MIROS

SM-050 Wave and Current Radar Mk III

Remote measurement of directional waves, wave spectra and surface current.

Ease of operation • Excellent Data Quality • High Reliability • Low Maintenance Cost

- measuring the ocean surface

Unique Concept

The SM-050 Wave and Current Radar is a unique high performance remote sensor for measurement of directional wave spectra and surface current. It is the only sensor in the world utilizing dual footprint pulse Doppler method for wave measurements, and microwave dual frequency method for measuring surface current.

The SM-050 Wave and Current Radar is based on proven technology, originally developed in the early 1980's. It has been thoroughly tested and kept continuously updated to meet latest requirements.

The present MkIII version encompasses a new digital Signal Processor and upgraded Cabinet, improving performance and reliability of the radar. The software is in addition totally redesigned with improved algorithms and user interface.

Verified accuracy and high reliability

The accuracy of the sensor has been verified in a number of independent comparisons. The data quality is at the same level as high performance buoys, but with higher availability.

Both the previous MkII version and the current MkIII version have proved to be a reliable sensor. MkIII has been further developed with new electronics which will improve the reliability even further.

Ease of operation

The radar operates fully automatic. Operators will within short time be familiar with the radar user interface.

All major components in the radar are easily accessible. Comparable sensors are normally deployed in the sea, making service tedious and expensive.

The radar is all solid state without magnetron or high frequency tubes. It has (except for a few fans) no rotating parts. Operating cost is consequently very low.

Floating structures

The SM-050/03 Wave and Current Radar has to be fitted with an optional Motion Reference Unit (MRU) when applied on floating structures such as semis, drill ships. FPSOs, FSUs etc. The radar with MRU is designed for use on stationary units, but reasonable measurements may be obtained during transit at speeds up to 6-8 knots. The MRU may also be utilized for motion monitoring. (Motion Monitoring Systems, including Helideck Monitoring are available from Miros AS)

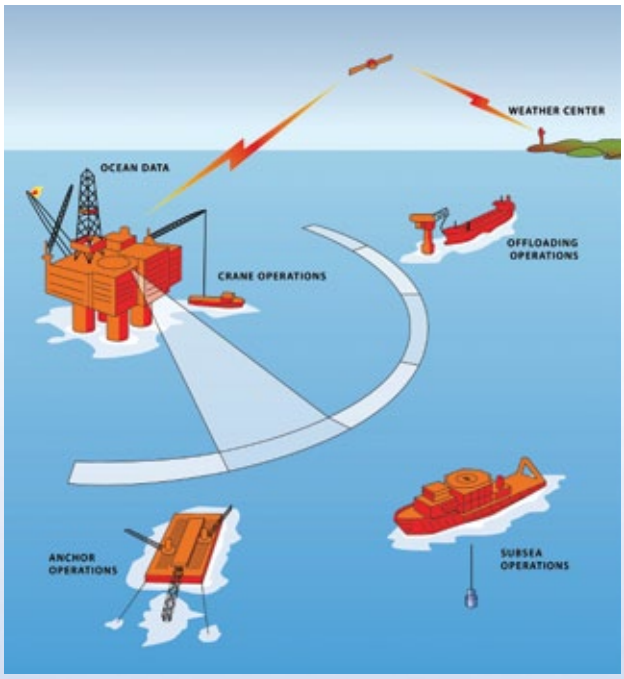
Principles Of Operation

The radar observes the ocean surface in a semi-circle at a distance of 180-450 m depending on the installation height, typically 25 – 80m.

Six 30° sectors are scanned in sequence. The observation footprint is 75 m deep (horizontally). Obstructions between the radar and the footprint (supply vessels etc.) should be avoided.

The radar frequency has been chosen to obtain a strong echo from the capillary waves. They are normally present at wind speed above 2 m/s. The radar reaches its best working performance at a wind speed of 3m/s or higher.

The selected frequency of operations ensures a very high degree of penetration through precipitation and sea spray, and provides accurate measurements in all harsh weather situations. This is a unique feature of the SM-050 Wave and Current Radar. Remote wave measuring systems based on other techniques, such as marine X-band radars, do have operational limitations during precipitation periods.



Upgrade Potential

Optional software will enable expansion to a full MetOcean system with interface to a number of sensors. The upgrade includes full integration with an Oracle SQL database and easy to implement LAN/WAN presentation of data to a high number of users.

SM-050 Wave and Current Radar System

The wave and current radar system consists of the following parts:

- SM-050/03 Wave and Current Radar
- EM-132 Junction Box
- EA-109 Indoor Interface Unit
- SM-139 Desktop System Computer
- SW-002 Wave Radar Software (pre-installed on the computer)

The system computer is a standard PC with connection to the interface Unit and a LAN connection to external systems which may access files for real time use. Real time data may in addition be transmitted on a serial line. Marinized and/or 19" rack mount version on the computer are available on request.

The software package is highly modular and encompasses sophisticated algorithms for filtering and processing of data. A single user data display application is included.

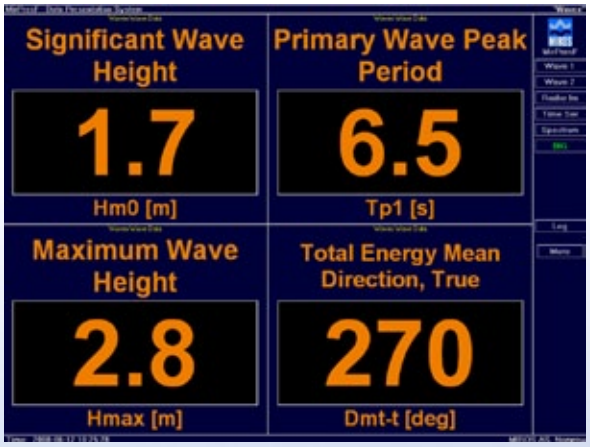
The user interface is configurable and provides different types of visualisation, such as large single parameter windows, parameter tables, historical graphs with zooming capabilities, 2D & 3D directional spectrum, frequency spectrum etc.

The system may receive heading, speed, time and position data on NMEA format for logging with the measured wave and current data by use of optional software.

Alarms and system status are presented to the operator, Maintenance personnel will find useful information for fault location and rectification.

SM-050/03 Wave and Current Radar

SM-139 Desktop System Computer



Radar Installation

The SM-050/3 Wave and Current Radar is easy to install. The unit is fitted with 5 m cable tails which enables installation without accessing the interior of the radar. The radar can be positioned at a height from 20 to 100m above sea level. Recommended height is 25 to 80m. No structures to be located in front of the antenna array in the covering sector of 180 degrees. For best possible result this sector should be 220 degrees, with open view of ocean surface in azimuth and +20 to -40 degrees in elevation in the sensors near fields.

The following options for the SM-050/03 Wave and Current Radar are available:

- A Pedestal is available to optimize the installation and hence reduce installation time.
- A Shock Absorber Kit is available for the SM-050/3. The kit is recommended for vessels with heavy motions.
- Al Sun Shield is available to reduce solar heating of the radar.
- An active Cooling Unit may additionally be installed if ambient temperature exceeds 30°C.

System Measurement Performance

Directional Spectra

Directions:	36
Directional Resolution:	10 degrees
Frequencies:	32
Frequency Resolution:	0.01 Hz
Frequency Range:	0.0 – 0.3 Hz[1)]
Update Interval:	2.5 minutes
Averaging Time:	45 minutes default

1) Frequency Bins 0-3 (0.0 – 0.03 Hz) are not used for wave calculations
2) Whichever is greater

Wave Data From Directional Spectra[1)]

	Range	Error	Resolution
Height:	0 – 30m	+/- 5% or 0,2m [2)]	0.1m
Period:	3 – 30s	+/- 5%	0.1s
Direction:	1 -360deg.	+/- 7deg.	1deg.

Surface Current

	Range	Error	Resolution
Magnitude:	0 – 2.5m/s	+/- 0.05m/s	0.01m/s
Direction:	1 -360deg.	+/- 7deg.	1deg.
Update interval:	15 minutes		
Averaging Time:	90 minutes		

SM-050 Wave and Current Radar specification

Physical Specification

Height:	860mm	(870mm [3)])
Width:	897mm	(1100mm [3)])
Depth:	696mm	(980mm [3)])
Weight:	70kg	(100kg [3)])
Material:	Aluminium Al 57 S	
Finish:	Enamelled	
Colour:	Grey RAL 7035	

Environmental Specification

Temperature:	-15 to + 30deg. C (+40deg. C[3)])
Humidity:	0 -100 %RH
Cabinet:	IEC IP-66
Wind Rating:	< 75 m/s

Electrical specification

Frequency of operation:	5.8 GHz
Pulse Bandwidth:	20 MHz
Antenna Beamwidth:	24 deg. (3 dB)
Antenna Gain:	18 dB
Number of Antennas:	6
Transmitted Power:	10 W peak, 275 mW average
Power Requirements:	110VAC or 230VAC ±10%, 47 – 400Hz
Power Consumption:	< 300 W (<500 W [3)])
EMC:	EN 50081-2:1993 (Emission) EN 50082-2:1995 (Immunity)

3) With optional Cooling Unit and Sun Shield.

System Interface Specification

Serial Output

RS-422 ASCII coded, 9600 b/s
Miros DF-022 format

Files available via LAN

Raw Data:	Miros DF-025 format
Spectrum:	Miros DF-038 format
Scalar Parameters:	Miros DF-037 format

Serial Inputs

Heading:	NMEA-0183, sentence HDT
Position:	NMEA-0183, sentence GLL / GGA
Date&Time:	NMEA-0183, sentence ZDA

Scope of Delivery

Standard System Delivery Includes[4)]

SM-050/03 Wave and Current Radar (Including 5m cable tails)
MP-352 Bolting kit
EM-132 Junction Box
EA-109 Indoor Interface Unit
SM-139 Desktop System Computer
SW-002 Wave Radar Software (Including single user display software licence)
Standard User Documentation

4) Some of these items are not included when the SM-050/03 is delivered as a part of a Miros Met-Ocean System.

Available Services

Installation and Commissioning
Remote supervision via Internet
Post processing, verification and analysis of data

Optional Items for SM-050/3

Motion Compensation, incl SM-103/5 MRU
EA-106 Cooling Door
MP-351 Sun Shield
MP-294 Shock Absorber
MP-309 Pedestal

System options

Field Cables
Marinized Computer
19" rack soulution for computer and interfaces
Spare parts
Upgrade to full MetOcean System

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