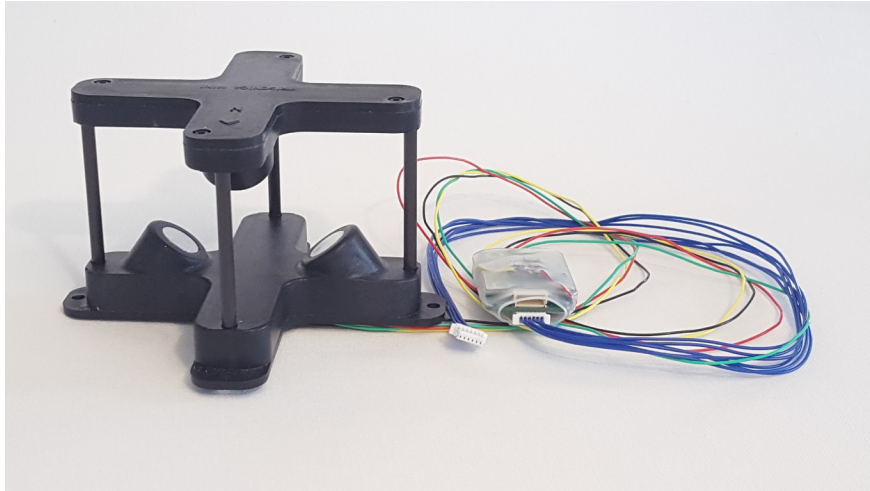




SKS31 Datasheet

Wind Sensor - 3D Ultrasonic Anemometer



The light-weight SKS31 wind sensor is perfect for use on small rotary-wing UAVs. Sparv Embedded also offers hardware to mount SKS31 on a pole on top of popular UAV models.

Parameter	Range	Resolution	Accuracy
Wind speed	0 – 50 m/s	0.1 m/s	0-10 m/s: ± 0.2 m/s 11-30 m/s: $\pm 2\%$ 31-50 m/s: $\pm 4\%$
Wind direction	0 – 359° in horizontal plane $\pm 30^\circ$ vertically	1°	$\pm 1^\circ$
Air temperature Derived from Speed of Sound and Humidity	-30 °C to +80°C	0.1 °C	± 2 °C (absolute)
Air humidity	0 – 100 % RH	0.1 % RH	± 3 % RH <i>The response time is many minutes</i>
Pressure	500 – 1150 hPa	1 hPa	± 10 hPa
Tilt (Pitch and Roll)	$\pm 90^\circ$		
Heading	± 16 Gauss	1°	$\pm 5^\circ$

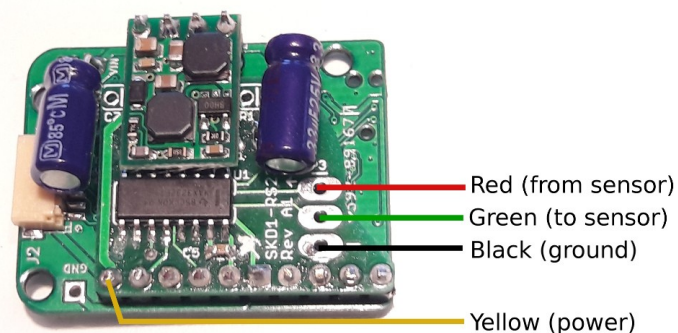


Parameter	Specification
Sampling frequency	1 – 10 Hz
Operating Temperature	-20 °C to +72 °C
Warm-up time	1 second
Supply Voltage	3.4 – 15 V _{DC} (Possible to power from USB, via SA1)
Power Consumption	Scales inversely with supply voltage; average 20 mA at 12 V
Communication	Sparvio SSP
Size	Sensor 92x92x54 mm, adapter 33x25x12 mm
Weight	Sensor 50 gram plus adapter 8 gram. In addition some mounting hardware is needed.

Electronics integration

The module comes with an adapter called “SKD1” to handle voltage level conversions and communication.

If not mounted at delivery, the SKD1 adapter can be soldered to the four sensor wires by the user. This picture shows where the sensor wires attach, by the color of the wires:



Afterwards, insert the SKD1 in the heatshrink and heat to a tight fit, to protect the electronics.

Wind Calibration

To calibrate wind readings, put the black sensor in a box, connect to SA1 and run Sparvio Toolbox:

```
python bridge.py Trisonica_XXX
```

Replace the XXX by the hexadecimal number unique to each sensor.

You should see the raw data from Trisonica, looking something like this:
00.49 063 00.21 00.42 00.14 23.9

Press Ctrl+C. The output should stop.

Now you are in Trisonica command mode. Put the Trisonica into a box to shield it from noise. From the Trisonica manual:



Type

calibrate <temp> [<rh>]

Where <temp> = xx.x in °C temperature and <rh> = xx.x in % relative humidity. If humidity is not supplied, then 50% is assumed.

The calibration cycle takes ten seconds. You will see dots printed on the serial console indicating progress, and the serial prompt will return. Then type nvwrite to store the values in non-volatile memory.

Then type exit to resume the data mode.

Exit bridge.py by Ctrl+D.

Compass Calibration

The compass inside the sensor needs to be calibrated for the electromagnetic environment it will operate in.

This command line command starts the calibration:

call.py Trisonica_XXX compassCalibrate

The calibration is active for 15 seconds. During this period the SKD1 shows a blue light. Orient the sensor in all directions during this period, to expose the compass to the full range of magnetic field readings. The new calibration is automatically saved afterwards.

The same compass calibration can also be done with a series of manual commands in bridge.py.

Readings

This is a list of all values that the sensor can be configured to report, and the corresponding name and unit used for the Sparvio system. Not all values are currently available, as some are superfluous or less important.

Trisonica code	Description	Sparvio name	Sparvio Unit
S	Wind Speed 3D	-	m/s
S2D	Wind Speed 2D	wspd	m/s
D	Horiz Wind Direction	wdir	Degrees
DV	Vert Wind Direction	-	Degrees
U	U Vector	windU	m/s
V	V Vector	windV	m/s
W	W Vector	windW	m/s
T	Temperature	temp	C
Cs	Speed of Sound	-	m/s
RHTemp	RH Temp Sensor	-	C
RH	RH Humidity Sensor	-	C
H	Humidity	rh	%
DP	DewPoint	-	C
PTemp	Pressure Temp Sensor	-	C
P	Pressure Sensor	pr	Pascal
Density	Air Density	-	kg/m ³
LevelX	Level X	-	
LevelY	Level Y	-	
LevelZ	Level Z	-	
Pitch	Pitch	pitch	Degrees
Roll	Roll	roll	Degrees
CTemp	Compass Temperature	-	C
MagX	Compass X	-	
MagY	Compass Y	-	
MagZ	Compass Z	-	



Trisonica code	Description	Sparvio name	Sparvio Unit
Heading	Compass Heading	heading	Degrees
TrueHead	True Heading	-	Degrees

Sparvio background

The Sparvio system provides a modular, plug-and-play solution for measuring various quantities for UAVs, other environmental studies, lab experiments and education. The system is designed to start immediate measurements without any further integration.