C-Band Polarimetric Radar Rainfall Sensor
with Fully Solid State Technology

RAINWATCHER

Features
- C-band dual polarization and Doppler function
- Fully Solid State Technology
- Short time starts up, No tuning and pre-heating
- Low power consumption
- High accuracy rainfall sensor
- Higher reliability and performance and low maintenance cost
- J-BIRDS™ Software Package provides optimized observation data for easier meteorological analysis
- Open File Format

System Configuration

Antenna & Radome
Radar units
Radar Workstation

Basic Functions
- Minimum observation mesh: 250m mesh
- Observation radius: 300 km

System Applications
- Rainfall Observation and Measurement System
- Landslide Monitoring System
- Dam Operation and Control System
- Water Resource Management System

Japan Radio Co., Ltd.
## JMA-540 C-Band Polariometric Radar Rainfall Sensor RAINWATCHER

### SYSTEM

**Type:** Polariometric radar with solid state technology  
**Operating Frequency:** 5.65 - 5.85 GHz (Option: 5.25 - 5.35 GHz, 5.85 - 5.90 GHz)  
**Pulse Width:** Short (PON): 1.0 / 2.0 μsec  
Long (QIN): 50 / 100 μsec  
**Pulse Repetition Frequency (PRF):** 300 Hz to 2,000 Hz  
**Staggered PRF Ratio:** None, 3.2, 4.3 or 5.4 (selectable)  
**Maximum Doppler Velocity:** 15, 32, 48 or 64 m/s (depend on PRF)  
**Observation Range:** 300 km (Maximum 400 km @ 23 dBz)  
**TR Duplexer:** Circulator with solid state limiter (no TR tube)  

#### Basic Data Output
- Received Signal Power (Pr)  
- Target Reflectivity (Zv)  
- Doppler Velocity (Vv)  
- Spectral Width (Wv)  

#### Polarization Data Output
- Differential Reflectivity (ZDR)  
- Differential Phase (ψd)  
- Specific Differential Phase (Kp)  
- Correlation Coefficient (ρhv)  
- Line Depolarization Ratio (LDRv)  

#### Operating Temperature
- Outdoor: -20 °C to 45 °C  
- Indoor: +5 °C to +35 °C  

#### Operating Relative Humidity
- Outdoor: ± 85 % & ± 40 °C, ± 75 % & ± 20 °C  
- Indoor: 20 % to 80 % @ 25 °C  

**Power Consumption:** ≤ 7.7 kVA @ 200 - 230 VAC, 50/60 Hz

### ANTENNA / PEDESTAL

**Type:** Parabolic, prime-focus reflector  
**Reflector Diameter:** Approx. 4.3 m (+/-1.1 feet)  
**Antenna Gain:** ≥ 44 dB  
**Half Power Beam Width:** ≤ 1.1 °  
**Polarization:** Linear, Horizontal & Vertical Dual Polarization  
- Simultaneous HV/VA Fixed Horizontal/Vertical Transmission  
**Side Lobes:** ≤ -26 dB  
**XPD (Cross Polarization Discrimination):** ≥ 30 dB  
**VSWR:** ≤ 1.4  
**Pedestal Structure:** Elevation over Azimuth  
**Angle Scan:**  
- A/Z: Full 360 °  
- E/L: ≤ ±90 ° (0.1 ° step)  
**Angular Positioning Accuracy:** ≤ 0.1 °  
**Scanning Speed:**  
- A/Z: 0 - 60 rpm (0.1 rpm step)  
- E/L: 0 - 2 rpm (0.1 rpm step)  
**Angle Resolution:** ≤ 0.1 ° (angle bits: ± 12 bits)  
**Angle Data Accuracy:** ≤ ±0.1 °  
**Weight:** Approx. 2.1 t  
**Safety Devices:** Safety switches

### TRANSMITTER / RECEIVER

**Transmitter Type:** Solid State Power Amplifier  
- Simultaneous HV/VA Fixed H or V Transmission  
**Peak Power:** 2.5 kW (H) & 2.5 kW (V)  
**Duty Cycle:** ≤ 10 %  
**Occupied Frequency Bandwidth:** 5.4 MHz, VON (50% QIN)  
**Off-center Attenuation:** ≥ 60 dB @ ± 0.1 MHz  
**Transmission Blanking:** A/Z and EL  
**Receiver Type:** Double Superheterodyne with Image reject mixing  
**Minimum Discernible Signal:** ≤ -110 dBm @ 1.0 μsec pulse width  
**Noise Figure:** ≤ 2.5 dB  
**Linear Dynamic Range:** ≥ 110 dB with BTC

### IF DIGITAL RECEIVER / SIGNAL PROCESSOR

**Type:** Multi-channel Digital Receiver & Signal Processor  
**Intermediate Frequency:** 60 MHz  
**IF Sampling:** Up to 96 MHz  
**A/D Resolution:** 16 bits each per polarization  
**Pulse Compression Ratio:** < 150  
**Maximum No. of Processed Range Bins:** Up to 2,000  
**Minimum Processing Resolution:** 25 m  
**Processing Mode:** FFT  
**Clutter Suppression Capability:** ≥ 40 dB  
**Various Processing Functions:** Range Correction, Velocity De-aliasing  
**2nd & 3rd Echo Suppression:** Random Phase  
**Interference Rejection:** Multi-Pulse Comparing

### RADAR WORKSTATION

**Computer System:** Commercial Off-The-Shelf PC, Core i5 or higher spec.  
**Operating System:** Linux  
**Application Software:** J-DRDE™ Software Package  
**Remote Radar Workstation:** Same function as the Radar Workstation on radar site

#### Radar Product Server
- Multi-windows showing different products  
- Customizable geographic play maps and text annotation  
- Data zooming, animation & screen sheat utility  
- Radar Volume Corrections  
- Sea Clutter Detection & Correction  
- Bright Band Correction  
- Vertical Profile Correction  
- Occultation Correction  
- Support Data Type: NetCDF, BUFR, HDF5, XML, ASCII, UF, NEXRAD Level 2 (Selectables)  
- Automatic Output Data: GIF, PNG, JPEG, NetCDF, (Selectables)  
- Data Transfer Type: FTP  
- Graphical Indication by Region, Basin or Route  
- Standard Meteorological Products  
- Extended Meteorological Products  
- Hydrological Products  
- Forecasting and Warning Products  
- Sensor & Data Integration  

#### Data Archival and Retrieval Server
- Archive radar data temporarily on PC hard disk by appropriate method  
- Transfer to external media such as Optical Disk  
- Archival data: Raw data, Product Data, System Log and BITE Messages  
- Open data structure and the XML format of archived raw and products data  
- Archive and retrieve data: HDF5 or BUFR priority over other formats

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*Specifications may be subject to change without notice.

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