FURUNO

MARINE ELECTRONICS CATALOG

2014

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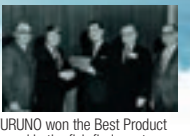
FURUNO World Wide Warranty 2 YEARS

Only one brand delivers the performance & reliability you demand... FURUNO!

Fish finder in the early years. (1948)

In 1950, FURUNO INDUSTRIES, LTD. was established. (1955)

Recording paper type fish finder, which is first export model for US market. (1965)



FURUNO won the Best Product Award in the fish finder category from NMEA. (1972)

1938 FURUNO ELECTRIC SHOKAI LTD. founded in Nagasaki, Japan
1948 Commercialized the world's first practical fish finder
Began manufacturing and selling fish finders
1955 Established FURUNO ELECTRIC CO., LTD.
1958 Started selling overseas (Argentina, Australia, China)
1959 Developed radar for vessels
1961 Developed the world's first net sonde
1965 Developed the world's first net recorder
1972 Received NMEA's fiscal 1971 Best Product Award
1973 Developed autopilot system, satellite positioning equipment and simple radio telephone

Offering the best possible solutions without compromise

For more than 70 years, FURUNO ELECTRIC CO., LTD. has established a heritage of innovating, building electronics that more captains depend on, day in and day out. From the men and women who make a living on the water, to those who simply enjoy the boating lifestyle, FURUNO is a name that is synonymous with quality electronics that you can rely on.

You will find that FURUNO's vast line of equipment offers the ultimate performance while providing intuitive operation, making your navigation experience more enjoyable. Add to that an unrivaled, worldwide sales/service network that can assist you in every corner of the globe. Every product includes a two-year factory parts and labor warranty, your assurance of top quality electronics. That's long-term, long lasting value that no other brand can deliver!

Contents

World's first bird radar was developed. (1986)

CH-300 (2005)

NAVnet 3D (2008)

NAVnet TZtouch (2012)

1980 Developed the world's first current indicator, VideoPlotter and compact facsimile receiver
1986 Developed the world's first bird radar
1987 Developed the world's first video LORAN
2001 Developed NavNet Series
2005 Developed the world's first dual-frequency searchlight sonar
2008 Developed NavNet 3D Series
2012 Developed NavNet TZtouch Series

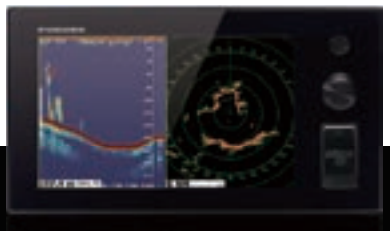
NAVnet 3D TZ Connect
TimeZero
RotoKey
MTC Multi Touch Control
UHD Ultra High Definition
TruEcho CHIRP
FDF FURUNO Digital Filter
BDS Bottom Discrimination Sounder
ACCU-FISH
FPS FURUNO Power-assist Steering
FANTUM FEEDBACK
FFS
AUTO
Target Tracking
AIS
3D CHART
Enhanced Sunlight View
Bonded LCD
Polarized Friendly
BlackBox
GPS Internal antenna
Ethernet Plug&Play
CAN bus
NMEA2000 Certified
NMEA Winner
VIDEO IN/OUT
VIDEO IN
VIDEO OUT
GMDSS

NAVnet TZ touch

Multi Touch Control · Wireless · TimeZero™ · Digital Revolution

Total Control at your fingertips

Today's NavNet has come a long way from the first multi function display. Take one look and you will see just how far. A generous 9" or 14.1" display with edge-to-edge glass makes for a clean and stylish installation. The LED backlighting pushes light through every pixel on the screen for remarkable brightness. Anti-reflective glass coating is visible under any lighting condition. Configure the displays with a wide variety of sensors to build a navigation suite that meets your individual requirements.



9" Multi Function Display

TZT9

Resolution: WVGA (800 x 480 pixels)
Brightness: 900 cd/m^2 (typical)

14.1" Multi Function Display

TZT14

Resolution: WXGA (1280 x 800 pixels)
Brightness: 900 cd/m^2 (typical)

Black Box Multi Function System

TZTBB

Powerful NavNet TZtouch Black Box system - user supplied display

TimeZero Designed by MAXSEA · RotoKey · MTC Multi Touch Control · AUTO · Target Tracking · AIS · 3D CHART · Enhanced Sunlight Viewable · Bonded LCD · Polarized Friendly · Ethernet Plug&Play · CAN bus · VIDEO IN OUT

▸▸▸ *Spec P62*

MULTI TOUCH CONTROL

The World's Most Advanced Multi Touch Navigation Interface

With NavNet TZtouch's high-sensitivity, touch screen interface, total control is at your fingertips. Navigation is simplified by using your fingers to zoom and pan around the chart. As soon as your fingers touch the display, taps, pinches and swipes are instantly transformed into action. You will learn your controls so quickly that you'll be up and running in no time. To make operation even easier while underway, adjustments such as range and gain are easily made from either the on-screen touch menu or our patented RotoKey™.

Multi Touch Control

Furuno elevates marine touch screen technology to an entirely new level with the industry's first multi touch MFD. The use of multi touch technology opens the door to a wide variety of gesture-based commands.

MTC
Multi Touch Control

Touch... and Go Menu Selection

Be more hands-on with our easy-to-understand touch screen interface. You'll have full control of each component connected to the network right at your fingertips.

RotoKey™

NavNet's revolutionary RotoKey™ merges the power and versatility of touch screen control with an easy-to-use rotary knob. One turn of the RotoKey™ gives you instant access to full control of NavNet TZtouch.

RotoKey

Home Key

By simply pressing the Home key, you'll gain immediate access to your carousel of customized display configurations. The Home screen is where you can find, select, and custom build the presentation modes you want to display.

Wireless

Get Connected With Our Wirelss Interface

Engineered to utilize the latest technology, NavNet TZtouch opens the door to cutting edge WiFi features, such as tablet and smartphone apps, points of interest (POI), real time weather data, software updates and more.

Visit the Apple App Store to download these FREE apps to view and control NavNet TZtouch.

NavNet Remote App

Take full control of your NavNet in a whole new way. The TZtouch Remote app allows you to operate your system remotely with an iPad via WiFi when connected to the network.

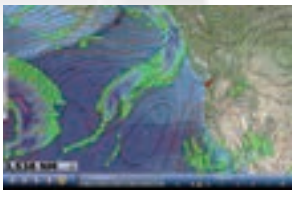
NavNet Viewer App

Conveniently view information shared wirelessly by the NavNet TZtouch network on your Apple mobile products*. One of the features allows you to flick through instrument pages to view key navigational information, such as Depth, Temp, Wind, COG and much more.

*Other mobile platforms to be supported in the future

Marine Weather Forecast

The weather tool is completely FREE and easy to use, giving you unlimited access to worldwide weather forecasts 24 hours a day provided by NavCenter. Select geographic coverage, data type and period of time, then choose how to receive the file. NavNet TZtouch displays up to 16 days of weather forecasting.



TimeZero™

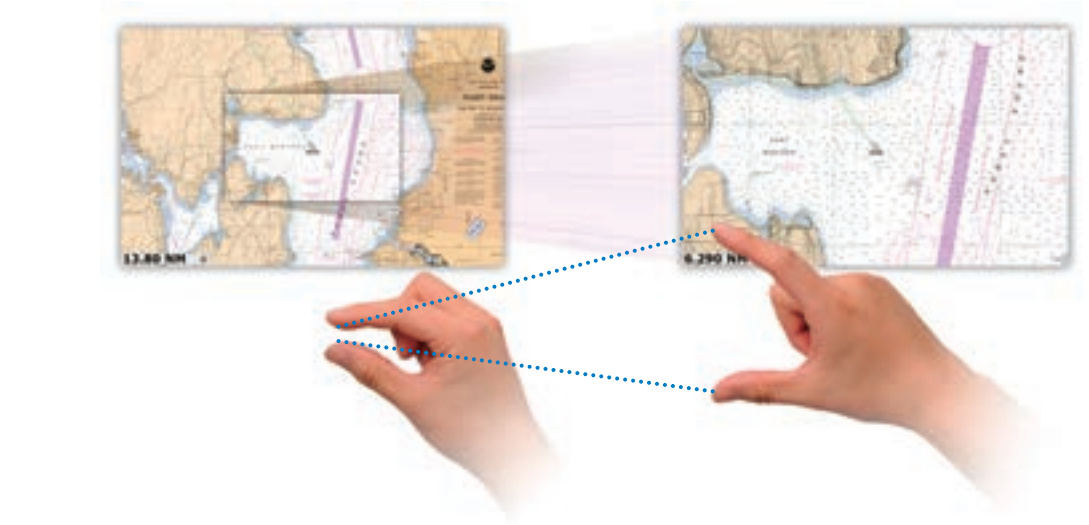
Nothing Is Faster Than TimeZero™

NavNet TZtouch's TimeZero™ technology delivers chart processing like you've never seen before – seamless chart handling allows you to zoom and pan without the screen disappearing. TimeZero™ technology redefines stress-free operation by smoothing out your charting experience.

TimeZero
Designed by MAXSEA

The Only Acceptable Wait Time is Zero: TimeZero™ Technology Changes Your Perspective on Chart Redraw

Equipped with powerful TimeZero™ technology, NavNet TZtouch will completely transform the way you navigate. You can scroll, pan, zoom in/out with a smooth, fast and seamless graphics engine. Navigating in a fully 3D environment offers you a true perspective and wider area of view around the ship, which allows you to better plan your routes, while TimeZero technology updates the information on your screen with virtually no redraw.



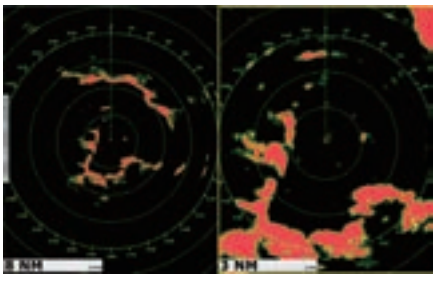
DIGITAL REVOLUTION

FURUNO's NavNet TZtouch Digital Solution sets a new standard

NavNet TZtouch operates on a fully digitized environment with its highly sensitive digital sensors for Radar and Fish Finder. The operating structure is also digitized, delivering total fusion of hardware and software modules in its operation scheme, utilizing Ethernet, NMEA0183 and CAN bus interface.

Ultra High Definition (UHD™) Digital Radar

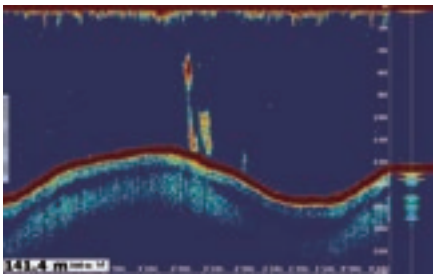
FURUNO has taken its NMEA award-winning Radar technology to the next level with Ultra High Definition Digital Radar. UHD™ offers crystal clear target presentation with automatic real-time digital signal processing. Antenna rotation speed (24/36/48 rpm) is automatically shifted to the appropriate pulse length. Commercial-grade Radar performance is now available in the ultimate MFD navigation suite.



UHD
Ultra High Definition

FURUNO Digital Filter (FDF™) Fish Finder

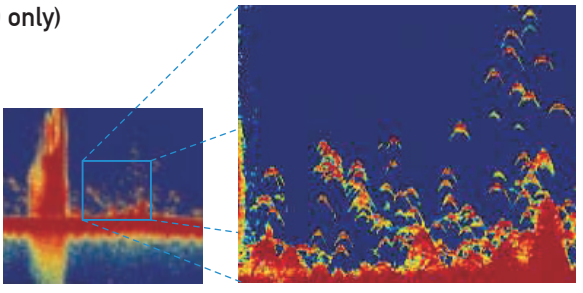
FURUNO Digital Filter (FDF™) Fish Finders feature advanced filtering capabilities and digital auto tuning, which eliminates noise, while delivering the ability to spot individual fish with clarity, accuracy and detail. Whether it is used for shallow or deep water, FURUNO FDF™ Fish Finders give you what you would expect from a Fish Finder at all times.



FDF
FURUNO Digital Filter

TruEcho CHIRP™ Fish FInder (with DFF1-UHD only)

An advanced technology for professional and sport fisherman. Designed to operate over a broadband range of frequencies utilizing a broadband transducer, the TruEcho CHIRP™ network sounder DFF1-UHD delivers significant advancements in signal clarity and target definition. The clear presentation of the sounder marks individual game fish and bait fish, even when tightly schooled together.

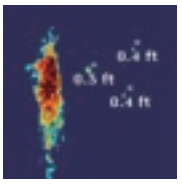


TruEcho
CHIRP

ACCU-FISH™ (Fish Size Analyzer)

FURUNO's award winning network Fish Finders (DFF1/DFF3/BBDS1/DFF1-UHD) offer a unique fish size analyzer function, ACCU-FISH™.

The ACCU-FISH™ algorithm analyzes echo returns to compute individual fish size, which it displays on screen.



ACCU-FISH

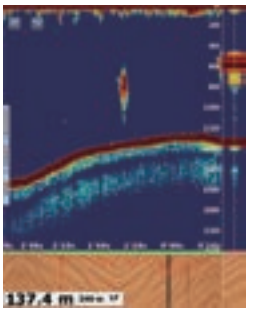
In some instances, fish size indicated on NavNet TZtouch may differ from its actual size. Please carefully read the operator's manual prior to utilizing this feature.

*ACCU-FISH™ is capable of detecting individual fish from 2 m down to 100 m and computing the size of those fish from 10 cm to 199 cm.

Bottom Discrimination (BBDS1/DFF1-UHD only)*

Utilizing input from the new BBDS1 Network Fish Finder, the bottom composition will be shown in the following four categories; "Rocks", "Gravel", "Sand" and "Mud", either in dedicated graphics or colors. This information is helpful in locating rich fishing grounds based on bottom type.

▸▸▸ *Spec P81*



BDS
Bottom Discrimination Sounder

Adding a New Dimension to 3D

The world of onboard navigation systems has evolved. Never before has so much information been available to you to improve and enhance your boating experience. FURUNO's dedication to deliver the most intuitive, integrated navigation solution has led to the launch of NavNet 3D.

Are you wondering if navigating in 3D is really practical? We've not only made it practical, we've made it easy! In fact, once you start navigating in 3D, you'll wonder how you ever made your way without it.

8.4" Multi Function Display
12.1" Multi Function Display
MFDBB (Black Box)

12.1" COLOR LCD
MULTI FUNCTION DISPLAY
MFD12

2008/2009/2010/2011

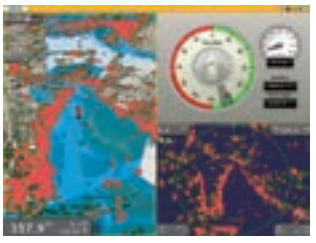
8.4" COLOR LCD
MULTI FUNCTION DISPLAY
MFD8

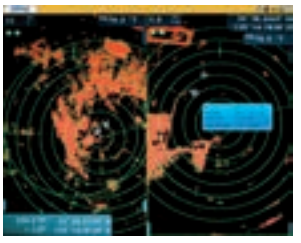
TimeZero Designed by MAXSEA
RotoKey
AUTO
Target Tracking
AIS
3D CHART
Enhanced Sunlight Viewable
Bonded LCD
Polarized Friendly
Ethernet Plug&Play
CAN bus
NMEA2000 Certified
VIDEO IN OUT

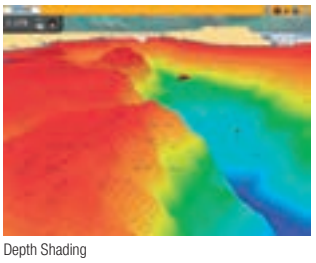
▸▸▸ *Spec P63*

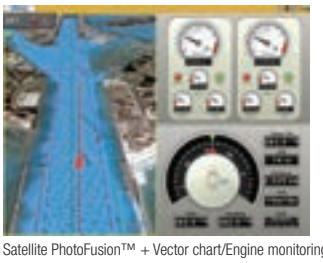
- True 3D chart architecture
- TimeZero™ technology for seamless chart redraw, zooming and chart handling with no lag time
- Easy-to-use RotoKey™ interface
- Unlimited range scales for zooming
- Dedicated 3D key allows you to easily toggle between 2D & 3D
- More than 10,000 ship's track points and over 2,000 waypoints
- 200 planned routes, with up to 100 waypoints/route
- True color depth shading utilizing bathymetric data
- Preloaded tides & currents
- Standard video input and output
- Alternating video & data boxes
- Engine Monitoring
- AIS target tracking when connected to an AIS receiver
- Supports NMEA2000 & NMEA0183
- Wide variety of other options such as Digital Radar, Fish Finder, Instruments, Autopilot, Fax, etc.


Satellite PhotoFusion™ + Raster chart/3D


Satellite PhotoFusion™ + Radar-Vector chart overlay/ Radar/Wind


Dual-range Radar with TT target


Depth Shading


Satellite PhotoFusion™ + Vector chart/Engine monitoring


Radar/Raster chart/Video

Photo: NavNet 3D BB with the MU190HD

MULTI FUNCTION DISPLAY
BLACK BOX

MFDBB

TimeZero Designed by MAXSEA · RotoKey · AUTO · Target Tracking · AIS · 3D CHART · Enhanced Sunlight Viewable · Ethernet Plug&Play · CAN bus · NMEA2000 Certified · VIDEO IN OUT

NavNet 3D Display Options

	Screen Size and Resolution	Brightness	NMEA0183 in/out	CAN bus/ NMEA2000	Ethernet (100 BASE-TX)	USB	Video IN (NTSC/PAL)	SD Card Slot	Audio IN/OUT
MFD8	8.4" LCD VGA (640 x 480) Video Out Resolution: VGA	700 cd/m^2	3 x in/out ports	1 port	1 port	1 x USB 1.1	2 inputs	2 slots	1 output
MFD12	12.1" LCD SVGA (800 x 600) Video Out Resolution: SVGA	1100 cd/m^2	3 x in/out ports	1 port	1 port	1 x USB 1.1	2 inputs	2 slots	1 output
MFDBB	Owner-supplied Display		3 x in/out ports	1 port	4 ports hub included	2 x USB 2.0	4 inputs	2 slots in a control unit	1 output

Easy Flush Mount Installation

MFD8 and MFD12 display options attach to the mounting console with bolts from the front side.

Black Box Configuration

NavNet 3D's Black Box configuration combines the power of the MFDBB processor with the flexibility to utilize almost any display. Choose from FURUNO's line of 15"/19" Marine Monitors or other third party displays.

Marine Monitor
MU150HD/MU190HD

+

MFDBB Processor

MFDBB Keyboard MCU001

Combine FURUNO's Marine Display MU Series with MFDBB Processor and Keyboard to configure the NavNet 3D Black Box system

CHART PLOTTER

The Most Amazing Chart Plotter You've Ever Seen

By incorporating our TimeZero™ technology, we have created a chart plotter with blazing speed. The most amazing feature is the utilization of native 3D charting architecture, showing the exact position of your vessel in a wide variety of chart presentation formats. Incorporating a dedicated high-speed processor and powerful graphic engine, NavNet 3D delivers an unprecedented level of performance and utility by seamlessly integrating diverse, essential navigational data.

TimeZero
Designed by MAXSEA

Navigate in True 3D

NavNet 3D incorporates "native 3D chart architecture" that allows for a full time 3-dimensional presentation, as opposed to 2D charts that require special effects to appear 3-dimensional. With NavNet 3D's true 3D environment, you can see all of the information you want with no limitations.

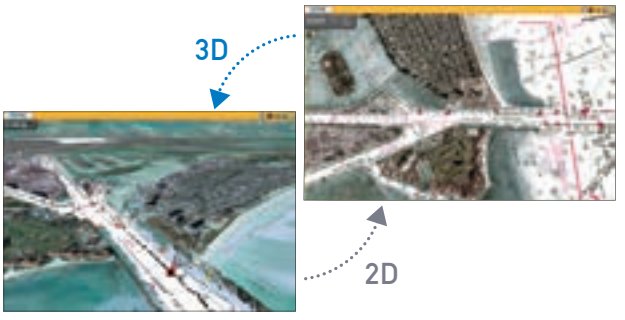
Plan your routes and enter points directly on your raster or vector native 3D charts, overlay a variety of data with a touch of the RotoKey™, such as Radar overlay, AIS and TT targets or all of your chart symbols and depth soundings. Any and all of your information can be displayed at will.

3D Raster

3D Vector

3D Key

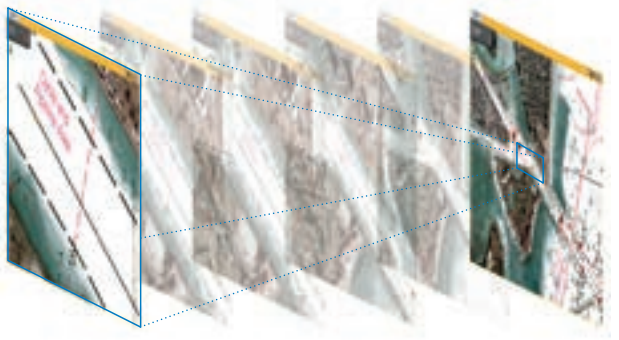
Even though the charts are always operating in their native 3D environment, one long press of the 3D key will toggle the chart from 3D to a familiar 2D, top-down perspective and vice versa.



Bathymetric data is needed to display underwater presentation in 3D.

Chart scaling without limitation

This completely new system design allows you to zoom seamlessly and continuously to whatever chart scale you desire. Instead of limiting you to a small handful of chart scales to choose from, like traditional chart plotters, TimeZero™ architecture allows you to zoom in or out to the exact magnification level you like without steps or limitations.

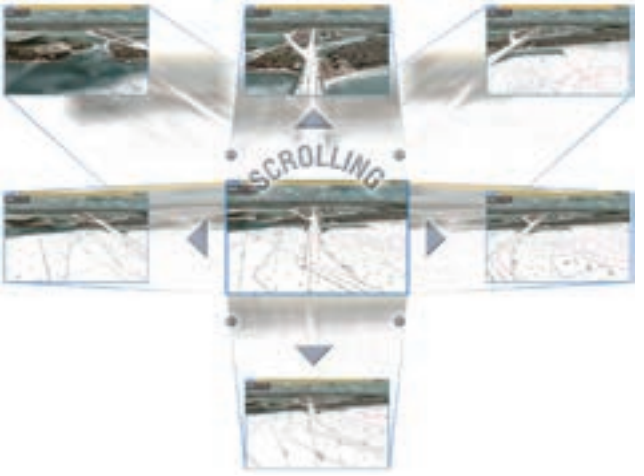


Smooth scaling delivers any range scale you desire.

Easy chart panning gives you the freedom to explore

You can pan the chart freely by simply pressing the scrolling pad. This gives you the freedom to explore the chart, allowing you to focus on a specific area ahead of or around your vessel with greater intensity, without losing track of your position on the chart.

Explore the chart data at your leisure, then instantly return to own ship at the touch of a single dedicated button. TimeZero™ technology provides a useful utility for focusing on a specific direction, such as the area ahead of your vessel.



CARTOGRAPHY

MapMedia Vector and Raster Chart Library

NavNet 3D provides users the ability to choose from pre-loaded official NOAA raster and vector charts, or optional "C-MAP by Jeppesen"** and "Datacore by Navionics" vector cartography.
MapMedia brings an authentic vector and raster chart library for the areas you sail. MapMedia cartography integrates cutting edge data analytic algorithms with high resolution image processing techniques to deliver a fusion of digital navigation charts and satellite photography. This ensures absolute clarity and detail when displayed by NavNet 3D.

www.MapMedia.com

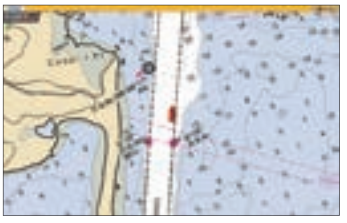
MapMedia Raster*

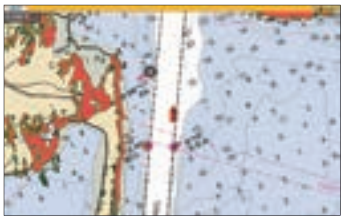
MapMedia raster charts are digitized official paper charts, issued by hydrographic offices. NavNet 3D brings highly reliable, professional hydrographic cartography to the recreational sailor. A high-resolution scan has been applied to MapMedia raster charts so that quality will not deteriorate even when the chart is viewed in close-up.

MapMedia Vector*

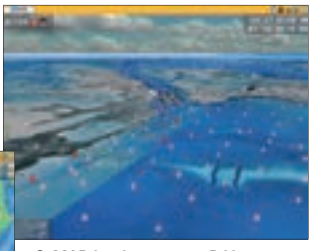
Vector charts contain a huge volume of data in different layers, each of which can be selectively displayed. As you zoom into the chart, increasing levels of detail can be obtained without any sacrifice in image resolution.

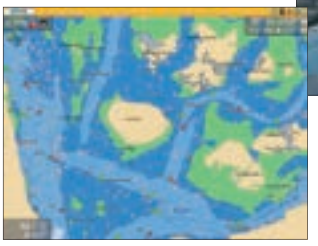
*Availability of vector and raster cartography depends on the area. Please contact your local Furuno dealer for details.


MapMedia Rastar


Radar-Chart overlay


MapMedia Vector


C-MAP by Jeppesen 3D Vector + Satellite PhotoFusion™


C-MAP by Jeppesen 2D Vector

Optional "C-MAP by Jeppesen" vector cartography**

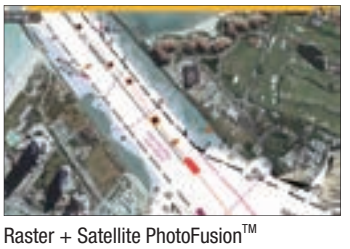
NavNet 3D now offers three different sources of vector chart options with the addition of C-MAP by Jeppesen. Optional "C-MAP by Jeppesen" vector cartography** delivers a wealth of important chart detail for navigation, including spot soundings and depth contours.

** A software update (v2.05) is necessary to use the new "C-MAP by Jeppesen" charts, which are available for download at Furuno's web site (www.FurunoUSA.com).

Satellite PhotoFusion™

Satellite photography is included in the MapMedia Raster and Vector charts, Satellite PhotoFusion™ within the charts is a feature available only with FURUNO's NavNet 3D and NavNet TZtouch. Land areas (zero depth) are completely opaque, so that these areas are displayed as satellite photos on the chart. As the depth increases, the satellite image is merged with the chart data to provide you, the user, with added detail on seabed areas in shallow water without losing vital chart information. In deeper water where the satellite image has no detail to offer, the chart is displayed without alteration. This ensures that navigational integrity is not only maintained but enhanced where it is most needed in areas where grounding might be a risk.


Vector + Satellite PhotoFusion™

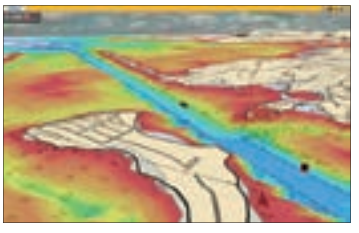

Raster + Satellite PhotoFusion™

You can save the following marks and points in the NavNet 3D internal memory:

- Up to 10,000 ship's track points;
- Up to 2,000 points and
- 200 planned routes, within which up to 100 waypoints can be placed.

Depth Shading

A depth color scale can be applied to both 2D and 3D vector and raster charts. Transparency levels can be adjusted so that the chart data is visible beneath the color shading. This unique feature allows you to view water depths at-a-glance with vibrant colors. No more searching for depth numbers, when you can simply set depths to your specified colors. Whether you want to see the depth for navigation or fishing purposes, this new feature makes it easier than ever.


Bathymetric data is needed to display underwater presentation in 3D.

NavNet series
NETWORK / PRODUCTS LINEUP

NAVnet 3D/TZ touch Connect

NAVnet 3D

Ethernet

Radar

ARPA Radar
FAR21x7-BB Series

Radar Sensors

Fish Finder

Network Fish Finder
DFF1/DFF3

TruEcho CHIRP Sounder
DFF1-UHD

Bottom Discrimination Sounder
BBDS1

Color LCD Sounder
FCV1150

AIS

AIS Receiver
FA30

Class-B AIS Transponder
FA50

All the NavNet Radar sensors incorporate a CAN bus port to which certain CAN bus/NMEA2000 sensors can be directly connected. Power for these networked sensors is supplied directly from the Radar itself. This unique feature allows for flexible installation of multiple CAN bus/NMEA2000 sensors without the need to run cables all the way to the main processor unit. CAN bus/NMEA2000 data is converted and distributed throughout the NavNet Ethernet network.

CAN bus*

GPS

GPS/WAAS
Receiver Antenna
GP330B

INSTRUMENTS

FI50 Series

GPS

GPS/WAAS Antenna
BBWGPS

Weather Station
200WX

GPS

GPS Navigator
GP33

NMEA0183

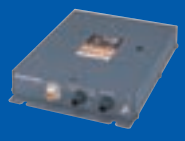
AIS

U-AIS Transponder
FA150

NavNet series are built on an Ethernet network, allowing you to add as few or as many components as you desire along with up to ten displays, to create your perfect navigational suite. Further, you can connect NMEA0183* and CAN bus (NMEA2000) devices to any display or BB processor* and share that information across the Ethernet network automatically. Point and Route data can also be transferred by using SD cards between NavNet TZtouch and NavNet 3D. The NavNet system is built upon the most advanced chart plotter technology.

* NavNet 3D Only.

WEATHER FAX



Network Weather Facsimile Receiver FAX30

PC

MAXSEA TimeZero Explorer PC Software

CAMERA

IP Camera

Ethernet

COMPASS

Integrated Heading Sensor PG700

SENSORS

Depth/Speed/Temp Sensor DST800

CAN bus*

AUTOPILOT

NAVpilot 700 Series

Satellite Compass SC30

Satellite Compass SC50/110

Integrated Heading Sensor PG500R

REMOTE DISPLAY

Remote Display RD33

NMEA0183

NMEA Data Converter IF-NMEA2K2

NMEA0183 to CAN bus converter available

The optional IF-NMEA2K2* converts NMEA0183 sentences to FURUNO CAN bus PGNs, enabling conventional NMEA0183 navigation devices to be incorporated into the NavNet TZtouch network.

*All CAN bus devices can be incorporated into the NMEA2000 network.

UHD™ DIGITAL Radar

UHD
Ultra High Definition

Radar Sensors

▸▸▸ *Spec 66-67*

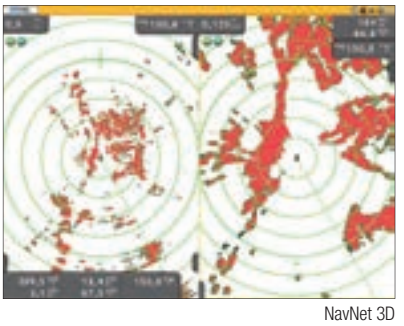
Ethernet Plug&Play
NMEA
2008/2009/2010/2011

Ultra High Definition (UHD™) Digital Radar for NavNet TZtouch & NavNet 3D

FURUNO has taken its NMEA award-winning Radar technology to the next level with Ultra High Definition Digital Radar. UHD™ offers crystal clear target presentation with automatic real-time digital signal processing. Antenna rotation speed (24/36/48 rpm) shifted according to pulse length needed for optimal performance. Commercial-grade Radar performance is now available in the ultimate MFD navigation suite.

Real-Time Dual Range Radar Presentation with Dual Progressive Scan

NavNet 3D and TZtouch's simultaneous scanning technology allows dual progressive scan to display and update two Radar pictures, both long and short range, at the same time as opposed to alternate update methods of typical conventional dual range Radar. Autonomous control over gain and anti-clutter can be performed on each Radar presentation. This can be used to have one screen with the gain set to locate birds and buoys, while you use the other Radar screen to navigate.



NavNet 3D

NavNet TZtouch/3D Radar Sensor Options

		DRS2D	DRS4D	DRS4A	DRS6A	DRS12A	DRS25A
Output Power		2.2 kW	4 kW	4 kW	6 kW	12 kW	25 kW
Size		19 inch	24 inch	3.5 ft	4 ft	4 ft/6 ft	4 ft/6 ft
Antenna Type		Radome	Radome	Open	Open	Open	Open
Beam Width	Horizontal	5.2°	4.0°	2.3°	1.9°	1.9°/1.4°	1.9°/1.4°
	Vertical	25°	25°	22°	22°	22°/22°	22°/22°
Max. Range		24 nm	36 nm	48 nm	64 nm	72 nm	96 nm
48 rpm Capability		●	●	●	●	●	●
Power Amp Unit	NavNet TZtouch (TZT9/TZT14)	PSU-017	PSU-017	PSU-012	PSU-012	PSU-012	PSU-013
	NavNet 3D (MFD8)	—	—	PSU-012	PSU-012	PSU-012	PSU-013
	NavNet 3D (MFD12)	—	—	—	—	PSU-012	PSU-013

The Radar antenna complies with IEC62252 Ed.1:2004 (Clauses 4.33, 5.33, Annex D) relevant to radio characteristic.

Radar-Chart Overlay

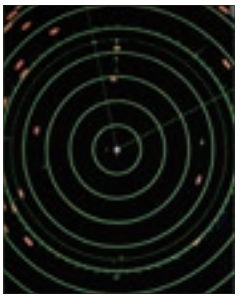
A Radar image of spot-on accuracy can be overlaid onto a chart screen. Not only is it done with the conventional 2D chart format, but also it can be projected onto a 3D chart presentation. Radar range scales in the Radar chart overlay entirely depend on the range scales in the chart presentation, allowing you to view the Radar image on the chart information in whatever magnification level you desire.
(An appropriate heading sensor is required.)

NavNet TZtouch

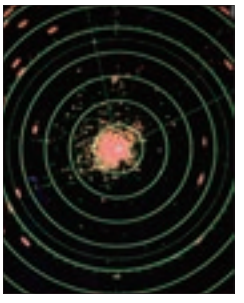
Real-time Digital Auto Gain/Sea Clutter Controls

NavNet employs revolutionary real-time digital auto Gain/Sea controls to deliver crystal clear Radar presentation. With this new technical application, NavNet computes and applies an adaptive omni-directional anti-clutter filter with variable intensity depending on bearing.

Auto Gain/Sea Controls On



Auto Gain/Sea Controls Off

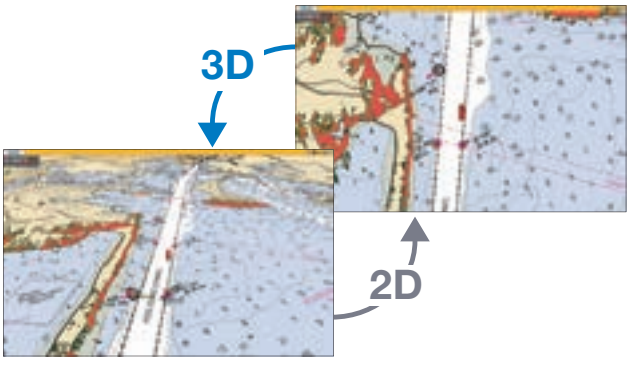


NavNet TZtouch

UHD™ Digital Radar Features

- Digital Signal Processing enhances short and long range target detection
- Advanced side lobe reduction technology
- Real-time true dual range Radar with independent/automatic clutter controls
- Enhanced auto gain, anti-clutter controls and auto tuning
- 48 rpm antenna rotation speed for close range and river environments
- Adaptive antenna rotation speed according to pulse length
- Spot-on Radar overlay on both 2D/3D chart presentations*
- True echo trail shows an afterglow of moving Radar targets*
- Built-in TT processor can simultaneously acquire and track up to 30 targets*
- AIS overlay "AIS-over-Radar" presentation for precise vessel tracking*
- True color Radar shows density of targets
- Radar Guard Zone and Watchman features alert you to potential danger
- Dual VRM (Variable Range Markers) and dual EBL (Electronic Bearing Lines) give distance and bearing indications
- Built-in CAN bus port provides external sensor input directly to Radar sensor

* Appropriate sensor required



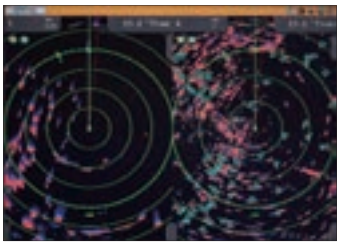
NavNet 3D

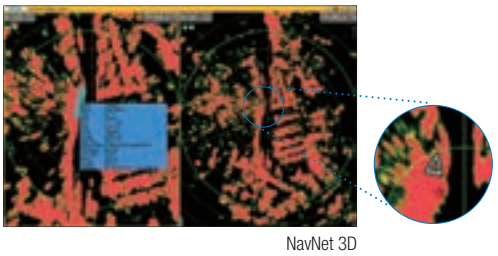
AIS (Automatic Identification System)

AIS Target Tracking

When a FURUNO AIS FA30/50/150 is interfaced with NavNet, the AIS information is integrated into the NavNet network to facilitate enhanced monitoring of the surrounding area from any station. Up to 100 AIS targets can be tracked and displayed with five different symbols to indicate their status on your Radar or Chart Plotter screen. Detailed information about a specific target can be viewed in a pop-up AIS data window when you select the target with the cursor.

AIS Display


NavNet 3D


NavNet 3D

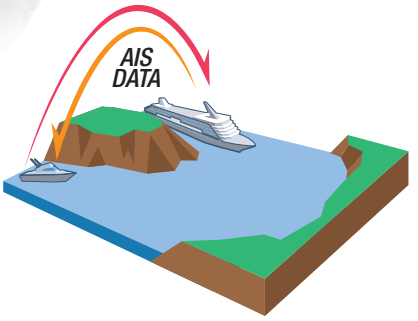

FA150 ▸▸▸ Spec P92


FA30/50 ▸▸▸ Spec P92

What is AIS?

The Automatic Identification System (AIS) improves the safety level of boating by exchanging information about the status of your ship with other AIS-equipped vessels nearby.
The system utilizes VHF broadcasts to handle information about the surrounding area, such as other craft and buoys and other aids-to-navigation.

The AIS data includes target position, course and speed over ground, allowing you to foresee the course changes of particular targets. AIS targets are constantly visible even when they are shrouded in fog or darkness, or hidden behind headlands, river bends or other obstructions.



FDF™ DIGITAL Fish Finder

BLACK BOX
NETWORK Fish Finder
DFF1

BLACK BOX
NETWORK Fish Finder
DFF3

NEW

BLACK BOX
NETWORK TruEcho CHIRP Fish Finder
DFF1-UHD

DFF1-UHD only

*DFF3 only

*DFF1 only

2008

BLACK BOX
BOTTOM DISCRIMINATION SOUNDER
BBDS1

▸▸▸ *Spec P81*

	DFF1	BBDS1	DFF3	DFF1-UHD
Frequency	Dual frequency 50 kHz and 200 kHz		The synthesized transducer works with dual frequencies between 28 and 200 kHz	Dual Frequency Broadband CHIRP 50 kHz +/- 20 kHz, 200 kHz +/- 25 kHz
Output Power	600 W/1 kW		1/2/3 kW	
Range Scale	8 basic range scales customized up to 1,200 m		8 basic range scales customized up to 1,500 m	8 basic range scales customized up to 1,200 m
ACCU-FISH	Available			
Bottom Discrimination	N/A	Available	N/A	Available

FURUNO Digital Filter (FDF™) Fish Finder

FDF
FURUNO Digital Filter

FURUNO's DFF1, DFF3, BBDS1and new DFF1-UHD feature FURUNO's Digital Filter (FDF™) technology. These digital Network Sounders can turn any NavNet display into a powerful, dual frequency digital Fish Finder.

The main difference between digital and conventional Fish Finders lies in the filtering capabilities and auto adjustments. Our award winning FDF™ technology helps to optimally adjust gain, STC (Clutter) and output power as well as suppress surface clutter. It also makes the picture clearer and easier to decipher.

However, even the best digital filter won't help unless you start with a solid basis, such as FURUNO's renowned Fish Finder technology, which has made FURUNO the best friend of professional fishermen for years.

- Enhanced detection of fish echo by FURUNO Digital Filter (FDF™) Fish Finder technology
- Selectable display modes include High or Low Frequency, Dual Frequency, Zoom, Nav Data, A-Scope, Marker Zoom, Bottom Zoom or Bottom-Lock
- FURUNO Free Synthesizer transceiver to let you choose any two operating frequencies from 28 to 200 kHz (DFF3 only)
- Audio and visual alarms alert you whenever preset limits are met for water depth, water temperature and fish echoes
- Two selectable automatic gain control modes: Cruising and Fishing modes to match your boating purposes
- New Bottom Discrimination Display mode available (BBDS1 and DFF1-UHD only)
- IP address is automatically assigned for Plug and Play installation
- Sweep across 90 frequencies utilizing CHIRP transducer (DFF1-UHD only)
- 1,000 times greater sound energy transmitted compared to traditional sounder (DFF1-UHD only)

FURUNO Free Synthesizer (FFS) transceiver on the DFF3 allows you to choose any two frequencies from 28 to 200 kHz

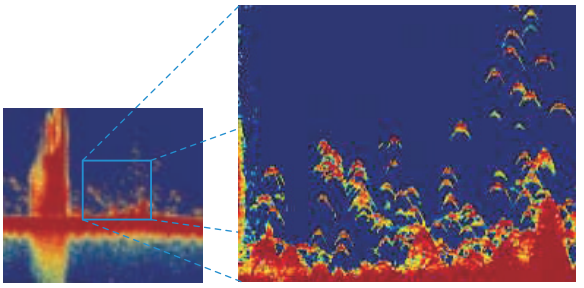
FFS

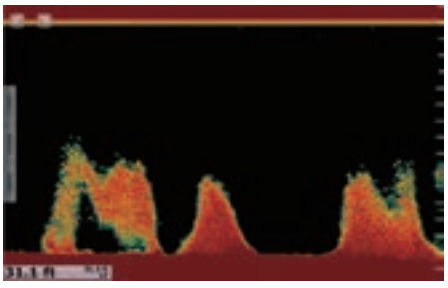
FURUNO's Free Synthesizer (FFS), a feature developed for the professional Fish Finder FCV1200L, is utilized for the DFF3 transceiver. FFS allows you to operate a Fish Finder in any of the two operating frequencies from 28 to 200 kHz without using a matching box. The FFS gives you the freedom to choose your operating frequencies for more productive fishing. Output power of the DFF3 can also be selected among 1, 2 and 3 kW to suit a variety of situations.

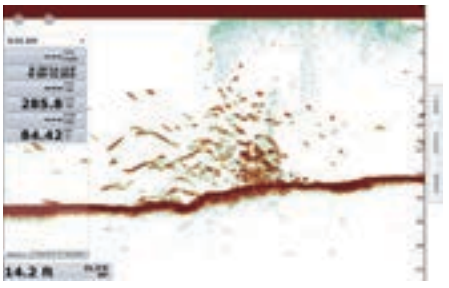
TruEcho CHIRP™ Fish Finder (DFF1-UHD only)

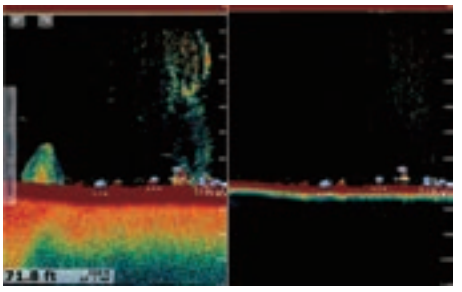
TruEcho CHIRP

An advanced technology for professional and sport fisherman. Designed to operate over a broadband range of frequencies utilizing a broadband transducer, the TruEcho CHIRP™ network sounder DFF1-UHD delivers significant advancements in signal clarity and target definition. The clear presentation of the sounder marks individual game fish and bait fish, even when tightly schooled together.









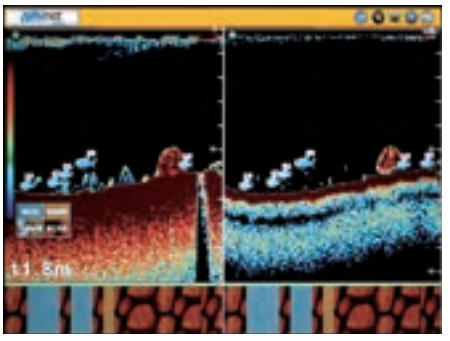
ACCU-FISH™ (Fish Size Analyzer)

ACCU-FISH

FURUNO's award winning network Fish Finders (DFF1/DFF3/DFF1-UHD/BBDS1) offer a unique fish size analyzer function, ACCU-FISH™.

The ACCU-FISH™ algorithm analyzes echo returns to compute individual fish size and show it on the screen.

In some instances, fish size indicated may differ from its actual size. Please carefully read the operator's manual prior to utilizing this feature.
*ACCU-FISH™ is capable of detecting individual fish at the depth of 2 m down to 100 m and computing the fish size of those ranging from 10 cm to 199 cm.



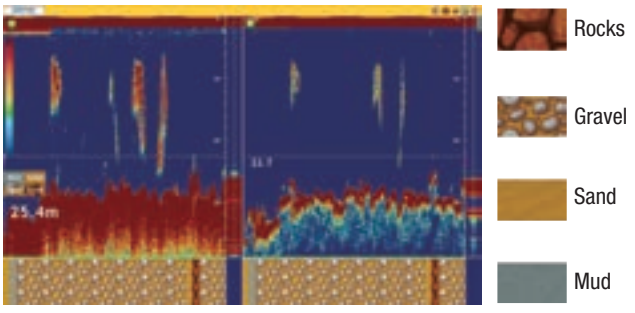
NavNet 3D

Bottom Discrimination Display

BDS
Bottom Discrimination Sounder

With the new BBDS1, NavNet 3D and TZtouch can show the bottom discrimination information from the depth sounder echogram. Bottom discrimination can be displayed in four categories. "Rocks", "Gravel", "Sand" and "Mud", in either easy to read graphics or color display modes.

The bottom discrimination function provides you with valuable information to help you locate rich fishing grounds and boost the day's catch. There are two bottom discrimination diaplay modes selectable:



Graphic mode
The standard graphic display mode shows the most probable bottom composition by graphic or four colors.

Please keep the following in mind when using the Bottom Discrimination Sounder:
1) Use at a depth of 5 m - 100 m.
2) Use approved transducer in transom mount or thru-hull mount.
3) To show a consistent display of the actual bottom, set the range display of the Fish Finder screen to "auto".
4) Enter the ship's draft value
5) Use a ship speed of 10 kn or less.
6) In some instances, bottom component indicated on the display may carefully differ from its actual bottom structure.

Network integration with NavNet TZtouch/3D

12.1" COLOR LCD SOUNDER
FCV1150

NAVnet 3D TZtouch Connect | FDF FURUNO Digital Filter | ACCU-FISH | FFS | AUTO | Enhanced Sunlight Viewable | Bonded LCD

	FCV1150
Frequency	Dual-frequency from 28-200 kHz
Output Power	1/2/3 kW
Range Scale	5-3,000 m (6-9,800 ft) split range available
ACCU-FISH	Available*
Bottom Discrimination	N/A

*Available when 50/200-1T transducer is connected.

▸▸▸ *Spec P80*

CAN bus/NMEA2000 SENSORS

Weather Station

▸▸▸ Spec P65

CAN bus | NMEA2000 Certified

Weather Station

Weather Station informs you of instantaneous changes in weather. The information you can obtain includes: true and apparent wind direction and speed, air temperature, barometric pressure, GPS, and others. It supports the CAN bus interface, allowing for simplified integration into the NavNet 3D/TZtouch network.

GP330B

▸▸▸ Spec P65

CAN bus | NMEA2000 Certified

GPS sensor GP330B

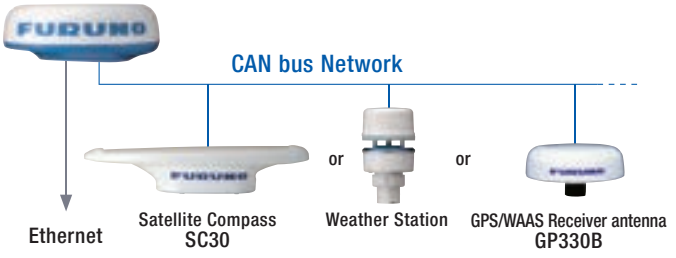
The GPS/WAAS receiver antenna, GP330B, compiles a variety of data ranging from L/L, Ship's speed, COG, Date and Time.
The data can be output in both NMEA0183 and CAN bus formats. Its processor module is incorporated into the compact sensor so that installation can be done simply by plugging the unit in the CAN bus network.

What is CAN bus?

CAN bus is a communication protocol that shares multiple data and signals through a single backbone cable. You can simply connect any CAN bus devices onto the backbone cable to expand your network onboard. With CAN bus, IDs are assigned to all the devices, and the status of each sensor in the network can be detected.
All the CAN bus devices can be incorporated into the NMEA2000 network.

FURUNO CAN bus network*

The NavNet 3D and TZtouch Radar sensor incorporates a CAN bus port to which FURUNO's CAN bus sensors such as the Weather Station, the GP330B GPS Sensor and the SC30 Satellite Compass can be directly connected. Power for these networked CAN bus sensors is supplied from the CAN bus. This unique feature allows for flexible installation of multiple CAN bus sensors without the need to run cables all the way to the main processor unit. CAN bus data can be converted and distributed throughout the Ethernet network.



*Third-party CAN bus/NMEA2000 sensors cannot be networked.

Instruments
FI50 Series

CAN bus

▸▸▸ Spec P86

The FURUNO FI50 series are designed to match the NavNet 3D series and other navigation equipment. The "Plug and Play" system utilizes CAN bus interface protocol, which gives the system exceptional interface ability.

Autopilot
NAVpilot 700 Series

CAN bus | NMEA2000 Certified

▸▸▸ Spec P84

When the NAVpilot is added onto the NavNet 3D/TZtouch network, you can set the destination and course to steer on the plotter mode, and transfer the course information to the NAVpilot. The NAVpilot will do the rest, steering your craft automatically to the destination.

GPS Navigator
GP33

CAN bus

▸▸▸ Spec P76

The GP33 is a GPS navigator with 4.3" "Sunlight Viewable" color LCD. It displays a variety of "easy-to read" navigation data both graphically and alphanumerically. The GP33 can easily be integrated into the existing onboard network, because it supports both NMEA0183 and CAN bus interface.

Remote Display
RD33

CAN bus

▸▸▸ Spec P89

FURUNO's Remote Display RD33 is now modernized, while retaining the fame it enjoys, "easy to install", "flexible presentation options available" and much more. The RD33 Remote Display comes with a 4.3" "Sunlight Viewable" color LCD that boosts legibility and visibility of necessary navigation data. The RD33 can easily be integrated into the existing onboard network, because it also supports both NMEA0183 and CAN bus interface.

Satellite Compass
SC30

CAN bus | NMEA2000 Certified

▸▸▸ Spec P90

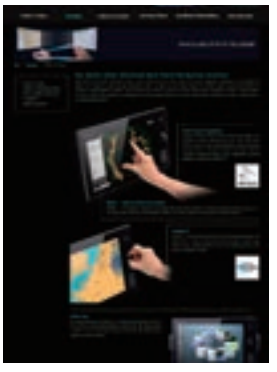
Unstable Fish Finder presentation caused by vessel's heaving motion will no longer be an issue. FURUNO's Satellite Compass SC30/50/110 detects your craft's heaving motion and transfers the data to the networked Fish Finder.

The network Fish Finder will then correct the echo distortion to deliver a stable underwater presentation to your network.

WWW.NAVNET.COM

Whenever you require any information about NavNet TZtouch and NavNet 3D, just visit our web site (www.navnet.com), solely dedicated to current and prospective users of NavNet series. At NavNet.com, you can access the contents with in-depth product information from various angles, including demonstration videos, introduction to the product, product specifications, training video, user interviews, and much more!





Radar/CHART PLOTTER

10.4" COLOR LCD Radar/CHART PLOTTER

2005/2006

	Radar Range Scales	Output Power	Antenna Type
MODEL 1824C/NT	0.125-24 nm	2.2 kW	18" Radome
MODEL 1834C/NT	0.125-36 nm	4 kW	24" Radome
MODEL 1934C/NT	0.125-48 nm	4 kW	3.5' Open Array
MODEL 1944C/NT	0.125-64 nm	6 kW	4' Open Array

▸▸▸ *Spec P68*

Echo Trail

Radar Overlay

C-MAP NT MAX Chart

NavNet vx2 Radar/Chart Plotter

The high-performance Radar/Chart Plotter is one of the core components of FURUNO's NavNet vx2. Working in perfect collaboration, the NavNet vx2 Radar/Chart Plotter assists you in facilitating safe and efficient cruising. A powerful X-band transmitter secures stable and detailed target detection even in adverse weather conditions, and with an appropriate heading sensor, the Radar images can be overlaid onto the electronic chart to graphically show your exact position. Together with a variety of NAV data, this true color Radar is perfect for navigating, tracking targets and finding birds.

NavNet vx2 Radar/Chart Plotter Features

- Utilizes C-MAP NT MAX Charts
- Radar image overlay (appropriate heading sensors required)
- Auto gain control
- Echo trail to display an afterglow of moving Radar targets
- Automatic Radar plotting to track up to ten targets (ARP11 required)
- Radar Guard Zone to alert you to potential danger
- Dual VRM (Variable Range Markers) and dual EBL (Electronic Bearing Lines) to give distance and bearing to targets
- Off-center display to focus on a specific area
- Customizable color presentation suitable for various lighting conditions
- Optional DFF1 & DFF3 Fish Finder modules available

CHART PLOTTER

10.4" COLOR LCD CHART PLOTTER

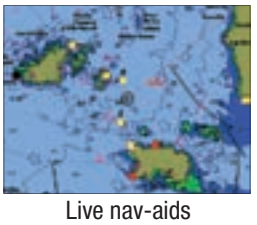
GP1920C/NT

NMEA 2005/2006 | AUTO | Enhanced Sunlight Viewable

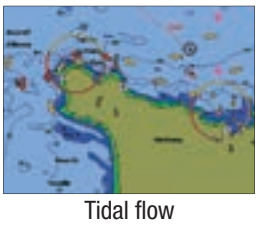
▸▸▸ *Spec P68*

Utilizes the latest C-MAP NT MAX Chartography

NavNet vx2 utilizes C-MAP's NT MAX Charts, which feature live nav-aids, tidal flows, local street maps, photographs of harbors and perspective view in addition to anti-grounding Guardian Technology™.

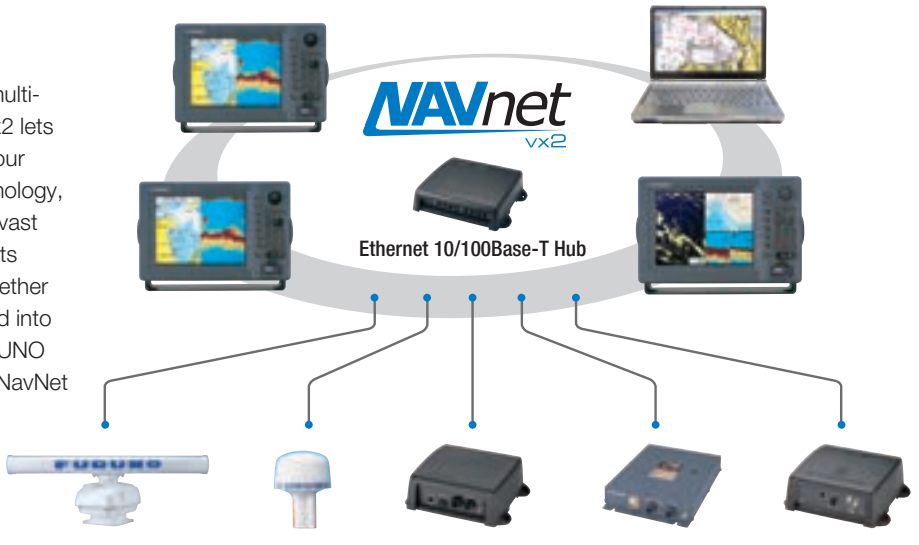


Live nav-aids
(Flashing buoys/Light houses)



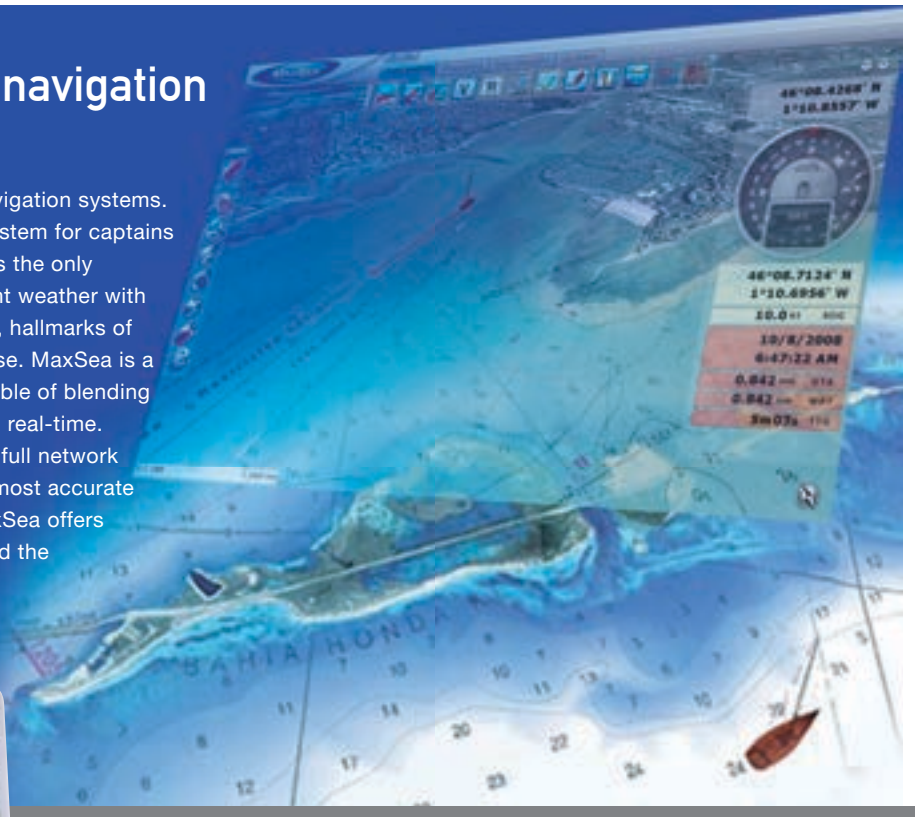
Tidal flow

From a stand-alone, single station system to a multi-station integrated navigation network, NavNet vx2 lets you build your navigation system according to your needs. Utilizing state-of-the-art networking technology, NavNet vx2 enables seamless data sharing and vast future expandability. The heart of NavNet vx2 is its Ethernet-based network. Up to four displays together with various navigation sensors can be integrated into a NavNet network. Adding to it, a variety of FURUNO equipment, such as AIS, autopilot and MaxSea-NavNet navigation PC software, further enhances the all-around capability of NavNet vx2. Streamlined navigation can be performed from any display unit within the network.



MaxSea is a powerful navigation software program

Today's captains expect a lot from their navigation systems. MaxSea Navigation Software is the ideal system for captains and crews that demand the best. MaxSea is the only navigation platform that combines intelligent weather with superior raster and vector charting support, hallmarks of MaxSea's superior engineering and expertise. MaxSea is a powerful navigation software program capable of blending and analyzing data from multiple sources in real-time. Features such as multi-screen support and full network compatibility make it, without a doubt, the most accurate and advanced onboard tool of its kind. MaxSea offers simple operation, increased productivity and the comfort of added confidence and safety.



MaxSea Marine Software

MaxSea TimeZero Explorer
MaxSea TimeZero Navigator

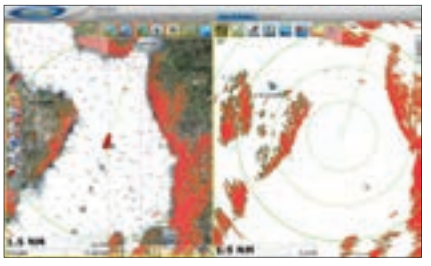
Combining NavNet TZtouch or NavNet 3D information with MaxSea's charting capabilities creates a revolutionary improvement in charting accuracy & clarity. Changes in vessels direction are displayed instantaneously on the chart screen. Combining NavNet TZtouch or NavNet 3D with MaxSea TimeZero Explorer, you get all of the features of MaxSea software plus the added bonus of being able to interface with your NavNet system to gather data from all of the network sensors.

TimeZero Technology

Thanks to TimeZero technology, your software runs and reacts instantaneously. MaxSea TimeZero operates in a fully rendered 3D environment, delivering unparalleled speed and a seamless chart plotting experience. What you see on the screen is realistically representative of what you are experiencing on the bridge of your vessel.

Full-time 3D environment

You can switch from the traditional 2D view to the impressive 3D perspective at the click of a mouse. Equipped with powerful TimeZero technology, the new 3D engine will completely transform the way you navigate. Scroll, pan, zoom in and zoom out with a smooth, fast and seamless graphics engine. Navigating in a fully 3D environment offers you a true perspective and wider area of view around the ship, which will allow you to better plan your routes, while TimeZero technology updates the information on your screen with virtually no redraw.

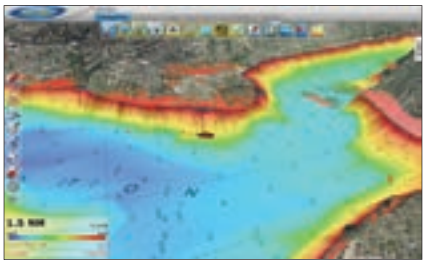


Ergonomics and performance

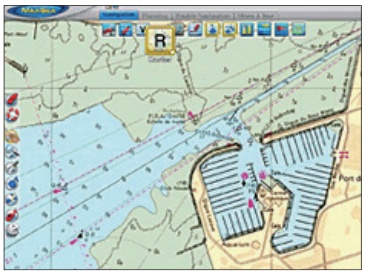
MaxSea TimeZero offers a completely new, innovative user interface which has been designed to be extremely intuitive and easy to use. Thanks to innovative "Work Spaces," the user interface automatically adapts to your present navigation needs. No more complicated dropdown menus to navigate! You only display the tools you need. MaxSea "Work Spaces" combine functionality with ease of use, providing for a practical and personalized navigating experience.

Satellite Photo Fusion

The ability to fuse satellite images with the chart is a feature unique to MaxSea TimeZero. You have the ability to fuse the satellite photo directly onto your chart. Land areas (zero depth) are completely opaque, showing only high-resolution satellite photography. As the depth increases, the satellite photography becomes more transparent so you can see the chart layer underneath. You will know exactly where the shallows end and the deep water begins!



MapMedia Charts



Raster chart

Vector chart

MapMedia provides a complete packaged navigation solution. Each [.mm3d] area includes: High quality nautical charts, 3D data and satellite photos combined to provide the best nautical information available. MapMedia charts and data provide a useful navigation aid tool with TimeZero™ performance of seamless charts, PhotoFusion™ and 3D data.

MapMedia offers a complete range of nautical charts called [.mm3d] specially designed for Furuno's NavNet 3D and MaxSea Time Zero. [.mm3d] charts are available in Raster chart format or in Vector chart format. MapMedia Raster charts are based on official hydrographic office and selected, privately sourced paper charts. MapMedia Vector charts are based on official hydrographic office or are "C-MAP by Jeppesen" or "Datacore by Navionics"

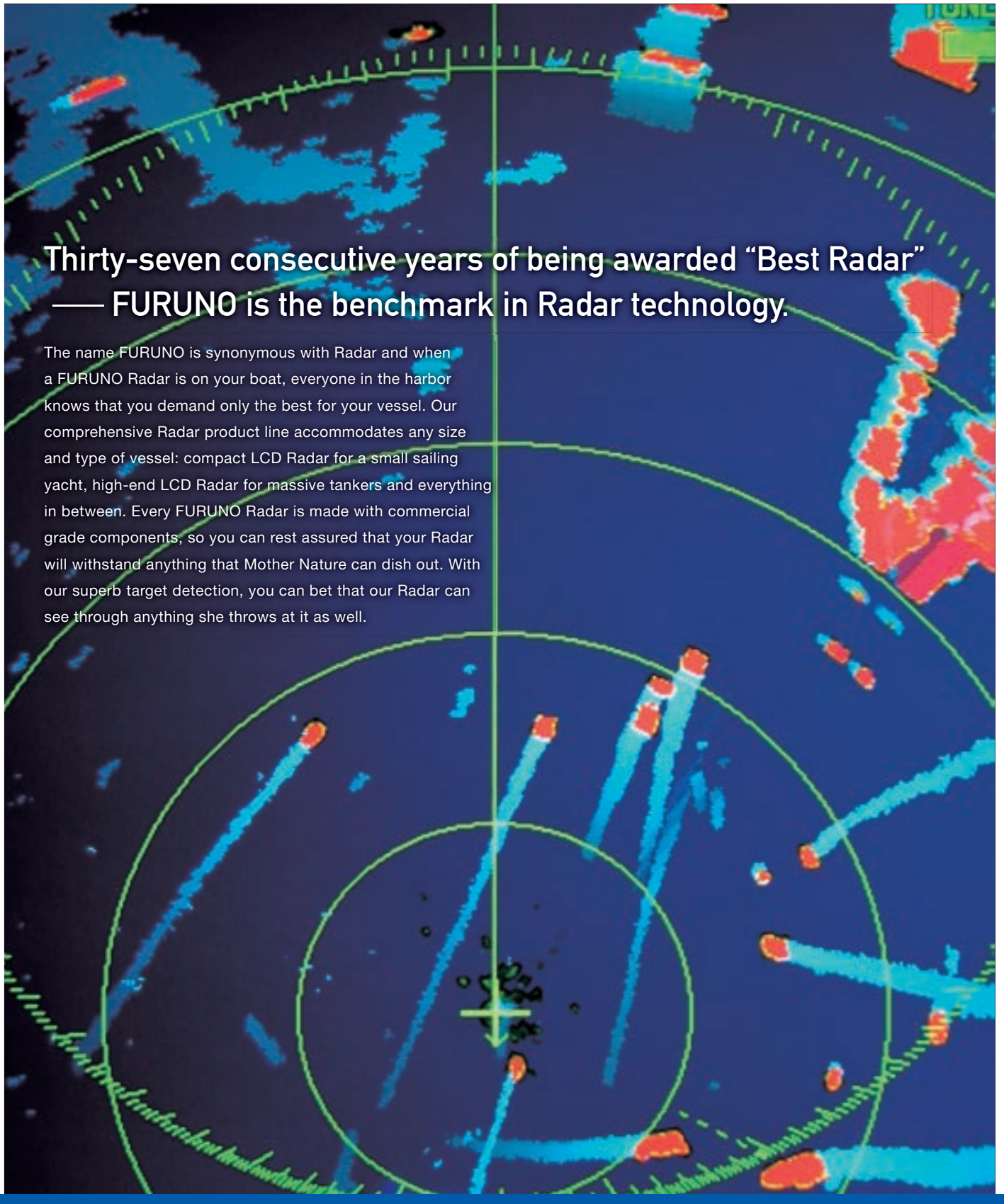
MaxSea TimeZero Navigator

- Connect your GPS and autopilot, download/overlay weather, and perform advanced planning
- TimeZero Technology: MaxSea TimeZero operates in a fully rendered 3D environment and delivers unparalleled speed and a seamless chart plotting experience
- Switch from traditional 2D view to impressive 3D perspective at the click of a mouse for a true perspective and wider area of view around the ship
- TimeZero technology updates the information on your screen with virtually no redraw
- Compatible with AIS: MaxSea TimeZero can be connected to any AIS using NMEA0183 or via Ethernet when using an Ethernet capable FURUNO AIS
- Compatibility with DSC: MaxSea TimeZero can be connected to a DSC Radio to display Position Request and Distress Call directly on the chart

MaxSea TimeZero Explorer

- Advanced Weather and Oceanography data and seamless integration with NavNet TZtouch and NavNet 3D
- Chart Server feature available with NavNet 3D (software version 2.05 required)
- TimeZero Technology: MaxSea TimeZero operates in a fully rendered 3D environment and delivers unparalleled speed and a seamless chart plotting experience
- Switch from traditional 2D view to impressive 3D perspective at the click of a mouse for a true perspective and wider area of view around the ship
- TimeZero technology updates the information on your screen with virtually no redraw
- Compatible with AIS: MaxSea TimeZero can be connected to any AIS using NMEA0183 or via. Ethernet when using an Ethernet capable FURUNO AIS
- Compatibility with DSC: MaxSea TimeZero can be connected to a DSC Radio to display Position Request and Distress Call directly on the chart
- Direct compatibility with FAR2xx7 Radar: MaxSea TimeZero can be connected directly to one (or two) FAR2xx7 Radars using a simple Ethernet connection

▸▸▸ *Spec P69*



Thirty-seven consecutive years of being awarded “Best Radar” —— FURUNO is the benchmark in Radar technology.

The name FURUNO is synonymous with Radar and when a FURUNO Radar is on your boat, everyone in the harbor knows that you demand only the best for your vessel. Our comprehensive Radar product line accommodates any size and type of vessel: compact LCD Radar for a small sailing yacht, high-end LCD Radar for massive tankers and everything in between. Every FURUNO Radar is made with commercial grade components, so you can rest assured that your Radar will withstand anything that Mother Nature can dish out. With our superb target detection, you can bet that our Radar can see through anything she throws at it as well.

Radar

MODEL1623
MODEL1715
MODEL1835/1935/1945

FR8062/8122/8252
FAR2117BB/2127BB/2137SBB

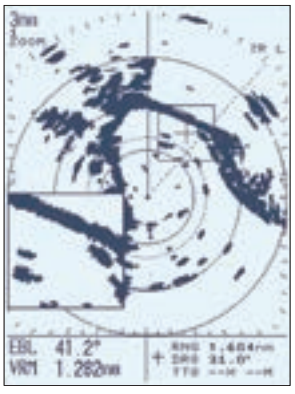
LCD Radar

7" SILVER LCD Radar
MODEL1715

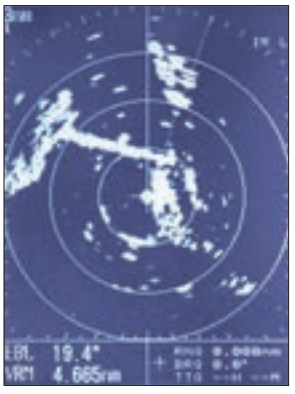
AUTO

6" SILVER LCD Radar
MODEL1623

AUTO

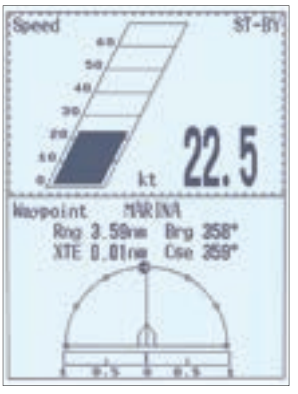


Zoom



Reverse

NAV Data



NAV Data

- Exceptional short range target detection achieved by narrow pulselength and dual IF bandwidth
- Automatic adjustment of antenna rotation speed according to selected range scale for optimum performance on all ranges
- Low power consumption in the Watchman mode — only 8 W
- Display a “lollipop” indication of selected waypoint position (optional input required)
- Excellent screen clarity - day or night
- Reverse video feature for quality night-time view
- Zoom window for close observation of a specific area
- Intuitive operation with simple key layouts

Antenna Selections

Model	MODEL 1623	MODEL 1715
Output Power (kW)	2.2	2.2
Size	15" Radome	18" Radome
Range Scale (nm)	0.125-16	0.125-24

▸▸▸ *Spec P70*

LCD Radar

10.4" LCD Radar

MODEL1835/1935/1945

AUTO | Target Tracking | AIS | Enhanced Sunlight Viewable | Bonded LCD

- Easy-to-install 10.4" portrait color LCD (350 cd/m^2) display
- Bonded LCD provides clear view in all weather conditions
- Stable AIS/TT (ARPA)* with zoom display function
- Full Screen Mode lets operators observe a wider range around the vessel
- Enhanced auto tuning/gain/anti-clutter controls
- Echoes in yellow, green, orange or multiple colors

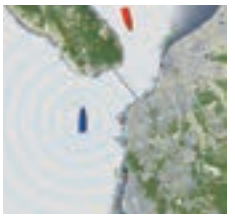
* Optional supply required

- High speed antenna rotation (48 rpm) for faster update of Radar image (Optional for 1935, Standard for 1945)

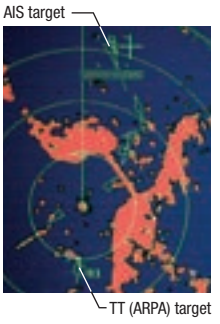
AIS/TT (ARPA) Display*

Up to 100 AIS and 10 TT (ARPA) targets can be tracked and overlaid on the Radar screen to assist the operator in tracking vessel movements. Since AIS works by a VHF transceiver system, a variety of navigational information such as vessel name, speed, course, ROT, length and beam can be included in real time. Unlike TT (ARPA) targets, AIS targets are visible even if they are located behind large ships or islands.

* Optional sensors required

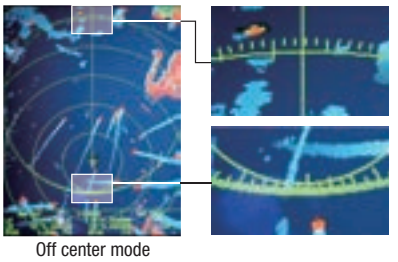


AIS targets can show that a vessel is coming from behind an island, where a Radar beam does not reach.



Off Center Mode

With a push of the "OFF CENTER" button, own ship position is shifted to a pre-registered point on the screen.
This allows the operator to focus on a specific area ahead of or around the vessel without losing track of the position.



Off center mode

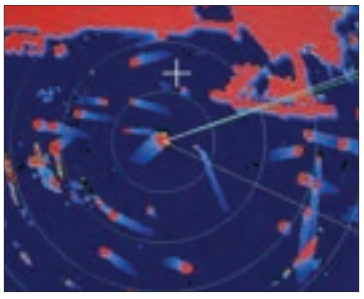
Clearance between markings of the bearing scale is changed according to the proximity between own ship and the bearing circle, as shown in the images on the left-hand side.
It helps to grasp the bearing to the target echo without using EBL.

Antenna Selections

Model	MODEL 1835	MODEL 1935	MODEL 1945
Output Power (kW)	4	4	6
Size	24'' Radome	3.5' Open	4' Open
Range Scale (nm)	0.0625-36	0.0625-48	0.0625-64
Rotation Speed	24 rpm	24 rpm 48 rpm (option)	

▸▸▸ *Spec P71*

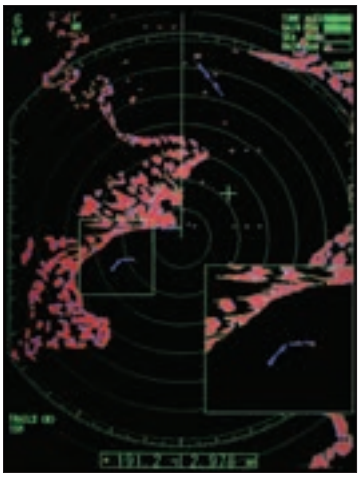
MARINE Radar



Echo Trail

True echo trail is available when a satellite compass is connected to the FR8xx2 series.True echo trails are helpful for determining own ship's movement. Heading accuracy and sensing speed ensures that trails are displayed in smooth lines.

- High-resolution 12.1" color LCD (SVGA) with 7 levels of target gradation
- Output power selectable: 6, 12, 25 kW
- Superior short range target detection capability
- Advanced automatic gain, tuning, and AC rain/sea controls
- Automatic antenna rotation speed switching (24/36/48 rpm) to meet a variety of user demands
- True Motion echo trail (Heading sensor and L/L position required)



Full-screen Radar presentation

Antenna Selections

Model	FR8062	FR8122	FR8252
Output Power (kW)	6	12	25
Size (ft)	4/6 (Open Array)		
Range Scale (nm)	0.125-72		0.125-96

Auto Plotter ARP-11 (option)

Target acquisition:	Automatic or manual acquisition of up to 10 targets within 0.2-16 nm
Vector mode:	True or relative vector
Vector length:	30 sec., 1, 3, 6, 15, or 30 min.
Target plot interval:	15 or 30 sec., 1, 2, 3, 6 or 12 min.
Audio visual alarm:	Produced against lost targets and targets on collision course
Target data display:	Range, bearing, course, speed and CPA/TCPA of the target chosen

▸▸▸ *Spec P72*

BLACK BOX MARINE Radar

12 ft antenna
for FAR2137SBB

8 ft antenna
for FAR2117BB/2127BB

Processor Unit

BLACK BOX MARINE Radar*

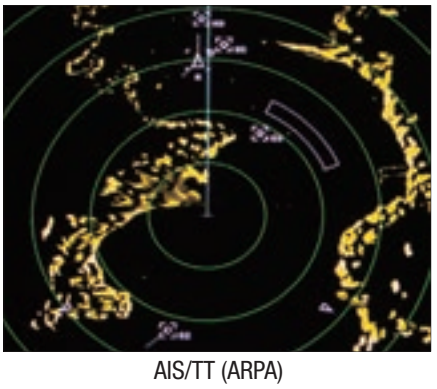
FAR2117BB/2127BB/2137SBB

NAVnet 3D Connect | AUTO | Target Tracking | AIS | BlackBox

*Any SXGA display is connectable

Chart Option: NAVIONICS THE LEADER IN ELECTRONIC CHARTS | FURUNO

▸▸▸ *Spec P73*



AIS/TT (ARPA)

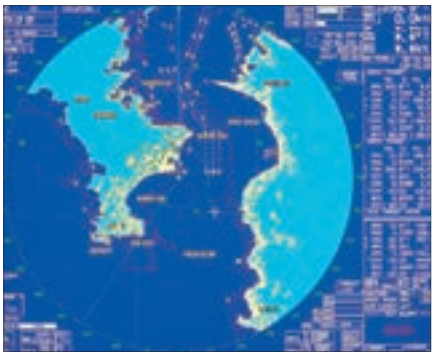


Chart Overlay

- Superb detection of even small targets
- S-band to achieve stable detection under all weather conditions (FAR2137SBB)
- Advanced signal processing to present crystal clear images in rough seas
- Automatic plotting/tracking of 100 manually or automatically acquired targets
- Handles up to 1,000 AIS targets (separate AIS receiver required)
- Straightforward operation by using a trackball and a wheel menu selector
- Up to four sets of Radar can be interconnected in the network without an extra device to share the Radar images

Trackball Control Unit

Antenna Selections

Open Array	X-band Radar		S-band Radar
	FAR2117BB	FAR2127BB	FAR2137SBB
Output Power (kW)	12	25	30
Size (ft)	4/6.5/8		10/12
Range Scale (nm)	0.125-96		

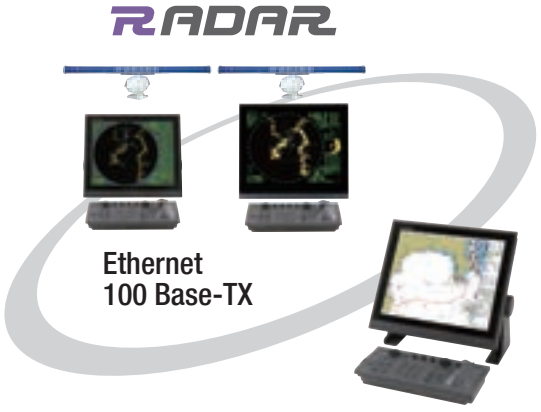
Our Black Box Radars are the number one selling Radars in the mega yacht and large sport fish markets. Simply walk down any dock in any harbor and you will see the FURUNO antennas proudly spinning. Why are they so popular? Because of the enhanced target detection techniques, such as echo stretch, echo average and anti-clutter functions. And in true FURUNO style, we offer the best sunlight viewable marine monitors available (See P52-53), at an affordable price! Connect the monitor to your Radar, PC or camera for a complete system.

Monitor Selection

Marine Display
MU190HD

Marine Display
MU231

100 Base-TX Ethernet Network System

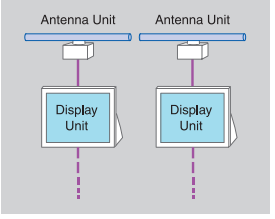


One of its outstanding features is the Ethernet-based network capability, which makes it possible to create a navigation network with other onboard equipment such as ECDIS (Electronic Chart Display and Information System). The Ethernet-based data link makes the data transfer speedy and stable, while keeping maintenance simple.

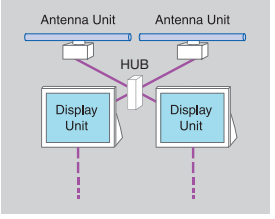
ECDIS

ELECTRONIC CHART DISPLAY
AND INFORMATION SYSTEM

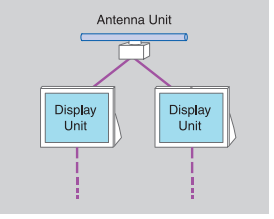
FMD3200BB (Less Display)
FMD3200 (20.1" color LCD)
FMD3300 (23.1" color LCD)



Independent



Interswitch



Repeater

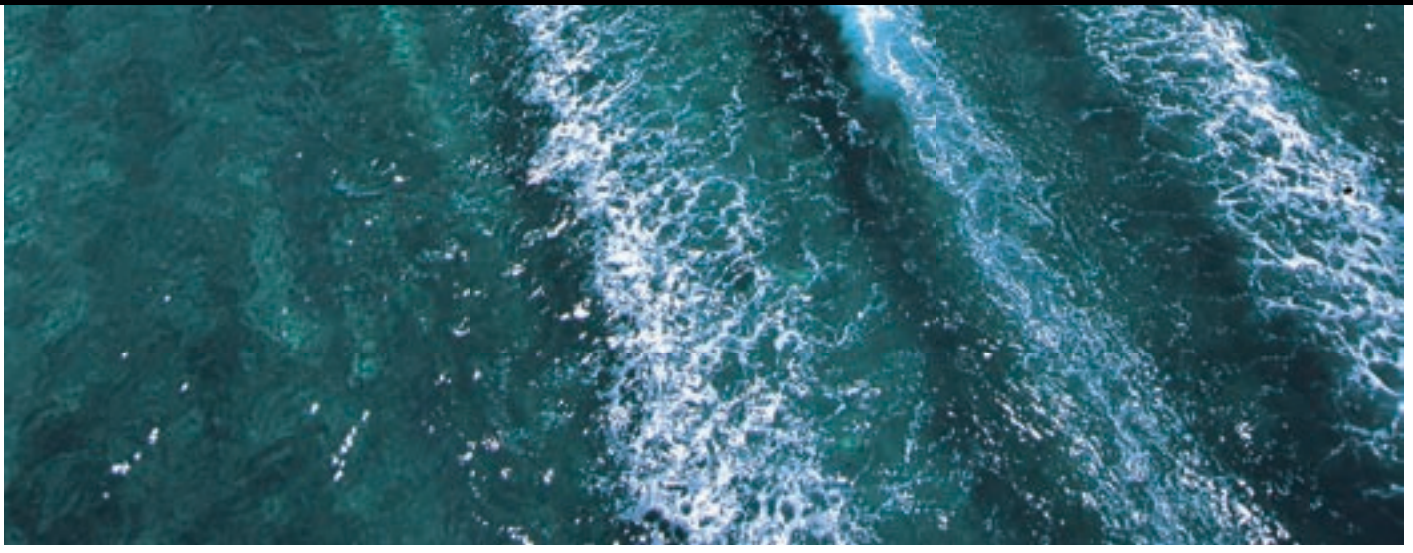
Charting your position with pinpoint accuracy: FURUNO GPS Navigators and Chart Plotters guide your voyage.

With the aid of GPS, you can quickly and accurately view where you have been, where you are and where you are going.
Know your position, course and speed at a glance, along with other critical navigation data in both graphic and alphanumeric formats.

GPS/Chart Plotter

GP33
GP32
GP150

GP1670F
GP1870F



GPS NAVIGATOR

4.3" GPS NAVIGATOR
GP33

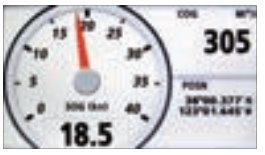
NAVnet 3D Connect | Enhanced Sunlight Viewable | CAN bus

Plotter

Highway

COG

Nav data



User Display

- 4.3" "Sunlight Viewable" color LCD
- Maximum visibility under various ambient conditions both during night and under direct sunlight (brightness of LCD is 700 cd/m^2)
- Enhanced data legibility thanks to large characters and high resolution visual aid
- Stores up to 10,000 waypoints, 100 routes, and 3,000 track points
- 7 display modes available, including 2 user-customized modes
- Supports both NMEA0183 and CAN bus interface
- Contact closure capability available on the 10P connector
- SBAS* capable for better measurement

*SBAS (Satellite-Based Augmentation System)
SBAS is a general term for a GPS navigation system with differential correction by means of geostationary satellites. In the US, it is called WAAS (Wide Area Augmentation System), whereas in Europe and Japan, it is called EGNOS (European Geostationary Navigation Overlay System) and MSAS (MSAT Satellite-based Augmentation System), respectively.

▸▸▸ *Spec P76*

GPS/WAAS NAVIGATOR

4.5" GPS/WAAS NAVIGATOR
GP32

- Stores up to 999 waypoints, 50 routes, and 1,000 track points
- One-touch waypoint entry
- 6 display modes including 2 user-defined modes
- Track Back feature stores waypoints at user-defined intervals for intuitive trace-back cruising
- Waypoints and routes can be uploaded to and downloaded from a PC

6" GPS NAVIGATOR
GP150

- Fully meets IMO Resolution MSC.112 (73) and IEC 61108-1 Ed.2 for SOLAS carriage requirements
- Ideal position sensor for AIS, Radar and other navigational equipment
- Enhanced accuracy with standard WAAS and optional DGPS receiver (GP150D)
- Stores up to 2,000 tracks and marks including past positions, 99 event marks, 999 waypoints, and 30 routes with up to 30 waypoints per route

▸▸▸ *Spec P75*

GPS/WAAS CHART PLOTTER

5.7" GPS/WAAS COLOR
CHART PLOTTER with FISH FINDER

GP1670F

RotoKey FDF BDS ACCU-FISH AUTO 3D CHART Enhanced Sunlight Viewable Bonded LCD Polarized Friendly GPS Internal antenna CAN bus

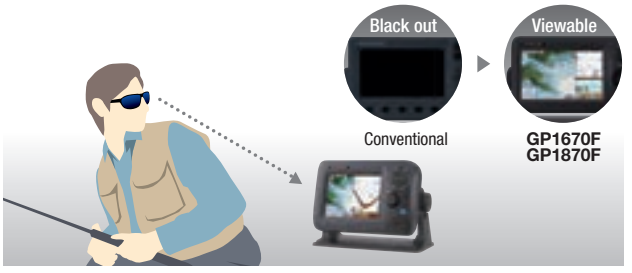
GP1670F/GP1870F:

- Bright 800 cd/m^2 (GP1670F) and 900 cd/m^2 (GP1870F) LCD gives excellent readability
- Bright display provides superior viewing even in direct sunlight
  - The LCD and the AR glass are bonded together to ensure no fogging issues
  - Clear visibility even when wearing polarized sunglasses
- Internal GPS antenna for simple and easy installation
- Standard C-Map 4D chart* available in SD card
- RotoKey™ revolving menu and familiar point-and-click operation
- Internal memory: Waypoint/Track 30,000 points, Route 1,000 routes
- Equipped with FURUNO's latest technology: Bottom Discrimination Function
  - Analyze bottom structure**
- ACCU-FISH™ — A unique fish size analyzer based on the latest digital technology
- Post-processing Gain Control applied to all echoes displayed on the screen
- White Line feature — Discriminate fish lying near the bottom
  - The top edge of the sea floor is displayed in white to clearly show structures
- Utilizes CAN bus (NMEA2000) interface

** Thru-hull or transom transducer mount required.

Clear visibility even when wearing polarized sunglasses

FURUNO New GP Series have LCD screens which do not "black out" when wearing polarized sunglasses at certain angles, providing no loss of visibility while fishing.

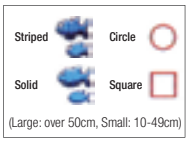


"ACCU-FISH™" identifies individual fish with size and fish mark function

ACCU-FISH

In order to assess individual fish size, the echo strength from the fish needs to be computed and turned into fish size display on the screen. It can detect the fish size of 10 to 199 cm, in the depth of 2 to 100 m.

In some instances, fish size indicated on the GP1670F/1870F may differ from its actual size.



Bottom Discrimination feature**

The GP1670F/1870F Bottom Discrimination feature enables the fish finder to indicate if a major component of the bottom is mud, sand, gravel or rocks.

BDS Bottom Discrimination Sounder

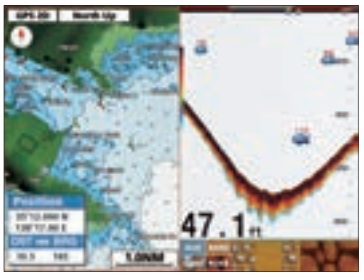
Please keep the following in mind when using the Bottom Discrimination Sounder:
1) Use at a depth of 5 m - 100 m.
2) Use approved transom mount or thru-hull mounted transducer.
3) To show a consistent display of the actual bottom, set the range display of the fish finder screen to "auto".
4) Enter the ship's draft value
5) Use a ship speed of 10 kn or less.
6) In some instances, bottom component indicated on the GP1670F/1870F may differ from actual bottom structure. Please read the operation manual prior to utilizing this feature.

7" WIDE GPS/WAAS COLOR
CHART PLOTTER with FISH FINDER

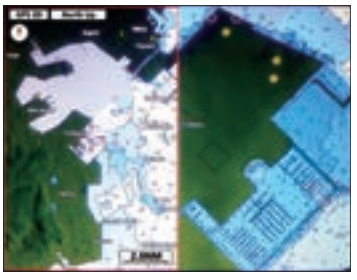
GP1870F

RotoKey · FDF FURUNO Digital Filter · BDS Bottom Discrimination Sounder · ACCU-FISH · AUTO · 3D CHART · Enhanced Sunlight Viewable · Bonded LCD · Polarized Friendly · GPS Internal antenna · CAN bus

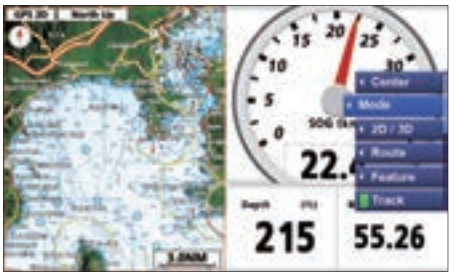
▸▸▸ *Spec P77*



Plotter + Fish Finder
(ACCU-FISH, Bottom Discrimination mode)



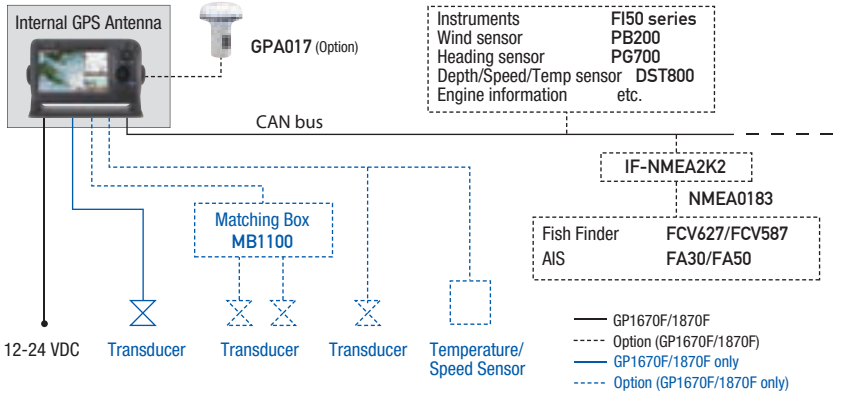
Dual range chart display



Plotter + SOG + Rotokey

Some of the screenshots used in this page are still provisional, and they may be subject to change in the final products.

SYSTEM CONFIGURATION

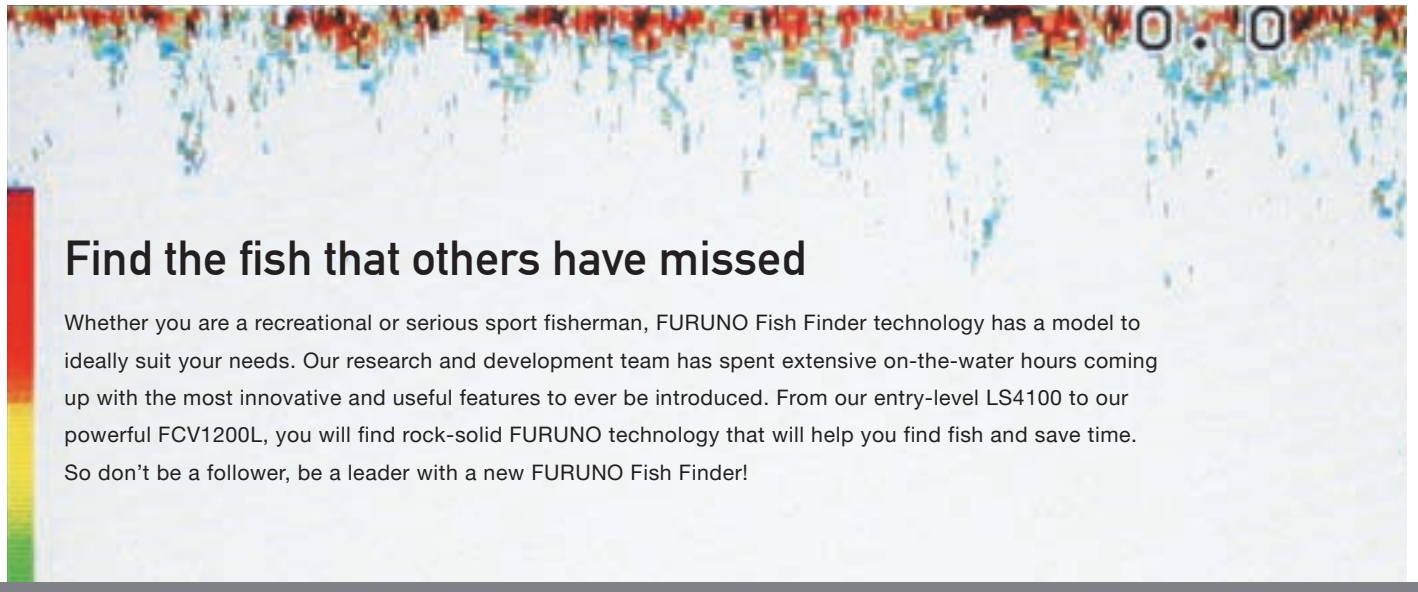


NMEA DATA CONVERTER IF-NMEA2K2

Furuno's NMEA DATA CONVERTER is the compact interface unit, which converts NMEA 0183 data into CAN bus/NMEA2000 data and vice-versa. Control data such as Heading and Rate-of Turn can be translated in high speed conversion rate.

REPLACEMENT BEZEL KIT (option)

For easy replacement from FURUNO GP1650F Series/GP1850F Series/GP7000 Series.

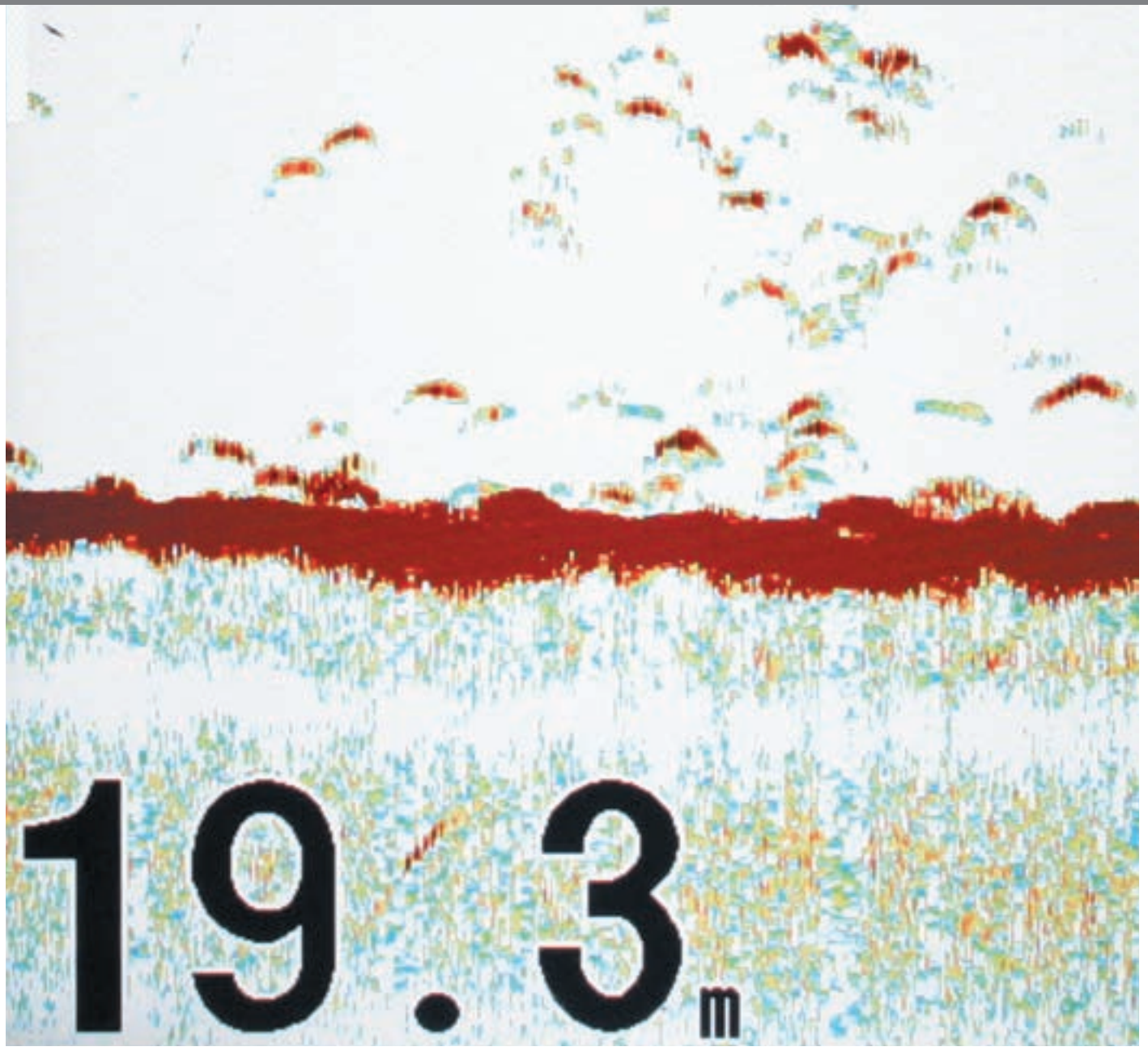


Find the fish that others have missed

Whether you are a recreational or serious sport fisherman, FURUNO Fish Finder technology has a model to ideally suit your needs. Our research and development team has spent extensive on-the-water hours coming up with the most innovative and useful features to ever be introduced. From our entry-level LS4100 to our powerful FCV1200L, you will find rock-solid FURUNO technology that will help you find fish and save time. So don't be a follower, be a leader with a new FURUNO Fish Finder!

Fish Finder

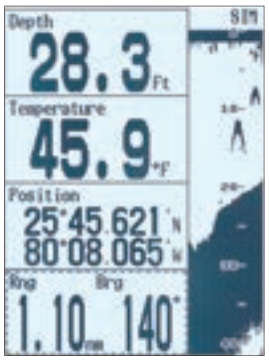
- LS4100/6100
- FCV627
- FCV587
- FCV295
- FCV1150
- FCV1200L



LCD SOUNDER

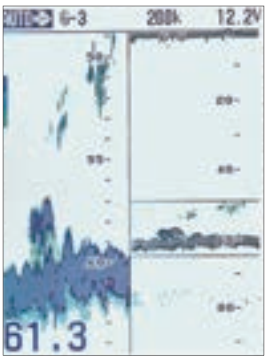
6" LCD SOUNDER
LS6100

5" LCD SOUNDER
LS4100



Nav Data

A-scope



Marker Zoom

- Dual-frequency 50/200 kHz with 300 W output power
- "White Line" function to discriminate fish echoes from seabed and reefs
- User-programmable function keys for simple operation
- Two Customizable Navigation Data Display - Displaying digital and analog graphical info, including: Wind Speed/Direction, Ship's Speed, Steering Screens and more*
- "Mini Navigator" feature allows storage of up to 12 waypoints, with capability to navigate back to these points. XTE/Range and Bearing calculation and steering screens*
- Unique Bottom-Lock Fish alarm provides for audible bottom fish detection

*requires appropriate sensors

▸▸▸ *Spec P78*

Fish Finder

8.4" Fish Finder
FCV587

5.7" Fish Finder
FCV627

- Bright 800 cd/m^2 LCD gives excellent readability, even in bright sunlight
  - · The LCD and the AR glass are bonded together to ensure no fogging issues.
  - · Clear visibility even when wearing polarized sunglasses.
- Equipped with Furuno's latest technology: the Bottom Discrimination Function — Analyze bottom structure*
  - · Provides an at-a-glance recognition of bottom form with four types of graphical displays (Rocks/Sand/Gravel/Mud) when connected to required thru-hull or transom mount transducer.

  * Thru-hull or transom transducer mount required
- ACCU-FISH™ - A unique fish size analyzer based on the latest digital technology
- White Line feature - Discriminate fish lying near the bottom
  - · The top edge of the sea floor is displayed in white to clearly show structures.
  - · This feature helps to discriminate weeds and bottom fish distinctly.
- Configurable Alarm function (depth, fish echoes, etc.)
- Post-processing Gain Control applied to all echoes displayed on the screen
- Share and display information on a Chart Plotter*
  - · Furuno's TLL (Target Lat/Lon) output allows you to interface the FCV627/587 with your Chart Plotter so that you can mark fishing spots with various information (L/L, Depth, Water Temp, Fish size, Bottom).

  * Required connection to Chart Plotter.
- Fast transmission rate of 3,000 PRR (Pulse Repetition Rate) per minute (at 5 m depth range)

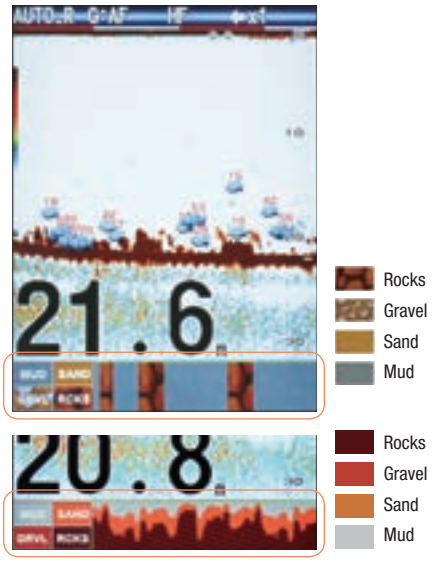
Swivel mounting bracket to adjust the angle of the display unit

Bottom Discrimination feature

The FCV627/587's Bottom Discrimination feature enables the Fish Finder to indicate if a major component of the bottom is rocks, gravel, sand or mud.

The Bottom Discrimination Function provides you with valuable information to locate rich fishing grounds, while boosting your catch of the day.

Please keep the following in mind when using the Bottom Discrimination Sounder:
1) Use at a depth of 5 m - 100 m.
2) Use approved transom mount or thru-hull mounted transducer.
3) To show a consistent display of the actual bottom, set the range display of the Fish Finder screen to "auto".
4) Enter the ship's draft value.
5) Use a ship speed of 10 kn or less.
6) In some instances, bottom component indicated on the FCV627/587 may differ from its actual bottom structure.



BDS
Bottom Discrimination Sounder

Graphic mode
The standard graphic display mode shows the most probable bottom composition by graphic or four colors.

Probability mode
The probability display mode shows the most probable bottom composition in graph form.

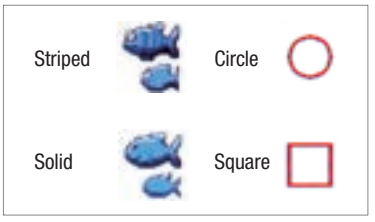
"ACCU-FISH™" identifies individual fish with size and fish mark function

Recognizes individual or multiple fish instantaneously

ACCU-FISH™ is a revolutionary fish size assessment function of the FCV627/587. In order to assess individual fish size, the echo strength from the fish is computed and turned into fish size display on the screen. It can detect the fish size of 10 to 199 cm, in the depth of 2 to 100 m.

Displaying fish marks

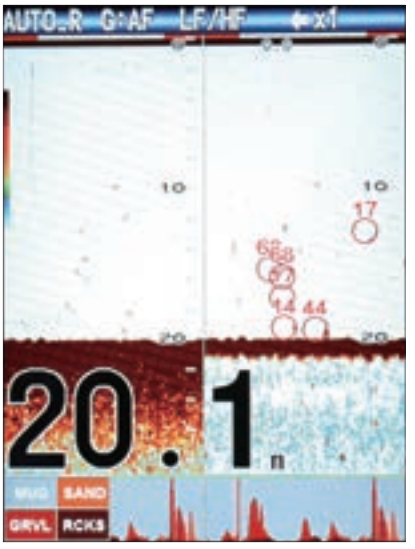
The fish mark can be utilized to display individual fish echoes when detected. It helps beginners to identify the fish targets on the display for a more fun fishing experience. Fish mark is selectable from two types of fish symbol, circle and square. The fish symbol, displayed in two different sizes (Large: over 50 cm, Small: 10 to 49 cm), is a great help for anglers to identify fish targets. Circle and square indentify targets without hiding fish echo.



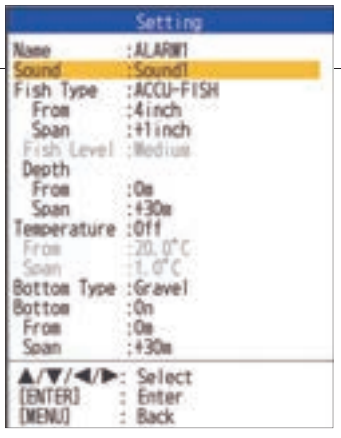
Displaying fish size or fish depth

Activating the ACCU-FISH™ from the menu, FCV627/587 displays fish size on the individual fish echo. When the ACCU-FISH™ is used concurrently with fish marks, it greatly helps anglers to identify fish targets on the display. You may also select and display the target depth instead of fish size, which helps to see how far the fish is from the boat.

In some instances, fish size indicated on the FCV627/587 may differ from its actual size.
Please carefully read the operation manual prior to utilizing this feature.



Circles and fish size are displayed on fish echoes. When in dual frequencies mode, you can set the mark displayed on both or either frequency screen.

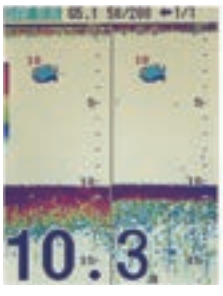


Fish Alarm function

When fish echoes come in the area which you set above the bottom, an audible alarm sounds and the alarm icon flashes at the top right corner of the screen. Furthermore, an integrated alarm setting is also available that can be set to notify the operator of a specific condition, such as water depth, target depth, water temp, bottom component, etc.

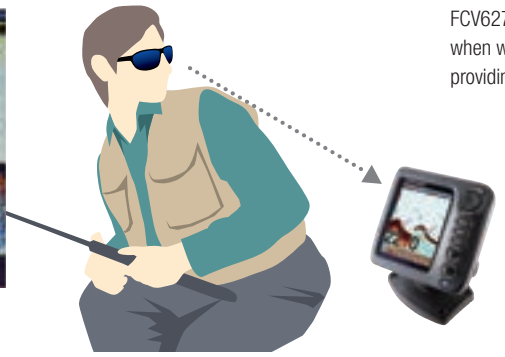
Bright LCD for excellent in sunlight viewability

Bright 800 cd/m^2 LCD gives excellent readability even in bright sunlight.

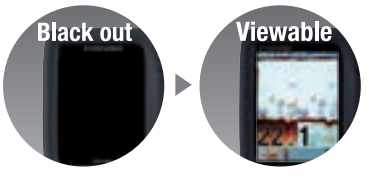


Conventional

FCV627/587



FCV627/587 have LCD screens which do not "black out" when wearing polarized sunglasses at certain angles, providing no loss of visibility while fishing.



Conventional FCV627/587

▸▸▸ *Spec P79*

COLOR LCD SOUNDER

10.4" COLOR LCD SOUNDER
FCV295

FDF FFS AUTO Enhanced Sunlight Viewable Bonded LCD NMEA 2010/2011

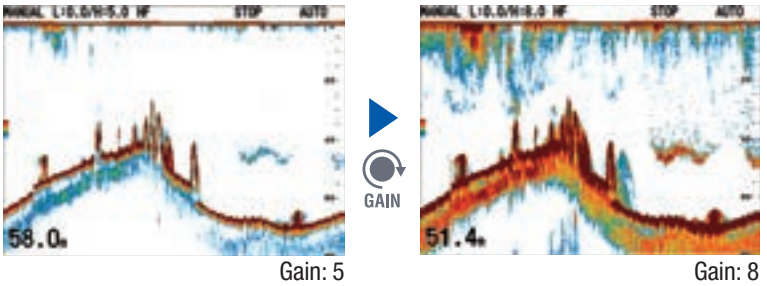
12.1" COLOR LCD SOUNDER
FCV1150

NAVnet 3D TZ Connect FDF ACCU-FISH FFS AUTO Enhanced Sunlight Viewable Bonded LCD 1,000 cd/m²

- Integrate into the NavNet 3D or TZtouch network (FCV1150 only)*

  *Auto range, auto gain, shift and zoom controls can be performed from both NavNet 3D/TZtouch and the FCV1150; gain control and mode selection can only be done by the FCV1150.
- Unique fish size analyzing function "ACCU-FISH™" mode (Available when FCV1150 connected with select transducers)
- Post-processing gain control applies changes to gain setting to all existing returns on the display
- White Edge feature for enhanced bottom discrimination
- FURUNO Digital Filter (FDF™) delivers crystal clear target presentation
- FURUNO Free Synthesizer (FFS) allows for adjustable operating frequency
- Heaving Compensation provides stable echo presentation even in rough seas (Available with FCV1150 only)**

  **Requires appropriate sensors



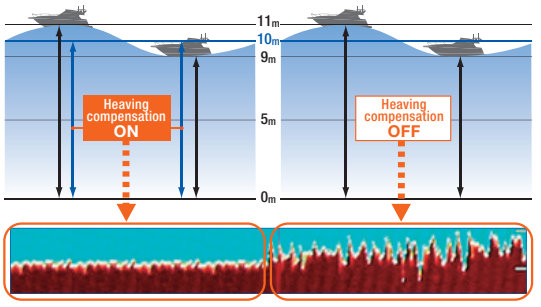
Gain: 5 Gain: 8

Quick Gain Control

With Quick Gain control, changes you make to the gain setting are applied not only to new echoes, but also to all past echoes on the screen. You can compare past and current echoes under the same gain setting. Because the changes are applied to both new and existing returns, you can quickly and easily determine the right Gain setting for your conditions.

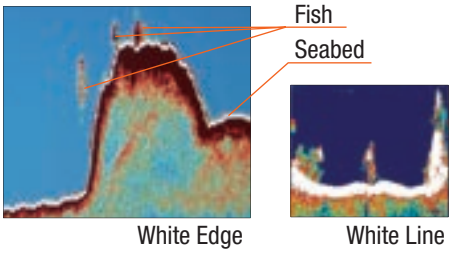
White Edge

The top of the seabed is displayed in white to easily discern seabed structure from bottom fish returns. While conventional bottom discrimination function (i.e.: White Line) is applied to the strongest echoes, the White Edge function enhances the discrimination between bottom fish and the seabed.



Heaving Compensation (FCV1150 only)

Even in rough sea conditions, the FCV1150 compensates for heaving, presenting a display without undulations caused by the sea conditions. FURUNO SC30, SC50 or SC110 Satellite Compass required.



White Edge White Line

▸▸▸ *Spec P80*

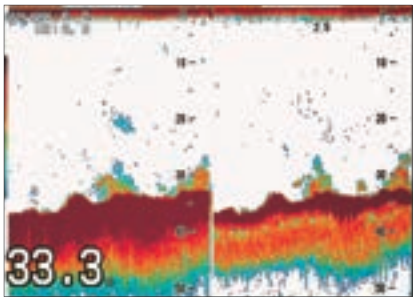
BLACK BOX SOUNDER

FCV1200BB

(Photo: Control unit with an optional monitor MU150HD)

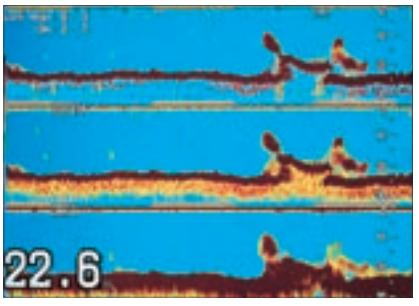
FFS BlackBox VIDEO OUT

- FURUNO Free Synthesizer (FFS) Transceiver with easily selected operating frequencies (15/28/38/50/88/107/200/400* kHz)
  *400 kHz requires optional transmit board.
- Independent Low and High frequency range selection in the Dual Frequency mode
- Use LF or HF only, both LF and HF simultaneously, either LF or HF Zoom, or select from 2 Customized user preset modes
- Automatic range shifting mode for continuous bottom acquisition and tracking
- 8 or 16 echo colors with blue, light blue, dark blue, black or white background
- 8 range scales, may be custom set anywhere from 16 to 6,000 feet (5–2000 m)



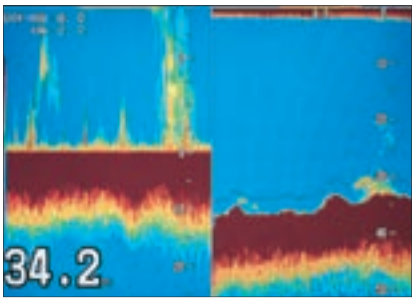
Selectable Display Color

Selectable background colors for easy-to-view presentation under all lighting conditions



Mix Mode

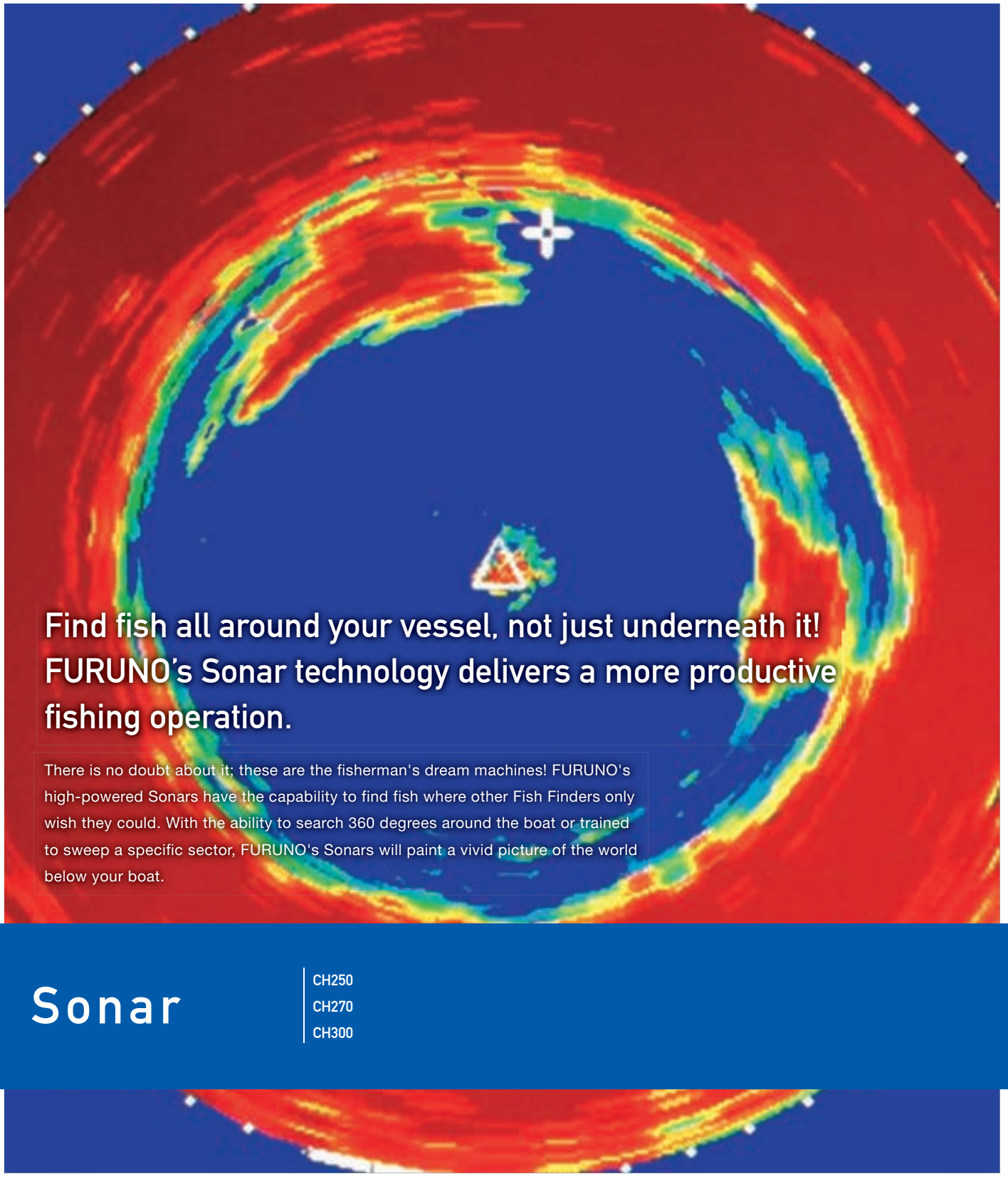
Fusion of HF and LF echoes for optimum detection of small targets



Ground Discrimination

The ground is displayed as a straight line, and echoes immediately below this line have enhanced bottom tails. Harder bottom is shown as darker and longer tails. The material and hardness of the bottom can be evaluated by color and tail lengths.

▸▸▸ *Spec P80*



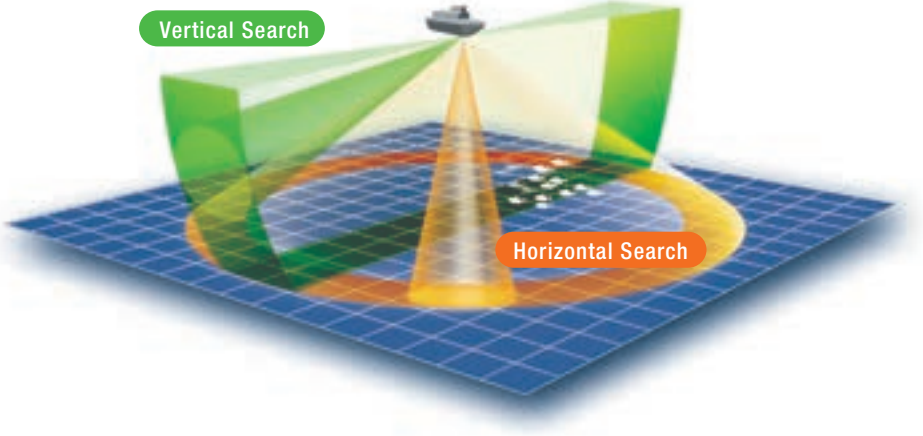
Find fish all around your vessel, not just underneath it! FURUNO's Sonar technology delivers a more productive fishing operation.

There is no doubt about it; these are the fisherman's dream machines! FURUNO's high-powered Sonars have the capability to find fish where other Fish Finders only wish they could. With the ability to search 360 degrees around the boat or trained to sweep a specific sector, FURUNO's Sonars will paint a vivid picture of the world below your boat.

Sonar

CH250
CH270
CH300

Searchlight Sonar gives you the ability to search both horizontally and vertically. With horizontal search, you can specify the tilt angle to search an area around your boat. With vertical search, you can obtain detailed underwater conditions at any bearing. Combine the two to make your cruising safer and your fishing operation more productive.



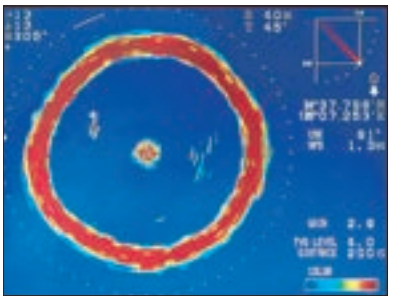
SEARCHLIGHT Sonar

10.4" SEARCHLIGHT Sonar
CH250/270

BlackBox NMEA* VIDEO OUT
2001/2002/2003/2004

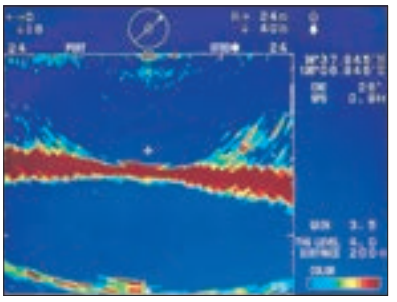
Frequency: 60, 88, 150, 180* kHz
* 180kHz available with CH270 only

- Waterproof, high-resolution 10.4" Color LCD
- Echo presentation in 8 or 16 color gradation with selectable day or night background color
- Audio Target Detection makes continuous visual watch unnecessary (optional speaker required)
- Target Lock mode keeps track of targets
- L/L mode allows for continual search of particular area of interest
- Available in Black Box configuration to allow for use of custom displays



Full Circle Scan

Full Circle scan allows for detection of fish schools at any bearing



Vertical Scan

Vertical scan paints the bottom profile within a user-specified vertical plane.

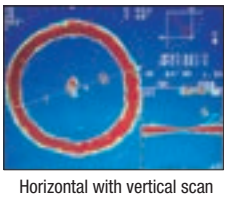
10.4" DUAL-FREQUENCY SEARCHLIGHT Sonar
CH300

BlackBox VIDEO OUT

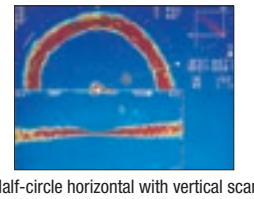
Frequency: 60/153, 85/215 kHz

- Incorporates both high and low frequency (60/153 or 85/215 kHz) transducers in a single soundome
- CUSTOM MODE key provides one-touch setup or soft key function
- Variety of display modes including Horizontal and Vertical scans, Mix mode, echo sounder
- Pulse length automatically switched according to range for hands-free optimization
- Target lock tracks selected fish school or L/L position
- Available in Black Box configuration to allow for use of custom displays

Combination Full/Half Circle and Vertical scan

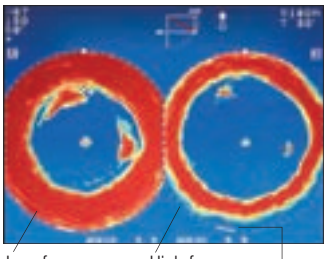


Horizontal with vertical scan



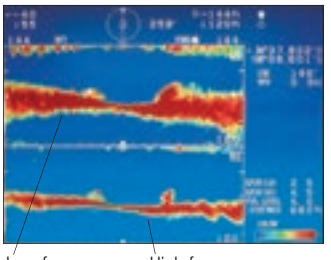
Half-circle horizontal with vertical scan

A unique feature of this Sonar is a mode integrating the two images above. This Sonar image can be switched between full and half circle with vertical scan.



Horizontal scan

The horizontal scan helps detect fish schools at any tilt, all around the vessel. In the dual-frequency presentation, any two presentations from high/low frequency scan and the mix mode can be displayed. Gain of each mode can be adjusted separately.



Vertical scan

The vertical scan paints the bottom profile within a user-specified vertical plane in any direction. In the dual-frequency presentation, the vertical scan mode shows any two of high/low frequency scan and the mix mode. The slant range and Sonar dome tilt are graphically shown by a cursor indicator.

▸▸▸ *Spec P82*

FURUNO's NAVpilot is a revolutionary Autopilot with a sunlight viewable display designed for a variety of vessels.
It utilizes a self-learning and adaptive software algorithm, and plays the ultimate role in course keeping capability dynamically adjusting essential parameters for navigation i.e., vessel speed, trim, draught, tide and wind effects, dead band, weather, etc. These parameters are stored in the system memory and continuously optimized.

Kick back, relax and let NAVpilot steer you to your destination!

Autopilot

NAVpilot700
NAVpilot711
NAVpilot720

NAVpilot700 NAVpilot720 NAVpilot711

NAVnet 3D Connect
FPS FURUNO Power-assist Steering
Enhanced Sunlight Viewable
CAN bus
NMEA2000 Certified
FANTUM FEEDBACK

FLSI

NAVpilot's remarkable self-learning, adaptive software is developed by collaborative works between FURUNO and FLSI.

NAVpilot

- Optional revolutionary SAFE HELM and POWER ASSIST brings unrivaled steering control and comfort at the helm*
- Selectable "Economy" and "Precision" Navigation Modes combine adaptive technology providing fuel and power savings of up to 2.5% or more.**
- "Precision" XTE accuracy: within 0.003 nm
- Simplified activation set-up by on-screen wizard
- All-new "Fantum Feedback" - NavPilot outboard installations no longer require use of a physical rudder feedback unit
- Perfect for inboard or outboard power boats and sail boats
- Simple one-touch mode selection enables flexible steering and course control
- Perfect cosmetic match with NavNet 3D, FI50 instrument series, GP33 GPS Navigator and RD33 Data Display

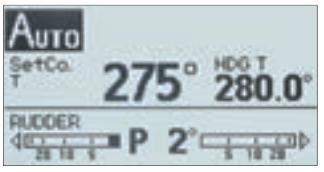
* Required Options - HRP11 or HRP17 Pump and FPS8 Power Steering Module
** Based on Furuno testing and "Scenarios for a Clean Energy Future 2000" - U.S. Department of Energy (www.ornl.gov/sci/eere/cef)

Display modes for NAVpilot700

Rudder Angle

User Customizable Display

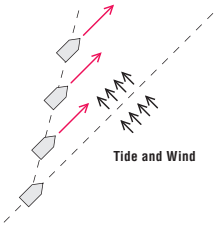
Display modes for NAVpilot711/720



User Customizable Display

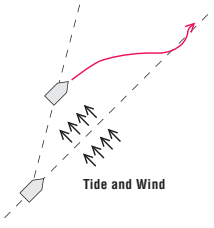
Operation Modes

Auto mode



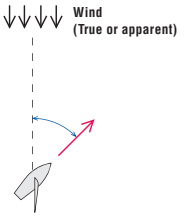
NAVpilot consistently maintains the desired heading, but the vessel may drift off course due to the effects of tide and wind.

Advanced auto mode



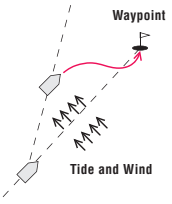
NAVpilot consistently maintains the desired heading while compensating for the effects of tide and wind.

Wind mode*



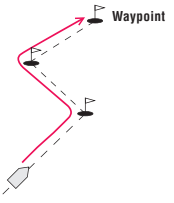
NAVpilot consistently maintains the desired heading toward true or apparent wind direction while compensating for the effects of tide and wind (available for sail yacht only).

Nav mode



NAVpilot steers the vessel towards the current waypoint while compensating for the effects of tide and wind.

Route tracking



When connected to a GPS Navigator, NAVpilot steers the vessel to follow a series of waypoints in succession. Upon arriving at each waypoint or destination, audible and visual alerts are activated.

FishHunter mode

FishHunter mode is a unique feature of FURUNO's NAVpilot series. Find a fish target with your FURUNO Sonar/Sounder or bird target with your FURUNO Radar and feed it to the NAVpilot. The NAVpilot will activate the FishHunter mode to perform square, zigzag, circle, orbit, spiral or figure eight maneuvers around the specified target. This feature can also be used for Man Overboard (MOB).

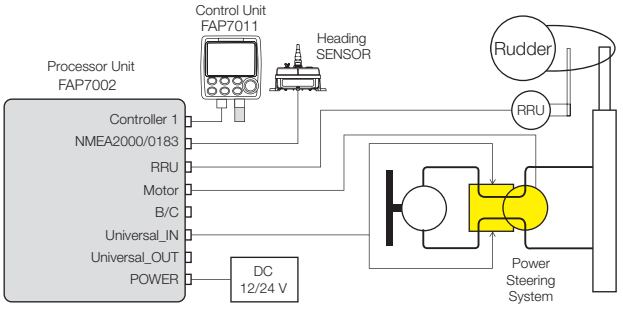
Fantum Feedback

With Fantum Feedback, a menu-selectable feature available in the latest NavPilot 700 series software, NavPilot outboard installations no longer require use of a physical rudder feedback unit. This software was developed and extensively tested on a wide variety of outboard vessels with hydraulic steering and reversing pump control. Fantum Feedback achieves precise course control, from slow trolling speeds to over 60 knots, utilizing a newly developed, time-based rudder gain process, rather than traditional rudder angle based control. Furuno's all-new "Fantum Feedback" NavPilot software clears the path to a simplified installation, while delivering enhanced steering control.

SAFE HELM and POWER ASSIST features provide Efficient and Effective Helm Steering Control

The optional SAFE HELM and POWER ASSIST features* provide a unique interface to the vessel's hydraulic hand steering system, providing unrivaled comfort and control of the vessel's steering directly from any manual helm on the vessel. These two modes greatly reduce steering effort and enhance the safety of your vessel's Autopilot.

* Required Options - HRP11 or HRP17 Pump and FPS8 Power Steering Module



Configuration diagram of the steering system

SAFE HELM

The SAFE HELM temporarily switches the NAVpilot to manual steering for a specified time interval, taking it out of an automatic steering mode (AUTO, NAV, etc.) After the time interval has elapsed, SAFE HELM is deactivated and the previous automatic steering mode is restored.

POWER ASSIST

The POWER ASSIST incorporates the SAFE HELM concept and provides speed-based, power assisted steering, which greatly reduces manual helm effort in maneuvering situations. POWER ASSIST is a unique helm-activated assisted steering feature that can augment and possibly replace separate electric and power-robbing, engine-driven power steering systems on many vessels. POWER ASSIST reduces steering system complexity and costs while increasing economy.

▸▸▸ *Spec P84*

Instruments

FI501
FI502
FI503
FI504
FI505
FI506
FI507

Precision Instruments for Safe and Comfortable Boating

The FURUNO FI50 series of navigation is designed to meet the needs of sail boaters and power boaters alike. These precision instruments provide a wide variety of information even under the harshest conditions when connected to the appropriate sensors.

FI50 series

NAVnet 3D/TZ Connect
Enhanced Sunlight Viewable
CAN bus

WIND
FI501

Apparent and True Wind Angle are displayed in both analog and digital format when connected to the FI5001 or other CAN bus/ NMEA2000 wind measurement device.

CH WIND
FI502

The FI502 provides detailed and precise wind bearing measurements from 60 port to 60 Starboard, an important range for Close Hauled (CH) points of sail.

Data displayed

•Apparent and true wind speed •Apparent and true wind angle •Maximum true wind speed •MAX/LOW true wind speed alarm •High/Low apparent wind angle alarm •Beaufort wind speed •VMG to windward

RUDDER
FI506

When connected to an Autopilot, the analog FI506 Rudder Angle Display shows precise rudder angle information.

Data displayed

•Rudder angle

COURSE PILOT
FI505

The FI505 provides a digital compass readout with an analog "Off Course" needle that greatly assists the helmsman in maintaining a desired course. When connected to a Satellite Compass, smooth and precise ROT (Rate Of Turn) of the boat is shown with the analog needle. The needle can also be used to verify Autopilot steering performance.

Data displayed

•Current heading •Locked heading •Average heading
•Course over ground •ROT

DIGITAL
FI503

The FI503 displays critical digital navigation data such as depth, speed, temp, and weather data in a 3-way split screen.

Specifications of FI50 series

Display:	Analog and digital LCD (FI501, 502, 505) Digital LCD (FI03, 504, 507) Analog (FI506)
Power supply:	12 VDC, less than 0.1 A
Temperature:	–15°C to +55°C
Waterproofing:	IP56

Data displayed

❶ •Current depth •Shallow/deep alarm •Shallow/deep anchor alarm •Wind angle •High/Low apparent wind angle
❷ •Boat speed •MAX/AVG STW •SOG •MAX/AVG SOG
•VMG to windward •Wind speed •MAX true wind •MAX/LOW true wind speed alarm •Beaufort wind speed
❸ •LOG •Trip •Count up/down timer •Water temperature
•Air temperature •Air pressure •Humidity •Wind chill temperature •Dew point

MULTI
FI504

1 DIN type

MULTI XL
FI507

1.5 DIN type

The FI504 and FI507 feature large digital displays with easy-to-read characters presenting all of the information available in the CAN bus network*. Alternating data display mode switches the user-selected information in 3-second intervals.

Data displayed

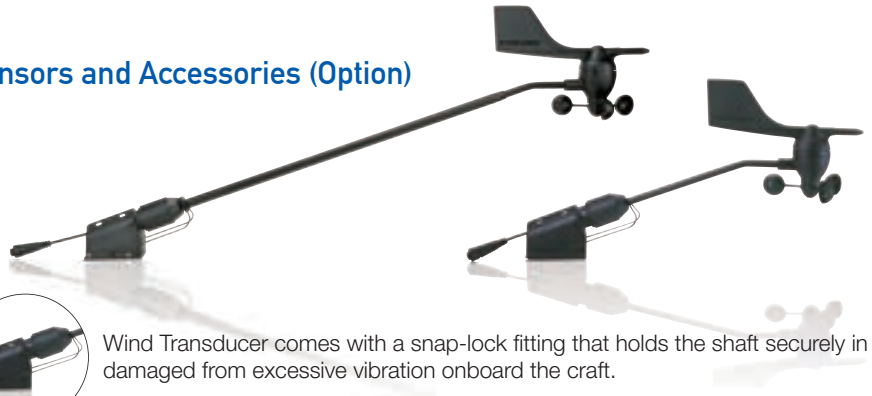
•Displays all information of the FI50 series*
•NAVIGATION (Bearing/distance to WPT, XTE, WPT number/name, L/L, Satellites tracked, Roll & Pitch)
•ENVIRONMENT (Battery voltage, Time & Date)
•ENGINE (Trip fuel used, Fuel consumption, Engine RPM)

▸▸▸ *Spec P86*

* Except ROT. ROT can be displayed on FI505.

FI50 SERIES

Sensors and Accessories (Option)



Wind Transducer
FI5001/5001L
(Long Shaft)

Angle Accuracy:	Better than ±10°
Speed Accuracy:	Better than ±5 % (20 kt)
Power supply:	12 VDC, less than 40 mA
Transducer cable (option):	30/50 m

Wind Transducer comes with a snap-lock fitting that holds the shaft securely in order to prevent the sensor from being damaged from excessive vibration onboard the craft.

Depth/Speed/ Temp Sensor
DST800

Frequency:	235 kHz
Cable:	6 m

Junction Box
FI5002

CAN bus backbone x 2 ports
CAN bus x 6 ports
Power supply: 12 VDC, less than 2A

▸▸▸ *Spec P87*

Easy to Install

Surface-mount the displays with a hole saw, and then install the 4 hidden screws under the front bezel. Installation is easy and clean with a finished appearance. (1" (26mm) bulkhead protrusion)

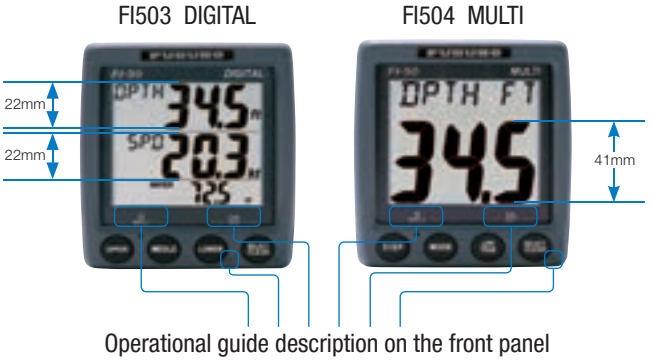
Surface mount installation

Optional “Low-Profile” flush-mounting front panels provide a cosmetic match to NavNet 3D displays and a custom console appearance (0.4" (10mm) bulkhead protrusion).

Flush mount installation with optional front panel

Easy to Read with Silver Bright LCD Displays

The FI50 Series utilize high-contrast, backlit LCD displays for superior viewing even in direct sunlight. Each unit features an easy-to-read display and 4 programming buttons for simple operation.



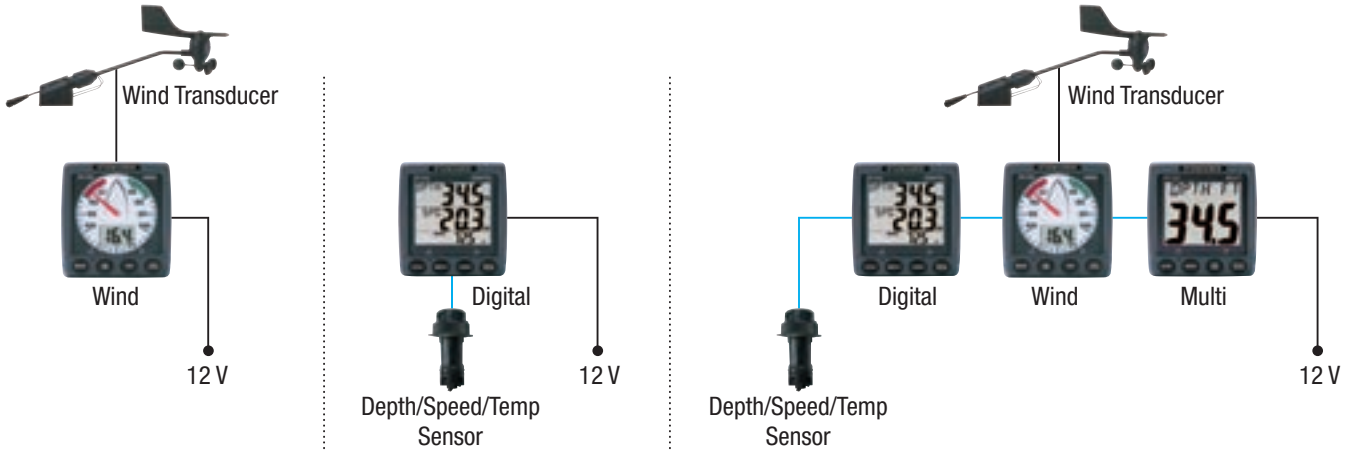
Operational guide description on the front panel

Automatic Backlight Adjustment

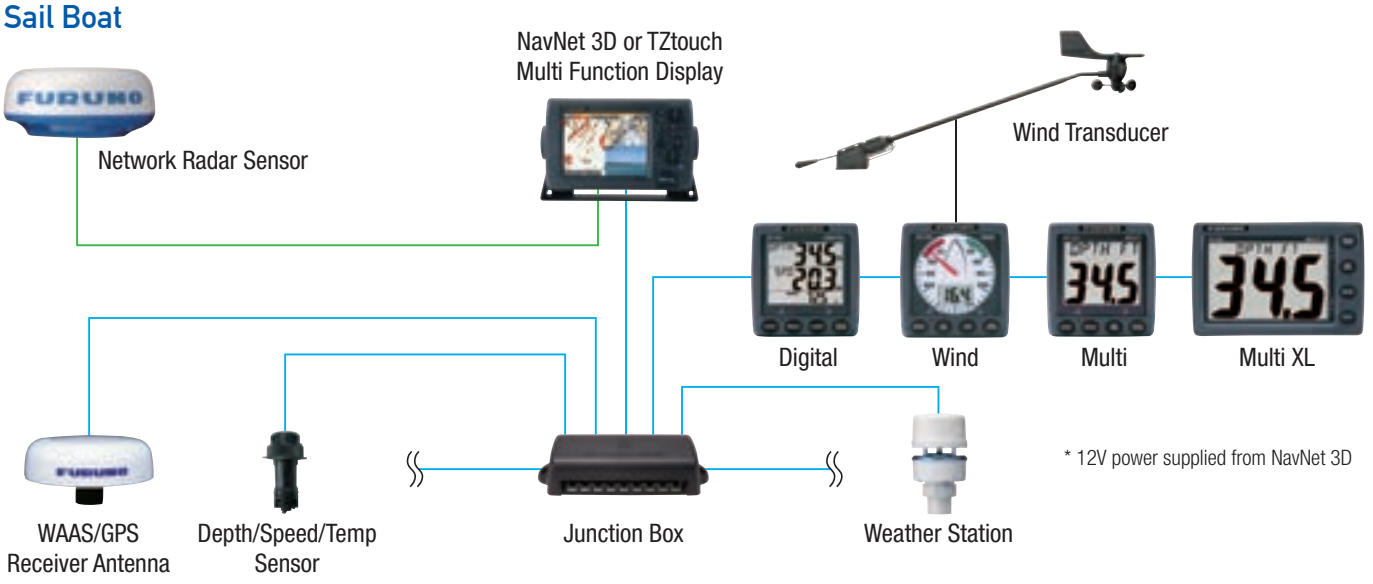
The FI50 series of instruments minimize power consumption by turning off the backlight during the daytime. Sensors on the front panel measure ambient lighting conditions and adjust the on/off condition of the display backlighting accordingly.

SYSTEM CONFIGURATIONS

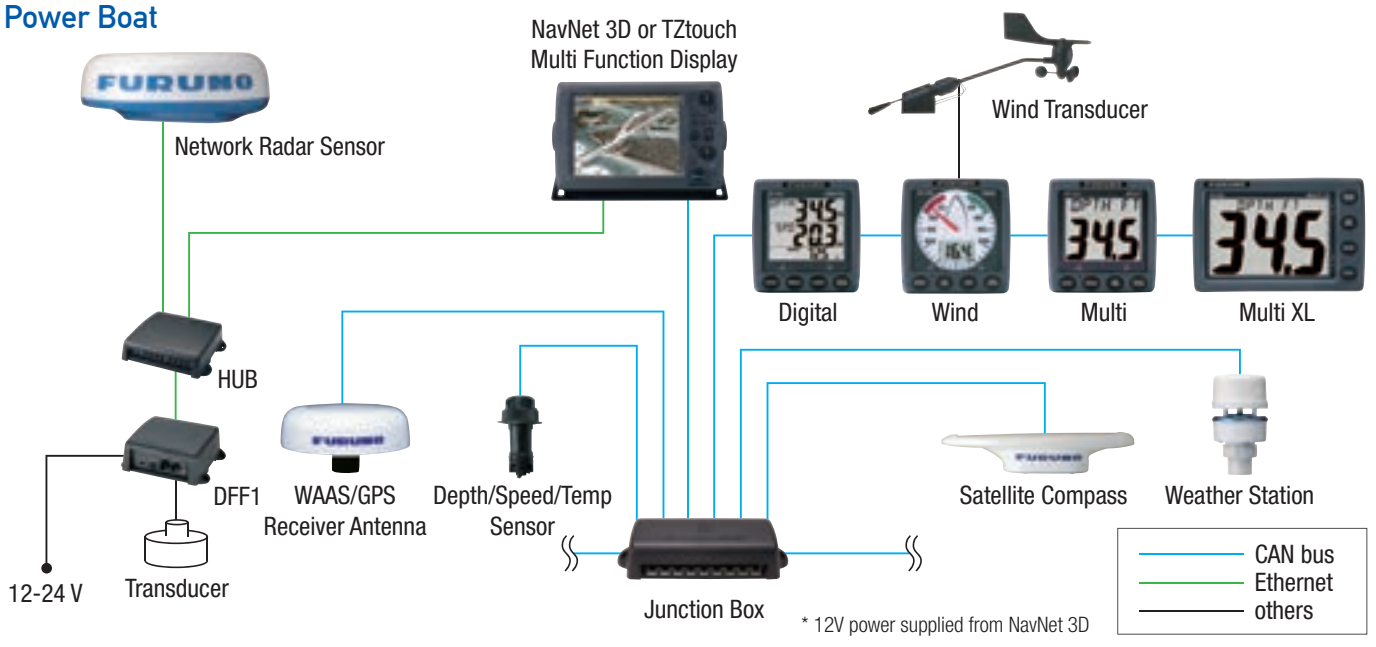
Basic Configurations



Sail Boat



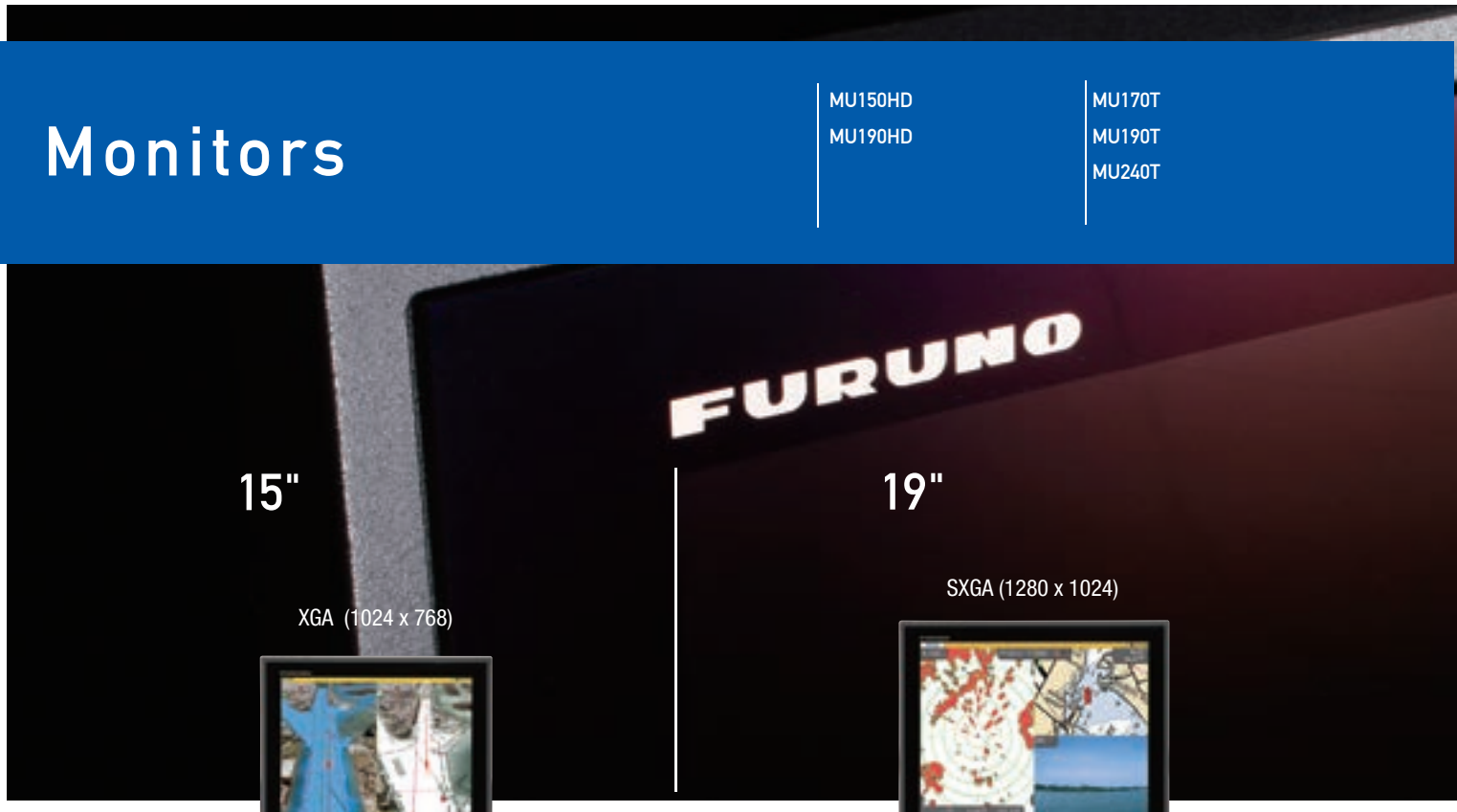
Power Boat



Monitors

MU150HD
MU190HD

MU170T
MU190T
MU240T



15"

XGA (1024 x 768)

MU150HD

1000 cd/m²

19"

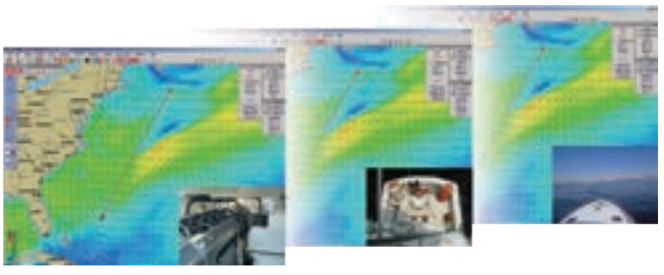
SXGA (1280 x 1024)

MU190HD

1000 cd/m²

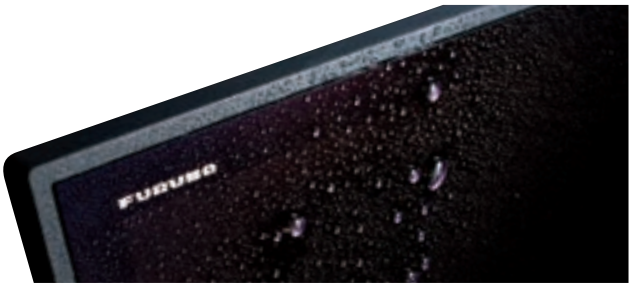
Picture In Picture (PIP)

Composite video (NTSC/PAL) input is available for displaying video images from an onboard TV/DVD player. For monitors with more than two Composite Video Inputs, the images in the PIP window automatically switch alternately.



Waterproof

The MU series of waterproof displays are built to stand up to tough marine conditions when mounted at fly bridge console. The display can be rinsed in water for easy, worry-free cleaning.



Slim, lightweight and compact

The MU Display series is slim in depth, light weight and is so compact that it fits right into virtually any console.
It's space-saving design makes optimum use of your dashboard.

photo: MU150HD/MU190HD

Low power consumption

Utilizing the latest LED backlight, the MU-Display series delivers sharp, high quality images with bright colors and all at very low power consumption.

With the introduction of a variety of Black Box products, marine displays are becoming more of a necessity than a luxury

For crystal clear presentation for your Radar, Chart Plotter, NavNet or other electronics turn to the unmatched FURUNO quality and reliability that you depend on.

17"

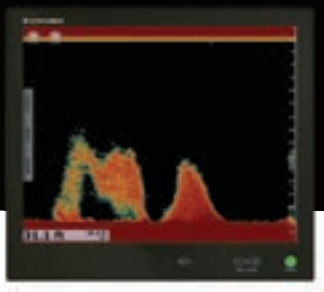
SXGA (1280 x 1024)

MU170T

1000 cd/m²

19"

SXGA (1280 x 1024)



MU190T

800 cd/m²

24"

HD1080 (1920 x 1080)
16:9 Aspect Ratio

MU240T

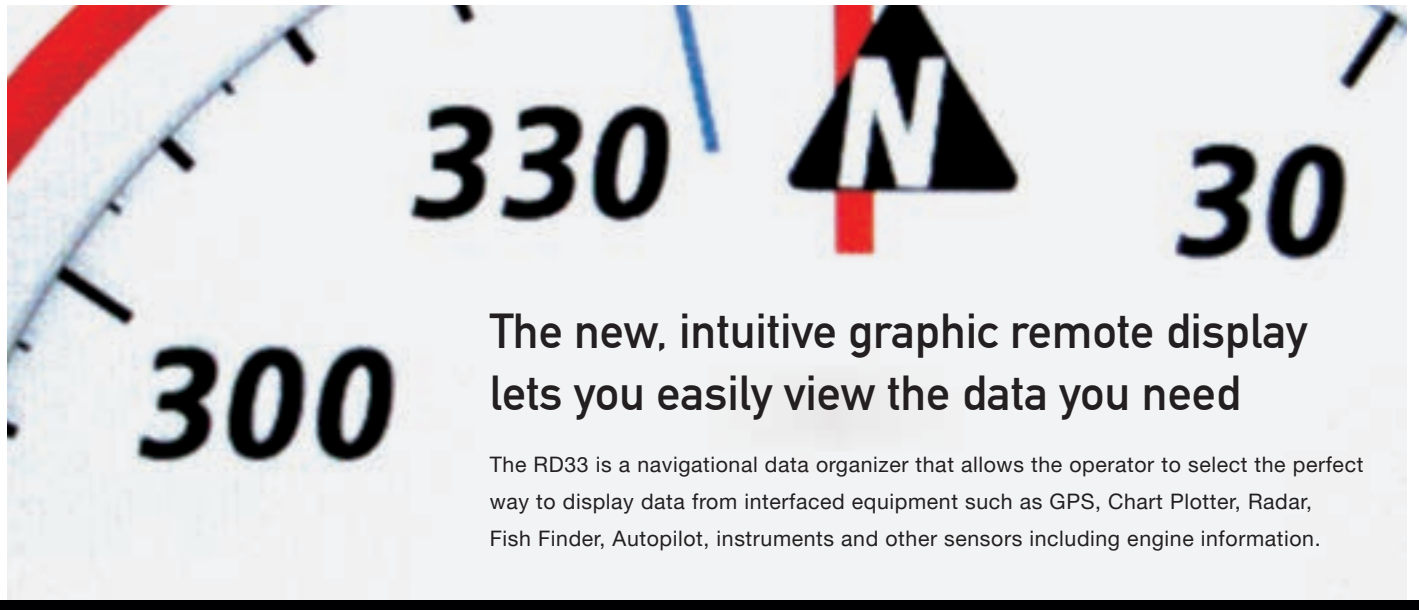
1000 cd/m²

	MU 150HD	MU 190HD	MU 170T	MU 190T	MU 240T
Crystal clear marine grade monitors for use as main or remote display	✓	✓	✓	✓	✓
Bonded LCD provides clear view in any weather condition and avoids concerns such as dew condensation	✓	✓	✓	✓	✓
Available in table top or flush mount (Mounting bracket is optional)	✓	✓	✓	✓	✓
Automatic dimmer sensor adjusts the display brightness as lighting conditions change	✓	✓	✓	✓	✓
Customizable input names for easy on-the- fly identification and switching between onboard Radar, Sonar, Sounder, Camera, etc.	✓	✓	✓	✓	✓
Any of the composite inputs are PIP (Picture-In-Picture) capable, with adjustable size and screen location	✓	✓	✓	✓	✓
Power ON/OFF automatically by the DVI signal	✓	✓	✓	✓	✓
1,000 cd/m2 brightness provides superior visibility even in direct sunlight	✓	✓	✓	✓	✓
Built-in scaler allows accepting up to various resolutions	VGA to SXGA	VGA to SXGA	VGA to XGA	VGA to SXGA	VGA to SXGA
Selectable inputs including RGB analog, DVI (Digital Video Interface) and Composite	✓	✓	✓	✓	✓
Multi-Touch Control - compatible with NavNet TZtouch			✓	✓	✓

Flush mounting

For space-saving installation and additional security, flush mount installation is optionally available for all the MU-Display series. The display unit can be fixed from either front or rear with the flush mount kit for MU150HD/190HD

▸▸▸ *Spec P88*



The new, intuitive graphic remote display lets you easily view the data you need

The RD33 is a navigational data organizer that allows the operator to select the perfect way to display data from interfaced equipment such as GPS, Chart Plotter, Radar, Fish Finder, Autopilot, instruments and other sensors including engine information.

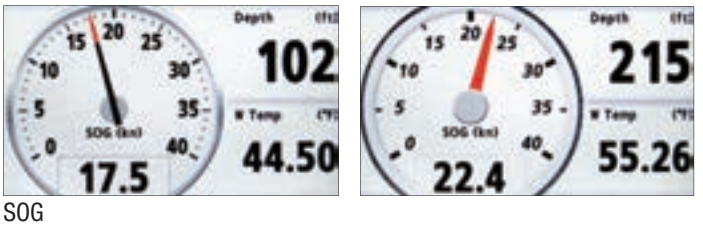
Remote Display | RD33

4.3" REMOTE DISPLAY
RD33

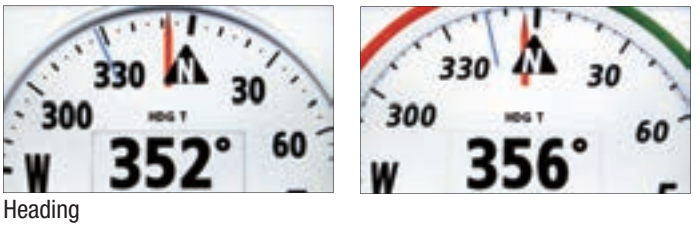
NAVnet 3D Connect | Enhanced Sunlight Viewable | CAN bus

- 4.3" "Sunlight Viewable" color LCD
- Maximum visibility under various ambient conditions both during night and under direct sunlight (brightness of LCD is 700 cd/m^2)
- Enhanced data legibility thanks to large characters and high resolution visual aid
- Full-screen single presentation down to six-way split screen presentation available
- Supports both CAN bus and NMEA0183 interface
- Two independent CAN bus input and output ports incorporated for daisy chain networking
- Internal NMEA0183/CAN bus conversion capability available
- Straightforward operation comparable to NavNet 3D
- Perfect match on the helm station when flush-mounted together with NavNet 3D MFD

Two different styles of presentation available

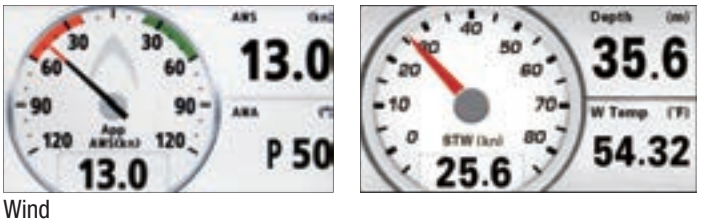


SOG



Heading

Roll & Pitch

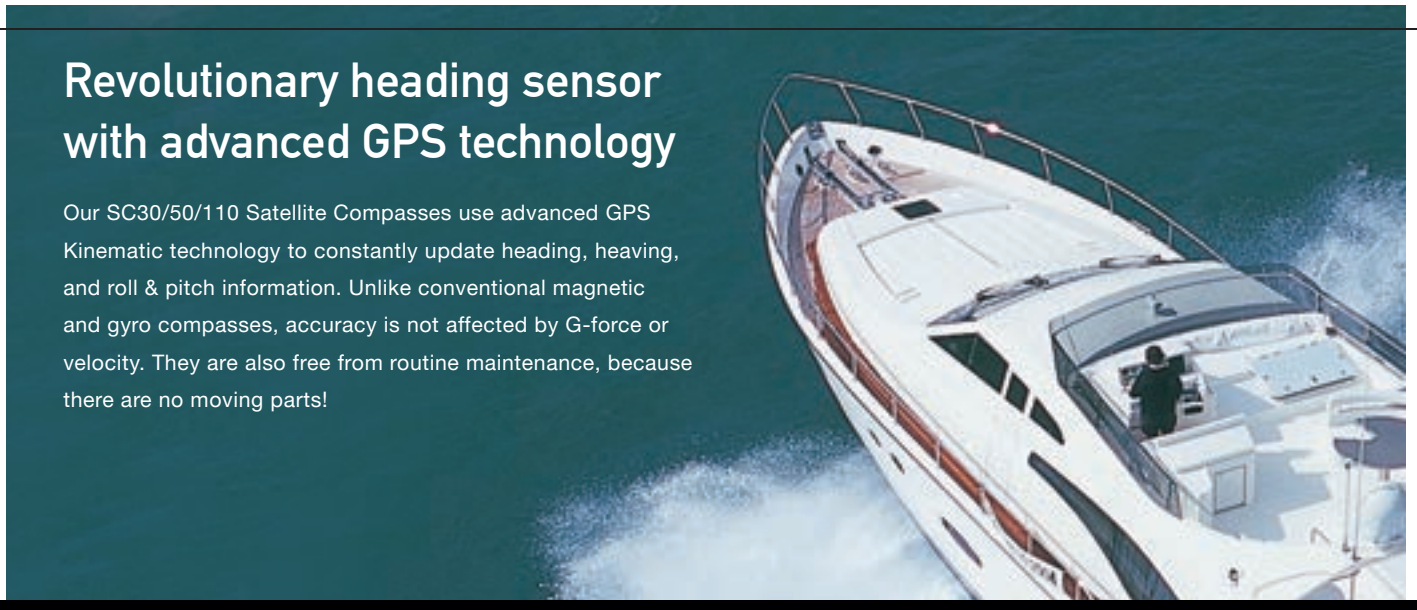


Wind

▸▸▸ *Spec P89*

Revolutionary heading sensor with advanced GPS technology

Our SC30/50/110 Satellite Compasses use advanced GPS Kinematic technology to constantly update heading, heaving, and roll & pitch information. Unlike conventional magnetic and gyro compasses, accuracy is not affected by G-force or velocity. They are also free from routine maintenance, because there are no moving parts!



Compass

SC30
SC50/110
PG700
PG500

SATELLITE COMPASS SC30

NAVnet 3D TZ Connect
NMEA2000 Certified
NMEA 2009/2010/2011

- Combine with Radar for constant ARPA target tracking and stable echo trails
- Combine with Radar and Chart Plotter for spot-on Radar Overlay
- Combine with Sonar and Fish Finder for stable echo images and accurate ship's track information
- Combine with NAVpilot for precise Autopilot control

Basic specifications of SC30

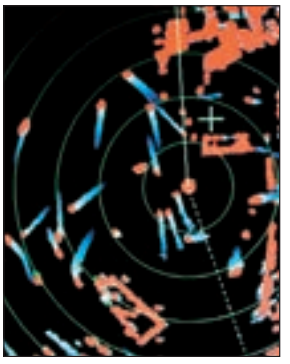
	SC30
Heading Accuracy	0.5° rms
GPS Fix	10m (95%)
DGPS Fix	N/A
WAAS Fix	3m (95%)
Follow-up Rate	45° per sec.
Setting Time	3 min
Antenna Unit	Radome

Radar

NavNet TZtouch/3D/FR8002 series

True Motion Echo Trail

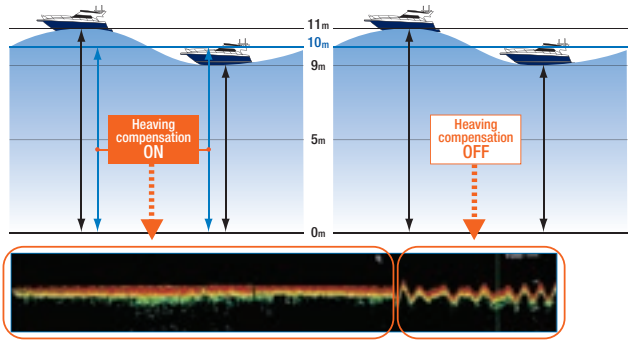
True echo trails are available when the satellite compass is connected to your FURUNO Radar. True echo trails are helpful for determining own ship's movement as well as the movement of other vessels. Heading accuracy and sensing speed ensures that trails are displayed in smooth lines.



Fish Finder NavNetTZtouch/3D/FCV1150/etc

Heaving Compensation

The satellite compass provides compensation data to your Fish Finder to present a display free from undulations due to vessel's heaving in rough seas.

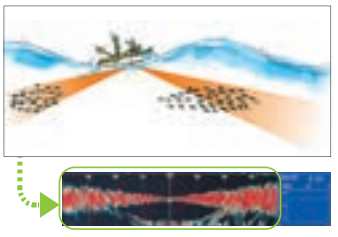


Sonar CH300/CH270/CH250/etc

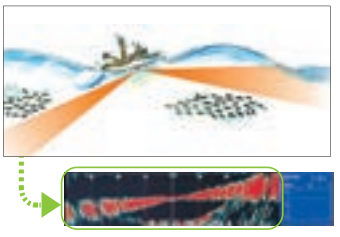
Pitch And Roll Compensation

Pitch and Roll Compensation data allows FURUNO Sonar systems to display an unwavering presentation on the screen and facilitates stable detection, even in foul weather conditions.

Beam Stabilizer ON



Beam Stabilizer OFF



▸▸▸ *Spec P90*

SATELLITE COMPASS

SATELLITE COMPASS
SC50/SC110

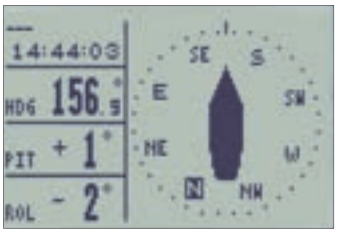
NAVnet 3D Connect

Radome Antenna
SC303 for the SC50

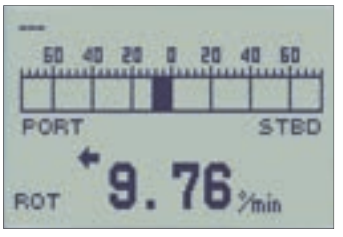
Open Antenna
SC1203F for the SC110

Heading

NAV Data



Compass Rose



Rate of Turn

- Precise heading data for Autopilot, Radar, AIS, Sonar and Chart Plotter
- Rapid follow-up rate (45°/s)
- Works as motion sensors with accurate pitch/roll data output
- 100% free from regular maintenance
- Tri-antenna system to improve the accuracy and reduce the effects of ship's motions
- Heading data output in IEC61162-2
- Pitch and roll output in both analog and digital formats for compensation for ship's motion

Basic specifications of SC50/110

	SC50	SC110
Heading Accuracy	0.5° rms	0.3° rms
GPS Fix	10m (95%)	10m (95%)
DGPS Fix	5m (95%)	5m (95%)
WAAS Fix	3m (95%)	3m (95%)
Follow-up Rate	45° per sec.	45° per sec.
Setting Time	3 min	4 min
Antenna Unit	Radome/Open	Open

▸▸▸ *Spec P90*

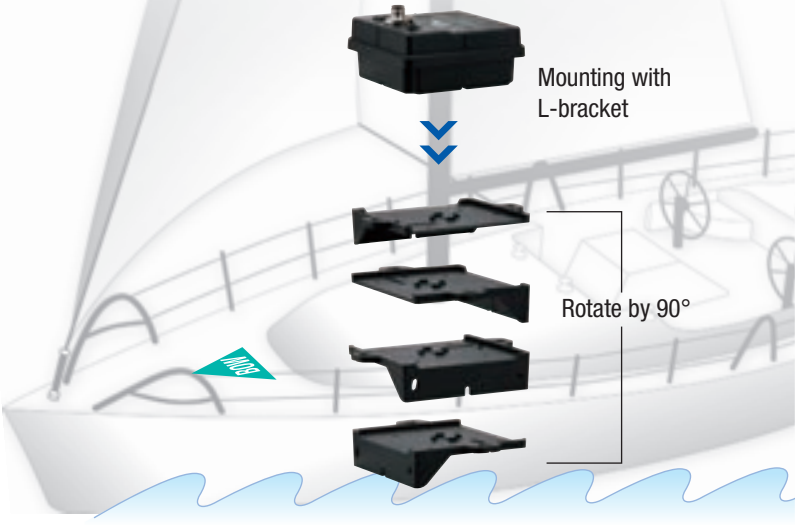
INTEGRATED HEADING SENSOR

INTEGRATED
HEADING SENSOR
PG700

- Providing heading data of high accuracy
- Black box type fluxgate magnetic sensor
- CAN bus interface incorporated
- Can be mounted on both the bulkhead and floor thanks to L-bracket

Easy mounting with included L-bracket

PG700 can be mounted on both the bulkhead and floor with L-bracket.*



*Since the L-bracket can rotate by 90 degrees, the PG700 on the L-bracket can face toward the bow of the craft.

INTEGRATED
HEADING SENSOR
PG500R

- Inexpensive heading sensor with the highest accuracy and stability in this class of equipment
- Automatic correction for local magnetic variation with an appropriate GPS navigator or manual correction with an optional remote display RD33
- High stability for a solid-state rate gyroscope
- Compact waterproof housing with visual status indicators for a simple installation
- Three heading data output ports: two IEC/NMEA0183 ports, one AD-10 port incorporated

▸▸▸ *Spec P91*

Safety at sea means staying connected

Even though everything on your boat is well maintained and in good working order, you've got to be sure that you're safe, and that means receiving the correct navigational information as well being able to send out a distress signal in case of emergency.
FURUNO offers a complete line of communications equipment to keep you connected to others, including AIS, single- or multi-station Radiotelephones, NAVTEX receivers, weather facsimile and Inmarsat mobile earth stations. Our broad range of communications equipment offers recreational boaters the same quality and reliability chosen by the commercial maritime community.

Communications

- FA30/50/150
- FS1575
- FS2575
- FM8900S
- LH3000
- LH3010
- NX300
- FAX408
- FAX30
- FELCOM250/500
- SafeComNet™

AIS Receiver

AIS Receiver
FA30

The FA30 AIS Receiver helps to enhance situational awareness by receiving critical navigation data from other AIS-equipped vessels.
The FA30 outputs AIS data to NavNet 3D and TZtouch as well as to a PC via Ethernet connection. The FA30 can also be interfaced with your FURUNO Radar or Chart Plotter.

Information to be received

Dynamic Data	• Ship's position • Coordinated universal time (UTC) • Course over ground (COG) • Speed over ground (SOG) • Rate of turn (ROT) • Heading • Navigation status*
Static Data	• MMSI (Maritime Mobile Service Identity) • IMO number* • Ship's name • Type of ship • Call sign • Length and beam • Location of position-fixing antenna on the ship
Voyage Related Data	• Ship's draft* • Hazardous cargo • Destination and ETA*
Safety-related message	

* Class-A AIS only

AIS Transponder

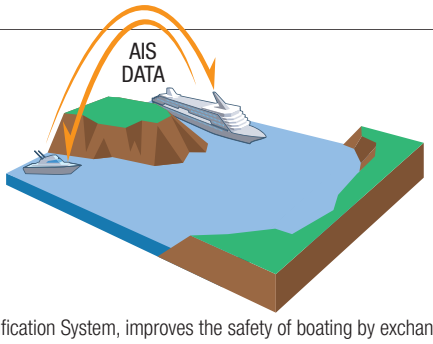
Class-B
AIS Transponder
FA50

The FA50 is a Class B AIS (Automatic Identification System) capable of exchanging navigation and ship data between own ship and other ships or coastal stations. The FA50 complies with relevant international regulations and standards, such as IMO, ITU-R, and IEC. The FA50 sends AIS data to NavNet 3D and TZtouch networks or a PC via Ethernet connection, and can also be interfaced with a FURUNO Radar or Chart Plotter to supplement these navigation systems.

Class-A
U-AIS Transponder
FA150

The FA150 is a Universal AIS Transponder capable of exchanging navigation and ship data between own ship and other ships or coastal stations. The FA150 consists of a transponder unit and a compact display unit with 4.5" Silver Bright Display designed to accommodate a simple and space-saving installation with a user-friendly ergonomic design. The FA150 complies with relevant international regulations and standards, such as IMO, ITU-R, and IEC.

What is AIS?



AIS, or Automatic Identification System, improves the safety of boating by exchanging information about the status of your own vessel with other AIS-equipped vessels.
The system utilizes VHF broadcasts to share information about the navigational situation, including nav data from individual vessels as well as buoys and other aids to navigation. AIS data includes position, course, and speed over ground, allowing you to foresee course changes of specific targets. Because AIS uses VHF rather than line of sight, AIS targets are constantly visible, even when they are shrouded in darkness or fog, or hidden behind capes, bends or other obstructions.

AIS Symbols

Sleeping AIS Target | Activated Target | Selected Target

Lost Target | Dangerous Target

AIS COG/SOG vector changes its length with speed and a ROT mark is viewable at the tip of AIS target when a target ship is equipped with a FURUNO satellite compass SC30/50/110 or other compatible equipment.

▸▸▸ *Spec P92*

MH/HF Radiotelephone

MH/HF Radiotelephone

FS1575/FS2575

(150 W) (250 W)

GMDSS

- MF/HF Radiotelephone with DSC facility
- Fully meets GMDSS carriage requirements for SOLAS ships operating in A3 and A4 sea areas
- Meets the new ITU recommendation on digital selective calling system for use in the Maritime Mobile Service, ITU-R M.493-13
- High-contrast 4.3" bright color LCD (480x272 pixels)
- Capable of distress, safety and routine communication
- Instant selection of 256 user-specified channels with a rotary knob or direct keypad input
- Quick access to DSC message composition by dedicated keys on the control unit
- Quick access to dedicated functions in the menu operation using numeric keypad

What is DSC (Digital Selective Calling)?

DSC (Digital Selective Calling) is a global protocol that uses VHF channel 70 (156.525 MHz) to exchange digital messages between DSC-equipped vessels and onshore stations within range. These messages include vessels identification number, location, and purpose of call. Distress messages are repeated every 4 minutes until they are acknowledged.

▸ *Spec P93*

VHF Radiotelephone

VHF Radiotelephone

FM8900S

(Semi-duplex)

GMDSS

- Semi-duplex 25-Watt VHF Radiotelephone with a built-in Class-A DSC and CH70 Watch Receiver
- Fully meets GMDSS carriage requirements for SOLAS ships
- Meets the new ITU recommendation on digital selective calling system for use in the Maritime Mobile Service, ITU-R M.493-13
- Easy to read, high-contrast 4.3" bright color LCD
- Further enhancement in noise reduction and speaker for superb voice quality
- Quick access to CH16 key
  - Press the CH16 key on the keypad to switch to Radiotelephone display and select CH16 instantly
- Easy channel selection with rotary control or direct keypad input
- Automatic entry of own ship position and time through the interfaced GPS receiver
- ATIS signal transmission available for inland waterways
- Connect to an office or home via an existing PSTN (Public Switched Telephone Network)

▸▸▸*Spec P94*

Loud Hailer/Optional Intercom Speaker/NAVTEX RECEIVER

Loud Hailer
LH3000

- High-performance, 30 W output power Loud Hailer
- Built in, high-quality speaker
- Hail, Intercom and Alarm functions
- Eight internationally recognized warning signals
- Up to four intercoms are connectable for two-way communication between master and one or all remote stations

Low profile, solidly built intercom speakers can be installed on the deck or flybridge.

Optional
Intercom Speaker
LH3010

- Backlit keys for nighttime operation
- Audio input for CD, radio, etc.
- LED indicators keep you informed of equipment status
- Optional low-profile, quality speakers for installation on deck or fly bridge

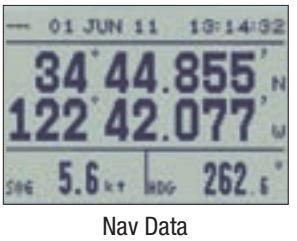
NAVTEX RECEIVER
NX300

- Paper-free Navtex receiver
- Dual frequency for both international and domestic/local Navtex messages
- Uninterrupted reception of Navtex messages
- Memory of up to 28,000 characters
- High contrast 4.5" Silver Bright LCD
- Nav data display when connected to GPS
- Automatic selection of the Navtex station according to position when connected to GPS
- Low power consumption
- Memory backup with long-life lithium battery

Message Category

A Navigation warning
B Meteorological warning
C Ice report
D Search and rescue information/piracy and armed robbery
E Meteorological forecast
F Pilot message
G Decca message
H Loran-C message
I Omega message
J Differential omega message
K Other electronic navigational aid and system message
L Navigational warning (additional)
M-Y Reserved – presently not used
V Notice to Fishermen (US only)
Z QRU (no message on hand)

Message List



Nav Data

▸▸▸ *Spec P95*

WEATHER FACSIMILE RECEIVER

WEATHER FACSIMILE RECEIVER
FAX408

- Provides weather charts and satellite images in nine gray levels on 8" thermal paper
- Electronic scanning with thermal head recording system provides high quality facsimile images
- 9-tone gradation recording provides clear and detailed weather images
- Automatic channel selection by judging the quality of signal reception
- All known facsimile channels in 2-25 MHz bands are pre-programmed: 150 channels
- Additional memory capacity of 164 user-programmable channels available
- Full automatic operation by a built-in schedule timer (16 programs can be set per week for automatic operation)
- Quiet thermal printing due to minimal mechanical components

BLACK BOX WEATHER FACSIMILE RECEIVER
FAX30

*A PC is to be procured locally.

- Cost effective paperless Weatherfax and Navtex receiver
- Connect directly to a NavNet 3D/TZtouch display or through an Ethernet hub
- Connect to a generic PC equipped with Ethernet
- Selectable display colors: 8 gray tones, monochrome, blue shades, pink and black, red and blue
- User friendly softkey menu operation on NavNet display
- Web browser navigation on generic PC, no proprietary software required
- Print images and messages from generic PC and printer
- Store a maximum of 12 Weatherfax images (depending on file size)
- Navtex messages can be retrieved in a table listing of up to 130 stored files
- Stored images/messages can be shown at any time
- 320 user programmed channels
- Noise rejection for clear image
- Thumbnail view for easy selection of stored images

▸▸▸ *Spec P96*

INMARSAT FleetBroadband

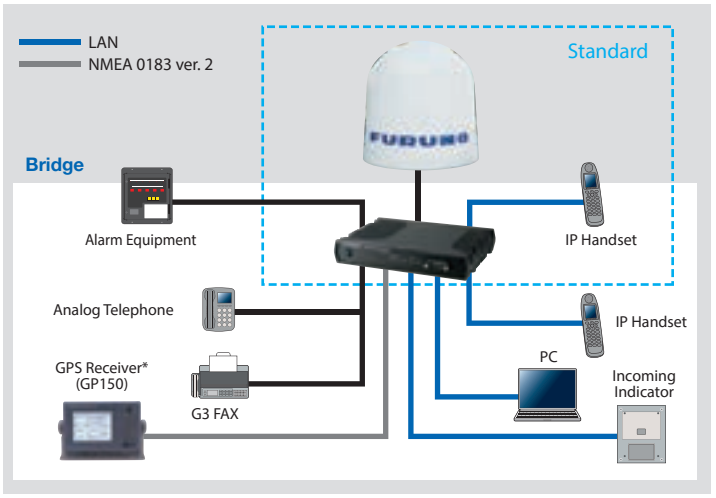
INMARSAT
FleetBroadband
FELCOM500

INMARSAT
FleetBroadband
FELCOM250

- IP handsets and Incoming Indicators (option) can be integrated through Ethernet
  - · Multiple IP handsets can be incorporated into the network by using the switching hub
  - · Different ringtones can be set for each of the communication lines for easy recognition of the incoming calls
- IP-PBX incorporated
  - · Comprehensive selection of telephone exchange functions available, i.e., internal communication lines, incoming call routing, etc.
  - · Wide range of incoming call setting available, i.e., group call function, etc.
- Incoming call routing allows for assignment of multiple extension numbers to each of the handsets onboard for each voice line with a single SIM card
  - · Any incoming calls can be routed to any handsets in a ship according to the extension numbers assigned
- Built-in NAT router facilitates smooth network integration to the Internet
- Wide variety of security settings available, i.e., firewall, IP filter, etc.
- No dedicated software required for configuration setup (web server function incorporated)
  - · Configuration setup can be done by using web browser
- Supports PPPoE to facilitate automatic dial-up connection/disconnection via applications
- Wide variety of interface options available for communication unit FB2000
- Simplified installation through a compact antenna unit
  - · FELCOM250 antenna diameter 41.0 cm, weighing around 6 kg
  - · FELCOM500 antenna diameter 65.3 cm, weighing around 20 kg

Data rate (shared service)	up to 432 kbps (FELCOM500) up to 284 kbps (FELCOM250)
Data rate (dedicated service)	up to 256 kbps (FELCOM500) up to 128 kbps (FELCOM250)
Voice	available
FAX	available (3.1 k audio)
SMS	available
Service area	global
Billing	pay-as-you-go

FleetBroadband System Configuration



Equipment List

Model	FELCOM250	FELCOM500
Standard		
1. Antenna Unit	FB1250	FB1500
2. Communication Unit	FB2000	
3. IP Handset	FB8000	
Option		
Incoming Indicator	FB3000	
Analog Telephone	FC755D1	
G3 FAX	FAX2810/2820	
AC/DC Power Supply Unit	PR240	

*A vessel needs to notify Inmarsat Satellite of which spot beam area where the vessel is located. In this way, the Inmarsat Satellite can transmit the spot beam to the vessels location.

▸▸▸ *Spec P97*

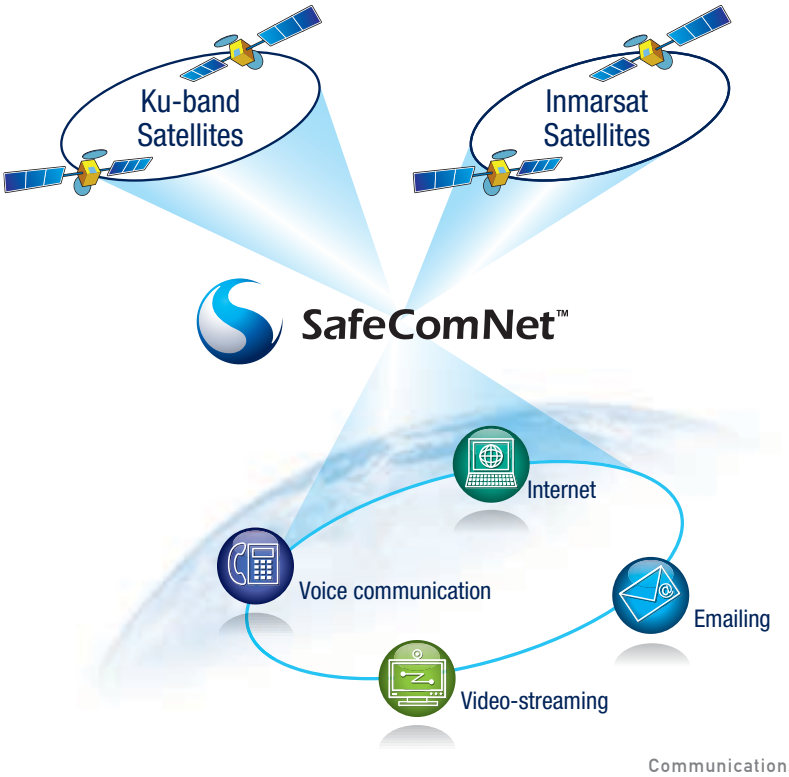
About SafeComNet™

SafeComNet is FURUNO's new satellite-based broadband communication solution using Inmarsat FleetBroadband and Ku-band VSAT. In recent years, Information Technology has grown and developed in the marine sector and vessel owners have requested greater access to communications, email and Internet facilities aboard their ships.

In response to this trend, satellite technology providers have developed FleetBroadband and VSAT as components of their network infrastructure to facilitate the link between vessels and onshore. FleetBroadband delivers a broadband service of up to 432 around the globe with moderate communication fees, while VSAT delivers a broadband service with speeds up to 1 Mbps. This is comparable to the communication speed we enjoy every day at the office or at home. While the hardware costs are higher, VSAT offers a flat monthly rate, "Always-on" network onboard, bringing the vessels network environment up to speeds comparable to what we are accustomed to onshore.

Safety and efficiency of navigation have become increasingly dependent upon IT-based communication and with increasing demands to enhance crew welfare onboard the vessels, the need to bring the IT network environment onboard the vessels has risen. Our answer to these market needs is a broadband network infrastructure onboard the vessels, provided through SafeComNet.

Through SafeComNet, FURUNO will not only supply a wide range of navigation products but will also deliver airtime, applications and worldwide service and support as an all-inclusive solution package.

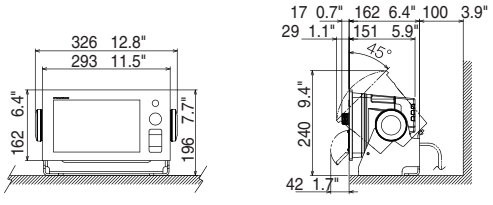


Technical Specifications

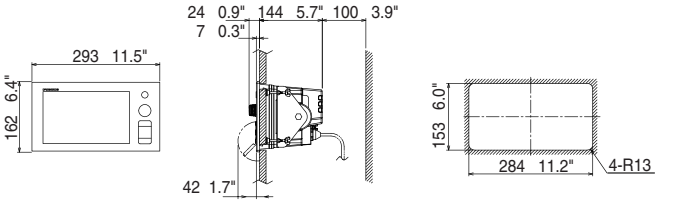
NavNet TZtouch

	MULTI FUNCTION DISPLAY		
	TZT9	TZT14	TZTBB
			
DISPLAY UNIT			
Type	Color TFT multi touch LCD		Supplied Seperately
Screen Size	9" wide	14.1" wide	n/a
Screen Resolution	WVGA 800 x 480	WXGA 1280 x 800	n/a
Screen Brightness	900 cd/m^2 (typical)		n/a
Language	English (US & UK), French, Spanish, German, Italian, Portuguese, Swedish, Danish, Norwegian, Finnish, Greek, Russian*, Chinese (simplified Chinese characters)*, Japanese *Available in future update.		
CHART PLOTTER			
Cartography	MapMedia mm3d chart (Jeppesen/Navionics/NOAA)		
Memory Capacity	30,000 user points, 30,000 points for ship's tracks, 200 planned routes (500 points per route)		
Alarms	Anchor Watch, XTE, Proximity, Depth, Temperature, Speed, etc.		
RADAR			
Display Modes	Head-up, North-up* *Heading input required.		
Echo Trail	Interval: 15 s, 30 s, 1 min, 3 mins, 6 mins, 15 mins, 30 mins and continuous		
INTERFACE			
CAN bus	1 Port		
LAN	1 Port (100 BASE-TX)	3 Ports (100 BASE-TX)	
USB	1 Port (USB2.0)		
Video Output	1 Port (DVI-D)		
Video Input	2 Ports (NTSC/PAL)		
Line Out	1 Port		
MIC In	1 Port		
SD Card Slot	2 Slots (SDXC card - supports upto 128GB)		
ENVIRONMENT			
Temperature (IEC60945)	-15°C to + 55°C		
Waterproofing	IP56		
POWER			
Power Supply	12-24 VDC		
Power Consumption	42 W (3.5 - 1.8 A)	60 W (5.0 - 2.5 A)	TBA

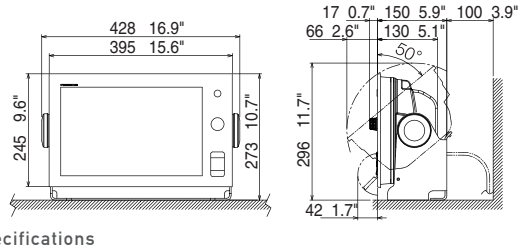
Multi Function Display (Table-top Mount) TZT9 — 4.7 kg 10.4 lb



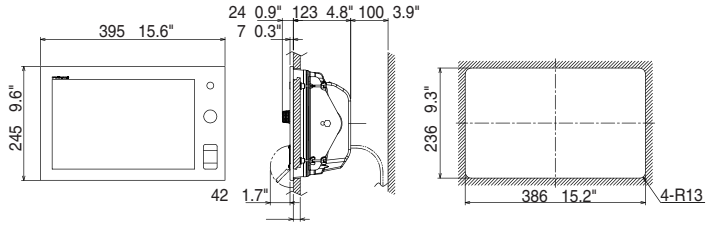
Multi Function Display (Flush Mount) TZT9 — 4.5 kg 9.9 lb



Multi Function Display (Table-top Mount) TZT14 — 8.0 kg 17.6 lb



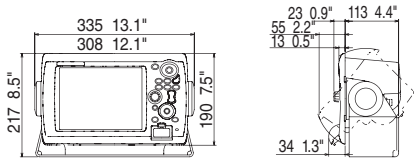
Multi Function Display (Flush Mount) TZT14 — 7.1 kg 15.6 lb



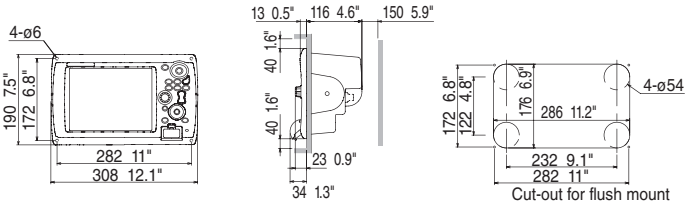
NavNet 3D

		MULTI FUNCTION DISPLAY	
		MFD8	MFD12
			
DISPLAY UNIT			
Type		**8.4" Color TFT LCD**	**12.1" Color TFT LCD**
Screen Size		**8.4", 170.4 x 127.8 mm**	**12.1", 246.0 x 184.5 mm**
Screen Resolution		**VGA 640 x 480 pixels**	**SVGA 800 x 600 pixels**
Screen Brightness		**700 cd/m^2 (typical)**	**1100 cd/m^2 (typical)**
Display Colors		**Chart Plotter/Menu: 65,536 colors Fish Finder: 64 colors Radar: 32 Colors**	
Language		**English (US & UK), French, Spanish, German, Italian, Portuguese, Swedish, Danish, Norwegian, Finnish, Dutch, Japanese**	
PLOTTER CHARACTERISTICS			
Memory Capacity		**Up to 10,000 points for ship's tracks, 2000 user points, 200 planned routes (100 points per route)**	
Display Modes		**Course plot, NAV data, Navigational instrument display, Engine monitoring display**	
Latitude Limit		**Between 85°N and 85°S**	
Alarms		**Anchor Watch, XTE, Proximity, Depth, Temperature, Speed, Trip Log, Countdown, Timer, Alarm Clock**	
RADAR CHARCTERISTICS			
Display Modes		**Head-up, Course-up*, North-up*, Relative Motion, True Motion** (*Heading input required **Heading and speed inputs required)**	
ARPA Target Tracking		**30 targets**	
AIS Target Tracking		**up to 100 targets**	
Echo Trail		**Interval: 15 s, 30 s, 1 min, 3 mins, 6 mins, 15 mins, 30 mins and continuous**	
INTERFACE			
Ethernet		**1 Port, 100 BASE-TX**	
NMEA0183		**3 Ports for Input/Output**	
Interface (NMEA0183)	**Input:**	**DBK, DBS, DBT, DPT, DTM, GGA, GLL, GNS, HDG, HDM, HDT, MDA, MTW, MWV, RMA, RMC, ROT, VDM, VHW, VTG, VWR, VWT, ZDA, FURUNO Proprietary Sentences are used for pitch, roll and heave data input from FURUNO Satellite Compass SC series.**	
	Output:	**AAM, APB, BOD, BWC, BWR, DBT, DPT, DTM, GGA, GLL, GNS, GTD, HDG, HDT, MTW, MWV, RMA, RMB, RMC, ROT, VHW, VTG, WPL, XTE, ZDA, ZTG, FURUNO Proprietary Sentence is used for true heading, pitch and roll data output.**	
CAN bus (NMEA2000)		**1 Port**	
Interface CAN bus (NMEA2000)	**Input:**	**059392, 059904, 060928, 126208, 126992, 126996, 127245, 127250, 127251, 127257, 127258, 127488, 127489, 128259, 128267, 129025, 129026, 129029, 129033, 129044, 129538, 129540, 129808, 130306, 130310, 130311, 130577**	
	Output:	**059392, 059904, 060928, 126208, 126464, 126992, 126996, 127245, 127250, 127251, 127257, 127258, 128275, 128259, 128267, 129025, 129026, 129029, 129033, 129283, 129284, 130306, 130310, 130311**	
USB Port		**1 Port (USB 1.1)**	
Video Output		**1 Port (DVI-D VGA)**	**1 Port (DVI-D SVGA)**
Video Input		**2 Ports (NTSC/PAL)**	
Line Out		**1 Port**	
SD Card Slot		**2 Slots**	
Variable Line Level Stereo Output		**—**	
ENVIRONMENT			
Temperature (IEC60945)	**Display Unit**	**-15°C to +55°C**	
	Processor Unit		
	Control Unit	**—**	
Waterproofing	**Display Unit**	**IP56 (IEC60529)**	
	Processor Unit	**—**	
	Control Unit	**—**	
POWER SUPPLY			

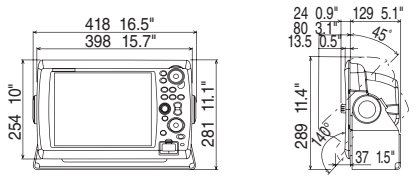
Multi Function Display (Table-top Mount) MFD8 4.7 kg 10.4 lb



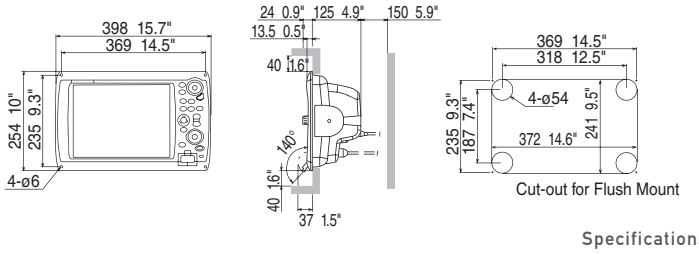
Multi Function Display (Flush Mount) MFD8 3.9 kg 8.6 lb



Multi Function Display (Table-top Mount) MFD12 6.8 kg 15.0 lb



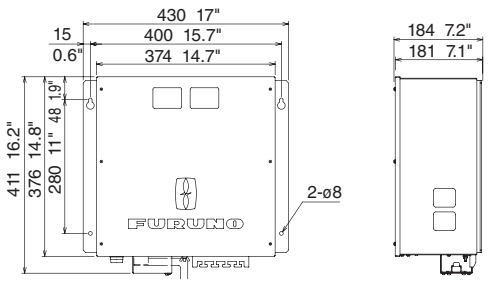
Multi Function Display (Flush Mount) MFD12 5.4 kg 11.9 lb



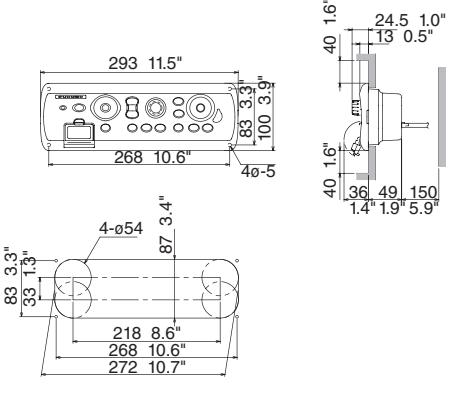
NavNet 3D

		MULTI FUNCTION DISPLAY
		MFDBB
		
DISPLAY UNIT		
Type		**Custom monitor of your choice**
Screen Size		**Please refer to the specifications of DCU12, MU-120C/155C/170C**
Screen Resolution		**SVGA 800 x 600 pixels, XGA 1024 x 768 pixels or SXGA 1280 x 1024 pixels**
Screen Brightness		**Please refer to the specifications of DCU12, MU-120C/155C/170C (Optional Supply)**
Display Colors		**Chart Plotter/Menu: 262,144 colors Fish Finder: 64 colors Radar: 256 Colors**
Language		**English (US & UK), French, Spanish, German, Italian, Portuguese, Swedish, Danish, Norwegian, Finnish, Dutch, Japanese**
PLOTTER CHARACTERISTICS		
Memory Capacity		**Up to 10,000 points for ship's tracks, 2000 user points, 200 planned routes (100 points per route)**
Display Modes		**Course plot, NAV data, Navigational instrument display, Engine monitoring display**
Latitude Limit		**Between 85°N and 85°S**
Alarms		**Anchor Watch, XTE, Proximity, Depth, Temperature, Speed, Trip Log, Countdown, Timer, Alarm Clock**
RADAR CHARCTERISTICS		
Display Modes		**Head-up, Course-up*, North-up*, Relative Motion, True Motion** (*Heading input required **Heading and speed inputs required)**
ARPA Target Tracking		**30 targets**
AIS Target Tracking		**up to 100 targets**
Echo Trail		**Interval: 15 s, 30 s, 1 min, 3 mins, 6 mins, 15 mins, 30 mins and continuous**
INTERFACE		
Ethernet		**4-Port Hub is included, 100 BASE-TX**
NMEA0183		**3 Ports for Input/Output**
Interface (NMEA0183)	**Input:**	**DBK, DBS, DBT, DPT, DTM, GGA, GLL, GNS, HDG, HDM, HDT, MDA, MTW, MWV, RMA, RMC, ROT, VDM, VHW, VTG, VWR, VWT, ZDA, FURUNO Proprietary Sentences are used for pitch, roll and heave data input from FURUNO Satellite Compass SC series.**
	Output:	**AAM, APB, BOD, BWC, BWR, DBT, DPT, DTM, GGA, GLL, GNS, GTD, HDG, HDT, MTW, MWV, RMA, RMB, RMC, ROT, VHW, VTG, WPL, XTE, ZDA, ZTG, FURUNO Proprietary Sentence is used for true heading, pitch and roll data output.**
CAN bus/NMEA2000		**1 Port**
Interface (CAN bus/ NMEA2000)	**Input:**	**059392, 059904, 060928, 126208, 126992, 126996, 127245, 127250, 127251, 127257, 127258, 127488, 127489, 128259, 128267, 129025, 129026, 129029, 129033, 129044, 129538, 129540, 129808, 130306, 130310, 130311, 130577**
	Output:	**059392, 059904, 060928, 126208, 126464, 126992, 126996, 127245, 127250, 127251, 127257, 127258, 128275, 128259, 128267, 129025, 129026, 129029, 129033, 129283, 129284, 130306, 130310, 130311**
USB Port		**2 Ports (USB 2.0)**
Video Output		**2 Ports (DVI-D)**
Video Input		**4 Ports (NTSC/PAL)**
Line Out		**1 Port**
SD Card Slot		**2 Slots**
Variable Line Level Stereo Output		**1 Port**
ENVIRONMENT		
Temperature (IEC60945)	**Display Unit**	**-15°C to +55°C (DCU12)**
	Processor Unit	**0°C to +45°C**
	Control Unit	**-15°C to +55°C**
Waterproofing	**Display Unit**	**IP56 (DCU12 when flush mounted) IEC60529**
	Processor Unit	**IP20**
	Control Unit	**IP56 (MCU-001 when flush mounted) IEC60529**
POWER SUPPLY		
		12-24 VDC
		104 W/149 W (with DRS2D)/154 W (DRS4D)/195 W (with DRS4A)/ 207 W (with DRS6A)/222 W (with DRS12A)/249 W (with DRS25A)
		100/110/220/230 VAC with optional rectifier RU-1746B-2

Multi Function Display MFDBB
Black Box Processor Unit MPU-001 15.0 kg 33.1 lb



Black Box
Control Unit MCU-001 1.0 kg 2.2 lb

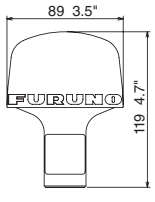


NavNet TZtouch/NavNet 3D Antennas

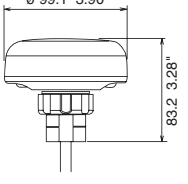
	GPS/WAAS RECEIVER ANTENNA	
	BBWGPS	GP330B
		
RECEIVER CHARACTERISTICS		
Receiver Type	Twelve discrete channels, C/A code, all-in-view, WAAS	
Receiving Frequency	L1 (1575.42 MHz)	
Time to First Fix	12 s (warm start) 90 s (cold start)	90 s (cold start)
Tracking Velocity	999 kn	999.9 kn
Geodetic Systems	WGS-84, NAD-27 and others	
Accuracy	10 m (GPS) 7 m (MSAS) 3 m (WAAS)	
ENVIRONMENT (IEC 60945 test method)		
Temperature	-25°C to +70°C	-25°C to +55°C
Waterproofing	IEC 60529 IPX6	IEC 60529 IP56
POWER SUPPLY		
	12-24 VDC	12 VDC
	1.3 W	1.4 W

		WEATHER STATION
		
RECEIVER CHARACTERISTICS		
Receiver Type		GPS: 12 channels parallel, 12 satellites, WAAS: 2 channels, C/A code,all-in-view, 8-state Kalman filter
Receiving Frequency		1575 MHz
Time to First Fix		60 s (cold start)
Tracking Velocity		999.9 kt
Accuracy		10 m (GPS) 3 m (WAAS)
INTERFACE		
LAN		1 port (NMEA0183/CAN bus)
Interface	**Input:**	VHW
(NMEA0183)	**Output:**	DTM, GGA, GLL, GSA, GSV, MDA, MWD, MWV, RMC, ROT, VTG VWR, VWT, XDR, ZDA
Interface	**Input:**	059904, 060928, 065286, 126208, 126720, 128259, 130821
(CAN bus)	**Output:**	059392, 060928, 065821, 065285, 065287, 126208,126464, 126720, 126992, 126996, 126998, 127251, 127257, 127258, 129025, 129026, 129029, 129033, 129044, 129538, 129539, 129540, 295539, 295540, 129044, 130306, 130310, 130311, 130323, 130822, 130823, 130880, 130881, 130944
ENVIRONMENT		
Temperature		-25°C to +55°C
Degree of protection		IPX6
Vibration		IEC 60945
POWER SUPPLY		
		12 VDC
		2.4 W

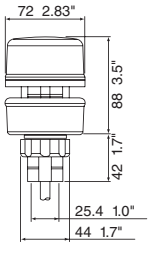
GPS/WAAS Receiver Antenna BBWGPS 0.8 kg 1.8 lb
10 m cable attached



GPS/WAAS Receiver Antenna GP330B 0.22 kg 0.49 lb



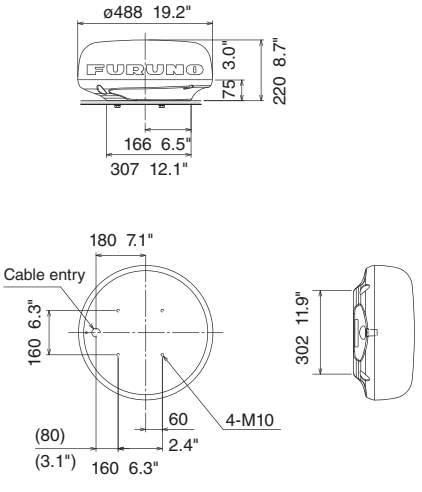
Weather Station 0.3 kg 0.66 lb



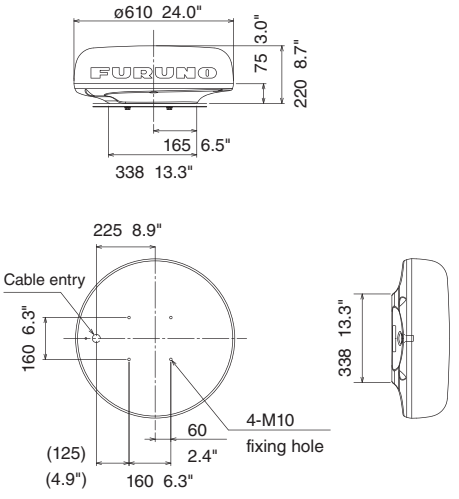
NavNet TZtouch/NavNet 3D DRS Radar Antennas

		NavNet 3D RADAR SENSOR	
		DRS2D	DRS4D
			
ANTENNA			
Peak Output Power		**2.2 kW**	**4 kW**
Type		**ø488 mm Radome (19")**	**ø610 mm Radome (24")**
RF TRANSCEIVER			
Frequency		**9410 ± 30 MHz**	
Pulselength & PRR		**0.08 μs/3000 Hz (0.0625 to 0.75 nm)** **0.15 μs/3000 Hz (1 to 1.5 nm)** **0.3 μs/1500 Hz (2 nm)** **0.5 μs/1000 Hz (3 to 4 nm)** **0.7 μs/600 Hz (6 to 8 nm)** **0.8 μs/600 Hz (8 to 24 nm)**	**0.08 μs/3000 Hz (0.0625 to 0.75 nm)** **0.15 μs/3000 Hz (1 to 1.5 nm)** **0.3 μs/1500 Hz (2 nm)** **0.5 μs/1000 Hz (3 to 4 nm)** **0.7 μs/600 Hz (6 to 8 nm)** **0.8 μs/600 Hz (8 to 36 nm)**
Beam Width	**Horizontal**	**5.2°**	**4.0°**
	Vertical	**25°**	**25°**
Range Scales		**0.0625 to 24 nm**	**0.0625 to 36 nm**
Antenna Rotation Speed		**24/36/48 rpm**	
Wind Load		**Relative Wind 70 kn**	
ENVIRONMENT			
		Temperature: -30°C to + 55°C, Waterproofing: IP26	
POWER AMP UNIT			
	MFD8	**Not required (Power Provided by the Display Unit)**	
	MFD12	**Not required (Power Provided by the Display Unit)**	
	MFDBB	**Not Required (Power Provided by the BB Processor Unit)**	

19" Radome Radar Sensor DRS2D 6.5 kg 14.3 lb



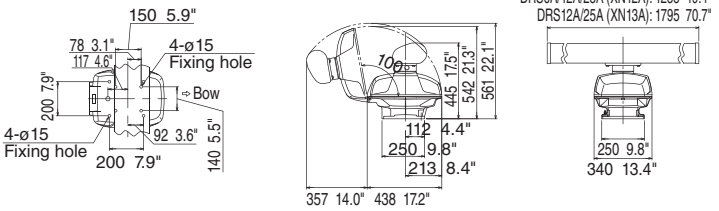
24" Radome Radar Sensor DRS4D 7.5 kg 16.5 lb



		NavNet 3D RADAR SENSOR	
		DRS4A	DRS6A
			
ANTENNA			
Peak Output Power		**4 kW**	**6 kW**
Type		**1036 mm Open (3.5')**	**1255 mm Open (4')**
RF TRANSCEIVER			
Frequency		**9410 ± 30 MHz**	
Pulselength & PRR		**0.08 μs/3000 Hz (0.0625 to 0.75 nm)** **0.15 μs/3000 Hz (1 to 1.5 nm)** **0.3 μs/1500 Hz (2 nm)** **0.5 μs/1000 Hz (3 to 4 nm)** **0.7 μs/600 Hz (6 to 8 nm)** **0.8 μs/600 Hz (8 to 48 nm)**	**0.08 μs/3000 Hz (0.0625 to 0.75 nm)** **0.15 μs/3000 Hz (1 to 1.5 nm)** **0.3 μs/1500 Hz (2 nm)** **0.5 μs/1000 Hz (3 to 4 nm)** **0.7 μs/600 Hz (6 to 8 nm)** **0.8 μs/600 Hz (8 to 64 nm)**
Beam Width	**Horizontal**	**2.3°**	**1.9°**
	Vertical	**22°**	**22°**
Range Scales		**0.0625 to 48 nm**	**0.0625 to 64 nm**
Antenna Rotation Speed		**24/36/48 rpm**	
Wind Load		**Relative Wind 70 kn**	
ENVIRONMENT			
		Temperature: -30°C to + 55°C, Waterproofing: IP26	
POWER AMP UNIT			
	MFD8	**PSU-012**	
	MFD12	**Not required (Power Provided by the Display Unit)**	
	MFDBB	**Not Required (Power Provided by the BB Processor Unit)**	

		NavNet 3D RADAR SENSOR	
		DRS12A	DRS25A
			
ANTENNA			
Peak Output Power		**12 kW**	**25 kW**
Type		**1255 mm Open (4')/1795 mm Open (6')**	**1255 mm Open (4')/1795 mm Open (6')**
RF TRANSCEIVER			
Frequency		**9410 ± 30 MHz**	
Pulselength & PRR		**0.08 μs/3000 Hz (0.0625 to 0.75 nm)** **0.15 μs/3000 Hz (1 to 1.5 nm)** **0.3 μs/1500 Hz (2 nm)** **0.5 μs/1000 Hz (3 to 4 nm)** **0.7 μs/600 Hz (6 to 8 nm)** **0.8 μs/600 Hz (8 to 64 nm)** **0.8 μs/550 Hz (72 nm)**	**0.08 μs/3000 Hz (0.0625 to 0.75 nm)** **0.15 μs/3000 Hz (1 to 1.5 nm)** **0.3 μs/1500 Hz (2 nm)** **0.5 μs/1000 Hz (3 to 4 nm)** **0.7 μs/600 Hz (6 to 8 nm)** **0.8 μs/600 Hz (8 to 64 nm)** **0.8 μs/550 Hz (72 to 96 nm)**
Beam Width	**Horizontal**	**1.9°/1.4°**	**1.9°/1.4°**
	Vertical	**22°/22°**	**22°/22°**
Range Scales		**0.0625 to 72 nm**	**0.0625 to 96 nm**
Antenna Rotation Speed		**24/36/48 rpm**	
Wind Load		**Relative Wind 70 kn**	
ENVIRONMENT			
		Temperature: -30°C to + 55°C, Waterproofing: IP26	
POWER AMP UNIT			
	MFD8	**PSU-012**	**PSU-013**
	MFD12	**PSU-012**	**PSU-013**
	MFDBB	**Not Required (Power Provided by the BB Processor Unit)**	**PSU-013**

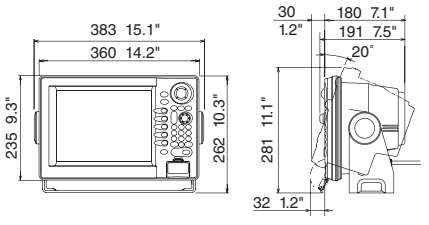
3.5' Open Radar Sensor DRS4A	25 kg 55.1 lb
4' Open Radar Sensor DRS6A	25 kg 55.1 lb
4' Open Radar Sensor DRS12A/25A	26 kg 57.3 lb
6' Open Radar Sensor DRS25A/12A/25A	28 kg 61.7 lb



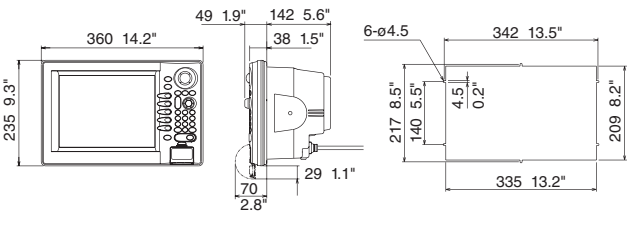
NavNet vx2

		10.4"COLOR LCD RADAR/CHART PLOTTER				
		MODEL GP1920C	MODEL 1824C/NT	MODEL 1834C/NT	MODEL 1934C/NT	MODEL 1944C/NT
						
ANTENNA						
Type		n/a	Radome	Radome	Open	Open
Length		n/a	ø460 mm (18")	ø602 mm (24")	1035 mm (3.5 ft)	1255 mm (4 ft)
Beamwidth		n/a	Hor: 5.2˚ Ver: 25˚	Hor: 3.9˚ Ver: 20˚	Hor: 2.2˚ Ver: 22˚	Hor: 1.9˚ Ver: 22˚
Rotation Speed		n/a	24/30 rpm (Automatic Switch)	24 rpm	24 rpm	24 rpm
RF TRANSCEIVER						
Frequency		n/a	9410 ±30 MHz (X-Band)			
Pulselength & PRR		n/a	0.08μs/2100 Hz (0.125 to 1.5 nm) 0.3μs/1200 Hz (1.5 to 3 nm) 0.8μs/600 Hz (3 to 64 nm)			
Output Power		n/a	2.2 kw	4 kW	4 kW	6 kW
DISPLAY						
Display Unit		10.4" Color TFT LCD				
Effective Display Area		211.2 (W) x 158.4 (H) mm				
Pixel Number		640 x 480				
Range Scales		0.125 to 24 nm 14 steps		0.125 to 36 nm 15 steps	0.125 to 48 nm 16 steps	0.125 to 64 nm 17 steps
Echo Trail		Interval: 15 s, 30 s, 1 min, 3 min, 6 min, 15 min, 30 min or Continuous				
NavNet Interface		Ethernet 10 BASE-T				
Interface (NMEA0183 format)	Input	DBT, DPT, DSC, DSE, GGA, GLL, HDG, HDM, HDT, MTW, MWV, RMA, RMB, RMC, TLL, TTM, VHW, VTG, VWT, VWR, WPL, ZDA, ZTG				
	Output	AAM, APB, BOD, BWC, BWR, DBT, DPT, GGA, GLL, GTD, HDT, MTW, MWV, RMA, RMB, RMC, TLL, TTM, VHW, VTG, WPL, XTE, ZDA, ZTG				
PLOTTER CHARACTERISTICS						
Map Scale		0.125 to 2,048 nm				
Latitude Limits		Between 85˚N and 85˚S				
Plot Interval		1 s to 99 min 99 s or 0 to 99.99 nm				
Display Modes		Course plot, Nav data, Steering display, Highway				
Presentation Modes		TM/RM North-up, Course-up, Auto Course-up				
Memory Capacity		Up to 8,000 points for ship's track and marks, 999 waypoints, 35 quick points, 1 MOB, 200 planned routes (max. 35 waypoints/routes), 1 quick route				
Alarms		Guard Zone, Arrival/anchor watch, XTE, proximity alert, ship speed depth*, water temperature**, fish*, grounding***				
		(*Network fish finder required, **temperature sensor required for water temperature alarm, ***C-Map version only)				
Electronic Charts		C-Map NT MAX				
ENVIRONMENT (IEC 60945 test method)						
Temperature	Display Unit	-15˚C to +55˚C				
	Antenna Unit	-25˚C to +70˚C				
Waterproofing	Display Unit	IPX5, CFR-46 (USCG)				
	Antenna Unit	IPX6				
POWER SUPPLY						
		12-24 VDC				
		55 W	90 W		110 W	115 W
		115/230 VAC with an optional rectifier RU-3423/1746B-2				
OPTIONAL UNIT						
Antenna Bracket		n/a	OP03-93	OP03-92	Locally Arranged	
10-Target Autoplotter		n/a	ARP11* (*Requires an appropriate heading sensor)			
External Buzzer		OP03-136 or Relay/Contact Closure				

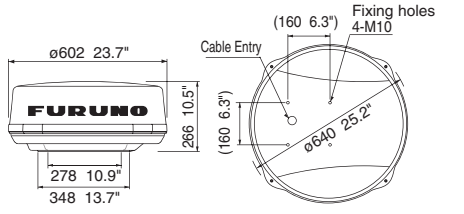
10.4" LCD (Bracket Mount) 6.0 kg 13.2 lb



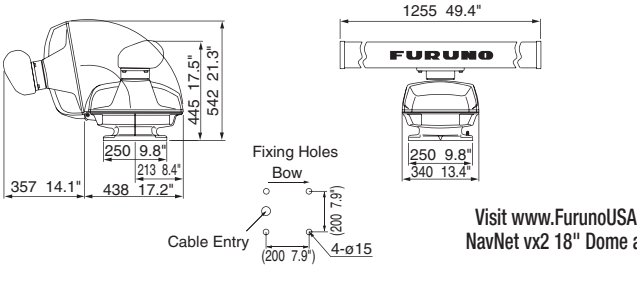
10.4" LCD (Flush Mount) 5.2 kg 11.5 lb



24" Radome Antenna 8 kg 17.6 lb



4 ft Open Antenna 23 kg 50.7 lb



Visit www.FurunoUSA.com for specs on NavNet vx2 18" Dome and 3.5' Open Array

MaxSea Marine Software

	MAXSEA TIMEZERO NAVIGATOR	MAXSEA TIMEZERO EXPLORER
		
Processor	1.5 GHz (Intel Core2Duo 2GHz recommended)	2 GHz (Intel Core2Duo highly recommended)
Operating System	Windows XP SP3, Vista SP2 or Windows 7	Windows XP SP3, Vista SP2 or Windows 7
RAM Memory	1 GB RAM if using Windows XP 2 GB RAM if using Windows Vista or 7	2 GB RAM (4GB Recommended)
Video Board	(WDDM Driver, Pixel Shader 2.0, 32 Bits/pixel) Min: Intel Integrated chipset 945 or above Recommended: Dedicated ATI or NVIDIA card w/256Mb RAM	(WDDM Driver, Pixel Shader 2.0, 32 Bits/pixel) Min: Dedicated ATI or NVIDIA card w/256Mb RAM; Recommended: Dedicated ATI or NVDIA card w/512Mb RAM; Integrated video chipset not supported; Screen settings: 1,024x768 or higher; 16 Bit (32 Bit recommended) *Note: PBG Module or Dual Monitor Support require dedicated Video Board with 512MB VRAM*
HDD	20 GB of HD space for software (up to 5 GB for charts)	20 GB of HD space for software (up to 5 GB for charts)
CD/DVD drive	Required for installing software & charts	Required for installing software & charts
Serial or USB port	For connecting instruments (adapter required for USB connection)	For connecting instruments (adapter required for USB connection)
Network Environment	–	Ethernet 10/100 BASE-T for NavNet 3D connection

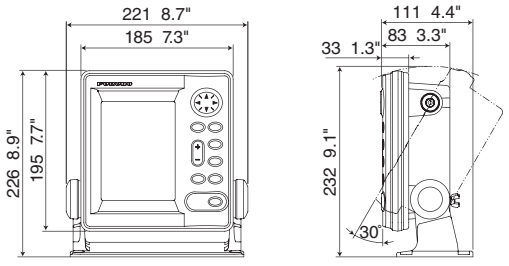
TIMEZERO STANDARD FEATURES	TZ Navigator	TZ Explorer
Seamless Electronic Chart Display	●	●
Multiple chart compatibility: Raster, Vector, Satellite Photo	●	●
Loran TD support	●	●
Worldwide tide database (Tidal Height)	●	●
US tidal currents	●	●
Work Spaces & Ribbons	●	●
Undo function	●	●
PhotoFusion (satellite photos & charts)	●	●
TimeZero 3D navigation	●	●
Unlimited vessel track & track line coloring	●	●
Unlimited waypoints & routes, waypoint & route lists	●	●
FREE weather updates (cloud, air temp, wind, waves, currents, pressures)	●	●
FREE ocean data (SST, altimetry, sea color/plankton)	–	●

TIMEZERO STANDARD FEATURES	TZ Navigator	TZ Explorer
Weather & tidal animation	●	●
Active & historic track	●	●
Navigation log book	●	●
NavNet 3D full Ethernet network connection	–	●
Radar Overlay (NavNet 3D Radar required)	–	●
Chart synchronization & chart serving for NavNet 3D	–	●
Route synchronization with NavNet 3D	–	●
Route & Waypoint exchange using SD memory card	●	●
Display of NavNet 3D AIS & ARPA targets	–	●
Display AIS & ARPA targets (non NavNet 3D)	●	●
Routing Module Routing (according to weather conditions) Iscochrones calculation & display Polar management Routing list Routing & weather animation	Optional	Optional

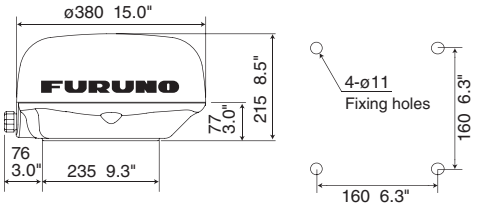
Radar

		6" SILVER LCD RADAR	7" SILVER LCD RADAR
		MODEL1623	MODEL1715
			
ANTENNA			
Type		ø380 mm radome (15.0")	ø460 mm radome (18.1")
Beamwidth	**Horizontal**	6.2°	5.2°
	Vertical	25°	
Rotation speed		24/31/41 rpm (auto-select according to pulselength)	
RF TRANSCEIVER			
Frequency		9410±30 MHz (X-band)	
Pulselength & PRR		0.125-0.75 nm : 0.08μs/3000 Hz 1-2 nm : 0.3μs/1200 Hz 3-16 nm : 0.8μs/600 Hz	0.125-0.75 nm : 0.08μs/3000 Hz 1-2 nm : 0.3μs/1200 Hz 3-24 nm : 0.8μs/600 Hz
Output power		2.2 kW	
IF amplifier	**IF**	60 MHz	
	BW	15 MHz (0.125-0.75 nm) 5 MHz (1-16 nm)	15 MHz (0.125-0.75 nm) 5 MHz (1-24 nm)
DISPLAY			
Display unit		6" monochrome LCD	7" monochrome LCD
Effective display area		90 (W) x120 (H) mm	102 (W) x 138 (H) mm
Resolution		240 x 320	
Accuracy	**Range**	1.0 % of range in use or 8 m, which is greater	
	Bearing	EBL accuracy ±1°	
Range and range ring interval	**Range**	0.125, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 4, 6, 8, 12, 16, 24* nm * MODEL1715 only	
	Ring	0.0625, 0.125, 0.125, 0.25, 0.25, 0.5, 0.5, 1, 1, 2, 2, 3, 4, 6* nm * MODEL1715 only	
Echo trail		interval: 30 s, 1, 3, 6 m or continuous	
Interface (IEC61162, NMEA0183)	**Input**	GGA, RMC, RMA, RMB, GLL, VTG, VBW, VHW, HDT, HDG, HDM, BWR, BWC, GLC, GTD, DPT, DBK, DBS, DBT, MTW, ZDA, MWV, XTE	
	Output	TLL	
ENVIRONMENT			
Temperature	**Display unit**	-15°C to +55°C	
	Antenna	-25°C to +70°C	
Waterproofing	**Display unit**	IPX5	
	Antenna	IPX6	
POWER SUPPLY			
	Display unit	12-24 VDC: 3.2-1.4 A	

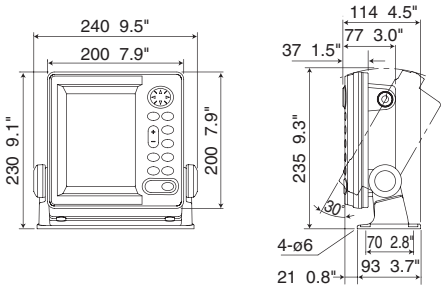
MODEL1623 Display Unit 1.3 kg 2.9 lb



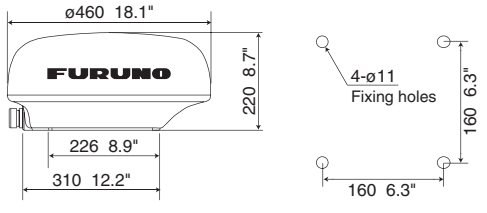
MODEL1623 Antenna 4.6 kg 10.1 lb



MODEL1715 Display Unit 1.5 kg 3.3 lb

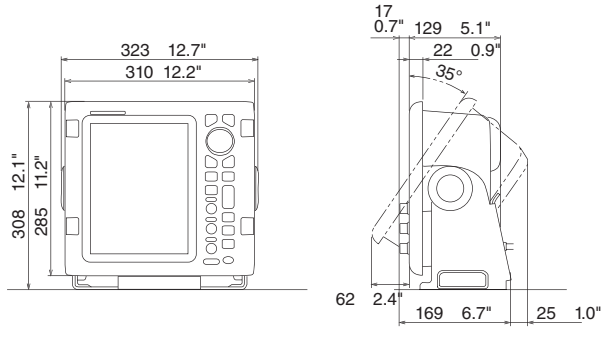


MODEL1715 Antenna 5.1 kg 11.2 lb

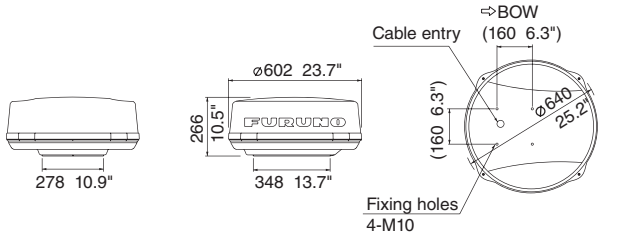


		10.4" COLOR LCD RADAR		
		MODEL1835	MODEL1935	MODEL1945
				
ANTENNA				
Type		**ø602 mm Radome (24")**	**1000 mm Open (3.5')**	**1200 mm Open (4.0')**
Beamwidth	**Horizontal**	**4.0°**	**2.4°**	**1.9°**
	Vertical	**20°**	**22°**	
Rotation speed		**24 rpm**	**24 rpm 48 rpm (option)**	
RF TRANSCEIVER				
Frequency		**9410±30 MHz (X-band)**		
Pulselength & PRR		**0.0625-1.6 nm : 0.08µs/2100 Hz 1.5-3.2 nm : 0.3µs/1200 Hz 3-64 nm : 0.8µs/600 Hz**		
Output power		**4 kW**		**6 kW**
IF amplifier	**IF**	**60 MHz**		
	BW	**25 MHz (0.08/0.3µs) 3 MHz (0.8µs)**		
DISPLAY				
Display unit		**10.4" color LCD**		
Effective display area		**158 (W) x 211 (H) mm**		
Pixel number		**640 x 480, VGA**		
Accuracy	**Range**	**1.0 % of range in use or 8 m, which is greater**		
	Bearing	**EBL accuracy ± 1°**		
Range and range ring interval	**Range**	**0.0625, 0.125, 0.25, 0.5, 0.75, 1, 1.5, 1.6, 2, 3, 3.2, 4, 6, 8, 12, 16, 24, 32, 36, 48*, 64* (*range max. MODEL 1935/1937: 48nm, MODEL 1945: 64nm)**		
	Ring	**0.03125, 0.0625, 0.125, 0.125, 0.25, 0.25, 0.5, 0.4, 0.5, 1, 0.8, 1, 2, 2, 3, 4, 6, 8, 12, 12*, 16* (*ring max. MODEL 1935/1937: 12nm, MODEL 1945: 16nm)**		
Echo trail		**Interval: 15 s, 30 s, 1 min, 3 min, 6 min, 15 min, 30 min, or continuous**		
ARPA target tracking		**Up to 10 (required optional board ARP-11)**		
AIS target tracking		**Up to 100 (Data input from AIS is required.)**		
Interface	**Input**	**GNS, GGA, RMC, GLL, VTG, VHW, BWR, BWC, RMB, HDT, HDG, HDM, XTE, DPT, DBT, MTW,**		
	Output	**TTM, RSD, TLL**		
ENVIRONMENT				
Temperature	**Display unit**	**-15°C to +55°C**		
	Antenna	**-25°C to +55°C**		
Waterproofing	**Display unit**	**IP55**		
	Antenna	**IP26**		
POWER SUPPLY				
	Display unit	**12-24 VDC: 4.1-2.0 A**	**12-24 VDC: 6.8-3.3 A (24 rpm) 8.2-3.8 A (48 rpm)**	**12-24 VDC: 7.3-3.5 A (24 rpm) 8.8-4.1 A (48 rpm)**

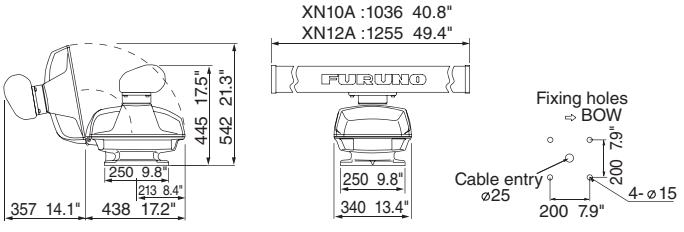
MODEL1835/1935/1945 Display Unit 5.4 kg 11.9 lb



24" Radome Antenna 8 kg 17.6 lb



3.5 ft Open Antenna 22 kg 48.5 lb
4 ft Open Antenna 25 kg 55.1 lb

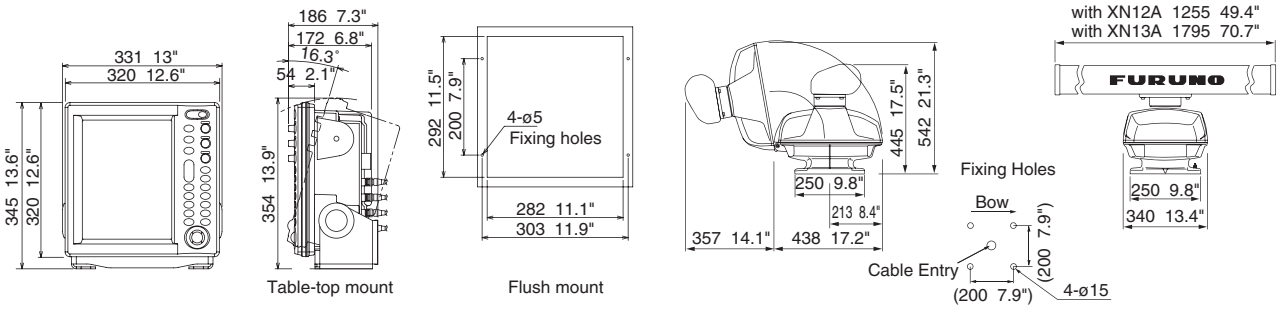


Radar

		12.1" LCD RADAR		
		FR8062	FR8122	FR8252
				
ANTENNA				
Type		1255 mm Open (4') or 1795 mm Open (6')		
Beamwidth	Horizontal	1.9˚(4' Open: XN-12A) or 1.35˚ (6' Open: XN-13A)		
	Vertical	22˚		
Rotation speed		4 ft ant: 24 rpm 6 ft ant: 24/36/48 rpm (auto select according to pulselength)	24/36/48 rpm (auto select according to pulselength)	
RF TRANSCEIVER				
Frequency		9410±30 MHz (X-band)		
Pulselength & PRR		0.125-1.5 nm: 0.08μs/2100 Hz 1.5, 2, 3 nm: 0.3μs/1200 Hz 3-36 nm: 0.8μs/600 Hz 48, 64 nm: 0.8μs/550 Hz 72, 96* nm: 0.8μs/500 Hz * FR-8252 only		
Output power		6 kW	12 kW	25 kW
IF amplifier	IF	60 MHz		
	BW	40 MHz (0.125-1.5 nm) 2.5 MHz (1.5-96 nm)		
DISPLAY				
Display unit		12.1" color LCD		
Effective display area		184 (H) x 246 (V) mm		
Pixel number		600 (H) x 800 (V)		
Accuracy	Range	1.0 % of range in use or 8 m, which is greater		
	Bearing	EBL accuracy ±1˚		
Range and range ring interval	Range	0.125, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 4, 6, 8, 12, 16, 24, 36, 48, 64, 72, 96* nm (range max. FR-8062/8122: 72 nm, FR-8252: 96 nm)		
	Ring	0.025, 0.05, 0.1, 0.25, 0.25, 0.25, 0.5, 0.5, 1, 1, 2, 2, 4, 4, 6, 8, 8, 12, 16* nm * FR-8252 only		
Echo trail		interval: 15 s, 30 s, 1, 3, 6, 15, 30 min., 12, 24 hour., or continuous		
ARPA target tracking		Up to 10 (Required optional board ARP-11)		
AIS target tracking		Up to 100 (Data input from AIS is required)		
Interface (IEC61162, NMEA0183)	Input	GNS, GGA, RMC, GLL, VTG, VHW, HDT, HDG, HDM, VHW, RMB, BWC, BWR, DPT, DBT, MTW, ZDA, MWV, VWT, VWR		
	Output	TLL, TTM, RSD		
ENVIRONMENT				
Temperature	Display unit	-15°C to +55°C		
	Antenna unit	-25°C to +55°C		
Waterproofing	Display unit	IPX5 (front panel)		
	Antenna unit	IPX6		
POWER SUPPLY				
	Display unit	12-24 VDC: 3.2 A	12-24 VDC: 3.8 A	12-24 VDC: 5.0 A
	Power Amp Unit	—	—	PSU-008

FR8062/8122/8252 Display Unit	6.9 kg 15.2 lb

4 ft Open Antenna	25 kg 55.1 lb
6 ft Open Antenna	27 kg 59.5 lb

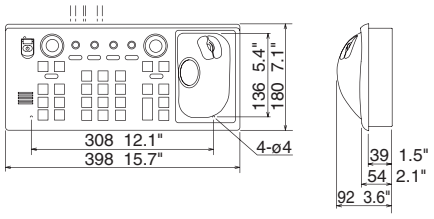


		BLACK BOX MARINE RADAR		
		FAR2117BB	FAR2127BB	FAR2137SBB
				
ANTENNA				
Type		1260 mm Open (4'), 2040 mm Open (6.5') or 2550 mm Open (8')		3090 mm S-band (10') or 3765 mm S-band
Beamwidth	**Horizontal**	1.9°(4' Open: XN-12AF), 1.23°(6.5' Open: XN-20AF) or 0.95°(8' Open: XN-24AF)		2.3° (10' S-band: SN-30AF) or 1.8° (12' S-band: SN-36AF)
	Vertical	20°		25°
Rotation speed		24 rpm or 42 rpm		21/26 rpm or 45 rpm
RF TRANSCEIVER				
Frequency		9410±30 MHz (X-band)		3050±30 MHz (S-band)
Pulselength & PRR		0.125, 0.25 nm : 0.07μs/3000 Hz 0.5 nm: 0.07, 0.15μs/3000 Hz 0.75, 1.5 nm: 0.07, 0.15, 0.3μs/3000, 1500 Hz 3 nm: 0.15, 0.3, 0.5, 0.7μs/3000, 1500, 1000 Hz 6 nm: 0.3, 0.5, 0.7, 1.2μs/1500, 1000, 600 Hz 12, 24 nm: 0.5, 0.7, 1.2μs/1000, 600 Hz 48, 96 nm: 1.2μs/600 Hz		
Output power		12 kW	25 kW	30 kW
IF amplifier	**IF**	60 MHz		
	BW	40 MHz (Short pulse) 10 MHz (Middle pulse) 3 MHz (Long Pulse)		
Display		Custom monitor of your choice		
Accuracy	**Range**	1% of the maximum range of the scale in use or 30 m, whichever is the greater		
	Bearing	±1°		
Range and range ring interval	**Range**	0.125, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 72, 96, 120		
	Ring	0.025, 0.05, 0.1, 0.25, 0.25, 0.25, 0.5, 0.5, 1, 1, 2, 2, 4, 4, 8, 8, 12, 16, 20		
Echo trail		interval: 15, 30 s, 1, 3, 6, 15, 30 m or continuous		
ARPA target tracking		Up to 100		
AIS target tracking		Up to 1000 (Data input from AIS is required)		
Interface (IEC61162, NMEA0183)	**Input**	BWC, BWR, DBS, DBT, DPT, DTM, GGA, GLL, HDT, MTW, MWV, RMA, RMB, RMC, RTE VBW, VDR, VHW, VTG, VWR, VWT, WPL, ZDA		
	Output	AAM, TLL, TTM, RSD, ESP		
ENVIRONMENT				
Temperature	**Processor unit**	-15°C to +55°C		
	Antenna unit	-25°C to +55°C		
Waterproofing	**Processor unit**	IPX0		
	Antenna unit	IPX6		
POWER SUPPLY				
	Processor unit	24VDC: 7.6 A*1 /8.5 A*2 100-115 VAC: 2.6 A*1 /3.0 A*2 220-230 VAC: 1.6 A*1 /1.7 A*2 *1 : 24 rpm, *2: 42 rpm	24 VDC: 8.8 A*1 /9.7 A*2 100-115 VAC: 3.0 A*1 /3.4 A*2 220-230 VAC: 1.8 A*1 /1.9 A*2 *1 : 24 rpm, *2: 42 rpm	100-115 VAC: 3.0A 220-230 VAC: 1.5A
	Antenna unit	—	—	200/220 VAC: 3.0A 380/440 VAC: 1.5A 220 VAC: 3.5A (for HSC) 440 VAC: 1.7A (for HSC)

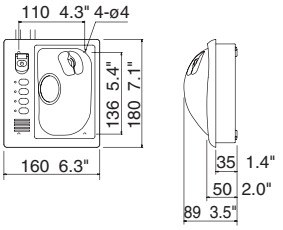
Radar

FAR2117BB/2127BB/2137SBB

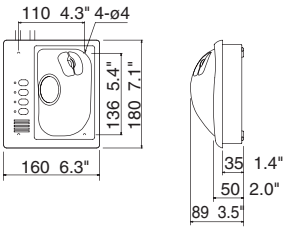
Full-keyboard
Control Unit RCU014 3.7 kg 8.2 lb



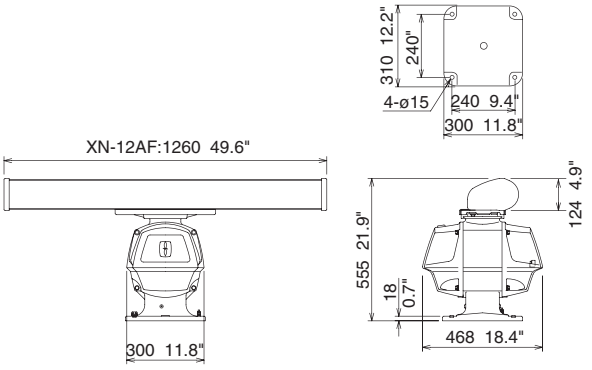
Trackball
Control Unit RCU015 2.4 kg 5.3 lb



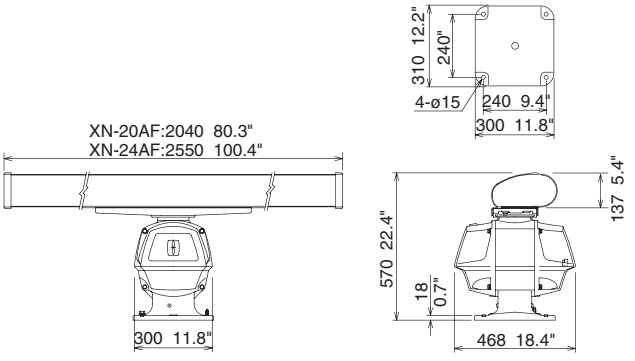
Remote
Control Unit RCU016 2.4 kg 5.3 lb



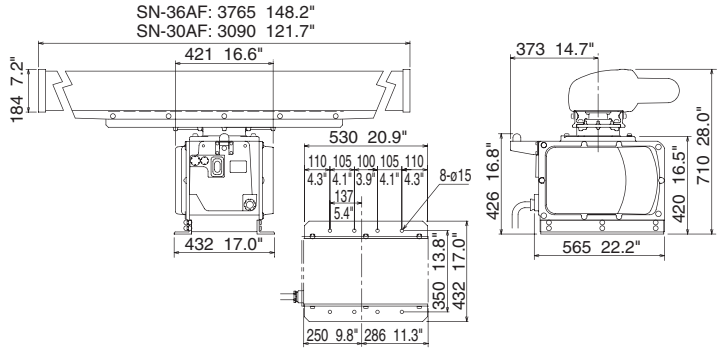
4 ft Open Antenna 33 kg 73 lb



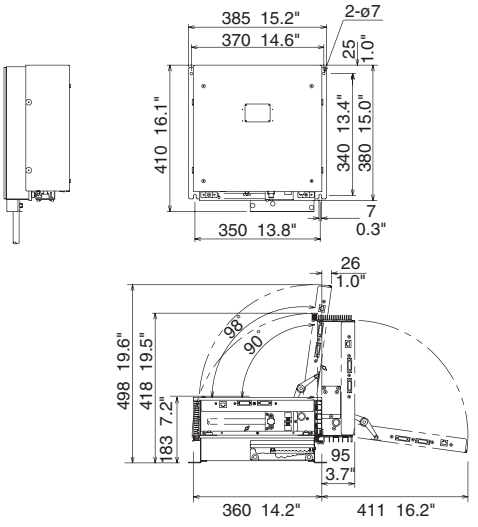
6.5 ft Open Antenna 39 kg 86 lb
8 ft Open Antenna 42 kg 92.6 lb



12 ft S-band Antenna 133 kg 293.2 lb



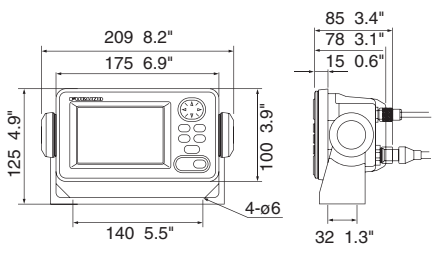
Processor Unit RPU013 10 kg 22 lb



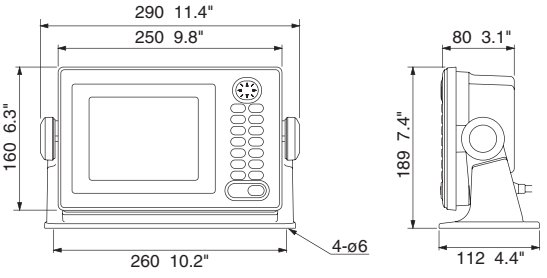
GPS/Chart Plotter

		4.5" GPS/WAAS NAVIGATOR	6" GPS NAVIGATOR
		GP32	GP50
			
GPS/WAAS			
Receive Type	**GPS**	**Twelve discrete channels, C/A code, all-in-view**	
	WAAS	**standard fitted in Display Unit**	
Receive Frequency		**L1 (1575.42 MHz)**	
Time to First FIX		**12 seconds typical (Warm start)**	
Tracking Velocity		**999 kt**	
Geodetic Systems		**WGS-84 (and others)**	
ACCURACY			
	GPS	**10 m (95 %)**	
	DGPS	**5 m (95 %)**	
	WAAS	**3 m (95 %)**	
DISPLAY			
Display Unit		**4.5" monochrome LCD**	**6" monochrome LCD**
Effective display area		**95 (W) x 60 (H) mm**	**122 (W) x 92 (H) mm**
Pixel number		**120 x 64**	**320 x 240**
Display Modes		**Plotter, Steering, Highway, NAV data, Destination, User display**	**Plotter mode 1 and 2, Highway, Navigation, Data**
Memory Capacity		**1,000 ship's track points 999 waypoints with comments 50 routes, 30 waypoints/route**	**2,000 points for ship's track and marks, 999 waypoints with comments, 30 routes**
Alarms		**Arrival, Anchor watch, XTE, Speed, WAAS/DGPS, Time, Trip, Odometer**	**Arrival, Anchor watch, XTE, Speed, time, water depth, trip, DGPS, WAAS, water temp**
INTERFACE			
Interface	**Output**	**(NMEA 0183 ver 1.5/2.0/2.1) AAM, APB, BOD, BWC, GGA, GLL, GTD, RMA, RMB, RMC, VTG, XTE, ZDA**	**(IEC 61162-1 ed 2, NMEA0183) AAM, APA, APB, BOD, BWC, BWR, BWW, DTM, GGA,GLL, GNS, RMB, RMC, VTG, WCV, WNC, WNR, VDR, WPL, XTE, ZDA, GBS, Rnn, RTE**
	Input	**WPL (YEOMAN wpt data in NMEA 0183) DGPS data in RTCM SC104 ver 2.1**	**NMEA0183: DBT, DPT, HDG, HDM, HDT, MTW, TLL, VBW, VHW DGPS data in RTCM SC104 ver 2.0 Universal data from personal computer.**
ENVIRONMENT			
Temperature	**Display Unit**	**-15˚C to +55˚C**	
	Antenna Unit	**-25˚C to +70˚C**	
Waterproofing	**Display Unit**	**IPX5**	
	Antenna Unit	**IPX6**	
POWER SUPPLY			
		12-24 VDC	
		0.24-0.12 A	**0.8-0.4 A**

GP32 Display Unit 0.54 kg 1.2 lb



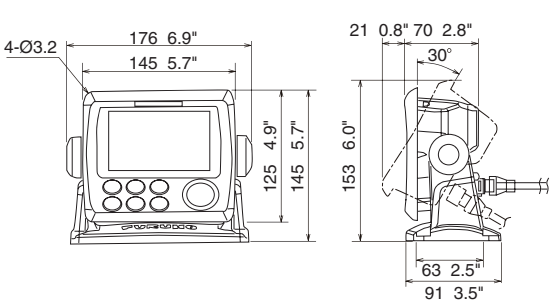
GP150 Display Unit 2.2 kg 4.9 lb



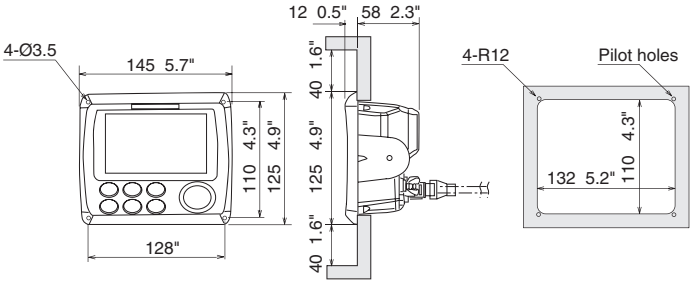
GPS/Chart Plotter

		4.3" GPS NAVIGATOR
		GP33
		
GPS/WAAS		
Receive Type	**GPS**	**Twelve discrete channels, C/A code, all-in-view**
	WAAS	**Two channels**
Receive Frequency		**L1 (1575.42 MHz)**
Time to First FIX		**Under 90 s, 43 s typical (cold start)**
Tracking Velocity		**999 kt**
Geodetic Systems		**WGS-84 (and others)**
ACCURACY		
	GPS	**10 m (2 drms)**
	MSAS	**7 m (2 drms)**
	WAAS	**3 m (2 drms)**
DISPLAY		
Display Unit		**4.3" Color LCD**
Effective display area		**95.04 (W) x 53.85 (H) mm**
Pixel number		**480 x 272**
Display Modes		**Plotter, Steering, Highway, NAV data,User display1, User display2, Satellite Monitor Display**
Memory Capacity		**3,000 ship's track points 10,000 waypoints with comments 100 routes, 30 waypoints/route**
Alarms		**Arrival, Anchor watch, XTE, Speed, WAAS, Time, Trip, Odometer**
INTERFACE		
Ports		**NMEA0183: 1, CAN bus: 1**
Interface	**Output**	**(NMEA0183 ver. 2, 3) AAM, APB, BOD, BWC, BWR, DTM, GGA, GLL, GSA, GSV, RMB, RMC, VTG, XTE, ZDA (CAN bus) 059392, 060928, 061184, 126208, 126464, 126720-1, 126720-2, 126992, 126996, 127258, 129026, 129029, 129033, 129044, 129283, 129284, 129285, 129538, 129539, 129540, 130822, 130823**
	Input	**(CAN bus) 059904, 065286, 060928, 061184,126208, 126720**
ENVIRONMENT		
Temperature	**Display Unit**	**-15˚C to +55˚C**
	Antenna Unit	**-25°C to +70°C**
Waterproofing	**Display Unit**	**IP56**
	Antenna Unit	**IPX6**
POWER SUPPLY		
Non CAN bus		**12-24 VDC**
		0.24-0.12 A
CAN bus		**15 VDC**
		LEN7

GP33 Display Unit (Bracket Mount) 0.9 kg 2.0 lb



GP33 Display Unit (Flush Mount) 0.6 kg 1.3lb

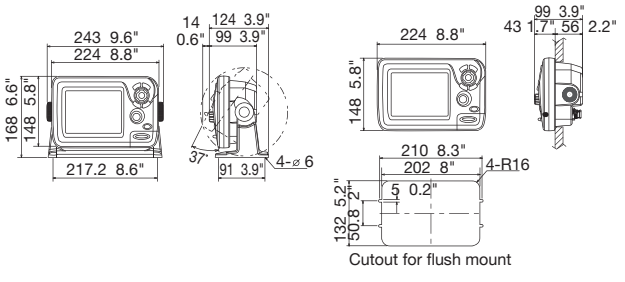


		5.7" GPS/WAAS COLOR CHART PLOTTER	7" WIDE GPS/WAAS COLOR CHART PLOTTER
		GP1670F	GP1870F
			
GPS/WAAS			
Receive Type	**GPS**	**50 channels**	
	WAAS	**1 channel**	
Receiving Frequency		**L1 (1575.42 MHz)**	
Time to First FIX		**30 s (cold start)**	
Tracking Velocity		**999 kt**	
SBAS		**WAAS, EGNOS, MSAS, GAGAN**	
ACCURACY			
Internal Antenna	**GPS**	**10 m Max**	
	MSAS	**7 m Max**	
External Antenna GPA-017 (Option)	**GPS**	**10 m Max**	
	MSAS	**7 m Max**	
DISPLAY			
Type		**5.7" Color TFT LCD**	**7" Wide Color TFT LCD**
Screen Size		**115.2 x 86.4 mm**	**152.4 x 91.4 mm**
Screen Resolution		**VGA 640 x 480 pixels**	**SVGA 800 x 480 pixels**
Screen Brightness		**800 cd/m^2 (typical)**	**900 cd/m^2 (typical)**
Language		**English (US & UK), French, Spanish, German, Italian, Portuguese, Danish, Swedish, Norwegian, Finnish, Greek, Japanese, Chinese, Russian, Thai, Vietnames, Polish, Bahase Malaysia, Bahasa Indonesia**	
Display Modes		**Course plot, Nav Data, Instruments, Engine monitor, Anemometor, Fuel level gauge, GPS status, Fish finder**	**Course plot, Nav Data, Instruments, Engine monitor, Anemometor, Fuel level gauge, GPS status, Fish finder**
Memory Capacity		**30,000 points for ship's track and wayponts 1,000 planned routes (Max. 50 points per route) 5,000 quickpoints (Max routes x max points per route)**	
INTERFACE			
CAN bus		**1 Port**	
Interface (CAN bus)	**Input**	**059392, 059904, 061184, 060928, 126208, 126992, 126996, 127237, 127245, 127250, 127251, 127258, 127488, 127489, 127493, 127496, 127497, 127505, 128259, 128267, 129025, 129026, 129029, 129033, 129038, 129039, 129040, 129538, 129540, 129793, 129794, 129798, 129808, 129809, 129810, 130306, 130310, 130311, 130312, 130313, 130314, 130577, 130818, 130821, 130822, 130828, 130880, 130830, 130831, 130832**	**059392, 059904, 061184, 060928, 126208, 126992, 126996, 127237, 127245, 127250, 127251, 127258, 127488, 127489, 127493, 127496, 127497, 127505, 128259, 128267, 129025, 129026, 129029, 129033, 129038, 129039, 129040, 129538, 129540, 129793, 129794, 129798, 129808, 129809, 129810, 130306, 130310, 130311, 130312, 130313, 130314, 130577, 130818, 130821, 130822, 130828, 130880, 130830, 130831, 130832**
	Output	**059392, 059904, 061184, 060928, 126208, 126464, 126992, 126996, 127258, 128259, 128267, 128275, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130310, 130312, 130818, 130821, 130822, 130823, 130830, 130831, 130832**	**059392, 059904, 061184, 060928, 126208, 126464, 126992, 126996, 127258, 128259, 128267, 128275, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130310, 130312, 130818, 130821, 130822, 130823, 130830, 130831, 130832**
USB*		**1 Port (2.0)** *for maintenance only	
SD Cart Slot		**1 Slot (Acceptable up to 32 GB)**	
Electronic Chart		**C-MAP 4D**	
ECHO SOUDER			
Transmit Frequency		**50/200 kHz**	
Transmission		**600 W or 1 kW***	
Display Range		**5-1,200 m, shift: 0-500 m**	
Extension Mode		**ACCU-FISH, Auto (Fishing/Cruising/Manual), A-Scope, Marker Zoom, Bottom Zoom, Bottom Lock, Bottom Discrimination**	
Picture Advance		**8 steps: 2/1, 1/1, 1/2, 1/4, 1/8, 1/16, 1/32, stop**	
ENVIRONMENT			
Temperature	**Display Unit**	**-15˚C to +55˚C**	
Waterproofing	**Display Unit**	**IP56**	
POWER SUPPLY			
		12-24 VDC	
		1.05 - 0.53 A	**1.05 - 0.53 A (Equip 520-5PD) 1.37 - 0.64 A (Equip 50/200-1T)**

* Matching box MB-1100 required

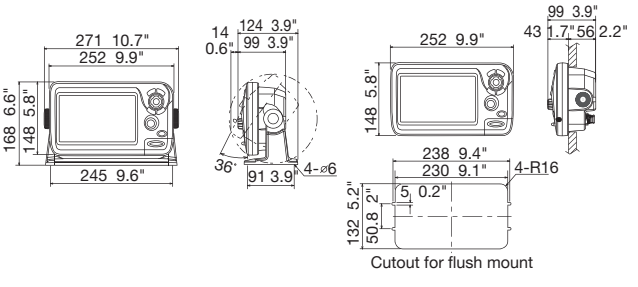
GP1670F

Bracket Mount 1.4 kg 3.1 lb
Flush Mount 1.2 kg 2.6 lb



GP1870F

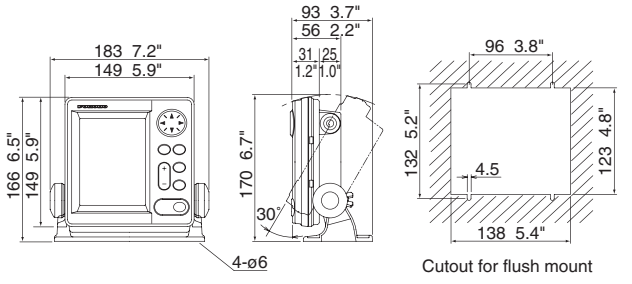
Bracket Mount 1.5 kg 3.3 lb
Flush Mount 1.3 kg 2.9 lb



Fish Finder

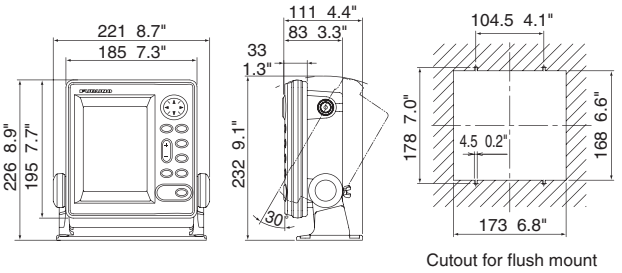
		5" LCD FISH FINDER	6" LCD FISH FINDER
		LS4100	LS6100
			
General			
Frequency		50 and 200 kHz	
Output Power		300 W	
DISPLAY			
Display unit		5" monochrome LCD	6" monochrome LCD
Effective display area		76 (W) x 100 (H) mm	92 (W) x 122 (H) mm
Pixel number		240 x 320	
Display Mode		Single frequency (high/low freq.), Dual-frequency, Zoom, Nav data, Marker zoom, Bottom zoom, Bottom-lock	
Basic Range *m, ft, fa, p/b can be selectable in the menu		2-500 m	
Range phasing		up to 500 m	
Expansion	Bottom-lock expansion	3-10 m	
Range	Sectional expansion	2-50 m	
Picture advance speed		8 steps: stop, 1/16, 1/8, 1/4, 1/2, 1/1, 2/1, 4/1	
Pulselength & PRR		0.1-0.8 ms, Max 500 pulse/min	0.1-1.0 ms, Max 550 pulse/min
Interface (IEC61162, NMEA0183)	**Input**	GGA, RMA, RMB, RMC, BWC, GLL, HDT, HDG, VTG, VHW, MTW, MWV, MDA, XTE	
	Output	MTW*, VHW*, DBT, DPT, RMB*, TLL *: External data required	
ENVIRONMENT			
Temperature	Display unit	-15°C to +55°C	
Waterproofing	Display unit	IPX5	
POWER SUPPLY			
		12 VDC : 0.5 A	12 VDC : 0.8 A

LS4100 Display Unit 0.7 kg 1.5 lb



Cutout for flush mount

LS6100 Display Unit 1.3 kg 2.9 lb

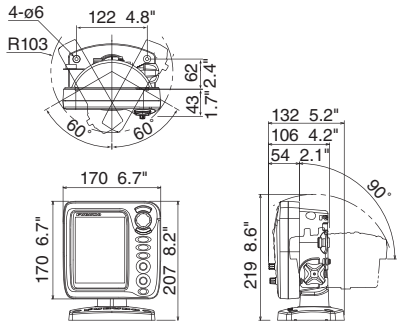


Cutout for flush mount

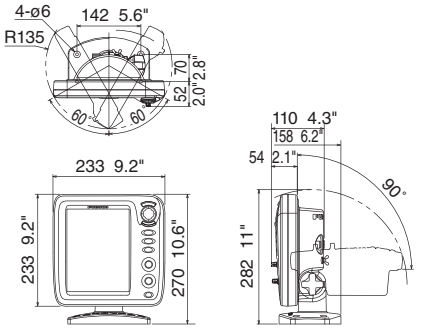
			5.7" FISH FINDER	8.4" FISH FINDER
			FCV627	FCV587
				
General				
Frequency			50 and 200 kHz	
Output Power			600 W	600 W/1 kW*
DISPLAY				
Display unit			5.7" TFT color LCD	8.4" TFT color LCD
Effective display area			87.1 (W) x 116.2 (H) mm	128.2 (W) x 170.9 (H) mm
Pixel number			480 x 640	
Display Mode			Single frequency (high/low freq.), Dual-frequency, Zoom, Nav data, A-scope, Marker zoom, Bottom zoom, Bottom-lock, Bottom Discrimination, ACCU-FISH™	
Basic Range *m, ft, fa, p/b can be selectable in the menu			2-1200 m	
Range phasing			up to 1200 m	
Expansion	Bottom-lock expansion		3-10 m	
Range	Sectional expansion		2-1200 m	
Picture advance speed			8 steps: stop, 1/16, 1/8, 1/4, 1/2, 1/1, 2/1, 4/1	
Pulselength & PRR			0.1-3 ms, Max 3,000 pulse/min	
Interface (IEC61162, NMEA0183)		**Input**	RMA, RMB, RMC, BWC, GLL, GGA, MWV, VTG, VHW, MTW, XTE, MDA, HDT, HDG, ZDA	
		Output	RMB*, VTG*, VHW*, MTW*, DBS, DBT, DPT, MTW**, VHW**, TLL * : GPS sensor required **: Speed/temperature sensor is required.	
ENVIRONMENT				
Temperature		**Display unit**	-15°C to +55°C	
Waterproofing		**Display unit**	IP56	
POWER SUPPLY				
			12-24 VDC : 0.8 -0.4 A	12-24 VDC : 1.0 - 0.5 A
			13 W	15.7 W

*The FCV-587 can be connected with the transducers of 1 kw output power, when interfaced with the Matching Box MB-1100.

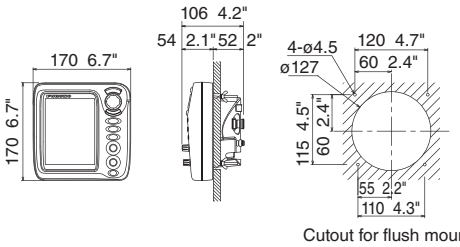
FCV627 Bracket Mount 1.3 kg 2.9 lb



FCV587 Bracket Mount 2.2 kg 4.9 lb

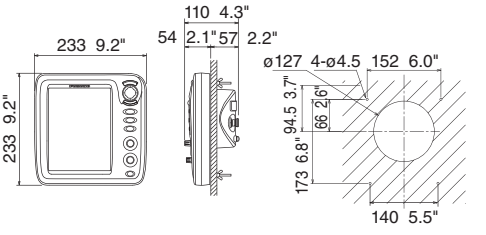


FCV627 Flush Mount 0.9 kg 2.0 lb



Cutout for flush mount

FCV587 Flush Mount 1.5 kg 3.3 lb

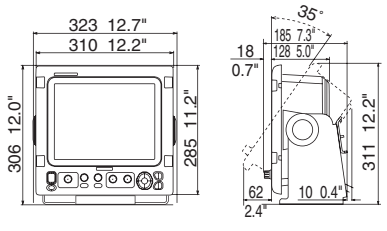


Cutout for flush mount

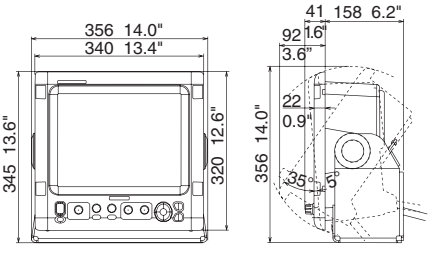
Fish Finder

		10.4" LCD FISH FINDER	12.1" LCD FISH FINDER	10.4" LCD FISH FINDER
		FCV295	FCV1150	FCV1200BB
				
General				
Frequency		The synthesized transreceiver works with dual frequencies in 28 to 200 kHz		The synthesized transreceiver works with dual frequencies in 15 to 400 kHz 400 kHz requires optional transmit board
Output Power		1, 2 or 3 kW		1, 2 or 3 kW
DISPLAY				
Display unit		10.4" TFT color LCD	12.1" TFT color LCD	Locally supplied for BlackBox configuration
Pixel number		640 x 480	800 × 600	640 x 480 or higher
Display Mode		Single mode (high/low frequency), Dual-frequency, Zoom, Mix, A-scope, Marker zoom, Bottom zoom, Bottom-lock expansion		
Basic Range *m, ft, fa, p/b can be selectable in the menu		5-3000 m		5-2000 m
Range phasing		0-2000 m		
Expansion Range	Bottom-lock expansion	5-200 m		
Picture advance speed		6 steps: stop, 1/16, 1/8, 1/4, 1/2, 1/1, 2/1, 4/1		7 steps: stop, 1/16, 1/8, 1/4, 1/2, 1/1, 2/1, 3/1, 4/1
Pulselength & PRR		0.1-5.0 ms, 20-3000 pulse/min		0.2-5.0 ms, 20-3000 pulse/min
Interface (IEC61162, NMEA0183)	Input	BWC, GGA, GLC, GLL, GNS, GTD, HDG, HDT, MDA, MTW, MWW, RMA, RMB, RMC, VHW, VTG, XTE	BWC, GGA, GLC, GLL, GNS, GTD, HDG, HDT, MDA, MTW, MWW, RMA, RMB, RMC, VHW, VTG, XTE, HVE, att, hve, req	GGA, GLC, GLL, GTD, MTW, RMA, RMB, RMC, VTG, att, hve
	Output	DBS, DBT, DPT, MTW*, TLL, SDmrk, VHW, RMB, dat *Optional sensor required		SDDBS, SDDBT, SDDPT, SDTLL, YCMTW*, VRM *Optional sensor required
	Output for external Monitor	—		RGB: VGA signal, optional interface IF-8000 required
ENVIRONMENT				
Temperature	Display unit	-15°C to +55°C		
	Control unit	—		-15°C to +55°C
	Processor unit	—		-15°C to +55°C
Waterproofing	Display unit	IP55 (When flush mounted)		IPX5
	Control unit	—		IPX5
	Processor unit	—		IPX5
POWER SUPPLY				
		12-24 VDC: 2.6-1.3 A, 100/110/220/230 VAC, optional rectifier required	12-24 VDC: 3.3-1.7 A, 100/110/220/230 VAC, optional rectifier required	12-24 VDC: 10.0-5.0 A, 100/110/115/220/230 VAC, optional rectifier required

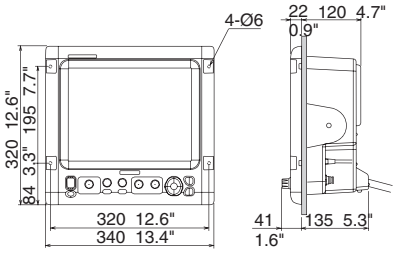
FCV295 7.0 kg 15.4 lb

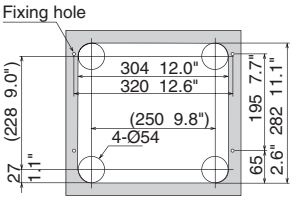


FCV1150 (Bracket Mount) 8.2 kg 18.1 lb



FCV1150 (Flush Mount) 6.8 kg 15.0 lb

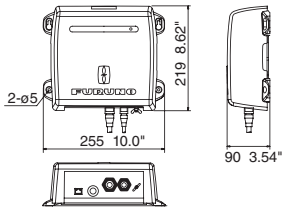




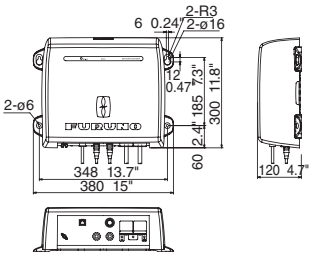
Cutout for flush mount

	NETWORK FISH FINDER/BOTTOM DISCRIMINATION FISH FINDER		
	DFF1/BBDS1	DFF3	DFF1-UHD
			
TRANSCEIVER & DISPLAY			
Display Modes	**Single (50 or 200 kHz), Dual (50 and 200 kHz), Bottom-lock, Bottom-Zoom, Bottom Discrimination*, Marker Zoom, A-Scope** *BBDS1 only	**Single (High or Low frequency), Dual (Both High and Low frequencies), Bottom-lock, Bottom-Zoom, Marker Zoom, A-Scope**	**Single (High or Low frequency), Dual (both High and Low frequencies), Bottom-lock, Bottom-Zoom, Bottom Discrimination*, Marker Zoom, A-Scope**
Frequency	**Dual frequency 50 kHz and 200 kHz**	**The synthesized transducer works with dual frequencies between 28 and 200 kHz**	**Dual Frequency Broadband CHIRP 50 kHz +/- 20 kHz, 200 kHz +/- 25 kHz**
Output Power	**600 W/1 kW**	**1, 2 or 3 kW**	
Range Scale	**Max. 1,200 m**	**Max. 1,500 m**	**Max. 1,200 m**
Range Phasing	**Up to 2,400 m (8,000 ft, 1,300 fa)**	**Up to 3,000 m (9,850 ft, 1,640 fa)**	**Up to 2,400 m (8,000 ft, 1,300 fa)**
ENVIRONMENT			
Temperature	**-15°C to +55°C**		
Waterproofing	**IEC 60529 IP20**		
POWER SUPPLY			
	12-24 VDC		
	12 W, 1.1-0.4 A	**30 W, 3.5 A**	**TBA**

Network Fish Finder DFF1/Bottom Discrimination Sounder BBDS1 1.3 kg 2.9 lb

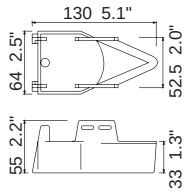


Network Fish Finder DFF3/DFF1-UHD 3.8 kg 8.4 lb

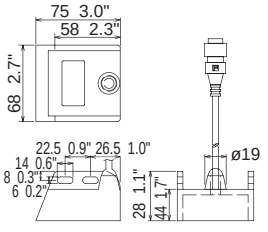


TRANSDUCERS for FCV1200BB			
	1 kW	**2 kW**	**3 kW**
15	**15F-4S**	**15F-10**	**15F-10X2**
28	**28F-8**	**28F-18, 28BL-6HR**	**28F-24H, 28BL-12HR**
38	—	**38BL-9HR**	**38BL-15HR**
50	**50B-6/6B, 50B-9B, 50F-8G**	**50B-12, 50BL-12HR**	**50F-24H, 50BL-24HR**
68	**68F-8H**	**68F-30H**	**68F-30H**
88	**88B-8**	**88B-10, 82B-35R**	**88F-126H**
107	—	—	**100B-10R**
150	—	—	**150B-12H**
200	**200B-5S**	**200B-8/8B/8N**	**200B-12H**
50/200	**50/200-1T, 50/200-1ST**	—	—
TRANSDUCERS for FCV295/FCV1150/DFF3			
	1 kW	**2 kW**	**3 kW**
28	**28F-8**	**28F-18, 28BL-6HR**	**28F-24H, 28BL-12HR**
38	—	**38BL-9HR**	**38BL-15HR**
50	**50B-6/6B, 50B-9B**	**50B-12, 50BL-12HR**	**50F-24H, 50BL-24H, 50BL-24HR**
68	**68F-8H**	—	**68F-30H**
82	—	**82B-35R**	—
88	**88B-8**	**88B-10**	**88F-126H**
107	—	—	**100B-10R**
150	—	—	**150B-12H**
200	**200B-5S**	**200B-8/8B**	**200B-12H**
50/200	**50/200-1T, 50/200-1ST, 50/200-12M***	—	—

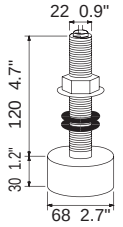
Transducer 520-5PWD (Plastic, Transom)



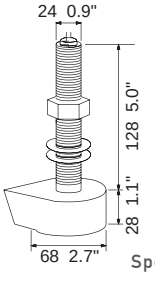
Transducer 525-5PWD (Plastic, Transom)



Transducer 520-5PSD (Plastic, Thru-hull)



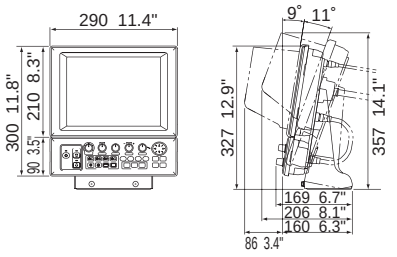
Transducer Bronze 520-5MSD (Plastic, Thru-hull)



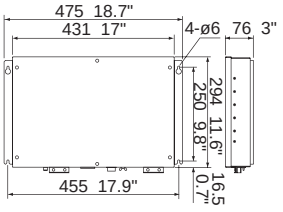
Sonar

		10.4" SEARCHLIGHT SONAR		10.4" SEARCHLIGHT DUAL FREQUENCY SONAR
		CH250	CH270	CH300
				
GENERAL				
Frequency		60, 88 or 150 kHz	180 kHz	60/153 or 85/215 kHz
Output Power		0.8-1.2 kW	0.8 kW	1 kW
DISPLAY				
Display unit		10.4" TFT color LCD, or locally supplied for Black Box configuration		
Effective display area		102 (W) x 138 (H) mm		
Pixel number		640 x 480		
Display Mode		Horizontal (Normal/Expanded), Vertical Scan, Echo Sounder, Vertical Search, Combination Display (Plotter, Vertical Scan, Strata, History)		Mix, Horizontal (Normal/Expanded), Vertical Scan, Echo Sounder
Basic Range *m,ft,fa,p/b can be selected in the menu	Horizontal mode	60 kHz: 10-1600 m 88 kHz: 10-1200 m 150 kHz: 10-1000 m		20-1200 m
	Vertical mode	10-600 m		
Pulselength		0.24-20.0 ms		
Audio Monitor	Output	2 W		
	Frequency	1.0 kHz (external speaker required)		
Target Lock (three functions, selected on menu)	Scanning Reverse	Scanning orientation changed by pressing key		
	Position Search	Auto-search for marker setting position		
	Echo Search	Auto-search for signal level in a search zone, or manual search		
Interface (IEC61162, NMEA0183)	Input	DBS, DBT, DPT, GGA, GLL, HDG, HDM, HDT, MDA, MTW, RMA, RMC, VDR, VHW, VTG		
	Output	TLL		
Video Signal Output	Method	RGB analog, separated synchronization, VGA (VESA) (Optional interface unit required)		
	Resolution	640 x 480, 65.0 MHz clock		640 x 480
	Connector	D-sub15P-female		
HULL UNIT				
Transducer travel		400 mm or 250 mm	350 mm or 250 mm	400 mm or 250 mm
Raising/lowering Time		400 mm: 30 s	350 mm: 30 s, 250 mm: 4 s	400 mm: 30 s
Allowable Ship's Speed		20 kt or less (15 kt during raise/lower operation)		
Horizontal Mode Control	Scanning Angle	6° to 360°, 24° step		
	Elevation Angle	+5° to 90°, 1° step		
Transceiver Beam Width	Frequency Vertical/ Horizontal	60 kHz: 12˚ /15˚ (-3 dB) 88 kHz: 9.5˚/11.5˚ (-3 dB) 150 kHz: 6.5˚/6.5˚ (-3 dB)	180 kHz: 8˚conical (-3 dB)	60 kHz: 14˚/16˚ (-3 dB) 153 kHz: 5˚ /7˚ (-3 dB) 85 kHz: 10˚/11˚ (-3 dB) 215 kHz: 4˚ /5˚ (-3 dB)
Stabilizer		Within 30° (optional motion sensor or clinometers required)		
ENVIRONMENT				
Temperature	Display unit	-15°C to +55°C		
	Control unit	-15°C to +55°C		
	Processor unit	-15°C to +55°C		
	Hull unit	-15°C to +55°C	0°C to +45°C	-15°C to +55°C
Waterproofing	Display unit	IPX5		
	Control unit	IPX5		
	Transceiver unit	IPX2	IPX0	
	Hull unit	IPX2		
POWER SUPPLY				
Display Unit/Control Unit/Transceiver Unit		12-32 VDC: 4.7-1.8 A	12-32 VDC: 4.7-1.8 A	12-24 VDC: 7.0-3.5 A
Hull Unit		12/24-32 VDC: 4.7/2.3-1.8 A Max. 16.7/8.2-7.7 A	12/24 VDC: 4/2.5 A Max. 10/6 A	12/24 VDC: 4.7/2.3 A Max. 16.7/8.2 A

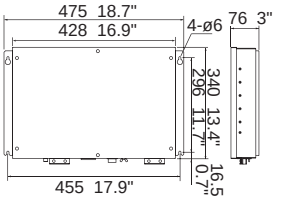
CH250/270/300 Display Unit 5.7 kg 12.6 lb



CH250/270 Transceiver Unit 3.2 kg 7.1 lb

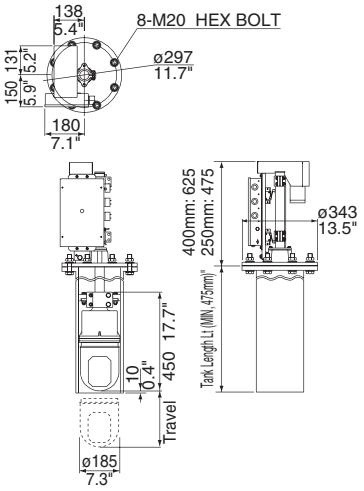


CH300 Transceiver Unit 3.5 kg 7.7 lb



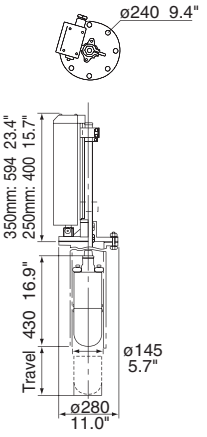
CH250 (Hull Unit)

CSH254 (Travel: 400 mm)	43 kg 94.8 lb
CSH255 (Travel: 250 mm)	42 kg 92.6 lb



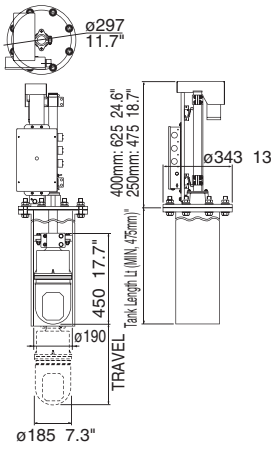
CH270 (Hull Unit)

CSH181 (Travel: 350 mm)	37 kg 81.6 lb
CSH184 (Travel: 250 mm)	35 kg 77.2 lb



CH300 (Hull Unit)

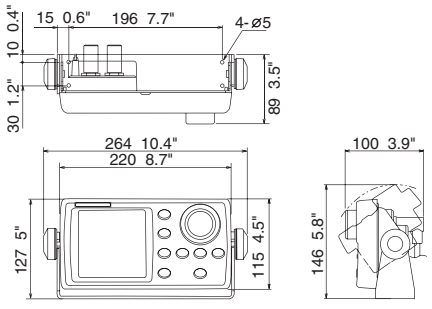
CSH304 (Travel: 400 mm)	43 kg 94.8 lb
CSH305 (Travel: 250 mm)	42 kg 92.6 lb



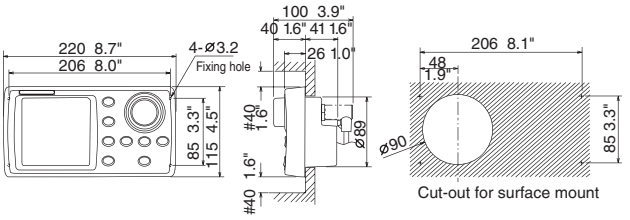
Autopilot

		AUTOPILOT		
		NAVpilot700	NAVpilot711	NAVpilot720
				
CONTROL UNIT				
Display		**Monochrome LCD**		
Effective Display Area		**85.2 (W) x 85.2 (H) mm**	**85.2 (W) x 43.6 (H) mm**	
Pixel Number		**160 x 160 dots**	**160 x 80 dots**	
Backlight		**8 steps**		
Contrast		**16 steps**		
PROCESSOR UNIT				
Rudder Angle Adjustment		**STBY, Auto, Navigation*, Wind**, FISH HUNTER*, Turn, Tack, NFU, FU, Dodge * Navigational data required ** Wind data required**		
Weather Adjustment		**AUTO/CALM/MODERATE/ROUGH**		
Rudder Angle Settings		**45° max**		
Alarm		**Deviation, Out of course*, Watch, Ship's speed*, Water temperature*, Depth*, Log*, Wind Deviation** * Navigation data reuired ** Wind data required**		
INTERFACE				
Ports		**CAN bus (NMEA2000): 1, NMEA0183: 2**		
Input		**(NMEA0183) AAM, APB, BOD, BWC, BWR, DBT, DPT, GNS, GGA, GLL, HDG, HDT, HDM, MTW, MWV, RMC, RMB, ROT, THS, TLL, VTG, VHW, VWR, VWT, XTE, ZDA (CAN bus) 059392, 059904, 060928, 126208, 126992, 126996, 127250, 127251, 127258, 127488, 127489, 128259, 128267, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130306, 130310, 130311, 130577, 130312, 130313, 130314**		
Output		**(NMEA0183) DBT, DPT, GGA, GLL, GNS, HDG, HDM, HDT, MTW, MWV, RMB, RMC, ROT, RSA, VHW, VTG, VWR, VWT, ZDA (CAN bus) 059392, 059904, 060928, 126208, 126464, 126992, 126996, 127245, 127250, 127251, 127258, 128259, 128267, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130306, 130310, 130311, 130312**		
ENVIRONMENT				
Temperature		**-15°C to +55°C**		
Waterproofing	**Processor unit**	**IPX0**		
	Other unit	**IP56**		
POWER SUPPLY				

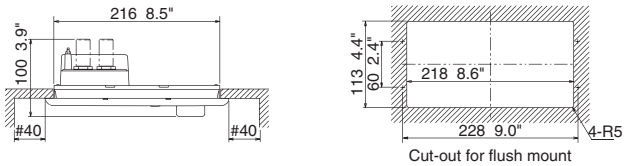
NAVpilot700 Control Unit (Bracket Mount) 0.9 kg 1.9 lb

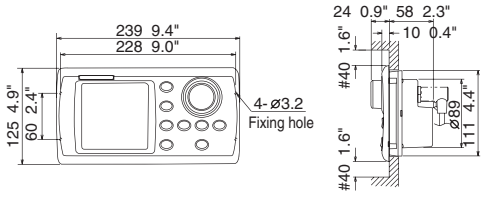


NAVpilot700 Control Unit (Surface Mount) 0.62 kg 1.4 lb

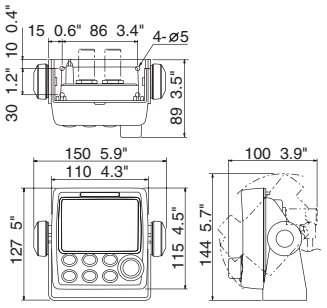


NAVpilot700 Control Unit (Flush Mount) 0.64 kg 1.4 lb

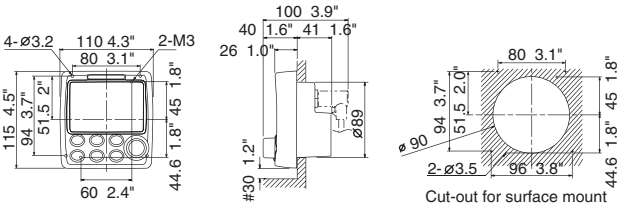




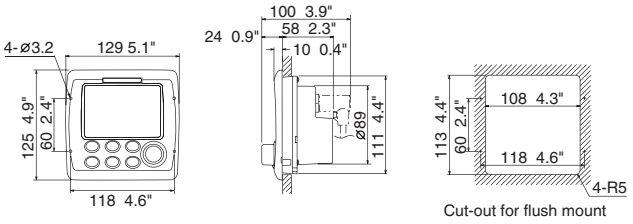
NAVpilot711 Control Unit (Bracket Mount) 0.52 kg 1.15 lb



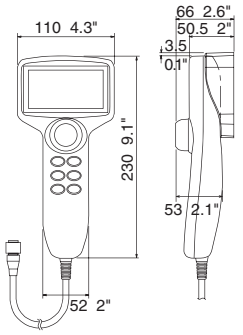
NAVpilot711 Control Unit (Surface Mount) 0.34 kg 0.75 lb



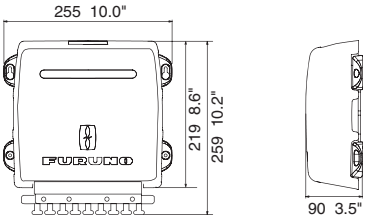
NAVpilot711 Control Unit (Flush Mount) 0.35 kg 0.77 lb



NAVpilot720 0.99 kg 2.2 lb



Processor Unit 1.9 kg 4.2 lb

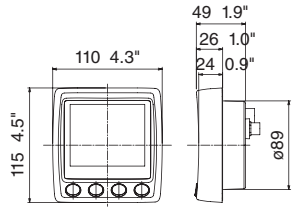


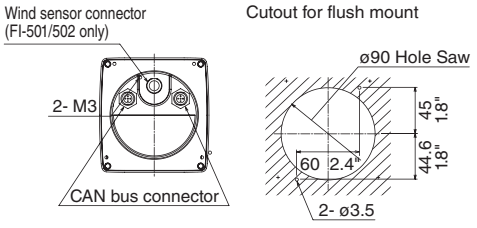
Instruments

	WIND	CH WIND	DIGITAL	MULTI	COURSE PILOT	RUDDER	MULTI XL
	FI501	FI502	FI503	FI504	FI505	FI506	FI507
							
Port	**CAN bus**	**CAN bus**	**CAN bus**	**CAN bus**	**CAN bus**	**CAN bus**	**CAN bus**
	WIND×1	**WIND×1**					
Depth							
Current depth	-	-	○	○	-	-	○
Shallow alarm threshold	-	-	○	○	-	-	○
Deep alarm threshold	-	-	○	○	-	-	○
Anchor shallow alarm threshold	-	-	○	○	-	-	○
Anchor deep alarm threshold	-	-	○	○	-	-	○
Speed							
STW (Speed through water)	-	-	○	○	-	-	○
SOG (Speed over ground)	-	-	○	○	-	-	○
Maximum speed	-	-	○	○	-	-	○
Average speed	-	-	○	○	-	-	○
VMG to windward	○	○	○	○	-	-	○
Log (0 – 99999nm)	-	-	○	○	-	-	○
Trip (0.01 – 999nm)	-	-	○	○	-	-	○
Wind							
Apparent wind speed	○	○	○	○	-	-	○
Apparent wind angle	○	○	○	○	-	-	○
True wind speed	○	○	○	○	-	-	○
True wind angle	○	○	○	○	-	-	○
Beaufort scale angle	○	○	○	○	-	-	○
Maximum wind speed	○	○	○	○	-	-	○
Maximum true wind speed alarm	○	○	○	○	-	-	○
Low true wind speed alarm	○	○	○	○	-	-	○
High apparent wind angle alarm	○	○	○	○	-	-	○
Low apparent wind angle alarm	○	○	○	○	-	-	○
Ground wind direction	-	-	-	○	-	-	○
Heading							
Heading	-	-	-	○	○	-	○
Average heading	-	-	-	○	○	-	○
Locked heading	-	-	-	○	○	-	○
Heading on next tack	○	○	-	○	-	-	○
COG (Course over ground)	-	-	-	○	○	-	○
CMG (Course made good)	-	-	-	○	-	-	○
DMG (Distance made good)	-	-	-	○	-	-	○
ROT (Rate of turn)	-	-	-	-	○	-	-
Navigation							
Bearing to waypoint	-	-	-	○	-	-	○
Distance to waypoint	-	-	-	○	-	-	○
Cross track error and error steer bar	-	-	-	○	-	-	○
Target waypoint name	-	-	-	○	-	-	○
Target waypoint number	-	-	-	○	-	-	○
Latitude	-	-	-	○	-	-	○
Longitude	-	-	-	○	-	-	○
GPS satellite status	-	-	-	○	-	-	○
Roll	-	-	-	○	-	-	○
Pitch	-	-	-	○	-	-	○
SOG	-	-	○	○	-	-	○
Environment							
Battery voltage	-	-	○	○	-	-	○
Battery voltage alarm	-	-	-	○	-	-	○
Date and Time	-	-	-	○	-	-	○
Water temperature (two decimal points)	-	-	○	○	-	-	○
Air temperature	-	-	○	○	-	-	○
Pressure	-	-	○	○	-	-	○
Humidity	-	-	○	○	-	-	○
Wind chill temperature	-	-	○	○	-	-	○
Dew point	-	-	○	○	-	-	○
Timer							
Count up timer	-	-	○	○	-	-	○
Count down timer	-	-	○	○	-	-	○
Autopilot							
Rudder angle	-	-	-	○	-	○	○
Engine							

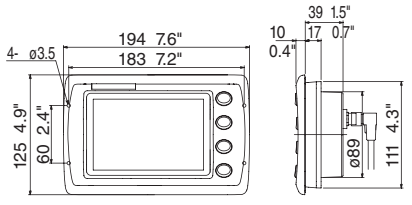
	ELECTRONIC NAVIGATION INSTRUMENTS			
	FI5001 Wind Transducer	FI5001L (Long Shaft) Wind Transducer	DST800 Depth/Speed/Temp sensor	FI5002 Junction Box
				
GENERAL				
	Power supply: 12 VDC, less than 40 mA **Transducer cable: 30/50 m**		**Frequency: 235 kHz** **Cable: 6 m**	**CAN bus backbone x 2 ports** **CAN bus x 6 ports** **Power supply: 12 VDC, less than 2A**

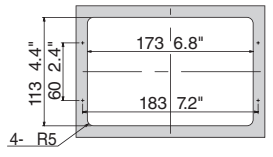
Instruments FI50 Series 0.3 kg 0.7 lb



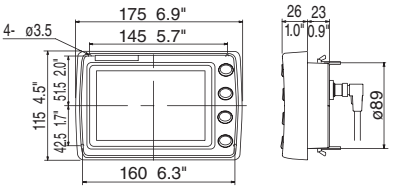


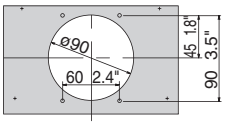
Instruments FI507 (Flush Mount) 0.5 kg 1.1 lb



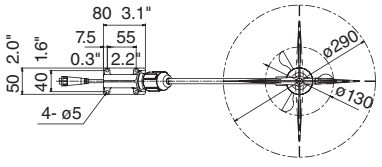


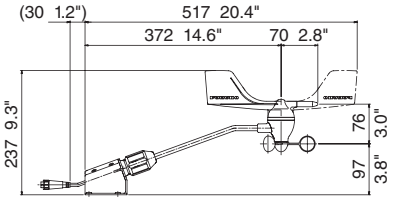
Instruments FI507 (Surface Mount) 0.5 kg 1.1 lb



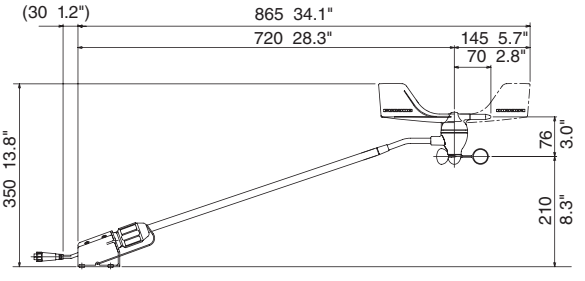


Wind Transducer FI5001 0.3 kg 0.7 lb

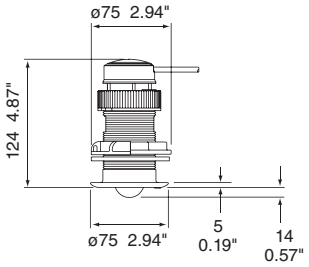




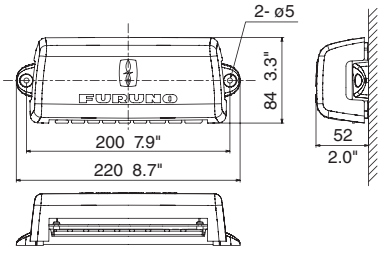
Wind Transducer FI5001L (Long Shaft) 0.4 kg 0.9 lb



Depth/Speed/Temp Sensor DST800 (Option) 0.9 kg 2.0 lb



Junction Box FI5002 (Option) 0.3 kg 0.7 lb



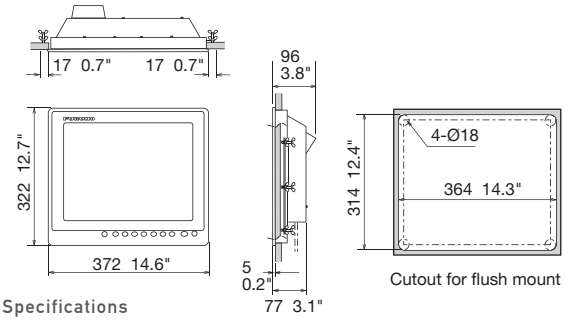
Monitors

	15" MARINE DISPLAY	19" MARINE DISPLAY
	MU150HD	MU190HD
		
DISPLAY CHARACTERISTICS		
Screen Size	15 inches, landscape	19 inches, landscape
Resolution	XGA (1024 x 768)	SXGA (1280 x 1024)
Contrast Ratio (typical)	600 : 1	900 : 1
Viewing Angle (typical)	left/right and up/down: 80° or more	
Max Brightness (typical)	1000 cd/m²	
Min Brightness (typical)	0.2 cd/m² or less	
INTERFACE		
Analog RGB (D-SUB/15 pins)	1 port	1 port
DVI (DVI-D)	2 ports	2 ports
Composite Video (NTSC/PAL)	3 ports	3 ports
Built-in Scaler	VGA to SXGA	VGA to SXGA
POWER SUPPLY		
	12-24 VDC 4.5 - 2.2 A	12-24 VDC 8.4 - 3.9 A
ENVIRONMENT (IEC 60945 test method)		
Temperature	-15°C to +55°C	
Waterproofing	IP56 (CFR46, front panel), IP22 (rear panel)	
EQUIPMENT LIST		
	Standard 1. Display Unit 2. Installation Materials, Accessories and Spare Parts	**Option** 1. Cable Assembly 2. Bracket Assembly (w/knobs) 3. Hood Assembly 4. Flush Mount Kit (for fixing at front)

	17" Hi-Brite Multi Touch Monitor	19" Hi-Brite Multi Touch Monitor	24" Hi-Brite Multi Touch Monitor
	MU170T	MU190T	MU240T
			
DISPLAY CHARACTERISTICS			
Screen Size	17 inches, 5:4 Aspect Ratio*	19 inches, 5:4 Aspect Ratio*	24 inches, 16:9 Wide Aspect Ratio*
Resolution	1280 x 1024	1280 x 1024	1920 x 1080
Contrast Ratio (typical)	1,000 : 1	1,000 : 1	3,000 : 1
Viewing Angle (typical)	+/- 80° (typical) (Up/Down/Left/Right)	+/- 89° (typical) (Up/Down/Left/Right)	
Max Brightness (typical)	1,000 NITS Hi- Brite	800 NITS Hi- Brite	1,000 NITS Hi- Brite
INTERFACE			
Analog RGB (D-SUB/15 pins)	2 ports		
DVI (DVI-D)	2 ports		
Composite Video (NTSC/PAL)	3 ports		
Supported Resolutions	VGA to SXGA	VGA to SXGA	VGA to WUXGA
POWER SUPPLY			
	115 & 230 VAC, 50/60Hz + 24 VDC Note: You may connect either AC or DC power or both. When both sources are connected, power will be sourced from the AC input. If AC input is lost, there will be an uninterrupted switch-over to DC input.		
ENVIRONMENT (EN60529 test method)			
Temperature	-15°C to +55°C		
Waterproofing	IP66 (front panel), IP22 (rear panel)		

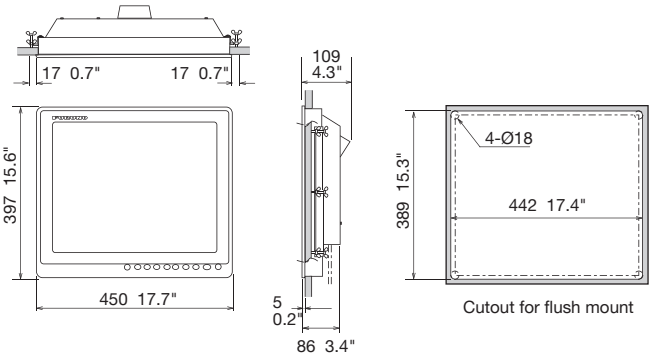
*Note: Only the MU240T should be used as a remote display for the TZT14 or TZT9, as this monitor has a wide aspect ratio for proper video scaling of the TZT MFD video output.

MU150HD Flush Mount 5.4 kg 11.9 lb



Cutout for flush mount

MU190HD Flush Mount 8.2 kg 18.1 lb

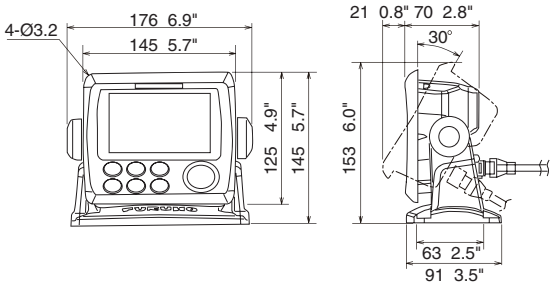


Cutout for flush mount

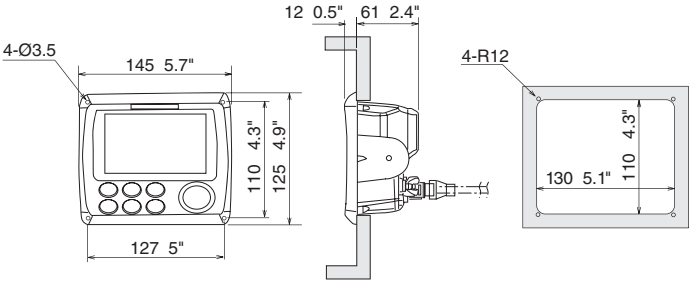
Remote Display

	REMOTE DISPLAY
	RD33
	
GENERAL	
Screen Size	**4.3" color LCD**
Effective display area	**95.04 (W) x 53.85 (H) mm**
Pixel number	**480 x 272**
Display style	**1/2/3/4 data, Highway, Graph, Alphanumeric, 6-way split**
Display mode	**Nav data, Highway, Heading, Speed, Depth Graph, Graph, Layline, STW, SOG, RPM, Rudder, Wind angle, Airtemp, Humidity, Roll pitch, ROT, Battery, Engine temp, Oil pressure, Oil temperature, Coolant pressure, Trim, Watch**
INTERFACE	
Ports	**NMEA0183 (ver. 2.0, 3.0): 1, CAN bus: 2 (male/female)**
Input	**(NMEA0183)** **APB, BWR, BWC, CUR, DBT, DPT, DBS, DBK, GLL, GGA, GNS, GTD, GLC, HDT, HDG, HDM, MTW, MDA, MWV, RSA, RMA, RMB, RMC, ROT, VHW, VBW, VTG, VWT, VWR, VDR, XTE, ZTG, ZDA, PFEC, Gpatt (Pitch & Roll)** **(CAN bus)** **059392, 059904, 060928, 065286, 126208, 126992, 127245, 127250, 127257, 127258, 127488, 127489, 127497, 128259, 128267, 128275, 129025, 129029, 129033, 129285, 130306, 130310, 130311, 130577, 130823**
Output	**(NMEA0183)** **DPT, VHW, RMC, MWV, HDT, HDG, XTE, MTW, RSA, VTG** **(CAN bus)** **059392, 059904, 060928, 065282, 065285, 065287, 126208, 126464, 126996, 126992, 127245, 127250, 128259, 128267, 129026, 129029, 129283, 129284, 130306, 130311**
ENVIRONMENT	
Temperature	**-15°C to +55°C**
Waterproofing	**IP56**
Power Supply	
	15 VDC:LEN6 (CAN bus)
	12-24 VDC:0.2-0.1A (Non CAN bus)

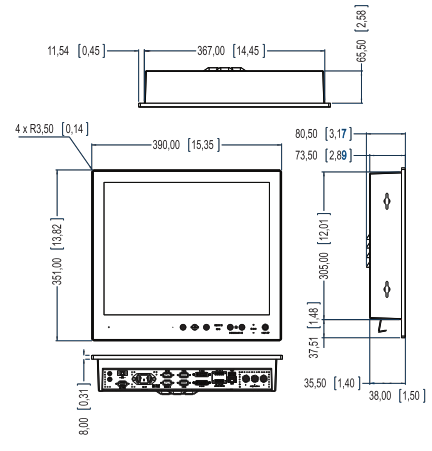
RD33 Display Unit (Bracket Mount) 0.7 kg 1.54 lb



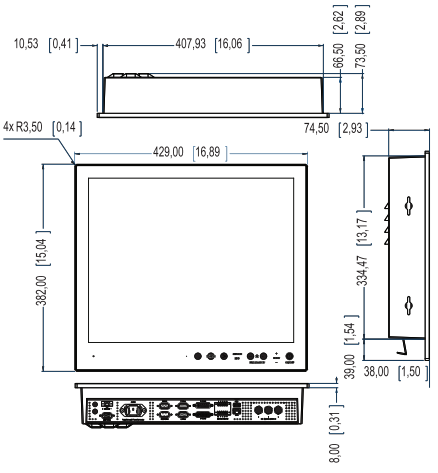
RD33 Display Unit (Flush Mount) 0.59 kg 1.3 lb



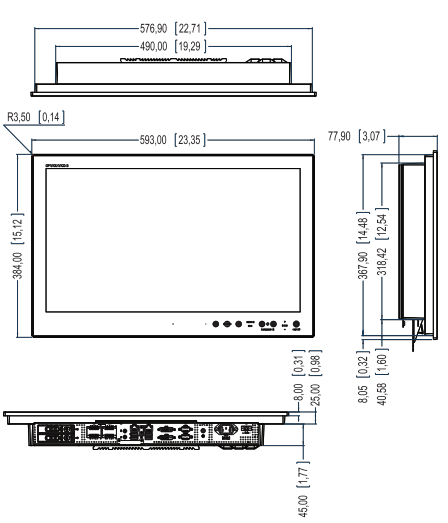
MU170T (Flush Mount) 13.6 lb



MU190T (Flush Mount) 18 lb



MU240T (Flush Mount) 24.2 lb

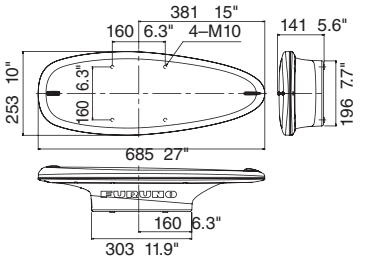


Refer to the manual for complete flush mounting dimensions and instructions.

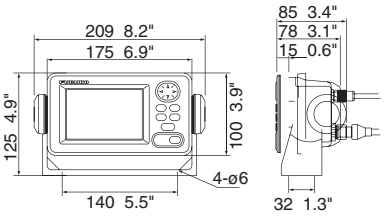
Compass

		SATELLITE COMPASS		
		SC30	SC50	SC110
				
GENERAL				
Heading Accuracy		0.5˚ rms	0.5˚ rms	0.3˚ rms
Heading Resolution		0.1˚		
Follow-up		45˚/s rate-of-turn		
Settling Time		3 mins		4 mins
Position Accuracy		10m or 3m (WAAS), 95% of the time	10m, 5m (DGPS), 3m (WAAS)	
INTERFACE				
Heading/ Nav Data Output		1 port in CAN bus		
		2 ports in IEC61162-3, 1 port in AD-10, 1 port in Analog *Optional Interface Unit IF-NMEASC is required	10 ports* (5 ports in AD-10 or 10 ports in IEC61162-1/-2), 1 Port in AD-10 *can be utilized in menu selection	
Output sentence	**PGN**	127250, 127257, 065280, 126992, 129033, 129026, 129025, 129029, 127258, 129540, 130820	—	
	25,100,200ms, 1,2s data rate	HDT, HDG, HVE, HDM, ATT (Pitch and Roll) *Optional Interface Unit IF-NMEASC is required	**HDT, HDM** (Heading), **ROT** (Rate of turn), **ATT** (Pitch and Roll), **HDG, THS**	
	1,2 s data rate	VTG, GGA, ZDA (UTC), RMC *Optional Interface Unit IF-NMEASC is required	**VHW*** (Heading), **VTG, VBW*** (SOG), **GGA, GLL, GNS** (L/L), **ZDA** (UTC), **VDR*** (Set and Drift) *only when STW is input	
Log Output	**1 port**	—	**200/400 p/nm** (closure)	
Alarm Output	**1 port**	—	**Alarm signal** (closure signal)	
Heading Input	**1 port**	—	**Backup Heading** (AD-10/IEC 61162-1) **HDT, HDG, HDM, VBW, VHW, VLW**	
DGPS Input	**1 port**	—	**RTCM SC-104 format**	
DISPLAY UNIT				
Display Type		—	**4.5" monochrome LCD**	
Effective display area		—	**95 (W) x 60 (H) mm**	
Pixel number		—	**120 x 64**	
Contrast		—	**64 levels**	
Display Mode		—	**Heading, Nav data, Steering, Compass rose, Rate of turn and set and Drift modes**	
ENVIRONMENT				
Temperature	**Display/Processor Unit**	—	**-15°C to +55°C**	
	Antenna Unit	**-25°C to +70°C**		

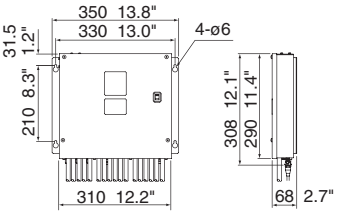
SC30 Sensor Unit 2.5 kg 5.5 lb



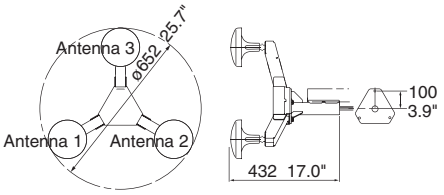
SC50/110 Display Unit 0.55 kg 1.2 lb



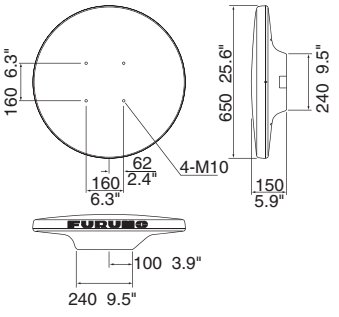
SC50/110 Processor Unit 4.2 kg 9.3 lb



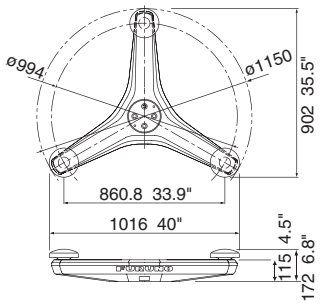
SC50 Antenna Unit (Open) 3.9 kg 8.6 lb



SC50 Antenna Unit (Radome) 4.2 kg 9.3 lb

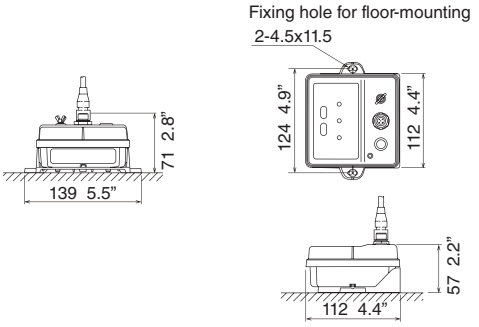


SC110 Antenna Unit 6.8 kg 15 lb

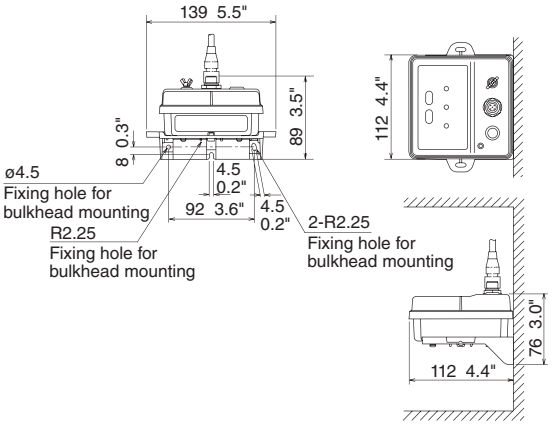


		INTEGRATED HEADING SENSOR
		PG700
		
GENERAL		
Heading Accuracy		**±1.0° (horizontal)**
Heading resolution		**0.1°**
Follow-up		**45°/s rate-of turn**
Correction	**Deviation**	**Automatic by swinging the boat**
INTERFACE		
Port		**CAN bus: 1**
Output		**065284, 127250**
Input		**059904, 060928, 061184, 126720, 126208, 130818, 165283**
ENVIRONMENT		
Temperature		**-15°C to 55°C**
Waterproofing		**IP55**
Power Supply		
		9-16 VDC (LEN=3)

PG700 (floor mounting) Main Unit 0.31 kg 0.7 lb

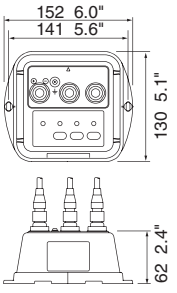


PG700 (bulkhead mounting) Main Unit 0.35 kg 0.77 lb



		INTEGRATED HEADING SENSOR
		PG500R
		
GENERAL		
Heading Accuracy		**±1.0° (horizontal)**
Heading resolution		**0.1°**
Follow-up		**25°/s rate-of turn**
Correction	**Deviation**	**Automatic by swinging the boat**
	Variation	**Automatic through GPS navigator or manual with RD-30.**
INTERFACE		
I/O Port	**Input**	**1 port**
	Output	**2 ports (one port drives 3 outputs)**
Output		**FURUNO AD-10 format, IEC 61162-1 (NMEA0183 Ver2.0) HDG, HDT, HDM**
Input		**IEC 61162-1 (NMEA0183 Ver1.5/2.0) RMC, VTG**
Data Update	**AD-10 formatted**	**25 ms**
	IEC 61162-1 (NMEA0183)	**100 ms, 200 ms or 1 s selected**
ENVIRONMENT		
Temperature		**-15°C to 55°C**
Waterproofing		**IPX5 (IEC 60529), CFR-46 (USCG standard)**
Power Supply		
		12-24 VDC: 120-30 mA

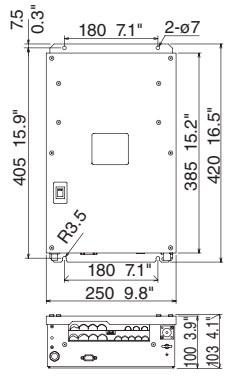
PG500R 0.3 kg 0.7 lb



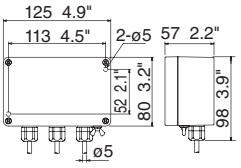
Communications

		AIS RECEIVER	Class-B AIS TRANSPONDER	U-AIS TRANSPONDER
		FA30	FA50	FA150
				
STANDARDS				
		Standards referred to; IMO MSC.74 (69) Annex 3, ITU-R Rec. M.1371-2, IEC 61993-2 Ed.1 (Class-A AIS), IEC 62287-1 (Class-B CS-TDMA AIS), IEC 60945 Ed.4, IMO Res. A.917 (22)	IMO MSC.140(76), IEC 62287-1, ITU-R M.1371-2, DSC ITU R M.825-3, IEC 60945 Ed.4	IMO MSC.74(69) Annex 3, IEC 61993-2, ITU-R M.1371-3, ITU-R M.825-3(DSC)
TRANSPONDER UNIT*		*FA-30: RECEIVER UNIT		
TX/RX Frequency (FA-30: RX Frequency)		156.025 MHz to 162.025 MHz		
Output Power		—	1 W/2 W	1 W/12.5 W selectable
Channel Spacing		25 kHz/12.5 kHz	25 kHz	25 kHz/12.5 kHz
DISPLAY UNIT				
Screen Size		—	—	4.5" monochrome LCD
Effective Viewing Area		—	—	95 (H) x 60 (V) mm
Pixel Number		—	—	120 (H) x 64 (V) mm
GPS RECEIVER				
Receiving Channels		—	12 channels parallel, 12 satellites tracking	12 channels parallel, 12 satellites tracking
Rx Frequency		—	1575.42 MHz	1575.42 MHz
Rx Code		—	C/A code	C/A code
Position Accuracy		—	10 m (HDOP ≦ 4)	10 m (HDOP ≦ 4)
INTERFACE				
COM	Input	ACK, ACA, AIQ, DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, VBW, VTG, DSC, DSE, ZDA	ACK, BBM, DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, SSD, VBW, VSD, VTG, AIQ, DSC, DSE	VSD, SSD, ABM, BBM, ACA, ACK, AIR, DTM, GBS, GGA, GLL, GNS, HDT, LRF, LRI, OSD, RMC, ROT, VBW, VTG
	Output	VDM, VDO, ACA, ACS, ALR, TXT	VDM, VDO, ABK, ACA, ACS, ALR, TXT	VDM, VDO, ABK, ACA, ALR, TXT, LR1, LR2, LR3, LRF, LRI
Ethernet		10/100BASE-T	10/100BASE-T	10/100BASE-T (Option)
ENVIRONMENT				
Temprature	Antenna Unit	—	-30°C to +70°C	-25°C to +70°C
	Other Units	-15°C to +55°C	-15°C to +55°C	-15°C to +55°C
Waterproofing	Antenna Unit	—	IPX6	IPX6
	Other Units	IP20	IP20	Display Unit: IP22 Transpoder Unit: IP20

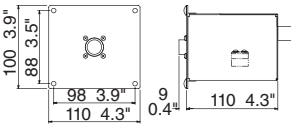
Transponder Unit
FA1501 7.3 kg 16.1 lb



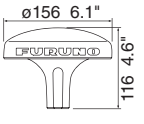
Distribution Box
DB1 0.9 kg, 2.0 lb



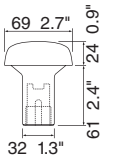
Pilot Plug (Option)
OP24-3 0.6 kg, 1.3 lb



GPS Antenna
GSC001 0.5 kg, 1.1 lb
GPA017S 0.15 kg, 0.3 lb

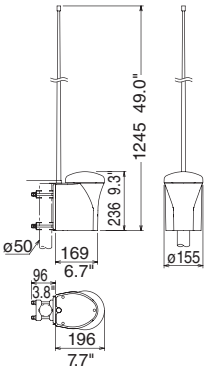


GSC-001

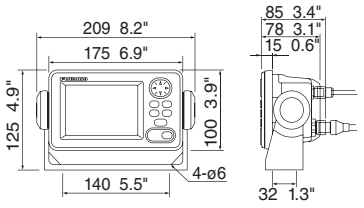


GPA-017S

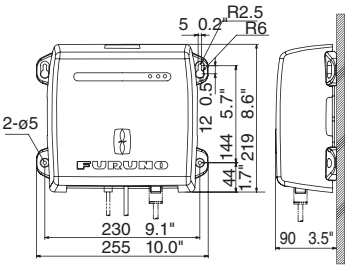
GPS/VHF
Combined Antenna
GVA100 3.3 kg 7.3 lb



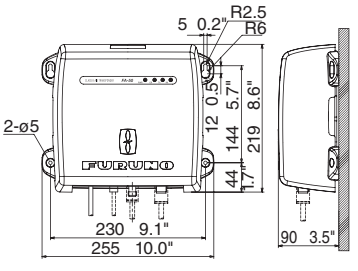
Display Unit
FA1502 0.6 kg 1.3 lb



FA30 AIS RECEIVER 1.5 kg 3.3 lb

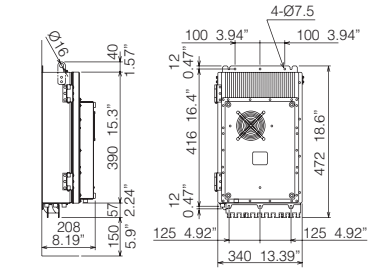


FA50 Class-B AIS Transponder 1.7 kg 3.7 lb

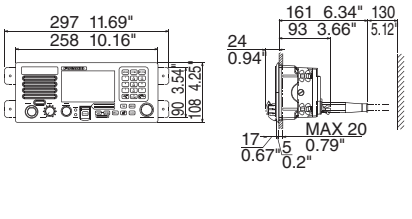


		MF/HF RADIOTELEPHONE	
		FS1575	FS2575
			
GENERAL			
Frequency Range	TX	1.6 to 27.5 MHz (100Hz Steps)	
	RX	0.1 to 29.9 MHz (10Hz Steps)	
Channels		256 user-specified channels plus ITU, SSB/TELEX channels	
Rules and Regulations		IMO A.694 (17), A.806 (19), MSC36 (63), MSC68 (68) A3, ETS 300 067 November 1998 A1, EN 300 338 April 1999, ETS 300 373 August 1997 A1, EN 61162-1 July 2000, EN 301 033 August 1998, EN 60945 October 2002, ITU-R M.1173, M.476-5, M.491-1, M.492-6, M.493-11, M.541-9, M.625-3, MSC/Cir. 862	ITU-R M. 1082-1, ITU-R M. 1173, ITU-R M. 476-5, ITU-R M. 490, ITU-R M. 491-1, ITU-R M. 492-6, ITU-R M. 493-13, ITU-R M. 541-9, ITU-R M.625-3, ITU-R M.821-1, IMO Res. A. 694 (17), IMO Res. A. 806 (19), IMO Res. MSC36 (63), IMO Res. MSC68 (68), MSC/Circ. 862, IEC 61162-1 Ed. 4, IEC 60945 Ed. 4, ETS 300 067 ed. 1, EN 300 338-1 V1.3.1, EN 300 338-2 V1.3.1, EN 301 033 V1.3.1, EN 300 373-1 V1.3.1
Communication System		Simplex/semi-duplex	
Class of Emission		J3E, H3E, A1A, J2B	
TRANSCEIVER			
RF Output Power		150 W pep	250 W pep
Antenna		10-18 m whip or wire	
Tuning Speed		within 15 sec.	
Receiver Sensitivity		less than +7 dBμV (4.0-29.99999 MHz, J3E) / less than +13 dBμV (1.6-4 MHz, J3E)	
DSC			
Receiving Frequency	General	All DSC frequencies in MF/HF	
	Distress and safety	DSC distress/safety frequencies: 2187.5 kHz, 4207.5 kHz, 6312.0 kHz, 8414.5 kHz, 125770 kHz, 16804.5 kHz	
Message Storage	TX:	50 distress messages, plus 50 non-distress messages	
	RX:	50 messages, telephone no., frequencies, etc.	
POWER SUPPLY			
		24 VDC, 20 A (TX), 5.0 A (RX)	24 VDC, 40 A (TX), 5.0 A (RX)
		100/110/120/200/220/240 VAC with optional AC/DC Power Supply PR-300	100/110/120/200/220/240 VAC with optional AC/DC Power Supply PR-850A

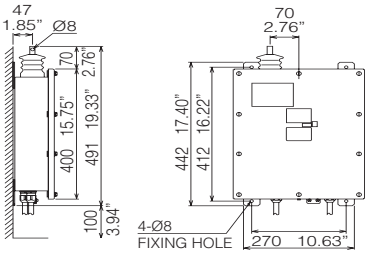
Transceiver Unit FS1575T 16 kg 35.3 lb



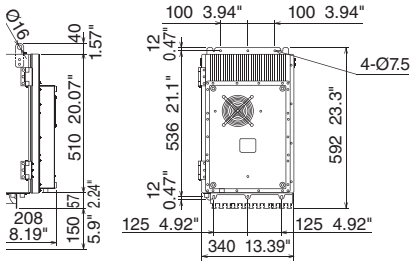
FS2575C 1.9 kg 4.2 lb



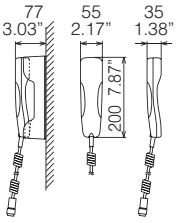
Antenna Coupler AT1575 2.6 kg 5.7 lb



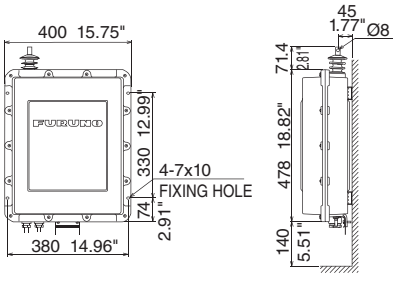
Transceiver Unit FS2575T 20 kg 44.1 lb



Handset HS2003 0.5 kg 1.2 lb



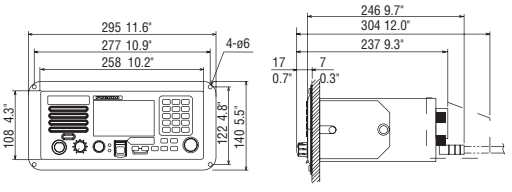
Antenna Coupler AT5075 8.5 kg 18.7 lb



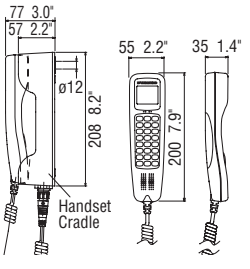
Communications

		VHF RADIOTELEPHONE
		FM8900S
		
GENERAL CHARACTERISTICS		
Class of Emission		**G3E (telephone), G2B (DSC)**
Communication System		**Simplex/Semi-duplex**
Channels		**All VHF channels according to ITU-R Radio Regulations Appendix S18, All channels in FCC Part 80, Max 20 Private channels where permitted by Administrations (preset by the service agent), 10 weather channels (USA and Canada, receive only)**
Rules and Regulations		**VHF Radiotelephone: EN 301 925 V1.3.1 (2010.9) VHF ATIS: EN 300 698-1 V1.4.1 (2009.12) DSC: ITU-R M.493-13, (2009-10), ITU-R M.541-9 (2004.05), ITU-R M.689-2 (1994.09), EN 300 338-1/-2 V1.3.1 (2010.02)**
Display		**4.3 inches WQVGA (480 x 272 dots), color dot matrix LCD**
TRANSMITTER		
Frequency Range		**155.00 - 161.475 MHz**
RF Output Power		**High: Max 25 W, Low: Not exceed 1 W US version: Manual override for 25 W available on CH13, CH67 and CH77 (usually not exceed 1 W)**
Frequency Stability		**less than ±1.5 kHz**
RECEIVER		
Frequency Range	**Simplex**	**155.000 - 159.600 MHz**
	Semi-duplex	**161.475 - 164.200 MHz**
Receiving System		**Double-conversion super-heterodyne 1st IF : 51.1375 MHz, 2nd IF: 62.5 kHz**
AF Output Power		**3 W (4Ω loud speaker), 2 mW (150Ω handset)**
Audio Response		**De-emphasis of 6 dB/oct +1/-3 dB**
Sensitivity		**less than 6 dBμV at SINAD 20 dB**
Adjacent Channel Selectivity		**70 dB or more**
DSC Section		
Message Log	**Receive**	**50 distress messages plus 50 non-distress messages**
	Transmit	**50 messages**
Interface	**Nav data**	**IEC61162-1 Ed.4**
	Printer	**Centronics-compatible**
Alarm		**Audible and visual on receipt of a DSC call**
Receiver Characteristics	**DSC frequency**	**CH70**
	Calling sensitivity	**Symbol error rate: less than 1% (at 0 dBμV)**
ENVIRONMENT		
Temperature		**-15°C to +55°C**
Waterproofing		**FM-8900S: IP20 (IP22 with option), HS-2003: IP24, RB-8900: IP22**
POWER SUPPLY		
		24 VDC
	RX	**1.8 A (MAX), 0.6 A (standby)**
	TX	**4.7 A (MAX)**

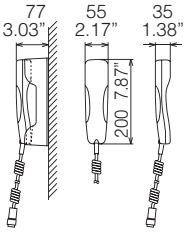
Transceiver Unit (Flushmount) FM8900S 4.2 kg 9.3 lb



Remote Station RB8900 0.7 kg 1.5 lb



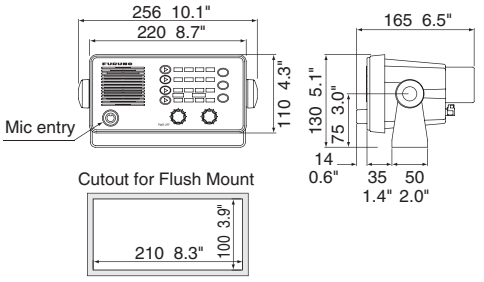
Handset HS2003 0.2 kg 0.4 lb



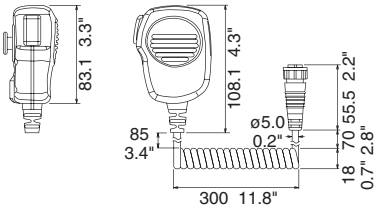
		LOUD HAILER
		LH3000
		
AUDIO OUTPUT		
Hail speaker		**30 W, 8Ω**
Intercom speaker		**4.5 W, 4Ω**
External speaker		**4.5 W, 4Ω**
Internal speaker		**2.5 W, 4Ω**
INPUT IMPEDANCE		
MIC impedance		**600Ω**
Aux impedance		**10kΩ**
INPUT SENSITIVITY		
MIC sensitivity		**-73 dB ±3 dB** (0 dB=1V/μBar at 1000Hz)
Aux sensitivity		**0 dBm ±3 dB** (at 1 kHz)
DISTORTION FACTOR		
Hail mode		**less than 10%** (1 kHz 30 W)
Intercom mode		**less than 10%** (1 kHz 2.5 W)
ENVIRONMENT		
Ambient temperature		**-15°C to +55°C**
Waterproofing		**IPX5** (Front panel), **IPX0** (Other)
POWER SUPPLY		
		12 VDC ±20%, less than 5A, less than 280 mA (standby)

		NAVTEX RECEIVER
		NX300
		
NAVTEX RECEIVER		
Receiving Frequency		**518 kHz or 490 kHz**
Mode of Reception		**F1B**
Sensitivity		**2μ V e.m.f.** (50 ohms), **4% error rate**
Message Category		**A:** Navigational warning **B:** Meteorological warning **C:** Ice report **D:** Search and rescue information/piracy and armed robbery **E:** Meteorological forecast **F:** Pilot message **G:** Decca message **H:** Loran-C message **I:** Omega message **J:** Differential omega message **K:** Other electronic navigational aid and system message **L:** Navigational warning (additional) **M to Y:** Reserve _ presently not used **V:** Notice to Fishermen (US only) **Z:** QRU (no message on hand)
DISPLAY		
Display		**4.5" Monochrome LCD**
Effective display area		**95 (W) X 60 (H) mm**
Pixel number		**120 x 64**
Display Modes		**Message Selection, NAV Data, Message Display**
Message Storage		**28,000 Characters**
Languages		English, Spanish, German, French, Italian, Danish, Dutch, Portuguese
INTERFACE		
Input		**0183 Ver.1.5/2.0, RS-232C, 4800 bps** **GGA, GLL, RMB, ZDA, RMC**
Output		**Message data for personal computer, RS-232C, 4800 bps**
ENVIRONMENT		
Temperature	**Antenna unit**	**-25°C to +70°C**
	Display unit	**-15°C to +55°C**
Waterproofing	**Antenna unit**	**IPX6**
	Display unit	**IPX5**
POWER SUPPLY		
		12-24 VDC: 180-90 mA

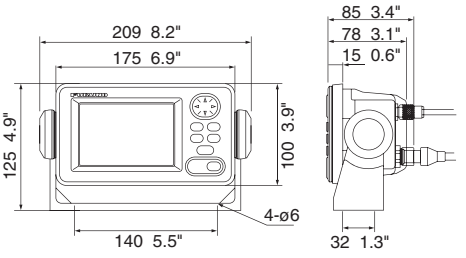
LH3000 2.0 kg 4.4 lb



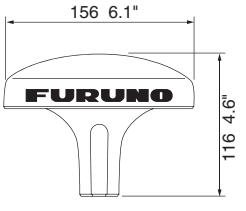
Microphone
DM2003 0.2 kg 0.44 lb



NX300 Display Unit 0.68 kg 1.5 lb

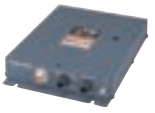


Antenna Unit
NX3H-D 0.9 kg 1.5 lb

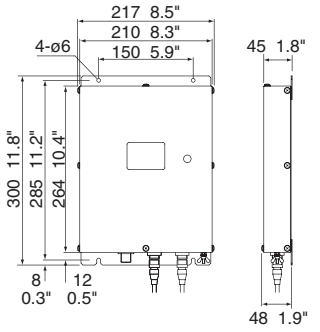


Internal thread 1x14UNS1B

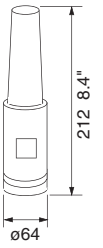
Communications

		FACSIMILE RECEIVER
		FAX30
		
GENERAL		
Frequency Range		**80 kHz to 160 kHz, 2 MHz to 25 MHz, 490 kHz, 518 kHz (NAVTEX)**
Class of Emission		**F3C, J3C, F1B (NAVTEX)**
Receiving System		**Double superheterodyne**
Number of Channel		**1000 channels**
Storage	**Fax**	**12 pictures**
	NAVTEX	**130 messages**
Scanning Speed		**60, 90, 120, 180 or 240 r.p.m., automatic or manual selection**
I.O.C.		**576 or 288, automatic or manual selection**
Display Color		**Monochrome, 8 shades of gray, Blue shades, Pink and black, Red and blue**
Networking Standard		**Ethernet 10Base-T TCP/IP**
ENVIRONMENT		
Temperature		**-15°C to +55°C**
Waterproofing		**IPX2**
POWER SUPPLY		
		12-24 VDC: 1.0-0.5 A
MINIMUM SYSTEM REQUIREMENTS FOR PC		
OS		**Windows 98, 2000, ME, XP, Vista, 7(32 bit/64 bit)**
CPU		**600 MHz or faster**
RAM		**128 MB or more**
Resolution		**1024 x 768 pixels**
Browser		**Internet Explorer Ver. 5.01 SP2/5.5 SP2/6.0 SP1/7.0, SP1/8.0 Netscape Communicator Ver. 4.78/6.2/7.0**

FAX30 Receiver Unit 2.0 kg 4.4 lb

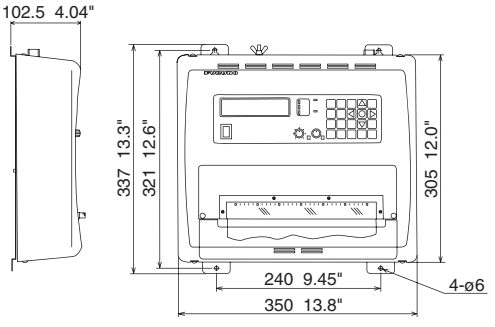


Preamp Unit FAX5 1.3 kg 2.9 lb



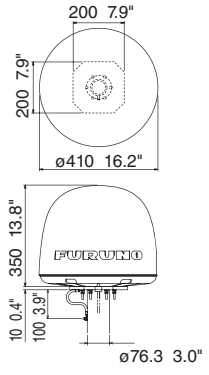
		FACSIMILE RECEIVER
		FAX408
		
RECEIVER CHARACTERISTICS		
Frequency Range		**2 MHz to 25 MHz in 100 Hz steps**
Number of Channels	**User programmed**	**164**
	Pre-programmed	**150**
Receiving System		**Synthesized double super heterodyne**
Mode of Reception		**F3C**
Sensitivity		**MF/HF: 2μV at 20 dB SINAD**
RECORDER CHARACTERISTICS		
Recording System		**Thermal head printing**
Recording Paper		**216 mm x 20 m with effective width of 212 mm**
Scanning Speed		**60, 90, 120 rpm**
Gradation		**9 levels**
Phase Control		**Automatic or manual**
Operation		**Automatic* or manual *By APSS signal Schedule Timer 16 programs/week**
ENVIRONMENT		
Temperature		**-10°C to +50°C**
POWER SUPPLY		
		12-24 VDC, less than approx. 28 W

FAX408 Receiver Unit 5.6 kg 12.3 lb

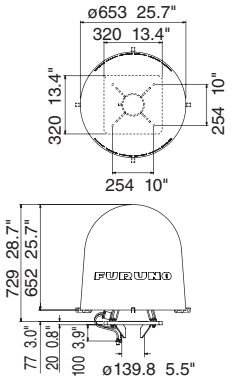


		INMARSAT FLEETBROADBAND	
		FELCOM250	FELCOM500
			
GENERAL			
Transmitting Frequency		1626.5 - 1660.5 MHz	
Receiving Frequency		1525.0 - 1559.0 MHz	
INTERFACE			
Ethernet	**RJ45**	4 ports	
2-wire analog telephone	**RJ11**	2 ports	
	Phoenix 4 pin	2 ports	
NMEA in/out	Phoenix 5 pin (NMEA0183 ver. 2)	1 port	
Alarm output	**Pnoenix 3 pin Contact (Normal Close)**	1 port	
USIM/SIM	**Plug in type**	1 port	
RS-232	9 pin D-Sub female connector (EIA574)	1 port	
L-band output	**BNC**	1 port	
COMMUNICATION SERVICES			
Voice		4 kbps circuit switched (AMBE+2 codec) ISDN 3.1 kHz Audio (Transparent)	
Data	**ISDN UDI/RDI**	—	56/64 kbps
	Standard IP(Best Effort Delivery)	284 kbps (RX), 225 kbps (TX)	432 kbps (RX), 372 kbps (TX)
	Streaming IP(Guaranteed Service Rate)	8, 16, 32, 64, 128 kbps	8, 16, 32, 64, 128, 256 kbps
SMS (Short Message Service)		Up to 160 characters	
FAX		G3 Fax through 3.1 kHz audio	
ENVIRONMENT			
Temperature	Antenna Unit (operative temperature)	-25°C to +55°C	
	Antenna Unit (storage temperature)	+70°C	
	Below Deck Unit (operative temperature)	-25°C to +55°C	
Waterproofing		IP56	
Ship's motion	**Roll**	± 30°/8 sec	
	Pitch	± 10°/6 sec	
	Yaw	± 8°/50 sec	
	Rate of Turn	6°/1 sec	
	Ship's Speed	30 knot	
POWER SUPPLY			
Power Supply		10.8 - 31.2 VDC	
Fuse		12 A (TX) at 12 VDC, 6 A (TX) at 24 VDC	

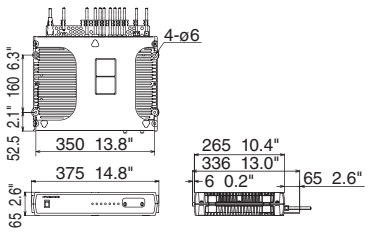
FELCOM250 Antenna FB-1250 6.6 kg 14.5 lb



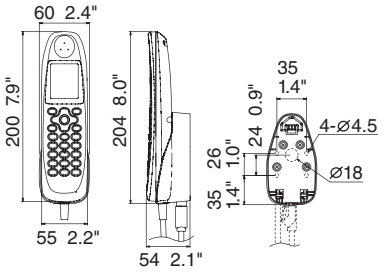
FELCOM500 Antenna FB-1500 (with an attachment) 21 kg 46.3 lb



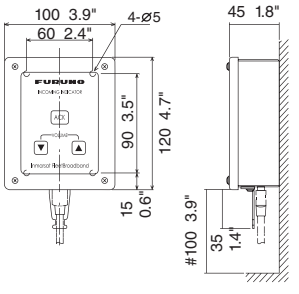
Communication Unit FB-2000 4.1 kg 9 lb



Handset FB-8000 0.38 kg 0.8 lb



Incoming Indicator FB-3000 0.37 kg 0.81 lb



Notes:

FURUNO WARRANTY & SERVICE

When it comes down to reliability, dependability and service, we stand behind our products like no one else!

FURUNO's network of service agents covers the whole world, led by our continental service centers located in the US, Germany and Japan. Our field technicians are well-experienced in marine industry, and they are teeming with in-depth knowledge about our entire product line through regularly conducted technical seminars. The combination of knowledge and experience of our field technicians leads to more thorough, comprehensive service provision to our customers. On top of that, all FURUNO products are covered by our two-year worldwide warranty policy to back you up.
This means that you are always protected by FURUNO's comprehensive back-up scheme all around the globe at all times!

FURUNO World Wide Warranty 2 YEARS

FURUNO WEB SITES

FURUNO ELECTRIC CO., LTD.

www.Furuno.com

Visit our Corporate web site to access the most up-to-date company information as well as the in-depth product information from FURUNO!

www.NavNet.com

http://www.NavNet.com

Quick access to all the facts about NavNet TZtouch and NavNet 3D at NavNet.com. At NavNet.com, you can access the contents with product information from various angles, including demonstration films, introduction to the product, product specifications, online tutorial, system suggestions and more. Also, you can register your NavNet system online to obtain various premium benefits, including chart update, Operating System software update and much more!

www.FurunoDeepSea.com

FURUNODEEPSEA.com

http://www.FurunoDeepSea.com

At furunodeepsea.com, not only can you gain access to in-depth information about the products for our deepsea business segment but there are also introduction to our service provision as well as end-user training schemes and other added values of FURUNO, the qualities for which people would always come back to us.

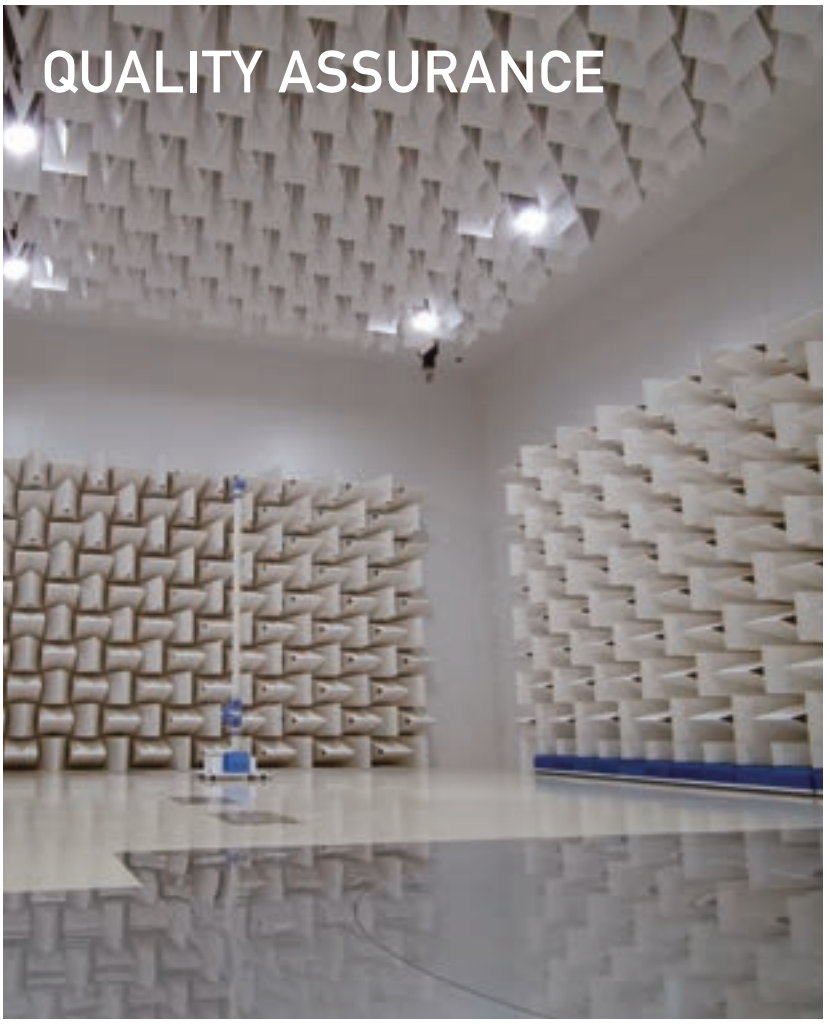
www.SafeComNet.com

SafeComNet™
FURUNO Mobile Satellite Services

www.SafeComNet.com

FURUNO's portal web site for introducing satellite-based broadband communications solution "SafeComNet", utilising Ku-band VSAT and Inmarsat Fleet Broadband.

QUALITY ASSURANCE



Stance on Quality Assurance

FURUNO's philosophy is that the quality of products depends on the quality of processes. Guided by this policy, FURUNO works to raise quality to earn the trust and satisfaction of customers. One example is the acquisition by all business units of ISO 9001 certification, an international standard for quality control management.

Status of ISO 9001 Certification (As of April 2009)

Business Unit	Certification Authority (Registration No.)	Scope of Registration
Marine Electronic Products Division	LRQA (No.YKA 0931818) November 1994	Design, development, manufacture, management of installation and provision of services of navigational and fishery equipment and communication equipment.
Systems Product Division	TÜV SÜD Japan (No.12 100 17099 TMS) March 1997	Development, production and distribution of in vitro diagnostic biochemical analyzers, ultrasound bone densitometer, fare collection equipment, GPS engine and apparatus, controller for Industrial robot *Applies to ISO 13485 (No.Q1N 05 08 40403 001) for medical devices
Avionics and Defense Electronics Division	BSK (No.BSK0014) September 1998	Design and development, Production and Service Provision (including Repair) for Electronics of Aviation, Ground use and for Marine use

Quality Testing

Maritime electronic equipment is used in particularly harsh environments. To meet any environmental conditions, FURUNO employs a variety of testing equipment to conduct various testing against temperature and humidity, severe shock and vibration as well as package drop and waterproofing testing.

Also, in order to keep the radio wave emission level below a predetermined threshold, FURUNO opened a facility for testing electromagnetic compatibility (EMC).

ENVIRONMENTAL ACTIVITIES

Environmental Philosophy

All business units of FURUNO have acquired ISO 14001 certification, an international standard for quality control management. Based on a corporate theme of endeavoring to create environmentally friendly products for the 21st century, we aim to conduct business activities that are environmentally responsible, thereby contributing to society.

Promoting the Creation of Environmentally Friendly Products

In accordance with our theme, we will continue to develop and manufacture environmentally friendly products contributed to save natural resources and recycle materials.
For instance, lead, mercury, cadmium and other hazardous substances are avoided in the production process.
We are following each environmental law to prevent land, air and water pollution issues.

Promoting Green Procurement

FURUNO is obtaining raw materials that contain no harmful substances, in addition we source environmentally friendly materials that decrease the burden on the environment.

Promoting Industrial Waste Reduction and Recycling

FURUNO is promoting reduction and controlling of industrial waste as well as recycling. It is strictly processed under waste management and recycle laws.

Promoting effective use of energy

FURUNO is making efforts to decrease CO_2 emissions by promoting effective use of energy in order to avoid global warming. At the same time, we are cutting down on the use of natural resources for reducing the effects on the environment.

Committee for environmental control

For promoting environmental activities, FURUNO has established a committee for promoting environment control under every business units and/or departments.

Status of ISO 14001 Certification (As of April 2009)

Business Unit	Certification Authority (Registration No.)
Nishinomiya Office	JACO (No.EC00J0300) March 2001
Miki Factory	JACO (No.EC99J1129) December 1999
FURUNO INT Center	TÜV SÜD Japan (No.12 104 17099 TMS) August 2003

FURUNO's Global Network

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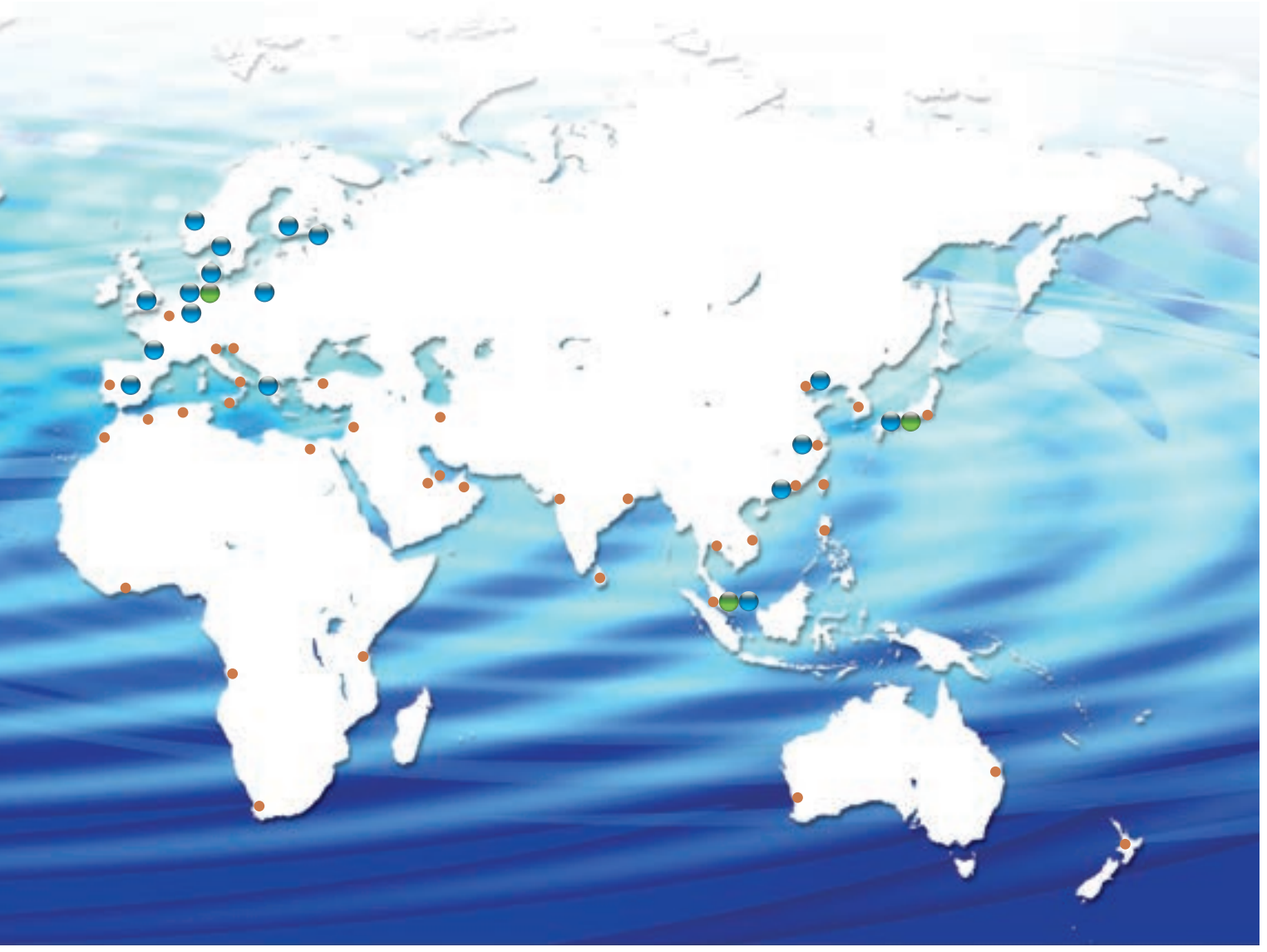

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This photograph is FURUNO Dong Guan Factory (Guangdong, China).

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