

## FM-CW micro rain radar MRR-01

Instrument name: MRR-01

Instrument type: MRR-1

Manufacturer: Meteorologische Messtechnik GmbH (METEK)

Location: Meteorological Institute, Bonn

Coordinates: Lat: 50.73123° N, Lon: 7.07073° E, Alt: 72 m asl

The **Micro Rain Radar (MRR)** is a vertical pointing FM-CW (frequency modulated – continuous wave) Doppler radar operating at 24.1 GHz (K-band, 12.4 mm wavelength). The emitted radar signal (only 50 mW transmitting power) is backscattered by falling hydrometeors (rain, graupel, snow). From the Doppler spectra the radar reflectivity factor ( $Z_e$ ) and the terminal fall velocity distribution can be derived. The range resolution can be varied from 10 to 200 m which determines together with the 30 range gates the system's maximum height range of 300 - 6000 m. In case of rain the Doppler spectra can be used to derive vertical profiles of microphysical rain properties like drop size distribution and rain rate.

The **MRR-01** is located on the roof of the Meteorological Department in the Institute of Geoscience and Meteorology in the University of Bonn.

### Instrument specifications

Parameter	Specification
Frequency	24.1 GHz
Wavelength	12.4 mm
Radar Type	FM-CW
Transmit Power	50 mW
Receiver	Single Polarization
Power consumption (radar)	25 W
Total power cons. incl heating	525 W
Max. range	6 km
Range Resolution	10 - 200 m
No. of range gates	30
Temporal resolution	10 s
Antenna diameter	0.5 m
Beam width (2-way, 6 dB)	1.5°

### Instrument time-line

29/07/2008 - today    operation at Institute for Geoscience and Meteorology in Bonn

## Available measurement modes

- Vertical pointing FM-CW Radar at 30 range gates between 10 m and 200 m and a temporal resolution of 1 minute

## JOYCE-CF Standard Operation Procedures

- Range gate spacing of 200 m with 1 min temporal resolution

## Data quality assurance procedures

- Internal data processing via METEK GmbH MRR processor

## Available datasets

The following data products are available via JOYCE-CF data request sheet.

Due to data storage amount and transmittance limitations, level 0 (raw pulses, etc.) and level 1 (I/Q data) are not stored. Only processed level 2 data is available.

### Level 2

- Available data per scan:
  - measurement height H (m)
  - liquid water content LWC ( $\text{g m}^{-3}$ )
  - path integrated attenuation PIA (dB)
  - rain rate RR ( $\text{mm h}^{-1}$ )
  - transfer function TF (dimensionless)
  - fall velocity W ( $\text{m s}^{-1}$ )
  - radar reflectivity attenuation corrected Z (dBZ)
  - attenuated radar reflectivity z (dBZ)
- Resolution:
  - Temporal resolution: approx. 1 min
  - Beam width: 2 deg
  - range resolution: 10 m to 200 m
- File size per day approx. 35 MB

## Contact

### Josephin Beer

University of Bonn  
Institute of Geoscience and Meteorology  
Auf dem Hügel 20  
53121 Bonn, Germany  
Tel.: +49 (0)228 73-3152  
E-mail: [jbeer@uni-bonn.de](mailto:jbeer@uni-bonn.de)