

Pyrometer CellaCast **PT 18x**

Mat. No. 105 9957 10/2018



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Please note:

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Contents

1	Miscellaneous	1
1.1	About this manual.....	1
1.2	Explanation of symbols.....	1
1.3	Liability and Warranty	1
1.4	Copyright.....	2
2	Safety	2
2.1	Intended use	2
2.2	User's responsibility.....	2
2.3	Electromagnetic Compatibility	3
2.4	Quality Management Certification.....	3
2.5	Environmental Management.....	3
3	Scope of delivery	4
4	General Description.....	4
4.1	Intended Use	4
4.2	Operating Controls and Display	4
5	Initial Setup.....	6
5.1	General Information.....	6
5.2	Using the protective glass	6
5.3	Charging the batteries	6
5.4	Diopter compensation.....	7
5.5	Focusing the pyrometer.....	7
5.6	Brightness control to protect the eye	8
5.7	Aiming at the target	8
6	Measurement.....	9
6.1	Performing a measurement	9
6.2	Automatic switch-off	9
7	Setting parameters at the pyrometer (basic configuration)	10
8	Menu.....	11
8.1	Configuration layer C001	11
8.2	Configuration layer C011	12
8.3	Configuration layer C020.....	12
9	How to determine and set material constants	12
10	Initialising material constants	14
10.1	Define number of material constants in array.....	14
10.1.1	Store material constants	14
10.2	Select the material constant	15
11	Further configuration	15
11.1	Automatic Temperature Detection (ATD).....	15
11.1.1	Threshold limits	16
11.1.2	Display and output of temperature reading [RnO].....	17
11.1.3	Average weighting [F - Pr].....	17
11.1.4	Cut-off interval [t d iS].....	18
11.1.5	Auto reset Function [ArSe].....	18
11.1.6	Li2 check on tAct [c hL 2]	19
12	Setting Parameters at the device	19
12.1	Configuration layers.....	19
12.1.1	Temperature measurement using two-colour/ratio mode (Configuration layer: c 00 i).....	20
12.1.2	One-colour (single-wavelength) measurement:.....	21
Spectral channel 1: config. layer c 00 2 Spectral channel 2: config. layer c 00 3		21
12.1.3	Configuration I/O (Configuration layer: c 0 i0).....	22

12.1.4	General Functions (Configuration layer: $\llcorner \square \mid \mid$)	24
12.1.5	Displayed temperature readings/ Signal intensity.....	24
13	Software CellaView	25
14	PC Interface	25
15	Remote configuration.....	26
15.1	Main Menu	27
15.2	View Current Configuration.....	27
15.3	Submenus	28
15.3.1	Configure two-colour/ratio mode.....	28
15.3.2	Configure single-wavelength mode Lambda 1	28
15.3.3	Lambda 2	29
15.3.4	Quick access to emissivity / signal smoothing / operating mode.....	29
15.3.5	I/O Signal Configuration	29
15.3.6	Automatic temperature data output.....	30
15.3.7	User Recalibration.....	31
16	Maintenance	34
16.1	Cleaning the pyrometer lens/protective glass	34
17	Accessories.....	34
18	General technical data	35
19	Technical data PT 180	35
19.1	Field of View Diagrams PT 180	36
19.1.1	CellaCast PT 180 AF 4	36
19.1.2	CellaCast PT 180 AF 6	37
20	Technical data PT 183	38
20.1	Field of View Diagrams PA 183	38
20.2.1	CellaCast PT 183 AF 1	39
20.2.2	CellaCast PT 183 AF 3	40
20.2.3	CellaCast PT 183 AF 13	41
21	Dimensions.....	42
21.1	Shipping, Packaging and Disposal	43
21.1.1	Inspecting your shipment	43
21.2	Packaging	43
21.3	Disposal of used apparatus	43
22	Copyright.....	44
23	Default Settings PT 180.....	45
23.1	Temperature measurement using two-colour/ratio mode (Cofiguration layer: $\llcorner \square \square \mid$).....	45
23.2	General Functions (configuration layer: $\llcorner \square \mid \mid$).....	46
24	Default Settings PT 183.....	46
24.1	Temperature measurement using two-colour/ratio mode (Cofiguration layer: $\llcorner \square \square \mid$).....	46
24.2	General Functions (configuration layer: $\llcorner \square \mid \mid$).....	47

1 Miscellaneous

1.1 About this manual

The Operating Manual shall enable the user to operate the pyrometer.

Prior to initial use, 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 very important information. Failure to follow these instructions may 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.



Read this Operating Manual carefully before you do anything to and/or with the device, especially prior to initial use! The Manufacturer shall not be held liable for any damages or malfunctions arising from the failure to comply with 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 device 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. Unauthorized 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 operation.

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
- Quartz protective glass

4 General Description

4.1 Intended Use

The CellaCast PT 180/ PT 183 were specially designed for mobile temperature detection of molten metal. The CellaCast PT 180/ PT 183 features ATD (Automatic Temperature Detection). The pyrometer starts measuring as soon as you switch it on and point it at the target. After a few seconds an audible alarm indicates the end of the measurement. The display panel shows the temperature reading and, if desired, communicates the data via USB interface.

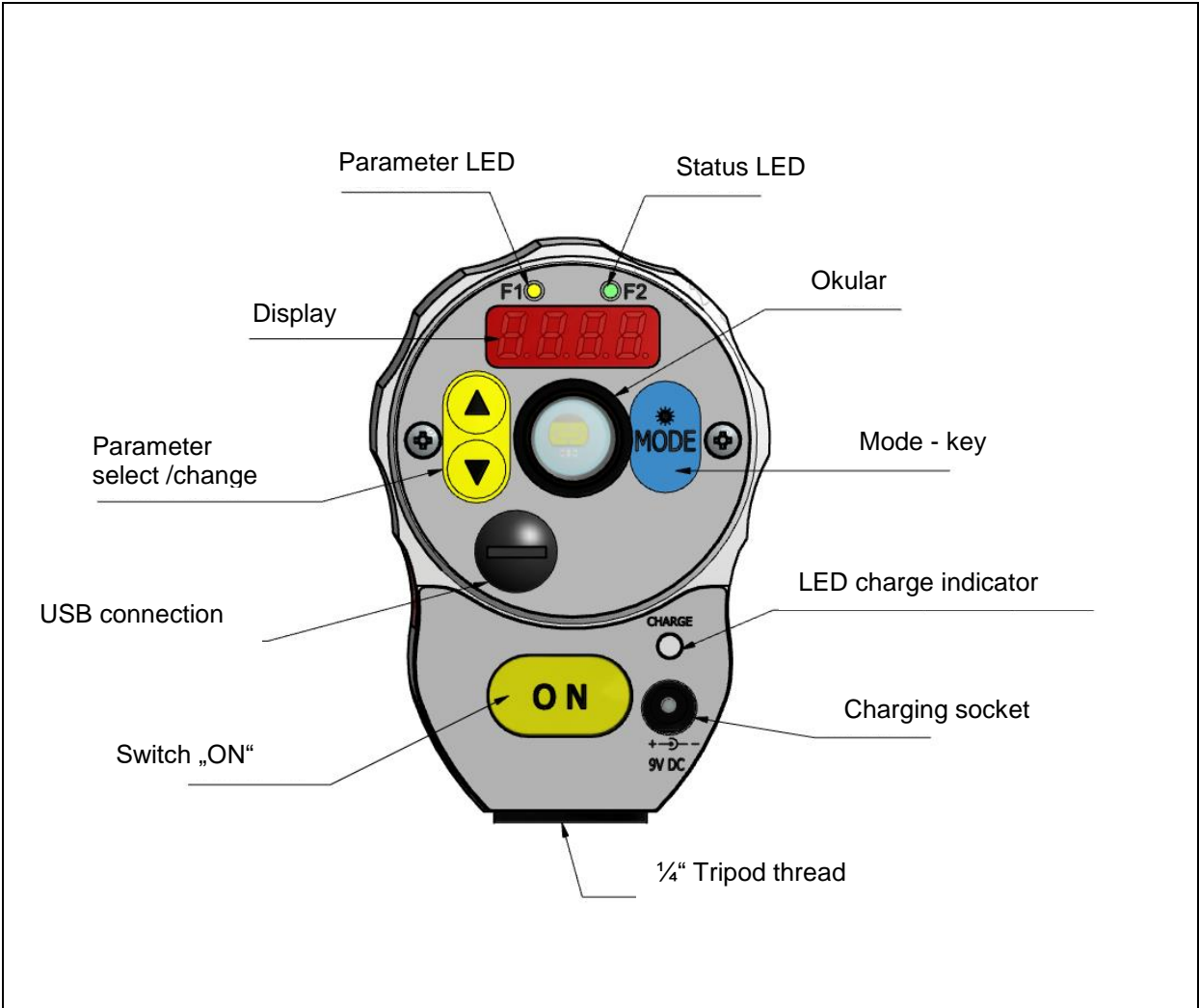
As an optical measuring technique, CellaCast PT 180 / PT183 detect temperature without contact. The pyrometer captures the infrared energy radiating from an object's surface and yields a temperature value. The optical system measures the radiation within a clearly defined measurement area. Depending on the specific target size and the particular lens being used, the CellaCast PT pyrometer can measure from a distance of several meters.

Signal processing is based on a dual-wavelength method. The IR radiation is detected at two separate wavebands and a temperature reading is generated from the ratio of these two intensities. Compared to a single-wavelength pyrometer, the two-colour method is far less susceptible to signal attenuation due to line-of-sight obstructions such as dust, steam or smoke.

4.2 Operating Controls and Display

The rear panel of the CellaCast PT 180 / PT 183 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.



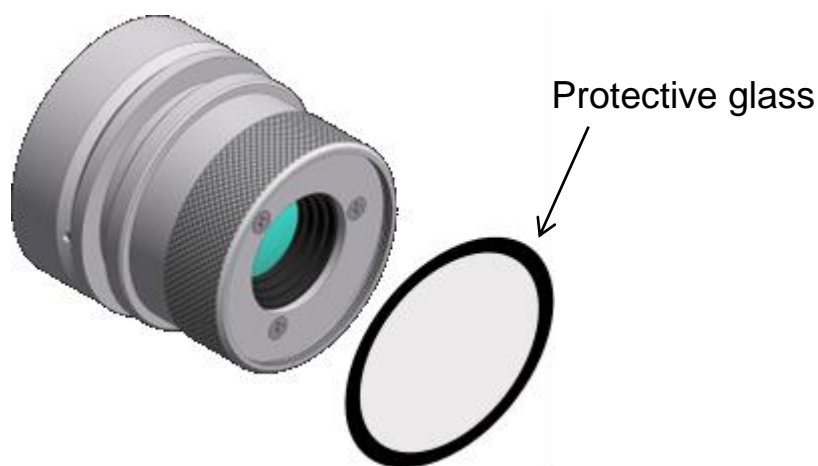
5 Initial Setup

5.1 General Information

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

5.2 Using the protective glass

A protective glass will protect the pyrometer lens against dirt and molten metal splatter. This optional accessory is included with the pyrometer purchase. If desired, simply screw it onto the objective lens.



When using the CellaCast PT 180 / PT 183 as a two-colour pyrometer (which is the normal operating mode), you will not need to select a special setting to compensate for the transmittance of the quartz glass. If you perform a spectral (single-wavelength) measurement, you must set the transmittance to 0.93 for the selected spectral channel (see chapter 12.1.2, parameter ϵ_{RU} !).



Only use the wavelength-neutral lens protection glass supplied by KELLER. Do not use any commonly available camera lens accessory! Doing so will result in measurement errors.

5.3 Charging the batteries

Connect the battery charging socket of the CellaCast PT to the provided power supply. The charge indicator lights as long as the batteries are being charged. A complete charging cycle takes approx. 15 hours.

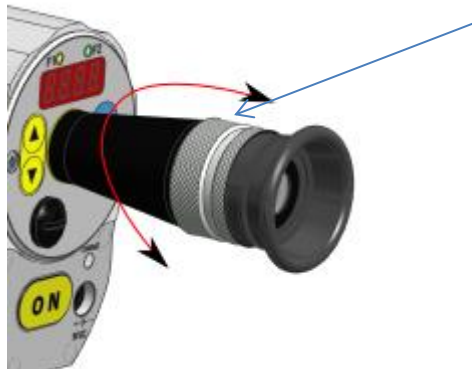


Only use the power supply which comes with the pyrometer. Do not use any other power supply as this may cause irreparable damage to the device.



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

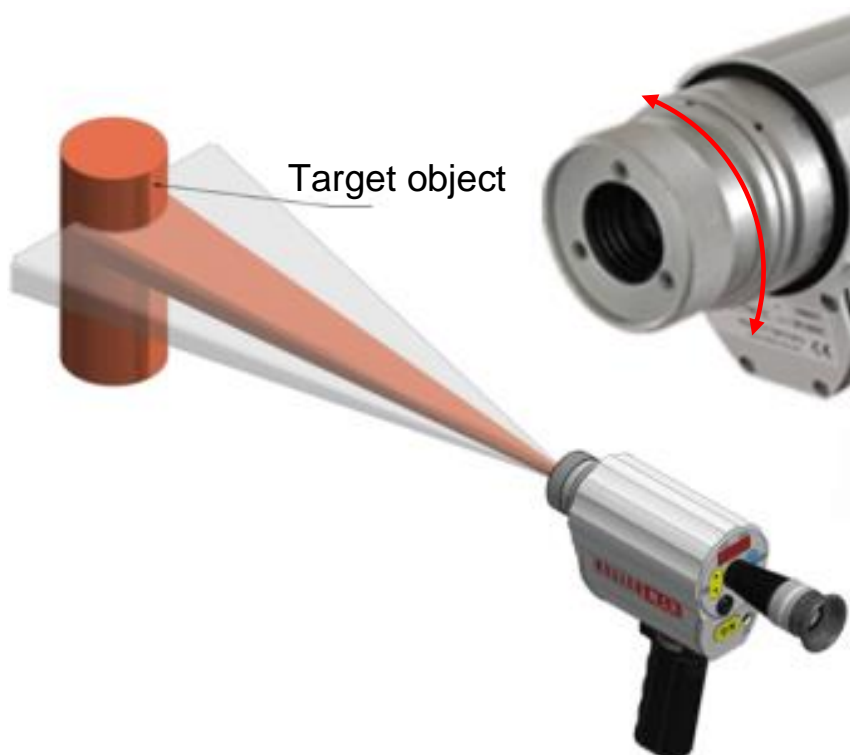
5.4 Diopter compensation



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.

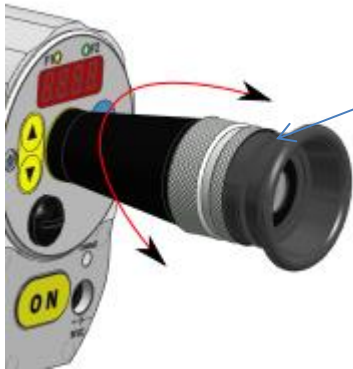
5.5 Focusing the pyrometer

The CellaCast PT 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.

5.6 Brightness control to protect the eye



The CellaCast PT pyrometer is equipped with an adjustable polarising filter to control brightness and protect the user's eye.

5.7 Aiming at the target

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). When measuring with a two-colour pyrometer, the object to be measured is not required to fill the complete measurement area. When aiming the pyrometer PT 183, hold it at a right angle (perpendicular) to the targeted object (the molten metal stream). Make sure the target 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 rectangle.



Correct aiming captures the free flowing molten metal stream



Incorrect aiming captures the target *and* the hot background

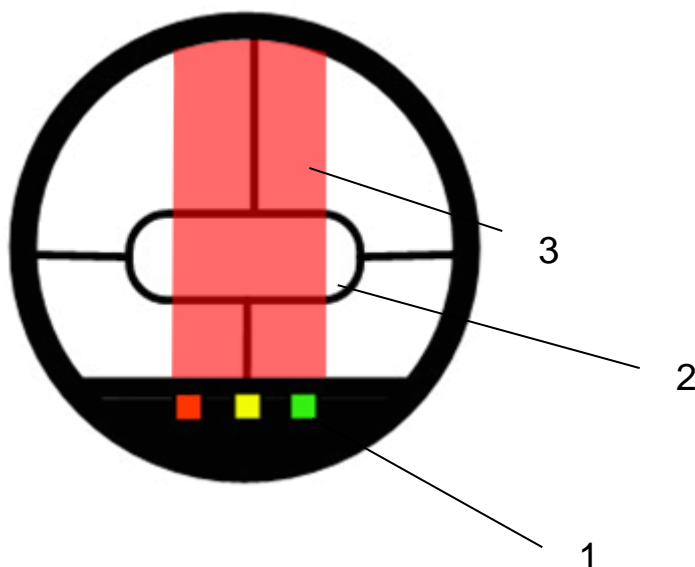


A hot background within the measurement area can result in erroneous temperature data.

A traffic light status indicator, integrated in the viewfinder, tells the user when not enough emitted infrared energy is reaching the sensor for a reliable temperature measurement. If signal attenuation (due to dust, steam or fumes in the line of sight or when the pyrometer is too far from the target) has reached a critical level at which the pyrometer can no longer generate reliable temperature data, a red LED will light up and the device stops measuring.

6 Measurement

6.1 Performing a measurement



- 1) Traffic light status indicator
- 2) Measurement area
- 3) Target object (molten stream)

Press the ON-button to switch on the device. The pyrometer starts measuring as soon as you point it at the hot target. The target (metal stream) must remain within the rectangular measurement area as long as the display is blinking. After a few seconds an audible signal indicates that the pyrometer has finished measuring. The temperature reading appears in the display or, as an option, is 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 (see Chapter 9).

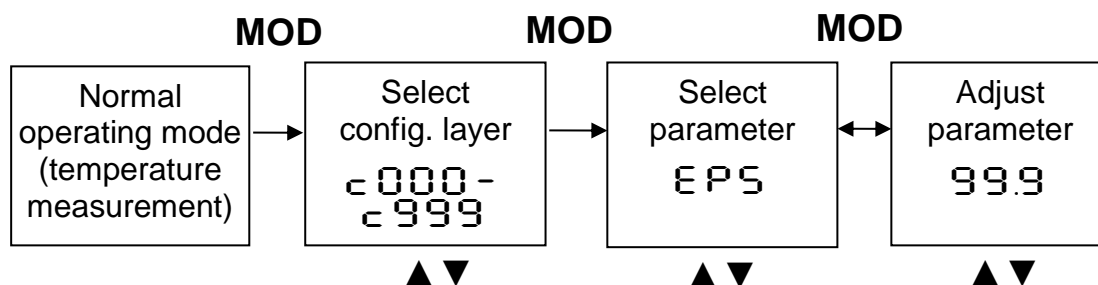
6.2 Automatic switch-off

In the default setting, the CellaCast PT pyrometer switches off automatically after 2 minutes if none of the control keys are pressed. Automatic switch-off can be configured from 1 – 60 minutes. When the pyrometer is in “automatic switch-off deactivated” mode, you must press the ON key to manually to switch the pyrometer off.

7 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.

Hierarchy of manual configuration:



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.

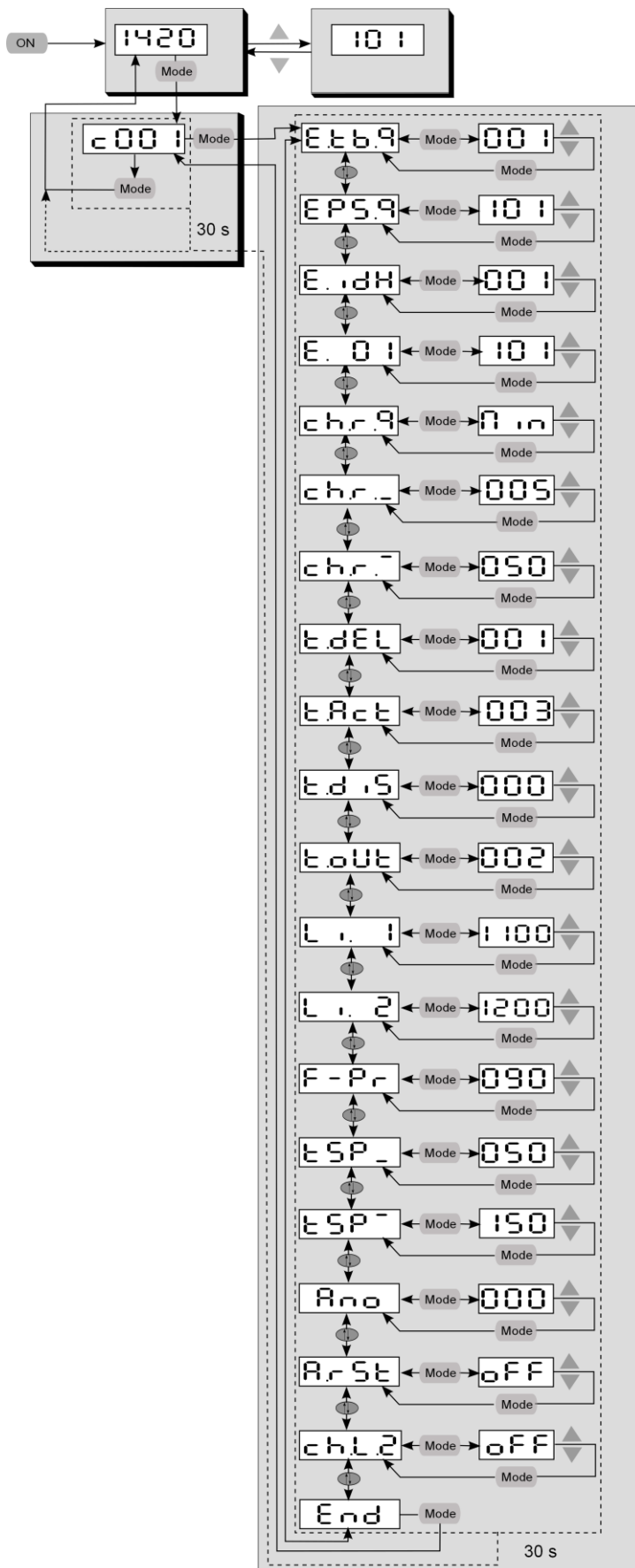
Whenever a control key has not been pressed within 30 seconds, the pyrometer will automatically return to normal operating mode.



Key lock may have been activated at the terminal. When selecting the configuration layer you will be prompted to enter an access code with P 000 . To obtain full access to parameter settings, enter P 100 otherwise you will only be able to view parameters but not change them.

8 Menu

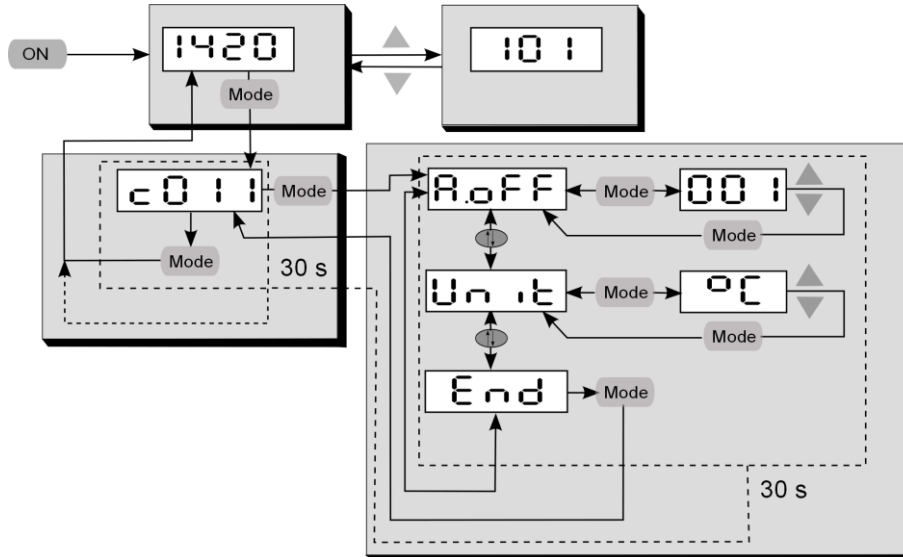
8.1 Configuration layer C001



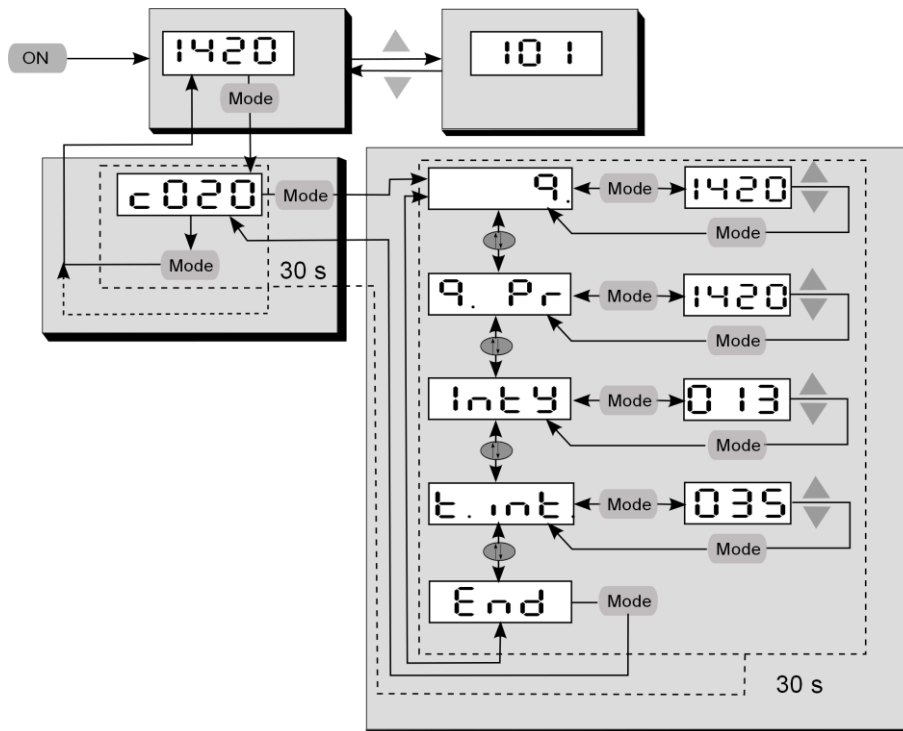


In the default configuration, certain parameter settings will be hidden. If required, you can have them shown.

8.2 Configuration layer C011



8.3 Configuration layer C020



9 How to determine and set material constants

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) for the particular molten metal and point of measurement.

Based on our experience, we recommend the following emissivity ratio settings:

Grey cast iron: 101 (default)
Spheroidal graphite iron: 103 -104



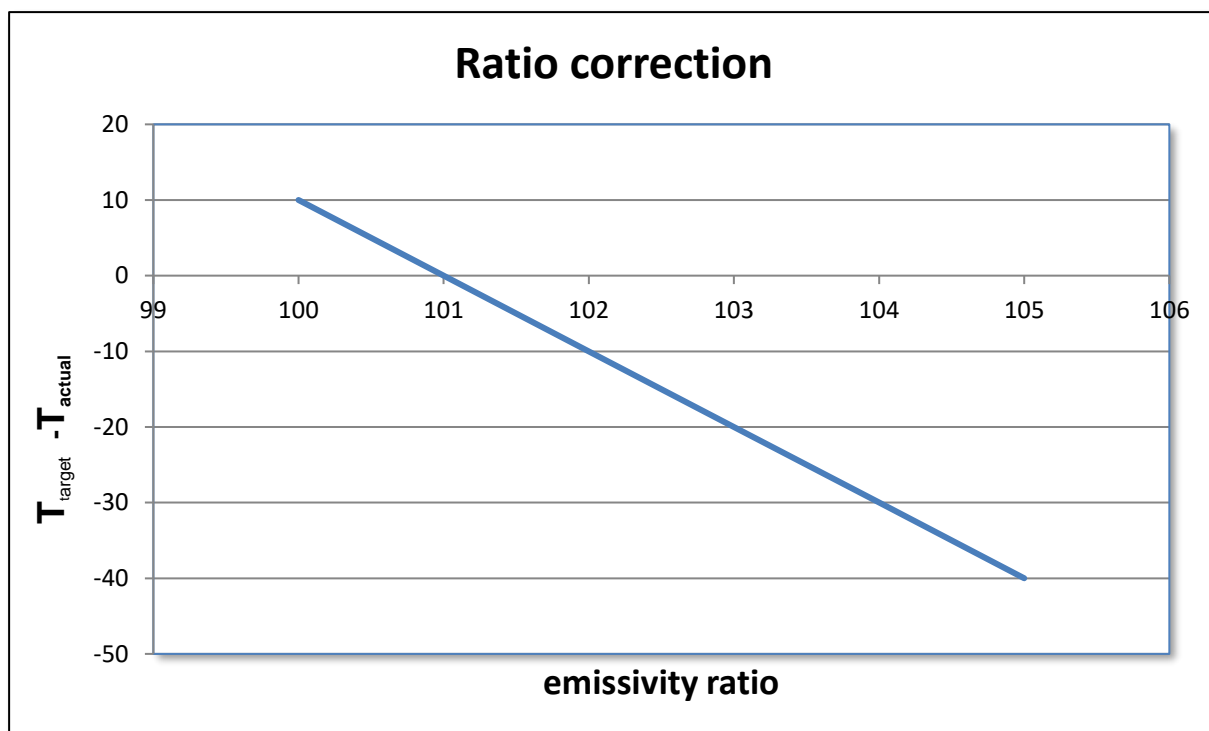
To determine the emissivity ratio of the material surface, you must conduct a comparison measurement using a thermocouple probe. To obtain comparable temperature data, you should carry out the probe measurement and the pyrometer measurement at the same time and at the same point (as far as possible).

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.



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.

The chart below shows an approximation of the impact of the emissivity ratio setting on the change in temperature reading. A decrease in emissivity ratio produces a higher temperature reading.



10 Initialising material constants

The CellaCast PT pyrometer lets you store up to 10 material constants. Before you perform a new measurement, simply use the ▲▼ control keys to select your preconfigured material constant for that specific application. When you select a stored material constant, the display will briefly show the preconfigured value for that constant (e.g. 103%).

10.1 Define number of material constants in array

Before you configure the pyrometer with material constants, 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.t.b.9, enter the total number.

Temperature measurement two-colour/ratio mode (Configuration layer: c 00 i)

Parameter	Function	Explanation
E.t.b.9	Enter desired number of elements in array	If E.t.b.9 = 0, then use ▲▼ keys to manually set emissivity ratio.

10.1.1 Store material constants

Next, assign a value to each material constant in the index (E. 0 i, E. 02 etc.).

Temperature measurement two-colour/ratio mode (Configuration layer: \llcorner 00 !)

Parameter	Function	Explanation
E. 01	Enter a material constant	e.g. 103 % (spheroidal graphite iron)
E. 02	Enter a material constant	e.g. 101 % (grey cast iron)
E. 03	Enter a material constant	

10.2 Select the material constant

The CellaCast PT pyrometer offers two ways to access the material constants you have stored: either directly using \blacktriangle \blacktriangledown or at the parameter setting below:

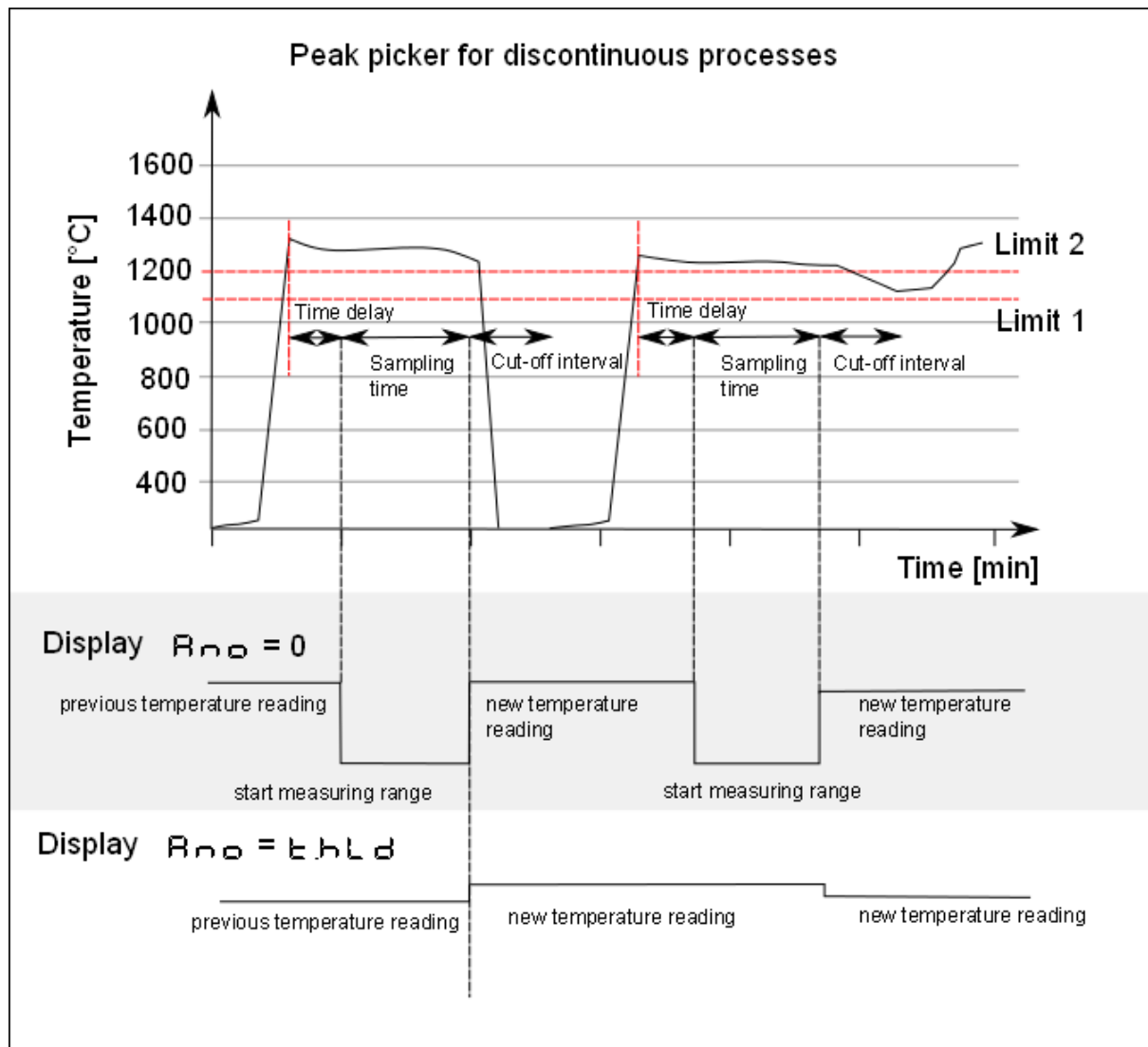
Temperature measurement two-colour/ratio mode (Configuration layer: \llcorner 00 !)

Parameter	Function	Explanation
E. 1dH	Enter a material constant	Choose a constant from the array, e.g. E. 02

11 Further configuration

11.1 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.



11.1.1 Threshold limits

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

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

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

Parameter	Function
Sampling time (t_{RC}) *1	During the sampling time the temperature is detected and stored as a temperature value.

*1 Applies to parameter t_{RC} 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 a sampling time commensurate to the shortest pour time likely to occur.

11.1.2 Display and output of temperature reading [R_{NO}]

The parameter R_{NO} (normal display mode) defines which temperature value is saved during sampling.

Parameter	Function
Display mode (R_{NO})	„ $t=0$ “ 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.

11.1.3 Average weighting [$F - P_r$]

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 ($F - P_r$)	Factor for average weighting. If you enter 100%, averaging will be off.

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

When the averaging function is activated ($F - P_r < 100\%$) 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 t_{SP} , 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 ($\pm SP_{+}$)	Upper threshold for permissible deviation, if temperature reading > average value
Plausibility ($\pm SP_{-}$)	Lower threshold for permissible deviation, if temperature reading is < average value

If a measuring cycle does not start during the period $\pm 0.5t$ the saved average will be deleted and reinitialized when the next cycle begins.

Parameter	Function
Timeout ($\pm 0.5t$)	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 „- - - -“).

11.1.4 Cut-off interval [± 0.5]

Sometimes towards the end of the pour, flames may arise or the pour stream will flow intermittently. Should this occur between actual measurements (after the configured measurement duration has expired), this could prematurely trigger a new measuring cycle. To prevent this, you can configure a cut-off interval (time lag) during which measurement is disabled. When the cut-off interval has expired, measurement will once again be enabled.



If, after a pour, when the pyrometer has finished measuring, a new measurement cycle is triggered for an invalid reason, we recommend increasing the cut-off interval.

Parameter	Function
Cut-off interval (± 0.5)	The interval between one completed sampling and the start of a new sampling.

11.1.5 Auto reset Function [$R_{1} S t$]

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 $\pm 0.5t$.

Parameter	Function
Auto reset (R_r 5 t):	Auto reset on/off

11.1.6 Li2 check on tAct [c h.L 2]

When this parameter is set to ON (c h.L 2 =on), the detected temperature must exceed Limit 2 during the entire measuring time (t R c t) in order for the pyrometer to generate a valid temperature reading. If, for example, the material flow is interrupted or the target object moves outside of the measurement field, the temperature reading will be rejected. The pyrometer will indicate „- - - - „ (invalid temperature value).

Parameter	Function
Li2 check on tAct (c h.L 2)	on/off

12 Setting Parameters at the device

In addition to the configuration possibilities described in chapter 11, many parameters can be adjusted at the rear panel using push buttons. These settings can be accessed via configuration layers.

12.1 Configuration layers

The configuration layers are structured as follows:

- c 00 1 Temperature measurement via two-colour/ratio mode
- c 00 2 Temperature measurement via Lambda 1
- c 00 3 Temperature measurement via Lambda 2
- c 0 10 I/O configuration
- c 0 11 General functions
- c 0 20 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 by **●**. If required, remote access to these parameters can be enabled via PC interface or at configuration layer c 0 11. 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.

12.1.1 Temperature measurement using two-colour/ratio mode (Configuration layer: **c 00 1**)

Parameter	Function	Explanation	
E t b . 9	No. of material constants (array length)	Define the no.of elements you would like the array of material constants to contain. Max. array length is 10 (up to 10 constants).	
E P 5 . 9	Emissivity ratio	Direct setting of material constant as emissivity ratio.	
E . . d H	Set pyrometer to material constant	Choose one of the stored constants from the array, e.g. E . 0 2 . for the application	
E . 0 1	Assign material constants	Customize the array: assign a value to each of the material constants in the array.	
c h r . 9	Plausibility check ratio mode	o F F off n . n deactivation when below limit n . n R. deactivation when below or above limit	
c h r . -	Relative limit min.	Relative lower limit [%] , two-colour temp. reading invalid (signal intensity)	
c h r . -	Relative limit max.	Relative upper limit [%] , two-colour temp. reading invalid (signal intensity)	
c h R t	Absolute min. temp.	Absolute lower limit, two-colour temp. reading invalid	①
c h R .	Absolute minimum emissivity	Absolute lower limit [%], two-colour temp. reading invalid	①
L . n . 9	Temperature offset using linear interpolation (user configurable table)	o F F off 2 - 1 0 : number of nodes used	①
L . H 1	Node x 1 - 10	Signal input (initial value) node n	①
L . Y 1	Node y 1 - 10	Signal output (resulting value) node n	①
F . L . 9	Smoothing filter	o F F o n	①
F . L t	Smoothing time	Time in seconds t98	①
n e n . 9	Min/Max memory	o F F Off n . n lowest (min.)temperature, single n R H highest (max.) temperature, single d b L n double maximum d b L c double peak picker combined d . S n ATD function **	①
n e n t	Hold time for Min/Max	Hold time in sec. (only available, if double maximum memory filter is active)	①
F . L n	Smoothing filter for min/max*	o F F o n	①
F . L t	Smoothing time*	Time in seconds t98	①
t d e L	Time delay**	For ATD function, see Chap. 11.1	
t R c t	Sampling time**	For ATD function, see Chap. 11.1	
t d . S	Cut-off interval**	For ATD function, see Chap. 11.1	
t o U t	Timeout**	For ATD function, see Chap. 11.1	
L . 1	Limit 1**	For ATD function, see Chap. 11.1	
L . 2	Limit 2**	For ATD function, see Chap. 11.1	
F - P r	Average weighting**	For ATD function, see Chap. 11.1	

εSP-	Plausibility Threshold **	For ATD function, see Chap. 11.1	
εSP-	Plausibility Threshold **	For ATD function, see Chap. 11.1	
Rno	Display mode during Sampling time**	ε=0 show lower limit of temp. range during running measurement εHLd Hold previous temp. reading during running measurement	
RSt	Auto reset	For ATD function, see Chap. 11.1	
chL2	Li2 check on tAct	For ATD function, see Chap. 11.1	
End	End	Save changes / exit menu	

* Only available with Min/Max and Double Max modes

** Only available with ATD function

12.1.2 One-colour (single-wavelength) measurement:

Spectral channel 1: config. layer c 002

Spectral channel 2: config. layer c 003

In the factory default configuration, all parameter settings for spectral channels 1 and 2 will be hidden.

Parameter	Function	Explanation	
Et6.1	No. of material constants (array length)	Select the quantity of elements you would like the array of material constants to contain. Max. array length is 10 (up to 10 constants).	①
EPS.1	Emissivity factor L1		①
E. idH	Set pyrometer to material constant	Choose one of the stored constants from the array, e.g. E. 02, for the application	①
E. 01	Assign material constants	Customize the array: assign a value to each of the material constants in the array.	①
εAU.1	Transmittance factor		①
bAc.1	Ambient temperature compensation		①
bAc.t	Temp. of ambient source of radiation		①
bAc.!	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 %	①
L. in.1	Temperature offset using linear	oFF off 2-10 number of nodes used	①
L. H1	node x 1 - 10	Signal input (initial value) node n	①
L. Y1	node y 1 - 10	Signal output (resulting value) node n	①
F. L.1	Smoothing filter	oFF smoothing not activated o simple smoothing RUTo subsequent smoothing (only model PA1x)	①
F. L.t	Smoothing time	time t98 in sec for simple smoothing	①
REn.1	Min/Max memory	oFF off n n lowest (min.)temperature, single	①

		MAX highest (max.) temperature, single DBL MAX double maximum ATD ATD function	
HELT	Hold time for Min/Max	Hold time in sec.	①
FILN	Smoothing filter for min/max*	OFF OFF ON ON	①
FILT	Smoothing time*	Time t98 in sec.	①
tdEL	time delay **	For ATD function, see Chap. 11.1	①
tRct	Sampling time**	For ATD function, see Chap.11.1	①
tdIS	cut-off interval**	For ATD function, see Chap. 11.1	①
tOUT	timeout**	For ATD function, see Chap.11.1	①
L1	Limit 1**	For ATD function, see Chap.. 11.1	①
L2	Limit 2**	For ATD function, see Chap.11.1	①
F-Pr	Average weighting**	For ATD function, see Chap.11.1	①
tSP-	Plausibility threshold**	For ATD function, see Chap.11.1	①
tSP-	Plausibility threshold**	For ATD function, see Chap.. 11.1	①
Rno	Mode of display**	L= show lower limit of temp. range during running measurement H= Hold previous temp. reading during running measurement	①
ARSt	Auto reset	ATD Function siehe Chapter 11.1	①
End	End	Save changes / exit menu	①

* Only available with Min/Max and Double Max modes

** Only available with ATD function



L1 = Lambda 1 = temperature reading from spectral channel 1

L2 = Lambda 2 = temperature reading from spectral channel 2

12.1.3 Configuration I/O (Configuration layer: c 0 10)

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

Parameter	Function	Explanation	
tYPE	Operating mode/ measuring technique	L1 Lambda 1 L2 Lambda 2 Q ratio mode (quotient) (the selected source for temp. reading will be shown on the display)	①
LED.	LED (green)	OFF OFF ON ON	①
LED.S	LED: define source	rdy Status LED indicates 'ready' 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 Device inner temperature	①

		INT9 Signal intensity RET1 Triggered by ATD function Lambda 1** RET2 Triggered by ATD function Lambda 2** RET9 Triggered by ATD function two-colour/ratio mode** DIRT Dirt Alert RAC1 Measuring time ATD Lamda 1** RAC2 Measuring time ATD Lamda 2** RAC9 Measuring time ATD two colour/ratio mode**	
LEDF	LED function	LVL+ Switch direction "Level" (LED activated if limit exceeded) LVL- Switch direction "Level" (LED / output inverted) RNB+ Switch direction "Range" (LED activated if range exceeded) RNB- Switch direction "Range" (LED / output inverted)	①
LEDt	LED switching threshold	Switching threshold (only available at function "Level")	①
LEDh	LED signal threshold	Hysteresis +/- relative to signal threshold (only available at function "Level")	①
LED-	LED lower limit of range	Lower limit of range for switch signal (only available function "range")	①
LED+	LED upper limit of range	Upper limit of range for switch signal (only available function "range")	①
LEDL	LED delay time		①
LEDH	LED hold time		①
BUZ.	Buzzer	OFF OFF ON ON	①
BUZS	Buzzer: define source	RDY Status Ready-Signal L1 Lambda 1 L1Pr Lambda 1 without peak picker L2 Lambda 2 L2Pr Lambda 2 without peak picker 9 Two-colour/ratio mode 9.Pr Two-colour/ratio mode without peak picker EU Device inner temperature INT9 Signal intensity RET1 Triggered by ATD function Lambda 1** RET2 Triggered by ATD function Lambda 2** RET9 Triggered by ATD function two-colour/ratio mode ** DIRT Dirt Alert RAC1 Measuring time ATD Lamda 1** RAC2 Measuring time ATD Lamda 2** RAC9 Measuring time ATD two colour/ratio mode**	①
BUZF	Buzzer function	LVL+ Switch direction "Level" (Buzzer active if limit is exceeded) LVL- Switch direction "Level" (Buzzer / output inverted) RNB+ Switch direction "Range" (Buzzer active if range is exceeded) RNB- Switch direction "Range" (Buzzer /	①

		output inverted)	
bU2t	Buzzer switching threshold	Switching threshold (only available at function "Level")	①
bU2h	Buzzer signal threshold	Hysteresis +/- relative to signal threshold (only available at function "Level")	①
bU2..	Buzzer lower limit of range	Lower limit of range for switch signal (only available function "range")	①
bU2.-	Buzzer upper limit of range	Upper limit of range for switch signal (only available function "range")	①
bU2L	Buzzer delay time		①
bU2n	Buzzer hold time		①
End	End	Save changes / exit menu	①

** Only available with ATD function

12.1.4 General Functions (Configuration layer: c 0 1 1)

Parameter	Function	Explanation	
AoFF	Auto switch-off	oFF automatic switch-off function deactivated t-00 time period in seconds for auto switch-off delay	
AStr.	Auto temp. data output	oFF automatic temp. data output is off on temp. data output at PC terminal	①
AcyC.	Cycle for auto temp. data output	Select cycle time in s	①
Addr.	Device address	Enter address of device for non-terminal mode	①
d.SP.	Display control	"on" display panel indicates "on" .R I indicate temperature reading according to operating mode mode	①
Unit	temperature unit	oC degrees Celsius oF degrees Fahrenheit	
Menu	Menu-Mode	non With ① marked parameter are not shown FULL All parameters are shown	
End	End	Save changes / exit menu	

12.1.5 Displayed temperature readings/ Signal intensity

(Configuration layer: c 0 2 0)

Parameter	Function	Explanation	
q.	two-colour/ratio temp. reading	Shows current temperature reading in two-colour mode	
L1.	Temp. reading Lambda 1	Shows current single-colour temperature reading for L1	①
L2.	Temp. reading Lambda 2	Shows current single-colour temperature reading for L2	①
q. Pr.	Temp. reading two-colour mode without	Shows current temperature reading in two-colour/ratio mode prior to peak picker	

	peak picker		
L1Pr.	Reading Lambda1 without peak picker	Shows current temperature reading for L1 prior to peak picker	①
L2Pr.	Reading Lambda2 without peak picker	Shows current temperature reading for L2 prior to peak picker	①
IntY.	Signal intensity	Calculated signal intensity	
t.int.	Inner temperature	Current inner temp. of device	
End	End	Save changes / exit menu	

13 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/

14 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**

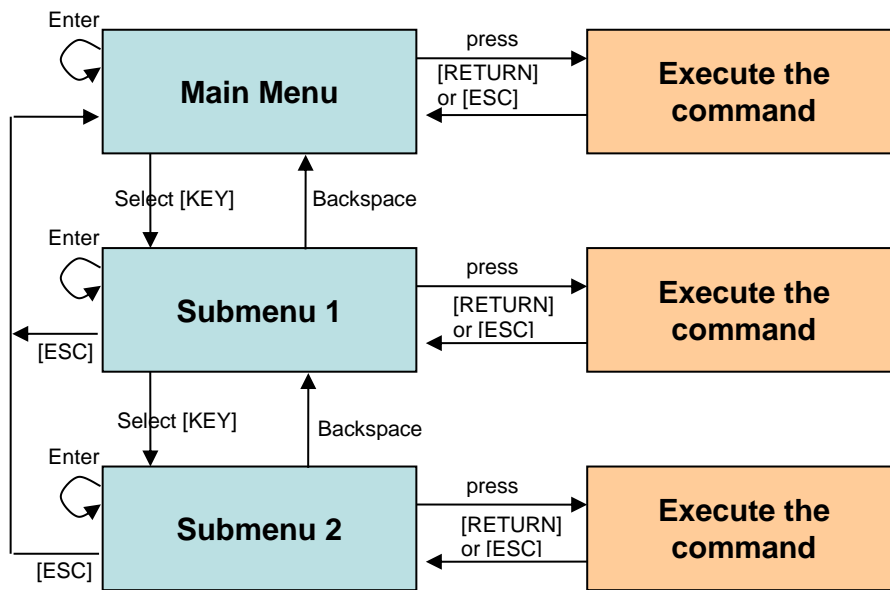


Serial communication starts approximately 2 seconds after the data terminal ready (DTR) control signal is enabled at the interface. Activate this signal in the terminal program or device configuration.

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

15 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: [QUOTIENT]

15.1 Main Menu

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

```

-----
>H
-----
Mainmenu
-----
0: [QUOTIENT]                E: Quick access EPSILON
1: [LAMBDA 1]               A: Quick access FILTER
2: [LAMBDA 2]               T: Quick access TYPE of measure
C: [I/O]
K: [CALIBRATION]

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

15.2 View Current Configuration

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

```

-----
-   PT 183 AF 1      650-1700C -
-   PT40SW101/0    QP 0,95/1,05um  Version 01.02  10.07.13 -
-----
Qu range .... 650.0 - 1700.0 C    DISPLAY source ..... quotient
Qu epsilon ratio ..... 101.0 %
Qu check L2  rel.limit  5.00 %
Qu abs.limit  650 C @  50.00 %
Qu linearization ..... off
Qu filter ..... 0.50 s
Qu memory type ..... ATD          GRN.LED source .... ATD tAct Qu
                                   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 (ATD)           BUZZER  source ATD triggered Qu
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.

15.3 Submenus

15.3.1 Configure two-colour/ratio mode

 Submenu QUOTIENT

```

Qu epsilon ratio ..... 101.0 %
Qu check L2  rel.limit   5.00 %
Qu abs.limit   650 C @  50.00 %
Qu linearization ..... off
Qu filter ..... 0.50 s
Qu memory type ..... ATD
  
```

```

C: [CONFIG EPSILON TABLE]
E: Epsilon
U: [Q-CHECK]
L: [LINEARIZATION]
F: Filter
M: [MEMORY]
P: Show parameter
Q: Show calibration data
O: Show signal intensity
X: Show measure temperatures
Y: Show premax measure temps.
ESC: Back to MAIN-MENU
  
```

 >QUOTIENT >

15.3.2 Configure single-wavelength mode Lambda 1

Press key „1“ to access all data logging parameters for Lambda 1 (L1).

 Submenu LAMBDA 1

```

L1 epsilon ..... 99.0 %
L1 transmission ..... 100.0 %
L1 backc. .... off
L1 linearization ..... off
L1 filter ..... 0.10 s
L1 memory type ..... 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 measure temperatures
Y: Show premax measure temps.
ESC: Back to MAIN-MENU
  
```

 >LAMBDA 1 >

15.3.3 Lambda 2

Press key „2“ to access all data logging parameters for Lambda 2 (L2). Configuration options are identical to Lamba 1.

15.3.4 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.

15.3.5 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 Qu
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: Lambda 2
5: Lambda 2 premax
6: Quotient
7: Quotient premax
8: Signal intensity
9: Dirt Alert
10: Ambient Temperature
```

```
11: Lambda 1 ATD Trigger
12: Lambda 2 ATD Trigger
13: Quotient ATD Trigger
14: Lambda 1 ATD tAct
15: Lambda 2 ATD tAct
16: Quotient 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 >

15.3.6 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

57600 Baud / 8 Data bits / odd parity / 1 stop bit / no hand-shake

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 sign -	Space	Minus sign -	Minus sign -
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 sign -	Minus sign -
10	Unit C or F	Unit C or F	Space	Space
11	Tabulator	Tabulator	Tabulator	Tabulator
12	Space	Space	Space	Space
13	Minus sign -	Space	Minus sign -	Minus sign -
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 sign -	Minus sign -
21	Unit C or F	Unit C or F	Space	Space
22	Tabulator	Tabulator	Tabulator	Tabulator
23	Space	Space	Space	Space
24	Minus sign -	Space	Minus sign -	Minus sign -
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 sign -	Minus sign -
32	Unit C or F	Unit C or F	Space	Space
33	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 at the PC terminal (minimum cycle duration is 0.1 second).

15.3.7 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

0: [QUOTIENT CALIBRATION]
1: [LAMBDA 1 CALIBRATION]
2: [LAMBDA 2 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 CellaCast PT 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 12.1), 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".

Specific settings regarding the measurement channels can be found in configuration layers "0", "1" and "2".

Submenu QUOTIENT

Qu range 650.0 - 1700.0 C
Qu User calibration off
Qu User def. offset +0.00000
Qu User def. factor +1.00000

A: Set Qu - extended-range
B: Set Qu User-Cal. On/Off
C: Set Qu User-Cal. Offset
D: Set Qu User-Cal. Factor
ESC: Back to MAIN-MENU

>CALIBRATION >QUOTIENT >

Use command "A" to reconfigure the pyrometer's measuring range (in two-colour / ratio mode). The range can be adjusted to be either larger or smaller than the factory-configured range. When customizing the tem-

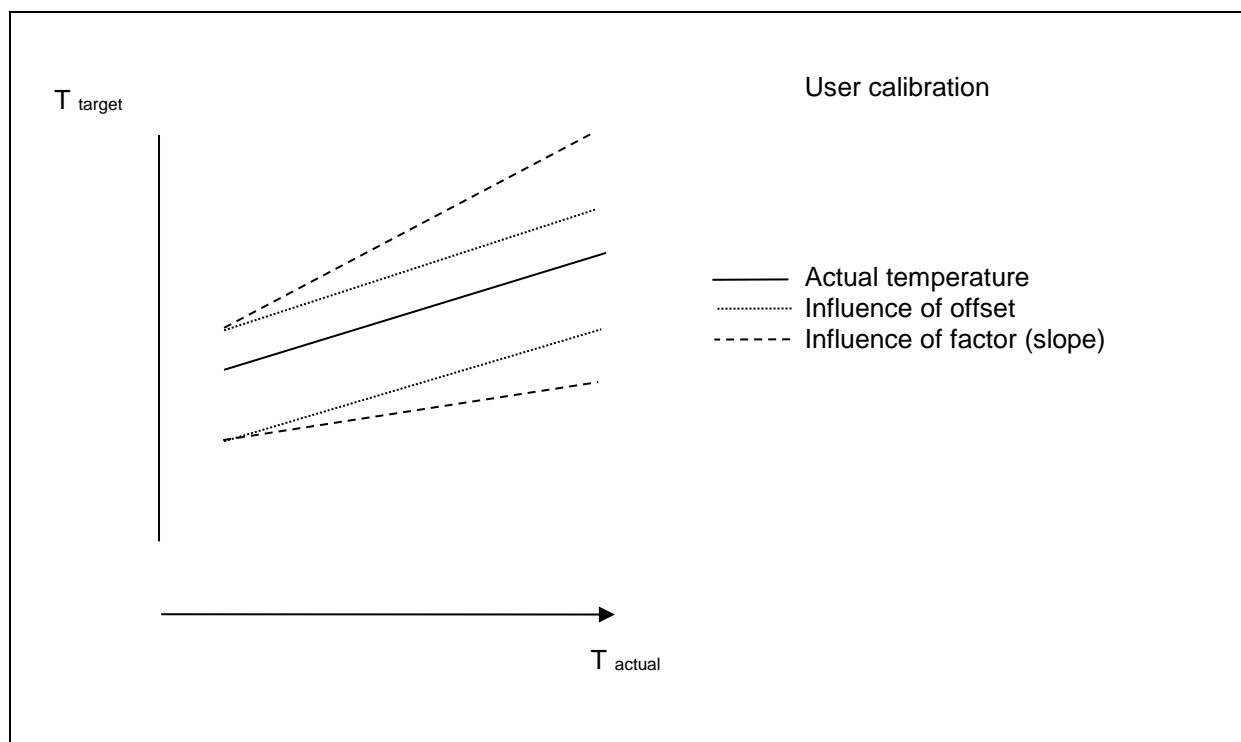
perature range, make sure that upper and lower temperatures you enter are compatible with the pyrometer's actual working range.

Use keys "B", "C" and "D" for direct access to enable adjustments to the Quotient (two-colour) channel.



To recalibrate your CellaCast PT, you will require a calibration furnace and a reference standard.

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



Change parameter setting for the single-wavelength mode at Channels L1 and L2 in the same manner as described for the quotient (dual-wavelength) mode.

16 Maintenance

16.1 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.

17 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

18 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 $T_a = 23\text{ °C}$)

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

19 Technical data PT 180

Measuring range:

750 ... 2400 °C

Sensors:

photo diode

Spectral sensitivity:

0.95/ 1.05 μm

Response time t_{98} :

≤ 10 ms ($T > 950\text{ °C}$)

Measuring uncertainty:

1 % of range
(at $\epsilon = 1.0$ and $T_A = 23\text{ °C}$)

Repeatability:

2 K

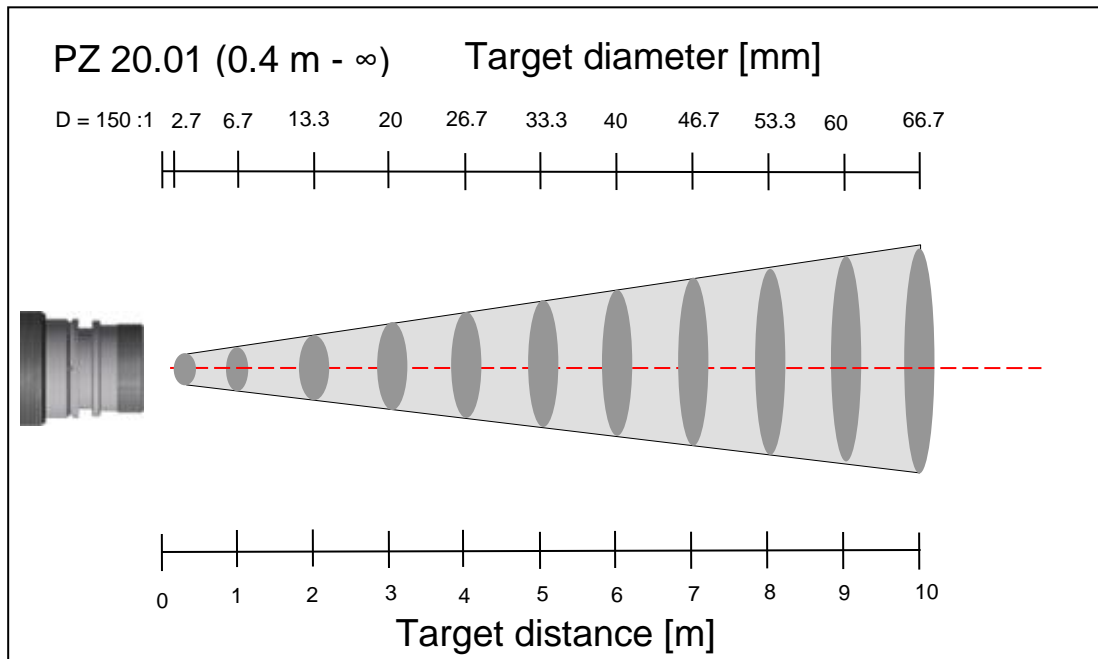
Temperature coefficient with reference to 23 °C:

≤ 0.05 %/K
of measured value

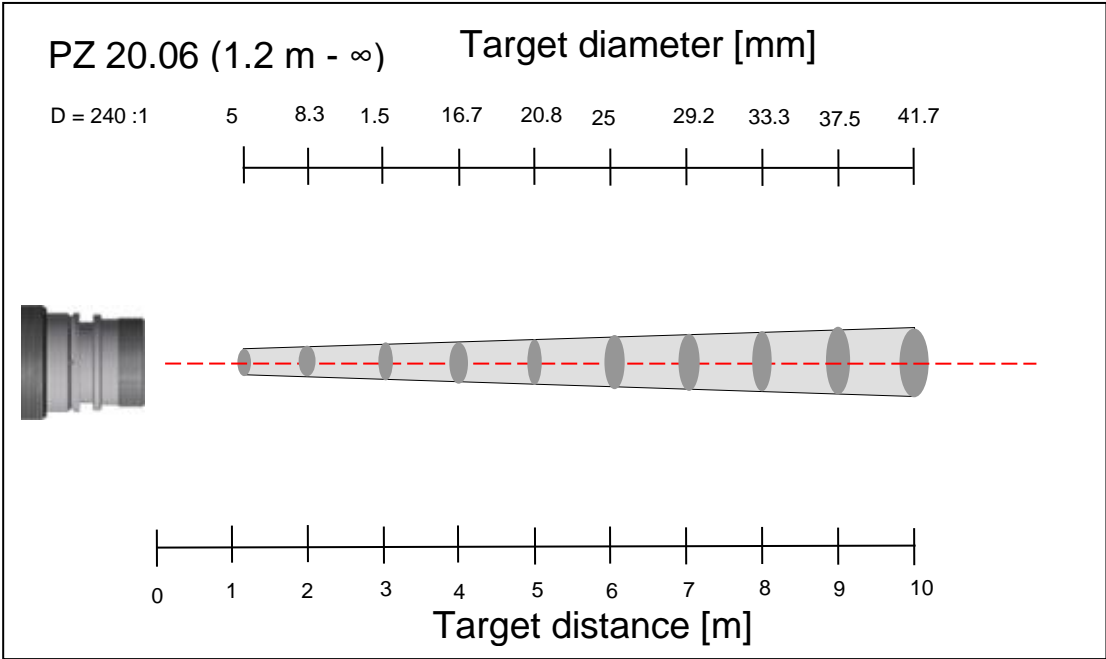
19.1 Field of View Diagrams PT 180

Model	Optics	Focus range	Distance ratio	FOV
PT 180 AF 4	PZ 20.01	0.4 m ... ∞	D = 150:1	7.1°
PT 180 AF 6	PZ 20.06	1.2 m ... ∞	D = 240:1	4.5°

19.1.1 CellaCast PT 180 AF 4



19.1.2 CellaCast PT 180 AF 6



20 Technical data PT 183

Temperature range:
650 - 1700 °C

Sensor:
Double photodiode

Spectral sensitivity:
0.95/ 1.05 µm

Response time t₉₈:
≤ 10 ms (T > 750 °C)

Measurement uncertainty:
1.5 % (at ε = 1,0 and T_a = 23 °C)

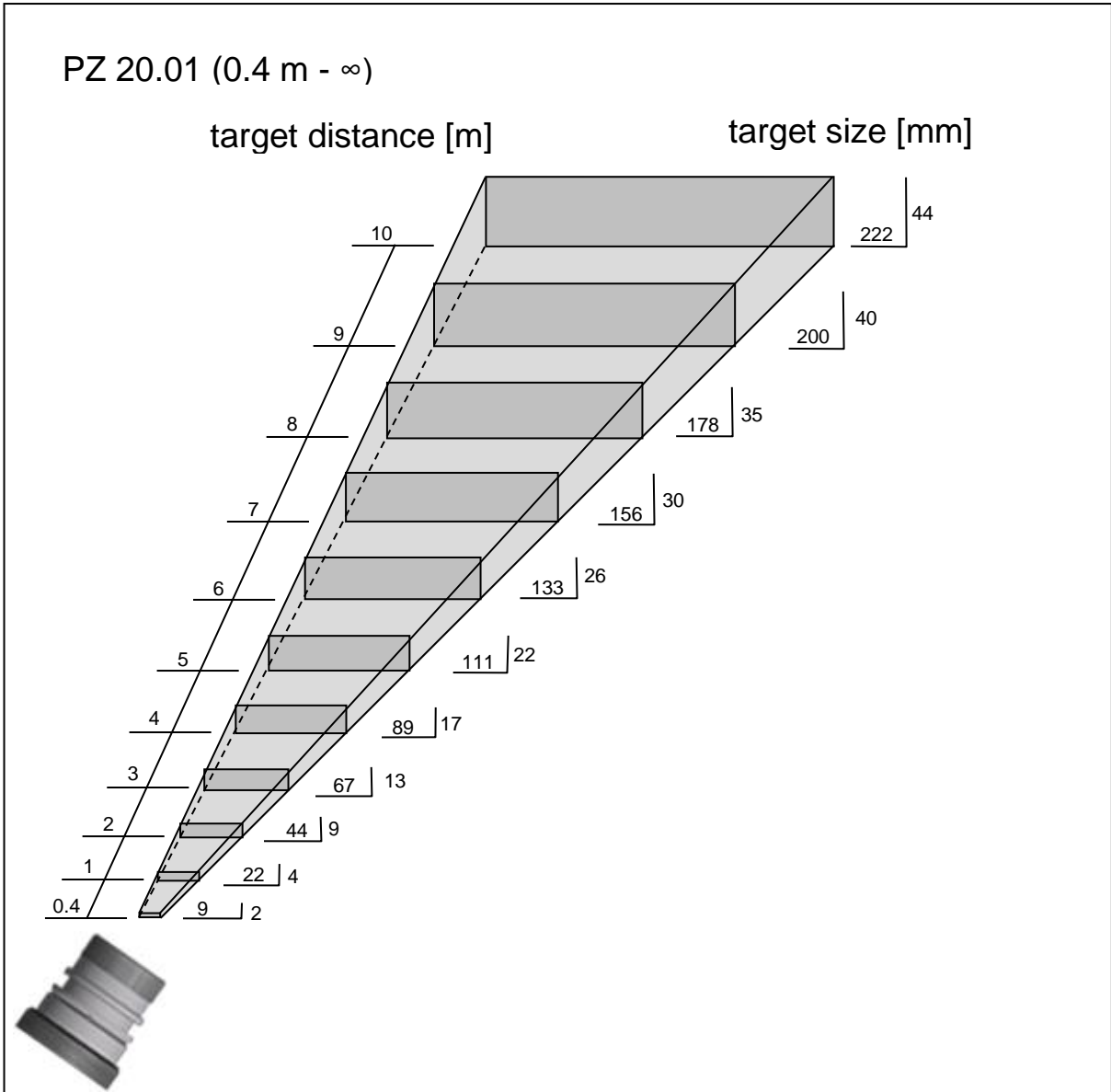
Repeatability:
3 K

Temperature coefficient:
≤ 0.05 %/K
of temp. reading per K
(deviation to T_a = 23 °C)

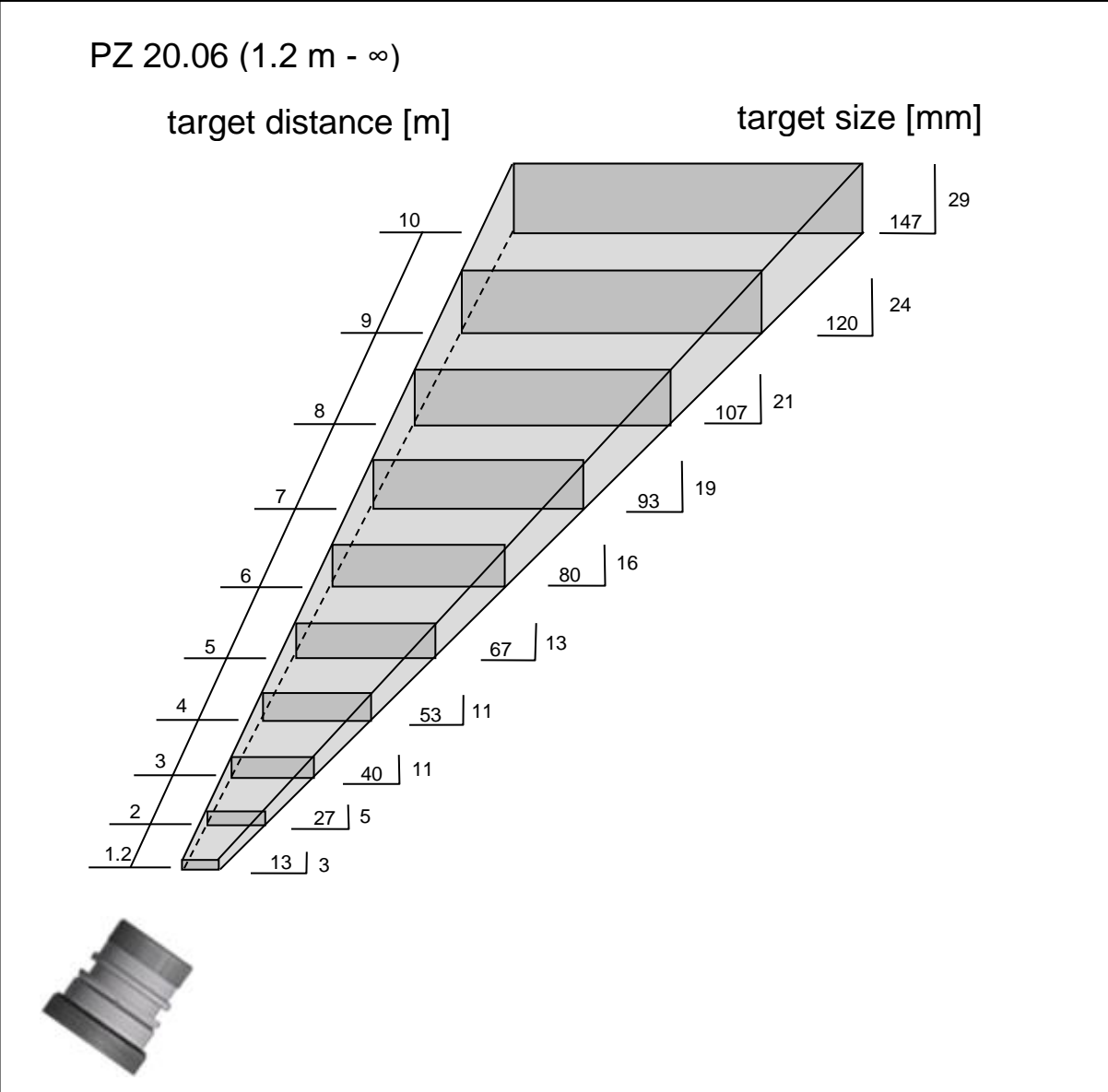
20.1 Field of View Diagrams PA 183

Model	Optics	Focus range	Distance ratio	FOV
PT 183 AF 1	PZ 20.01	0.4 m ... ∞	D _V = 230:1 D _H = 45:1	7.1°
PT 183 AF 3	PZ 20.06	1.2 m ... ∞	D _V = 375:1 D _H = 75:1	4.5°
PT 183 AF 13	PZ 20.08	0.3 m ... ∞	D _V = 150:1 D _H = 30:1	10.8°

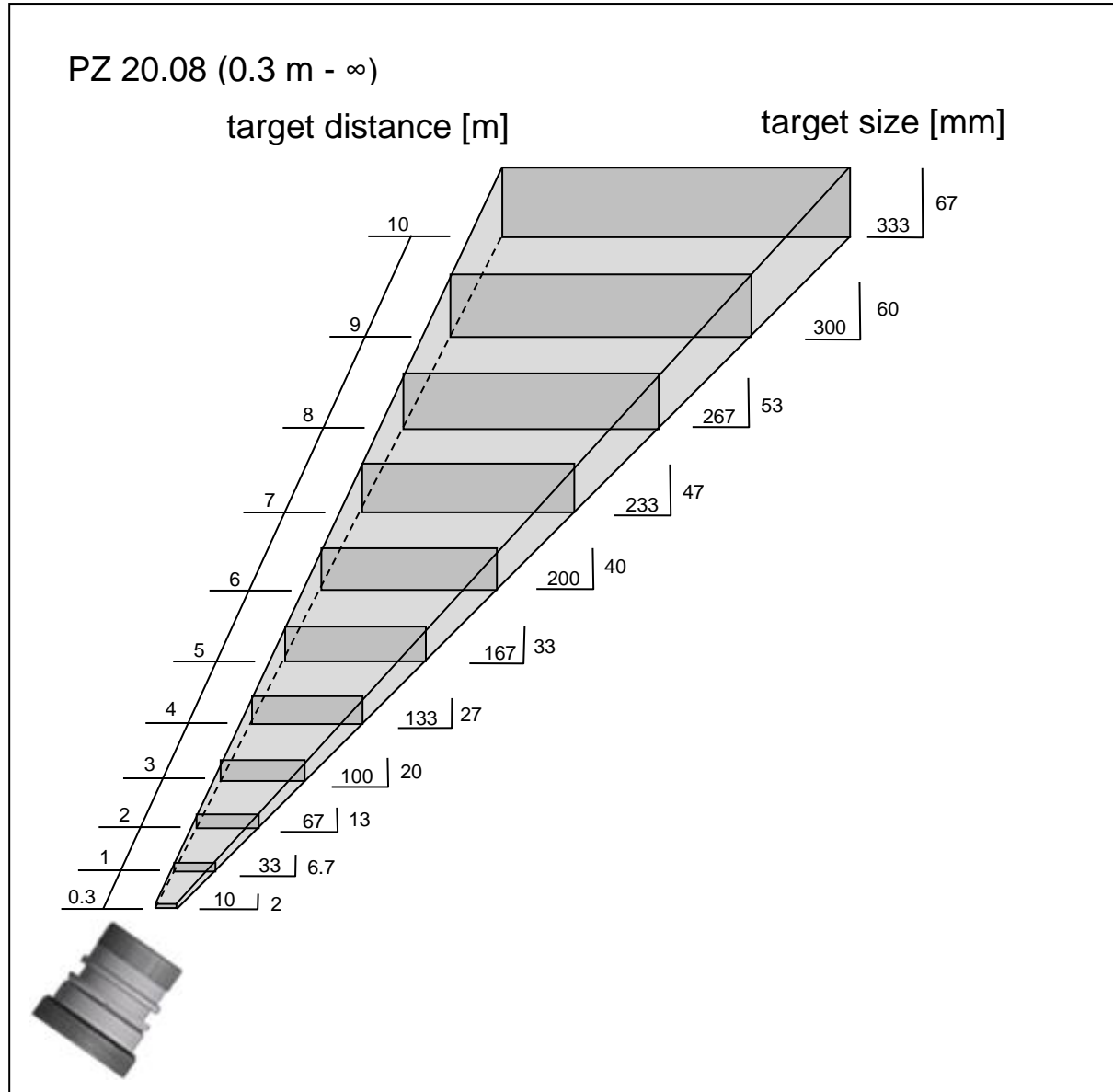
20.2.1 CellaCast PT 183 AF 1



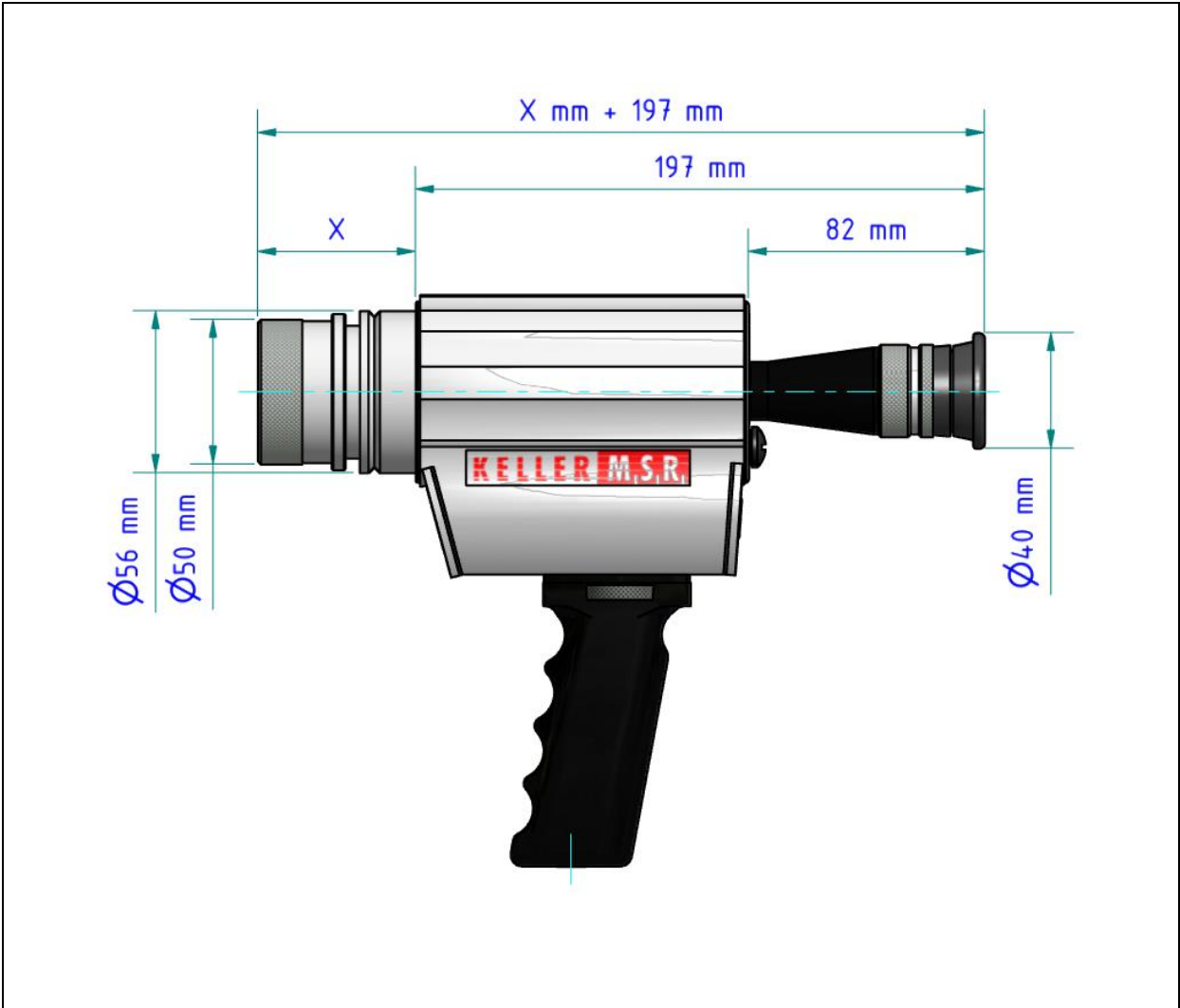
20.2.2 CellaCast PT 183 AF 3



20.2.3 CellaCast PT 183 AF 13



21 Dimensions



21.1 Shipping, Packaging and Disposal

21.1.1 Inspecting your shipment

Unpack and inspect the entire shipment immediately upon receipt to make sure it is complete and undamaged.

Do not accept the package if it shows visible signs of damage. 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.

21.2 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 it is disposed of in an ecologically sound manner.

21.3 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



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23 Default Settings PT 180

23.1 Temperature measurement using two-colour/ratio mode (Configuration layer: `c 00 i`)

Parameter	Function	Default	Customized configuration
<code>E t b . 9</code>	Define no. of mat. constants in array	Off	
<code>E P 5 . 9</code>	Set emissivity ratio	101 %	
<code>E . i d H</code>	Select constant		
<code>E . 0 i</code>	Assign value to constant		
<code>c h r . 9</code>	Plausibility check ratio mode	<code>n i n</code>	
<code>c h r . _</code>	Relatives limit min.	5 %	
<code>c h r . ^</code>	Relatives limit max.	--	
<code>c h A t</code>	Absolute min. temp.	Lower limit of measuring range	
<code>c h A %</code>	Absolute minimum Emissivity	50 %	
<code>L i n . 9</code>	Temperature offset using linear interpolation (user configurable table)	Off	
<code>L . H i</code>	Node x 1..10	--	
<code>L . Y i</code>	Node y 1..10	--	
<code>F i L 9</code>	Smoothing filter	On	
<code>F i L t</code>	Smoothing time	500 m sec	
<code>n e n . 9</code>	Min/Max memory	<code>A t d</code> Function	
<code>n e n t</code>	Hold time for Min/Max	--	
<code>F i L n</code>	Smoothing filter for min/max	--	
<code>F i L t</code>	Smoothing time	--	
<code>t d E L</code>	Time delay	1 s	
<code>t A c t</code>	Sampling time	15 sec	
<code>t d . 5</code>	Cut-off interval	0 s	
<code>t o U t</code>	Timeout	1 min	
<code>L . 1</code>	Limit 1	1100 °C	
<code>L . 2</code>	Limit 2	1200 °C	
<code>F - P r</code>	Average weighting	75 %	
<code>t S P _</code>	Plausibility Threshold	50 K	

ESP	Plausibility Threshold	150 K	
Rno	Display mode during sampling time	thld	
chL2	Auto reset	On	
Rst	Set Li2 check on tAct	Off	
End	End		

23.2 General Functions (configuration layer: c 0 1)

Parameter	Function	Default	Customized configuration
ROFF	Automatic Switch off	2 min	
End	End		

24 Default Settings PT 183

24.1 Temperature measurement using two-colour/ratio mode (Configuration layer: c 00 1)

Parameter	Function	Default	Customized configuration
Et6.9	Define no. of mat. constants in array	Off	
EPS.9	Set emissivity ratio	101 %	
E. idH	Select constant		
E. 0 1	Assign value to constant		
chr.9	Plausibility check ratio mode	on	
chr._	Relatives limit min.	5 %	
chr.~	Relatives limit max.	--	
chr.t	Absolute min. temp.	Lower limit of measuring range	
chr.!	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. L.9	Smoothing filter	On	

FILT	Smoothing time	500 ms	
MEM9	Min/Max memory	Red Function	
MEMt	Hold time for Min/Max	--	
FILT0	Smoothing filter for min/max	--	
FILT	Smoothing time	--	
tdEL	Time delay	1 s	
tAct	Sampling time	3 s	
tdIS	Cut-off interval	0 s	
tOUT	Timeout	1 min	
Li1	Limit 1	1100 °C	
Li2	Limit 2	1200 °C	
F-Pr	Average weighting	90 %	
tSP-	Plausibility Threshold	50 K	
tSP+	Plausibility Threshold	150 K	
ANO	Display mode during sampling time	t=0	
chL2	Auto reset	Off	
ARSt	Set Li2 check on tAct	Off	
End	End		

24.2 General Functions (configuration layer: c 0 1 1)

Parameter	Function	Default	Customized configuration
ROFF	Automatic Switch off	2 min	
End	End		

