

Doppler SODAR

DSDPA.90-24



- Mobile Profiler for Automatic Monitoring of Boundary Layer Structures
- Measurements of Wind, Turbulence and Dispersion Parameters
- High Performance Even Within Noisy Industrial Areas
- High Flexibility by User Defined Operational Parameters
- Reliable Automatic Data Checks
- Powerful Offline Data Processing Features
- **Extension with RASS** for Temperature Profiling

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General Characteristics

The mini SODAR DSDPA.90-24 is a small powerful acoustic sounder for wind and turbulence profiles in up to 40 height intervals (> 5 m) within typical height ranges of 15 - 500 m (nominal max. height > 1000 m). DSDPA.90-24 offers easy handling and simple set up, high flexibility in operation and well proven analysing techniques. Powerful software tools are available for system control, automatic data storage and further off-line processing, for remote access by Modem (GSM), for data analysis and professional graphic displays including time series, profiles, contour plots, statistics.

All outdoor antenna components are made from high durable weatherproof and light weight materials. The electronic units are easy to access minimising efforts for regular inspection or system diagnosis. Small size and weight of all components allow transportation in a mid size van and set up by a trained single person within less than 15 minutes.

System Design

DSDPA.90-24 uses a 90 degree phase shift steering antenna array of 24 loudspeaker (max. load 30 W) with exponential horns for perfect impedance matching. The steering allows measurements for a selection of up to 5 orientations (90° different in azimuth, 1 vertical), the zenith angle is adjusted by frequency (1.7-3 kHz). The antenna integrates electronic unit and capacity buffered power supply. It can be located up to 50 m apart from the processor (68040VME-Bus) and PC unit.

The system is controlled by an pre-emptive real time operating system pSoS+. The signal processing uses a homodyne receiver, low pass filtering, mixer, low noise sample and hold amplifier, 16 bit AD conversion. This concepts allows a spectral analysis of only 32 FFT-lines saving most of the processor power for the detailed signal analysis and comprehensive data tests.

As a unique feature the signal can be analysed simultaneously in averaging and instantaneous mode for all radial components. In average mode the system provides all information from the spectral moments of 0th, 1st and 2nd order. With the optional Ethernet port instantaneous spectra, radial components and even original A/D converted time series of each single pulse are available for special research purposes.

As an essential part of the signal analysis conservative internal plausibility routines are performed on the instantaneous and the averaged spectra detecting and rejecting all data with insufficient signal quality. As a new feature off-line data processing routines can be applied to improve the data availability by evaluation of instantaneous data by cluster detection routines.

Antenna

Due to the special 2+4+6+6+4+2 arrangement of the antenna element and the narrow tolerance characteristics of the used loudspeaker the antenna diagram shows a significant reduction of the side lobes (first order to -25 dB) without broadening of the main beam ($\pm 7^\circ$ at 2200 Hz). Thus power reducing shading techniques are avoided. In addition the customer of DSDPA.90-24 benefits from the high efficient pyramidal shaped acoustic shield which are always included in the system price. Each acoustic panel is foldable reducing size and the weight of each element down to 11 kg and 1.50 x 0.70 m. The antenna panel has a size of 0.75 x 0.75m and a weight of about 50 kg.

Parameter Lists

DSDPA.90-24 offers adjustments of all relevant operation parameters in wide ranges (frequency, power, pulse length, height steps, height range, gain, zenith, azimuth,

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etc.). The complete parameter sets can be stored under user generated parameter names which can be used for easy predefinition of parameters. They can be entered also into a parameter list for automatic cyclic alternation of operation modes.

Power Supply

In case a 110/220 VAC power line is available the system will take the electrical energy from the capacity buffered power supply (24 VDC). For battery operation an external 24 VDC source is required. Small generators allow operation which benefits from the low power consumption of 100-170 W for the complete system (depending on parameter settings).

Compatibility

The electronic of DSDPA.90-24 is designed to allow an operation of an 64 element antenna as an alternative to the original 24 element antenna. Thus the customer has the choice to extend DSDPA.90-24 to the high end DSDPA.90-64 system. This applies also to the software components. Different customers can easily exchange the antenna units to optimise their SODAR resources.

RASS Extension, Sonic Integration, Spare Parts

Hard- and software of DSDPA.90-24 are prepared to integrate a 1295 or 482 MHz RADAR to build up a MERASS 1000/3000 systems for simultaneous measurements of wind, turbulence and temperature.

Also METEK's sonic sensor USA-1 can be integrated easily for ground based measurements of wind and turbulence (heat flux, momentum flux, etc.).

Using well accepted industrial standards METEK can confirm a delivery of spare parts for at least 7 years.

Output Variables

- Spectra, received power, range correct. reflectivity, radial comp. (instantaneous and average mode)
- Wind speed and direction, vector wind components
- Standard deviations of radial/vector components
- Stability classes, height of inversion layers, mixing height estimates (on request)
- Plausibility checks
- Virtual temperature (RASS, vertical wind correction)

