



QXP-120 Quad Pol Doppler X-band Weather Radar

MetaSensing offers the QXP-120 X-band weather radar, featuring Doppler detections, full polarimetry, and solid-state technology. These benefits provide precipitation monitoring with a spatial resolution of 15m, with a 120km diameter of coverage.

QUAD-POL (Full Polarimetry)

QXP-120 features full polarimetry as the standard polarimetric mode, capturing more information than single- or dual-pol. This produces not only single-pol spectral moments (reflectivity Z , velocity V , spectrum width w) but all polarimetric variables: differential reflectivity (Z_{DR}), linear depolarization ratio (LDR), propagation differential phase (ϕ_{DP}), specific differential phase (KDP), copolar correlation coefficient (ρ_{HV}), and cross-polar correlation coefficient (ρ_{XH}).

BISTATIC OPERATIONS

QXP-120 can be deployed as an individual radar unit or as part of a network of radars. For the latter case, MetaSensing has developed oscillator boards that enable bistatic radar operations. A network of X-band radar systems is the solution of choice for urban areas or flood-prone water management areas which require very high-resolution measurements of precipitation.

Bistatic and full polarimetry (quad-pol) are unique to the QXP-120 weather radar, placing it at the forefront of weather radar technology. As part of our mission to hasten the turnover time between scientific discoveries and robust implementations, the QXP-120 is the instrument of choice for atmospheric science research and weather service operations.

DATA PROCESSOR

The QX-120 data processor capitalizes on MetaSensing's years of experience with real time multichannel SAR signal processing on CUDA GPU boards. It features clutter and interference filtering; hydrometeor classification derived from 3D volume data segmentation; rain rate field evaluation; and detection and identification of electrified cloud volumes, sandstorms, volcanic ash, and bioscatter. It can also process bistatic polarimetry for more accurate results using a bistatic network of radars.

QXP-120 specifications

SYSTEM	
Frequency	9.3-9.5 GHz
Polarization	Full Pol (Quad-Pol)
Minimum operational range	200 m
Maximum operational range	120 Km
Highest range resolution	5 m
Sensitivity	0 dBZ (@ 30 Km)
Scanning modes	PPI-RHI-VCP-Fixed

ANTENNA	
Half-power beam width	$\leq 1.3^\circ$
Antenna gain	> 42 dBi
Side-lobe level	< -29 dB
Integrated cross polarization isolation	< 31 dB
Azimuth operating range	$0^\circ - 360^\circ$ continuous
Elevation operating range	$-2^\circ - 90^\circ$
Angular positioning accuracy	$\pm 0.1^\circ$
Scanning speed	Az (0-6 rpm) El (0-6 rpm)

TRANSMITTER	
Power transmitter	100 W (per channel)
Power stability	$< \pm 0.1$ dB per second $< \pm 0.5$ dB per day
Phase stability	$< \pm 0.5^\circ$ per second
Tx channels	2 independent (H and V)
Pulse Repetition Frequency (PRF)	up to 20 KHz

RECEIVER	
Channels	2 simultaneous (H and V)
Noise figure	< 2 dB
Minimum Detectable Signal @ 1 MHz	≤ -118 dBm
Dinamic Range @ 1 MHz	> 90 dB
Data Rate	20 MBps / channel
DAC/ADC resolution	16 bit
Computer system	COTS PC with CUDA enabled processing

DATA PROCESSOR	
Output data	Raw data (I&Q)
	Reflectivity (Z), Radial Velocity (V)
	Spectrum Width (W)
	Differential Reflectivity (Z_{DR})
	Linear Depolarization Ratio (LDR)
	Differential Propagation Phase (ϕ_{DP})
	Specific Differential Phase (KDP)
	Copolar Correlation Coefficient (ρ_{HV})
	Cross-polar Correlation Coefficient (ρ_{xH})
	Rain Rate Estimators (R-Z / R-KDP)
Wind Direction, Wind Speed	
Hydrometeor classification	
Data correction	Rain attenuation
	Clutter suppression

OPERATIONAL CONDITIONS	
Temperature	$-20^\circ / 55^\circ$ C
Environmental condition	All weather / Outdoor
Wind	up to 65 m/s
Power characteristics	230 V, Single phase, 50/60 Hz, 3 A
Weight	< 500 Kg

ADVANCED OPTIONAL FEATURES	
Synchronization	Time and Phase
Synchronization mode	GNSS
Configuration	Networked into Radar Sensor Network
Operation	Monostatic, Bistatic, Multistatic
Data Product	3D wind vector 3D view of rainstorm Bistatic / Multistatic observation of hydrometeors

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