



QX-120 Quad-pol FMCW X-band Weather Radar

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

FMCW architecture achieves high sensitivity with a low transmit power, allowing for the use of light-weight, low-maintenance solid-state amplifiers. FMCW systems require two antennas, one for transmit and one for receive. The antenna diameter can be as small as 1.3m, or larger depending on customer requirements.

QX-120 features **full polarimetry** as the standard polarimetric mode, capturing more information than single/dual-pol systems. This produces not only single-pol spectral moments (reflectivity Z , velocity V , spectrum width w) but all polarimetric variables at the same time: 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}).

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.

X-band systems are smaller, cheaper and therefore especially suited for the coverage of smaller, more isolated geographic areas that long-range radars often miss, providing cost-effective coverage of the lower troposphere in locations that need it the most.

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.

QX-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	15 m
Sensitivity	< -10 dBZ (@ 30 Km)
Scanning modes	PPI-RHI

ANTENNA	
Half-power beam width	$\leq 1.5^\circ$
Antenna gain	> 42 dBi
Side-lobe level	< -28 dB
Integrated cross polarization isolation	< 30 dB
Azimuth operating range	0° - 360° continuous
Elevation operating range	-2° - 90°
Angular positioning accuracy	$\pm 0.1^\circ$
Scanning speed	Az (0-6 rpm) El (0-6 rpm)

TRANSMITTER	
Power transmitter	20 W (per channel)
Power stability	< ± 0.1 dB per second < ± 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 10 KHz

RECEIVER	
Channels	2 simultaneous (H and V)
Noise figure	< 1 dB
Minimum Detectable Signal @ 1 MHz	≤ -118 dBm
Dinamic Range @ 1 MHz	> 90 dB
Data Rate	20 MBps / channel
DAC/ADC resolution	16/14 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° / 55° C
Environmental condition	All weather / Outdoor
Wind	up to 65 m/s
Power characteristics	230 V, Single phase, 50/60 Hz, 12 A
Weight	< 250 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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