



### Features

- Fully solid-state transmitters
- Compact, modular design
- High resolution, accuracy, and sensitivity
- Fast installation and easy maintenance
- Low life-cycle costs
- Built-in automatic calibration
- Graceful degradation
- Light-weight pedestal
- Built around RVP900™ and IRIS™ software

Vaisala Weather Radar WRS400 is a dual-polarization X-band radar that uses solid-state transmitters.

### Solid-state transmitters

Solid-state power amplifier (SSPA) transmitters provide increased observation accuracy, sensitivity, and tracking quality. The tunable transmit frequency makes 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.

Thanks to continuous calibration, there is no calibration downtime.

### Improved coverage with high quality

X-band frequency provides measurement data with high resolution and excellent precision for short-range meteorological surveillance.

By filling gaps in radar networks, the X-band weather radar improves radar network coverage, for example, in mountainous areas, rain catchment areas, and around wind parks.

### 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 only a short waveguide structure is needed. The simplified signal path provides improved sensitivity.

The simplified structure requires no RF rotary joints, waveguide switches, or site-specific parts. This enables increased data quality, reliability, and lower costs.

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

The transceiver has an internal heating/cooling system. The other units can be installed inside radar cabinet, or in other preferred location.

### Graceful degradation

WRS400 has an independent SSPA transmitter for H channel and V channel. The radar design is based on reliable and redundant modules; even if one of the key components fails, the system will still maintain limited functionality.

# Technical data

## Operating environment for units in the radome

Operating temperature	-40 ... +55 °C
Operating humidity	0 ... 100 %RH, condensing
Operating altitude/Ambient pressure	Up to 3000 m Down to 700 hPA
IP class for pedestal and transceiver	IP54

## Transmitter

Type	Fully solid-state, SSPA-based transmitters. Transmitters for H and V channels are separate and independently-modulated.
Peak power (H+V)	200 W + 200 W 400 W + 400 W
Pulse width	1 ... 90 µs
Duty cycle	max. 10 %
Max. pulse repetition frequency	3 kHz
Cooling	Forced air
Polarization	Simultaneous Transmit and Receive (= STAR), H-only, V-only

## Receiver

Type	RF front-end, dual-channel digital receiver for horizontal and vertical polarization
Noise figure	≤ 3 dB
Linear dynamic range	> 95 dB
Image rejection	> 80 dB (with WG filters)
Recovery time after Tx pulse	≤ 5 µs

## Antenna

Type	Center-fed parabolic reflector
Reflector diameter	1.4 m or 2.4 m
Gain	For 1.4 m antenna: > 40 dBi For 2.4 m antenna: > 45 dBi
Beam width	For 1.4 m antenna: <1.8° For 2.4 m antenna: <1°
Peak sidelobes at main polarization planes	< -25 dB
Cross-pol isolation at main polarization planes	< -30 dB
H/V alignment (squint angle)	< 0.1°

## Pedestal

Type	Semi-yoke elevation over azimuth
Scanning rates	Up to 40°/s (6.67 rpm)
Acceleration	20°/s <sup>2</sup>
Position accuracy	±0.05° accuracy
Azimuth steering	360°
Vertical steering	-2 ... +92° or better
Weight	250 kg

## Radar cabinet

Dimensions (w × h × d)	600 × 1300 × 1010 mm
Weight (without UPS, server)	100 kg
Weight (with UPS, server)	180 kg

## System

Typical operating range	100 km
Frequency range	9300 ... 9700 MHz Selectable in 100 MHz bands and tunable within the range.
Phase stability	0.5° or better
Input power	Voltage: 230 ±10 %, 50 ... 60 Hz ±3 Hz (single-phase)
Power consumption	Typical: 1200 W
Total weight of radar (antenna, pedestal, transceiver)	With 1.4 m antenna: approx. 340 kg With 2.4 m antenna: approx. 370 kg
Noise emissions	55 dB

## Signal processing

Signal processor	RVP900
Azimuth averaging	2 ... 1024 pulses
Clutter filters	IIR, fixed, and adaptive width GMAP
Dual PRF velocity de-aliasing	2:3, 3:4, or 4:5 for 2X, 3X, or 4X de-aliasing
High sensitivity mode processing	> 3 dB improvement detection gain
IF digitizing	16 bits, up to 5 channels, up to 100 MHz sampling (WRS400: typically 83 MHz)
Number of range bins	Up to 8168 per channel
Optional data outputs	I/Q
Processing modes	PPP, FFT/DFT, Random phase 2nd trip filtering/recovery
Range resolution	Down to 15 m (with 83 MHz sampling, down to 22 m)
Range de-aliasing by random phase	

## Radar controller

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

## Radome

Type	Quasi-random (dual-polarization)
Typical outside diameter	For 1.4 m antenna: 2400 mm For 2.4 m antenna: 3660 mm

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