



Warning

ANGER

ever the indication  is blinking, the laser marker beam emitted. Exercise extreme care not to allow the laser beam to enter your eyes or those of another person. Use of this laser light causing damage to the eyes.

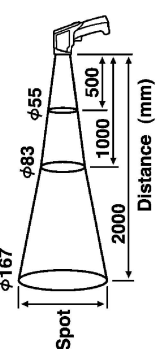
Active measurements are carried out by pulling and holding the measuring trigger key. Measurement will stop when the measuring trigger key is released and the last shown value will be retained. The instrument will automatically switch off approximately 15 seconds after the measuring trigger key is released.

Power On
The power switch at OFF, pull the measuring trigger key to switch the power to start measuring.

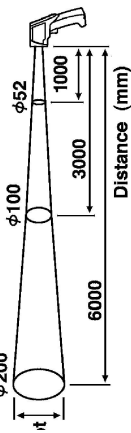
Thermal emissivity setting
Press the **MODE** key to activate emissivity mode ("↕E↕" will be shown on the display).
Press the **↕E↕** keys to set thermal emissivity.
Press the **↕E↕** keys to set thermal emissivity for the section on thermal emissivity for thermal emissivity setting.

Measuring
Point the lens toward the object whose temperature is to be measured.

Measurement field of view
FT3700-20



FT3701-20



The laser marker indicates the diameter of the measurement field of view. The measurement field of view is defined as the measurement diameter at which the optical response is 90%. The object whose temperature is to be measured needs to be larger than the measurement diameter by an adequate margin. (1.5 to 2 times or more)

OFF setting for laser marker
The laser marker is set to OFF in the factory default or immediately after changing the batteries. To turn ON the laser marker, press and hold the **OFF** key (1 sec) while pulling the measuring trigger key. The OFF setting for the laser marker is the same operation again.

Continuous measurement mode
Pressing the **LOCK** key while the instrument is on activates continuous measurement mode, except when using the emissivity setting, the **OFF** key, or the **HAL** key. This mode lets you take measurements continuously without needing to pull the measurement trigger.

The instrument will turn off automatically about 60 minutes after continuous measurement mode is activated.
The laser marker is on, the sighting laser will only activate when the measuring trigger is pulled.
The response may be slow when continuous measurement mode is on.

Changing the Mode
Pressing the **MODE** key while the instrument is on causes it to cycle through the following modes:

- E

Emissivity display

↕

HAL

Alarm lower limit setting
- ↕E↕

Emissivity setting

↕

HAL

Alarm upper limit setting
- MAX

Maximum value display

↕

AVG

Average value display
- MIN

Minimum value display

↕

dIF

Difference between maximum and minimum values

MAX/MIN/dIF/AVG measurement
The instrument will display the maximum value, minimum value, difference between the maximum and minimum values, and average value since measurement began.
• Press the **MODE** key to display "MAX", "MIN", "dIF" or "AVG" on the sub-display.
• The MAX/MIN/dIF/AVG value will be refreshed when you pull the measuring trigger or while continuous measurement mode is active.
• When using the continuous measurement mode, the key response may be slow.

Alarm Function
The alarm can be set to go off whenever a value which is higher or lower than a threshold value inputted beforehand is reached. The alarm is in the form of a display and a buzzer.

1. Pull the measuring trigger key to switch on the power.
2. Press the **MODE** key to display "HAL" in the sub-display. Press the **↕** key to set the alarm setting's upper limit temperature.
3. Press the **MODE** key to display "LAL" in the sub-display. Press the **↕** key to set the alarm setting's lower limit temperature.

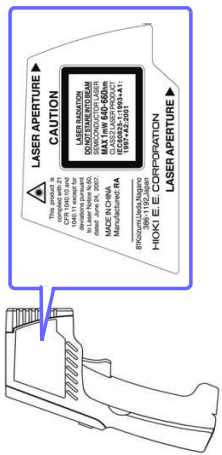
Error Indication

Error indication	Description	Remedy
E-2	The change in the measurement temperature is too great.	Allow the instrument to acclimate to the measurement temperature for about 30 minutes before use.
E-3	The ambient temperature is outside the operating temperature range.	Use the instrument within the operating temperature range (0°C to 50°C).

E-5 to E-9 System error
Remove the battery, wait at least 1 minute, and then replace the battery. If you are unable to resolve the error, the instrument may be broken. Contact your dealer or HIOKI representative.

H1 or La The measurement value is outside the measurement range.
The measurement value cannot be displayed since it is outside the measurement range.

Warning Labels
Location of labels used in the HIOKI FT3700-20, FT3701-20 Infrared Thermometer is as follows.



Specifications

Function	Infrared temperature measurement
Additional Function	MAX, MIN, dIF (MAX-MIN), AVE measurement, Alarm function, Backlight function
Power supply	LR03 alkaline battery x 2
Dimensions	Approx. 48 W x 172 H x 119 D mm (1.89" W x 6.77" H x 4.69" D) (excluding projections)
Mass	Approx. 256 g (9.0 oz.) (including LR03 alkaline battery x 2)
Location for use	Indoors, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity	0 to 50°C (32°F to 122°F), 80%RH or less (non-condensation)
Storage temperature and humidity	-10 to 50°C (14°F to 122°F), 80%RH or less (non-condensation), 50 to 60°C (122°F to 140°F), 70%RH or less (non-condensation)
Accessories	Instruction manual, LR03 alkaline battery x 2, Carrying case x 1
Effect of radiated radio frequency electromagnetic field	70°C at 3 V/m
Applicable standards	EMC : EN61326 Laser : IEC60825-1:1993+A1:1997+A2:2001 CLASS 2 LASER This product is compliant with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated June 24, 2007

Electrical characteristics	
Detection element	Thermopile
Temperature units	°C, °F
Measurement temperature range	FT3700-20: -60 to 550°C (-76 to 1022°F) FT3701-20: -60 to 760°C (-76 to 1400°F)
Display resolution	0.1°C, 0.1°F (1°F at 1000°F and over)
Outside display of measurement range	FT3700-20: "Lo" mark lights when -60.0°C (-76.0°F) or less FT3701-20: "Hi" mark lights when 550.0°C (1022°F) or higher FT3701-20: "Hi" mark lights when -60.0°C (-76.0°F) or less FT3701-20: "Hi" mark lights when 760.0°C (1400°F) or higher
Response time	1 second (90%)
Measurement wavelength	8 to 14 μm
Thermal emissivity compensation	0.10 to 1.00 by steps of 0.01
Diameter of field of measurement	FT3700-20: 83 mm at 1000 mm (D:S=12:1) FT3701-20: 100 mm at 3000 mm (D:S=30:1)
Sighting	Two-point laser marker, 1 mW (MAX), Red (640 nm to 660 nm) It is illuminated in conjunction with pulling the measuring trigger key.
Battery low warning voltage	mark lights when 2.70 V (±0.1 V) or higher mark lights when 2.55 V (±0.1 V) or less, measurement value is fixed.
Power turned off at 2.20 V (±0.1 V)	
Rated supply voltage	1.5 VDC x 2
Maximum rated powers	150 mVA
Continuous operating time	Approx. 140 hours (alkaline battery)
Auto Power Off	When laser marker and backlight are OFF Approx. 15 seconds

Accuracy Specifications	
Accuracy (infrared)	-60.0 to -35.1°C (-76.0 to -31.1°F) Accuracy not specified -35.0 to -0.1°C (-31.0 to 31.9°F) ±10%rdg, ±2°C 0.1 to 500.0°C (32.0 to 932.0°F) ±2%rdg, ±2°C 500.1 to 550.0°C (932.0 to 1022.0°F) ±2%rdg 550.1 to 550.0°C (932.0 to 1022.0°F) ±2%rdg 550.1 to 760.0°C (932.0 to 1400.0°F) ±2%rdg Accuracy not specified (except when battery mark is blinking)
Guaranteed accuracy period	1 year
Accuracy guarantee for temperature and humidity	23°C ±3°C (73°F ±5°F), 80%RH or less (non-condensation) Measurement accuracy x 0.1 / °C
Temperature coefficient	

Accuracy
rdg.: reading value (The value currently being measured and indicated on the measuring instrument)

Thermal Emissivity

This instrument allows thermal emissivity to be adjusted within the range of 0.10 to 1.00. Please refer to the following table when setting the thermal emissivity.

Refractory & Building Materials	Metal
Alumina (coarse grain)	0.45
Alumina (fine grain)	0.25
Aluminum Alloys various	0.10 to 0.25
Asbestos	0.95
Aluminum oxide at 260°C	0.60
Carbon (graphite)	0.75
Aluminum oxide at 800°C	0.30
Carbon (soot)	0.95
Brass (oxidized)	0.60
Carborundum (Trademark)	0.85
Brass (polished)	0.10
Brass (roughened surface)	0.20
Concrete	0.75
Cast iron (polished)	0.20
Marble	0.90
Cast iron (rough) rusted	0.95
Plaster	0.90
Quartz (rough)	0.90
Cast iron (turned at 100°C)	0.45
Red brick (rough)	0.75 to 0.90
Cast iron (turned at 1000°C)	0.60 to 0.70
Silica (coarse grain)	0.55
Copper (oxidized)	0.80
Silica (fine grain)	0.40
Copper (polished)	0.05
Iron plate (rusted)	0.70 to 0.85
Lead (oxidized at 25°C)	0.30
Zirconium silicate at 850°C	0.60
Lead (oxidized at 200°C)	0.60
Zirconium silicate up to 500°C	0.85
Lead (pure)	0.10
Miscellaneous	
Mild steel	0.30 to 0.50
Aluminum lacquer	0.50
Molten cast iron	0.30
Enameled (any color)	0.90
Molten copper	0.15
Lacquer	0.70
Nichrome	0.95 to 0.98
Matte black paint	0.95
Oil paint (any color)	0.95
Nickel (pure)	0.10
Paper and cardboard	0.90
Nickel plate (oxidized)	0.40 to 0.50
Plastics	0.80 to 0.95
Polished aluminum	0.10
Plastics films (0.05 mm thick)	0.50 to 0.95
Rough ingot iron	0.90
Polyethylene film (0.03 mm thick)	0.20 to 0.30
Stainless steel (polished)	0.10
Rubber (rough)	0.98
Stainless steel (various)	0.20 to 0.60
Rubber (smooth)	0.90
Steel	0.60
Silicone polish	0.90
Steel plate (oxidized)	0.90
Water	0.98

- NOTE**
- Variations in the surface condition and color of the object whose temperature is to be measured may cause the thermal emissivity (ε) to be somewhat different from the values in the above table. If an accurate temperature measurement is desired for an object whose thermal emissivity is not known, black body tape (commercially available) should be used. In this case the setting for thermal emissivity (ε) should be the value indicated on black body tape.
 - Iron and other objects with low thermal emissivity reflect their surrounding temperature, causing inaccuracies in measurement. The black body tape (commercially available) is also recommended when measuring these objects of low thermal emissivity.
 - A black body is an object that represents a standard emissivity, and may not necessarily be black in color.