FLUKE ®

VT02

Visual IR Thermometer

Users Manual

LIMITED WARRANTY AND LIMITATION OF LIABILITY

This Fluke product will be free from defects in material and workmanship for two years from the date of purchase. This warranty does not cover fuses, disposable batteries, or damage from accident, neglect, misuse, alteration, contamination, or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on Fluke's behalf. To obtain service during the warranty period, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that Service Center with a description of the problem.

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Introduction

The VT02 (the Product) is a Visual IR Thermometer that combines surface temperature measurement together with a real-time thermal image.

The thermal image removes the time necessary for component-by-component measurement associated with traditional spot radiometers. Potential issues are clearly shown on the color LCD display to help the user quickly and accurately position the center-point measurement cursor and measure the temperature.

To aid identification, the Product includes a visual camera. Images can be blended from full thermal to full visual as necessary. Both thermal and visual images can be saved to the removable memory card. Images can be recalled or saved to a PC for report generation and to print.

The VT02 is easy to use. Turn on and within seconds it is ready to test. The Product is ideal for electricians and maintenance technicians and can be used to find areas of concern quickly.

Several features increase the accuracy and usability of the Product:

- Adjustable emissivity and reflected background compensation improves measurement accuracy on semi-reflective surfaces

- Hot and cold spot temperature markers that guide the user to the hottest and coldest regions in the thermal image

- Selectable color palettes

How to Contact Fluke

To contact Fluke, use one of these telephone numbers:

- USA: 1-800-760-4523

- Canada: 1-800-36-FLUKE (1-800-363-5853)

- Europe: +31 402-675-200

- Japan: +81-3-6714-3114

- Singapore: +65-6799-5566

- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your Product, visit http://register.fluke.com.

To view, print, or download the latest manual supplement, visit http://us.fluke.com/usen/support/manuals.

Safety Information

A **Warning** identifies hazardous 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.

⚠⚠ **Warning**

To prevent possible electrical shock, fire, or personal injury:

- **Read all safety information before you use the Product.**
- **Carefully read all instructions.**
- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**
- **Replace the batteries when the low battery indicator shows to prevent incorrect measurements.**
- **Do not use the Product around explosive gas, vapor, or in damp or wet environments.**
- **Do not use the Product if it operates incorrectly.**
- **Do not use and disable the Product if it is damaged.**
- **See emissivity information for actual temperatures. Reflective objects result in lower than actual temperature measurements. These objects pose a burn hazard.**

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- **Remove the batteries if the Product is not used for an extended period of time, or if stored in temperatures above 50 °C. If the batteries are not removed, battery leakage can damage the Product.**

Table 1 is a list of symbols used on the Product or in this manual.

Table 1. Symbols

Symbol	Description
⚠	Important information. See manual.
⚡	Hazardous voltage. Risk of electrical shock.
C N10140	Conforms to relevant Australian standards.
CE	Conforms to requirements of European Union and European Free Trade Association.
Ⓚ	Conforms to relevant South Korean EMC standards.
🗑	This product complies with the WEEE Directive (2002/96/EC) 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. Go to Fluke's website for recycling information.

Before You Start

Table 2 is a list of all items included with the Product.

Table 2. Packing List

Item	Description	Part Number
1	Visual IR Thermometer	4253599
2	AA Alkaline Batteries (QTY. 4)	1560231
3	Micro SD Memory Card and conversion adapter to standard SD Memory Card[1]	4269849
4	Transport/Storage Case	4272528
5	Quick Reference Card (printed in English, Spanish, French, German, and Simplified Chinese[2])	4257700
6	CD-ROM with Users Manual	4253607
7	SmartView® Software on CD-ROM	2814474
[1] Fluke recommends the SD memory card that is supplied with the Product. Fluke does not warrant the use or reliability of aftermarket SD memory cards of different brands or capacities.		
[2] See the CD-ROM for additional languages. To request a printed Quick Reference Card in a language not supplied with your product, email Fluke at TPubs@fluke.com. Specify the product name and language preference in the subject line.		

Power On and Off

To turn on the Product, push and hold 🔘 for 2 seconds. A start-up screen shows on the display and an indicator bar shows the status, see Figure 1. The indication bar increases on power up and decreases on power down. After the start-up screen, the Product is ready to use. To turn off the Product, push and hold 🔘 for 2 seconds.

The Auto Off feature turns off the Product after 10 minutes of inactivity.

hak03.eps
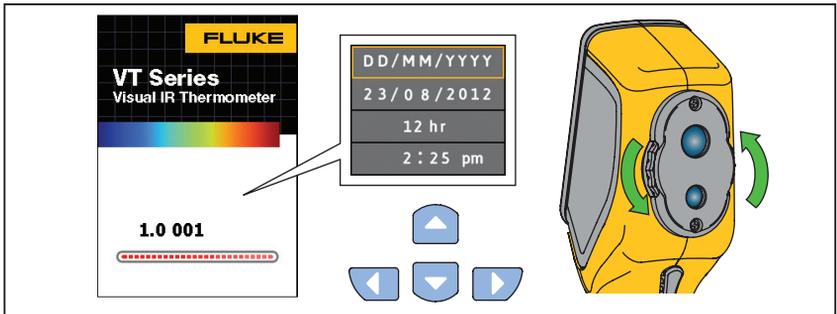
Figure 1. Start-Up Screen and Power Indicator

Note

All visual IR thermometers need sufficient warm-up time for the most accurate temperature measurements and best image quality. This time can often vary by model and by environmental conditions. Although most visual IR thermometers are fully warmed up in 3 to 5 minutes, it is always best to wait a minimum of 10 minutes if the most accurate temperature measurement is very important to your application. When you move a visual IR thermometer between environments with large differences in ambient temperature, more adjustment time can be required.

For the first time use, or when the batteries are removed for more than a few hours, the Date and Time menu opens. See page 13 for more information about how to set the date and time.

Features and Controls

Table 3 is a list of the Product features with the location of each control.

Table 3. Features
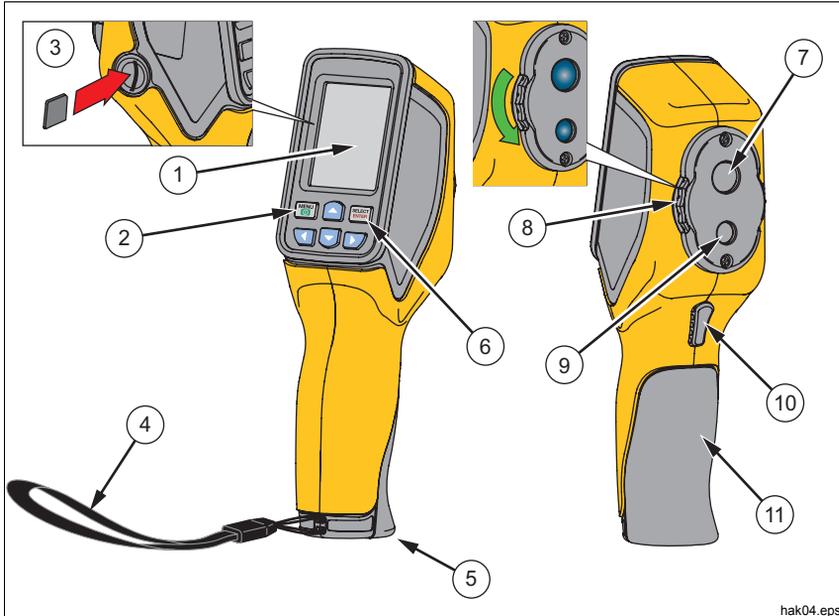
hak04.eps

Item	Description
1	LCD Display
2	Power On/Off and Menu
3	SD Memory Card Slot
4	Lanyard
5	Tripod Mount
6	Menu Selection/Parameter Adjustment
7	Infrared Lens
8	Rotating Lens Cover
9	Visual Camera
10	Trigger for Image Capture
11	Battery Cover

Focus

The Product is a fixed focus visual IR thermometer that operates from 50 cm (20 in).

Button Operations

Two functions are accessed directly from the buttons: Blending/Capture and Save. The arrow buttons are used for menu navigation.

Image Blending

Image blending makes it easier to understand infrared images through the use of an aligned visible image and infrared image. The Product captures a visible image with each infrared image to exactly show the target area and more effectively share it with others.

To use the blending function:

1. Push [MENU] until ▢ shows in the bottom left-hand corner of the screen.

2. Use ▲/▼ to adjust the blending from 0 % to 100 %.

The blend options are shown in Figure 2.

| 0 % | 25 % | 50 % | 75 % | 100 % |
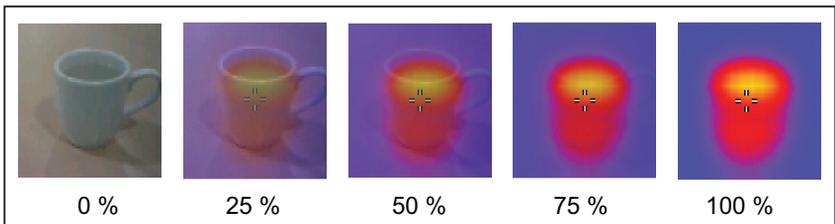
Figure 2. Blend Options

hak01.eps

Capture and Save

The Product saves up to 10,000 images on the Micro SD card.

To capture the image and save it to memory:

1. Push [MENU] until 🖼 shows in the bottom right-hand corner of the screen.

2. Point the Product at the object or area of interest.

3. Pull the trigger to capture the image.

The image remains frozen for about 4 seconds. It then shows the dialog box to let you either save or discard the image.

4. Push [SELECT ENTER] to save or [MENU ◯] to discard the image.

The display has an icon that shows the current status of the SD card, see Figure 3.

hak02.eps

Figure 3. SD Card Warning Icons

① No SD card in slot

② SD card error

③ SD card empty

④ SD card full

Note

A routine file back-up procedure is recommended for the SD card to store these files in a safe location.

Menu Functions

To open the display menu, push 🔳. The menu has options for memory, emissivity, background temperature, spot temperature markers, date, and time.

Basic Navigation

The basic functions of the Product are accessible with the six buttons and color display. Only five options show on the display at one time. The 🔼/🔽 buttons scroll through the display menu. The middle option is always highlighted in yellow. See Figure 4.
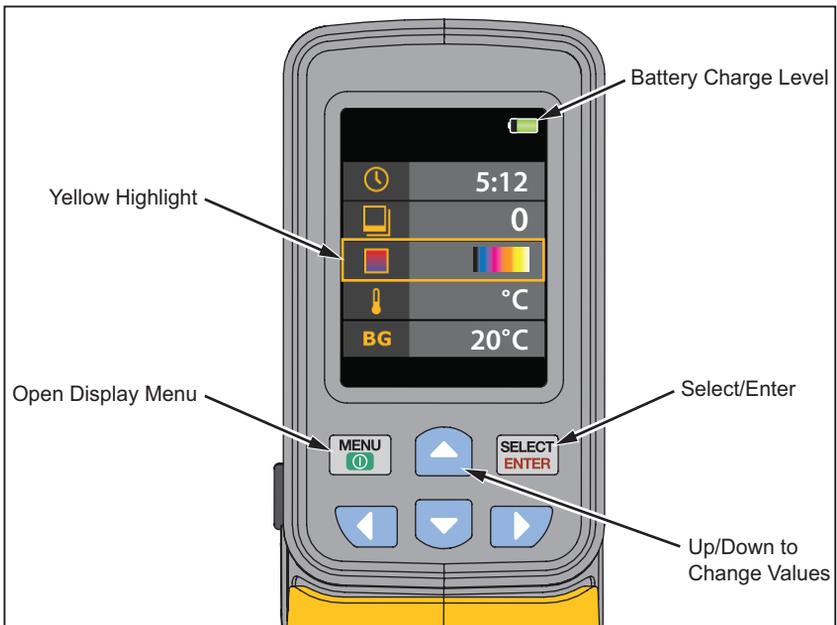
Figure 4. Menu Navigation and Battery Icon

hak07.eps

Push 🔳 to select the menu option and edit the value. The 🔼/🔽 buttons change the value of the menu selection. After adjustments are made, push 🔳 to accept a new value and exit the edit mode. See Figure 5.

BG 20 °C	⬛/⬛ to highlight SELECT/ENTER to select (color inverts)
BG 25 °C	⬛/⬛ change values SELECT/ENTER accept new value
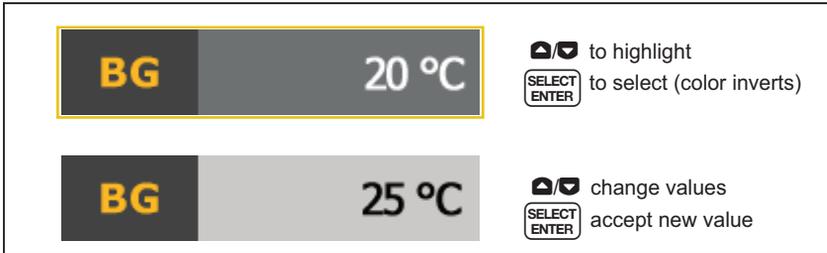
hak08.eps

Figure 5. Parameter Adjustment

Table 4 is a list of the menu icons and their descriptions.

Table 4. Menu Icons

Icon	Description
🖼 0	Play Stored images, see *Review Memory* on page 11
ε 0.95	Emissivity, see page 11
🟥 ▮▮▮▮▮	Color Palette, see page 12
BG 20 °C	Background Temperature, see *Reflected Background Temperature* on page 13
⊕ ✕	Temperature Markers, see *Spot* *Temperature Markers* on page 13
🌡 °C	Temperature Units, see page 13
🕐 5:12	Clock, see *Time and Date* on page 13

Review Memory

The Memory mode lets you view the stored images. You can also delete images in this menu.

1. Push ⬛ to open the Memory mode.
2. Push ⬓/⬒ to scroll through and review the stored images.
3. Push ⬛ to delete image.

Emissivity

The emissivity is adjustable in 0.01 steps from 0.10 to 01.00. The default value is set at 0.95.

The correct emissivity values are important for you to make the most accurate temperature measurements. Emissivity of a surface can have a large effect on the apparent temperatures that the Product observes. Understanding the emissivity of the inspection surface can, but not always, allow you to obtain more accurate temperature measurements.

Temperature Measurement

All objects radiate infrared energy. The quantity of energy radiated is based on the actual surface temperature and the surface emissivity of the object. The Product senses the infrared energy from the surface of the object and uses this data to calculate an estimated temperature value. Many common objects and materials such as painted metal, wood, water, skin, and cloth are very good at radiating energy and it is easy to get relatively accurate measurements. For surfaces that are good at radiating energy (high emissivity), the emissivity factor is ≥90 % (0.90). This simplification does not work on shiny surfaces or unpainted metals as they have an emissivity of <60 % (0.60). These materials are not good at radiating energy and are classified as low emissivity. To more accurately measure materials with a low emissivity, an emissivity correction is necessary. Adjustment to the emissivity value will usually allow the Product to calculate a more accurate estimate of the actual temperature.

Note

Surfaces with an emissivity <0.60 make reliable and consistent determination of actual temperatures problematic. The lower the emissivity, the more potential error is associated with the temperature measurement calculations of the Product, even when emissivity and reflected background adjustments are attempted and performed properly.

⚠ **Warning**

To prevent personal injury, see emissivity information for actual temperatures. Reflective objects result in lower than actual temperature measurements. These objects pose a burn hazard.

Go to http://www.fluke.com/Fluke-Thermal-Imaging-and-Thermal-Imagers for more information on emissivity and how to get the most accurate temperature measurements.

Color Palette

The Palette menu changes the false-color presentation of the infrared images that are on the display or captured. A variety of palettes are available. Some palettes are more suitable for specific applications and are set as required.

Grayscale Palettes offer an equal, linear presentation of colors that allow for best presentation of detail.

The High Contrast palette offers a weighted presentation of colors. This palette is best in situations with high thermal contrast for increased color contrast between the high temperatures and low temperatures.

The Ironbow and Rainbow palettes offer a mixture of the High Contrast and Grayscale palettes.

	Grayscale (White hot)
	Grayscale (Black hot)
	High Contrast
	Ironbow
	Rainbow

Reflected Background Temperature

The background temperature can be set between 0 °C and +36 °C.

Compensation for reflected background temperature is set in the Background tab. Very hot objects or very cold objects can affect the apparent temperature and measurement accuracy of the target or object of interest, especially when surface emissivity is low. Adjustment of the reflected background temperature can make the temperature measurement better in many situations. For more information, see *Emissivity* on page 11.

Spot Temperature Markers

The spot temperature markers turn on and off. When turned on, the marker is an indication of a hot or cold spot in the scene that may require additional evaluation. When turned off, the user is able to concentrate on the single measurement pixel.

Temperature Units

The Product displays temperatures in °C or °F.

Date and Time

In the Clock menu the user can set the time and the date.

Push 〔SELECT ENTER〕 to select the Clock.

hak12.jpg

1. Push [SELECT ENTER] again to select the date type. Move through the menu selections with the ▲/▼ buttons.

    Selections are:
    *   DD/MM/YYYY
    *   MM/DD/YYYY

2. Move down to the date.

3. Use ◄/► buttons to select each date item. Use ▲/▼ to change the value.

4. Push [SELECT ENTER] to set the value.

5. Move down to 12/24 hour clock. Push [SELECT ENTER] to edit the option.

6. Use the ▲/▼ to move through the selections.

7. Push [SELECT ENTER] to set the selection as:
    *   12 hr
    *   24 hr

8. Move down to time.

9. Push [SELECT ENTER] to edit the option.

10. Use ◄/► to move through individual time items.

11. Use ▲/▼ to change the value.

12. Push [SELECT ENTER] to set the value.

13. Push [MENU] to exit the Clock menu and go to the live image.

Measurements

The temperature measurement of the center pixel is shown at the top of the display. The emissivity setting also shows at the top of the display. When the hot/cold temperature markers are turned on, move the Product until the hot or cold spot coincides with the middle measurement pixel. Point the Product at an object that is likely to be hotter or colder than its surroundings for best results. The value of the hot/cold point shows at the top of the screen.
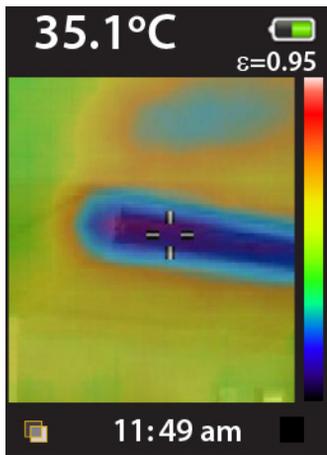
hak13.jpg

Smartview® Software

Smartview® software is supplied with the Product. This software contains features to analyze images, organize data and information, and make professional reports.

Smartview includes a function to export IR and visible images as .is2 files.

Maintenance

Maintenance is not necessary for this Product.

⚠⚠ **Warning**

To prevent possible electrical shock, fire, or personal injury, use only specified replacement parts.

How to Clean the Case

Clean the case with a damp cloth and a weak soap solution. Do not use abrasives, isopropyl alcohol, or solvents to clean the case or lens/window.

Battery Care

⚠ **Warning**

To prevent personal injury and for safe operation and maintenance of the Product:

- **Batteries contain hazardous chemicals that can cause burns or explode. If exposure to chemicals occurs, clean with water and get medical aid.**
- **Be sure that the battery polarity is correct to prevent battery leakage.**
- **Do not short the battery terminals together.**
- **Keep cells and battery packs clean and dry. Clean dirty connectors with a dry, clean cloth.**
- **Do not disassemble or crush battery cells and battery packs.**
- **Do not put battery cells and battery packs near heat or fire. Do not put in sunlight.**

⚠ **Caution**

Do not incinerate the Product and/or battery. Go to Fluke's website for recycling information.

To replace the batteries:

1. Remove the battery cover from the handle.

2. Remove the discharged batteries.

Note

Do not charge the batteries included with the Product.

3. Install new batteries with the correct polarity, see Figure 6.
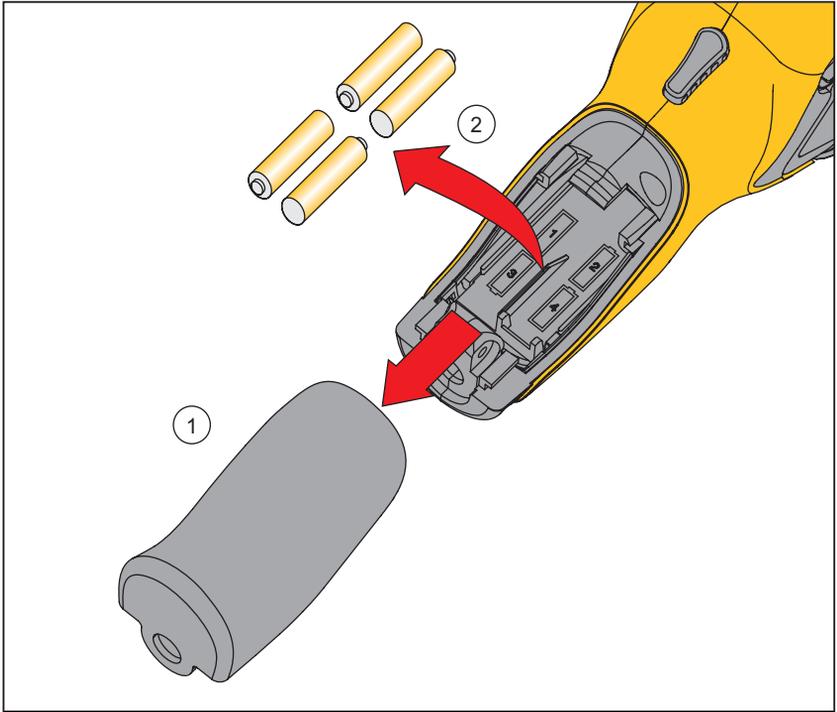
hak06.eps

Figure 6. Battery Replacement

4.   Slide battery cover into place on the handle.

Specifications

Temperature

    Temperature Measurement Range ....-10 °C to +250 °C

    Temperature Measurement Accuracy ....±2 °C or ±2 % of reading in °C, whichever is the greater (at 23° nominal)

    On-Screen Emissivity Correction ....Yes

    On-Screen Reflected Background Temperature Compensation................................Yes

Image Performance

    Image Capture Frequency...................................8 Hz

    Detector Type..Uncooled pyroelectric ceramic

    Thermal Sensitivity (NETD)................................≤250 mK

    Infrared Spectral Band ....8 µm to 14 µm

    Visual Camera...11025 pixels

    Minimum Focus Distance ....50 cm

    Field of View...20° X 20°

    Focus Mechanism ....Fixed Focus

Image Presentation

    Palettes ....Ironbow, Rainbow, Rainbow High Contrast, Grayscale (white hot) and Grayscale (black hot)

    Level and Span ....Auto

Blending Information

    Parallax Correction of Visual and IR Blending ....Fixed

    View Options ....Blending of the visual and the infrared from full infrared to full visual in 25 % steps

    Hot Spot and Cold Spot Tracking.......................Yes

Image capture and data storage

    Image Capture...Image available for review before a save

    Storage Medium ....Micro SD card, stores up to 10,000 images

    File Format is2

    Memory Review..Scroll through all saved images and view on-screen

Operating Temperature..-5 °C to +45 °C

Storage Temperature ....-20 °C to +60 °C

Relative Humidity ....10 % to 90 % non-condensing

Display .... 2.2 in diagonal
Controls and Adjustments
   Select Color Palette
   User-Selectable Temperature Scale (°F/°C)
   Time/Date Set
   Emissivity Selection
   Reflected Background Temperature Compensation
Software.. Smartview®

Note

Smartview® software is available for reports.

Batteries .... 4 AA
   Battery Life... 8 hrs
   Power Save .... Power down after 10 minutes of inactivity

Safety Standards
   EMC.. EN 61326-1:2006
             US FCC (optional) .... CFR47: 2009 Class A. Part 15 subpart B.
             Applies to use in Korea only .... Class A Equipment (Industrial Broadcasting & Communication Equipment)[1]

[1] This product meets requirements for industrial (Class A) electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and is not to be used in homes.

   Safety Compliance .... IEC/EN 61010-1:2010
Drop .... MIL-PRF-28800F; Class 2 section 4.5.5.4.2; 30 cm
Size (H x W x L).. 21 cm x 7.5 cm x 5.5 cm (8.3 in x 3 in x 2.2 in)
Weight (Battery Included) .... <300 gm (10.5 oz)
Warranty .... 2 years
Recommended Calibration Cycle........................ 2 years