

SM-140 RangeFinder



The ultimate stand-alone sensor for Air Gap, Tide, Water Level, Draught and Waves measurements.

The versatile SM-140 RangeFinder is purpose made for accurate measurements of the vertical distance to the water surface, and with market leading range and accuracy specifications. The measurements are not impacted by fog, rain or water-spray. The sensor is available with two antenna alternatives, either a 10° wide or 5° narrow beam width antenna with a smaller footprint, to suit different applications. Measurement ranges from 1 – 23 m to 3 – 95 m.

The sensor provides accurate air gap data at high sampling rates. Water Level and Draught are calculated, where averaging periods and reference points are configurable. Wave variables are calculated both from the wave spectrum and from timeseries.

The new SM-140 RangeFinder is a stand-alone sensor with embedded processing and storage, enabling data to be easily and securely accessible both locally and remotely by utilizing modern IoT technologies.

The sensor has proved its ruggedness and reliability through many years of service in extreme weather conditions, all over the world.

Key Features:

- High sampling rate and accuracy
- Embedded data processing and browser-based user interface
- IoT enabled, for easy data access, locally and remotely
- No parts submerged in water
- Low maintenance cost

Essential For:

- Accurate air gap, water level and draught measurements
- Tide gauge according to WMO TD 1339
- Accurate non-directional wave measurements calculated from both wave spectrum and timeseries
- Weather-critical maritime operations





SM-140/Wide (10°)

SM-140/Narrow (5°)

The triangular FMCW (Frequency Modulated Continuous Wave) microwave sensor accurately measures the distance to the water surface, with a sampling frequency up to 200Hz. Wave variables are calculated both the wave point spectrum and from time-series analysis¹.

The sensor is a self-contained, network connected device with an integrated web-based user interface.

The SM-140 WaveFinder is an IoT-enabled device that can be easily and securely integrated both with local and remote systems. It can also be complimented with various value-adding cloud services from Miros, such as web displays, database integration, data processing and device management services.

SPECIFICATIONS

SM-140/02 RangeFinder

Data	Range	Resolution	Accuracy ²
Distance (air-gap)	1 – 23m ³ 3 – 95 m ³	1 mm	<5 mm ⁵
Wave height	< 22 m ⁴ < 92 m ⁴	1 cm	<1cm ⁵
Wave period	0.5 – 128 s ⁴	0.1s	0.1s

Internal sampling rate: 50 – 200Hz, depending on range.

Interfaces:

Standard interface: TCP/IP over CAT5e or better
Alternative interface: Serial line RS-422/232⁷.

Displays / GUI:

Data, status and configuration: Web GUI⁶

Output Interfaces:

Sensor data and status: NMEA
JSON over HTTP and Cloud
Data output rate: Up to 50Hz via TCP/IP or serial

Input Interfaces:

Position: NMEA – GGA/GLL
Date/Time: NTP

Electrical Data:

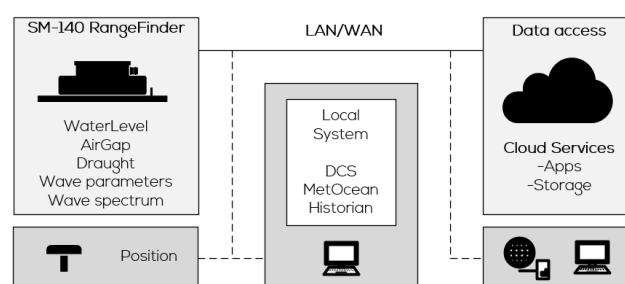
Frequency of operation: 9.4 – 9.8 GHz, Triangular FM
Transmitted power: 2 dBm ± 3 dB (nominal 1,6 mW)
Beam width: SM-140/W: 10° (-3 dB one way)
SM-140/N: 5° (-3 dB one way)
Supply voltage: 12 – 36 VDC (Nominal 24 VDC)
Power consumption: < 7 W
EMC: RED 2014/53/EU (pending)

Environmental specifications:

Temperature: -30°C to +50°C
Humidity: 0 – 100 %RH
Ingress Protection: IP 67 (IEC/EN 60529)

Physical Specifications:

Dimensions, H x Diam.: SM-140/W/02: 122 x 340 [mm]
H x W x D: SM-140/N/02: 136 x 500 x 440 [mm]
Weight: SM-140/W/02: 8 kg
SM-140/N/02: 11 kg
Material: Al. EN AW 5052 / EN AW 6082
Finish / Colour: Enameled / Grey RAL 7035



Versions:

SM-140/W/02/20: Range 1 – 23 m
SM-140/N/02/90: Range 3 – 95 m, see note 1
SM-140/xx/02/xx/RSxxx⁶: Serial-line, RS-422 or RS-232

Accessories and options:

MP-327: Mounting Bracket
EA-116/xx: Junction Box
Cloud services

Notes

- Wave point spectrum (range 0.0039 – 2 Hz, 0.0039 Hz resolution)
A selection of wave parameters from the wave spectrum:
 - Significant wave height, H_{m0}
 - Maximum wave height, H_{max} (most likely value in 30 min interval)
 - Peak period, T_p
 - Average period, T_{m02}
 Wave parameters from time-series analysis (8Hz sampling for 256sec):
 - Significant wave height, H_s
 - Maximum wave height, H_{max}
 - Significant wave period, T_s
 - Period of wave with max. height, T_{Hmax}
- The accuracy (standard deviation) of water level and wave variables, like H_s , H_{m0} and T is mainly determined by the sea surface statistics, site specific properties, sensor mounting height and data integration time (user selectable).
- For SM-140/W/02/20: Range: 1 – 23m
For SM-140/N/02/90: Configurable range: 3-23 m, 3-45 m or 3-95 m.
- Depending on sensor elevation above sea level and selected sensor range.
- Typical accuracy for averaged measurement is ± 5mm. For measurements to a fixed target in a controlled environment, the accuracy is ± 1mm
- WEB GUI with real-time and historical data, operational alarms, sensor status and sensor configuration.
- Serial line version, 4,8 – 115,2 kb/s. For this version:
 - No Web GUI or position/time inputs available.
 - MirLog06 and MirUtil01 software utilities are included.