P20 series

Non-contacted infrared thermometer for measurements up to 2000 °C

Manual

Content

Introduction

Thank you for choosing the P20!

Infrared thermometers measure contactless. They determine the temperature on the basis of the emitted infrared radiation from an object. These thermometers enable the user to detect the temperature of inaccessible or moving objects without difficulties.

Please read this manual completely before the initial operation.

Scope of Supply

- Infrared Thermometer P20
- Aiming scope magnification 4:1
- Rechargeable AA batteries
- Recharger cable
- USB cable
- IR Connect Report software
- Manual

Optional:

- Certificate of calibration

Applications

Maintenance of electrical equipment

Hot spot detection on bearings, transmission and motors

Measurement of moving objects in manufacturing processes

Detection of energy losses on heat insulations

Inspection of critical components on vehicles

Important Notes

The P20 contains a laser class 2 for marking the measurement spot.

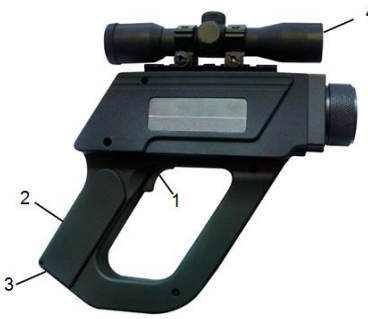
Do not point the laser directly at the eye or indirectly off reflective surfaces as this may cause serious damages!

Please protect the instrument from the following:

- Electromagnetic fields (EMF)
- Static electricity
- Abrupt changes of the ambient temperature

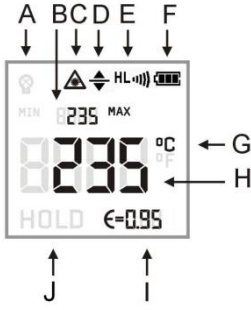
Infrared thermometers measure the surface temperature of objects only. The P20 LT cannot measure through transparent material such as glass or plastic.
Keep the optics clean of dirt (cleaning with a humid tissue or a mild commercial cleaner).

Functional Elements



1 Trigger
2 Battery lid
3 USB interface
4 Aiming scope
5 Up button
6 Mode button
7 Down button

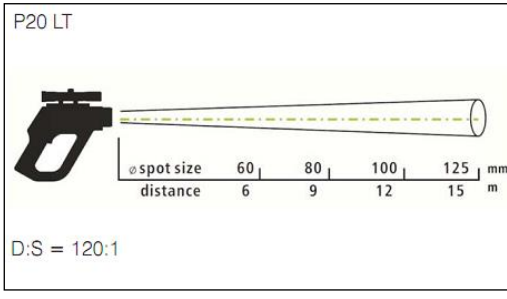
Display

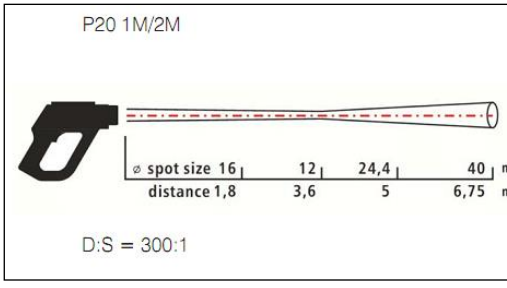


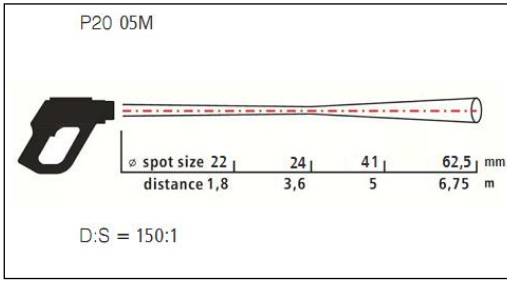
A Display backlight
B MAX or MIN value
C Laser symbol
D Temperature offset
E HIGH and LOW alarm indication
F Battery icon
G Temperature scale
H Current temperature value
I Emissivity
J HOLD function

Optics

Due to the precision optics the measuring beam of the instrument has a diameter shown in the following diagram.
The object must be at least as large as the spot size.
The diagram shows the distance (D) to spot (S) ratio.







Insertion of Batteries

Remove the battery lid at the handle of the unit. Remove the battery holder and insert the batteries. Observe the correct polarity.

Charging of the Batteries

In order to charge the batteries please connect the charger cable to the USB interface.

Scope adjustment

In order to adjust the scope remove the protection caps. Using a screw driver you can adjust the middle of the cross hair. Adjust the cross hair to the middle of the laser dots.

Basic Operation

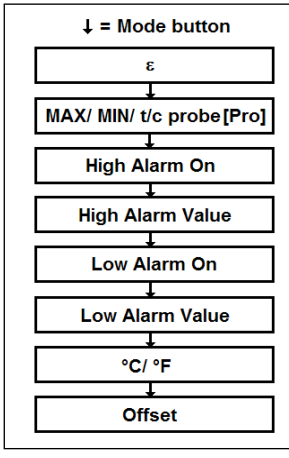
TEMPERATURE MEASUREMENT
Please aim with the unit at the target and press the **TRIGGER**.
HOLD function: After release of the **TRIGGER** all display values will be shown for 7 seconds.
Shut down: If you do not press any button during the HOLD mode the unit shuts down automatically after 7 seconds.

DISPLAY BACKLIGHT
Please press the **DOWN** button while the **TRIGGER** is pressed to switch the display backlight on or off.

LASER
Please press the **UP** button while the **TRIGGER** is pressed to activate/ deactivate. The current status will be shown in the display.

Unit Settings

With the **MODE** button you can select the different setting functions. The unit must be in the HOLD mode. The respective function will be flashing in the display. With the **UP** and **DOWN** buttons you can change parameters or activate/ deactivate functions.
To save the settings you have to press the **MODE** button again (will also switch to the next function) or the **TRIGGER**.
If you have not activated any button for 7 seconds, the instrument will not save the current modification and shut down.



EMISSIVITY
The intensity of infrared radiation, which is emitted by each body, depends on the temperature as well as on the radiation features of the surface of the measuring object.
The emissivity (ε = Epsilon) is used as a stable factor of the material, with which to describe the ability of the body to emit infrared energy. If the emissivity chosen is too high, the infrared thermometer may display a temperature value which is much lower than the real temperature.

The unit will be delivered with a preset fixed emissivity of 0.95. This emissivity value is very common for most organic materials and painted or oxidized surfaces.

Shiny or metallic surfaces may result in inaccurate reading due to reflexions. To prevent this, cover the measuring surface with either flat black paint or with plastic labels.

Setting the emissivity: Press the **MODE** button (during HOLD mode) – with **UP** and **DOWN** you can adjust the value. The shown temperature value corresponds to the emissivity adjustment. This allows a correction of ε even after the measurement has been done.

MAX/ MIN

With this function you can select if the maximum or minimum value will be shown permanently in the upper part of the display.
To switch between both please press the **MODE** button, either during the HOLD mode or during a measurement (while the **TRIGGER** is pressed). The made setting will be saved, also after the unit switched off.

If you press the **MODE** button after you made a measurement (during the HOLD mode) the determined maximum and minimum value taken during that measurement will be displayed.

ALARM FUNCTIONS

To activate/ deactivate please press the **UP** or **DOWN** button if the **H** or **L** is shown in the display. The alarm function is activated as soon as the display shows the sign .

After pressing **MODE** again the alarm values can be adjusted using the **UP** and **DOWN** button.
If the temperature exceeds the selected **High value** an acoustic signal will appear and the display color will change to **RED**.

If the temperature falls below the selected **Low value** an acoustic signal will appear and the display color will change to **BLUE**.

°C/ °F SETTING

To setup the temperature unit to °F please press the **DOWN** button (keep pressed) and then the **TRIGGER**.

To setup the temperature unit to °C please press the **UP** button (keep pressed) and then the **TRIGGER**.

OFFSET

With this function you can set a linear offset (+/-) to the temperature reading. It allows a field calibration of several units showing exactly the same values.

Reset Function

The unit can be reset to the factory default values by pressing the **MODE** and **UP** button simultaneously (during HOLD mode). The Data logger will not be deleted by this procedure.

Data Logger

The P20 has an internal data logger for up to 2000 values.

STORING DATA

Please make your measurement and release the **TRIGGER** – the unit is in the HOLD mode. Pressing the **DOWN** button will show the next free data logger position (flashing) and a disc icon in the display. With **UP** and **DOWN** you can change the data logger position manually. Pressing **MODE** will store the data into the logger (confirmed by a twofold acoustic signal).

RECALL OF DATA

Please press the **TRIGGER** and **MODE** simultaneously. The next free data logger position and a disc icon (flashing) will be shown in the display. With **UP** and **DOWN** you can select any data logger position. To switch between IR temperature value and t/c probe value please press the **MODE** button.

RESET OF THE DATA LOGGER

Please press the **DOWN** button during the HOLD mode. Select logger position **0** and press **MODE** again. A threefold acoustic signal confirms the successful reset.

IR Connect Report software

Minimum system requirements

- Windows XP
- USB interface
- Hard disc with at least 30 MByte free space
- At least 128 MByte RAM
- CD-ROM drive

MAIN FUNCTIONS OF THE SOFTWARE

- Setup of unit parameters
- Display and record of temperature trends
- Easy creating of image based temperature reports
- Download of logger data

INSTALLATION

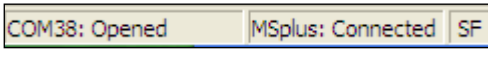
If the auto run option on your computer is activated the installation wizard will start automatically. Otherwise please start **setup.exe** on the CD-ROM. Follow the instructions of the wizard until the installation is finished.

CONNECTION TO THE PC

Please connect the unit via the special USB adapter cable. The installation of the driver software from the CD-ROM will start automatically.
NOTE: The driver installation process will start two times (USB adapter and COM port).

STARTING THE SOFTWARE

After you have started the software and connected the unit the successful communication will be shown in the status line (below the time axis).

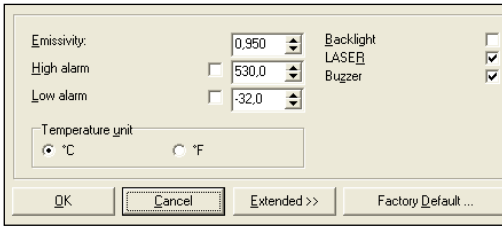


If you cannot establish a communication in spite of correct connection between unit and computer please choose the correct COM port under **[Menu: Setup\Interface]**.

If the USB adapter cable is connected this port is marked as **[Infrared Thermometer Adapter].**

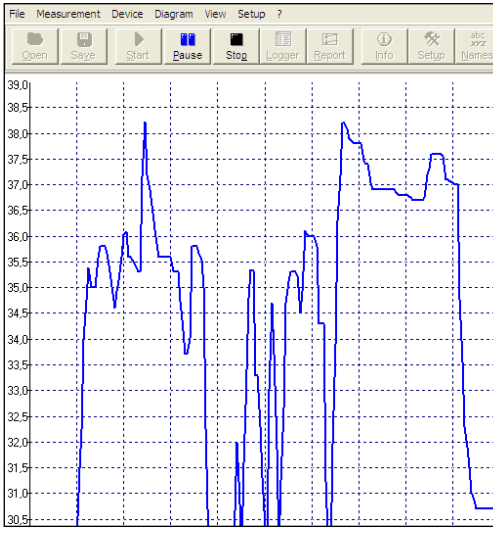
DEVICE SETUP

The menu item **[Menu: Device\Setup]** opens a dialog window for setup of the following parameters: Emissivity, Alarm, Temperature unit, Display backlight, Laser, Buzzer.



STARTING A MEASUREMENT

You can start a measurement by pressing the **START** button in the tool bar **[Menu: Measurement\Start]**.



STOP MEASUREMENT/ SAVE

The **STOP** button will finish the current measurement **[Menu: Measurement\Stop]**.

The **SAVE** button **[Menu: File\Save as]** opens an explorer window for selection of file name and location.
The menu item options **[Menu: Setup\Options]** enables settings for data protection.

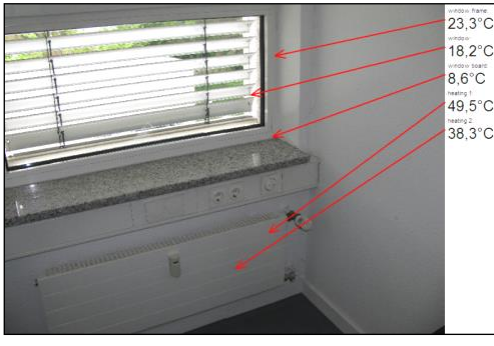
IMAGE BASED REPORTS

This feature allows an easy creating of reports showing temperature points inside a digital picture.
At first you have to make a picture of the desired object/ scenery using a digital photo camera (not included in scope of supply).

To create a report you have to do the following steps:

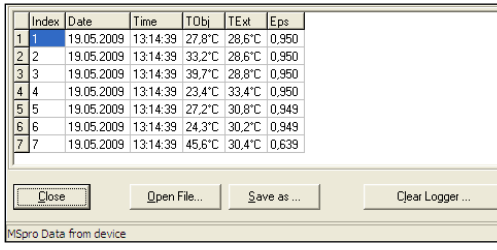
- Save the picture on your PC
- Open the picture inside the IR Connect Software using the Report function **[Menu: File\Report]**.
- Connect the P20 unit to the PC
- Point to the desired object
- Align the cursor on the picture to the same location the laser of the MS is showing
- Press the left mouse button

An arrow will now show the location inside the picture and the measured value.



DATA LOGGER FUNCTIONS

To download the logger data from the unit please press the **LOGGER** button **[Menu: Measurement\Download logger data]**. All data from the logger will be displayed in an extra window as a table. Date and time correspond to the time of the download.



	Index	Date	Time	TObj	TExt	Eps
1	1	19.05.2009	13:14:39	27,8°C	28,6°C	0,950
2	2	19.05.2009	13:14:39	33,2°C	28,6°C	0,950
3	3	19.05.2009	13:14:39	39,7°C	28,8°C	0,950
4	4	19.05.2009	13:14:39	23,4°C	33,4°C	0,950
5	5	19.05.2009	13:14:39	27,2°C	30,8°C	0,949
6	6	19.05.2009	13:14:39	24,3°C	30,2°C	0,949
7	7	19.05.2009	13:14:39	45,6°C	30,4°C	0,639

Close | Open File... | Save as ... | Clear Logger ...

MSpro Data from device

You will find a detailed software description after start of the program under [Menu: ?\Help].

Technical Data [P20 LT]

Temperature range	0…1300°C
Accuracy (at T_{amb} = 23 ±5°C)	± 1% or ± 2°C
Repeatability	± 0,5% or ± 1°C
Optical resolution	120:1
Response time (95%)	300 ms
Ambient temperature	0...50°C
Storage temperature	-20...60°C (without batteries)
Spectral range	8...14µm
Emissivity/ Gain	0,100...1,000 adjustable
Functions	MIN, MAX, HOLD, °C/°F, Offset
Alarm functions	Visual and acoustic HIGH- and LOW-alarm
Laser	< 1mW dual laser class IIa
PC interface	USB
Software	OptrisConnect Report software
Data logger	for 2000 values
Weight/ Dimensions	1000g, 264x204x60 mm
Battery	4x AA NiMH rechargeable batteries
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C

Technical Data [P20 2M]

Temperature range	385…1600°C
Accuracy (at T_{amb} = 23 ±5°C)	± (0,3% of reading +2°C)
Repeatability	± (0,1% of reading +1°C)
Optical resolution	300:1
Response time (95%)	100 ms
Ambient temperature	0...50°C
Storage temperature	-20...60°C (without batteries)
Spectral range	1,6 µm
Emissivity/ Gain	0,100...1,000 adjustable
Functions	MIN, MAX, HOLD, °C/°F, Offset
Alarm functions	Visual and acoustic HIGH- and LOW-alarm
Laser	< 1mW dual laser class IIa
PC interface	USB
Software	OptrisConnect Report software
Data logger	for 2000 values
Weight/ Dimensions	1000g, 264x204x60 mm
Battery	4x AA NiMH rechargeable batteries
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C

Technical Data [P20 1M]

Temperature range	650…1800°C
Accuracy (at T_{amb} = 23 ±5°C)	± (0,3% of reading +2°C)
Repeatability	± (0,1% of reading +1°C)
Optical resolution	300:1
Response time (95%)	100 ms
Ambient temperature	0...50°C
Storage temperature	-20...60°C (without batteries)
Spectral range	1 µm
Emissivity/ Gain	0,100...1,000 adjustable
Functions	MIN, MAX, HOLD, °C/°F, Offset
Alarm functions	Visual and acoustic HIGH- and LOW-alarm
Laser	< 1mW dual laser class IIa
PC interface	USB
Software	OptrisConnect Report software
Data logger	for 2000 values
Weight/ Dimensions	1000g, 264x204x60 mm
Battery	4x AA NiMH rechargeable batteries
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C

Technical Data [P20 05M]

Temperature range	1000…2000°C
Accuracy (at T_{amb} = 23 ±5°C)	± (0,3% of reading +2°C)
Repeatability	± (0,1% of reading +1°C)
Optical resolution	150:1
Response time (95%)	100 ms
Ambient temperature	0...50°C
Storage temperature	-20...60°C (without batteries)
Spectral range	525 nm
Emissivity/ Gain	0,100...1,000 adjustable
Functions	MIN, MAX, HOLD, °C/°F, Offset
Alarm functions	Visual and acoustic HIGH- and LOW-alarm
Laser	< 1mW dual laser class IIa
PC interface	USB
Software	OptrisConnect Report software
Data logger	for 2000 values
Weight/ Dimensions	1000g, 264x204x60 mm
Battery	4x AA NiMH rechargeable batteries
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C

Emissivity Table Metals

Material		typical Emissivity
Aluminium	non oxidized	0,02-0,1
	polished	0,02-0,1
	roughened	0,1-0,3
	oxidized	0,2-0,4
Brass	polished	0,01-0,05
	roughened	0,3
	oxidized	0,5
Copper	polished	0,03
	roughened	0,05-0,1
	oxidized	0,4-0,8
Chrome		0,02-0,2
Gold		0,01-0,1
Haynes	alloy	0,3-0,8
Inconel	electro polished	0,15
	sandblast	0,3-0,6
	oxidized	0,7-0,95
Iron	non oxidized	0,05-0,2
	rusted	0,5-0,7
	oxidized	0,5-0,9
	forged, blunt	0,9
Iron, casted	non oxidized	0,2
	oxidized	0,6-0,95
Lead	polished	0,05-0,1

Material		typical Emissivity
Lead	roughened	0,4
	oxidized	0,2-0,6
Magnesium		0,02-0,1
Mercury		0,05-0,15
Molybdenum	non oxidized	0,1
	oxidized	0,2-0,6
Monel (Ni-Cu)		0,1-0,14
Nickel	electrolytic	0,05-0,15
	oxidized	0,2-0,5
Platinum	black	0,9
Silver		0,02
Steel	polished plate	0,1
	rustless	0,1-0,8
	heavy plate	0,4-0,6
	cold-rolled	0,7-0,9
	oxidized	0,7-0,9
Tin	non oxidized	0,05
Titanium	polished	0,05-0,2
	oxidized	0,5-0,6
Wolfram	polished	0,03-0,1
Zinc	polished	0,02
	oxidized	0,1

Emissivity Table Non-Metals

Material		typical Emissivity
Asbestos		0,95
Asphalt		0,95
Basalt		0,7
Carbon	non oxidized	0,8-0,9
	graphite	0,7-0,8
Carborundum		0,9
Ceramic		0,95
Concrete		0,95
Glass		0,85
Grit		0,95
Gypsum		0,8-0,95
Ice		0,98
Limestone		0,98
Paint	non alkaline	0,9-0,95
Paper	any color	0,95
Plastic >50 μm	non transparent	0,95
Rubber		0,95
Sand		0,9
Snow		0,9
Soil		0,9-0,98
Textiles		0,95
Water		0,93
Wood	natural	0,9-0,95

Troubleshooting

Error/ Code	Problem	Action
HHH	object temperature above range limit	choose object within measuring range
LLL	object temperature below range limit	choose object within measuring range
battery indicator	low battery	replace battery
no display	low battery	replace battery
laser does not work	low battery	replace battery
	laser deactivated	activate laser

Warranty

Each single product passes through a quality process. Nevertheless, if failures occur please contact the customer service at once. The warranty period covers 24 months starting on the delivery date. After the warranty is expired the manufacturer guarantees additional 6 months warranty for all repaired or substituted product components. Warranty does not apply to electrical circuit breakers, primary batteries and damages, which result from misuse or neglect. The warranty also expires if you open the product. The manufacturer offers a 3 months warranty for rechargeable batteries. The manufacturer is not liable for consequential damage or in case of a non-intended use of the product. If a failure occurs during the warranty period the product will be replaced, calibrated or repaired without further charges. The freight costs will be paid by the sender. The manufacturer reserves the right to exchange components of the product instead of repairing it. If the failure results from misuse or neglect the user has to pay for the repair. In that case you may ask for a cost estimate beforehand.

The product complies with the following standards:

EMC:	EN 61326-1:2013 (Basic requirements) EN 61326-2-3:2013
Device safety:	EN 61010-1:2010
Laser safety:	EN 60825-1:2015

The product accomplishes the requirements of the EMC Directive 2014/30/EU and of the Low-Voltage Directive 2014/35/EU.

CE

Disposal of old electrical and electronic equipment

This symbol on the unit indicates that this product shall not be treated as household waste. Instead it should be handed over to the applicable collection point for the recycling of electrical and electronic equipment. For more information please contact your distributor

P20-MA-DE2018-01-A