# MMR-116 DP

*X-Band Dual polarization Doppler Weather Radar*

**Mini Meteorological Radar MMR-116 DP is a unique X-band weather radar for permanent installations or mobile applications with large functionality integrated into the small device sold for favorable price. The radar provides real-time insight to weather situation, reconstructs the wind field and is capable to detect precipitation of 10 dBZ at distance of 200 km.**

***High sensitivity up to 200 km***


**Doppler wind speed measurement and dual polarization**

**Real-time insight to weather situation**

**Fully automatic operation without servicing staff**

**Low weight and small dimensions**

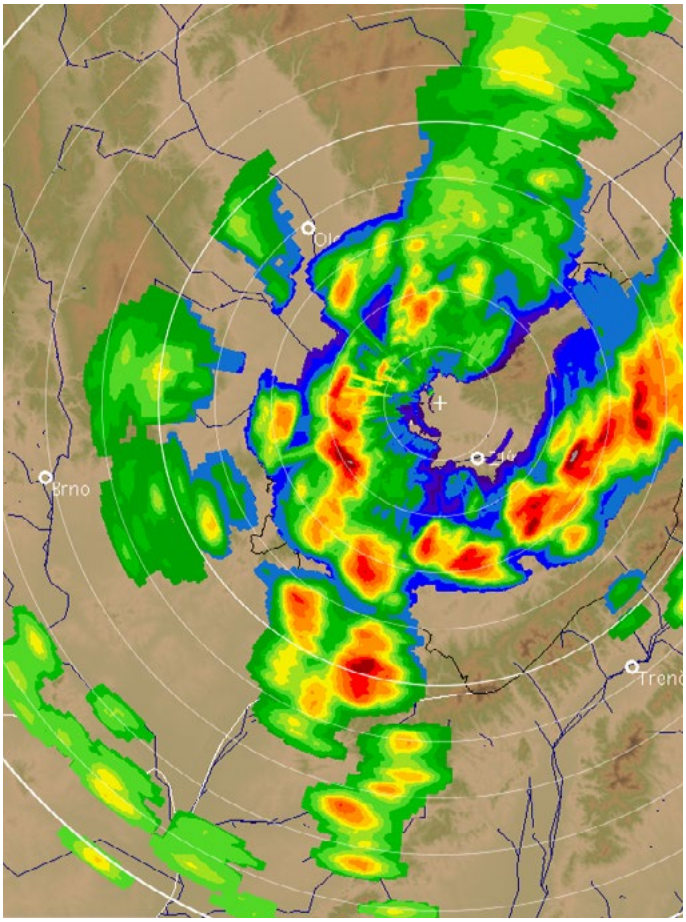
**User-friendly graphic web-interface**

MMR-116 DP´s combination of its size and low price implies wide use in aviation and aviation safety, water management, watershed management, global warming adaptation strategies, flood protection, operational weather forecast, hazardous meteorological phenomena detection, tourism, media, transport, military, civil defense, and agriculture. MMR-116 DP is an exceptionally powerful radar approaching the performance of the big radars. Its capabilities allow the design of efficient small radar networks which have important advantages compared to the single radar withlong-range.

MMR-116 DP comes with the IMS4 Radar Studio Software displaying meteorological spatial data in user-friendly graphic form.

MMR-116 DP Mini Meteorological Radar provides:

- programmable scan of echoes from the radar range (including but not limited to full 3D volume scan, PPI scan, RHI scan);
- data transformation into spatial matrix;
- input data processing;
- data distribution to customer graphic workstation.




*ColumnMax product (immediate maximum at a given location) from the storm front in the Czech Republic on 21.6.2018*

## IMS4 RadarStudio Software

The data processing software takes the earth curvature and atmospheric refraction into account. During the data processing, the non-meteorological data, like ground clutters, are removed (filtered) in final visualization products:

- BUFR, GRIB, HDF5, OPERA ODIM, UF data formats
- Image export to GIF, GeoTiff, PNG, JPG
- TITAN compatibility (www.ral.ucar.edu)

All products are available over HTTP interface and easily accessible to any user using web browser. The access to the web interface is secured by encrypted (https) protocol, and protected by password.

### IMS4 Radar Studio Basic License - Standard meteorological products (MIS:IMS.Radar)

- PPI (Plan Position Indicator) one radar elevation
- CAPPI (Constant Altitude PPI) horizontal cross section
- RHI (Range Height Indicator) vertical cross section
- Echo Tops heights of cloud tops
- Composite Reflectivity (Column max) maximas in columns
- VIL (Vertically Integrated Liquid Water) column sums
- HMAX (The height of the maximum dBZ)

### Wind Products

- Doppler radial wind speed
- VAD, VVP, UWT wind field reconstruction

### Hydrological products (MIS:RADAR.HYDRO)

- QPE (Quantitative Precipitation Estimate)
- Rainfall Accumulation
- River basin statistics

### Windshear and turbulence products (MIS:RADAR.SHEAR)

- Radial / azimuthal / elevation shear
- Runway oriented shear
- Horizontal / vertical shear
- 2D / 3D shear
- Integration of radar / lidar / anemometer LLWAS systems

### Hydrometeor classification

The hydrometeor classification algorithms coupled with MMR-116 DP radar discriminate between the different types of precipitation and calculate the warning products (hail, etc.).

### Composite products from multiple radars (MIS:RADAR.COMPOSITE)

- Generation of the composite products from the heterogenous radar networks (LRA - layer reflectivity average, LRM - layer reflectivity maximum)

### Nowcasting (MIS:RADAR.NOWC)

- Storm cell identification and nowcasting (MIS:RADAR.NOWC.TI)
- TREC (Tracking radar echoes by correlation) nowcasting up to 2 h including
- QPE (MIS:RADAR.NOWC.TREC)

### IMS4 Maps Map Server (OGC Web Services)

- Zoomable maps with layers
- Integration of Openly Licensed Maps for Offline use
- Radar product layers
- OGC Web Map Service

Low emitted power enables the device to comply with standards for operation in settled areas (towns, airports, highways, ports, etc.). Despite the low emitted power, the radar is able to monitor small precipitation up to distance of 200 km. MMR-116 DP can complete “white spots” in existing large radar network or a complete network of MMRs can be established in areas with no radar coverage. Small size and low weight enable easy installation and operation.

## Technical specification

| | |
|---|---|
| **Height** | 1630 mm |
| **Width** | 1310 x 1310 mm |
| **Weight** | 140 kg |
| **Antenna** | parabolic, diameter 1160 mm |
| **Antenna elevation** | –1 to +90°, angle span |
| **Antenna scanning speed** | 0 to 15 rpm |
| **Transmitter tube** | magnetron |
| **Receiver sensitivity** | –113 dBm |
| **Radar sensitivity** | 10 dBZ at 200 km |
| **Modulator type** | solid-state |
| **Dynamic range** | 110 dB |
| **Operating frequency range** | 9 410 MHz (support adjust range from 9300 MHz to 9500 MHz) |
| **Half power beam width** | 1.8° |
| **Polarization** | horizontal and vertical |
| **Antenna gain** | 40 dBi typical |
| **Transmitter power peak** | 40 kW |
| **Raw data resolution** | 24 bit |
| **RF pulse width** | 0.25 - 2 µs |
| **Pulse repetition frequency** | 250 - 2000 Hz |

| | |
|---|---|
| **Maximum range** | 200 km |
| **Wind speed range** | -30 to 30 m / s |
| **Wind speed accuracy** | accuracy ≤1 m / s |
| **Moments** | Z(v), Z(h) - reflectivity<br>V – Doppler velocity<br>W – spectrum width<br>ZDR, PhiDP, RhoHV, KDP |
| **Radial resolution** | 37.5 - 600 m |
| **Consumption** | 320 W |
| **Data update rate** | 3D full scan 1 – 5 minutes (depending on configuration) |
| **Data transfer** | TCP/IP (LAN, private networks, internet, etc.) |
| **Operating temperature range** | -40 °C to +60 °C without air condition |
| **Antenna side lobes** | -23 dB within 10° |