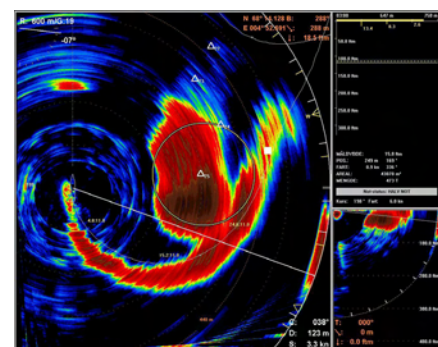
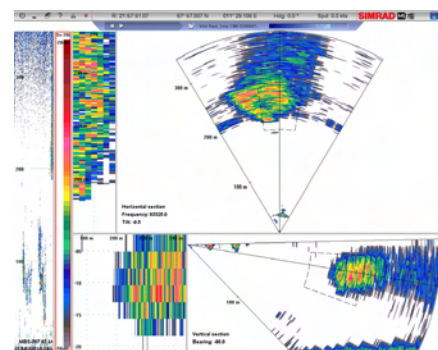
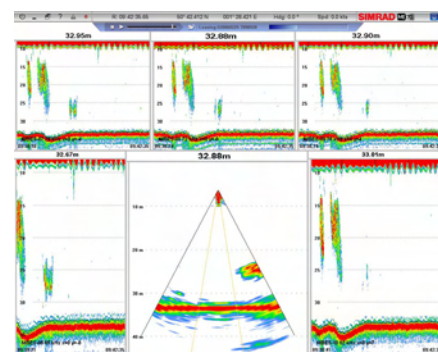
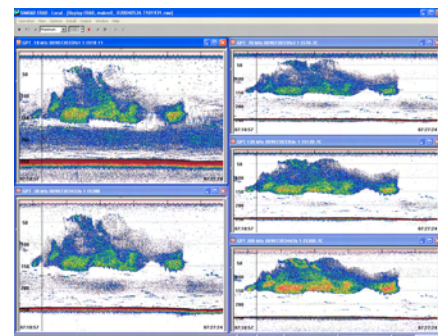


Simrad scientific systems

Dedicated to fishery research



Scientific echo sounders
Scientific multibeam systems
360° omnidirectional sonars
Wireless trawl instrumentation

SIMRAD EK60 SCIENTIFIC ECHO SOUNDER



Unique features

- High dynamic range
- Easy to use calibration program
- Personal user configuration
- Fulfills all multi frequency requirements specifications
- Comparable sample volumes
- Remote control
- Data subscriptions
- On-line/off-line processing
- Low noise
- High ping rate
- Raw data recording
- Frequency channels with individual settings
- Support for multiple network interface boards

The Simrad EK60 Scientific Sounder system is a high performance fishery research tool. The electronic hardware is combined with PC processing and Windows® operation. The EK60 provides accurate echo sounding, data storage, data analysis and reporting functions.

The system communicates using Ethernet, this offers high installation flexibility, allows for easy access to data from other instruments or computers.

Target Strength analyzing

Full freedom with Target Strength investigation is possible both on- and off-line.

The split beam principle is used to find the position of the individual targets in the transducer beam. It compensates for the beam pattern, and calculates corrected

Target Strength values.

Echo Integrator

The unique receiver concept provides an echo integrator with virtually unlimited dynamic range. Saturation with resulting under estimation never happens in the EK60. The integration of echo levels are performed in surface or bottom locked layers with individual parameter settings for each layer.

Post-processing

The high quality data produced by the Simrad EK60 provides an excellent basis for further analysis for applications such as biomass assessment and fish behaviour studies. The data formats are public and documented. This ensures that Simrad EK60 is a truly open solution, allowing third party or own software to be

developed for post-processing purposes.

Multi frequency acoustics

Ecosystem monitoring is becoming increasingly important, and new directives require status reports of all components in the food chain. The echo sounder has traditionally been used to locate fish resources, and to measure stock size and fish size distribution. Recent research has shown that simultaneous use of several discrete echo sounder frequencies not only improves fish stock assessment, it can also be used to separate species and identify them. This is because each species has a unique acoustic frequency response.

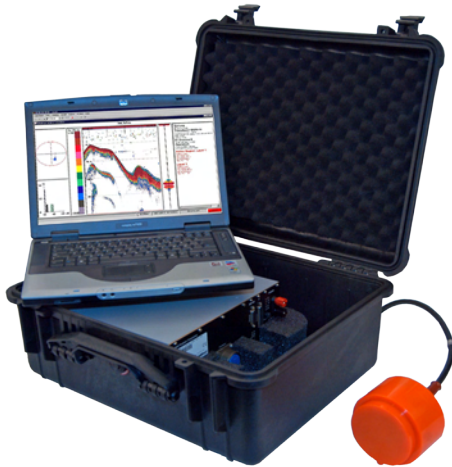
SIMRAD EK60 SCIENTIFIC ECHO SOUNDER

In this echograms example, a school of mackerel is observed by simultaneous transmission using 18, 38, 70, 120 and 200 kHz. The frequency response of the mackerel is clearly different documenting the potential of multifrequency acoustics in species classification.

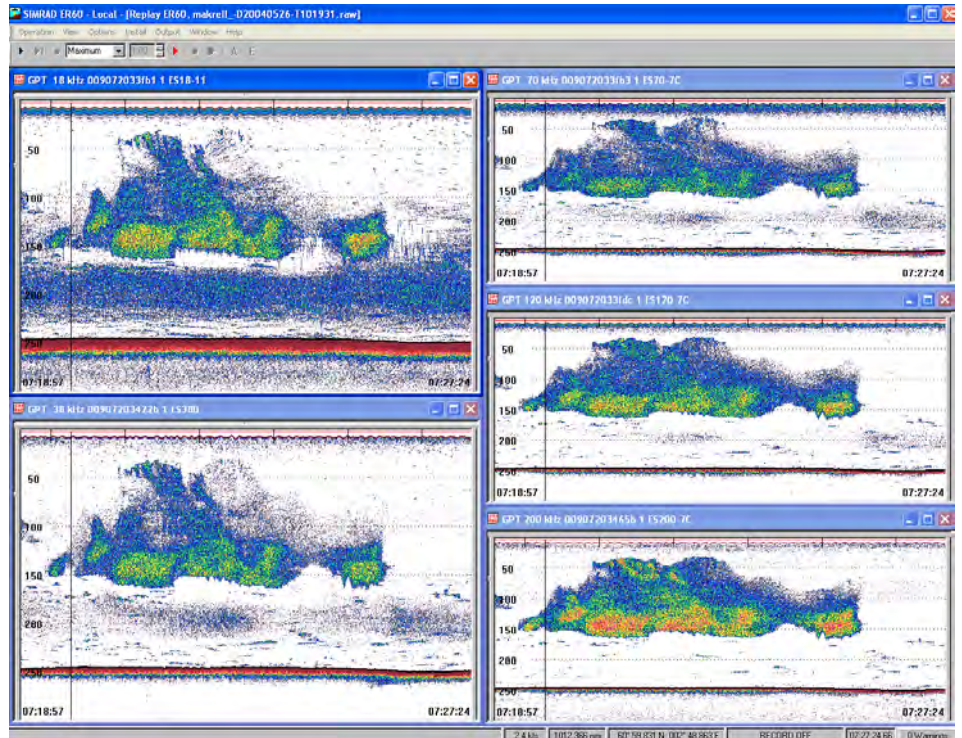
Portable scientific system

The portable **Simrad EY60** is specifically suited for use in a shallow waters, lakes and rivers. The EY60 is the most modern, accurate and easy-to-use fish abundance measurement and fish tracking tool today.

It is the same instrument as the **Simrad EK60**, but set up for outdoor portable use. The EY60 can be delivered in a rugged transport case with robust splash proof laptop with sun-screen and a GPS.



Echograms are showing recordings from a mobile lake survey using 38 and 200 kHz transducers. Daytime recordings (1) show fish patches in mid-water at 38 kHz (A), but no targets are detected near bottom. At 200 kHz (B) a scattering layer, corresponding to zooplankton, is seen near bottom. At night (2) single fish tracks are seen distributed in the whole water column at 38 kHz (A). At 200 kHz (B), all fish echoes are masked by zooplankton that have emerged from their daytime near bottom refuge.



Multiplexing

With the EK60 multiplexer two identical transducers can be connected to the same transceiver. A typical application is mobile surveys in lakes. One transducer is then pointing vertically, while the other is mounted horizontally. This setup allows you to cover the whole water column simultaneously.

Wireless system

Many scientists, both in freshwater and marine environments, have chosen

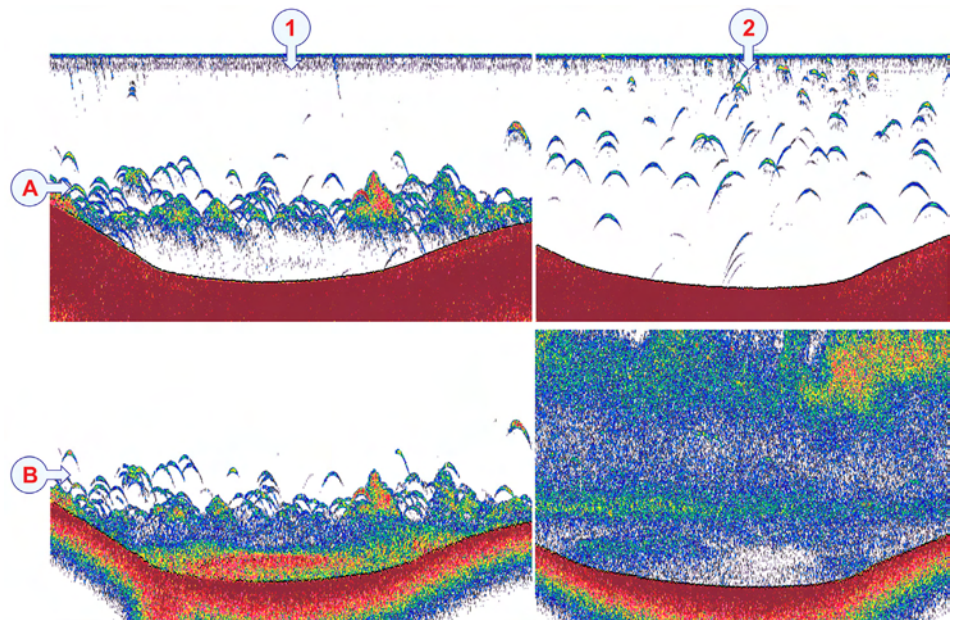
a wireless solution for data transfer and echo sounder control.

Both the EK60 and the EY60 can be set up to be used implementing wireless communication.

Single beam echo sounder

A low price dual frequency EY60 is available for biomass assessment, studies of behaviour, and fish and zooplankton detection and separation.

A combination of 38 and 200 kHz has proven effective for this purpose.



HIGH SENSITIVE, HIGH QUALITY TRANSDUCERS

In addition to Simrad's well known 18 and 38 kHz transducers, a range of new transducers with frequencies 70, 120, 200 and 333 kHz have been designed for fishery research applications. These new transducers are all designed using the latest composite ceramics technology.

This new design has a much wider bandwidth, and lower sidelobes, than the old traditional transducer design. In addition, smaller physical size and lower weight allow for easier installation and portable use.

Except for the 18 kHz transducers, all split beam transducers have 7 degrees beam angle.

When several transducers are mounted close together, the resulting array enables you to explore overlapping sample volume for the different frequencies.

Pressure resistance

In order to study the biology of the deep ocean organisms, the sensor must be brought down to the target. Several pressure resistant transducers are available for deep sea research. All are depth rated for 1500 meters.

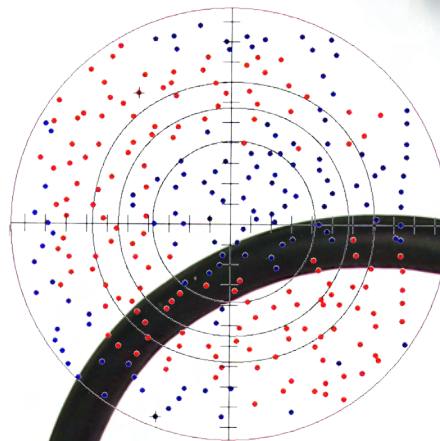
Calibration capabilities

Our scientific echo sounders include calibration software. The calibration utility updates the system with accurate gain settings and beam pattern calculations. You can perform the calibration yourself on board the vessel just prior to the data collection. This unique feature offers valid check of the equipment prior to each survey.

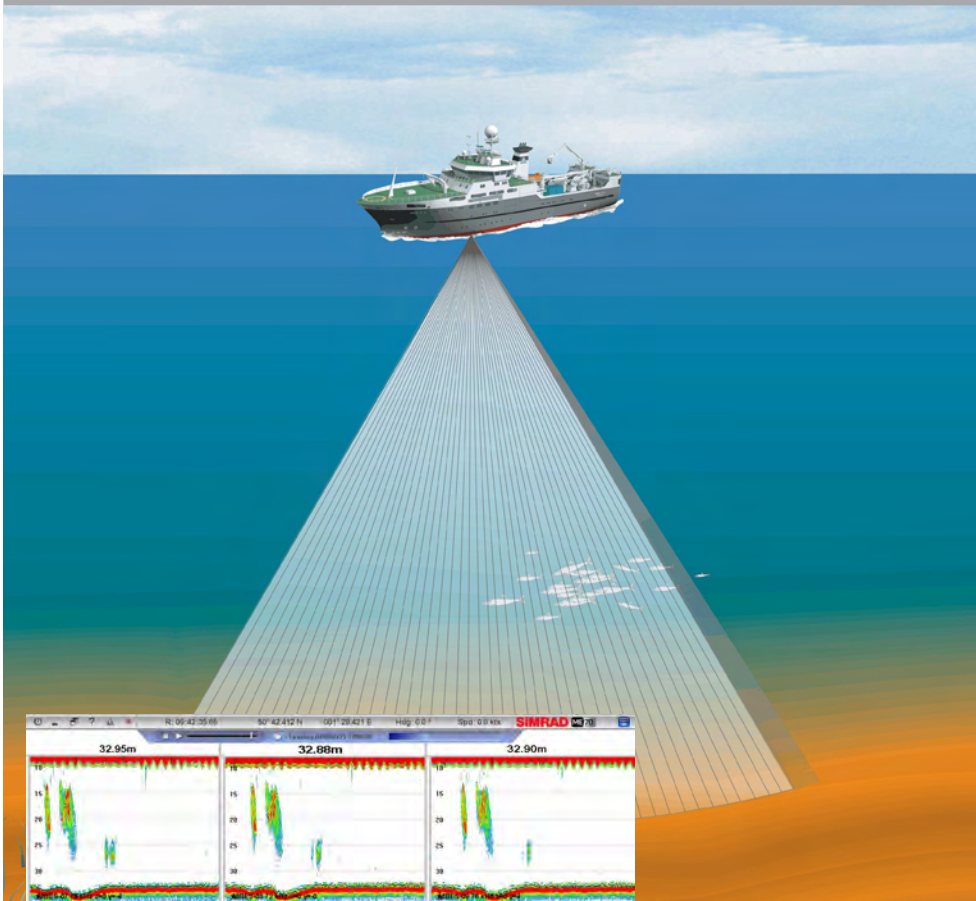
Detection capabilities

With the low self-noise, efficient transducer and signal processing, our scientific echo sounders offer astonishing detection capabilities. Echoes from single fish can be observed at depths down to 1000 meters (TS -30 dB, 38 kHz operating frequency, 10 dB signal-to-noise ratio). Bottom echoes may be detected down to 9000 meters with 18 kHz operating frequency.

The development of advanced transducer technology demands considerable patience, accuracy and many hours of testing.

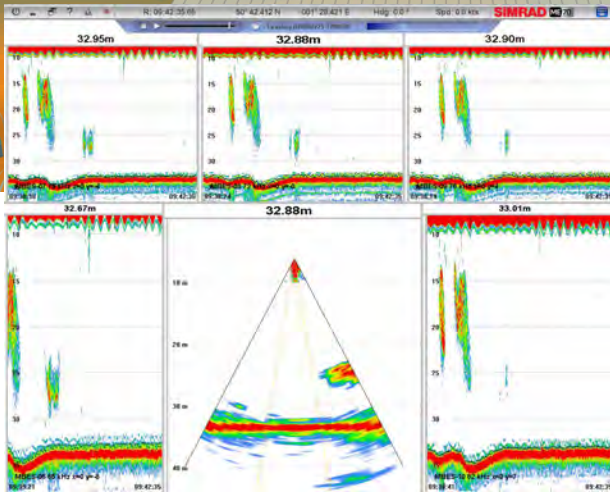


SIMRAD ME70 MULTIBEAM SCIENTIFIC ECHO SOUNDER



Unique features

- The Simrad ME70 operates in the 70 to 120 kHz frequency range.
- The Simrad ME70 provides a configurable acoustic fan containing 3 to 45 stabilized beams.
- All beams can be configured as split beams.
- Calibration software included.
- Minimum beam opening is 2° depending on operational frequency and steering.
- 140° maximum total swath width.
- The athwartship centre angle of the fan can be adjusted from +45° to -45°.
- Minimum acquisition depth is less than 1 m below the transducer depending on beam mode configuration.
- Sidelobe levels and beam interleakage are adjustable from -35 to -70 dB depending on beamwidth and frequency configuration.



Data output

It is possible to set up continuous output of all beam data. This can be used for echo integration and 3D visualisation. The output data for each beam include for example:

- non-TVG compensated sample power and sample angle
- 20 log R compensated sample Sv
- 40 log R compensated sample TS
- 40 log R compensated single target detections
- Detected depth

Raw data output is on the same format as for the Simrad EK60.

Remote operation

Remote systems, such as data loggers and external post-processing systems, can subscribe to data and parameters from the Simrad ME70.

Options

The Simrad ME70 may optionally be supplied with an Element Data Logger and a Bathymetric System.

The Simrad ME70 offers quantitative data and high operational flexibility. It provides a configurable wide fan of stabilized and calibrated beams for biomass estimation, fish school characterization, and behaviour studies.

Within the bandwidth of the transducer, the limits for beam steering, and the minimum achievable beam opening, you can select the directions, frequencies, and opening angles for the beams.

Low sidelobe levels

Very low two-way sidelobe levels are obtained by using two-way side lobe suppression. Very low beam interleakage is obtained by using Frequency Rotated Directional Transmission (FRDT) where the frequency band is distributed over

all the beams. Since each beam has its own frequency and the fan width is configurable, the design also allows you to use all the beams over the full frequency range pointing in one direction for frequency analysis of targets.

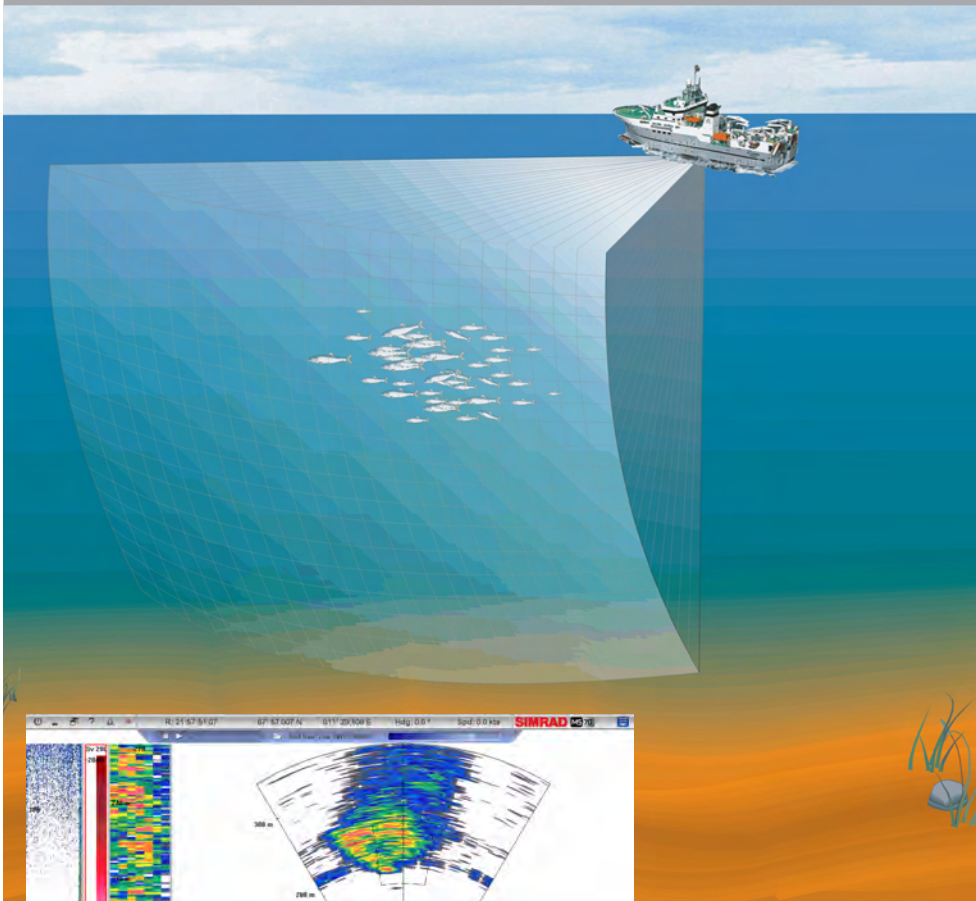
Calibration

A calibration utility is implemented as a special built-in function. Each beam configuration of interest can be calibrated using a reference target located under the ship.

Splitbeam configuration

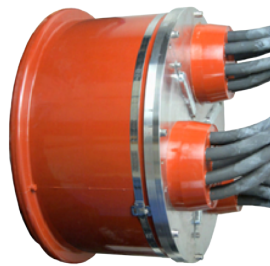
All beams can be configured as split beams. In addition, two adjustable reference split beams are available. These allow you to compare ME70 data with data from other split beam systems, for example the EK60.

SIMRAD MS70 MULTIBEAM SCIENTIFIC SONAR



Unique features

- The Simrad MS70 operates in the 75 to 112 kHz frequency range.
- The Simrad MS70 provides an acoustic matrix containing 500 beams (25 horizontal and 20 vertical).
- Each beam is 3° to 4° wide depending on its position in the matrix.
- Calibration software included.
- 60° horizontal operating sector.
- 45° vertical operating sector.
- -25 dB horizontal side lobe levels.
- -35 dB vertical side lobe levels and beam interleakage.



The Simrad MS70 offers a new dimension to fishery research. It provides an acoustic matrix of stabilized and calibrated beams for biomass estimation, fish school characterization and behaviour studies. You can measure an entire school with one ping!

A new dimension

The MS70 provides an acoustic matrix of 500 beams (25 horizontal and 20 vertical). This enables the MS70 to provide instantaneous 3D volume data. Where other systems need multiple pings to provide 3D volume data, the MS70 can provide this using a single ping. This allows the MS70 to provide more accurate data. For example, a school of fish can change its structure several times during the time other systems need to cover the

school. Multiple consecutive pings enable the MS70 to provide true 4D data, where time is the fourth dimension. This allows for improved characterization of school structures that are changing over time.

Low sidelobe levels

Very low vertical two-way sidelobe levels are obtained by using two-way side lobe suppressions. Very low beam interleakage is obtained by using Frequency Rotated Sector Transmission (FRST) where the frequency band is distributed over all the sectors.

Data output

It is possible to set up continuous output of all beam data. This can be used for echo integration, school characterization and 3D visualisation.

The output data from the MS70

include for example:

- non-TVG compensated sample power and sample angle
- 20 log R compensated sample Sv
- Mean volume back-scattering strength for a user defined volume

An Element Data Logger may be provided for storage of logged data. The raw data output is on the same format as for the Simrad EK60.

Calibration

A calibration utility is implemented as a special built-in function in the Simrad MS70 system. The sonar can be calibrated using a reference target located under the ship. Individual gain parameters for each beam are adjusted to provide calibrated target strength and volume backscattering strength measurements.

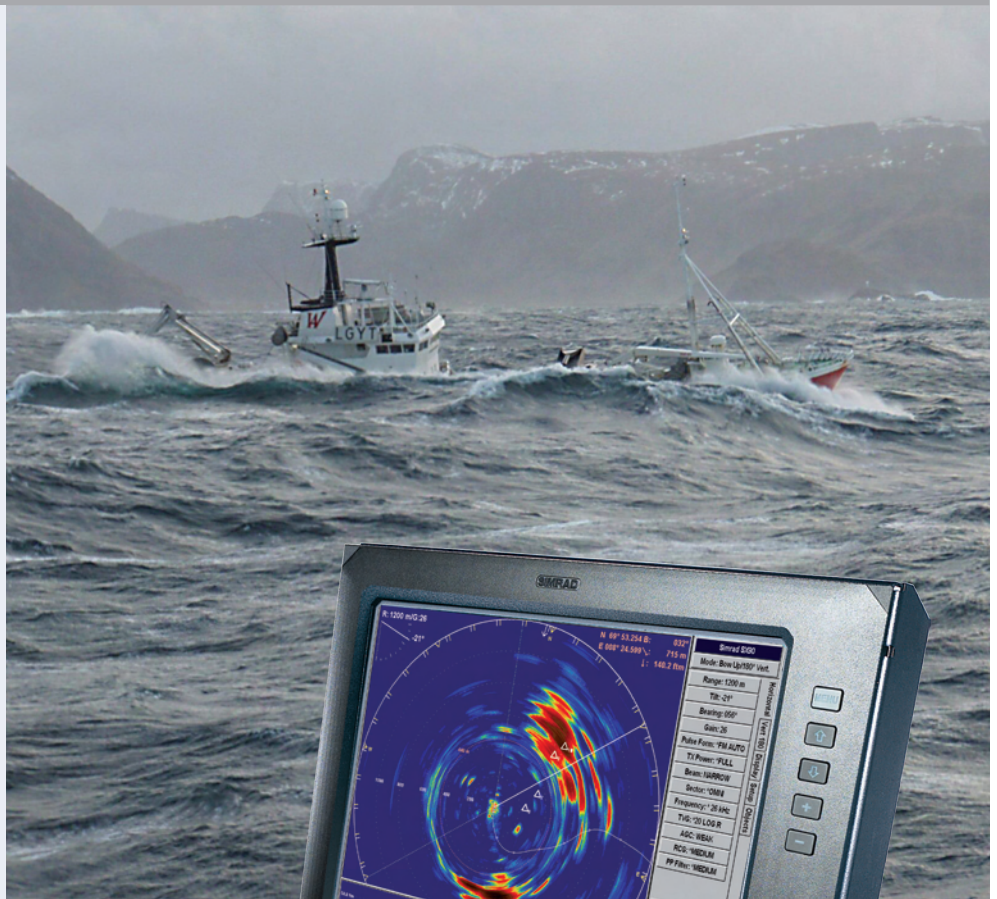
Remote operation

Remote systems, such as a data logger and external post-processing systems, can subscribe to a series of data and parameters from the MS70.

SIMRAD SX90 LONG RANGE SONAR

Unique features

- 360° Omni sonar
- 90° Vertical tip
- Multifrequency operation; 20 to 30 kHz
- Narrow sound beams
- Selectable beam width
- Hyperbolic FM
- Large dynamic range
- Stabilized beams
- Dual beam
- Easy operation
- Store and Recall
- Individual user settings
- Noise cancelling filter
- Scientific output



The Simrad SX90 is a high definition and long range sonar. It is designed for vessels where long detection range is important.

11 user selectable frequencies from 20 to 30 kHz are available to prevent interference from other vessels. By using hyperbolic FM mode, fast moving objects like mackerel and tuna are detected further away than with CW (continuous wave) due to the doppler tolerance. The SX90 also offers full circle beam stabilization for easier fish detection in poor weather.

The long range and higher definition of the SX90 will improve your detection abilities, and save time at sea.

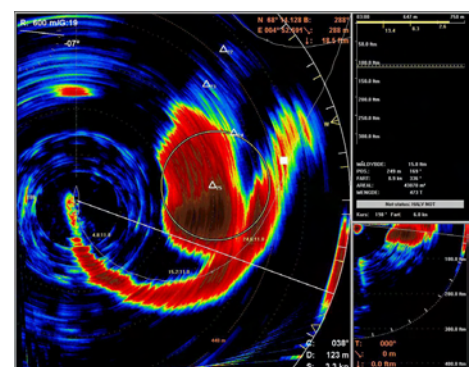
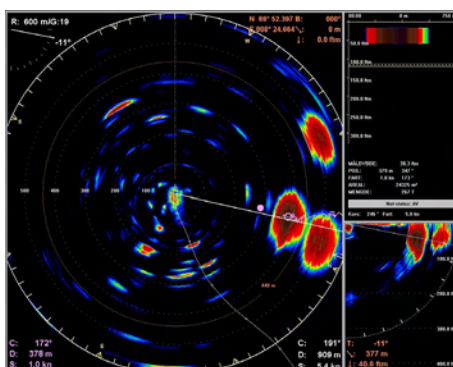
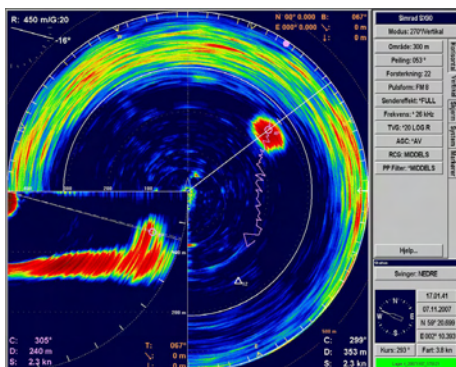
Great emphasis has been placed on

giving the best possible overview in the search and evaluation situation. In addition, full screen echo presentation, resizable windows, off center, zoom and dual operation are standard functions. You can evaluate one school while tracking two other targets, giving you full control of the schools.

Three different vertical beam widths, single or dual vertical view and 180° tiltable vertical view are available. At 30 kHz operating frequency, the vertical beam width is only 6,7°.

A new 180° vertical view is tiltable down to 90°, it has been specially

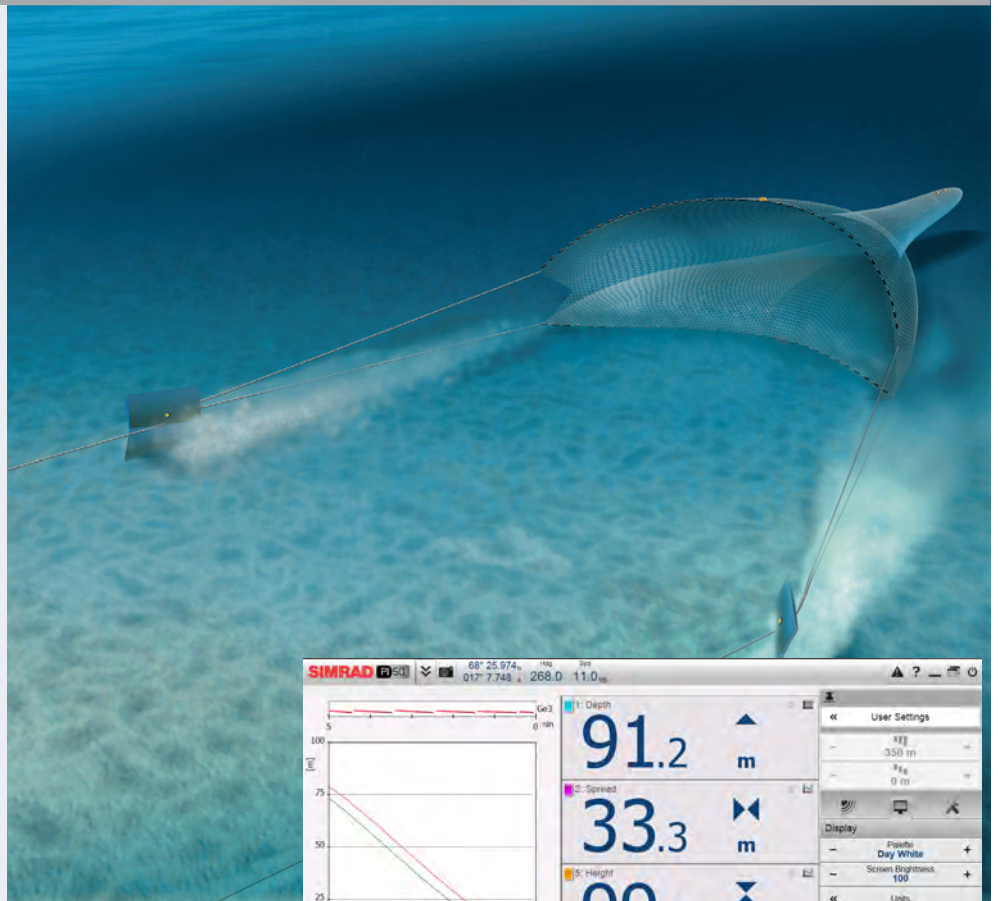
designed for tracking pelagic species. New and faster full circle beam stabilization for better fish detection in poor weather and/or fishing close to the surface.



SIMRAD PI CATCH MONITORING

Unique features

- Up to six sensor channels
- Full range of sensors
- Small and easy to install
- Easy to use
- Clear and precise information
- Enhanced sensors using shock absorbing abrasive resistant polyurethane and high-grade titanium
- High accuracy
- Record and replay sensor data



The Simrad PI systems keep you in control of the gear. The system is robust, intelligent, visible, and cable free.

To know how your fishing gear behaves is vital for efficient fishing. The PI system provides you with vital information such as the stability of the doors (door spread sensors), quality of your catch (catch sensors), efficiency of your bottom trawl (bottom contact sensor) or correct time of purse seining (depth/sink rate sensor).

Depth

The PI Depth sensor monitors the exact gear depth relative to the surface, as well as the ascending or descending rate of the fishing gear. With this data, you can adjust the gear depth according to the echo sounder registrations. By using two depth sensors, the trawl opening can be accurately measured.

Bottom Contact

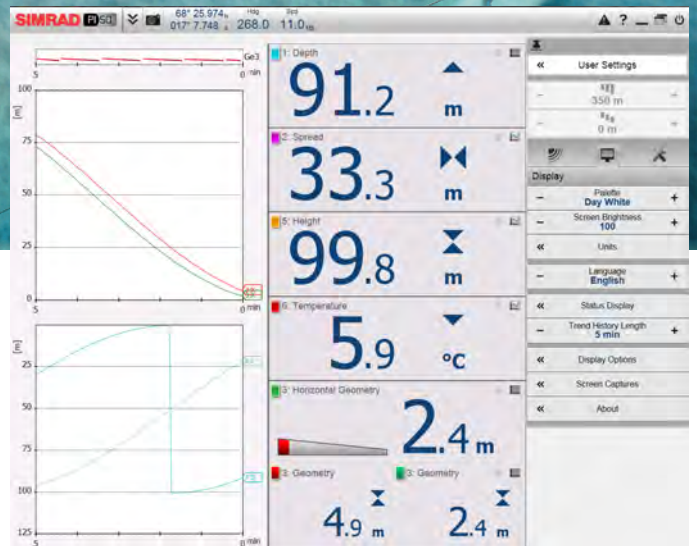
The Bottom Contact monitors if the trawl is lifted off the bottom. Fish escaping under the net give bias in the catch data. By adjusting the length of the sensor chain you can change the sensor sensitivity.

A Bottom Contact sensor on a purse seine gives an alarm when the sensing weight touches the bottom.

Data logging from sensors

All sensor data are available on NMEA format for continuous logging. Both sensor and GPS data are available to ensure reliable information, and to track how long the trawl has been lifted off the bottom during a tow.

The Simrad PI logging program has replay- and report functionality.



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