Thermosight GL

USER MANUAL

Thermosight Series

-32 °C to 1800 °C

THE ERGONOMICAL PORTABLE

NON-CONTACT TEMPERATURE MEASUREMENT - WORLDWIDE

Contents

1. General

Welcome to the manual for the hand held infrared pyrometer. You can measure surface temperatures between 150°C (302°F) and 1800°C (3272°F) without contact using this digital, battery powered pyrometer.
A laser pilot light marks the center of the measuring spot.

Caution!

Do not look into the laser beam!
It may damage your eyes.

AVOID EXPOSURE ✳ | **CAUTION**
VISIBLE LASER
RADIATION IS | LASER RADIATION
EMITTED FROM | DO NOT STARE
THIS APERTURE | INTO BEAM
PEAK POWER <1mW WAVELENGTH 670 nm
CLASS II LASER PRODUCT
COMPLIES WITH 21 CFR 1040.1 & 1040.11
PULSE DURATION = 270 ms

The instrument has an illuminated LCD display, a serial RS-232-interface and a socket for a 9 V battery charger.

This portable infrared thermometer is specialy made for the glass industry. With a fixed spectral range at 5,14 µm the instrument is perfectly suitable to measure to measure the temperature on glass surfaces.
On pure metal or other strong reflecting surfaces accurate measurements are not possible.

Caution!

Prevent any contact between the lens and acidic substances
to avoid the generation of toxic gases!

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2. Technical Data

Temperature range:	150...1800°C/ 302...3272°F
Spectral range:	5.14 µm
IR Detector:	Thermopile
Measurement uncertainty:	1 % of the reading or 1 K at 23°C ±10 K ambient temperature (the larger value applies);
Repeatability:	0.5 % of the reading or 1 K, (the larger value applies)
Temperature coefficient*:	0.03 % of the reading in °C per Kelvin difference of the ambient temperature from 23°C
Response time t_{90}:	150 ms
Emissivity:	Adjustable between 20 and 100 % in 1% steps (Glass, Quartz: 0.97)
Spot diameter:	M=13 mm at a=650 mm (Distance to spot-ratio, D:S 50:1) M=2.3 mm at a=96 mm (with close-up lens)
Laser sighting:	The laser beam marks the center of the measuring spot. The laser is automatically turned off at ambient temperatures > 50°C. class II laser, output < 1 mW
Temperature display:	3 values/s large display: 4 Digit - 9 mm height small display: 4 Digit - 4.5 mm height
Display resolution:	0.1°C between 150...999.9°C 0.1°F between 302...999.9°F 1.0°C between 1000...1800°C 1.0°F between 1000°F...3272°F
Temperature overflow high temperature limit:	At temperatures higher than 1800°C/ 3272°F the display shows 8888
Temperature underflow low temperature limit:	At temperatures lower than 150°C/ 302°F the display shows 7777
Display backlight:	automatically at dark ambient
Temperature units:	°C / °F, switchable
Functions:	Normal, MAX, MIN, AVG, DIF
Acoustic alarm function:	HI-Alarm (Temperature adjustable)
Serial interface:	RS-232-interface with 9600 Baud, USB socket type B
Power supply:	9 V battery (IEC 6LR61), 9 V rechargeable battery-NiMH

Battery life:	50 hours (without laser) with 9 V - battery; 12 hours (without laser) with 9 V rechargeable battery
Socket for charging unit:	for connection of the charging unit
Operating temperature:	0...55°C / 32°F…131°F
Storage temperature:	-20...70°C / -4°F…158°F
Housing:	ABS, UL-Class V0
Weight:	340 g
Tripod thread:	UNC ¼"
Safety class:	IP20
CE-label:	according to EN 50082-2, basic standard for industrial use

*The instrument adapts to larger changes in the ambient temperature within 20 minutes and resumes standard precision.

# 3. How to operate the instrument

3.1 Display and Keyboard
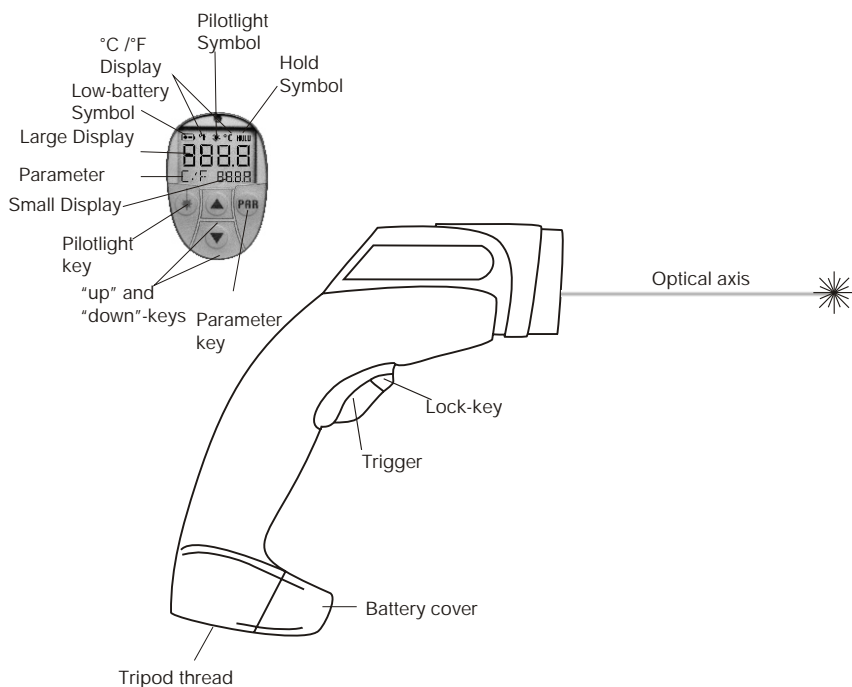
Pull the trigger to switch on the instrument. This is a two stage trigger. To lock the trigger for continuous readings, pull the trigger fully back and push up the lock-key.
All functions can be managed using the keys on the keyboard. The laser can be turned on or off with the key marked by a laser symbol. The key marked "PAR" is the Parameter key for choosing the parameter to be used or adjusted (i.e. MAX or MIN or EMI Parameter for emissivity). The chosen function always appears in the small display. Use the "up" or "down" keys for adjusting or selecting a parameters value.

3.2. Setting up the instrument

The instrument is powered by a 9 V Alcaline-Manganese battery (IEC 6LR61) or a 9 V rechargeable battery with the same dimensions, fitted into the handle. To replace the battery, first remove the screw in the batterycover and then pull out the battery cap. Fit the battery clip to the terminals on the battery, ensuring the polarities are correctly matched. Replace the battery cap and the screw. The pyrometer is now ready to use.
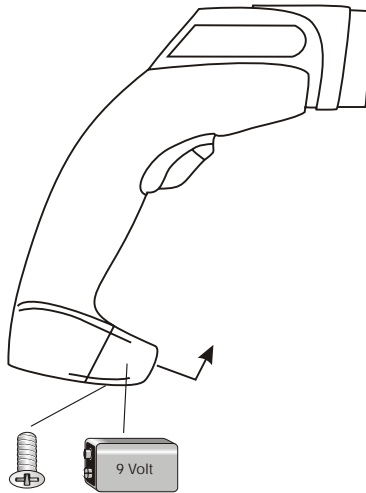

To prevent data losses, the battery change should only be done if the instrument is not working.
When using a rechargeable battery, it can be recharged via the socket for the battery charger, being available as accessory.
The typical changing current is 10 mA.

Caution!

Do not use the battery chargerif a non-rechargeable battery is fitted!

When the battery power is low the symbol will flash on the display. The instrument can still be operated for a short time. If the battery power is too low for the instrument to operate correctly, then it will switch off automatically. For saving battery life it is advisable to use the laser pilot light only temporarily for aiming at the target and then turning it off.

3.3. Measuring

By pulling the trigger to the first position the instrument is turned on and starts to measure. The trigger can be locked in this position with the lock-key.
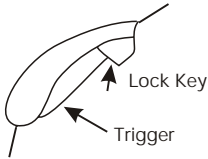

After an internal check (about 0.5 s), the measured temperature appears on the display. At the RS-232-interface the values are also supplied at a time base of 100 ms.
After releasing the trigger the last measured value is displayed, the output via interface stops.
In the upper right corner of the LCD display the "HOLD" symbol appears. The instrument remains for another 10s in standby and then turns off automatically.
After switching on the instrument again, the MAX, MIN, DIF and AVG values are reset.

3.4. Spot size

The size of the spot depends on the distance to the target object.
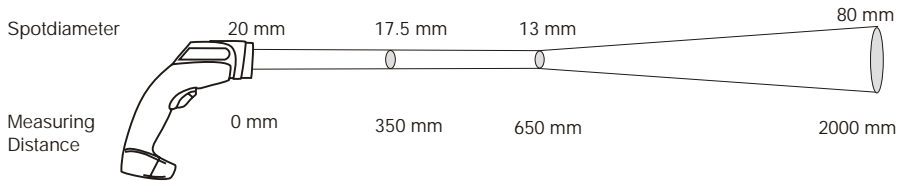
The spot diameter for distances longer than 650 mm can be calculated according to the following formula:
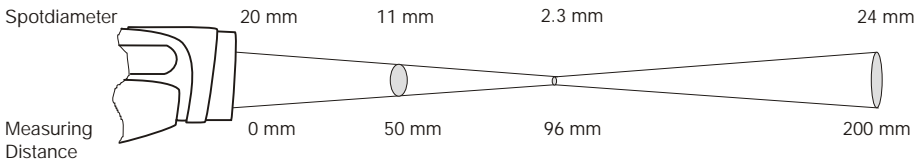
$$M = 0.05 * a - 20 \qquad \text{(all values in mm)}$$

M - Diameter of the spot
a - Distance between targeted object an instrument

The close-up lens (accessory) reduces the spot diameter to 2.3 mm at a distance of 96 mm.
Then the emissivity has to be set according to the following formula:

(with $_{Object}$ = the real objects emissivity)

$$= 0.72 * _{Object}$$

When using the close-up lens the spot diameter for distances larger than 96 mm can be calculated according to the following formula:

$$M = 0.23 * a - 20 \qquad \text{(all values in mm)}$$

M - Diameter of the spot
a - Distance between targeted object and instrument

3.5. Laser sighting

The laser pilot light can be switched on or off by pressing the key marked with the laser symbol. The laser beam marks the center of the target spot. If the laser is turned on the laser symbol in the center of the upper row on the display flashes.

> ## Caution!
>
> Do not look into the laser beam! It may damage your eyes.

3.6. Setting a Parameter

The different parameters can be chosen by repeatedly pressing the "PAR"-key until the requested parameter appears in the parameter display.

EMI (97)
MAX
MIN
AVG
DIV
HI (1800°C)
C/F (°C)

°C
800
EMI   97

PAR

.
98
97
96
95
94
93
92
91
.

(Factory settings)

To change a parameter value just press the „up" or "down" key until the value required is shown in the small display.

The measuring functions (NORMAL, MAX, MIN, AVG, DIF) remain set until the user chooses a different function. Any change will be saved even when the instrument has turned off automatically.

After changing a parameter function (EMI, HI, C/F), the instrument automatically returns to the NORMAL mode after 10 s.

3.6.1. Emissivity

The emissivity is the amount of heat radiation from the measured object – compared with an ideal black object. To measure the temperature of any surface accurately, it is necessary to know its emissivity and to set this value correctly.
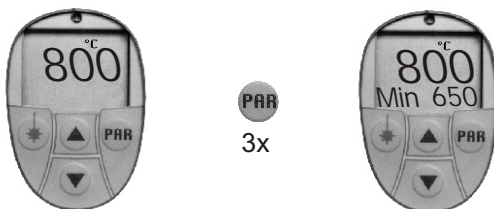

3.6.2. MAXimum and MINimum function

In addition to the actual temperature being shown on the large display, the maximum (MAX) or minimum (MIN) temperature can be shown on the small display.The MAXimum function is especially useful for finding hot spots on larger areas by scanning this area with the pyrometer. Even small hot spots can be registered because the MAX display reacts faster than the NORMAL function (response time 150 ms). This method can also be used for fast moving objects.

MAXimum- value
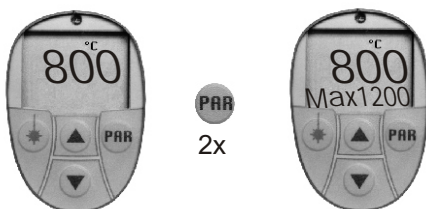
MINimum-value

The actual MAXimum value or MINimum value will be held in the display as the trigger is released. The instrument now is in the HOLD-mode.
By pulling the trigger again, the MAX and MIN values are deleted. The function (MIN, MAX) itself will not be changed unless the Parameter (PAR) key is pressed again.

3.6.3. Average function (AVG)

The Average function is used to increase the accuracy in measuring temperatures, that change slowly in the time scale.
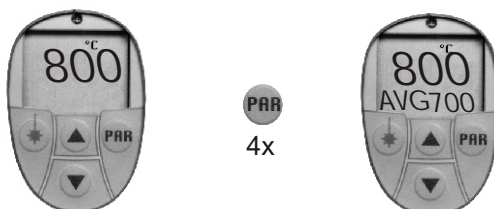
"AVG" appears in the parameter display, the averaged temperature values are shown in the small display. The values are calculated from the readings taken during the previous four seconds.

3.6.4. Difference temperature function

The Difference function (DIF) is used to measure temperature differences between the starting temperature and the current value.
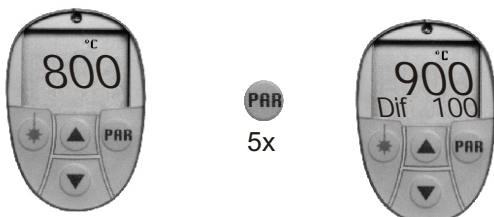
The starting temperature is set new every time the trigger is pulled. The large display now shows the current temperature, and on the small display is shown the difference between the starting temperature value and the current temperature. This function can be changed by pressing the " PAR" key again.

3.6.5. Acoustic alarm

High Alarm limit

The alarm limit temperature can be set in steps of 1°C or 1°F. The high alarm is signaled by a high intermittent tone.
If the temperature exceeds the instrument`s range limits ( 1800°C /3272°F), the tone`s intermission will become shorter.

3.6.7. Data transfer

The infrared thermometer has a serial RS-232-interface. The interface is connected via a four pole USB-Socket Type B, and the appropriate cables.

The pin code of the RS-232-interface cable is:

1 - open	6 - open
2 - RxD	7 - open
3 - TxD	8 - open
4 - open	9 - open
5 - GND	

The data transfer has a baud rate of 9600 Baud. The format is:

8 data bits, even parity, 1 stop bit

The general data transfer has the following format:

AAA$_v$YYYY-MM-DD$_v$hh:mm:ss+LF+CR (25 characters)
$_v$0000.0C$_v$PPP$_v$Exxx$_v$Ix+LF+CR   (22 characters)
LF+CR   (2 characters, empty line)
AAA: address of storage position [1]
YYYY-MM-DD: date (year, month, day) [2]
hh:mm:ss: time, (hour, minute, second, output in 24h-format) [2]
0000.0:   temperature
C: temperature in °C or °F
PPP: transfered parameter (i.e.: MAX = Maximum value)
Exxx: Emissivity in percent
Ix: storage interval [2]

The pyrometer always sends 10 data sets per second.

The settings of MIN, MAX and DIF do not change the data output.

In the AVG mode, the data sent to the RS-232 always represent the average value.

[1] at online-measuring "000"
[2] instruments without data storage always filled out with zero

4. Error messages

In case there should be an internal error, it will be shown on the small display.

Err1: The internal power supply is faulty.e.g. the battery is exhausted or defective, or the battery charger is defective. In each case a replacement is required.

Err2: Error during program e.g. due to strong electromagnetic interference, move the instrument away from the source of the interference and restart it.

Having change the battery it is necessary to reset the instrument. Release the trigger let the instrument turn off, and turn it on again by pulling the trigger.

If it is now working, check the settings and reset the parameters.

If the error message is shown again, please contact your local dealer.

Apart from the error messages, an "out of range" message can also be displayed.

Normal measuring:

Temperature above the
limit of the measuring range

Temperature below the limit
of the measuring range

Maximum value

Maximum value is above the
limit of the measuring range

All measured values picked
so far were below the limit of
the measuring range

Minimum value

All measuring values were
higher than 1800°C/ 3272°F

The lowest measuring value
was lower than 150°C/ 302°F

Difference value

| Measuring value out of temperature range | Reference value out of temperature range or Difference value < -999 K |

5. Maintenance

Beside an occasional cleaning of the lens, no additional maintenance is necessary.
For cleaning of the lens, a non fluffing cotton rag with pure alcohol is best.
Never use any other chemical cleaning detergent or mechanical aids.

Acidic liquids are strongly forbidden. 🚫

If the instrument is not used for a longer time period the battery should be removed to avoid leaking and damaging the instrument.

Service Instruction   for Thermosight portable infrared pyrometers

Maintenance of *Thermosight* infrared pyrometers is not necessary.
All necessary repairs have to be performed by the manufacturer.

It is not allowed to intervene the instrument. 🚫

The laser emission (class 2) is below to 1 mW, even when the housing is opened.

The radiant power of the laser was set to a value between 0.6 and 0.8 mW, measured directly in front of the laser module, without penetrating the prism and the lens in the pyrometer's main optics.

The regulation potentiometers on the laser power supply board, which is attached immediately behind the laser, have been fixed with two-component resin after adjustment and cannot be turned any longer.
(No possibility to change the emission/power of the laser pointer)

6. Accessories

AS - 101	Close-up lens (M=2.3 mm at a = 96 mm)
AS - 102	Software incl. RS 232 cable
AS - 104	Charger for 9 V Accu NiMH
AS - 106	NiMH- Accu 9 V
AS - 107	Tripod
AS - 108	Contact Thermometer with probe
AS - 109	Holster
AS - 111R	Carring Case
AS - 111B	Carring Case