

FLUKE®

566-2/568-2

Infrared Thermometers

Users Manual

PN 4739876
November 2015

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Introduction

The 566-2/568-2 Infrared Thermometers (the Product) are for non-contact temperature measurement. The Product determines the surface temperature of an object by measuring the amount of infrared energy radiated by the object surface. The Product also uses a K-type thermocouple for contact temperature measurement.

Contact Fluke

To contact Fluke, visit Fluke's website at www.fluke.com.

To register your product, visit <http://register.fluke.com>.

To see, print, or download the latest manual supplement, visit <http://us.fluke.com/user/support/manuals>.

Safety Information

A **Warning** identifies conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

Figure 1 shows the safety label of the Product. Symbols used on the Product and in this manual are explained in Table 1.

Warning

To prevent possible electrical shock, fire, eye damage, and personal injury:

- **Read all safety information before you use the Product.**
- **Do not look directly into the laser with optical tools (for example, binoculars, telescopes, microscopes). Optical tools can focus the laser and be dangerous to the eye.**

- **Do not look into the laser. Do not point laser directly at persons or animals or indirectly off reflective surfaces.**
- **Do not use laser viewing glasses as laser protection glasses. Laser viewing glasses are used only for better visibility of the laser in bright light.**
- **Do not open the Product. The laser beam is dangerous to eyes.**
- **Have the Product repaired only through an approved technical site.**
- **Replace the batteries when the low battery indicator shows to prevent incorrect measurements.**
- **The battery door must be closed and locked before you operate the Product.**
- **Do not use the Product if it operates incorrectly.**
- **Do not use the Product around explosive gas, vapor, or in damp or wet environments.**
- **Do not connect the optional external probe to live electrical circuits.**
- **See emissivity information for actual temperatures. Reflective objects result in lower than actual temperature measurements. These objects pose a burn hazard.**
- **Do not leave the thermometer on or near objects of high temperature.**
- **Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.**
- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**

⚠ Caution

To avoid damage to the Product or the equipment under test, protect them from:

- EMF (electromagnetic fields) from arc welders, induction heaters, etc.
- Static electricity
- Thermal shock (caused by large or abrupt ambient temperature changes. For highest accuracy, allow 30 minutes for Thermometer to become stable before use).

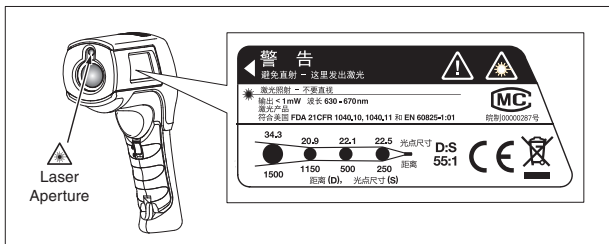


Figure 1. Laser Safety Markings (568-2 Shown)

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Table 1. Symbols

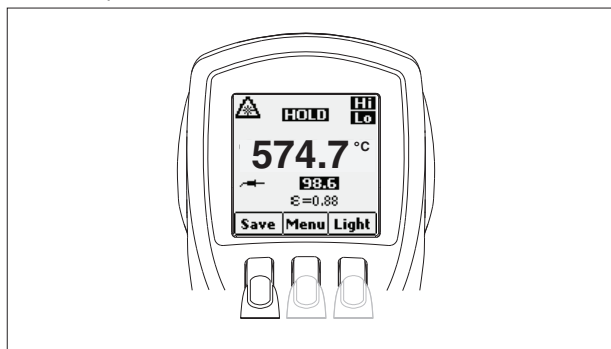
Symbol	Explanation
	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
	WARNING - RISK OF DANGER. Consult user documentation.
	WARNING. LASER RADIATION. Risk of eye damage.
°C	Celsius
	Battery
	This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste.
 皖制00000287号	China metrology certification mark for measuring instruments manufactured in the Peoples Republic of China (PRC).
CE	Conforms to European Union directives.
	Conforms to relevant South Korean EMC Standards

Features

- Single-spot laser sighting
- Backlight display
- Current Temperature plus MAX, MIN, DIF, AVG temperature displays
- Two AA batteries
- Hard case
- 80PK-1 K-type thermocouple probe
- Adjustable emissivity and predefined emissivity table
- Infrared and thermocouple temperature display
- Celsius temperature display
- Tripod mount
- Auto off
- Standard miniature K-type thermocouple connector input
- Printed 566-2/568-2 Users Manual
- 12 or 24 hour clock
- Last reading Hold (20 seconds)
- Multi-language interface
- High and low alarm
- Data storage and review
- Trigger lock

Menu Overview

Figure 2 shows the LCD and menu interface. Table 2 is a top-level description of the menu.



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Figure 2. Menu Navigation

Table 2. Top-Level Menu Description

Level	Softkey		Description
1	Left	Save	Save reading to memory
2	Left	Mem	Review/delete memory entries
3	Left	MnMx	Enable Min/Max
4	Left	°C	Shows temperature units
5	Left	🔒 (Lock)	Lock the trigger
6	Left	Setup	Turn off/on backlight Change Time/Date
1	Right	Light	Adjust backlight brightness
2	Right	ε	Set emissivity
3	Right	Avg	Enable Avg/Diff
4	Right	Alarm	Set and enable alarms
5	Right	Laser	Toggle the laser on/off
All	Center	Menu	Advance the menu to the next level

Each menu item and function is explained in greater detail in the following sections.

Save

To save readings:

1. Pull the trigger to take a measurement.
2. Release the trigger to stop taking the measurement.
3. Push the **Save** softkey to enter the Save menu.
4. Push the **Yes** softkey to save the reading.

The reading is assigned a memory location and a time and date stamp.

The reading includes:

- IR temperature
- Thermocouple temperature (if connected)
- Emissivity
- Min/Max/Avg/Dif (if Min/Max or Avg/Dif is enabled)
- Date/Time

You can push the **Cancel** softkey to stop saving the reading.

Light

The Product has a backlight display with two brightness levels.

To toggle the backlight brightness, push the **Light** softkey.

To disable the backlight, use the Setup menu.

Memory

The Product can store measurement records including time, date, emissivity, and measurement record numbers (see *Save* for more information). The 566-2 can store 50 records and the 568-2 can store 99.

To access records stored in memory:

1. Push the **Menu** softkey until **Mem** shows as the left softkey function.
2. Push the **Mem** softkey to access the Memory menu.
Saved readings show on the display.

Emissivity Menu

The Emissivity menu includes a list of pre-defined materials and lists their typical emissivity values. See Table 3 for further information.

Note

Default emissivity is 0.95.

Table 3. Nominal Surface Emissivity

Material	Value	Material	Value
Default****	0.95	Glass (plate)	0.85
Aluminum*	0.30	Iron*	0.70
Asbestos	0.95	Lead*	0.50
Asphalt	0.95	Oil	0.94
Brass*	0.50	Paint	0.93
Ceramic	0.95	Plastic**	0.95
Concrete	0.95	Rubber	0.95
Copper*	0.60	Sand	0.90
Food - Frozen	0.90	Steel*	0.80
Food - Hot	0.93	Water	0.93
		Wood ***	0.94

* Oxidized

** Opaque, over 20 mils

*** Natural

**** Factory Setting

Highlighted items may also be found in the emissivity table built into the Product.

To access the Emissivity menu:

1. Push the **Menu** softkey until **E** shows as the right softkey.
2. Push the **E** softkey.

To access the Emissivity list:

1. Push the **Table** softkey. The display shows a list of materials and their suggested emissivity.
2. Use the down arrow to navigate through the list.
3. Push the **Enter** softkey to choose the necessary material.

To manually type the typical emissivity of a material:

1. Push the **No.** softkey.
2. Use the down or up arrow softkey to change the entry. Hold down the arrow softkeys to increase the rate of change.
3. Push the **Done** softkey to return to the main menu.

Min, Max, Avg, Differential

The Product can measure minimum (MIN), maximum (MAX), average (AVG), or differential (Δ) temperatures each time a reading is taken. These values are not shown if a thermocouple is plugged into the Product.

To turn on the Min Max mode:

1. Push the **Menu** softkey until **MnMx** (Min Max) shows as the left softkey function.
2. Push the **MnMx** softkey.

The display shows the present reading, maximum and minimum readings, and the emissivity setting.

To turn on the Avg/Dif mode:

1. Push the **Menu** softkey until **Avg** shows as the right softkey function.
2. Push the **Avg** softkey.

The display shows the present reading, average reading, the differential reading between max and min (designated by Δ), and the emissivity setting.

Note

Min, Max, Avg, and Differential readings are saved as part of the saved data when either Min/Max or Avg/Dif mode is enabled.

Alarm

The Product has a programmable high and low temperature alarm to assign high or low readings. When the alarm level is reached, an alarm sounds and the display flashes orange and white.

To set the high or low alarm:

1. Push the **Menu** softkey until **Alarm** shows as the right softkey.
2. Push the **Alarm** softkey to access the Alarm menu.
3. Push the **Hi** or **Lo** softkey as necessary.
4. Push the **ON** or **OFF** softkey to turn the alarm on or off.
5. Use the **Set** softkey to access the Hi or Lo Alarm Set menu.
6. Use the down or up softkeys to change the alarm setting.
7. After the settings are completed, push the **Done** softkey.

Trigger Lock

The Product trigger can be locked on for continuous measurement.

To lock the trigger:

1. Push the **Menu** softkey until the lock symbol (🔒) shows as the left softkey.
2. Push the 🔒 softkey to lock the trigger.

The lock symbol shows on the display. When the trigger is locked, the 🔒 softkey changes to 🔓. Push this softkey to unlock the trigger.

Laser



To prevent eye damage and personal injury:

- Do not look into the laser.
- Do not point laser directly at persons or animals or indirectly off reflective surfaces.

The Product has a laser for aiming purposes only. The laser turns off when the trigger is released.

To enable or disable the laser:

1. Push the **Menu** softkey until **Laser** shows as the right softkey.
2. Push the **Laser** softkey to enable or disable the laser.
 shows on the display when the laser is enabled.

Setup

From the Setup menu, the display language, backlight, and time/date can be changed.

Backlight

The backlight is on by default. Turn the backlight off to conserve battery power.

1. Push the **Menu** softkey until **Setup** shows as the left softkey.
2. Push the **Setup** softkey.
3. Push the **Enter** softkey to enter the Backlight menu.
4. Push the **OFF** softkey to turn the backlight off, or push the **ON** softkey to turn it on.
5. Push the **Back** softkey to return to the Setup menu.

Time/Date

To change the time:

1. Push the **Menu** softkey until **Setup** shows as the left softkey.
2. Push the **Setup** softkey to enter the Setup menu.
3. Push the down arrow softkey to select **Time/Date**.
4. Push the **Enter** softkey.
5. Push the **Time** softkey to set time.
 - a. Push the necessary time format (**24hr** or **12hr**).
 - b. Use the up and down arrow keys to select the correct hour.
 - c. Push **Next** to select the minutes.
 - d. Use the up and down softkeys to select the minute.
 - e. When in 12-hour mode, push the **Next** softkey to highlight the **am/pm** parameter.
 - f. Use the up and down softkey to change to **am** or **pm**.
6. Push the **Done** softkey.

To change the date:

1. From the Time/Date menu, push the **Date** softkey.
2. Select the date format: Day/Month/Year (**dmy**) or Month/Day/Year (**mdy**).
3. Use the up and down softkeys to select the correct parameter.
4. Push the **Next** softkey and the arrow softkeys to select the month, date, or year parameters.
5. Use the up and down arrow keys to set the necessary parameter.
6. Push the **Next** softkey to move through each parameter.
7. Push the **Done** softkey.

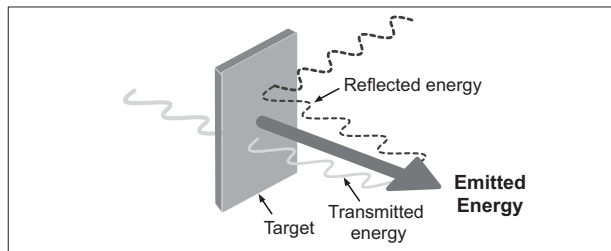
Delete Data

To delete stored data from the Product, from the main menu, push the **Menu** softkey until **Mem** shows as the left softkey function. The last memory location shows on the display.

- To access the Delete menu, push the **Delete** softkey.
- To delete all records, push the **All** softkey. At the confirmation screen, push the **Yes** softkey.
- To delete individual records, push the **View** softkey and then use the down and up arrow softkeys to access the necessary record. When the correct record is shown, push the **Yes** softkey to delete the record.
- To cancel data deletion, pull the trigger.

How the Product Works

The Product measures the surface temperature of an object. The Product optics sense emitted, reflected, and transmitted energy, which is collected and focused onto a detector. The Product electronics translate the signal into a temperature measurement which the Product shows on the display (see Figure 3).



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Figure 3. How the Product Works

Product Operation

Temperature Measurement

To measure temperature, point the Product at an object and pull the trigger. Use the laser pointer to aim the sensor. You can also insert the KTC probe for contact measurement. Be sure to consider distance-to-spot size ratio and field of view (see *Distance and Spot Size* and *Field of View*).

Note

The laser is used for aiming purposes only and is not related to temperature measurement.

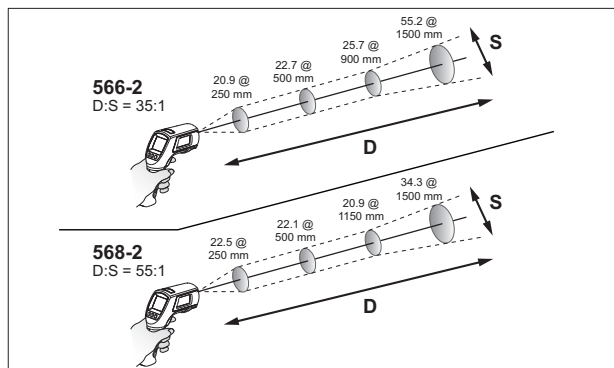
The Product automatically powers down after 20 seconds of inactivity. To turn the Product on, pull the trigger.

Find a Hot or Cold Spot

To find a hot or cold spot, aim the Product outside the necessary area. Then, slowly scan across the area with an up and down motion until the hot or cold spot is found.

Distance and Spot Size

As the distance (D) from the object under measurement increases, the spot size (S) of the area measured by the Product becomes larger. The relationship between distance and spot size (D:S) is shown in Figure 4. The spot sizes indicate 90 % encircled energy.

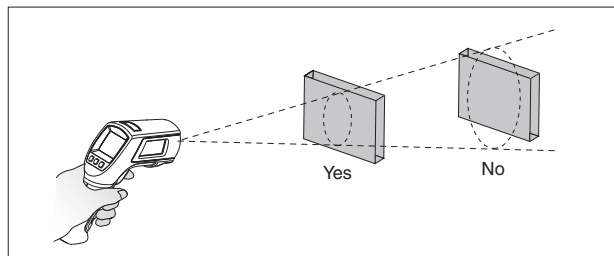


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Figure 4. Distance and Spot Size

Field of View

When making measurements, make sure that the target is larger than the Product spot size. The smaller the target, the closer you should be to it (see Figure 5). For accurate measurement, it is strongly recommended that the target size is at least twice as large as the spot size.



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Figure 5. Field of View

Emissivity

Emissivity describes the energy-emitting characteristics of materials. Most organic materials and painted or oxidized surfaces have an emissivity of approximately 0.95, the default setting for the Product.

To compensate for inaccurate readings that may result from measuring shiny metal surfaces, you can cover the surface to be measured with electrical tape or flat black paint (<148 °C) with emissivity set to 0.95. Allow time for the tape or paint to reach the same temperature as the surface beneath it. Measure the temperature of the tape or painted surface.

If you cannot paint or use tape, then you can improve the accuracy of your measurements by either numerically adjusting emissivity or by using the Emissivity Menu to access a table of some common materials. The Product has numerically adjustable emissivity from 0.10 to 1.00 that can be used in conjunction with the emissivity in Table 3. Also, the Product has a built-in table of the most common materials that can be set from the Emissivity menu. The built-in values are indicated in Table 3.

HOLD

After the trigger is released, the display retains its last infrared measurement for 20 seconds. At the same time, **HOLD** shows on the display. With the probe inserted, the Product stays on. To freeze the infrared temperature when a probe is not inserted, release the trigger until **HOLD** shows on the display.

Data Storage

The 566-2 can store up to 50 data records. The 568-2 can store up to 99 data records. Each record includes:

- Record number
- IR and probe temperature in °C
- Date/Time
- Emissivity
- Max/Min/Avg/Dif Temperature (if enabled)

For more information, see *Save*.

External Contact Probe

Warning

To avoid electrical shock or personal injury, do not connect the external contact probe to live electrical circuits.

The Product has a bead K-type thermocouple probe. The probe attaches to the Product via the probe input located on the top of the Product.

With the probe installed, the probe symbol () shows on the display. The probe can be used simultaneously when the Product is making non-contact measurements. The probe measurements are shown below the non-contact measurements. The Product stays on when a probe is inserted.

Troubleshooting

See Table 4 for solutions to possible problems during Product operation.

Table 4. Troubleshooting

Symptom	Cause	Action
--- (on display)	Target temperature is over or under range.	Select target within specifications.
	Low batteries.	Replace batteries.*
Blank display	Product is asleep. Possible dead batteries.	Pull trigger. Replace batteries.*
Laser does not work	Low or dead batteries Ambient temperature is above 40 °C.	Replace batteries.* Use in area with lower ambient temperature.
Inaccuracy	Possible incorrect emissivity setting, field of view, or spot size.	See <i>Emissivity</i> , <i>Field of View</i> and <i>Distance and Spot Size</i> sections.
Settings such as emissivity, date/time, C, and saved data lost	Batteries are dead or not replaced in <1 minute of removal.	Reset settings. Replace batteries as soon as low battery indicated. Exchange the batteries within one minute of removal.*
*For details about battery replacement, see <i>Battery Replacement</i> .		

Maintenance

Battery Charge

Use the battery charge symbols to gauge the approximate level of charge left on the batteries.

Note

*When in low battery mode, the Product does not store values. **Err** shows on the display if attempted.*



Batteries are at 5 %. Before taking further readings, the batteries must be changed.

Battery Replacement

Warning

To prevent possible electrical shock, fire, eye damage, and personal injury, do not open the Product. The laser beam is dangerous to eyes. Have the Product repaired only through an approved technical site.

For safe operation and maintenance of the Product:

- Repair the Product before use if the batteries leak.
- Be sure that the battery polarity is correct to prevent battery leakage.

Caution

To prevent damage to the Product:

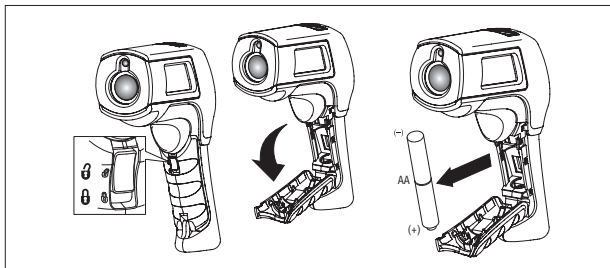
- Do not short the battery terminals together.
- Do not keep cells or batteries in a container where the terminals can be shorted.
- Do not put battery cells and battery packs near heat or fire. Do not put in sunlight.

Note

The batteries should be replaced in less than one minute after removal to avoid manually re-initializing the Product clock and date.

To install or change the two AA batteries (see Figure 6):

1. Slide the locking tab on the battery door to the  position and then open the handle.
2. Insert the batteries noting their correct polarity.
3. Close and lock the handle.



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Figure 6. Battery Replacement

Clean the Lens

Use clean compressed air to blow off loose particles. Carefully clean the surface with a water-moistened cotton swab.

Clean the Case

Use mild soap and water on a moist sponge or soft cloth.

Caution

To prevent damage to the Product, do NOT submerge the Product in water. Do not use abrasive cleaners, they will damage the case.

Replacement Parts

See Table 5 for a list of replacement parts.

Table 5. Replacement Parts

Description	Qty.	Fluke Part Number
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Accessories

Optional accessories:

- Soft Carrying Case (H6)
- Calibration Certification
- All K-type thermocouple probes with standard mini-connector.
See Table 6 for more information.

Recommended Temperature Probes

Warning

To avoid electrical shock or personal injury, do not connect the external contact probe to live electrical circuits.

See Table 6 for a list of recommended temperature probes.

Table 6. Recommended Temperature Probes

Probe	Usage
80PK-1	General purpose bead probe for measurement of surface temperatures and air temperatures within ducts and for vent temperatures
80PK-8	Pipe clamp probes to track temperature differentials on hydronic tubing and pipe loops, and for refrigerant temperatures
80PK-9	Insulation piercing probe for good surface thermal contact, air temperatures within ducts, and vent temperatures
80PK-11	Flexible cuff thermocouple temperature probe that attaches a thermocouple to a pipe
80PK-25	Piercing probe for checking air temperature in ducts, surface temperature under carpets/pads, liquids, thermometer wells, vent temperatures, and for penetrating pipe insulation
80PK-26	General-purpose gas and surface probe that reacts quickly to surface and air temperatures

General Specifications

Feature	566-2	568-2
IR Temperature Range	-35 °C to 750°C	-35 °C to 850 °C
Accuracy	<0 °C: $\pm(1.0\text{ °C} + 0.1\text{ °/1 °C})$ >0 °C: $\pm 1\%$ or $\pm 1.0\text{ °C}$, whichever is greater	
Repeatability	$\pm 0.5\%$ of reading or $\pm 0.5\text{ °C}$, whichever is greater	
Display Resolution	0.1 °C	
Spectral Response	8 μm to 14 μm	
Response Time (95 %)	<500 ms	
K-Type Thermocouple Input Temperature Range	-270 °C to 1372 °C	

Feature	566-2	568-2
K-Type Thermocouple Input Accuracy	-270 °C to -40 °C: $\pm(1\text{ °C} + 0.2\text{ °/1 °C})$ -40 °C to 1372 °C: $\pm 1\text{ %}$ or 1 °C, whichever is greater	
K-Type Thermocouple Resolution	0.1 °C	
Distance:Spot (90 % energy)	35:1	55:1
Laser sighting	Single laser, output <1 mW Class II, wavelength 630 nm to 670 nm	
Emissivity	Digitally adjustable from 0.10 to 1.00 by 0.01 or via built-in table of common materials	
Data storage	50 points	99 points
Communication	none	USB 2.0
Operating Altitude	3000 meters above mean sea level	
Storage Altitude	12,000 meters above mean sea level	
Relative Humidity	10 % to 90 % RH non-condensing up to 30 °C	
Operating Temperature	0 °C to 50 °C	
Storage Temperature	-20 °C to 60 °C	
Weight	0.322 kg	
Dimensions	17.69 cm (6.965 in) H x 16.36 cm (6.441 in) L x 5.18 cm (2.039 in) W	
Power	2 AA /LR6 Batteries (alkaline or NiCD)	2 AA /LR6 Batteries or USB connection when used with a PC
Battery Life	12 hours with laser and backlight on; 100 hours with laser and backlight off, at 100 % duty cycle (thermometer continuously on)	
Safety	IEC 61010-1: Pollution Degree 2, IEC 60825-1: Class 2, 650 nm, <1 mW	

Feature	566-2	568-2
Electromagnetic Compatibility (EMC)		
International	IEC 61326-1: Portable Electromagnetic Environment, IEC 61326-2-2 CISPR 11: Group 1, Class A	
	Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.	
	Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.	
	Emissions that exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object. The equipment may not meet the immunity requirements of this standard when test leads and/or test probes are connected.	
Korea (KCC)	Class A Equipment (Industrial Broadcasting & Communication Equipment)	
	Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.	
USA (FCC)	47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.	

KTC Specifications

Measurement Range	-40 °C to 260 °C
Accuracy	±1.1 °C from 0 °C to 260 °C. Typically within 1.1 °C from -40 °C to 0 °C
Cable Length	1 m K-type thermocouple cable with standard miniature thermocouple connector and bead termination