

## Vaisala Weather Radar WRK200



### Features/Benefits

- Vaisala's light-weight, semi-yoke-style pedestal
- 1 degree beamwidth low side lobe antenna
- High sensitivity mode processing to recover sensitivity loss in STAR mode
- >35 dB integrated cross-polarization isolation
- Image rejection >80 dB (>100dB with Vaisala WG filters).
- Dynamic range > 99 dB (2 $\mu$ s pulse)
- Feed forward control loop to allow extremely fast and precise antenna movement
- Dual channel digital IF receiver
- Precision horizontal and vertical beam matching
- Built around Vaisala Sigmnet RVP900 signal processor
- Integral flat screen display for local maintenance
- Remote control/monitoring
- Rainfall estimation based on KDP
- Accurate attenuation correction
- 250 kW klystron transmitter with low-maintenance solid-state modulator
- Option: Built-in dual channel receiver calibration

### Dual Polarization Adds New Dimension

The Vaisala Weather Radar WRK200 is a dual polarization C-band Klystron Doppler Weather Radar. The radar operates in either Simultaneous Transmit and Receive of H and V (STAR) mode or Linear Depolarization Mode (LDR) mode, during which H alone is transmitted and both are received. STAR mode enables use of the high sensitivity power estimator increasing detectability by up to 10 dB versus the competition. The polarization variables, depending on the mode, are ZDR, RHOHV, PHIDP, KDP and LDR. However, the goal of polarization radar is not only to produce and display these outputs; it is also to expand the capabilities of the radar for the operational forecaster.

The WRK200 provides the following benefits:

- Hydrometeor identification
- Attenuation correction

- Data quality improvement
- Improved rainfall estimates, based on KDP

### S-Band Performance at a C-Band Price

Attenuation by intervening heavy precipitation has been a long-standing problem with C-band weather radars, making S-band radars preferable, especially in tropical environments where heavy rain is common. However, with dual polarization, the radar performs accurate, real-time attenuation corrections. The benefit is that you can obtain the same precipitation measurement accuracy using the WRK200 as with an S-band system that costs typically two or three times more.

### More Accurate Precipitation Measurement

Eliminating non-meteorological targets and correcting attenuation can substantially improve precipitation measurement. However, the WRK200

goes further by providing KDP-based measurement of the precipitation rate. Unlike the reflectivity (Z), KDP is directly proportional to the precipitation rate, independent of the radar calibration and unbiased by intervening clutter or partial beam blockage. This makes the KDP very robust in measuring moderate and heavy rain.

# Technical Data

## System Performance

Modes	STAR or LDR
Phase stability	<0.1 deg rms
Maximum RhoHV	>0.99

## Transmitter

Type	Klystron VKC8387
Operating frequency range	5.6 - 5.65 GHz
Peak power	250 kW
Average power	max 550 W
Duty cycle	0.0022
Pulse widths	Typical 0.5, 1.0, 2.0, max 5.0 $\mu$ s
PRF	250 to 2125 Hz
Modulator	Solid state

## Antenna

Type	Center-fed parabolic reflector
Diameter	4.5 m
Gain (typical)	45 dB
Beam width	<1 degree
Peak side lobe (typical)	-28 dB
Peak on horizontal axis (typical)	-33 dB
Integrated cross-pol isolation	$\leq$ -35 dB
H/V alignment (squint angle)	<0.1 degrees
Weight	620 kg

## Pedestal

Type	Semi yoke elevation over azimuth
Elevation range	-2 to 108 degrees
Maximum scan rate	40 deg/sec
Acceleration	20 deg/sec <sup>2</sup>
Position accuracy	0.1 deg
Weight	910 kg (total with antenna 1530 kg)
Motors	Brushless AC servo

## RF-to-IF Receiver

Type	Dual stage, dual channel IF downconverter
Dynamic range	> 99 dB ( 2 $\mu$ s pulse ) >115 dB option
IF frequency	442/60 MHz
Image rejection	>80 dB (>100dB with Vaisala WG filters)
Phase stability	0.1 deg rms
Tuning range	5.5 - 5.7 GHz
Noise figure	< 2 dB

## Radar Controller

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

## Digital IF Receiver and Signal Processor RVP900

Type	Vaisala Sigmet RVP900
IF digitizing	16 bits, 100 MHz in 5 channels
Range resolution	N*15 m
Number of range bins	Up to 4200
Velocity dealiasing	Dual PRF 2x, 3x, 4x
Range dealiasing	by phase coding
Clutter filters	fixed, adaptive or GMAP to >55 dB clutter cancellation
High sensitivity STAR mode processing:	>3 dB detection gain

## System Specifications

### PHYSICAL DIMENSIONS

Cabinet (w x h x d)	1400 x 1800 x 1300 mm
Cooling:	Air-conditioned and forced air
Weight	992 kg
Total height	1890 mm

### CABINET ENVIRONMENT

Operating	+5 °C to +40 °C, 0 to 95 %RH, non condensing
Recommended	+15 °C to +25 °C
Storage	-50 °C to +50 °C without oil -10 ° to +50 °C with oil

### ANTENNA/PEDESTAL ENVIRONMENT

Operating	-40 °C to +55 °C, 0 to 95 %RH, non condensing
Storage	-50 °C to +60 °C

### INPUT POWER

Voltage	230/400 VAC $\pm$ 10 %, 50 - 60 Hz $\pm$ 5 %
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### POWER CONSUMPTION

Cabinet	8720W max. with UPS 7850W max. without UPS
Antenna/pedestal	1050 W (max), 200 W (typical)

## Options

Radome	6.7 m, foam core sandwich, random panel
Automatic calibration	
Forward and reverse transmitted power monitoring	

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