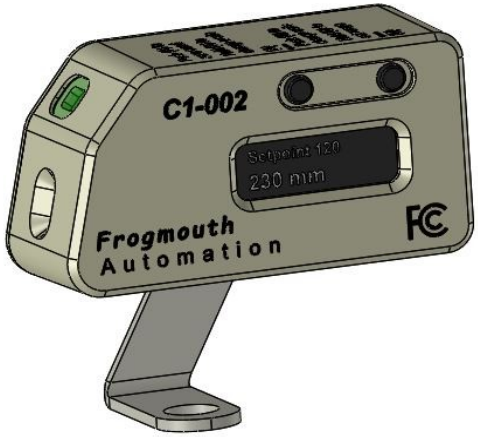
Frogmouth
Automation



C1-002
LASER DISTANCE SENSOR
USER MANUAL

Contents

Page 1	Warnings
Page 2	Specifications
pages 3	Overview
Pages 4-6	Functions
Page 7	Communications
Page 8	M12 Cable Pin-out
Page 9	Installation

August 2020 CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Cables, Cable Assemblies, and Printed Circuit Boards can expose you to chemicals including lead and lead compounds which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov

WARNING: Electrical cords, cables, product cords and wire assemblies made with PVC can expose you to chemicals including DEHP, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov

WARNING: This Housing of this product is molded out of ABS plastic which can expose you to chemicals including styrene which are known to the State of California to cause cancer, and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device is not intended to be used for residential purposes or in residential environments

Warning !

Read and understand all instructions before use of this product. Any use other than the intended use of this product can be hazardous to people, damage equipment and/or cause permanent injury or death.

Warning !

- This product was not designed as or intended to be used as a safety device to protect people or equipment. Using this device in any way other than its intended use or altering this device in any way could be hazardous to people, damage equipment or cause permanent injury or death!

- Installation is only to be done by a trained professional who understands electronics and automation as well as safety regulations and procedures that apply to this type of device.

- If this product gets wet, dropped, is damaged or functions incorrectly, immediately remove from power and send it to the factory or authorized repair center for repair or replacement.

- This product is to be used indoors in a temperature and humidity controlled environment free of water, moisture, combustible or hazardous objects, chemicals or gasses. Explosion, electric shock, fire or death can result if used in an environment other than what is instructed.

- Do not connect the cable under power as this could cause electric shock and/or damage equipment.

- The C1-002 is only intended to be used as a tool in the functionality of an automated system and not as a stand alone system. It is the end user's sole responsibility to ensure that this product is the proper tool for their system design. US Custom Billet assumes no responsibility for damages or injury caused by a system that has incorporated the C1-002 in their design. Furthermore, US Custom Billet only gives direction and advise in the form of technical support and all suggestions should be approved by the engineering team of the end user's system.

Frogmouth Automation

C1-002 Specifications

Range of measurement	50.8mm - 1220 mm (2 inch – 48 inches)
Resolution ratio	1mm (.039 inch)
Laser type	Class 1 laser device compliant with latest standard IEC 60825-1:2014 - 3rd edition
Laser color	Invisible IR
Laser Indicator	RGB LED
Connector	M12 male 8 pin
Communication modes	Serial Discrete NPN: Analog
Communication protocol	ASCII output in millimeters/count
Power supply	5-36 Volts DC
Operating temperature range	10 – 120 deg. Fahrenheit (-15 - 50 degrees Celsius)

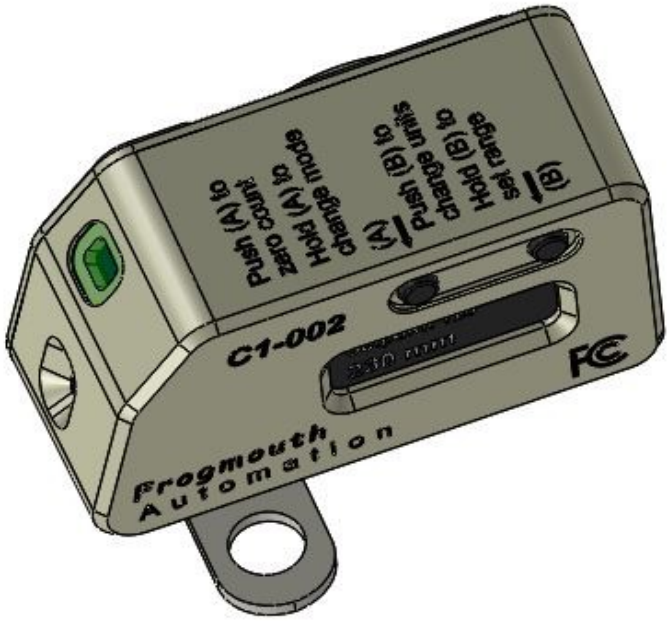
C1-002 Overview

The C1-002 is a multifunction adjustable laser distance sensor/parts counter that utilizes an invisible IR laser and TOF (time of flight) technology to measure distance and communicate information to other devices such as micro-controllers, computers or PLC's including devices such as Arduino® development boards and Raspberry Pi®. Listed below are the key features.

- Eye safe Class I IR laser
- * Range 2-48 inches (50.8 mm– 1220 mm)
- ** 27 degrees FOV (field of view)
- Input voltage range 5V-36V DC
- Lightweight ABS housing
- Discrete NPN output
- Serial output
- Analog output
- Precision .039 inch (1mm)
- * Accuracy +/- .078 inch (2mm) and +/- 2%
- OLED Display
- Adjustable/teachable range
- Dual units inch/mm
- Dual modes – distance sensor/parts counter
- Adjustable timing budget

* Range and accuracy will vary depending on lighting conditions and target size.

** Measurement accuracy will decrease when the target is outside of the center of the FOV.



Functions

Teach and Function Buttons:

- Set Range (Hold button B for 5 seconds)
  *see instructions for teaching range
- Units (Hold button B until units go blank)
- Modes (Hold button A until display changes)
- Zero Counter (Press button A)
- Timing budget speed (Press and hold both A and B)

- **Set range button and discrete output:**
  Pressing and holding the Set range button (button B) for 5 seconds will set the range limit at the laser termination point. To teach this termination point, simply place an object in front of the sensor at the desired distance before pressing and holding button (B). When an object terminates the laser at this position or closer to the unit, the indicator light will turn green and the discrete output will become high. The discrete output is **NPN** which completes the ground in the circuit. The max current through this output is 400 mA and the maximum voltage is 36V. The receiving device must share a common ground with the C1-002.

- **Units:**
  Pressing the Unit button (button B) until the distance on the display goes blank and then releasing will toggle the units displayed on the screen between inches and millimeters.

  NOTE Changing the units will **only** change the units displayed on the screen, the units output through serial will remain in millimeters to maintain consistency in PLC or PC programming.

- **Modes:**
  Pressing and holding the mode button (button A) until the screen displays the next mode will toggle between distance sensor and part counter modes.

- **Zero Counter:**
  Pressing and releasing the zero counter button (button A) while in counter mode will reset the counter to zero.

- **Timing budget speed:**
  The C1-002 has three speed modes that can be toggled by pressing and holding the (A) and (B) buttons simultaneously. The unit is programmed by default to fast mode.

  ** NOTE Speed mode only applies to the distance sensor mode. Parts counter mode is always in fast mode.

- **Slow mode** will take longer to display and output the distance but has the most accurate measurement and the highest tolerance to undesirable lighting situations.

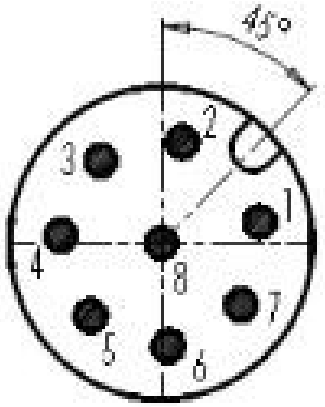
- **Medium mode** reacts reasonably fast and is somewhat tolerant to undesirable lighting.

- **Fast mode** has the fastest reaction time but is the least tolerant of undesirable lighting.

Serial port settings
Baud - 115200
Parity – none
Data bits - 8
Stop bits – 1
Flow control – none
Communication voltage is 5V DC

- **Serial output to PLC or micro controller:**
  Serial output is ASCII. When connecting to a PLC or micro controller, connect the TX pin to the RX pin on the receiving device and the RX pin to the TX pin on the receiving device. Make sure that the two devices share common ground, that the receiving device is rated for 5V DC communication and that transmitting voltage to the distance sensor does not exceed 5 volts.
- **Serial output to a computer:**
  When connecting to a computer use a TTL to USB converter and connect TX on the C1-002 to RX on the converter, + Volts on the C1-002 to + Volt on the converter, RX on the C1-002 to the TX on the converter and 0 Volts on the C1-002 to 0 Volts on the converter.
- **Analog output :**
  Analog output operates in a range from 0 to 5 volts where O volts = 0 mm and 5 volts = 2048 mm

CABLE PINOUT



M12 MALE CONNECTOR OUT OF SENSOR

Pin Number	Connection
1	Input 5-36 Volts
2	RX
3	0V
4	NPN Discrete Output
5	Not Connected
6	Analog Output
7	TX
8	Not Connected

Installation

Installation is only to be done by a trained professional who understands electronics and automation as well as safety regulations and procedures that apply to this type of device.

Mount the C1-002 by installing a ¼ inch bolt, nut and locking washer through the hole in the supplied bracket.

Mounting this device as close to the target as possible while staying inside of the operating range will yield the best results

Small angular adjustments may be made by loosening the two self threading screws that fasten the bracket to the C1-002 housing and then rotating the unit clockwise or counter clockwise. Make sure that all bolts and screws are tight after mounting and adjusting.

When wiring this device to a receiving device, only use a compliant female M12-8 pin cable that is shielded and 20 cm or less in length.

A compliant cable with a female M12 8 pin connector on one end and open leads on the opposite end can be purchased through the Frogmouth Automation store on Amazon by ordering part# FMA-M12-8P-20CM-F

All open leads must be connected to a terminal block.