DATASHEET

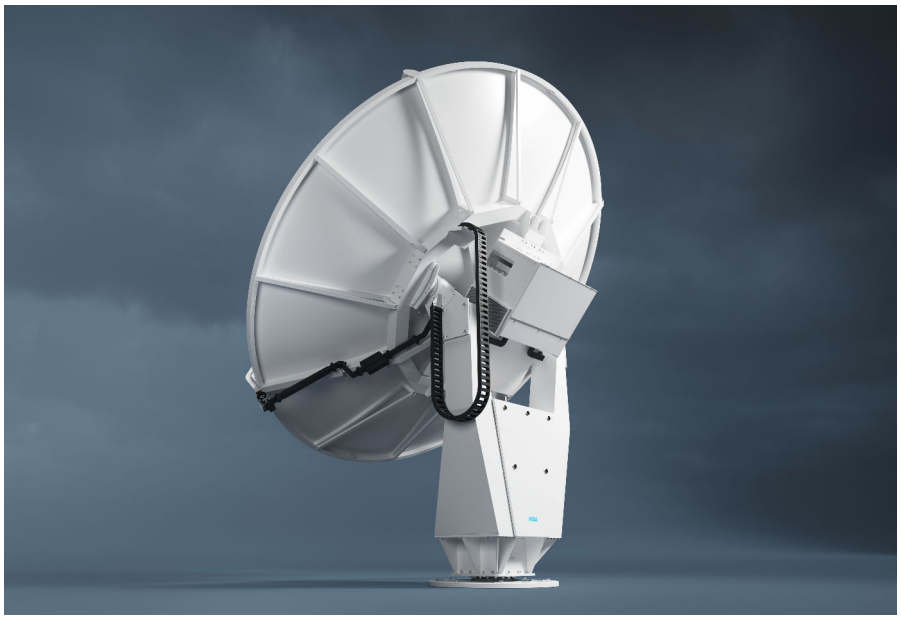
WRS300

Vaisala · Authorized Partner

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VAISALA

Weather Radar WRS300



Features

- Fully solid-state transmitter
- Compact, modular design
- Low life-cycle costs
- Fast installation and easy maintenance
- High resolution, accuracy, and sensitivity
- Software-tunable transmit frequency
- Continuous runtime calibration
- Graceful degradation
- Remote control and monitoring
- Built around RVP10™ and IRIS™ software

Vaisala Weather Radar WRS300 is a high-performance dual-polarization C-band radar that uses solid-state technology.

Solid-state transmitters

Solid-state power amplifier (SSPA) transmitters provide increased observation accuracy, sensitivity, and tracking quality. The software-tunable transmit frequency and frequency modulation make it easy to avoid frequency interference.

The life-cycle costs of the SSPA transmitters are low because they do not require replacement of expensive consumable parts, in contrast to tube-based transmitters.

Compact design

The compact weather radar is designed for fast installation and easy maintenance.

The transceiver is located at the back of the antenna, so the site only needs a short waveguide structure with fewer components subject to mechanical stress. The simplified signal path provides improved sensitivity.

Because there is no need for a large equipment room, the site construction work is less extensive, and maintenance costs lower.

Pulse compression

Pulse compression is used in SSPA weather radars to achieve the required range resolution using long transmitted pulses. The pulse compression is implemented by non-linear frequency modulation (NLFM). The pulse compression also enhances the radar receiver's dynamic range (system dynamic range).

Graceful degradation

WRS300 has independent SSPA transmitters for H channel and V channel. The transmitter design combines reliable and redundant SSPA modules: even if one of the key components fails, the system still maintains limited functionality.

Enhanced reflectivity

Enhanced reflectivity is a signal processing technique that improves the detection capabilities of a dual-polarization radar.

The technique combines measurement data from both polarization channels for echo power estimation to improve the detectivity of weak signals over a long range.

Enhanced reflectivity is exclusive to Vaisala dual-polarization radars.

Technical data

Operating environment of units in the radome

Operating environment	Indoor use
Operating temperature	-40 ... +55 °C
Operating humidity	0–100 %RH, condensing
Operating altitude/Ambient pressure	Up to 3000 m Down to 700 hPa
IP rating	Pedestal: IP42 Transceiver: IP52

Transmitter

Type	Fully solid-state, SSPA-based transmitters. Transmitters for H and V channels are separate and independently modulated.
Peak power (H + V)	4 kW + 4 kW or 2 kW + 2 kW
Pulse widths	0.5–200 µs
Duty cycle	Max. 10%
Max. pulse repetition frequency	2500 Hz
Cooling	Forced air
Polarization	Simultaneous Transmit and Receive (STAR), H only, V only

Receiver

Type	Dual-conversion, dual-channel IF downconverter and digitizer
Noise figure	< 2 dB
Dynamic range	> 100 dB (4 µs pulse, 0.4 MHz NEBW)
Image rejection	> 80 dB > 100 dB with waveguide filters

Antenna

Type	Center-fed parabolic reflector
Reflector diameter	4.5 m
Gain	> 45 dBi
Beam width	< 1.0°
Difference between H and V beam widths	< 0.1° (< 0.2 dB difference in gain)
Peak sidelobes at main polarization planes	< -29 dB
Cross-pol isolation at main polarization planes	< -36 dB
H/V alignment (squint angle)	< 0.1°

Pedestal

Type	Semi-yoke elevation over azimuth
Angle span software limits	-2 ... 108°
Scanning rates (azimuth and elevation)	up to 40°/s (6.67 rpm)
Acceleration	20°/s ^{2}
Position accuracy	Better than ±0.05
Motors	Brushless AC servo

Radar cabinet

Dimensions (W × H × D)	600 × 1300 × 1000 mm
Weight (without UPS and server)	100 kg
Operating temperature	+10 ... +40 °C
Recommended operating temperature	+15 ... +25 °C
Operating humidity	0–95 % RH, non-condensing
Operating altitude / Ambient pressure	Up to 3000 m / Down to 700 hPa

System

Frequency range	5500–5700 MHz (selectable in 50 MHz bands and tunable within the range)
System dynamic range	117 dB (190 µs, 0.2 MHz NEBW)
Phase stability	< 0.1° rms
Input power	Voltage: 230 V (± 10 %) 50–60 Hz (± 5 %) Main fuse minimum 32 A Single-phase
Power consumption	4 kW + 4 kW option: Max. 5.1 kW, typical 4.5 kW 2 kW + 2 kW option: Max 3.1 kW, typical 2.5 kW
Weight of antenna, pedestal, waveguides, and transceiver	Approximately 1600 kg

Signal processing

Signal processor	Vaisala RVP10
Azimuth averaging	2–1024 pulses
IF digitizing	16 bits
Clutter filters	Fixed/Adaptive GMAP in frequency domain
Data outputs (8 and 16 bit)	`Ah/v`, `Azdr`, `CCOR`, `CSP`, `CSR`, `dBT`, `dBZ`, `dBZt`, `KDP`, `LDR`, `LOG`, `PHIH/V`, `PHIDP`, `PMI`, `R`, `RHOHV`, `SNR`, `SQI`, `T`, `V`, `VC`, `W`, `Z`, `ZC`, `ZDR`, `ZDRC`, `Zh`, `Zv`, `Zhv`
Optional data outputs	`HCLASS`, `I/Q`
Dual-polarization	Simultaneous (STAR), H only, V only
Dual PRF velocity de-aliasing	2:3, 3:4, or 4:5 for 2X, 3X, or 4X velocity unfolding
Enhanced reflectivity processing (Zhv)	> 3 dB improvement detection gain
Processing modes	PPP, FFT/DFT, Random phase coding / SZ 8/64 phase coding for 2nd trip filtering and recovery
Maximum number of range bins	15,000
Minimum range resolution	Down to 15 m (accuracy of ±1.0 m)
Maximum range	Up to 1024 km
Pulse compression	NLFM and LFM, compression ratio of up to 19.5 dB or better

Radar controller

Type	Vaisala RCP8 with IRIS Radar
Scan modes	PPI, RHI, Volume, Sector, Manual, Rapid Scan
Local display	Real time, Ascope, BITE, products

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