



Manual for MiniBSV 10k

MiniBSV 10k is a low price fog sensor for visibility measurement, suitable for warning system for a dense fog.



* acrylic panel is attached.

The sensor is sensitive for fog particles in a zone about 25 cm ahead of the location of the sensor who limit the visibility in the air. These particles are normally the microscopic water particles constituting fog, but they may also be snowflakes, raindrops or air pollutants.

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 =1 km gives 0.5 Volt, and VIS = 500 meters gives 0.25 Volt etc up to 5 Volt at 10000 meters).

About the RS232 output:

The calculated data is presented in digital form as an ASCII string on the RS232 output, 1,200 baud 8N1, that is transmitted "streaming" every 30 seconds. 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 Hyper Terminal (part of WINDOWS).

This is an example of an output string:

amb= 100 alfa=0.001200 VIS= 2500

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. 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 1,000 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 10,000 meters. But note that the absolute accuracy in alfa is limited in such cases and not guaranteed. Visibility between 2~10km is as well output but the absolute accuracy for this range is not guaranteed.

The third figure – the VIS parameter - is the measured visibility in meters calculated based on the value of alfa.

If the optical receiver is saturated by for instance sunlight or reflections from an object in the sensitive zone like an insect or fallen snow covering the front, the visibility displayed visibility value will be 0000 and the output can be:

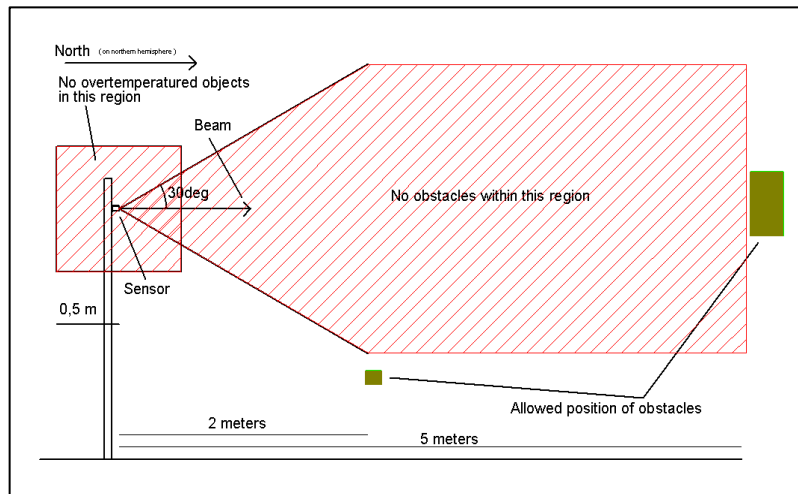
amb=050 alfa=0.0000 VIS= 0000

MiniBSV 10k Specifications

Size(W*D*H)	68*34*45 mm
Weight	Approx. 170 g
Heating time	Approx. 1 min.
Power consumption	<50 mA DC12 Volt (8-14)
Output	Analog: 0-5 V Digital: RS232 1200 bps8N1
Measurement time	30 sec.
Operational temperature	-20...+50 °C
Projector output	Approx. 3 mW(NIR LED), Eye safe class 1 M
Light source wavelength	850 nm
Housing	Aluminum Oxide, O-ring sealing
Visibility calculation range	10 m... 10 km
Guaranteed absolute accuracy	±30 % (Visibility calculation range : up to 2 km)

Mounting and connecting MiniBSV 10k

The sensor should be mounted so that it "looks" horizontal and roughly north (south on the southern hemisphere) – eliminating direct sunlight into receiver. There must not be anything in the sightline closer than 5 meters.







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

We deliver the sensor with a mounting bracket made of PMMA plastic, seen in the picture above, so the sensor is electrically isolated when using the bracket.

When the sensor is mounted on the roof or the wall of a multistoried building, it is preferable that the sensor is kept a few meters apart from the surface of the building. The visibility can be measured higher than the actual value at a building surface where the ambient temperature is heated by the heat emitted by the building itself and water vapor is more likely to evaporate.

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	