



MiniBSV FAST(Indoor) Manual

MiniBSV FAST is a low price sensor for visibility in heavy fog like smoke or snowstorm etc. The main application is detection of different kinds of very low visibility in a fast reaction. To make it happen, FAST model outputs measured visibility in every 1 second.



The sensor is heated to a few degrees above ambient temperature in order to keep moisture away. In order to keep the electronics dry a membrane ventilator that keeps the pressure inside at the same level as outside. This prevents liquid water from sucking into the sensor through micro cracks etc. at falling temperature – a creative solution to a big problem.

The sensor produces analog and digital signals:

About the analog output:

The microprocessor controls the analog output giving the visibility directly (vis=0100 meters gives 0.5 Volt, and up to 5 Volt at 1000 meters by 20mV steps). While temporal measurement errors such as sensor saturations by sunlight or reflections from an object in the sensitive zone like an insect or fallen snow covering the front, the sensor outputs 5 Volt as an error code. The analog output is refreshed at each every 1 second after once the voltage is dropped to 0 volt.

About the digital output:

We recommend this digital output since more and better information can be taken from it. The calculated data is presented in digital form as an ASCII string on the RS232 output, 19,200 baud 8N1, that is transmitted "streaming" every 1 second the fixed length data. This string can be received by many loggers with RS232 inputs but also by a PC via the serial port and with a terminal program like TeraTerm.

An example of an output string:

amb=+100 alfa=+0.0120 vis=0250

The first figure – the amb parameter is uncalibrated measure of the ambient solar irradiance in W/m². The sensitivity depends strongly on how the sensor is aimed. It may vary as much as -50 to +100%. But the repeatability is much better and the offset error between units is only +/- 2. The sensor can, when mounted, be calibrated by comparing it with an irradiance sensor. But a simple method is to take data from a clear day at noon. If the sun is 60 deg or more above the horizon the irradiance is not far from 1000 W/m². The measurement is not very accurate, but it may be useful for instance for telling if it is day or night.

The second figure is the so-called extinction coefficient often called alfa. The relation between the extinction and visibility is $\text{alfa} = 3/\text{vis}$. * The alfa parameter can be used for monitoring trends in visibility when the visibility is larger than 1,000 meters. But note that the absolute accuracy in alfa is limited in such cases.

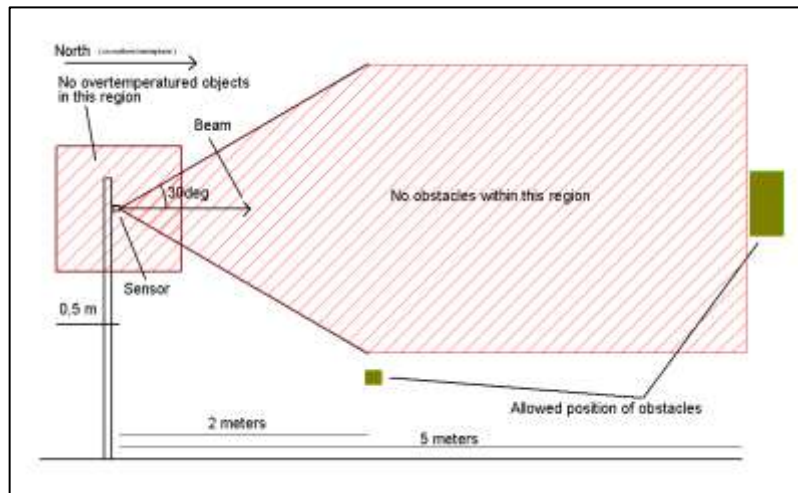
The third figure – the vis parameter – is the measured visibility in meters. The displayed visibility will also be 1000 if the measured visibility is larger than 1000 meters.

MiniBSV FAST Specifications

| | |
|-----------------------|--|
| Dimensions(W*D*H) | 68*34*45 mm |
| Weight | About 170 g |
| Warm up time | About 10 seconds |
| Current consumption | <50 mA DC12 Volt (8-14) supply |
| Outputs | Analog 0-5 V, and Digital RS232 19200bps |
| Update time | About 1 second |
| Operation Temp. range | -20 to +50 deg C |
| Optical output power | About 3 mW (NIR LED) eye safe, class 1 M |
| Wavelength | 850nm |
| Housing | Anodized aluminum, opening sealed with O-rings |
| Visibility range | 2m – 1,000m |

Mounting

The sensor should be mounted so that it "looks" horizontal and roughly north (south on the southern hemisphere) – minimizing sunlight into receiver. There must not be anything in the sightline closer than 5 to 10 meters. Outside a cone of about 30 degrees angle objects can be tolerated at down to 2 about meter. See figure below.








The outer dimensions are 68*45*34 mm and the four M3 holes for fastening are located on the top surface on a centered rectangle 14*51 mm.

We deliver a mounting bracket –seen in picture above - made of PMMA plastic. The picture shows our solution for mounting on a vertical 42 mm dia. tube. The sensor is electrically isolated when using this mounting bracket.

Mounting on a wall or too near to a roof of a building is not recommended. The reason is that the air near a building is a little warmer than some meters away from it. And in the warmer air the small “drops” will evaporate resulting in a higher measured visibility not representative for the visibility in the area.

The sensor is delivered with a 6 meter 5-wire cable connected. The wire colors are chosen as follows:

| | | |
|--------|---------------------|--|
| red | 12 Volt DC Power in |  |
| black | Power ground |  |
| white | Signal ground |  |
| green | Digital signal out |  |
| yellow | Analog out |  |