MassaSonic® FlatPack® Sensors are low profile designed ultrasonic transmitter modules. They are optimized to provide continuous non-contact distance measurement of fluids, pastes, or uneven solid bulk materials in constrained working zones for application ranges from 1 inch (25 mm) to 13 feet (4 m). Incorporating state-of-the-art dual-transducer ultrasonic technology and processing algorithms, all FlatPack Series Sensors provide precision measurement for factory automation, warehouse materials control, pipe and conveyor belt level monitoring, or tank level applications with non-uniform surfaces.

FlatPack Sensors include an advanced diagnostic feature that will retrieve the ultrasonic waveforms for analysis and display it on a computer to aid users debugging complex installations. All available models are RoHS compliant, CE certified, and IP68 rated. Because of the unique dual transducer design with 15° beam angles, the maximum range capabilities will be less affected by solid materials with uneven surfaces than occurs with single transducer sensors with narrower beam angles.

FlatPack Sensors are field proven designs and come in a PVC housing suitable for use in all-weather resistant moderate chemical environments from -40°C to 70°C. An integrated mounting plate with pre-formed holes is provided for easy installation. All models are equipped with continuous temperature compensation to ensure precise speed of sound calibration and measurement accuracy. Some other user friendly features include diagnostic and monitoring outputs, protection from over voltage, short circuits, and reverse polarity.

Operating from 12 to 24 V DC, all Massa FlatPack Series Sensors provide a linear output of either 0 to 10 V DC or 4-20 mA, that are proportional to the measured distance to the target. The output range is readily programmable to accommodate a wide variety of user specific set-up and application conditions. In addition, this output voltage can be set to operate as a digital switch within zones defined by specified target set-point distances, enhancing the sensor’s flexibility for use in non-routine applications.

The measurement parameters and outputs are programmed using a common standard RS-485 data link to ensure set-up uniformity. Compatible with Microsoft Windows® operating systems using a USB/RS-485 or RS-232/RS-485 converter, up to 32 sensors can be connected in parallel onto the same multi-drop communication network using the supplied protocol. This network also enables users to remotely program their sensors and read target distances for quick integration into control applications. All FlatPack Sensors are adjustable for sampling rate, averaging measurement, analog output slope, loss-of-echo time-out, set point hysteresis (digital switch mode) and provide a software sensor transmit trigger.

Massa FlatPack Series Sensors provides versatile distance measurement for non-uniform liquid or solid surfaces where mounting headroom is restricted or a minimal deadband is desired for accurate ranging with an affordable cost of ownership.

For more information, please visit www.massa.com, or contact one of our Applications Specialists at: sales@massa.com
# FlatPack® Series Ordering Information

## FlatPack Series Ordering Code

![Ordering Code Diagram](image)

- **Model Type**
  - S: FlatPack (standard)

- **Analog Output Options**
  - V: 0-10 Volt
  - I: 4-20 mA

- **Sensing Range Options**
  - 95: 4 inches to 13 feet for FlatPack (standard)
  - 160: 1 inch to 5 feet for FlatPack (standard)

## Optional Items:
- **Serial Port Converters**: USB/RS-485, P/N 8448-1 or RS-232(DB9)/RS-485, P/N 7868-1
- **Massa Software & Manuals**: Go to [www.massa.com](http://www.massa.com) to download the latest versions

## FlatPack® Series Performance Specifications

*(Typical 24 V DC, 22°C, and 50% RH Air)*

<table>
<thead>
<tr>
<th>Performance</th>
<th>Short Range (160 kHz)</th>
<th>Medium Range (95 kHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Detection Distances</td>
<td>1 inch (25 mm) to 5 feet (1.5 m)</td>
<td>4 inches (100 mm) to 13 feet (4 m)</td>
</tr>
<tr>
<td>Measurement Resolution</td>
<td>0.01 inches (0.25mm)</td>
<td></td>
</tr>
<tr>
<td>Measurement Accuracy</td>
<td>± 0.1% of Target Range</td>
<td></td>
</tr>
<tr>
<td>Echo Detection Sensitivity</td>
<td>User Selectable</td>
<td></td>
</tr>
<tr>
<td>System Beam Angle</td>
<td>15° Conical</td>
<td></td>
</tr>
<tr>
<td>Response Time</td>
<td>60 mS</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>11 bits</td>
<td></td>
</tr>
<tr>
<td>Temperature Compensation</td>
<td>Internal Probe</td>
<td></td>
</tr>
</tbody>
</table>

### Mechanical

- **Housing Material**: PVC
- **Transducer Surface**: MassaPlast 102 (custom PPA)
- **Cable**: 5 Conductor, 24 AWG, Shielded, PVC Jacket
  - [User Extendable for RS-485 Communication to 5,000 feet (1,500m)]

### Environmental

- **Operational Temperature**: -40°C to 70°C
- **Storage Temperature**: -40°C to 85°C
- **Relative Humidity**: 0 to 95%, non-condensing
- **Enclosure Rating**: IP68

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**All Specifications Subject to Change Without Notice**

[www.massa.com](http://www.massa.com)
**FlatPack® Series User Interface Specifications**

<table>
<thead>
<tr>
<th>Programmable Outputs</th>
<th>Voltage Output Models</th>
<th>Current Output Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 10 Volts</td>
<td>4-20 mA</td>
</tr>
<tr>
<td>Power Required</td>
<td>12 V DC to 24 V DC (reverse polarity protected), 30 mA, typical</td>
<td>12 V DC to 24 V DC (reverse polarity protected), 30 mA, typical (not including I-out)</td>
</tr>
<tr>
<td>Setpoints (Properably options in range min. to &gt; max. detection range)</td>
<td>0 or 10.25 V DC</td>
<td>0 or 20.5 mA DC</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>100 ohms (both operational modes)</td>
<td>N/A</td>
</tr>
<tr>
<td>Current Loop Output</td>
<td>N/A</td>
<td>4 to 20 mA or 0 to 20 mA DC sourcing, invertible Factory Default: 4 to 20 mA DC</td>
</tr>
<tr>
<td>Zero &amp; Span Voltage or Current</td>
<td>Programmable from 0 to 10.25 VDC Factory Default: 0 to 10.0 VDC</td>
<td>Programmable from 0 to 20.5 mA DC Factory Default: 4 to 20.0 mA DC</td>
</tr>
<tr>
<td>Loss of Echo Voltage or Current</td>
<td>Programmable from 0 to 10.25 VDC Factory Default: 10.25 V DC</td>
<td>Programmable from 0 to 20.5 mA DC Factory Default: 20.5 mA DC</td>
</tr>
<tr>
<td>Zero &amp; Span Distance</td>
<td>Each Programmable over a range from min. distance to greater than max. distance Factory Default:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>160 kHz: from 1 inch to 5 feet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>95 kHz: from 4 inches to 13 feet</td>
<td></td>
</tr>
<tr>
<td>Trigger Modes</td>
<td>Internal or Software Trigger</td>
<td></td>
</tr>
<tr>
<td>Target Distance Averaging</td>
<td>Rolling Averages: from 1 to 32 samples, or Boxcar Average: from 1 to 1,024 samples Factory Default: 1</td>
<td></td>
</tr>
<tr>
<td>Loss of Echo Time-Out</td>
<td>Programmable from 1 to 254 consecutive samples missed before time-out Factory Default: 1</td>
<td></td>
</tr>
<tr>
<td>Sampling Rate</td>
<td>0.1 Hz to 20 Hz in 0.1 Hz increments Factory Default: 10 Hz</td>
<td></td>
</tr>
<tr>
<td>Communications Converter</td>
<td>USB/RS-485 or RS-232/RS-485 with automatic send data control</td>
<td></td>
</tr>
<tr>
<td>Operating System</td>
<td>Windows 10, 8, 7, Vista, and XP SP3</td>
<td></td>
</tr>
</tbody>
</table>

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### Outline Dimensions

**160 kHz FlatPack Sensor Outline Dimensions (inches)**

- 6 Holes, 0.16 Dia.
- 2.21
- 1.50
- 1.50
- 5.10
- 1.06
- 45°

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**95 kHz FlatPack Sensor Outline Dimensions (inches)**

- 6 Holes, 0.16 Dia.
- 2.21
- 1.50
- 1.50
- 5.10
- 1.25

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*All Specifications Subject to Change Without Notice*
To operate a MassaSonic® FlatPack® Series Sensor, it is only necessary to connect its red and black wires to a DC battery or power supply (12 to 24 VDC) as shown in the diagram below. The white wire will then indicate the distance to the target or its position to the setpoint.

To change the programmable parameters, or to observe the target distance digitally with the user-friendly software, the sensor can be connected to a computer or other host system with either an optionally supplied USB/RS-485 or RS-232/RS-485 converter. Before more than one FlatPack 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 FlatPack Sensors should all be connected in parallel. Terminating resistors are not required for the RS-485 Network.

**FlatPack Wiring and Connector Information**

To operate a MassaSonic® FlatPack® Series Sensor, it is only necessary to connect its red and black wires to a DC battery or power supply (12 to 24 VDC) as shown in the diagram below. The white wire will then indicate the distance to the target or its position to the setpoint.

To change the programmable parameters, or to observe the target distance digitally with the user-friendly software, the sensor can be connected to a computer or other host system with either an optionally supplied USB/RS-485 or RS-232/RS-485 converter. Before more than one FlatPack 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 FlatPack Sensors should all be connected in parallel. Terminating resistors are not required for the RS-485 Network.

**FlatPack Wiring Diagram**

**Cable:**
5 Conductor, PVC Jacket, Shielded 24AWG

- **Red:** +12 V DC to +24 V DC
- **Black:** Ground
- **White:** Vout
- **Green:** RS-485-A
- **Brown:** RS-485-B
- **Shield:** Ground

**Connector:**
C1: Bulgin P/N PX0729/P (Mating Connector: P/N PX0729/S)

*All Specifications Subject to Change Without Notice*