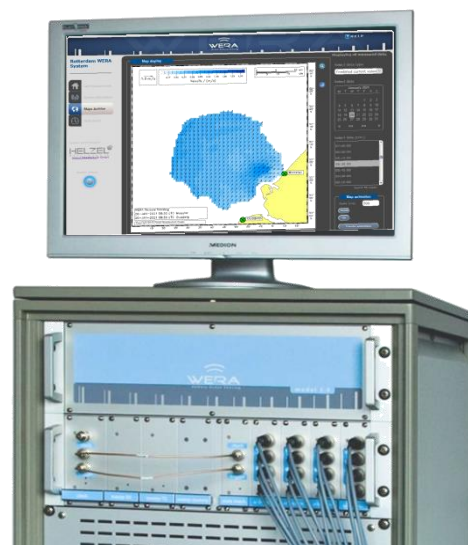


Remote Ocean Sensing System

for short & medium ranges up to 100 km

- Shore based Ocean Radar for ranges of **up to 100 km**
- Modular system with flexibility to enable set-up in **Compact** or **Array** type **Antenna** configuration
- WERA[®] always provides the **best ocean radar configuration** for your **specific application**
- HELZEL is **ISO 9001** Quality certified and WERA[®] is **FCC** and **RED** approved
- Very reliable system to guarantee **high Data Availability**



Pos	Parameter	Description	Value		
01	Working range <i>Typical values, can be reduced due to environmental effects</i>	Depends on frequency	13.5 MHz	16.15 MHz	24 - 27 MHz
		for currents:	100 km	80 km	40 km
		for wave height:	45 km	35 km	18 km
		for wave spectra:	30 km	25 km	12 km
02	Range resolution <i>Integration in range</i>	Depends on allocated bandwidth	50 kHz	100 kHz	150 kHz
		Grid size should be 20 % wider than this value	3000 m	1500 m	1000 m
03	Angular field of view	100° with 8 antennas (40 m long array @ 24.5 MHz) 120° for 12 or 16 antennas in a linear array (60 m long array @ 24.5 MHz) > 140° for 12 or 16 antennas in a convex curved array > 180° for 4 antennas in a square for Direction Finding (4.5 x 4.5 m @ 24.5 MHz)			
04	Angular Accuracy	± 2° for 8 antennas ± 1° for 12 or 16 antennas in a linear array (Beam Forming) ± 5° typical for 4 antennas in a square (Direction Finding)			
05	Beam width <i>Integration in azimuth</i> <i>The angular resolution is always 1°</i>	depends on beam steering angle	at centre	typical	at edge
		for 16 Rx antennas	± 3°	± 5°	±6°
		for 12 Rx antennas	± 4°	± 6°	±8°
		for 8 Rx antennas	± 7°	± 10°	±16°
		For compact 4 antenna array	No beam, using Direction Finding		

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Pos	Parameter	Description	Value		
06	Integration Time <i>programmable</i>	Recommended integration time to get best performance <i>for Beam Forming Systems</i>	for current measurements:	5 ... 9 min	
			for wave parameters:	15 ... 30 min	
			for disaster warning:	2 min	
		Recommended integration time : <i>for compact antenna arrays (direction finding)</i>	for current measurements:	20 ... 30 min	
			for wave parameters:	not possible	
			for disaster warning:	not recommended	
07	Data up-date rate <i>to optimise data transfer rate</i>	Recommended up-date rate : <i>for Beam Forming Systems</i>	for current measurements:	10 ... 20 min	
			for wave parameters:	20 ... 60 min	
			for disaster warning:	30 sec	
08	Data output <i>all data (current and wave) are provided on a user defined grid</i>		Currents	Wave*	Spectra**
		Available on the grid: <i>for each individual WERA station</i>	radial velocity	significant wave height	-
		<i>Within the overlapping area of two WERA stations</i>	velocity vector	Period & direction	Directional* wave spectra
09	Accuracy <i>These parameters are typical values, affected by site configuration, geometry and environmental conditions</i>	radial current velocity:	4 cm/s @ 13.5 MHz & 5 min integration time		
		significant wave height:	typical ±5 % @ 20 min integration time		
		mean wave direction:	typical ±15° @ 20 min integration time		
		mean wave period *:	typical ± 0.6 sec		
		wind direction:	10° ... 40° depends on wind speed		
		<i>*with array type antenna systems only **with 12 or 16 antennas only</i>			
10	Limits for wave detection	min. significant wave height	0.50 m @ 13.5 MHz		0.30 m @ 26.3 MHz
		max. significant wave height	8.0 m @ 13.5 MHz		4.0 m @ 26.3 MHz
11	Limits for wind direction	at very low wind speed the measurement of the direction becomes uncertain			
12	Antenna construction	Simple vertical monopoles, matched to site specific ground conditions. Integrated lightning protection.	Overall height for Tx typically 4 m for Rx 2 to 3 m Smaller active Rx antennas are available		
13	Antenna array	Dimensions depend on frequency	13.5 MHz	16.15 MHz	24 - 27 MHz
		Rectangular configuration for Tx	11 x 3.3 m	9 x 2.8 m	5.7 x 1.7 m
		4 antenna receive array for DF	8 x 8 m	6.3 x 6.3 m	4 x 4 m
		Linear receive array, 8 antennas	70 m	60 m	36 m
		Linear receive array, 12 antennas	110 m	90 m	56 m
		Linear receive array, 16 antennas	150 m	125 m	77 m
14	Transmit power	Low, non-harmful rf power, typically 7.5 W per antenna pole, 30 Watts total			

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Pos	Parameter	Description
15	Synchronise WERA systems	Multiple stations can share the frequency band with WERA-multi method
16	Signal processing	Analog: Quadrature detector with phase conserving A-to-D conversion Software: Beam forming in real time with automatic beam calibration Adaptive integration time to optimise processing for specific applications Unique WERA noise reduction in connection with beam forming Real time quality check of ocean data providing a quality flag for each grid cell
17	System control	Access to all radar parameters via web based user interface, listen before talk mode with frequency adaptation, RF interference reduction, system self-check and automatic calibration
18	System Hardware	All system parts are modular, easy to up-grade/extend and maintain Desktop case to be installed indoors 19" rack, depth: 650 mm, height: 850 mm Supply: 115 – 230 V / 50 - 60 Hz Power: 300 - 500 Watts-peak with power manager to reduce average power
19	WERA Container	The WERA system should be installed indoors in an air conditioned room. If such a room is not available a WERA container can be provided: Vandalism protected, thermal and EMI insulated cabin, electricity installation, 19" cabinet for WERA rack, desk, shelves, lightning protection, fire proof, water tight. Integrated high efficient air-conditioning dimensions: 3000 x 2200 x 2300 mm (L x W x H) (other dimensions available) weight app.: 900 kg
20	WERA Interface Computer	State of the art industrial rack mounted PC with Intel processor and Linux operating system
21	Basic Software packages <i>All packages are installed on the WERA Interface Computer</i>	✓ Real-Time processing ✓ Unique Noise Reduction for array type WERA systems ✓ Frequency Management (listen-before-talk mode) ✓ Beam Forming and Direction Finding software with Self-Calibration feature ✓ Smart Parallel Signal Processing software to use individual integration time for each application ✓ Ocean Data processing software providing Radial Current velocity, Wave Height & Period and Wind Directions from each station ✓ Quality Control of all processed data in Real Time ✓ House Keeping tool to optimise the available disk space ✓ System Self-Test functions including regularly Antenna Tests ✓ Remote Control of system parameters via web interface ✓ Smart Power Management to reduce average power consumption.

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Data Server for central station including:

- ✓ WERA Data Manager
- ✓ Capable to handle up to 6 stations
- ✓ Access to real time maps
- ✓ Access to archived data
- ✓ Generation of time series and animated maps
- ✓ Easy data export in various formats



Pos	Parameter	Description
22	WERA Server	State of the art industrial rack mounted PC with Intel processor and Linux operating system or virtual server
23	Software packages (Optional)	WERA-Synthetic-Wave-Buoy Provides directional wave spectra for selected user-defined grid cells within the overlapping radar ranges and time series of derived parameters such as significant wave height, mean wave period and direction & wind direction. WERA-Wave-Grid Provides directional wave spectra for all grid cells with sufficient signal quality within the overlapping radar range, software by Seaview Sensing Ltd. WERA-CurDrift Surface current drift prediction for search and rescue or environmental protection applications. WERA-HYDDOA Combination of direction finding methods with beam-forming to get some finer resolution, in particular at far ranges, software by Actimar S.A. WERA-Warn Generation of warnings if user defined thresholds for ocean currents or wave height at selected areas are exceeded. WERA-Eddy Automatic Eddy current detection, software by Actimar S.A. WERA-TEWS Detects the current signature generated by an approaching Tsunami. For long ranges from shore up to the continental shelf edge. Providing maps and time series of Tsunami probability in near-real time.
24	Services	Conceptual planning including site survey Site preparation (civil works), typical through local WERA partners Installation of WERA systems User training at Helzel factory, at customers site or virtual WERA system configuration and optional data management service Extended warranty, maintenance contracts and hotline service