

L-GAGE® LTF Time of Flight Laser Distance Sensor with IO-Link



Quick Start Guide

Laser distance sensor with dual discrete (switched) outputs and IO-Link.

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 195393 to view the manual. Use of this document assumes familiarity with pertinent industry standards and practices.

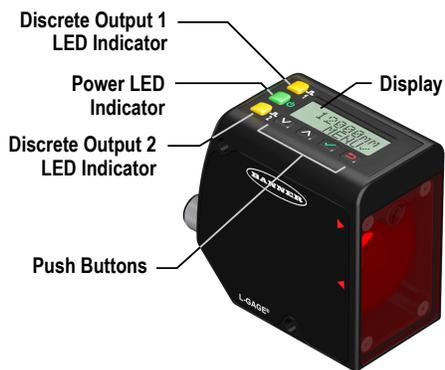


WARNING:

- **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

Figure 1. Features



Three LED indicators provide ongoing indication of the sensing status.

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 Indicators

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

Display

Figure 2. 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.

Buttons

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



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 check mark "✓" 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.

Laser Description and Safety Information



CAUTION: 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 Laser Models



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.



For Safe Laser Use - Class 2 Lasers

- Do not stare at the laser.
- Do not point the laser at a person's eye.
- Mount open laser beam paths either above or below eye level, where practical.
- Terminate the beam emitted by the laser product at the end of its useful path.

Reference IEC 60825-1:2007, Section 8.2.

Class 2 Lasers

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.

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 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.

Figure 3. FDA (CDRH) warning label (Class 2)



Sensor Installation



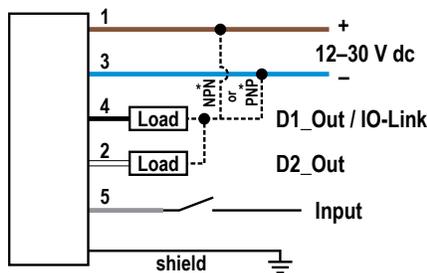
Note: Handle the sensor with care during installation and operation. Sensor windows soiled by fingerprints, dust, water, oil, etc. may create stray light that may degrade the peak performance of the sensor. Blow the window clear using filtered, compressed air, then clean as necessary using 70% isopropyl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

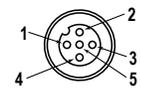
Wiring Diagrams

Figure 4. IO-Link Models



* User-configurable PNP/NPN setting

Key



- 1 = Brown
- 2 = White
- 3 = Blue
- 4 = Black
- 5 = Gray

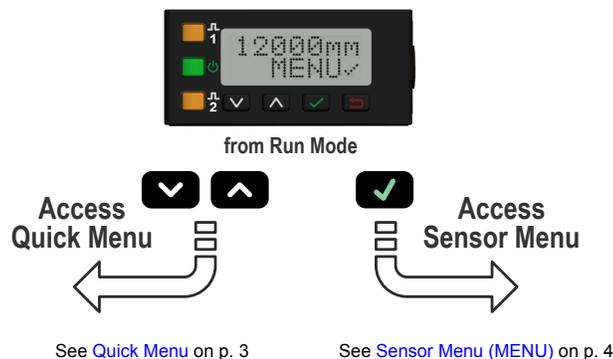
Sensor Programming

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 p. 3, [Sensor Menu \(MENU\)](#) on p. 4, and the instruction manual (p/n 195393) 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.

Figure 5. Accessing the Menus

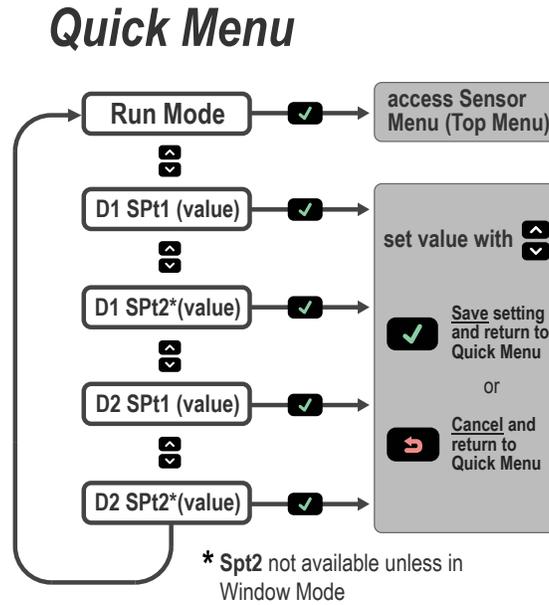


Quick Menu

The sensor includes a Quick Menu with easy access to view and change the 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 discrete output switch points 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.

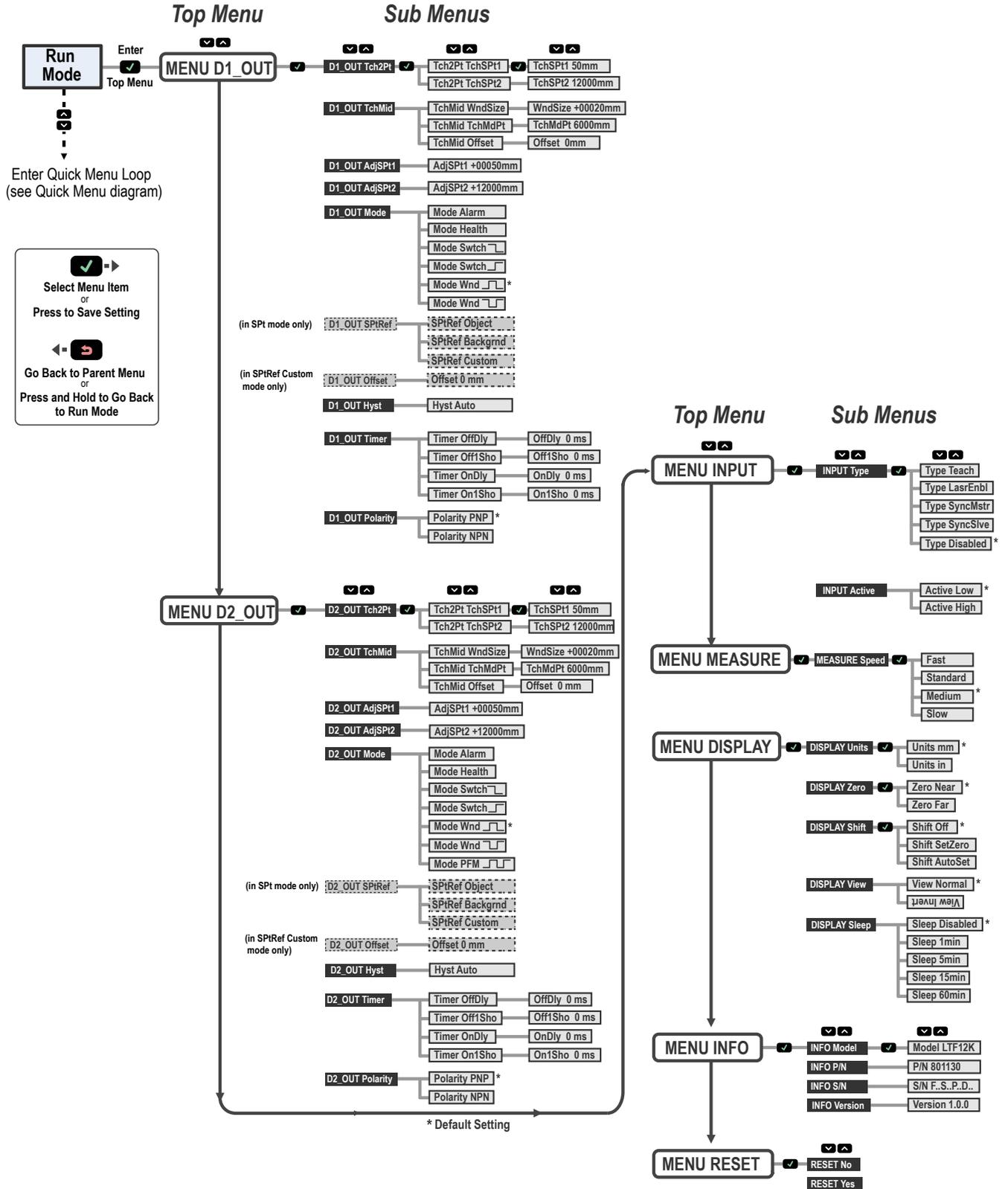
Figure 6. Quick Menu Map (Window Mode)



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.

Figure 7. 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

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)

Output Configuration

User configurable to dual discrete NPN or dual discrete PNP; the NPN/PNP polarity menus change both outputs

Output Ratings

Discrete Output: 100 mA maximum (protected against continuous overload and short circuit)
OFF-state leakage current (PNP): < 10 μ A at 30 V
OFF-state leakage current (NPN): < 200 μ A at 30 V
Output saturation voltage (PNP outputs): < 3 V at 100 mA
Output saturation voltage (NPN outputs): < 1.6 V at 100 mA

Remote Input

Allowable Input Voltage Range: 0 to Vcc
Active Low (internal weak pullup—sinking current):
High State > 4.3 V at 740 μ A maximum
Low State < 1.3 V at 800 μ A 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

Response Time

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

IO-Link Interface

Supports Smart Sensor Profile: Yes
Baud Rate: 38400 bps
Process Data Widths: 32 bits
IODD files: Provides all programming options of the display, plus additional functionality. See p/n [199517](#) for IO-Link reference information.

Repeatability

See Performance Curves

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

Minimum Window Size

10 mm

Boresighting

40 mm radius at 12000 mm
80 mm radius at 24000 mm

Temperature Effect

50 mm to 12000 mm: ± 0.25 mm/ $^{\circ}$ C (typical)
>12000 mm: ± 0.5 mm/ $^{\circ}$ C (typical)

Linearity/Accuracy

Reflectance	LTF12		LTF24		
	± 10 mm	± 20 mm	± 25 mm	± 50 mm	± 100 mm
6% Black Card	5 m	7 m	7 m	9 m	11 m
18% Gray Card	8 m	11 m	11 m	14 m	18 m
90% White Card	12 m	-	24 m	-	-

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 $^{\circ}$ 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 D4 σ measured diameter

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)

Environmental Rating

IP67; NEMA 6

Shock

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

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

Certifications



Advanced Capabilities



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 (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

Repeatability Performance

LTF12 Models

Figure 8. Speed: Slow (256 ms)

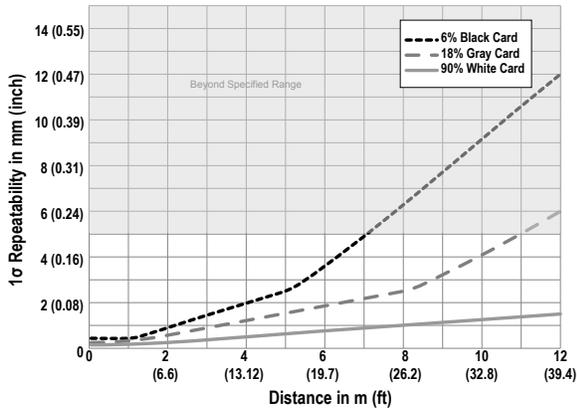


Figure 9. Speed: Medium (32 ms)

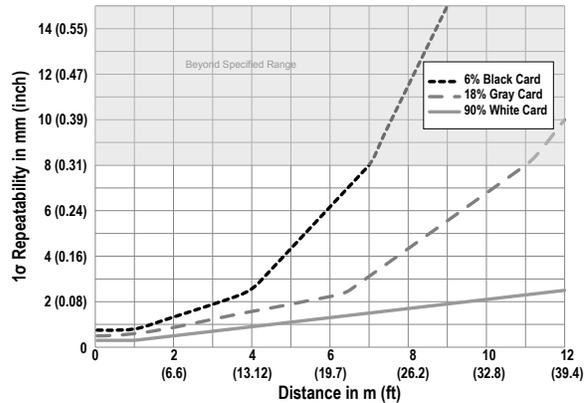


Figure 10. Speed: Standard (8 ms)

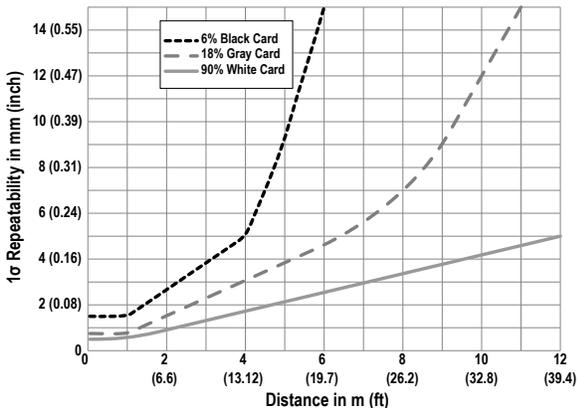
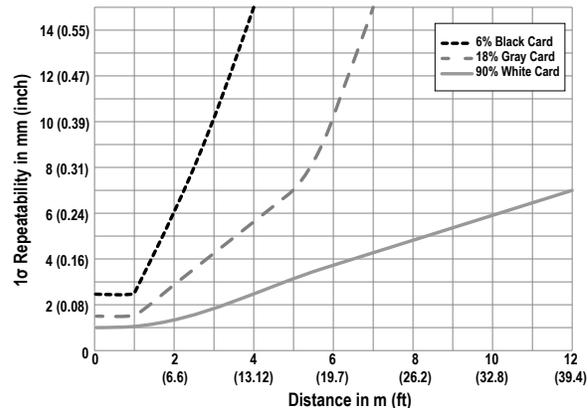


Figure 11. Speed: Fast (1.5 ms)



LTF24 Models

Figure 12. Speed: Slow (256 ms)

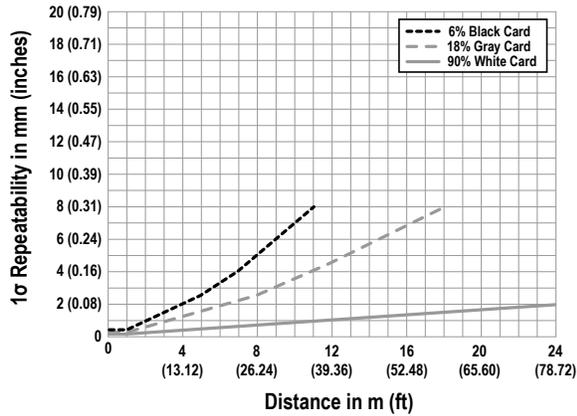


Figure 13. Speed: Medium (32 ms)

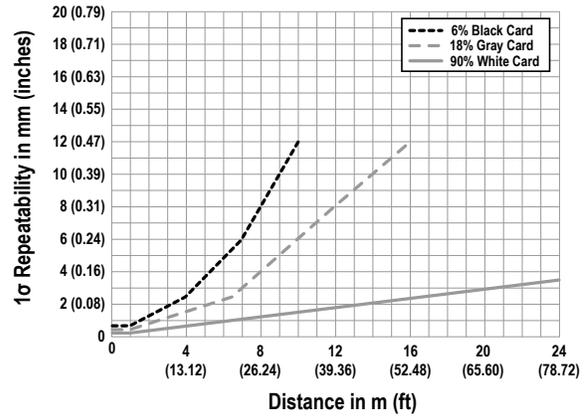


Figure 14. Speed: Standard (8 ms)

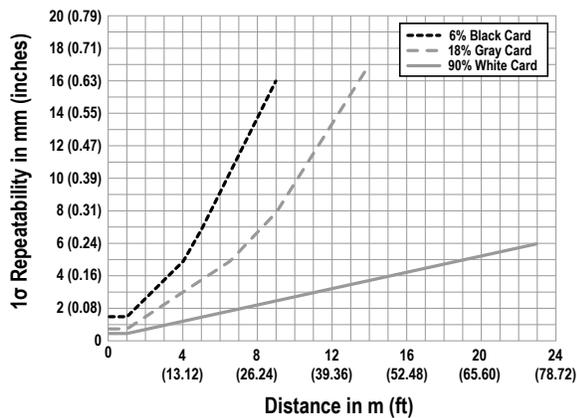
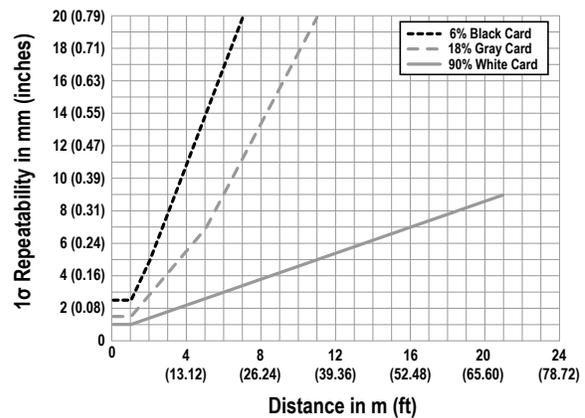


Figure 15. Speed: Fast (1.5 ms)



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