Pyrometer CellaPort

PT 11x, 12x,13x

Item No.: 106 3102 01/2019

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.

Carl - Keller - Straße 2 - 10
D - 49479 Ibbenbüren – Laggenbeck
Germany
www.keller.de/its/

830-hm / 810-het
PT11x_12x_13_en.doc
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1 Miscellaneous

1.1 Informationen about this manual

The Operating Manual shall enable the user to properly install the pyrometer and those accessories which are necessary.

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.

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

☞ This symbol points out guidelines which should be heeded 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.

☞ *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.

☞ *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.

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 Electromagnetic Compatibility

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

2.4 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.

2.5 Environmental Management

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

3 Scope of delivery

Make sure that all of the following components have been included with your shipment:

- Pyrometer
- Carrying case
- Battery charger
- Calibration certificate
- Software CellaView (Download Version)
- USB cable

4 Pyrometer types

Model	Range	Application
PT 110	0 – 1000 °C	Non metallic
PT 113	500 – 1300 °C	Furnace with flames
PT 115	300 – 1300 °C 500 – 2500 °C	Glass
PT 117	400 – 2000 °C	CO_2 bands
PT 118	500 – 2500 °C	Hot combustion gas
PT 120	250 – 2000 °C 350 – 2500 °C	Metals, ceramics, molten glass
PT 128	75 - 650 °C	Aluminium, reflective metals Laser application
PT 129	150 - 800 °C 180 – 1200 °C	Aluminium, reflective metals Laser application
PT 130	500 – 2500 °C	Metals, ceramics, glass at high temperatures
PT 135	600 – 3000 °C	Ultra accurate measures on metals, semi-conductors

5 General Description

5.1 Intended Use

The CellaPort PT series provides efficient pyrometers for non-contact temperature measurements.

The field of applications for CellaPort PT 110 includes temperature detection of materials such as synthetic materials, rubber, textiles, paper, coated sheet steel, wood or varnish within a range from 0 °C to 1000 °C.

The CellaPort PT 113 is specially designed to detect the temperature of objects in flame-heated furnaces. Because the PT 113 works at a narrow spectral range of 3.9 µm, water vapour and CO_2 in the detector's field of view will not influence the measurement, even at greater target distances.

The CellaPort PT 115 is specially designed to measure the temperature of glass. Glass is transparent in the visible spectrum and near infrared. The emissivity depends on the wave length, type of glass and thickness of glass. In the range of 4.5 – 8 µm glass has an emissivity near 100%. Above 5 µm atmospheric influences such as humidity or water vapor affect the measurement. The CellaPort PT 115 has a special band-stop filter with a spectral sensitivity of 4.6 - 4.9 µm. Thus, it measures the temperature of the near surface region of the glass. Changes in thickness, different types of glass or a change in the humidity in the atmosphere due to the wave length does not affect the measured values.

The PT 117 is used for measuring hot CO_2 combustion gases for example in wasting plants, incinerators, coal power plants and other combustion furnaces. The PT 118 measures at a specific wavelength, where hot, organic combustion gases have a high optical density and therefore good radiation properties

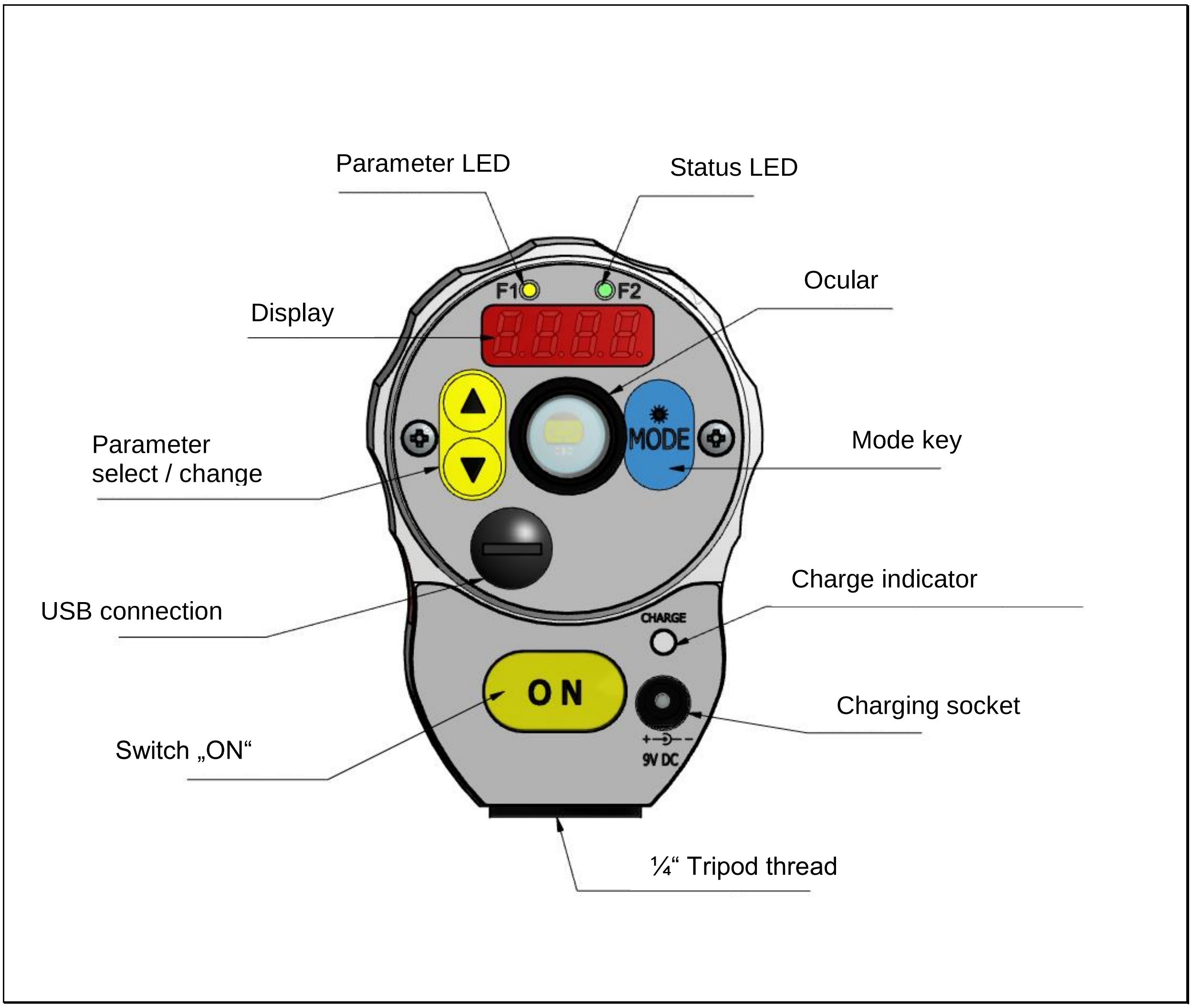
The spectral pyrometers CellaPort PT 120, PT 130 and PT 135 are used for temperature measurements from 250 °C to 3000 °C. Their applications cover large segments of the iron and steel producing industry and the metal, glass, ceramics and chemical industries.

The CellaPort PT 128/ PT 129 are designed with a special band-stop filter and sensor which ignore interfering IR radiation from sources such as daylight or laser beams. CellaPort PT 128 and PT 129 features a response spectrum which is far less sensitive to incidental light reflections from nearby hot objects than most commonly available pyrometers which are responsive at short wavelengths. It is suitable for various applications in the metalworking industry, and is ideal for measuring reflective metals and aluminium at low temperatures. With its band-stop filter, the CellaPort PT 128 and PT 129 are highly accurate in capturing the temperature of metal surfaces which are heat-treated by diode, Nd:YAG or CO_2 lasers.

5.2 Operating Controls and Display

The rear panel of the CellaPort has a 4-digit display and 4 push-buttons. The display normally indicates the currently measured temperature. During configuration (using the push-buttons), the display will show the parameter you are setting. Whenever the display shows a parameter, the

F1 Parameter LED (yellow) will light up. During a running measurement, the F2 Status LED (green) will light up.



6 Charging the batteries

Connect the battery charging socket of the CellaPort to the provided power supply (9 V DC). The charge indicator lights as long as the batteries are being charged. A complete charging cycle takes approx. 15 hours.

! **Only use the power supply which comes with the pyrometer. Do not use any other power supply as this may cause irreparable damage to the device.**

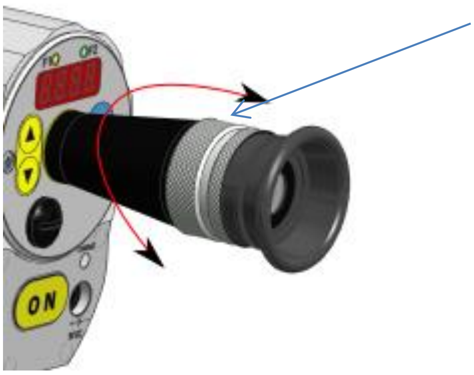
! **The charger is only for charging the battery.**
The rechargeable battery is only charged when the pyrometer is switched off.

7 Preparing the pyrometer for measurements

7.1 General Information

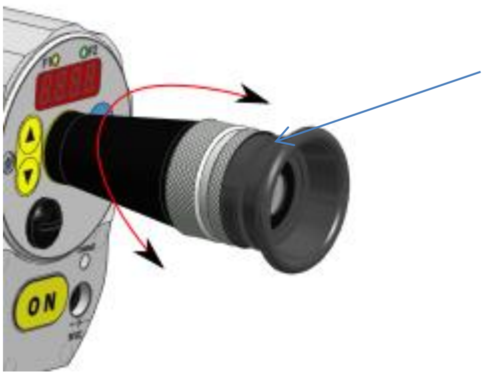
The pyrometer’s field of view must remain unobstructed. Any obstruction may lead to measurement errors.

7.2 Diopter compensation



The pyrometer offers diopter compensation to adjust the sighting device to the user’s vision. Turn the ring until you see a sharp image of the target spot indication in the viewfinder.

7.3 Brightness control to protect the eye



Instruments with a measuring range of > 2000 °C are equipped with a polarisation filter to control brightness and protect the user’s eye.

7.4 Focusing the pyrometer

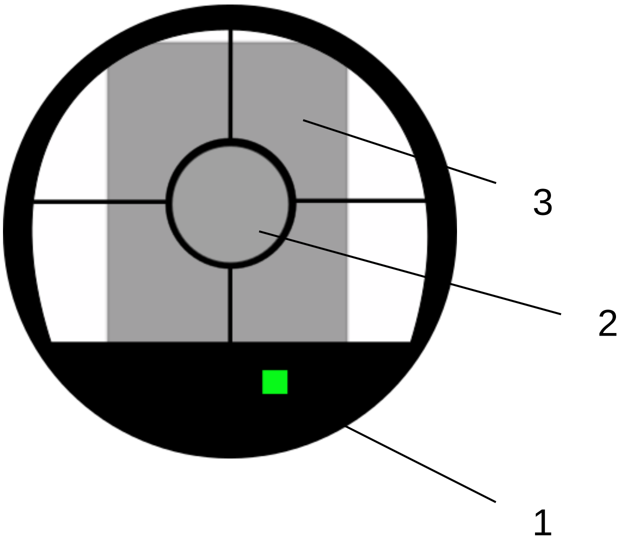
The pyrometer is equipped with focusable optics. Turn the lens until the target object ***and*** the target marker (distinctly marked in the viewfinder) ***both*** appear in sharp focus simultaneously

☞ *To ensure precise temperature measurement, the pyrometer* ***must*** *be correctly focused on the target object*

7.5 Align the pyrometers

Direct the CellaPort to the object to be measured. The target marker in the through-the-lens sighting device indicates the size of the target. (see technical data/ course of target). Make sure that the target spot is fully covered during the measurement, otherwise the indicated temperature will be too low.

7.6 Performing a measurement



1) LED measurement active
2) Measurement area
3) Target object

Press the ON button to switch on the device and to adjust the emissivity. Then direct the CellaPort to the measuring object. Focus the target marker at the diopter correction switch and adjust the pyrometer lens to the correct measuring distance.

Measurement is in progress as long as you press the ON button. The temperature (depending on the configured mode) is displayed on the rear panel when you release the ON button. As an option, the measurement readings can be transmitted via interface.

☞ *The amount of thermal radiation emitted from an object depends on the specific radiation properties of the material and its surface. Non-contact temperature measurement requires that you determine the material constant (emissivity) of the target object prior to first-time use*

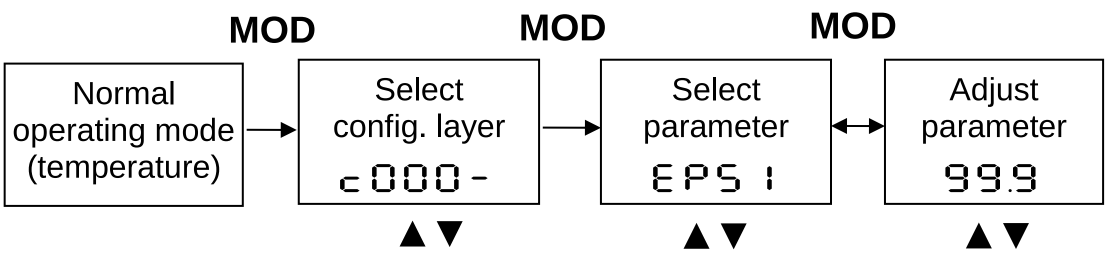
7.7 Automatic switch-off

In the default setting, the CellaPort switches off automatically after 2 minutes if none of the control keys are pressed. Automatic switch-off can be configured from 1 – 60 minutes. The CellaPort measures continuously when it is in "automatic disconnection deactivated" mode.

8 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.

Menu structure:



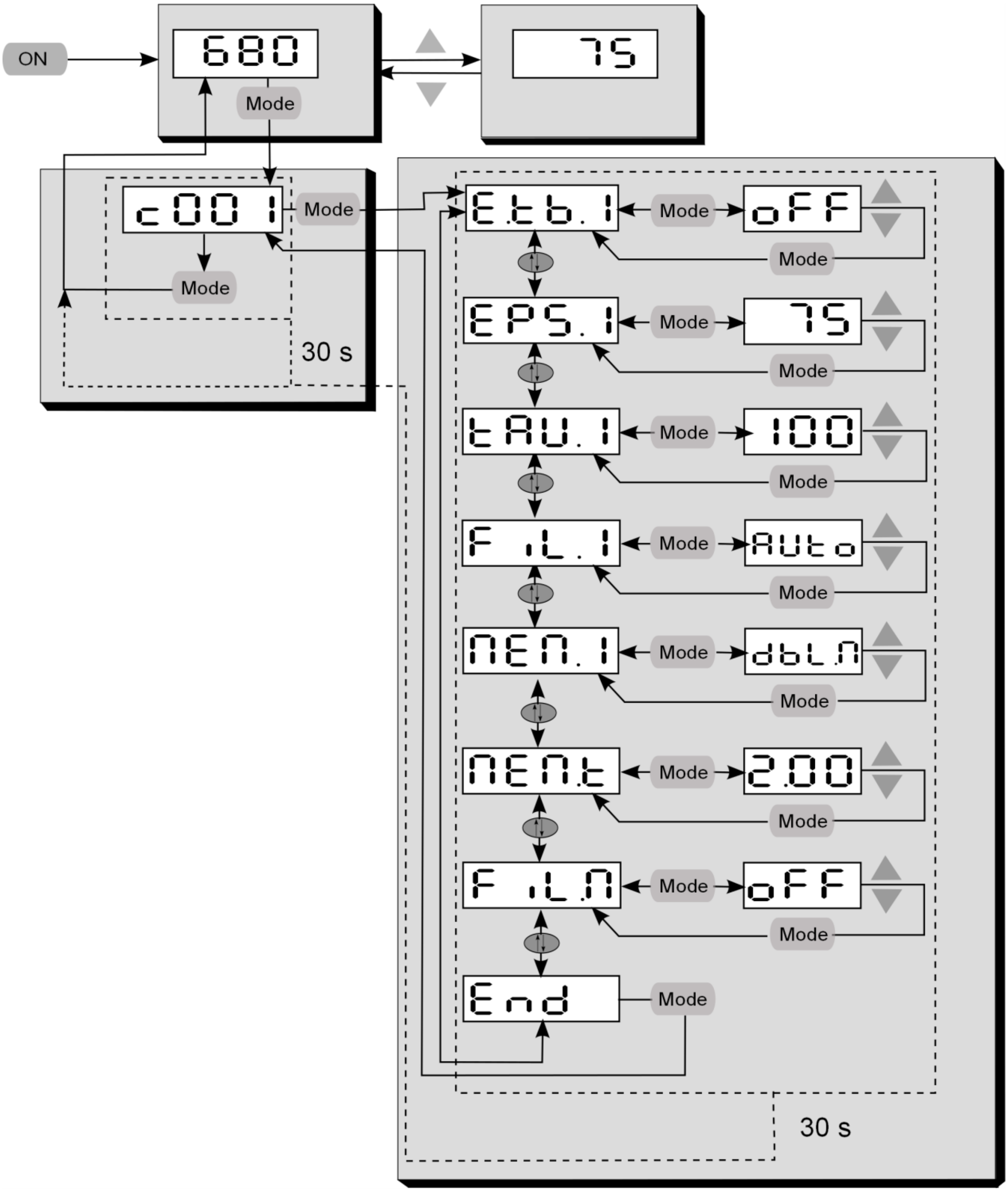
1. Press the MODE button while in normal operating mode to switch to "configuration layer" mode.
2. Use ▲▼ to select the configuration layer for the parameter you wish to set.
3. Press MODE to confirm. Press ▲▼ to select the particular parameter.
4. Press MODE to confirm. Press ▲▼ to adjust the parameter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

Whenever a control key has not been pressed within 30 seconds, the pyrometer will automatically return to normal operating mode. The modified value is applied.

☞ *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.*

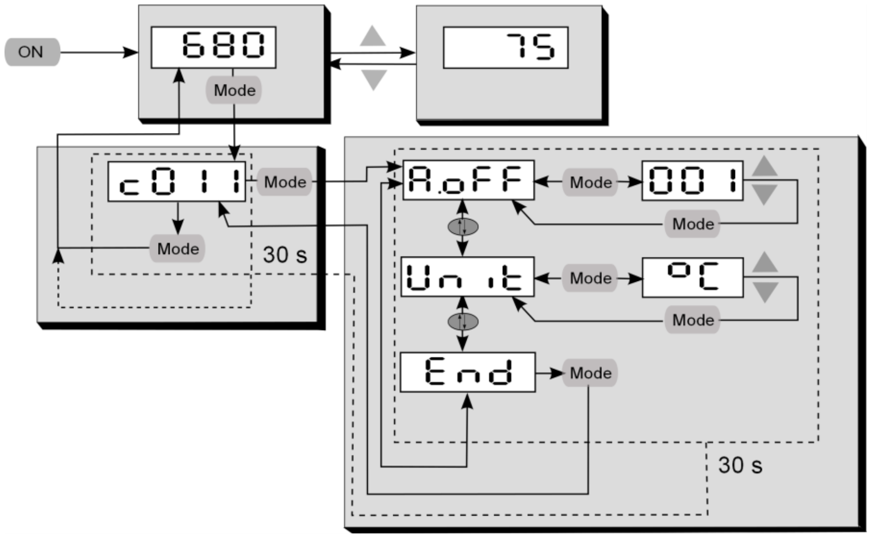
9 Menu

9.1 Measurement configuration layer C001

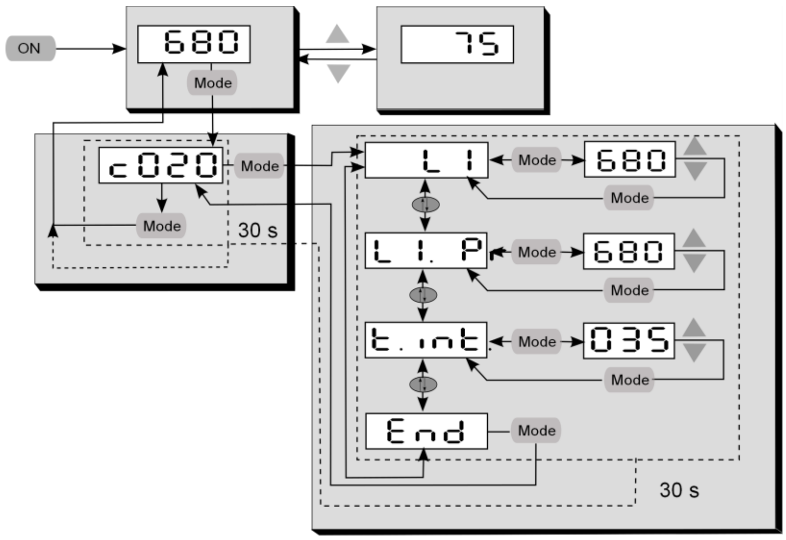


☞ *In the default configuration, certain parameter settings will be hidden. If required, you can have them shown.*

9.2 General function configuration layer C011



9.3 Displayed temperature readings configuration layer C020



10 Determining and Setting Emissivity

In pyrometry, the specific radiation characteristics of the measured object will influence the generated temperature data. In order to produce accurate and reliable temperature readings, the pyrometer must be configured according to the specific material constant (emissivity).

☞ To determine the correct setting of the emissivity of a comparative measurement is carried out by a contact measurement. In order to minimize measurement differences between the two different physical measuring methods, the comparison measurement is almost the same time and performs at the same measuring point as possible.

During normal operating mode, emissivity 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 coefficient continues to be adjusted in the background. This is an easy way to determine the emissivity when the object temperature is known. The modified values are directly adopted.

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

11 Initializing material constants

The CellaPort lets you store up to 10 emissivity factors. Before you perform a new measurement, simply use the ▲▼ control keys to select your preconfigured emissivity factor. When you select a stored emissivity factor, the display will briefly show the preconfigured factor for that emissivity factor.

11.1 Define number of material constants in array

Before you configure the pyrometer with emissivity factors, you must define the size/length of the array. This is the number of material constants you would like the array to contain (10 maximum). Using parameter E.tb.1, enter the total number.

Temperature measurement (Configuration layer: C001)

Parameter	Function	Explanation
E.tb.1	Enter desired number of elements in array	If E.tb.1 = oFF. then use ▲▼ keys to manually set emissivity

11.1.1 Store and assign material constants

Next, assign a value to each material constant in the index (E. 01, E. 02. etc.).

Temperature measurement (Configuration layer: c001)

Parameter	Function	Explanation
E. 01	Emissivity Memory position 1	z. B. 75 %
E. 02	Emissivity Memory position 2	z. B. 60 %
E. 03	Emissivity Memory position 3	z. B. 50 %

11.2 Select the material constant

The memory position can optionally be set using the menu.

Temperature measurement (Configuration layer: c0013

Parameter	Function	Explanation
E.idH	Memory position	Shows current selected material constant, e.g. E.02

12 Further configuration

13 Configuration – signal conditioning

13.1.1 Transmission factor

The pyrometer has to be adjusted for the transmission properties of any supplementary lens and/or protective window screwed onto the pyrometer. Set the pyrometer for the specific transmission factor (a percentage value) which is indicated either in the product's data sheet or on the lens itself. This is parameter tAU.1 and can be accessed at configuration layer c001. If you are not using any auxiliary lens or protective window, set the parameter to 100.0.

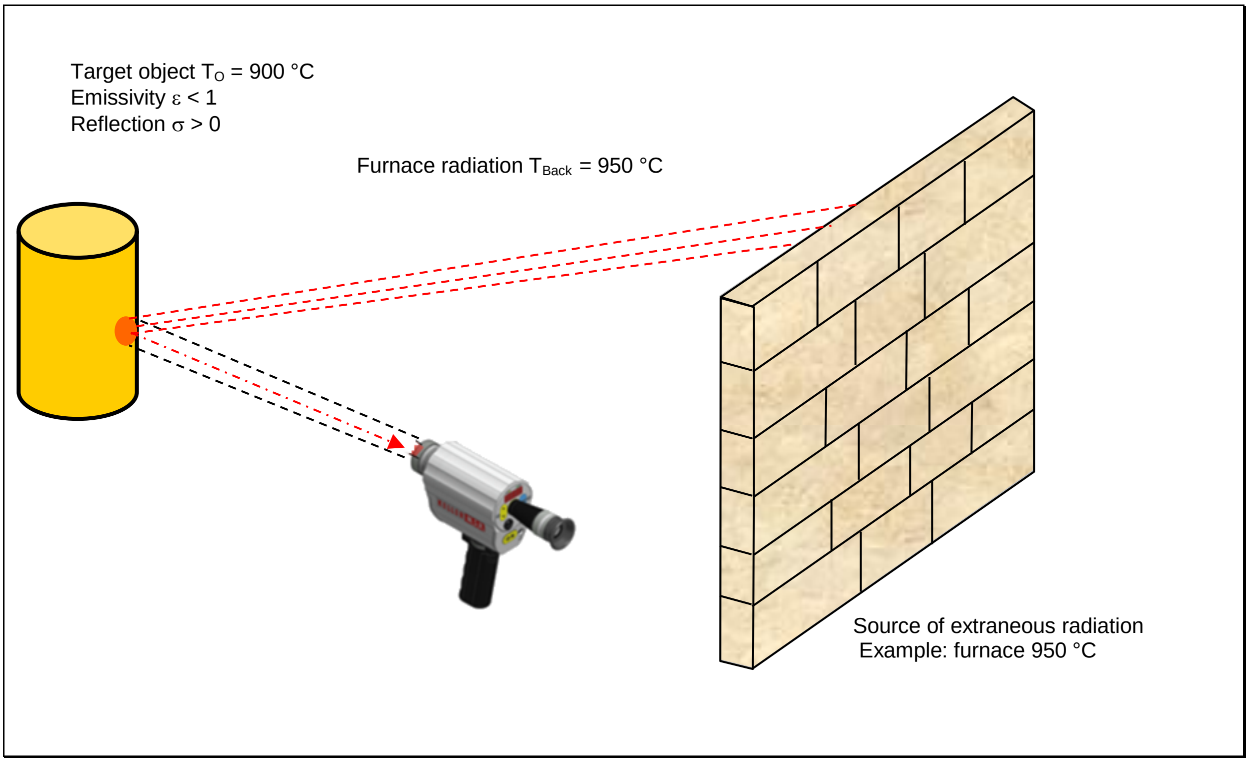
13.1.2 Background Temperature Compensation

Thermal radiation reflected from the surrounding will require that you make an additional correction when the reflected radiation is strong compared to the natural radiation of the target. This applies to object surfaces which have very low emissivity or when the temperature of the object is lower than the temperature of its surroundings.

The background radiation reflected from the object consists of the following factors:

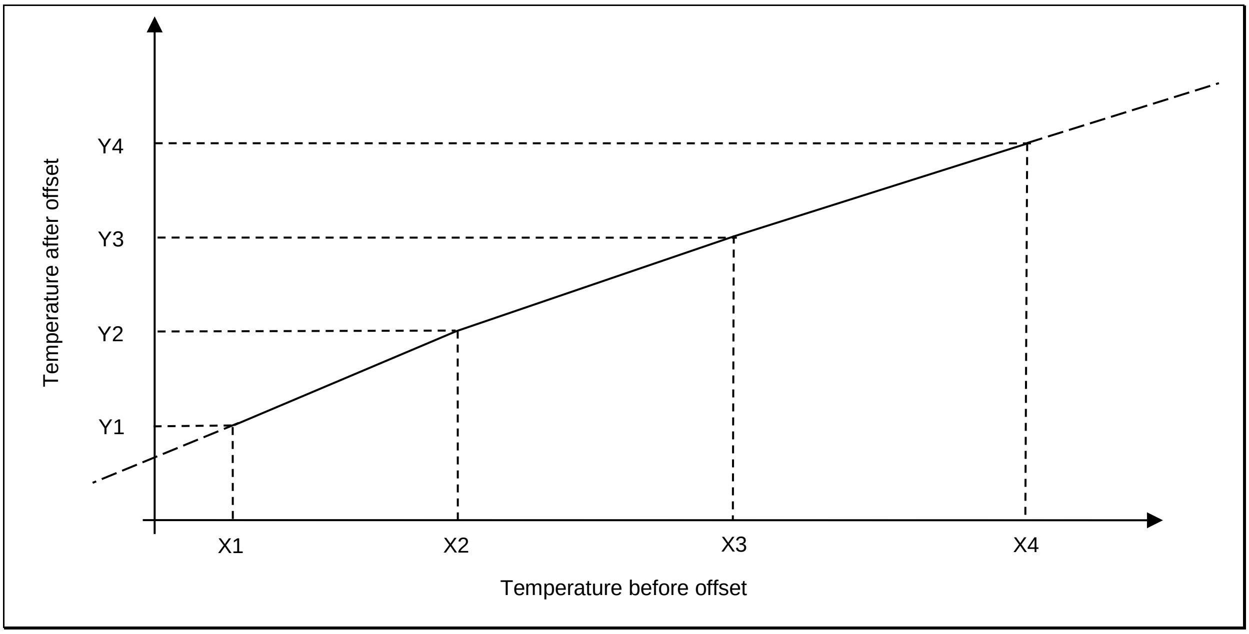
- Background temperature
- Background size
- The capability of the background material to reflect infrared radiation

To ensure that the measurement is not distorted and that the temperature readings are completely accurate, you should activate "background temperature compensation" (switch on c001 / bAc.1). Now enter the temperature value of the ambient source of radiation (bAc.t) and its influence as a percentage (bAc.'i). The influence in percent stands for the size and the capability of the material to emit infrared radiation. You will have to determine these variables first.



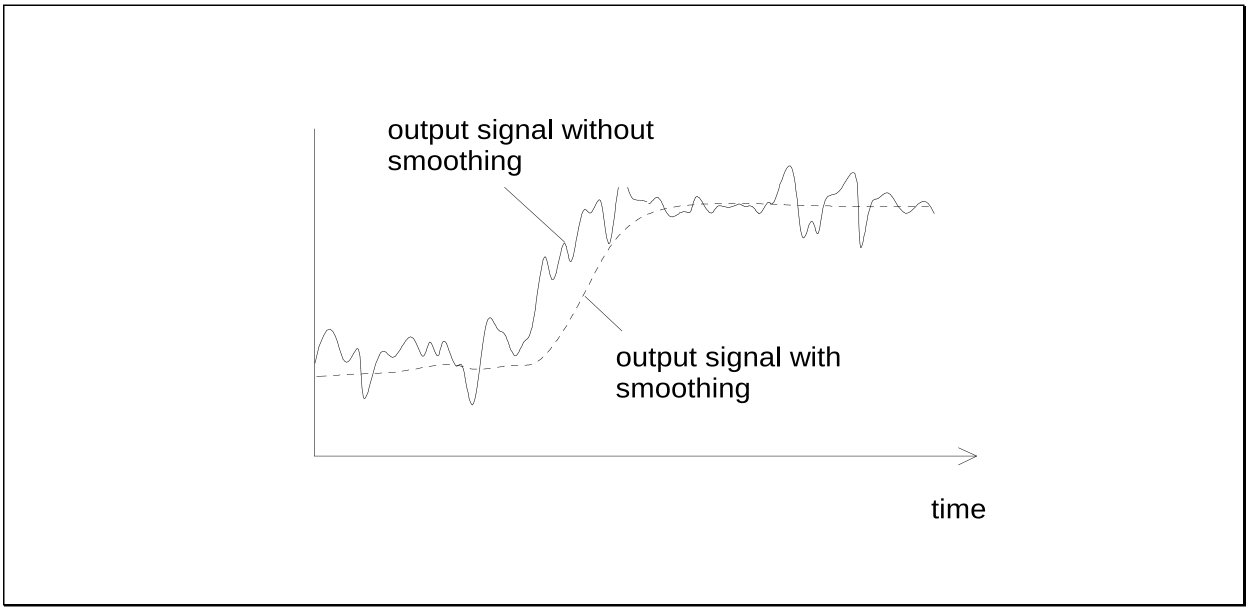
13.1.3 Temperature offset using linear interpolation

When necessary, CellaPort PT 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 c001/ Lin.1.



13.1.4 Smoothing function

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 signal smoothing via parameter c001 / FiL.1. CellaPort models PT 110/113 which have a thermopile sensor also feature „automatic averaging". This facilitates a steady measurement, on the one hand, and enables fast response times on the other hand when temperatures become erratic. This function is activated as a default setting.



13.2 Min/Max memory

The pyrometer features a data memory to store minimum and maximum (peak) temperature readings. This feature can be configured in one of the following modes:

- Memory off
- Store minimum value (single)
- Store maximum value (single)
- Store double max. value for cyclical processes
- ATD function (Only available in pyrometer with ATD function)

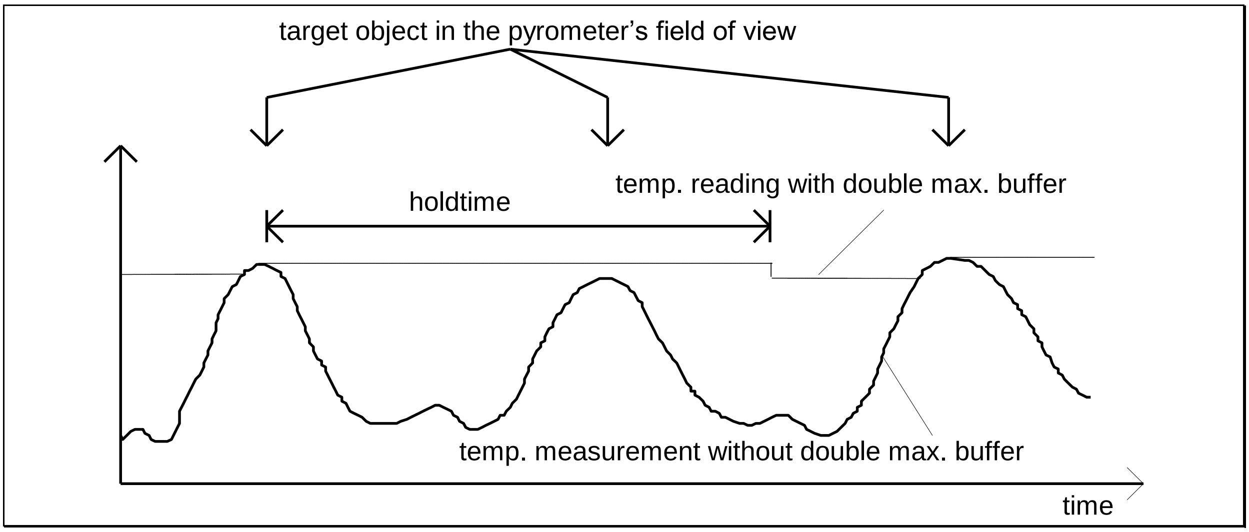
13.2.1 Min/Max Memory

In this mode—also called peak picker—the pyrometer determines the highest or lowest temperature reading and keeps the temperature reading. The value is stored until you press the ON button again. Additionally, you can define the smoothing filter setting.

13.2.2 Double Maximum Memory with hold time

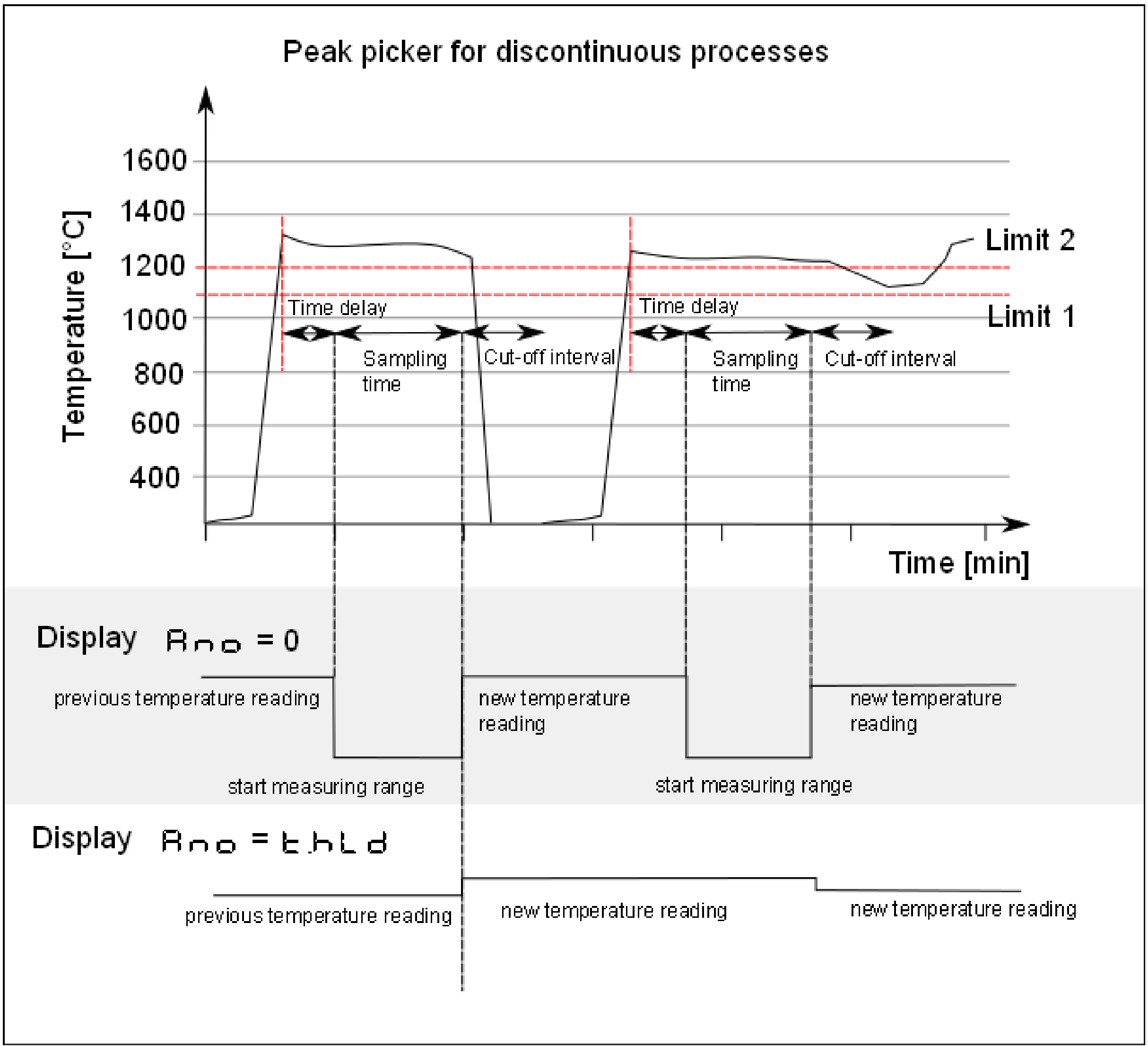
In this operating mode the pyrometer continuously detects the maximum temperature reading. This value is stored for the duration of the configured hold time and is displayed on the rear panel. In mid-sequence – after 50% lapse of the hold time – a second internal peak picker starts. When the hold time has expired without finding a new max value, the output signal decreases to the value of the second peak temperature (if it turned out being lower than the first peak).

This memory mode serves to detect the maximum temperature of objects moving periodically past the pyrometer lens. The temperature reading is kept for the duration of the configured holding time when the pyrometer does not detect any hot object. The holding time should be configured to approximately 1.5 times as long as the cycle of the moving targets. This ensures that a temperature measurement gap is avoided and temperature changes are detected quickly.



13.2.3 Automatic Temperature Detection (ATD)

This function serves to automatically detect the temperature during manufacturing processes with discontinuous or intermittent material flow, for example molten metal casting at foundries. 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.



Threshold limits

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

Parameter	**Function**
Limit 1 (Li. 1)	Before beginning the measurement, the temperature reading must have been lower than Limit 1 at least once. If Auto reset is activated (A.r St = on), Limit 1 will be ignored
Limit 2 (Li. 2)	Limit 2 must be exceeded at least for the duration of the time delay (t.dEL).
Time Delay (t.dEL):	See Limit 2

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

Parameter	Function
Sampling time (t.Act) *1	During the sampling time the temperature is detected and stored as a temperature value.

☞ The parameter t.Act = 0 automatically recognises the end of the discontinuous process (measured temperature < L2). The pyrometer then shows "Auto" instead of the time under parameter t.Act .

Display and output of temperature reading [Ano]

The parameter Ano (normal display mode) defines which temperature value is saved during sampling.

Parameter	Function
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.

The green status LED indicates that a measurement is currently in process.

Average weighting [F-Pr] Plausibility check

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.

Parameter	Function
Weighted average (F-Pr)	Factor for average weighting. If you enter 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 greater than the plausibility threshold tSP, the transmitted data will be „0“ and the average value will remain unchanged.

Enter the upper threshold and lower threshold for the permissible deviation separately.

Parameter	Function
Plausibility (tSP_)	Upper threshold for permissible deviation, if temperature reading > average value
Plausibility (tSP¯)	Lower threshold for permissible deviation, if temperature reading is < average value

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.

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

At the end of the measuring cycle the pyrometer displays the averaged temperature value (or the invalid reading „- - - -“).

Cut-off interval [t.d iS]

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

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

Timeout [t.oUt]

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.

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

Autoreset Funktion [A.r St]

Activate auto reset for the ATD function to run cyclically. Limit 1 will then be ignored.

Normally, for a new measuring cycle to start, the detected temperature must have dropped below Limit 1. If, however, you wish to measure a continuous process (continuous material flow), you must activate Auto Reset. Limit 1 will then be ignored. Sampling will continue (restarting automatically and producing temperature readings cyclically) as long as Limit 2 is exceeded for the time period defined by t.dEL .

Parameter	Function
Auto reset (A.r St):	Auto reset on/off

Parameter Set Li2 check on tAct [chL.2]

When this parameter is set to ON (chL.2=on), the detected temperature must exceed Limit 2 during the entire measuring time (tAct) in order for the pyrometer to generate a valid temperature reading. The measurement is discarded when the value falls below Limit 2.

Parameter	Function
Li2 check on tAct (chL.2)	on/off

14 Setting Parameters at the device

In addition to the configuration possibilities described, many parameters can be adjusted at the rear panel using push buttons. These settings can be accessed via configuration layers.

14.1 Configuration layers

The configuration layers are structured as follows:

- c001 Temperature measurement lamdba 1
- c010 I/O configuration (LED / Buzzer)
- c011 General function
- c020 Display temperature readings

The following chart lists all parameters. In the factory default configuration, certain parameters and configuration layers will not be accessible by control key. This is meant to simplify pyrometer operation for the user. These parameters are indicated by❶. If required, remote access to these parameters can be enabled via PC interface or at configuration layer c011. Open the user calibration menu (Menu mode: Full).

Some parameter settings will be hidden if their basic function has been deactivated. For example, you will not be able to adjust the smoothing time of the filter if the filter has been turned off or switched to automatic mode.

14.1.1 Temperature measurement lambda 1 (Configuration layer: c001)

By default, some parameters are suppressed to facilitate operation.

Paramters	Function	Explanation	
Etb.1	Array size	Use array with 1-10 entries or enter material constant directly into the pyrometer	
EPS.1	Emissivity factor L1	Enter material constant directly into the pyrometer	
E.idH	Memory position	Choose an entry from the material constants array	
E. 01	Assign material constants	Customize the array; assign a value to each of the material constants in the array. Possible indexes depend on the size of the array	
tAU.1	Transmittance factor L1		
bAc.1	Ambient temperature compensation		❶
bAct	Temp. of ambient source of radiation		❶
bAc'i	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 %	❶
Lin.1	Temperature offset using linear	oFF off 2 - 10 number of nodes used	❶
L. H1	node x 1 - 10	Signal input (initial value) node n	❶
L. Y1	node y 1 - 10	Signal output (resulting value) node n	❶
FiL.1	Smoothing filter	oFF smoothing not activated on simple smoothing AUto subsequent smoothing (only model PA11x)	
FiLt	Smoothing time	time t98 in sec for simple smoothing	
nEn.1	Min/Max memory	oFF off nin lowest (min.)temperature, single nAH highest (max.) temperature, single dbLn double maximum diSn ATD function	
nEnt	Hold time for Min/Max	Hold time in sec.	
FiLn	Smoothing filter for min/max*	oFF Off on On	
FiLt	Smoothing time*	Time t98 in sec.	
tdEL	time delay **	For ATD function, see Chap. 13.2.3	
tAct	Sampling time **	A For ATD function, see Chap. 13.2.3	
tdiS	cut-off interval **	For ATD function, see Chap. 13.2.3	
toUt	Timeout**	For ATD function, see Chap. 13.2.3	
Li. 1	Limit 1**	For ATD function, see Chap. 13.2.3	
Li. 2	Limit 2**	For ATD function, see Chap. 13.2.3	
F-Pr	Average weighting **	For ATD function, see Chap. 13.2.3	
tSP_	Plausibility threshold **	For ATD function, see Chap. 13.2.3	

tSP-	Plausibility threshold **	For ATD function, see Chap. 13.2.3	
Ano	Mode of display **	t=0 show lower limit of temp. range during running measurement t.hLd Hold previous temp. reading during running measurement	
A.rSt	Auto reset**	For ATD function, see Chap. 13.2.3	
ch.L.2	Set Li2 check on tAct**	For ATD function, see Chap. 13.2.3	
End	End	exit menu	

* Only available with Min/Max and Double Max modes

** Only available with ATD function

☞ L1 = Lambda 1 = temperature reading from spectral channel 1

14.1.2 Configuration I/O (Configuration layer: cO IO)

In the factory default configuration, all parameter settings for digital inputs and outputs will be hidden.

Parameter	Function	Explanation	
tYPE	Operating mode/ measuring technique	L 1 Lambda 1	
LEd.	LED (green)	oFF OFF on ON	❶
LEd.S	LED: define source	rdY Status LED indicates ‘ready’ L 1 Lambda 1 L 1.Pr. Lambda 1 without peak picker tU Device inner temperature A.tr.1 Measuring time ATD Lambda 1** A.Ac.1 Messzeit vom ATD Funktion Lamda 1**	❶
LEd.F	LED function	LuL. Switch direction “Level” (LED activated if limit exceeded) LuL.- Switch direction “Level” (LED / output inverted) rnG. Switch direction “Range” (LED acticated if range exceeded) rnG.- Switch direction “Range” (LED / output inverted)	❶
LEd.t	LED switching threshold	Switching threshold (only available at function “Level”)	❶
LEd.h	LED signal threshold	Hysteresis +/- relative to signal threshold (only aviable at function “Level”)	❶
LEd._	LED lower limit of range	Lower limit of range for switch signal (only available function “range”)	❶
LEd.‾	LED upper limit of range	Upper limit of range for switch signal (only available function “range”)	❶
LEd.L	LED delay time		❶
LEd.H	LED hold time		❶
bU2.	Buzzer	oFF OFF on ON	❶
bU2.S	Buzzer: define source	rdY Status Ready-Signal L 1 Lambda 1	❶

		L 1.Pr. Lambda 1 without peak picker tU Device inner temperature A.tr.1 Triggered by ATD function Lambda 1** A.Ac.1 Measuring time ATD Lamda1**	
bU2.F	Buzzer function	LvL. Switch direction “Level” (Buzzer active if limit is exceeded) LvL.- Switch direction “Level” (Buzzer / output inverted) rnG. Switch direction “Range” (Buzzer active if range is exceeded) rnG.- Switch direction “Range” (Buzzer / output inverted)	❶
bU2.t	Buzzer switching threshold	Switching threshold (only available at function “Level”)	❶
bU2.h	Buzzer signal threshold	Hysteresis +/- relative to signal threshold (only available at function “Level”)	❶
bU2._	Buzzer lower limit of range	Lower limit of range for switch signal (only available function “range”)	❶
bU2.‾	Buzzer upper limit of range	Upper limit of range for switch signal (only available function “range”)	❶
bU2.L	Buzzer delay time		❶
bU2.M	Buzzer hold time		❶
End	End	exit menu	❶

** Only available with ATD function

14.1.3 General Functions (Configuration layer: c011)

Parameter	Function	Explanation	
A.oFF	Auto switch-off	oFF automatic switch-off function deactivated 1-60 time period in minutes for auto switch-off delay	
A.Str.	Auto temp. data ouput	oFF automatic temp. data output is off on temp. data output at PC terminal	❶
A.cYc.	Cycle for auto temp. data output	Select cycle time in s	❶
Addr.	Device address	Enter address of device for non-terminal mode	❶
d iSP.	Display control	"on" Display panel indicates "on" iA1 Indicated temperature reading according to operating mode	❶
Unit	temperature unit	°C degrees Celsius °F degrees Fahrenheit	
MEnU	Menu-Mode	norM With ❶ marked parameter are not-shown FULL All parameters are shown	
End	End	exit menu	

14.1.4 Displayed temperature readings (Configuration layer: c020)

Parameter	Function	Explanation	
L 1.	Temp. reading	Actual temperature reading lambda L1	

	Lambda1		
L 1Pr.	Temp. reading Lambda1 Pre	Shows current temperature reading for L1 prior to peak picker	
t.int.	Inner temperature	Current inner temp. of device	
End	End	exit menu	

15 Software CellaView

The software CellaView can be used for representation, analysis and archiving of measured values of your pyrometer.

You can download the CellaView software here:

www.keller.de/its/

16 PC Interface

The CellaPort features a USB port to enable data communication to a PC for remote device configuration and temperature monitoring. Either use the CellaView software or use another standard terminal program.

The USB port is on the back of the pyrometer, covered by a protective cap. The pyrometer is supplied with a standard USB cable.

A Windows®operating system released prior to Windows®7 will not automatically identify the CellaPort as the peripheral device. The required driver is on the download area CellaView or use the link www.prolific.com.tw to download the PL 2303 driver.

When using the CellaView software no additional parameter must be set.

For more information on CellaView, please refer to the software instruction manual.

If you are using a terminal program such as HyperTerminal, set parameters for the serial interface as follows:

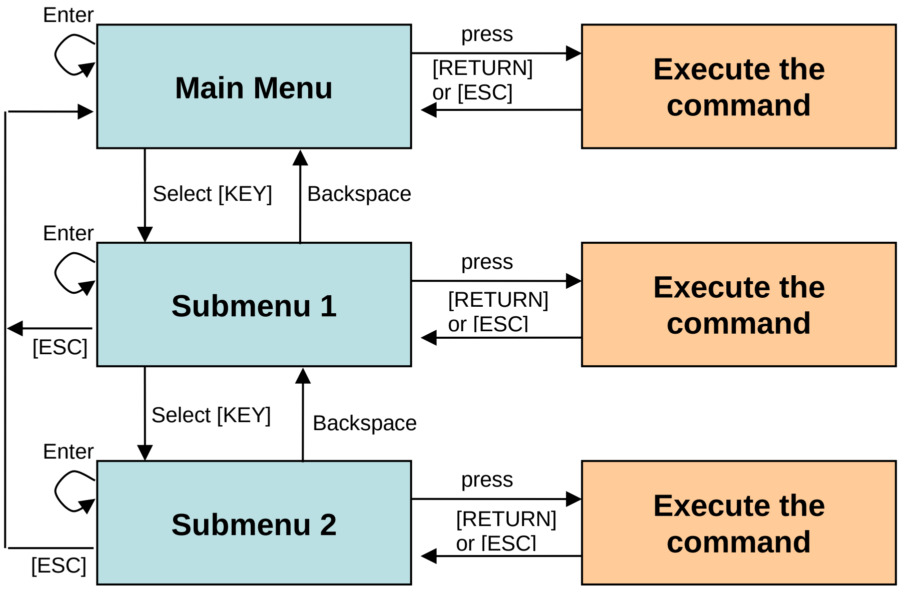
57600 Baud / 8 Data bits / odd parity / 1 stop bit / no handshake

Serial communication starts approximately 2 seconds after the data terminal ready (DTR) control signal is enabled at the interface. Activate this signal in the terminal program or device configuration

After enabling the interface and selecting parameter settings, the pyrometer will automatically transmit data via serial interface (autoprint activated).

17 Remote configuration

Pyrometer setup and temperature monitoring can be configured from a PC running a simple serial terminal such as HyperTerminal. Many key parameters can be easily accessed from a keyboard. Additional functions and settings can be programmed from cascading submenus, as shown in the menu navigation chart below:



To set the pyrometer to the terminal mode, simultaneously hold down the **Ctrl key** and press the **E key** twice in rapid succession.
A help menu will appear on the screen.

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

17.1 Main Menu

After starting the terminal program or after entering „H“ the main menu will appear:

```
-------------------------------------------------------------------
>H
-------------------------------------------------------------------
Mainmenu
-------------------------------------------------------------------
                                   E: Quick access EPSILON
1: [LAMBDA 1]                      A: Quick access FILTER
                                   T: Quick access Ao1 SOURCE
C: [I/O]                           Y: Quick access Ao1 SCALE BEGIN
K: [CALIBRATION]                   Z: Quick access Ao1 SCALE END

H: Show this help-site             J: Show diagnosis
W: Show ambient temperature        Q: Show calibration data
X: Show measure temperature        P: Show channel parameters
-------------------------------------------------------------------
```

17.2 View Current Configuration

Command „P“ shows you how your CellaPort is currently configured. At a glance you can view the following parameters:

```
-------------------------------------------------------------------
-    PT 110 AF1       0-1000C - 00/00104 - Job  - 10.06.13       -
-    PT10SW101/0   SP 8 - 14 um    Version 01.02  10.07.13       -
-------------------------------------------------------------------
L1 range ....    0.0 - 1000.0 C    DISPLAY source ....... lambda 1
L1 epsilon ...........  99.3 %
L1 transmission .......  99.9 %
L1 backc. ................. off
L1 linearization .......... off
L1 filter ........... automatic
L1 memory type double    2.00 s    GRN.LED source .... ATD tAct L1
L1 memory filter .......... off    GRN.LED function   level/signal

Unit .................. Celsius    GRN.LED delay time ...   0.00 s
Terminal assigned to ...... USB    GRN.LED hold time ....   0.00 s
Autoprint ......... on (cyclic)    BUZZER  source ATD triggered L1
Print cycle time .....    0.1 s    BUZZER  function   level/signal
Protocol address .......... 001
Display ........... temperature    BUZZER  delay time ...   0.00 s
Key lock .................. off    BUZZER  hold time ....   1.00 s

-------------------------------------------------------------------
>
```

At the top left, there is a list of data acquisition parameters for ratio mode (quotient). The right-side column shows LED/Buzzer configuration. At the bottom left you will find general settings.

17.3 Submenus

17.3.1 Configuration

Press key "1" to access all data logging parameters for Lambda 1.

```
-------------------------------------------------------------------
Submenu LAMBDA 1
-------------------------------------------------------------------
L1 epsilon ...........  99.3 %
L1 transmission .......  99.9 %
L1 backc. ................. off
```

```
L1 linearization .......... off
L1 filter ........... automatic
L1 memory type double    2.00 s
L1 memory filter .......... off

C: [CONFIG EPSILON TABLE]
E: Epsilon
T: Transmission
B: Background-Compensation
L: [LINEARIZATION]
F: Filter
M: [MEMORY]
P: Show parameter
Q: Show calibration data
X: Show L1 temperature
Y: Show L1 premax temperature
ESC: Back to MAIN-MENU
------------------------------------------------------------------
>LAMBDA 1 >
```

17.3.2 Quick access to emissivity / signal smoothing / operating mode

Use keys "E", "A" and "T" to access and change the emissivity setting, smoothing filter and measuring mode.

17.3.3 I/O Signal Configuration

Press „C“ to access and adjust all settings regarding LED and buzzer.

```
------------------------------------------------------------------
Submenu I/O
------------------------------------------------------------------
C: [STATUS LED CONTROL]
D: [BUZZER CONTROL]
M: [OPTIONS]
ESC: Back to MAIN-MENU
------------------------------------------------------------------
>I/O >
```

The LED and buzzer configuration are grouped in submenus where each can be accessed for further configuration.

LED control:

```
------------------------------------------------------------------
Submenu CONTROL LED
------------------------------------------------------------------
GRN.LED source .... ATD tAct L1
GRN.LED function   level/signal
GRN.LED delay time ...   0.00 s
GRN.LED hold time ....   0.00 s

S: Set source
F: Set function
D: Set delay time
O: Set hold time
ESC: Back to MAIN-MENU
------------------------------------------------------------------
>I/O >LED CONTROL >
```

```
>I/O >LED CONTROL >S

Set status LED source:
 0: Off
 1: Ready-Signal
 2: Lambda 1
 3: Lambda 1 premax
 4: Ambient Temperature
 5: Lambda 1 ATD Trigger
 6: Lambda 1 ATD tAct
-------------------------------------------------------------------
Your choice>
```

In the submenu "Options" you can program a keylock. If keylock is activated and you wish to change a parameter setting, enter Code P 100 for full access. If you enter an incorrect code, you can view the configuration but you will not be able to change the setting.

```
-------------------------------------------------------------------
Submenu OPTIONS
-------------------------------------------------------------------
Autoprint ......... on (cyclic)
Print cycle time .....    0.1 s
Protocol address .......... 001
Display ........... temperature
Key lock ................. off
Unit ................. Celsius

A: Set autoprint function
T: Set output cycle time
P: Set protocol-address
D: Set display function
E: Set key lock
F: Set unit Celsius/Fahrenheit
R: Switch off pyrometer
ESC: Back to MAIN-MENU
-------------------------------------------------------------------
>I/O >OPTIONS >
```

17.3.4 Automatic temperature data output

For continuous serial transmission of temperature data, you must activate automatic temperature data output.

In the submenu “Options”, command **“A"** activates (on) / deactivates (off) this function.

If ATD is activated, the temperature data will only be transmitted after successful completion of measurement.

If ATD is deactivated, press command **"T"** to select the cycle time in which the current temperature data are transmitted through the serial interface.

When *automatic* temperature data output is activated, the pyrometer will ***not*** display the parameter settings when it is switched on. Instead, the pyrometer will instantly begin transmitting data.

Temperature data format

Byte	Negative Temperature	Positive Temperature	Temperature exceeds measuring range	Temperature falls below measuring range
1	Minus symbol "-"	Space	Space	Space
2	Digit 1000	Digit 1000	Minus symbol "-"	Minus symbol "-"
3	Digit 100	Digit 100	"O"	"U"
4	Digit 10	Digit 10	"V"	"N"
5	Digit 1	Digit 1	"E"	"D"
6	Decimal point "."	Decimal point "."	"R"	"E"
7	Decimal place	Decimal place	Space	"R"
8	Space	Space	Space	Space
9	Unit "C" or "F"	Unit "C" or "F"	Minus symbol "-"	Minus symbol "-"
10	Space	Space	Space	Space
11	Carriage Return	Carriage Return	Carriage Return	Carriage Return

All signs/symbols are ASCII coded; preceding zeros will be transmitted

The cycle time in which the temperature reading is transmitted can be set via parameter AcYc (minimum cycle duration is 0.1 second).

17.4 User Recalibration

If ever required, the pyrometer can be recalibrated. Go to Submenu Calibration. Press command „K“ and then enter the password „100“ to access the calibration menu.

```
-------------------------------------------------------------------
Submenu CALIBRATION
-------------------------------------------------------------------
Name .... "Pyrometer PT Series"
Menu mode ............. default

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

You can reset all configurations you have made to your pyrometer and restore the factory default settings using command "A". This also applies to data acquisition parameters, LED and buzzer.

Press command "E" if you would like to view all parameters which are otherwise hidden. Because this list of menu items is quite long (Chapter

14.1), we only recommend this for advanced users. If you intend to carry out measurements of molten metal only, it makes sense to maintain the factory configuration. This will keep those parameters, which will not require adjustment, hidden.
Command "S" enables the user to enter a short word to designate the measurement location/task. This text can be accessed from the Main Menu by pressing "Q".

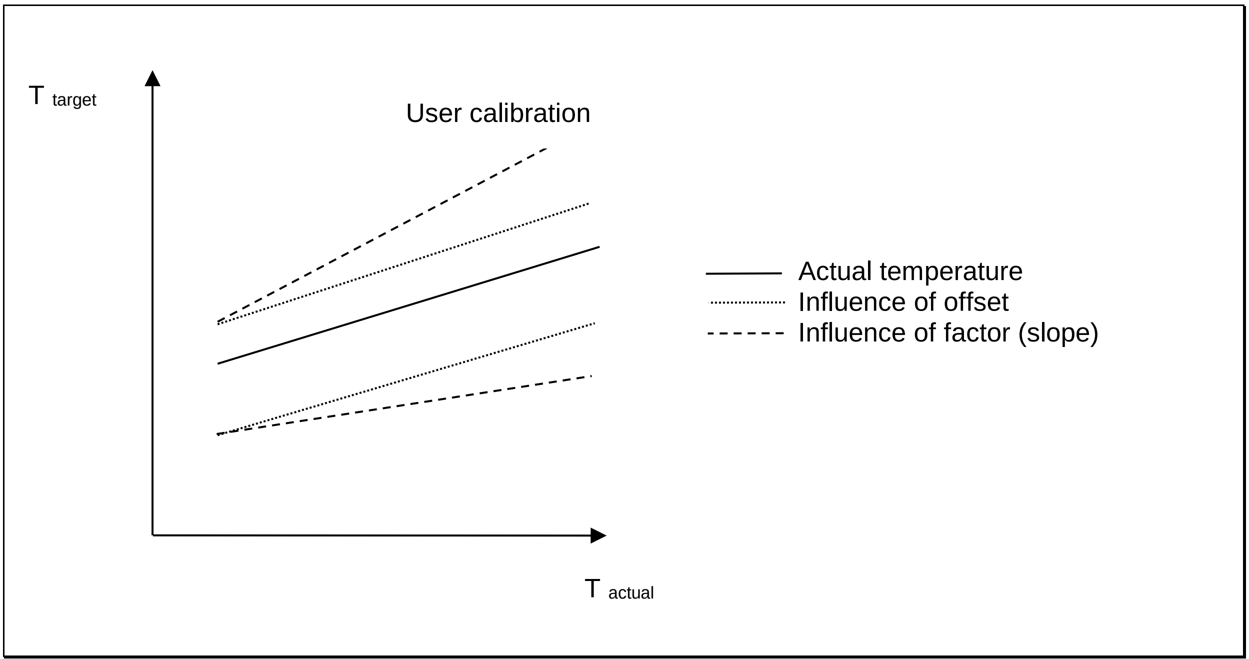
```
------------------------------------------------------------------
Submenu LAMBDA 1
------------------------------------------------------------------
L1 range ....    0.0 - 1000.0 C
L1 User calibration ....... off
L1 User def. offset    +0.00000
L1 User def. factor    +1.00000

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

Use command "A" to reconfigure the pyrometer‘s measuring range. The range can be adjusted to be either larger or smaller than the factory-configured range. When customizing the temperature range, make sure that upper and lower temperatures you enter are compatible with the pyrometer’s actual working range.

Use key "B" for direct access to enable adjustments to the CellaPort PT.

To recalibrate your CellaPort, you will require a calibration furnace and a reference standard

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



18 Maintenance

18.1 Cleaning the pyrometer lens/protective glass

A false temperature reading will be generated when the lens/protective glass 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 before removing or attaching the lens. Failure to do so may result in damage to the instrument!

☞ *Protect the pyrometer against high ambient temperatures, high air humidity, high voltage and strong electromagnetic fields. Never point the lens directly towards the sun*.

19 Accessories

Description	Type	Item No.
Protective glass M46	70146	120314
USB Cable	VK 11/D	1009677
Power supply		1053975
Carrying case	PT 110/A	1052289
Supplementary lens	PZ 20/O-50	514744
Supplementary lens	PZ 20/O-63	514985
Supplementary lens	PZ 20/O-75	513840
Supplementary lens	PZ 20/O-120	514973

19.1 Supplementary lens

Pyrometer	Supplementary lens							
Type	PZ 20/O-50		PZ 20/O-63		PZ 20/O-75		PZ 20/O-120	
	distance [mm]	spot size Ø in mm	distance [mm]	spot size Ø in mm	distance [mm]	spot size Ø in mm	distance [mm]	spot size Ø in mm
PT 120 AF 1/5 PT 129 AF 1 PT 130 AF 1 PT 135 AF 1	36-41	0,35-0,45	45 - 54	0,4 – 0,6	52 - 63	0,45 – 0,7	84 - 112	0,7 – 1,1
PT 120 AF 2/6 PT 129 AF 2 PT 130 AF 2 PT 135 AF 2	31-36	0,3-0,4	38-45	0,35-0,5	43-52	0,4-0,6	66-84	0,55-0,9
PT 120 AF 3/7 PT 129 AF 3 PT 130 AF 3 PT 135 AF 36/9	41	0,3					101-112	0,55-0,67
PT 129 AF 10	34-41	1,28-1,75						
PT 129 AF 21/22			45-54	1,05-1,5	52-63	1,2-1,75		
PT 129 AF 23							101-112	1,13-1,75

20 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. The intensity of this infrared radiation is a measure for the temperature of the radiating body. A pyrometer detects this radiation and displays it as a temperature value.

20.1 Emissivity

The intensity of the radiation not only depends on the temperature but also on the radiation properties of the material you want to measure. The ability of a body to emit infrared radiation is expressed by a material constant called

Emissivity coefficient or just **emissivity.**

This coefficient lies between 0...100 %. A body with ideal radiation (black body) has a coefficient of 100 %. Materials with the same temperature but with lower radiation intensity have coefficients lower than 100 %. Exact temperature readings can only be obtained when the emissivity coefficient of the target is correctly adjusted on the pyrometer. The pyrometer then automatically compensates for the lower radiation.

For non-contact measurements the CellaPort uses the intensity of the infrared radiation at a certain wavelength.
It is necessary to configure the CellaPort to the respective emissivity coefficient of the measuring object. An incorrectly set emissivity coefficient leads to wrong temperature readings. Below is a table showing emissivity coefficients for various materials.

20.2 Emissivity Coefficient Table PT 110

List of emissivity coefficients of different materials in %

CellaTemp	**PA 10**
Wavelength λ	**8 - 14 µm**
"Black body"	100
Aluminium oxide	76
Asphalt	90 - 98
Baking oven, dark colour	96
Concrete	55 - 65
Bitumem (roofing paper)	96
Bread in baking oven	88
Ferrous oxide	85 - 89
Enamel	84 - 88
Earth	92 - 96
Paint and varnish, bright	92
‘’ ‘’ ‘’ , pale	96
Gypsum	80 - 90
Glass	85 - 95
Graphite	98
Rubber, black	94
Skin, human	98
Wood	80 - 90
Radiator	80 - 85
Lime cast	91
Clinker bricks, glazed	75
Cooking plate	95
Synthetic material, nontransparent	65 - 95
Copper, oxidized	78
Leather	75 - 80
Marble	94
Brass, oxidized	56 - 64
Paper	70 - 94
Sand	90
Fireclay	75
Steel, stainless	45
Steel, rusty	69
Textiles	75 - 88
Water	92 - 98
Cement	90
Bricks	93 - 96

20.3 Emissivity Coefficient Table PT 120 - PT 130

List of emissivity coefficients of different materials in %

Type	PT 120	PT 130/135
Wavelength λ	**1,1...1,7 µm**	**0,78...1,06 µm 0,82…0,93 µm**
"Black Body"	100	100
Aluminium, polished	5	15
Aluminium, blackened	10	25
Asbestos cement	60	70
Bronce, polished	1	3
Bronze, blackened	15	30
Chromium, polished	15	30
Iron, heavily scaled	90	95
Iron, rolling skin	75	90
Iron, liquid	15	30
Gold and silver	1	2
Graphite, blackened	85	90
Copper, oxidized	70	90
Brass, oxidized (tarnished)	50	70
Nickel	8	20
Porcelain, glazed	50	60
Porcelain, rough	75	85
Soot	90	95
Fireclay	40	50
Slag	80	85
Pottery, glazed	85	90
Bricks	85	90
Zinc	40	60

21 General technical data

Digital output:
Cyclical data output,
adjustable cycle time

Resolution Display:
1 K

Resolution USB:
0.1 K

Power supply
Rechargeable battery pack
Mains adapter

Battery-life
Up to 12 hours of use
(based on continuous operating
at T_a = 23 °C

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

Ambient operating temperature:
0 - 50 °C

Storage temperature:
-20 - 50 °C

Housing:
Aluminium

Protection rating:
IP 40 nach DIN 40050

Weight:
Approx.. 1.1 kg

Sighting
Through-the-lens sighting, parallax free imaging, target spot indicator, diopter compensation, polarizing filter

ATD function
automatically identifies the target and detects its temperature

22 Technical Data PT 110

Temperature range:
0 ... 1000 °C

Sensor:
thin-film thermopile

Spectral sensitivity:
8 - 14 µm

Reponse time t_{90}:
≤ 30 ms

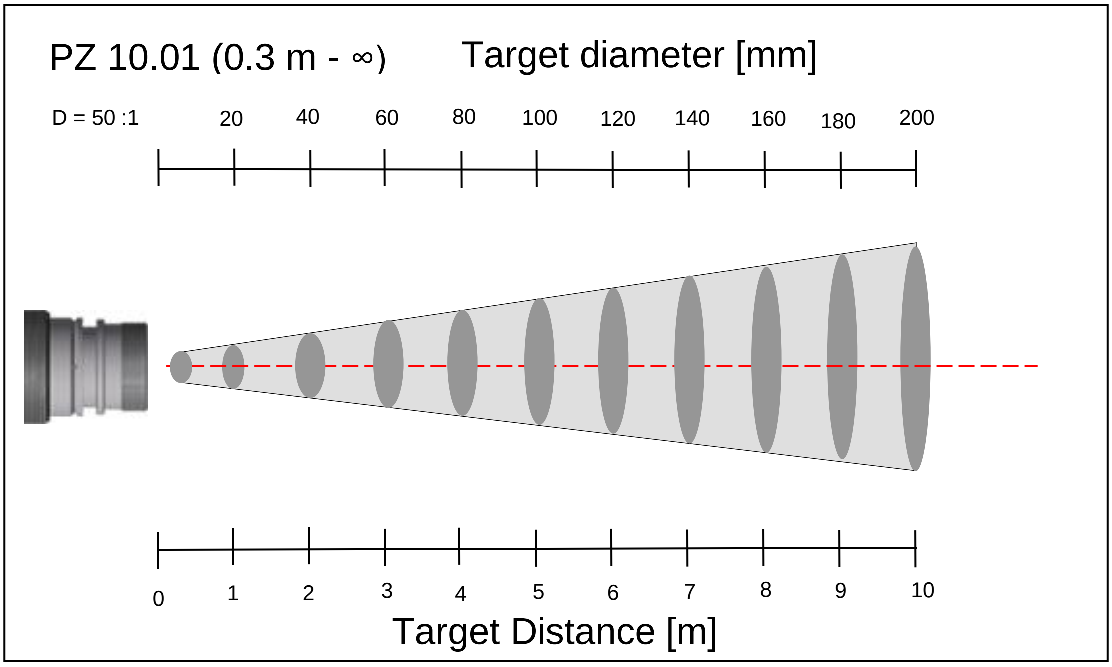
Measuring uncertainty:
1 % of range and but at least
2 K (if smoothing is = 30 ms)
(at ε =1.0 and TA=23 °C)

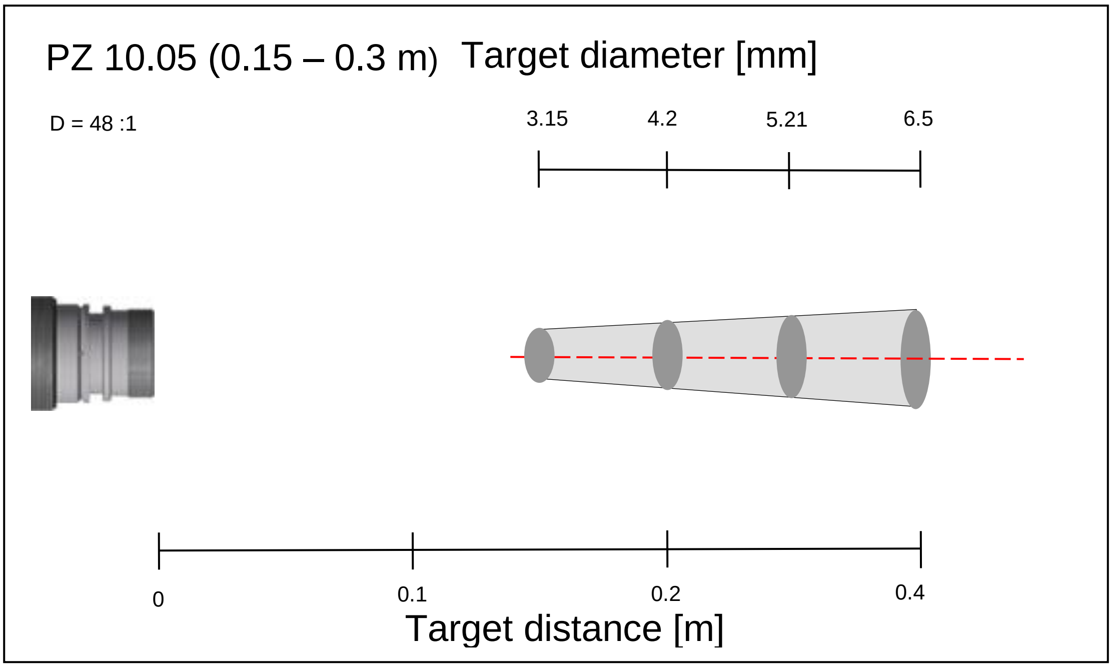
Repeatability:
1 K

Temperature coefficient with reference to 23 °C:
≤ 0.1 K / K (at T < 250 °C)
≤ 0.04 %/K (at T ≥ 250 °C)
of measured value

22.1 Field of View Diagrams for PT 110

PT 110	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 10.01	0.3 m - ∞	50:1
AF 2	PZ 10.05	0.15 – 0.3 m	48:1





23 Technical data PT 113

Measuring range:
500 ... 1600 °C

Sensor:
Thermopile

Spectral sensitivity:
3.9 µm

Reponse time t_{90}:
≤ 100 ms

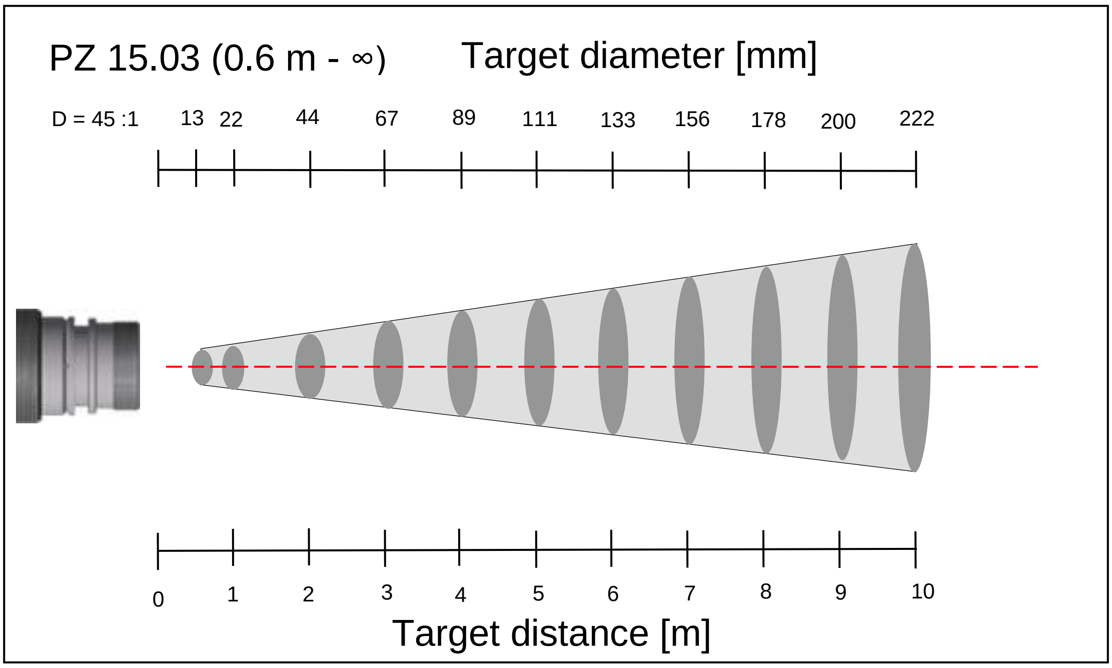
Measuring uncertainty:
1 % of range
(at ε =1.0 and TA=23 °C)

Repeatability:
1 K

Temperature coefficient with reference to 23 °C:
≤ 0.04 %/K

23.1 Field of View Diagrams for PT 113

PT 113	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 15.03	0.8 m - ∞	45:1



24 Technical Data PT 115

Measuring ranges :
MR I: 500 ... 2500 °C
MR II: 300 … 1300 °C

Sensor:
Thermopile

Spectral sensitivity:
4.6 – 4.9 µm

Reponse time t_{90}:
≤ 100 ms

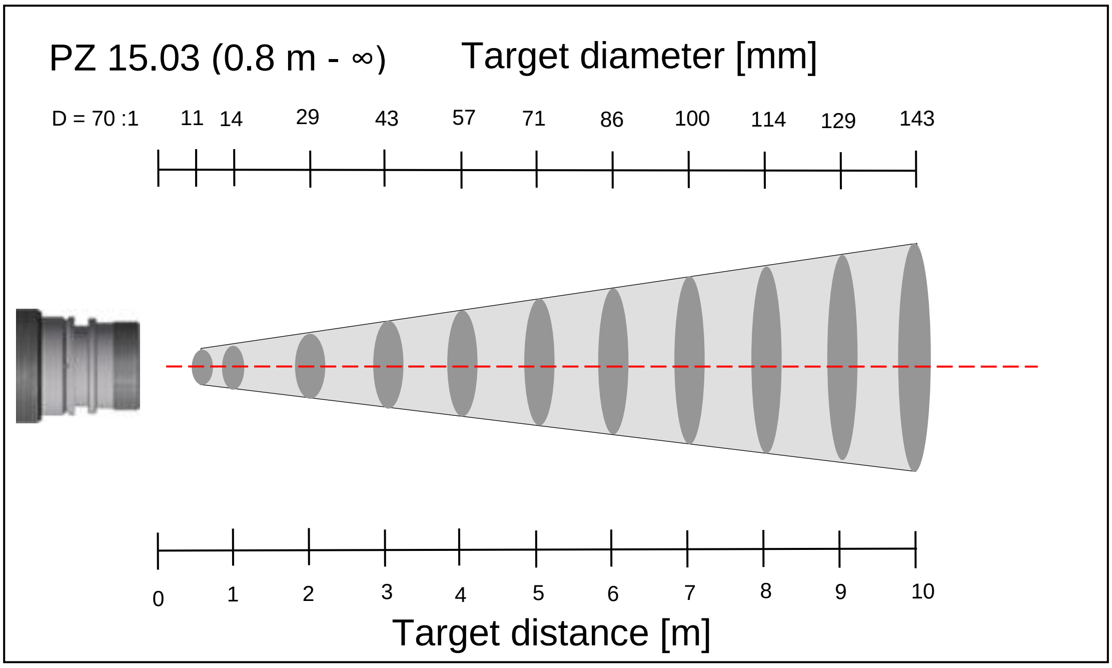
Measuring uncertainty:
PT 115 AF 1
0.75 % of range
PT 115 AF 2
0.75 % of range and but at least 3 K
(at ε =1.0 and T_A=23 °C)

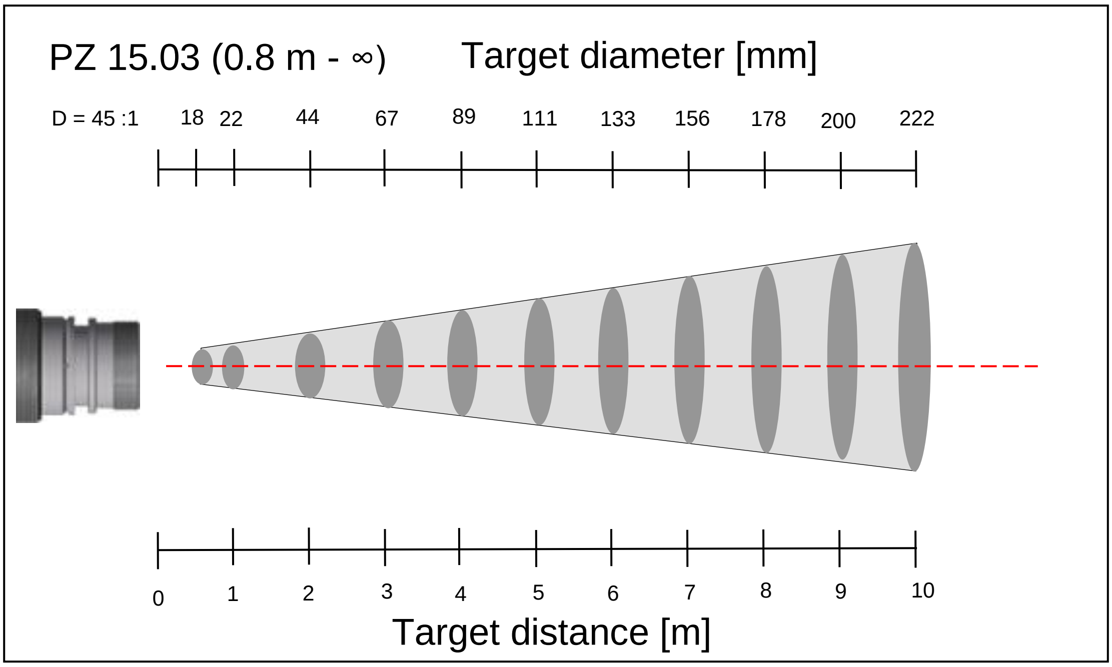
Repeatability:
1 K

Temperature coefficient with reference to 23 °C:
≤ 0.04 %/K

24.1 Field of View Diagrams for PT 115

PT 115	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 15.03	0.8 m - ∞	70:1
AF 2	PZ 15.03	0.8 m - ∞	45:1




PZ 15.03 (0.8 m - ∞)
Target diameter [mm]
D = 45 :1
18
22
44
67
89
111
133
156
178
200
222
0
1
2
3
4
5
6
7
8
9
10
Target distance [m]

25 Technical Data PT 117

Measuring ranges:
400 ... 2000 °C

Sensor:
Thermopile

Spectral sensitivity:
CO_2 band

Reponse time t_{98}:
≤ 100 ms

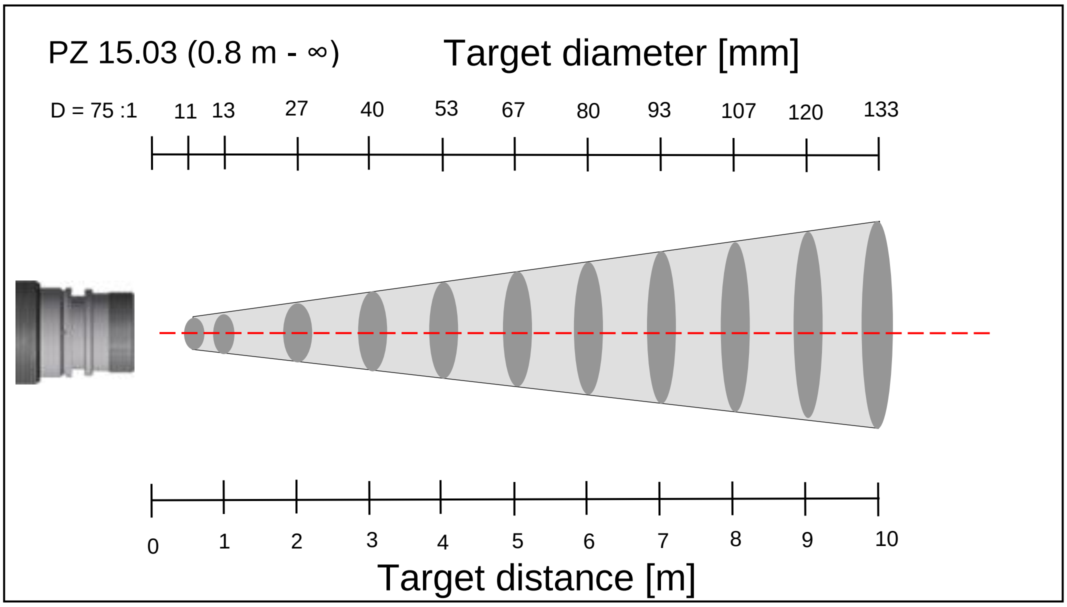
Measuring uncertainty:
0.75 % of reading + 1 K
(at ε =1.0 and TA=23 °C)

Repeatability:
2 K

Temperature coefficient with reference to 23 °C:
≤ 0.04 %/K

25.1 Field of View Diagram for PT 117

PT 117	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 15.03	0.8 m - ∞	70:1



26 Technical Data PT 118

Measuring ranges:
500 ... 2500 °C

Sensor:
Thermopile

Spectral sensitivity:
hot combustion gas

Reponse time t_{98}:
≤ 100 ms

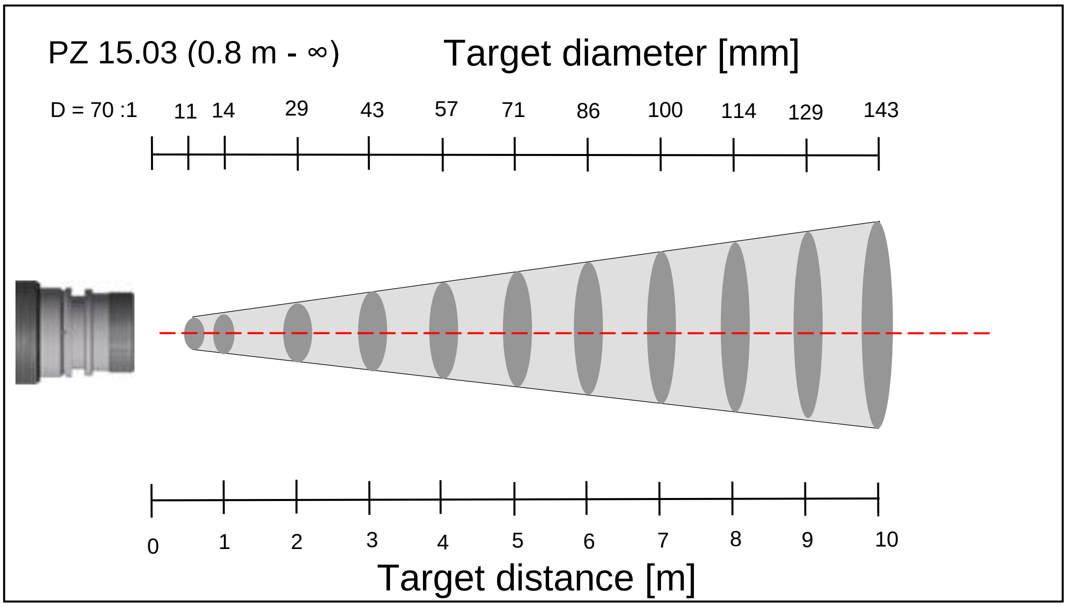
Measuring uncertainty:
0.75 % of reading
(at ε =1.0 and TA=23 °C)

Repeatability:
2 K

Temperature coefficient with reference to 23 °C:
≤ 0.04 %/K

26.1 Field of View Diagram for PT 118

PT 118	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 15.03	0.8 m - ∞	70:1



27 Technical Data PT 120

Measuring ranges:
250 ... 2000 °C

Sensors:
photo diode

Spectral sensitivity:
1.1 - 1.7 µm

Response time t_{98}:
≤ 50 ms (T > 250 °C)
≤ 2 ms (T > 750 °C)

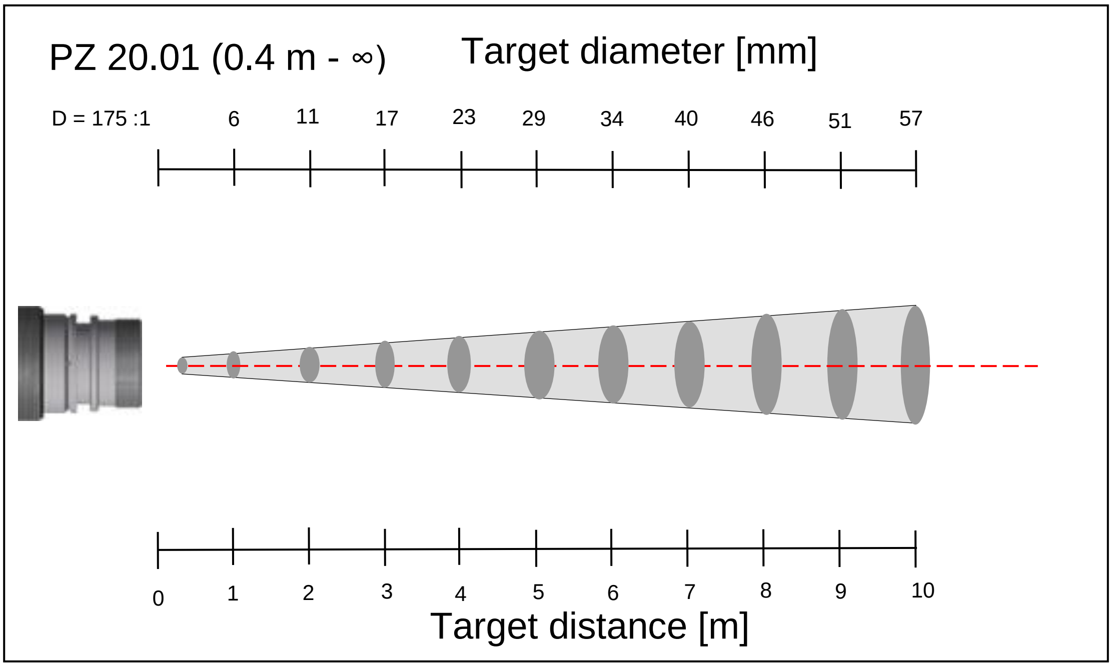
Measuring uncertainty:
0,3 % of temp. Reading, at least 4 K
(at ε =1.0 and T_A = 23 °C)

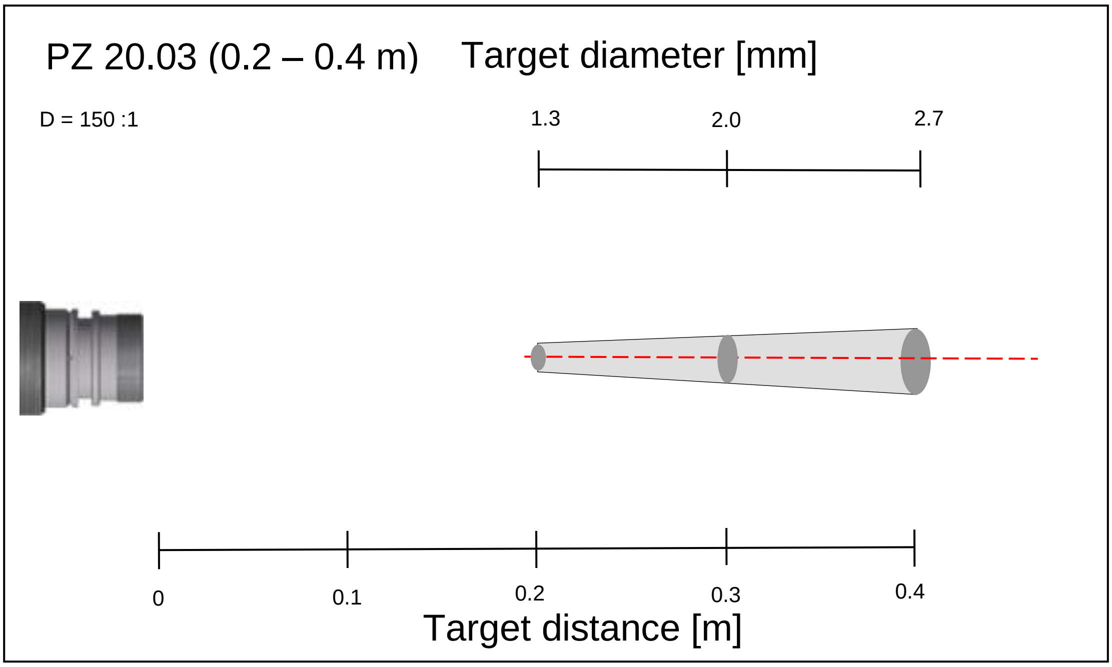
Repeatability:
1 K

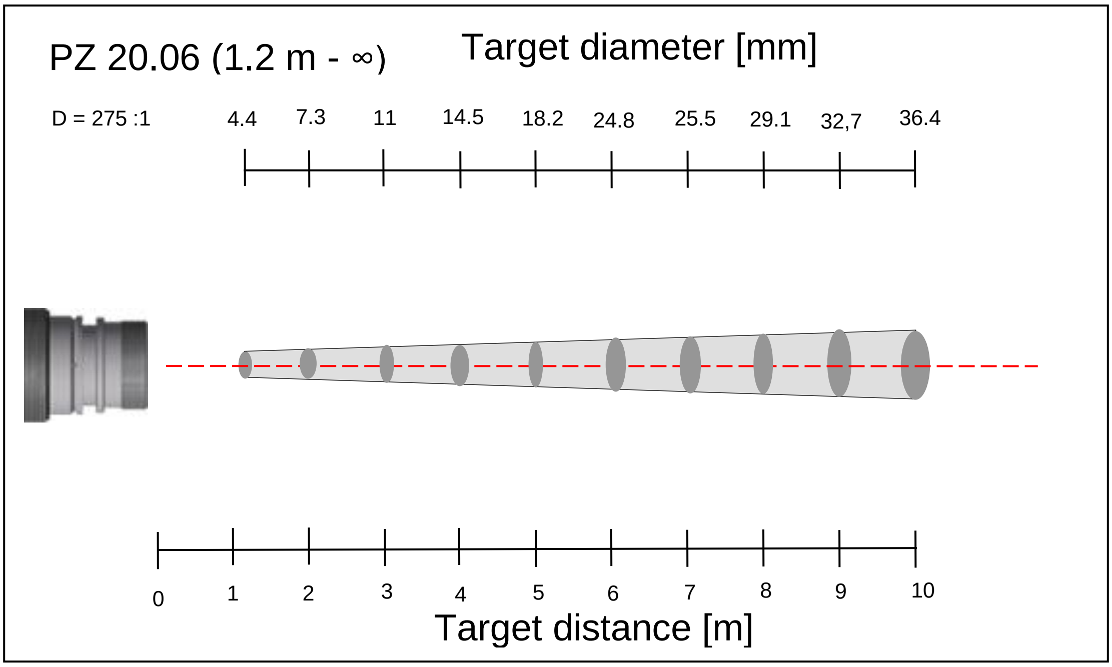
Temperature coefficient with reference to 23 °C:
0.25 K / K (for T < 500 °C)
0.05 % / K (for T ≥ 200 °C)
of measured value

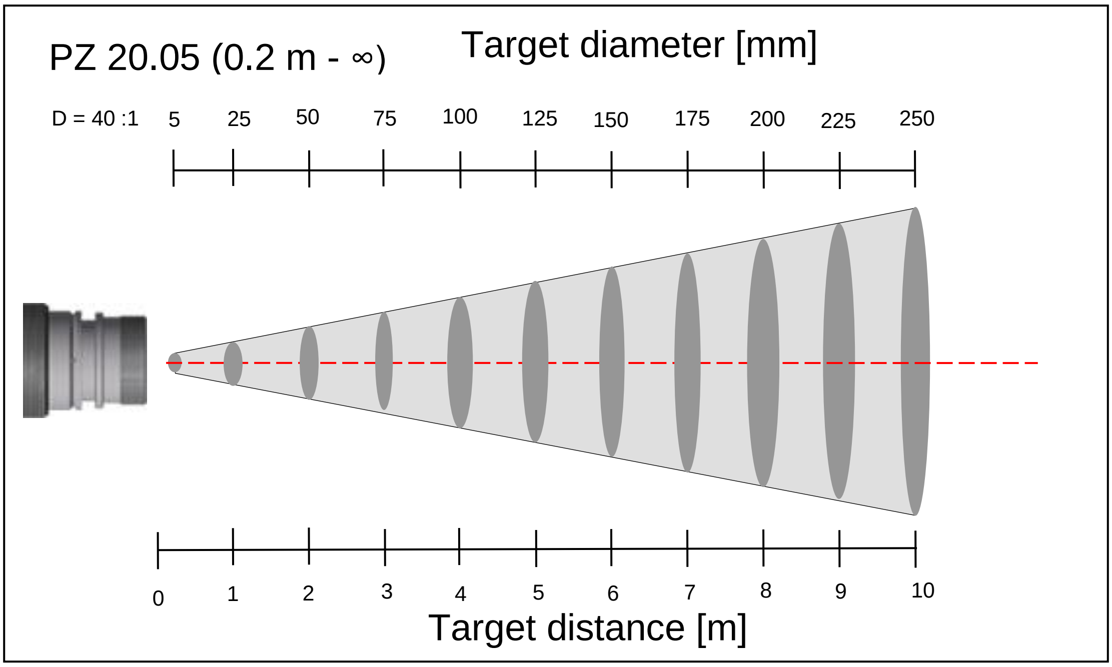
27.1 Field of View Diagrams for PA 120

PT 120	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 20.01	0.4 m - ∞	175:1
AF 2	PZ 20.03	0.2 m – 0,4 m	150:1
AF 3	PZ 20.06	1.2 m - ∞	275:1
AF 4	PZ 20.05	0.2 m - ∞	40:1




PZ 20.03 (0.2 – 0.4 m)
Target diameter [mm]
D = 150 :1
1.3
2.0
2.7
0
0.1
0.2
0.3
0.4
Target distance [m]


PZ 20.06 (1.2 m - ∞)
Target diameter [mm]
D = 275 :1
4.4
7.3
11
14.5
18.2
24.8
25.5
29.1
32,7
36.4
0
1
2
3
4
5
6
7
8
9
10
Target distance [m]


PZ 20.05 (0.2 m - ∞)
Target diameter [mm]
D = 40 :1
5
25
50
75
100
125
150
175
200
225
250
0
1
2
3
4
5
6
7
8
9
10
Target distance [m]

28 Technical Data PT 128 AF 10

Measuring range:
75 ... 650 °C

Sensors:
photo diode

Spectral sensitivity:
1.8 – 2.4 µm

Response time t_{98}:
≤ 200 ms (T > 75 °C)
≤ 50 ms (T > 100 °C)
≤ 15 ms (T > 125 °C)
≤ 2 ms (T> 200 °C)

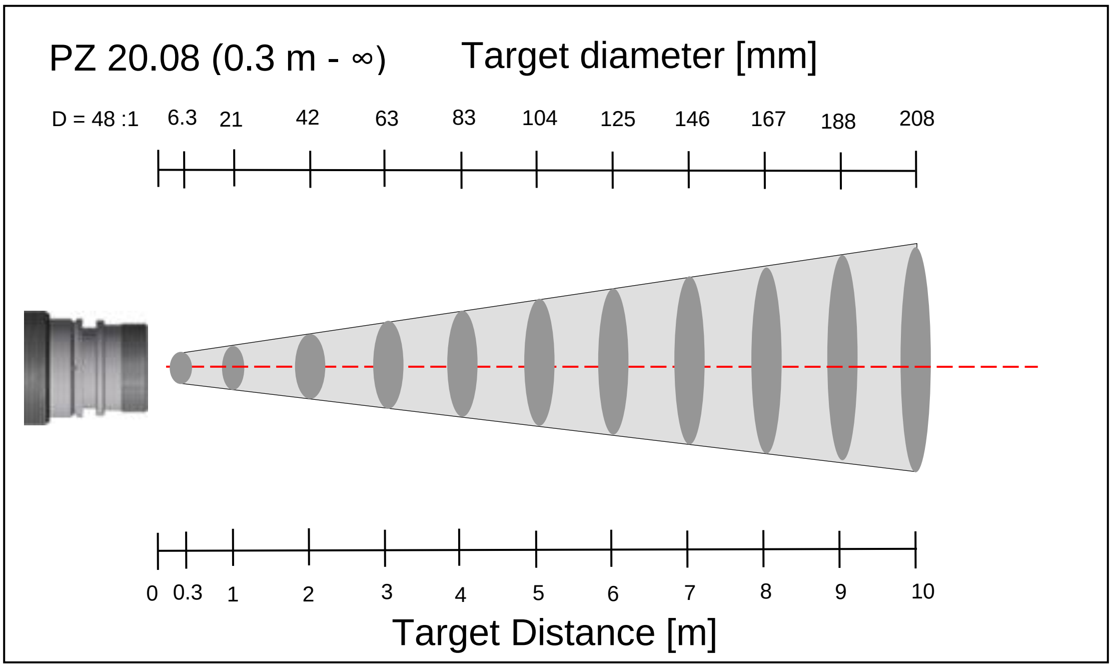
Measuring uncertainty:
0.75 % of range and but at least 3 K (ε =1.0 and T_A=23 °C)

Repeatability:
1 K

Temperature coefficient with reference to 23 °C:
0.25 K / K (for T < 500 °C)
0.05 % / K (for T ≥ 500 °C)
of measured value

28.1 Field of View Diagram for PT 128 AF 10

PT 128	Lens	Focussing range	Distance to target size ratio
AF 10	PZ 20.08	0.3 m - ∞	48:1



29 Technical Data PT 129 AF 10

Measuring range:
150 ... 800 °C

Sensors:
photo diode

Spectral sensitivity:
1.8 – 2.2 µm

Response time t_{98}:
≤ 50 ms (T > 150 °C)
≤ 2 ms (T > 200 °C)
≤ 2 ms (T> 350 °C

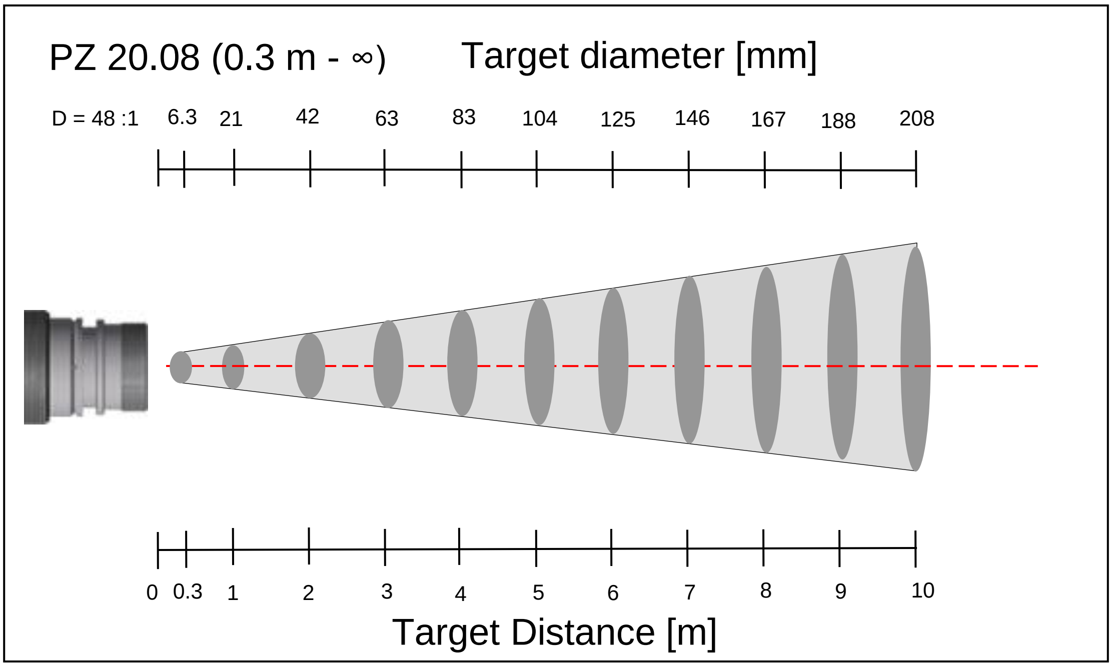
Measuring uncertainty:
0.75 % of range and but at least 5 K (ε =1.0 and T_A=23 °C)

Repeatability:
1 K

Temperature coefficient with reference to 23 °C:
0.25 K / K (for T < 500 °C)
0.05 % / K (for T ≥ 500 °C)
of measured value

29.1 Field of View Diagram for PT 129 AF 10

PT 129	Lens	Focussing range	Distance to target size ratio
AF 10	PZ 20.08	0.3 m - ∞	48:1



30 Technical Data PT 129 AF 21/22/23

Measuring range:
180 ... 1200 °C

Sensors:
photo diode

Spectral sensitivity:
1.8 – 2.2 µm

Response time t_{98}:
≤ 75 ms (T>180 °C)
≤ 35 ms (T>200 °C)
≤ 5 ms (T>300 °C)
≤ 2 ms (T>600 °C)

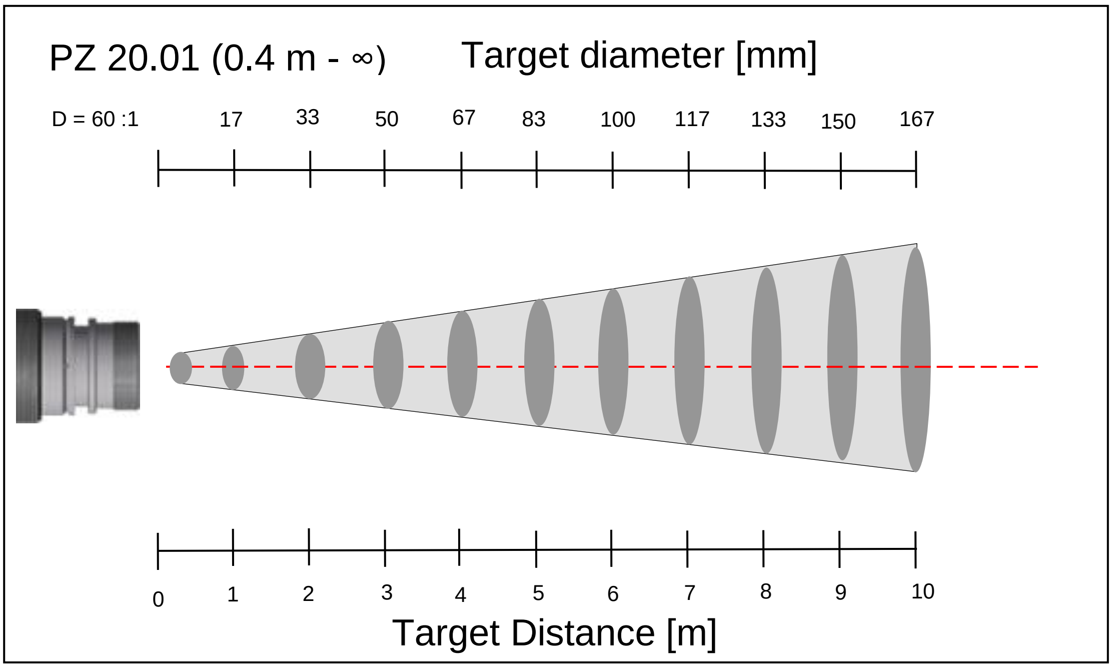
Measuring uncertainty:
0.75 % of range and but at least 5 K (ε =1.0 and T_A=23 °C)

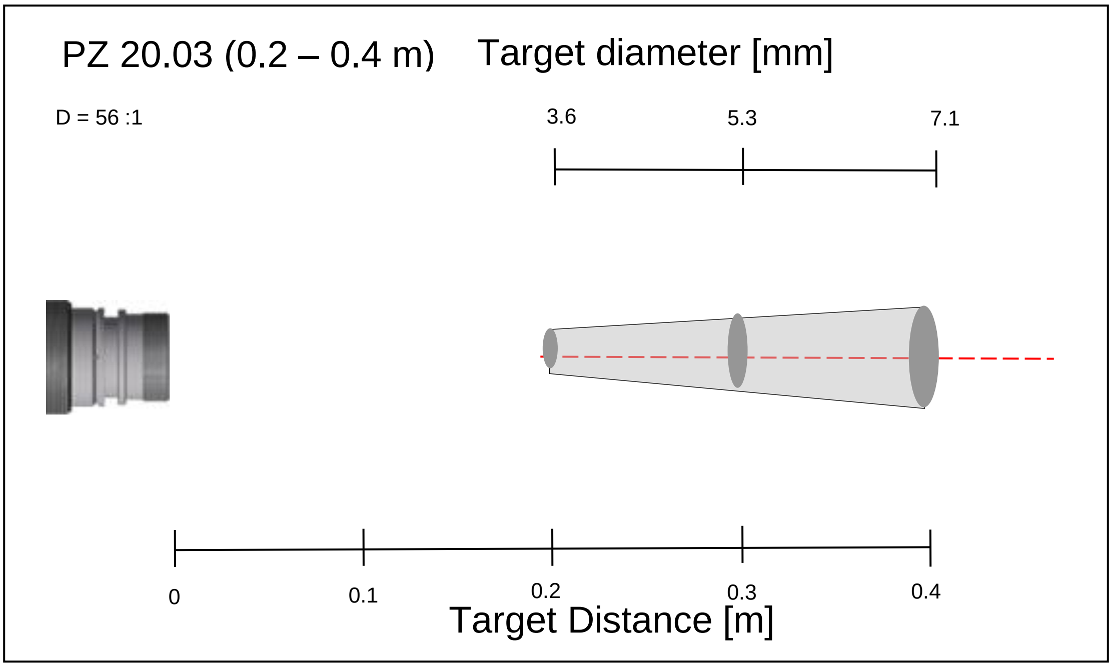
Repeatability:
1 K

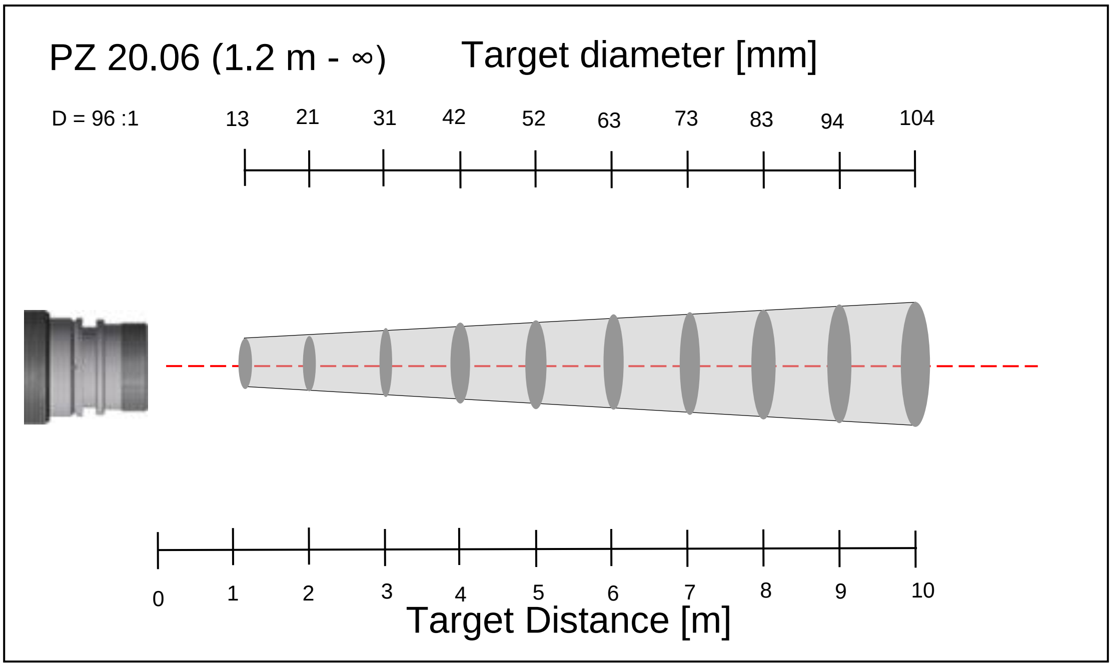
Temperature coefficient with reference to 23 °C:
0.25 K / K (for T < 500 °C)
0.05 % / K (for T ≥ 500 °C)
of measured value

30.1 Field of View Diagrams for PT 29 AF 21/22/23

PT 129	Lens	Focussing range	Distance to target size ratio
AF 21	PZ 20.01	0.4 m - ∞	60:1
AF 22	PZ 20.03	0.2 m – 0,4 m	56:1
AF 33	PZ 20.06	1.2 m - ∞	96:1




PZ 20.03 (0.2 – 0.4 m)
Target diameter [mm]
D = 56 :1
3.6
5.3
7.1
0
0.1
0.2
0.3
0.4
Target Distance [m]


PZ 20.06 (1.2 m - ∞)
Target diameter [mm]
D = 96 :1
13
21
31
42
52
63
73
83
94
104
0
1
2
3
4
5
6
7
8
9
10
Target Distance [m]

31 Technical Data PT 130

Measuring range:
500 ... 2500 °C

Sensors:
photo diode

Spectral sensitivity:
0.78 - 1.06 µm

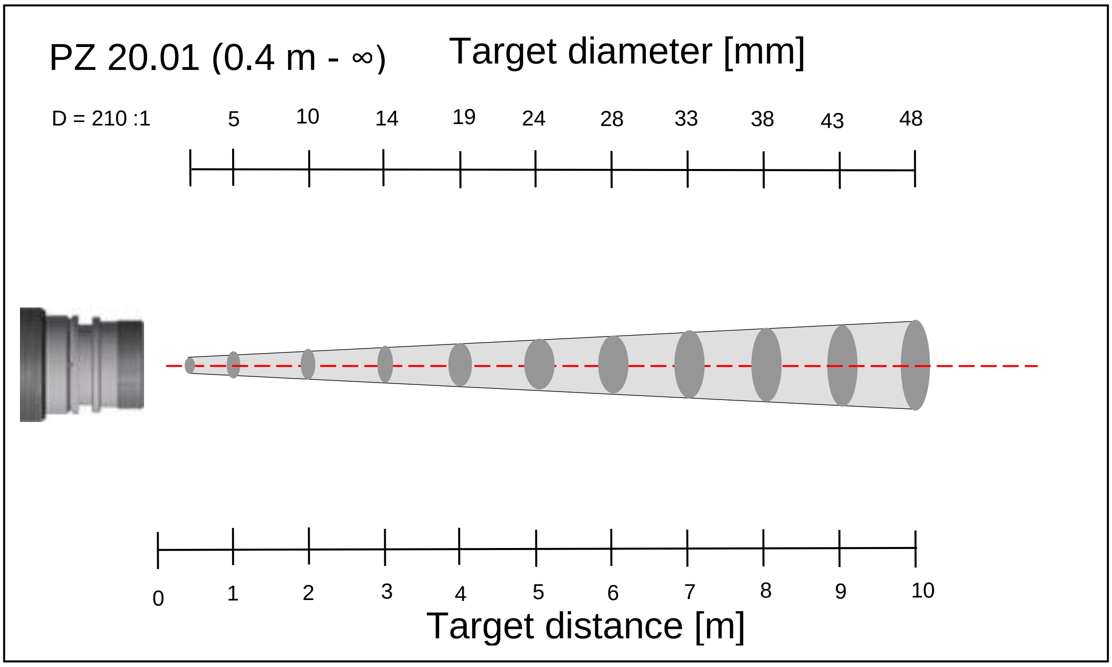
Response time t_{98}:
≤ 50 ms (T > 550 °C)
≤ 2 ms (T > 750 °C)

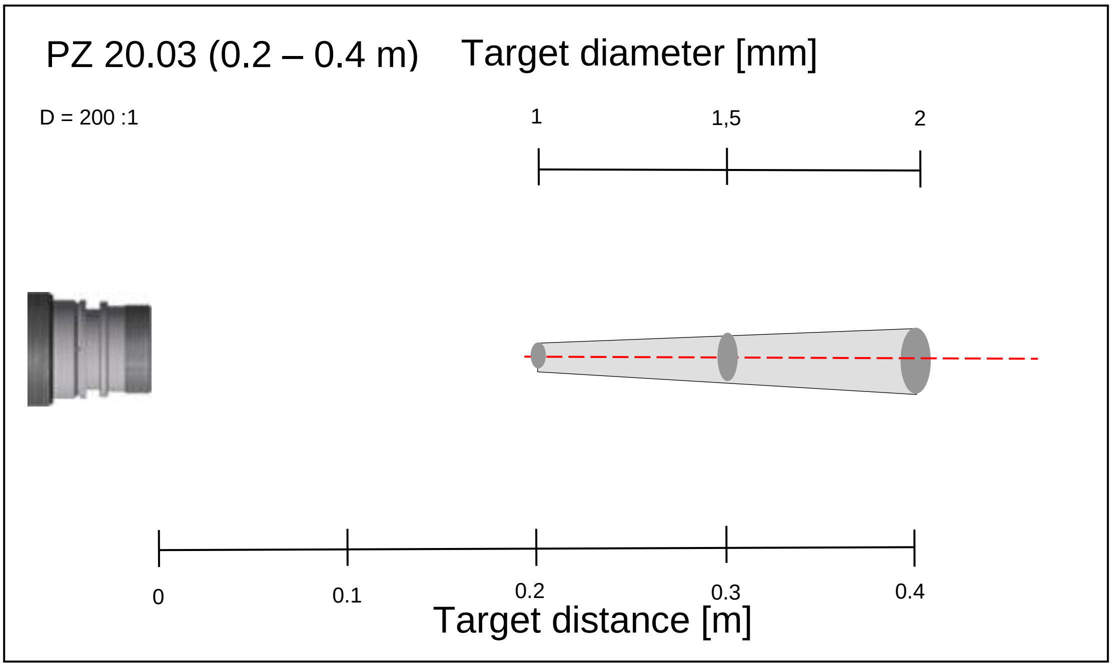
Repeatability:
1 K

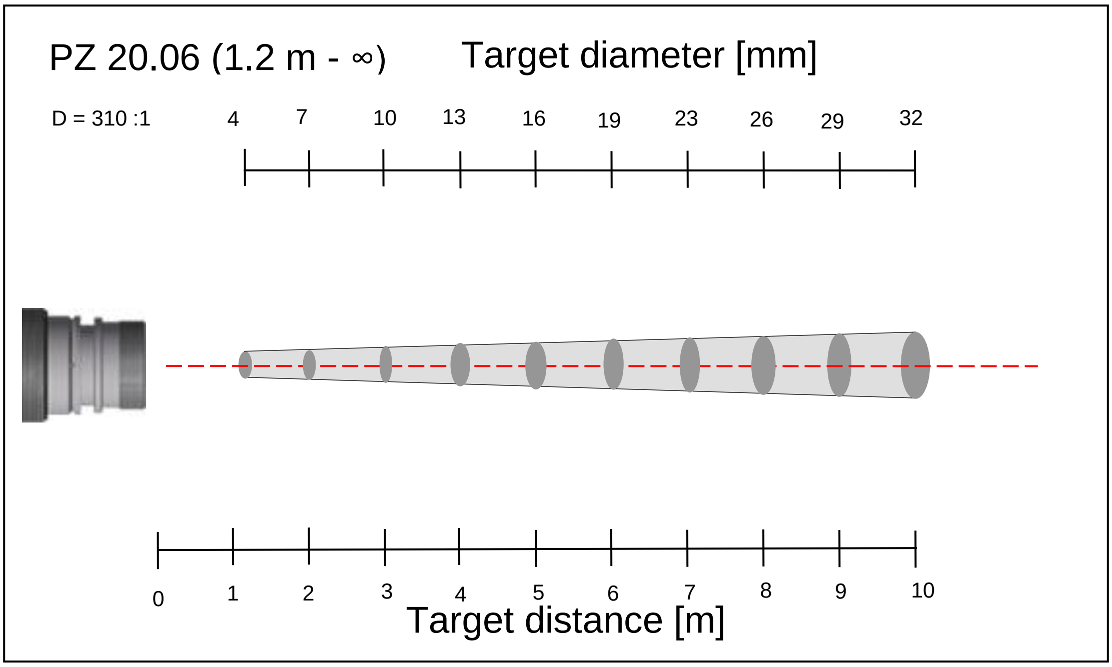
Measuring uncertainty:
0.3 % of range and but at least 4 K
(ε =1.0 and T_A=23 °C)

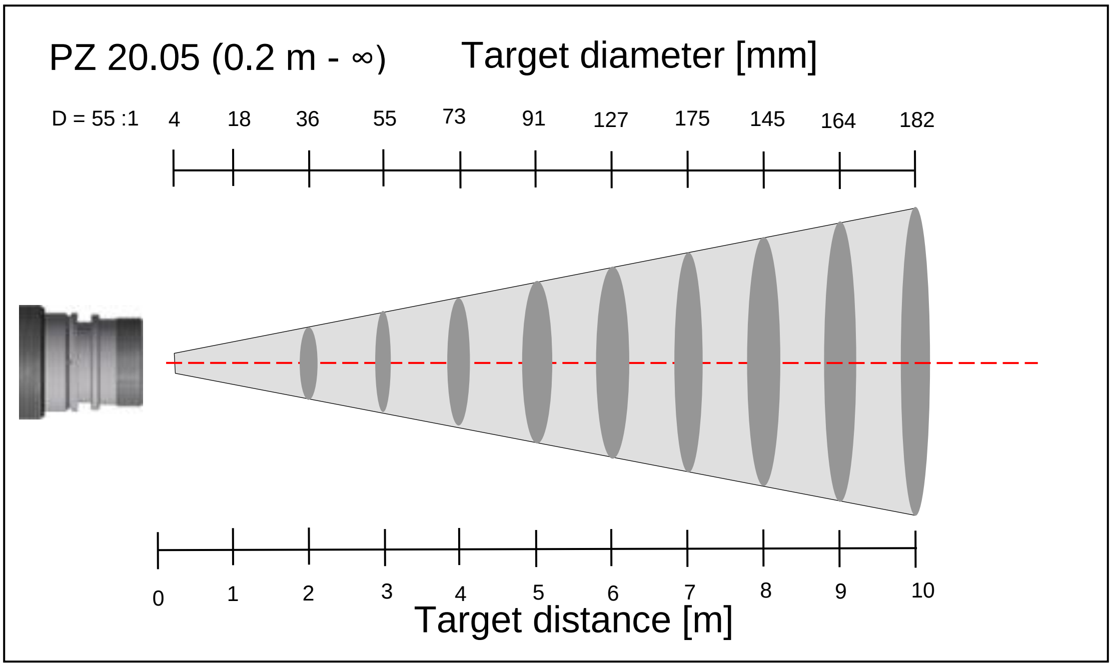
31.1 Field of View Diagrams for PT 130

PT 130	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 20.01	0.4 m - ∞	210:1
AF 2	PZ 20.03	0.2 m – 0.4 m	200:1
AF 3	PZ 20.06	1.2 m - ∞	310:1
AF 4	PZ 20.05	0.2 m - ∞	55:1




PZ 20.03 (0.2 – 0.4 m)
Target diameter [mm]
D = 200 :1
1
1,5
2
0
0.1
0.2
0.3
0.4
Target distance [m]


PZ 20.06 (1.2 m - ∞)
Target diameter [mm]
D = 310 :1
4
7
10
13
16
19
23
26
29
32
0
1
2
3
4
5
6
7
8
9
10
Target distance [m]


PZ 20.05 (0.2 m - ∞)
Target diameter [mm]
D = 55 :1
4
18
36
55
73
91
127
175
145
164
182
0
1
2
3
4
5
6
7
8
9
10
Target distance [m]

32 Technical Data PT 135

Measuring range:
600 ... 3000 °C

Sensors:
photo diode

Spectral sensitivity:
0.82 – 0.93 µm

Response time t_{98}:
≤ 50 ms (T > 650 °C)
≤ 2 ms (T > 850 °C)

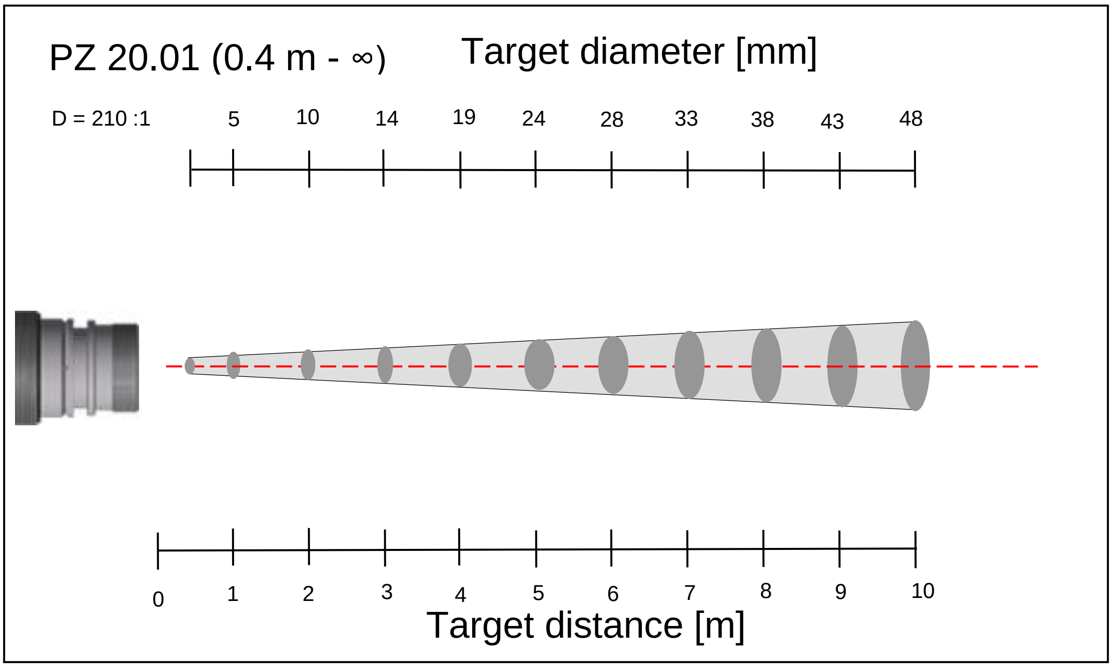
Measuring uncertainty:
0,3 % of range and but at least 4 K (at ε =1,0 and T_A = 23 °C)

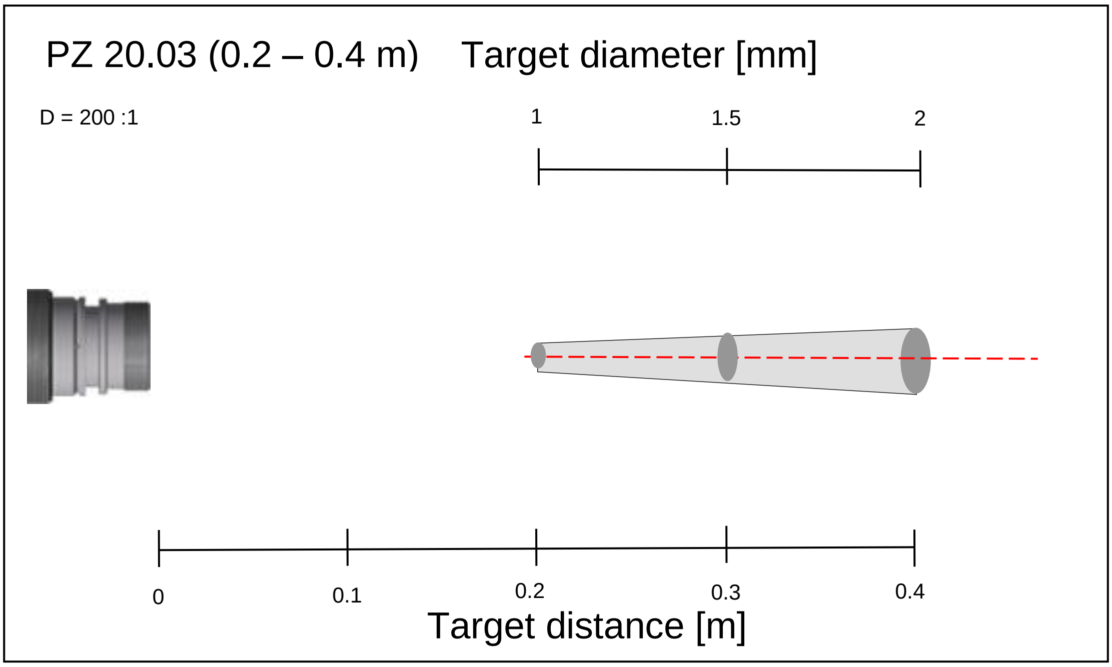
Repeatability:
1 K

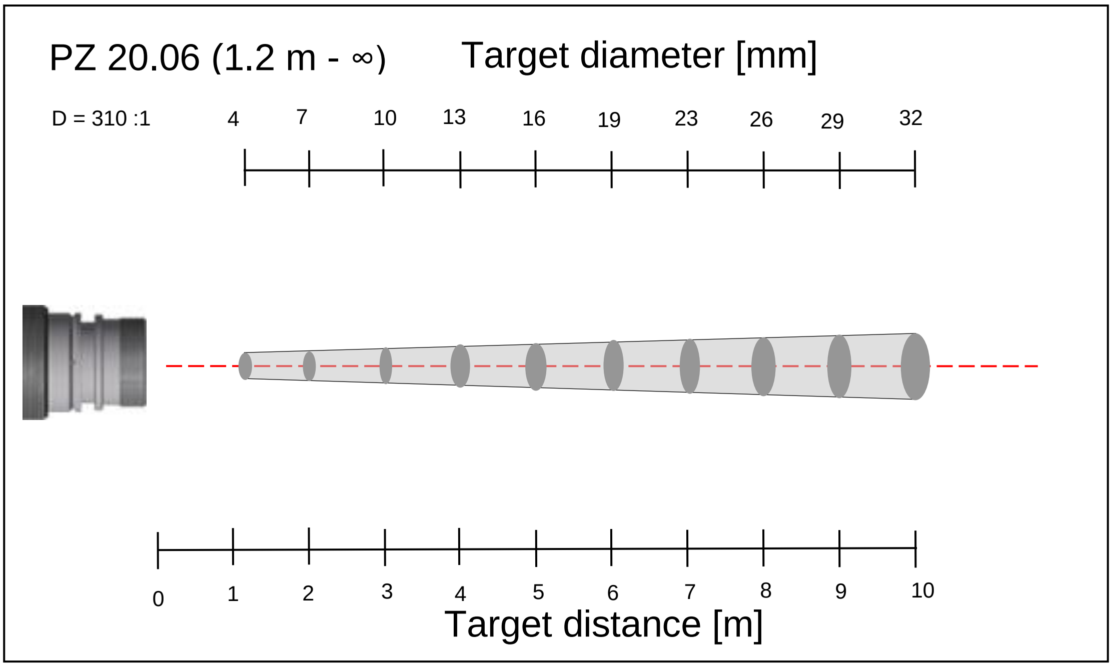
Temperature coefficient with reference to 23 °C:
≤ 0.25 K / K (for T < 500 °C)
≤ 0.05 %/K (for T ≥ 500 °C)
of measured value

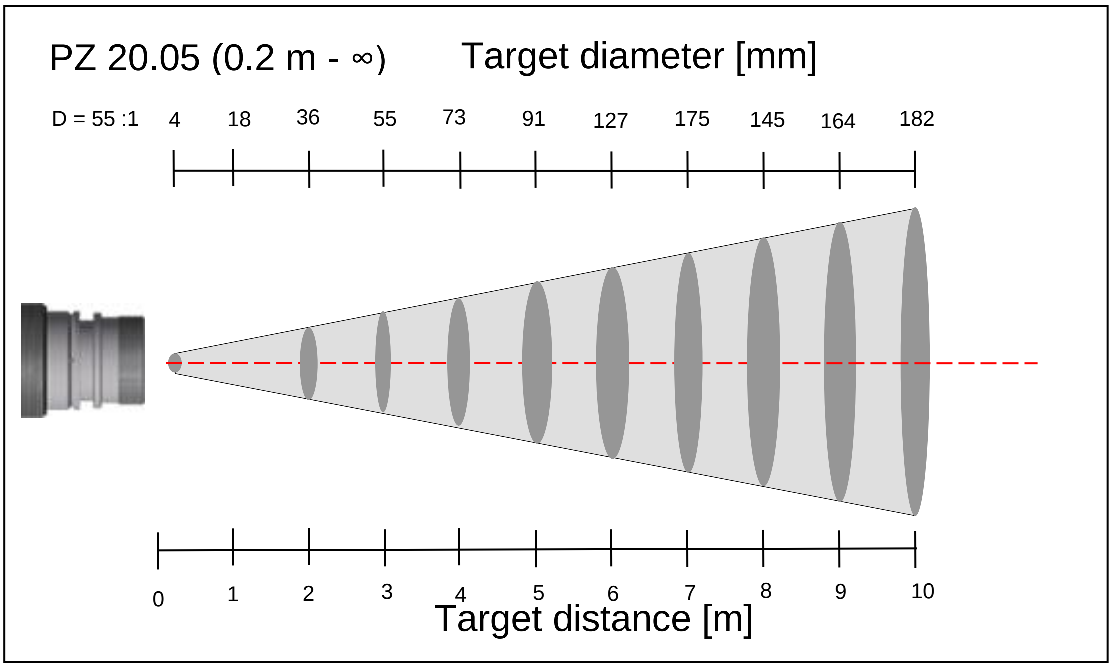
32.1 Field of View Diagrams PT 135

PT 135	Lens	Focussing range	Distance to target size ratio
AF 1	PZ 20.01	0.4 m - ∞	210:1
AF 2	PZ 20.03	0.2 m – 0.4 m	200:1
AF 3	PZ 20.06	1.2 m - ∞	310:1
AF 4	PZ 20.05	0.2 m - ∞	55:1

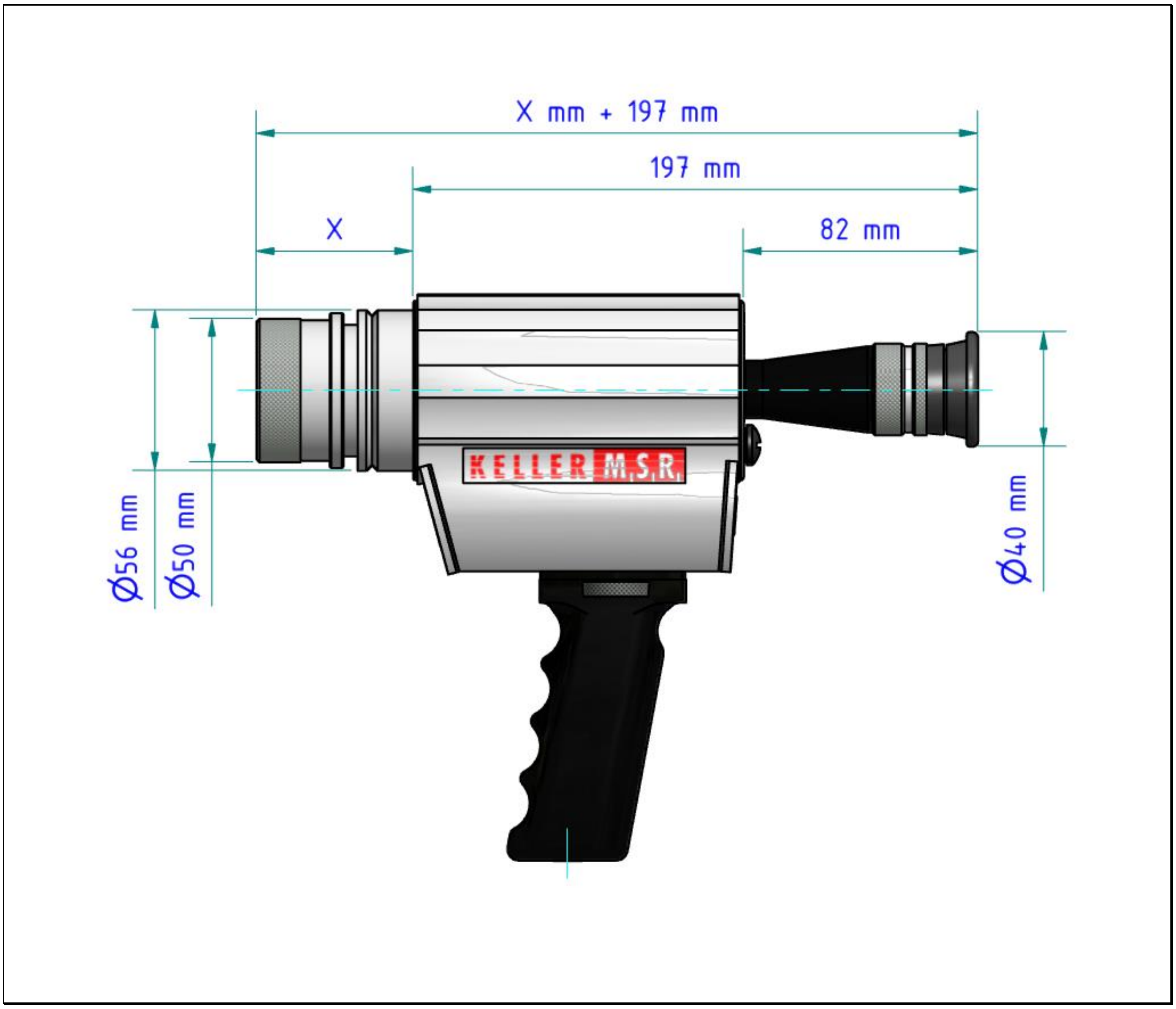



PZ 20.03 (0.2 – 0.4 m) Target diameter [mm]
D = 200 :1
1
1.5
2
0
0.1
0.2
0.3
0.4
Target distance [m]


PZ 20.06 (1.2 m - ∞) Target diameter [mm]
D = 310 :1
4
7
10
13
16
19
23
26
29
32
0
1
2
3
4
5
6
7
8
9
10
Target distance [m]


PZ 20.05 (0.2 m - ∞)
Target diameter [mm]
D = 55 :1
4
18
36
55
73
91
127
175
145
164
182
0
1
2
3
4
5
6
7
8
9
10
Target distance [m]

33 Dimensions



34 Shipping, Packaging and Disposal

34.1 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.

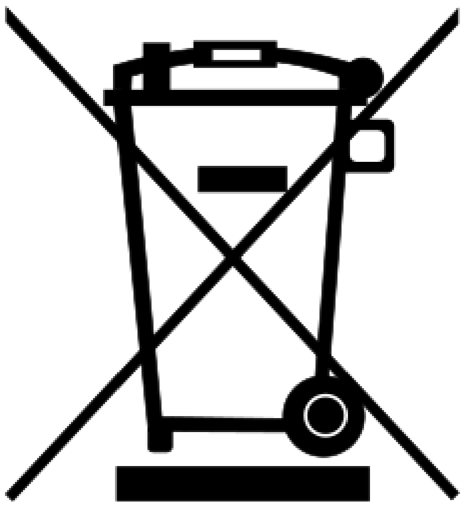
34.2 Packaging

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.

34.3 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.



35 Copyright

36 Default settings PT 110,113,115, 117

36.1 Temperature measurement (configuration layer: c001)

Function	Parameter configuration layer C001					Default	Customized configuration
Array size	Etb.1	oFF	1- 10			oFF	
Emissivity	EPS.1					99.0	
Memory position			E.idH			1	
Material constant 1			E. 01			100.0	
Material constant 2			E. 02			100.0	
Transmission factor	tAU.					100.0	
Smoothing filter	FiL.1	oFF	on	AUto		AUto	
Smoothing time			FiLt			4.00	
Min/Max memory	nEn.1	oFF	nin nAH	dbLn	Atd	oFF	
Smoothing time				nEnt		1.00	
Smoothing filter for min/max Smoothing time			FiLn FiLt	FiLn FiLt		oFF 0.10	
					tdEL	1.0	
					tAct	3.0	
					td iS	0.0	
					toUt	1.0	
					Li. 1	1100 °C	
					Li. 2	1200 °C	
					F-Pr	100.0	
					tSP_	200 °C	
					tSP‾	200 °C	
					Ano	thLd.	
					ArSt	oFF	
					chL2	oFF	
End	End						

36.2 General Functions (configuration layer: (c011)

Function	Parameter	Default	Customized configuration
Automatic Switch off	AoFF	2	
Temperature unit	Unit	°C	
End	End		

37 Default settings PT 120,130,135

37.1 Temperature measurement (configuration layer: c001)

Function	Parameter configuration layer C001					Default	Customized configuration
Array size	Etb.1	oFF	1-10			oFF	
Emissivity	EPS.1					99.0	
Memory position			E.idH			1	
Material constant 1			E. 01			100.0	
Material constant 2			E. 02			100.0	
Transmission factor	tAU.					100.0	
Smoothing filter	FiL.1	oFF	on			on	
Smoothing time			FiLt			0. 10	
Min/Max memory	MEM.1	oFF	Min MAH	dbL.n	Atd	oFF	
Smoothing time				MEMt		1.00	
Smoothing filter for min/max Smoothing time			FiL.M FiLt	FiL.M FiLt		oFF 0.10	
					tdEL	1.0	
					tAct	3.0	
					tdiS	0.0	
					toUt	1.0	
					Li. 1	1100 °C	
					Li. 2	1200 °C	
					F-Pr	100.0	
					tSP_	200 °C	
					tSP‾	200 °C	
					Ano	thLd.	
					ArSt	oFF	
					chL.2	oFF	
End	End						

*** Start of measuring range**

37.2 General Functions (configuration layer: c011)

Funktion	Parameter	Default	Eigene Einstellungen
Automatic Switch off	A.oFF	2	
Temperature unit	Unit	°C	
End	End		