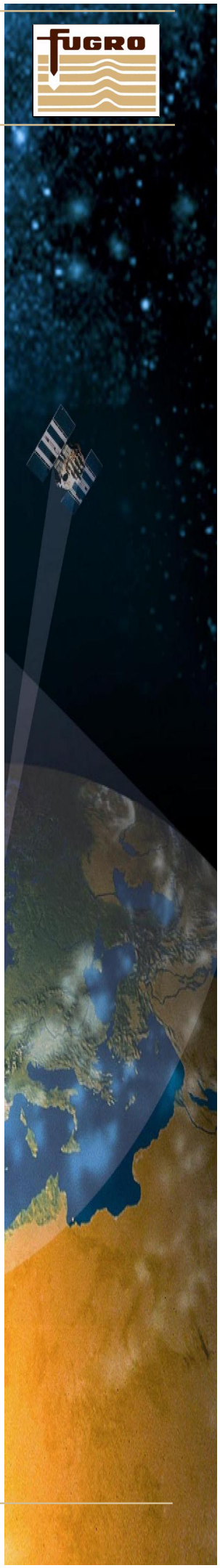
SCHEDA IMBARCAZIONE "*MEDMA*"

NOME:	MEDMA - RR.NN.MM.GG Trapani n° TP2262 uso speciale "ricerche oceanografiche"
ARMATORE:	MEDMA TOURING S.R.L. - TRAPANI, ITALIA
BASE OPERATIVA:	TRAPANI - ITALIA
LUNGHEZZA FT:	16.90 m
LARGHEZZA:	5.00 m
PESCAGGIO:	1.20 m
SISTEMI DI NAVIGAZIONE:	G.P.S. + RADAR 50 NM
SISTEMI DI COMUNICAZIONE:	RADIO VHF
PROPULSIONE:	2 X 270 HP AIFO
VEL CROCIERA:	10 NODI
VEL. SURVEY:	VARIABILE, MIN 3.0 NODI
LIMITI OPERATVI:	FORZA 4/5, ALTEZZA D'ONDA 2 m
NAVIGAZIONE:	NAZIONALE COSTIERA
LABORATORI:	12 m^2 LABORATORIO ASCIUTTO + 12 m^2 AREA DISPONIBILE**.**
SPAZIO IN COPERTA	30 m^2 CIRCA
ALIMENTAZIONI ELETTRICHE:	1 X ONAN 6.5 KW - 12 /24 VCC E 220 VAC STAB.
ALTRI SERVIZI:	A-FRAME PNEUMATICO A POPPA PER LA MESSA A MARE E RECUPERO DI STRUMENTI: 2-7.5m PER 2000-2500 KG; VERRICELLO IDROGRAFICO PER SSS CON 500 METRI DI CAVO ARMATO COASSIALE. STRUTTURA ESTERNA PER L'INSTALLAZIONE DI TRASDUTTORI MULTIBEAM E SINGLE BEAM.

OmniSTAR
3200LR12 DGPS Receiver



The OmniSTAR 3200LR12 DGPS receiver combines high performance GPS reception with OmniSTAR's real time sub-metre accuracy in a single, lightweight, durable and robust housing. This compact receiver can easily be mounted to a Belt system or belt holder or to any standard GIS backpack or can also be easily installed in a vehicle. The 3200LR12 is compatible with a wide range of data loggers.

OmniSTAR Applications

- Airborne geophysics
- Mapping & boundary marking
- Precision Farming
- Aerial Applications
- Search & Rescue
- Vehicle location & Positioning
- Navigation
- Environmental Monitoring
- GIS data acquisition
- Defence applications
- Asset Monitoring
- Aviation
- Photogrammetry
- Surveying

Features

- Compact, lightweight portable receiver
- Robust design using high quality components
- Minimal power requirements (reverse page)
- Real time performance indicators
- Single and multiple output rates NMEA message in all formats (user selected)
- Remote access facility (via satellite link)
- Compatible with most common antenna systems
- Quality Control Statistics available to the user

The OmniSTAR 3200LR12 DGPS receiver can be configured in different modes with various options including data output, multiple output rates and timing outputs.

OmniSTAR DGPS services

OmniSTAR transmits Differential GPS correction data world wide using a global network of reference stations to measure errors in the GPS system and generate corrections.
This reference data is gathered at a Network Control Centre (NCC) where it is checked for integrity and reliability and up-linked to a series of geo-stationary satellites, which distribute the data worldwide. The OmniSTAR service is available by subscription.

VBS – Virtual Base Station

OmniSTAR's Virtual Base Station (VBS) Service is a unique, worldwide high accuracy service with sub-metre performance throughout the coverage area (subject to the antenna used).
The high level of reliability is made possible by processing all of the data from the available reference stations and processing this information using a weighted, least squares solution. The corrections are adjusted for the users specific position giving an optimal solution.

OmniSTAR
The Global Positioning System

OmniSTAR's VBS services features

VBS provides a consistent accuracy over a wide area. It is highly reliable because it is not dependent on any single reference station. There are no position jumps due to switching from one reference station to another. All reference stations have dual data connections to their network control centre. The European service uses two up-links (primary and backup) and is covered by several satellite services.

OmniSTAR Global Coverage

OmniSTAR corrections are available around the world. OmniSTAR operate a global network of reference stations, controlled by two global Network Control Centres. These Network Control Centres also provide free of charge, 24-hour technical support to OmniSTAR users if required.

Specifications

Receiver Frequency

Automatic scanning:	1525 MHz to 1559 MHz

Environmental

Operating Temperature:	- 20° to 60° C
Non-Operating:	- 40° to 85° C
Humidity:	95% non-condensing
Vibration:	3G/30 Hz/ x, y & z axes
Shock:	Max 7G, 5-20 msec zero rebound

Dynamics

Altitude:	-400 m - + 18,000 m MSL
Velocity	<515 m/s
Acceleration:	<4 g

Approvals

Complies with European and USA EMI/EMC Directives.

Data inputs and outputs

Serial Ports:	2
Data Rates:	600 – 38,400
Output Message type:	NMEA 0183 version 2.3, ALM, GBS, GGA, GLL, GRS, GSA, GST, GSV, RMC, VTG, ZDA

Connectors

RF input to receiver:	TNC
Power:	EN3C3M

Power

Power Supply:	10-32 Vdc
Power Consumption:	410mA @12Vdc
LNA Power:	5 Volt

Physical Characteristics

Weight *(g) (approx.):*	870
Display:	3 LED indicators
Size *(mm) (L x W x H):*	194 x 112 x 67
Control:	Power Switch

OmniSTAR B.V.
P.O. Box 113 - 2260 AC Leidschendam
The Netherlands
Phone +31 70 31 70 900, Fax +31 70 31 70 919
E-mail info@omnistar.nl
www.omnistar.nl

Or contact your local distributor:

OmniSTAR B.V. is a member of the Fugro Group, with offices throughout the world.

Gyro, Surface TSS Meridian

- RS232 Output
- 24V DC Supply
- Speed & Latitude Conpensation

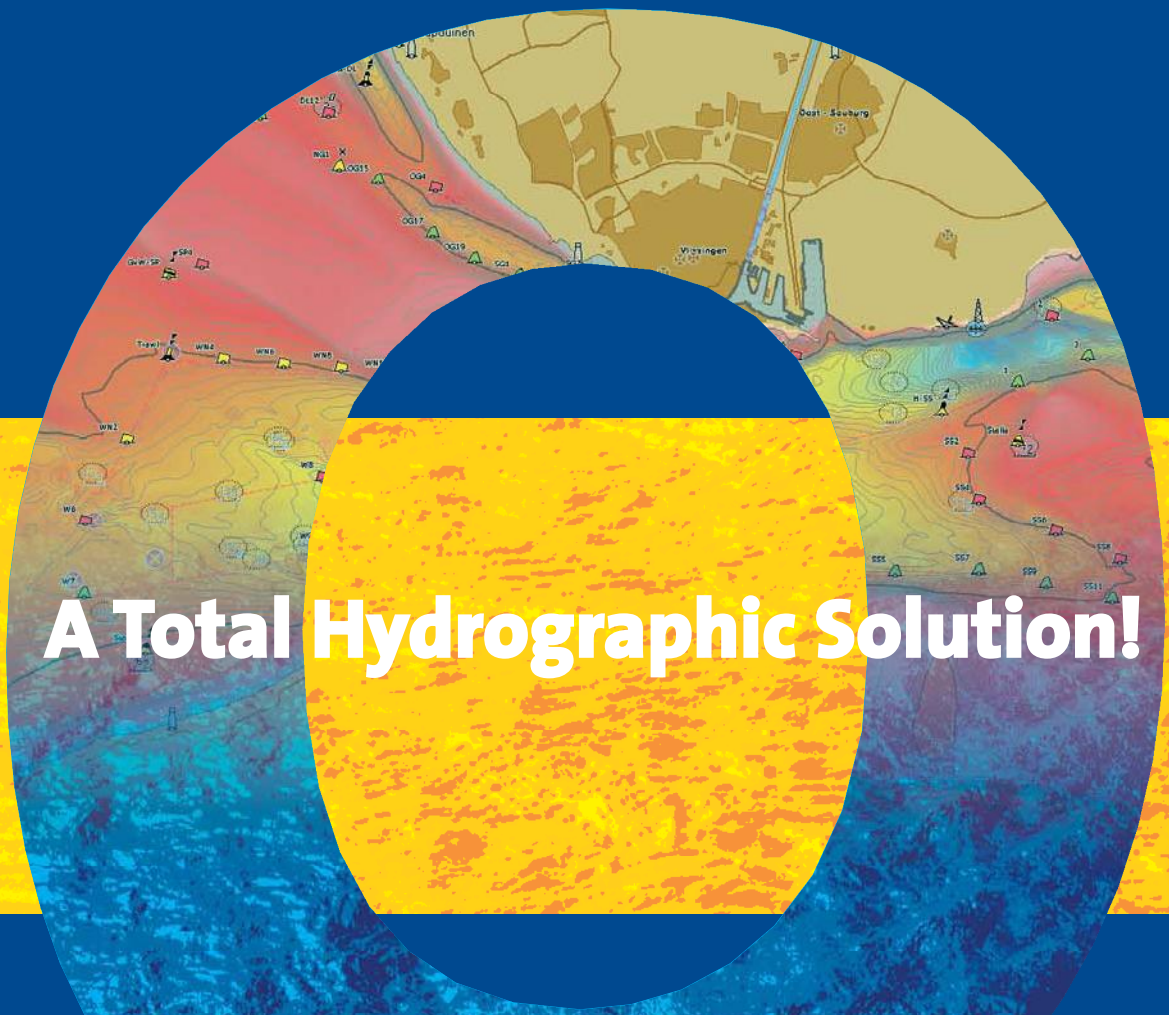
DESCRIPTION

The SG Brown Meridian is an accurate Gyro Compass which is easy to use and simple to integrate into navigation systems. Outputs include RS232, RS422, 20mA Current Loop, Stepper and Synchro. Latitude and Speed compensation can be entered either by the top panel controls or from a navigation computer via the RS232 interface. The Meridian is also IMO Wheelmark and HSC certified.

SPECIFICATIONS

Static Accuracy	0.05 degrees RMS sec Latitude
Settle Point	0.1 degrees sec Latitude
Settling Time	<40 Minutes to within 0.7 degrees
Follow Up Speed	200 degrees per second
Latitude Compensation	80 degrees North to 80 degrees South
Speed Compensation	0 to 90 Knots
Serial Output Strings	NMEA 0183
Serial Interface Types	RS232, RS422, 20mA
Stepper Output	TTL Level 1/6 degree resolution
Synchro Output	26v 400Hz reference
Power Requirements	24VDC @ 2 Amps
Dimensions	344mm x 267mm x 440mm
Weight	15.5 Kg

QINSy



A Total Hydrographic Solution!

QINSy provides a user-friendly, turnkey solution for all types of marine navigation, positioning and surveying activities. From survey planning, to data collection, data cleaning, volume calculations, bathymetric chart production, and S-57 ENC production, QINSy offers a seamless data flow from a large variety of hardware sensors, all the way to a complete chart product. QINSy runs on a standard PC platform under the Windows (2000/XP) operating system. The software is not only independent of sensor manufacturer, but also hardware independent.

QPS

Extreme Versatility - Survey Applications

From scraping diamonds off the seabed to dumping rock on pipelines, from anchor handling to bathymetric or Side Scan Sonar surveys, its modular design and inherent flexibility makes QINSy perfect for a wide variety of applications. For example, it can be configured to perform:

- Hydrographic and Oceanographic Surveys
- Offshore Pipeline Inspection and Pipe-laying
- Marine Construction including Offshore Oil and Gas
- Dredge Monitoring and Support
- ROV and AUV Tracking and Data Collection
- Barge, Tug and Fleet Management
- Bathymetric Chart Production, Cross Section Creation, and Volume Calculation
- S-57 ENC Production

Since its launch in 1996, QINSy has become the standard in marine surveying, bathymetric chart production and ENC production.

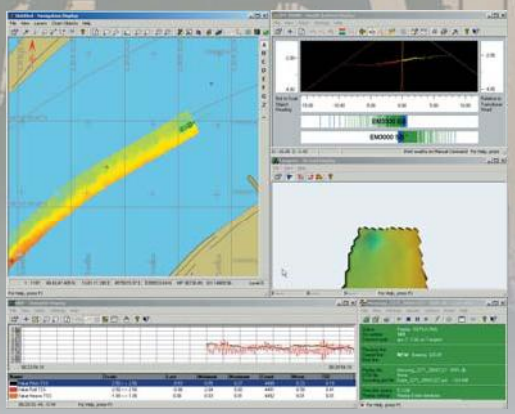
Extremely Large Sounding Grids

The key technology developed by QPS is based on the collection and presentation of large volumes of navigation and depth data, all in real-time to produce almost final results on-the-fly. A powerful Sounding Grid (SG) is used for on-line presentation and off-line processing.
The SG comprises multiple levels with a different resolution per level based on the quadtree technique. Only the highest resolution level need be defined; all others are produced automatically. The other resolutions (e.g.1m x 1m, 2m x 2m, 4m x 4m, 8m x 8m, etc.) are used for faster display purposes, and also to define the resolution of data exported from the Sounding Grid.
The SG has no boundaries and is therefore unlimited in size! In the Sounding Grid Utility (SGU) the user has only to define the base cell size (highest resolution). Online the first position recorded is used as origin.
Multiple layer support allows simultaneous storage of different data types to different layers. For example, multibeam data is stored in one layer, side scan sonar data to another, magnetometer data to a third layer and singlebeam data, pipe tracker data, dredger production value and/or any other system to additional layers in the same SG. During on-line navigation, displaying a combination of two layers is possible. This allows for draping side scan sonar data over multibeam bathymetric data, or dredge production volumes draped over bathymetric depth, or theoretical profile.

QINSy Survey

QINSy is based on a "no limits" design criterion, benefiting the user in supporting an unlimited numbers of vessels, sensors, computations and displays, and in making modifications and future developments easier and cheaper to achieve
The key technologies behind the success of QINSy are based on precise navigation, data acquisition, presentation, storage and processing of large volumes of data all in real-time to produce almost final results on-the-fly.
QINSy Survey is the heart of the QINSy product portfolio. This package is used for Survey Planning, Data Acquisition, Processing and Data Cleaning. Add-on modules extend basic package functionality. Modules include:

- Multibeam support
- Side scan sonar and sub-bottom profiling support
- Dredging support
- DGPS QC functionality
- S-57 ENC update functionality
- Qloud

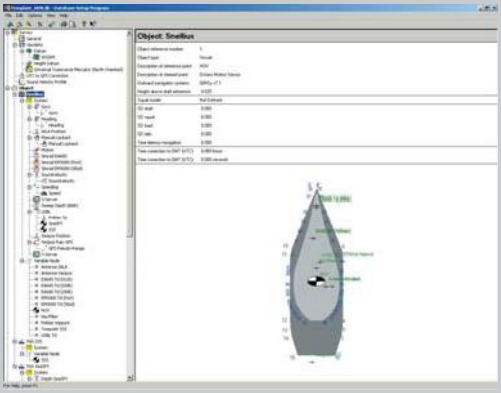


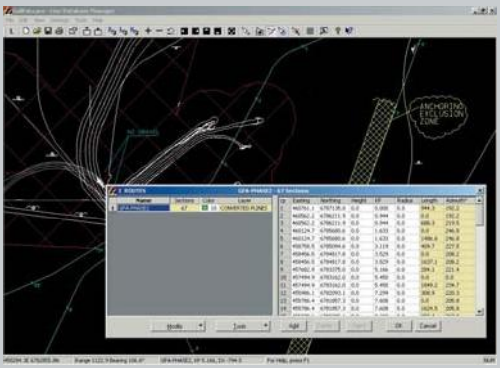
Great Flexibility -Sensor Support

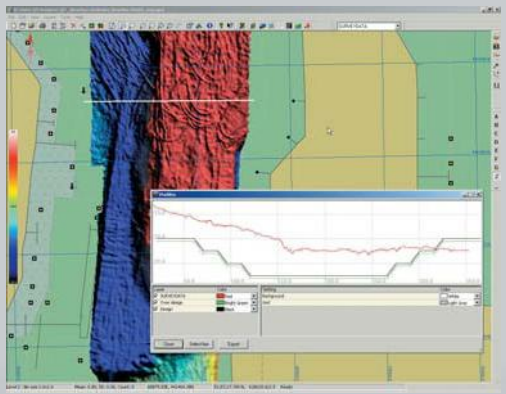
A very large number of sensor I/O drivers have already been developed over the past years. QINSy comes standard with over 600 field-tested I/O drivers, so, in most cases, it handles all your hydrographic related sensors right out of the box. If an existing driver does not meet your need, the *I/O Driver Utility* usually lets you write your own driver. Failing that, the modular design of QINSy allows QPS to write additional drivers quickly.
QINSy supports the following sensor types:

- **Singlebeam, Multibeam Echosounders and Mechanical Profilers**
- **Motion Sensors, Gyros and Compasses**
- **GPS, DGPS, RTK and Total Stations**
- **Side Scan Sonar, Sub Bottom Profiler and Magnetometer**
- **Dredge Monitoring, Auto Pilot and DP Systems**
- **USBL and LBL systems**
- **ARPA and AIS functionality**
- **Generic Sensors (analog, weather, rpm, environmental)**

The *Console* is your starting point in QINSy Survey. It makes navigation through the program suite very intuitive at each phase of the project. You are guided through the various program modules designed specifically for survey planning, data collection, data processing and chart production. The *Program Manager* provides a complete overview of project status at each phase.







The *Line Database Manager* is a comprehensive toolbox for survey planning, allowing the surveyor to manually define, automatically generate and/or import from ASCII and DXF files, the following line types:

- **Targets and Symbols**
- **Single Lines**
- **Survey Grids**
- **Routes**
- **Wing Lines**
- **Cross Lines**

Data can also be exported to:

- **ASCII**
- **DXF**

The Line Data Manager works interactively in real-time with the Online Navigation Display where points, lines and routes can be generated right in the Display during data acquisition.

Comprehensive Survey Planning

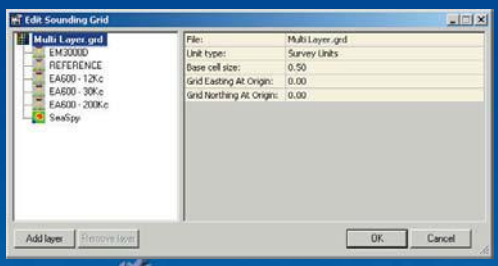
Created at the planning stage with the *Setup* program, a *Template Database* contains all survey configuration parameters pertinent to the project. QINSy supports most of the World's datums and projections (including predefined US State Plane System coordinate systems), multiple units and geoidal models used world-wide. The template contains vessel shapes, administrative information, as well as vessel offsets and I/O parameters. It is a complete reflection of your current survey set up and fully editable to kick-start your next project.

Background Display

Drawing files generated from CAD programs often contain more recent and more accurate information than electronic navigation charts. QINSy allows import of DXF, DWG and PRO files. To ensure speedy refresh rates of real-time displays, DXF and DWG files are converted with the *DXF Converter* at the planning phase. These binary files are displayed as an overlay to S-57 ENC charts in the Navigation Display. QINSy supports both S-57 and *CM93v3 Electronic Navigation Charts*.
The use of satellite images, aerial photo's or any other *geo-referenced bitmaps* in the Navigation Display gives another dimension to your area of interest.

Sounding Grid Utility

A Sounding Grid to be used during data acquisition is created in survey planning. Grid cell size, the statistics to be recorded per cell and the layers required to store the various data acquired online are all defined at this stage. No boundary definition is needed, and file size is no longer a software issue, the limits now being attributable to processing power, memory available and hard disk capacity.
The Sounding Grid Utility (SGU) is populated online with various data, all of which can be accessed offline in post processing. With support for ENCs, GeoTIFFs, and DXF background files, waypoint planning functionality in the utility is used during survey planning to design survey line layouts.



Real-time Final Results -Data Collection and Output

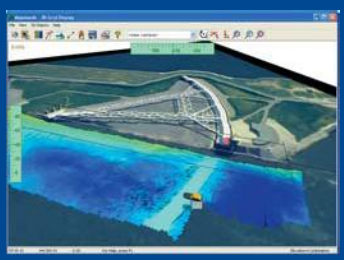
Raw Sensor Data

All raw sensor data is logged and permanently stored in fast relational databases (*.db) to each of which the entire survey configuration is copied from the template. Raw data can be analyzed and edited using the *Analyse* program, making it ready for the *Replay* program and generation of new results if that is necessary.

Accurate Timing and Ring Buffers

Accurate timing is imperative in many survey situations. QINSy uses a very sophisticated timing routine based on the PPS option (Pulse Per Second) available on almost all GPS receivers. All incoming and outgoing data is accurately time stamped with a UTC time label. Internally, QINSy uses so-called "observation ring buffers", so that data values may be interpolated for the exact moment of the event or ping.

Real-time DTM Production



All computations of position are performed in 3D. In combination with RTK or real-time tide gauges, this means that all depth observations are immediately available in absolute survey datum coordinates. This unique technique is called "on-the-fly DTM Production".
QPS was the first company introducing the "delta heave" method, which means that the quality of the final DTM is no longer affected by heave drift caused by vessel turns.
Gridded point data output to the Sounding Grid is paralleled by an output of ALL soundings to a second file (*.qpd,*.sds,*.fau,*.pts or other). Either reduced or full datasets are available for further DTM processing.

Data Storage

How raw and results data files are split up during acquisition is your choice. Data may be stored on a line-by-line basis, by file size, or by manual intervention. Whatever the method, data are normally stored in several separate databases for convenience in processing.

Enhanced Functionality - Getting the best out of your system

Side Scan Sonar

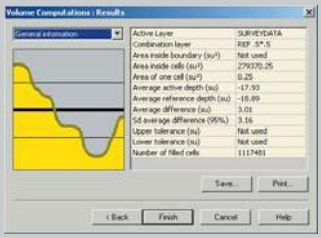
Backscatter from most modern multibeam systems (called 'snippets') and/or true Side Scan Sonar data, is mosaiced in real-time, geo-referencing being performed using a flat bottom assumption, or, better still, using a full 3D terrain model. In addition to the waterfall display, this geo-referenced backscatter data, and/or data from dedicated side scan sonar sensors, is presented in real-time as a mosaic in one layer of the multi-layered sounding grid, itself one of the layers in the multi-layered Navigation Display. QINSy offers advanced real-time SSS target detection, meaning that SSS processing time is cut down to almost zero. A dedicated SSS data viewer supports loading, viewing and performing target detection is just seconds.

Eventing

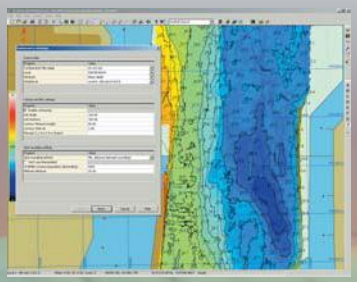
Used in many survey operations like pipe-laying, pipeline inspection, and buoy tendering for example, ***Eventing*** is a powerful feature in QINSy. Completely user-configurable, all events, and classes of events are defined in planning. Using the resultant Event Tablet online, events are easily generated with a single mouse click, with each event log stored in real-time.

Use of Multi Layer Sounding Grid

For multibeam surveys, "gridding" is the predominant data reduction method. However, achieved reductions usually mean a loss of resolution. In QINSy a regular multi-level gridding method is used. Based on the minimum cell size, 5 additional grids are generated on-the-fly. Grid file size is no longer an issue, since there is no limit to the number of grid cells. If the minimum cell size is selected to be 1x1 meter, then the following grid levels are automatically generated; 2 x 2, 4 x 4, 8 x 8, 16 x 16, 64 x 64 being the overview level.
The method used in QINSy ensures faster update of navigation and 3D displays (only show the resolution which fits to the viewing scale and screen resolution), smoother contours using larger cell size without loosing data and provide the user direct access to various resolution levels without the need of replaying the survey data.



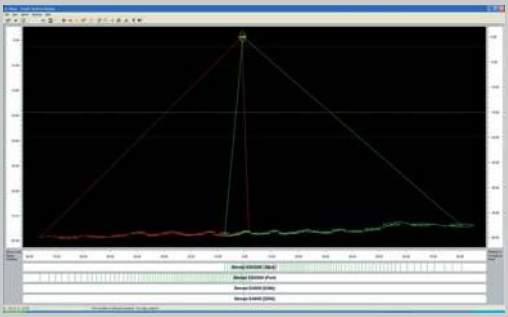
Beside the availability of multiple properties per cell such as mean value, minimum value, maximum value, value count, standard deviation etc, the user has access to create multiple layers into the same sounding grid. Data from multiple sensors can be recorded into the same sounding grid, at the same time, but on different layers. The user can toggle easily between the different layers and/or can set up multiple navigation displays showing different Sounding Grid layers. It is also possible to combine two layers, allowing the user to view, for example, Side Scan Sonar data draped over the multibeam echo sounder data in real time!
Sun illumination of the sounding grid layer opens the eyes of the user. Small items and difficult to find pipelines suddenly show up when using the colored sun illumination option on your data.



In post processing the recorded data can be viewed and edited using the special developed sounding grid utility, the user has the ability to perform;

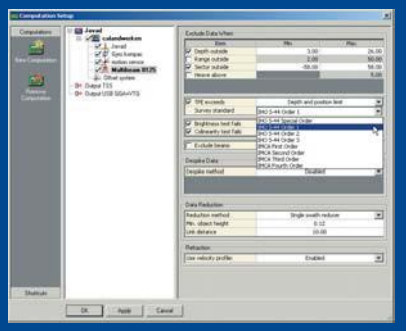
- **Improved Volume calculation between two layers with or without tolerance levels (Over dredge design);**
- **Quick cross profiles through Sounding Grid;**
- **GeoTIFF images can be exported for use by QINSy online, or by 3rd party software;**
- **Depth contours and spot soundings can be generated and exported to both S-57 ENC and DXF;**
- **Combining several layers (draping);**
- **Waypoint and single line planning;**
- **Overlay of DXF and PRO files;**
- **Sun illumination and shade exaggeration to highlight seabed features;**
- **Full control over statistical information regarding data recorded in each layer;**
- **Manual editing of sounding grid entries**

The Multilayer Sounding Grid can be used not only for bathymetry, but also for SSS Mosaicing, magnetometerdata, seabed classifications, dredging pro-

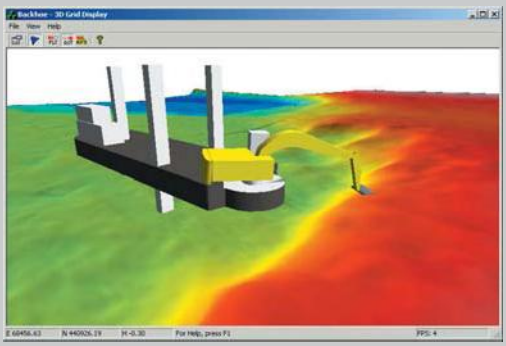


Total Propagated Error

So that our users could qualify their data in real-time according to IHO S-44 provisions, QPS implemented TPE (Total Propagated Error) functionality, sometimes referred to as 'error budget'. The TPE of a point is a measure of the accuracy to be expected for that point, when all relevant error sources are taken into account.



For example, the TPE of a computed DTM point on the seafloor, comprises the propagation of the individual errors of the echosounder system, motion reference system, sound velocity system, positioning system, heading system, ships offset system and other systems which contribute to the total propagated error.



Advanced Dredging Functionality

Advanced dredging functionality to control and monitor dredging operations in real-time is available as an add-on module to QINSy Survey. The available sensors on board the dredger are integrated in QINSy and used to calculate not only the exact location of the dredge tool, but also perform TDS and production calculations.

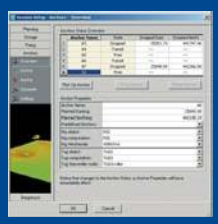
The Profile Display is used to visualize in real-time, the dredge tool relative to the various DTM layers containing, for example, current survey depth and theoretical profile. The dredge tool object shape (dredge head, bucket, etc.) is viewable from different angles. The Profile display shows the distance between the object and each of the DTM layers with an update rate of up to 10 times per second.

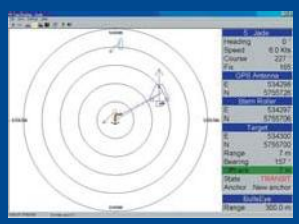
The entire dredge process can also be monitored using the powerful real-time 3D display, employing multiple perspectives from different camera views. Hopper dredgers, cutter dredgers, backhoes and other dredging tools are seen moving in a 3D environment at the same time that the dredged depths are updating the multi-layer sounding grid, all in real-time.

Anchor Handling &Barge Monitoring

Advanced functionality is used to monitor tugboats relative to a rig/barge and the local environment from one location. Data transmission between rig/barge and tugboats ensures anchor pattern exchange between the vessels. A special Tugboat Display program, requiring no surveyor, runs on each tugboat, providing continuous geographic context of position and target information for the required task.

For ease of use, anchor locations can all be positioned by click and drag of the mouse on the navigation display!





Quality Management System

A Quality Management System (QMS) provides both surveyor and processor with full insight into the calibrations performed, and the settings used, from start of survey (calibrations) to end (validation of data).

The following main features are recorded in the QMS:

- **Start and end time of each survey line;**
- **Sound velocity profile;**
- **Alerts such as roll, pitch outside limits;**
- **Data cleaning tools and de-spiking used both on-line and off-line (Validator)**
- **Position check through Establishment Fix routine;**
- **Gyro and Height calibration;**
- **Tidal stations used in the Tide Processor;**
- **Comparison between a (single beam) reference line and another (single beam)survey line;**
- **Statistical information of data recorded in Sounding Grid**

OBC-Seismic support

QINSy provides full support for the execution, monitoring and controlling of the OBC Seismic operation on both the recording, and the shooting, vessel.

On the shooting vessel, QINSy provides general navigation, positioning of the on-bottom streamer by means of a USBL system, and interpolation of hydrophone group positions.

On board of the airgun vessel, QINSy is used for general navigation, triggering of airguns at predefined positions (including user defined preload) and positioning of airguns.

QINSy can export and merge navigation records from the shooting and recording vessel using the UKOOA P1/90 format.

Speedy Processing - Data Validation, Editing, Calibration and Tide Reduction

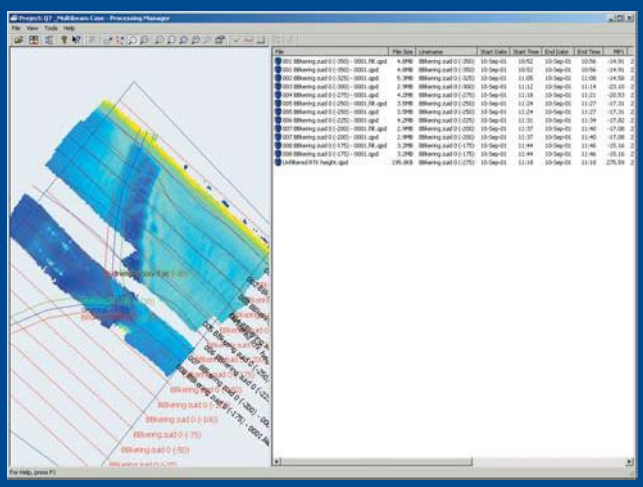
Data Cleaning

Employing various real-time data cleaning tools and correcting for motion, tide and refraction, QINSy is designed to output almost final results at the time of data acquisition. Moreover, the many quality assurance functions equip the surveyor with tools to qualify results data in real-time. Starting with a cleaner, and thinner, data set effectively reduces time spent in post processing.

The QINSy Processing Manager

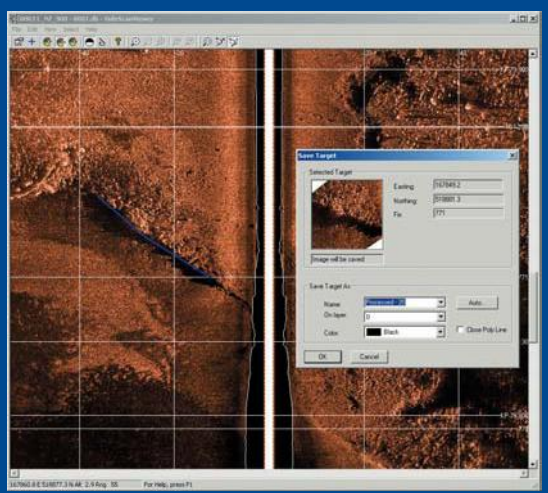
All XYZ files are listed in the QINSy Processing Manager, tabulated against a history of processes performed on each file. This provides a complete overview of the project processing status. Processing programs are launched from the Processing Manager:

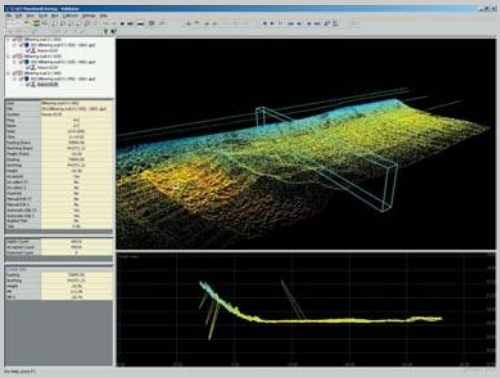
- The Tide Definition and Processing utility supports various methods for tidal reduction.
- The Validator supports both manual and automated data cleaning including advanced 3D splined surface cleaning.



Powerful Side Scan Sonar Functionality

Side Scan Sonar data is viewed and processed with the Side Scan Sonar Viewer Program . It offers the same look and feel as the waterfall SSS Display used during data acquisition. Powerful target detection tools allow you to export targets and geo-referenced bitmaps to the QINSy Mapping database to provide a complete targets overview.



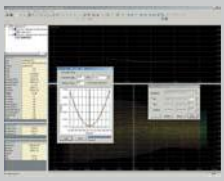


The QINSy Validator

Multibeam exploded the volume of point data and created data handling challenges both in the acquisition and processing phases. The QINSy Validator is probably the most powerful data-cleaning program on the market today. Inherently fast data access allows loading and viewing of millions of points in just seconds. The Validator has 4 different views, 3 of which can be opened simultaneously:

- Plan View
- Cross View
- Profile View
- 3D View

Multibeam Calibration



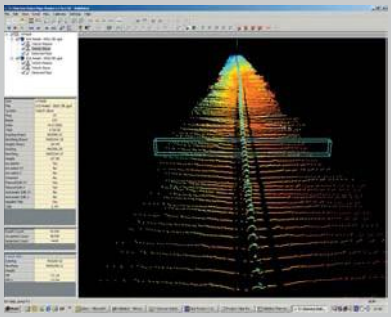
Multibeam calibration is interactive, and very easy, providing both manual and auto-calibration options. These tools calibrate for errors in:

- Roll
- Pith
- Yaw

Singlebeam and Multibeam Data Editing

Editing of singlebeam, or multibeam, has never been easier. A variety of automated cleaning algorithms are available:

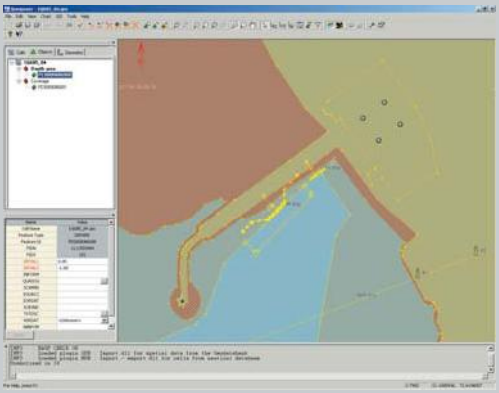
- Apply On-line Flags
- Adaptive Clipping
- Butterworth
- Multiply/Shift
- Clip Below /Clip Above
- Median and Mean
- 3D Spline Surface Despiker



The Validator adds fully automated pipeline detection features, such as:

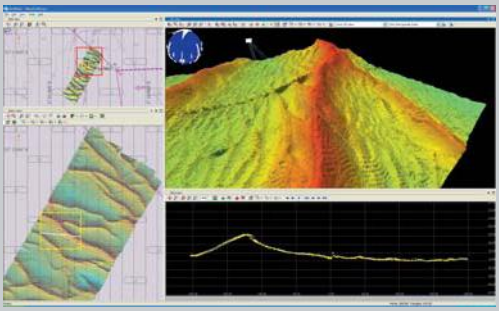
- Top of Pipe Detection
- Bottom of Trench
- Mean Seabed Detection

Eye-Catching Products
DTMs, Profiles, Volumes, Chart Production and ENC 's



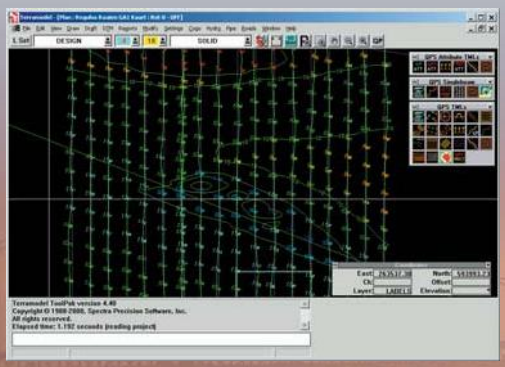
QINSy EPP-57

The QINSy ENC Production Platform 57 distinguishes itself from other approaches to electronic chart production platforms by its efficient way of data storage, and through the principle of semi-static base cells that are easily updated with highly dynamic bathymetric data. The bathymetric data is generated directly from the digital terrain model, itself updated constantly with new hydrographic survey data. This principle allows for a completely updated ENC cell ready for distribution within hours of survey completion. Since the system is built on open Oracle technology, it can be adapted and extended under the user's own supervision. The user makes use of the newly developed ENC Qomposer, an ENC editor for conversion of data to and from the EPP-57.



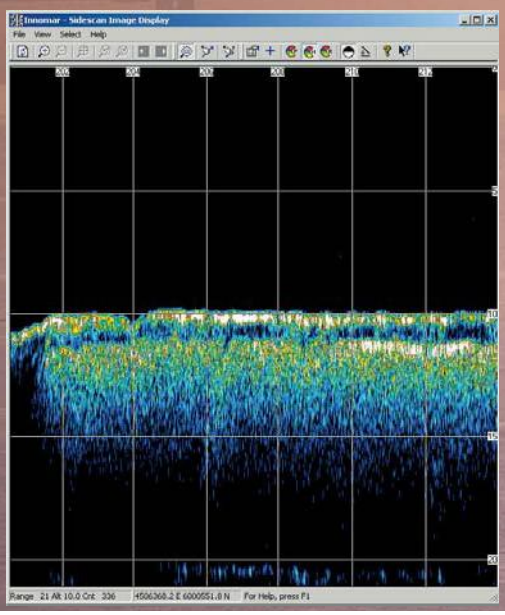
Qloud

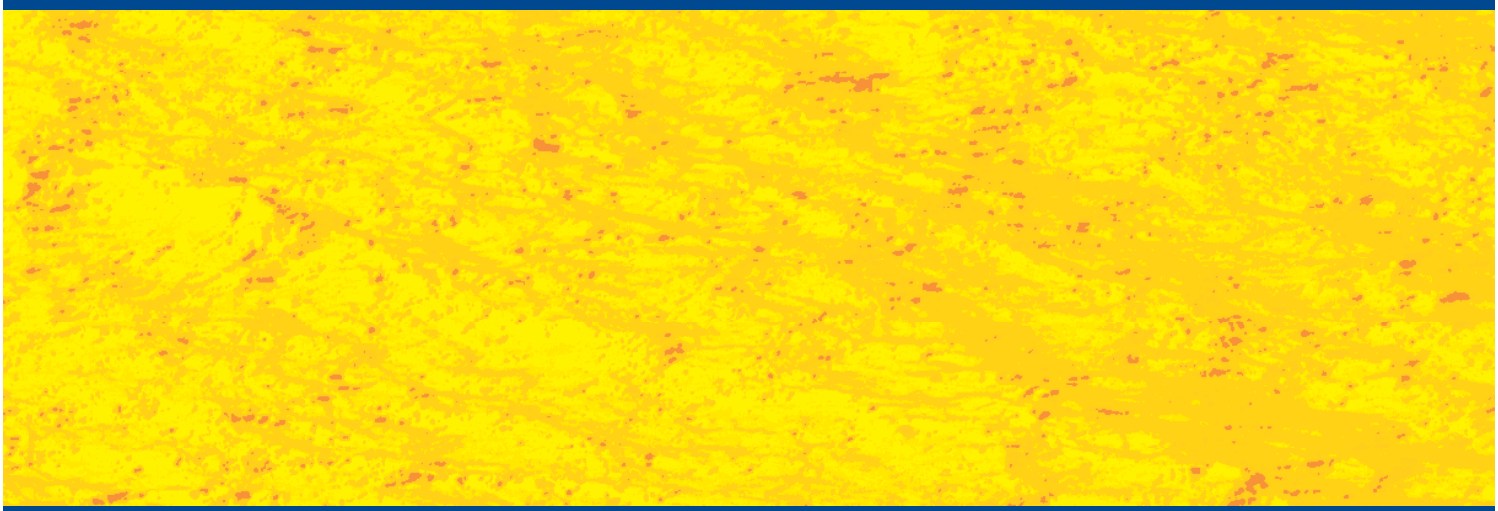
Newer generations of multibeam echsounders dramatically increased the number of depth soundings, both in terms of number of beams, and in ping rate. Dual-head multibeam systems providing up to 20,000 depth measurements per second have become a reality.
Despite this increase in data volumes, the QPS philosophy of producing almost final soundings in real-time remains effective. However, as always, there is still a need to validate the online results using off-line tools. The difference is that these ever increasing data volumes require a new offline data analyze tool, ready for the future.
Our new 3D data cleaning tool, called Qloud, is specially developed to handle extremely large areas of multibeam data and to perform statistical data cleaning using parameters such as Total Propagated Error (TPE) in algorithms like CUBE (developed by the Ocean Mapping Group at the University of New Hampshire) and the surface spline filter.
Qloud allows very fast scrolling through the data and instantaneous focusing on the problem areas.



QINSy Mapping

QINSy Mapping is a powerful processing package for the marine surveying and construction industry. With its many task-specific macro utilities, the software performs all necessary calculations quickly and easily, produces plots, generates contours and spot soundings, and calculates precise volumes in just seconds. A dedicated add-on module is available to export depth contours and spot soundings directly into IHO S57 ENC vector chart format. The QINSy 3D Tool generates not only great looking images of the seafloor, but also realistic fly-through video clips ideal for client presentations.





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Explorer

Mini Marine Magnetometer

Explorer's light weight, compact size and ultra low power consumption make it the ideal tool for shallow water surveys, especially when deployed from a small craft. Explorer's high sensitivity, unmatched accuracy, and the ability to operate around the world without any restrictions make this mini magnetometer a professional tool that will help you find what you're looking for. Best of all Explorer will fit in your boat *and* in your budget.

Features

Compact Size and Light In Weight

Explorer is smaller and lighter than competing technologies
The Explorer towfish weighs 3 kgs (7 lbs)
50m (164ft) of cable weighs 6 kgs (13 lbs)

Maintenance Free Sensors, No Realignment or Consumable Parts

Explorer Overhauser sensors are entirely maintenance free and most importantly, Explorer's specifications do not degrade over time. As a result, the Explorer sensor, unlike optically pumped sensors, never has to be realigned or recalibrated in order to meet the manufacturer's specifications at the time of shipping.
In addition, Explorer sensors do not contain any parts that wear out or need to be replaced.

Unmatched Low Power Consumption

Explorer's maximum power consumption is only 2W. A 24V Universal AC power supply is supplied with each system. Explorer can also be powered by a single car battery.

High Sensitivity

Explorer Overhauser sensors deliver high-resolution output with a noise level of 0.02nT/√Hz; counter sensitivity is 0.001nT
In other words, Explorer is orders of magnitude more sensitive than proton sensors, and is on par with optically pumped sensors.

Side Scan and Deep Tow Platform Integrations

Explorer's small size and light weight also makes it ideal for towing behind side scan sonars and deep tow platforms. All integrations enable the customer to run each system independently as well as together. Deep tow options for this application are 1000m, 3000m and 6000m.

Explorer is Ideal For

- Inshore geophysical surveys
- Archaeology
- Wreck detection
- Magnetic mapping of harbours
- Ferrous target detection in lakes, rivers and estuaries

Highest Absolute Accuracy

Explorer, like Marine Magnetics' SeaSPY marine magnetometer, has the best absolute accuracy of any marine magnetometer available: 0.2nT

Worldwide Operation With No Restrictions

Explorer is entirely omnidirectional, meaning you never have to orient your sensor, because it is already optimized to work around the World. As a result, regardless of where you are in the World and no matter what the magnetic field strength is, your Explorer sensor will continue to provide a strong signal and accurate data.

Digital Towfish

Explorer is entirely digital. The magnetometer signal is measured inside the towfish where the signal is strongest and most immune to outside noise.

No Sensor Warm-Up Time

Explorer Overhauser sensors do not require temperature stabilization. Therefore Explorer will work equally as well in cold water as in warm, tropical water, instantly on power-up.

Ready to Deploy

Explorer is ready to deploy. You do not have to fill the Explorer towfish with a hydrogen rich fluid, or any fluid, and you will never have to orient the Explorer sensor to a certain angle of the earth's magnetic field depending on your location.

The Overhauser Effect

Marine Magnetics is the only marine magnetometer company in the world that can produce stable Overhauser sensors that do not degrade with time. Marine Magnetics' Explorer magnetometer measures the ambient magnetic field using a specialized branch of nuclear Magnetic Resonance technology, applied specifically to hydrogen nuclei.

Options Available for Explorer Include:

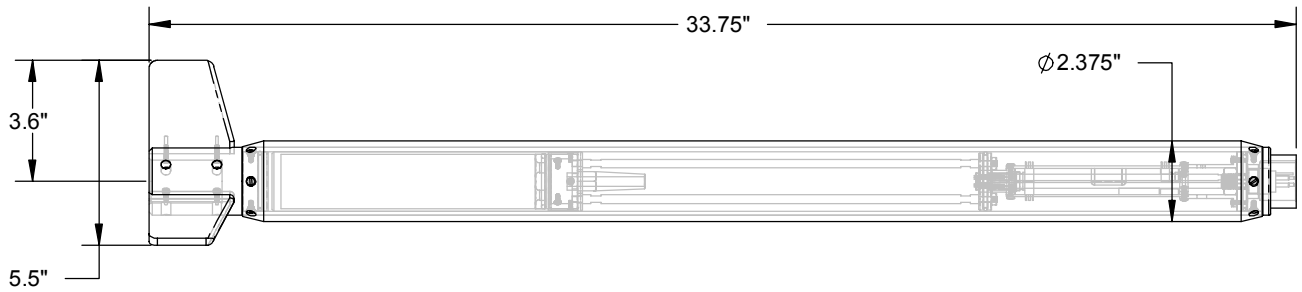
- Pressure sensor
- Side Scan Sonar integration
- Additional tow cable
- Flotation tow cable
- Tow cable weights
- Tow cable termination kit
- Custom reusable shipping case
- Metal tow cable reel – hand winch
- RS-232 Extension cable
- Battery clip cable
- Deep tow options: 1000m, 3000m and 6000m
- SeaLINK analogue output – printer capability

SeaLINK Logging & GPS software for Windows

SeaLINK provides an interactive text interface as well as a real-time plot view of data that is being collected from the magnetometer.

Features include:

- Real-time graphing of magnetic field trace
- The ability to place event markers in the recorded data
- Review of stored data
- Real-time graphical printing to a dot matrix printer
- Audible alarms for signal quality flags
- Optional, display of depth and altimeter trace
- The ability to synchronize the magnetometer clock to GPS time at the click of a button.
- The ability to tag every mag reading with a GPS coordinate
- GPS data can also be stored completely independently from the mag data stream.
- All GPS information can be shown on-screen in real time in latitude/longitude format, or as UTM projection with WGS84 datum.
- The ability to correct the GPS coordinates for towfish layback in real time.



Performance

Operating Zones	NO RESTRICTIONS. *Explorer will perform exactly according to spec throughout the entire range.*
Absolute Accuracy	0.2nT
Sensor Sensitivity	0.02nT
Counter Sensitivity	0.001nT
Resolution	0.001nT
Dead Zone	NONE
Temperature Drift	NONE
Power Consumption	2 W
Timebase stability	1ppm, -45°C to +60°C
Range	18,000nT to 120,000nT
Gradient Tolerance	Over 10,000nT/m
Sampling Range	4Hz – 0.1Hz
External Trigger	By RS-232
Communications	RS-232, 9600bps
Power Supply	9VDC - 40VDC or 100 - 240VAC
Operating Temperature	-45°C to +60°C
Temperature Sensor	-45°C to +60°C, 0.1 step

Towfish Dimensions

Towfish Length	86 cm (33.75 inches)
Towfish Diameter	6 cm (2.375 inches)
Towfish Weight in Air	3 kgs (7 lbs)
Towfish Weight in Water	1.2 kg (2.6 lbs)

Tow Cable Dimensions

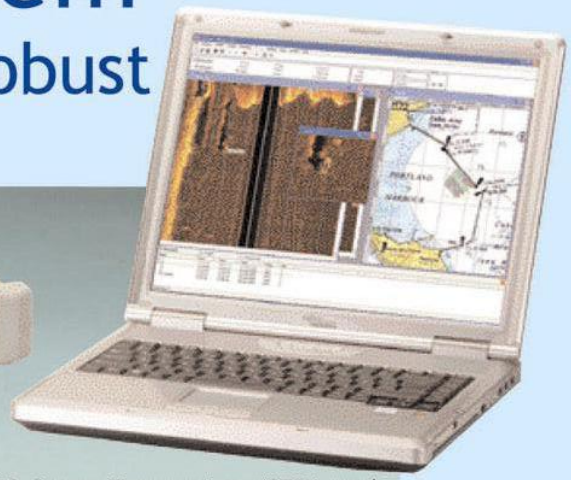
Conductors	Four + shield
Strength Member	Kevlar
Breaking Strength	2,500 kg (5,500 lbs)
Outer Diameter	1 cm (0.4 inches)
Bending Diameter	16.5 cm (6.5 inches)
Weight in Air	122 g/m (82 lb/1000 ft)
Weight in Water	34 g/m (23 lb/1000 ft)
Cable Termination	Field Replaceable

Marine Magnetics
True Detection Power

52 W Beaver Creek Rd #16, Richmond Hill, ON, L4B 1L9 Canada t: +1 905 709.3135 f: 709.0805 e: info@marinemagnetics.com www.marinemagnetics.com

The CM2 Sidescan Sonar System

High definition . Versatile . Easy to use . Robust



Rugged CM2 Sonar Transceiver (STR) and PC running MaxView acquisition software. The STR's USB interface needs no extra hardware. Simple optional connection to third party software.

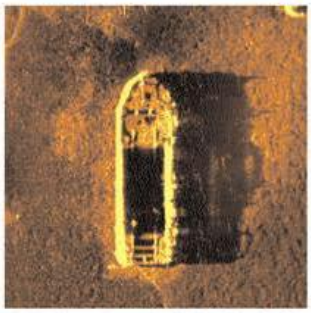
Digital CM2 Towfish. Dual frequency 325/100kHz, dual frequency 780/325kHz or single frequency options. All stainless steel construction.

CM2 C-Case all-in-one unit, weatherproof to IP64 when operating. Runs MaxView or third party acquisition software. Ideal for open boat use and exposed conditions.

C-MAX www.cmaxsonar.com

High definition images

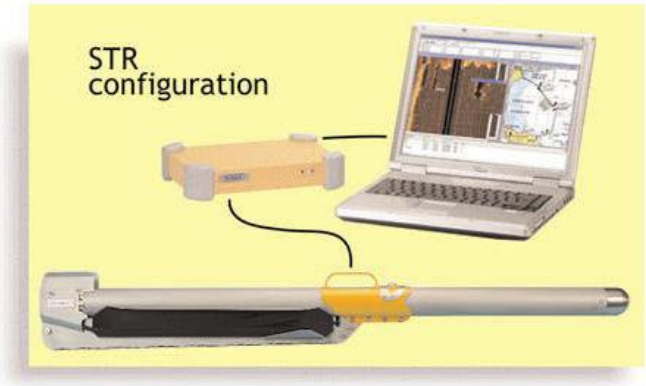
- new ultra-low noise towfish electronics
- digital towfish and 2-wire telemetry; no crosstalk or loss of quality
- lateral resolution of 39mm (780kHz); 78mm (325kHz); 156mm (100kHz)
- range out to 500m (100kHz); 150m (325kHz); 50m (780kHz)
- enhanced immunity to unwanted surface reflections

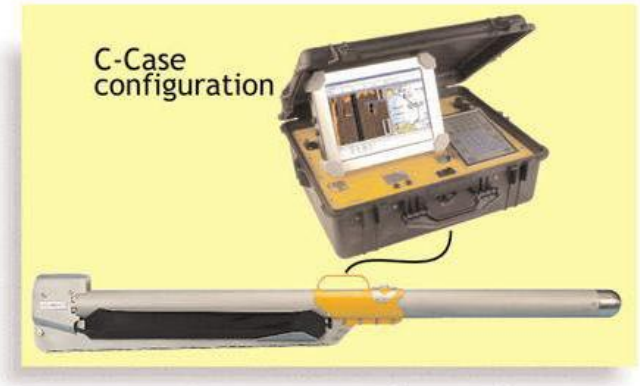


Winch options include the CM2 portable unit

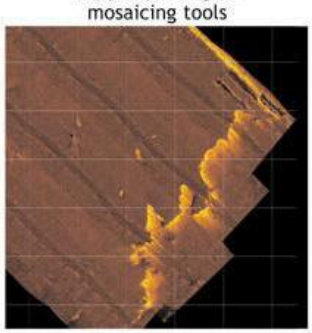
Versatile

- choice of dual frequency 325/100kHz, dual frequency 780/325kHz or single frequency towfish
- wide range of cable and winch options
- optional sensor interfaces including magnetometer
- ROV and AUV versions
- choice of STR or C-Case configurations





Easy exporting to mosaicing tools



Double O-ring sealed rated to 2500m

Easy to use

- intuitive, full-featured MaxView acquisition software
- licence-free MaxView Reader software allows replay, editing and format conversion, on any PC
- automatic towfish gain control and altitude measurement
- transducer beam depression switched in seconds, without tools
- towfish handle and slim outline allows easy launch and recovery
- clear, concise, easily understood handbook

Robust

- towfish constructed of stainless steel, not aluminium
- safety mechanism to save the towfish if it strikes an obstruction
- rugged surface electronics with all stainless steel case (STR) or polypropylene clamshell case (C-Case)
- 3 year warranty on towfish, STR and C-Case

CM2/06

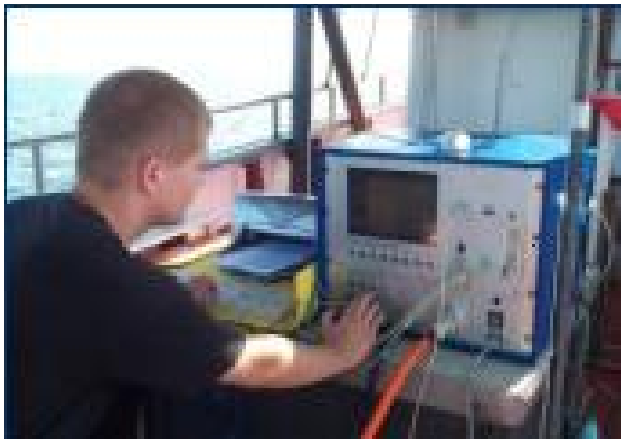
Full specifications can be downloaded from our website: **www.cmaxsonar.com**

C-MAX

C-MAX Ltd, Unit B1, Roman Hill Business Park, Broadmayne, Dorchester DT2 8LY, UK
Tel: +44 1305 853005 Fax : +44 1305 852136 email: sales@cmaxsonar.com

INNOMAR SES-2000 standard

The system SES-2000 standard is based on the SES-96 product line, which is the first mobile parametric sediment echo sounder on the international market. The compact design with an user friendly control unit allows the survey also in small and shallow waters with all the advantages of the parametric acoustics, like the small beamwidth at low frequencies, deep penetrations with high resolutions of layers and objects and very accurate depth measurements with the high frequency. The system has the possibility to store the data digitally but gives also during the online processing excellent and reliable results.



The variant SES-2000 standard has the possibility for electronical beam steering and beam stabilization and is equipped with modules for high ping rates, high energy pulses and deep water transmit modes.

Technical Parameters

Transducer:	nonlinear transmitter, linear receiver beamwidth ±1.8° (0.22 x 0.22)m2
Transmitter:	primary frequency: 100 kHz secondary frequencies: 4, 5, 6, 8, 10, 12, 15 kHz electrical power: >18 kW source level: >239 dB/µPa re 1m
	electronical beam stabilization and beam steering
Pulse Width:	66 µSec ... 800 µSec
Pulse Repetition Rate:	up to 50/sec depending on range
Water Depth Range:	1m ... 500 m
Operating Ranges:	5m ... 200 m
Sound Velocity Range:	1400 m/s ... 1600 m/s
Penetration:	up to 50 m depending on sediments and frequency

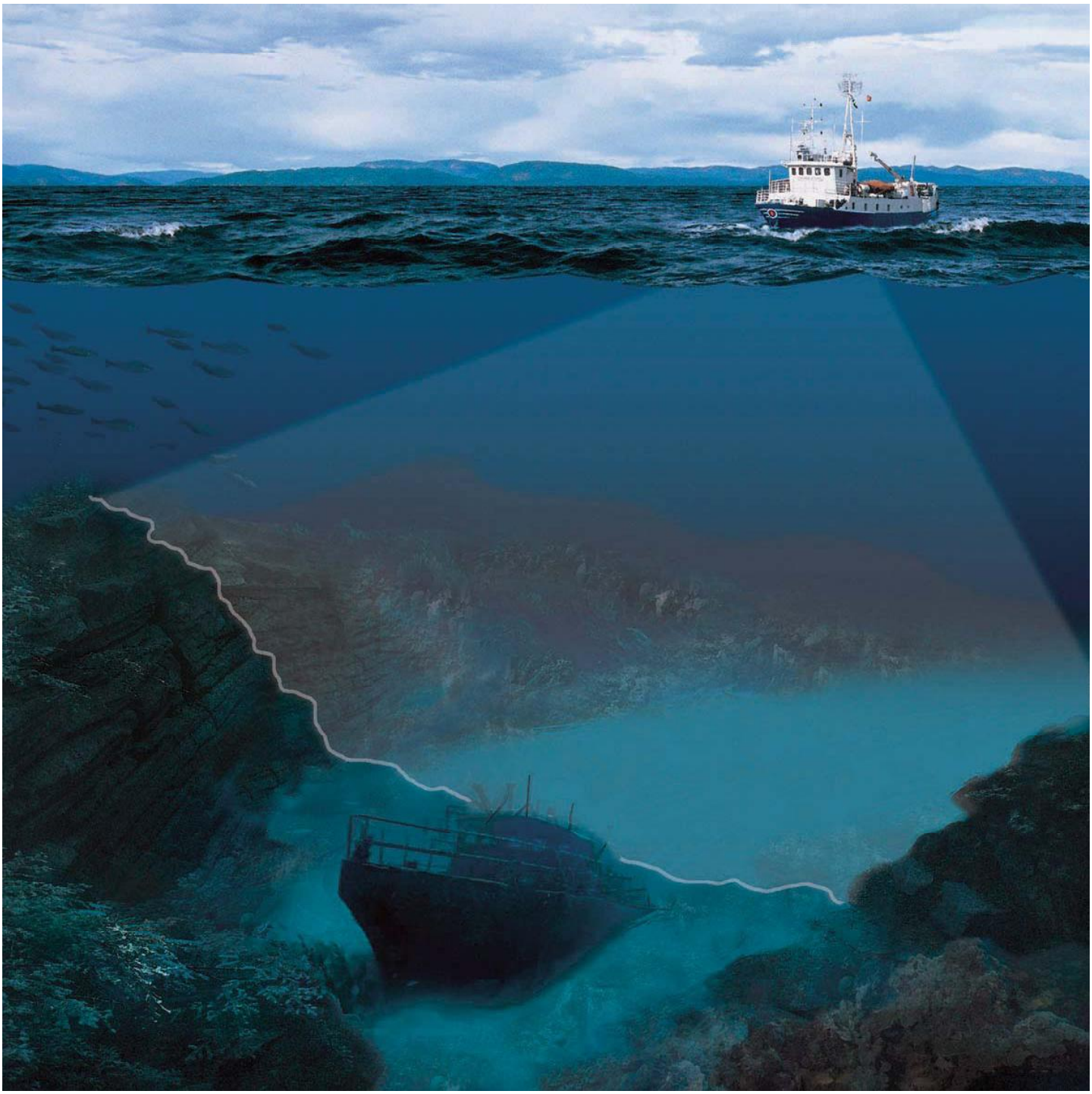
Resolution:	multiple target resolution: > 5 cm depending on frequency and operating range
Accuracy:	100 kHz : 0.02 m + 0.02% of water depth 10 kHz : 0.04 m + 0.02% of water depth
Trigger:	internal: depending on time control, output available external: input available
Receiver Channels:	1 channel primary frequency 1 channel secondary frequency
Gain Controls:	AGC or manual 0 ... 96 dB in 6 dB steps Time Variable Gain
Digitization:	16 bit (real dynamic 14 bit)
Signal Processing:	noise reduction: stacking rate up to 64 DSP to increase signal to noise ratio, resolution and penetration, online view of processed echo data, replay of recorded data
Data Output:	online storage of echo envelope in chosen range, online storage of raw signal in chosen range, system parameters and navigation data on hard disk backup: USB 2.0 interface for HD, MO-Disk or others serial output for depth, time, position online colour echo prints and thermal recorder prints
Data Input:	serial input for navigation data (NMEA compatible) serial input for motion sensor for heave compensation and roll/pitch compensation remote control via TCP/IP network
System Components:	SES-2000 standard with integrated transmitter, receivers, DSP´s, 10,4" TFT panel and integrated PC unit (0.53 x 0.42 x 0.49)m3 / weight: 49 kg transducer with 30 m cable (0.26 x 0.30 x 0.1) m3 / weight: 30 kg (including cable)
Operating Conditions:	115-230 V AC +5%/-10%, 50 - 60 Hz, power consumption < 1000 W operating temperature: 0°C ... 40 °C
Optional Features:	water protected case in MIL standard module Side Scan with separate transducer

EM 3000

KONGSBERG

Multibeam echo sounder

The obvious choice for shallow water surveys and ROV or AUV use



855-164661 / Rev.C / October 2003

System description

Kongsberg Maritime's **EM 3000** multibeam echo sounder is the ultimate shallow water mapping system with respect to high accuracy and resolution. The minimum operating depth is only 1 m below the sonar head, and in typical sea water conditions the depth range will exceed 150 m. Small dimensions and low weight makes the system portable and easy to install allowing use both on survey launches and subsea vehicles to 1500 m water depth.

A special version of the Processing Unit is available for AUV and ROV installations.

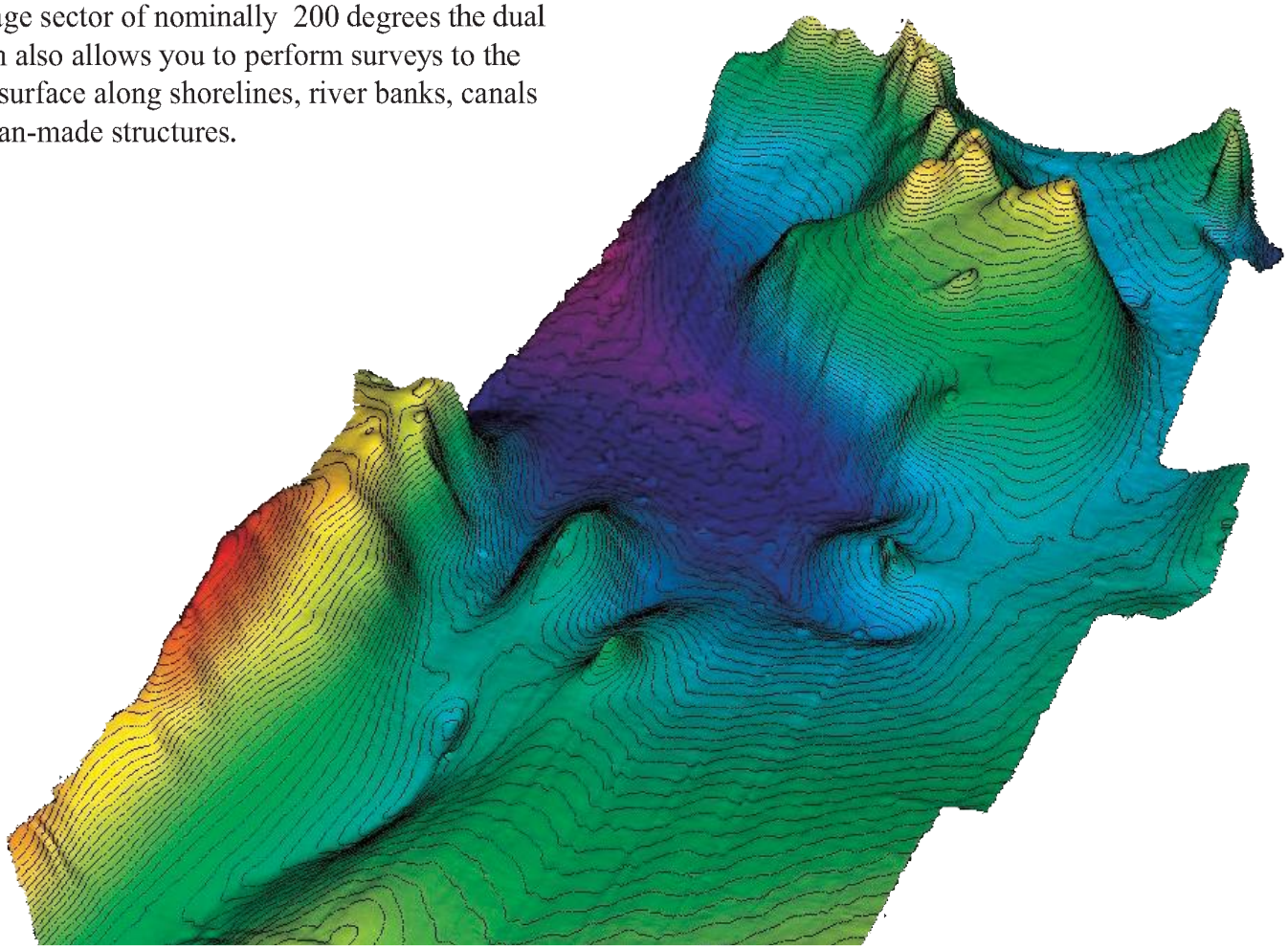
The EM 3000 may be configured to use two sonar heads. This increases the shallow water coverage to ten times the water depth, and the number of measurements per ping to typically 220. With an angular coverage sector of nominally 200 degrees the dual system also allows you to perform surveys to the water surface along shorelines, river banks, canals and man-made structures.

The EM 3000 is a complete system with all necessary sensor interfaces, real-time compensation for vessel motion and ray-bending, data displays for quality control including sensor calibration, and data logging included as standard.

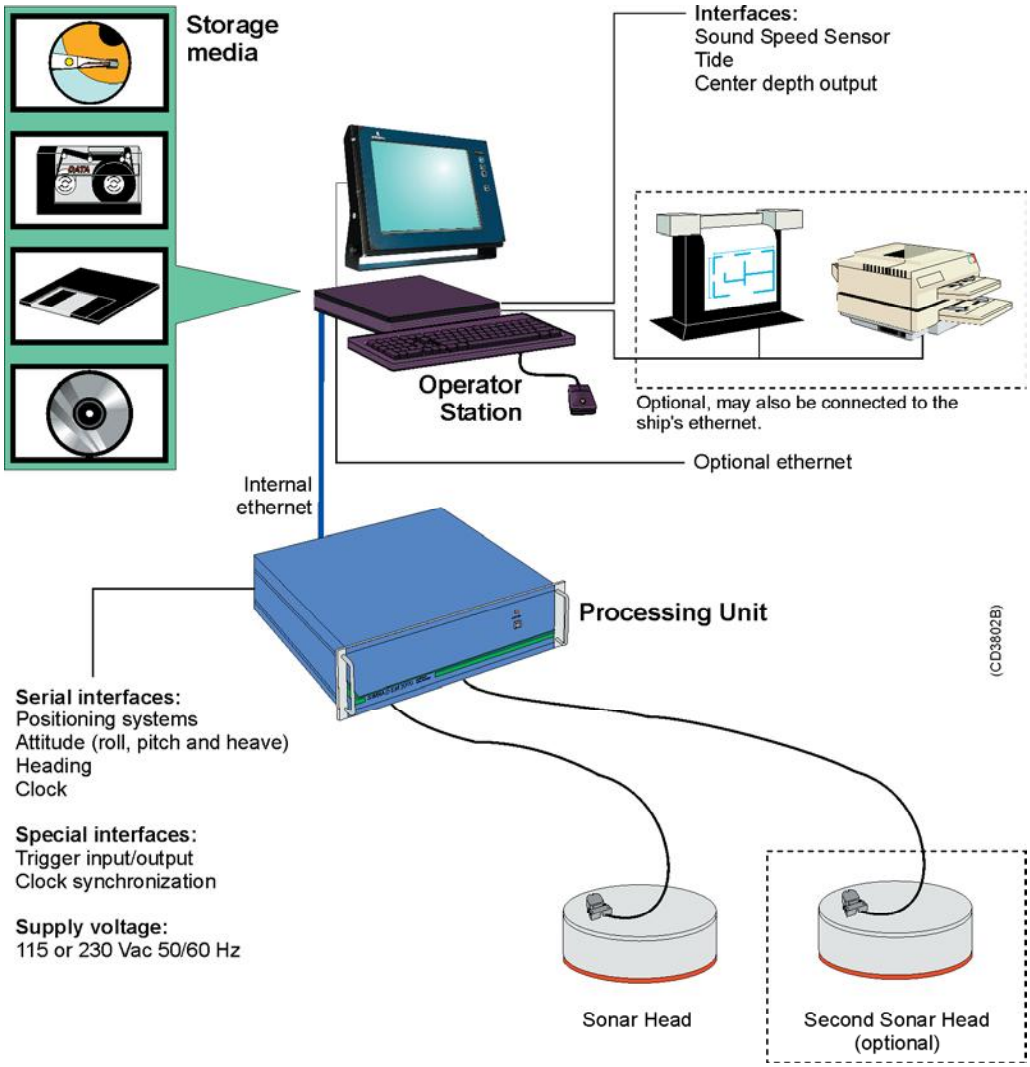
A range of post-processing software utilities are available for the EM 3000:

- **Neptune** for bathymetry
- **Poseidon** for mosaicing
- **Triton** for seabed classification

A world-wide marketing and service organization with many years of multibeam experience is available to support you while using the EM 3000.



- Full swath width accuracy to the latest IHO standard
- Swath width up to 10 x water depth or 200 m
- Depth range from < 1 meter to > 150 meters
- 100% bottom coverage even at more than 10 knots vessel speed
- Real-time ray bending and attitude compensation
- Bottom detection by phase or amplitude
- Seabed image (sidescan) data output
- Sonar heads for 500 or 1500 meters depth rating
- Choice of native or third-party operational software for several operating systems
- Special Processor Unit available for ROV and AUV implementations



Typical system configuration with desktop Operator Station, Processing Unit and one or two Sonar Heads.

A single Sonar Head mounted at the bow of a small vessel.

Optionally the EM 3000 may be supplied with a PC Operator Station running QPS "QINSy" or Coastal Oceanographic's "HYPACK Max" operational software.

Operator Station highlights

- Display of sensor status and values
- Extended log of all occurrences important for the system quality
- Displays showing depths, quality factors, detection method (amplitude and phase), ref ectivity etc.
- Waterfall, ping and geographical displays
- Real time grid display with
  - Contouring
  - Artif cicial sunlight from different angles
  - Seabed ref ectivity
- Fair sheet plots
- Supports colour postscript printers, A4 to A0
- Include high resolution seabed image (sidescan) display
- Helmans and steering display with autopilot interface
- Interfaces different types of speed probes
- Logging of attitude and refraction corrected data
- Logging of raw and sensor data allows full reprocessing

Example of dual Sonar Heads mounted on a retractable hull unit

Technical specifications

System performance

Frequency.....300 kHz
Maximum ping rate.....40 Hz
No. of beams per ping.....127 (single) / 254 (dual)
Beam width..... 1.5 x 1.5 degrees
Beam spacing..... 0.9 degrees
Depth range from Sonar Head ..... 1 to 150 m
Depth resolution.....1 cm
Depth accuracy..... 5 cm RMS
Range sampling rate.....14 kHz

Physical properties

Sonar Head:
- Diameter ..... 332 mm
- Height (500 m depth rating) ..... 119 mm
- Height (1500 m depth rating) ..... 121 mm
(Add 27 mm for connector)
- Weight.....25 kg (15 kg in water)
- Power requirements ..... 24 Vdc, 1A
(provided by the Processing Unit)

Material:..... Titanium and Polyurethane
Processing Unit:
- Height .....178 mm (4U)
- Power requirements .....100 to 240 Vac, 47-63 Hz, 100 W

Interfaces

- Positioning systems (max 3)
- Two attitude sensors (roll, pitch, heave, heading)
- Heading sensor
- Sonar head depth
- Trigger in/out
- Datum heights
- Tide
- Sound speed
- Clock
- Clock synchronization
- Ethernet data output
- Postscript printer and/or plotter

AUV/ROV implementations

A special version of the Processing Unit (AUV-PU) is available for AUV and ROV use.
Physical dimensions:
- Height: ..... 182 mm
- Width: ..... 140 mm
- Length:..... 421 mm

Power requirments: .....+5 Vdc, 7A and +24 Vdc, 1A

Alternative operating software

- QPS "QINSy"
- Coastal Oceanographics "HYPACK Max"

The system is also compatible with software from Triton Elics International, EIVA. and Thales Geosolutions.

Note: Kongsberg Maritime is not responsible for any system malfunction caused by third-party software.

Processing Unit for AUV/ROV

Kongsberg Maritime AS
Strandpromenaden 50
P.O.Box 111
N-3191 Horten,
Norway

Telephone: +47 33 02 38 00
Telefax: +47 33 04 47 53
www.kongsberg.com
E-mail: subsea@kongsberg.com

KONGSBERG

TSS DMS Dyna ic Mo ion Sen or

- Accurate under High Dynamics
- Serial & Analogue Outputs
- 3000m Rated

DESCRIPTION

The TSS DMS2-05 provides accurate vessel motion measurements for motion sensitive equipment such as multibeam echosounders. The DMS2-05 allows total data confidence aboard small vessels in rough sea conditions undertaking tight turns and rapid speed changes. Interfacing to DGPS or gyro information enhances the sensors performance, achieving 0.05 degree pitch and roll accuracy. Real time heave, roll and pitch are available in analogue or digital form and all outputs are configured via a simple operator menu.

SPECIFICATIONS

ea e

Range	+/- 10m
Accuracy	5cm or 5%
Resolution	1cm
Bandwidth	0.05 to 30Hz

Ro Pi c

Range	+/- 30 degrees
Accuracy	+/- 0.05 degrees
Resolution	0.01 degree - digital output
	12 bit - analogue output
Bandwidth	0 to 30Hz

da e Ra e

Digital Update Rate	up to 200 Hz

Analogue Update Rate	up to 500 Hz

In u

Velocity Input Format	NMEA 0183 (VTG & GLL or GGA) or TSIP
Heading Input Format	NMEA 0183 HDT, SGB, Robertson, Sperry LR40/60

P y ica

Power	18 to 36VDC @ 14 watts
Temperature Range	0 to 55 degree C
Depth Rating	3000m
Dimensions	210 x 110mm diameter
Weight in Air	5 Kg
Weight in Water	2 Kg

Sound Velocity Profiler

Model 650

A Self Recording & Direct Reading Sound Velocity Profiler, which combines the proven operation of the 600 Series CTDs with Valeport's new Sound Velocity Sensor to give unsurpassed Speed of Sound measurement.

FEATURES

- True Sound Velocity measurement
- Utilises Valeport's proprietary digital sound speed sensor
- Self Recording and/or Direct Reading
- Ideal for profiling and fixed mooring
- Titanium body
- Fast Response PRT temperature sensor
- Time and depth triggering
- SVLog Windows based operating software
- Programmable sampling regime
- Up to 4Mbyte memory
- Sealed electronics module not exposed during battery changes
- Rated to 5000m
- 3 year warranty

INTRODUCTION

Valeport has a worldwide reputation for manufacturing quality instruments for speed of sound measurement. In the past, this has been done through Conductivity, Temperature and Pressure sensors, with speed of sound generated through industry standard equations applied to these measurements. The latest Digital Signal Processing techniques have now allowed Valeport to develop a true "time of flight" sound velocity sensor, with a data resolution of 0.001m/s, and an accuracy of ±0.05m/s (±0.03m/s rms).

Combining this sensor with the proven functionality of the 600 Series CTDs gives rise to the Model 650 Sound Velocity Profiler - an essential tool for anyone who needs high accuracy, high resolution sound speed data.

APPLICATIONS

- Oceanographic Studies
- Hydrographic Surveys
- Dredging Operations
- Seismic Operations
- Swath Sonar/Echosounder Calibration
- Coastal and Estuary Surveys
- Education
- Marine and Environmental Studies
- Military Applications

VALEPORT

Sound Velocity Profiler

Model 650

DESCRIPTION

Sensors
Sound Velocity: The sound velocity sensor fitted to the Model 650 is a temperature and pressure compensated time of flight sensor, giving high accuracy, high resolution data.

Pressure: The Model 650 uses a strain gauge transducer, accurate to 0.1%FS. The sensor is rated for use to 5000m as standard, with other options available for shallower work.

Temperature: The Model 650 benefits from a very fast response Platinum Resistance Thermometer (PRT) temperature sensor, making it particularly suitable for profiling use, but maintain a high level of accuracy.

Power
The unit uses approximately 75mA at 12v when running, so the 7 x 1.5v "C" cells fitted, giving approximately 7.5Ah, will last for about 100 hours in continuous use. This can be extended by using Burst Mode (e.g. 20 second burst every 10 minutes gives over 100 days life). Alternatively, external power (11.5 to 25vDC) can be used.

Data Acquisition
Scan Rate: 1Hz, 2Hz or 4Hz

Switch On: By flashing LED connector cap in self recording mode, or by power and software control in direct reading mode.

Sample Modes: Time (continuous sampling), Burst (configurable length and frequency), Depth (configurable trigger and increment values).

Data Recording
1Mbyte standard memory, giving up to 174,000 data records (80,000 in depth trigger mode). A separate file is created for each deployment, each containing header information including setup, calibration, and user defined sit information.

A 4Mbyte memory option is also available.

Communication
RS232: Setup and data extraction, and for direct reading to PC over up to 100m cable.

Digital Current Loop: Direct reading to PC over cable lengths up to 6000m (requires additional adaptor).

Software
Valeport's SVLog Windows based software allows full sampling set up, and extraction of recorded data. In addition, it features several display modes for both recorded and real time data, including tabular and graphical formats.

ORDERING

0650001 Model 650 Sound Velocity Profiler with 1Mbyte RAM memory, time of flight sound velocity sensor, fast response PRT temperature sensor, and 0.1% accuracy strain gauge pressure sensor (5000dBar range). Supplied with stainless steel deployment frame, 3m Y lead (unit to PC and power supply), SVLog software, operating manual and transit case.

0650002 4Mbyte memory option.

SPECIFICATION

Parameter	Type	Range	Accuracy	Resolution	Response time
Speed of Sound	Time of flight	1400 to 1600 m/s	± 0.05 m/s (± 0.03 m/s rms)	0.001 m/s	Single pulse. Maximum time of flight is 145µs.
Temperature	Fast response PRT	-5 to +35 °C	± 0.01 °C	0.002 °C	100ms (60ms without guard)
Pressure	Strain Gauge	5000dBar	± 0.1%FS	0.005%FS	20 ms

PHYSICAL SPECIFICATIONS
Body Dimensions: 695mm long x 88mm ∅
Cage Dimensions: 825mm long x 140mm x 120mm

Weight in air (in cage): 12.5kg
Weight in water (in cage): 9kg
Material: Titanium housing, stainless steel frame

Depth Rating: 5000m
Shipping Size: 160mm x 460mm x 1020mm
Shipping Weight: 26kg

Valeport manufactures a wide range of oceanographic and hydrometric instruments including self-recording and direct reading multi-parameter current meters, sound velocity probes, CTD probes, wave recorders, tide gauges, open channel flow meters, water and plankton samplers, winches, sinker weights, connectors and accessories.

VALEPORT

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