



GENERATIONS AHEAD IN SONAR & ULTRASONIC TECHNOLOGY

## Model M-320/95 Low Cost Sensor (0-20 mA Output)

The Massa Model M-300/95 Sensor measures target distances over a range of 1 foot (0.3 meters) to 15 feet (4.5 meters). It is a member of the Massa M-300 family that includes several models of RoHS compliant and CE certified low cost liquid level sensors that produce detection ranges from as close as 4 inches (100 mm) to 15 ft. (4.5 meters). Incorporating state-of-the-art ultra-sonic technology, the sensors provide precision non-contact distance measurement for factory automation or industrial process control. The M-300 family of sensors stand out over all other systems because of their affordability, extraordinary ease of operation, genuinely user-friendly software, versatility in user-controlled outputs, and the ability to be set up without using a target. They transmit narrow beam sound pulses at a user-selected rate (or they can be software triggered), process return echoes, and produce several outputs dependent on the position of the target.

Operating from 15 to 24 V DC, the M-320/95 Sensor provides a linear output of 0 to 20 mA DC, which is proportional to the measured distance to the target. This output voltage range can be easily reprogrammed to start and end anywhere between 0 and 20 mA DC. The corresponding target distance span can be set to start and stop at any two target ranges. In addition, this output current can also be programmed to operate as a digital switch at a specified target setpoint distance.

The system parameters and outputs are programmable via an RS-485 data link, thereby eliminating problems associated with adjustment potentiometers or pushbuttons. Some additional programmable adjustments include: analog output slope, sampling rate, averaging of multiple distance measurements, loss-of-echo time-out, setpoint hysteresis when operating in the digital switch mode, and a software sensor transmit trigger.

The Model M-320/95 includes an advanced diagnostic feature that will retrieve the ultrasonic waveform for analysis and display it on a computer using the sensor's software. Users will find this very useful for debugging and correcting more difficult applications without using an oscilloscope.

The M-320/95 Sensor's user-friendly software operates with MS Windows® operating systems using an RS-232/RS-485 or USB/RS-485 converter. This data link allows up to 32 sensors to be connected in parallel onto the same multi-drop communication network using the supplied protocol. This network also allows users to remotely program their sensors and read target distances for quick integration into their process control application.

Other features include a totally sealed PVC housing containing an industry standard 1 inch NPT fitting for mounting, operation from -20°C to 65°C with built-in temperature compensation, diagnostic and monitoring outputs, and protection from over-voltage, short circuits, and reverse polarity.

For more information visit our web site at [www.massa.com](http://www.massa.com).

### MASSA PRODUCTS CORPORATION

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### FEATURES

- Low Cost
- 1" NPT Mounting Fitting
- Analog or Setpoint Outputs
- Plug & Play Setup
  - No Target Needed
- Software Set Span and Zero
  - No Pots or Pushbuttons
  - Tamperproof Settings
- Easy to Use Setup Software
  - Windows® 98 / NT / 2000 / XP SP3 / Vista / 7
- Built-in Temperature/Sound Speed Compensation
- Up to 32 Sensors on RS-485 Multi-drop Network

### APPLICATIONS

- Liquid Level Control
- Mechanical Positioning
- Roll Diameter Measurement
- Web Loop Monitoring
- Automatic Filling Operations
- Automatic Packaging
- Bulk Level Control
- Paper/Plastic Film Processing



## ORDERING INFORMATION

Massa Model M-320/95 Sensor:  
P/N 300444-501

### OPTIONAL ITEMS:

#### Mounting Bracket:

P/N 200671-1

#### Locknut *(one included with each sensor):*

P/N 8195-1, For use when installing on a bracket or plate.

#### Serial Port Converter:

P/N 7868-1, RS-232 (DB9)/RS-485 Converter

#### USB Port Converter:

P/N 8220-1, USB/RS-485 Converter

#### M-300 Software:

Go to: [www.massa.com](http://www.massa.com) to download the latest version.

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## M-320/95 SPECIFICATIONS (0-20 mA Output)

### PERFORMANCE *(Typical at 24 V DC, 22° C, and 50% RH)*

Ultrasonic Frequency:	95 kHz, nominal
System Beam Angle:	8 degrees conical
Target Detection	
Minimum Distance:	1 foot (0.3 meters)
Maximum Distance:	Up to 15 feet (4.5 meters), dependent on target
Measurement Resolution:	.01 inches (0.25 mm)
Echo Detection Sensitivity:	User selectable
Power Required:	15 V DC to 24 V DC (reverse polarity protected), 30 mA, typical <i>(not including I-Out)</i>
Temperature Compensation:	Internal probe

### PROGRAMMABLE CURRENT OUTPUTS

#### Proportional Current Output Mode

Current Loop Output:	0 to 20 mA or 4 to 20 mA DC sourcing, 10-bit resolution, invertible
Zero & Span Distance:	Programmable from 1 foot to over 15 feet <i>(factory default: 1 foot to 13 feet)</i>
Zero & Span Currents:	Programmable from 0 to 20.5 mA DC <i>(factory default: 0 to 20.0 mA DC)</i>
Loss of Echo Current:	Programmable from 0 to 20.5 mA DC <i>(factory default: 20.5mA DC)</i>
Response Time:	60 mS
Resolution:	10 bits

#### Switched Setpoint Output Mode

Setpoint Distances:	Programmable from 1 foot to over 15 feet
Setpoint Current:	0 or 20.5 mA DC
Setpoint Hysteresis:	Programmable from 0% to 75%
Response Time:	< 1 ms

### PROGRAMMABLE SAMPLING SETTINGS

Sampling Rate:	0.1 Hz to 20 Hz in 0.1 Hz increments <i>(factory default: 10 Hz)</i>
Trigger Modes:	Internal, software trigger
Target Distance Averaging:	Rolling Average: from 1 to 32 samples, or Boxcar Average: from 1 to 1,024 samples <i>(factory default: 1 sample)</i>
Loss-of-Echo Time-out:	From 1 to 254 consecutive samples missed before time-out <i>(factory default: 1 sample)</i>

### MECHANICAL *(see outline drawing)*

Housing Material:	PVC
Transducer Surface:	MassaPlast™102 (custom PPA)
Cable:	5 conductor, PVC jacket, 22 AWG, 18" (460 mm) pigtail [user-extendable for RS-485 Communication to 5,000 ft. (1,500 m)]

### ENVIRONMENTAL

Operating Temperature:	-20°C to 65°C
Storage Temperature:	-40°C to 85°C
Relative Humidity:	0 to 95%, non-condensing
Enclosure Rating:	IP67

### PROGRAMMING REQUIREMENTS

Communications Converter:	RS-232 (or USB)/RS-485 with automatic send data control
Operating System:	Windows® 95/98/NT/2000/XP SP3/Vista/7

*All Specifications subject to change without notice.*

# Massa Model M-320/95 Sensor

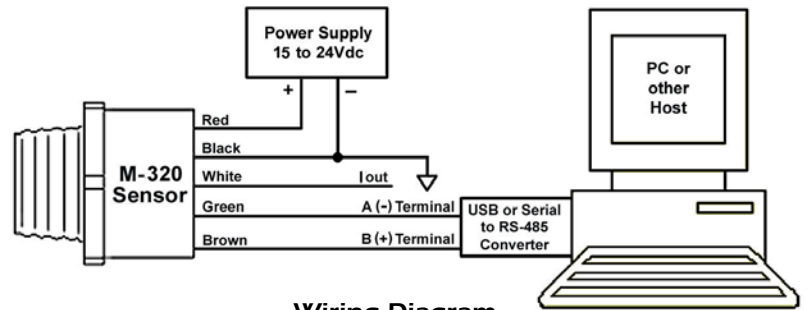
(0-20 mA Output)

## WIRING AND MOUNTING INFORMATION

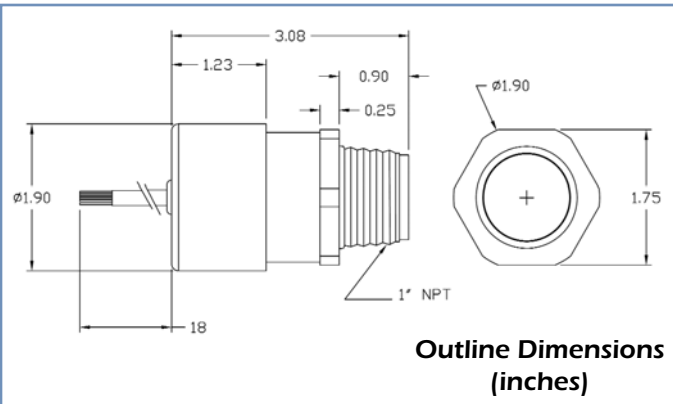
### Guide for Connecting an M-320 Sensor to a Power Supply and a Computer

To operate the Massa M-320 Sensor, it is only necessary to connect its red and black wires to a 15 to 24 V DC battery or power supply, as shown in the diagram below. The current output on the white wire will then indicate the distance to the target or its position relative to the setpoint.

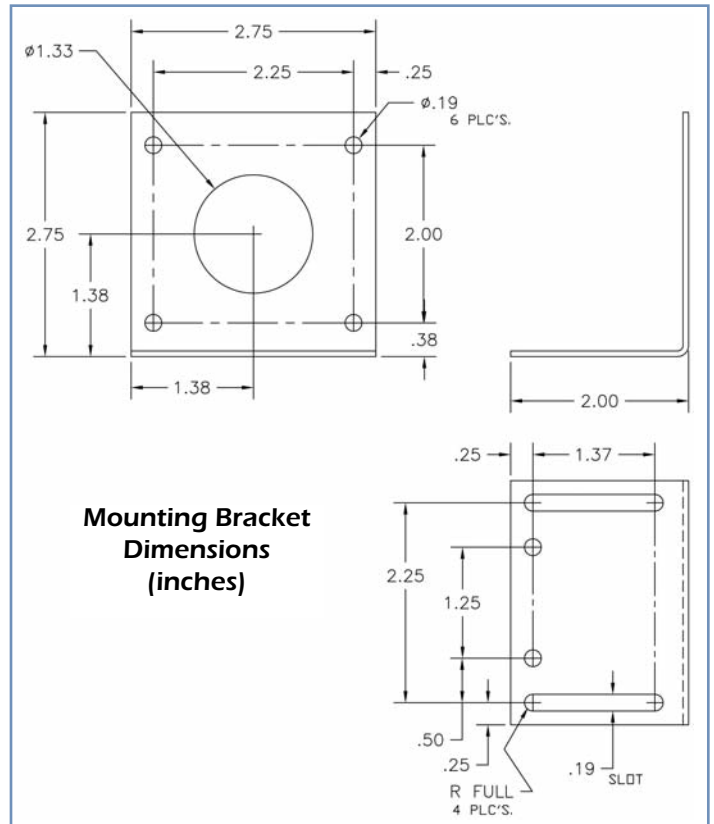
To change the programmable parameters or to observe the target distance digitally with the user-friendly software, the M-320 Sensor can be connected to a computer or other host system with either an optionally supplied RS-485/RS-232 Serial Converter or an RS-485/USB Converter. Before more than one M-320 Sensor can be used simultaneously on the same RS-485 Communication Bus, each sensor must first be programmed with its own unique ID Tag. After this has been completed, the green and brown communication wires for all of the M-320 Sensors should all be connected in parallel. Terminating resistors are not required for the RS-485 Network.



Wiring Diagram



Outline Dimensions (inches)



Mounting Bracket Dimensions (inches)



Photograph of an M-320/95 Sensor on a Mounting Bracket

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