BALTECH
RELIABILITY TECHNOLOGIES

OPERATION MANUAL
infrared thermometer

BALTECH
TL
PYROMETER

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CONTENT

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1 INTRODUCTION

Thank you for purchasing the BALTECH TL infrared thermometer. The device allows you to perform non-contact one-touch temperature measurement. The built-in laser pointer improves targeting, while backlit LCD display and handy buttons make the device more ergonomic. The non-contact infrared thermometers can be used for temperature measurement of surfaces, that can't be measured with traditional (contact) thermometers (e.g. moving or hard-to-get-to objects, surfaces of pressurized objects).

Before you start using the device read this operation manual carefully.

2 DEVICE DESCRIPTION

2.1 Application

The infrared thermometer BALTECH TL is designed for non-contact temperature measurements of industrial and household objects. The device can be used for temperature monitoring of electrical equipment, conditioning and ventilation systems, industrial and residential buildings, in scientific experiments.

2.2 Technical data

No.	Characteristics	Value		
2.2.1	Temperature measurement range, °C (°F)	BALTECH TL-0208C -50+800°C (-58...+1472°F)	BALTECH TL-0212C -50+1000°C (-58...+1832°F)	BALTECH TL-0215C -50+1500°C (-58...+2732°F)
2.2.2	Accuracy	±3°C (±5°F) From -50~-20°C (-58°F~-4°F) ±2°C (±3°F) From -20~-100°C (-4°F~212°F) ±2% From 100~-1500°C (212°F~2732°F)		
2.2.3	Response time, sec	0.5	0.5	0.5
2.2.4	Repeatability, °C (°F)	±1°C (±2°F)		
2.2.5	Resolution, °C (°F)	0.1°C (0.1°F)		
2.2.6	Field of view	50:1	50:1	50:1
2.2.7	Emissivity setting	0.1-1.0	0.1-1.0	0.1-1.0
2.2.8	Power supply, V	9	9	9
2.2.9	Operating temperature range relative humidity, %	0~50°C (32°F~122°F) 10 ~90% RH		
2.2.10	Auto shutdown	Yes ,~6sec		
2.2.11	Laser pointer	Yes, switchable		
2.2.12	Display illumination	Yes	Yes	Yes
2.2.13	Memory	Yes, 10 points		
2.2.14	Max/Min/Avr/ΔT	Yes	Yes	Yes
2.2.15	Alarm when reaching defined temperature	Yes	Yes	Yes
2.2.16	Defined and current temperature display	Yes	Yes	Yes
2.2.17	Dimensions, mm	200x127x47	200x127x47	200x127x47
2.2.18	Weight, g	~330	~330	~330

2.3 Delivery set

1	Infrared thermometer	1
2	Strap	1
3	Battery (9V, type 006P)	1
4	Operation manual	1
5	Carrying case	1
6	Packing	1

2.4 Design and principle of operation

The Infrared thermometer performs non-contact temperature measurement of object surfaces through measurement of thermal radiation. Radiated, reflected and transmitted energies (figure 2.1) are collected and focused on the infrared detector. A built-in digital processor converts the information into temperature data in accordance with the selected operation mode, and displays it on the multifunction LCD.

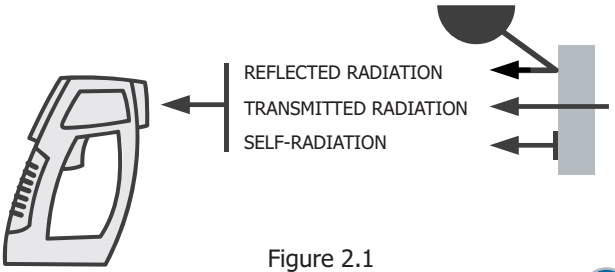


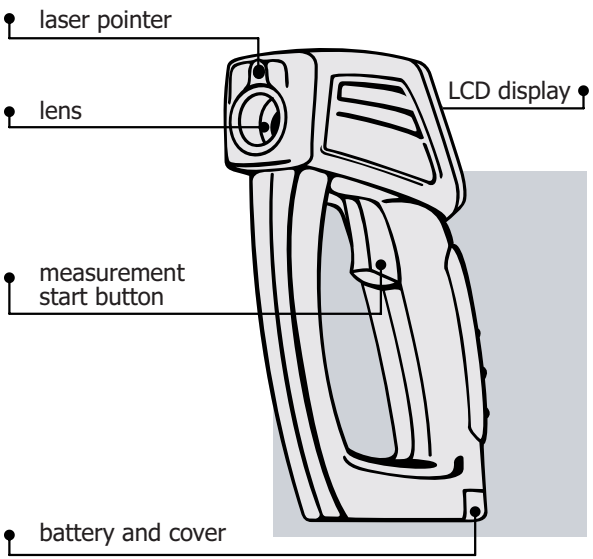
Figure 2.1

2.5 Marking

The device is marked with a nameplate on the side face of the measurement unit. The nameplate contains the device name, measurement range, field of view and manufacturer name.

2.6 Packing

The device is packed in a plastic carrying case with polyurethane foam inserts.



Device appearance and functions
of main elements are shown on the figure 2.2.

3 DEVICE APPLICATION

3.1 Operating limitations

The device can be used at the environmental temperature from 0 to 50°C and relative humidity from 10 to 90%.
A controlled object must be bigger than a size of a spot, which is calculated according to the diagram of FOV (paragraph 3.3.3. of the this operation manual)

The device can't perform measurements through transparent surfaces, for example glass or plastic material. It will measure the temperature of these materials.

Steam, dust and fume or other substances can lead to inaccurate measurement results due to the creation of obstacles for the device's optics.

When operating with the laser pointer, do not direct the laser beam towards eyes or mirror surfaces (figure 3.1).

3.2 Prestarting procedures

3.2.1 Safety measures

It is necessary to observe the following safety measures:
- to protect the device from exposure of electro-magnetic stirring, emitted during arc welding and when using induction heaters.
- to protect the device from heat shock (at a high temperature or sharp temperature change, it is necessary to wait for 30 minutes before you start using the device).
- do not leave the device on or near objects with a high temperature.
- to protect the device from static electricity.

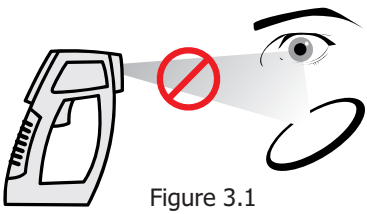


Figure 3.1

3.2.2 External examination

Before you start using the device, it is necessary to carry out an external examination of the device concerning damages and contamination of the lens and display. If there is contamination, it is necessary to perform maintenance of the device in accordance with paragraph 4 of this operation manual. If there are mechanical damages, make sure, that they will not influence readings, or send the device for repair.

3.2.3 Preparation

Preparation consists of evaluation of emissivity of controlled objects and to enter these values into the device. The emissivity is determined by means of the table or experimentally (paragraph 3.3.4 of this operation manual). If necessary, one can perform modification of a controlled surface for the purpose of emissivity increasing.
It is also necessary to make sure, that the controlled spot size is smaller, than the size of a controlled object at a defined distance to the object.

3.2.4 Selection of measurement units and laser pointer

To select measurement units (°C or °F) and switch on (off) the laser pointer, open the cover in the device handle (figure 3.2) and set the corresponding switches to a proper position.

3.2.5 Battery changing

If the device screen displays «  », open the cover in the device handle (figure 3.2) and change the battery. You can use both alkaline battery, type 6F22 and nickel-cadmium battery or nickel metal hydride battery of the same size.

3 DEVICE APPLICATION

LASER ON/OFF, °C / °F

Figure 3.2

3.3 Work with the device

3.3.1 LCD display and control panel

The measured values and the operation mode are displayed on the LCD. The device management is carried out with a push-button control panel. The functions of the display and control buttons are shown on the figure 3.3.

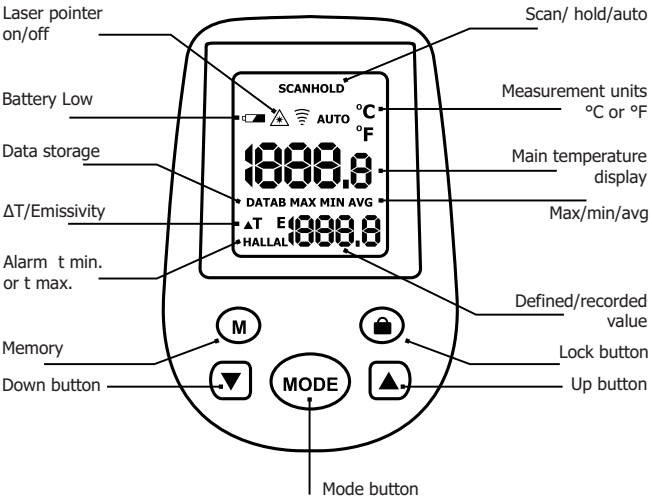
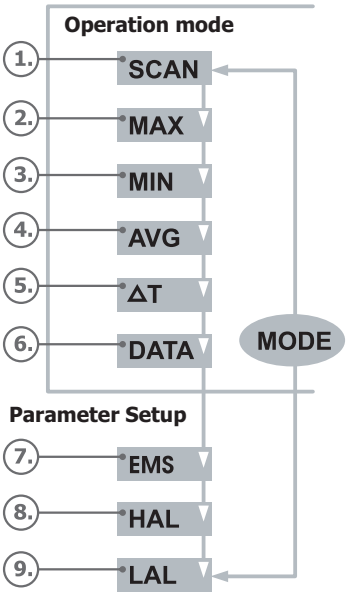


Figure 3.3

3.3.2 Operation modes of the device

To select an operation mode and set up parameters of the device, use the button «MODE». The selection of the required mode is performed by multiple pressing of a button and through control of the required mode on the device display. The device operation modes and sequence of their selection are shown on the figure 3.4. After the mode is selected, press the measurement start button and start measuring. Release the button to switch off the device. The device will switch off in about 6 seconds.



1. Scanning and displaying temperature during measurement
2. Maximum temperature during measurement
3. Minimum temperature during measurement
4. Average temperature during measurement
5. The difference between the maximum and the minimum temperature during measurement
6. Recalling the stored measurement results by using ▼ or ▲ buttons.
7. Setting of a controlled surface emissivity
8. Setting of the highest alarm temperature
9. Setting of the lowest alarm temperature
(The parameters are set with ▼ or ▲ buttons)

Figure 3.4

3 DEVICE APPLICATION

REMARKS

1. MEMORY: To save the values, press the button «M». To delete all the records, select «DATAO», using the ▼ or ▲ button, and press the button «M».

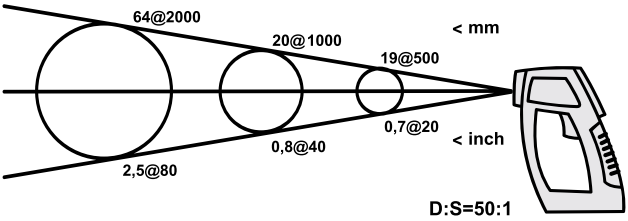
2. FIXATION: After the operation mode is selected, press the measurement start button to start measuring (figure 2.2). Push the lock button for continuous measurements without having to press the start measurement button. The device will operate continuously in the selected mode without automatic shutdown.

3. In scan mode, the LCD displays both the current temperature in Celsius or in Fahrenheit. The unit will hold the last reading for 6 seconds after the measurement start button is released. When the battery is low, the battery icon will be displayed, but the device will continue to operate.

4. When DATA# flashes, the temperature value on the main display can be recorded in the # memory unit by pressing the button **«M».**

3.3.3 Field of View (FOV)

The field of view is the angle of vision of the device, which is determined by the optics of the device. The field of view is the ratio of the distance from the device lens to the measurement spot* to the measurement spot diameter. The FOV diagram is shown on the figure 3.5.



The field of view for this device is determined at the distance of 1 meter from the lens. At smaller distances the spot diameter is almost constant and is ~17-19 mm, and at bigger distances the FOV starts decreasing.

*Measurement spot is an area, from which more than 90% of emission is fallen to the detector.

3 DEVICE APPLICATION

3.3.4 Emissivity of a controlled object

Most of organic matters and painted or oxidized surfaces have the emissivity 0,95 (predefined in the device). But when measuring the temperature of shiny or polished metal surfaces, you can have inaccurate measurement results. To remove this error, set up the emissivity of a controlled object in the device (see the table below and setting description in the paragraph 3.3.2) , or stick a dark scotch tape (friction tape) on the measured surface or coat it with black mat paint. Carry out measurement of the modified surface, when this material has the same temperature, as the controlled object has (in several minutes).

If the object surface allows no painting or black tape, you can measure the temperature, using a contact thermometer and pyrometer, after which calculate emissivity as the ratio of pyrometer readings to contact thermometer readings.

The emissivity of the most common materials is specified in the table.

Material	Emissivity
Aluminum	0,30
Asbestos	0,95
Asphalt	0,95
Basalt	0,70
Brass	0,50
Brick	0,90
Coal	0,85
Ceramics	0,95
Concrete	0,95
Copper	0,95
Dirt	0,94
Frozen food	0,90
Hot food	0,90
Glass (plate)	0,85
Ice	0,98
Lead	0,50
Limestone	0,98
Oil	0,94
Paint	0,93
Paper	0,95
Plastic	0,95
Rubber	0,95
Sand	0,90
Leather	0,98
Snow	0,90
Steel	0,80
Textiles	0,94
Wood	0,94
Water	0,93

4 MAINTENANCE

Repair and maintenance, not described in this operation manual, must be performed only by qualified trained staff.
Clean the device housing with a dry cloth periodically. Do not use abrasives and solvents for the device cleaning. The lens should be cleaned with compressed air jet or soft brush.
It is recommended to clean the device housing, using soft jaw or cloth, moistened with soap solution.

5 STORAGE AND TRANSPORTATION

The device must be transported and stored in the carrying case.
The packed device must be stored in dry heated space at air temperature from 0 to 40 °C and relative humidity to 80%, in the absence of acid and alkali fumes and other aggressive environments.
After transportation at negative temperature, wait for 2 hours before starting using the device.

6 ACCEPTANCE AND PACKING CERTIFICATE

The infrared thermometer BALTECH TL-____№_____ is manufactured according to the specifications and is ready for operation.

Issue date «___»_____201_

Signature _____
Job position and signature of the manufacturer's representative

The infrared thermometer BALTECH TL-____№_____ is manufactured according to the specifications and is ready for operation.

Issue date «___»_____201_

Signature _____
Job position and signature of the manufacturer's representative

7 CALIBRATION CERTIFICATE

8 WARRANTY CERTIFICATE

The warranty period begins from the date the warranty certificate was filled in, but not later than 1 month after the delivery of the equipment.
The warranty is not valid, if the customer registration form is not filled in. The guarantee gives the right for free training of 2 specialists in the company BALTECH GmbH (Spenglerstrasse 39-41, 23556 Lübeck Germany, Tel: +49 (0) 451-370-87-700, e-mail: info@baltech.biz, www.baltech.biz) within coordinated time periods, not later than 6 months after the delivery date.

No.	Item	Details
	Signature/print full name	
	Commissioning date (date, month, year)	
	Responsible person (job position, full name)	
	Department	
	E-mail	
	Fax (country code, area code, №)	
	Phone number (country code, area code, №)	
	Company full name	
	Postal address , index	
	Country	
	Device model (serial number)	

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