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LTF Time of Flight Laser Distance Sensor Quick Start Guide

Product Description

Laser distance sensor with both analog and discrete (switched) outputs

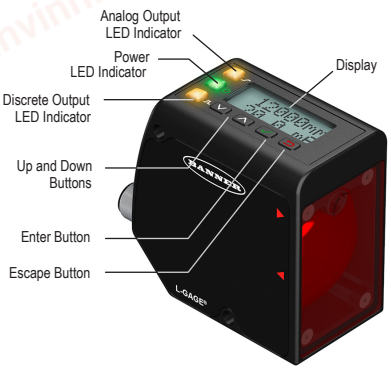
This guide is designed to help you set up and install the LTF Time of Flight Laser Distance Sensor. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at www.bannerengineering.com. Search for p/n 194135 to view the manual. Use of this document assumes familiarity with pertinent industry standards and practices.

WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

Features and Indicators

Features



Three LED indicators provide an ongoing indication of the sensing status.

Analog Output LED Indicator

Solid Amber = Displayed distance is within the taught analog output window
Off = Displayed distance is outside the taught analog output window

Power LED Indicator

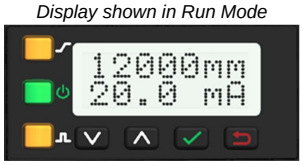
Solid Green = Normal operation, power On and laser On
Flashing Green (1 Hz) = Power On and laser Off (laser enable mode)

Discrete Output LED Indicator

Solid Amber = Discrete Output is On
Off = Discrete Output is Off

Display

Display shown in Run Mode



The display is a 2-line, 8-character LCD. The main screen is the Run mode screen, which shows the real-time distance measurement and the analog output measurement.

Buttons and Icons

Use the sensor buttons **Down**, **Up**, **Enter**, and **Escape** to program the sensor and to access sensor information.

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194136
p/n: 194136 Rev. H

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Down and Up Buttons

Press **Down** and **Up** to:

- Access the Quick Menu from Run mode
- Navigate the menu systems
- Change programming settings
- Change individual digit values in distance based settings

When navigating the menu systems, the menu items loop.

Enter Button

Press **Enter** to:

- Access the Sensor Menu from Run mode
- Access the submenus
- Move right one digit in distance based settings
- Save changes

In the Sensor Menu, a checkmark in the lower right corner of the display indicates that pressing **Enter** accesses a submenu.

Press **Enter** to save changes. New values flash rapidly and the sensor returns to the parent menu.

Escape Button

Press **Escape** to:

- Leave the current menu and return to the parent menu
- Return to Run mode from the Quick Menu

IMPORTANT: Pressing **Escape** discards any unsaved programming changes.

In the Sensor Menu, a return arrow in the upper left corner of the display indicates that pressing **Escape** returns to the parent menu.

Press and hold **Escape** for 2 seconds to return to Run mode from any menu or remote teach.

A lock symbol displays in the upper left corner of the display to indicate when the sensor is locked.

Sensor Installation

NOTE: Handle the sensor with care during installation and operation. Sensor windows soiled by fingerprints, dust, water, oil, etc. may create stray light that may degrade the peak performance of the sensor. Blow the window clear using filtered, compressed air, then clean as necessary using 70% isopropyl alcohol and cotton swabs or water and a soft cloth.

Mount the Device

1. If a bracket is needed, mount the device onto the bracket.
2. Mount the device (or the device and the bracket) to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.
3. Check the device alignment.
4. Tighten the mounting screws to secure the device (or the device and the bracket) in the aligned position.

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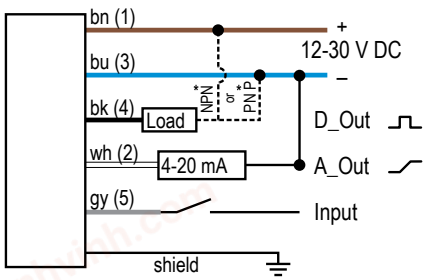
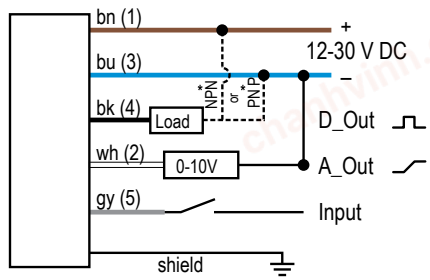
Wiring Diagrams

Analog Current Model

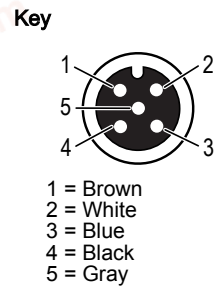


* User-configurable PNP/NPN setting

Analog Voltage Model



* User-configurable PNP/NPN setting



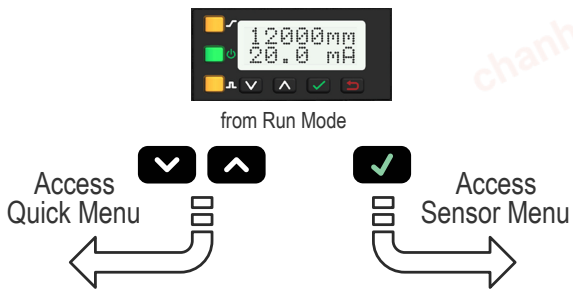
Sensor Programming

Program the sensor using the buttons on the sensor or the remote input (limited programming options).

From Run mode, use the buttons to access the Quick Menu and the Sensor Menu. See "Quick Menu" on page 3, "LTF Sensor Menu (MENU)" on page 4, and the instruction manual (p/n 194135) for more information on the options available from each menu. For TEACH options, follow the TEACH instructions in the instruction manual.

In addition to programming the sensor, use the remote input to disable the buttons for security, preventing unauthorized or accidental programming changes. See the instruction manual for more information.

Accessing the menus



See "Quick Menu" on page 3

See "LTF Sensor Menu (MENU)" on page 4

Quick Menu

The sensor includes a Quick Menu with easy access to view and change the analog and discrete output switch points. Access the Quick Menu by pressing **Down** or **Up** from Run mode. When in the Quick Menu, the current distance measurement displays on the first line and the menu name and the analog value alternate on the second line of the display. Press **Enter** to access the switch points. Press **Down** and **Up** to change each digit. Press **Enter** to move right one digit. After reviewing each digit, press **Enter** again to save the new value and return to the Quick Menu. Press **Cancel** to ignore any changes made if only some digits have been changed.

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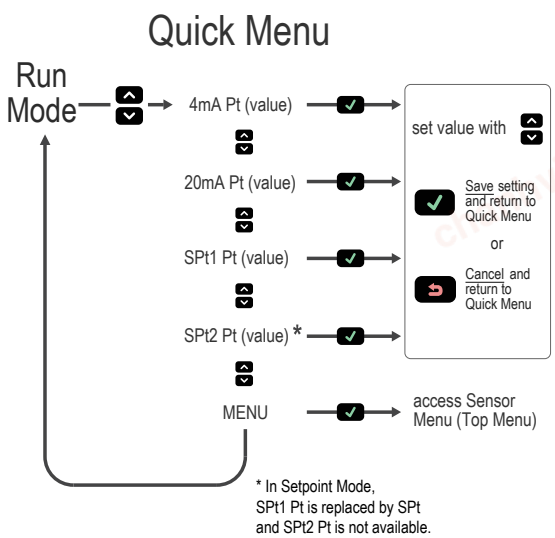
Quick Menu Map (Window Mode)



LTF Sensor Menu (MENU)

Access the Sensor Menu by pressing **Enter** from Run mode. The Sensor Menu is also accessible from the Quick Menu: navigate to **MENU** and press **Enter**. The Sensor Menu includes several submenus that provide access to view and change sensor settings and to view sensor information.

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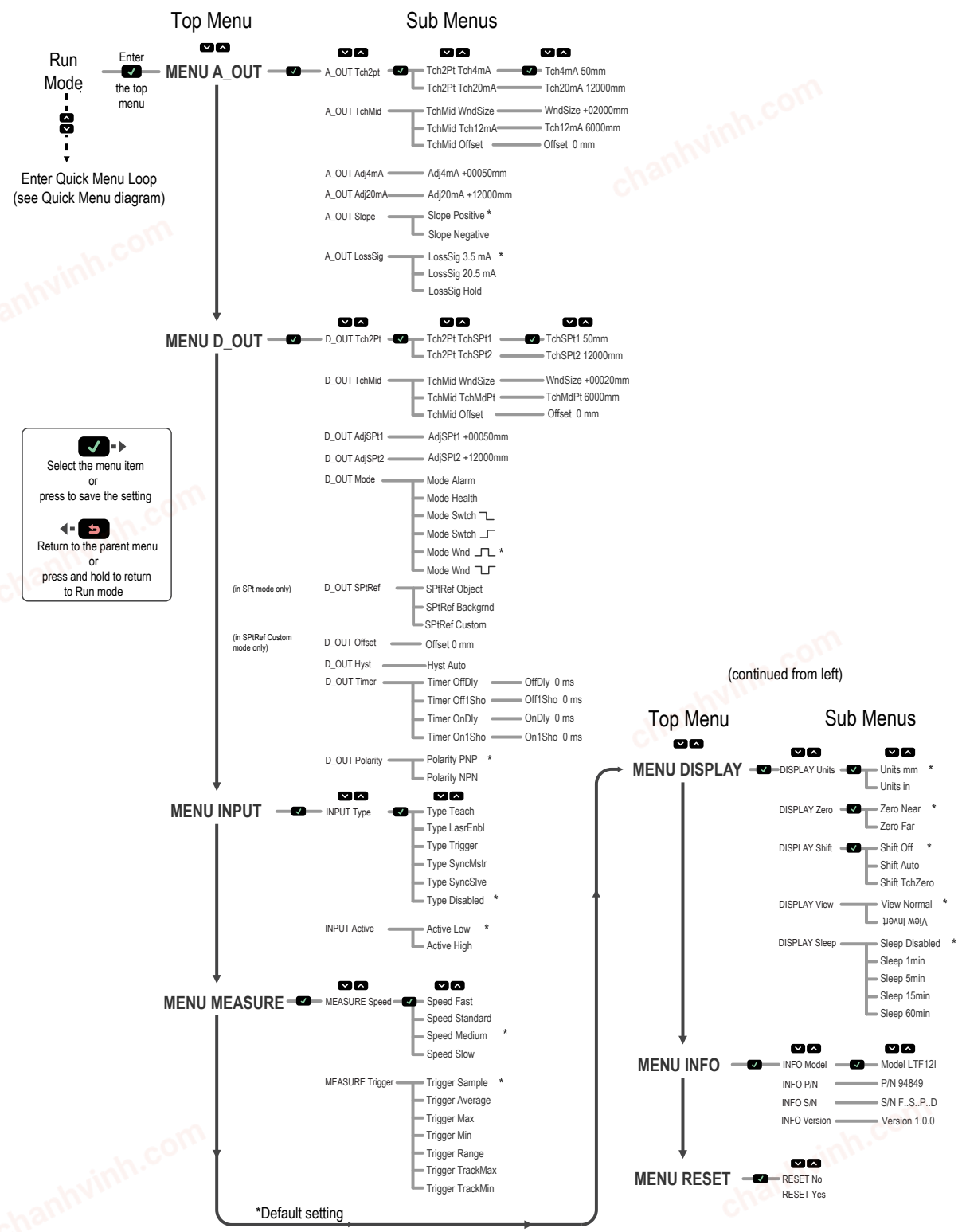
Sensor Menu Map



Specifications

Supply Voltage
12 V DC to 30 V DC

Power and Current Consumption (Exclusive of Load)
Normal Run Mode: < 2.1 W
Current consumption < 85 mA at 24 V DC

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Supply Protection Circuitry
Protected against reverse polarity and transient overvoltages

Construction
Die-cast zinc housing; acrylic window

Maximum Torque
2.6 N·m (23.0 in-lbs)

Sensing Beam
Visible red, 660 nm

Sensing Range – LTF12
90% White Target: 50 mm to 12000 mm
18% Gray Target: 50 mm to 11000 mm
6% Black Target: 50 mm to 7000 mm

Sensing Range – LTF24
90% White Target: 50 mm to 24000 mm
18% Gray Target: 50 mm to 18000 mm
6% Black Target: 50 mm to 11000 mm

Ambient Light Immunity
> 40000 lux

Delay at Power Up
2 seconds

Measurement Output Rate
0.5 ms

Output Configuration
Analog output: 4 to 20 mA or 0 to 10 V, depending on model
Discrete output rating: Discrete NPN/PNP is user-configurable

Output Ratings
Discrete Output: 100 mA maximum (protected against continuous overload and short circuit)
OFF-state leakage current (PNP): < 10 µA at 30 V
OFF-state leakage current (NPN): < 200 µA at 30 V
Output saturation voltage (PNP outputs): < 3 V at 100 mA
Output saturation voltage (NPN outputs): < 1.6 V at 100 mA
Analog current output (LTF...I Models):1 kΩ maximum at 24 V; maximum load resistance = [(Vcc-4.5)/0.02 Ω]
Analog voltage output (LTF...U Models): 2.5 kΩ minimum load resistance

Remote Input
Allowable Input Voltage Range: 0 to Vcc
Active Low (internal weak pullup—sinking current): High State > 4.3 V at 740 µA maximum; Low State < 1.3 V at 800 µA maximum
Active High (internal weak pulldown—sourcing current): High State > 4.3 V at 1.7 mA maximum; Low State < 1.3 V at 1.6 mA maximum

Certifications

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1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

Industrial Control Equipment
3TJJ

Minimum Window Size, Analog and Discrete
10 mm

Boresighting
100 mm radius at 12000 mm

Temperature Effect
50 mm to 12000 mm: ±0.25 mm/°C (typical)
>12000 mm: ±0.5 mm/°C (typical)

Resolution
LTF12: < 0.3 mm to 3 mm
LTF24: < 0.3 mm to 4 mm
Resolution measured as twice repeatability with white target at slow response speed at 20 °C. See repeatability curves for more detail.

Beam Spot Size
6.5 mm at 50 mm
10 mm at 7500 mm
12.5 mm at 12000 mm
35 mm at 24000 mm
Beam spot size is calculated as 1.6 times the D4σ measured diameter

Response Time
Fast: 1.5 ms
Standard: 8 ms
Medium: 32 ms
Slow: 256 ms

Storage Conditions
–30 °C to +65 °C (–22 °F to +149 °F)

Operating Conditions
–20 °C to +55 °C (–4 °F to +131°F)
90% at +55 °C maximum relative humidity (non-condensing)

Shock
MIL-STD-202G, Method 213B, Condition I (100G 6x along X, Y, and Z axes, 18 shocks), with device operating

Repeatability
See "Repeatability Performance" on page 8

Environmental Rating
IP67

Vibration
MIL-STD-202G, Method 201A (Vibration: 10 Hz to 55 Hz, 0.06 inch (1.52 mm) double amplitude, 2 hours each along X, Y and Z axes), with device operating

Application Note
For optimum performance, allow 15 minutes for the sensor to warm up

Linearity/Accuracy

Reflectance	LTF12		LTF24		
	±10 mm	±25 mm	±25 mm	±50 mm	±100 mm
6% Black Card	4 m	7 m	7 m	8 m	11 m
18% Gray Card	7 m	11 m	11 m	13 m	18 m
90% White Card	12 m	-	24 m	-	-

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Required Overcurrent Protection

WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	2.0	30	0.5

Class 2 Laser Description and Safety Information



Laser light. Do not stare into the beam.

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019.



CAUTION:

- **Never stare directly into the sensor lens.**
- Laser light can damage your eyes.
- Avoid placing any mirror-like object in the beam. Never use a mirror as a retroreflective target.

CAUTION:

- **Return defective units to the manufacturer.**
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Do not attempt to disassemble this sensor for repair. A defective unit must be returned to the manufacturer.

Class 2 lasers are lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Complies with IEC 60825-1:2014 and EN 60825-1:2014+A11:2021.

Class 2 Laser Safety Notes. Low-power lasers are, by definition, incapable of causing eye injury within the duration of a blink (aversion response) of 0.25 seconds. They also must emit only visible wavelengths (400 nm to 700 nm). Therefore, an ocular hazard may exist only if individuals overcome their natural aversion to bright light and stare directly into the laser beam.

Class 2 Laser Characteristics

Output power: ≤ 0.91 mW
Laser wavelength: 660nm

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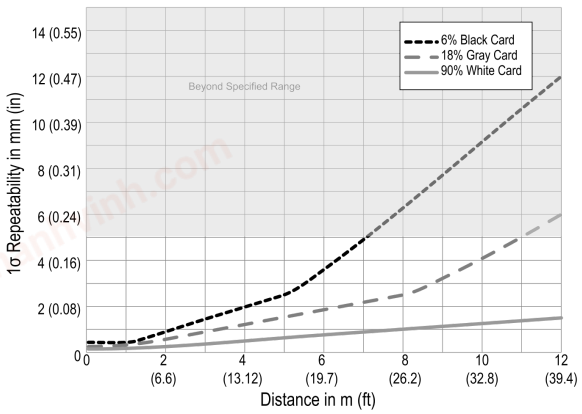
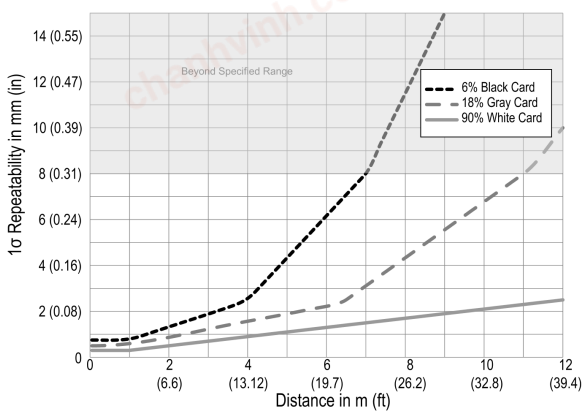
Repeatability Performance

LTF12 Models

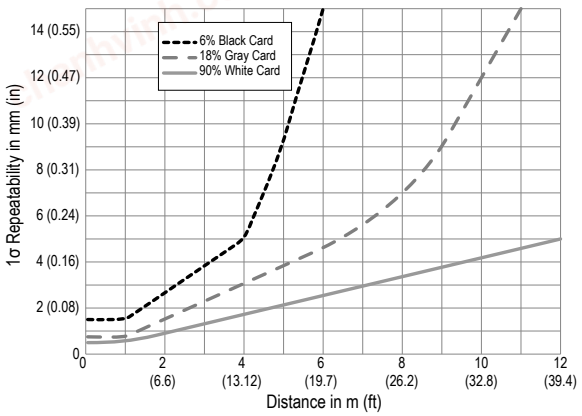
Speed: Slow (256 ms)



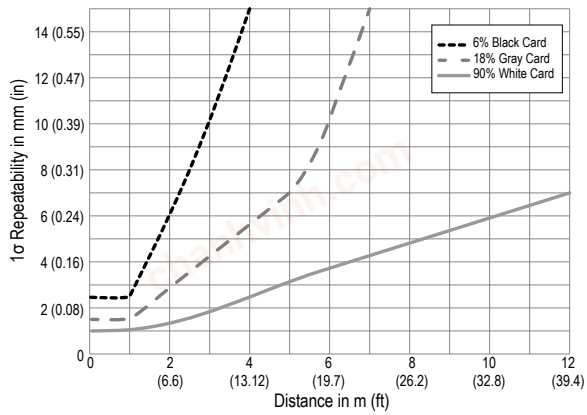
Speed: Medium (32 ms)



Speed: Standard (8 ms)

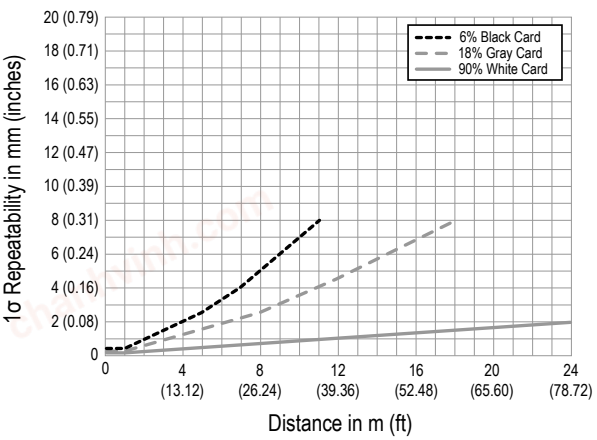


Speed: Fast (1.5 ms)

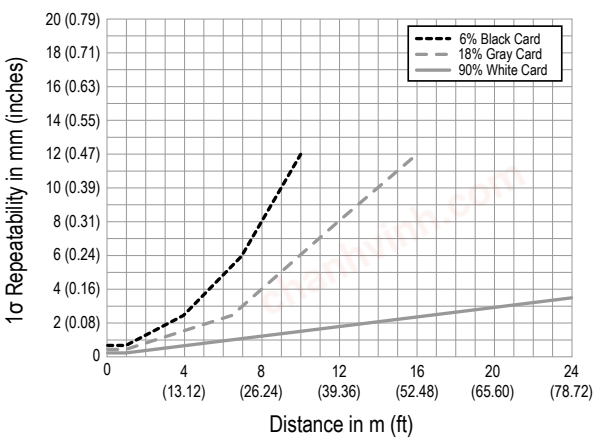


LTF24 Models

Speed: Slow (256 ms)



Speed: Medium (32 ms)



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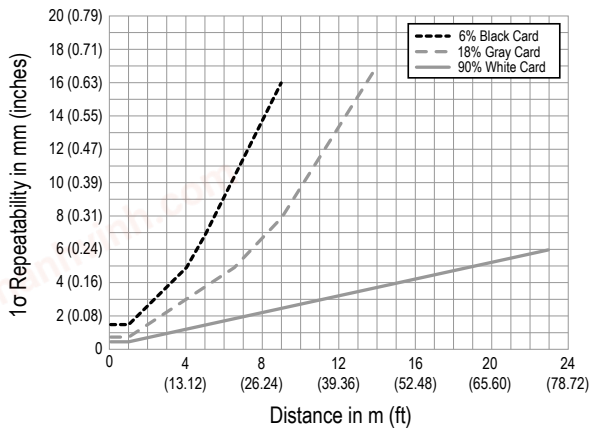
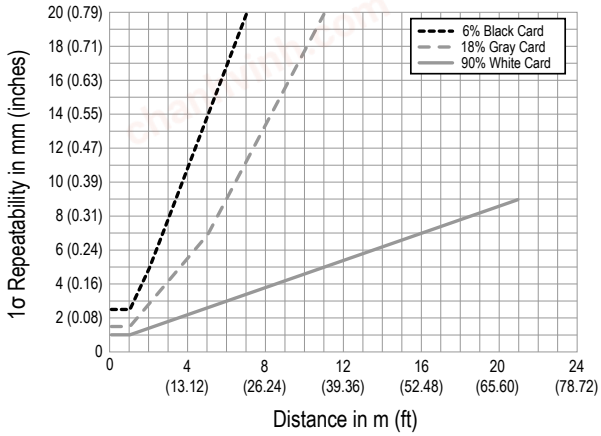
LTF24 Models

Speed: Standard (8 ms)



Speed: Fast (1.5 ms)



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