

# Acoustic Wind Profilers



Advanced High Performance Profilers  
for Wind and Turbulence

## PREFACE

Scintec Flat Array Sodars (FAS) have established new standards for acoustic wind profilers in performance, quality and design. They measure profiles of three-dimensional wind speed and turbulence structure with an unmatched accuracy and performance. This is achieved by a combination of novel sensing concepts and innovative antenna design.

# MEETING YOUR NEEDS



SFAS - base length: 42 cm (16.5")



MFAS - base length: 72 cm (28.3")



XFAS - base length: 145 cm (57.1")

## THE SCINTEC FAS SERIES

The Scintec FAS Series consists of three models which differ in size, operation frequency, vertical measurement range and spatial resolution.

The XFAS is a powerful instrument optimized for long ranges. The MFAS compromises range, spatial resolution and portability.

The revolutionary SFAS has made a sodar more compact than ever. With its high operation frequencies it provides a vertical resolution down to 5 m. In spite of its small size, the SFAS has an impressive measurement range not achieved by many larger sodars before.

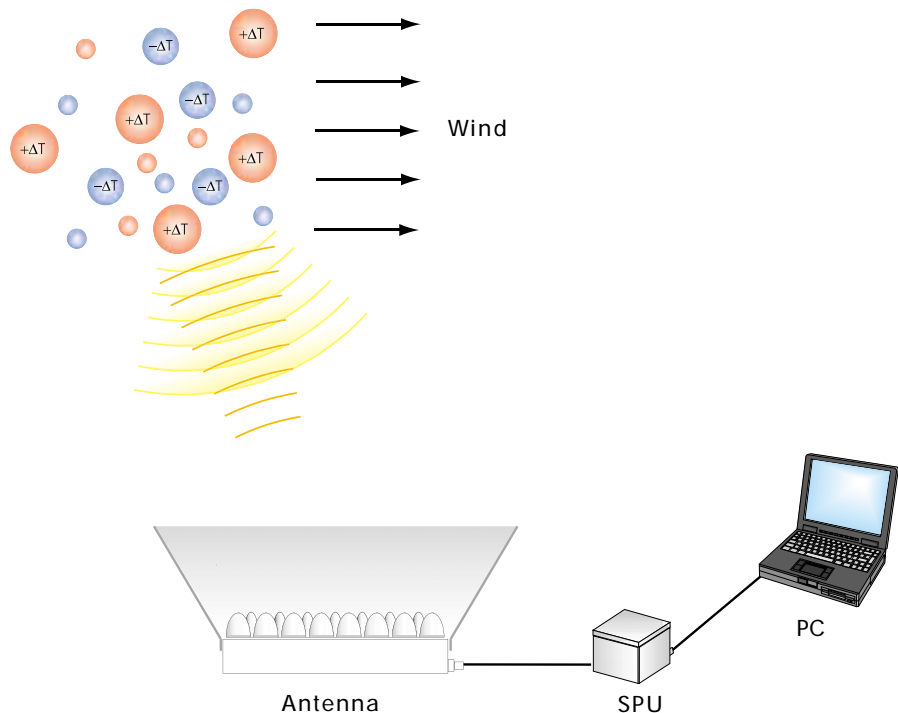
## A SOUND TECHNIQUE

For the remote measurement of wind speed, wind direction and turbulence in the lower atmosphere, sodars (sound detection and ranging) are becoming more and more popular. They allow continuous vertical soundings without bulky masts or work-intensive tethered balloons. A sodar antenna emits short acoustic pulses into the atmosphere. The acoustic waves are scattered at temperature inhomogeneities in the air. The antenna receives the backscattered signals. Since the temperature

inhomogeneities move with the mean wind, a Doppler frequency shift emerges.

The frequency shift reveals the wind speed. The amplitude of the backscattered signals supplies information about the thermal turbulence. The duration between emission and reception of a pulse provides the measurement height. By emitting multiple beams into different directions, vertical profiles of three-dimensional wind and the turbulence structure are derived.

# OPERATION PRINCIPLE



Operation principle and set-up of Scintec Flat Array Sodars

## PERFORMANCE HAS REASONS

### Innovative Antenna

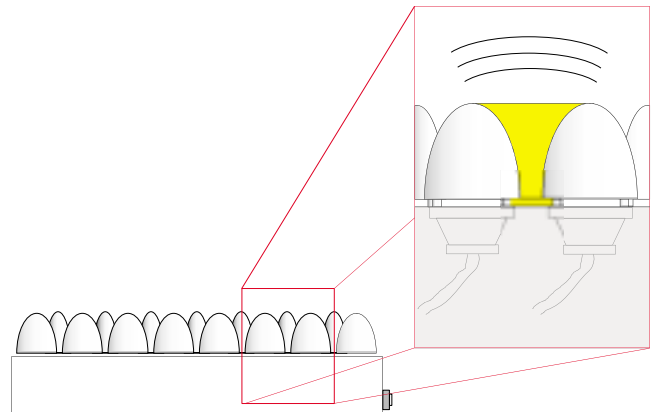
Scintec's proprietary antenna design represents a remarkable step in acoustic profiler innovation. User benefits include higher efficiency, longer measurement ranges and improved operation characteristics during rain.

### Dynamic Shading

Through application of a new dynamic two-dimensional shading technique, Scintec Flat Array Sodars generate considerably less environmental noise without extensive mechanical shielding.

### Multi-Frequency Operation

Scintec Flat Array Sodars operate with up to 80 frequencies in one measurement mode. Different frequencies are received and evaluated simultaneously. The result is a significant increase of the signal-to-noise ratio, which leads to an increase of the measurement range, shorter possible averaging times and an improved vertical resolution.



Impedance match of Flat Array Antenna: inverse acoustic horn.

# ADVANTAGES

### More performance with 9 beams

Scintec Flat Array Sodars have the capability to send and receive beams at 9 different angles. Like the multi-frequency operation, the simultaneous reception at opposite angles results in a significant increase of the signal-to-noise ratio.

### Automatic Self-Test

One simple keystroke and Scintec Flat Array Sodars perform a comprehensive self-test. This includes an individual test of all transducers and related electronics, ensuring easy maintenance and full lifetime performance.

### Height Dependent Vertical Resolution

Scintec Flat Array Sodars can be operated with a height-dependent vertical resolution. In this mode, long pulses are followed by shorter pulses of different frequencies. This allows the highest spatial resolution at low altitudes to be combined with the maximum possible range in the same measurement.

### RASS Extension

All sodars allow integration of the RASS Extension Scintec RAE-1 for the additional measurement of vertical temperature profiles (see separate data sheet).

## COMFORT AND CONTROL

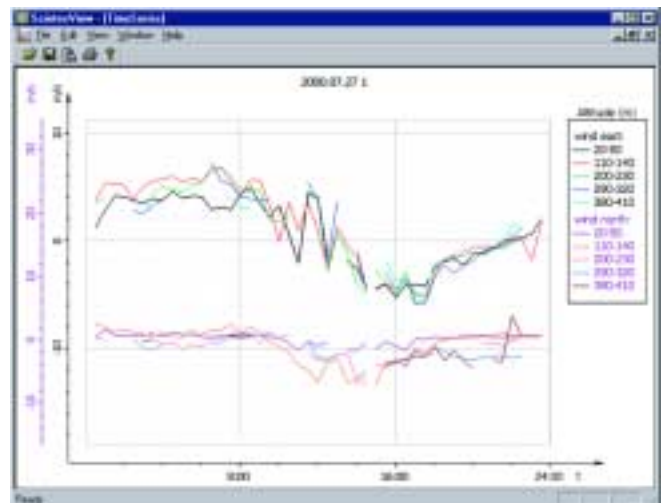
Scintec's sodar operation software FASRUN is very powerful and flexible to meet all needs. An advanced user interface gives full access to all operation parameters, besides averaging time and spatial resolution, this includes the frequencies, durations, amplitudes, numbers, directions and the order of the emitted pulses.

The output comprises for all vertical layers:

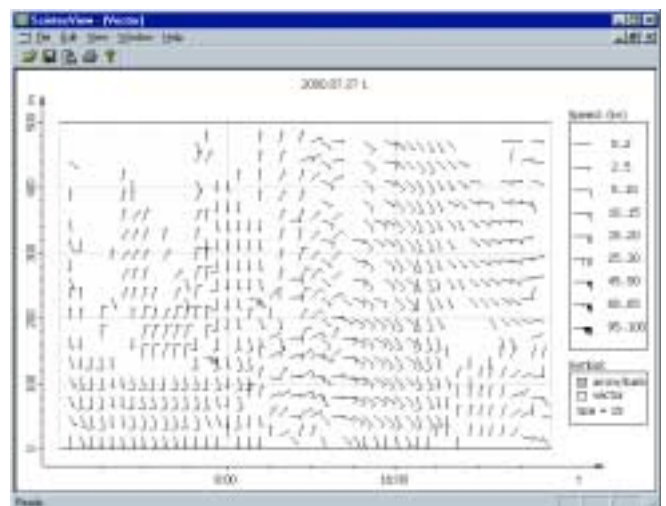
- wind components (u, v, w)
- horizontal wind speed and direction
- standard deviation of all wind speed components
- temperature structure parameter (calibrated)
- reflectivity, information on boundary layer and inversion height
- stability, eddy diffusivity and other derived quantities
- vertically resolved Doppler spectra
- reflectivity charts (sodar-grams)
- height profiles of all measured quantities
- time series of all measured quantities
- wind vector, false colour and contour plots
- wind statistics (wind roses)

The following graphical representations are available:

# SOFTWARE



Time series plot



Vector plot

## APPLICATIONS

Scintec Flat Array Sodars are perfectly suited for a variety of applications, including:

	SFAS	MFAS	XFAS
Boundary layer investigations		■	■
- full boundary layer coverage			■
Surface layer studies	■	■	
Local climate analysis		■	■
Regional weather forecast		■	■
Pollution flow monitoring		■	■
Airport windshear and wake vortex detection		■	■
Measurement of optical propagation conditions	■	■	■
Wind energy investigations	■	■	
Agrometeorology	■	■	
Supplement to standard network weather stations	■		
Measurements of flow around objects (e. g. buildings)	■		

# ...INTO YOUR WORLD



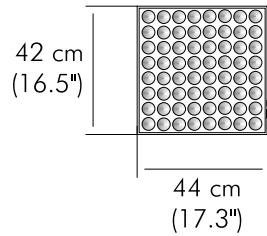
SFAS with Standard Enclosure



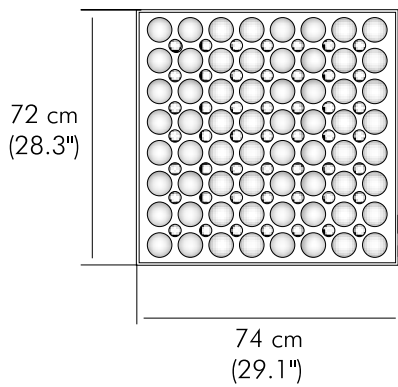
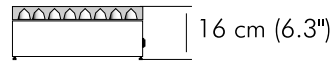
MFAS with Large Enclosure

# ANTENNA OUTLINES

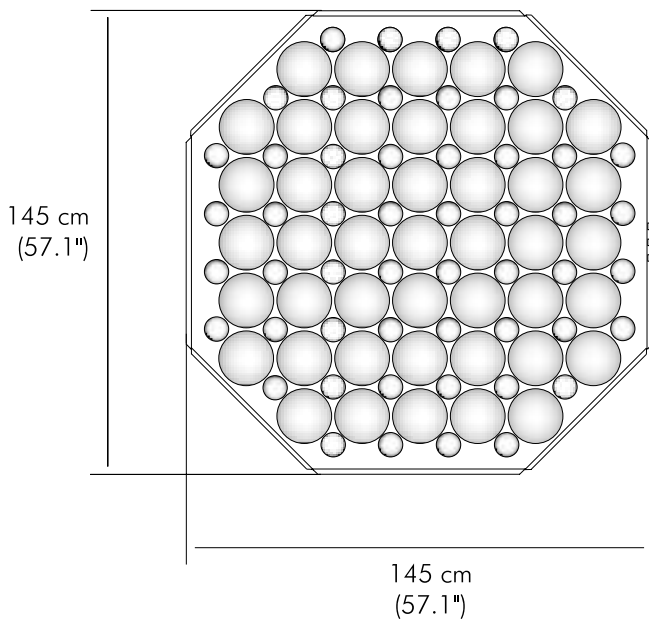
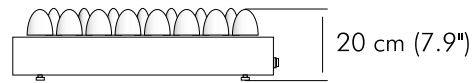
All dimensions in centimetres (inches)



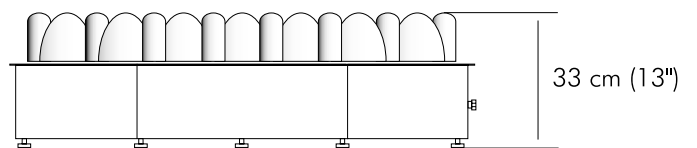
## SFAS



## MFAS



## XFAS





## SPECIFICATIONS

description	SFAS	MFAS	XFAS	remarks
number of elements	64	64	52	individual drivers
frequency range	2525 - 4850 Hz	1650 - 2750 Hz	825 - 1375 Hz	freq. user selectable
acoustic output power	2.5 W	7.5 W	35 W	maximum, selectable
multifrequency operation	yes, up to 80 frequencies			mode selectable
beam angles	0°, ±19°, ±24°	0°, ±22°, ±29°	0°, ±22°, ±29°	9 beams, selectable
no. of vertical layers	100	100	256	maximum, selectable
thickness of layers	5 m - 100 m	10 m - 250 m	20 m - 500 m	selectable
lowest meas. height	10 m	20 m	20 m	start of lowest layer
maximum range	500 m	1000 m	2000 - 5000 m	depending on mode
averaging time	1 min - 60 min	1 min - 60 min	1 min - 3 h	down to 2 s for research applications
accuracy of horizontal wind speed	0.1 - 0.3 m/s			depending on mode
accuracy of vertical wind speed	0.03 - 0.1 m/s			depending on mode
accuracy of wind direction	2 - 3°			at wind speeds above 2 m/s
meas. range horizontal	-50 to +50 m/s			depending on mode
meas. range vertical	-10 to +10 m/s			depending on mode
operation temperature range	-35 to +50 °C			antenna and processing unit
power requirements (AC supply not used)	±12 VDC, 100 W peak, 30 - 50 W average	±12 VDC, 200 W peak, 50 - 100 W average	±18 VDC, 700 W peak, 80 - 350 W average	reduced in energy saving modes
size	44 cm x 42 cm x 16 cm	74 cm x 72 cm x 20 cm	145 cm x 145 cm x 33 cm	antenna without enclosure
weight	11.5 kg	32 kg	144 kg	antenna without enclosure
remote operation	yes, several options available			

Specifications are subject to change without notice.

**Scintec AG**  
 Europaplatz 3  
 D-72072 Tübingen  
 Germany

Tel. [+49] 70 71-92 14 10  
 Fax [+49] 70 71-55 14 31  
<http://www.scintec.com>  
 E-Mail: [info@scintec.com](mailto:info@scintec.com)

**Scintec** 