

## Model M-300/95 Low Cost Sensor

### 0 - 10 Volts Output

The Massa Model M-300/95 Sensor measures target distances over a range of 12 inches (300 mm) to 13 feet (4 meters). It is a member of the Massa M-300 family, which 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 13 feet (4 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 stands out over all other sensors because of its affordability, extraordinary ease of operation, genuinely user-friendly software, versatile 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 outputs dependent on the position of the target.

Operating from 12 to 24 V DC, the M-300/95 Sensor provides a linear output of 0 to 10 V 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 10 V DC. The corresponding target distance span can be set to start and stop at any two target ranges. In addition, this output voltage can also be programmed to operate as a digital switch within zones defined by specified target setpoint distances.

The measurement 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-300/95 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-300/95 Sensor's user-friendly software operates with MS Windows® operating systems using an USB/RS-485 or RS-232/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 (*PVDF also available*) 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® 10, 8, 7, Vista, and XP SP3
- 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-300/95 Sensors:

P/N 300420-501: PVC Housing, 6 ft. Cable  
P/N 300420-505: PVC Housing, 15 ft. Cable  
P/N 300420-506: PVC Housing, 30 ft. Cable  
*For PVDF Housing, consult factory*

### Sensors Include:

Locknut (Qty. 1)  
P/N 8195-1: For use when installing the sensor on a bracket or plate

## OPTIONAL ITEMS

### Mounting Bracket:

P/N 200671-1

### Serial Port Converters:

USB/RS-485: P/N 8448-1  
RS-232 (DB9)/RS-485: P/N 7868-1

### Custom Tank Fitting PVC Adapter, 2" to 1" NPT: P/N 200758-1

**M-300 Software & Manuals:**  
Go to: [www.massa.com](http://www.massa.com) to  
download the latest versions

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**RoHS Compliant and CE Certified**

## M-300/95 SPECIFICATIONS

### 0-10 Volts Output

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

Target Detection	
Minimum Distance:	12 inches (300 mm)
Maximum Distance:	Up to 13 feet (4 meters), dependent on target
Measurement Resolution:	.01 inches (0.25 mm)
Measurement Accuracy:	± 0.1% of target range ( <i>uniform temperature</i> )
Echo Detection Sensitivity:	User selectable
System Beam Angle:	8 degrees conical
Ultrasonic Frequency:	95 kHz, nominal
Power Required:	12 V DC to 24 V DC (reverse polarity protected), 30 mA, typical
Temperature Compensation:	Internal probe

### PROGRAMMABLE VOLTAGE OUTPUTS

Output Impedance: 100 ohms for both modes of operation

#### Proportional Voltage Output Mode

Zero & Span Distances:	Programmable from 1 foot to over 13 feet ( <i>factory default: 1 foot to 13 feet</i> )
Zero & Span Voltages:	Programmable from 0 to 10.25 V DC ( <i>factory default: 0 to 10.0 V DC</i> )
Loss of Echo Voltage:	Programmable from 0 to 10.25 V DC ( <i>factory default: 10.25 V DC</i> )
Response Time:	60 mS
Resolution:	10 bits

#### Switched Setpoint Output Mode

Setpoint Distances:	Programmable from 1 foot to over 13 feet
Setpoint Voltages:	0 or 10.25 V 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 or 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 (standard) or PVDF (consult factory)
Transducer Surface:	MassaPlast™102 (custom PPA)
Cable:	5 conductor, 24 AWG, shielded, PVC jacket, 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® 10, 8, 7, Vista, and XP SP3

*All Specifications Subject to Change Without Notice*

# Massa Model M-300/95 Sensor

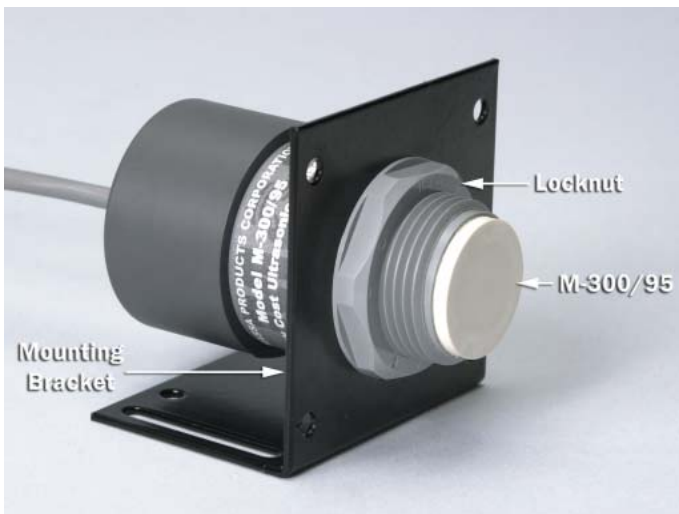
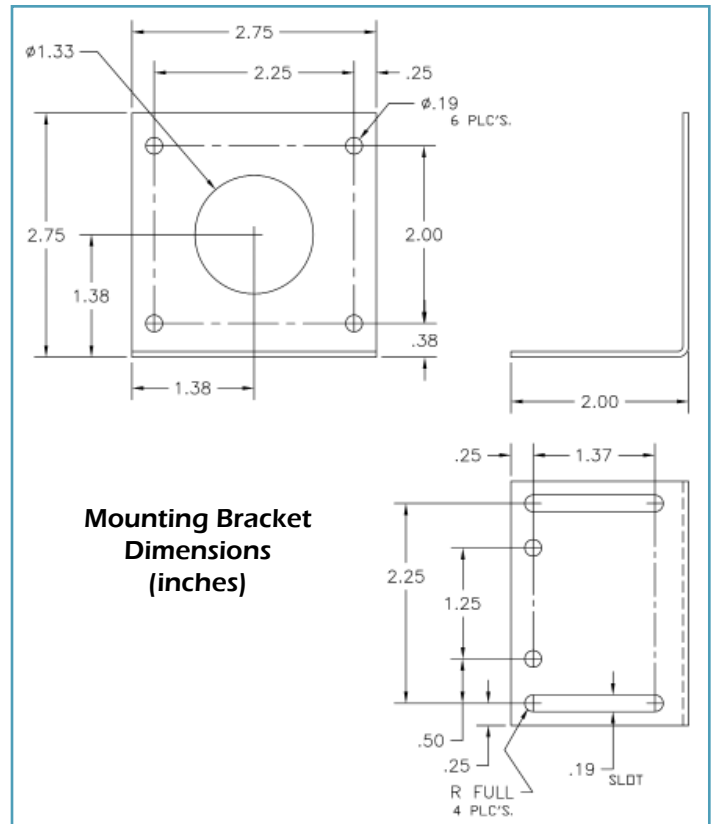
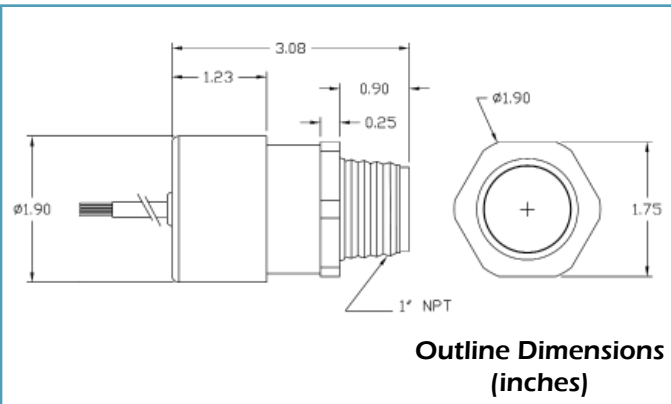
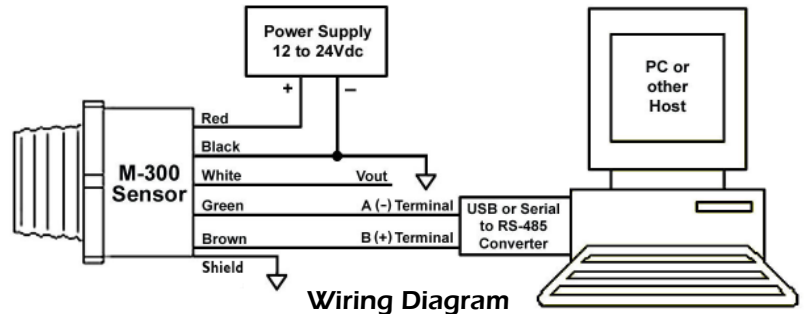
0-10 Volts Output

## WIRING AND MOUNTING INFORMATION

### Guide for Connecting an M-300 Sensor to a Power Supply and a Computer

To operate any of the Massa M-300 Family of Low Cost Liquid Level Sensors, it is only necessary to connect its red and black wires to a 12 to 24 V DC battery or power supply, as shown in the diagram below. The voltage 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-300 Sensor can be connected to a computer or other host system with either an optionally supplied USB/RS-485 converter or RS-232/RS-485 converter. Before more than one M-300 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-300 Sensors should all be connected in parallel. Terminating resistors are not required for the RS-485 Network.



Photograph of an M-300/95 Sensor on a Mounting Bracket

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