weather radar

WR10X

The WR-10X is an innovative radar system designed for real-time monitoring of weather phenomena.
Thanks to its small size and weight, the WR-10X can be easily installed in a fixed or mobile platform.
Its low purchase and operating costs allow this new monitoring instrument to be used in a wide variety of applications.
Gap filling, storm prevention, research, hydrology, transportation, outdoor events, etc… now easier with WR-10X.

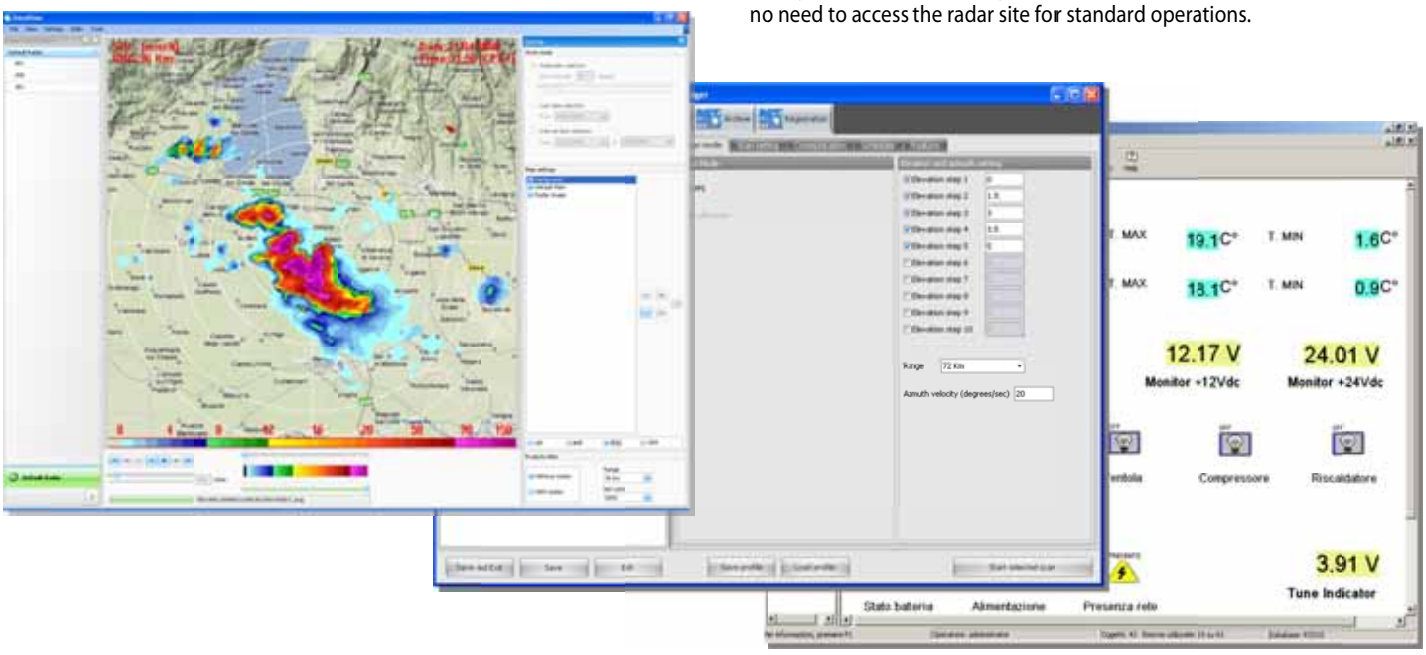
ELDES

Weather Radar WR-10X

General Description

The **WR-10X** is a valuable tool for real-time monitoring of weather phenomena in areas with complex topography.
It can be used advantageously at both urban and regional scales, or as a gap filler in an existing network.
A mobile version can be deployed quickly in cases where meteorological alerts occur in areas with significant hydrological risks, as an important tool for civil protection emergencies.
The radar can be installed alone or in a cluster, in both fixed and mobile configurations. Cluster *networking* allows the system coverage to be extended practically without limit. The resulting image products are mosaics integrating the data collected by all the sensors composing the network.
Thanks to the use of the latest technology, the capital, installation, and operating costs of **WR-10X** radars networks are very attractive alternatives to the traditional high-power big-size weather radar approach.

The control and display software has a very intuitive graphic user interface, which allows good skills in radar operation and data interpretation to be achieved after only a short training period, even for a user without specific knowledge in radar meteorology.
Once a scanning schedule has been programmed, the system will begin acquiring data and generating "products", which are images of the weather events detected, with colour levels proportional to weather reflectivity, superimposed on a local map, with adjustable distance and time scales.
A comprehensive set of the most common "weather products" is provided with the system, and thanks to the open software architecture, additional or customized products can be easily added later.
Reliability, maintainability, and ease of installation have been fundamental design objectives for the **WR-10X**.
The system can be remotely controlled, operated, and tested, so there is no need to access the radar site for standard operations.



Technical description

The **WR-10X** operates in X band (9400-9500MHz), allowing the use of a very compact antenna while still preserving good angular resolution. The radar electronics are integrated into the antenna pedestal and everything, with the exception of the server PC, is contained inside a small radome. This integrated configuration allows the installation time and the cost of the infrastructure to be drastically reduced. The power consumption of the **WR-10X** (ca. 200W) is tiny compared to traditional high power weather radars, easing installation in remote sites.

The **WR-10X** has a coverage of about 100 km for medium to strong precipitation, and about 35 km for medium to light precipitation.

Any communication channel supporting the TCP/IP protocol can be used for the **WR-10X** networked radar sites and control centre, including standard wireless or switched telephone networks.

Despite its low cost, the **WR-10X** provides all the features necessary for accurate and complete radar observations and the assessment of weather phenomena.

A "pencil-beam" antenna with equal beam widths in both elevation and azimuth and fully automated elevation control, allow acquisition of three-dimensional sets (volumes) of polar data for generating meteorological products and RHI scans.

The cost-effective **WR-10X-CE** version features single elevation azimuthal scans hence generating only the simplest "weather products", still allowing very accurate and sensible storms detection and monitoring. The **WR-10X-CE** version can be later upgraded to the full fledged one with simple operations.

The radar products listed below consist of maps representing various weather parameters such as reflectivity, instantaneous and accumulated surface rainfall, from a single radar or from a combination of networked sensors (mosaic).

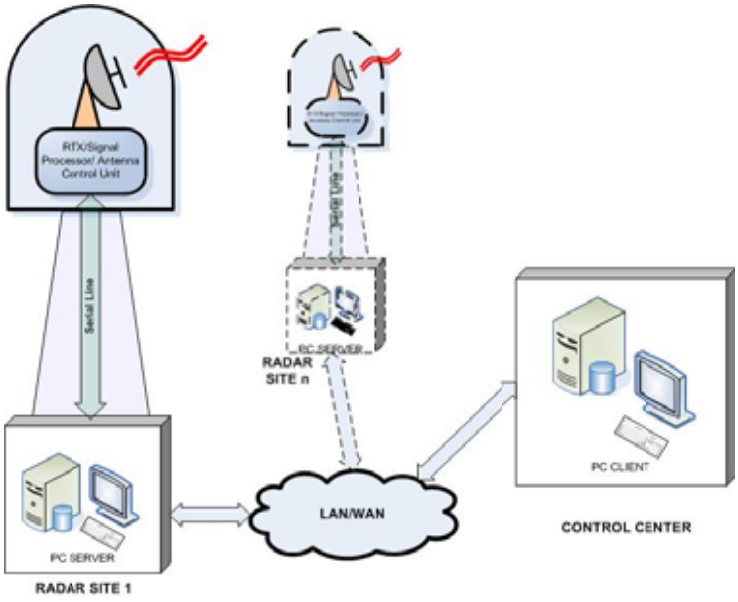
The radar software can be used to display both real-time and archived products with "movie-loop" functionality and other display tools.

Each radar can be individually programmed with a particular scanning schedule to acquire and record data in a synchronous way. The software allows integration of the radar data with other sensor information, such as rain gauge data, satellite images, etc., to create customizable multi-sensor views.

Typical applications

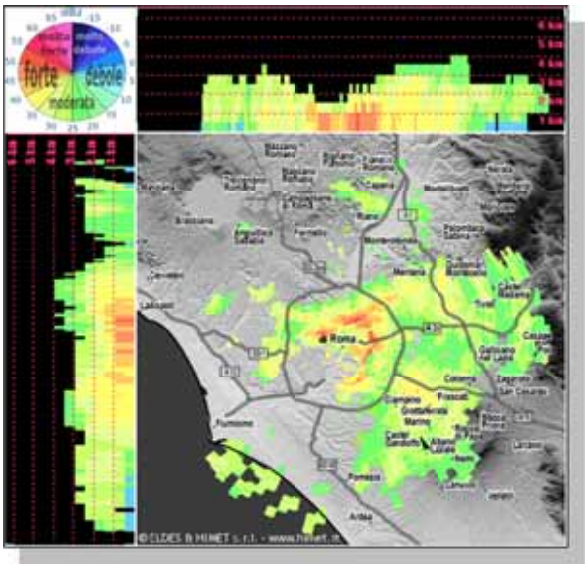
Monitoring of:

- hydrological basins not covered by the main radar network
- critical weather events for Civil Protection purposes
- local urban area weather conditions for local authorities and citizens
- weather conditions for outdoor recreational activities, sports, concerts, happenings, etc.
- urban or regional weather for local TV stations
- hydroelectric basin conditions
- roads, airports, harbours
- events potentially harmful for agriculture



Available Radar Products (full option):

- PPI-Z (reflectivity PPI; RHI (Range Height Indicator)
- CAPPI: Constant Altitude PPI
- SRI: Surface Rainfall Intensity (instantaneous)
- SRT: Surface Rainfall Total (accumulated)
- VMI: Vertical Maximum Intensity
- ECHO VMI: Height of maximum reflectivity
- HVMI: Maximum Reflectivity on horizontal and vertical axis
- VCUT: Atmosphere vertical cross section
- VPR: Reflectivity vertical profile
- LBM: Low base map
- ECHO LBM: height of low base map
- Nowcasting: storm cell evolution forecast at: 15', 30', 1h
- Mosaic: combination of the maps of all the radars in the same network



Weather Radar WR10X

Technical Specifications

Transceiver

Operating frequency	9410 MHz ±30 MHz
Peak power	10 Kw (magnetron)
Pulse width	0.3; 0.6; 1.2 uS user selectable
Repetition frequency (PRF)	1600; 800; 500 Hz user selectable (Jittered PRF for interference rejection)
Modulator	Solid state
Receiver	Logarithmic
Dynamic range	> 90 dB
Intermediate frequency	60 MHz
IF bandwidth	4 MHz
Noise figure	< 4 dB

Antenna

Type	Horizontal polarization, pencil beam (ϕ 75 cm) protected by radome
Horizontal lobe width	< 3° (Typical)
Vertical lobe width	< 3° (Typical)
Sidelobes within ±10°	< -23 dB (Typical)
Gain	> 35 dB (Typical)
Motion	Continuous azimuth scan with elevation steps of 0.1° in the 0° to 180° range, RHI, manual and automatic pointing (**WR-10X**) Azimuthal scan with fixed elevation adjustable during initial setup (**WR-10X-CE**)
Sector Blanking	Fully programmable in two separate azimuth sectors

Signal processor

Type	Digital processing on PC and DSP with 14 bit A/D converter
Parameters assessed	Horizontal reflectivity (Z) in dBz
Clutter correction	Statistical
Sensitivity	7dBz @ 25 km (standard)
Pulse integration	Adjusted to rotation velocity
Calibration	Automatic noise correction, yearly manual RX calibration with provided support tools
Range scale	21.6Km 36.0Km 72.0Km 108.0Km User selectable
Range resolution	90m 150m 300m 450m Depending upon Range scale

Display and control

Movie loop to display PPI maps at different heights in real time and from archived files.	
Standard Weather Products:	PPI-Z, RHI, VMI, H-VMI, Nowcasting (**WR-10X**) PPI-Z, VMI and Nowcasting (**WR-10X-CE**)
Optional Weather Products:	SRI, SRT, CAPPI, ECHO VMI, HVMI, VCUT, VPR, LBM and ECHO LBM (**WR-10X**) SRI and SRT (**WR-10X-CE**)
Composite and conversion Products:	Mosaic, BUFR, HDF5 and MDV format converters
Image export in: GIF, BMP, TIFF, JPEG, PNG, TIFF formats	
Measurement cursors. Pan and Zoom features. Underlay and overlay can be configured	

Generals

Dimensions (typical data)	Cylindrical radome. Diameter cm 90. Height cm 130.
Weight	< 90Kg excluding mast
Temperature range	*typical: 0÷40 °C (optional heater and coolers available upon request for extended ranges)*

The specifications are referred to the IC05 (standard version) and IC06 (CE version) or later version and are subject to change without notice.

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