`

15.1 Serial Data Transmission of Temperature Data

Transmission parameters for the serial interface:

57600 Baud / 8 data bits / odd parity / 1 stop bit / no handshake

two-colour/ratio Lambda 1 – Lambda 2 (one cycle):

Byte	Negative Temperature	Positive Temperature	Temperature exceeds measuring range	Temperature falls below measuring range
1	Space	Space	Space	Space
2	Minus symbol -	Space	Minus symbol -	Minus symbol -
3	Digit 1000	Digit 1000	O	U
4	Digit 100	Digit 100	V	N
5	Digit 10	Digit 10	E	D
6	Digit 1	Digit 1	R	E
7	Decimal point .	Decimal point .	Space	R
8	Decimal place	Decimal place	Space	Space
9	Space	Space	Minus symbol -	Minus symbol -
10	Unit C or F	Unit C or F	Space	Space
11	Tabulator	Tabulator	Tabulator	Tabulator
12	Space	Space	Space	Space
13	Minuszeichen -	Space	Minus symbol -	Minus symbol -
14	Digit 1000	Digit 1000	O	U
15	Digit 100	Digit 100	V	N
16	Digit 10	Digit 10	E	D
17	Digit 1	Digit 1	R	E
18	Decimal point .	Decimal point .	Space	R
19	Decimal place	Decimal place	Space	Space
20	Space	Space	Minus symbol -	Minus symbol -
21	Unit C or F	Unit C or F	Space	Space
22	Tabulator	Tabulator	Tabulator	Tabulator
23	Space	Space	Space	Space
24	Minuszeichen -	Space	Minus symbol -	Minus symbol -
25	Digit 1000	Digit 1000	O	U
26	Digit 100	Digit 100	V	N
27	Digit 10	Digit 10	E	D
28	Digit 1	Digit 1	R	E
29	Decimal point .	Decimal point .	Space	R
30	Decimal place	Decimal place	Space	Space
31	Space	Space	Minus symbol -	Minus symbol -
32	Unit C or F	Unit C or F	Space	Space
33	Carriage Return	Carriage Return	Carriage Return	Carriage Return

☞ Please note:

All symbols are ASCII coded; preceding zeros will be included in the transmission

The cycle time in which the temperature reading is transmitted can be set at the PC terminal (minimum cycle duration is 0.1 second).

15.2 Terminal connection via USB

For communication through a terminal connection via USB set the parameter tErn on the pyrometer to USB (default setting).

The parameter tErn is available on configuration layer C011.

Parameter tErn. = USb

- Install the pyrometer's USB driver on the PC
- Connect the pyrometer with a USB cable to the PC
- Start a standard terminal program (e.g. Windows Hyperterminal or Putty)
- Select the correct COM port
- Set the interface parameters for the serial interface (see chapter transmission of measurement values)
- Open the connection

15.3 Terminal connection via RS485

For communication through a terminal connection via RS485 set the parameter tErn on the pyrometer to r485.

The parameter tErn is available on configuration layer C011.

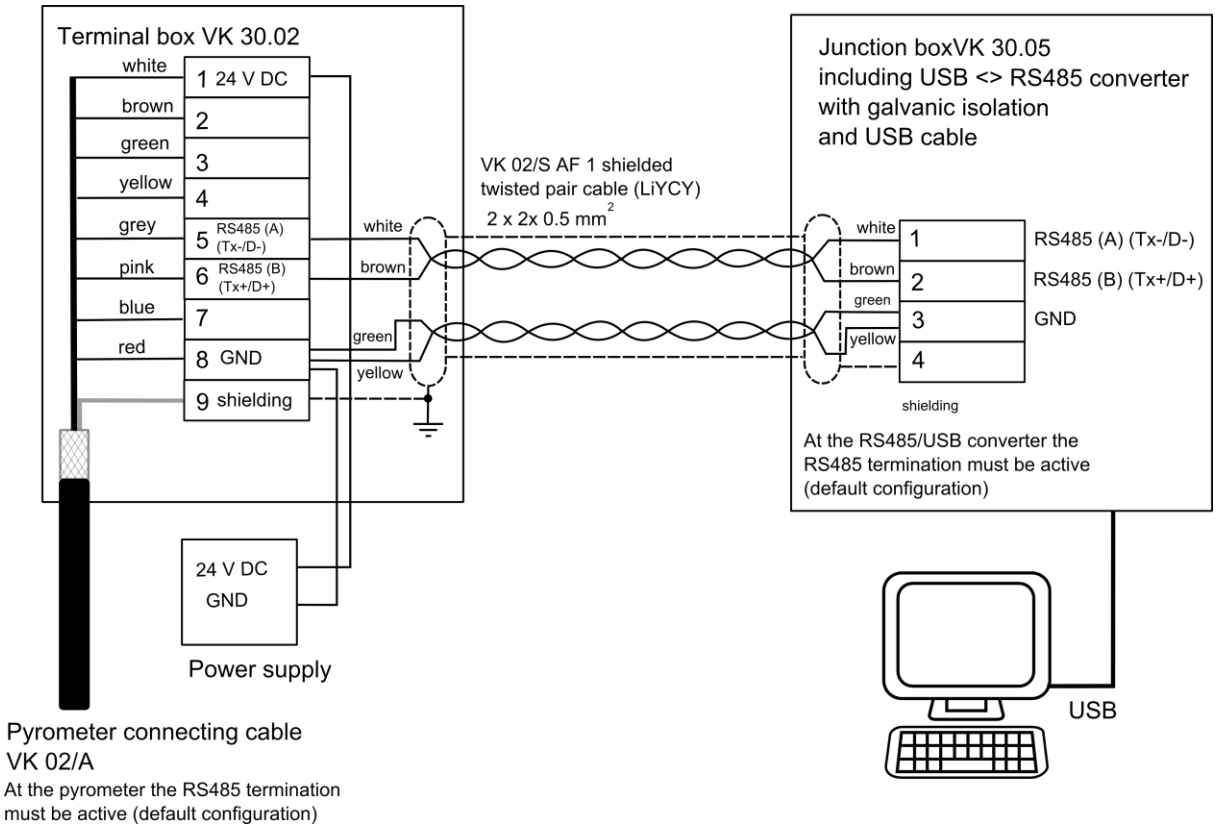
Parameter tErn. = r485

Caution !

When using a terminal connection via the RS485 interface, CellaView cannot be used via the RS485 interface any longer.

A USB/RS485 converter is needed when working with the RS485 interface. The distance between pyrometer and PC can be up to 1200 m.

In order to prevent reflections on the RS485 connection, it is absolutely necessary to terminate the connection at the pyrometer and at the converter. The termination is integrated in the PA pyrometer and is active when delivered from the factory.



Moreover, use a converter with galvanic isolation (e.g. W&T 38211) to avoid problems with ground loops.

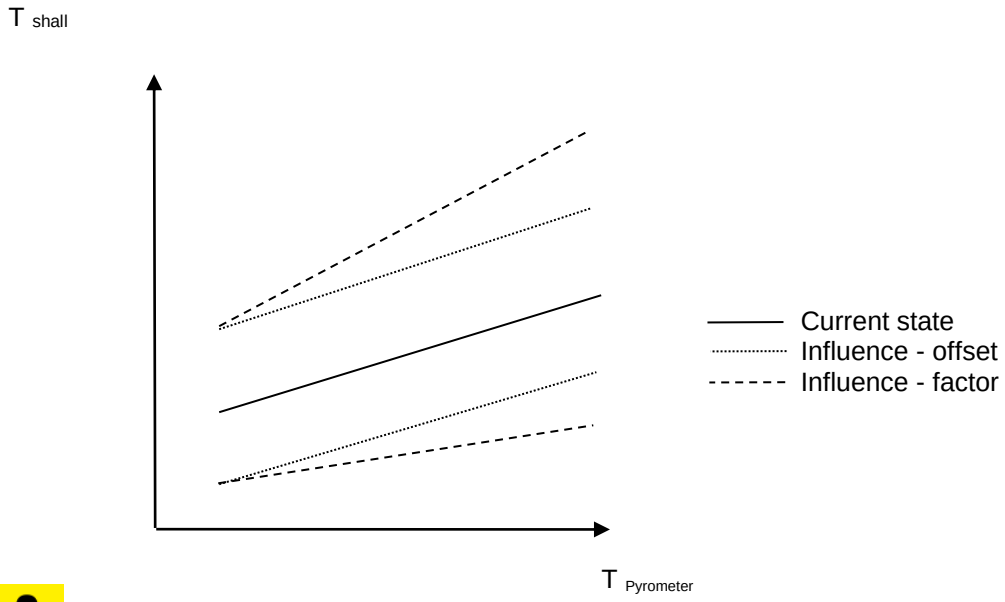
Caution !

If the supply voltage or current output are conducted via this cable, then make sure to consider the voltage drop if the cable length is greater than 100 m.

- Disconnect the pyrometer from any voltage source
- Install all required electric connections
- Connect the converter with the PC
- Install the converter according to instructions.
- Connect the voltage supply for the pyrometer
- Change the parameter tErn. to r485
- Start a terminal program such as Hyperterminal
- Select the correct COM port
- Set the correct parameters for the serial interface (see chapter transmission of measurement values)
- Open the connection

16 User-defined calibration / scaling of the current output

If necessary, the pyrometer can be adjusted with a user-defined calibration function. The following drawing explains the effects for offset and factor.



Caution**:**

To recalibrate your CellaTemp PA, you will require a calibration furnace and a reference standard.

In addition to a user-defined calibration, the user-defined range function can also be activated. With this function being active, scaling of the current output can be extended.

Please note:

The measuring accuracy is not defined when the scaling is outside the pyrometer range.

16.1 Calibration/scaling via CellaView

To use the user-defined calibration function, activate it first in expert mode.

- Start CellaView
- Open the menu Settings Extras -> Settings
- Select expert mode and activate editable calibration
- Close the menu
- Open the menu Pyrometer settings

The parameters can now be edited under the tab Spectral channel 1.

16.2 Calibration/scaling via terminal connection

If ever required, the CellaTemp PA can be recalibrated using the sub-menu Calibration. Press command „K“ and then enter the password „100“ to access the calibration menu.

The calibration menu opens.

```
------------------------------------------------------------------------
------------------------------------------------------------------------
Submenu CALIBRATION
------------------------------------------------------------------------
Name .... "Pyrometer PA Series"

1: [LAMBDA 1 CALIBRATION]
A: Reset settings to factory default
S: Set pyrometer name
Z: End Calibration-Mode
ESC: Back to MAIN-MENU
------------------------------------------------------------------------
>CALIBRATION >

------------------------------------------------------------------------
Submenu LAMBDA 1
------------------------------------------------------------------------
L1 range ....    0.0 - 1000.0 C
L1 User calibration ....... off
L1 User def. offset    +0.00000
L1 User def. factor    +1.00000

A: Set L1 - extended-range
B: Set L1 User-Cal. On/Off
C: Set L1 User-Cal. Offset
D: Set L1 User-Cal. Factor
ESC: Back to MAIN-MENU
------------------------------------------------------------------------
>CALIBRATION >LAMBDA 1 >
```

You can reset all configurations you have made to your CellaTemp PA and restore the factory default settings using Command „A“. This also applies to data acquisition parameters and input/output settings. Use keys "B", "C" and "D" for direct access to enable the adjustments.

If you make a mistake while making the adjustments, simply enter offset=0.0 und factor=1.0, or set User Cal. to „off“.

Command "A" redefines the pyrometer’s entire measuring range. This new temperature span may be smaller or larger than the range originally programmed by the manufacturer. When selecting a new temperature range for your CellaTemp PA, make absolutely sure that the temperature span you select is actually covered by the pyrometer model you have purchased. The only way to be certain is to perform measurement tests.

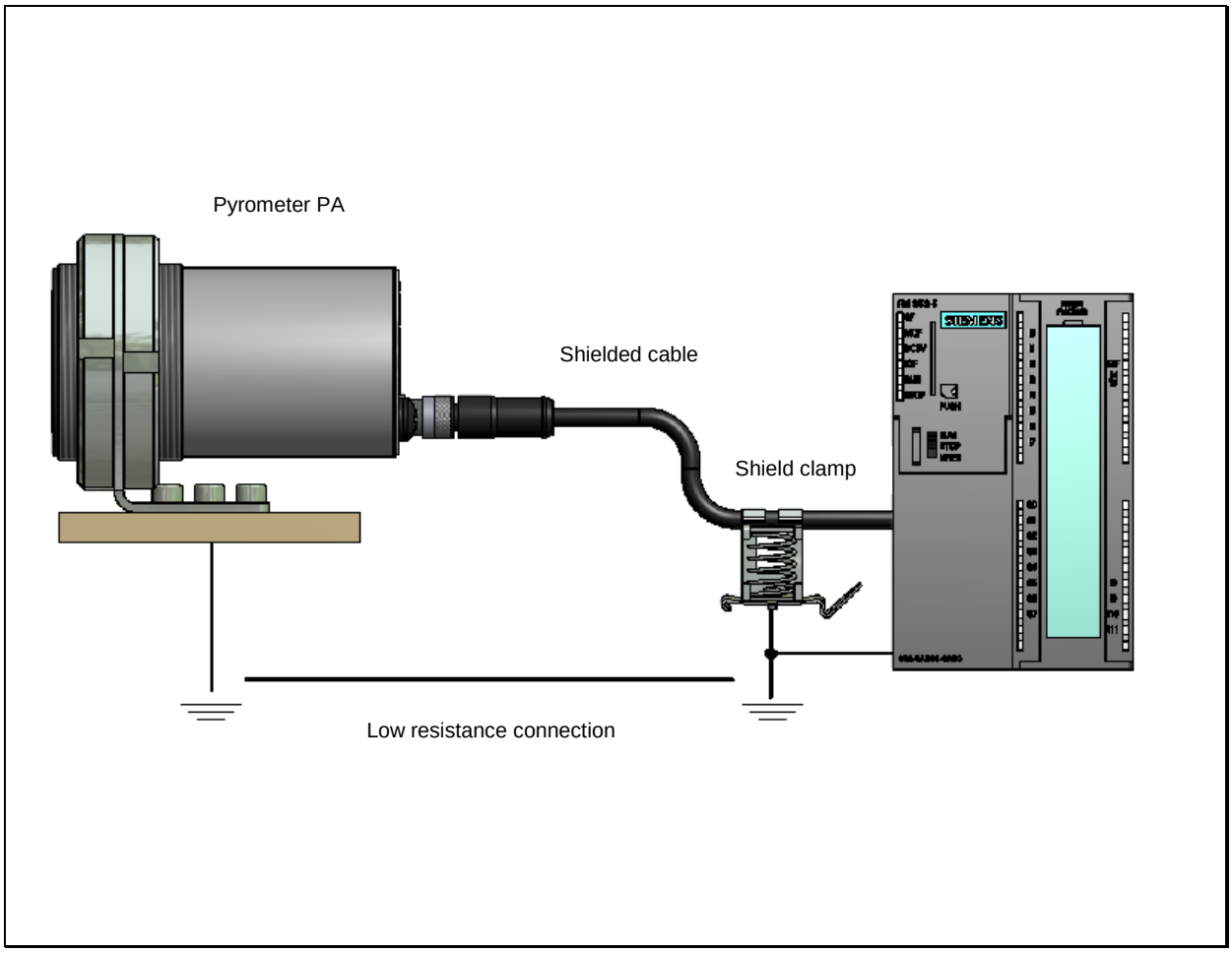
Press "S" to enter a short text to name the control point. View this text by selecting „Q“ in the Main Menu.

17 Shielding and Grounding

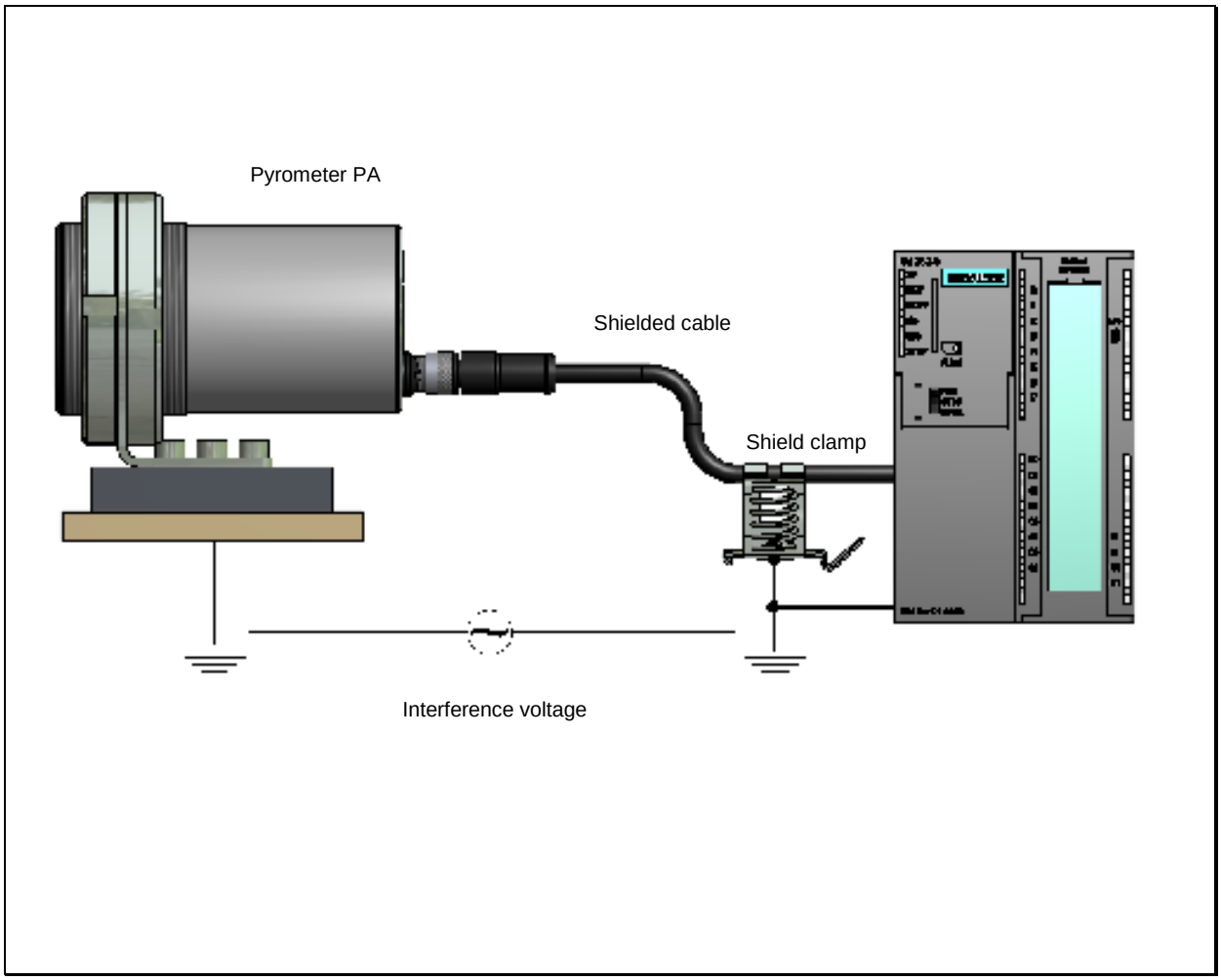
17.1 Potential equalisation

Caution:
All applicable laws and codes must be complied with at all times.

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 potential equalisation line.



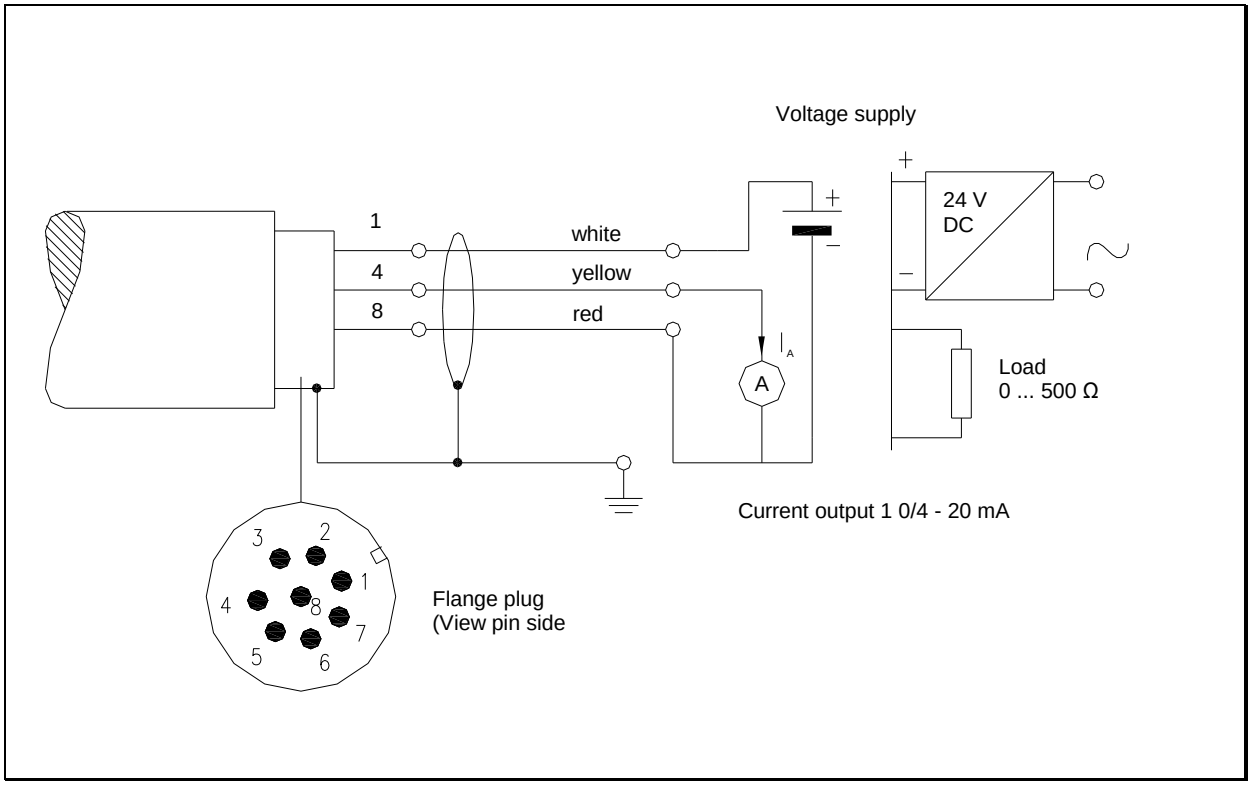
To avoid an equalising current, the pyrometer can be mounted electrically insulated. The shielding must be connected to the plant's earthing system.

Caution:

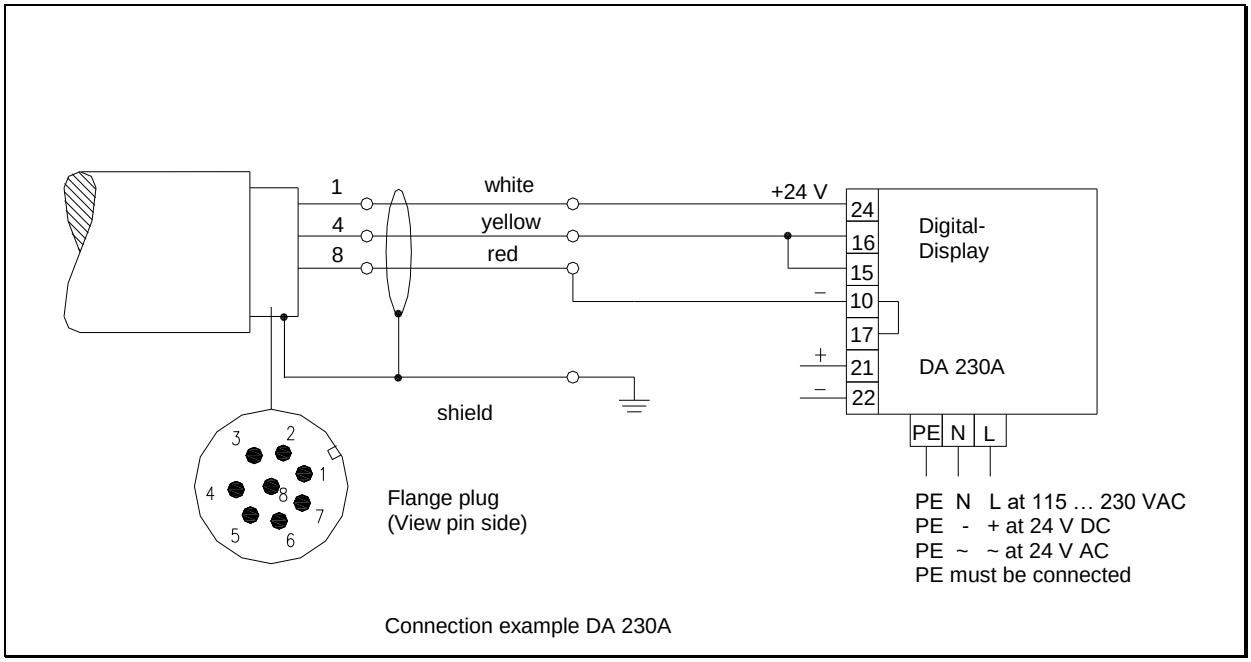
If the pyrometer is installed without an insulator and without potential equalisation, the interference voltage may not exceed 48V.

18 Connectivity Examples

18.1 Connection to VK 02/A Cable



18.2 Connection to DA 230 digital display unit



Connection example DA 230A

19 Theory of Non-Contact 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 wavelengths of more than 40 μm. The KELLER HCW PA radiation pyrometers detect infrared radiation for non-contact temperature measurement.

19.1 Advantages of Non-Contact Temperature Measurement

Non-contact temperature detection means cost-effective temperature measurement because this technique only requires a single investment 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. Last but not least it is also possible to measure the temperature of voltage-carrying objects.

19.2 Measurements at Black Bodies (Cavity Radiators)

A black body or a black radiator is used to calibrate radiation pyrometers. 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(λ) 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.

19.3 Measurements of Real Radiators

Real radiation sources are characterized 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. 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 coefficient is correctly adjusted on the PA pyrometer.

The spectral emissivity coefficient of a body does not represent an exact material constant, but is also largely dependent on the surface properties.

20 Maintenance

20.1 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 pyrometer down. Apply as little pressure as possible to avoid scratching the lens.

Make sure to turn off the pyrometer prior to connecting or disconnecting the coupler connector (e.g. when cleaning). Failure to do so may result in damage to the instrument!

☞ NOTE !

The pyrometer must be protected against high ambient temperatures, high air humidity, high voltage and strong electromagnetic fields. Never hold the lens directly into the sun.

21 Technical Data PA 80 AF 6

Measuring range :
(adjustable in partial range):
750 ... 2400 °C

Sensor:
Fotodiode

Spectral sensitivity:
0.95/ 1.05 µm

Focussing range M 30:
Optic PZ 20.06
1.2 m ... ∞ (Telephoto-lens)

Distance to target-size ratio:
240 : 1 at 1200 mm
(Telephoto-lens 20.06)

Digital output:
Periodic output of measurement data with adjustable cycle time

Analogue output 1 & 2:
0(4) ... 20 mA linear, switchable, scalable
(4…20 mA normally)

Resistance:
max. 500 Ω

Reponse time t_{98}:
≤ 10 ms (T> 950 °C)

Resolution Analogue output:
0.2 K + 0.03 % of the adjusted span

Resolution Display:
1 K

Resolution USB / RS 485:
0.1 K at terminal operation

Measuring uncertainty:
1 % of reading
(at ε =1.0 and T_A = 23 °C)

Repeatability:
2 K

Sighting device:
laser spot light

Ambient operating temperature:
sensor: - 20 ... 250 °C
fibre optic cable:- 20 ..85 °C
optional up to 250 °C
electronic: 0 ... 65 °C

Excess temperature signal:
When internal temperature exceeds > 80 °C, the analogue output value will be > 20.5 mA!

Storage temperature:
sensor: - 20 ... 250 °C fibre optic cable:- 20 . 85 °C
optional up to 250 °C
electronic: -20 ... 70 °C

Permissible humidity:
95% r.H. max.
(non-condensing)

Temperature coefficient with reference to 23 °C
≤ 0.05 %/K
of measured value

Data communication:
USB / RS485 with integrated software to set parameters and transmit measurement data to a PC

Analogue input:
0 – 10 V

Digital output:
2 Open collector outputs
24 V; ≤ 30 mA

Digital input:
2 to 24 V

Power supply requirements:
24 V DC +10% / -20%
current input ≤135 mA/ ≤ 150 mA with switched on spotlight
Ripple: ≤ 200 mV

Dimension:
ϕ 65 x 220 mm

Housing material:
Stainless steel

Weight:
Approx. 0.9 kg

Mounting:
External thread M 65 x 2
length 40 mm

Connection:
with 8-pin connector

Protection:
IP 65 according to DIN 40050
(with connector attached)

Adjustable parameters:

Analogue output 1 & 2:
source/ scaling

Digtal input output 1 & 2:
source/ switch-point

Transmission factor
λ_1 and λ_2

Compensation of background radiation
λ_1 and λ_2

Look-up table for temperature alignment

Ratio correction:
$\frac{\varepsilon_1}{\varepsilon_2}$**:** 80 ... 120 %
increment size 0.1 %

Emissivity ε:
λ_1 u. λ_2**:** 10...110 %
increment size 0.1 %

Smoothing function t_{98}:
0 - 999 s

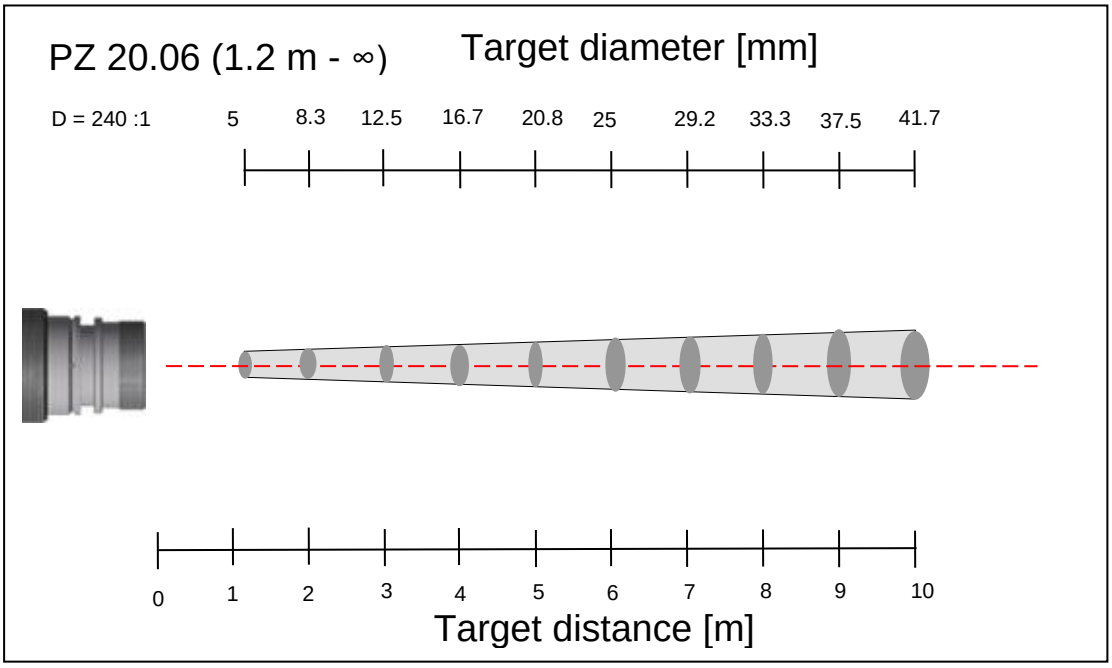
Memory modes:
- Min./Max. (peak picker)
- Double maximum with adjustable hold time

Optional accessories:
calibration certificate according to ISO 9001

calibration certificate according to DKD

large variety of mounting devices, digital displays, software, etc.

21.1 Field of View Diagrams PA 80 AF 6



22 Technical Data PA 81

Measuring range :
(adjustable in partial range):
800 ... 2400 °C

Sensor:
Fotodiode

Spectral sensitivity:
0.95/ 1.05 µm

Focussing range M 30:
Optik PA 41.01
0.2 m ... ∞ (standard-lens)

Distance to target-size ratio:
PA 41.01: 190:1 (0.2m-∞) M30

Digital output:
Periodic output of measurement data with adjustable cycle time

Analogue output 1 & 2:
0(4) ... 20 mA linear, switchable, scalable (4…20 mA normally)

Resistance:
max. 500 Ω

Reponse time t_{98}:
≤ 10 ms (T> 950 °C)

Resolution Analogue output:
0.2 K + 0.03 % of the adjusted span

Resolution Display:
1 K

Resolution USB / RS 485:
0.1 K at terminal operation

Measuring uncertainty:
1 % of reading
(at ε =1.0 and T_A = 23 °C)

Repeatability:
2 K

Sighting device:
laser spot light

Ambient operating temperature:
sensor: - 20 ... 250 °C
fibre optic cable:- 20 ..85 °C
optional up to 250 °C
electronic: 0 ... 65 °C

Excess temperature signal:
When internal temperature exceeds > 80 °C, the analogue output value will be > 20.5 mA!

Storage temperature:
sensor: - 20 ... 250 °C fibre optic cable:- 20 . 85 °C
optional up to 250 °C
electronic: -20 ... 70 °C

Permissible humidity:
95% r.H. max.
(non-condensing)

Temperature coefficient with reference to 23 °C
≤ 0.05 %/K
of measured value

Data communication:
USB / RS485 with integrated software to set parameters and transmit measurement data to a PC

Analogue input:
0 – 10 V

Digital output:
2 Open collector outputs
24 V; ≤ 30 mA

Digital input:
2 to 24 V

Power supply requirements:
24 V DC +10% / -20%
current input ≤135 mA/ ≤ 150 mA with switched on spotlight
Ripple: ≤ 200 mV

Dimension:
ϕ 65 x 220 mm

Housing material:
Stainless steel

Weight:
Approx. 0.9 kg

Mounting:
External thread M 65 x 2
length 40 mm

Connection:
with 8-pin connector

Protection:
IP 65 according to DIN 40050
(with connector attached)

Adjustable parameters:

Analogue output 1 & 2:
source/ scaling

Digtal input output 1 & 2:
source/ switch-point

Transmission factor
λ_1 and λ_2

Compensation of background radiation
λ_1 and λ_2

Look-up table for temperature alignment

Ratio correction:
$\frac{\varepsilon_1}{\varepsilon_2}$**:** 80 ... 120 %
increment size 0.1 %

Emissivity ε:
λ_1 u. λ_2**:** 10...110 %
increment size 0.1 %

Smoothing function t_{98}:
0 - 999 s

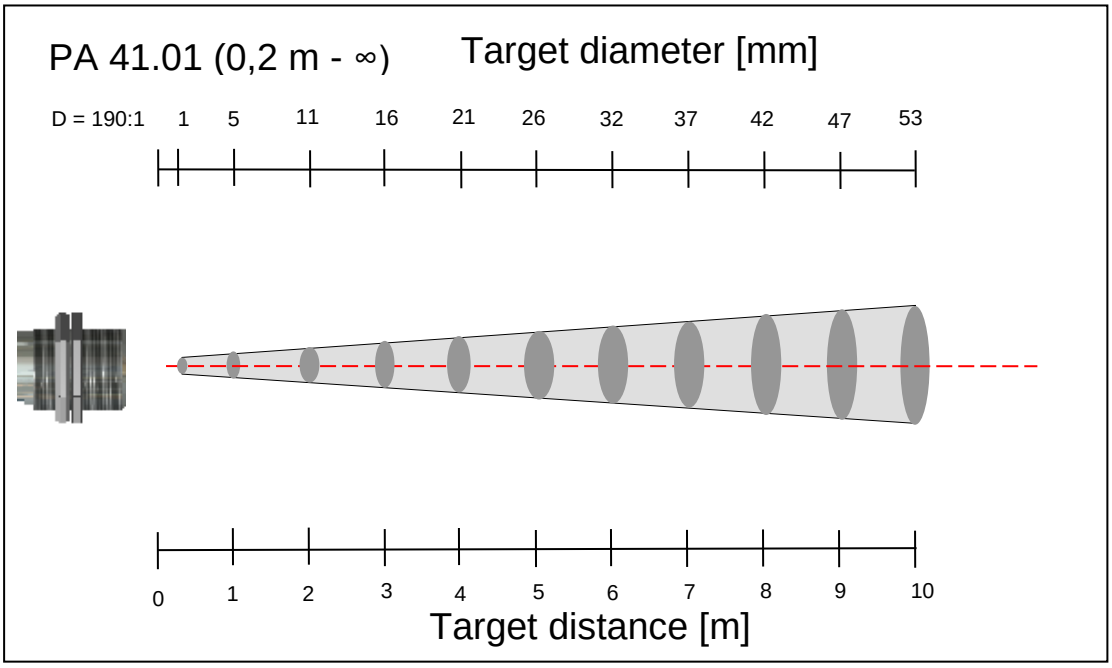
Memory modes:
- Min./Max. (peak picker)
- Double maximum with adjustable hold time

Optional accessories:
calibration certificate according to ISO 9001

calibration certificate according to DKD

large variety of mounting devices, digital displays, software, etc.

22.1 Field of View Diagrams PA 81



23 Technical Data PA 83

Measuring range :
(adjustable in partial range):
650 ... 1700 °C

Sensor:
Fotodiode

Spectral sensitivity:
0.95/ 1.05 µm

Focusing range:
0.2 ... 0,4 m (close-up lens)
0.4 m ... ∞ (Standard-lens)
1.2 m ... ∞ (Tele-Optik)
0.2 m ... ∞ (Weitwinkel-Optik)

Distance to target size ratio:
close-up lens 20.03
horizontal: 40:1
vertical: 215:1
Standard lens 20.01
horizontal: 45:1
vertical: 230:1
Telephoto-lens 20.06
horizontal: 75:1
vertical: 375:1
Wide-angle lens 20.05
horizontal: 10:1
vertical: 55:1

Digital output:
Periodic output of measurement data with adjustable cycle time

Analogue output 1 & 2:
0(4) ... 20 mA linear, switchable, scalable
(4…20 mA normally)

Resistance:
max. 500 Ω

Reponse time t_{98}:
≤ 10 ms

Resolution Analogue output:
0.2 K + 0.03 % of the adjusted span

Resolution Display:
1 K

Resolution USB / RS 485:
0.1 K at terminal operation

Measuring uncertainty:
1.5 % of reading
(at ε =1.0 and T_A = 23 °C)

Repeatability:
3 K

Sighting device:
through-the-lens sighting with target marking or laser spot light

Ambient operating temperature:
0 ... 65 °C

Excess temperature signal:
When internal temperature exceeds > 80 °C, the analogue output value will be > 20.5 mA!

Storage temperature:
-20 ... 80 °C

Temperature coefficient with reference to 23 °C
≤ 0.05 %/K
of measured value

Permissible humidity:
95% r.H. max.
(non-condensing)

Data communication:
USB / RS485 with integrated software to set parameters and transmit measurement data to a PC

Analogue input:
0 – 10 V

Digital output:
2 Open collector outputs
24 V; ≤ 30 mA

Digital input:
2 to 24 V

Power supply requirements:
24 V DC +10% / -20%
current input ≤135 mA
250 mA with switched on spotlight
Ripple: ≤ 200 mV

Dimension:
ϕ 65 x 220 mm

Housing material:
Stainless steel

Weight:
Approx. 0.9 kg

Mounting:
External thread M 65 x 2
length 40 mm

Connection:
with 8-pin connector

Protection:
IP 65 according to DIN 40050
(with connector attached)

Adjustable parameters:

Analogue output 1 & 2:
source/ scaling

Digtal input output 1 & 2:
source/ switch-point

Transmission factor
λ_1 and λ_2

Compensation of background radiation
λ_1 and λ_2

Look-up table for temperature alignment

Ratio correction:
$\frac{\varepsilon_1}{\varepsilon_2}$**:** 80 ... 120 %
increment size 0.1 %

Emissivity ε:
λ_1 u. λ_2**:** 10...110 %
increment size 0.1 %

Smoothing function t_{98}:
0 - 999 s

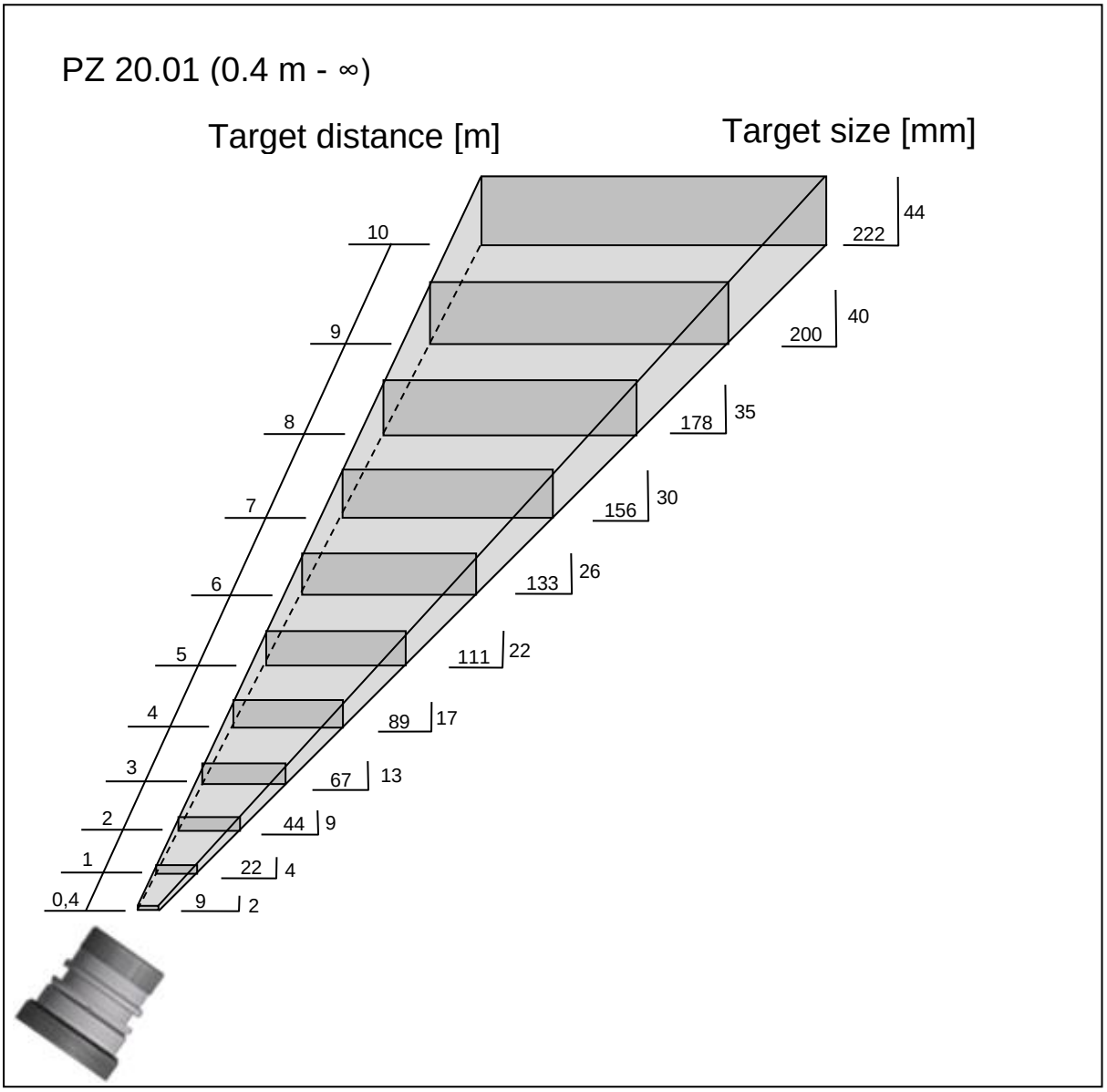
Memory modes:
- Min./Max. (peak picker)
- Double maximum with adjustable hold time

Optional accessories:
calibration certificate according to ISO 9001

calibration certificate according to DKD

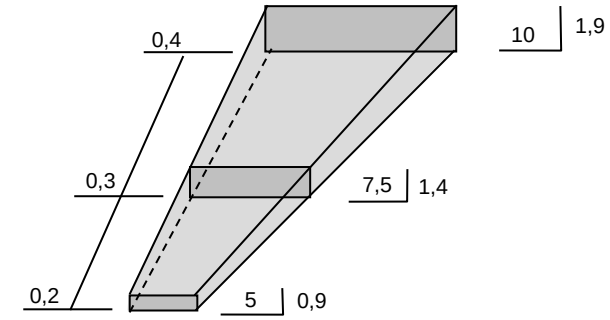
large variety of mounting devices, digital displays, software, etc.

23.1 Field of View Diagrams PA 83

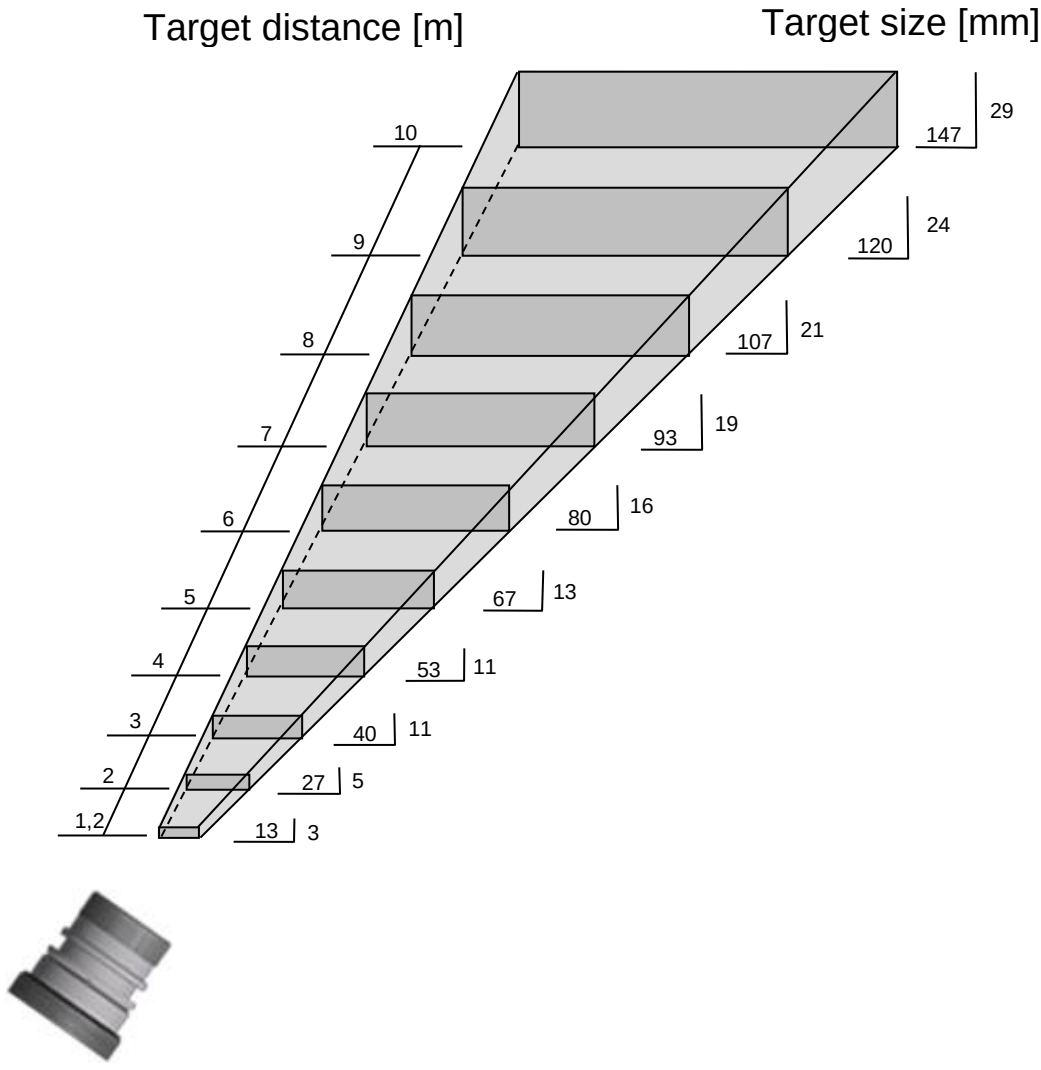


PZ 20.03 (200 – 400 mm)

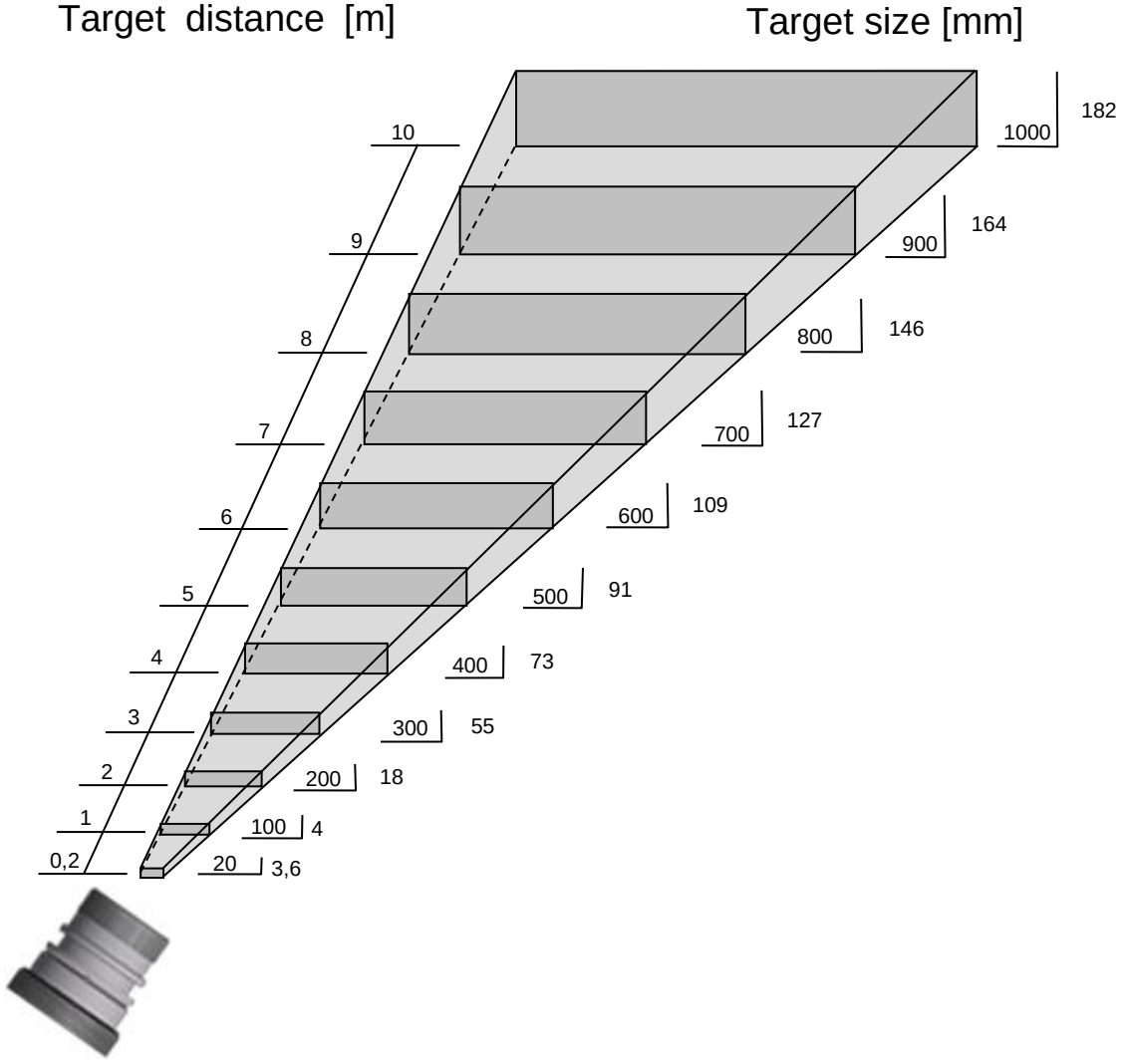
Target distance [m] Target size [mm]



PZ 20.06 (1.2 m - ∞)

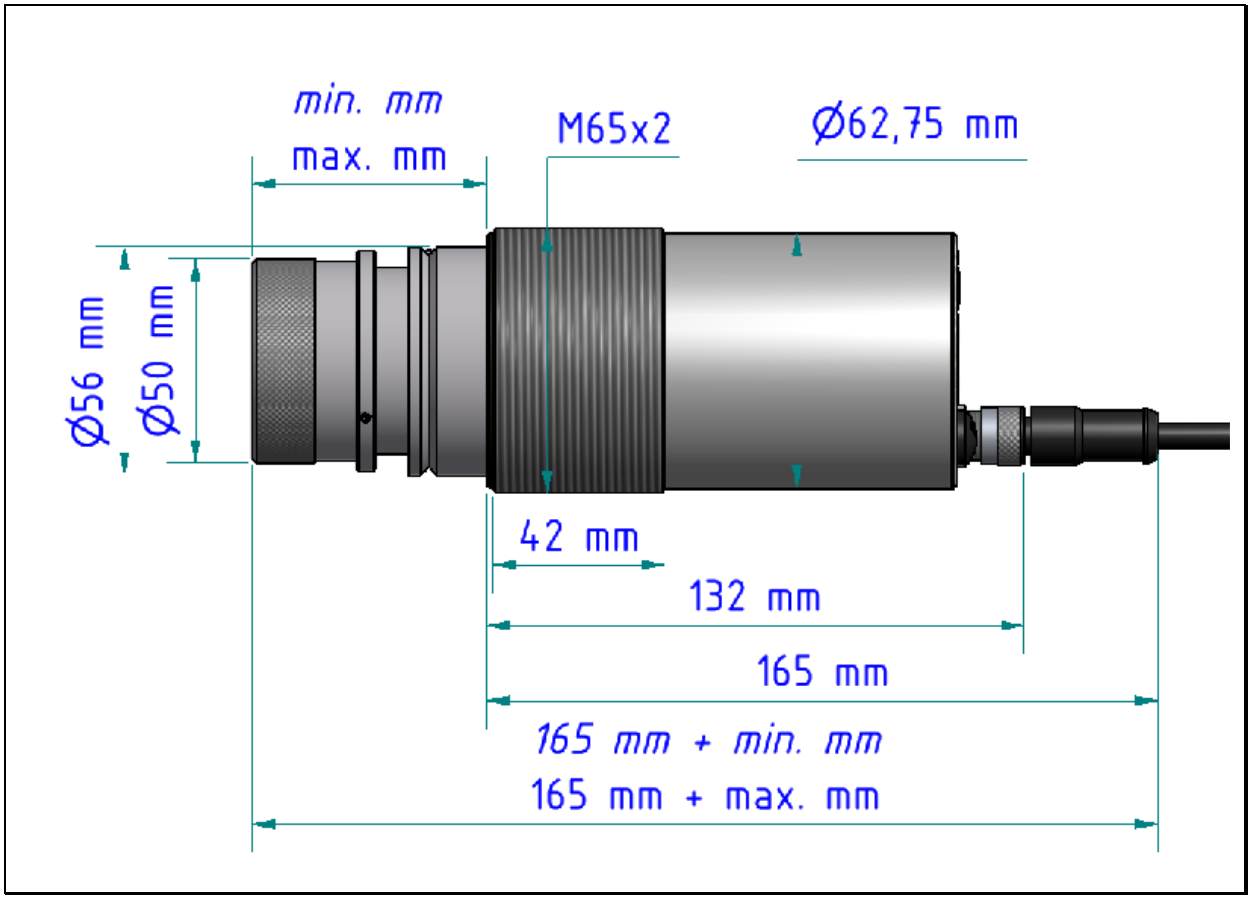

Target distance [m]
Target size [mm]
10
9
8
7
6
5
4
3
2
1,2
147
29
120
24
107
21
93
19
80
16
67
13
53
11
40
11
27
5
13
3

PZ 20.05 (0.2 m - ∞)

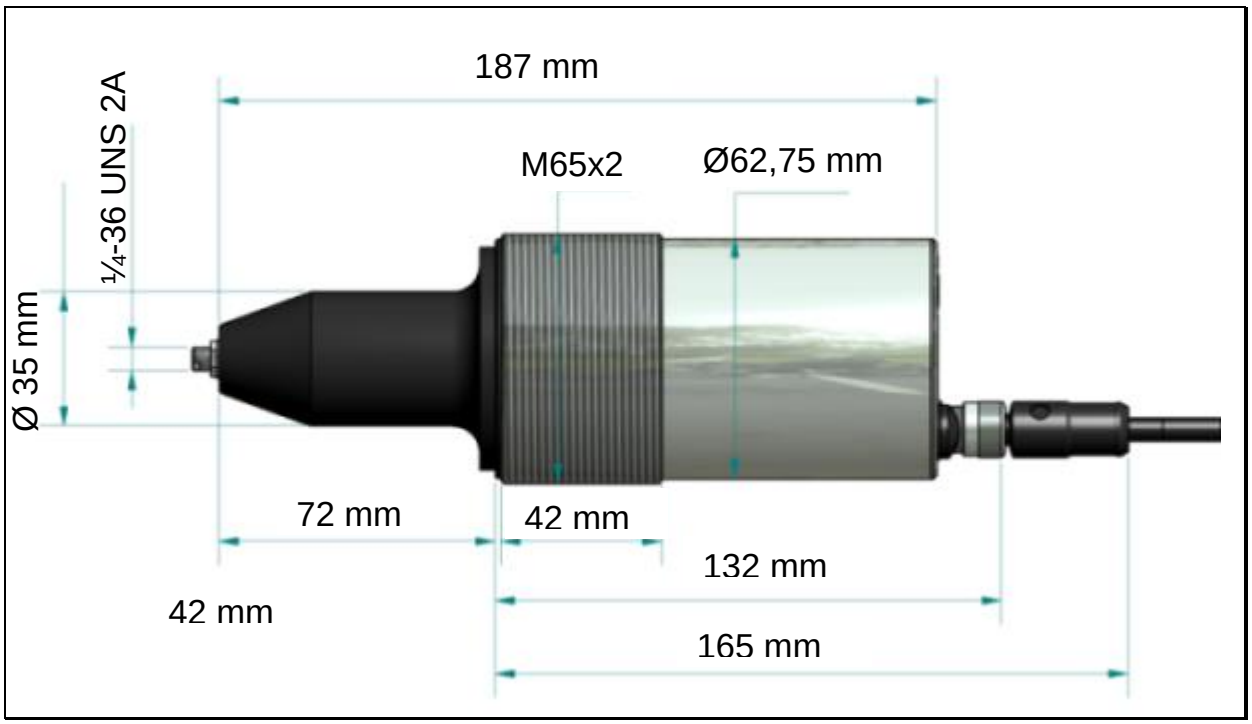

Target distance [m]
Target size [mm]
10
9
8
7
6
5
4
3
2
1
0,2
1000
182
900
164
800
146
700
127
600
109
500
91
400
73
300
55
200
18
100
4
20
3,6

24 Dimensions

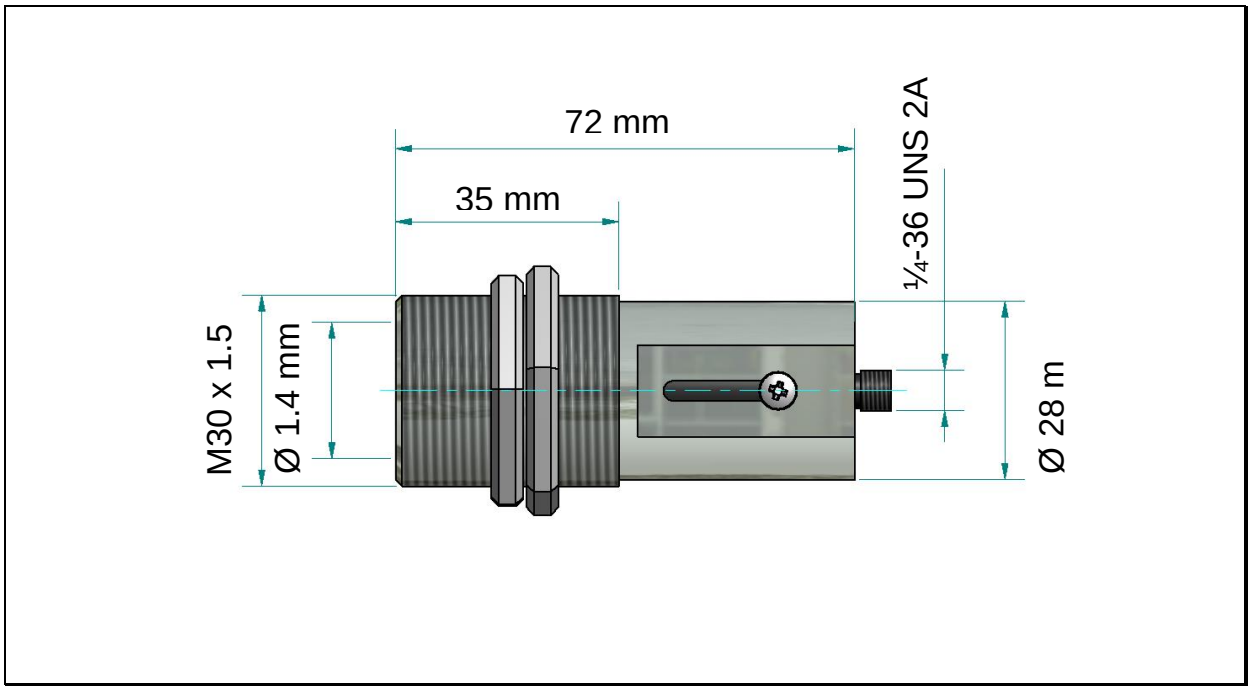
24.1 Pyrometer PA 80/83



24.2 Pyrometer PA 81

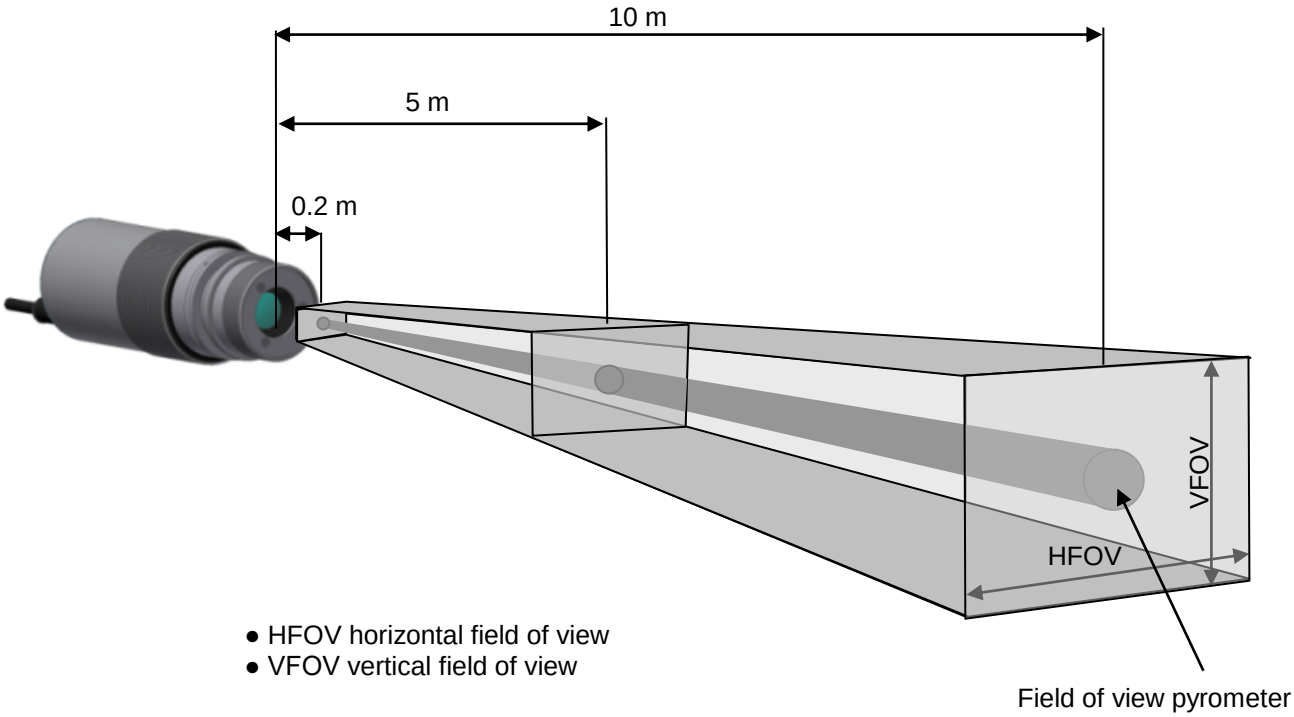


24.3 Sensor head PA 41.01 (M30)



25 Technical data camera

- Video-System: Composite Video PAL, 1 Vpp, 75 Ohm
- Connection: Pyrometer -> TNC plug, monitor-> chinch or BNC (video cable VK 02/F), electrically isolated from the power supply of the pyrometer
- Resolution: 722 x 576 pixel
- Image overlay: target marker
- Target Brigthness Control (TBC)



CAUTION!

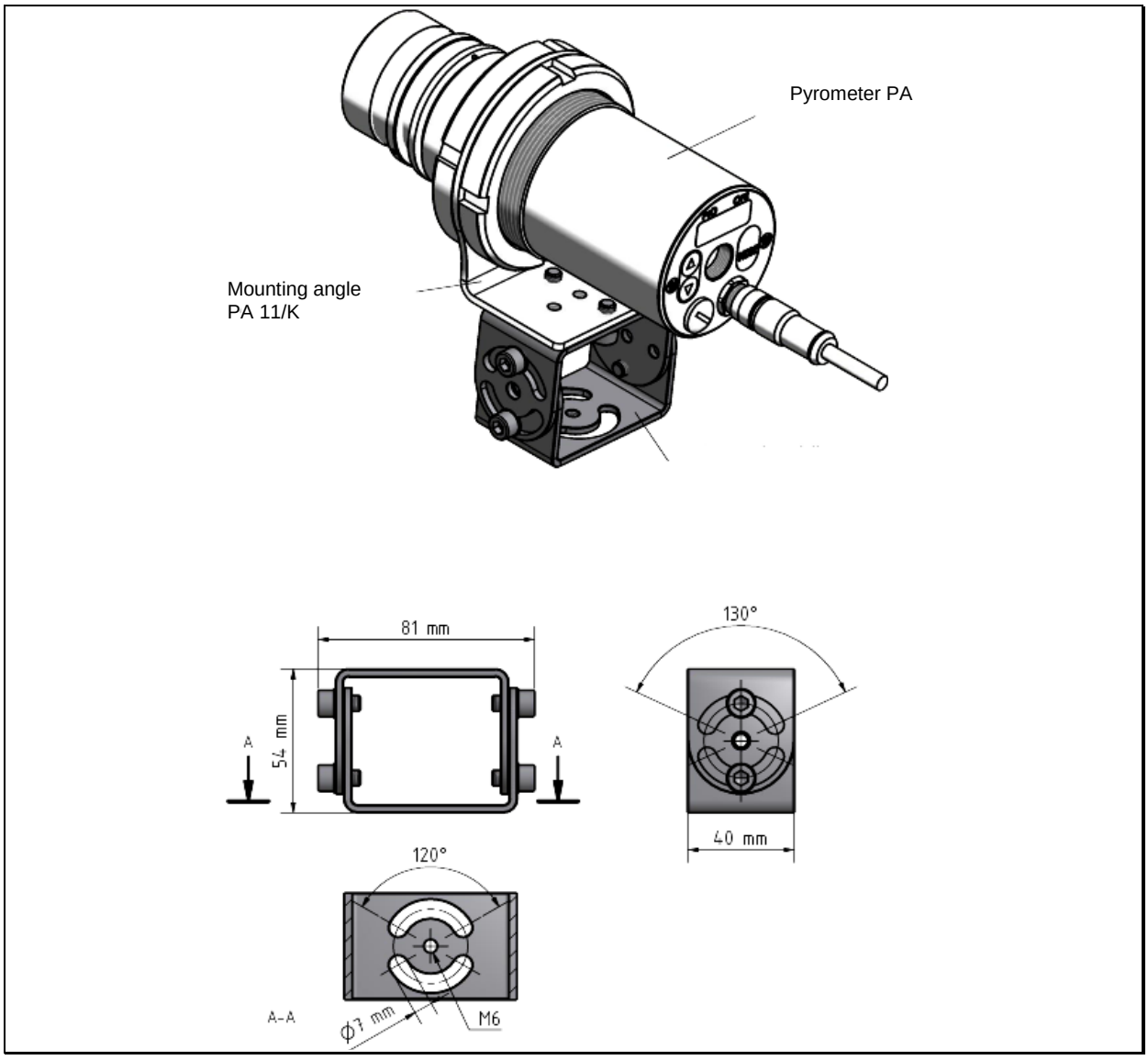
When connecting the video cable VK 02/F, make sure that the plug is tightened.

Optical system		Distance to target size ratio Target distance [m]													
		0.2	0.3	0.4	1	1.2	2	3	4	5	6	7	8	9	10
Standard 20.01	HFOV [mm]			16.2	44.9	54.4	92.7	140	188	236	284	332	379	427	475
	VFOV [mm]			12.1	33.7	40.8	69.5	105	141	17	213	249	285	320	356
Close-up 20.03	HFOV [mm]	8.5	14.1	19.8											
	VFOV [mm]	6.4	10.6	14.8											
Telephoto lens 20.06	HFOV [mm]					32.5	56.4	86.3	116	146	176	206	236	266	295
	VFOV [mm]					24.4	42.3	64.7	87.1	110	132	154	177	199	222
Wide-angle 20.05	HFOV [mm]	41.7		79.4	192.6	230.3	381	570	759	947	1136	1324	1513	1702	1890
	VFOV [mm]	31.3		59.6	144.4	172.7	286	427	569	710	852	993	1135	1276	1418
F50 lens 20.08	HFOV [mm]		19.6	26.8	69.8	84.2	142	213	285	357	428	500	572	643	715
	VFOV [mm]		14.7	20.1	52.4	63.1	106	160	214	267	321	375	429	482	536

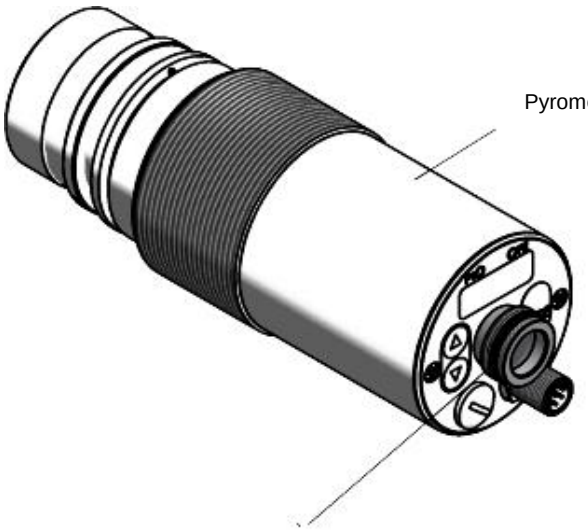
26 Accessories

Description	Product Name	Item No.
Cable length 5 m, 8 x 0.25 mm², shielded	VK 02/A	101 3909
Video cable	VK 02/F	103 1446
Polarising filter	PA 20/P	100 9974
Mounting bracket	PA 11/U	100 9679
Lock nut	KM 13	513 854
Mounting angle, adjustable	PA 11/K	100 7490
USB cable	VK 11/D	100 9677

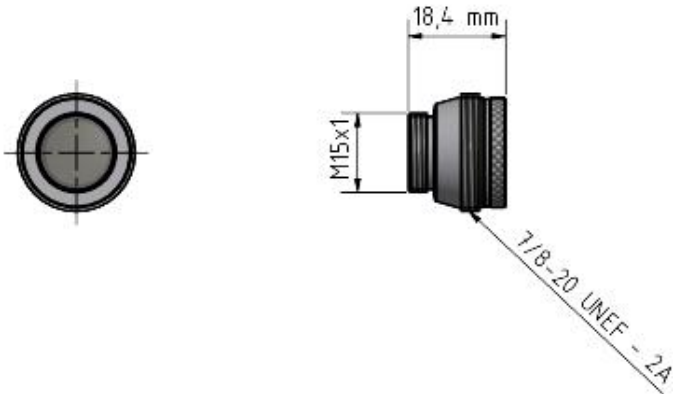
26.1 Mounting angle PA 11/K



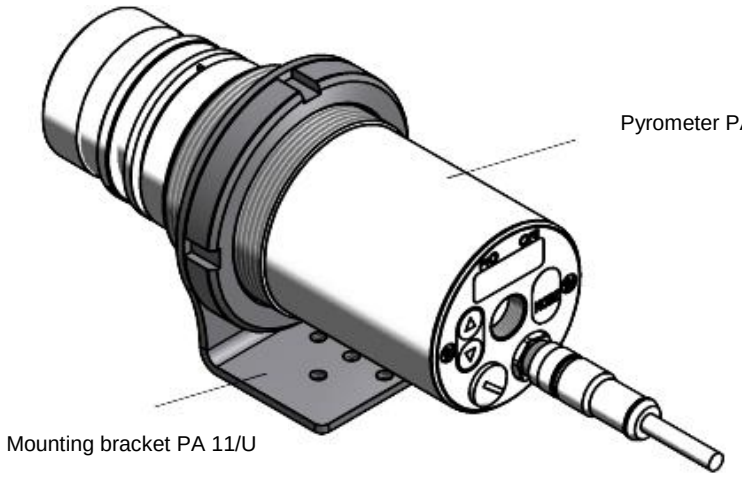
26.2 Polarising filter

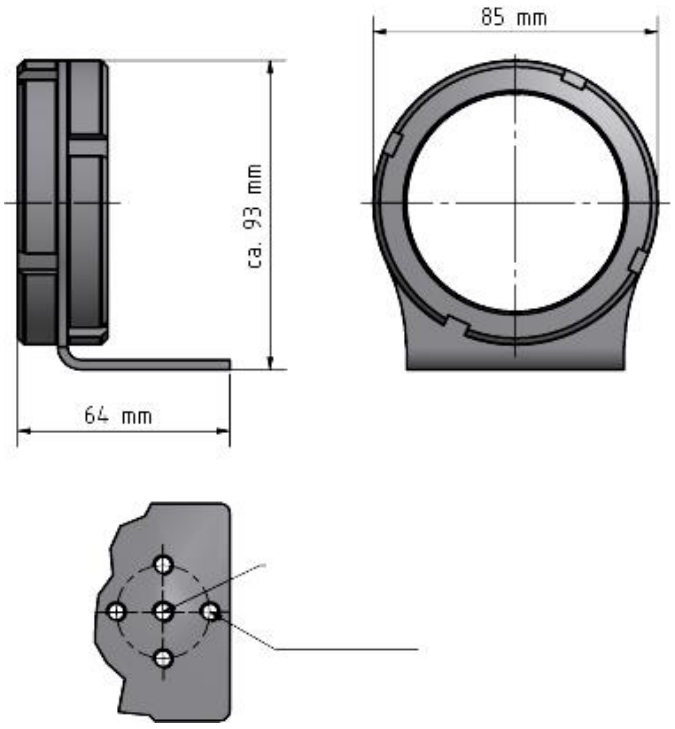


Polarising filter PA 20/P

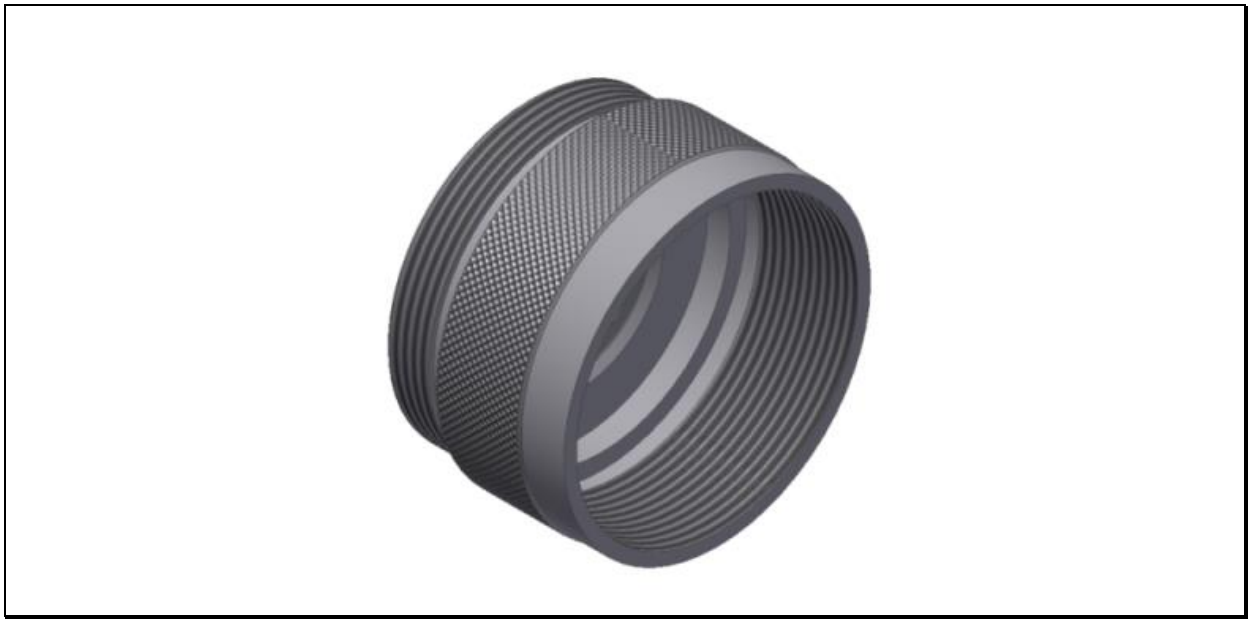


26.3 Mounting bracket PA 11/U





26.4 Quarz window PA 20/I

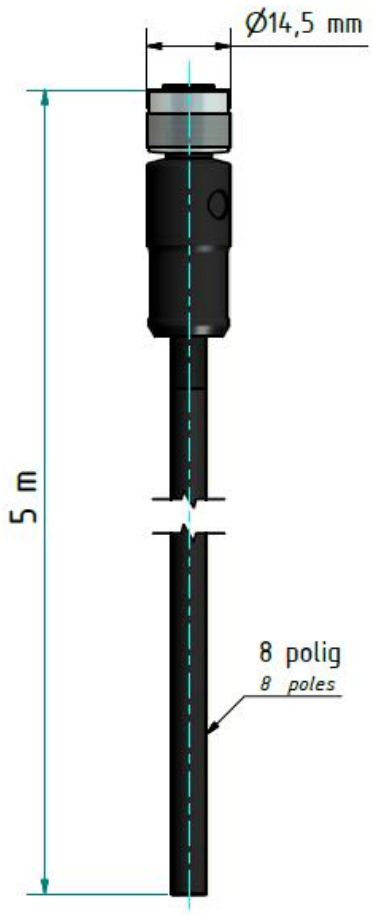


CAUTION !

The replacement of the protection glass can be performed only by authorized person. When removing the protective screen, always wear protective glasses and -gloves

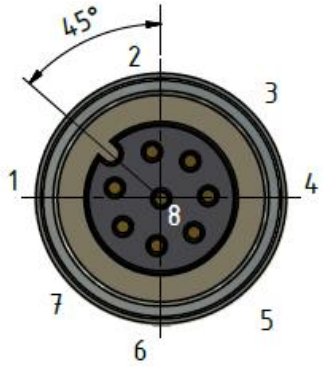
26.5 Cable VK 02/A

Ident. - Nr. 101 3909



Belegung *Configuration*	Pol *contacts*
weiß *white*	an 1 *at 1*
braun *brown*	an 2 *at 2*
grün *green*	an 3 *at 3*
gelb *yellow*	an 4 *at 4*
grau *grey*	an 5 *at 5*
rosa *pink*	an 6 *at 6*
blau *blue*	an 7 *at 7*
rot *red*	an 8 *at 8*

Schirm durchgängig an Verschraubung
Shield constantly at screw connection



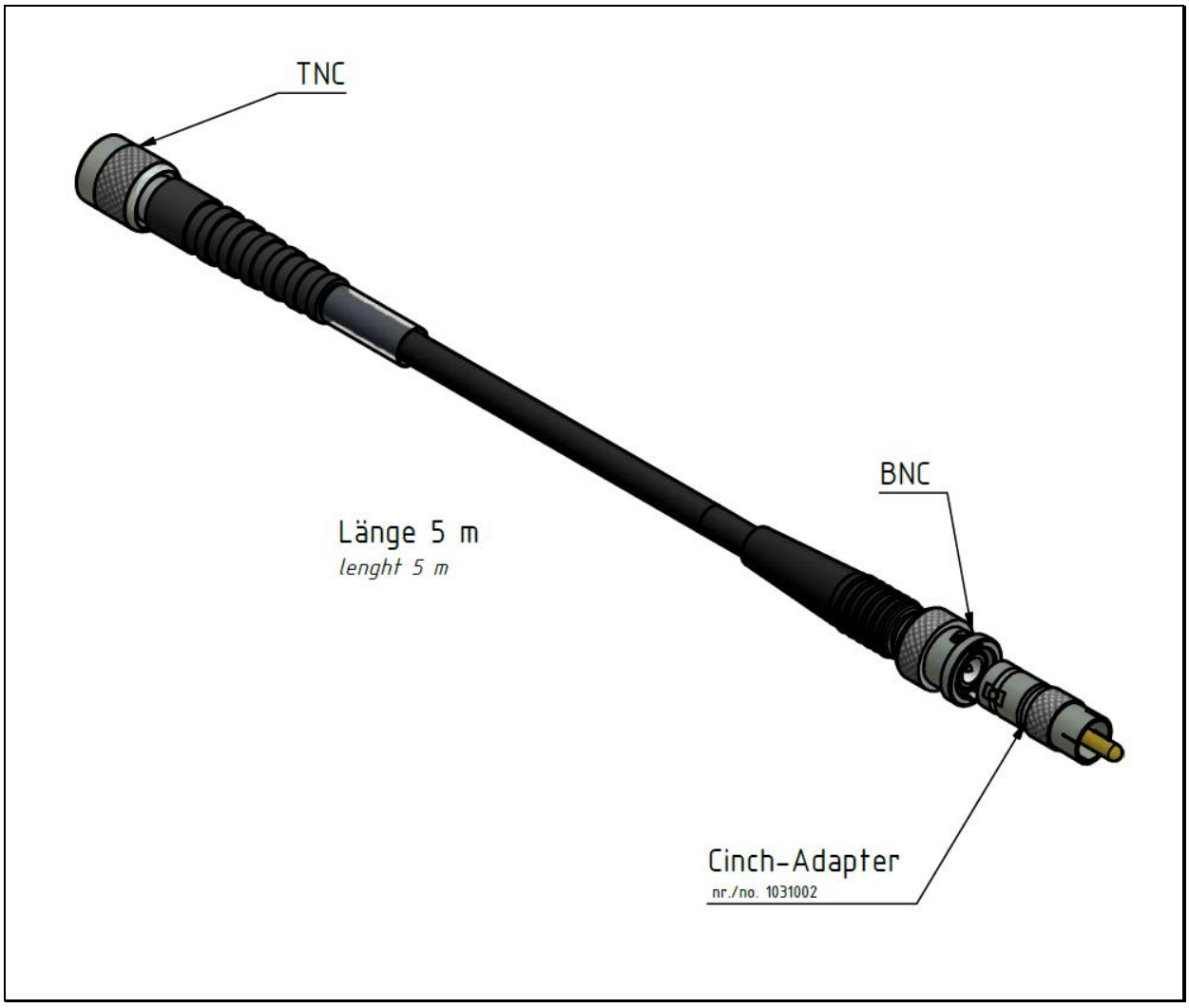
(Maßstab 3:1)

Anschlussquerschnitt 0,25mm² (AWG 24)
Schutzart IP68 / IP67 geschirmt
Obere Grenztemperatur + 85°C
Untere Grenztemperatur – 25°C

Wire gauge 0,25mm² (AWG 24)
Degree of protection IP68 / IP67 shielded
Upper temperature + 85°C
Lower temperature – 25°C

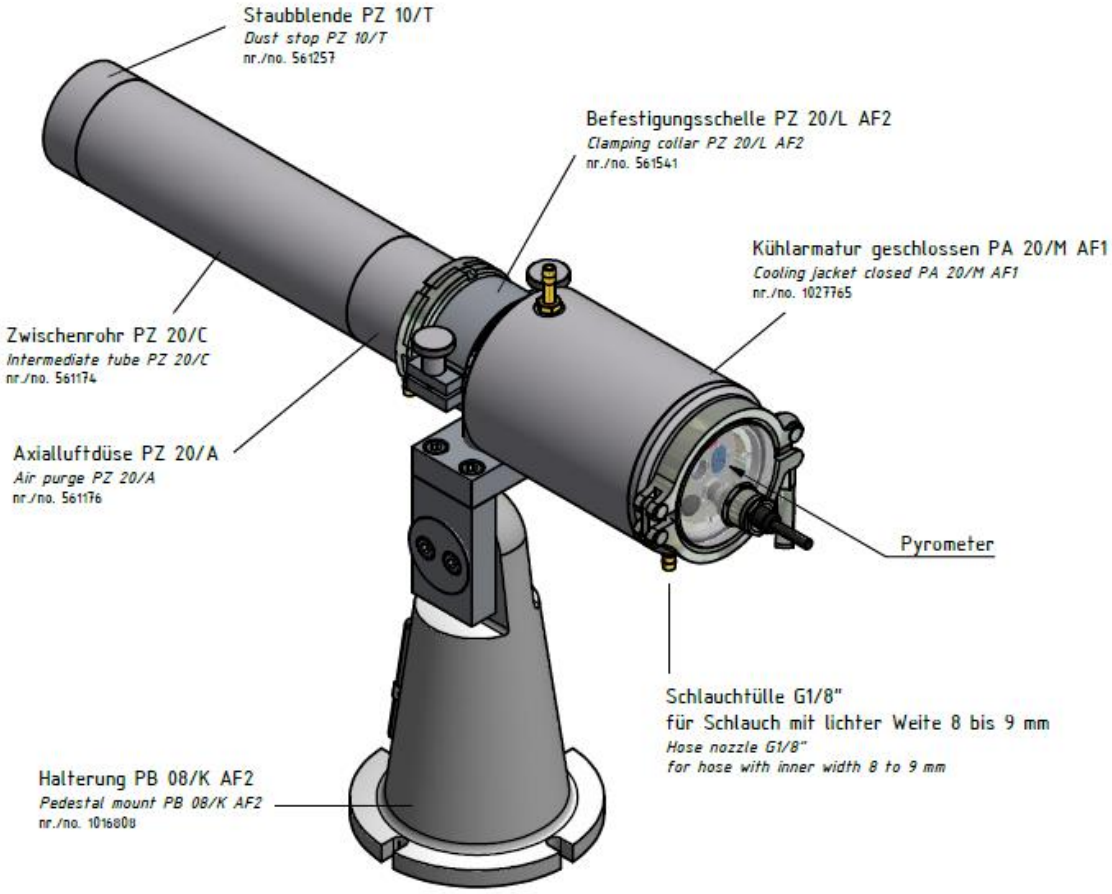
26.6 Cable VK 02/F

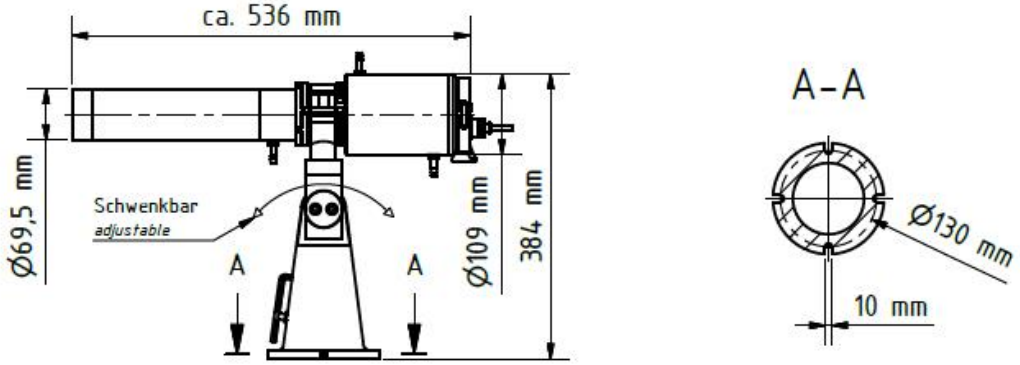
Ident. - Nr. 103 1446



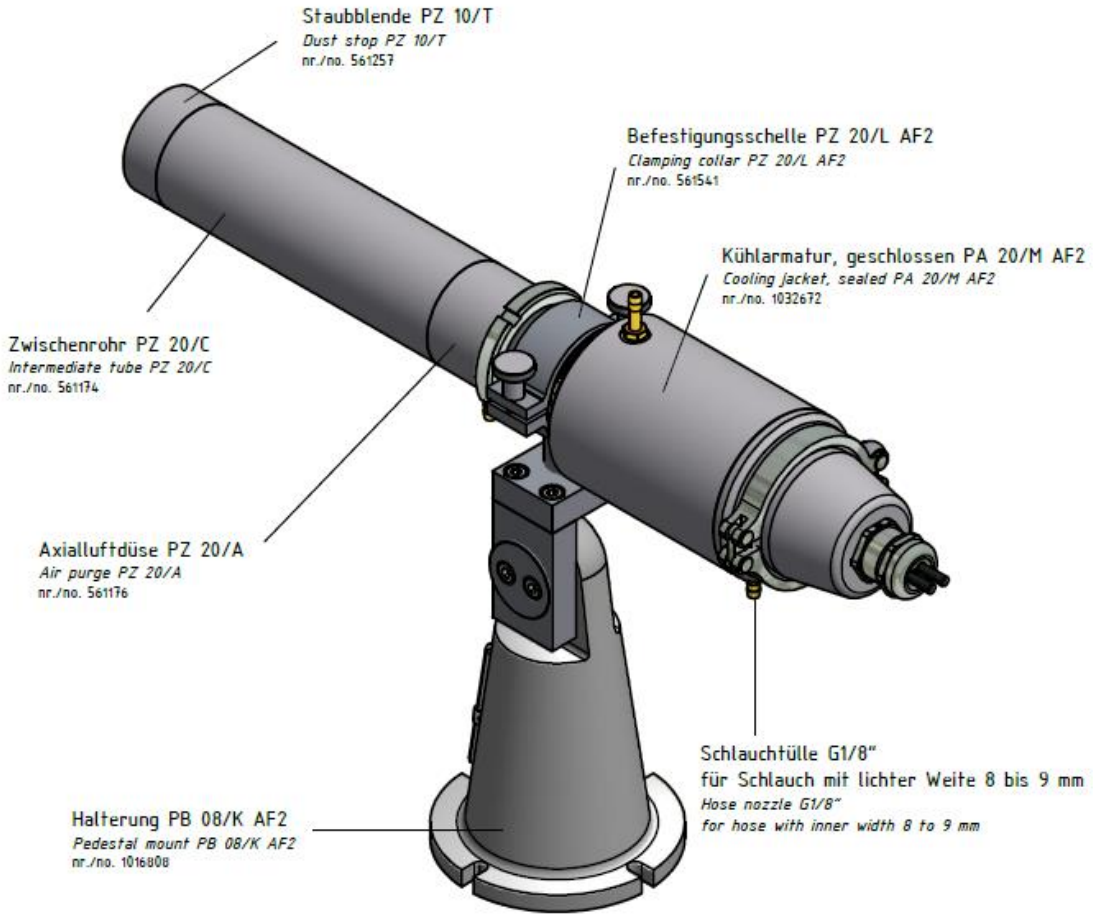
27 Mounting assembly

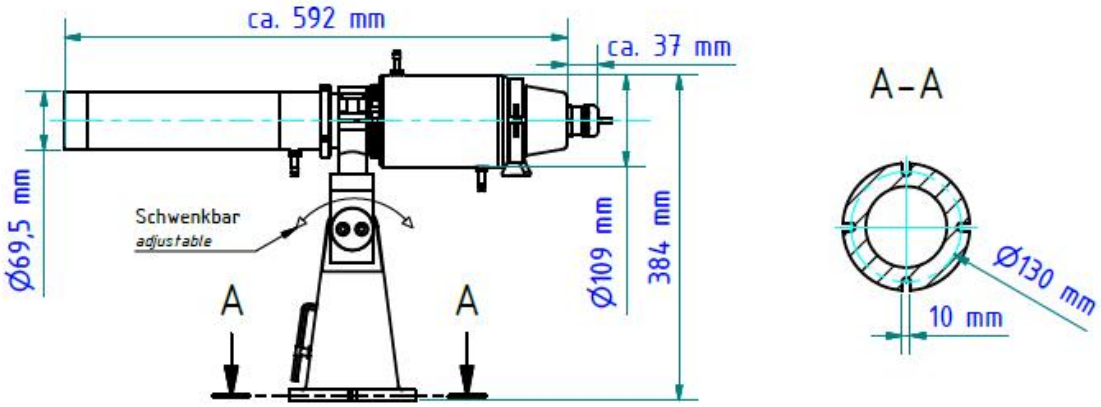
27.1 Mounting assembly PA 83-002





27.2 Mounting assembly PA 83-003





28 Glossary

Autoprint	After connecting the power supply, the pyrometer automatically begins transmitting measurement data via the serial interface.
Print cycle time	The cycle time for the temperature data output via the serial interface.
Distance to target size ratio	Describes the ratio between the pyrometer-to-object distance and the target spot diameter.
Double Max-Memory	Brief temperature peaks will be held for an adjustable holding time.
Emissivity	A measure of a material's ability to emit energy by radiation. The emissivity value is the ratio of energy radiated by a particular material's surface to energy emitted by an ideal radiator (black body) at the same temperature. A pyrometer's emissivity setting must be adjusted for the specific material to be measured.
Switching outputs	The digital outputs can be used as digital inputs
Two-colour pyrometer	Detects infrared radiation at two different wavelengths at the same time. Based on that ratio, the pyrometer calculates the temperature value.
Spectral pyrometer	Detects infrared radiation at one particular wavelength and produces a temperature reading from that measurement.

29 Shipping, Packaging and Disposal

29.1 Inspecting your shipment

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 KELLER HCW and to the 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.

29.2 Packaging

The packages used by KELLER HCW are made of carefully selected, environmentally compatible materials and are thus recyclable. We suggest you retain the packaging for possible future use; otherwise please ensure that they are disposed of in an ecologically sound manner.

29.3 Disposal of used apparatus

Used electrical and electronic equipment often contain valuable components. The owner/user may either return such an instrument to the manufacturer for disposal, or he must dispose of it himself in a professional and nonpolluting manner.

KELLER HCW will not be held accountable for any inappropriate disposal carried out by the user/owner of KELLER HCW instruments.

30 Copyright

31 Default settings PA 83

31.1 Temperature measurement using two-colour/ratio mode (Configuration layer: C001)

Parameter	Function	Default	Customized configuration
EPS.9	Ratio correction	101 %	
chr.9	Plausibility check ratio mode	n in	
chr._	Relative limit min.	5 %	
chr.¯	Relative limit max.	--	
chAt	Absolute min. temp.	Lower limit of measuring range	
chA'ı	Absolute minimum Emissivity	50 %	
L in.9	Temperature offset using linear interpolation (user configurable table)	Off	
L. H 1	Node x 1 - 10	--	
L. y 1	Node y 1 - 10	--	
F iL.9	Smoothing filter	On	
F iL.t	Smoothing time	500 ms	
mEn.9	Min/Max memory	Atd ATD function	
mEnt	Hold time for Min/Max	--	
F iL.n	Smoothing filter for min/max	--	
F iL.t	Smoothing time	--	
cLrn	external delete for Min/Max memory	--	
t.dEL	Time delay	1 s	
t.Act	Sampling time	0 s	
t.d iS	Cut-off interval	0 s	
t.oUt	Timeout	2 min	
L i. 1	Limit 1	1100 °C	
L i. 2	Limit 2	1200 °C	
F-Pr	Average weighting	90 %	
tSP_	Plausibility threshold	50 K	
tSP¯	Plausibility threshold	150 K	
Ano	Display mode during der Sampling time	t=0	
A.rSt	Auto reset	Off	
chL2	Set Li2 check on tAct	Off	
SAvE	Save		
ESc	Escape		

31.2 Temperature measurement using one-colour/spectral mode (Configuration layer: c002 = spectral channel 1, c003 = spectral channel 2)

Parameter	Function	Default	Customized configuration
EPS.1	Emissivity factor L1	99.6%	
tAU.1	Transmission factor L1	100 %	
bAc.1	Ambient temperature compensation	Off	
bAct	Temperature of ambient source of radiation	Off	
bAc'1	Influence of ambient IR radiation	--	
L in.1	Temperature offset using linear interpolation	Off	
L. x 1	node x 1..10	--	
L. y 1	node y 1..10	--	
F iL.1	Smoothing filter	Off	
F iLt	Smoothing time	0.1 s	
MEM.1	Min/Max memory	Off	
MEMt	Hold time for Min/Max	--	
F iLM	Smoothing filter for min/max	--	
F iLt	Smoothing time	--	
cLrM	external delete for Min/Max memory*	--	
tdEL	time delay	--	
tAct	meas. time activee	--	
td iS	cut-off interval	--	
toUt	timeout	--	
L i. 1	Limit 1	--	
L i. 2	Limit 2	--	
F-Pr	Average weighting	--	
tSP_	Plausibility threshold	--	
tSP¯	Plausibility threshold	--	
Ano	Mode of display	--	
ArSt	Auto reset	--	
chL2	Set Li2 check on tAct		
SAvE	Save	--	
ESc	Escape	--	

31.3 Configuration I/O (configuration layer: c0 10)

Parameter	Function	Default	Customized configuration
Ao 1.S	Ao1 select source	Quotient	
Ao 1._	Ao1 define lower limit of temp. span	Measuring range begin	
Ao 1.-	Ao1 define upper limit of temp. span	Measuring range end	
Ao 1.4	Ao1 0/4 - 20mA	4 – 20 mA	
Ao2.	Analogausgang 2	Off	
Ao2.S	Ao2 select source	--	
Ao2._	Ao2 define lower limit of temp. span	--	
Ao2.-	Ao2 define upper limit of temp. span	--	
Ao2.4	Ao2 0 / 4 - 20mA	--	
do 1.	Switching output 1	On	
do 1.S	Do1 select source	Status Ready signal	
do 1.F	Do1 function	Level/signal	
do 1.t	Do 1 switching threshold	--	
do 1.h	Do1 signal threshold	--	
do 1._	Do1 lower limit of range	--	
do 1.-	Do1 upper limit of range	--	
do 1.L	Do1 delay time	0.00 s	
do 1.n	Do1 hold time	0.00 s	
do2.	Switching output 2	Off	
do2.S	Do2 select source	--	
do2.F	Do2 function	--	
do2.t	Do 2 switching threshold	--	
do2.h	Do2 signal threshold	--	
do2._	Do2 lower limit of range	--	
do2.-	Do2 upper limit of range	--	
do2.L	Do2 delay time	--	
do2.n	Do2 hold time	--	
A .Fn	Analogue input function	--	
A .U1	Analogue in upper and lower voltage values	--	
A .U2	Analogue in upper and lower voltage values	--	
A .u1	Analogue in upper and lower input variables	--	
A .u2	Analogue in upper and lower input variables	--	
SAvE	Save		
ESc	Escape		

31.4 General Functions (configuration layer: c011)

Parameter	Function	Default	Customized configuration
LEd6	Green status LED	DO1	
P.Lo.	Activate laser*	INT	
P.LT	Laser ON-time	2 min	
tErM.	Assign interface	USB	
AStr.	Automatic temperature data output	Off	
AcYc.	Cycle for automatic temp. data output	0. s	
Addr.	Device address	001	
d.SP.	Display panel	active	
Un.t	temperature scale	Celsius	
c.oUL.	Screen insert temperature reading**	on	
c.tbc.	TBC exposure metering**	"on" spot weighted	
c.coL.	White balance**	"dAYL." daylight	
SAvE	Save		
ESc	Escape		

* Only available at pyrometer with laser target spot indicator

** Only available at pyrometer camera

32 Default settings PA 80/ 81

32.1 Temperature measurement using two-colour/ratio mode (Configuration layer: C001)

Parameter	Function	Default	Customized configuration
EPS.9	Ratio correction	101 %	
chr.9	Plausibility check ratio mode	n in	
chr._	Relative limit min.	5 %	
chr.¯	Relative limit max.	--	
chAt	Absolute min. temp.	Lower limit of measuring range	
chA'i	Absolute minimum Emissivity	50 %	
L in.9	Temperature offset using linear interpolation (user configurable table)	Off	
L. H 1	Node x 1 - 10	--	
L. y 1	Node y 1 - 10	--	
F iL.9	Smoothing filter	On	
F iL.t	Smoothing time	500 ms	
MEN.9	Min/Max memory	Atd ATD function	
MENt	Hold time for Min/Max	--	
F iL.n	Smoothing filter for min/max	--	
F iL.t	Smoothing time	--	
clrn	external delete for Min/Max memory	--	
tdEL	Time delay	1 s	
tAct	Sampling time	15 s	
td iS	Cut-off interval	0 s	
toUt	Timeout	2 min	
L i. 1	Limit 1	1100 °C	
L i. 2	Limit 2	1200 °C	
F-Pr	Average weighting	75 %	
tSP_	Plausibility threshold	50 K	
tSP¯	Plausibility threshold	150 K	
Ano	Display mode during der Sampling time	thLd	
ArSt	Auto reset	on	
chL2	Set Li2 check on tAct	off	
SAvE	Save		
ESc	Escape		

32.2 Temperature measurement using one-colour/spectral mode (Configuration layer: c002 = spectral channel 1, c003 = spectral channel 2)

Parameter	Function	Default	Customized configuration
EPS.1	Emissivity factor L1	99.6%	
tAU.1	Transmission factor L1	100 %	
bAc.1	Ambient temperature compensation	Off	
bAct	Temperature of ambient source of radiation	Off	
bAc'1	Influence of ambient IR radiation	--	
L in.1	Temperature offset using linear interpolation	Off	
L. x 1	node x 1..10	--	
L. y 1	node y 1..10	--	
F iL.1	Smoothing filter	Off	
F iLt	Smoothing time	0.1 s	
MEM.1	Min/Max memory	Off	
MEMt	Hold time for Min/Max	--	
F iLM	Smoothing filter for min/max	--	
F iLt	Smoothing time	--	
cLrM	external delete for Min/Max memory*	--	
tdEL	time delay	--	
tAct	meas. time activee	--	
td iS	cut-off interval	--	
toUt	timeout	--	
L i. 1	Limit 1	--	
L i. 2	Limit 2	--	
F-Pr	Average weighting	--	
tSP_	Plausibility threshold	--	
tSP¯	Plausibility threshold	--	
Ano	Mode of display	--	
ArSt	Auto reset	--	
chL2	Set Li2 check on tAct		
SAvE	Save	--	
ESc	Escape	--	

32.3 Configuration I/O (configuration layer: c0 10)

Parameter	Function	Default	Customized configuration
Ao 1.S	Ao1 select source	Quotient	
Ao 1._	Ao1 define lower limit of temp. span	Measuring range begin	
Ao 1.-	Ao1 define upper limit of temp. span	Measuring range end	
Ao 1.4	Ao1 0/4 - 20mA	4 – 20 mA	
Ao2.	Analogausgang 2	Off	
Ao2.S	Ao2 select source	--	
Ao2._	Ao2 define lower limit of temp. span	--	
Ao2.-	Ao2 define upper limit of temp. span	--	
Ao2.4	Ao2 0 / 4 - 20mA	--	
do 1.	Switching output 1	On	
do 1.S	Do1 select source	Status Ready signal	
do 1.F	Do1 function	Level/signal	
do 1.t	Do 1 switching threshold	--	
do 1.h	Do1 signal threshold	--	
do 1._	Do1 lower limit of range	--	
do 1.-	Do1 upper limit of range	--	
do 1.L	Do1 delay time	0.00 s	
do 1.n	Do1 hold time	0.00 s	
do2.	Switching output 2	Off	
do2.S	Do2 select source	--	
do2.F	Do2 function	--	
do2.t	Do 2 switching threshold	--	
do2.h	Do2 signal threshold	--	
do2._	Do2 lower limit of range	--	
do2.-	Do2 upper limit of range	--	
do2.L	Do2 delay time	--	
do2.n	Do2 hold time	--	
A .Fn	Analogue input function	--	
A .U1	Analogue in upper and lower voltage values	--	
A .U2	Analogue in upper and lower voltage values	--	
A .u1	Analogue in upper and lower input variables	--	
A .u2	Analogue in upper and lower input variables	--	
SAvE	Save		
ESc	Escape		

32.4 General Functions (configuration layer: c011)

Parameter	Function	Default	Customized configuration
LEd6	Green status LED	DO1	
P.Lo.	Activate laser*	INT	
P.LT	Laser ON-time	2 min	
tErM.	Assign interface	USB	
AStr.	Automatic temperature data output	Off	
AcYc.	Cycle for automatic temp. data output	0. s	
Addr.	Device address	001	
d.SP.	Display panel	active	
Un.t	temperature scale	Celsius	
c.ouL.	Screen insert temperature reading**	on	
c.tbc.	TBC exposure metering**	"on" spot weighted	
c.coL.	White balance**	"dAYL." daylight	
SAvE	Save		
ESc	Escape		

* Only available at pyrometer with laser target spot indicator

** Only available at pyrometer camera