



### 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 ultra-wideband performance virtually removes the risk of 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 and data

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.

### 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. The failing component can be replaced fast and easily without an extensive break in operation.

# Technical data

## Operating environment for units in radome

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

## Antenna

Reflector diameter	1.4 m or 2.4 m
Type	Center-fed parabolic reflector
Gain (minimum)	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
Acceleration	20°/s <sup>2</sup>
Position accuracy	±0.05° accuracy
Azimuth steering	360°
Vertical steering	-2 ... +92° or better
Scanning rates	Up to 6 rpm

## Transmitter

Type	Fully solid-state, SSPA-based transmitters. Transmitters for H and V channels are separate and independently-modulated.
Frequency range	9300 ... 9700 MHz Selectable in 100 MHz bands and tunable within the range.
Peak power	SSPA 200 W (H) + 200 W (V) SSPA 400 W (H) + 400 W (V)
Pulse width	1...90 µs
Duty cycle	Max. 10%
Max pulse repetition frequency	3 kHz
Polarization	Simultaneous Transmit and Receive (= STAR) Horizontal-only Vertical-only

## Radar controller

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

## Receiver

Type	RF front-end, dual-channel digital receiver for horizontal and vertical polarization
Noise figure	With WG filters: 4 dB Without WG filters: 3 dB
Linear dynamic range	95 dB or better
Image rejection	80 dB or better (with WG filters)
Sensitivity	-113 dBm

## System specifications

Input power	Voltage: 230 ±10 %, 50 ... 60 Hz ± 3 Hz (single-phase)
Power consumption	Typical: 1100 W
Phase stability	0.5° or better
Total weight of radar (antenna, pedestal, transceiver)	with 1.4 m antenna: approx. 340 kg with 2.4 m antenna: approx. 370 kg

## Signal processing

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, 100 MHz in 5 channels
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	N*15 m
Range de-aliasing by random phase	

## Radome

Property	Value
Typical outside diameter	For 1.4 m antenna: 2400 mm For 2.4 m antenna: 3900 mm
Type	Quasi-random (dual-polarization)

