FURUNO

MARINE ELECTRONICS CATALOG

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FURUNO

We sense more!

Offering the best possible solutions without compromise

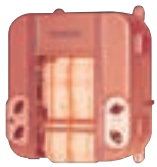
For more than 70 years, FURUNO ELECTRIC CO., LTD. has been establishing a heritage of inventions and making electronic equipment on which more captains rely on day in and day out.

For the men and the women who make a living on the seas, to those who simply enjoy the boating lifestyle, FURUNO is the name that is synonymous with quality electronics you can definitely trust.

You will find that vast and varied range of equipment from FURUNO offers the ultimate performance while providing intuitive operation and making your navigation experience more enjoyable.

It is also reassuring to know that there is an unrivaled, worldwide sales/service network that provides assistance in every corner of the globe.

Every product includes two-year assurance program of factory parts, service work and equipment maintenance guaranteeing the high quality upkeep for all the devices. That is a priceless value that no other brand can have responded to as far as 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

Contents

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

World's first dual-frequency searchlight sonar. **CH-300** (2005)

Developed NavNet TZtouch2 Series. NAVnet TZtouch2 (2015)

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
2015 Developed NavNet TZtouch2 Series
2016 Developed solid state doppler radar DRS4D-NXT

NAVnet TZ touch 2

Simply Refined, Simply Beautiful

12.1" Multi Function Display
Model TZTL12F

Resolution: WXGA (1280 x 800 pixels)
Brightness: 1300 cd/m^2 (typical)

15.6" Multi Function Display
Model TZTL15F

Resolution: FWXGA (1366 x 768 pixels)
Brightness: 1000 cd/m^2 (typical)

SD Card Unit (option)
Model SDU001

TimeZero, MTC, RezBoost, BDS, ACCU-FISH

▸▸▸ *Spec P68*

AUTO, Target Tracking, AIS, Enhanced Sunlight Viewable, Bonded LCD, Polarized Friendly, GPS Internal Antenna, FISH FINDER Internal, Ethernet Plug&Play, CAN bus, NMEA2000 Certified, VIDEO IN OUT

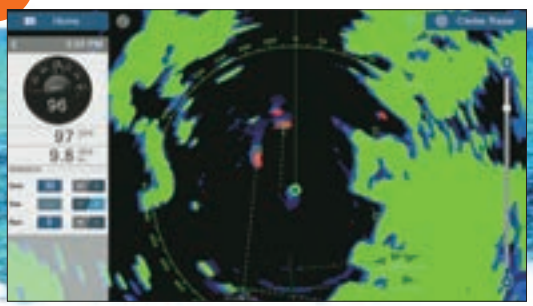
- Edge-to-edge glass front
- Sunlight viewable multi touch display with impressive brightness, 1300 cd/m^2 for TZTL12F and 1000 cd/m^2 for TZTL15F
- Seamless, smooth chart operation with the TimeZero™ Technology
- Enhanced touch gestures like edge swiping for frequently used functions
- A graphical user interface that has been renewed and refined, focusing on usability and ease of operation
- Internal RezBoost™ Fish Finder
- Internal GPS Antenna
- Add Autopilot, Instruments, Radar, AIS, and a wide variety of other sensors to your NavNet TZtouch2 network
- An instrument display like nothing you have seen before. Totally customizable, totally simple
- Connect up to 6* NavNet TZtouch2/ TZtouch displays on one network
- With an internet connection, NavNet TZtouch2 can wirelessly access real-time weather data
- Tablet & Smart phone apps: NavNet Remote, NavNet Viewer and NavNet Controller for your iOS and Android™ devices
- With ActiveCaptain, you can find updated information on fuel prices, marinas and obstructions directly on your plotter screen
- Compatible with CZone Digital Switching
- Manual Fuel Management enabling visual evaluation of fuel amount

Remote Control Unit (option)
Model MCU002

Remote Control Unit (option)
Model MCU004

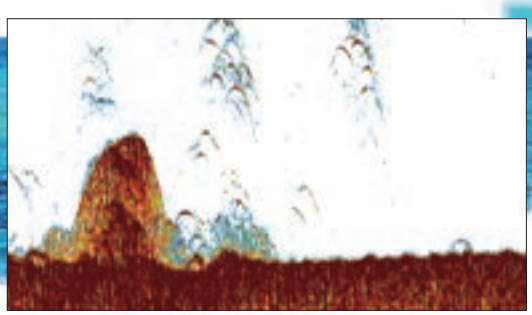
* Software version 5.01 or later, coming Spring 2017 - connect up to 4 displays with earlier software versions

NEW



Target Analyzer with Echo Trail

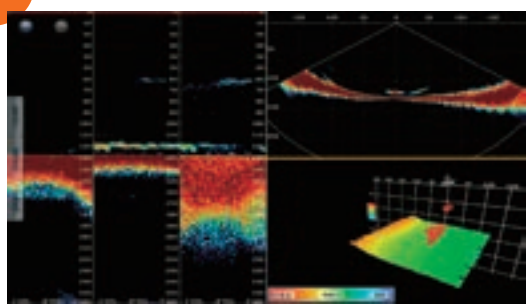
Revolutionary Target Analyzer function instantly identifies hazardous targets with Echo Trail.



Built-in Fish Finder with RezBoost™

RezBoost™ technology makes it easier to spot individual fish in tightly packed fish schools as well as discerning game fish from bait fish.

NEW



Advanced multi-beam technology with DFF3D*

Deep and wide-range water column and seabed are displayed in real time. *Coming in spring 2017.

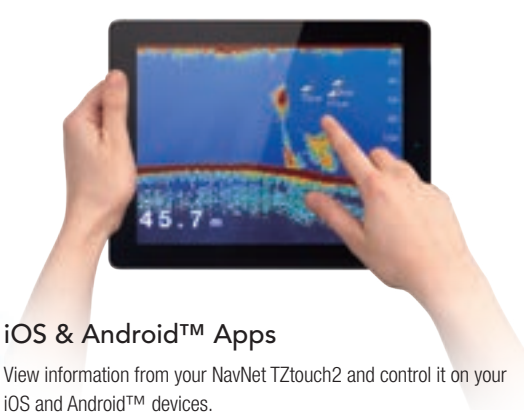
Instrument Display & Customization

An instrument display like nothing you have seen before. Totally customizable, totally simple.

NEW

Digital Switching on Your Fingertips

Monitoring and Controlling digital switching CZone system from your NavNet TZtouch2.



iOS & Android™ Apps

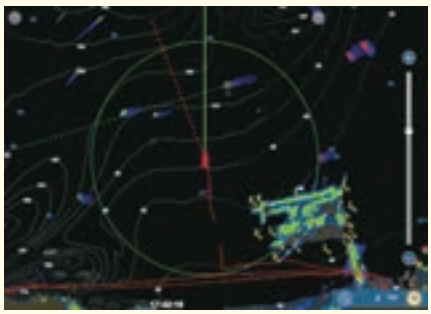
View information from your NavNet TZtouch2 and control it on your iOS and Android™ devices.

New Features

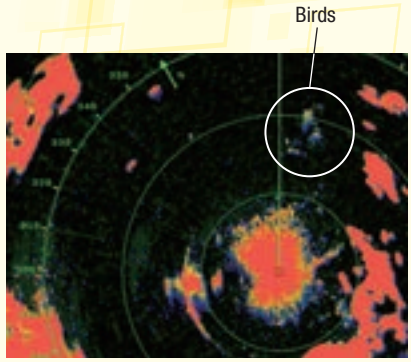
Echo Trail/Echo Average

Echo Trail and Echo Average features have been added to the latest version of NavNet TZtouch2 series. Using these new functions, Bird mode will more accurately detect and track birds by providing a clear view of the target with a more powerful noise reduction. Echo Trail enhances and amplifies the Target Analyzer* and doppler technology to help prevent hazardous situation and gives an intuitive understanding of nearby vessel's movements.

* Target Analyzer available when connected to DRS4D-NXT.



True Echo Trail



Bird mode with Echo Average

CZone Digital Switching

CZone digital switching by BEP simplifies the installation and operation of complex electrical systems. NavNet TZtouch2 is compatible with CZone controls, allowing you to operate many of your boat's electronic systems directly from your MFD.

Learn more about CZone Digital Switching at www.czone.net

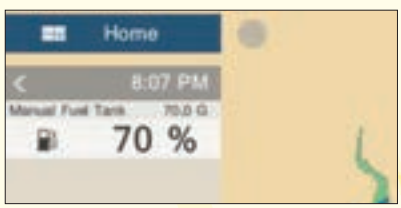
CZone Control & Monitoring

CZone, engine, navigation and various NMEA2000 data can be laid out in the same screen.

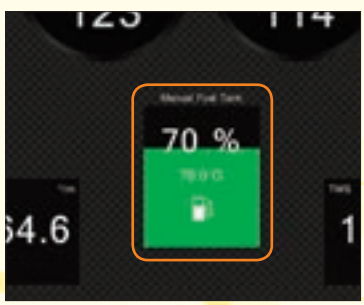
Manual Fuel Management*

NavNet TZtouch2 calculates and displays the remaining fuel based on the manually entered tank capacity, as well as fuel consumption information from an NMEA2000 network. The gauge allows the user to evaluate precisely the fuel level without equipping the ship with a fuel gauge. By configuring the settings, an alarm is available to inform you if the tank is running out of fuel.

* 1) NMEA 2000 PGN127489 (Fuel Rate) input is required.
  2) While the engine is running, at least one TZTL12F/TZTL15F in the network should be always turned on in order to keep calculating the fuel consumption.
  3) The fuel indication may be inaccurate if the values entered are not correct, or the fuel rate sensor is not functioning correctly.



Data box



Manual Fuel Tank display in Instrument mode

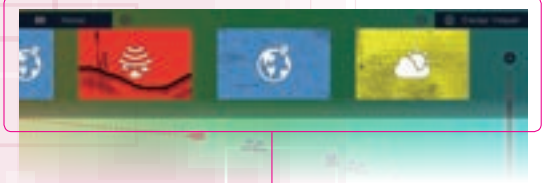
All new functions require software v4.01 or later.

NEW GRAPHICAL INTERFACE

NavNet TZtouch2 features a graphical user interface that has been renewed and refined, focusing on usability and ease of operation. You'll have full control of each component connected to the network right at your fingertips.

Home Screen

The new home screen, with its bright and crisp graphics, is easy to understand and operate. The colors and icons have been carefully chosen to provide maximum visibility, allowing you to know instantly which screen is displayed, just by seeing the color and icon. Changing to different display screens is just a simple matter of dragging and dropping.



Quick Page

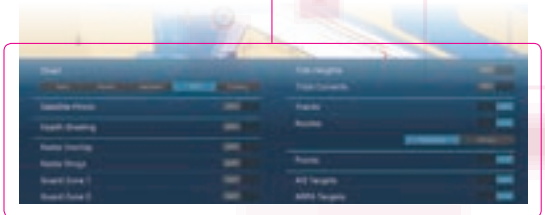
Swiping your finger down from the top edge of the screen displays the Quick Page. As the name implies, the Quick Page allows you to quickly change between the different screens from your current display. With bold colors, the previews are easy to differentiate and quickly choose from.

NavData

Swiping from the left edge of the screen reveals the NavData panel, where you can customize contents to simplify navigation and chart usage. You can set the autopilot, check tide information and much more.

Slide-Out Menu

The slide-out menu provides quick and easy access to often-used functions, and is available in every mode.



Layers

One of the new features is the layers menu, just swipe up from the bottom edge of the screen. The layers menu is a practical way of changing settings on the fly without having to venture into deeper menu systems. Since the screen is visible at all times, understanding and using the different settings becomes a breeze.

Instrument display set up

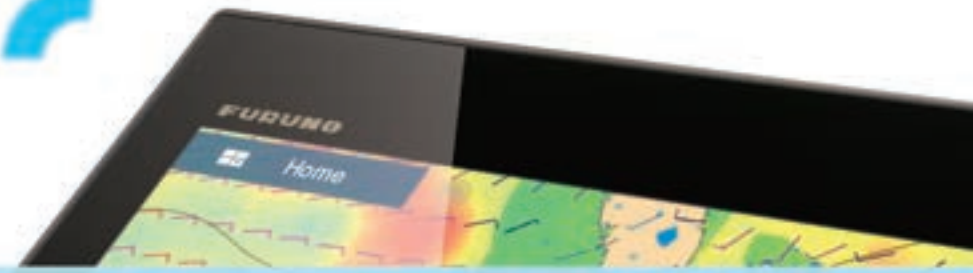
Instruments

The instrument page is impressive just on its own rights, but where it really shines is it's customizability. No matter if it is for navigation, engine and tank monitoring, autopilot control, or a combination, data can be displayed according to your personal tastes and needs.

Fully Customizable

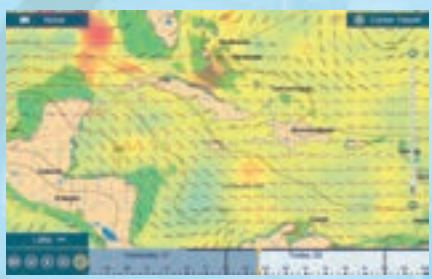
Instrument rearrangement is available at your fingertips. You are free to customize the display to precisely fit your unique needs. Also note that instruments can overlap each other, giving you even more space to work with.

WIRELESS



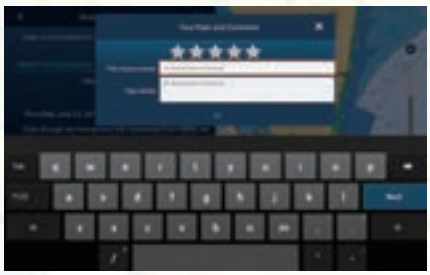
Marine Weather Forecast

The weather tool is completely free and easy to use, giving you unlimited access to weather forecasts, worldwide, 24 hours a day, provided by NavCenter. Select the coverage you want, what type of data it is you need and for what time period, then it is simply a matter of choosing how to download the data. NavNet TZtouch2 can display up to 16 days of downloaded weather forecasting.



ActiveCaptain*

NavNet TZtouch2, the world's first Multi Function Display with ActiveCaptain functionality. Share the experience together with other boaters around the world, browse and discover new points of interest. With a community of 250,000 users, reliable and updated information on fuel prices, marinas and obstructions are all available at the tip of your fingers. You can even rate and comment on points of interests, such as marinas and anchorages, straight from your NavNet TZtouch2. *Software version 3.01 or later is required.



My TimeZero™ Cloud Data Service*

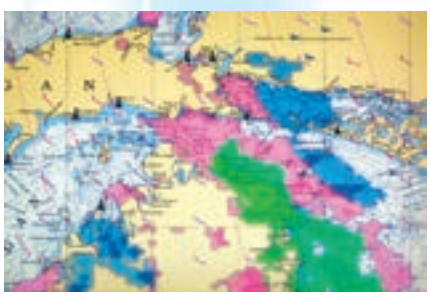
My TimeZero™ cloud data service allows you to back up your data on the cloud and synchronize it among your TimeZero™ devices. Connect your NavNet TZtouch2 to the internet and login on your My TimeZero™ account, and you are able to back up or restore points, routes, tracks and settings to/from the cloud server. Plan routes on your tablets at home and transfer them to your NavNet TZtouch2 onboard through cloud. You won't have to carry memory cards from device to device ever again.

*Coming soon.

BBWX3 – SiriusXM Satellite Weather Receiver*

Keeping track of weather is easier than ever with Furuno's BBWX3 Third-Generation SiriusXM Satellite Weather Receiver! The weather information is obtained from the weather industry's leading experts and is delivered via digital receiver through SiriusXM' Marine Weather services. You can receive high-quality and comprehensive weather information and forecasting for use while navigating. You can also enjoy the full package of SiriusXM's satellite radio channels straight from your NavNet device. With over 140 channels available, you can listen a wide variety of music, as well as news and other entertainment.

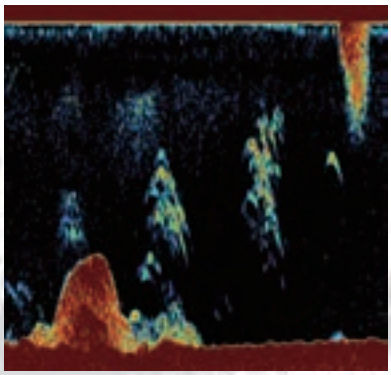
*Satellite weather receiver service is available for all NavNet TZtouch2, TZtouch and NavNet 3D models. Requires SiriusXM weather service subscription, sold separately. SiriusXM weather coverage is currently available only in U.S and Canada.



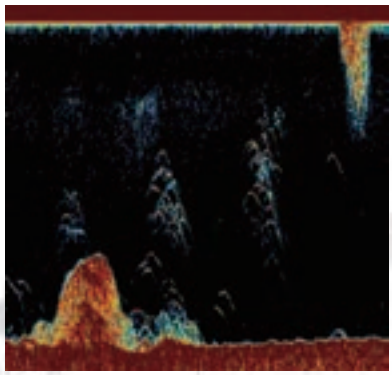
BUILT-IN FISH FINDER

RezBoost™

Rezboost™ is a revolutionary new technology utilizing FURUNO's advanced digital signal processing to provide fantastic resolution without having to change your transducer.



Conventional Signal Processing

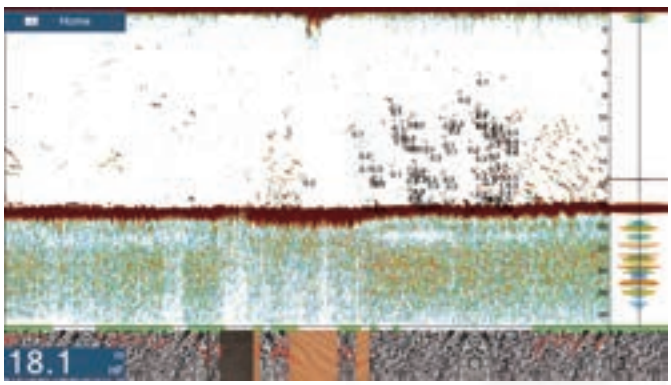


RezBoost™ Signal Processing

RezBoost™ improves target separation close to the seabed, as well as giving an unprecedented boost in resolution. With RezBoost™ technology, resolution and target separation previously limited to FURUNO commercial-grade Fish Finders can now be achieved. RezBoost™ technology makes it easier to spot individual fish in tightly packed fish schools, as well as discerning game fish from bait fish. Since RezBoost™ technology is software based, you can use transducers* already installed on your vessel.

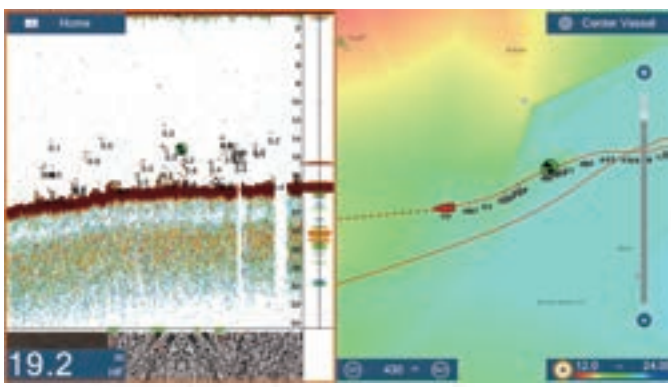
* For compatible transducers see Spec P85. In-hull mounted transducers not compatible with RezBoost™ technology.
** RezBoost™ performance may vary depending on depth, range and signal freguency used.

Fully featured fish finder



With RezBoost™, ACCU-FISH™ and Bottom Discrimination at your fingertips, finding and reeling in that catch has never been easier.

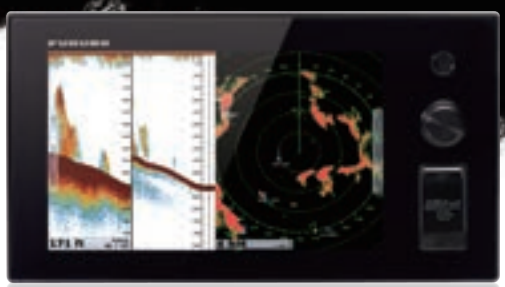
Scroll-back function



Found a fishing hot spot? Simply tap the screen and add a fish mark.
With the new scroll-back feature, you can look at past echoes simply by swiping the screen, and add new fish marks that will show the captured location on your plotter screen.

NAVnet TZtouch

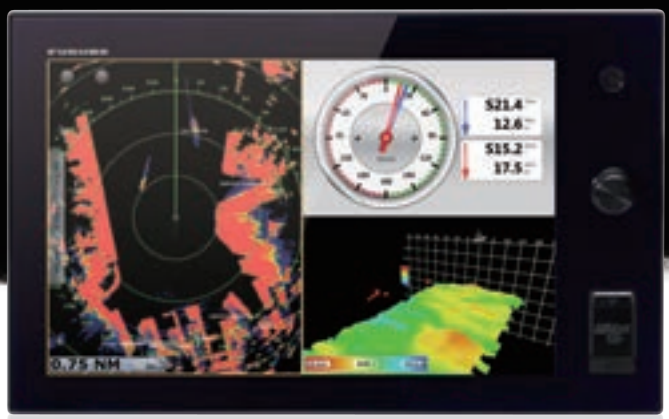
Total Control at your Fingertips



9" Multi Function Display

Model **TZT9**

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



14.1" Multi Function Display

Model **TZT14**

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

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 · NMEA2000 Certified · NMEA 2012/2013* 2014*

*TZT14

- Sunlight viewable multi touch display
- Luxury, piano black wide screen coated with glass panel
- Easy, intuitive and slick operation with touch screen and RotoKey™
- Seamless, instant chart/radar redraw with the TimeZero™ Technology
- Detailed 3D and 2D charts and high resolution satellite images
- Simple, flat display with a minimum of mechanical keys
- Add Radar, Network Fish Finder, AIS, and a variety of other sensors
- NMEA2000 network interface
- Connect up to 6 TZtouch/TZtouch2 displays
- Synchronize data with the NavNet TZtouch2 instantaneously
- Save up to 30,000 user points, 30,000 ship's track points and 200 planned routes with up to 500 waypoints per route
- Wireless LAN connectivity for weather information and automatic chart unlocking
- Tablet & Smartphone apps: NavNet Remote, NavNet Viewer and NavNet Controller for your iOS and Android™ devices
- Dual SD Card slots

Multi-touch marine display*
with TZTBB processor (model MPU-002)
* Local supply

Multi Function Display Black Box
Model TZTBB

Supports both wide and non-wide resolutions:
1280 x 720 (16:9), 1280 x 800 (16:10), 1280 x 960 (4:3),
1280 x 1024 (5:4)

Remote Control Unit (option)
Model MCU002

Remote Control Unit (option)
Model MCU004

TimeZero Designed by MAXSEA | RotoKey | MTC Multi Touch Control | AUTO | Target Tracking | AIS | 3D CHART | BlackBox | Ethernet Plug&Play | CAN bus | VIDEO IN OUT | NMEA2000 Certified | NMEA 2012/2013* 2014* * TZT14

▸▸▸ *Spec P69-70*

Multi Touch Control

FURUNO elevated 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.

APPS

View information on your smart devices via wireless network

NavNet TZtouch and TZtouch2 open the door to cutting edge Wireless LAN features, such as iOS and Android™ apps, real-time weather data, software updates and much, much more.

NavNet Remote App

Take full control of your NavNet TZtouch/TZtouch2 in a whole new way. The NavNet Remote app allows you to remotely operate and view your system with your smart devices when connected to the Wireless LAN network.

Download on the App Store | ANDROID APP ON Google play

NavNet Viewer App

Conventiently view instruments as well as the fish finder of your NavNet TZtouch/TZtouch2 on your smart devices over the Wireless LAN network. Key navigational information such as Depth, Temp, Wind, COG as well as Engine information can all be accessed from the palm of your hand. Even if you change the display on your NavNet TZtouch2, you can still view the fish finder on your smart devices.

Download on the App Store | ANDROID APP ON Google play

NavNet Controller App

Wirelessly control the NavNet TZtouch/TZtouch2 with touch controls just like the real thing. With a scroll pad, cursor pad and dedicated keys within the app, controlling the NavNet TZtouch/TZtouch2 is simple and straightforward.

Download on the App Store | ANDROID APP ON Google play

	NavNet Remote	NavNet Viewer	NavNet Controller
Compatible NavNet products	NEW NavNet TZtouch2 (TZTL12F/TZTL15F) - software version 4.01 or later. NavNet TZtouch (TZT9/TZT14/TZTBB)	NavNet TZtouch2 (TZTL12F/TZTL15F) NavNet TZtouch (TZT9/TZT14/TZTBB)	NavNet TZtouch2 (TZTL12F/TZTL15F) NavNet TZtouch (TZT9/TZT14/TZTBB)
Languages	English/Japanese	English/Japanese	English/Japanese

TimeZero™

Nothing Is Faster Than TimeZero™

NavNet TZtouch's TimeZero™ technology delivers chart processing like you've never seen before – seamless chart handling, zooming and panning without the screen disappearing. TimeZero™ technology redefines the meaning of stress-free operation by smoothing out your chart handling actions.

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

Equipped with powerful TimeZero™ technology, NavNet TZtouch2 and 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 route. TimeZero™ technology updates the information on your screen with virtually no redraw as you go.

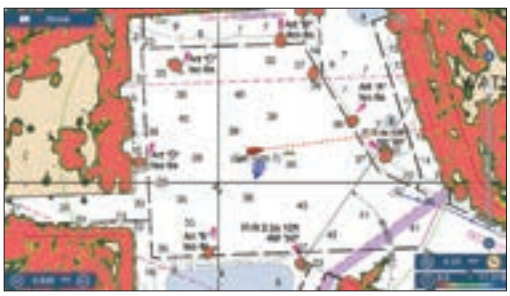
CHART PLOTTER

Mapmedia Vector and Raster Chart Library

The NavNet series offers users the ability to freely choose the charts that fit their personal needs. Coming with the official NOAA raster and vector charts, Mapmedia brings an authentic vector and raster chart library to your NavNet Series devices. "C-MAP"* as well as "Datacore by Navionics" vector cartography are both optional charts that can be downloaded to your NavNet Series device with ease.
Mapmedia cartography integrates cutting edge algorithms with high resolution image processing techniques to deliver a fusion of digital navigation charts and satellite photography. This knowledge ensures absolute clarity and detail when displaying charts on your NavNet Series devices.

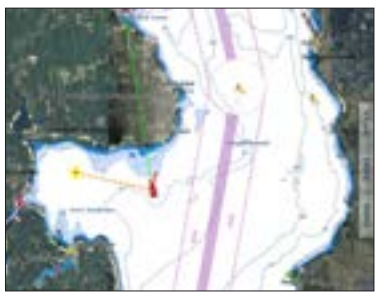
Mapmedia Raster

Mapmedia Vector



Radar-Chart overlay

C-MAP 2D Vector



C-MAP 2D Vector + Satellite PhotoFusion™

Sattelite PhotoFusion™

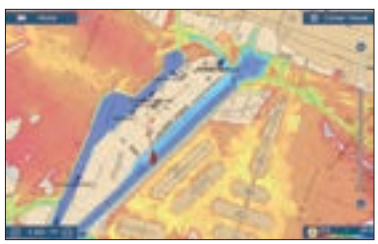
Satellite photography is included in the Mapmedia Raster and Vector charts, simply called Satellite PhotoFusion™. Land areas (zero depth) are completely opaque, displayed as satellite photos on the chart. As the depth increases, the satellite image is merged with the chart data to provide you with added detail on seabed areas in shallow water, without losing vital chart information. In deeper water, where the satellite photos have no detail to offer, the chart is displayed without alteration.

Vector + Satellite PhotoFusion™

Raster + Satellite PhotoFusion™

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 feature makes it easier than ever before.



DIGITAL RADAR

NEW

Model DRS25A X-Class

NEW

Model DRS12A X-Class

Model DRS6A X-Class

Model DRS4DL

Model DRS4D-NXT

Radar Sensors

▸▸▸ *Spec P74-74*

UHD Ultra High Definition

NMEA 2016

Doppler TARGET ANALYZER RezBoost

Exclusive DRS4D-NXT features

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. The antenna rotation speed (24/36/48 rpm) is automatically shifted according to the range needed for optimal performance*. Commercial-grade radar performance is now available in the ultimate MFD navigation suite.

*Not available on DRS4DL.

- Digital Signal Processing enhances short and long range target detection
- Enhanced auto gain anti-clutter controls and auto tuning
- Bird mode helps you identify birds, adjusting the gain and sea settings automatically for optimal visibility
- Fast Target Tracking™, takes a few seconds for a speed and course vector to be displayed
- Minimum detection range of just 20 m approx.**
- Advanced side lobe reduction technology
- Spot-on Radar-Chart Overlay on both 2D/3D chart presentations*
- AIS overlay "AIS-over-Radar" presentation for precise vessel tracking*
- Radar Guard Zone and Watchman features alert you to potential dangers
- Dual VRM (Variable Range Markers) and dual EBL (Electronic Bearing Lines) give distance and bearing indications
- No Power Supply Unit required

* Appropriate sensor required.

** Available on DRS X-Class radars.

NavNet TZtouch2/TZtouch Radar Sensor Options

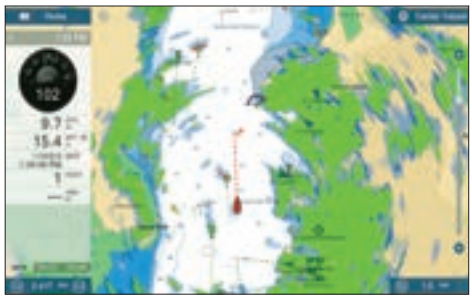
		DRS4DL	DRS4D-NXT	DRS6A X-Class	NEW DRS12A X-Class	NEW DRS25A X-Class
Output Power		4 kW	Solid-state, 25 W	6 kW	12 kW	25 kW
Size		19 inch	24 inch	3.5 ft/4 ft/6 ft	4 ft/6 ft	4 ft/6 ft
Antenna Type		Radome	Radome	Open	Open	Open
Beam Width	Horizontal	5.2°	3.9°	2.3°/1.9°/1.4°	1.9°/1.4°	1.9°/1.4°
	Vertical	25°	25°	22°/22°/22°	22°/22°	22°/22°
Max. Range		36 NM	36 NM	96 NM	96 NM	96 NM
48 rpm Capability		—	●	●	●	●
Functions		Head-up North-up* True Echo Trail, AIS	Head-up, North-up*, True Echo Trail, Bird mode, TT, AIS	Head-up, North-up*, True Echo Trail, Bird mode, TT, AIS	Head-up, North-up*, True Echo Trail, Bird mode, TT, AIS	Head-up, North-up*, True Echo Trail, Bird mode, TT, AIS
	Target Analyzer	—	●	—	—	—
Dual Range Scanning		—	● (Range is limited to 12 nm)	●	●	●
Fast Target Tracking™		—	●	●	●	●
MFD version reguired	TZtouch2	2.03	3.01	3.01	4.01	4.01
	TZtouch	4.11	4.21	4.21	5.01	5.01

* Heading input required.

The radar antenna complies with IEC62252 Ed. 1:2004 (Clauses 4.33, 5,33, Annex D) relevant to radio characteristic.

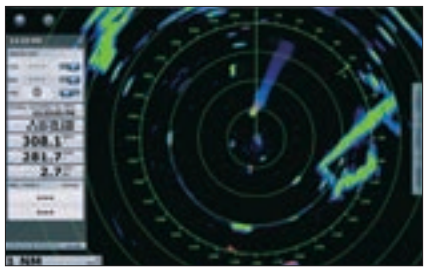
Not available for NavNet 3D.

Chart Overlay/TT/AIS/Echo Trail



Target Analyzer

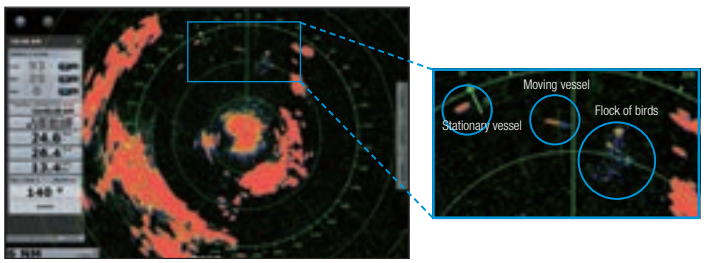
Target Analyzer function displays targets that are approaching your vessel automatically, changes color to help you identify when they are hazardous. Green echoes are targets that are moving towards your vessel.



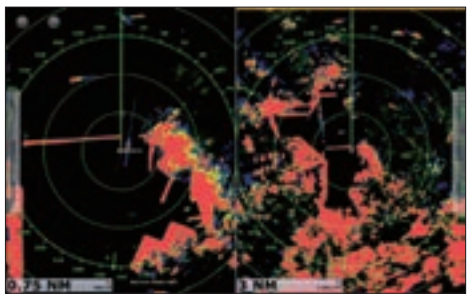
* Only available with DRS4D-NXT

Bird Mode

Bird mode works by adjusting the gain and sea settings automatically for optimal visibility.

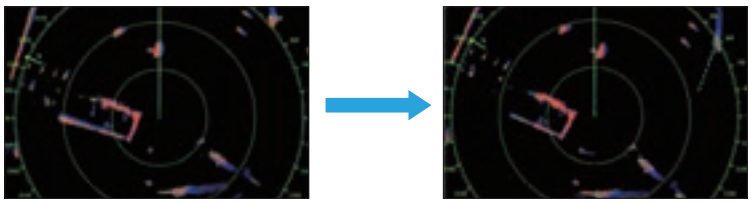


Dual Range Mode



Fast Target Tracking™ (TT)

After selecting a target, it only takes a few seconds for a speed and course vector to be displayed. With accurate tracking information, estimation of other vessels course and speed is made easier.



Before selecting a target

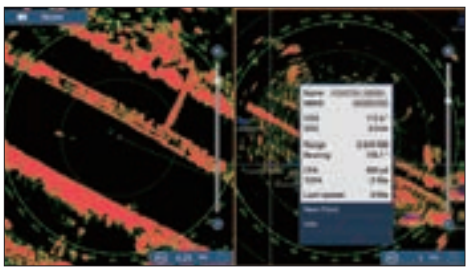
Speed and course vector

AIS (Automatic Identification System)

AIS Target Tracking

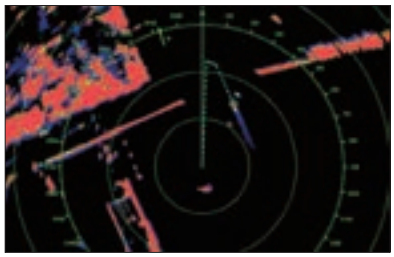
When connecting a FURUNO FA30/50/170 AIS unit to your NavNet series devices, up to 100 AIS targets can be tracked and displayed on the Radar screen. The Automatic Identification System (AIS) improves safety during travel by sharing the status and position of your vessel with other AIS-equipped vessels nearby. You can easily read detailed information about AIS-equipped vessels nearby such as speed, heading.

AIS Display



Model FA170 ▸▸▸Spec P105

CPA graphic display



The Closest Point of Approach (CPA) graphic display shows the CPA between own vessel and the selected AIS (or TT) target with a line, called the “CPA line”. You can use the line to monitor speed and heading changes of another vessel, which makes it useful as an anti-collision aid, especially in congested waters.

* Own ship and position data required.

Model FA30/50 ▸▸▸Spec P105

DIGITAL RADAR SENSORS

DRS4D-NXT, the NXT leap in Radar technology!

A solid-state Radar with pulse compression, Target Analyzer and Fast Target Tracking™ utilizing Doppler technology. Combined with FURUNO's exclusive RezBoost™ technology, the DRS4D-NXT packs the performance of an open array radar, in a compact 24" radome.

SOLID STATE DOPPLER RADAR
Model **DRS4D-NXT**

Doppler UHD RezBoost TARGET ANALYZER AUTO Target Tracking NMEA 2016

- NXT, Solid-State pulse compression Doppler Radar
- Revolutionary Target Analyzer function instantly identifies hazardous targets
- Fast Target Tracking™, up to 100 targets
- RezBoost™ beam sharpening, equivalent to 2 degree beam width open array
- Compact 24" radome with 25 W output power (equivalent to 4 kW magnetron)
- Bird Mode, track birds to find the best fishing grounds
- Simple installation, no need to open the radome, external PSU is not required
- New smart-connector cable for retro fitting existing DRS cable installations
- No warm-up time

▸▸▸ *Spec P74*

Doppler

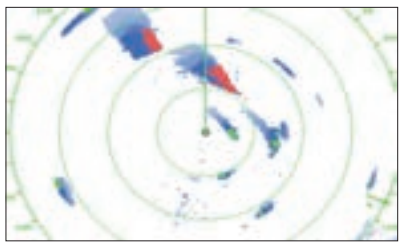
TARGET ANALYZER

Target Analyzer function utilizing Doppler technology spots hazardous targets instantly!

The DRS4D-NXT is the first radar in the world to use the new FURUNO exclusive Target Analyzer function. Targets that are approaching your vessel automatically change color to help you identify when they are hazardous. Green echoes are targets that stay stationary, or are moving away from you, while red echoes are hazardous targets that are moving towards your vessel.

Echoes dynamically change colors as targets approach, or get farther away from your vessel. Target Analyzer improves situational awareness and can increase safety by showing you which targets to look out for.

Hazardous targets are displayed in bright red



Fast Target Tracking™ function!

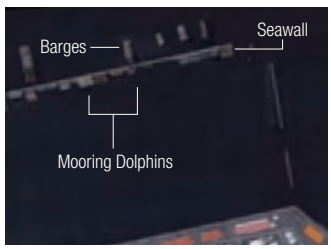
It only takes a few seconds, from when a target is selected, to display a speed and course vector. With accurate tracking information, estimation of other vessel's course and speed is greatly simplified. With Doppler technology, any vessel approaching yours will automatically display a target vector as well as sound an alarm*. Up to 100 targets can be displayed simultaneously.

* CPA/TCPA setting is required.

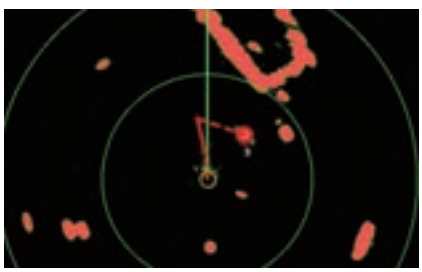
RezBoost™ beam sharpening

RezBoost

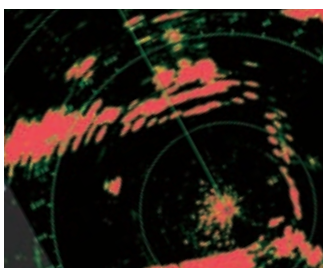
For the first time FURUNO exclusive RezBoost™ technology is used in one of our Radar units, with impressive performance. With RezBoost™, you'll see more detailed targets, with less clutter.



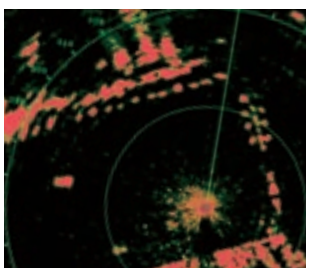
Approaching vessel with target vector



RezBoost™ standard

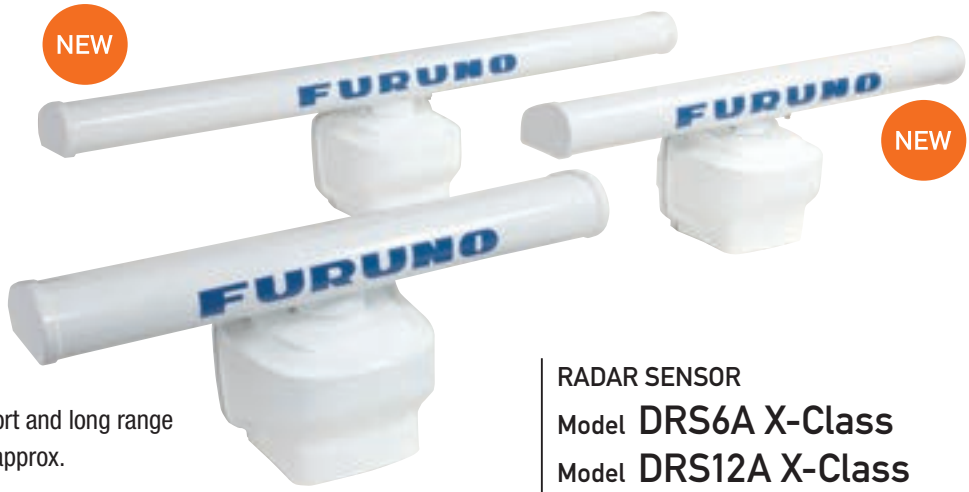


RezBoost™ Enhanced, MAX setting



DRS X-Class Series, a whole new class of Radars!

Pushing the boundaries of what is possible with conventional Radar technology, DRS X-Class Series mark yet another leap forward for FURUNO. Improved in almost all aspects, DRS X-Class Radars feature improved short range detection as well as an impressive long range detection of up to 96 nautical miles.



- Enhanced target detection, both short and long range
- Minimum detection range of 20 m approx.
- Fast Target Tracking™
- Bird Mode, track birds to find the best fishing grounds
- New pedestal unit, 20 % lighter than previous DRS Series unit, updated low noise motor

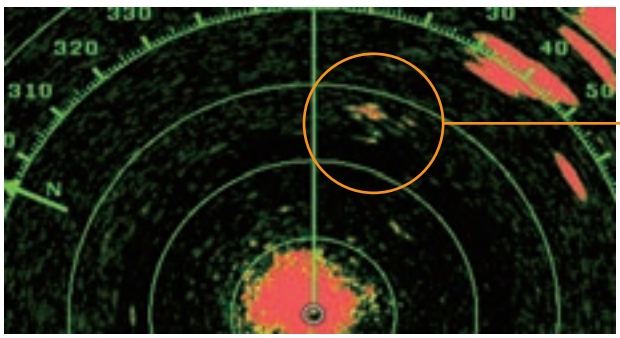
RADAR SENSOR
Model **DRS6A X-Class**
Model **DRS12A X-Class**
Model **DRS25A X-Class**

UHD Ultra High Definition | AUTO | Target Tracking

▸▸▸ *Spec P75*

Bird Mode

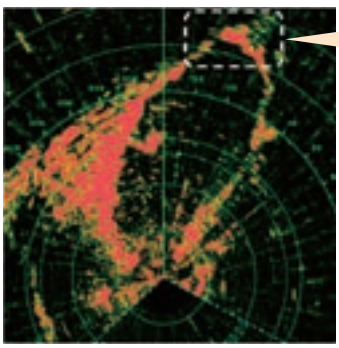
DRS4D-NXT and DRS X-Class Series feature a new bird mode that helps you identify birds congregating around schools of fish at the sea surface. Bird mode works by adjusting the gain and sea settings automatically for optimal visibility.



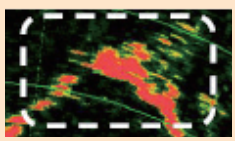
Bird echoes

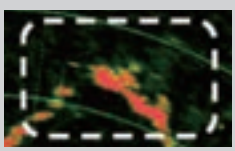
Actual scene

Impressive performance at long range (24 NM)



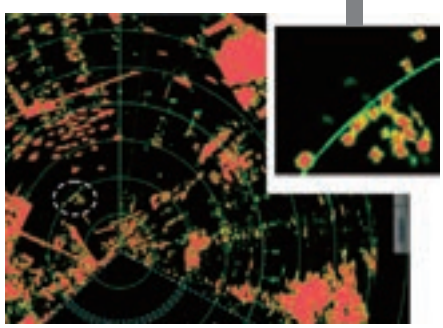
NavNet TZtouch





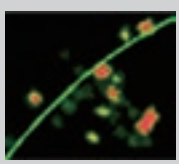
Conventional

Short range detection



NavNet TZtouch

Sailing dinghies in highly detailed echoes at short range



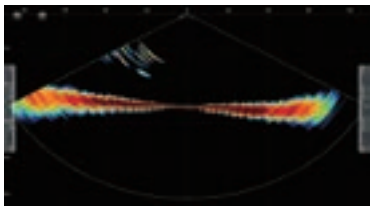
Conventional

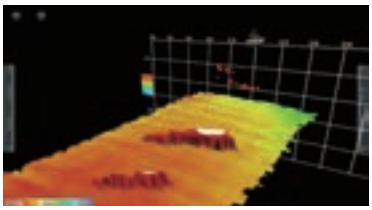
MULTI-BEAM SONAR

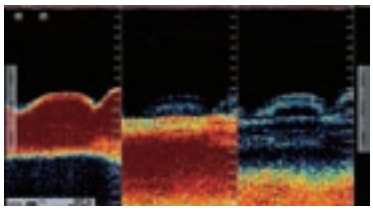
Innovative tool for exploring wide range of water column and seabed

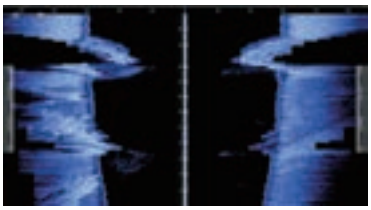
New Multi-Beam Sonar model DFF3D gives you real-time 120 port-starboard view of the water column and seabed up to 200m depth*. The DFF3D allows you to explore fishing spots and find fish in deep water by far faster than conventional single beam sounders. On the other hand, the main beam penetrate right under the boat at a depth of approximately 300 m*. Installation is made easy, thanks to a compact transducer design. The built-in motion sensor in the transducer stabilizes the display to give clear and stable images, even under rough sea conditions.

* Maximum depth depending on water, bottom type and other water conditions.


Cross Section


3D History


Triple/Single Beam Sounder


Side Scan

BLACK BOX
NETWORK MULTI-BEAM SONAR
Model **DFF3D**

▸▸▸ *Spec P73*

NAVnet Connect · AUTO · BlackBox · MULTI BEAM · Ethernet Plug&Play

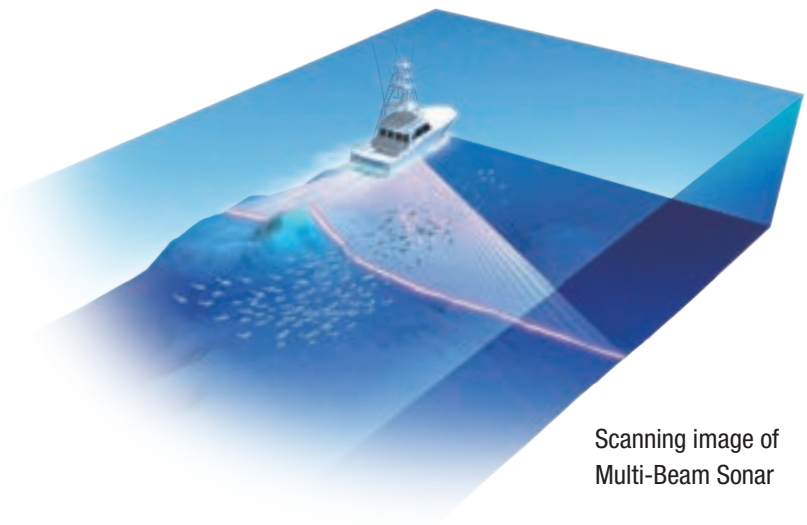
wassp MULTIBEAM SEE IT ALL

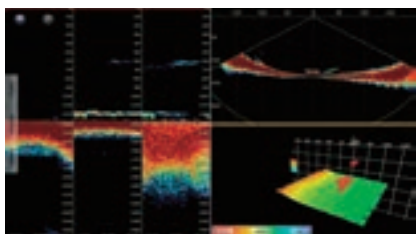
* System version requirement for NavNet series:
NavNet TZtouch (TZT9/TZT14/TZTBB) version 5.01 or later
NavNet TZtouch2 (TZTL12F/TZTL15F) version 5.01 or later

	DFF3D
Frequency	165 kHz
Range Scale	Up to 1,200 m
Detection Range	200 m* (Side beam best performance) 350 m* (Main beam directly under boat)
ACCU-FISH	N/A
Bottom Discrimination	N/A
Transducer	800 W

* Depending on bottom type and water conditions.

- Side Scan detection range is up to 200 m in a 120-degree swath port and starboard direction*
- Deep water, main beam penetration directly under the boat is approx. 300 m*
- The built-in motion sensor (standard supply) stabilizes the display to give clear and stable images even under rough sea conditions
- Compact thru-hull transducer allows easy installation
- Customize the display according to your needs
  - Depending on the situation and preference, a combination of screen modes can be displayed


Scanning image of Multi-Beam Sonar


Combination display of Triple Beam Sounder/
Cross section/3D Sounder History on NavNet TZtouch

Transducer
(with motion/temperature sensor)


B54

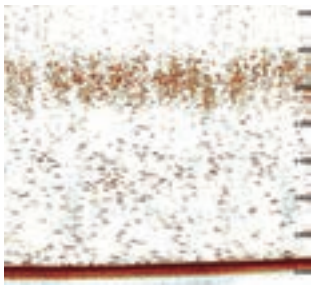
Coming in spring.

FDF™ DIGITAL FISH FINDER

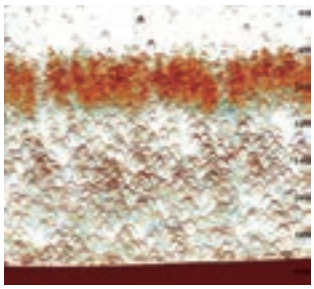
Find More Fish With a TruEcho CHIRP™ Fish Finder

An advanced technology for both professional and enthusiast fishermen. Designed to operate across a wide range of frequencies utilizing a broadband transducer, the TruEcho CHIRP™ network fish finder delivers significant advantages in signal clarity and target definition. Due to the constant sweep of frequencies the TruEcho CHIRP™ network fish finder is capable of gathering more, higher quality data than a traditional single frequency fish finder. The clear presentation marks individual game fish and bait fish, even when tightly schooled together.

- Designed to operate over a broadband range of frequencies utilizing a broadband transducer
- Clear presentation separates bottom structure from bottom fish, and bait fish from game fish
- Network fish finder for NavNet Series devices*



High Frequency CHIRP



Low Frequency CHIRP

	DFF1-UHD
Frequency	Dual frequency 50 ± 20 & 200 ± 25 kHz
Range Scale	Up to 1,200 m
Broadband	Available
ACCU-FISH	Available
Bottom Discrimination	Available
Transducer	1 kW

BLACK BOX
NETWORK FISH FINDER
Model DFF1-UHD

TruEcho CHIRP

▸▸▸ *Spec P72*

2015

Broadband Transducers*

AIRMAR TECHNOLOGY CORPORATION
Sensing Technology

CM265LH/CM275LH-W

B265LH/B275LH-W

* Local supply

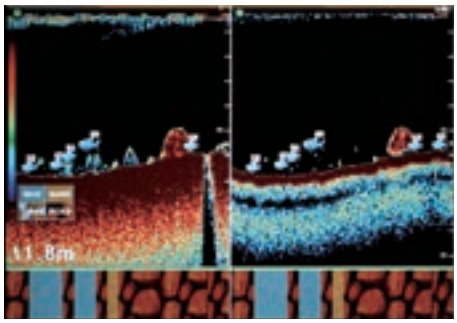
ACCU-FISH™ (Fish Size Analyzer)

ACCU-FISH

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

The ACCU-FISH™ algorithm analyzes echo returns in order to compute individual fish size. The algorithm is capable of computing fish size ranging from 10 cm up to 199 cm long. Fish depth can also be displayed.

In some instances, fish size indicated on the NavNet 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 to 100 m (DFF1/DFF3/BBDS1), 2 m to 200 m (DFF1-UHD) and computing the fish size of those ranging from 10 cm to 199 cm.

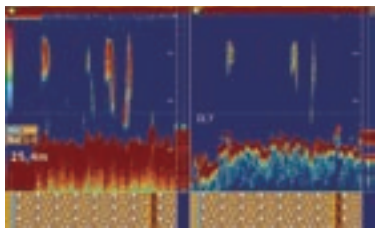


NavNet 3D

Bottom Discrimination Display

BDS
Bottom Discrimination Sounder

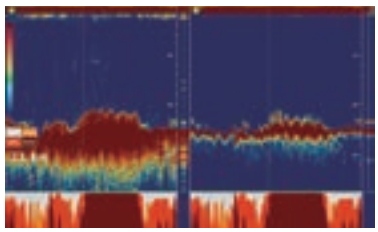
With the DFF1-UHD or BBDS1, NavNet Series devices can show bottom discrimination, displayed in four different categories.
The bottom discrimination function provides you with valuable information to help you locate rich fishing grounds to boost the day's catch. There are two bottom discrimination display modes selectable:



Rocks Gravel Sand Mud

Graphic mode

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



Rocks Gravel Sand Mud

Probability mode

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

Please keep the following in mind when using the Bottom Discrimination Sounder:
1) Use at a depth of 5 m - 200 m (DFF1-UHD), 5 m - 100 m (BBDS1).
2) Use 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.

FDF™ DIGITAL FISH FINDER

FURUNO Digital Filter (FDF™) Fish Finder

FURUNO's DFF1, DFF3, BBDS1 and DFF1-UHD feature FURUNO Digital Filter (FDF™) technology. These digital network fish finders 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.

BLACK BOX
BOTTOM DISCRIMINATION SOUNDER
Model **BBDS1**

BLACK BOX
NETWORK FISH FINDER
Model **DFF1**

BLACK BOX
NETWORK FISH FINDER
Model **DFF3**

*DFF3 only

*DFF1 only

2008

▸▸▸ *Spec P72*

- Enhanced detection of fish echoes 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 (DFF1-UHD/ BBDS1)
- IP address is automatically assigned for Plug and Play installation

	DFF1	BBDS1	DFF3
Frequency	Dual frequency 50 kHz and 200 kHz		The synthesized transducer works with dual frequencies between 28 and 200 kHz
Range Scale	Up to 1,200 m		Up to 3,000 m
ACCU-FISH	Available*		
Bottom Discrimination	N/A	Available	N/A
Transducer	600 W/1 kW		1/2/3 kW

* For DFF3, with 50/200-IT transducer only.

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

FURUNO's Free Synthesizer (FFS), a feature developed for the professional fish finder FCV-1200L, 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.

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 is the world's first brand that delivered the most intuitive integrated navigation solution to you.

NAVnet 3D

Shown in Extended Mode
with Optional Marine Display
Model MU190HD

Prosessor Unit

Control Unit

MULTI FUNCTION DISPLAY
BLACK BOX
Model MFDBB

▸▸▸ *Spec P71*

- 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
- Provides Extended Mode operation across two displays with a single processor – perfect for either side-by-side or up-down (Pilothouse & Flybridge) installations
- True 3D chart architecture
- True color depth shading utilizing bathymetric data
- Preloaded tides & currents
- Alternating video & data boxes
- Engine Monitoring
- AIS target tracking when connected to an AIS receiver
- Optional 12 kW or 25 kW Digital Radar Sensors
- Optional Network Fish Finder Sensors
- Wide variety of other options such as Instruments, Autopilot, Weatherfax, etc.

DIGITAL RADAR

		DRS12A	DRS25A
Output Power		12 kW	25 kW
Size		4 ft/6 ft Open	4 ft/6 ft Open
Beam Width	Horizontal	1.9°/1.4°	1.9°/1.4°
	Vertical	22°/22°	22°/22°
Max. Range		120 NM	120 NM

Model DRS25A

Model DRS12A

Winner of the NMEA awards
2008/2009/2010/2011
2012/2013/2014

NavNet series
NETWORK / PRODUCTS LINEUP

NAVnet Connect

RADAR	FISH FINDER	AIS	GPS

NAVnet TZ touch 2

Radar Sensor

DRS4DL

DRS4D-NXT

DRS6A X-Class

NEW

DRS12A X-Class

NEW

DRS25A X-Class

Ethernet

FISH FINDER Internal

INTERNAL

External Fish Finders can also be connected to the TZtouch2. The internal and external Fish Finder cannot operate simultaneously. You can select which one to use from the settings menu.

NEW Multi-Beam Sonar
DFF3D
Ethernet

Network Fish Finder
DFF1-UHD/DFF1/DFF3
Ethernet

Bottom Discrimination Sounder
BBDS1
Ethernet

AIS Receiver
FA30
Ethernet

Class-B AIS Transponder
FA50
Ethernet

U-AIS Transponder
FA170
Ethernet NMEA0183

GPS Internal Antenna

INTERNAL

External GPS antennas and navigators can also be connected to NavNet TZtouch2. You can select which one to use from the settings menu.

GPS/WAAS Receiver Antenna
GP330B
CAN bus

GPS Navigator
GP33
CAN bus NMEA0183

NAVnet TZ touch

Marine Radar
FAR21x7BB Series
Ethernet

Radar Sensor
DRS4DL
DRS4D-NXT
DRS6A X-Class
NEW DRS12A X-Class
NEW DRS25A X-Class
Ethernet

NEW Multi-Beam Sonar
DFF3D
Ethernet

Network Fish Finder
DFF1-UHD/DFF1/DFF3
Ethernet

Bottom Discrimination Sounder
BBDS1
Ethernet

Color LCD Sounder
FCV1150
Ethernet

AIS Receiver
FA30
Ethernet

Class-B AIS Transponder
FA50
Ethernet

U-AIS Transponder
FA170
Ethernet NMEA0183

GPS/WAAS Antenna
BBWGPS
NMEA0183

GPS/WAAS Receiver Antenna
GP330B
CAN bus NMEA0183

GPS Navigator
GP33
CAN bus NMEA0183

INSTRUMENT	AUTOPILOT	COMPASS	WEATHER FAX PC PLOTTER	SENSOR	OTHERS
FI 70 (CAN bus)	NAVpilot 700 (CAN bus, NMEA0183) NAVpilot 711C (CAN bus, NMEA0183)	Integrated Heading Sensor PG700 (CAN bus) Satellite Compass SC30 (CAN bus) SC50 (NMEA0183)	Network Weather Facsimile Receiver FAX30 (Ethernet) PC TIMEZERO Marine Software (Ethernet)	Depth/Speed/Temp Sensor DST800 (CAN bus)	Analog Camera (Video) Marine Entertainment System MS750 Series, etc. (Ethernet) Digital switching System (CAN bus)

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 TZtouch2/TZtouch network.

FI70 (CAN bus)	NAVpilot 700 (CAN bus, NMEA0183) NAVpilot 711C (CAN bus, NMEA0183)	Integrated Heading Sensor PG700 (CAN bus) PG500R (NMEA0183) Satellite Compass SC30 (CAN bus, NMEA0183) SC50 (NMEA0183)	Network Weather Facsimile Receiver FAX30 (Ethernet) PC TIMEZERO Marine Software (Ethernet)	Depth/Speed/Temp Sensor DST800 (CAN bus)	Analog Camera (Video) IP Camera (Ethernet) Marine Entertainment System MS750 Series, etc. (Ethernet)

* 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 TZtouch2/TZtouch network.
** All CAN bus devices can be incorporated into the NMEA2000 network.

We have won the Best Radar award for 41 years — 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

DRS4W
MODEL1623
MODEL1715
MODEL1815 NEW
MODEL1835/1935/1945

FR8065/8125/8255
FAR1513/1523BB
FAR1518/1528BB
FAR2117BB/2127BB/2137SBB

WIRELESS RADAR

1ST WATCH WIRELESS RADAR
Model **DRS4W**

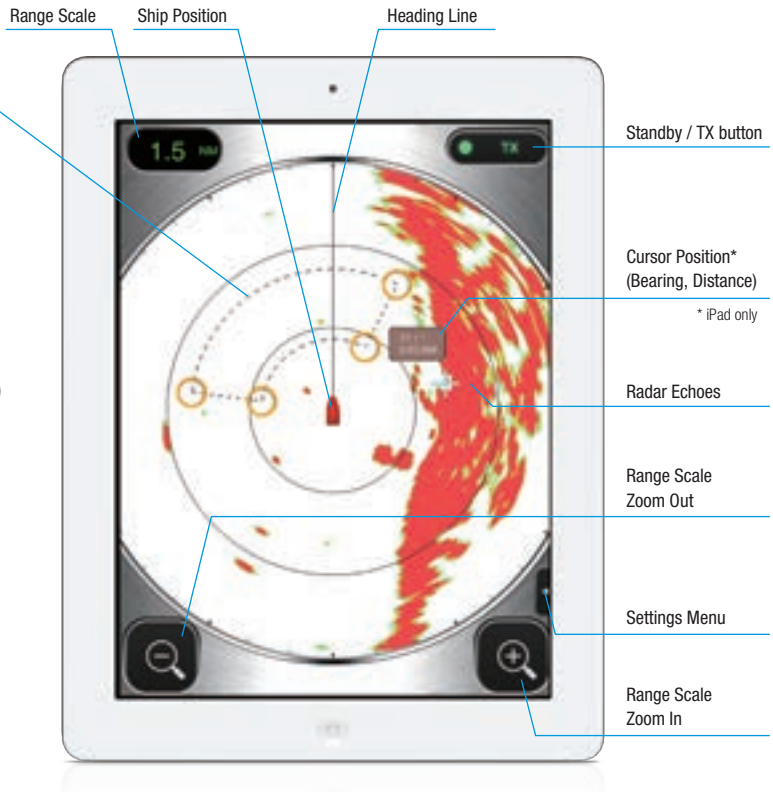
- 4 kW Radar antenna, powerful yet compact in size
- Wireless LAN, first Radar in the world accessible from your iOS devices
- No extra wiring needed except the power source, making installation a breeze
- Easy and quick operation
- Simple touch interface with familiar gestures
- User selectable range scale from 0.125 to 24 NM
- Guard zone alarm available with updated Radar App ver. 2.0.0.
- Two iOS devices – simultaneous operation
- With image quality that matches that of a conventional 10" LCD wired Radar, the DRS4W will impress you
- With TIMEZERO Marine Navigator (TZ App), providing the overlay radar image across the App's navigational chart on your iPad in real-time*

* Radar Module (in-app purchase) required.

Guard Zone

Adjust the size and area of the guard zone by dragging the circles. Once the guard zone is activated, your iPad or iPhone will alert you whenever a target enters or leaves the guard zone.

** Radar App ver. 2.0.0 required.*



	Radar App	Simulator App*
App version	2.0.0	Simulator_2.0.2
Compatible iOS	Up to iOS9	
Language	English	

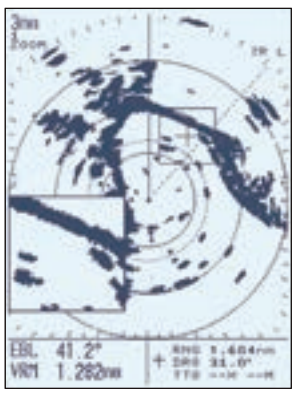
* Simulator App will help you lean how to use Marine Radar DRS4W in an off-line environment before you navigate with the DRS4W onboard.

▸▸▸ *Spec P77*

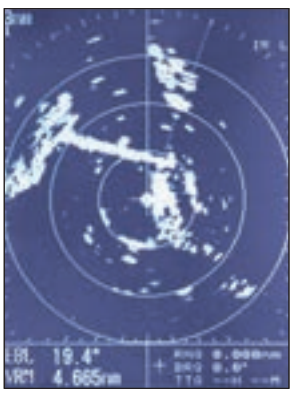
MARINE RADAR

7" SILVER LCD RADAR
MODEL1715

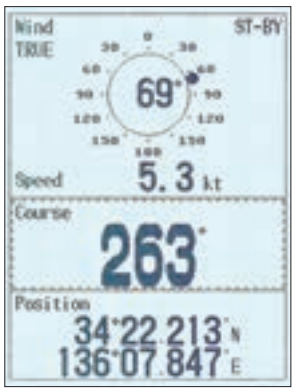
6" SILVER LCD RADAR
MODEL1623



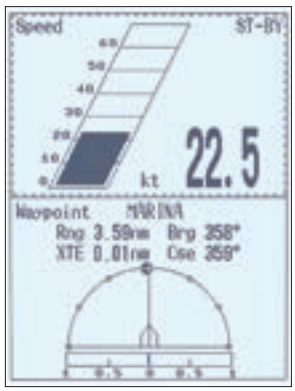
Zoom



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 nighttime visibility
- 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
Rotation Speed	24/31/41 rpm	

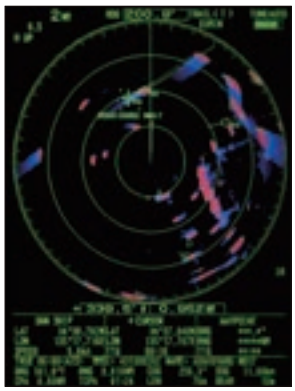
▸▸▸ *Spec P78*

NEW

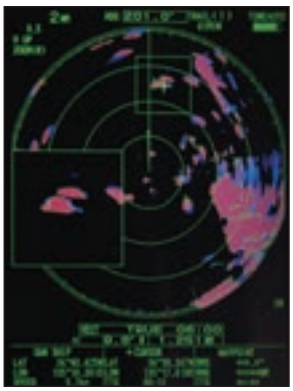
8.4" COLOR LCD RADAR

MODEL1815

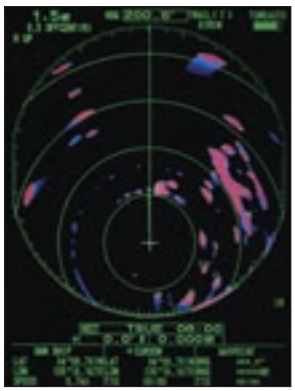
AUTO | Target Tracking | AIS



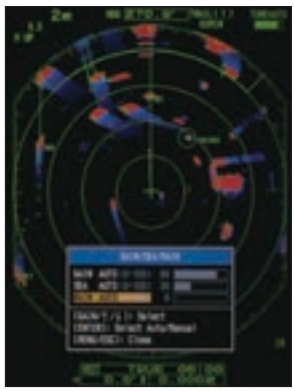
AIS/Fast Target Tracking™



Zoom

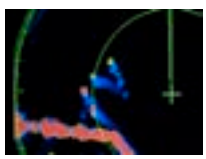


Off center

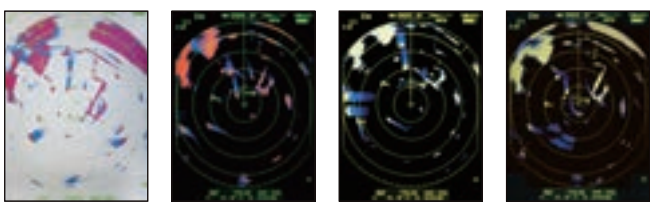


Gain/Sea/Rain setting menu

- Compact radome antenna with 4 kW transmitter output power
- Low power consumption of 38 W at the most
- Easy installation and intuitive operation
- Advanced auto-adjust settings for Gain/Sea clutter/Rain clutter
- Fast Target Tracking™(TT), a target's speed and course vector is displayed in just a few seconds after a TT target is acquired
- True trail mode, moving objects will show up on the main screen with a colorful trail
- True view mode based on the head-up mode reduces the discrepancy between an observed target and what is displayed on the radar
- Echoes in yellow, green, orange or multiple colors
- User-programmable function keys
- Swivel mounting bracket to adjust the angle of the display unit



True trail



Adjustable display colors

Antenna

Model	MODEL 1815
Output Power (kW)	4
Size	19" Radome
Range Scale (NM)	0.0625-36
Rotation Speed	24 rpm

▸▸▸ *Spec P78*

10.4" LCD Radar

MODEL1835/1935/1945

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

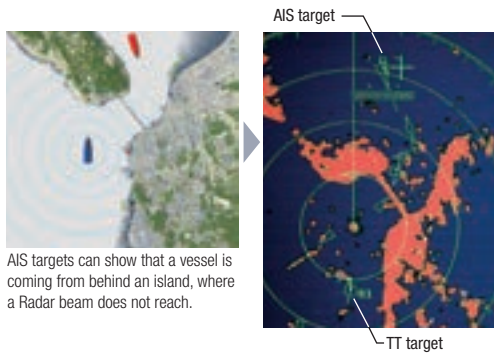
- Easy-to-install 10.4" portrait color LCD (350 cd/m^2) display
- Bonded LCD provides clear view in all weather conditions
- Stable AIS/TT* with zoom display function
- Full Screen Mode lets operators observe a wider range around the vessel
- Enhanced auto tuning/gain/anti-clutter controls
- Echoes in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

* Optional supply required

AIS/TT Display*

Up to 100 AIS and 10 TT 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 targets, AIS targets are visible even if they are located behind large ships or islands.

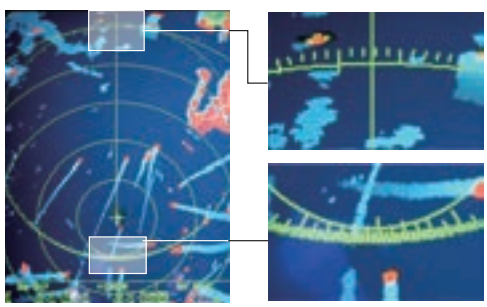
* Optional sensors required



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 an 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 P79*

12.1" LCD MARINE RADAR

Model **FR8065/8125/8255**

UHD Ultra High Definition | AUTO | Target Tracking | AIS | Enhanced Sunlight Viewable | NMEA * FR8065

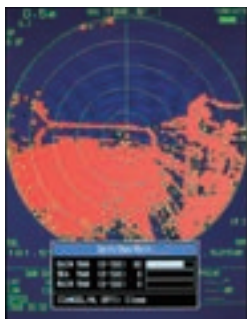
2015

The 12.1" color radar FR8005 series features state of the art signal processing, which makes it easier to identify targets in heavy rain and poor visibility. The FR8005 radar can discern between rain and surface reflections, providing the ability to find and track the movement of rain clouds as well as removing unnecessary echoes. For tracking the movement of other vessels at sea, "True Motion Trails" can be displayed as well as AIS/TT target-tracking with a zoom display function. When the vessel is in motion, the radar echoes move smoothly on the main display thanks to the "True View Mode".

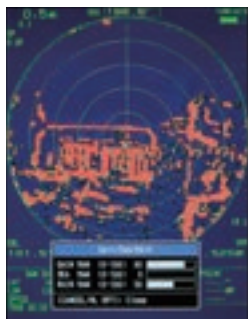
- One-touch auto-adjust settings for Gain/Sea clutter/ Rain clutter
- 48 rpm high-speed antenna rotation. Displays information clearly in narrow passages and on high-speed vessels
- Wide viewing angle LCD for great visibility from any direction

Advanced Signal Processing

Even during rainfalls or severe weather conditions, radar echoes are clearly displayed, and unnecessary echoes can be removed instantly with ease. Compared with current radars (FR8002 series) the technology for removing sea, rain and snow clutter has been greatly enhanced utilizing FURUNO's state of the art knowledge in digital signal processing.



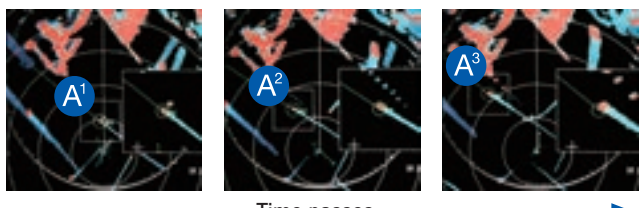
A/C Rain turned off, the marina is completely covered by the rain echo.



A/C Rain turned on, the marina appears clearly.

Target-Tracking Zoom Display Function

When using the Target mode, vessels close by and vessels on intersecting courses are automatically displayed zoomed in. These targets will remain displayed for as long as they pose any concern. Target Trails are also displayed, making it easy for the user to determine the movements of individual vessels.



* AIS transponder and ARP-11 are required to use the zoom display function

▸▸▸ *Spec P80*

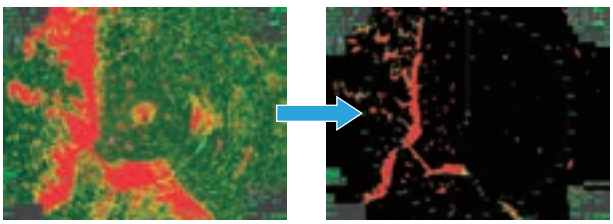
Photo: 15" Marine Display
MU-150HD (Optional supply)

BLACK BOX MARINE RADAR
Model **FAR1513/1523BB**

- FAR1513/1523BB Marine Radar features advanced functionality in a small and easy to use package
- Accurately track other vessels in order to avoid collisions with FURUNO's innovative new Fast Target Tracking™ functionality
- Target Analyzer, discern hazards simply by looking at the color of their echo
- Improved sea and rain clutter removal function.
  - Automatic Clutter Elimination (ACE) function provides clear echoes.
- Instant speed vector display for tracked targets
  - A speed vector will be displayed after clicking on a select target.
- AIS compatible out of the box
  - Targets are automatically acquired and information can be displayed on-screen easily.

Automatic Clutter Elimination (ACE) for unprecedented echo clarity

Quickly adjust the radar image with the push of a single button. With ACE activated, the system automatically adjusts clutter reduction filters and gain control according to sea and weather conditions selected by the user (calm/rough sea/hard rain).



Automatic Clutter Elimination (ACE) OFF　　Automatic Clutter Elimination (ACE) ON

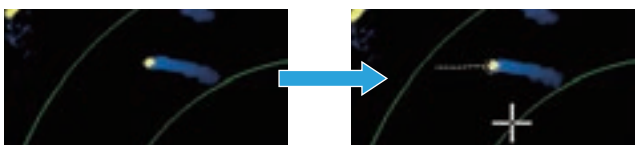
Easy to operate control unit

Simple and efficient operation is made possible with individual knobs for setting gain/rain/sea clutter suppression, as well as a RotoKey and touchpad. The optional trackball unit, as well as a regular USB mouse, can also be used.

Control Unit　　Optional Trackball Control Unit

Fast Target Tracking™ (TT)

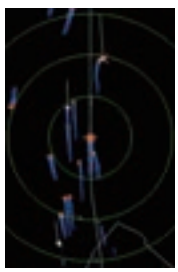
After selecting a target, it only takes a few seconds for a speed and course vector to be displayed. With accurate tracking information, estimation of other vessels course and speed is made easier.



Before selecting a target　　Speed and course vector

Target Analyzer function

Target Analyzer function displays moving target, stationary targets, rain, sea surface and targets closing in on your vessel in different colors. Spot hazardous targets directly, simply by the color they are displayed in. Target Analyzer can increase safety as well as improve situational awareness.



Antenna Selections

Model	FAR1513	FAR1523
Output Power (kW)	12	25
Size	4/6.5/8	
Range Scale (NM)	0.125-96	
Rotation Speed	24/48 rpm	

▸▸▸ *Spec P81*

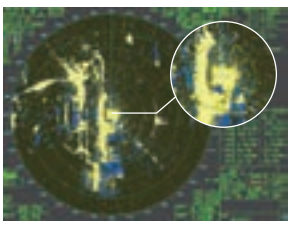
- FAR1518/1528BB Marine meets the criteria for IMO certification of vessels below 500 GT
- Accurately track other vessels in order to avoid collisions with FURUNO's innovative new Fast Target Tracking™ (TT) functionality
- Improved sea and rain clutter removal function.
  - Automatic Clutter Elimination (ACE) function provides clear echoes
- Instant speed vector display for tracked targets
  - A speed vector will be displayed shortly after clicking on a select target.
- AIS compatible out of the box
  - Targets are automatically acquired and information can be displayed on-screen easily.
- Low noise, large dynamic range antenna unit
- FAR15x8 Series can be overlapping display radar echoes on external ECDIS and GPS plotter screen

Photo: 15" Marine Display
MU150HD (Optional supply)

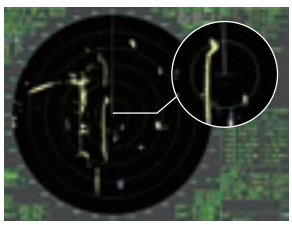
BLACK BOX MARINE RADAR
Model **FAR1518/1528BB**

Automatic Clutter Elimination (ACE) for unprecedented echo clarity

Quickly adjust the radar image with the push of a single button. With ACE activated, the system automatically adjusts clutter reduction filters and gain control according to sea and weather conditions selected by the user (calm/rough sea/hard rain).



Automatic Clutter Elimination (ACE) OFF



Automatic Clutter Elimination (ACE) ON

Easy to operate control unit

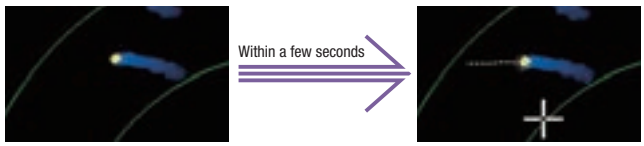
Simple and efficient operation is made possible with individual knobs for setting gain/rain/sea clutter suppression, as well as a RotoKey and touch panel. The optional trackball unit, as well as a regular USB mouse, can also be used.

Control Unit

Optional Trackball Control Unit

Fast Target Tracking™ (TT)

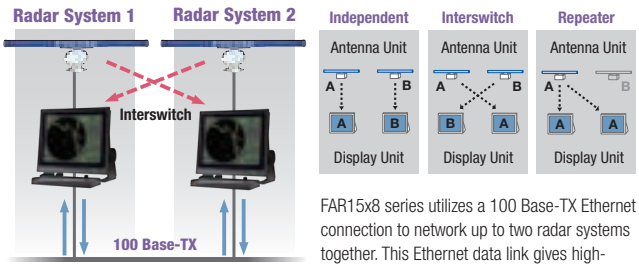
After selecting a target, it only takes a few seconds for a speed and course vector to be displayed. With accurate tracking information, estimation of other vessels' course and speed is made easier.



Before selecting a target

Speed and course vector

Scalable Ethernet Network System



FAR15x8 series utilizes a 100 Base-TX Ethernet connection to network up to two radar systems together. This Ethernet data link gives high-speed and stable navigational data sharing for interswitching as well as sharing data between ECDIS and GPS plotters.

Antenna Selections

Model	FAR1518	FAR1528
Output Power (kW)	12	25
Size	4'/6.5'	6.5'/8'
Range Scale (NM)	0.125-96	
Rotation Speed	26/48 rpm	

▸▸▸ *Spec P82*

12 ft antenna
for FAR2137SBB

8 ft antenna
for FAR2117BB/2127BB

Photo: 19" Marine Display
MU-190HD (Optional supply)

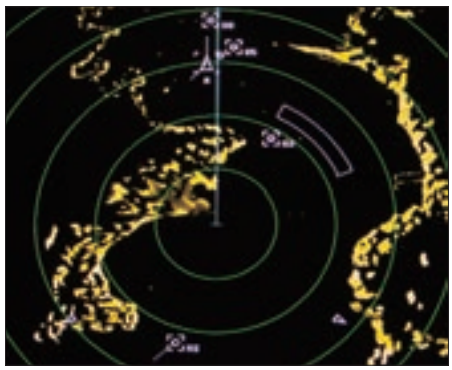
BLACK BOX MARINE RADAR*
Model FAR2117BB/2127BB/2137SBB

NAVnet 3D Connect | AUTO | Target Tracking | AIS | BlackBox | Ethernet Plug&Play | VIDEO IN OUT | NMEA 2016

*Any SXGA display is connectable

- Superb detection of small targets
- S-band to achieve stable detection under all weather conditions (FAR2137SBB)
- Advanced signal processing to present crystal clear images in rough sea
- Automatic target 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 a network and share images, without the need of extra devices

Trackball Control Unit



AIS/TT

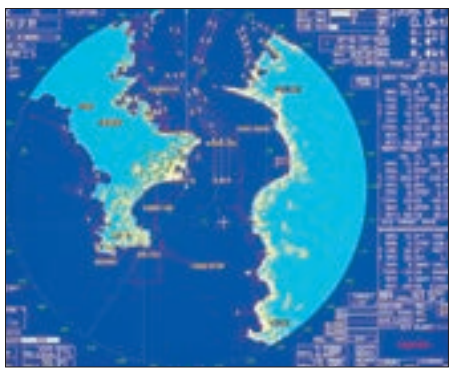


Chart Overlay

Processor 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		

▸▸▸ *Spec P83*

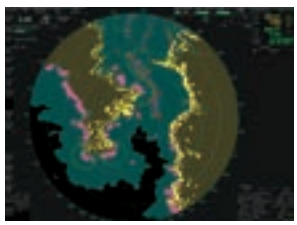
BLACK BOX CHART RADAR
Model **FAR3000**

- Available X-Band (12/25kW) or S-Band (30kW or Solid State 250W)
- 4', 6.5' or 8' Open Array (X-Band) or 12' Open Array (S-Band)
- "Deep Sea" Radar
- Newly designed, aerodynamic antennas with enhanced durability
- Less maintenance through DC brushless motor
- Ethernet link between scanner unit and BDU eliminates loss of signal between antenna and processor
- Advanced Furuno technology with new features, such as Automatic Clutter Elimination (ACE)
- Improved Target Tracking function requires only seconds and tracks even high-speed and rapidly maneuvering vessels
- Optional LAN Signal Converter enables users to extend the cable between antenna unit and processor unit or to utilize the existing cables when retrofitting
- Advanced Interference Reduction (IR) function
- Common sensor adaptor makes installation and maintenance simple
- Complies with EC62388 Ed. 2.0, IEC61174 Ed. 3.0, IEC62288, IEC61162-1 Ed. 4.0, IEC61162-2

UHD Ultra High Definition · TARGET ANALYZER · AUTO · Target Tracking · AIS · BlackBox · Ethernet Plug&Play · VIDEO IN OUT

Chart overlay on radar presentation

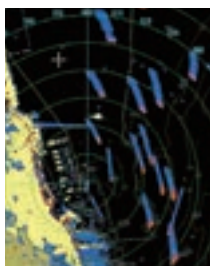
By overlaying radar presentation and chart map, you can easily recognize coastlines and buoys at a glance. Records of your vessel's track points and waypoints will help memorize fishing points. When the chart radar presentation and chart map are overlaid, North-Up, Course-Up, and Head-Up direction modes will be available.



Target Analyzer function

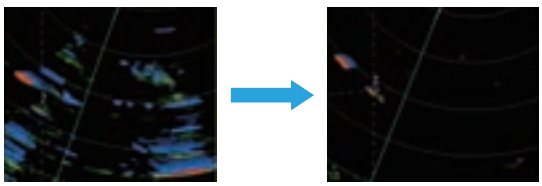
TARGET ANALYZER

Target Analyzer function displays moving target, stationary targets, rain, sea surface and targets closing in on your vessel in different colors. It can increase your safety as well as improve situational awareness.



Automatic Clutter Elimination (ACE) for unprecedented echo clarity

Quickly adjust the radar image with the push of a single button. With ACE activated, the system automatically adjusts clutter reduction filters and gain control according to sea and weather conditions selected by the user (calm/rough sea/hard rain).

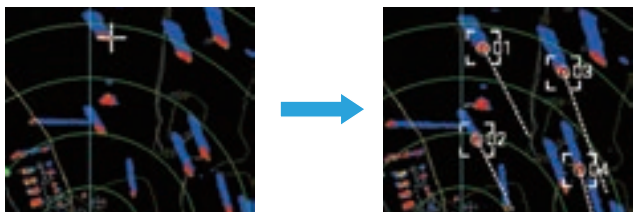


Automatic Clutter Elimination (ACE) OFF

Automatic Clutter Elimination (ACE) ON

Fast Target Tracking™ (TT)

After selecting a target, it only takes a few seconds for a speed and course vector to be displayed. With accurate tracking information, estimation of other vessels course and speed is made easier.



Before selecting a target

Speed and course vector

A new Solid State S-band transceiver generates clear echo images, even from weak targets and small craft.

▸▸▸ *Spec P85-86*

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
GP39 NEW
GP170
GP1870F

GPS NAVIGATOR

4.3" GPS NAVIGATOR
Model **GP33**

NAVnet Connect

Enhanced Sunlight Viewable

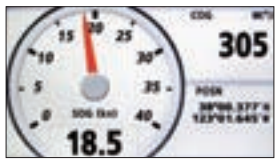
CAN bus


Plotter


Highway


COG

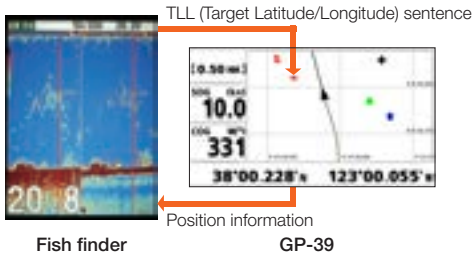

Nav data


User Display

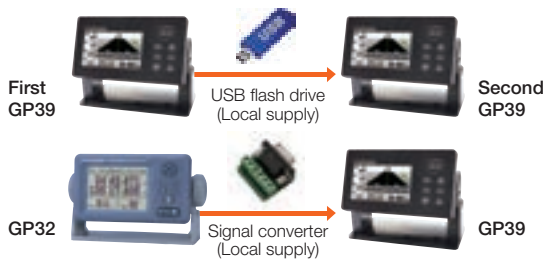
- 4.3" “Sunlight Viewable” color LCD
- Maximum visibility under various ambient conditions both during night and under direct sunlight (brightness of the LCD is 700 cd/m^2)
- Enhanced data legibility thanks to large characters and high resolution visual aid
- Stores up to 10,000 waypoints, 100 routes, 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

NEW

4.2" GPS NAVIGATOR
Model **GP39**



- Newly designed GPS core delivers enhanced position fixing accuracy
- Storage for 3,000 track points, 10,000 waypoints and 100 routes
- SBAS capable for better positioning calculations
- Share and display position information on networked equipment such as a fish finder, sonar, radar etc.
- Waypoint and route data can be exported/imported via a USB flash drive or signal converter



- Easy to mount on/off the bracket

▸▸▸ *Spec P87*

GPS/DGPS NAVIGATOR

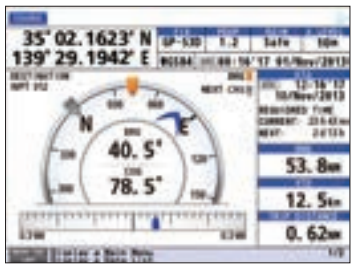
5.7" GPS/DGPS NAVIGATOR

Model **GP170/GP170D**

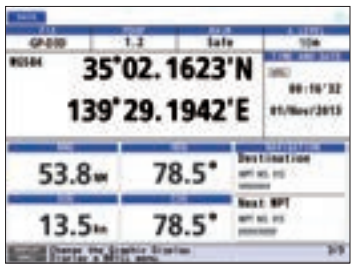
AUTO | Enhanced Sunlight Viewable | Bonded LCD | Polarized Friendly | GPS Internal antenna | CAN bus

- Full compliance with IMO MSC. 112 (73) and IEC 61108-1: performance and testing standards for GPS receiver
- Newly designed GPS chip and antenna unit deliver enhanced stability and precision in position fixing
- Augmentation to enhance precision by utilizing SBAS (Satellite-Based Augmentation System) and DGPS (an optional DGPS radio beacon receiver as well as GPA021S antenna unit required)
- Simplified menu operation

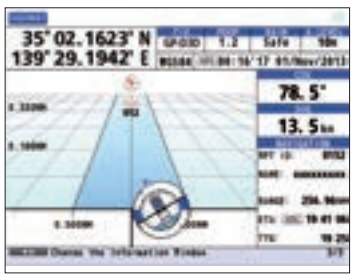
▸▸▸ *Spec P88*



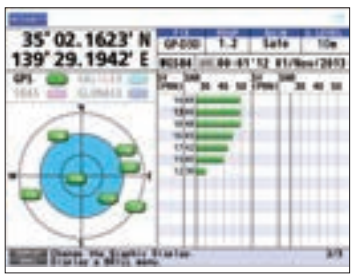
Course Display



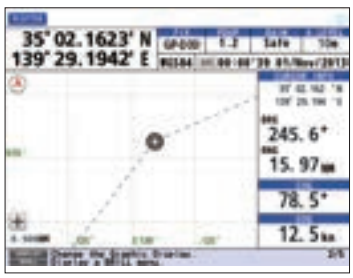
Data Display



Highway Display



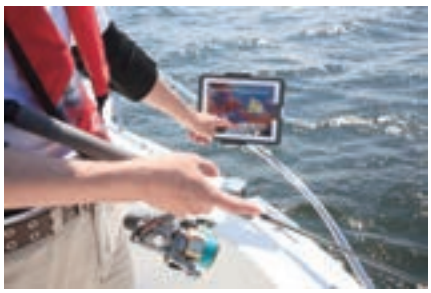
GPS Integrity Display



Plotter Display

GPS/WAAS CHART PLOTTER

7" WIDE GPS/WAAS COLOR
CHART PLOTTER with FISH FINDER
Model **GP1870F**



Wirelessly connect to your iOS devices

The GP1870F connects to your iOS devices using the app "C-MAP Plan2Nav" over a wireless ad-hoc connnection. GP1870F software version 2.01, iOS version 4.3 or later required.

C-MAP Plan2Nav*

Download on the App Store

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

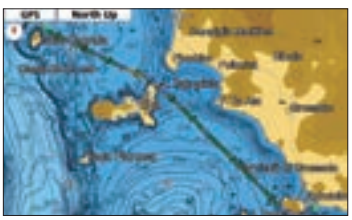
▸▸▸ *Spec P89*

GP1870F features

- Brightness 900 cd/m^2 LCD gives excellent readability even in direct sunlight
- The LCD and the AR glass are bonded together to ensure no fogging issues
- Internal GPS antenna for simple and easy installation
- Standard C-Map 4D chart* available on SD card
- RotoKey™ revolving menu and familiar point-and-click operation
- Internal memory: Waypoint/Track 30,000 points, Route 1,000 routes
- Easy-Routing function: Automatically create a route
- Built-in Wireless LAN, downloading up-to-minute weather service "C-Weather"*, via Internet.

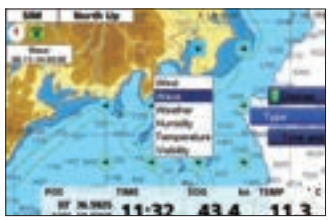
*Please visit, www.c-map.com, for details.

- Clear visibility even when wearing polarized sunglasses
- Equipped with FURUNO's latest digital fish finder technology
  - Bottom Discrimination Function**
  - ACCU-FISH™ — A unique fish size analyzer
- Post-processing Gain Control applied to all echoes displayed on the screen
- White Line function — Discriminates fish lying near the bottom



Easy-Routing function

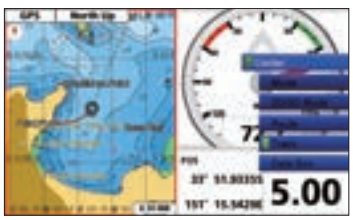
The Easy-Routing Technology analyzes the high-quality C-MAP 4D data, works out the shortest route and then checks and displays hazards in each leg of the journey. Enter start and end points along with specific boat parameters and automatically receive waypoints of the shortest route. The technology highlights potential hazards and displays varying levels of alerts for each segment of the route and allows you to manually adjust the route.



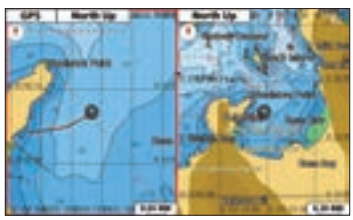
C-Weather information

C-Weather data can be downloaded from c-map.com to the GP1870F. Wind, Wave, Weather, Humidity, Temperature and Visibility (fog) information can be displayed on screen.

Plotter + Fish Finder
(ACCU-FISH and Bottom Discrimination)



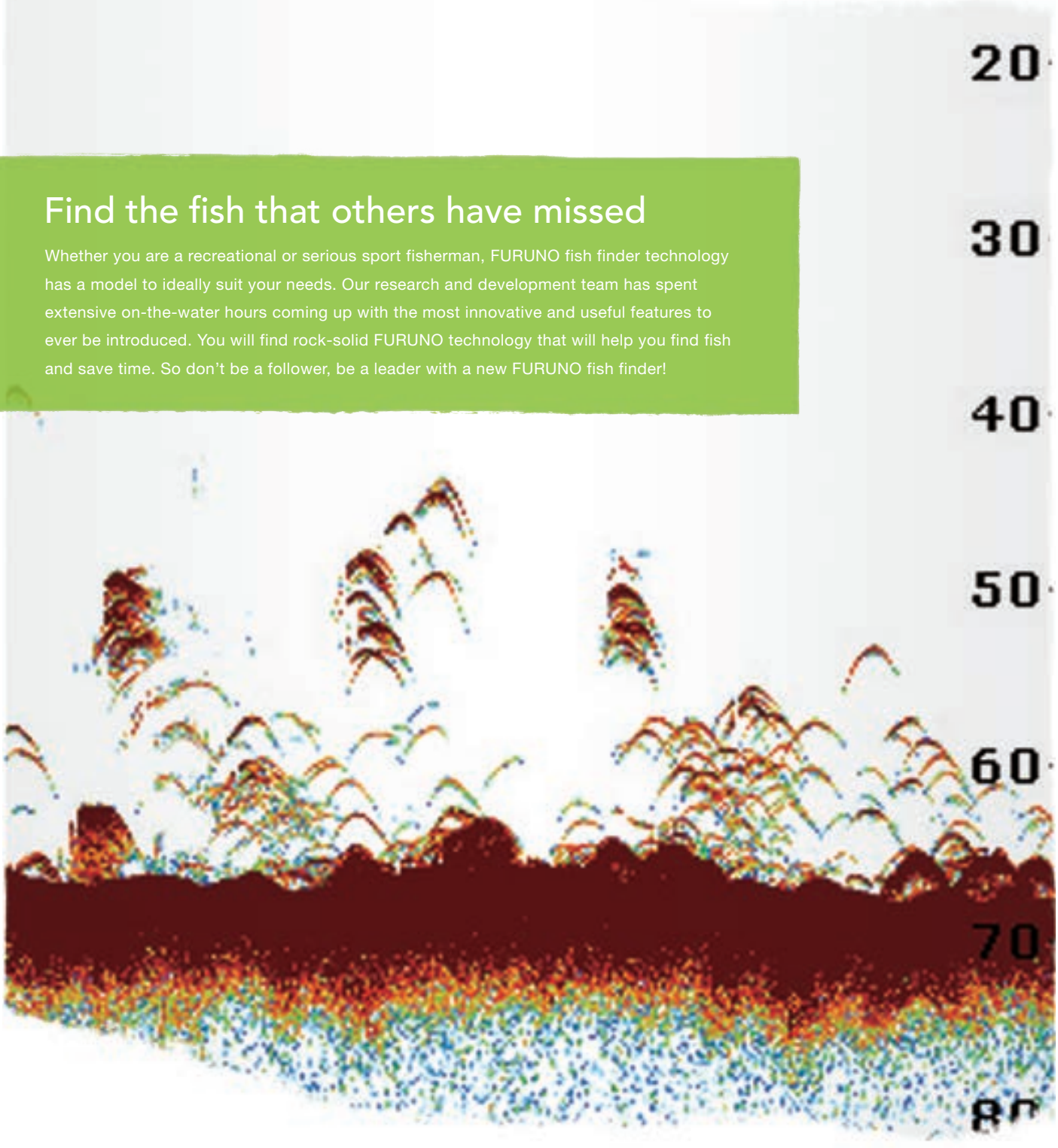
Plotter + SOG + Rotokey



Dual range chart display

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. 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

- FCV628
- FCV588
- FCV295
- FCV1150
- FCV1900
- FCV1900B
- FCV1900G

FISH FINDER

5.7" FISH FINDER
Model **FCV628**

8.4" FISH FINDER
Model **FCV588**

RezBoost BDS Bottom Discrimination Sounder ACCU-FISH AUTO Enhanced Sunlight Viewable Bonded LCD Polarized Friendly

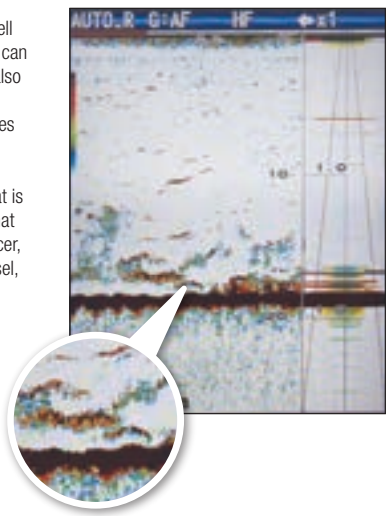
- Dual-frequency fish finder equipped with revolutionary RezBoost™ signal processing technology*
  - Improved clarity and resolution that was previously impossible with conventional narrowband transducers has been made possible thanks to the new RezBoost™ technology
- ACCU-FISH™– A unique fish size analyzer based on the digital technology*
- Bottom Discrimination – Analyze bottom structure*
- White Line feature – Discriminate fish lying near the bottom
- 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 connected chart plotter**
- Fast transmission rate of 3,000 PRR (Pulse Repetition Rate) per minute (at 5 m depth range)

* Thru-hull or transom transducer mount required
** Compatible chart plotter required

RezBoost™

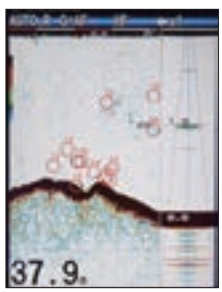
RezBoost™ is a revolutionary new signal processing technology developed by FURUNO that improves resolution and target separation when using conventional narrowband transducers.
Spot individual game fish surrounding bait balls, as well as fish close to the seabed. With RezBoost™, not only can you expect higher resolution and crisper visuals, but also improvements in the ACCU-FISH™ function.
Compared to conventional signal processing techniques (FDF), a RezBoost fish finder produces an image that is up to 8 times*1 clearer. A TruEcho CHIRP fish finder (requires a special transducer) produces an image that is up to 10 times*1 clearer when compared with FDF. What can be done with a conventional narrowband transducer, just like the one you might have installed on your vessel, is truly impressive*2.

*1 RezBoost performance may vary depending on depth, range and signal frequency used.
*2 The Enhanced mode of RezBoost requires a RezBoost capable thru-hull or transom mount transducer.



With RezBoost™ technology, the resolution is increased, leading to sharper and more defined echoes. Thanks to this increase in resolution, the accuracy of the ACCU-FISH™ function is also improved. ACCU-FISH™ is very useful when you need to determine fish size, but also has the added benefit of making fish echoes more visible when viewed from a distance. With ACCU-FISH™ you can spot individual fish echoes even from the deck of your vessel.

ACCU-FISH™ OFF



ACCU-FISH™ ON

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

Recognizes individual or multiple fish instantaneously

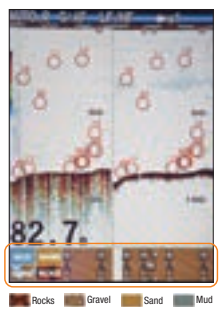
ACCU-FISH™ is a fish size assessment function of FCV628/588 that is unique to FURUNO. In order to assess individual fish size, echo returns are evaluated based on strength and turned into fish size display on screen. ACCU-FISH™ can detect fish size from 10 to 199 cm, in depths of 2 to 100 m.

In some instances, fish size indicated on FCV628 may differ from actual size.
Please read the operator's manual carefully before using this feature.

Bottom Discrimination function

The Bottom Discrimination function enables the fish finder to indicate whether the bottom is composed mainly of rocks, gravel, sand or mud. This provides you with valuable information that helps you locate rich fishing ground, and boost your catch of the day.

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



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

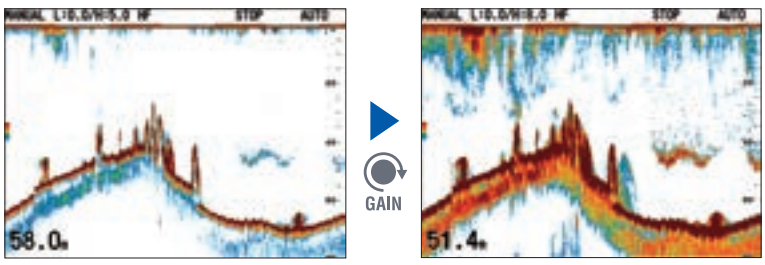
▸▸▸ *Spec P90*

10.4" COLOR LCD
SOUNDER
Model **FCV295**

12.1" COLOR LCD
SOUNDER
Model **FCV1150**

- Post-processing gain control applies changes to gain setting for 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
- Available Heaving Compensation provides stable echo presentation even in rough seas (FCV1150 only)*
- Unique fish size analyzing function ACCU-FISH™ mode (available when FCV1150 connected with 50/200-1T transcucer)

*Requires appropriate sensors



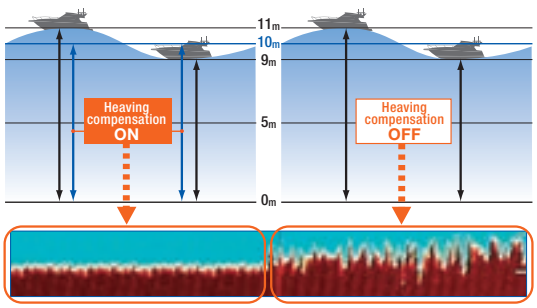
Gain: 5 Gain: 8

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. This lets you 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.

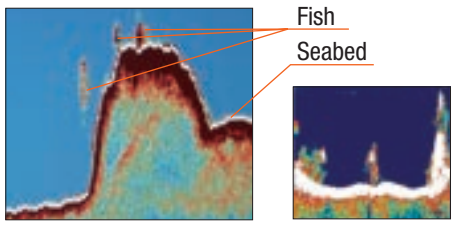
White Edge

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 SC-30, SC-50 or SC-110 Satellite Compass required.



White Edge White Line

▸▸▸ *Spec P91*

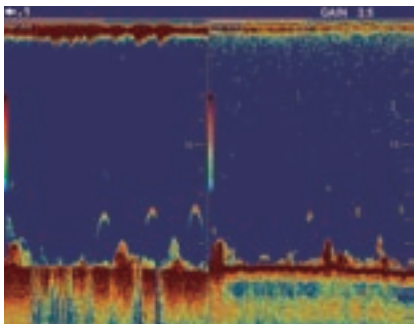
FISH FINDER
Model **FCV1900**

Photo: 19" Marine Display
MU190HD (Optional supply)

- ACCU-FISH™ feature identifies individual fish with size or depth indication and fish symbol
- Bottom discrimination display provides estimate of bottom composition*
- Post-processing gain control applies changes to gain setting for all existing returns on the display
- Capture and review videos and screenshots
- FURUNO Free Synthesizer (FSS) transceiver design allows use of user-selectable operating frequencies

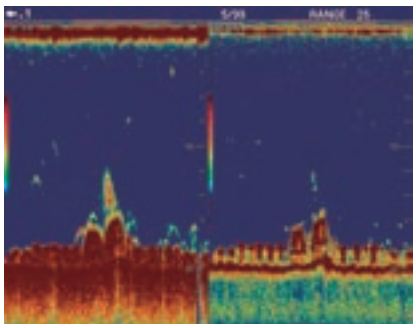
*Appropriate sensors required

Increased transmission rate for more details



Individual fish

In low frequency, the fish is displayed in a distinct boomerang shape. In high frequency, you can clearly see the amount of detail displayed.



Fish reef displayed in detail

Fish reef

See fish reefs in greater detail.

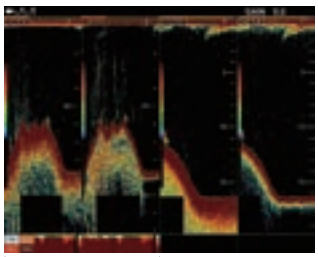
Upgrade to FCV1900B Hi-Res Fish Finder or FCV1900G Fish size indicator

You can upgrade your FCV1900 to a FCV1900B* or a FCV1900G*, both utilizing the latest TruEcho CHIRP™ technology by purchasing and installing a software license.

Feature		Model		
		FCV1900	FCV1900B	FCV1900G
Fish Size Histogram		NA	NA	✓
Transmission Mode**	TruEcho CHIRP™ mode	NA	✓	✓
	Standard mode	✓	✓	✓

* TrueEcho CHIRP™ compatible transducer required.
** The transmission mode is set by the installer.

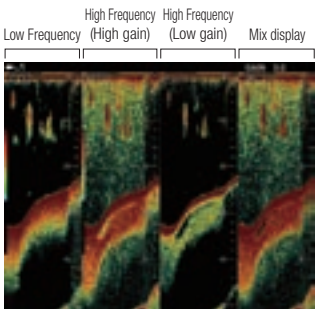
Functions for improved efficiency



Connect a BBDS1 network fish finder for bottom discrimination function

Display up to four different frequencies

Display up to four different frequencies together in a compact and easy way by connecting a required network fish finder. Since there is no need to install additional displays, this function is especially useful for small vessels.



Simultaneous gain setting for increased visibility

Display two different gain settings simultaneously for increased visibility in changing water conditions and when changing vessel speed.

Scroll back function

With the press of a button you can activate the scroll back function to instantly review past echoes. Up to two previous screens can be viewed.

▸▸*Spec P92*

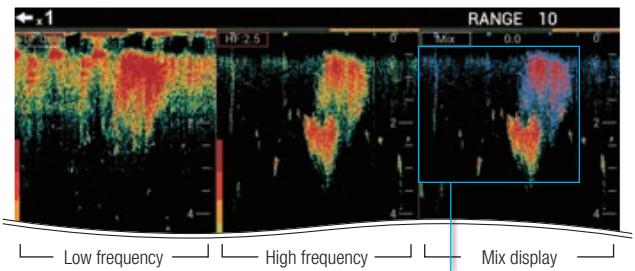
HI-REZ TruEcho CHIRP™
FISH FINDER
Model **FCV1900B**

- High resolution echoes from shallow to deep waters made possible with TruEcho CHIRP™ technology

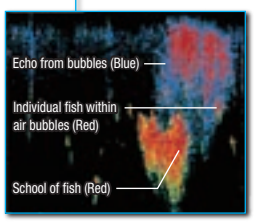
Photo: 19" Marine Display
MU190HD (Optional supply)

▸▸▸ *Spec P92*

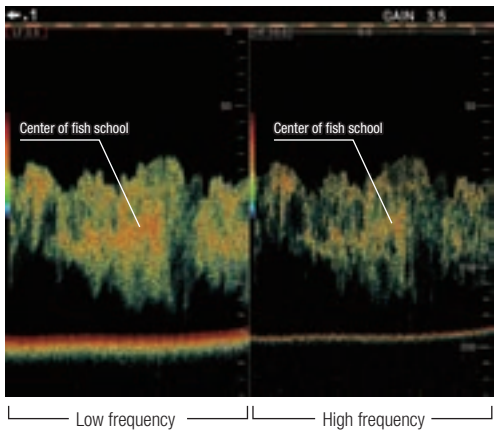
Near the surface



Fish are displayed clearly, even when they are close to the surface. In the mix display, bubbles are displayed in blue, and fish are displayed in bright red for easy target discrimination.
(Recommended transducer: CM275LHW)

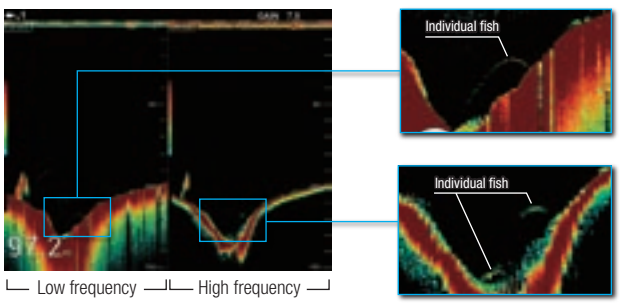


Middle layer



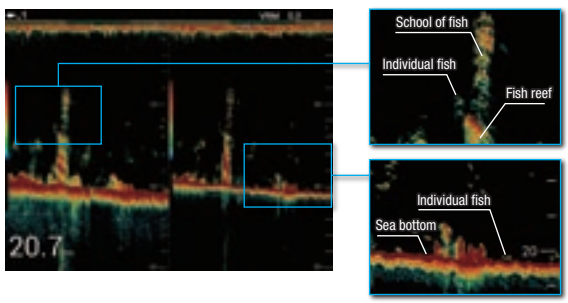
Spot the center of a school of fish simply by observing the color. Dense echoes are displayed in darker colors.

Individual fish



With improved depth resolution, individual fish can be observed even at depths of 100 m and deeper. Fish are displayed in a distinct boomerang shape.

Sea bottom



Individual fish can be discriminated within schools of fish, for easy identication of size and species.

You can easily spot individual fish close to the sea bottom

TruEcho CHIRP™ WITH UNIQUE FISH SIZE INDICATOR

Model FCV1900G

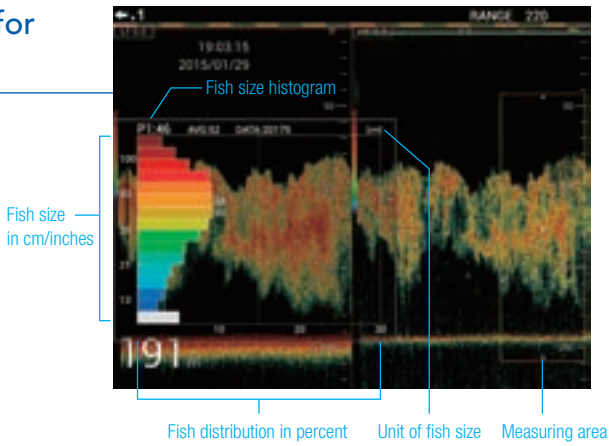
- High precision fish size feature provides approximate fish size in the dense school of fish in graph form
- TruEcho CHIRP™ technology delivers significant advancements in signal clarity and target definition
- Side Looking Mode, see targets and bottom structure below your vessel

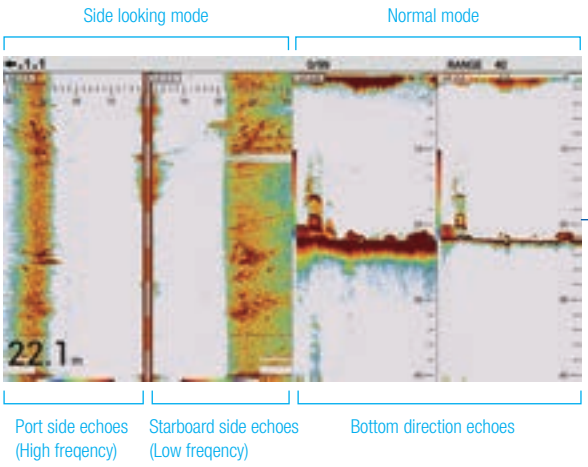
Photo: 19" Marine Display
MU190HD (Optional supply)

▸▸▸ *Spec P92*

Identify size and distribution with the fish size graph for increased efficiency at sea

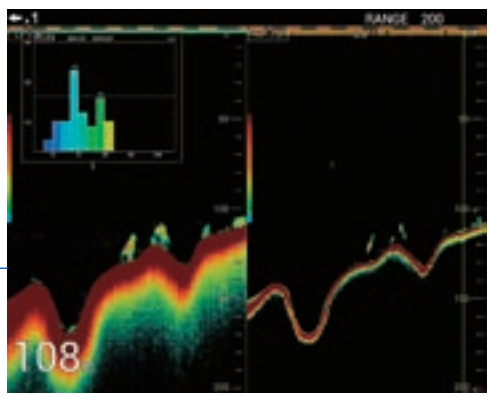
With a quick glance at the simple and efficient graph, you can get all the information you need to identify fish size and distribution. Once you know the fish size and its distribution, you can use this information to estimate the species and whether it's a viable target or not.
Together with the TruEcho CHIRP™ technology, the FCV1900G allows you to choose the best position to throw your net. Also, based on the fish size graph, you can choose the right mesh size for efficient operation. (Recommended transducers: CM265LH or CM599LH)





Side Looking Mode

Side Looking Mode gives you the possibility to observe bottom structure and hardness in greater detail. Side Looking Mode also provides you with additional information on schools of fish and the position of your net when out at sea.



School of fish close to the sea bottom

Accurately judge which target to go after

Experience incredibly accurate echoes, even in deep waters, thanks to our TruEcho CHIRP™ technology.
The FCV1900G is well suited for trawlers, where accurate and reliable information about the sea bottom is necessary. Utilizing the fish graph gives you the ability to choose the right target, maximizing your time at sea and avoiding bycatches.

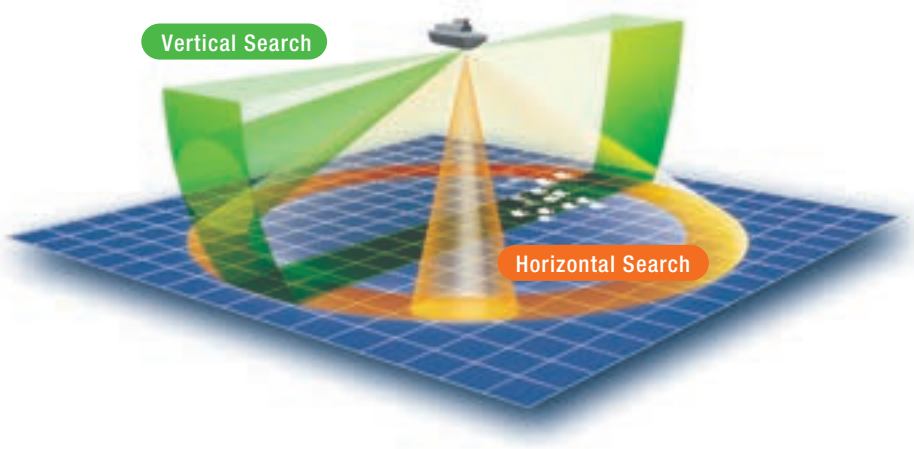
Find fish all around your vessel, not just underneath it! FURUNO's Sonar technology delivers a more productive fishing operation.

There is no doubt about it; these are a 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 Sonar will paint a vivid picture of the world below your boat.

Sonar

CH250	CSH5L MARK-2
CH270	CSH8L MARK-2
CH300	WMB-3230
	WMB-5230

Searchlight Sonar gives you the ability to search both horizontally and vertically. With horizontal search, you can specify the tilt angle to 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

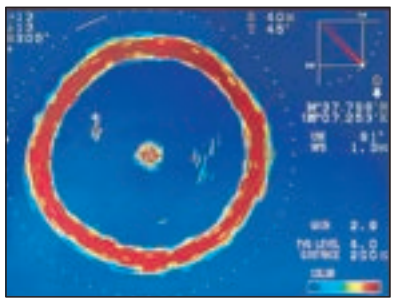
10.4" SEARCHLIGHT SONAR
Model CH250/270

BlackBox NMEA* VIDEO OUT

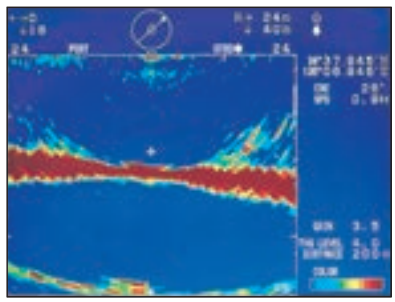
2000/2001/2002/2003/2004
* CH250

Frequency: 60, 88, 150, 180** kHz
** CH270

- 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 screen observation 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 configurations, allowing the use of after-market displays



Full Circle Scan
Full Circle Scan allows for detection of schools of fish at any bearing.



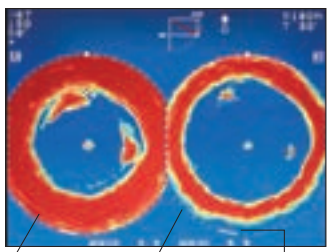
Vertical Scan
Vertical Scan shows the bottom profile at a user specified angle.

10.4" DUAL-FREQUENCY SEARCHLIGHT SONAR
Model CH300

BlackBox VIDEO OUT

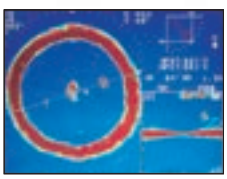
Frequency: 60/153, 85/215 kHz

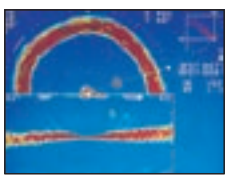
- Incorporates both high and low frequency (60/153 or 85/215 kHz) transducers in a single transducer
- CUSTOM MODE key provides one-touch setup or soft key function
- Display modes include Horizontal scan, Vertical scan, Mix mode and echo sounder
- Pulse length is automatically adjusted according to range, for optimized performance
- Target lock tracks selected school of fish or L/L position
- Available in Black Box configurations, allowing the use of after-market displays



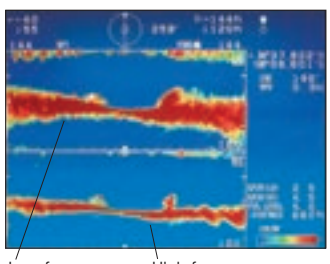
Horizontal scan
The horizontal scan helps detect fish schools at any tilt, all around the vessel. In the dual-frequency mode, any two presentations from high/low frequency scan and the mix mode can be displayed. The gain of each mode can be adjusted separately.

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.



Vertical scan
Vertical Scan shows the bottom profile at a user specified angle. In dual frequency mode, the vertical scan can show both high and low frequency. The search angle and range are indicated on screen.

▸▸▸ *Spec P94*

FULL-CIRCLE SCANNING SONAR

FULL-CIRCLE SCANNING SONAR
Model **CSH5L MARK-2**

BlackBox VIDEO OUT

- Full-circle scanning sonar detects and instantaneously displays schools of fish and underwater conditions
- The vivid 16-color display assists in recognition of seabed structure as well as concentration/distribution of fish schools
- Various fishing and navigation data* keep the operator abreast of fishing and navigation conditions

  * Requires appropriate sensors

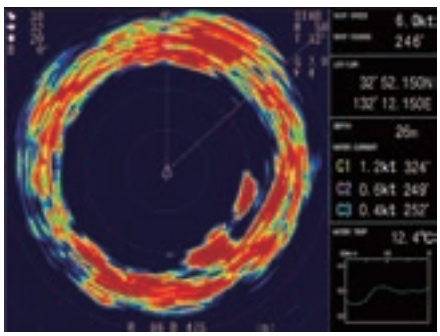
FULL-CIRCLE SCANNING SONAR
Model **CSH8L MARK-2**

BlackBox VIDEO OUT

- Four user-programmable function keys for quick set up according to fishing conditions or specific functions
- High power transmitter ensures reliable operation under any conditions
- Transducer frequency;
  - CSH5L MARK-2: 55 kHz
  - CSH8L MARK-2: 85 kHz

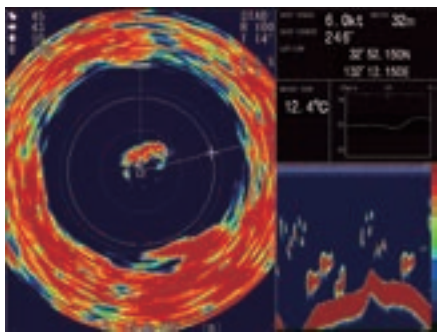
Selectable User-Friendly Operating Modes

There are three basic operation modes:



Sonar Display

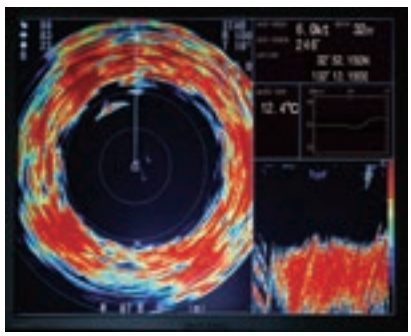
Navigation data can be displayed in the text window, with connection of appropriate sensors. This mode is useful for detecting and tracking schools of fish.



Sonar + Fish Finder*

The sonar picture appears on the left and the signal fed from the fish finder at the lower right side of the screen. This mode is suitable for judging fish school concentration.

* Interface with fish finder required.



Sonar + Audio

Sonar picture appears on the left and the audio display at the lower right side of the screen. This mode is useful for analyzing echoes in a desired area.

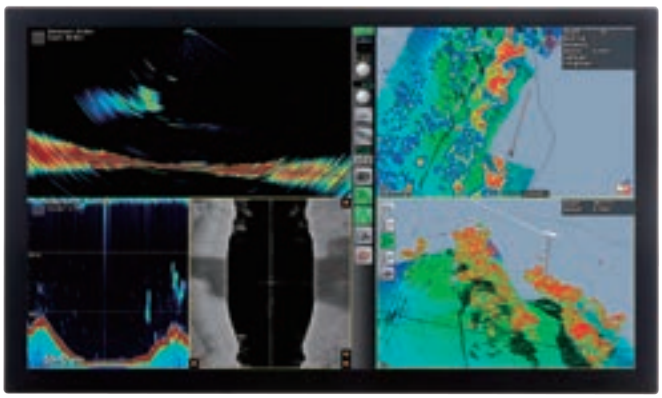
The optional remote controller provides armchair control of tilt, range and gain.

▸▸▸ *Spec P95*

MULTI BEAM SONAR

wassp MULTIBEAM

*Please visit, www.wassp.com, for details.



MULTI BEAM SONAR
Model **WMB-3230/5230**

BlackBox | 3D CHART | Ethernet Plug&Play

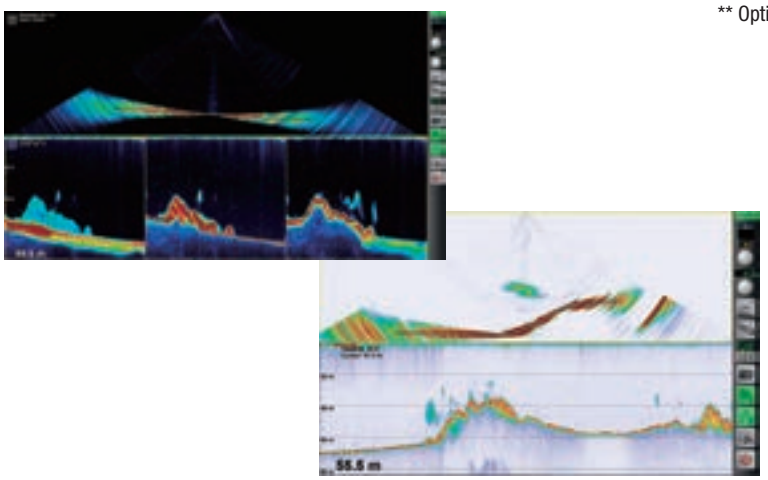
WASSP is the first product to bring the benefits of multi beam technology to fishing.

Providing unparalleled views of the water column and the seafloor, WASSP lets you accurately locate schools of fish, profile the seabed and map bottom hardness, all in real time 3D.

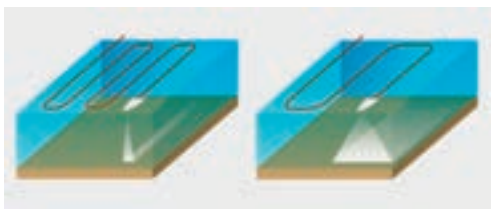
- WASSP multi beam sonar has vastly superior accuracy, wide 120-degree port-starboard scanning area and high-resolution real-time 3D mapping
- 120-degree port-starboard scan yields 3:1 water depth mapping capability
- Continuous real-time 2D and 3D mapping of the water column and seabed
- Stabilized for pitch, heave and roll*
- Selectable from a range of displays depending on needs at the time
- Record and replay survey or fishing runs for analysis later
- The WASSP sonar transducer** is available in 2 frequencies
  - 160 kHz: 200 m depth capability
  - 80 kHz: 500 m depth capability
- WASSP multi beam sonar is uncomplicated, self-contained and comprised of just three modules:
  - Compact transducer (incorporating transmit and receive arrays)
  - Black box transceiver unit
  - Processor unit with keyboard and trackball
- Software updates as new features and functions are added
  - Compatible with TZ plot software

* Compatible sensor required.

** Optional supply



WASSP gives you wide-angle 120° port-starboard view of the seafloor and water column with 112 beams per ping.
The viewing span is over 3 times sea depth, and WASSP can profile an area over 100 times faster than a single beam system.



▸▸▸ *Spec P96*

FURUNO's NAVpilot is a revolutionary autopilot designed for a variety of vessels. It utilizes a self-learning and adaptive software algorithm, and plays the ultimate role in course keeping capability by 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

NAVpilot 700
NAVpilot 711C

Model NAVpilot 700

Model NAVpilot 711C

NAVpilot

NAVnet Connect
FPS FURUNO Power-assist Steering
FANTUM FEEDBACK
Enhanced Sunlight Viewable
Bonded LCD
CAN bus
NMEA2000 Certified
* NAVpilot 700

FLSI

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

▸▸▸ *Spec P97*

NAVpilot

- FURUNO Fantum Feedback™ - Streamlined installation and precise course control without the need for a physical rudder feedback unit
- Selectable "Economy" and "Precision" Navigation Modes combine adaptive technology providing fuel and power savings of up to 2.5% or more.*
- Volvo Penta IPS, YAMAHA Helm Master™, Yanmar VCS compatible
- "Precision" provides for tighter course keeping, within 0.01 nm of the set course
- Perfect for inboard or outboard power boats and sail boats
- Simple one-touch mode selection enables flexible steering and course control
- Autopilot control available from NavNet TZtouch2/TZtouch
- Optional revolutionary SAFE HELM and POWER ASSIST brings unrivaled steering control and comfort at the helm**

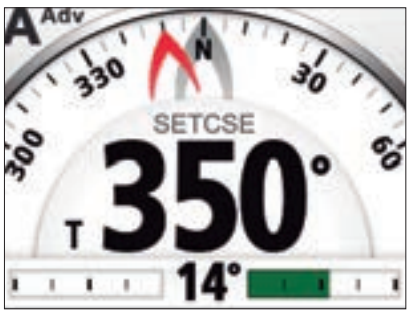
* Based on Furuno testing and "Scenarios for a Clean Energy Future 2000" - U.S. Department of Energy (www.ornl.gov/sci/eere/cef)

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

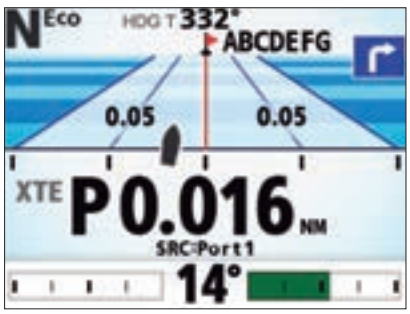
Graphic displays for NAVpilot 711C

Several types of the graphic displays are available, allowing you to customize the data to suit your own preferences with either digital or analog graphics.
The NAVpilot 711C features a color day/night graphic display, giving you much better sunlight visibility during the day, while not affecting your night vision when the sun goes down.

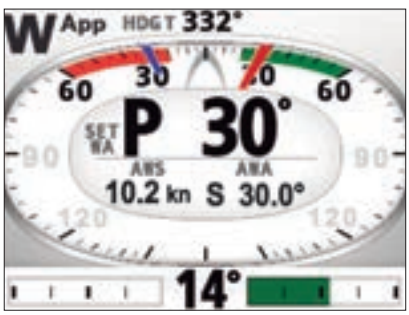
SABIKI



Compass

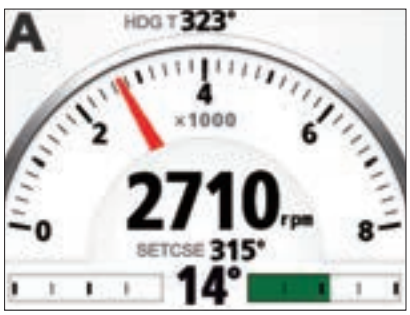


Highway



Wind

Rudder



Engine Speed

Night Version

Auto

Highway

Display modes for NAVpilot 700

Rudder Angle

Wind

Introducing "SABIKI mode" for the NAVpilot 711C

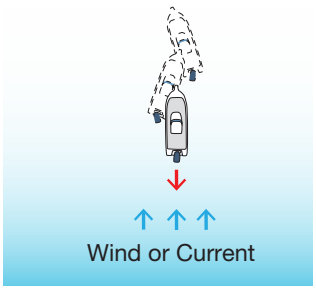
With the brand new SABIKI mode your NAVpilot 711C has just become even more capable than before. And the best thing is, there is no need to install additional hardware or sensors. Just perform the software upgrade and the SABIKI mode will be added to your NAVpilot 711C. SABIKI mode is only available on vessels with outboard engines.

SABIKI mode

SABIKI mode lets the autopilot take control while you are drifting astern, so you can focus on fishing instead of steering. Moving astern at a slow pace the SABIKI mode is uniquely tailored for sabiki fishing, jigging and bottom fishing. Sabiki fishing requires a bit of technique and no matter if you just started or have considerable experience, the SABIKI mode will help you catch the bait fish needed for the big catch.

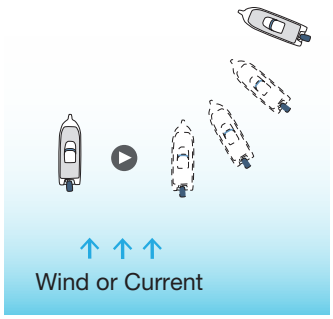
After performing the software upgrade, a SABIKI icon will appear in the turn menu. The SABIKI mode is only user selectable if the current speed is below 5 knots. Once SABIKI mode is selected, the course can be set with the Roto knob and the arrow keys.

Sabiki "ON"



With the SABIKI mode turned on, the direction can be kept just by adjusting the throttle.

Sabiki "OFF"



In order to keep the same direction it is not sufficient to just reverse the engine and move astern. The steering has to be constantly adjusted to keep direction.

NAVpilot 711C software version 1.02 and Processor unit FAP-7002 software version 1.20 required for SABIKI mode.

Autopilot control by NavNet TZtouch2/TZtouch

If you have your boat equipped with a NavNet TZtouch2 or TZtouch system you can take full advantage of the NAVpilot 700/711C from the NavNet TZtouch series display. You can activate the AUTO mode of the NAVpilot 700/711C and change the set course by tapping on arrow buttons, by adjusting a slider bar with your finger or the RotoKey™, or by dragging the course arrow with your finger.

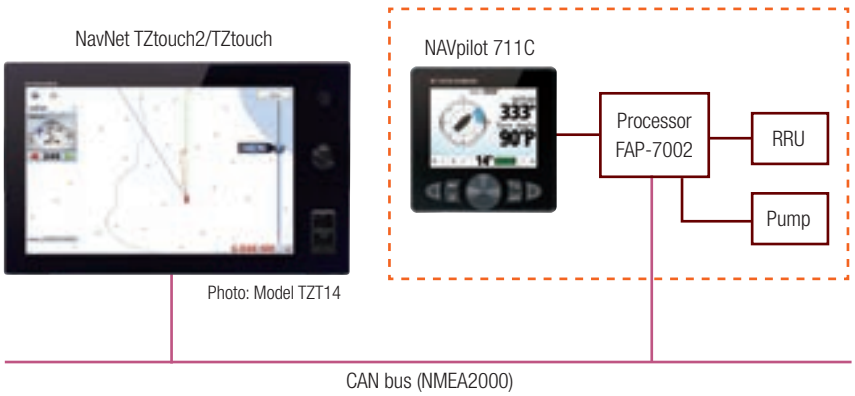


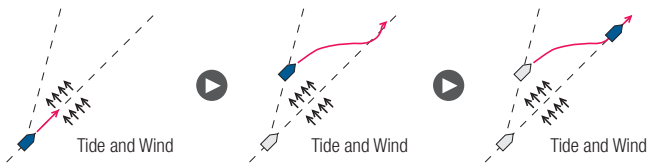
Photo: Model TZT14

Self-learning and adaptive software

From the first dock-side setup through the last voyage you made, NAVpilot continues to learn your vessel's steering characteristics.
This allows for dynamic adjustments to the boat's steering for vessel speed, trim, draft, tide and wind effects, weather, etc.
These characteristics are stored in the processor's memory where they are continuously optimized to make the NAVpilot more versatile.

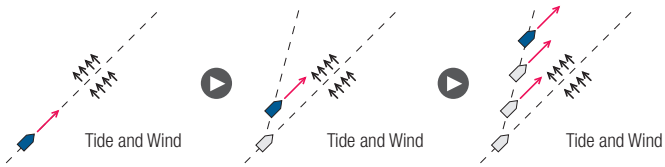
Advanced auto mode

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



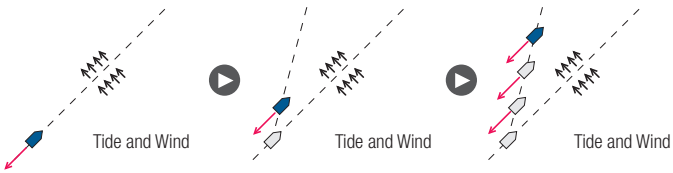
Auto mode

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



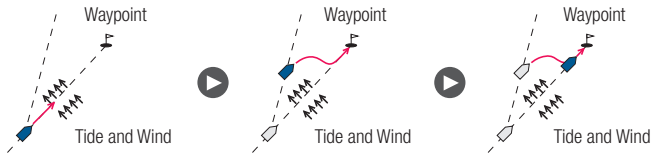
SABIKI mode

NAVpilot consistently maintains the desired heading astern while compensating for the effects of tide and wind. Speed is limited to 5 knots.

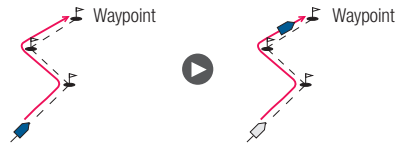


Nav mode/Route tracking

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



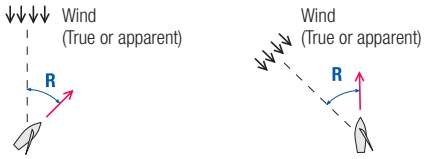
When connected to a GPS Navigator, NAVpilot steers the vessel to follow a series of waypoints in succession. Upon arriving at each waypoint or destination, audible and visual alerts are activated.



Wind mode*

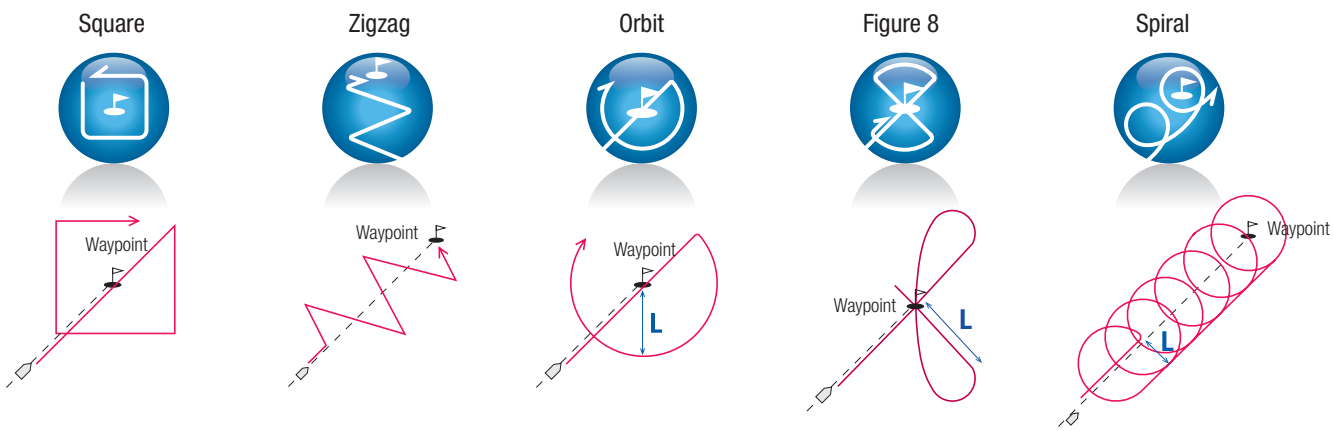
NAVpilot consistently maintains the desired heading toward true or apparent wind direction while compensating for the effects of tide and wind.

* This mode is available for sailing craft only. Wind data input is required.



FishHunter™ mode

FishHunter™ 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™ to perform square, zigzag, circle, orbit, spiral or figure eight maneuvers around the specified target at a user selected distance. This feature can also be used for Man Overboard (MOB).



Furuno Fantum Feedback™

FURUNO with Fantum Feedback™, NAVpilot outboard/sterndrive installations no longer require use of a physical rudder feedback unit.
Fantum Feedback™ NAVpilot software allows a simplified installation, while delivering enhanced speed.

This simplified installation, combined with Furuno's unique adaptive learning Autopilot technology, provides unmatched outboard Autopilot performance.
Fantum Feedback™ is a menu-selectable feature available in the latest NAVpilot 700 series software. This new 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 high-speed cruising, utilizing a newly developed, time-based rudder gain process, rather than traditional rudder angle based control.

Compatible with EVC engines

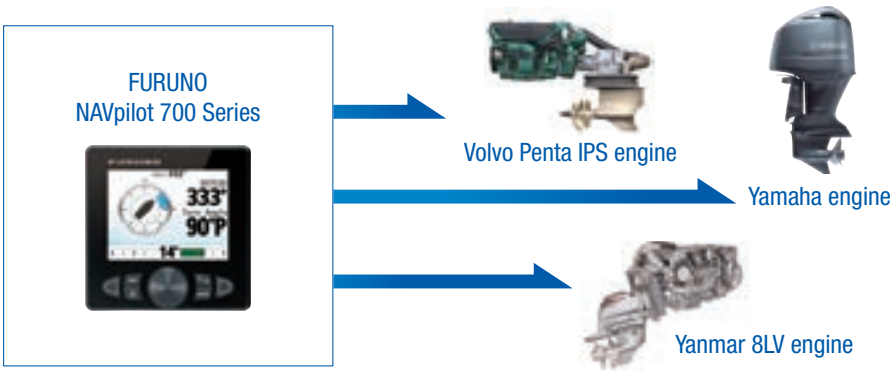
The NAVpilot 711C works with a wide variety of boats and engines, including power and sail boats, with inboard or outboard engines. It even has the capability to work with Volvo Penta IPS, Yamaha Helm Master™ and Yanmar 8LV engine systems.

Volvo Penta IPS system
(Compatible with Volvo Penta IPS drive versions C, D or E type.)

Yanmar Joystick Control System
(Compatible with Yanmar 8LV and JC10)

Yamaha Helm Master™ system

FURUNO IF-700IPS (IPS Interface Unit) is an optional unit to integrate with the innovative propulsion system. The IPS Interface Unit relays commands from the NAVpilot 700 series to the engines in order to steer the vessel.



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

FURUNO Power-assist Steering

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

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, steering systems on many vessels. POWER ASSIST reduces steering system complexity and costs while increasing economy.

SYSTEM CONFIGURATIONS

FURUNO FI70 Instrument and NAVpilot series are designed to match the NavNet TZtouch2/TZtouch/3D and other navigation equipment. The "Plug and Play" CAN bus interface allows for easy installation and exceptional interface ability.

The diagrams below show typical installations for power and sail boats.

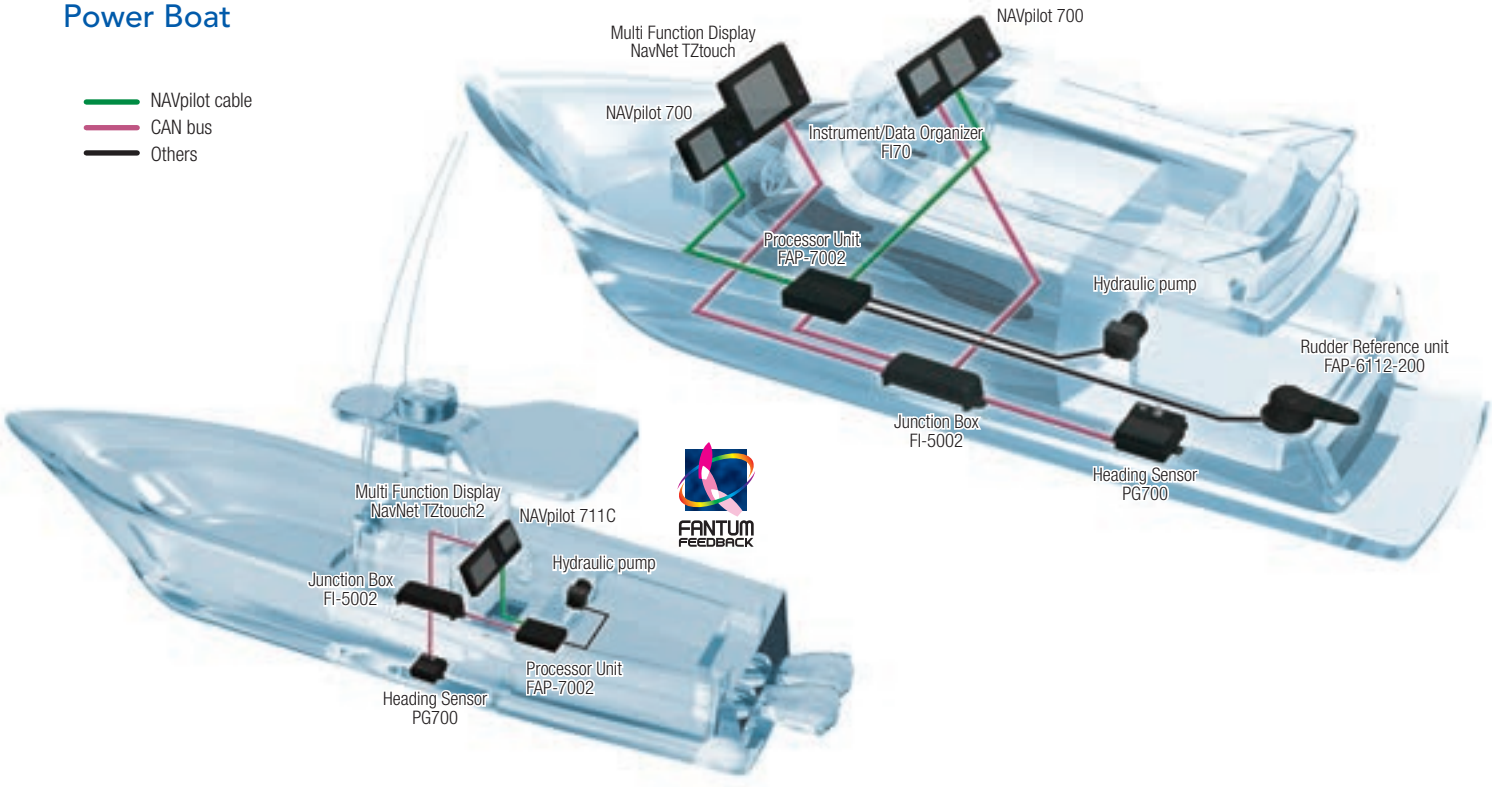
Model NAVpilot 711C

Model TZTL15F

Model FI70

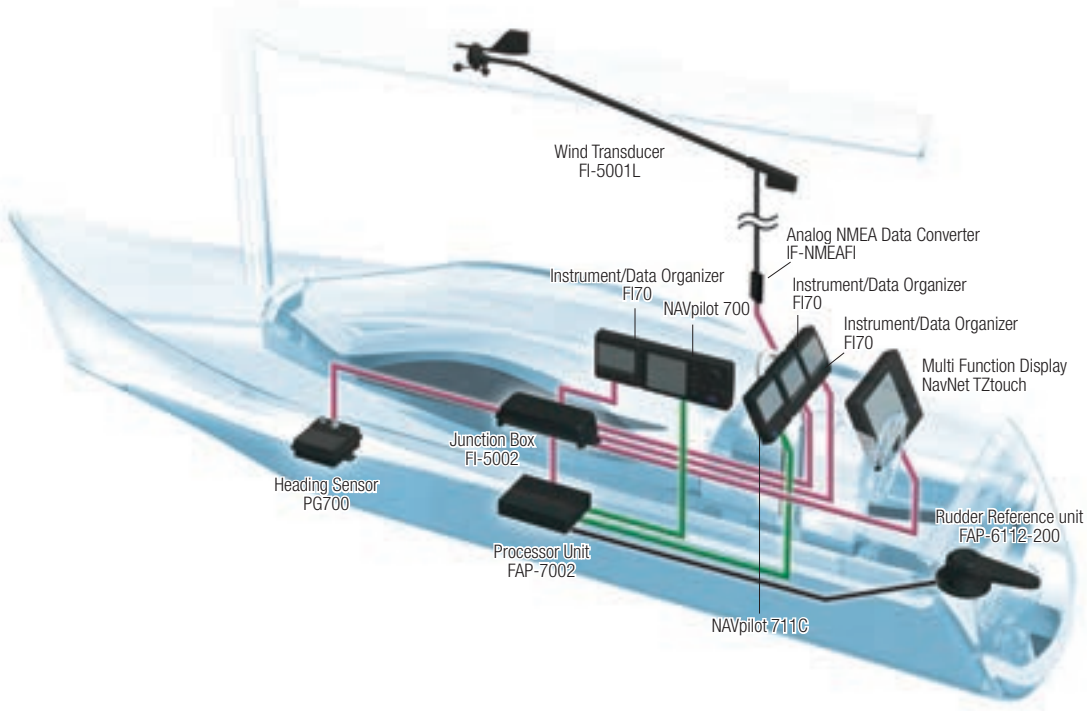
Power Boat

NAVpilot cable
CAN bus
Others



Sailboat

NAVpilot cable
CAN bus
Others



All your info...All in one, for powerboats and sailboats alike

The new FI70 INSTRUMENT/DATA ORGANIZER sports a vibrant 4.1" bonded color display that is visible even in the harshest sunlight conditions. Utilizing the CAN bus network, external sensors can easily be connected for simple and reliable operation. The FI70 features an easy to operate user interface. You can customize almost every display property, allowing you to choose the information you want to be displayed, in the way you want to see it!

Instrument/Data Organizer

FI70

Model **FI70**

NAVnet Connect | Enhanced Sunlight Viewable | CAN bus | Bonded LCD | NMEA2000 Certified

- Designed to perfectly match the NavNet TZtouch/TZtouch2 and NAVpilot 711C on your helm
- Clear 4.1" screen that is viewable even under direct sunlight
- Simple and intuitive interface allows full customization
- Bonded color LCD ensuring condensation free operation as well as great visibility
- Use your existing wind sensors (FI-5001/FI-5001L) with the new analog IF-NMEAFI converter
- Low power consumption (0.15 A max)
- Simple AIS display through connected CAN bus devices
- Share language and brilliance settings between FI70s when grouping them together

▸▸▸ *Spec P98*

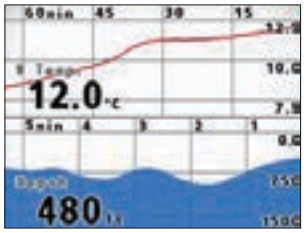
Heading

Wind (CH AWA/AH TWA)

Engine RPM (Single)

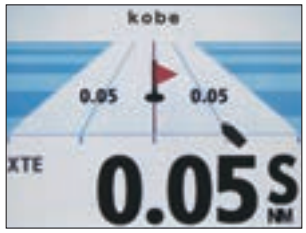
Engine RPM (Triple)


AIS

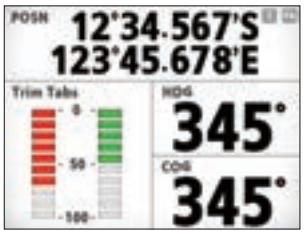


Graph

Timer



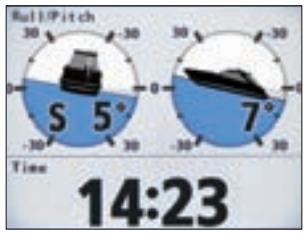
Highway



Data Box (Split)

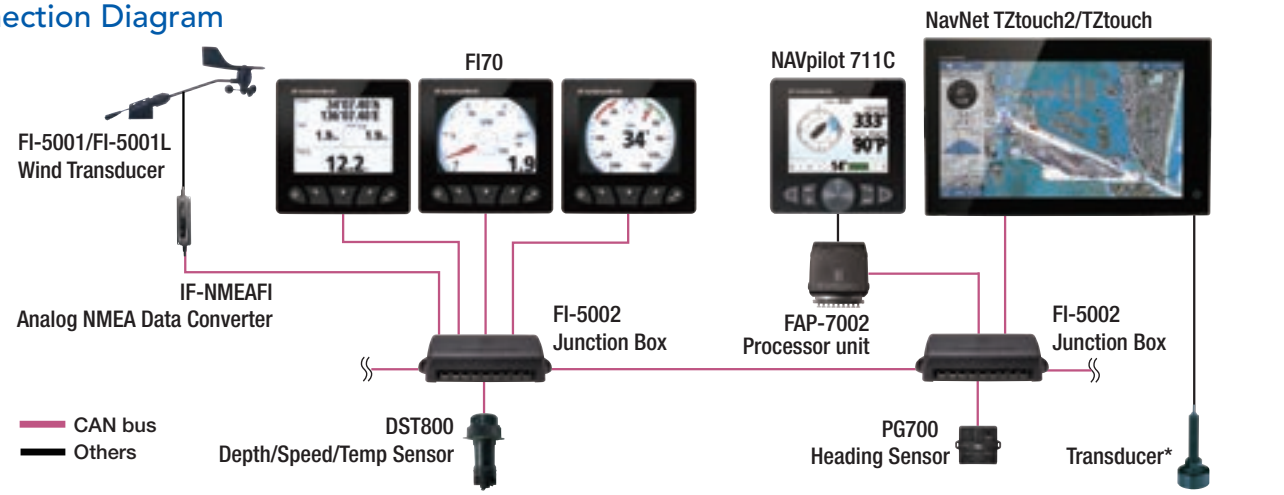
Data box (Single)

Rudder



Roll & Pitch

Connection Diagram



* Connecting directly is only available with TZtouch2

Sensors and Accessories (Option)

Wind Transducer
Model FI-5001/5001L
(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
Model DST800

Frequency: 235 kHz
Cable: 6 m

Junction Box
Model FI-5002

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

Analog NMEA Data Converter
Model IF-NMEAFI

CAN bus: 1 port
Power supply: 15 VDC, less than 200mA

▸▸▸ *Spec P99*

Monitors

MU150HD
MU190HD
MU170T
MU190T
MU240T

15"

XGA (1024 x 768)

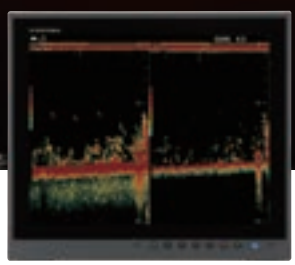
Model **MU150HD**

Enhanced Sunlight Viewable | Bonded LCD | VIDEO IN

1000 cd/m^2

19"

SXGA (1280 x 1024)



Model **MU190HD**

Enhanced Sunlight Viewable | Bonded LCD | VIDEO IN

1000 cd/m^2

Picture In Picture (PIP)

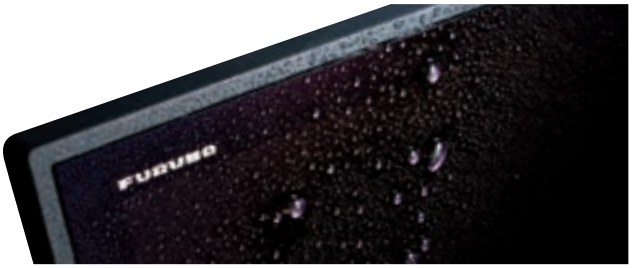
(MU150HD/190HD)

Composite video (NTSC/PAL) input is available for displaying video images from an onboard TV/DVD player. For MU150HD/190HD with more than two Composite Video Inputs, the images in the PIP window automatically switch alternately.

Waterproof

(MU150HD/190HD)

The MU150HD/190HD has a waterproof display and is 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

(MU150HD/190HD)

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

photo: MU190HD/MU150HD

Low power consumption

(MU150HD/190HD)

Utilizing the latest LED backlight, the MUDisplay 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 have depend on.

17"

SXGA (1280 x 1024)

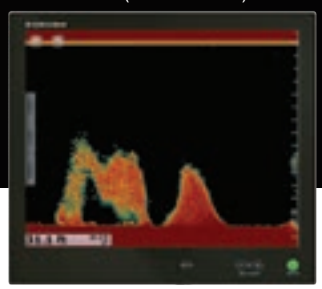
MU170T

Enhanced Sunlight Viewable | Bonded LCD | VIDEO IN | MTC Multi Touch Control

1000 cd/m²

19"

SXGA (1280 x 1024)



MU190T

Enhanced Sunlight Viewable | Bonded LCD | VIDEO IN | MTC Multi Touch Control

800 cd/m²

24"

HD1080 (1920 x 1080)
16:9 Aspect Ratio

MU240T

Enhanced Sunlight Viewable | Bonded LCD | VIDEO IN | MTC Multi Touch Control

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			✓	✓	✓

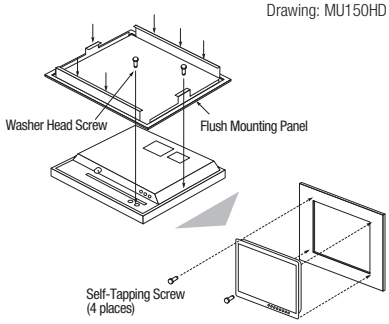
Flush mounting

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

Flush mounting, fixed from front

MU150HD/190HD

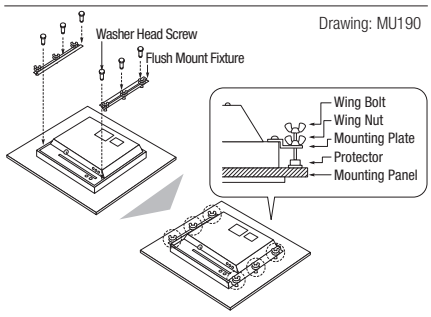
Drawing: MU150HD



Flush mounting, fixed from rear*

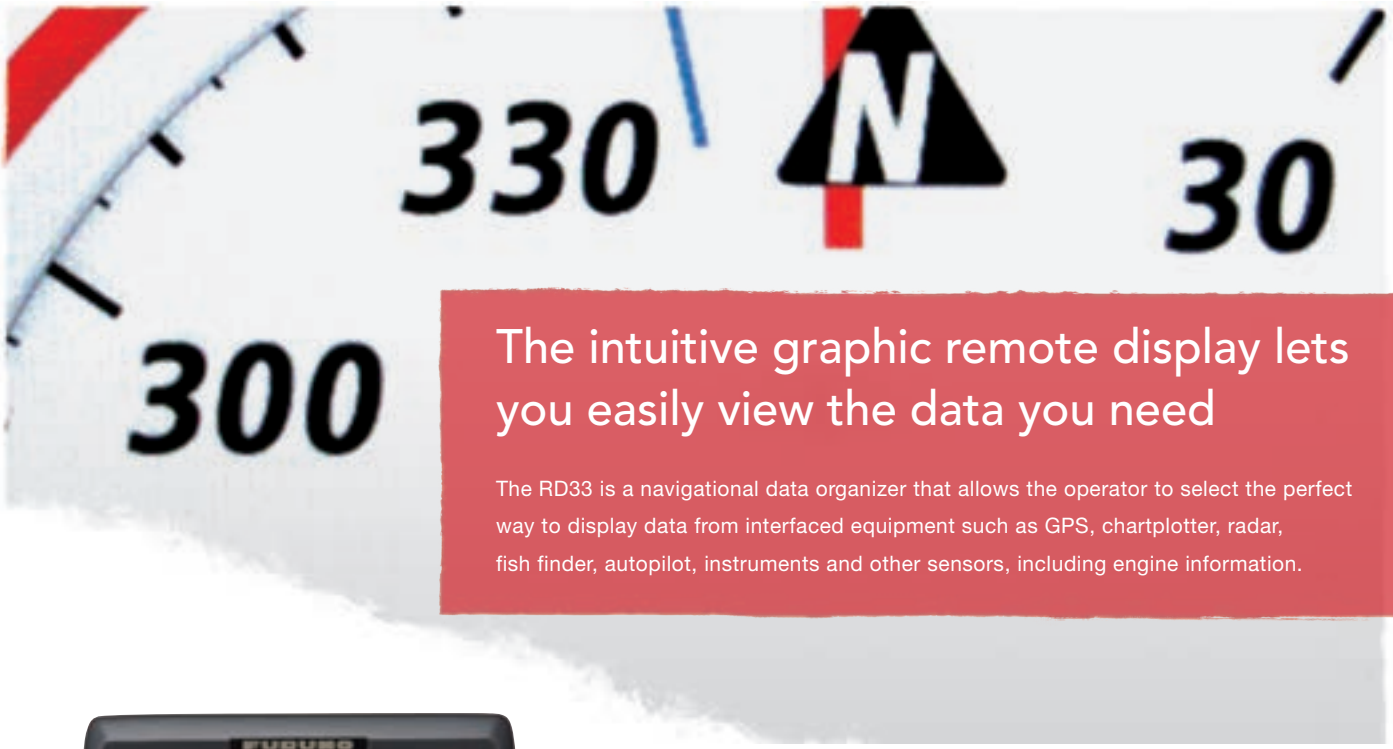
MU150HD/190HD

Drawing: MU190



* Standard for MU150HD/190HD

▸▸▸ *Spec P100-101*



The 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, chartplotter, radar, fish finder, autopilot, instruments and other sensors, including engine information.

4.3" REMOTE DISPLAY
Model RD33

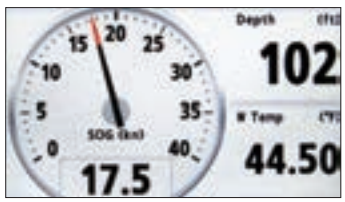
NAVnet Connect | Enhanced Sunlight Viewable | CAN bus

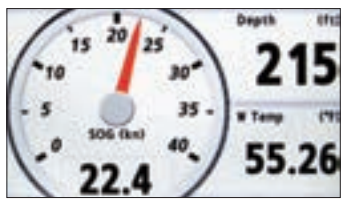
Remote Display

RD33

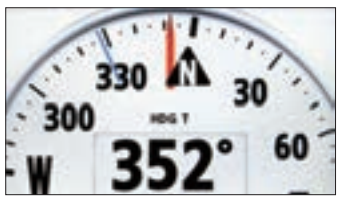
- 4.3" “Sunlight Viewable” color LCD
- Maximum visibility under various ambient conditions, both during night, and under direct sunlight (brightness of LCD is 700 cd/m^2)
- Enhanced data legibility thanks to large characters and high resolution visual aid
- Full-screen single presentation down to six-way 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 series

Two different styles of presentation available

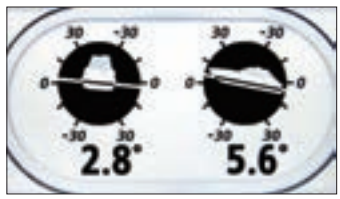




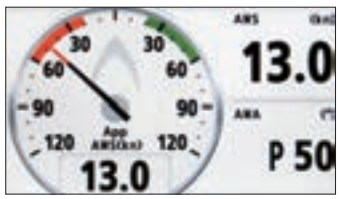
SOG

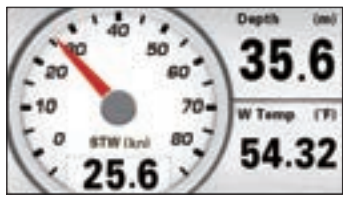


Heading



Roll & Pitch





Wind

▸▸▸ *Spec P102*

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/SC110
- PG700
- PG500R

SATELLITE COMPASS Model SC30

NAVnet Connect
NMEA2000 Certified
NMEA 2009/2010/2011

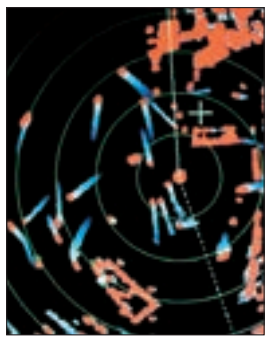
- Combine with Radar for constant target tracking and stable echo trails
- Combine with Radar and Chart Plotter for spot-on Radar Overlay
- Combine with Sonar and Fish Finder for stable echo images and accurate ship's track information
- Combine with NAVpilot for precise autopilot control

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

Models: NavNet TZtouch2/TZtouch/NavNet 3D/ FR8005 series/etc



True Motion Echo Trail

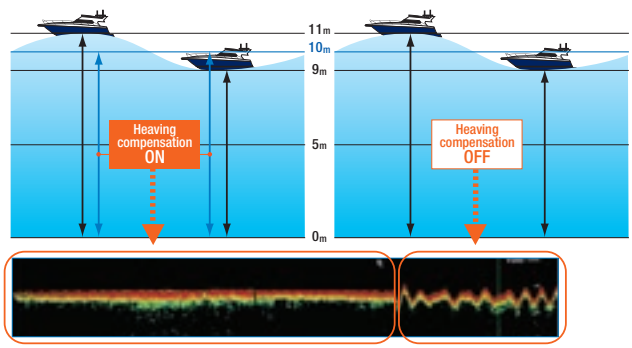
True echo trails are available when the satellite compass is connected to your FURUNO radar. True echo trails are helpful for determining own ship's movement as well as the movement of other vessels. Heading accuracy and sensing speed ensures that trails are displayed in smooth lines.

FISH FINDER

Models: NavNet TZtouch2/TZtouch/NavNet 3D/FCV1150/etc

Heaving Compensation

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



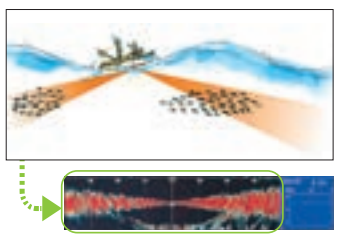
SONAR

Models: CH300/CH270/CH250/etc

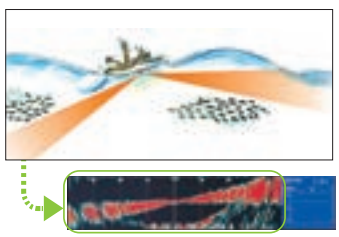
Pitch And Roll Compensation

Pitch and Roll Compensation data allows FURUNO sonar systems to display a steady image on the screen and facilitates stable detection, even in foul weather.

Beam Stabilizer ON



Beam Stabilizer OFF



▸▸▸ *Spec P103*

SATELLITE COMPASS™

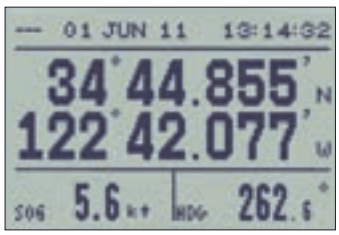
SATELLITE COMPASS™
Model **SC50/SC110**

NAVnet Connect

Radome Antenna
SC303 for the SC50

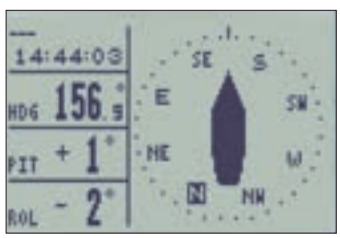
Open Antenna
SC1203F for the SC110

Heading



NAV Data

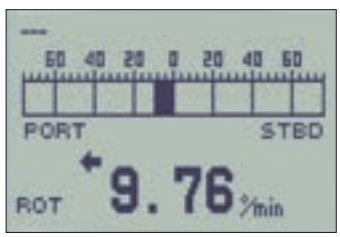
- Precise heading data for autopilot, radar, AIS, sonar and chart plotter
- Rapid follow-up rate (45°/s)
- Work as motion sensors with accurate pitch/roll data output
- 100% free from regular maintenance
- Tri-antenna system to improve the accuracy and reduce the effects of ship's motions
- Heading data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



Compass Rose

Basic specifications of SC50/SC110

	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



Rate of Turn

▸▸▸ *Spec P103*

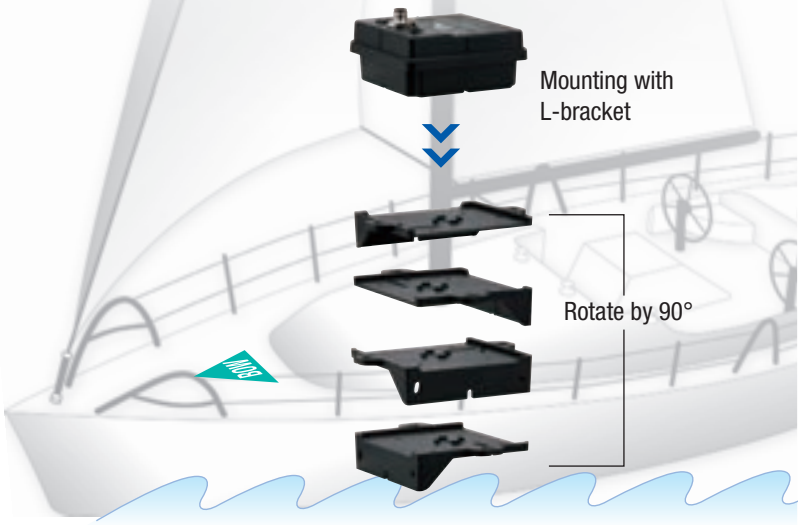
INTEGRATED HEADING SENSOR

INTEGRATED
HEADING SENSOR
Model **PG700**

- Provides heading data of high accuracy
- Black box type fluxgate magnetic sensor
- CAN bus interface incorporated
- Can be mounted on either the bulkhead or the floor, thanks to the L-bracket

Easy mounting with L-bracket

PG700 can be mounted on either a bulkhead or the deck with the L-bracket.*



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

INTEGRATED
HEADING SENSOR
Model **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 visible status indicators for simple installation
- Three heading data output ports: two IEC/NMEA0183 ports, one AD-10 port incorporated

▸▸▸ *Spec P104*

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 as 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
- FA50
- FA170 NEW
- FM8900S
- FS1575/FS2575
- LH3000
- NX300
- FAX30
- FAX408
- FELCOM250/500*

AIS RECEIVER

AIS Receiver
Model **FA30**

- Enhances safe navigation by receiving critical navigation information from local AIS-equipped vessels.
- Network output to NavNet and PCs for added redundancy and installation flexibility
- Serial Output for integration with various radar and chart plotter systems

Information to be received

Dynamic Data	• Ship's position • 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
Model **FA50**

- Fully satisfies the technical standards for Class-B AIS, IEC 62287-1
- Receives both Class-A and Class-B AIS information
- Outputs data to NavNet TZtouch2/TZtouch, 3D through Ethernet
- Flexible integration with various AIS compatible radar and chart plotters

NEW

CLASS A AIS TRANSPONDER
Model **FA170**

- Complies with IMO MSC. 74(69) Annex 3, IMO MSC.302(87), A694, ITU-R M. 1371-5 and DSC ITU-R M.825. It also complies with, IEC 61993-2 (Type testing standard) and IEC 60945 Ed. 4 (EMC and environmental conditions).
- Display information about the AIS-equipped ships, as well as, coastal stations and Aids to Navigations within VHF coverage
- Outputs AIS data to NavNet TZtouch2/TZtouch/3D, radar and other navigational equipment for collision avoidance support

Plotter display

Displays symbols for AIS-equipped ships, base stations, AIS-SARTs, and so on.
When you select a certain target, the information about the ship (MMSI (or name, when available), heading, SOG, COG, etc.) is displayed.

AIS symbols

Own ship symbol	AIS base station	AIS-SART/AIS MOB/EPIRB-AIS
Target	Aid to Navigation (physical)	SAR aircraft
Selected target	Aid to Navigation (virtual)	SAR vessel

▸▸▸ *Spec P105*

VHF RADIOTELEPHONE

VHF
RADIOTELEPHONE
Model **FM8900S**
(Simplex/Semi-duplex)

GMDSS

- Semi-duplex 25 W VHF radiotelephone with a built-in Class A DSC and CH70 watchkeeping receiver
- Fully meets GMDSS carriage requirements for SOLAS ships
- Meets the ITU recommendation on digital selective calling system for use in the Maritime Mobile Service, ITU-R M.493-13 or latest
- Easy to read, high-contrast 4.3" bright color LCD
- Improved noise reduction and speaker for superb voice quality
- Quick access to CH16
  - 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
- Replay of the latest receiving voice, which is automatically recorded, for 120 seconds

▸▸▸ *Spec P107*

MF/HF RADIOTELEPHONE
VHF RADIOTELEPHONE

MF/HF
RADIOTELEPHONE
Model **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

▸▸▸ *Spec P106*

LOUD HAILER

LOUD HAILER
Model **LH3000**

- High-performance, 20 W output power loud hailer
- Built in, high-quality speaker
- Hail, Intercom and Alarm functions
- Eight automatic warning signals
- Up to four intercoms are connectable for two-way communication between master and one or all remote stations

Optional Intercom Speaker
Model **LH3010**

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

- 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

▸▸▸ *Spec P108*

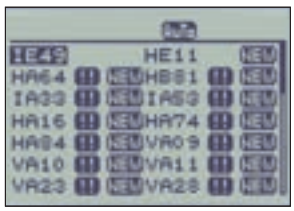
NAVTEX RECEIVER

NAVTEX RECEIVER
Model **NX300**

- Paper-free Navtex receiver
- Selectable frequency for both international and domestic/local Navtex messages
- Uninterrupted reception of Navtex messages
- Memory for up to 28,000 characters
- High contrast 4.5" Silver Bright LCD
- Nav data display when connected to external GPS
- Automatic selection of the Navtex station according to position when connected to external 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 AIS service message
H Loran-C message
I Reserved - presently not used
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 P108*

WEATHER FACSIMILE RECEIVER

WEATHER FACSIMILE RECEIVER
Model **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

▸▸▸ *Spec P109*

WEATHER FACSIMILE RECEIVER

BLACK BOX WEATHER FACSIMILE RECEIVER
Model **FAX30**

NAVnet Connect BlackBox

*A PC is to be procured locally.

- Cost effective paperless weatherfax and Navtex receiver
- Connect directly to a NavNet display or through an Ethernet hub
- Connect to a 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 PC, no proprietary software required
- Print images and messages from PC and printer
- Store a maximum of 12 weather fax 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 P109*

Communications

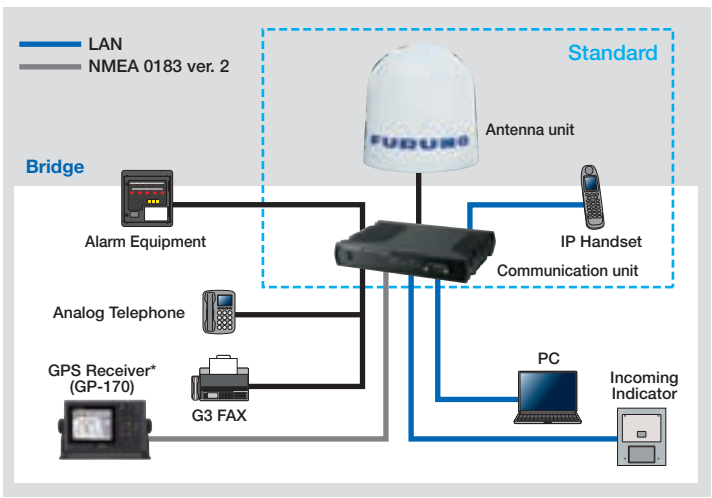
INMARSAT FleetBroadband

INMARSAT
FleetBroadband
Model **FELCOM500**

INMARSAT
FleetBroadband
Model **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 settings available, i.e., group call function, etc.
- 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 a web browser
- Supports PPPoE to facilitate automatic dial-up connection/disconnection via applications

FleetBroadband System Configuration



Equipment List

Model	FELCOM250	FELCOM500
Standard		
1. Antenna Unit	FB-1250	FB-1500
2. Communication Unit	FB-2000	
3. IP Handset	FB-8000	
Option		
Incoming Indicator	FB-3000	
Analog Telephone	GEMINI 9333B4	
G3 FAX	FAX2840JP/2840	
AC/DC Power Supply Unit	PR-240	

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

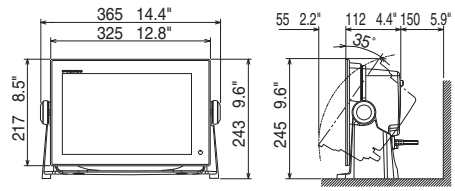
▸▸▸ *Spec P110*

Technical Specifications

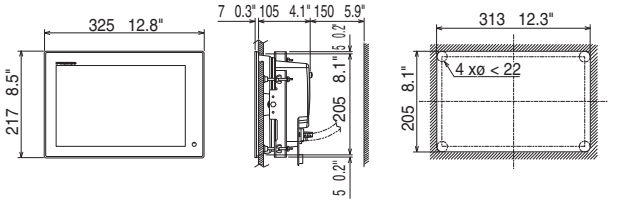
NavNet TZtouch2

		MULTI FUNCTION DISPLAY	
		TZTL12F	TZTL15F
			
DISPLAY UNIT			
Type		Color TFT multi touch LCD	
Screen Size		12.1" Wide	15.6" Wide
Screen Resolution		WXGA 1280 x 800	FWXGA 1366 x 768
Screen Brightness		1300 cd/m^2 (typical)	1000 cd/m^2 (typical)
Language		English (US & UK), French, Spanish, German, Italian, Portuguese, Swedish, Danish, Norwegian, Finnish, Greek, Chinese (simplified), Japanese	
GPS/WAAS			
Receiver Type		GPS: 56 channels, SBAS: 1 channel (C/A mode, WAAS)	
Receiving Frequency		L1 (1575.42 MHz)	
Time to First FIX		100 s (cold start)	
Tracking Velocity		999 kn	
SBAS		WAAS, EGNOS, MSAS	
ACCURACY			
Internal Antenna		GPS: 10 m Max, WAAS: 3 m Max, MSAS: 7 m Max	
CHART PLOTTER			
Cartgraphy		MapMedia mm3d chart (C-MAP/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	
Target Tracking		30 Targets* *Heading input required.	
FISH FINDER			
Transmit Frequency		50/200 kHz	
Transmission Power		600 W or 1 kW* *Matching box MB-1100 required for some FURUNO transducers.	
Display Range		2-1, 200 m, shift: 0-500 m	
Extension Mode		RezBoost, ACCU-FISH, Bottom Discrimination, A-Scope, Auto (Fishing/Cruising/Manual), Marker Zoom, Bottom Zoom, Bottom Lock	
Picture Advance		7 steps: x2, x1, 1/2, 1/4, 1/8, 1/16 stop	
INTERFACE			
CAN bus/NMEA2000		1 Port	
Interface (CAN bus/NMEA2000)	Input	059392, 059904, 060928, 061184, 065280, 126208, 126720, 126992, 126996, 127237, 127245, 127250, 127251, 127257, 127258, 127488, 127489, 127505, 128259, 128267, 129025, 129026, 129029, 129033, 129038, 129039, 129040, 129041, 129291, 129538, 129540, 129793, 129794, 129798, 129808, 129809, 129810, 130306, 130310, 130311, 130312, 130313, 130314, 130316, 130577, 130578, 130817, 130818, 130820, 130822, 130823, 130826, 130827, 130828, 130880	
	Output	059392, 059904, 060928, 061184, 126208, 126464, 126720, 126992, 126996, 127250, 127251, 127257, 127258, 128259, 128267, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130306, 130310, 130312, 130313, 130314, 130316, 130821, 130822, 130823, 130827	
NMEA0183		1 Integrated Output Port	
Interface (NMEA0183)	Output	AAM, APB, BOD, DPT, DBT, GGA, GLL, GNS, GSA, GSV, RMB, RMC, RTE, TTM, VTG, WPL, XTE, ZDA	
LAN		1 Port (100 BASE-TX)	
USB		1 Port (USB2.0)	
Video I/O		Input: 2 Ports (NTSC/PAL), Output: 1 Port (HDMI)	
AUX I/O		1 Port (External Event/MOB Input/Operator Fitness/Alarm Output)	
SD Card Slot		1 Slot (Micro SDXC, rear), 2 Slots Card Unit: Model SDU-001 (option)	
Wireless LAN		IEEE802.11b/g/n, Transmit frequency: 2.4 GHz band	
Transducer		1 Port	
ENVIRONMENT			
Temperature (IEC60945)		-15°C to +55°C	
Waterproofing		IP56	
POWER			
		12-24 VDC	
		3.0-1.5 A	3.6-1.8 A

Multi Function Display (Tabletop Mount) TZTL12F 3.8 kg 8.4 lb

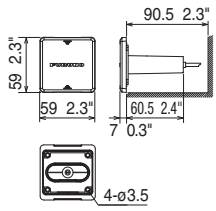


Multi Function Display (Flush Mount) TZTL12F 3.7 kg 8.2 lb

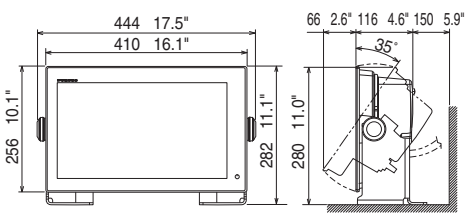


SD Card Unit SDU-001 (option)

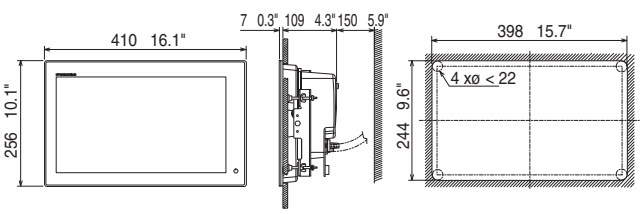
0.1 kg 0.22 lb



Multi Function Display (Tabletop Mount) TZTL15F 5.5 kg 12.1 lb



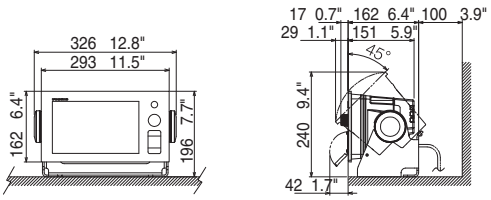
Multi Function Display (Flush Mount) TZTL15F 4.9 kg 10.8 lb



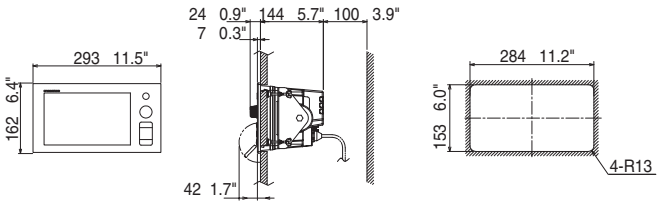
NavNet TZtouch

		MULTI FUNCTION DISPLAY	
		TZT9	TZT14
			
DISPLAY UNIT			
Type		Color TFT multi touch LCD	
Screen Size		9" wide	14.1" wide
Screen Resolution		WVGA 800 x 480	WXGA 1280 x 800
Screen Brightness		900 cd/m^2 (typical)	
Language		English (US & UK), French, Spanish, German, Italian, Portuguese, Swedish, Danish, Norwegian, Finnish, Greek, Chinese (simplified Chinese characters), Japanese	
CHART PLOTTER			
Cartography		MapMedia mm3d chart (C-MAP/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	
Target Tracking		30 Targets* *Heading input required.	
INTERFACE			
CAN bus		1 Port	
Interface (CAN bus)	Input	059392, 059904, 060928, 061184, 065280, 126208, 126720, 126992, 126996, 127237, 127245, 127250, 127251, 127257, 127488, 127489, 127505, 128259, 128267, 129025, 129026, 129029, 129033, 129038, 129039, 129040, 129041, 129044, 129538, 129540, 129793, 129794, 129798, 129808, 129809, 129810, 130306, 130310, 130311, 130312, 130313, 130314, 130577, 130578	
	Output	059392, 059904, 060928, 061184, 126208, 126464, 126720, 126992, 126996, 127250, 127251, 127257, 127258, 128259, 128267, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130306, 130310, 130312, 130313, 130314	
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 128 GB)	
ENVIRONMENT			
Temperature (IEC60945)		-15°C to +55°C	
Waterproofing		IP56 (with connector cover), IP22 (with connector boot)	
POWER			
Power Supply		12-24 VDC	
Power Consumption		42 W (3.5 - 1.8 A)	60 W (5.0 - 2.5 A)

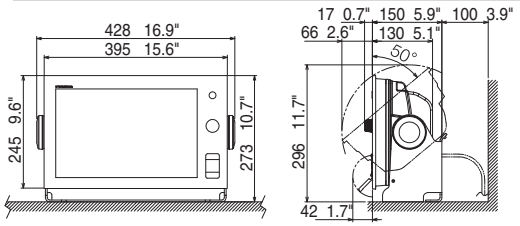
Multi Function Display (Tabletop Mount) TZT9 4.7 kg 10.4 lb



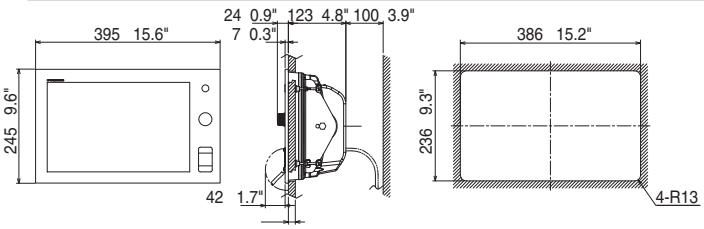
Multi Function Display (Flush Mount) TZT9 4.5 kg 9.9 lb



Multi Function Display (Tabletop Mount) TZT14 8.0 kg 17.6 lb

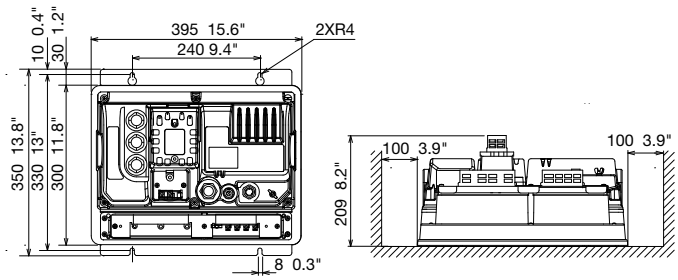


Multi Function Display (Flush Mount) TZT14 7.1 kg 15.6 lb

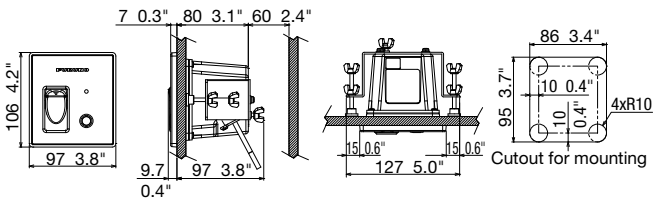


		MULTI FUNCTION DISPLAY BLACK BOX
		TZTBB
		
DISPLAY UNIT		
Type		Custom multi-touch panel monitor of your choice
Screen Resolution		Supports both wide and non-wide resolutions: 1280 x 720 (16:9), 1280 x 800 (16:10), 1280 x 960 (4:3), 1280 x 1024 (5:4)
Language		English (US & UK), French, Spanish, German, Italian, Portuguese, Swedish, Danish, Norwegian, Finnish, Greek, Chinese (simplified Chinese characters), Japanese
CHART PLOTTER		
Cartography		MapMedia mm3d chart (C-MAP/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
Target Tracking		30 Targets* *Heading input required.
INTERFACE		
CAN bus		1 Port
Interface (CAN bus)	Input	059392, 059904, 060928, 061184, 065280, 126208, 126720, 126992, 126996, 127237, 127245, 127250, 127251, 127257, 127258, 127488, 127489, 127505, 128259, 128267, 129025, 129026, 129029, 129033, 129038, 129039, 129040, 129041, 129538, 129540, 129793, 129794, 129798, 129808, 129809, 129810, 130306, 130310, 130311, 130312, 130313, 130314, 130577, 130578
	Output	059392, 059904, 060928, 061184, 126208, 126464, 126720, 126992, 126996, 127250, 127251, 127257, 127258, 128259, 128267, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130306, 130310, 130312, 130313, 130314
LAN		3 Ports (100 BASE-TX)
USB		6 Ports (USB2.0)
Video Output		2 Ports (DVI-D)
Video Input		2 Ports (NTSC/PAL)
Line Out		1 Port
SD Card Slot		2 Slots (SDXC card - supports upto 128 GB)
ENVIRONMENT		
Temperature (IEC60945)		-15°C to +55°C
Waterproofing		Processor unit: IP22 Switch box: IP56 (front panel)
POWER		
		12-24 VDC
		43.2 W, 3.6-1.8 A (includes switch box)

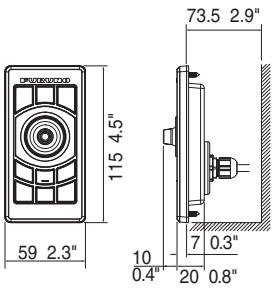
Multi Function Display Black Box TZTBB MPU-002 8 kg 17.6 lb



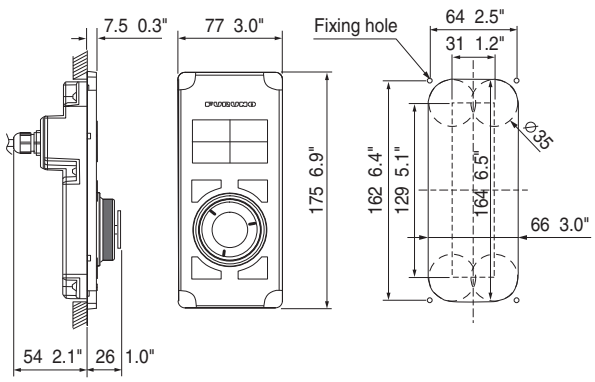
Multi Function Display Black Box TZTBB Switch Box PSD-002 0.75 kg 1.7 lb



Remote Control Unit MCU-002 (option) 0.14 kg 0.3 lb



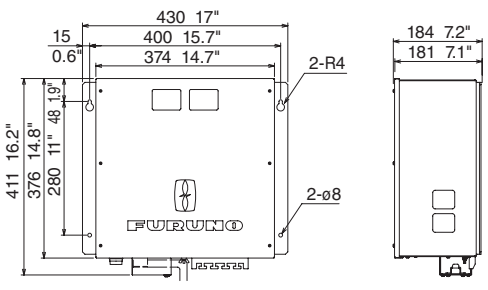
Remote Control Unit MCU-004 (option) 0.4 kg 0.9 lb



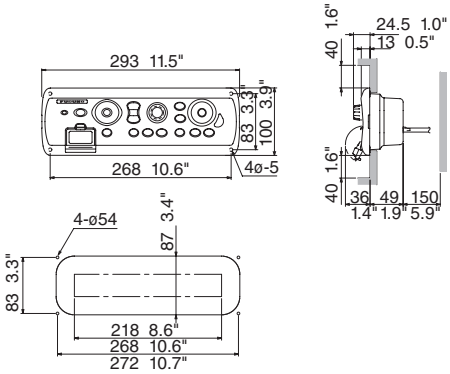
NavNet 3D

		MULTI FUNCTION DISPLAY
		MFDBB
		
DISPLAY UNIT		
Type		Custom monitor of your choice
Screen Size		Please refer to the specifications of MU150HD/MU190HD
Screen Resolution		SVGA 800 x 600 pixels, XGA 1024 x 768 pixels or SXGA 1280 x 1024 pixels
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, Chinese (simplified Chinese characters), 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, 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	Processor Unit	0°C to +45°C
	Control Unit	-15°C to +55°C
Waterproofing	Processor Unit	IP20
	Control Unit	IP56 (MCU-001 when flush mounted)
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

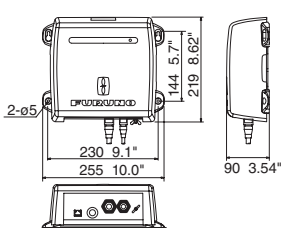


NavNet Series

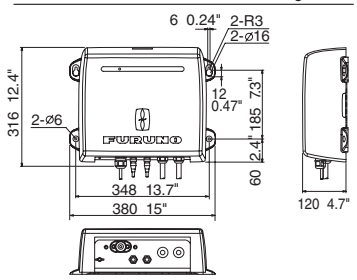
	NETWORK FISH FINDER/BOTTOM DISCRIMINATION SOUNDER	
	DFF1	BBDS1
		
TRANSCEIVER & DISPLAY		
Display Modes	Single (50 or 200 kHz), Dual (50 and 200 kHz), Bottom-lock, Bottom-Zoom, ACCU-FISH, Marker Zoom, A-scope	Single (50 or 200 kHz), Dual (50 and 200 kHz), Bottom-lock, Bottom-Zoom, ACCU-FISH, Bottom Discrimination, Marker Zoom, A-scope
Frequency	Dual frequency 50 kHz and 200 kHz	
Broadband	N/A	N/A
Range Scale	Max. 1,200 m	Max. 1,200 m
ENVIRONMENT		
Temperature	-15°C to +55°C	
Waterproofing	IP20	
POWER SUPPLY		
	12-24 VDC	
	12 W, 1.1-0.4 A	12 W, 1.1-0.4 A
TRANSDUCERS (Specify when ordering)		
	600 W 50/200 kHz: 520-5PSD (Plastic, thru-hull), 520-5MSD (Bronze, thru-hull), 520-5PWD (Plastic, transom), 525STID-MSD (Bronze, thru-hull with speed/temp sensor), 525STID-PWD (Plastic, transom, with speed/temp sensor) **1 kW** (Optional Matching Box, MB-1100 may be required) 50 kHz: 50B-6, 50B-6B, 50B-9B 200 kHz: 200B-5S, 50/200 kHz: 50/200-1T, 50/200-12M	**600 W** 50/200 kHz: 520-5PSD (Plastic, thru-hull), 520-5MSD (Bronze, thru-hull), 520-5PWD (Plastic, transom), 525STID-MSD (Bronze, thru-hull with speed/temp sensor), 525STID-PWD (Plastic, transom with speed/temp sensor) **1 kW** (Optional Matching Box, MB-1100 may be required) 50/200 kHz: 50/200-1T, 50/200-12M

	NETWORK FISH FINDER	
	DFF1-UHD	DFF3
		
TRANSCEIVER & DISPLAY		
Display Modes	Single (High or Low frequency), Dual (Both High and Low frequencies), Bottom-lock, Bottom-Zoom, ACCU-FISH, Bottom Discrimination, Marker Zoom, A-Scope	Single (high or low), Dual (high and low), Bottom-lock, Bottom-Zoom, ACCU-FISH*, Marker Zoom, A-scope * with 50/200-1T only.
Frequency	Dual frequency 50 ±20 & 200 ±25 kHz	The synthesized transducer works with dual frequencies between 28 and 200 kHz
Broadband	Available	N/A
Range Scale	Max. 1,200 m	Max. 3,000 m
ENVIRONMENT		
Temperature	-15°C to +55°C	
Waterproofing	IP55	IP20
POWER SUPPLY		
	12-24 VDC	
	30 W, 2.8-1.4 A	30 W, 3.5 A
TRANSDUCERS		(Specify when ordering)
	1 kW Broadband transducers by AIRMAR® 42-65 kHz (low), 130-210 kHz (high) CM265LH, B265LH (with temperature sensor)	**1/2/3 kW** 28 kHz: 28F-8, 28F-18, 28BL-6HR, 28F-24H, 28BL-12HR 38 kHz: 38BL-9HR, 38BL-15HR 50 kHz: 50B-6/6B, 50B-9B, 50B-12, 50BL-12HR, 50F-24H, 50BL-24HR 68 kHz: 68F-8H, 68F-30H 82 kHz: 82B-35R 88 kHz: 88B-8, 88B-10, 88F-126H 107 kHz: 100B-10R 150 kHz: 150B-12H 200 kHz: 200B-5S, 200B-8/8B, 200B-12H 50/200 kHz: 50/200-1ST, 50/200-1T, 50/200-12M

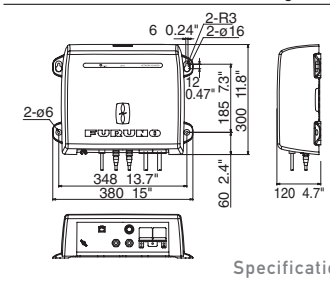
Network Fish Finder DFF1/Bottom Discrimination Sounder BBDS1 1.3 kg 2.9 lb



Network Fish Finder DFF1-UHD 3.1 kg 6.8 lb



Network Fish Finder DFF3 3.8 kg 8.4 lb

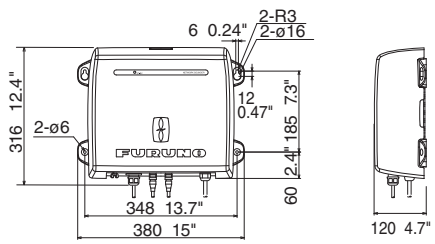


NavNet Series

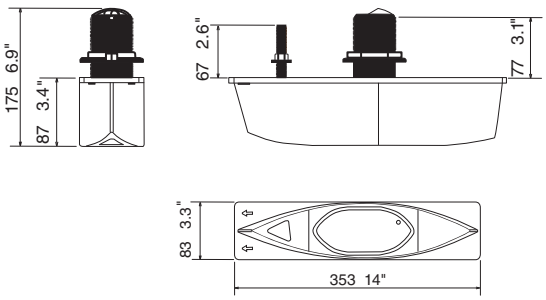
TRANSDUCER LIST for NavNet TZtouch2 Built-in RezBoost™ Fish Finder								
	Frequency	Type	Matching Box required	Mount	Output Power	ACCU-FISH™ mode	Bottom Discrimination Display	RezBoost™
TRANSDUCER	50/200 kHz	520-5PSD		Thru-hull	600 W	●	●	●
		525-5PWD		Transom		●	●	●
		520-5MSD		Thru-hull		●	●	●
		520-PLD		Thru-hull		●	●	●
		50/200-1T	○	Thru-hull	1 kW	●	●	●
	50 kHz	50B-6	○	Thru-hull	1 kW	—	—	—
		50B-6B	○	Thru-hull		—	—	—
	200 kHz	200B-5S	○	Thru-hull		—	—	—
TRIDUCER	50/200 kHz	525T-BSD		Thru-hull	600 W	●	●	●
		525T-PWD		Transom		●	●	●
		525T-LTD/12		Thru-hull		●	●	●
		525T-LTD/20		Thru-hull		●	●	●
		SS60-SLTD/12		Thru-hull		●	●	●
		SS60-SLTD/20		Thru-hull		●	●	●
		525STID-MSD		Thru-hull		●	●	●
		525STID-PWD		Transom		●	●	●
		526TID-HDD		Thru-hull	1 kW	●	●	●

	NETWORK MULTI-BEAM SONAR
	DFF3D
	
TRANSCEIVER & DISPLAY	
Display Mode	Cross Section, Triple/Single Beam Sounder, Side Scan, 3D Sounder History
Frequency	165 kHz
Beam Angle	120°
Detection Range	200 m* (Side beam best performance) 350 m* (Main beam directly under boat) * Depending on bottom type and water conditions.
Range	5-1200 m
INTERFACE	
LAN	1 port, Ethernet 10/100Base-TX
External KP	1 port (optional external KP kit required)
ENVIRONMENT	
Temperature	-15°C to +55°C
Waterproofing	IP55
POWER SUPPLY	
	12-24 VDC, 1.4-0.7 A
TRANSDUCER	
	800 W B54 (with motion/temperature sensor)

Network Multi-Beam Sonar DFF-3D 3.0 kg 6.6 lb

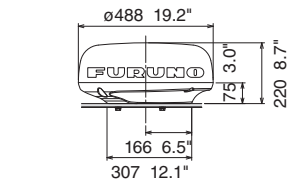


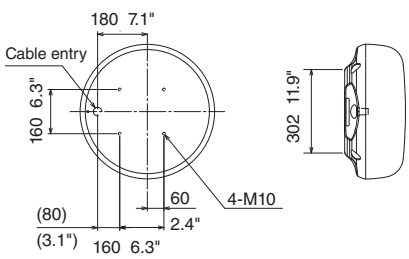
Transducer B54 with motion/temperature sensor 3.2 kg 7 lb



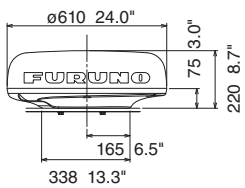
		NavNet Series RADAR SENSOR	NavNet Series SOLID STATE DOPPLER RADAR
		DRS4DL	DRS4D-NXT
			
ANTENNA			
Type		ø488 mm Radome (19")	ø610 mm Radome (24")
Beam Width	Horizontal	5.2°	3.9° typical (-3 dB) Adjustable between 2° and 3.9° (effective with RezBoost control)
	Vertical	25°	25°
Antenna Rotation Speed		24 rpm	24*/36/48 rpm * In dual range mode, speed is limited to 24 rpm
RF TRANSCEIVER			
Frequency		9410 ±30 MHz	CH1: 9380 MHz (P0N), 9400 MHz (Q0N) CH2: 9400 MHz (P0N), 9420 MHz (Q0N) CH3: 9420 MHz (P0N), 9440 MHz (Q0N)
Pulselength & PRR		S: 360 Hz (0.0625 to 0.5 NM) M: 360 Hz (0.75 to 2.0 NM) L: 360 Hz (3 to 36 NM)	P0N: 0.08 µs to 1.2 µs/1100 Hz Q0N: 5 µs to 18 µs/1100 Hz
Peak Output Power		4 kW	Solid-state, 25 W
Range Scales		0.0625 to 36 NM	0.0625 to 36* NM * In dual range mode, range is limited to 12 NM
ENVIRONMENT			
		Temperature: -25°C to +55°C, Waterproofing: IPX6	Temperature: -25°C to +55°C, Waterproofing: IP26
POWER SUPPLY			
		12-24 VDC, 2.1-1.0 A	12-24 VDC, 2.1-1.0 A

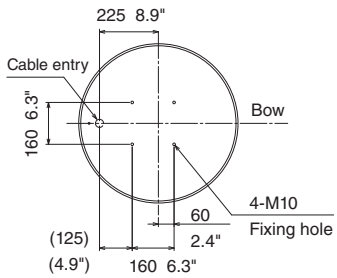
19' Radome Radar Sensor DRS4DL 6.5 kg 14.3 lb





24' Radome Radar Sensor DRS4D-NXT 7.3 kg 16.1 lb



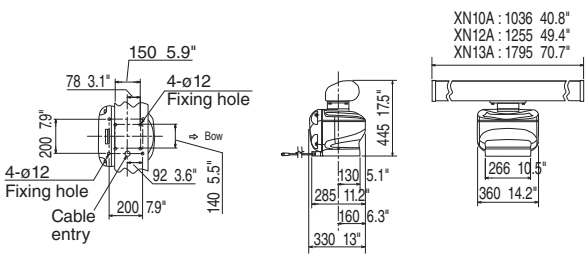


NavNet Series

		NavNet Series RADAR SENSOR
		DRS6A X-Class
		
ANTENNA		
Type		1036 mm Open (3.5')/1255 mm Open (4')/1795 mm Open (6')
Beam Width	Horizontal	2.3°/1.9°/1.4°
	Vertical	22°/22°/22°
Antenna Rotation Speed		24/36/48 rpm range coupled or 24 rpm fixed
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) 1.2 µs/600 Hz (12 to 64 NM) 1.2 µs/500 Hz (72 to 96 NM)
Peak Output Power		6 kW
Range Scales		0.0625 to 96 NM
ENVIRONMENT		
		Temperature: -25°C to +55°C, Waterproofing: IP56
POWER SUPPLY		
		24 VDC, 4 A

		NavNet Series RADAR SENSOR	
		DRS12A X-Class	DRS25A X-Class
			
ANTENNA			
Type		1255 mm Open (4')/1795 mm Open (6')	
Beam Width	Horizontal	1.9°/1.4°	
	Vertical	22°/22°	
Antenna Rotation Speed		24/36/48 rpm range coupled or 24 rpm fixed	
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) 1.2 µs/600 Hz (12 to 64 NM) 1.2 µs/550 Hz (72 to 96 NM)	
Peak Output Power		12 kW	25 kW
Range Scales		0.0625 to 96 NM	
ENVIRONMENT			
		Temperature: -25°C to +55°C, Waterproofing: IP56	
POWER SUPPLY			
		24 VDC, 4.5 A	24 VDC, 5.6 A

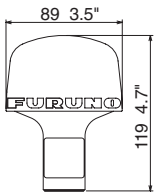
3.5' Open Radar Sensor DRS6A X-Class	20 kg 44.1 lb
4' Open Radar Sensor DRS6A X-Class	21 kg 46.3 lb
6' Open Radar Sensor DRS6A X-Class	23 kg 50.7 lb
4' Open Radar Sensor DRS12A X-Class	21 kg 46.3 lb
6' Open Radar Sensor DRS12A X-Class	23 kg 50.7 lb
4' Open Radar Sensor DRS25A X-Class	22 kg 48.5 lb
6' Open Radar Sensor DRS25A X-Class	24 kg 53 lb



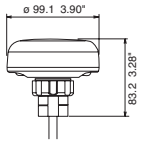
	GPS/WAAS RECEIVER ANTENNA	
	BBWGPS	GP330B
		
RECEIVER CHARACTERISTICS		
Receiver Type	Twelve discrete channels, C/A code, all-in-view, WAAS	
Receiving Frequency	L1 (1575.42 MHz)	
Time to First Fix	12 s (warm start) 90 s (cold start)	90 s (cold start)
Tracking Velocity	999 kn	999.9 kn
Geodetic Systems	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

GPS/WAAS Receiver Antenna BBWGPS 0.8 kg 1.8 lb

10 m cable attached



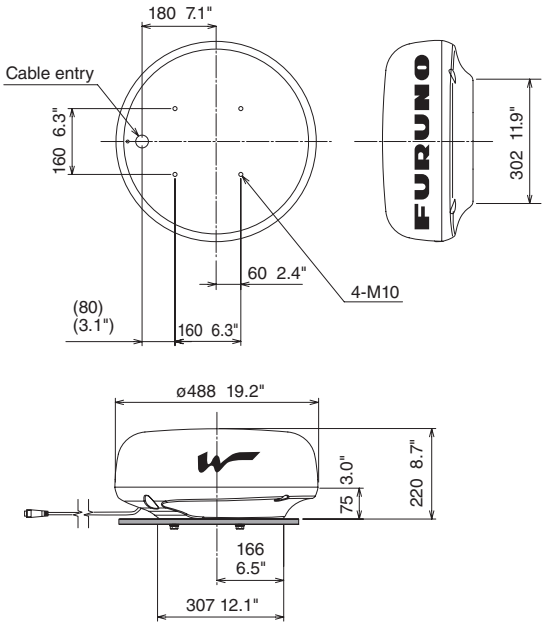
GPS/WAAS Receiver Antenna GP330B 0.22 kg 0.49 lb



Radar

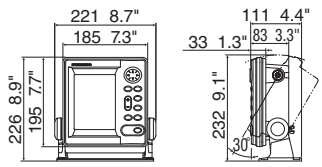
		1ST WATCH WIRELESS RADAR
		DRS4W
		
ANTENNA		
Peak Output Power		4 kW
Type		ø488 mm Radome (19")
Beam Width	Horizontal	7.2°
	Vertical	25°
Antenna Rotation Speed		24 rpm
Frequency		9410 ±30 MHz
Range Scales		0.125 to 24 NM
Wind Load		Relative Wind 70 kn
WIRELESS LAN		
The number of connectable iOS devices		2 units
Transmit frequency		2.4 GHz band
APPLICATION		
Name		"Marine Radar" from Apple App Store (Free of charge)
Display (customer supply)		iPad/iPad mini/iPhone, iOS 6.1 or later
Screen Orientation		Portrait/Landscape (iPad, iPad mini only)
Language		English
Mode		Full screen, Day/Night, Gain (auto), STC (auto), Rain, Auto Noise rejector, Guard Zone Off center, Cursor position* * iPad, iPad mini
ENVIRONMENT		
		Temperature: -25°C to +55°C, Waterproofing: IP26
POWER SUPPLY UNIT		
		12-24 VDC, 2.1-1.0 A (max)

1st Watch Wireless Radar DRS4W 5.7 kg 12.5 lb

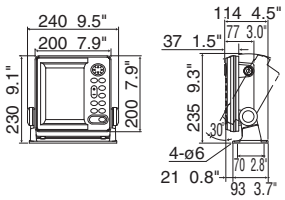


		6" SILVER LCD RADAR	7" SILVER LCD RADAR	"8.4 COLOR LCD RADAR
		MODEL1623	MODEL1715	MODEL1815
				
ANTENNA				
Type		ø380 mm radome (15.0")	ø460 mm radome (18.1")	ø488 mm radome (19")
Beamwidth	Horizontal	6.2°	5.2°	
	Vertical	25°		
Rotation speed		24/31/41 rpm (auto-select according to pulselength)		24 rpm
RF TRANSCEIVER				
Frequency		9410 ±30 MHz (X-band)		
Pulselength & PRR		0.125-0.75 NM: 0.08µs/3000 Hz 1-2 NM: 0.15µs/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	0.0625-0.5 NM: 0.08 µs/360 Hz 0.75-2 NM: 0.3 µs/360 Hz 3-36 NM: 0.8 µs/360 Hz
Output power		2.2 kW		4 kW
IF frequency	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)	20 MHz (0.0625-0.5 NM) 4.5 MHz (0.75-36 NM)
DISPLAY				
Display unit		6" monochrome LCD	7" monochrome LCD	8.4" color LCD
Effective display area		90 (W) x120 (H) mm	102 (W) x 138 (H) mm	128.2 (W) x 170.9 (H) mm
Resolution		240 x 320		640 x 480, VGA
Accuracy	Range	1.0% of range in use or 8 m, which is greater		1.0% of range in use or 0.01 NM, 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, 2, 3, 4, 6, 8, 12, 16, 24*, 36** NM *MODEL1715/1815 ** MODEL1815 only		
	Ring	0.03125, 0.0625, 0.125, 0.125, 0.25, 0.25, 0.5, 0.5, 1, 1, 2, 2, 3, 4, 6*, 12** NM *MODEL1715/1815 ** MODEL1815 only		
Echo trail		interval: 30 s, 1, 3, 6 min. 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		ALR, BWC, BWR, DBT, DPT, GGA, GLL, GNS, GSA, GSV, HDG, HDT, HDM, MTW, MWV, RMB, RMC, THS, TTM, VDM, VHW, VTG, VWR, VWT, XTE, ZDA
	Output	TLL		ACK, RSD, TLL, TTM
ENVIRONMENT				
Temperature	Display unit	-15°C to +55°C		-15°C to +55°C
	Antenna unit	-25°C to +70°C		-25°C to +55°C
Waterproofing	Display unit	IPX5		IP56
	Antenna unit	IPX6		IPX6
POWER SUPPLY				
	Display unit	12-24 VDC: 3.2-1.4 A		12-24 VDC: 3.0-1.5 A

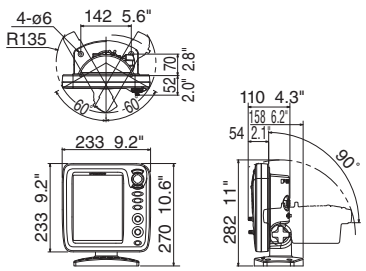
MODEL1623 Display Unit 1.3 kg 2.9 lb



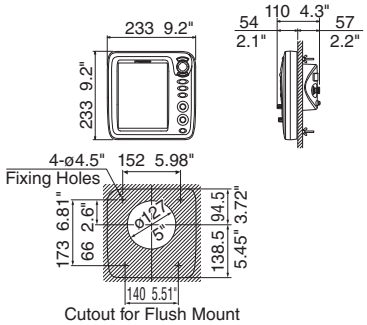
MODEL1715 Display Unit 1.5 kg 3.3 lb



MODEL1815 Display Unit (Bracket Mount) 2.2 kg 4.9 lb

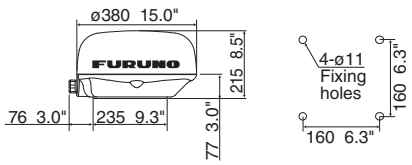


MODEL1815 Display Unit (Flush Mount) 1.6 kg 3.5 lb

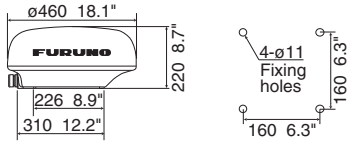


Cutout for Flush Mount

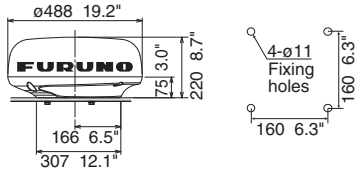
MODEL1623 Antenna 4.6 kg 10.1 lb



MODEL1715 Antenna 5.1 kg 11.2 lb



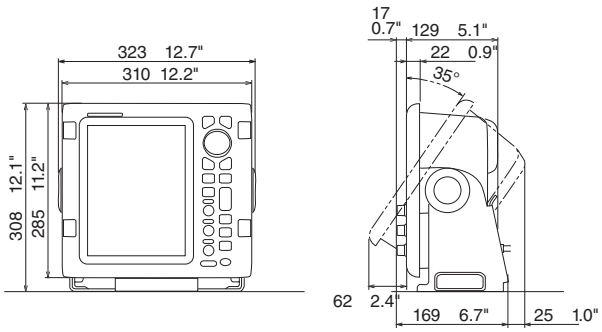
MODEL1815 Antenna 6.5 kg 14.3 lb



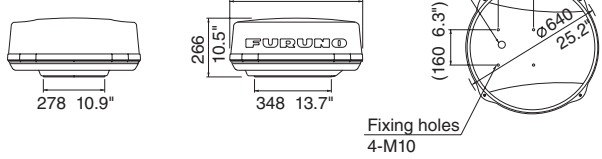
Radar

		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		
TT targets		Up to 10 (required optional board ARP-11)		
AIS targets		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, MWV, VWT, VWR, ZDA		
	Output	TTM, RSD, TLL		
ENVIRONMENT				
Temperature	Display unit	-15°C to +55°C		
	Antenna unit	-25°C to +55°C		
Waterproofing	Display unit	IPX5		
	Antenna unit	IPX6		
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)

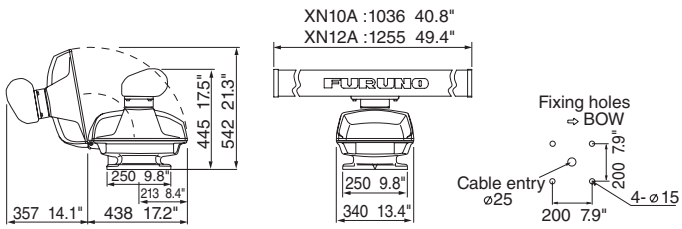
MODEL1835/1935/1945 Display Unit 5.4 kg 11.9 lb



24" Radome Antenna 8 kg 17.6 lb

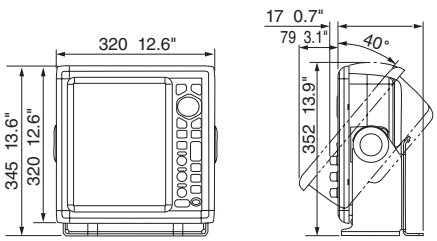


3.5 ft Open Antenna 22 kg 48.5 lb
4 ft Open Antenna 25 kg 55.1 lb

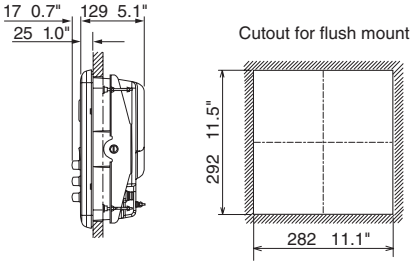


		12.1" LCD RADAR		
		FR8065	FR8125	FR8255
				
ANTENNA				
Type		1255 mm Open (4') or 1795 mm Open (6')		
Beamwidth	Horizontal	1.9˚(4' Open: XN-12A) or 1.35˚ (6' Open: XN-13A)		
	Vertical	22˚		
Rotation speed		24 rpm/48 rpm (option)		
RF TRANSCEIVER				
Frequency		9410 ±30 MHz (X-band)		
Pulselength & 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 * FR8255 only		
Output power		6 kW	12 kW	25 kW
IF frequency	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	0.9% 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. FR8065/8125: 72 NM, FR8255: 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 * FR8255 only		
Echo trail		interval: 15 s, 30 s, 1, 3, 6, 15, 30 min., or continuous		
TT targets		Up to 10 (Required optional board ARP-11)		
AIS targets		Up to 100 (Data input from AIS is required)		
Interface (IEC61162, NMEA0183)	Input	BWC, BWR, DBT, DPT, GGA, GLL, GNS, HDG, HDM, HDT, MTW, MWV, RMB, RMC, THS, TTM (for radiotelephone only), VHW, VTG, VWR, VWT, XTE, ZDA		
	Output	RSD, TLL, TTM (ARP-11 required)		
ENVIRONMENT				
Temperature	Display unit	-15°C to +55°C		
	Antenna unit	-25°C to +55°C		
Waterproofing	Display unit	IPX5 (front), IPX2 (rear)		
	Antenna unit	IPX6		
POWER SUPPLY				
	Display unit	24 VDC 24 rpm: 3.6 A 48 rpm: 3.9 A	24 VDC 24 rpm: 3.9 A 48 rpm: 4.5 A	24 VDC: 3.0 A
	Power supply unit	—	—	24 VDC 24 rpm: 2.3 A 48 rpm: 2.7 A

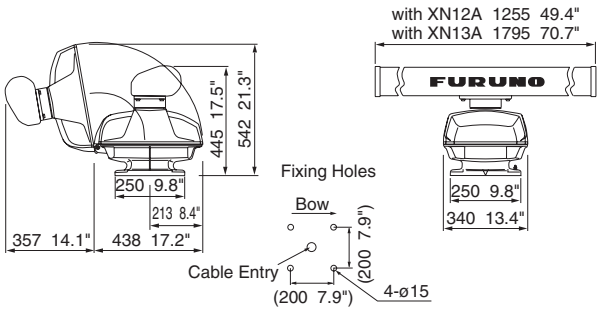
FR8065/8125/8255 Display Unit (Tabletop Mount) 5.8 kg 12.8 lb



FR8065/8125/8255 Display Unit (Flush Mount) 5.3 kg 11.7 lb



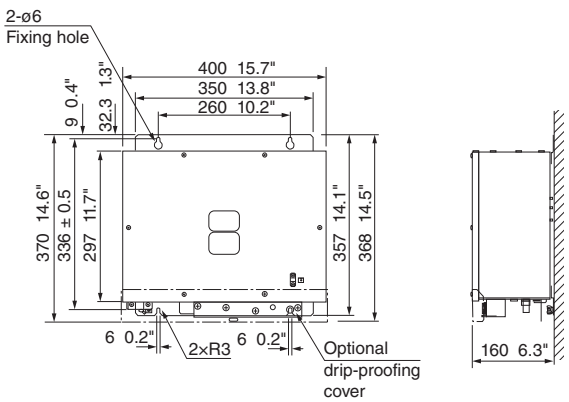
4 ft Open Antenna 25 kg 55.1 lb
6 ft Open Antenna 27 kg 59.5 lb



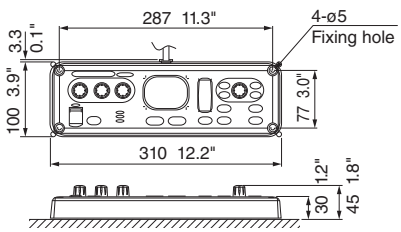
Radar

		MARINE RADAR	
		FAR1513	FAR1523
			
ANTENNA			
Type		1255 mm Open (4') or 1795 mm Open (6')	
Beamwidth	Horizontal	1.9˚ (XN12A), 1.35˚ (XN13A)	
	Vertical	20˚	
Rotation speed		24 rpm or 48 rpm	
RF TRANSCEIVER			
Frequency		9410 MHz ±30 MHz, P0N	
Pulselength & PRR		S : 2100 Hz (0.125 to 1.5 NM) M: 1200 Hz (1.5 to 3 NM) L : 600 Hz (3 to 96 NM)	
Output power		12 kW	25 kW
IF frequency	IF	60 MHz	
DISPLAY			
Accuracy	Range	1% of range in use or 10 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, 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, 8, 8, 16 NM	
Echo trail		Interval: 15 s, 30 s, 1-30min. (30 s steps) or continuous	
TT targets		Up to 50 in 0.2-32 NM Tracking: 5/10 pts on all target Time of vector: 0 to 60 minutes	
AIS targets		Up to 300 Tracking: 5/10 pts on all target Time of vector: 0 to 60 minutes	
Radar map		5,000 pts	
Interface (IEC61162, NMEA0183)	Input	ABK, ACK, ACN, ALR, BWC, BWR, CUR, DBK, DBS, DBT, DPT, DTM, GBS, GGA, GLL, GNS, HBT, HDG, HDM, HDT, MTW, MWV, RMB, RMC, RTE, THS, VBW, VDM, VDO, VDR, VHW, VTG, VWR, VWT, WPL, ZDA	
	Output	ABM, ACK, ALC, ALF, ALR, ARC, BBM, EVE, HBT, OSD, RSD, TLB, TLL, TTD, TTM, VSD	
INTERFACE (Processor unit)			
Heading		1 Port: AD-10 format or IEC61162-2	
Serial		IEC61162-2: 2 Ports (AIS/HDG), IEC61162-1: 4 Ports (GPS/LOG/AMS/ECDIS)	
Contact closure		Alert output: 4 ch, Remote ACK input, System fail, power fail	
Remote display		2 Ports (Signal: HD, BP, Trigger and Video)	
LAN		1 Port (100 BASE-TX)	
DVI-D		1 Port for main display	
RGB		1 Port for VDR or RGB monitor	
ENVIRONMENT			
Temperature	Processor unit	-15°C to +55°C	
	Antenna unit	-25°C to +55°C (storage: +70°C or less)	
Waterproofing	Processor unit	IP20 (IP22: option)	
	Antenna unit	IP26	
	Control unit	IP22	
POWER SUPPLY			
Processor unit		24 VDC: 5.0 A max. (24 rpm), 5.6 A max. (48 rpm)	24 VDC: 6.4 A max. (24 rpm), 7.0 A max. (48 rpm)

FAR1513/1523 Processor Unit — DC: 6.2 kg 13.7 lb / AC: 6.8 kg 15 lb

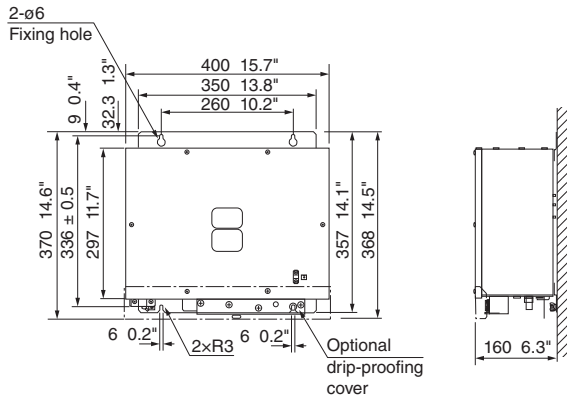


FAR1513/1523 Control Unit — 1.2 kg 2.6 lb

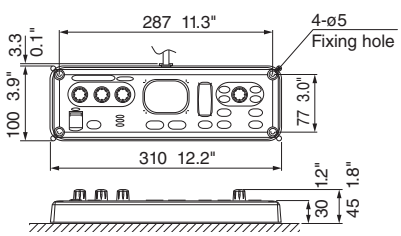


		MARINE RADAR	
		FAR1518	FAR1528
			
ANTENNA			
Type		1260 mm Open (4') or 2040 mm Open (6.5') or 2550 mm Open (8')	
Beamwidth	Horizontal	1.9° (XN12AF), 1.23° (XN20AF)	1.23° (XN20AF), 0.95° (XN24AF)
	Vertical	20°	
Rotation speed		26 rpm or 48 rpm	
RF TRANSCEIVER			
Frequency		9410 MHz ±30 MHz, P0N	
Pulselength & PRR		3000 Hz (0.125 to 3 NM), 0.08 µs 2760 Hz (0.125 to 6 NM), 0.12 µs 1500 Hz (0.75 to 24 NM), 0.22 µs 1000 Hz (0.75 to 24 NM), 0.38 µs 1000 Hz (3 to 24 NM), 0.68 µs 600 Hz (6 to 96* NM), 1.2 µs * 500 Hz on 96 NM range.	
Output power		12 kW	25 kW
IF frequency	IF	60 MHz	
DISPLAY			
Accuracy	Range	1% of range in use or 10 m whichever is the greater	
	Bearing	±1°	
Range and range ring interval	Range	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96 NM	
	Ring	0.025, 0.05, 0.1, 0.25, 0.25, 0.5, 1, 2, 4, 8, 16 NM	
Echo trail		Interval: 15 s, 30 s, 1-30min. (30 s steps) or continuous	
TT targets		Up to 50 in 0.2-32 NM Tracking: 5/10 pts on all target Time of vector: 0 to 60 minutes	
AIS targets		Up to 300 Tracking: 5/10 pts on all target Time of vector: 0 to 60 minutes	
Radar map		5,000 pts	
Interface (IEC61162, NMEA0183)	Input	ABK, ACK, ACN, ALR, BWC, BWR, CUR, DBK, DBS, DBT, DPT, DTM, GBS, GGA, GLL, GNS, HBT, HDG, HDM, HDT, MTW, MWV, RMB, RMC, RTE, THS, VBW, VDM, VDO, VDR, VHW, VTG, VWR, VWT, WPL, ZDA	
	Output	ABM, ACK, ALC, ALF, ALR, ARC, BBM, EVE, HBT, OSD, RSD,TLB,, TLL, TTD, TTM, VSD	
INTERFACE (Processor unit)			
Heading		1 Port: AD-10 format or IEC61162-2	
Serial		IEC61162-2: 2 Ports (AIS/HDG), IEC61162-1: 4 Ports (GPS/LOG/AMS/ECDIS)	
Contact closure		Alert output: 4 ch, Remote ACK input, System fail, power fail	
Remote display		2 Ports (Signal: HD, BP, Trigger and Video)	
LAN		1 Port (100 BASE-TX)	
DVI		1 Port for main display	
RGB		1 Port for VDR or RGB monitor	
ENVIRONMENT			
Temperature	Processor unit	-15°C to +55°C	
	Antenna unit	-25°C to +55°C (storage: +70°C or less)	
Waterproofing	Processor unit	IP20 (IP22: option)	
	Antenna unit	IP56	
	Control unit	IP22	
POWER SUPPLY			
Processor unit	AC type	100-115/220-230 VAC: 1.8/0.8 A (26 rpm), 2,2/1.0 A (48 rpm)	100-115/220-230 VAC: 2.3/1.0 A (26 rpm), 2.6/1.2 A (48 rpm)
	DC type	24 VDC: 6.1 A max. (26 rpm), 7.2 A max. (48 rpm)	24 VDC: 7.5 A max. (26 rpm), 8.6 A max. (48 rpm)

FAR1518/1528 Processor Unit DC: 6.2 kg 13.7 lb / AC: 6.8 kg 15 lb



FAR1518/1528 Control Unit 1.2 kg 2.6 lb

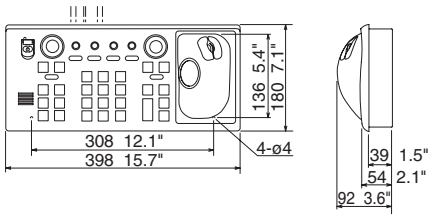


Radar

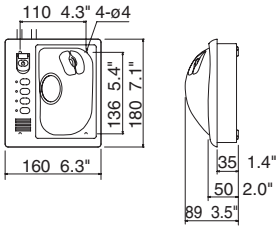
		BLACK BOX MARINE RADAR		
		FAR2117BB	FAR2127BB	FAR2137SBB
				
ANTENNA				
Type		1260 mm Open (4'), 2040 mm Open (6.5') or 2550 mm Open (8')		3090 mm S-band (10') or 3765 mm S-band (12')
Beamwidth	Horizontal	1.9˚(4' Open: XN-12AF), 1.23˚(6.5' Open: XN-20AF) or 0.95˚(8' Open: XN-24AF)		2.3˚ (10' S-band: 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 : 0.07 µs/3000 Hz 0.5 NM: 0.07, 0.15 µs/3000 Hz 0.75, 1.5 NM: 0.07, 0.15, 0.3 µs/3000, 1500 Hz 3 NM: 0.15, 0.3, 0.5, 0.7 µs/3000, 1500, 1000 Hz 6 NM: 0.3, 0.5, 0.7, 1.2 µs/1500, 1000, 600 Hz 12, 24 NM: 0.5, 0.7, 1.2 µs/1000, 600 Hz 48, 96 NM: 1.2 µs/600 Hz		
Output power		12 kW	25 kW	30 kW
IF frequency	IF	60 MHz		
	BW	40 MHz (Short pulse), 10 MHz (Middle pulse), 3 MHz (Long Pulse)		
DISPLAY				
Accuracy	Range	1% of the maximum range of the scale in use or 10 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 NM		
	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 NM		
Echo trail		interval: 15, 30 s, 1, 3, 6, 15, 30 m or continuous		
TT targets		Up to 100		
AIS targets		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	24 VDC: 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: 3.0 A 220-230 VAC: 1.5 A
	Antenna unit	—	—	200/220 VAC: 3.0 A 380/440 VAC: 1.5 A 220 VAC: 3.5 A (for HSC) 440 VAC: 1.7 A (for HSC)

FAR2117BB/2127BB/2137SBB

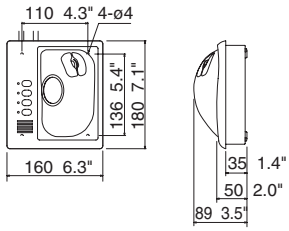
Full-keyboard
Control Unit RCU-014 3.7 kg 8.2 lb



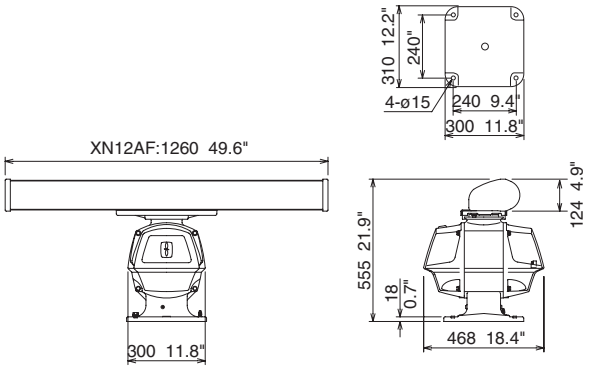
Trackball
Control Unit RCU-015 2.4 kg 5.3 lb



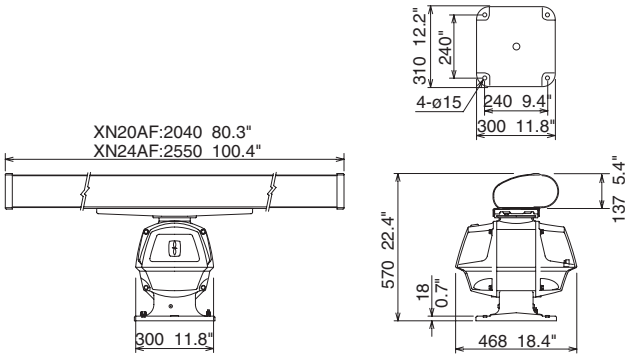
Remote
Control Unit RCU-016 2.4 kg 5.3 lb



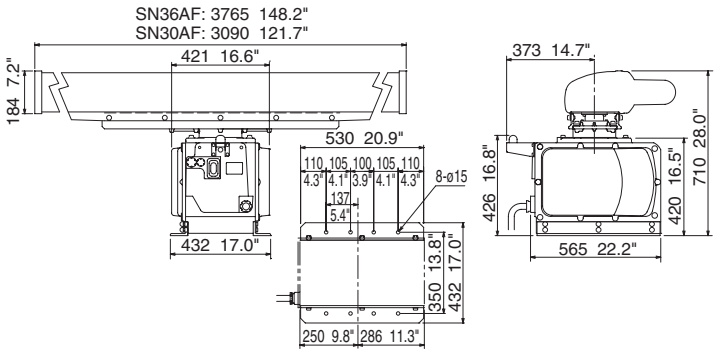
4 ft Open Antenna 33 kg 73 lb



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



12 ft S-band Antenna SN30AF 135 kg 297.6 lb
14 ft S-band Anatenna SN36AF 142 kg 313.1 lb



Processor Unit RPU-013 10 kg 22 lb

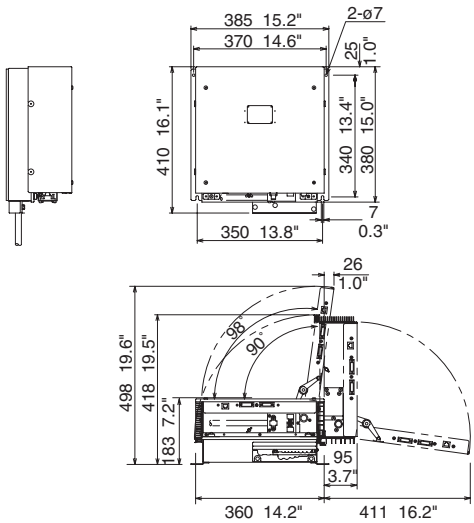


Chart Radar

CHART RADAR
FAR3000

MARINE RADAR

GENERAL

Range Scales and Ring Intervals

Range scales (NM)	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6
Ring intervals (NM)	0.025	0.05	0.1	0.25	0.25	0.25	0.5	0.5	1	1
Number of Rings	5	5	5	3	4	6	4	6	4	6

Range scales (NM)	8	12	16	24	32	48	72	96	120
Ring intervals (NM)	2	2	4	4	8	8	12	16	20
Number of Rings	4	6	4	6	4	6	6	6	6

1, 2, 4, 8, 16, 32, 72, 120 NM cannot be selected on IMO radar.

ANTENNA UNIT

Radiator Type: Slotted waveguide array

Beamwidth and Sidelobe

Radiator Type	XN12CF	XN20CF	XN24CF	SN36CF
Length	4 ft	6.5 ft	8 ft	12 ft
Frequency	X band: 9410±30 MHz			S band: 3050±30 MHz
Beamwidth (H) (-3 dB)	1.9°	1.23°	0.95°	1.8°
Beamwidth (H) (-20 dB)	4.5°	2.9°	2.4°	4.5°
Beamwidth (V)	20°	20°	20°	25°
Sidelobe (within ±10°)	-24 dB	-28 dB	-28 dB	-24 dB
Sidelobe (outside ±10°)	-30 dB	-32 dB	-32 dB	-30 dB

TRANSCEIVER UNIT

Transceiver Unit	Magnetron					Solid State
Frequency	RTR-105	RTR-106	RTR-108	RTR-107	RTR-109	RTR-111
	X band: 9410±30 MHz			S band: 3050±30 MHz		①P0N: 3043.75 MHz/Q0N: 3063.75±5 MHz ②P0N: 3053.75 MHz/Q0N: 3073.75±5 MHz
Output Power	12 kW	25 kW		30 kW		250 W

Pulselength, Pulse Repetition Rate (PRR) and Range scale

Magnetron

Pulselength (μs)	0.07	0.15	0.3	0.5	0.7	1.2
PRR (Hz)	3000*	3000*	1500	1200	1000	600**
Range scale (NM)	0.125/0.25/ 0.5/0.75/1/ 1.5/2	0.5/0.75/ 1/1.5/2/3/4	0.75/1/1.5/ 2/3/4/6/ 8/12	1.5/2/3/ 4/6/8/12/ 16/24	3/4/6/8/ 12/16/24	6/8/12/16/ 24/32/48/ 96/120

Solid State

Pulselength (μs)	P0N	0.07	0.18	0.3	0.5	0.7	1.2
	Q0N	5.0	7.5	12.5	17.5	18.3	18.3
PRR (Hz)		2400***	2000****	1500	1060	1000	600 (96 NM) 450 (120 NM)
Range scale (NM)		0.125/0.25/ 0.5/0.75/1/ 1.5/2	0.5/0.75/ 1/1.5/2/3/4	0.75/1/1.5/ 2/3/4/6/8	3/4/6/8/ 12/16/24	3/4/6/8/ 12/16/24	6/8/12/16/ 24/32/48/ 96/120

* 2200 Hz on TT range = 32 NM
** 500 Hz on 96/120 NM range
*** 1800 Hz on TT range = 32 NM
**** 1500 Hz on TT range = 32 NM

PROCESSOR UNIT

Chart Materials	IMO/IHO S57 edition-3 ENC vectorized material (IHO S-63 ENC data protection scheme), C-MAP and CM-93/3 vectorized materials
Data Presentation	
Own Ship	Own ship's mark and numeral position in lat/lon, speed and course
Target Data(TT: ARPA, AIS)	Range, bearing, speed, course, CPA/TCPA, BCR/BCT Target information from AIS (waypoint, ship's hull and status)
Position Calculation	Navigation by result from external position sensor Dead reckoning with gyro and log data from gyro, log, and position sensors to be fed to mathmatical filter to generate highly accurate position and speed
Navigation Planning	Planning by rhumb line, great circle
Route Monitoring	Off-track display, waypoint arrival alarm, shallow depth alarm
User Chart	User chart creation and display
Notes Data	Create and display notes data
MOB (Man Overboard)	Position, and other data at time of man overboard are recorded MOB mark is displayed on the screen

DISPLAY UNIT

Display Unit	MU-190	MU-231
Display Type	19" color LCD	23.1" color LCD
Resolution	SXGA (1280×1024 pixels)	UXGA (1600×1200 pixels)

Processor Unit

DVI	2 ports, DVI-D (Video signal from DVI-1 and DVI-2 is identical) 1 port, DVI-I Ver. 1.1 (RGB for VDR)
LAN	2 ports, Ethernet 1000 Base-T (for Interswitch and Sensor Adapter) 1 port, 100 Base-TX (for Radar sensor)
USB	4 ports, USB 2.0 type-A
COM	2 ports, RS232C/RS-485 (for brilliance control)
Serial I/O	8 ports IEC61162-1/2 (2 ports), IEC61162-1 (6 ports)
Sentences	
Input	ABK, ACK, ACM, ALR, CUR, DBT, DPT, DTM, GGA, GLL, GNS, HBT, HDT, MTW, MWV, RMC, THS, VBW, VDM, VDO, VDR, VHW, VTG, ZDA
Output	ABM, ACK, ALC, ALF, ALR, ARC, BBM, EVE, HBT, OSD, RSD, TLB, TTD, TTM, VSD
Digital Input	1 port (for ACK signal input)
Contact Closure	6 ports 1 port for system fail, 1 port for power fail, 2 ports for normal close, and 2 ports for nomal open

Sensor Adapter

Control and Serial Input	
LAN	1 port, Ethernet 100 Base-TX
Serial	8 ports IEC 61162-1/2 (4 ports), IEC 61162-1 (4 ports)
Analog Input	3 ports/per unit, -10 to +10 V/0 to 10 V, 4 to 20 mA selectable
Digital Input	8 ports/per unit, normal close or open, selectable
Digital Output	8 ports/per unit, normal close or open, selectable

POWER SUPPLY

Monitor unit	
MU-231	100-230 VAC; 1.0-0.6 A, 1 phase, 50/60Hz
MU-190	100-230 VAC; 0.7-0.4 A, 1 phase, 50/60Hz
Processor unit	100/230 VAC, 1 phase, 50/60 Hz

Power Supply Unit

	Input Voltage	Input Current
PSU-014	100-230 VAC 1 phase 50/60 Hz	3.7 A
PSU-015		6.4 A
PSU-016		2.8 A
PSU-018		5.6 A

ENVIRONMENTAL CONDITIONS

Unit	Ambient Temperature	Relative Humidity	Degree of protection	Vibration
Antenna Unit	-25°C to +55°C (storage +70°C)	93 % or less at 40°C	IP56	IEC 60945 Ed. 4
Power Supply Unit	-15°C to +55°C		IP20	
Processor Unit			IP20	
Control Unit			IP22	
Sensor Adapter			IP22	
Monitor Unit			IP22	

EQUIPMENT LIST

Standard

Display Unit	MU-190/231	1 unit
Processor Unit	EC-3000	1 unit
Control Unit		1 unit
Radar Control Unit	RCU-025	1 unit (specify when ordering)
Trackball Control Unit	RCU-026	
Antenna Radiator	XN12CF/XN20CF/XN24CF/ SN36CF	1 unit
Transceiver	RTR-105/106/107/108/109/111	1 unit
Gear Box	RSB-128/129/130/131/133	1 unit
Performance Monitor	PM-32A/52A/52B	1 unit
Power Supply Unit	PSU-014/015/016/018	1 unit
Cable between Power Supply Unit and Antenna Unit		1 pc
LAN Cable between Processor Unit and Power Supply Unit		1 pc
Standard Spare Parts and Installation Materials		1 set

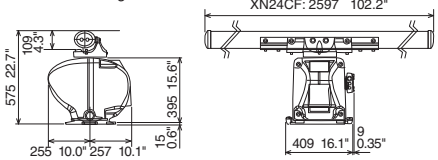
Option

Sensor Adapter	MC-3000S/3010A/ 3020D/3030D
Sub Display Radar Cable	RW-00136
Deicer	OP03-226/227
Junction Box (for foremast mounting)	RJB-001
Composite Cable between Junction Box and Antenna/ Power Supply Unit (for foremast mounting)	RW-9600
LAN Signal Converter (for foremast mounting)	OP03-223
Switching Hub for sensor network	HUB-100
Intelligent Hub for interswitch network	HUB-3000

Antenna Unit for FAR-3210/3310/3220/3320/3320W

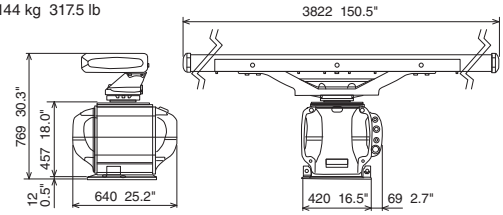
Radiator XN12CF 46.2 kg 101.9 lb
XN20CF 48.1 kg 106.1 lb
XN24CF 49.3 kg 108.7 lb

XN12CF: 1297 51.1"
XN20CF: 2097 82.6"
XN24CF: 2597 102.2"



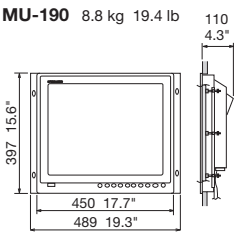
Antenna Unit for FAR-3230S/3330S/3330SW/3230S-SSD/3330S-SSD

Radiator SN36CF 144 kg 317.5 lb

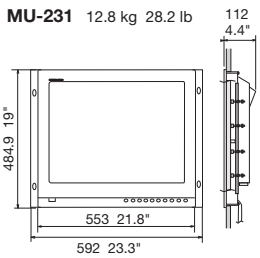


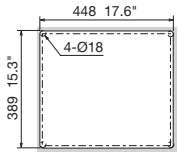
Monitor Unit

MU-190 8.8 kg 19.4 lb

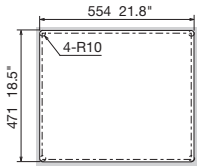


MU-231 12.8 kg 28.2 lb





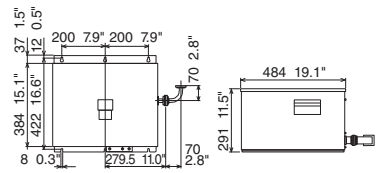
Cutout for flush mount



Cutout for flush mount

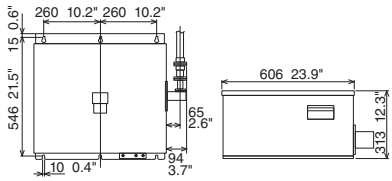
Transceiver Unit for FAR-3320W

RTR-108 17 kg 37.5 lb



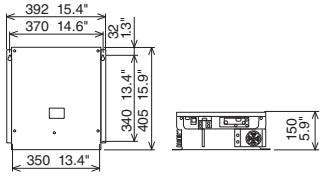
Transceiver Unit for FAR-3330SW

RTR-109 22 kg 48.5 lb

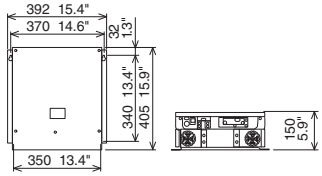


Power Supply Unit

PSU-014/016 8.5 kg 18.7 lb

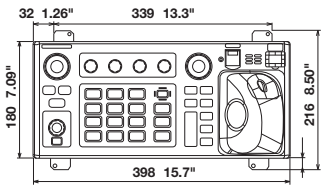


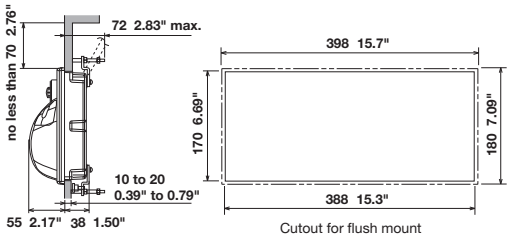
PSU-015/018 10 kg 22.0 lb



Control Unit

RCU-025 3.1 kg 6.84 lb

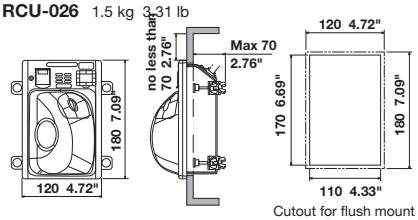




Cutout for flush mount

Trackball Control Unit

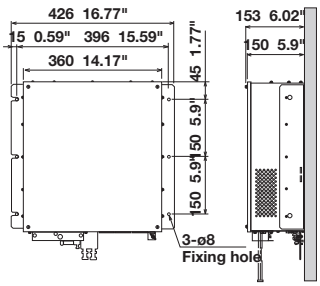
RCU-026 1.5 kg 3.31 lb



Cutout for flush mount

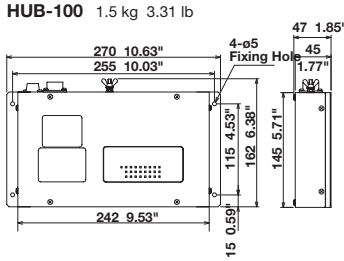
Processor Unit

EC-3000
14 kg 30.9 lb



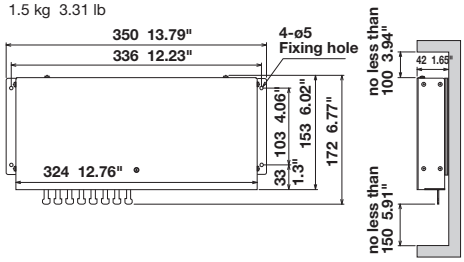
Switching Hub

HUB-100 1.5 kg 3.31 lb



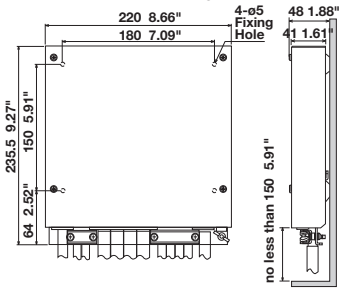
Intelligent Hub

HUB-3000
1.5 kg 3.31 lb

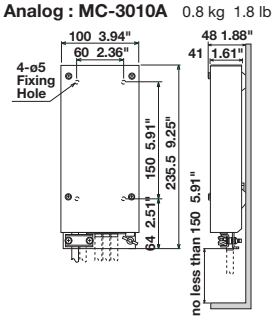


Sensor Adapter

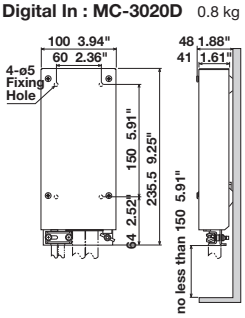
Serial : MC-3000S 1.5 kg 3.3 lb



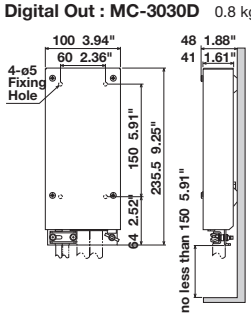
Analog : MC-3010A 0.8 kg 1.8 lb



Digital In : MC-3020D 0.8 kg 1.76 lb



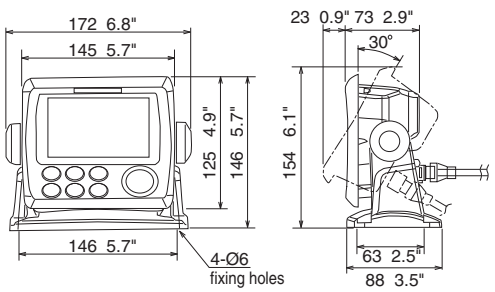
Digital Out : MC-3030D 0.8 kg 1.76 lb



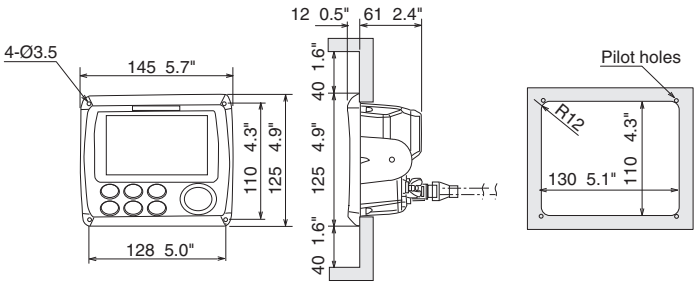
GPS/Chart Plotter

		4.3" GPS NAVIGATOR	4.2" GPS NAVIGATOR
		GP33	GP39
			
GPS/WAAS			
Receive Type	GPS	Twelve discrete channels, C/A code, all-in-view	
	WAAS	Two channels	
	SBAS	Two channels	
Receive Frequency		L1 (1575.42 MHz)	
Time to First FIX		Within 90 s (cold start)	90 s approx. (cold start)
Tracking Velocity		999 kn	1,000 kn
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	4.2" Color LCD
Effective display area		95.04 (W) x 53.85 (H) mm	92 (W) x 52 (H) mm
Pixel number		480 x 272	
Display Modes		Plotter, Steering, Highway, NAV data,User display1, User display2, Satellite monitor	Plotter, Steering, Highway, NAV data, User display, Satellite monitor (Digital, Speedometer, COG)
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	Arrival, Anchor watch, Cross track error, Speed, WAAS (SBAS), Time, Trip
INTERFACE			
Ports		NMEA0183: 1, CAN bus: 1	NMEA0183: 1, USB: 1
Interface	Output	(NMEA0183) AAM, APB, BOD, BWC, BWR, DTM, GGA, GLL, GSA, GSV, RMB, RMC, VTG, XTE, ZDA (CAN bus) 059392, 060928, 061184, 126208, 126464, 126720, 126992, 126996, 127258, 129026, 129029, 129033, 129044, 129283, 129284, 129285, 129538, 129539, 129540, 130822, 130823	(NMEA0183) AAM, APB, BOD, BWC, BWR, DTM, GGA, GLL, GSA, GSV, RMB, RMC, VTG, XTE, ZDA
	Input	(CAN bus) 059904, 065286, 060928, 061184,126208, 126720	(NMEA0183) RTE, TLL
ENVIRONMENT			
Temperature	Display Unit	-15˚C to +55˚C	-15°C to +55°C
	Antenna Unit	-15°C to +55°C	-25°C to +70°C
Waterproofing	Display Unit	IP56	IP55
	Antenna Unit	IPX6	IP56
POWER SUPPLY			
	Non CAN bus	12-24 VDC: 0.24-0.12 A	12-24 VDC: 0.7-0.3 A
	CAN bus	15 VDC, LEN7	—

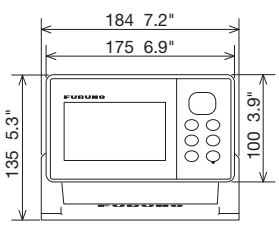
GP33 Display Unit (Bracket Mount) 0.72 kg 1.6 lb



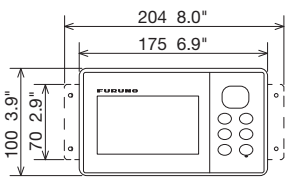
GP33 Display Unit (Flush Mount) 0.6 kg 1.3lb



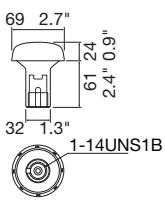
GP39 Display Unit (Bracket Mount) 0.39 kg 0.86 lb



GP39 Display Unit (Flush Mount) 0.36 kg 0.79 lb

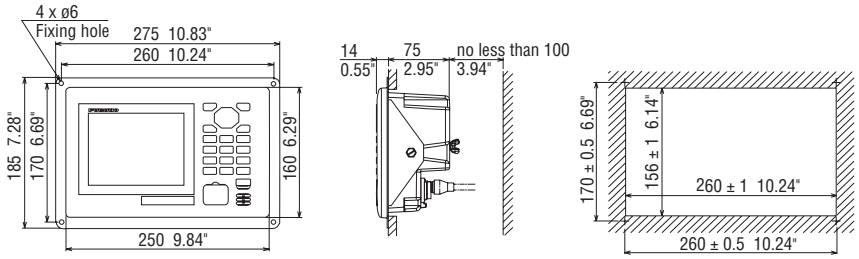


GPS Antenna GPA017 0.6 kg 1.3 lb



		5.7" GPS DGPS NAVIGATOR
		GP170
		
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		90 s approx. (cold start)
Tracking Velocity		1,000 kn
Geodetic Systems		WGS-84 (and others)
ACCURACY		
	GPS	10 m (2 drms)
	DGPS	5 m (2 drms)
	WAAS	3 m (2 drms)
	MSAS	7 m (2 drms)
DISPLAY		
Display Unit		5.7" color LCD
Effective display area		116.2 (W) x 87.1 (H) mm
Pixel number		640 x 480
Display Modes		Plotter, Highway, Course, Data, Integrity
Memory Capacity		Track: 1,000 points, Mark: 2,000 points Waypoints: 1,000 points with 20 characters comment each Route: 100 routes (containing 1,000 waypoints each)
Alarms		Notice: Arrival, Anchor watch, XTE, Speed, Trip
INTERFACE		
Serial (IEC 61162-1, -2)		4 ports (1 port: IEC 61162-2, In/Out, 1 port; IEC 61162-1, Out)
Data port 1, 2	Input	ACK, ACN, CRQ, DBT, DPT, HBT, HDG, HDM**, HDT**, MSK, MSS, MTW, THS, TLL, VBW, VHW ** not used for SOLAS ships
	Output	AAM, ALC, ALF, ALR, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, HBT, POS, RMB, RMC, RTE, VDR, VTG, WCV, WNC, WNR, WPL, XTE, ZDA
Data port 3	Input	MOB from external device (contact closure)
	Output	AAM, ALC, ALF, ALR, APA, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, HBT, MSK*, MSS**, POS, RMB, RMC, Rnn, RTE, VDR, VTG, WCV, WNC, WNR, WPL, XTE, ZDA, RTCM sc104 *when either internal/external beacon receiver is used ** when internal beacon receiver is used
Data port 4, IEC/NMEA Mode		Same as Data port 1, 2
Ethernet (IEC 61162-450)		1 port
	Input	ACK, ACN, DBT, DPT, HBT, HDG, HDM**, HDT**, MTW, THS, TLL, VBW, VHW ** not used for SOLAS ships
	Output	AAM, ALC, ALF, ALR, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, HBT, POS, RMB, RMC, RTE, VDR, VTG, WCV, WNC, WPL XTE, ZDA *when either internal/external beacon receiver is used ** when internal beacon receiver is used
ENVIRONMENT		
Temperature	Display Unit	-15˚C to +55˚C
	Antenna Unit	-25˚C to +70˚C
Waterproofing	Display Unit	IP25
	Antenna Unit	IP56
POWER SUPPLY		
		12-24 VDC
		0.8 - 0.4 A (w/internal beacon reciever)

GP170 Display Unit (with an optional flush mount kit) 2.2 kg 4.9 lb (without DGPS beacon receiver)
GP170 Display Unit (with an optional flush mount kit) 2.4 kg 5.29 lb (with DGPS beacon receiver)



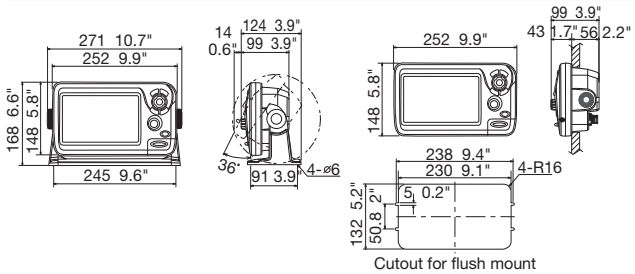
GPS/Chart Plotter

		7" WIDE GPS/WAAS COLOR CHART PLOTTER/FISH FINDER
		GP1870F
		
GPS/WAAS		
Receive Type	GPS	50 channels
	WAAS	1 channel
Receiving Frequency		L1 (1575.42 MHz)
Time to First FIX		80 s (cold start)
Tracking Velocity		999 kt
SBAS (Satellite-Based Augmentation System)		WAAS, EGNOS, MSAS
Electronic Chart		C-MAP 4D
ACCURACY		
Internal Antenna	GPS	10 m Max
	MSAS	7.5 m Max
External Antenna GPA-017 (Option)	GPS	10 m Max
	MSAS	7.5 m Max
DISPLAY		
Type		7" Wide Color TFT LCD
Screen Size		152.4 x 91.4 mm
Screen Resolution		WVGA 800 x 480 pixels
Screen Brightness		900 cd/m^2 (typical)
Language		English (US & UK), French, Spanish, German, Italian, Portuguese, Danish, Swedish, Norwegian, Finnish, Greek, Japanese, Chinese, Russian, Thai, Vietnamese, Polish, Bahase Malaysia, Bahasa Indonesia
Display Modes		Course plot, Nav Data, Instruments, Engine monitor, Anemometer, 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
INTERFACE		
CAN bus		1 Port
Interface (CAN bus)	Input	059392, 059904, 060928, 061184, 126208, 126992, 126996, 127245, 127250, 127251, 127258, 127488, 127489, 127493, 127496, 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
	Output	059392, 059904, 060928, 061184, 126208, 126464, 126992, 126996, 127258, 128259, 128267, 128275, 129025, 129026, 129029, 129033, 129283, 129284, 129285, 130310, 130312
USB*		1 Port (2.0)
SD Cart Slot		1 Slot (Acceptable up to 32 GB)
FISH FINDER		
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		7 steps: x2, x1, 1/2, 1/4, 1/8, 1/16, stop
ENVIRONMENT		
Temperature	Display Unit	-15˚C to +55˚C
Waterproofing	Display Unit	IP56
POWER SUPPLY		
		12-24 VDC
		1.05 - 0.53 A (Equip 520-5PD) 1.37 - 0.64 A (Equip 50/200-1T)

* The GP1870F can be connected with the transducers of 1 kW output power, when interfaced with the Matching Box MB-1100.

GP1870F Display Unit

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



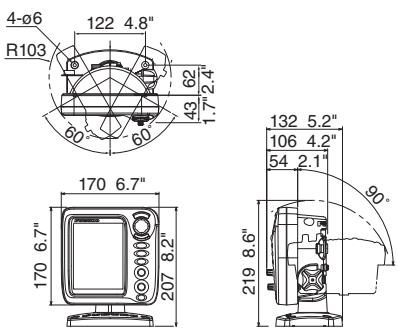
Cutout for flush mount

Fish Finder

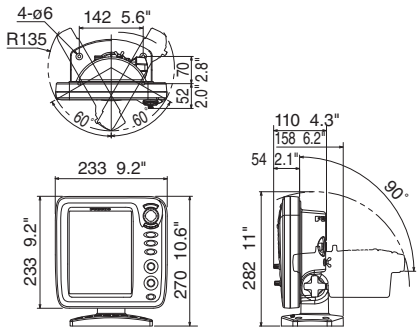
		5.7" FISH FINDER	8.4" FISH FINDER
		FCV628	FCV588
			
General			
Frequency		50 and 200 kHz	
Transducer		600 W	600 W/1 kW*
DISPLAY			
Display unit		5.7" TFT color LCD	8.4" TFT color LCDF
Effective display area		87.1 (W) x 116.2 (H) mm	128.2 (W) x 170.9 (H) mm
Pixel number		VGA 480 x 640 pixels	
Display Mode		Single frequency (50 or 200 kHz), Dual-frequency, Zoom, Nav data, A-scope, Marker zoom, Bottom zoom, Bottom-lock, Bottom Discrimination, ACCU-FISH™, RezBoost™	
Basic Range *m, ft, fa, p/b can be selectable in the menu		2-1200 m	
Range phasing		up to 1200 m	
Expansion Range	Bottom-lock expansion	2-10 m	
	Sectional expansion	2-1200 m	
Picture advance speed		8 steps: stop, 1/16, 1/8, 1/4, 1/2, x1, x2, x4	
Pulselength & PRR		0.04-3.0 ms, Max 3,000 pulse/min	
Interface (IEC61162-1, NMEA 0183 Ver 1.0/2.0/3.0)	Input	BWC, GGA, GLL, GNS, HDG, HDT, MDA, MTW, MWV, RMA, RMB, RMC, VHW, VTG, XTE, ZDA	
	Output	DBS, DBT, DPT, MTW*, RMB*, VHW*, TLL* by key operation * External data required.	
ENVIRONMENT			
Temperature		-15°C to +55°C	
Waterproofing		IP56	
POWER SUPPLY			
		12-24 VDC: 1.1-0.5 A	12-24 VDC: 1.3-0.6 A

* The FCV588 can be connected with the transducers of 1 kW output power, when interfaced with the Matching Box MB-1100.

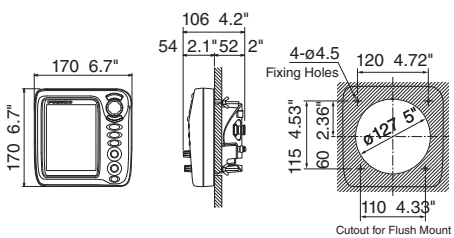
FCV628 (Bracket Mount) 1.3 kg 2.9 lb



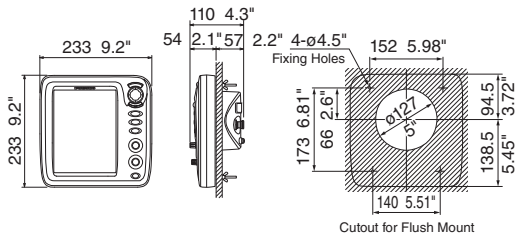
FCV588 (Bracket Mount) 2.3 kg 5.1 lb



FCV628 (Flush Mount) 0.9 kg 2.0 lb



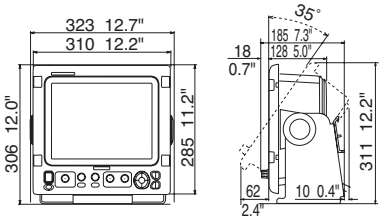
FCV588 (Flush Mount) 1.6 kg 3.5 lb



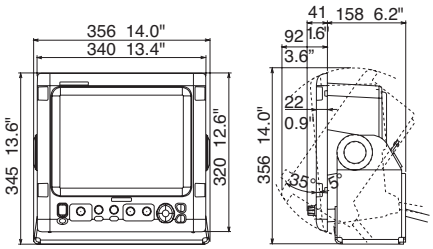
Fish Finder

		10.4" LCD SOUNDER	12.1" LCD SOUNDER
		FCV295	FCV1150
			
General			
Frequency		The synthesized transreceiver works with dual frequencies in 28 to 200 kHz	
Transducer		1, 2 or 3 kW	
DISPLAY			
Display unit		10.4" TFT color LCD	12.1" TFT color LCD
Pixel number		640 x 480	800 × 600
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	
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, x1, x2, x4	
Pulselength & PRR		0.1-5.0 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
	Output	DBS, DBT, DPT, MTW*, TLL, SDmrk, VHW, RMB, dat *Optional sensor required	
	Output for external Monitor	—	
ENVIRONMENT			
Temperature	Display unit	-15°C to +55°C	
Waterproofing	Display unit	IP55 (When flush mounted)	
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

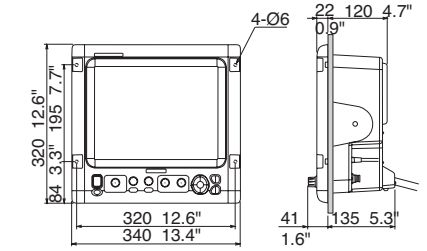
FCV295 7.0 kg 15.4 lb

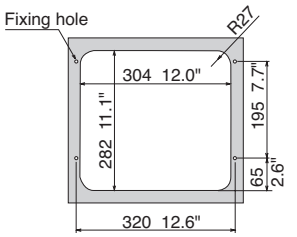


FCV1150 (Bracket Mount) 8.2 kg 18.1 lb

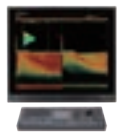


FCV1150 (Flush Mount) 6.8 kg 15.0 lb

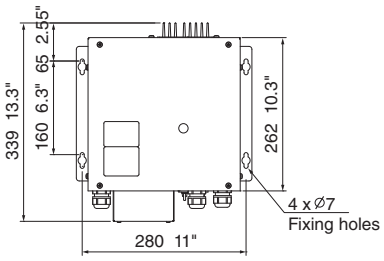


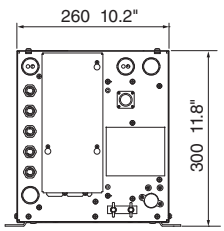


Cutout for flush mount

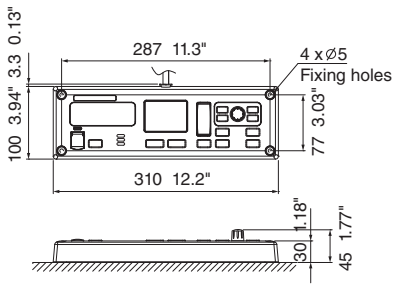
	FISH FINDER	HI-REZ TruEcho CHIRP FISH FINDER	TruEcho CHIRP WITH UNIQUE FISH SIZE INDICATOR
	FCV1900	FCV1900B	FCV1900G
			
General			
Frequency	15 to 200 kHz, Free-synthesize		
Transducer	1, 2 or 3 kW		
DISPLAY (Processor unit)			
Display mode	Single frequency high/low), Dual-frequency, Zoom, User 1/2 (available to use mixture, multi-gain, telesounder and external sounder display), Bottom-lock expansion, Bottom zoom, Marker zoom, Discrimination zoom		
Basic Range *m, ft, fa, p/b can be selectable in the menu	5 to 3000 m		
Range phasing	up to 2000 m		
Expansion Range	5 to 200 m		
Fish size histogram	—	—	2 m depth or more, specified transducer required
Picture advance speed	6 steps: stop, 1/4, 1/2, 1/1, 2/1, 4/1		
Data recording	Echo display and measured data can be recorded to internal memory		
Language	English, Danish, French, Spanish, Norwegian, Russian, Chinese, Korean, Japanese		
INTERFACE			
NMEA0183	3 Ports for Input/Output		
Interface (NMEA 0183 Ver 1.5/2.0/3.0) Input	GGA, GLL, GNS, MTW, VHW, VTG, ZDA		
Interface (NMEA 0183 Ver 1.5/2.0/3.0) Output	DBS, DBT, DPT, MTW, TLL		
LAN	1 port*, Ethernet 100Base-TX *Hub required		
CIF	1 port		
Net sonde	1 port (sonde marker/sonde KP)		
Video	1 port, HDMI type-D		
External KP	1 port		
Temperature sensor	1 port		
USB	1 port (USB2.0)		
ENVIRONMENT			
Temperature	-15°C to +55°C		
Waterproofing	IP22		
POWER SUPPLY			
	12-24 VDC: 8.3-3.9 A		

Processor Unit FCV1901 10.2 kg 22.5 lb





Contro Unit FCV1902 1.1 kg 2.4 lb



Fish Finder

TRANSDUCERS for FCV295/FCV1150/FCV1900/DFF3			
	1 kW	2 kW	3 kW
28	28F-8	28BL-6HR	28BL-12HR
38	—	38BL-9HR	38BL-15HR
50	50B-6/6B, 50B-9B	50B-12, 50BL-12HR	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**	—	—

* ACCU-FISH™ compatible for FCV1900/DFF3
** Except for FCV1900

TRANSDUCERS for FCV1900B/1900G			
	1 kW	2 kW	3 kW
42 to 65 (low), 130 to 210 (high)	CM265LH *	—	—
42 to 65 (low), 85 to 135 (high)	CM265LM	—	—
42 to 65 (low), 150 to 250 (high)	CM275LH-W **	—	—
38 to 75 (low), 130 to 210 (high)	—	PM111LH *	—
38 to 75 (low), 80 to 130 (high)	—	PM111LM	—
28 to 60 (low), 130 to 210 (high)	—	—	CM599LH *
28 to 60 (low), 80 to 130 (high)	—	—	CM599LM

* ACCU-FISH™ and fish size histogram compatible.
** Wide beam type transducer with high frequency beam width of 25°

TRANSDUCERS for DFF1-UHD	
	1 kW
42 to 65 (low)/130 to 210 (high)	CM265LH, CM275LH-W, B265LH, B275LH-W (Airmar®)

TRANSDUCER for DFF-3D	
	800 W
165	B54

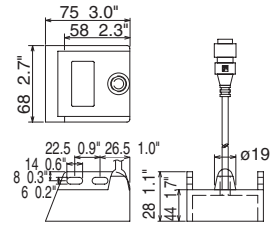
TRANSDUCER LIST

						Stand Alone			Sensor	
						FCV628	FCV588	GP1870F	DFF1	BBDS1
	Frequency	Type	Matching Box	Mount	Output Power					
TRANSDUCER	50/200 kHz	520-5PSD		Thru-hull	600 W	● ◎	● ◎	● ◎	●	● ◎
		525-5PWD		Transom		● ◎	● ◎	● ◎	●	● ◎
		520-5MSD		Thru-hull		● ◎	● ◎	● ◎	●	● ◎
		520-PLD(P319*)		Thru-hull		● ◎	● ◎	—	—	—
		50/200-1T	○	Thru-hull	1 kW	—	● ◎	● ◎	●	● ◎
	50 kHz	50B-6	○	Thru-hull	1 kW	—	○	○	○	—
		50B-6B	○	Thru-hull		—	○	○	○	—
		50B-9B	○	Thru-hull		—	—	—	○	—
	200 kHz	200B-5	○	Thru-hull	1 kW	—	—	—	○	—
		200B-5S	○	Thru-hull		—	○	○	○	—
TRIDUCER	50/200 kHz	525T-BSD(B45*)		Thru-hull	600 W	● ◎	● ◎	—	—	● ◎
		525T-PWD(B258*)		Transom		● ◎	● ◎	—	—	● ◎
		525T-LTD/12 (B60-12-*)		Thru-hull		● ◎	● ◎	—	—	—
		525T-LTD/20 (B60-20-*)		Thru-hull		● ◎	● ◎	—	—	—
		SS60-SLTD/12 (SS60-12*)		Thru-hull		● ◎	● ◎	—	—	—
		SS60-SLTD/20 (SS6-20*)		Thru-hull		● ◎	● ◎	—	—	—
		525ST(ID)-MSD		Thru-hull		● ◎	● ◎	● ◎	●	● ◎
		525ST(ID)-PWD(P66*)		Transom		● ◎	● ◎	● ◎	●	● ◎
		526T(ID)-HDD(B260*)		Thru-hull	1 kW	—	● ◎	—	—	● ◎

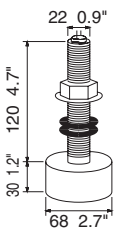
* Airmar® transducer

●ACCU-FISH mode available ◎Bottom discrimination display mode available

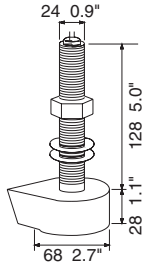
Transducer 525-5PWD (Plastic, Transom)



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



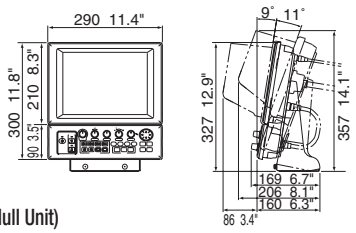
Transducer Bronze 520-5MSD (Metal, Thru-hull)



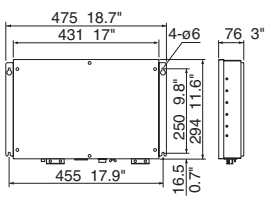
Sonar

		10.4" SEARCHLIGHT SONAR		10.4" SEARCHLIGHT DUAL FREQUENCY SONAR
		CH250	CH270	CH300
				
GENERAL				
Frequency		60, 88, 150, 180 or 240 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		213 (W) x 160 (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 150 kHz: 10-1000 m	88 kHz: 10-1200 m 180 kHz: 10-800 m	20-1200 m
	Vertical mode	10-600 m		
Pulselength		CH250: 0.20-20.0 ms, CH270: 0.24-8.0 ms, CH300: 0.24-16.0 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, 60 Hz		
	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 20° (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	IPX0	IPX0	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. 16.7-8.4/6.3 A	12/24 VDC: 4.0/2.5 A Max. 10.0/6.0 A	12/24 VDC: 4.7/2.3 A Max. 16.7/8.2 A

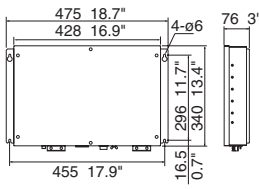
CH250/270/300 Display Unit 5.7 kg 12.6 lb



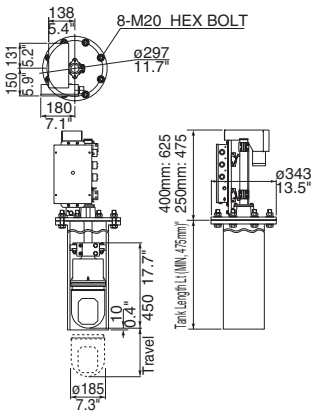
CH250/270 Transceiver Unit 3.5 kg 7.8 lb



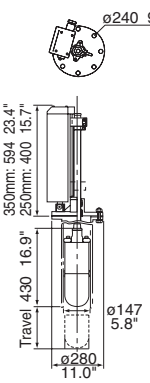
CH300 Transceiver Unit 3.5 kg 7.7 lb



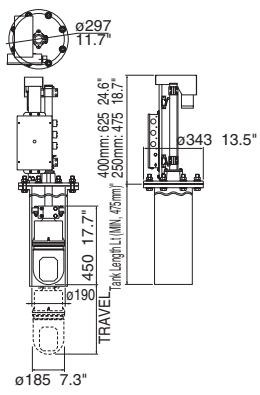
CH250 (Hull Unit)
CSH254 (Travel: 400 mm) 43 kg 94.8 lb
CSH255 (Travel: 250 mm) 42 kg 92.6 lb



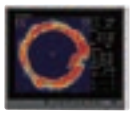
CH270 (Hull Unit)
CSH181 (Travel: 350 mm) 37 kg 81.6 lb
CSH184 (Travel: 250 mm) 35 kg 77.2 lb



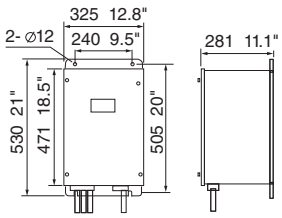
CH300 (Hull Unit)
CSH304 (Travel: 400 mm) 43 kg 94.8 lb
CSH305 (Travel: 250 mm) 42 kg 92.6 lb



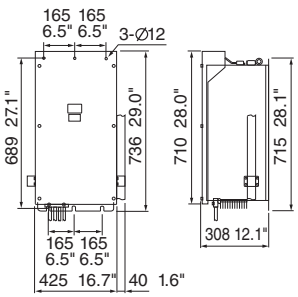
Sonar

		FULL-CIRCLE SCANNING SONAR	
		CSH5L MARK-2	CSH8L MARK-2
			
GENERAL			
Frequency		55 kHz or 68 kHz	85 kHz or 107 kHz
DISPLAY			
Display Mode		Single scan, Fish finder combination* (single and fish finder), Audio combination (single and audio pictures) * Fish Finder or Echo sounder required	
Colors		Scan/Echo: 16 colors, Mark: 1 color	
Mark		Own ship's track, Heading line, Direction/distance, Fish school, Event, Target lock	
Range Scale		50, 85, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 800, 1000, 1200, 1600 m	
Pulselength		0.5 to 20 ms (depending on range scales)	
Ship Speed		18 kn max (raise/lower operation up to 16 kn)	
Tilt		Manual control: 0° to 55° in 1° steps Automatic tilt scan: 4° to 52°	
Audio Search	Frequency	800 Hz	1 kHz
(By external loudspeaker)	Sector	20° , 40° , 80° and 120° selectable	
Language		English, Spanish, Danish, Dutch, French, Italian, Norwegian, Thai, Vietnamese, Burmese, Indonesian, Japanese	
INTERFACE			
NMEA0183 (Ver1.5/2.0/2.2)		2 ports	
Interface	Input	CUR, DBS, DBT, DPT, GGA*, GLC, GLL*, GTD, HDG, HDM, HDT, MTW, RMA, RMC, VDR, VHW, VTG * disabled for NMEA0183 Ver.1.5	
	Output	TLL	
Log, E/S, KP		Speed log pulse (contact signal): 200/400 pulse/NM Sonde, E/S signal: VI-1100A applicable External KP: Current loop, 0 to 12 V	
Video Signal Output	Method	RGB analog, separated synchronization, XGA (VESA)	
	Resolution	1024 x 768 pixels, 65 MHz clock	
CIF data input		Location, Ship's speed, Bearing, Current data (1 layer), Water depth, Water temperature, Multiple layer current data	
HULL UNIT			
Transducer travel		400 mm or 600 mm	
Raising/lowering Time		400 mm: 14 s, 600 mm: 20 s	
Allowable Ship's Speed		18 kn max. (16 kn during raise/lower operation)	
Driving system		Remote electric control	
ENVIRONMENT			
Temperature		0°C to +55°C	
Waterproofing		IPX2 (w/o connector panel of processor unit)	
POWER SUPPLY			
Processor unit		100-240 VAC: 4.0-2.0 A, 1 phase, 50-60 Hz	100-240 VAC: 4.5-2.2 A, 1 phase, 50-60 Hz

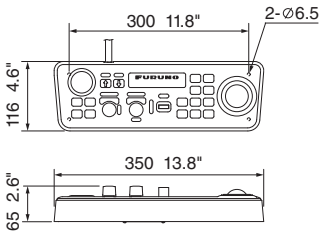
CSH5130-A-5L Transceiver Unit 20 kg 44.1 lb



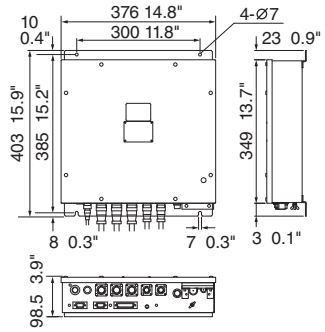
CSH8030-A-8L Transceiver Unit 37 kg 81.6 lb



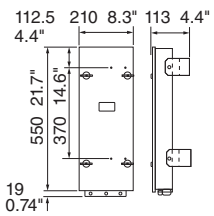
CSH5211-A Control Unit 3.5 kg 7.7 lb



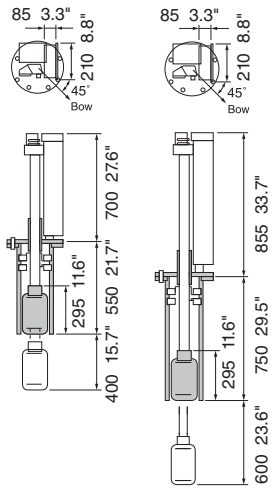
CSH5210-A Processor Unit 3.4 kg 7.5 lb



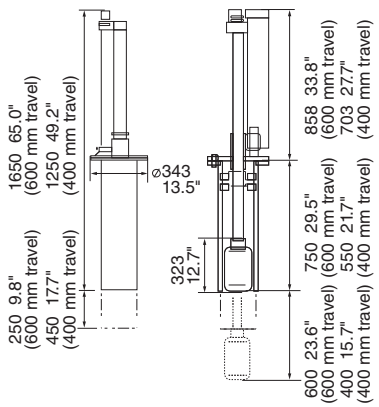
CSH5020-A Preamplifier 6.5 kg 14.3 lb

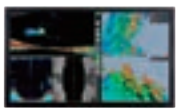
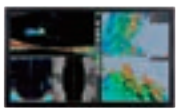


CSH5040-A (600 mm travel) Hull Unit 75 kg 165 lb
CSH5041-A (400 mm travel) Hull Unit 70 kg 154 lb

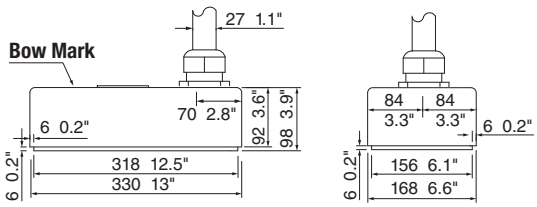


CSH8040-A (600 mm travel) Hull Unit 82 kg 180.8 lb
CSH8041-A (400 mm travel) Hull Unit 81 kg 178.6 lb

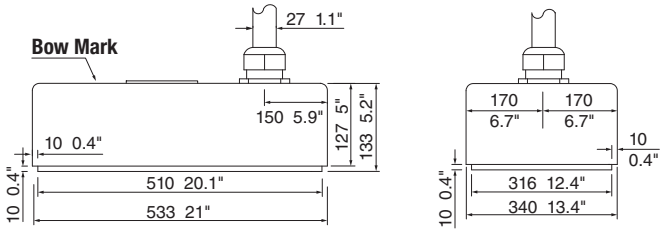


		MULTI BEAM SONAR	
		WMB3230	WMB5230
			
GENERAL			
Frequency		160 kHz	80 kHz
Output Power		14 settings from 40 W to 1 kW	14 settings from 150 W to 1.2 kW
Effective Beam Width (arthwartships x fore-aft)		120° x 4°	
Beam Spacing		Equi-Angular 120° @ 1.07° beams	
Beam Width		112 beams x 1.07º over 120º	
Maximum Depth		200 m	500 m
Max Resolution (height of smallest target detectable at nadir)		7.5 cm	15 cm
Correction		Pitch*, Roll, Heave*, Heading *depth correction only	
DISPLAY			
Display Mode		Sonar, Single/triple beam, Side scan, 2D and 3D mapping, Advanced mapping (Fish, Chart, Backscatter & Contour Overlay options)	
Display Windows		Accoustic & Charting with user-configured 1/2/3 way split panels per window, 6 panels max.	
Colors		Scan/Echo: 16 colors, Mark: 1 color	
Basic Range	Vertical	5-400 m, Shift: 5-200 m	10-800 m, Shift: 10-500 m
	Horizontal	20-3000 NM (2D) 10-1 km (3D)	
Picture advance speed		5 speeds	
Puselength		0.1, 0.2, 0.5, 1.0, 2.0 ms	0.2, 0.5, 1.0, 2.0, 3.0, 4.0, 6.0,8.0, 10.0 ms
Mark		Vessel, Cursor, Ship, Color, Type, Name options	
Database Management		Record, Edit & Export capability	
INTERFACE			
Processor		CPU 3.4 GHz, 64 bit	
RAM Memory		4 GB of RAM	
HDD		500 GB	
Serial Port (RS-232C)		4 ports	
NMEA0183 (Input)		GGA, GGL, HDG, HDT, HVE, SHR, TSS/TS1, VTG, ZDA	
USB Port		8 ports	
ENVIRONMENT			
Temperature		0°C to +40°C	
Waterproofing		IPX2	
POWER SUPPLY			
Transceiver unit		24 VDC, 2.9 A	24 VDC, 6.3 A
Processor unit		24 VDC, 2.5 A	

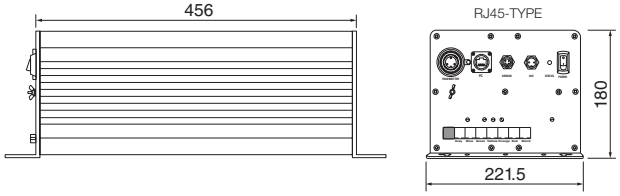
WMB3230 160 kHz TRANSDUCER **15 kg 33.07 lb**



WMB5230 80 kHz TRANSDUCER **39 kg 85.98 lb**



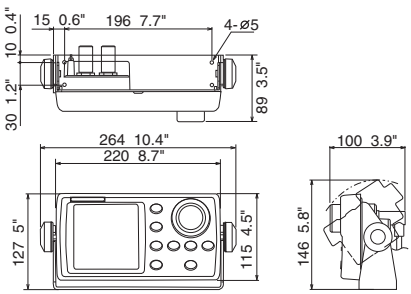
TRANSCEIVER **5 kg 11.02 lb**



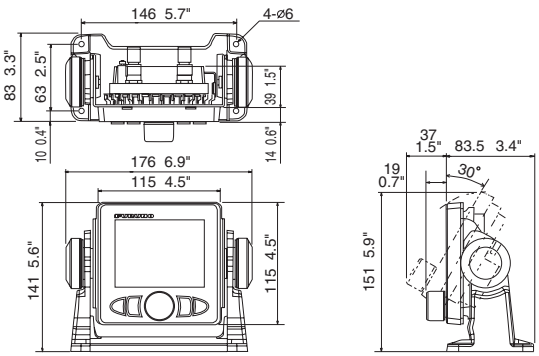
Autopilot

		AUTOPILOT	
		NAVpilot 700	NAVpilot 711C
			
CONTROL UNIT			
Type		Monochrome LCD	Color LCD
Screen Size		4.6"	4.1"
Effective Display Area		85.2 (W) x 85.2 (H) mm	82.6 (W) x 61.9 (H) mm
Screen Resolution		160 x 160 dots	320 x 240 dots
Screen Backlight		8 steps	
Screen Contrast		16 steps	—
PROCESSOR UNIT			
Steering mode		STBY, Auto, Dodge, Turn, Remote, Advanced auto*, Navigation*, Wind*, Fish Hunter™*, Sabiki** * external data required, ** 711C only	
Sea Condition Adjustment		AUTO/MANUAL-CALM/MODERATE/ROUGH	
Rudder Angle Settings		10 - 45 deg	
Alarm		Heading deviation, Cross-track error*, Ship's speed*, Depth*, Water temperature*, Wind*, Watch, Log trip* * external data required	
INTERFACE			
Ports		CAN bus (NMEA2000): 1, NMEA0183: 2	
Input		NMEA0183: AAM, APB, BOD, BWC, BWR, DBT, DPT, GGA, GLL, GNS, HDG, HDM, HDT, MTW, MWV, ROT, RMB, RMC, THS, TLL, VHW, VTG, VWR, VWT, XTE, ZDA CAN bus (NMEA2000): 059392/904, 060928, 061184, 126208/720/992/996, 127250/251/258/488/489, 128259/267, 129025/026/029/033/283/284/285, 130306/310/311/312/313/314/577/818/821/827/880	
Output		NMEA0183: DBT, DPT, GGA, GLL, GNS, HDG, HDM, HDT, MTW, MWV, RMB, RMC, ROT, RSA, VHW, VTG, VWR, VWT, ZDA CAN bus (NMEA2000): 059392/904, 060928, 061184, 126208/464/720/992/996, 127237/245/250/251/258, 128259/267, 129025/026/029/033/283/284/285, 130306/310/311/312/822/823/827	
ENVIRONMENT			
Temperature		-15°C to +55°C	
Waterproofing	Processor unit	IP20	
	Other unit	IP56	
POWER SUPPLY			
		12-24 VDC: 4.0 - 2.0 A (excluding pump)	

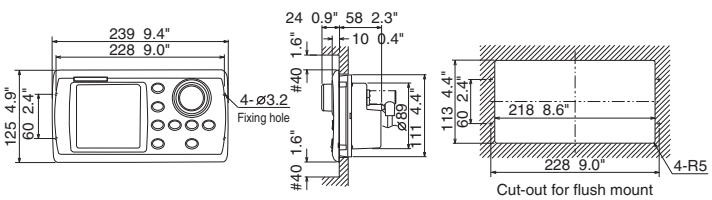
NAVpilot 700 Control Unit (Bracket Mount) 0.9 kg 1.9 lb



NAVpilot 711C Control Unit (Bracket Mount) 0.39 kg 0.9 lb

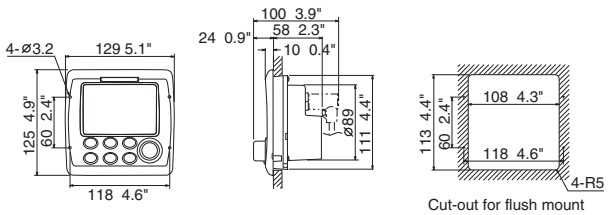


NAVpilot 700 Control Unit (Flush Mount) 0.64 kg 1.4 lb



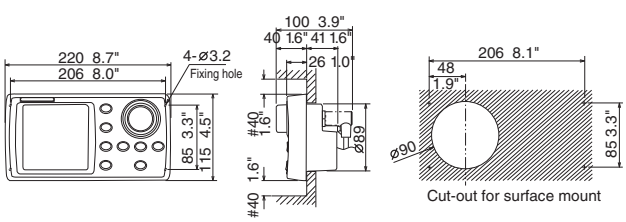
Cut-out for flush mount

NAVpilot 711C Control Unit (Tabletop Mount) 0.39 kg 0.9 lb



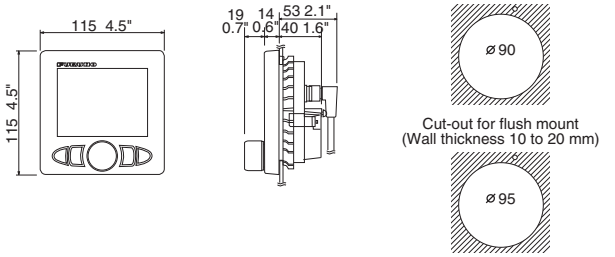
Cut-out for flush mount

NAVpilot 700 Control Unit (Surface Mount) 0.62 kg 1.4 lb



Cut-out for surface mount

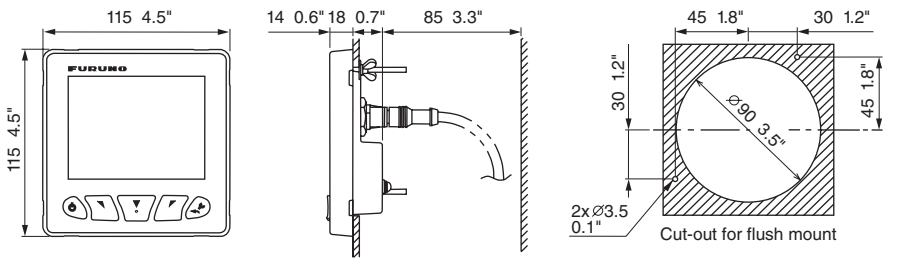
NAVpilot 711C Control Unit (Surface Mount) 0.33 kg 0.7 lb



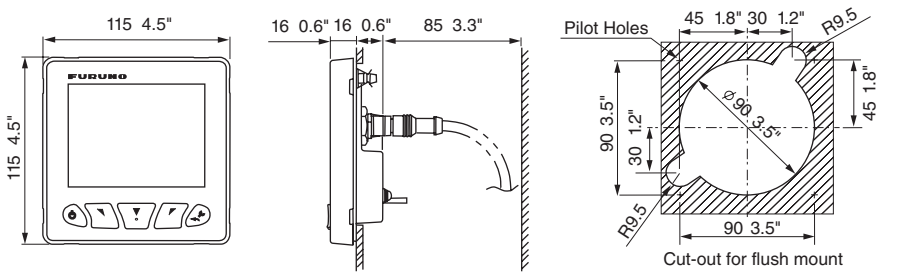
Instrument/Data Organizer

	INSTRUMENT/DATA ORGANIZER
	FI70
	
GENERAL	
Screen Size	4.1" Color LCD
Resolution	QVGA (320 x 240)
Brightness	Typical 700 cd/m²
Display Mode	Analog meter, Graph, Highway, Race timer, Simple AIS, Data box
Language	English, French, Spanish, German, Italian, Portuguese, Swedish, Danish, Norwegian, Finnish
DISPLAY DATA	
Speed	STW, Max STW, Average STW, SOG, Max SOG, Average SOG, Velocity madeg good (VMG)
Wind	AWS, TWS, Max TWS, AWA, TWA, Beaufort wind GWD
Heading	HDG, Average HDG, Heading on next tack, ROT
Course	COG
Timer	Count down timer 1, Count down timer 2, Count up timer
Navigation	Bearing, RNG, WPT, XTE, Position, ETA time, ETA date, Trip, Odometer
Boat	Rudder angle, Trim tabs, Roll/Pitch
Engine	Engine RPM, Trip fuel used, Fuel rate, Engine trim/tilt, Boost pressure, Engine temperature, Engine hour, Oil pressure, Oil temperature, Coolant pressure, Engine load, Transmission oil temperature, Transmission oil pressure
Tank	Tank level 1-6
Depth	Depth
AIS	AIS
Voltage	Supply voltage
Environment	Date, Time, Water temperature, Air temperature, Atmospheric pressure, Humidity, Wind chill temperatuere, Dew point
INTERFACE	
CAN bus (NMEA2000)	1 port
Input	059904, 060928, 061184, 126208/720/992/996, 127237/245/250/251/257/258/488/489/493/497/505, 128259/267, 129025/026/029/033/038/039/040/283/284/285/794/809/810, 130306/310/311/312/313/314/316/576/577, 130816/821/822/825/880/841
Output	059392/904, 060928, 061184, 126208/464/720/993/996, 816/821/822/823/825/841
ENVIRONMENT	
Temperature	-15°C to +55°C
Waterproofing	IP56
POWER SUPPLY	
	15 VDC through CAN bus 0.15 A max, LEN3

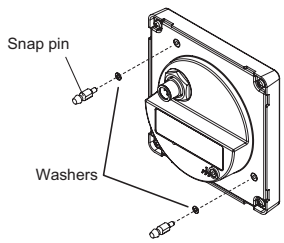
Instrument FI70 0.22 kg 0.5 lb

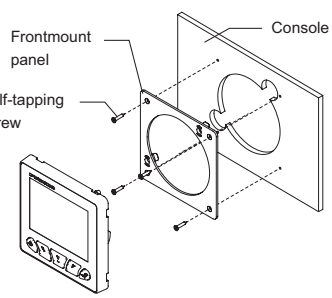


Instrument (Front Mount) FI70 0.24 kg 0.5 lb



Frontmount Installation (optional kit required)

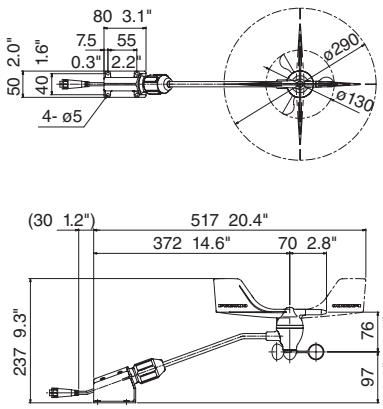




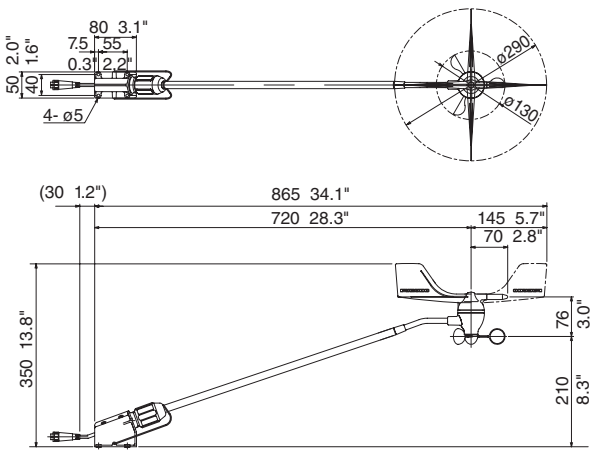
Instrument/Data Organizer

	ELECTRONIC NAVIGATION INSTRUMENTS				
	FI5001 Wind Transducer	**FI5001L** (Long Shaft) Wind Transducer	**DST800** Depth/Speed/Temp sensor	**FI5002** Junction Box	**IF-NMEAFI** Analog NMEA Data Converter
					
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 2 A	CAN bus: 1 port Extrernal Sensor: Tank gauge wind transducer (FI5001or FI5001L) Speed/Temperature sensor (ST-02PSB or ST-02MSB) Power supply: 15 VDC, less than 200 mA	

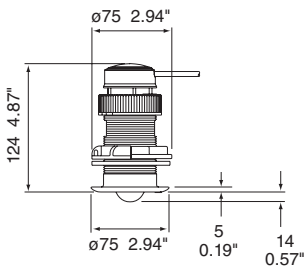
Wind Transducer FI5001 0.3 kg 0.7 lb



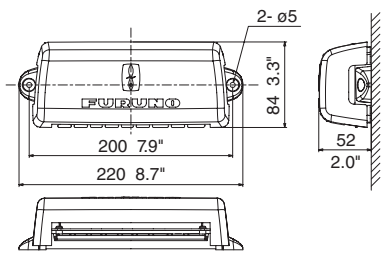
Wind Transducer FI5001L (Long Shaft) 0.4 kg 0.9 lb



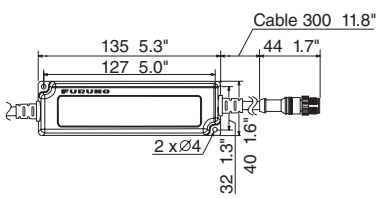
Depth/Speed/Temp Sensor DST-800 (Option) 0.9 kg 2.0 lb



Junction Box FI5002 (Option) 0.3 kg 0.7 lb



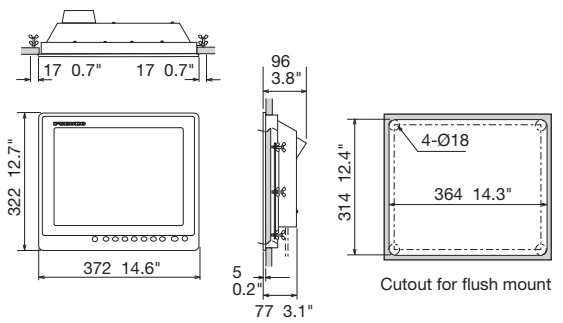
Analog NMEA Data Converter IF-NMEAFI (option) 0.35 kg 0.77 lb



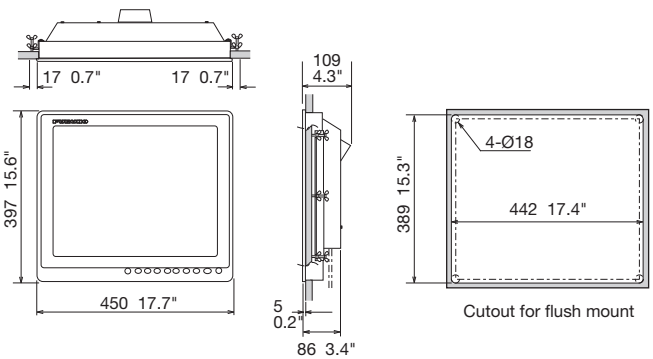
Monitors

	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)

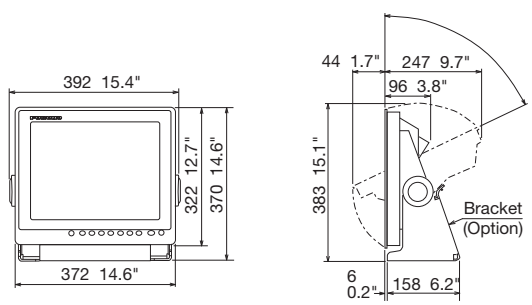
MU150HD Flush Mount — 5.4 kg 11.9 lb



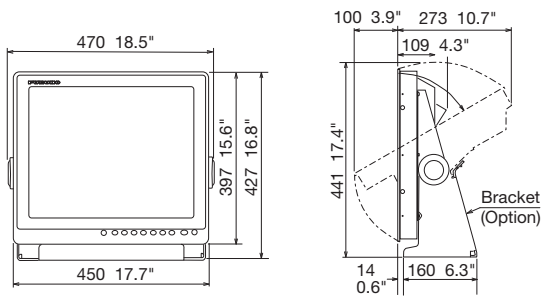
MU190HD Flush Mount — 8.2 kg 18.1 lb



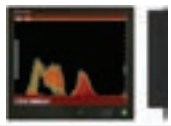
MU150HD Bracket Mount — 7.4 kg 16.3 lb



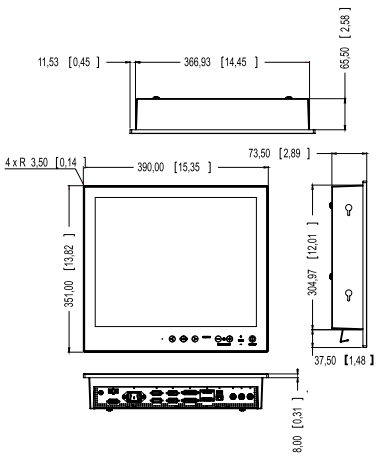
MU190HD Bracket Mount — 11 kg 24.3 lb



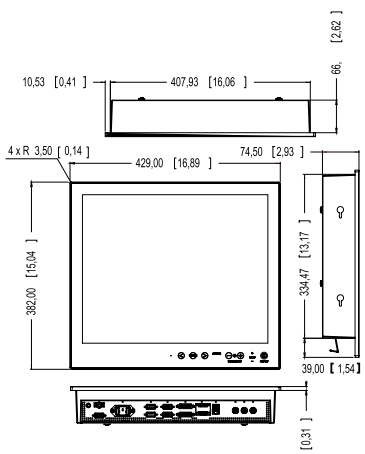
Monitors

	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)		

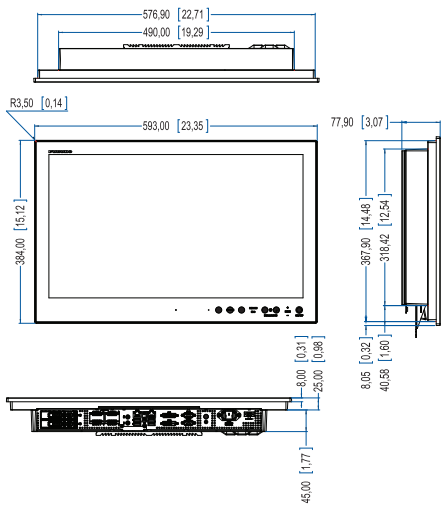
MU170T (Flush Mount) 13.6 lb



MU190T (Flush Mount) 18 lb



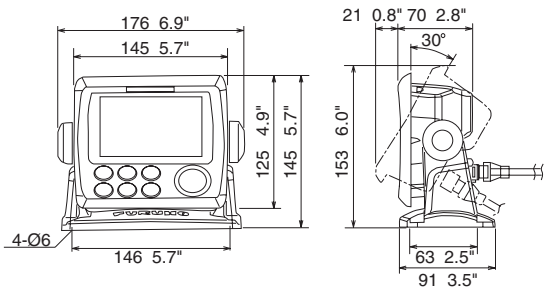
MU240T (Flush Mount) 24.2 lb



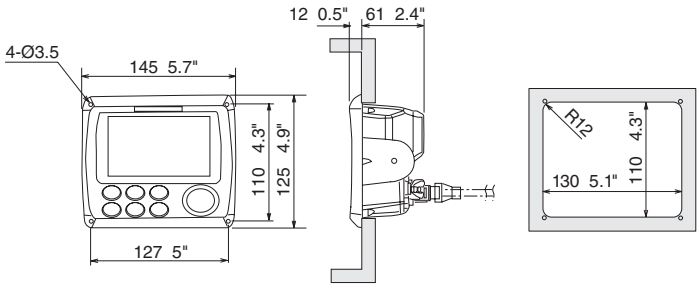
Remote Display

	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) 059904, 060928, 126208, 126992, 127245, 127250, 127257, 127258, 127488, 127489, 127497, 128259, 128267, 128275, 129025, 129029, 129033, 130306, 130310, 130311, 130577
Output	(NMEA0183) DPT, VHW, RMC, MWV, HDT, HDG, XTE, MTW, RSA, VTG (CAN bus) 059392, 059904, 060928, 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: 0.2-0.1 A (Non CAN bus)

RD33 Display Unit (Bracket Mount) **0.7 kg 1.54 lb**



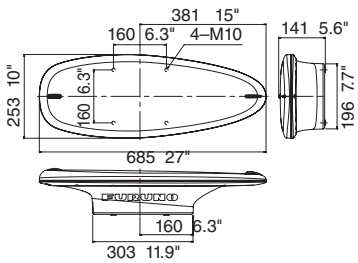
RD33 Display Unit (Flush Mount) **0.59 kg 1.3 lb**



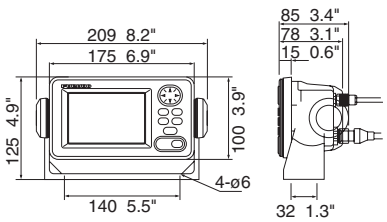
Compass

		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		10 m or 3 m (WAAS), 95% of the time	10 m, 5 m (DGPS), 3 m (WAAS)	
INTERFACE				
Heading/ Nav Data Output		1 port in CAN bus (NMEA2000)		
		2 ports in NMEA0183, 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	—	
	25,100,200 ms, 1,2 s 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 SC104 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		
Waterproofing	Antenna Unit	IP56	IPX6	
	Display Unit	—	IPX5	
	Processor Unit	—	IPX0	
POWER SUPPLY				
		12-24 VDC: 0.4-0.23 A LEN8	12-24 VDC: 1.2-0.5 A	

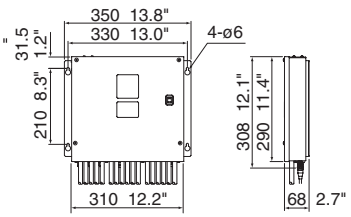
SC30 Sensor Unit 2.5 kg 5.5 lb



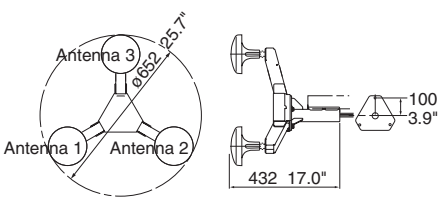
SC50/110 Display Unit 0.55 kg 1.2 lb



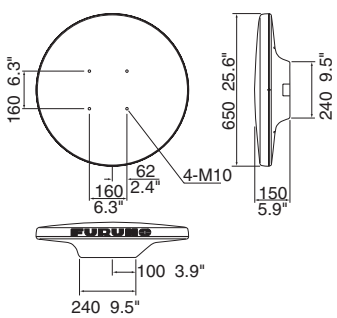
SC50/110 Processor Unit 4.2 kg 9.3 lb



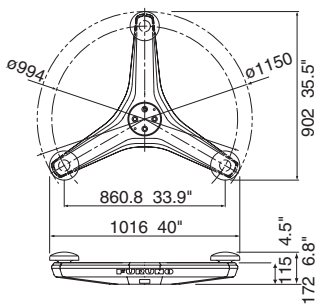
SC50 Antenna Unit (Open) 3.9 kg 8.6 lb



SC50 Antenna Unit (Radome) 4.2 kg 9.3 lb

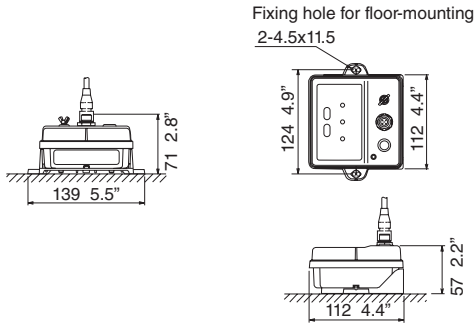


SC110 Antenna Unit 6.8 kg 15 lb

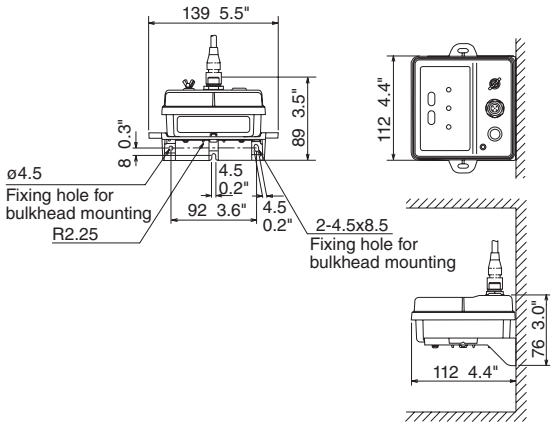


		INTEGRATED HEADING SENSOR
		PG700
		
GENERAL		
Heading Accuracy		±1.0° (horizontal)
Heading resolution		0.1°
Follow-up		45°/s rate-of-turn
Correction	Deviation	Automatic by swinging the boat
INTERFACE		
Port		CAN bus: 1
Output		065284, 127250
Input		059904, 060928, 061184, 126720, 126208, 130818, 165283
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

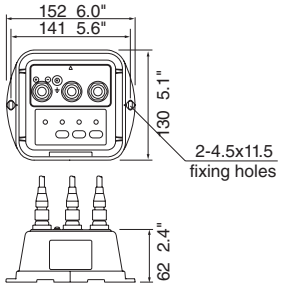


PG700 (bulkhead mounting) Main Unit 0.35 kg 0.77 lb



		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), CFR46 (USCG standard)
Power Supply		
		12-24 VDC: 120-30 mA

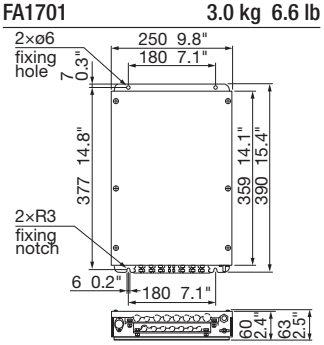
PG500R 0.3 kg 0.7 lb



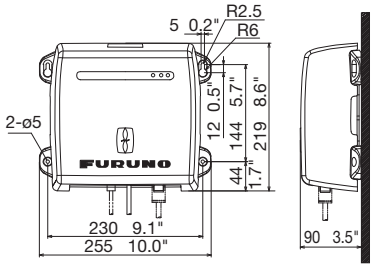
Communications

		AIS RECEIVER	Class-B AIS TRANSPONDER	U-AIS TRANSPONDER
		FA30	FA50	FA170
				
STANDARDS				
		IMO MSC.74 (69) ANNEX 3, ITU-R Rec. M.1371-2, IEC 60945 Ed.4, IMO Res. A.917 (22)	IMO MSC.140(76), ITU-R M.1371-2, DSC ITU R M.825-3, IEC 62287-1, IEC 60945 Ed.4	IMO MSC.74(69) ANNEX 3, IMO MSC.302(87), IMO A.694(17), IMO MSC.191(79), ITU-R M.1371-5, DSC ITU-R M.825-3, IEC61993-2 Ed. 2, IEC60945 Ed. 4 CORRIGENDUM 1, IEC 62288 Ed. 2, IEC 61162-1 Ed. 4, IEC 61162-2 Ed. 1, IEC61162-450 Ed. 1
TRANSPONDER UNIT*		*FA30: RECEIVER UNIT		
TX/RX Frequency (FA30: RX Frequency)		156.025 to 162.025 MHz		
Output Power		—	1 W/2 W	1 W/12.5 W
Channel Spacing		25 kHz/12.5 kHz	25 kHz	25 kHz
MONITOR UNIT				
Screen Size		—	—	4.3" Color LCD
Effective Viewing Area		—	—	95.04 (W) x 53.8 (H) mm
Pixel Number		—	—	480 x 272 dots
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)	GPS: less than 13 m (2 drms, HDOP < 4) DGPS: less than 5 m (2 drms, 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, THS, SSD, VBW, VSD, VTG, AIQ, DSC, DSE	ABM, ACA, ACK, ACM, ACN, AIQ, AIR, BBM, DTM, EPV, GBS, GGA, GLL, GNS, HBT, HDT, LRF, LRI, OSD, PIWWIVD, PIWWSPW, PIWWSSD, PIWWVSD, RMC, ROT, SPW, SSD, THS, VBW, VSD, VTG
	Output	VDM, VDO, ACA, ACS, ALR, TXT	VDM, VDO, ABK, ACA, ACS, ALR, TXT	ABK, ACA, ACS, ALC, ALF, ALR, ARC, EPV, HBT, LR1, LR2, LR3, LRF, LRI, NAK, PIWWIVD, PIWWSPR, PIWWSSD, PIWWVSD, SSD, TRL, TXT, VER, VDM, VDO, VSD
Ethernet		10/100BASE-T	10/100BASE-T	100Base-TX, RJ45 connector, Auto MDI/MDIX
ENVIRONMENT				
Temprature	Antenna Unit	—	-30°C to +70°C	-30°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	IP56
	Other Units	IP20	IP20	Transponder unit: IP22 at bulkhead mount, IP20 at floor Monitor unit: IP22, IP35 with optional waterproofing kit Pilot plug unit (front panel)/Power supply unit: IP22
POWER SUPPLY				

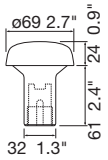
Transponder Unit
FA1701 3.0 kg 6.6 lb



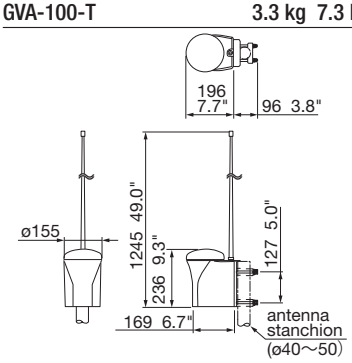
FA30 AIS RECEIVER 1.5 kg 3.3 lb
FA50 Class-B AIS Transponder 1.7 kg 3.7 lb



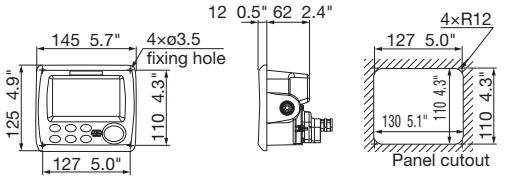
GPS Antenna
GPA-017S 0.15 kg 0.3 lb



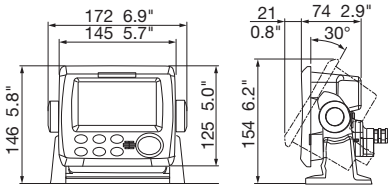
GPS/VHF Combined Antenna
GVA-100-T 3.3 kg 7.3 lb



Monitor Unit (Flush Mount)
FA1702 0.6 kg 1.3 lb

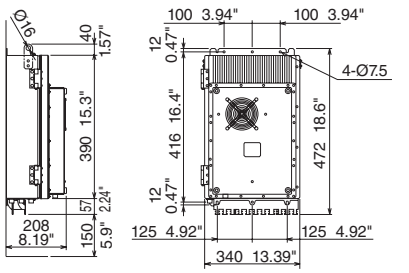


Monitor Unit (Hanger Mount)
FA1702 0.7 kg 1.5 lb

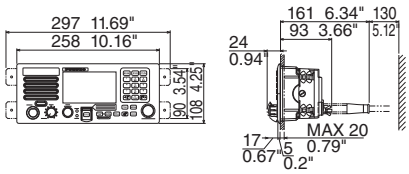


		MF/HF RADIOTELEPHONE	
		FS1575	FS2575
			
GENERAL			
Frequency Range	TX	1.6 to 27.5 MHz (100Hz Steps)	
	RX	0.1 to 29.9 MHz (10Hz Steps)	
Channels		256 user-specified channels plus ITU, SSB/TELEX channels	
Rules and Regulations		ITU-R M. 1082-1, ITU-R M. 1173, ITU-R M. 476-5, ITU-R M. 490, ITU-R M. 491-1, 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, 12577 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)
		100/110/200/220/240 VAC Power Supply PR-300	100/110/120/200/220/240 VAC with optional AC/DC Power Supply PR-850A

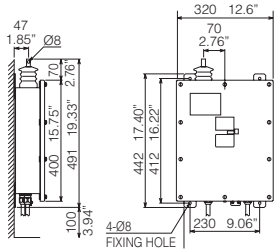
Transceiver Unit FS1575T 16 kg 35.2 lb



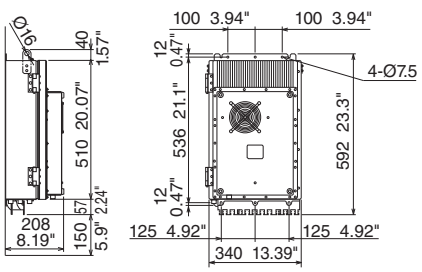
FS2575C 1.8 kg 4.0 lb



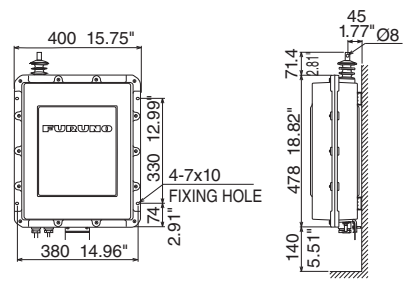
Antenna Coupler AT1575-SUS 8.8 kg 19.4 lb



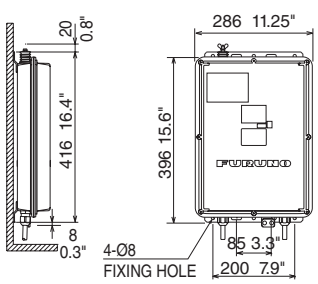
Transceiver Unit FS2575T 20 kg 44.1 lb



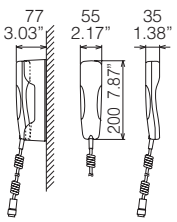
Antenna Coupler AT5075 9.2 kg 20.1 lb



Antenna Coupler AT1575-AES 2.6 kg 5.7 lb



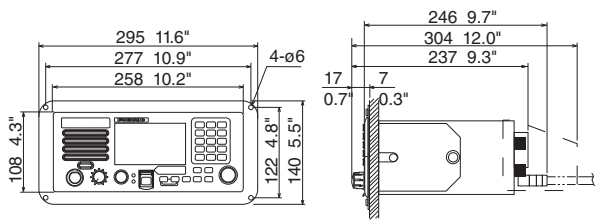
Handset HS2003 0.5 kg 1.2 lb



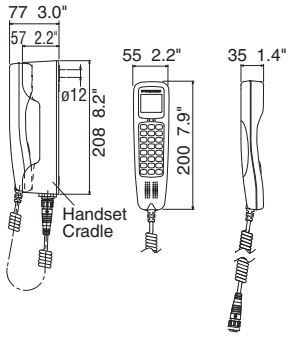
Communications

		VHF RADIOTELEPHONE
		FM8900S
		
GENERAL CHARACTERISTICS		
Class of Emission		G3E (Radiotelephone), G2B (DSC)
Communication System		Simplex/Semi-duplex
Channels		All VHF channels according to ITU-R Radio Regulations Appendix 18, 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 - 161.600 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 - 161.600 MHz
	Semi-duplex	159.600 - 164.200 MHz
Receiving System		Double-conversion super-heterodyne 1st IF : 51.1375 MHz, 2nd IF: 62.5 kHz
AF Output Power		3 W (4 Ω loud speaker), 2 mW (150 Ω 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	156.525 MHz (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	2.3 A (MAX), 1.3 A (standby)
	TX	4.7 A (MAX)

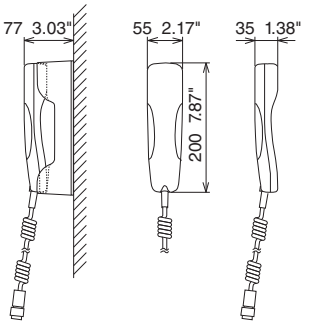
Transceiver Unit (Flushmount) FM-8900S 4.2 kg 9.3 lb



Remote Station RB-8900 0.7 kg 1.5 lb



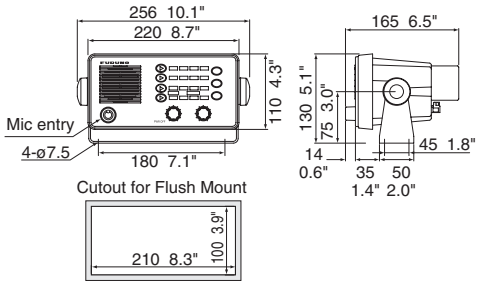
Handset HS-2003 0.2 kg 0.4 lb



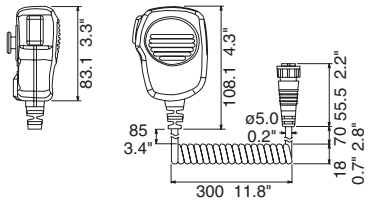
	LOUD HAILER
	LH3000
	
AUDIO OUTPUT	
Hail speaker	20 W, 8 Ω
Intercom speaker	4.0 W, 4 Ω
External speaker	4.0 W, 4 Ω
Internal speaker	2.2 W, 4 Ω
INPUT IMPEDANCE	
MIC impedance	600 Ω
Aux impedance	10 kΩ
INPUT SENSITIVITY	
MIC sensitivity	-73 dB ±3 dB (0 dB=1 V/μBar at 1 kHz)
Aux sensitivity	0 dBm ±3 dB (at 1 kHz)
DISTORTION FACTOR	
Hail mode	less than 10% (1 kHz 20 W)
Intercom mode	less than 10% (1 kHz 4.0 W)
ENVIRONMENT	
Ambient temperature	-15°C to +55°C
Waterproofing	IPX5 (Front panel), IPX0 (Other)
POWER SUPPLY	
	12 VDC ±20%, less than 5 A, 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: AIS Service message H: Loran-C message I: Reserve-presently not used 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

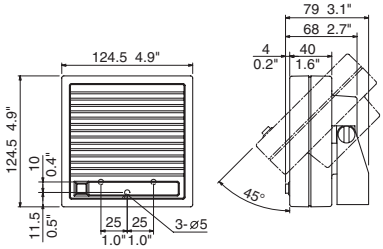
LH3000 **2.0 kg 4.4 lb**



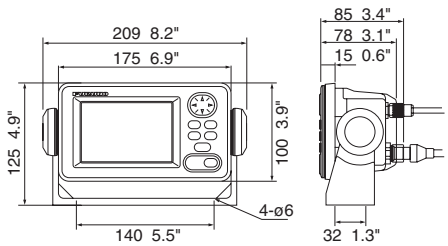
Microphone
DM2003 **0.2 kg 0.44 lb**



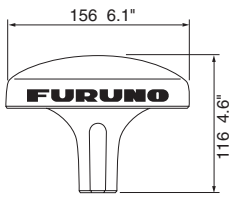
Intercom Speaker
LH3010 **0.56 kg 3.3 lb**



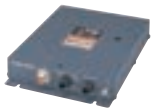
NX300 Display Unit **0.68 kg 1.5 lb**



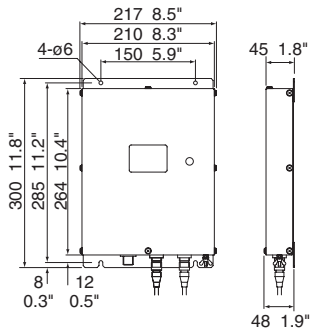
Antenna Unit
NX3H-D **0.9 kg 2.0 lb**



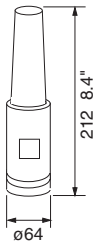
Communications

		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 rpm, 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, 8(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

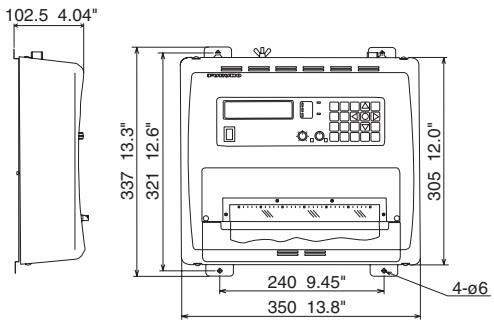


Preamp Unit FAX-5 1.3 kg 2.9 lb



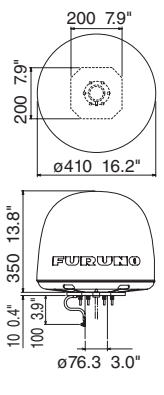
		FACSIMILE RECEIVER
		FAX408
		
RECEIVER CHARACTERISTICS		
Frequency Range		2 MHz to 25 MHz in 100 Hz steps
Number of Channels	User programmed	164
	Pre-programmed	150
Receiving System		Synthesized double super heterodyne
Mode of Reception		F3C
Sensitivity		MF/HF: 2µV at 20 dB SINAD
RECORDER CHARACTERISTICS		
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

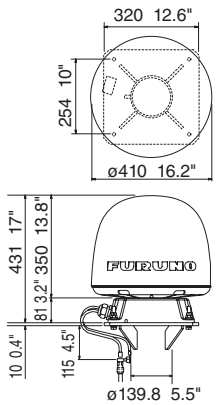


		INMARSAT FLEETBROADBAND	
		FELCOM250	FELCOM500
			
GENERAL			
Transmitting Frequency		1626.5 - 1660.5, 1668.0 - 1675.0 MHz	
Receiving Frequency		1518.0 - 1559.0 MHz	
INTERFACE			
Ethernet	RJ45	4 ports	
2-wire analog telephone	RJ11	2 ports	
	Phoenix 4 pin	2 ports	
NMEA in/out	Phoenix 5 pin (NMEA0183 ver. 2)	1 port	
Alarm output	Phoenix 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)	Up to 284 kbps	Up to 432 kbps
	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		Antenna: IP56, Below Deck Unit: IPX2, Handset: IPX2	
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	

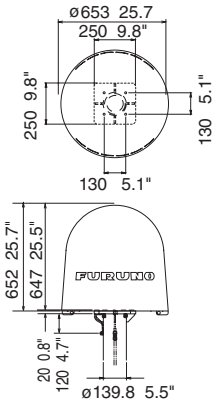
FELCOM250 Antenna
FB-1250-B 6.6 kg 14.5 lb
FB-1250-D 5.7 kg 12.6 lb



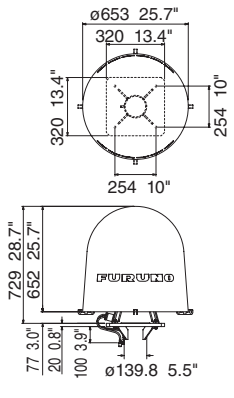
FELCOM250 Antenna (with an attachment)
FB-1250-A 9.5 kg 20.9 lb
FB-1250-C 8.6 kg 19 lb



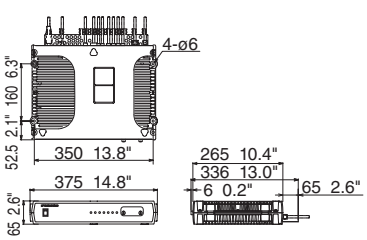
FELCOM500 Antenna
FB-1500-B 18 kg 40 lb
FB-1500-D 19 kg 41.9 lb



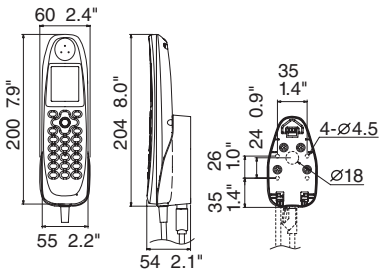
FELCOM500 Antenna (with an attachment)
FB-1500-A 21 kg 46.3 lb
FB-1500-C 22 kg 48.5 lb



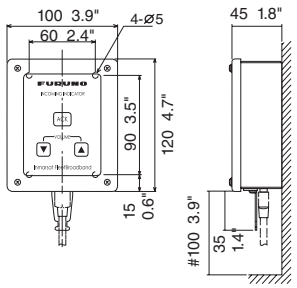
Communication Unit FB-2000 4.1 kg 9 lb



Handset FB-8000 0.38 kg 0.8 lb



Incoming Indicator FB-3000 0.37 kg 0.81 lb



FURUNO's Global Network

FURUNO ELECTRIC CO., LTD.
9-52 Ashihara-cho, Nishinomiya City, Hyogo. 662-8580, Japan
Phone: +81-798-65-2111
Fax: +81-798-63-1020
URL: http://www.furuno.com

FURUNO U.S.A., INC.
4400 N.W. Pacific Rim Boulevard Camas
Washington 98607-9408, U.S.A.
Phone: +1 360-834-9300
Fax: +1 360-834-9400
URL: http://www.furunousa.com/

FURUNO U.S.A., INC. East Coast Office
70 Engerman Ave. Denton Maryland 21629,
U.S.A.
Phone: +1 410-479-4420
Fax: +1 410-479-4429

FURUNO NORGE A/S
Sjømannsveien 19 6008 Ålesund,
Norway
Phone: +47 70-10-29-50
Fax: +47 70-10-29-51
URL: http://www.furuno.no/

FURUNO (UK) LTD.
West Building Penner Road Havant
Hampshire PO9 1QY, U.K.
Phone: +44 23-9244-1000
Fax: +44 23-9248-4316
URL: http://www.furuno.co.uk/

FURUNO DANMARK A/S
Hammerholmen 44-48 DK-2650
Hvidovre, Denmark
Phone: +45 36-77-45-00
Fax: +45 36-77-45-01
URL: http://www.furuno.dk/

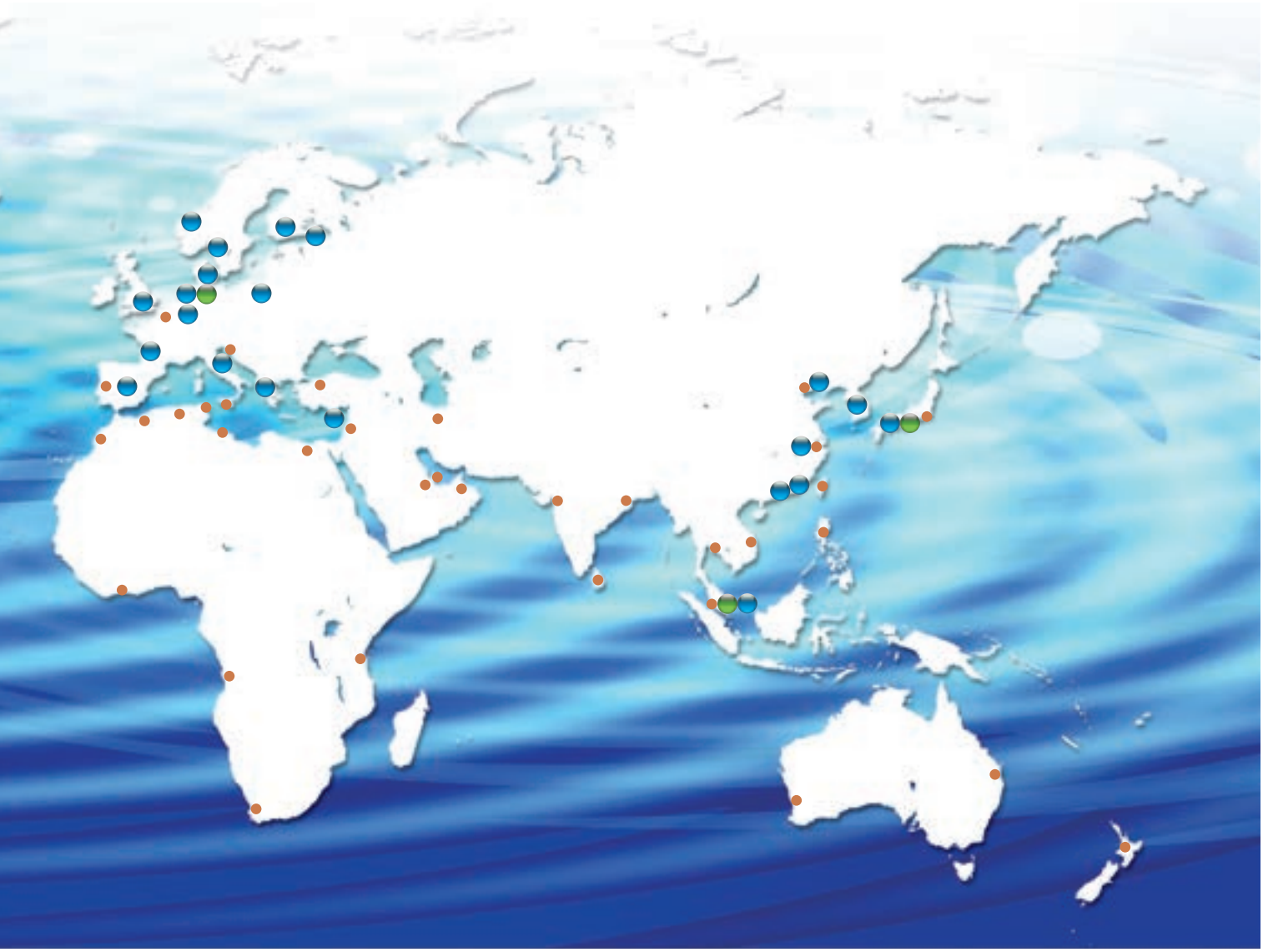
FURUNO SVERIGE AB
S-421 30 Västra Frölunda, Sweden
Phone: +46 31-709-89-40
Fax: +46 31-49-70-93
URL: http://www.furuno.se/

FURUNO FRANCE S.A.S.
Espace Phare 12, rue Laplace
33700 Mérignac, France
Phone: +33 5-56-13-48-00
Fax: +33 5-56-13-48-01
URL: http://www.furuno.fr/

FURUNO ITALIA S.R.L.
Via Ottorino Respighi
29-47043 Gatteo Mare (FC)
Italy
Phone: +39 0541 1849411
URL: http://www.furuno.it

FURUNO ESPAÑA S.A.
Francisco Remiro, 2-B 28028 Madrid,
Spain
Phone: +34 91-725-90-88
Fax: +34 91-725-98-97
URL: http://www.furuno.es/

FURUNO FINLAND OY
Niittyrinne 7 02270 Espoo, Finland
Phone: +358 9-4355-670
Fax: +358 9-4355-6710
URL: http://www.furuno.fi/



FURUNO POLSKA Sp. z o.o.
Ul. Wolnosci 20 81-327 Gdynia, Poland
Phone: +48 58-669-02-20
Fax: +48 58-669-02-21
URL: http://www.furuno.pl/

FURUNO EURUS LLC
4-th Sovetskaya str. house 16/10
Liter A, 191036, Saint-Petersburg
Russian Federation
Phone: +7 812-647-70-25
Fax: +7 812-767-15-92
URL: http://www.furuno.ru/

FURUNO DEUTSCHLAND GmbH
Siemensstraße 33 25462 Rellingen,
Germany
Phone: +49 4101-838-0
Fax: +49 4101-838-111
URL: http://www.furuno.de/

FURUNO HELLAS S.A.
10 Thetidos str.
16675 Glyfada, Greece
Phone: +30 210 4004426
Fax: +30 210 4004570
URL: http://www.furuno.gr

FURUNO (CYPRUS) LTD
82 Nicou Pattichi str. "MARITANIA COURT",
shop 3&4, 3070
P.O.Box: 51342, Postal Code: 3504, Limassol
Phone: +357 25 734466
Fax: +357 25 734460
URL: http://www.furuno.com.cy

FURUNO CHINA CO., LTD.
Unit C on 7th Floor, KC100
100 Kwai Cheong Road,
Kwai Chung, NT.,
Hong Kong
Phone: +852 2165 3700
Fax: +852 2362 0738

FURUNO SHANGHAI CO., LTD.
Unit 1201-1207, 12F
647 Long Hua east road, The Riverfront
Huangpu Shanghai, China
Phone: +86 21 3393 3260
Fax: +86 21 5386 2291
URL: http://www.furuno.com/cn

FURUNO HONGKONG CO., LTD.
Room 1610-16, 16/F., Grand City Plaza,
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Hong Kong
Phone: +852 2498-0109
Fax: +852 2498-0216

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FURUNO KOREA CO., LTD.
1st-2nd F., Cheong-hae Bldg.,
Choryang-dong 16-14, Jungang-daero
180beon-gil, Dong-gu
Busan, 601-839, Korea
Phone: +82 51 440 8900
Fax: +82 51 440 8901

FURUNO SINGAPORE PTE LTD
No.17 Loyang Lane, Singapore 508917
Phone: +65 6745 8472
Fax: +65 6747 1151
URL: http://www.furuno.sg/

WORLDWIDE DISTRIBUTORS

NORTH AMERICA

U.S.A. / CANADA
FURUNO U. S. A., INC.
4400 N.W. Pacific Rim Boulevard
Camas
Washington 98607-9408
Phone: +1 360-834-9300
Fax: +1 360-834-9400
E-mail: info@furuno.com

East Coast Office:
FURUNO U. S. A., INC.
70 Engerman Ave.
Denton
Maryland 21629
Phone: +1 410-479-4420
Fax: +1 410-479-4429

CENTRAL/SOUTH AMERICA

ARGENTINA
NAVAL STAR S.A.
9 de julio 817 - Puerto Madryn
(9120) Provincia del Chubut
Phone: +54-280-4472525/
4451929/4451236
Fax: +54 280 4451377
E-mail: service@navalstar.com

Ministro Brin 982
(1158) - Buenos Aires
Phone: +54 11 4362-6874
+54 11 4300-8616
Fax: +54 280 44513377
E-mail: service@navalstar.com

BRAZIL
RADIOMAR ELECTRONICA Naval ltda.
Rua Conde de Lages, 44 gr. 1201
Gloria - Rio de Janeiro - RJ.
CEP 20.241-080
Phone: +55 21 2187-2400
E-mail: radiomar@radiomar.com.br

CHILE
MARCO INDUSTRIAL SpA.
Los Gobelinos 2584,
Renca - Santiago
Phone: +56 2-7824400
Fax: +56 2-6464623
E-mail: cespinoza@marco.cl

COLOMBIA
ITEC ELECTRONICA MARITIMA LTDA
CC Santa Lucia locales 5 y 6
Cartagena-Colombia
Phone: +57 5 663-3909/663-3789
Fax: +57 5 663-3643
E-mail: mosoriov@iteccolombia.com

CURACAO
Refer to **FURUNO U. S. A., INC.**, U.S.A.

ECUADOR
ELECTROMARINA CIA. LTDA.
Ave. Juan Tanca
Marengo 200
Piso 1 of #1
Guayaquil
Phone: +593 4-2395701/2290486
Fax: +593 4-2286780
E-mail: elemar@electromarina.com.ec

MEXICO
Refer to **FURUNO U. S. A., INC.**, U.S.A.

PERU
MARCO PERUANA, S. A.
Avda. Saenz Pena 1439
Callao, 1
Phone: +51 14-294978
Fax: +51 14-659497
E-mail: raul@marco.com.pe

PANAMA
NAVSTAR MARINE ELECTRONICS, S.A.
Williamson place 0752 B
La Boca, Ancon
P.O.Box 2554, Zona 3
Phone: +507 228 0399/0907
Fax: +507 228 9331/7825
E-mail: Navmarine@cwpanama.net
info@navstarmarine.com

TRINIDAD AND TOBAGO
Refer to **FURUNO U. S. A., INC.**, U.S.A.

URUGUAY
AEROMARINE S.A.
Rambla 25 de Agosto 326
11000 - Montevideo
Phone: +598 2 916 64 56
+598 94 444 652
Fax: +598 2 916 64 56
E-mail: service@aeromarine.com.uy

VENEZUELA
Refer to **FURUNO U. S. A., INC.**, U.S.A.

EUROPE

BELGIUM
Refer to **FURUNO FRANCE S.A.S.**, FRANCE

BULGARIA
Refer to **OZSAY**, TURKEY

CROATIA / SLOVENIA
HORA ELEKTRONIK d.o.o.
A.B.Simica 65, 51000 Rijeka
Phone: +385 51-612 000
Fax: +385 51-612 001
E-mail: info@hora-elektronik.hr

CYPRUS
FURUNO (CYPRUS) LTD
82 Nicou Pattichi str. "MARITANIA COURT",
shop 3&4, 3070
P.O.Box: 51342, Postal Code: 3504, Limassol
Phone: +357 25 734466
Fax: +357 25 734460
Email: info@furuno.com.cy,
sales@furuno.com.cy,
tech@furuno.com.cy

DENMARK
FURUNO DANMARK AS
Hammerholmen 44-48
DK-2650 Hvidovre
Phone: +45 36 77 45 00
Fax: +45 36 77 45 01
Telex: 27289 FURUNO DK
E-mail: furuno@furuno.dk

ESTONIA
Refer to **FURUNO DANMARK AS**, DENMARK

FAROE ISLANDS
Refer to **FURUNO DANMARK AS**, DENMARK

FINLAND
FURUNO FINLAND OY
Niittyrinne 7 02270 Espoo
P.O.Box 74 FI02271 Espoo
Phone: +358 9 4355670
Fax: +358 9 43556710
E-mail: info@furuno.fi

FRANCE
FURUNO FRANCE S.A.S.
Espace Phare 12, rue Laplace
33700 Mérignac
Phone: +33 5 56 13 48 00
Fax: +33 5 56 13 48 01
E-mail: info@furuno.fr

GERMANY
FURUNO DEUTSCHLAND GmbH
Siemensstrasse 33
25462 Rellingen
Phone: +49 4101 838 0
Fax: +49 4101 838 111
E-mail: furuno@furuno.de

GREECE
FURUNO HELLAS S.A.
10 Thetidos str.
16675 Glyfada
Phone: +30 210 4004426
Fax: +30 210 4004570
E-mail: sales@furuno.gr (Sales)
salesgr@furuno.com.cy (Sales)
tech@furuno.gr (Service)
techgr@furuno.com.cy (Service)

GREENLAND
Refer to **FURUNO DANMARK AS**, DENMARK

ICELAND
Refer to **FURUNO DANMARK AS**, DENMARK

IRELAND
Refer to **FURUNO (UK) LIMITED**, UK

ITALY
FURUNO ITALIA S.R.L.
Via Ottorino Respighi
47043 Gatteo Mare (FC)
Phone: +39 0541 1849400
E-mail: sales@furuno.it (Sales)
service@furuno.it (Service)

LATVIA
Refer to **FURUNO DANMARK AS**, DENMARK

LITHUANIA
Refer to **FURUNO DANMARK AS**, DENMARK

MALTA G.C.
Refer to **FURUNO ITALIA S.R.L.**, ITALY

MONACO
Refer to **FURUNO FRANCE S.A.**, FRANCE

NETHERLANDS
RH MARINE NETHERLANDS B.V.
Sluisjesdijk 155, 3087
AG Rotterdam
Phone: +31 10-4283344
Fax: +31 10-4281498
E-mail: sales.nl@rhmarinegroup.com

NORWAY
FURUNO NORGE A/S
Sjømannsveien 19 6008 Ålesund
Service box 11, N-6025 Ålesund
Phone: +47 70 10 29 50
Fax: +47 70 10 29 51
E-mail: furuno@furuno.no

POLAND
FURUNO POLSKA Sp. Z O.O.
Ul. Wolnosci 20
81-327 Gdynia
Phone: +48 58 669 02 20
Fax: +48 58 669 02 21
E-mail: furuno@furuno.pl

PORTUGAL
Refer to **FURUNO ESPAÑA S.A.**, SPAIN

ROMANIA
Refer to **FURUNO (UK) LIMITED**, UK

SPAIN
FURUNO ESPAÑA S.A.
Francisco Remiro, 2-B
28028 Madrid
Phone: +34 91-725-90-88
Fax: +34 91-725-98-97
E-mail: furuno@furuno.es

SWEDEN
FURUNO SVERIGE AB
Gruvgatan 23
S-421 30 Västra Frölunda
Phone: +46 31-709 89 40
Fax: +46 31-49 70 93
E-mail: info@furuno.se (Sales)
service@furuno.se (Service)

U.K.
FURUNO (UK) LIMITED
West Building Penner Road Havant
Hampshire PO9 1QY
Phone: +44 2392-441000
Fax: +44 2392-484316
E-mail: sales@furuno.co.uk

UKRAINE
OZSAY UKRAINE
Artilleriskaya 18, 5th Floor 54030
Nikolaev - Ukraine
Phone: +38 0512-76-74-74
Fax: +38 0512-35-51-30
E-mail: ukraine@ozsay.com

MIDDLE EAST

BAHRAIN
UCO ENGINEERING W.L.L.
P.O.Box 5169
Phone: +973 17 700266
Fax: +973 17 702077
E-mail: ucogroup@batelco.com.bh

EGYPT
RADIO HOLLAND EGYPT S.A.E.
24 Syria St., Roushdy, Alexandria
P.O.Box 2026 Alexandria
Phone: +20 35233454
Fax: +20 35233238
E-mail: info@rhegypt.com

KUWAIT
Refer to **RADIO HOLLAND MIDDLE EAST LLC**, U.A.E.

LEBANON
SELCOM MARINE SARL
P.O.Box 55541
Dekwaneh Street
Beirut
Phone: +961 1 491489 / 498154
Fax: +961 1 495325
E-mail: info@selcom-marine.com

OMAN
Refer to **RADIO HOLLAND MIDDLE EAST LLC**, U.A.E.

QATAR
Refer to **RADIO HOLLAND MIDDLE EAST LLC**, U.A.E.

SAUDI ARABIA
YUSUF BIN AHMED KANOO MARINE SERVICES GROUP
P.O.Box 37
Dammam 31411
Phone: +966 1 3 8571265
Fax: +966 1 3 8592433
E-mail: msgdmm@kanoo.com

SYRIA
Refer to **SELCOM MARINE SARL.**, LEBANON.

TURKEY
OZSAY DENIZ ELEKTRONIGI A.S.
Guzelyali, E-5 Uzeri,
No.18 Pendik, 34903
Istanbul
Phone: +90 216-4933610
Fax: +90 216-4930306
E-mail: ozsay@tnn.net

UNITED ARAB EMIRATES
RADIO HOLLAND MIDDLE EAST LLC
P.O.Box 4592
Sharjah
Floors 1&2, Al Buhairah Insurance
Tower Buhairah Corniche Road
Sharjah
Phone: +971 6-574 4144
Fax: +971 6-574 9998
E-mail: dubai@serviceradioholland.com

AFRICA

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Refer to **FURUNO FRANCE S.A.,** FRANCE

IVORY COAST
S.I.E.C.M.I.
SOCIETE IVOIRIENN D'ELECTRONIQUE MARITIME ET INDUSTRIELLE
Port de Peche
10 B.P.513
Abidjan 10 (R.C.I.)
Phone: +225 21 21-63-45
Fax: +225 21 25-08-23
E-mail: abidjan@siecmi.com

KENYA
MARAJANI-COMMUNICATIONS, TOURS & ASSISTANCES LTD.,
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56, Balarabe Musa Crescent,
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Victoria Island, Lagos
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Fax: +234 1 4619882
E-mail: rantiomole@radialcircle.com

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Fishing port, P.O.Box 497
Victoria, Mahe
Phone: +248 22 47 52
Fax: +248 22 46 77
E-mail: seycmi@seychelles.net

SOUTH AFRICA
RADIO HOLLAND SOUTH AFRICA (PTY) LTD.
P.O.Box 527
PAARDEN EILAND 7420
Phone: +27 21 50-84-700
Fax: +27 21 50-84-888
E-mail: info@radioholland.co.za

TUNISIA
Refer to **FURUNO FRANCE S.A.,** FRANCE

RUSSIAN FEDERATION

RUSSIAN FEDERATION
FURUNO EURUS LLC
4-th Sovetskaya str. house 16/10,
Liter A, 191036, Saint-Petersburg
Phone: +7 812 647-70-25
Fax: +7 812 647-70-25
E-mail: sales@furuno.ru
service@furuno.ru

Refer to **FURUNO NORGE A/S**, NORWAY

MORIKAWA SHOJI KAISHA.LTD
KS Bldg. No.4-5 Kojimachi
Chiyoda-ku
Tokyo 102-0083, JAPAN
Phone: +81 3 5226 6411
Fax: +81 3 5226 6417
E-mail: furuno@mskaisha.co.jp

ASIA

JAPAN
Headquarters:
FURUNO ELECTRIC CO., LTD.
9-52, Ashihara-cho
Nishinomiya 662-8580
Phone: +81 798-65-2111
Fax: +81 798-65-4200
+81 798-66-4622

Tokyo office:
FURUNO ELECTRIC CO., LTD.
Kandaizumi-cho Asia Building
2-6 Kandaizumi-cho
Chiyoda-ku
Tokyo 101-0024
Phone: +81 3-5687-0411
Fax: +81 3-5687-0380/0381
+81 3-5687-0382/0383

BANGLADESH
Refer to **FURUNO SINGAPORE PTE LTD,** SINGAPORE

BRUNEI
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CHINA/HONG KONG
FURUNO CHINA CO., LTD.
Unit C on 7th Floor, KC100
100 Kwai Cheong Road,
Kwai Chung, NT.,
Hong Kong
Phone: +852 2165 3700
Fax: +852 2362 0738

FURUNO SHANGHAI CO., LTD.
Unit 1201-1207, 12F
647 Long Hua east road, The Riverfront
Huangpu Shanghai, China
Phone: +86 21 3393 3260
E-mail: inquiry@furuno.cn

INDIA
A.S.MOLOOBHOY Private Limited
Marathon Futurex, B-501, 5th Floor, Mafatlal
Mills Compound, N.M. Joshi Marg, Lower Parel,
Mumbai–400013
Phone: +91 22 23737590
Fax: +91 22 23742678
E-mail: electronicsales@asmoloobhoy.com
service@asmoloobhoy.com

INDONESIA
PT FURUNO ELECTRIC INDONESIA
Cowell Tower, 8th floor Jl. Senen Raya No. 135,
Jakarta 10410
Phone: +62-(0)213511282
Fax: +62-(0)213511283
E-mail: fid@furuno.id

KOREA
SHIN-A CORPORATION
645-3, Nambumin-Dong, Seo-Gu,
Pusan
Phone: +82 51-241-6151
Fax: +82 51-244-2878
E-mail: shina@shinacorp.co.kr

MALAYSIA
Refer to **FURUNO SINGAPORE PTE LTD** SINGAPORE

MALDIVES
Refer to **FURUNO SINGAPORE PTE LTD** SINGAPORE

PHILIPPINES
SCAN MARINE, INC.
P.O. Box 3241
#160 Honorio Lopez Blvd.
Balut, Tondo Manila
Phone: +63 2 5222826~27
Fax: +63 2 5222970
E-mail: smiphil@scanmarine.com.ph (Sales)
smiservice@scanmarine.com.ph (Service)

SINGAPORE
FURUNO SINGAPORE PTE LTD
Loyang Lane, SINGAPORE 508917
Phone: +65 6745-8472 (Office)
+65 6745-8473 (Service)
Fax: +65 6747-1151 (Office)
+65 6743-6077 (Service)
E-mail: fsg@furuno.sg

SRILANKA
QUEENS RADIO MARINE ELECTRONICS (PTE) LIMITED
861 Aluthmawatte Road, Colombo 15, Sri Lanka.
Phone: +94-11-2523511/12
+94-77-7730167 (24Hrs Service)
Fax: +94-11-2523669
E-mail: queensradio@queensgroup.net (General)
sales@queensgroup.net (Sales)
service@queensgroup.net (Service)

TAIWAN
ANCHANG BROTHERS CO., LTD.
No. 28, Lane 113
Hou-Pin Road Chien Chen District
P.O. BOX 44-1, Kaohsiung
Phone: +886 7-8114510
Fax: +886 7-8119369
E-mail: sales@anchangbros.com.tw
service@anchangbros.com.tw

THAILAND
C. SAHAMONGKOL ENGINEERING LTD., PART.
76/92-93 Ratchada-Thapra Road
Bangkok-Yai, Bangkok 10600
Phone: +66 2 4570066
Fax: +66 2 4579428
E-mail: csm@csm.co.th
dsc@csm.co.th

VIETNAM
HAIDANG CO., LTD.
666/64/30 Ba Thang Hai St.,
Dist.10, Ho Chi Minh City, S.R.
Phone: +84-8-3863 21 59
Fax: +84-8-3863 25 24
E-mail: haidang@haidang.vn

OCEANIA

AUSTRALIA
J. N. TAYLOR & CO. LTD.
62 Sparks Road Henderson WA 6166
Phone: +61 (8) 9494-9393
Fax: +61 (8) 9494-9388
E-mail: admin@taylormarine.com.au

NEW ZEALAND
ELECTRONIC NAVIGATION LTD.
46 Hillside Road
Wairau Valley
Auckland 0627
Phone: +64 9-3735595
Fax: +64 9-3795655
Inmarsat C: 451200183
E-mail: enl@enl.co.nz

FIJI
Refer to **EELECTRONIC NAVIGATION LTD.,** NEW ZEALAND

FRENCH POLYNESIA
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FURUNO U.S.A., INC.
4400 N.W. Pacific Rim Boulevard
Camas, Washington 98607-9408, U.S.A.
Phone: +1 360-834-9300 Fax: +1 360-834-9400
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