

FURUNO

FISH FINDER

Model **FCV-628/FCV-588**

ECF

(Elemental Chlorine Free)

The paper used in this manual is elemental chlorine free.

NOTICE - Product Inquiry

When contacting your dealer with a support or service inquiry, please provide the serial no. of your product.

MODEL : FCV-628/588

Serial number :

FURUNO ELECTRIC CO., LTD.

9-52 Ashihara-cho,
Nishinomiya, 662-8580, JAPAN

FURUNO Authorized Distributor/Dealer

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(MISU) FCV-628/588



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 **FURUNO ELECTRIC CO., LTD.**

www.furuno.com

IMPORTANT NOTICES

General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- The operator of this equipment must read and follow the descriptions in this manual. Wrong operation or maintenance can cancel the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will cancel the warranty.
- The following concern acts as our importer in Europe, as defined in DECISION No 768/2008/EC.
 - Name: FURUNO EUROPE B.V.
 - Address: Ridderhaven 19B, 2984 BT Ridderkerk, The Netherlands
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.

How to discard this product

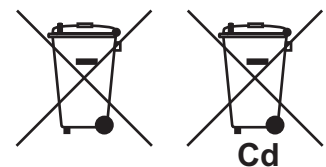
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

How to discard a used battery

Some FURUNO products have a battery(ies). To see if your product has a battery, see the chapter on Maintenance. Follow the instructions below if a battery is used. Tape the + and - terminals of battery before disposal to prevent fire, heat generation caused by short circuit.

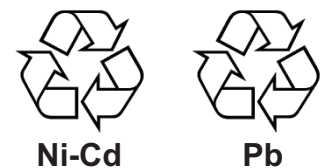
In the European Union

The crossed-out trash can symbol indicates that all types of batteries must not be discarded in standard trash, or at a trash site. Take the used batteries to a battery collection site according to your national legislation and the Batteries Directive 2006/66/EU.



In the USA

The Mobius loop symbol (three chasing arrows) indicates that Ni-Cd and lead-acid rechargeable batteries must be recycled. Take the used batteries to a battery collection site according to local laws.





In the other countries

There are no international standards for the battery recycle symbol. The number of symbols can increase when the other countries make their own recycle symbols in the future.









SAFETY INSTRUCTIONS







The operator and installer must read the applicable safety instructions before attempting to operate or install the equipment.

 WARNING	Indicates a condition that can cause death or serious injury if not avoided.
 CAUTION	Indicates a condition that can cause minor or moderate injury if not avoided.

 Warning, Caution	 Prohibitive Action	 Mandatory Action
--	--	--

Safety Instructions for the Operator

 WARNING	
	ELECTRICAL SHOCK HAZARD Do not open the equipment (other than when installing flush mount hanger cover). Hazardous voltage exists inside the equipment. Refer repair to authorized service personnel.
	Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire. Continued use of the equipment can cause fire or electrical shock. Contact a FURUNO agent for service.
	Do not maneuver the vessel based on the depth indication alone. Grounding can result.
	Do not disassemble or modify the equipment. Fire, electrical shock or injury can result.
	Use the proper fuse. Use of an incorrect fuse can damage the equipment and can cause fire.

 CAUTION	
	Do not turn on the equipment with the transducer out of water. The transducer can be damaged.
	The picture is not refreshed when picture advancement is stopped. Maneuvering the vessel in this condition can result in a dangerous situation.
	Adjust the gain correctly. Incorrect gain may give a wrong depth indication, which could result in a dangerous situation.
	The data presented by this equipment is intended as a source of navigation information. The prudent navigator never relies exclusively on any one source of navigation information, for safety of vessel and crew.
	The LCD panel is made of glass. Handle it with care. Injury can result if the glass breaks.

Warning Label

⚠ WARNING ⚠
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.
⚠ 警告 ⚠
感電の恐れあり。 サービスマン以外の方はカバーを開けないで下さい。内部には高電圧部分が数多くあり、万一さわると危険です。

FCV-628
Name: Warning Label (1)
Type: 86-003-1011-3
Code No.: 100-236-233-10





A warning label is attached to the display unit. Do not remove the label. If the label is missing or damaged, contact a FURUNO agent or dealer about replacement.

⚠ WARNING ⚠
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.

⚠ 警告 ⚠
感電の恐れあり。 サービスマン以外の方はカバーを開けないで下さい。内部には高電圧部分が数多くあり、万一さわると危険です。

FCV-588
Name: Warning Label (2)
Type: 03-129-1001-3
Code No.: 100-236-743-10

Safety Instructions for the Installer

 WARNING	
	<p>Turn off the power at the switchboard before beginning the installation.</p> <p>Fire or electrical shock can result if the power is left on.</p>
	<p>Be sure no water leaks in at the transducer or sensor mounting location.</p> <p>Water leakage can sink the vessel. Also confirm that the transducer and/or sensor will not loosen by ship's vibration. The installer is solely responsible for the proper installation of the equipment. FURUNO will assume no responsibility for any damage associated with improper installation of the transducer.</p>
	<p>Use the specified power cable.</p> <p>Use of other power cable can cause fire.</p>






 CAUTION										
	<p>Do not install the transducer or sensor where air bubbles and noise are present.</p> <p>Performance will be affected.</p>									
	<p>The following are guidelines for handling of the transducer cable.</p> <ul style="list-style-type: none"> - Keep fuels and oils away from the cable. - Locate cable in a safe place. - Do not paint the cable. <p>The sheath of the cable is made of chloroprene rubber (or polychloride vinyl). For this reason do not paint the cable.</p>									
	<p>Do not turn on the equipment with the transducer out of water.</p> <p>The transducer can be damaged.</p>									
	<p>Observe the following compass safe distances to prevent interference to a magnetic compass:</p> <table border="1" data-bbox="933 1624 1404 1836"> <thead> <tr> <th>Display unit</th> <th>Standard compass</th> <th>Steering compass</th> </tr> </thead> <tbody> <tr> <td>FCV-628</td> <td>0.40 m</td> <td>0.30 m</td> </tr> <tr> <td>FCV-588</td> <td>0.50 m</td> <td>0.30 m</td> </tr> </tbody> </table>	Display unit	Standard compass	Steering compass	FCV-628	0.40 m	0.30 m	FCV-588	0.50 m	0.30 m
Display unit	Standard compass	Steering compass								
FCV-628	0.40 m	0.30 m								
FCV-588	0.50 m	0.30 m								

TABLE OF CONTENTS

FOREWORD	v	2.3 Key Menu	26
SYSTEM CONFIGURATION	vi	2.4 Language Menu	26
1. OPERATION	1	2.5 Units Menu	27
1.1 Control Description	1	2.6 Calib Menu	27
1.2 Power On/Off	2	2.7 Transducer Menu	28
1.3 Display Brilliance	2	2.8 Demo Menu	28
1.4 Display Mode	2	2.9 Tankenmaru Menu	29
1.4.1 Single frequency display	2	3. MAINTENANCE,	
1.4.2 Dual frequency display	3	TROUBLESHOOTING	30
1.4.3 Zoom displays	3	3.1 Maintenance	30
1.4.4 Nav data display	4	3.2 How to Clean the Display Unit	30
1.5 How to Select a Range	5	3.3 Transducer Maintenance	30
1.6 How to Adjust the Gain	5	3.4 How to Replace the Fuse	31
1.7 How to Measure Depth	6	3.5 Battery Voltage Alert	31
1.8 Menu Operating Procedure	7	3.6 Troubleshooting	31
1.9 How to Shift the Range	7	3.7 Diagnostics	32
1.10 Picture Advance Speed	8	3.8 LCD Test	33
1.11 How to Reduce		3.9 How to Clear the Memory, Reset	
Interference	9	the Odometer	33
1.12 How to Reduce		4. INSTALLATION	34
Low Level Noise	9	4.1 Equipment List	34
1.13 How to Erase		4.2 Display Unit	36
Weak Echoes	10	4.3 Thru-hull Mount Transducer	37
1.14 A-scope Display	10	4.4 Transom Mount Transducer	39
1.15 Fish Information		4.5 How to Mount a Thru-hull	
(ACCU-FISH™)	11	Transducer Inside the Hull	39
1.15.1 How to activate		4.6 Triducer	41
ACCU-FISH™	12	4.7 Speed/Temperature Sensor	
1.15.2 Fish symbols	12	(option)	44
1.15.3 Fish info	12	4.8 Wiring	45
1.16 Bottom Discrimination Display	13	4.9 IEC 61162-1 Data Sentences	47
1.17 RezBoost™	14	4.10 Adjustments after Installation	48
1.17.1 How to set RezBoost™	14	MENU TREE	AP-1
1.18 Alarms	14	INSTALLATION FOR TRANSDUCER	
1.19 FUNC Key	18	(THRU-HULL MOUNT)	AP-4
1.19.1 How to use the FUNC key	18	INSTALLATION OF	
1.19.2 How to change the function	18	TEMPERATURE SENSORS	AP-8
1.20 Waypoints	18	SPECIFICATIONS	SP-1
1.20.1 How to register a waypoint	18	PACKING LISTS	A-1
1.20.2 How to edit registered		OUTLINE DRAWINGS	D-1
waypoints	20	INTERCONNECTION DIAGRAM	S-1
1.20.3 How to erase waypoints	20	INDEX	IN-1
1.20.4 How to set destination			
waypoint	20		
1.21 Setting Up Nav Data Displays	20		
1.22 Menu Description	22		
2. SYSTEM MENU	26		
2.1 How to Display the			
System Menu	26		
2.2 Range Menu	26		

FOREWORD

A Word to FCV-588/628 Owners

Congratulations on your choice of the FURUNO FCV-588/628 Fish Finder. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

Since 1948, FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

This equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

We would appreciate hearing from you, the end user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO equipment.

Features

The FURUNO FCV-588 and FCV-628 are dual frequency (50 kHz and 200 kHz) Fish Finders. Comprised of a display unit and a transducer, The FCV-588 and FCV-628 show underwater conditions on a color LCD, 8.4 inch (FCV-588) or 5.7-inch (FCV-628).

The main features of the FCV-628/588 are

- Bright color LCD gives excellent readability even in broad daylight.
- Waterproof construction permits installation on open bridge.
- Automatic mode automatically adjusts the set to provide the best possible display, from shallow to deep depths.
- ACCU-FISH™ provides estimate of fish length with fish size dependent fish mark.

- RezBoost™ raises echo resolution to see fish echoes clearly. (Not available when the transducer is installed with the inside hull installation method.)
- Bottom discrimination display provides estimate of bottom composition. (Not available when the transducer is installed with the inside hull installation method.)
- White line feature helps distinguish bottom fish from the bottom echo.
- Gain adjusts sensitivity over the entire screen.
- Various alarms alert you to presence of fish, dangerous situations, etc.
- Destination waypoint feature provides range, bearing, and time-to-go to destination waypoint (up to 20 waypoints).*
- Echo position can be output to a navigational plotter.*
- “Tankenmaru” system* outputs video signal to other Tankenmaru-equipped partner ship, etc., via a radio transmitter. (Available in the future.)

* Requires connection of appropriate sensor, navigation device.

LCD Panel

The LCD panel used in this equipment is a TFT LCD. The panel is constructed using the latest LCD techniques, and displays 99.99% of its pixels. The remaining 0.01% of the pixels may drop out or blink, however this is not an indication of malfunction; it is an inherent property of the LCD.

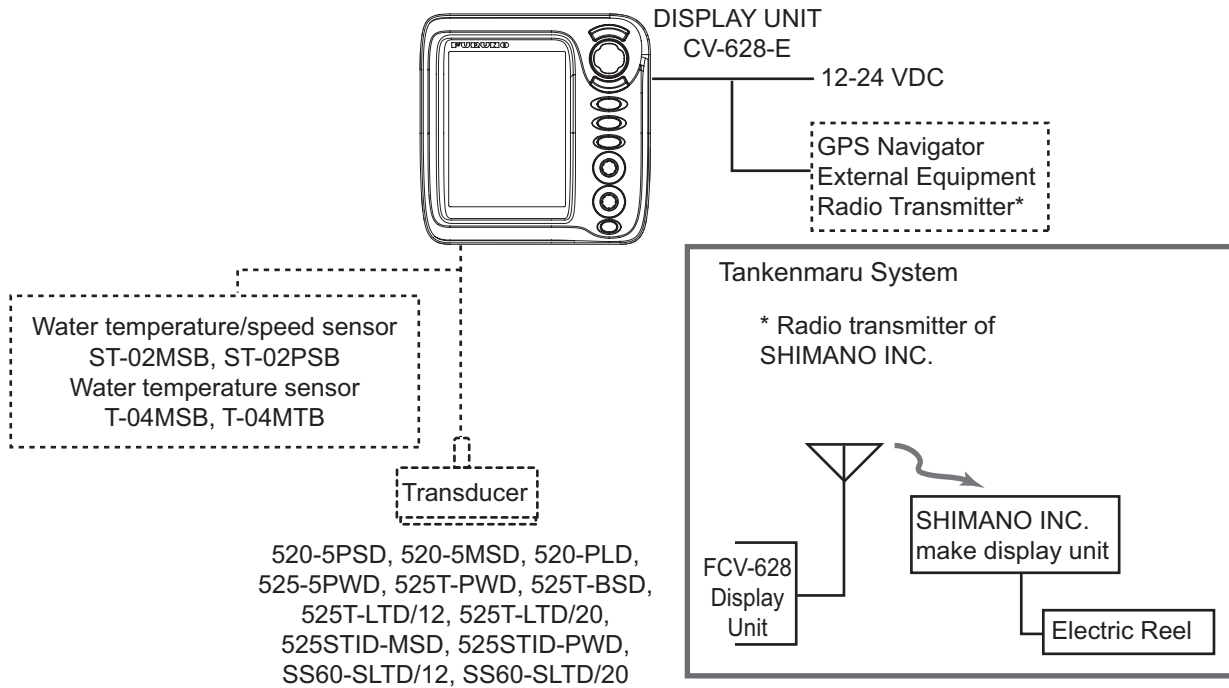
CE declaration

With regards to CE declarations, please refer to our website (www.furuno.com) for further information about RoHS conformity declarations.

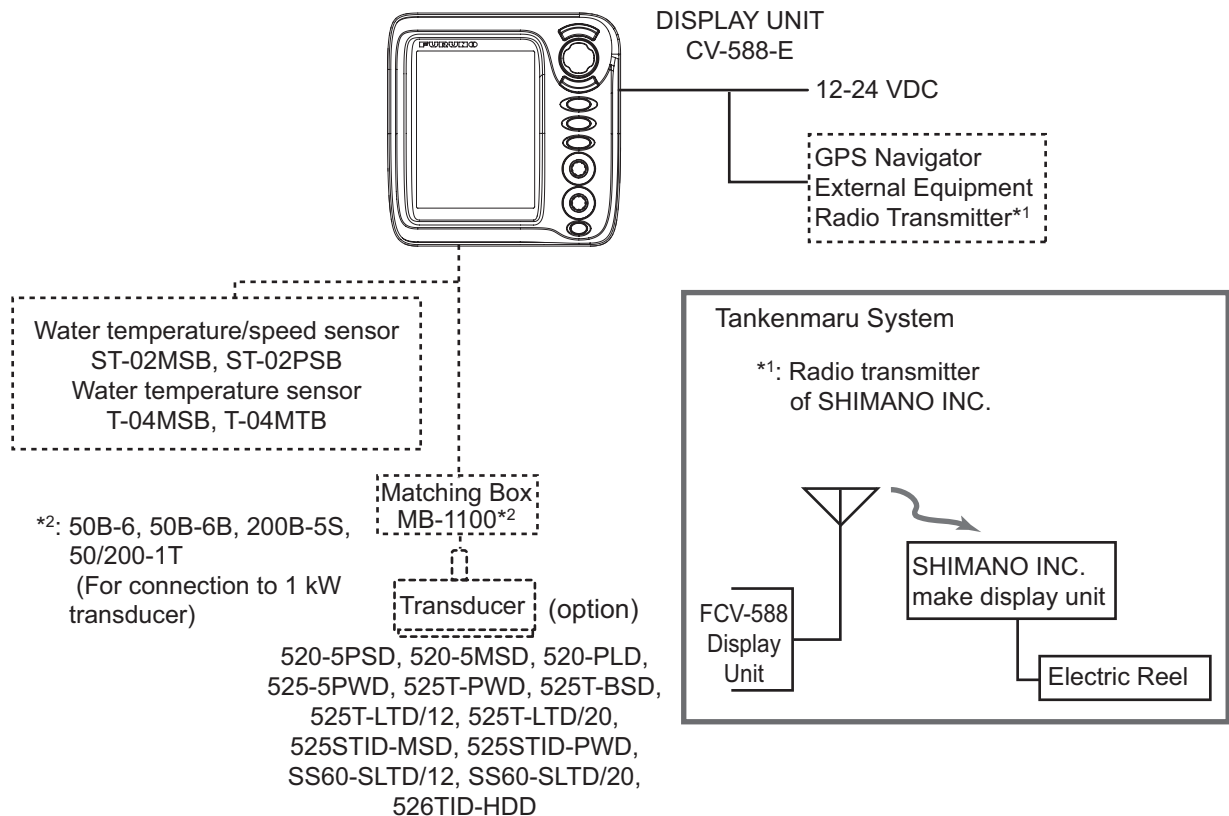
SYSTEM CONFIGURATION

Solid lines indicate standard equipment; dashed lines show optional or local supply equipment. For wiring, see the interconnection diagram at the back of this manual.

FCV-628



FCV-588



1. OPERATION

1.1 Control Description



No.	Control	Function
1	MENU/ESC	<ul style="list-style-type: none"> • Opens menu. Go back one page in multi-page menu. • Escapes from current operation.
2	▲▼◀▶ (TrackPad)	<ul style="list-style-type: none"> • Selects items on the menu. • Changes settings. • ▲ or ▼ moves the VRM (Variable Range Marker).
3	ENTER	Saves settings.
4	RANGE	Opens range selection window.
5	MARK*	Registers waypoint.
6	FUNC	Short press: Opens window programmed. Long press: Opens function key programming window.
7	GAIN	Push: Opens [Auto Gain] setting window. Rotate: Manually adjusts gain.
8	MODE	Selects display mode.
9	⏻/BRILL	Short press: Turns on power; opens the [Brill] adjustment window. Long press: Turns off power.

* Inoperative when equipped with "Tankenmaru" system.

<i>How to remove the cover</i>	<i>If you remove the display unit (for desktop installation) after an outing...</i>
Pull down on the catch at the bottom of the cover and pull the cover toward you. 	Cover the connectors with the supplied caps to keep dust out of terminals. <ul style="list-style-type: none"> • Transducer cable: Use the MJ cable cap (large) supplied with the transducer cable. • 12-24 VDC, NMEA, XDR: Use "port" and "XDR" caps. • Power cable assy.: Use supplied cap.

1. OPERATION

1.2 Power On/Off

1. Press the **⏻/BRILL** key to turn on the power. The unit beeps then the startup screen appears.



Start-up screen

→ Wait 3-5 seconds, or select mode with the **MODE** knob to display the picture.

2. To turn off the power, press the **⏻/BRILL** key more than three seconds. The time remaining until the power is turned off is counted down on the screen.

1.3 Display Brilliance

1. Press the **⏻/BRILL** key momentarily to show the [Brill] adjustment window.



2. Press the **⏻/BRILL** key. Continual pressing changes the brilliance continuously (0→1→...→9→8→...→0→1→...). "0" is the dimmest and "9" is the brightest. You can also adjust the brilliance with ◀ or ▶.
3. Press the **ENTER** key or **MENU/ESC** key to save the setting and close the window. (The window automatically closes if there is no key operation for approx. six seconds.)

Note 1: Key panel brilliance cannot be adjusted manually; its brilliance is changed automatically with display brilliance, as shown below.

Max. brilliance: Min. panel brilliance

Min. brilliance: Max panel brilliance

Note 2: The brilliance of the FCV-588 may change if the ambient temperature is not within the rated temperature range.

1.4 Display Mode

1. Rotate the **MODE** knob to open the mode setting window, which is displayed for six seconds.

MODE	
NAV1 ←	Nav data mode 1
LF-ZOOM ←	Low frequency zoom mode*
LF ←	Low frequency mode (50 k)
DUAL ←	Dual frequency mode
HF ←	High frequency mode (200 k)
HF-ZOOM ←	High frequency zoom mode**
NAV2 ←	Nav data mode 2

*: The indication at the top of the screen is BL-LF, BZ-LF or MZ-LF.

** : The indication at the top of the screen is BL-HF, BZ-HF or MZ-HF.

BL: Bottom lock, LF: Low frequency, BZ: Bottom zoom, HF: High frequency, MZ: Marker zoom

2. Rotate the **MODE** knob again to select the display mode desired. The screen related to the mode you selected appears.

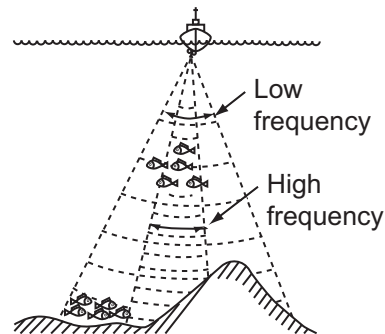
1.4.1 Single frequency display

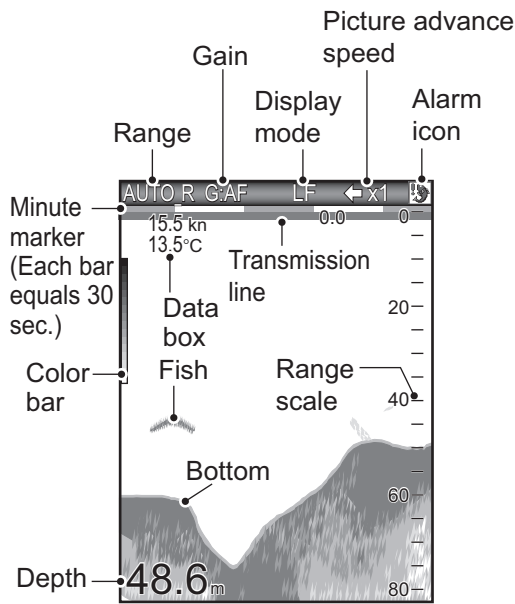
Low frequency (50 kHz)

The sounder uses ultrasound pulse signals to detect bottom conditions. The lower the frequency of the signal, the wider the detection area. Therefore, the 50 kHz frequency is useful for general detection and judging bottom condition.

High frequency (200 kHz)

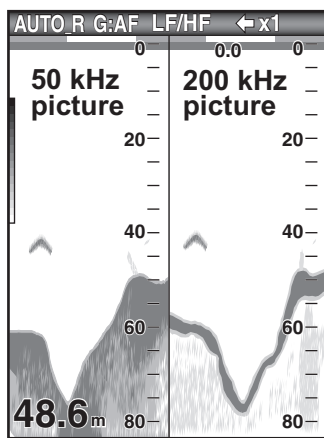
The higher the frequency of the ultrasound pulse signal, the better the resolution. For this reason the 200 kHz frequency is ideal for detailed observation of schools of fish.





1.4.2 Dual frequency display

The 50 kHz picture appears on the left; the 200 kHz picture on the right. This display is useful for comparing the same picture with two different frequencies.



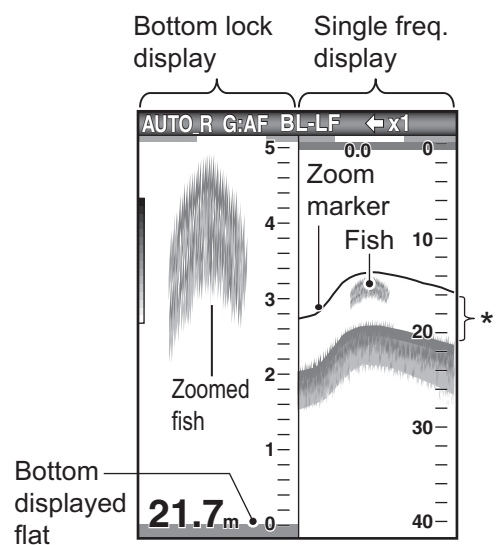
Freq. (kHz)	Beamwidth	Resolution	Detection range	Bottom tail
50	Wide	Low	Deep	Long
200	Narrow	High	Shallow	Short

1.4.3 Zoom displays

Zoom mode expands chosen area of the single frequency picture. Three modes are available: bottom lock, bottom zoom and marker zoom. The default zoom mode is bottom lock.

Bottom lock display

The bottom lock display provides a normal picture on the right half of the screen and a 10-30 feet (default: 15 feet) wide layer in contact with the bottom is expanded onto the left half of the screen. This mode is useful for detecting bottom fish.



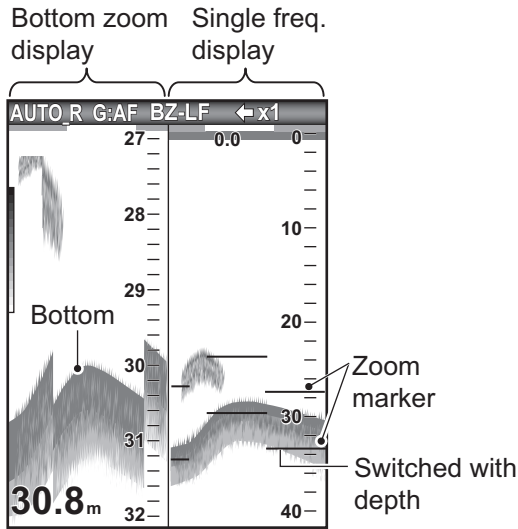
Note 1: To adjust the range of the zoom display, go to the [Range] menu (see section 2.2).

Note 2: To show or hide the zoom marker, go to the [Display] menu.

1. OPERATION

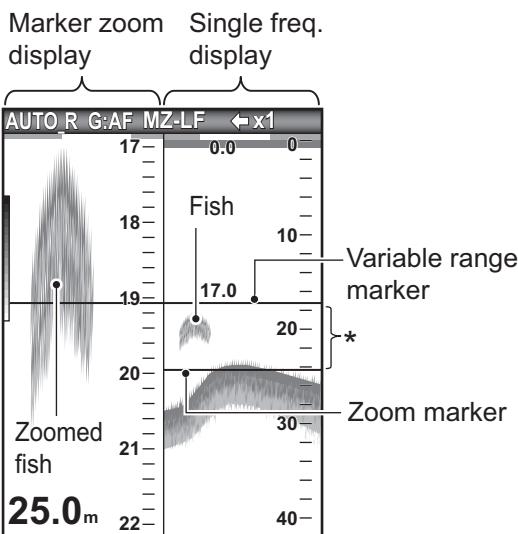
Bottom zoom display

The bottom zoom mode expands bottom and bottom fish on the left-half window. This mode is useful for tracking bottom contour. When the bottom depth increases (or decreases), the display automatically shifts to keep the bottom echo at the lower part of the screen.



Marker zoom display

The marker zoom mode expands chosen area of the normal picture to full vertical size of the screen on the left-half window. You may specify the portion to expand by operating the VRM (Variable Range Marker), which you can shift with ▲ or ▼. The area between the VRM and zoom marker is expanded. This mode is useful for determining the size of fish in the middle water.



* This section is zoomed.

1.4.4 Nav data display

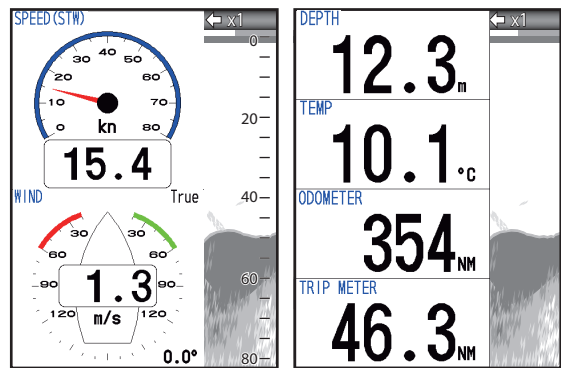
The nav data displays appear on the left 2/3 of the screen. Data other than depth requires appropriate sensor.

Two nav data displays are available, Nav Data 1 or Nav Data 2, and you may select which to use on the [Display] menu. The default settings are as follows.

NAV1: Two-data display (SPEED (STW), WIND)

NAV2: Four-data display (DEPTH, TEMPERATURE, TRIP METER, ODOMETER)

You can display between two and four items in a nav data display and select the item and order to display them. For details, see section 1.20.



NAV1 display

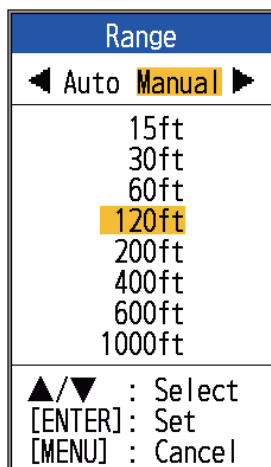
NAV2 display

1.5 How to Select a Range

The basic range may be selected in the [Auto] or [Manual] mode.

Note: The **RANGE** key is inoperative when the bottom discrimination feature is active.

1. Press the **RANGE** key to open the [Range] setting window.



These are available with Manual mode.

2. Use ◀ or ▶ to select [Auto] or [Manual].
 [Auto]: The range changes automatically to display the bottom echo on the screen always. (The shift function is inoperative in the auto mode.) [AUTO_R] is shown at the top left corner on the screen. Note that the deepest detection range of Auto Range is the largest setting of [Range 1] to [Range 8] of Manual Range. In case the sea bottom is deeper than the largest setting of Auto Range, set the setting of [Range 1] to [Range 8] deeper than the sea bottom.
 [Manual]: The range may be selected from the eight ranges listed below. [MAN_R] is shown at the top left corner on the screen.
 If you selected [Auto], go to step 4.
 For [Manual], go to the next step.

3. For [Manual], use the **RANGE** key (or ▲ or ▼) to select the range.

Unit	Basic Range							
	1	2	3	4	5	6	7	8
m	5	10	20	40	80	150	200	300
ft	15	30	60	120	200	400	600	1000
fm	3	5	10	20	40	80	100	150
HR*	4	8	15	30	50	100	150	200
pb	3	5	10	20	50	100	150	200

*: Japanese unit of depth measurement (hiro)

Note: Basic ranges may be preset as desired. See section 2.2.

4. Press the **ENTER** key.

Note: The range mode indication, which appears at the top-left corner, may be turned on or off with [Header Info] on the [Display] menu. For details, see [Header Info] on page 23.

1.6 How to Adjust the Gain

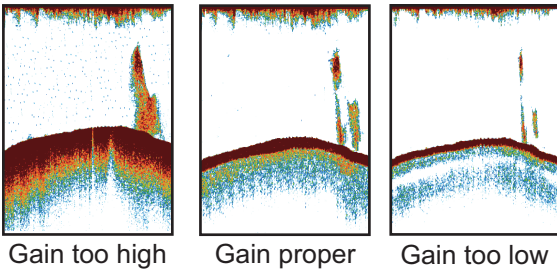
How to select the gain adjustment mode

The gain may be adjusted automatically ([Fishing] or [Cruising]) or manually. In automatic adjustment, the range is automatically selected to display the bottom echo in reddish brown. The automatic gain setting can be fine tuned with the offset gain feature. Clutter and TVG are also adjusted automatically when automatic gain is active.

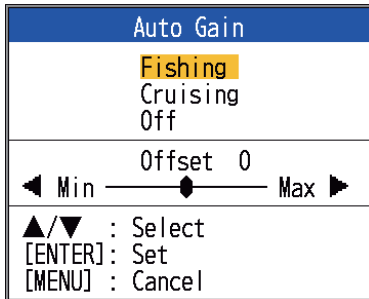
For manual gain adjustment, adjust the gain according to signal strength.

	CAUTION
Adjust the gain correctly.	
Incorrect adjustment can lead to a dangerous situation if the boat is steered according to the depth indication in shallow waters.	

1. OPERATION



1. Press the **GAIN** knob to open the [Auto Gain] setting window.

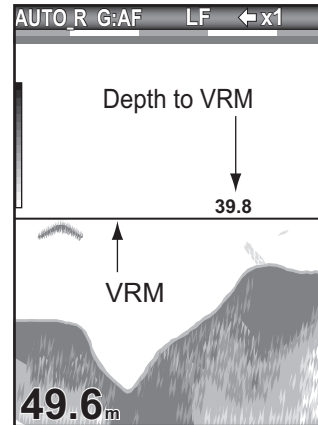


2. Press the **GAIN** knob (or ▲ or ▼) again to select [Fishing] or [Cruising].
[Fishing]: This mode clearly displays weaker echoes and is useful for searching schools of fish. "G:AF" is shown at the top left corner on the screen.
[Cruising]: This mode clearly displays stronger echoes (for example, bottom) and suppresses weak echoes. Use this mode for general cruising. "G:AC" is shown at the top left corner on the screen.
[Off]: For manual gain adjustment. The display shows, "G:X.X" (X.X=gain setting) when manual gain is active.
If you selected [Fishing] or [Cruising], you can apply an offset to the gain, at step 3. To apply no offset, go to step 4. For [Off], do steps 4 and 5.
3. Press ◀ or ▶ (setting range: -5 to +5) to apply an offset. Press ◀ to decrease the offset; ▶ to raise the offset.
4. Press the **ENTER** key. The new gain setting is also applied to past echoes.
5. For manual adjustment, rotate the **GAIN** control to set the gain (0.0 to 10).

1.7 How to Measure Depth

The VRM (Variable Range Marker) functions to measure the depth to schools of fish, etc. This function is inoperative when a NAV data display is active.

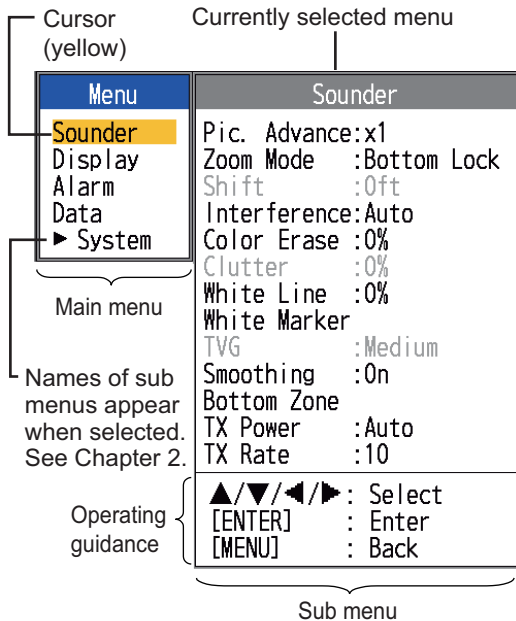
1. Use ▲ or ▼ to place the VRM on the object to measure depth.
2. Read the VRM depth just above the VRM.



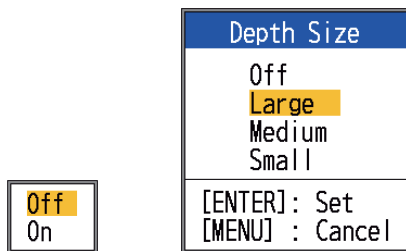
1.8 Menu Operating Procedure

Your fish finder has five main menus: [Sounder], [Display], [Alarm], [Data], and [System]. Below is the basic menu operating procedure.

1. Press the **MENU/ESC** key to open the menu.



2. Use ▲ or ▼ to select the main menu desired. The cursor (yellow) highlights current selection. The items in the sub menu change with the menu selected.
3. Press the **ENTER** key (or ▶). The cursor (yellow) shifts to the sub menu and the current selection on the main menu window (left) is highlighted in gray.
4. Use ▲ or ▼ to select the menu item desired, then press the **ENTER** key. A setting box or window appears depending on menu item. The example below shows the setting options and setting window for [Depth Size].



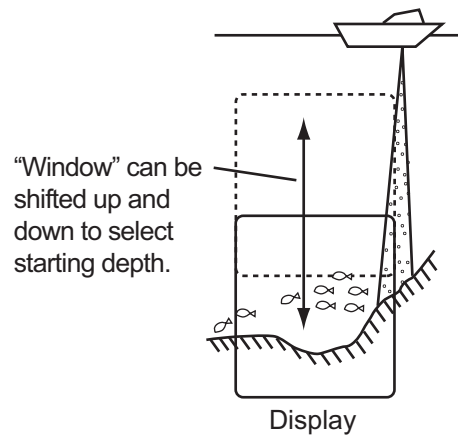
5. Use ▲ or ▼ to select an option or change a value.

6. Press the **ENTER** key (or ◀) to save the setting. The setting box or window disappears. To escape without changing a setting, press the **MENU/ESC** key instead of the **ENTER** key.
7. To select another menu, press the **MENU/ESC** key (or ◀). The cursor (yellow) moves to the main menu.
8. Press the **MENU/ESC** key to close the menu.

Note: Hereafter, this manual replaces the instruction “use ▲ or ▼ to (select an item or change a value)”, with “select”.

1.9 How to Shift the Range

The basic range and range shift together give you the means to select the depth you can see on the screen. The basic range can be thought of as providing a “window” into the water column and range shifting as moving the “window” to the desired depth.



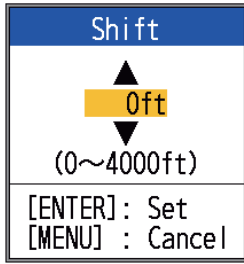
Note: This function is inoperative when [AU-TO_R] (auto range mode indication) is displayed.

The basic range can be shifted up or down in the [Manual] mode as follows:

1. Open the menu, select the [Sounder] menu, then press the **ENTER** key.

1. OPERATION

2. Select [Shift], then press the **ENTER** key.



3. Set the amount of shift desired, then press the **ENTER** key. The step for the amount of shift depends on setting range on the [Range] sub menu in the [System] menu. Below are the steps for feet and meters.

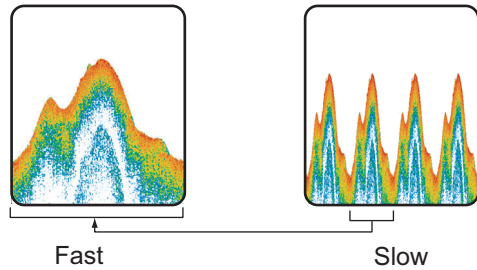
Unit: feet		Unit: meter	
Range	Step	Range	Step
7 - 10	2	2 - 5	1
11 - 20	5	6 - 10	2
21 - 50	10	11 - 20	5
60 - 100	20	21 - 50	10
110 - 250	50	60 - 100	20
260 - 500	100	110 - 250	50
550 - 1000	200	260 - 500	100
1100 - 2500	500	550 - 1000	200
2600 - 4000	500	1100 - 1200	500

4. Press the **MENU/ESC** key twice to close the window.

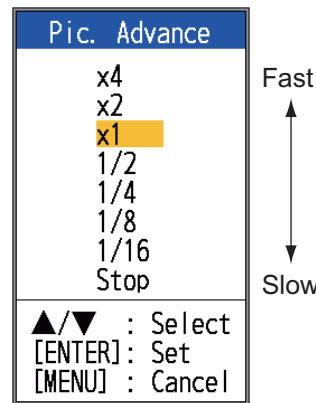
Note: Echoes may be lost if the amount of shift is greater than actual depth.

1.10 Picture Advance Speed

The picture advance speed determines how quickly the vertical scan lines run across the screen. When selecting a picture advance speed, keep in mind that a fast advance speed will expand the size of a school of fish horizontally on the screen and a slow advance speed will contract the school. Use a fast advance speed to observe a rugged bottom, and use a slow advance speed to monitor a smooth bottom.



1. Open the menu, select [Sounder], then press the **ENTER** key.
2. Select [Pic. Advance], then press the **ENTER** key.



3. Select picture advance speed desired, then press the **ENTER** key. [1/16] is the slowest speed and [x4] is the fastest speed. [1/16] means one scan line is produced every 16 transmissions. [Stop] stops picture advancement and is useful for taking a screenshot. Current picture advance speed is displayed at the top-right corner of the screen.

CAUTION

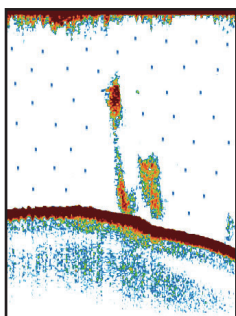
The picture is not refreshed when picture advancement is stopped.

Cruising in this condition may result in grounding in shallow waters.

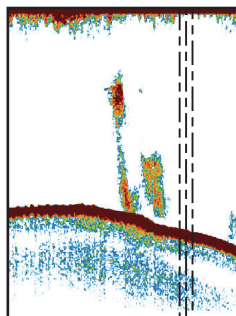
4. Press the **MENU/ESC** key twice to close the window.

1.11 How to Reduce Interference

Interference from other acoustic equipment operating nearby or other electronic equipment on your boat may show itself on the display as shown in the figure below. Follow the procedure below to reduce interference.

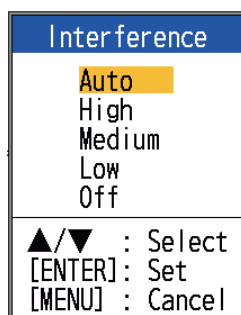


Interference from other sounder



Interference from electrical equipment

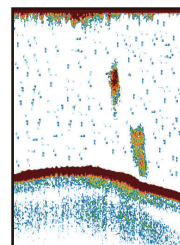
1. Open the menu, select [Sounder], then press the **ENTER** key.
2. Select [Interference], then press the **ENTER** key.



3. Select the degree of interference reduction desired, then press the **ENTER** key. [Auto]: Interference is suppressed automatically. [High], [Medium], [Low]: [High] provides the greatest degree of interference reduction and [Low] the smallest. [Off]: Turn off the interference rejector. **Note:** Turn off the interference rejector when no interference exists, so as not to miss weak echoes from small targets.
4. Press the **MENU/ESC** key twice to close the window.

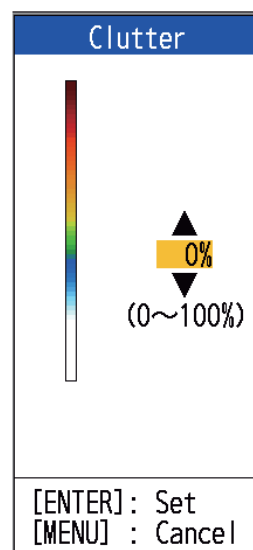
1.12 How to Reduce Low Level Noise

Low intensity "speckles," caused by sediments in the water or noise, may appear over most of screen. These speckles can be suppressed by adjusting the [Clutter].



Note: [Clutter] cannot be adjusted when [Fishing] or [Cruising] is selected (on the [Auto Gain] setting window).

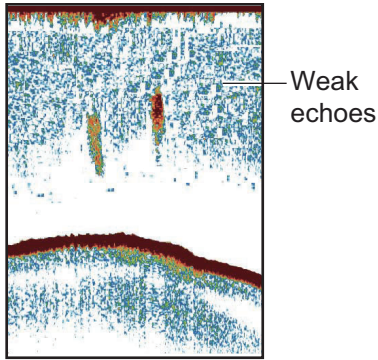
1. Open the menu, select [Sounder], then press the **ENTER** key.
2. Select [Clutter], then press the **ENTER** key.



3. Select the degree of clutter reduction desired, then press the **ENTER** key. The setting range is 0% to 100% in intervals of ten. The larger the setting value, the greater the degree of reduction.
4. Press the **MENU/ESC** key twice to close the window.

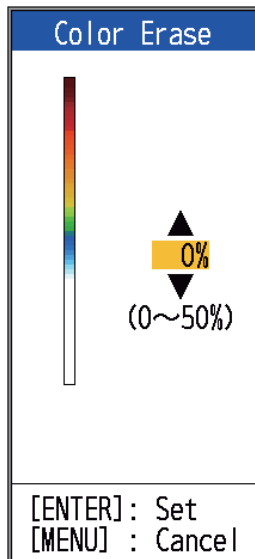
1.13 How to Erase Weak Echoes

Sediment in the water or reflections from plankton may be painted on the display in low intensity tones.



These weak echoes may be erased by using the [Color Erase] feature. This feature erases weaker echoes sequentially to show only strong echoes and clear the picture.

1. Open the menu, select [Sounder], then press the **ENTER** key.
2. Select [Color Erase], then press the **ENTER** key.



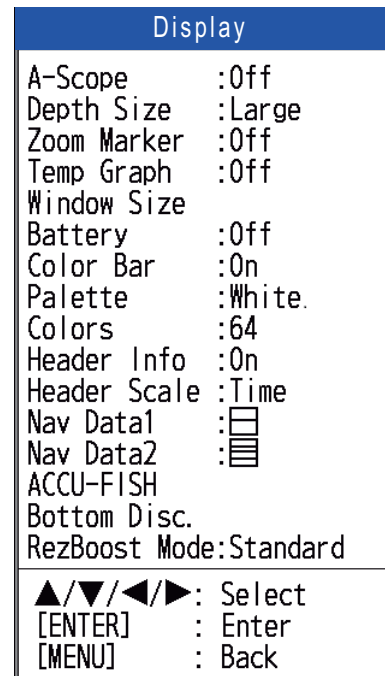
3. Select the color to erase, then press the **ENTER** key. The setting range is 0 to 50% in intervals of one per cent. The larger the setting value, the greater the number of colors that are erased.
4. Press the **MENU/ESC** key twice to close the window.

1.14 A-scope Display

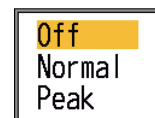
The A-scope display shows echoes at each transmission with amplitudes and tone proportional to their intensities, on the right 1/3 of the screen. The display shows strong echoes with strong amplitude; weak echoes in weak amplitude. Thus the A-scope display is useful for estimating the kind of school of fish and bottom composition.

Note: The A-scope display is only available with the high frequency display in dual frequency operation.

1. Open the menu, select [Display], then press the **ENTER** key.



2. Select [A-Scope], then press the **ENTER** key.



3. Select the A-scope presentation type desired,

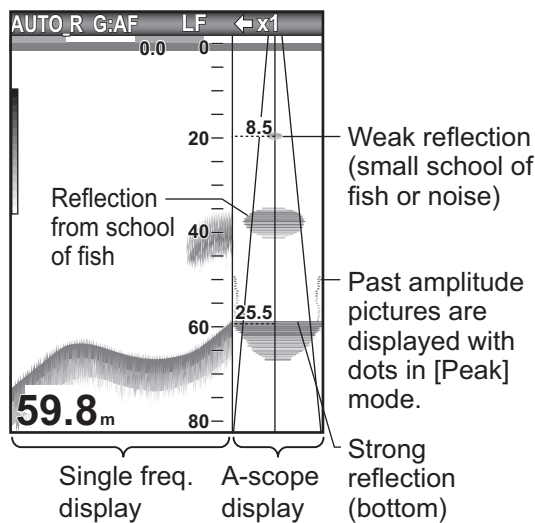
then press the **ENTER** key.

[Off]: Turn off the A-scope display.

[Normal]: Display shows echoes at each transmission with amplitudes and tone proportional to their intensities.

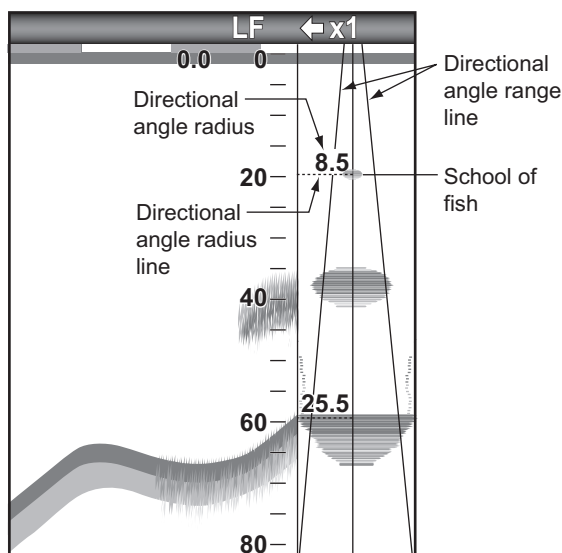
[Peak]: "Normal" A-scope display plus peak-hold amplitude picture for last five seconds in dots.

- Press the **MENU/ESC** key twice to close the window.



Directional angle display

With the transducer selected for other than 600 W or 1kW (FCV-588 only), directional angle range line, direction angle, directional radius, directional radius value and directional radius line appear on the A-scope display. The directional angle display provides an at-a-glance view of the available detection range. In the example below an echo from a school of fish is at the depth of 20 m. and within 8.5 m radius of the center of the transducer beam.



Note: The directional angle range lines represent the transducer beamwidth. They are not an indication of echo strength.

1.15 Fish Information (ACCU-FISH™)

The ACCU-FISH™ feature measures the length of individual fish and tags the fish with a fish symbol whose size is proportional to the length of the fish. The length or depth of the fish can be indicated digitally. Connection to a transducer that supports ACCU-FISH™ is required.

Note: The fish length calculated by this fish finder is intended for reference purposes; it is not a completely accurate measurement of fish length.

Considerations for ACCU-FISH™

- The following transducers support ACCU-FISH™:

	Transducer (option)
600 W	520-5PSD, 520-5MSD, 520-PLD, 525-5PWD, 525T-PWD, 525T-BSD, 525T-LTD/12, 525T-LTD/20, 525STID-MSD, 525STID-PWD, SS60-SLTD/12, SS60-SLTD/20
1 kW	50/200-1T, 526TID-HDD

- Echo intensity depends on fish species. When the fish length differs between the indicated length and the actual length, you can compensate the difference on the [Calib] menu (see section 2.6).
- ACCU-FISH™ is inoperative when the zero line rejector is active.
- High and low frequencies are alternately transmitted when ACCU-FISH™ is active, regardless of mode selection.
- A fish whose depth is shallower than 2 m or greater than 100 m cannot be measured.
- This feature cannot be used with the inside-hull transducer since a fish may not be detected depending on the transducer's frequency. Even if a fish is detected, the fish length indicated may be smaller than actual length.
- In a school of fish, echoes overlap one another, so the margin of error will be greater.
- The bottom echo must be present to show the fish symbols.

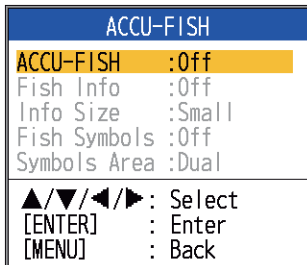
1. OPERATION

- The TX pulse length changes according to ACCU-FISH™ On/Off state. This causes a difference in both sensitivity and the echoes viewed.

1.15.1 How to activate ACCU-FISH™

ACCU-FISH™ is inoperative when the transducer type is selected to 600W or 1kW FCV-588 only), on the [Transducer] menu.

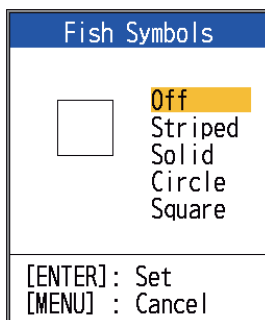
- Open the menu, select [Display], then press the **ENTER** key.
- Select [ACCU-FISH], then press the **ENTER** key to show the [ACCU-FISH] menu.



- Select [ACCU-FISH], then press the **ENTER** key.
- Select [On] to enable ACCU-FISH™.

1.15.2 Fish symbols

- Open the menu, select [Display], then press the **ENTER** key.
- Select [ACCU-FISH], then press the **ENTER** key to show the [ACCU-FISH] menu.
- Select [Fish Symbols], then press the **ENTER** key.



[Fish Symbols] setting box

- Select desired symbol, then press the **ENTER** key. The size of the symbol is scaled according to the estimated length of the fish.

	Striped	Solid	Circle	Square
Large fish symbol (more than 50 cm, or more than 20 inches)				
Small fish symbol (10 to 49 cm, or 4 to 19 inches)				

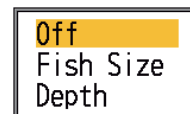
Note: To hide the fish symbol, select [Off] at step 4, then press the **ENTER** key.

Note: You can select which frequency display to show the fish symbols and fish information, with [Symbols Area] on the [ACCU-FISH] menu.

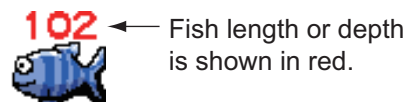
- [Dual]: Symbols and info shown on both HF and LF displays.
- [HF]: Symbols and info shown on HF display.
- [LF]: Symbols and info shown on LF display.

1.15.3 Fish info

- Open the menu, select [Display], then press the **ENTER** key.
- Select [ACCU-FISH], then press the **ENTER** key to show the [ACCU-FISH] menu.
- Select [Fish Info], then press the **ENTER** key.



- Use ▲ or ▼ to select [Off], [Fish Size] or [Depth] as appropriate, then press the **ENTER** key.



Note 1: You can show the fish info figure alone (without fish symbol) by turning off [Fish Symbols] on the [Display] menu.

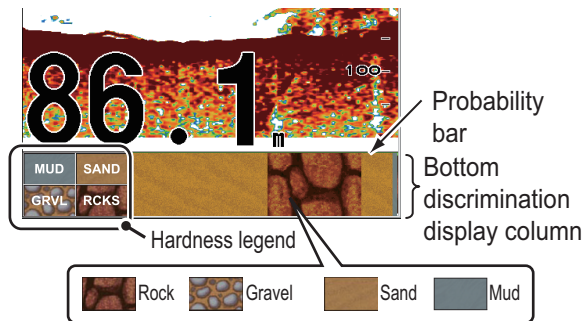
Note 2: You can show the fish info in small or large characters, with [Info Size] on the [ACCU-FISH] menu.

1.16 Bottom Discrimination Display

The bottom discrimination display analyzes the bottom echo to categorize bottom hardness in one of four types (rocks, gravel, sand, mud) and shows the results in a colorful graphic display. A transducer or triducer that supports the bottom discrimination display is required.

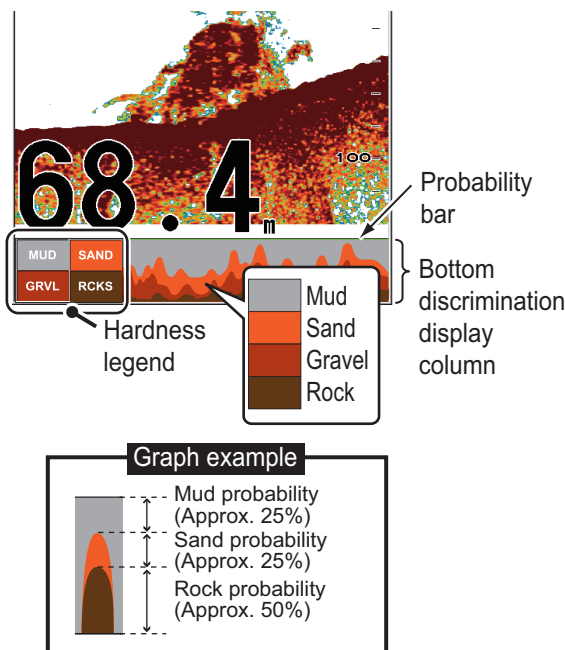
There are two bottom discrimination displays: graphic and probability.

Graphic display: The most probable material on the bottom (mud, sand, gravel, rock) is indicated graphically.



Probability bar:
Degree of trust for bottom discrimination display (Green, Normal; Yellow, Caution; Background color, Abnormal)

Probability display: The most probable bottom material is indicated in proportion.



About the bottom discrimination display

- The bottom discrimination display provides an estimate of bottom composition. Actual composition may be different.
- The transducers that support the bottom discrimination feature are as follows:

Transducer (option)	
600 W	520-5PSD, 520-5MSD, 520-PLD, 525-5PWD, 525T-PWD, 525T-BSD, 525T-LTD/12, 525T-LTD/20, 525STID-MSD, 525STID-PWD, SS60-SLTD/12, SS60-SLTD/20
1 kW	50/200-1T, 526TID-HDD

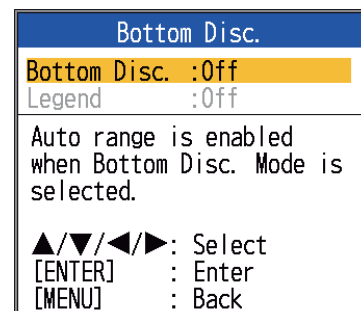
- The high and low frequencies are alternately transmitted, regardless of current display selection. The TX interval is slower when this feature is active.
- Operating environment:
 - Depth: 16 to 328 ft
 - Speed: 10 knots or less
- This feature uses the range from the boat's draft; therefore, enter the ship's draft. See page 26.
- Be sure that the transducer is mounted straight. Otherwise the bottom discrimination display may not function accurately.

How to activate the bottom discrimination display

Note 1: Auto range (AUTO_R) is automatically turned on when the bottom discrimination display is activated.

Note 2: The bottom discrimination is inoperative when the transducer type is selected to 600 W or 1 kW (FCV-588 only), on the [Transducer] menu.

- Open the menu, select the [Display] menu, select [Bottom Disc.], then press the **ENTER** key.



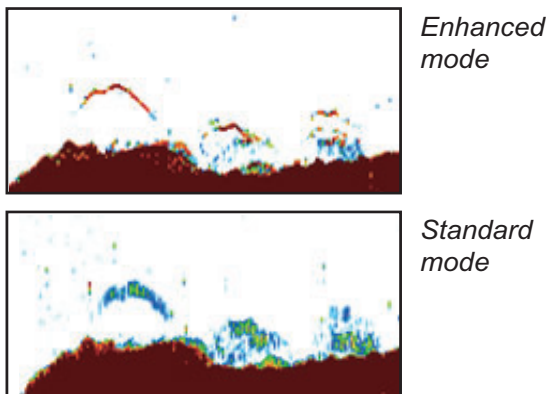
1. OPERATION

2. Select [Bottom Disc.], then press the **ENTER** key.
3. Select [Graphic] or [Probability], then press the **ENTER** key.
4. Select [Legend], then press the **ENTER** key.
5. Select [Off] or [On], then press the **ENTER** key to show or hide the hardness legend.

To turn off the bottom discrimination display, select [Off] at step 3, then press the **ENTER** key.

1.17 RezBoost™

With a RezBoost™ capable transducer, echo resolution can be improved. In the example below, it is difficult to distinguish fish from the bottom. With [Enhanced] RezBoost™, the default setting, fish near the bottom are clearly seen.



[Enhanced] RezBoost™ is available with the transducers listed in the table below. [Standard] RezBoost™ comes with the transducers shown on page 35.

Transducer (option)	
600 W	520-5PSD, 520-5MSD, 520-PLD, 525-5PWD, 525T-PWD, 525T-BSD, 525T-LTD/12, 525T-LTD/20, 525STID-MSD, 525STID-PWD, SS60-SLTD/12, SS60-SLTD/20
1 kW	50/200-1T, 526TID-HDD

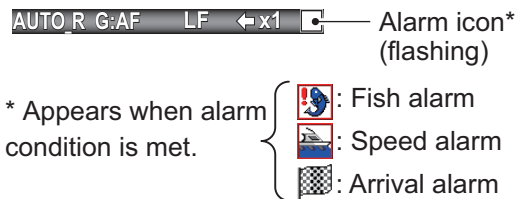
1.17.1 How to set RezBoost™

Note: RezBoost™ is inoperative if [Type] in the [Transducer] menu is set to [600W] or [1kW] (FCV-588 only).

1. Open the [Display] menu, then select [RezBoost Mode].
2. Select [Standard] or [Enhanced], then press the **ENTER** key.

1.18 Alarms

This fish finder has six fish alarms and two navigation alarms. When the conditions of an alarm are met, the audio alarm sounds and the alarm icon (flashing) appears at the top right corner on the display. The audio alarm may be silenced by pressing any key. The alarm icon remains on the screen until the cause of the alarm is removed or the offending alarm is disabled.



Description of alarms

● Fish alarms

The **ACCU-FISH™ alarm** alerts you when a fish of the specified length is in the alarm zone. Available when the ACCU-FISH™ feature is active.

The **fish school alarm** alerts you to a school of fish in the set alarm zone.

The **bottom fish alarm** is given when a fish is within the specified distance from the bottom. Available when the bottom lock display is active.

The **water temperature alarm*** alerts you when the water temperature is within (inside alarm) the alarm range set or under/over (outside alarm) the range set.

The **bottom type alarm** alerts you when the bottom type (rock, sand, mud, gravel) matches the bottom type selected. Available when the bottom discrimination display is active.

The **bottom alarm** alerts you when the bottom echo (displayed in red or reddish brown) is within the alarm range set.

● Navigation alarms

The **speed alarm*** alerts you when your boat's speed is within (inside alarm) or under/over (outside alarm) the preset speed.

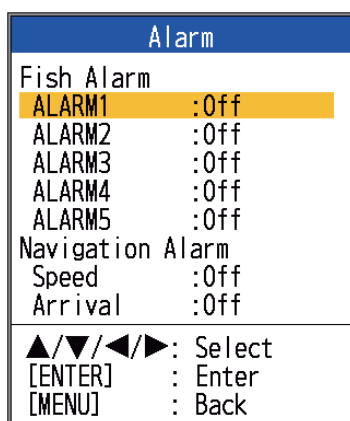
There are two types of **arrival alarms***: [Inside] and [Outside]. The [Inside] alarm alerts you when you are within the specified range from a waypoint. The [Outside] alarm alerts when your boat travels a specific distance from the location at the activation of the alarm.

* Requires GPS navigator or applicable sensor.

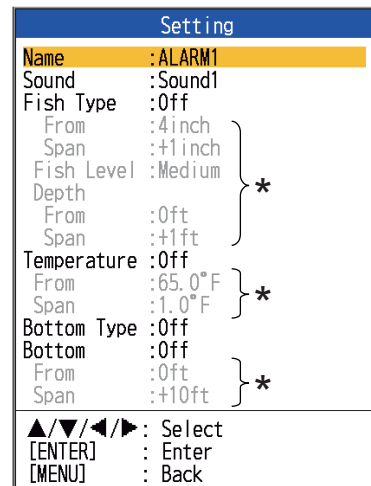
How to activate a fish alarm

Multiple fish alarms (ALARM1 - ALARM5, default names) can be activated. In this case, the audio and visual alarms are released when all alarm conditions are met. For example, the [Bottom Type] alarm is set for [Rock] and the [Bottom] alarm is set for 10-20 feet. Then, if the system judges the bottom to be rock and the depth to the bottom is 10-20 feet, the audio and visual alarms are released. The alarms are not released if only one condition is met.

1. Open the menu, select [Alarm], then press the **ENTER** key.



2. Select an alarm among [ALARM1] - [ALARM5] (default alarm names), then press the **ENTER** key.
3. Select [Setting], then press the **ENTER** key. If you want to change the name of an alarm, go to step 4. Otherwise go to step 6.



* Operable when corresponding alarm is activated.

4. To change the name of the alarm, select [Name], then press the **ENTER** key.
5. Enter the name of the alarm. (Max. of eight characters)
 - 1) Use ▲ or ▼ to select a character. Use ▲ to select a character in numerical order followed by alphabet order. Use ▼ to select a character in reverse order of that with ▲.
 - 2) Press ▶ to move the cursor to the next place.
 - 3) Repeat steps 1) and 2) to complete the name.
 - 4) Press the **ENTER** key to finish.
6. Select [Sound], then press the **ENTER** key.
7. Select desired alarm sound, then press the **ENTER** key.
8. Select [Fish Type], [Temperature], [Bottom Type] or [Bottom] as applicable, then press the **ENTER** key.
9. Do one of the following according to the item selected at step 8.



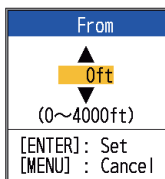
1. OPERATION

Fish Type

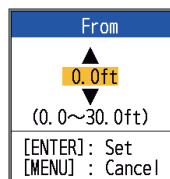
- 1) Select [ACCU-FISH], [Fish School], [Bottom Fish(Only BL)] or [Bottom], then press the **ENTER** key.
For [ACCU-FISH] go to step 2). For other choices go to step 6).
- 2) Select [From] (under [Fish Type]), then press the **ENTER** key.

▲
 4 inch
 ▼
 (4~78 inch)
- 3) Set the minimum fish length, then press the **ENTER** key.
- 4) Select [Span] (below [Fish Type]), then press the **ENTER** key.

▲
 + 1 inch
 ▼
 (+1~+78 inch)
- 5) Set the width of the alarm, then press the **ENTER** key. Go to step 8. (The maximum measurable fish length is 78 inch.)
- 6) Select [Fish Level], then press the **ENTER** key.
- 7) Select the echo strength that triggers the alarm, referring to the description below.
[Weak]: Echoes stronger than light-blue trigger the alarm.
[Medium]: Echoes stronger than yellow trigger the alarm.
[Strong]: Echoes stronger than red trigger the alarm.
- 8) Select the [From] that is below [Depth], then press the **ENTER** key.



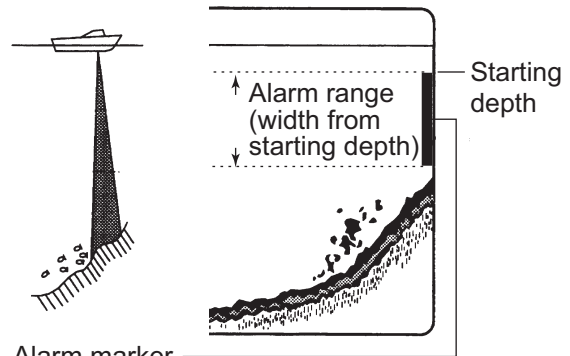
ACCU-FISH, Fish School alarms



Bottom Fish alarm

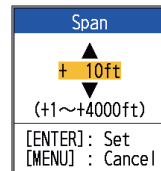
- 9) Enter the width of the alarm, then press the **ENTER** key.
The alarm marker appears at the starting point for the alarm. (The marker appears only when the corresponding alarm is active.) The starting depth for the ACCU-FISH™ and [Fish School] alarms is the transducer posi-

tion. For the [Bottom Lock] alarm the starting depth is the distance from the bottom.

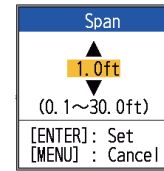


Alarm marker
 - ACCU-FISH, Fish School, Bottom: Left side
 - Bottom lock: Center

- 10) Select [Span], then press the **ENTER** key.



ACCU-FISH, Fish School alarms



Bottom Fish alarm

- 11) Enter the alarm width, then press the **ENTER** key.

Water temperature

- 1) Select [Inside] or [Outside] as applicable, then press the **ENTER** key.
- 2) Select [From], then press the **ENTER** key.

▲
 65.0°F
 ▼
 (20.0~110.0°F)
- 3) Enter the starting temperature for the alarm, then press the **ENTER** key.
- 4) Select [Span], then press the **ENTER** key.

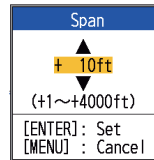
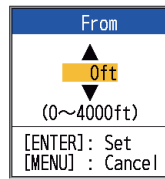
▲
 + 1.0°F
 ▼
 (0.1~30.0°F)
- 5) Enter the width for the alarm, then press the **ENTER** key.

Bottom Type

Select [Rock], [Gravel], [Sand] or [Mud], then press the **ENTER** key.

Bottom

- 1) Set [Bottom] to [On], then press the **ENTER** key.
- 2) Select [From], then press the **ENTER** key.
- 3) Set the starting depth, then press the **ENTER** key.
- 4) Select [Span], then press the **ENTER** key.
- 5) Set the width of the alarm, then press the **ENTER** key.



10. Press the **MENU/ESC** key to show the [Fish School] setting window.
11. Select [Alarm], then press the **ENTER** key.
12. Select [On], then press the **ENTER** key.

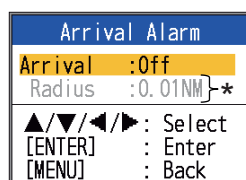
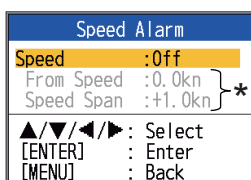
Note 1: To disable an alarm, select [Off] at step 12 in the above procedure.

Note 2: The default alarm settings can be restored. Open the [Fish Alarm] setting window, select [Reset?], press the **ENTER** key, select [Yes], then press the **ENTER** key.

Navigation alarms

Do the following to set the navigation alarms (speed alarm and arrival alarm).

1. Open the menu, select [Alarm], then press the **ENTER** key.
2. Select [Speed] or [Arrival], then press the **ENTER** key.

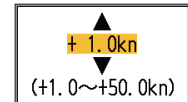
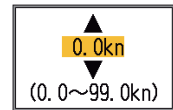


* Settable when alarm is activated.

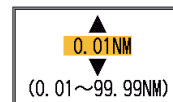
3. Do one of the following two procedures according to the item selected at step 2.

Speed

- 1) Select [Speed], then press the **ENTER** key.
- 2) Select [Inside] or [Outside] as applicable, then press the **ENTER** key.
- 3) Select [From Speed], then press the **ENTER** key.
- 4) Enter the starting speed, then press the **ENTER** key.
- 5) Select [Speed Span], then press the **ENTER** key.
- 6) Enter the width of the alarm, then press the **ENTER** key.

Arrival

- 1) Select [Arrival], then press the **ENTER** key.
- 2) Select [Inside] or [Outside] as applicable, then press the **ENTER** key.
- 3) Select [Radius], then press the **ENTER** key.
- 4) Enter the alarm radius, then press the **ENTER** key.



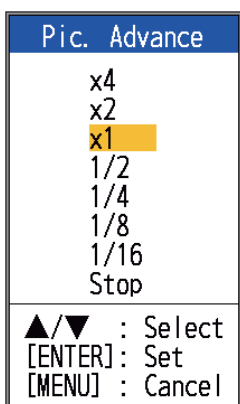
To disable the alarm, select [Off] at 2) of step 3.

1.19 FUNC Key

The **FUNC** key provides for one-touch call up of desired function setting window. 11 items are available: picture advance, shift, interference, clutter, color erase, white line, white marker, WPT list, bottom zone, TVG, and fish symbols.

1.19.1 How to use the FUNC key

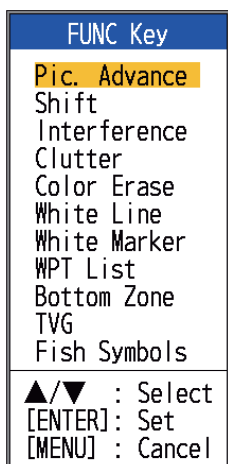
1. Short-press the **FUNC** key to open the setting window programmed; for example, the [Pic. Advance] setting window.



2. Use the **FUNC** key, ▲ or ▼ to select a setting, then press the **ENTER** key.

1.19.2 How to change the function

1. Press and hold down the **FUNC** key to show the [FUNC Key] menu.



2. Select a function, then press the **ENTER** key.

1.20 Waypoints

A waypoint can be used to mark a school of fish, reef, etc., and 20 waypoints may be entered. You can set a waypoint as a destination to get the range, bearing and time to go that point. The latitude and longitude position of the waypoint can be output to a navigation device, using the TLL sentence.

Note 1: The waypoint feature requires latitude and longitude position from a navigator.

Note 2: The waypoint feature is not available when the Tankenmaru feature is active.

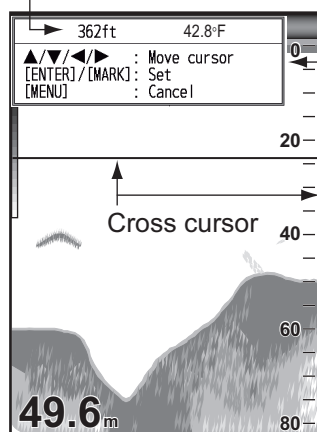
1.20.1 How to register a waypoint

There are two ways to register a waypoint: directly on the screen or manual input of latitude and longitude.

How to register a waypoint on the screen

1. Press the **MARK** key. The cross cursor appears on the screen together with guidance on how to enter a waypoint. To register a waypoint to your current position, go to step 3.

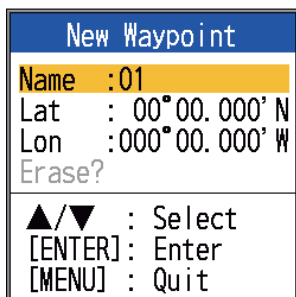
Depth and temperature at cursor position



Note: If there is no position data the message "No position data!" appears. Check the navigator.

2. Operate the TrackPad to set the cross cursor where desired. Up, down for vertical movement; left, right for horizontal movement. Picture advancement is stopped until step 3 is completed.

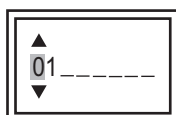
3. Press the **MARK** or **ENTER** key to register the position set at step 2. A red vertical line appears on the position set at step 2. The waypoint is automatically named with the next sequential waypoint number. If you want to change waypoint name, go to step 4. Otherwise, go to step 6.



Note 1: When [TLL] or [FURUNO-TLL] is selected at [TLL Output] on the [NMEA] menu of the [System] menu, the latitude and longitude position at the cursor position is output to the navigator.

Note 2: If you attempt to enter more than 20 waypoints, the message "Already entered 20 waypoints. No more waypoint can be entered." appears. In this case, erase an unwanted waypoint to enable entry. (See paragraph 1.19.3 for details.) However, the L/L position is output to the connected equipment.

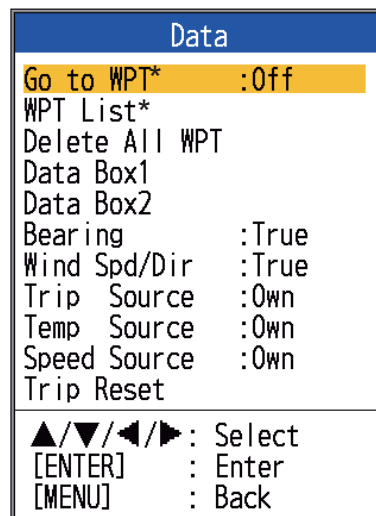
4. Press the **ENTER** key to open the waypoint name entry box.



5. Enter the waypoint name (Max. 8 characters).
6. Press the **MENU/ESC** key to close the window.

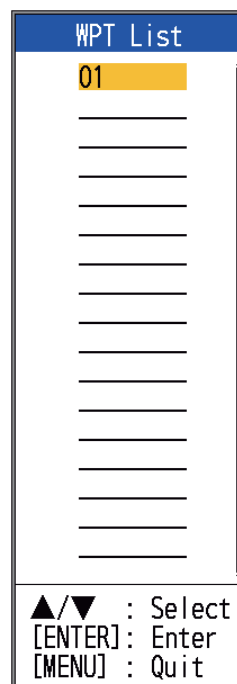
How to register a waypoint by manual entry of latitude and longitude

1. Open the menu, select [Data], then press the **ENTER** key.



*: Not operative when no position data is input (to the 12-24 VDC/NMEA port).

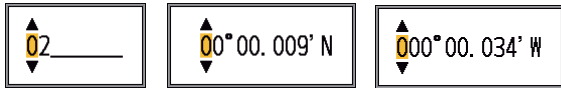
2. Select [WPT List], then press the **ENTER** key.



3. Select an empty waypoint, then press the **ENTER** key. The Waypoint setting window appears. [Lat] and [Lon] show the current position.

1. OPERATION

4. Select item desired, then press the **ENTER** key to show corresponding input box.



- Waypoint name Latitude Longitude
5. Enter name or latitude and longitude as applicable.
 6. Press the **MENU/ESC** key to register the window.
 7. Press the **MENU/ESC** key again to close the window.

1.20.2 How to edit registered waypoints

Registered waypoints can be freely edited.

1. Open the menu, select [Data], then press the **ENTER** key.
2. Select [WPT List], then press the **ENTER** key.
3. Select the waypoint to edit, then press the **ENTER** key.
4. Select the item desired, then press the **ENTER** key.
5. Edit data as appropriate.
6. Press the **MENU/ESC** key twice to return to the [WPT List].

1.20.3 How to erase waypoints

Waypoints can be erased two ways: individually or collectively. A waypoint set as destination cannot be erased.

How to erase individual waypoints

1. Open the menu, select [Data], then press the **ENTER** key.
2. Select [WPT List], then press the **ENTER** key.
3. Select the waypoint to erase, then press the **ENTER** key.
4. The message "Erase?" appears; press the **ENTER** key.
5. Select [Yes], then press the **ENTER** key.
6. Press the **MENU/ESC** key to close the window.

How to erase all waypoints

1. Open the menu, select [Data], then press the **ENTER** key.
2. Select [Delete All WPT], then press the **ENTER** key.
3. Select [Yes], then press the **ENTER** key.

1.20.4 How to set destination waypoint

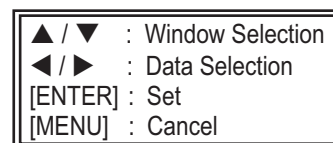
Set a destination waypoint to show the range, bearing and time-to-go to that point, on the Nav data display. See the next section for details.

1. Open the menu, select [Data], then press the **ENTER** key.
2. Select [Go to WPT], then press the **ENTER** key.
3. Select a destination waypoint, then press the **ENTER** key.

1.21 Setting Up Nav Data Displays

The user may arrange the nav data displays as desired.

1. Rotate the **MODE** knob to select the Nav data display to change. (This window is displayed for 10 seconds.)



2. Use ▲ or ▼ to select a data display window desired.
3. Use ◀ or ▶ to select the item to display. The items that can be displayed depend on the screen division.

(1)	(3)	(6)
(2)	(4)	(7)
	(5)	(8)
		(9)

Two-data display Three-data display Four-data display

Items displayable in (1) - (3): speed (STW)*, wind speed and direction*, destination waypoint data*, compass*, heading*, depth, position, course, range and bearing, trip meter, odometer, water temperature, air pressure, time-to-go to destination waypoint, XTE*, speed (SOG)*

Items displayable in (4) - (9): depth, position, speed (SOG), speed (STW), course, range and bearing, trip meter, odometer, water temperature, heading, wind speed, wind direction, air pressure, time-to-go to destination waypoint, XTE

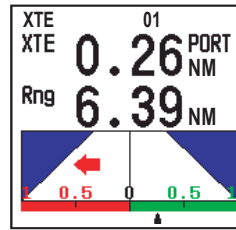
* = Graphic display

4. Press the **ENTER** key.

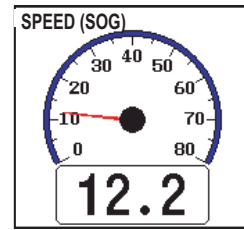
Note: Applicable data must be input to the 12-24 VDC/NMEA port in order to display the data mentioned in the table below.

Necessary data	Item
Longitude/latitude position	Position, waypoint data, course, range and bearing, time-to-go to destination, XTE
Bearing	Compass, heading
Ship speed	Speed over the ground, speed through the water ([Speed Source] on [Data] menu set for [NMEA])
Wind speed, wind angle	Wind speed, wind angle
Atmospheric pressure	Atmospheric pressure
Water temp.	Water temperature

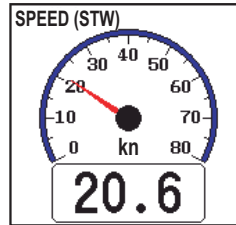
Note: A triducer w/speed sensor is required to display distance, distance run and speed through the water. A triducer w/temperature sensor is required to display water temperature.



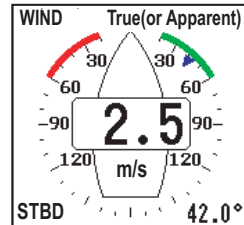
Cross-track error



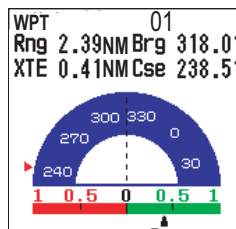
Speed over the ground



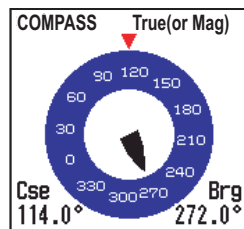
Speed thru the water



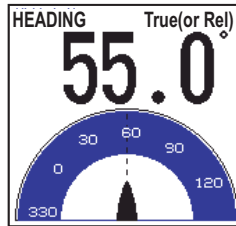
Wind speed and direction



Destination WPT

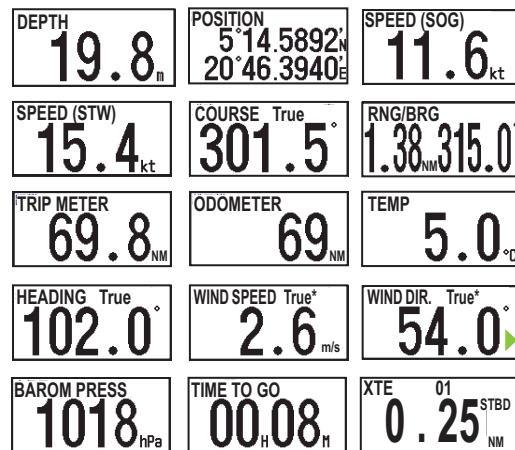


Bearing



Heading

XTE: Cross-track error
Rng: Range to WPT
Brg: Bearing to WPT
Cse: Course
STBD: Starboard
PORT: Port



▶: Starboard, ◀: Port

* Wind speed and direction

True: Wind speed and direction when boat is anchored.

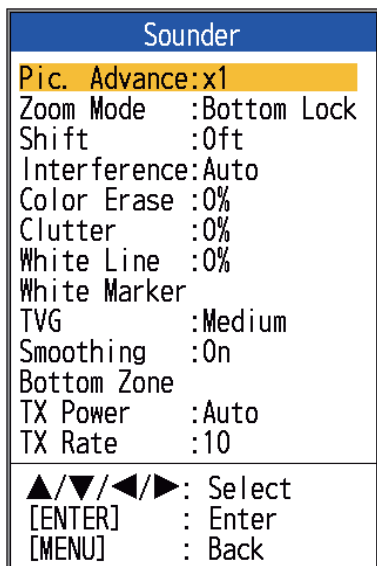
Relative: Wind speed and direction when boat is in motion.

Note: [- -] appears when respective data is not received for 30 seconds.

1.22 Menu Description

This section describes menu items not previously mentioned. For the [System] menu, see chapter 2.

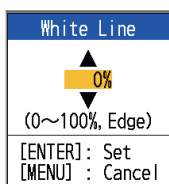
Sounder menu



[Zoom Mode]: Select the zoom display (bottom lock, bottom zoom and marker zoom) to show when "ZOOM" is selected with the **MODE** knob. For details, see page 3 and 4.

[White Line]: Display the leading edge of the bottom echo in white to help you distinguish bottom fish from the bottom echo.

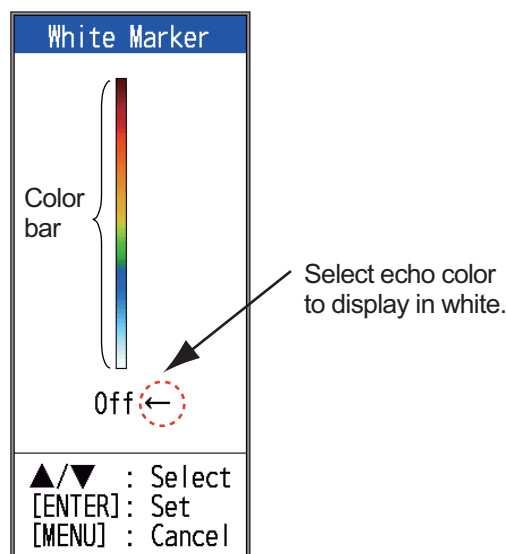
- 1) Select [White Line], then press the **ENTER** key.



- 2) Set the width. The larger the number the greater the width of the line. Select [Edge] to show the contour of the bottom in white.
- 3) Press the **ENTER** key.

[White Marker]: Display the selected echo color in white.

1. Select [White Marker] in the [Sounder] menu, then press the **ENTER** key.



2. Use ▲ or ▼ to select color desired. For example, move the arrow to the top of the color bar to display the bottom echo in white. The echo color chosen on the color bar is changed to white. That color is also white on the color bar.
To turn off the white marker, select [Off].
3. Press the **ENTER** key.
4. To restore the original color, move the arrow to [Off], then press the **ENTER** key.

[TVG]: Two schools of fish of the same size are displayed in different colors between deep water and in shallow water because of the feature of the ultrasound waves. TVG compensates for propagation attenuation of the ultrasound waves. It does this by equalizing echo presentation so that the schools of fish of the same size appear in the same color (echo strength) in both shallow and deep waters. The gain is adjusted automatically depending on the depth. The gain is low at short distance and increases over distance. [Low] applies the lowest gain level against short range echoes providing less cluttered, cleaner shallow water column, [Low] is recommended in deep water.

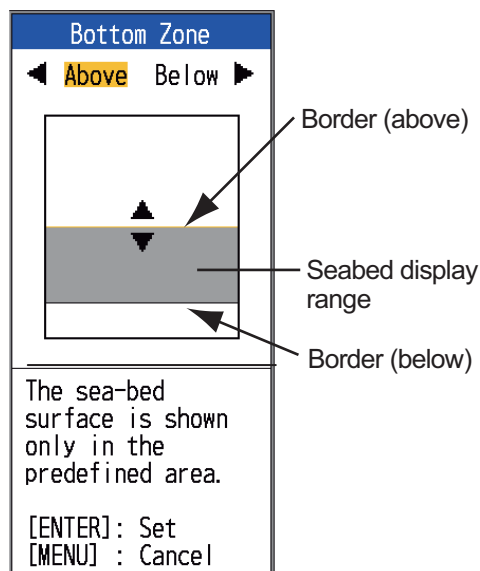
Note: Auto gain must be disabled to use the TVG.

[Smoothing]: Smooth echo presentation when enabled. Turn smoothing on when echoes appear "spotty" or "jagged".

[Bottom Zone]: Set the area where to display the bottom echo when selecting the [Auto] mode on the **RANGE** key.

Note: The bottom discrimination feature must be disabled to use this feature.

1. Select [Bottom Zone], then press the **ENTER** key.



[Bottom zone] setting window

2. Use ◀ or ▶ to select the border desired ([Above] or [Below]).
3. Use ▲ or ▼ to move upper or lower border, then press the **ENTER** key.

[TX Power]: Interference may appear on the screen when an echo sounder having the same frequency as your own is being operated in the vicinity of your vessel. In this case, lower your TX power and contact the vessel to request them to reduce their TX power. The higher the numeric (percentage) the greater the TX power. The [Auto] setting automatically adjusts TX power with depth. The [Off] setting disables transmission.

Note: The bottom discrimination and ACCU-FISH™ functions must be disabled to use other than [Auto]. If one of those features is active, the TX power setting is automatically set to [Auto].

[TX Rate]: Change pulse repetition rate. Normally, the highest rate (10) is used. When in shallow waters second reflection echoes may appear between the surface and actual bottom echo. In this case, lower the TX rate level. The setting [MAX] automatically adjusts the frequency and pulse length with depth. The [S] setting, which requires speed data, selects the TX rate according to your boat's speed. A high rate for fast speed; a slow rate for slow speed.

Note: The TX rate may not change when [Pic. Sync] in the Tankenmaru menu is set to [Yes]. This is because of the communications speed limitation between this unit and Shimano's receiver.

Display menu

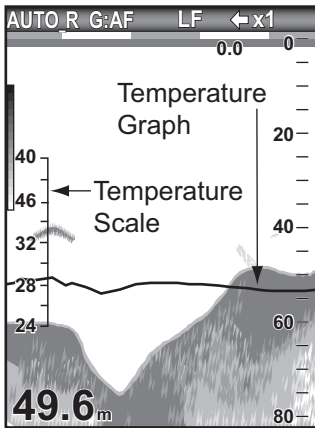
Display	
A-Scope	:Off
Depth Size	:Large
Zoom Marker	:Off
Temp Graph	:Off
Window Size	
Battery	:Off
Color Bar	:On
Palette	:White.
Colors	:64
Header Info	:On
Header Scale	:Time
Nav Data1	:☐
Nav Data2	:☐☐
ACCU-FISH	
Bottom Disc.	
RezBoost Mode	:Standard
▲/▼/◀/▶ : Select	
[ENTER] : Enter	
[MENU] : Back	

[Depth Size]: Select the font size of the depth indication ([Small], [Medium], [Large] or [Off]).

[Zoom Marker]: Turn the zoom marker on or off (on the single frequency display) when the bottom lock display, the bottom zoom display or the marker zoom display is active.

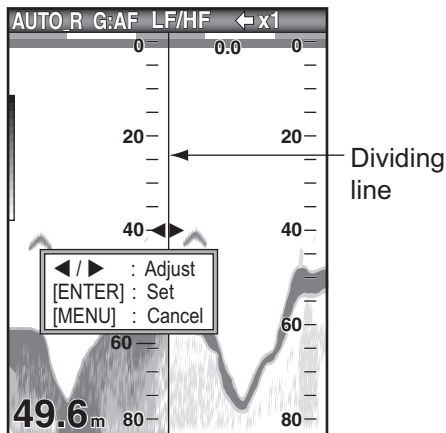
1. OPERATION

[Temp Graph]: Turn the water temperature graph on or off. The temperature scale range is 16°(°F) in [Narrow]; 40°(°F) in [Wide]. Require water temperature data.



[Window Size]: Adjust the display area of the dual frequency mode or zoom mode. This function is inoperative with the single frequency, nav data mode or A-scope display.

1. Select [Window Size], then press the **ENTER** key.



Window size setting window

2. Use ◀ or ▶ to move the dividing line, then press the **ENTER** key.

[Battery]: Turn the battery voltage indication (appears at the top of the screen) on or off. When displayed, the battery indication replaces the picture advance speed indication.

[Color Bar]: Turn the color bar on or off.

[Palette]: Change the background color of the screen to suit surroundings. The choices are white, blue, black, mono, and night.

[Colors]: Select the number of colors to display. The choices are 8, 16, and 64. When the setting for colors is changed, white marker settings may also be affected.

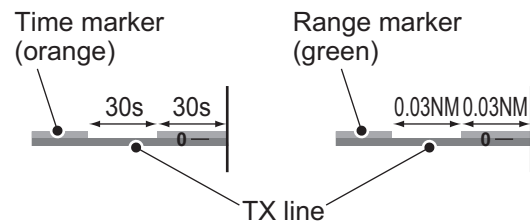
[Header Info]: Turn the operational info display (appears at the top on the screen) on or off.

AUTO_R G:AF LF ← x1

Header info

[Header Scale]: The header scale (below the header info) provides an estimate of time or distance.

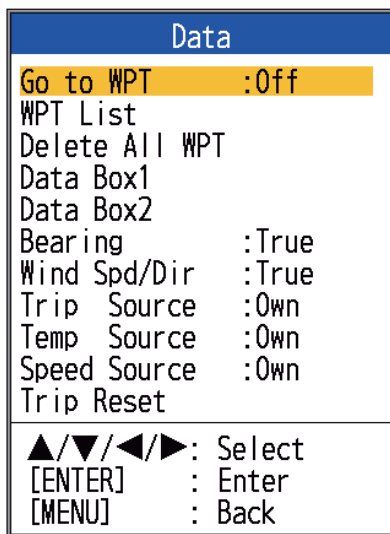
- **Time:** An orange bar and a “blank” bar scroll across the screen for 30 seconds each. (One set is one minute.)
- **Distance:** An orange bar and a “blank” bar scroll across the screen. Each bar is equal to 0.03 NM. (One set is 0.06 NM.) Requires speed and position data.



[Nav Data1, Nav Data2]: Set the division configuration of respective displays.

Data menu

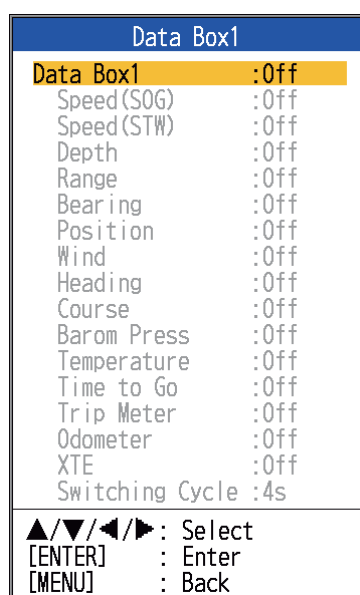
This menu mainly sets up how to display data input by external equipment.



[Data Box1(2)]: Show or hide the Data Box1, Data Box2 indication, which appears below the header info. You can select multiple indications in which case they are displayed alternately every four seconds (default setting). Requires appropriate sensors.

Data Box1 display → **0.5_{kn}** SOG
 Data Box2 display → **36.2_n**

- 1) Select [Nav Data1], then press the **ENTER** key.



- 2) Select [Data Box1], then press the **ENTER** key.

- 3) Select [On], then press the **ENTER** key.
- 4) Select a data, then press the **ENTER** key.
- 5) Select [On] or [Off], then press the **ENTER** key.
- 6) Repeat steps 4 and 5 show or hide other items.
- 7) Select [Switching Cycle], then press the **ENTER** key.
- 8) Select the amount of time (in seconds) to show each data, then press the **ENTER** key.
- 9) Set the Nav Data2 box similar to how you set the Nav Data1 box.

[Bearing]: Select the bearing sensor. [True] for gyrocompass, satellite compass; [Mag](netic) for magnetic compass.

[Wind Spd/Dir]: Select the format of wind speed and direction output from a wind sensor, [True] or [Apparent].

[Trip Source]: Select the source for the trip indication: Select [Own] to use the speed data from the speed sensor connected to this unit, or [NMEA] to use speed data from a navigator.

[Temp Source]: Select the source for the water temperature indication: Select [Own] to use the water temperature data from the water temperature sensor connected to this unit, or [NMEA] to use the water temperature data from a navigator.

[Speed Source]: Select the source for speed. Select [Own] to use the speed data from the speed sensor connected to this unit, or [NMEA] to use the speed data from a navigator.

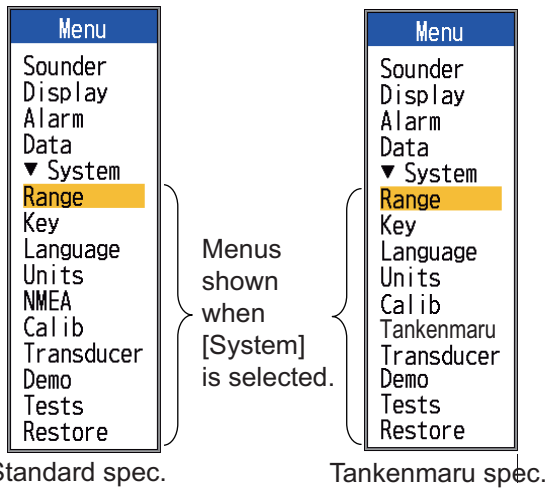
[Trip Reset]: Select [Yes] to reset the trip distance to zero. Two beeps sound after the completion.

2. SYSTEM MENU

2.1 How to Display the System Menu

The [System] menu mainly consists of items which do not require regular adjustment.

1. Press the **MENU/ESC** key to open the menu.
2. Select [System]. For [Tests], and [Restore], see Chapter 3. See Chapter 4 for "NMEA".



2.2 Range Menu

Range	
Range 1	: 15ft
Range 2	: 30ft
Range 3	: 60ft
Range 4	: 120ft
Range 5	: 200ft
Range 6	: 400ft
Range 7	: 600ft
Range 8	: 1000ft
Zoom Range	: 15ft
BL Range	: 15ft

▲/▼/◀/▶: Select
[ENTER] : Enter
[MENU] : Back

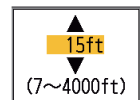
[Range 1] - [Range 8]: Set range of each of the eight ranges (available range: 7 to 4,000 ft). Note that all default ranges are



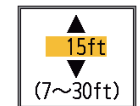
restored whenever the depth unit is changed. Therefore, change the depth unit before changing the preset ranges.

Note: The deepest detection range of Auto Range is the largest setting of [Range 1] to [Range 8] of Manual Range. In case the sea bottom is deeper than the largest setting of Auto Range, set the setting of [Range 1] to [Range 8] deeper than the sea bottom.

[Zoom Range]: Select the range to zoom in the bottom zoom and marker zoom modes.



[B/L Range]: Select the expansion width for the bottom lock display.



2.3 Key Menu

Key	
FUNC Key	: Pic. Advance
Key Beep	: Off

▲/▼/◀/▶: Select
[ENTER] : Enter
[MENU] : Back

[FUNC Key]: Select the item to program to the **FUNC** key. The programming can also be done by long-pressing the **FUNC** key. See section 1.18.2.

[Key Beep]: Turn key beep on or off.

2.4 Language Menu

Language	
Language	: English

▲/▼/◀/▶: Select
[ENTER] : Enter
[MENU] : Back

[Language]: The system language is available in English, and European and Asian languages. To change the language, select the

appropriate language, then press the **ENTER** key.

2.5 Units Menu

Units	
Depth	:ft
Temp	:°F
Fish Size	:inch
Speed	:kn
Wind	:kn
Distance	:NM
▲/▼/◀/▶: Select	
[ENTER] : Enter	
[MENU] : Back	

[Depth]: Select unit of depth measurement, among [m], [ft], [fm], [HR] (Hiro, Japanese) and [pb].

[Temp]: Select unit of water temperature measurement, between °C and °F. Water temperature data is required.

[Fish Size]: Select unit of fish size measurement, between [inch] and [cm].

[Speed]: Select unit of speed measurement among [kn], [km/h] and [mph]. Speed data is required.

[Wind]: Select unit of wind speed measurement, among [kn], [km/h], [mph] and [m/s]. Wind speed data is required.

[Distance]: Select unit of distance measurement, among [NM], [km] and [SM].

2.6 Calib Menu

Calibration	
Draft	:+0.0ft
Gain ADJ HF	:+0
Gain ADJ LF	:+0
Temp	:+0.0°F
Speed(STW)	:+0%
Fish Size	:+0%
Water Type	:Salt
Zero Line	
Rejector	:0n
Area	:4.5ft
Bottom Detect	:0.0ft
Bottom Level	:+0
▲/▼/◀/▶: Select	
[ENTER] : Enter	
[MENU] : Back	

[Draft]: The default depth display shows the distance from the transducer. If you would rather show the distance from the sea surface, set your ship's draft.

Draft
+ 0.0ft
(-15.0~+50.0ft)

[Gain ADJ HF], **[Gain ADJ LF]**: If the gain is too high or too low, or the gain for the low and high frequencies appears unbalanced, you can compensate it here.

Gain ADJ HF
+ 0
(-20~+20)

[Temp]: If the water temperature indication is wrong, you can correct it here. For example, if the water temperature indication is 2° higher than actual water temperature, enter -2.

Temp
+ 0.0°F
(-20.0~+20.0°F)

[Speed(STW)]: If the speed indication is wrong, you can correct it here. For example, if the speed indication is 10% lower than actual speed, enter +10.

Speed (STW)
+ 0%
(-50~+50%)

[Fish Size]: Compensate for wrongful indication of fish size.

Setting value	Compensation size
+100%	Double
+50%	1.5

2. SYSTEM MENU

Setting value	Compensation size
-50%	1/2
-65%	1/3
-75%	1/4
-80%	1/5

[Water Type]: Select the water type with which to use the equipment, from [Salt] or [Fresh]. Select correct water type to get accurate depth data.

[Zero Line Rejector]: Turn the zero line (transmission line) on or off. When turned on, the transmission line disappears, which allows you to see fish echoes near the surface clearly. The length of the transmission line changes with transducer used and installation characteristics. If the width of the transmission line is 4.5 ft (default value) or more, set the transmission line width with [Zero Line Area], as below.

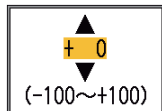
[Zero Line Area]: This feature adjusts the transmission line so that the transmission line disappears when the menu item [Zero Line Rejector] is turned on. For a long tail, increase the value. If the transmission line does not disappear, lower the TX power.



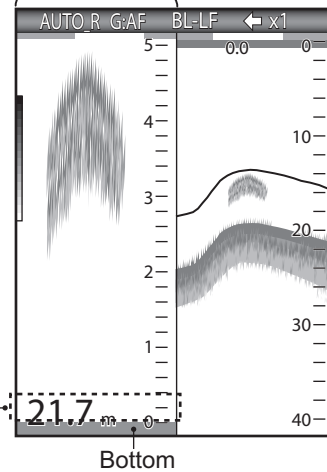
[Bottom Detect]: In some installations the tail of the TX line or the echo afterglow can be mistaken for the bottom echo. If this occurs, raise this setting to solve the problem. Too low a setting may prevent display of the bottom echo.



[Bottom Level]: In the default bottom level setting (+0), the equipment judges consecutive strong echoes to be bottom echoes. If, in that setting, the depth indication is unstable, adjust the bottom level. If vertical lines extend upward from the bottom echo in the bottom lock display, lower the bottom level to erase the vertical lines. If the level is too low, however, it may be difficult to distinguish bottom fish from the bottom echo.

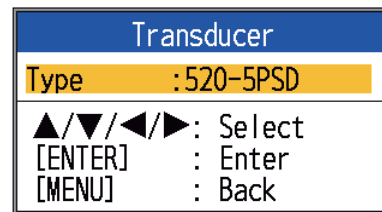


Bottom lock display



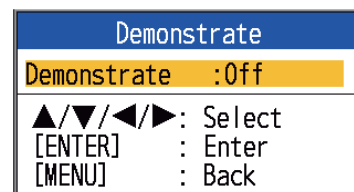
Set the bottom level so that these vertical lines just disappear.

2.7 Transducer Menu



[Type]: Select the transducer. See section 4.11.

2.8 Demo Menu

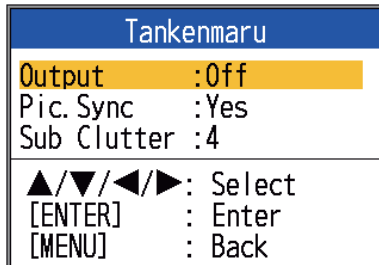


[Demonstrate]: The demonstration mode provides, without connection of the transducer, simulated operation of the equipment, using internally generated echoes. All controls are operative. The message [DEMO] appears at the bottom right corner on the screen when the demonstration mode is active.

[Off]: Deactivate the demonstration mode.
[On]: Activate the demonstration mode.

2.9 Tankenmaru Menu

The Tankenmaru system outputs the video signal from your display unit to the display unit of a Tankenmaru-equipped partner ship, etc., via a radio transmitter.



[Output]: Select On to output this unit's video signal to the display unit of a partner ship in the Tankenmaru system, via a radio transmitter.

[Pic. Sync]: Display or don't display the same video signal on your display unit and a partner's display unit.

- [Yes]: Display the same video signal on both your display unit and a partner's display unit. Note that the TX interval is longer when compared to the [No] setting.
- [No]: The display units are independent of one another.

[Sub Clutter]: Reduce clutter at a partner's display unit. The higher the setting the greater the degree of clutter reduction.

3. MAINTENANCE, TROUBLESHOOTING

⚠ WARNING

ELECTRICAL SHOCK HAZARD
 Do not open the equipment (other than when installing flush mount hanger cover).

Only qualified personnel can work inside the equipment.

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

3.2 How to Clean the Display Unit

Dust or dirt may be removed from the cabinet with a soft cloth. Water-diluted mild detergent may be used if desired. DO NOT use chemical cleaners to clean the display unit; they may remove paint and markings. Wipe the LCD carefully to prevent scratching, using the cleaning cloth provided and an LCD cleaner. To remove dirt or salt deposits, use an LCD cleaner, wiping slowly with cleaning cloth so as to dissolve the dirt or salt. Do not use solvents such as thinner, acetone or benzene for cleaning. Also, do not use degreaser or anti-fog solution on the LCD, as they can strip the coating on the LCD.

3.1 Maintenance

Regular maintenance is essential for good performance. Check the items listed in the table below monthly to help keep your equipment in good shape for years to come.

Checking


Item	Action
Transducer cable	Check cable for damage.
Power cable, transducer cable plug	Check that they are tightly fastened. Refasten if necessary.
Display unit ground	Check for corrosion. Clean if necessary.
Power supply voltage	Check voltage. If out of rating correct problem.

3.3 Transducer Maintenance

Marine life on the face of the transducer will result in a gradual decrease in sensitivity. Check the face of the transducer regularly for cleanliness. Carefully remove any marine life with a piece of wood or fine-grade sandpaper.

3.4 How to Replace the Fuse



The two fuses (Type: FGBO-A 125V 2A PBF, Code No.: 000-155-849-10) in the power cable assy. protect the system from reverse polarity of the power supply and equipment fault. If you cannot turn on the power, a fuse may have blown. Find the cause before replacing the fuse. If the fuse blows after replacement, contact your dealer for advice.

	WARNING
<p>Use the proper fuse.</p> <p>Use of a wrong fuse can result in fire and damage the equipment.</p>	

3.5 Battery Voltage Alert

A battery icon appears at the top of the display when the battery voltage is too high or too low.

Battery icon and meaning

Icon	Meaning
	Voltage is lower than 10 VDC. If the voltage goes below 9 V, the equipment is automatically turned off.
	Voltage is higher than 32 VDC. If the voltage goes higher than 33 V, the equipment is automatically turned off.

3.6 Troubleshooting

The table below provides basic troubleshooting procedures which the user may follow to restore normal operation.

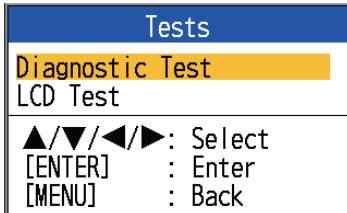
Troubleshooting table

If...	then check...
the screen is blank	<ul style="list-style-type: none"> the brilliance setting.
neither echo nor fixed range scale appears	<ul style="list-style-type: none"> the battery voltage. the fuse. the power cable assy.
no echo appears but the fixed range scale appears	<ul style="list-style-type: none"> if the display advance speed is set to [Stop]. the transducer plug. the transducer cable.
echo appears but zero line does not	<ul style="list-style-type: none"> if the range shifting is set to "0". if the zero line rejection is "Off". the draft setting; it should be other than "0".
sensitivity is low	<ul style="list-style-type: none"> the gain setting. if air bubbles or marine life are clinging to the transducer face. for dirty water. if the bottom is too soft to return an echo.
there is extreme interference or noise	<ul style="list-style-type: none"> if the transducer is too close to the engine. if the unit is properly grounded. if other echo sounders of the same frequency as own are being operated nearby.
the speed/water temperature readout is unrealistic or not present	<ul style="list-style-type: none"> if the sensor plug is securely connected.
the position readout is unrealistic or not present	<ul style="list-style-type: none"> the connection between fish finder and navigator. the navigator.

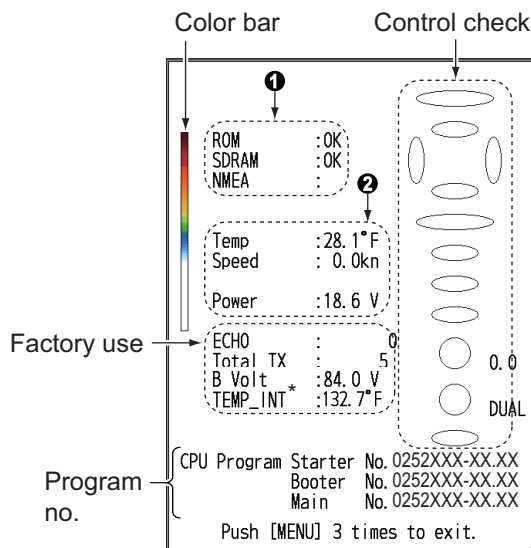
3.7 Diagnostics

If you feel your unit is not working properly, conduct the diagnostic test to find the probable cause. If you cannot restore normal operation, contact your dealer for advice.

1. Open the menu, select [Tests] under [System], then press the **ENTER** key.



2. Use ▲ or ▼ to select [Diagnostic Test], then press the **ENTER** key.



Prog.	FCV-628	FCV-588
Starter	0252427-XX.XX	0252430-XX.XX
Booter	0252428-XX.XX	0252431-XX.XX
Main	0252429-XX.XX	0252432-XX.XX

XX.XX=version no.

No.	Test item	Content
1	ROM	"OK" is shown if check is normal; "NG" for error.
	SDRAM	
	NMEA	Reserved for factory use. Special connector required. Nothing appears unless the connector is used.
2	Water temp.	Water temp. and speed from the respective sensors. Updated every three seconds.
	Speed	
	Power	Voltage of power source. Updated every three seconds.

3. The ovals and circles at the right side of the test display are for checking the controls.

How to check the keys and TrackPad: Press each key and the arrows on the TrackPad one by one. A key's (or arrow's) corresponding on-screen oval "lights" in red if the control is normal. Release hold and the oval turns white.

How to check the GAIN knob: Rotate the knob. The indication goes higher with clockwise rotation; lower with counter-clockwise rotation. Press the knob. The knob's corresponding on-screen circle "lights" in red if the knob is normal. Release hold and the circle turns white.

How to check the MODE knob: Rotate the knob. The corresponding on-screen circle "lights" in red or white with each knob position selected and the name of the setting selected appears.

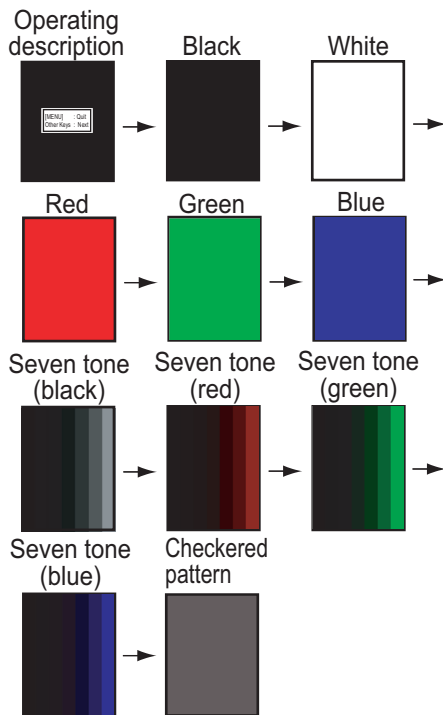
4. To quit the test, press the **MENU/ESC** key three times to close the test menu.

3.8 LCD Test

The LCD test checks the LCD for proper display of colors.

Note: To review the seven-tone screen easily, set the brilliance to maximum before starting the test.

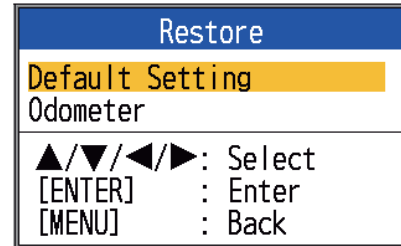
1. Open the menu, select [Tests] (under [System]), then press the **ENTER** key.
2. Use ▲ or ▼ to select [LCD Test], then press the **ENTER** key.
3. Press any key except **MENU/ESC** key to start the test. Press any key other than the **MENU/ESC** key to change the test color, in the sequence shown below. After the checkered pattern, the [Tests] menu appears.



3.9 How to Clear the Memory, Reset the Odometer

You can restore default menu settings and reset the odometer (trip distance indication) as follows.

1. Open the menu, select [Restore] (under [System]), then press the **ENTER** key.



2. Select [Default Setting] or [Odometer] as appropriate, then press the **ENTER** key. **[Default Setting]:** Restore all default menu settings (excluding language). **[Odometer]:** Reset the odometer to zero.
3. Use ▲ to select [Yes], then press the **ENTER** key. For [Odometer], the unit beeps after the reset is completed. For [Default Setting], the unit beeps, the startup screen appears, then the [Installation] menu appears. Select appropriate language, then press the **MENU/ESC** key twice.

4. INSTALLATION

4.1 Equipment List

Standard supply for FCV-628

Name	Type	Code No.	Qty	Remarks
Display Unit	CV-628-E	-	1	With hard cover
Installation Materials	CP02-07910	000-027-527	1 set	<ul style="list-style-type: none"> • Cable Assy. (Type: KON-004-02M, Code No.: 000-156-405-13) • Self-tapping Screw (Type: 5×25, Code No.: 000-162-610-10, 4 pcs.)
Spare Parts	SP02-05001	001-384-040	1 set	Fuse (Type: FGBO-A 125V 2A PBF, Code No.: 000-155-849-10, 2 pcs.)
<u>Accessories</u> Type: FP02-05501 Code No.: 001-384-090 Qty: 1 set	<u>Contents</u> <ul style="list-style-type: none"> • LCD Cleaning Cloth (Type: 02-155-1082-2, Code No.: 100-332-652-10) • Large MJ Cable Cap (Type: 02-154-1221-1, Code No.: 100-329-441-10) • Flush Mounting Sponge (Type: 02-154-1601, Code No.: 100-329-460-10) • Wing Nut (Type: M4, Code No.: 000-167-545-10, 4 pcs.) • Flat Washer (Type: M4, Code No.: 000-167-455-10, 4 pcs.) • Spring Washer (Type: M4, Code No.: 000-167-405-10, 4 pcs.) • Threaded Rod (Type: M4×50, Code No.: 000-162-679-10, 4 pcs.) 			

Standard supply for FCV-588

Name	Type	Code No.	Qty	Remarks
Display Unit	CV-588-E	-	1	With hard cover
Installation Materials	CP02-07910	000-027-527	1 set	<ul style="list-style-type: none"> • Cable Assy. (Type: KON-004-02M, Code No.: 000-156-405-13) • Self-tapping Screw (Type: 5×25, Code No.: 000-162-610-10, 4 pcs.)
Spare Parts	SP02-05001	001-384-040	1 set	Fuse (Type: FGBO-A 125V 2A PBF, Code No.: 000-155-849-10, 2 pcs.)
<u>Accessories</u> Type: FP02-05601 Code No.: 001-384-260 Qty: 1 set	<u>Contents</u> <ul style="list-style-type: none"> • LCD Cleaning Cloth (Type: 02-155-1082-2, Code No.: 100-332-652-10) • Large MJ Cable Cap (Type: 02-154-1221-1, Code No.: 100-329-441-10) • Flush Mounting Sponge (Type: 02-154-1801, Code No.: 100-330-851-10) • Wing Nut (Type: M4, Code No.: 000-167-545-10, 4 pcs.) • Flat Washer (Type: M4, Code No.: 000-167-455-10, 4 pcs.) • Spring Washer (Type: M4, Code No.: 000-167-405-10, 4 pcs.) • Threaded Rod (Type: M4×50, Code No.: 000-162-679-10, 4 pcs.) 			

Optional equipment

Name	Type	Code No.	Remarks
Transducer	520-5PSD*	000-015-204	Thru-hull mount, plastic
	520-5MSD*	000-015-212	Thru-hull mount, metal
	520-PLD*	000-177-684-10	Thru-hull mount, plastic
	525-5PWD*	000-027-447	Transom mount, plastic
Triducer (transducer with speed/temperature sensor)	525T-PWD*	000-023-019	Transom mount, plastic
	525T-BSD*	000-023-020	Thru-hull mount, metal
	525STID-MSD*	000-011-783	Thru-hull mount, metal
	525STID-PWD*	000-011-784	Transom mount, plastic
	525T-LTD/12*	000-023-679	Tilt angle 12°, thru-hull mount, metal
	525T-LTD/20*	000-023-678	Tilt angle 20°, thru-hull mount, metal
	SS60-SLTD/12*	000-023-676	Tilt angle 12°, thru-hull mount, alloy
SS60-SLTD/20*	000-023-677	Tilt angle 20°, thru-hull mount, alloy	
Converter Cable Assy.	02S4147	001-258-330	For connection of speed sensor, speed/temperature sensor
Cable Assy.	MJ-A7SPM0001-005+R	000-169-364-10	0.5 m, for Tankenmaru
Cable Assy.	KON-004-02M	000-156-405	2 m
Extension Cable**	C332 10M	000-192-786-10	10m, for transducer
Speed/Temperature Sensor	ST-02MSB	001-164-150-10	Thru-hull mount, metal
	ST-02PSB	001-164-160-10	Thru-hull mount, plastic
Temperature Sensor	T-04MSB	000-026-893	Thru-hull mount
	T-04MTB	000-026-894	Transom mount
Inside Hull Kit S	22S0191	001-321-930	w/installation instructions, not available with bottom discrimination display.
Matching Box	MB-1100	000-027-226	For FCV-588, necessary when using 1 kW transducer
Transducer (for FCV-588)	50B-6	000-015-042	10 m, 1 kW
	50B-6B	000-015-043	15 m, 1 kW
	200B-5S	000-015-029	10 m, 1 kW
	50/200-1T*	000-015-170	10 m, 1 kW
Triducer (for FCV-588)	526TID-HDD*	000-023-021	Thru-hull mount, metal, 1 kW (Does not require Matching Box MB-1100.)

* Supports ACCU-FISH™, Bottom discrimination display, RezBoost™ [Standard] mode. All transducers listed above provide the RezBoost™ [Standard] mode.

** Use of the extension cable may cause the following problems:

- Reduced detection ability
- Wrong ACCU-FISH™ information (fish length smaller than actual length, fewer fish detections, error in individual fish detection).
- Wrong speed data
- No TD-ID recognition

4.2 Display Unit

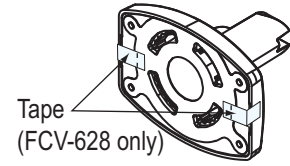
Mounting considerations

The display unit can be installed on a desktop, or flush mounted in a console. When choosing a location keep the following in mind:

- Locate the unit away from the air from air conditioners.
- The operating temperature range is 5°F to 131°F.
- Locate the unit away from devices that emit active gas.
- The mounting location must be well ventilated.
- Select a location where vibration and shock are minimal.
- Select a location out of direct sunlight. Prolonged exposure to direct sunlight can cause LCD blackout.
- A magnetic compass will be affected if the display unit is placed too close to the compass. Observe the compass safe distances in the safety instructions to prevent interference to the compass.

Desktop mount

1. Remove the tape from the bottom of the bracket assembly.
2. Fix the bracket assembly to a desktop with four self-tapping screws (5×25, supplied). Be sure to follow the recommended maintenance space show in the outline drawing. Insufficient space may cause damage to connectors when disconnecting and reconnecting them.
3. Loosely screw knob into the bracket assembly.
4. Set the display unit to the bracket assembly.
5. Adjust the angle of the display unit and then tighten the knob to fix the display unit.
Note: When loosening the knob to adjust the angle of the display, do not tilt the unit 90-degree backward or forward. The cable connector may be damaged if it contacts the bracket.
6. Attach the hard cover to the display unit for protection when the unit is not in use.

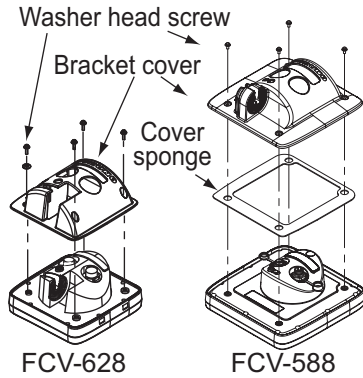


Flush mount (in a console)

Select a flat mounting location and install the unit as shown below.

It is recommended to set up a dedicated breaker when flush mounting the unit, since it will be difficult to disconnect cables.

1. Using the paper template (supplied), make a cutout in the mounting location.
2. Unfasten four washer head screws on the rear of the display unit to remove the bracket cover and the cover sponge (FCV-588 only).



3. Set the flush mounting sponge (supplied) to the display unit.
4. Screw four threaded rods (supplied) to the display unit.
5. Set the display unit to the cutout.
6. Fasten the display unit from behind with four sets of flat washers, spring washers and wing nuts (supplied).

4.3 Thru-hull Mount Transducer

520-PLD

For details of the installation, see the manual of the transducer.

Transducer mounting location (for 520-5PSD/520-5MSD)

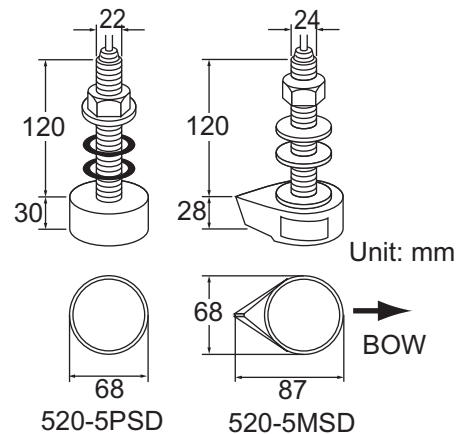
The thru-hull mount transducer provides the best performance of all, since the transducer protrudes from the hull and the effect of air bubbles and turbulence near the hull skin is reduced. When the boat has a keel, the transducer should be at least 30 cm away from it.

The performance of this fish finder is directly related to the mounting location of the transducer, especially for high-speed cruising. The installation should be planned in advance, keeping the length of the transducer cable and the following factors in mind:

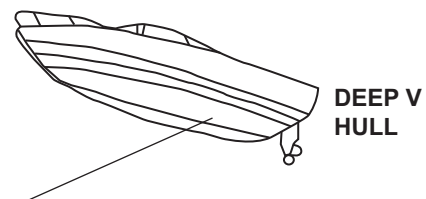
- Air bubbles and turbulence caused by movement of the boat seriously degrade the sounding capability of the transducer. The transducer should, therefore, be located in a position where water flow is the

smoothest. Noise from the propellers also adversely affects performance and the transducer should not be mounted nearby. The lifting strakes are notorious for creating acoustic noise, and these must be avoided by keeping the transducer inboard of them.

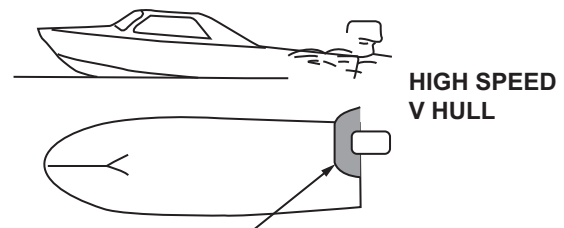
- The transducer must always remain submerged, even when the boat is rolling, pitching or up on a plane at high speed.
- A practical choice would be somewhere between 1/3 and 1/2 of the boat's length from the stern. For planing hulls, a practical location is generally rather far astern, so that the transducer is always in water regardless of the planing attitude.



Thru-hull mount transducer mounting dimensions



- Position 1/2 to 1/3 of the hull from stern.
- 15 to 30 cm off center line (inside first lifting strakes.)



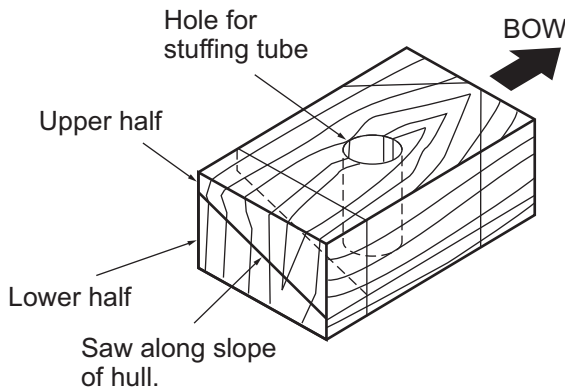
- Within the wetted bottom area
- Deadrise angle within 15°

Suitable transducer mounting locations

4. INSTALLATION

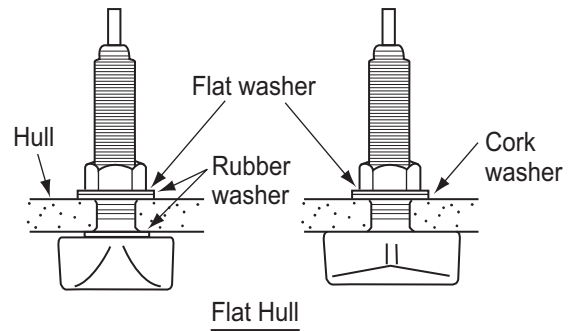
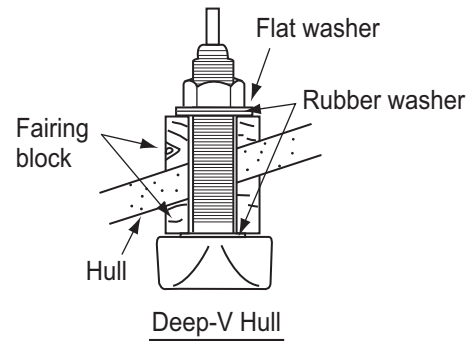
Procedure for installation of the thru-hull mount transducer (for 520-5PSD/520-5MSD)

1. With the boat hauled out of the water, mark the location chosen for mounting the transducer on the bottom of the hull.
2. If the hull is not level within 15° in any direction, fairing blocks made out of teak should be used between the transducer and hull, both inside and outside, to keep the transducer face parallel with the water line. Fabricate the fairing block as shown below and make the entire surface as smooth as possible to provide an undisturbed flow of water around the transducer. The fairing block should be smaller than the transducer itself to provide a channel to divert turbulent water around the sides of the transducer rather than over its face.



Construction of fairing block

3. Drill a hole just large enough to pass the threaded stuffing tube of the transducer through the hull, making sure it is drilled vertically.
4. Apply a sufficient amount of high quality caulking compound to the top surface of the transducer, around the threads of the stuffing tube and inside the mounting hole (and fairing blocks if used) to ensure watertight mounting.
5. Mount the transducer and fairing blocks and tighten the locknut. Be sure that the transducer is properly oriented and its working face is parallel to the waterline.



Note: Do not over-stress the stuffing tube and locknut through excessive tightening, since the wood block will swell when the boat is placed in the water. It is suggested that the nut be tightened lightly at installation and re-tightened several days after the boat has been launched.

Transducer preparation (for 520-5PSD/520-5MSD)

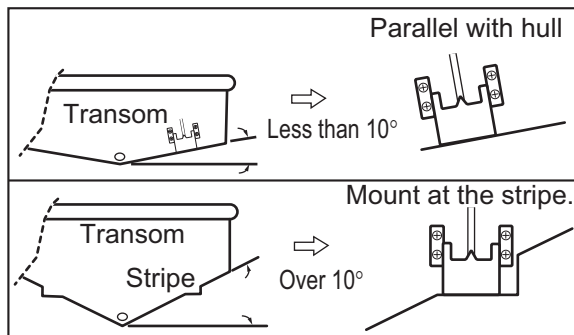
Before putting the boat in water, wipe the face of the transducer thoroughly with a detergent liquid soap. This will lessen the time necessary for the transducer to have good contact with the water. Otherwise the time required for complete "saturation" will be lengthened and performance will be reduced.

DO NOT paint the transducer. Performance will be affected.

4.4 Transom Mount Transducer

The optional transom mount transducer is very commonly employed, usually on relatively small I/O or outboard boats. Do not use this method on an inboard motor boat because turbulence is created by the propeller ahead of the transducer.

DO NOT overtighten screws; they may be damaged.



525-5PWD mounting locations

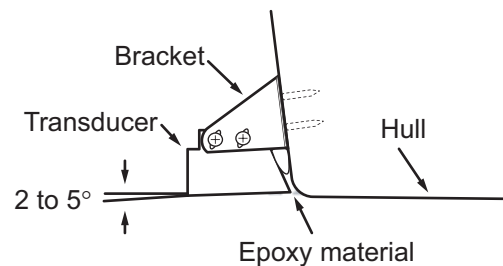
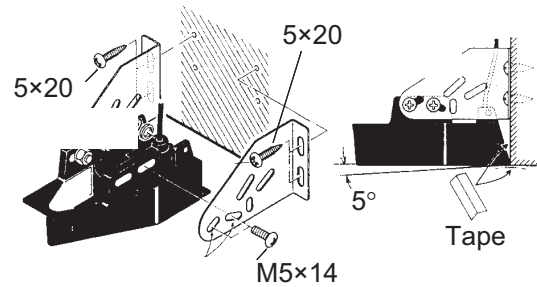
Select the installation method depending on the rise angle of the hull.

Installation procedure

A suitable mounting location is at least 50 cm away from the engine and where the water flow is smooth.

1. Drill four pilot holes for self-tapping screw (5×20) in the mounting location.
2. Coat the threads of the self-tapping screws (5×14) for the transducer with marine sealant for waterproofing. Attach the transducer to the mounting location with the self-tapping screws.
3. Adjust the transducer position so the transducer faces right to the bottom. If necessary, to improve water flow and minimize air bubbles staying on the transducer face, incline the transducer about 5° at the rear. This may require a certain amount of experimentation for fine tuning at high cruising speeds.

4. Tape the location shown in the figure below. Fill the gap between the wedge front of the transducer and transom with epoxy material to eliminate any air spaces.



5. After the epoxy hardens, remove the tape.

4.5 How to Mount a Thru-hull Transducer Inside the Hull

The thru-hull mount transducer may also be installed inside the hull on FRP boats. However, this installation method affects the ability to detect the bottom, fish and other objects because the ultrasound pulse is weakened when it passes through the hull. Do not install the transducer inside the hull on a steel or wooden hull vessel, since the ultrasound pulse cannot penetrate those hulls.

NOTICE

This mounting method should not be used to mount the transducer that supports the ACCU-FISH™, the bottom discrimination display or the [Enhanced] RezBoost™ functions since performance is greatly degraded.

4. INSTALLATION

Necessary tools

You will need the following tools:

- Sandpaper (#100)
- Marine sealant
- Silicone grease

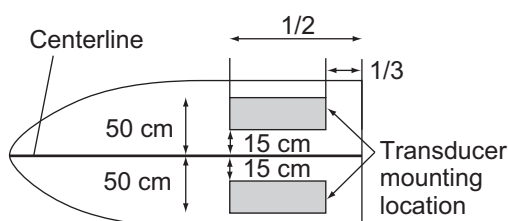
Remarks on installation

- Do the installation with the ship moored at a dock, etc. The water depth should be 6.5-32 feet (2-10 meters).
- Turn off the engine.
- Install the transducer with the engine room.
- Do not power the unit with the transducer in the air, to prevent damage to the transducer.
- Do not use this method on a double layer hull.
- Before attaching the transducer to the hull, check that the site is suitable. Put the transducer in a water-filled plastic bag. Connect the transducer to the display unit and put the transducer on the installation site. Turn on the display unit and check that the depth indication appears.

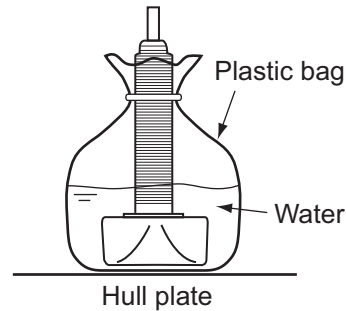
Installation procedure

If the thickness of the hull varies, then the attenuation of the ultrasound pulse may vary. Select a location where the attenuation is the lowest.

1. Select two or three locations considering the four points mentioned below. (You will finalize the mounting location through some trial and error later.)
 - Mount the transducer at a location 1/2 to 1/3 of the length of the boat from the stern.
 - The mounting location is between 15 to 50 cm from the centerline of the hull.
 - Do not place the transducer over hull struts or ribs which run under the hull.
 - Avoid a location where the rising angle of the hull exceeds 15°, to minimize the effect of the boat's rolling.

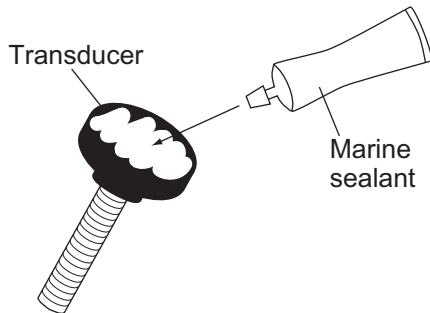


2. Decide the most suitable site from the selected locations by doing the following:
 - 1) Connect the power cable and transducer cable to the display unit.
 - 2) Put the transducer into a water-filled plastic bag. Press the transducer against the chosen site.

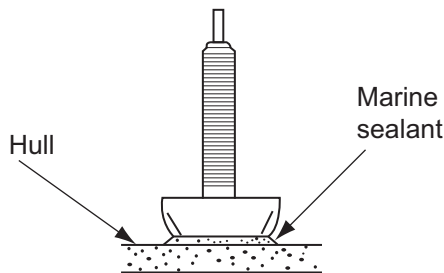


- 3) Turn on the display unit.
 - 4) Push the **MENU/ESC** key to show the main menu.
 - 5) Select [Sounder] menu.
 - 6) Set the [TX Power] to [10%].
 - 7) Press the **MENU/ESC** key two times.
 - 8) Check if the bottom echo appears on the display. If it doesn't, do this procedure until a suitable location is found.
 - 9) After the mounting location is decided, turn off the power of display unit.
3. Remove the transducer from the plastic bag and wipe the face of transducer with a cloth to remove water and any foreign material. Lightly roughen the face of transducer with #100 sandpaper. Also, use the sandpaper to roughen the inside of the hull where the transducer is to be mounted.
 4. Wipe off any sandpaper dust from the face of the transducer.

5. Dry the face of the transducer and the hull. Coat the transducer face and mounting location with marine sealant. Hardening begins in approx. 15-20 minutes so do this step without delay.



6. Attach the transducer to the hull. Press the transducer firmly down on the hull and gently twist it back and forth to remove any air which may be trapped in the marine sealant.



7. Support the transducer with a piece of wood to keep it in place while the sealant is drying. It takes 24-72 hours to harden completely.
8. Turn the power on and change the menu setting as follows:
 - 1) Push the **MENU/ESC** key to show the main menu.
 - 2) Select [Sounder] menu.
 - 3) Set the [TX Power] to [Auto].
 - 4) Push the **MENU/ESC** key to show the main menu.
 - 5) Select [Calib] and set the [Gain ADJ HF] to [+8].
 - 6) Set the [Gain ADJ LF] to [+8].
 - 7) Set the [Bottom Level] to [-60].
 - 8) Press the **MENU/ESC** key two times.

4.6 Triducer

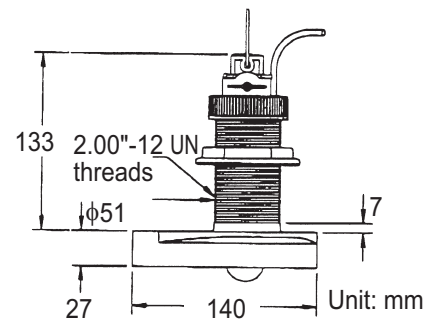
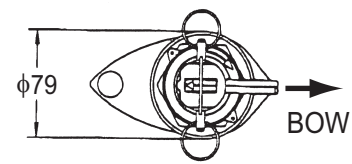
DO NOT overtighten screws. They may be damaged.

525T-BSD, 526TID-HDD

For details of the installation, see the manual of the triducer.

525STID-MSD

The optional triducer 525STID-MSD is designed for thru-hull mounting. For how to install this triducer see section 4.3.



Triducer 525STID-MSD

525T-PWD

For details of the installation, see the manual of the triducer.

525STID-PWD

The optional transom mount triducer 525STID-PWD can be installed by the thru-hull method or the inside-hull method.

Pre-test for speed and temperature

Connect the sensor to the instrument and spin the paddlewheel. Check for a speed reading and the approximate air temperature. If there is no reading, return the sensor to your place of purchase.

Tools and materials needed

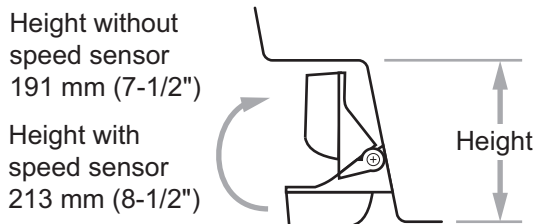
- Scissors
- Safety goggles
- Electric drill
- Masking tape
- Dust mask
- Screwdrivers

4. INSTALLATION

- Drill bit:
 - For bracket holes: 4 mm, #23, or 9/64"
 - For fiberglass hull: chamfer bit (preferred), 6 mm, or 1/4"
 - For transom hole: 9 mm or 3/4" (optional)
 - For cable clamp holes: 3 mm or 1/8"
- Straight edge
- Pencil
- Water-based antifouling paint (mandatory in salt water)
- Marine sealant
- Cable ties

Mounting location

To ensure the best performance, the sensor must be submerged in aeration-free and turbulence-free water. Mount the sensor close to the centerline of the boat. On slower heavier displacement hulls, positioning it farther from the centerline is acceptable. Allow adequate space above the bracket for it to release and rotate the sensor upward. Refer to the illustration below for dimensions.



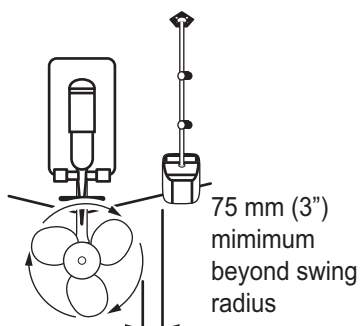
NOTICE

Do not mount the sensor in an area of turbulence or bubbles:

- near water intake or discharge openings
- behind strakes, struts, fittings, or hull irregularities
- behind eroding paint (an indication of turbulence).

Avoid mounting the sensor where the boat may be supported during trailering, launching, hauling, and storage.

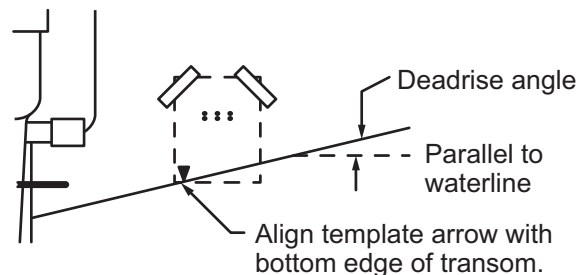
Note 1: For single drive boat, mount on the starboard side at least 75 mm (3") beyond the swing radius of the propeller.



Note 2: For twin drive boat, mount between the drives.

Installation of bracket

1. Cut out the installation template (enclosed with transducer) along the dotted line.
2. At the selected location, position the template, so the arrow at the bottom is aligned with the bottom edge of the transom. Being sure the template is parallel to the waterline, tape it in place.



Positioning the template

Warning: Always wear safety goggles and a dust mask.

3. Using a 4 mm, #23, or 9/64" bit, drill three holes 22 mm (7/8") deep at the locations indicated. To prevent drilling too deeply, wrap masking tape around the bit 22 mm (7/8") from the point.

Fiberglass hull: Minimize surface cracking by chamfering the gelcoat. If a chamfer bit or countersink bit is not available, start drilling with a 6mm or 1/4" bit to a depth of 1 mm (1/16").

4. If you know your transom angle, the bracket is designed for a standard 13° transom angle.
 - 11°-18° angle: No shim is required. Skip to step 3 in "Adjustments".
 - Other angles: The shim is required. Skip to step 2 of "Adjustments".
 If you do not know the transom angle, temporarily attach the bracket and sensor to the transom to determine if the plastic shim is needed.

5. Using the three #10 x 1-1/4" self-tapping screws, temporarily screw the bracket to the hull. **DO NOT** tighten the screws completely at this time. Follow the step 1-4 in

"Attaching the sensor to the bracket", before proceeding with "Adjusting".

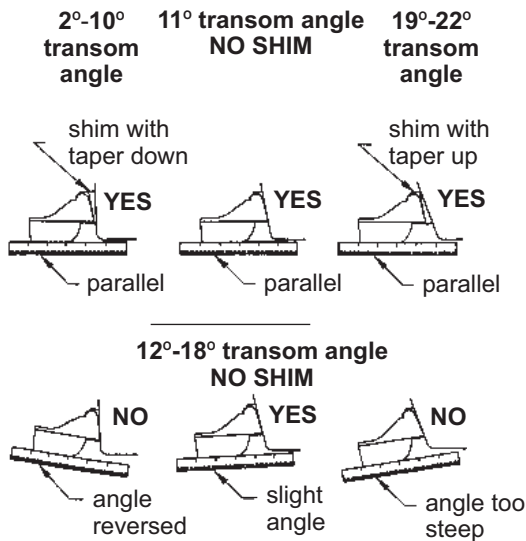
Adjustments

- Using a straight edge, sight the underside of the sensor relative to the underside of the hull. The stern of the sensor should be 1-3 mm (1/16-1/8") below the bow of the sensor or parallel to the bottom of the hull. **Note:** Do not position the bow of the sensor lower than the stern because aeration will occur.

- To adjust the sensor's angle relative to the hull, use the tapered plastic shim provided. If the bracket has been temporarily fastened to the transom, remove it. Key the shim in place on the back of the bracket.

2°-10° transom angle (stepped transom and jet boats): Position the shim with the tapered end down.

19°-22° transom angle (small aluminum and fiberglass boats): Position the shim with the tapered end up.



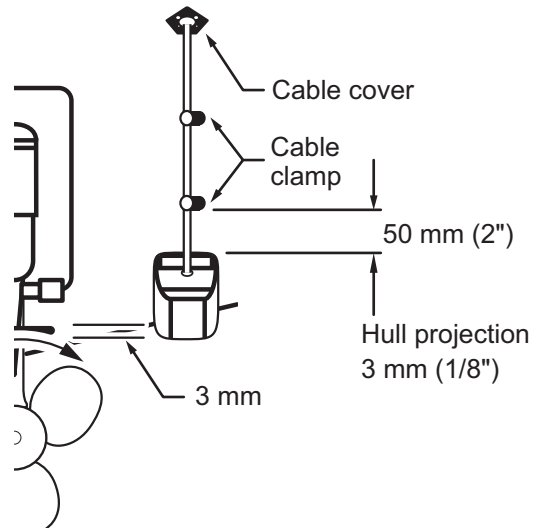
Sensor position and transom angle

- If the bracket has been temporarily fastened to the transom, remove it. Apply a marine sealant to the threads of the three #10 x 1-1/4" self tapping screws to prevent water seeping into the transom. Screw the bracket to the hull. Do not tighten the screws completely at this time.

- Repeat step 1 to ensure that the angle of the sensor is correct.

Note: Do not position the sensor farther into the water than necessary to avoid increasing drag, spray, and water noise and reducing boat speed.

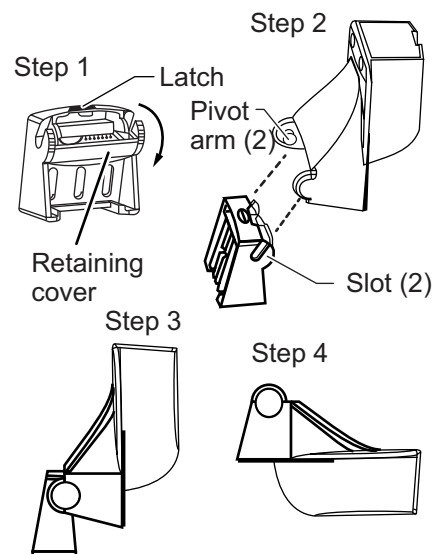
- Using the vertical adjustment space on the bracket slots, slide the sensor up or down to provide a projection of 3 mm (1/8"). Tighten the screws.



Vertical adjustment and cable routing

Attaching the sensor to the bracket

- If the retaining cover near the top of the bracket is closed, open it by depressing the latch and rotating the cover downward.



- Insert the sensor's pivot arms into the slots near the top of the bracket.

4. INSTALLATION

3. Maintain pressure until the pivot arms click into place.
4. Rotate the sensor downward until the bottom snaps into the bracket.
5. Close the retaining cover to prevent the accidental release of the sensor when the boat is underway.

Cable routing

Route the sensor cable over the transom, through a drain hole, or through a new hole drilled in the transom above the waterline.

Never cut the cable or remove the connector; this will void the warranty. Always wear safety goggles and a dust mask.

1. If a hole must be drilled, choose a location well above the waterline. Check for obstructions such as trim tabs, pumps, or wiring inside the hull. Mark the location with a pencil. Drill a hole through the transom using a 19 mm or 3/4" bit (to accommodate the connector).
2. Route the cable over or through the transom.
3. On the outside of the hull secure the cable against the transom using the cable clamps. Position a cable clamp 50 mm (2") above the bracket and mark the mounting hole with a pencil.
4. Position the second cable clamp halfway between the first clamp and the cable hole. Mark this mounting hole.
5. If a hole has been drilled in the transom, open the appropriate slot in the transom cable cover. Position the cover over the cable where it enters the hull. Mark the two mounting holes.
6. At each of the marked locations, use a 3 mm or 1/8" bit to drill a hole 10 mm (3/8") deep. The prevent drilling too deeply, wrap masking tape around the bit 10 mm (3/8") from the point.
7. Apply marine sealant to the threads of the #6 x 1/2" self-tapping screw to prevent water from seeping into the transom. If you have drilled a hole through the transom, apply marine sealant to the space

around the cable where it passes through the transom.

8. Position the two cable clamps and fasten them in place. If used, push the cable cover over the cable and screw it in place.
9. Route the cable to the instrument being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. To reduce electrical interference, separate the sensor cable from other electrical wiring and "noise" sources. Coil any excess cable and secure it in place with zip-ties to prevent damage.

4.7 Speed/Temperature Sensor (option)

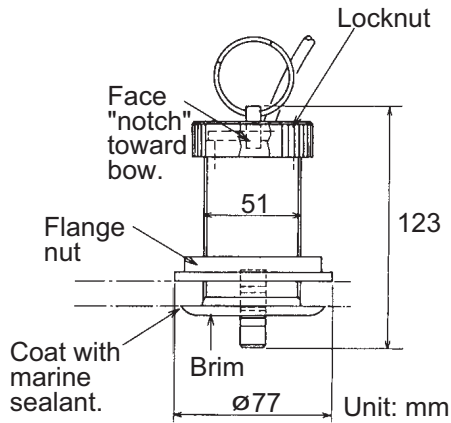
The speed/temperature sensors (ST-02MSB and ST-02PSB) are designed for thru-hull mounting. Install them as shown below.

Mounting considerations

Select a suitable mounting location, considering the following:

- Select a mid-boat flat position. The sensor does not have to be installed perfectly perpendicular.
 - Select a location where the transducer will not be damaged in trailering, launching, hauling, and storage.
 - Select a location in the forward direction viewing from the drain hole, to allow for circulation of cooling water.
 - Select a location away from water flow from keel, water discharge pipe, etc.
 - Vibration at the location shall be minimal.
 - Do not install fore of the transducer of a fish finder, to prevent disturbance (and loss of performance) to the fish finder.
1. Dry-dock the boat.
 2. Make a hole of approx. 51 mm diameter in the mounting location.
 3. Unfasten the locknut and remove the sensor section.

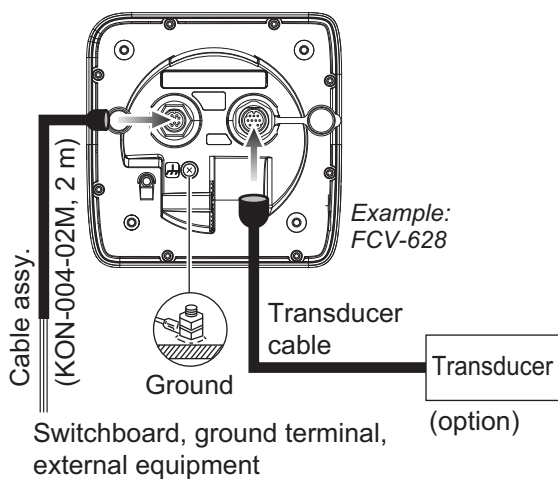
4. Apply marine sealant to the flange of the sensor. The height of the coat should be approx. 6 mm
5. Pass the sensor casing through the hole.
6. Face the notch on the sensor toward boat's bow and tighten the flange.
7. Set the sensor section to the sensor casing and tighten the locknut.
8. Launch the boat and check for water leakage around the sensor.



Speed/Temperature sensor
ST-02MSB, ST-02PSB

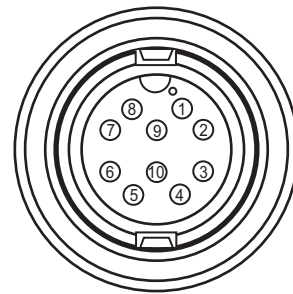
4.8 Wiring

Connect the cable assy. (supplied) to the [12-24 VDC/NMEA] port, and the transducer cable to the [XDR] port. Refer to the interconnection diagram to connect cables. Leave slack in cables to facilitate checking and maintenance. See the next page for how to ground the display unit.



Cable assy. signal names

Connector	Color	Remarks	
1	TD-A	WHT	IEC61162-1/ NMEA0183
2	TD-B	BLU	
3	RD-A	YEL	IEC61162-1/ NMEA0183
4	RD-B	GRN	
5	12V-P(+)	BRN	Power output (12 VDC)
6	12V-M(-)	ORG	
7	DC-P-IN (+)	RED	Power input 12-24 VDC
8	DC-M-IN (-)	BLK	
9	NC	-	
10	SHIELD	-	Drain wire (to GND terminal on switchboard)

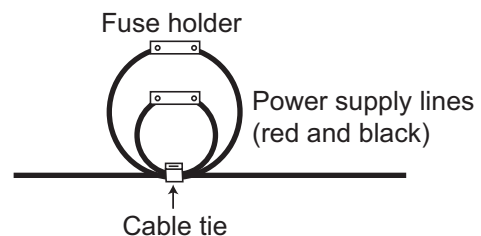


Note 1: Attach the MJ cable cap (supplied) to the transducer cable to protect the connector when the display unit is removed from the boat.

Note 2: Cut unused cores and tape them.

Note 3: Connector of cable edge breaks easily. Be careful when connecting or disconnecting the connector.

Note 4: The fuse holder contains a spring which fixes the fuse. To prevent detachment of the spring, which would cause loss of power, tie the lines as shown below.





4. INSTALLATION

How to ground the display unit

NOTICE
Be sure to ground the display unit.
An improper ground or no ground can affect performance and cause interference to other equipment.

- Use a 1.25 sq wire (local supply) for the ground wire.
- Make the length of the ground wire as short as possible and connect it to the boat's ground.
- For FRP vessel, attach a steel plate measuring 20 cm by 30 cm on the outside of the hull to provide a ground point. Connect the ground wire there.

Note 1: Use a ring-type lug () to make the connection at the display unit. Do not use a fork-type lug ().

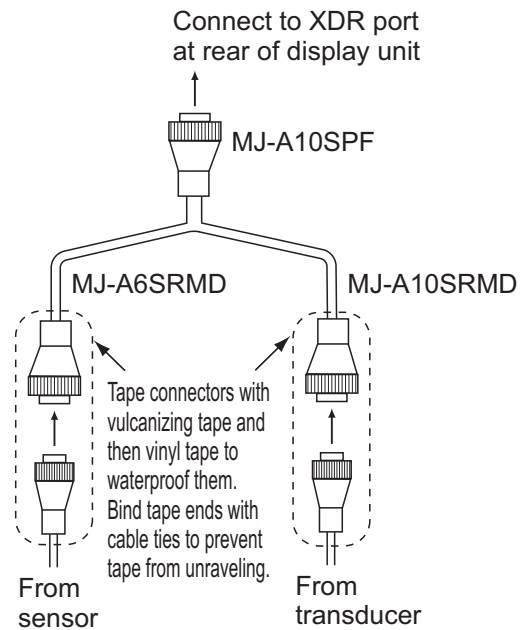
Note 2: External equipment should not be connected to the fish finder if the signal ground of the external equipment and the positive DC terminal of the fish finder are connected to the boat's ground.

External equipment

The [12-24 VDC/NMEA] port is commonly used for connection of external equipment such as a GPS receiver and/or wind indicator. This port is also used to connect the radio transmitter for the Tankenmaru system. Refer to the interconnection diagram to connect cables.

Speed/Temperature sensor

Connect the optional speed/temperature sensor to the XDR port with the optional conversion cable (Type 02S4147) as shown on the following page.



Connection of conversion cable 02S4147

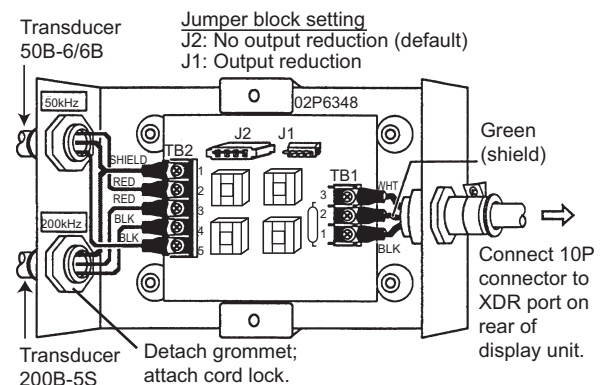
Matching box for optional transducer

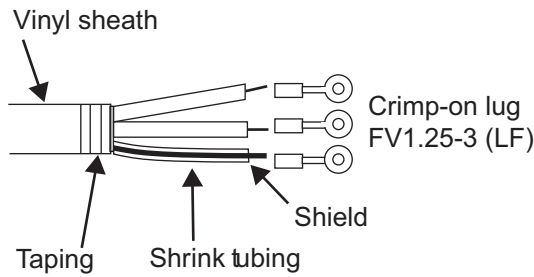
The optional matching box (Type: MB-1100, Code No.: 000-041-353) is required to connect the optional transducers 50B-6, 50B-6B, 200B-5S, and 50/200-1T.

Part	Type	Code no.	Qty
Match- ing Box*	MB-1100	000-041-000	1
Crimp-on Lug	FV1.25-3 (LF)	000-116-756- 10	6
Cord Lock**	NC-1	000-168-230- 10	1

*: With 10P connector cable

** : For connecting two transducers





4.9 IEC 61162-1 Data Sentences

The table below shows the data sentences which can be input to and output from your fish finder. The transmission speed for both input and output is 4,800 bps. Data is output at two-second intervals.

Input/output data sentences

Sentence	Meaning
BWC	Bearing (magnetic) and distance to waypoint
GGA	Global positioning system (GPS) fix data
GLL	Geographic position - latitude/longitude
GNS	GNSS fix data
HDG	Heading, deviation and variation
HDT	Heading, true
MDA	Atmospheric pressure
MTW	Water temperature.
MWV	Wind speed and angle
RMA	Lat/Lon, SOG, course
RMB	Nav data (waypoint, etc.)
RMC	Lat/Lon (GPS), SOG, course
VHW	Water speed and heading
VTG	Course over ground and ground speed
XTE	Cross track error
ZDA	Time and date

Order of priority

<u>Data</u>	<u>Priority</u>
Latitude/Longitude:	GNS>GGA>RMC>RMA>GLL
Course (true):	VTG>RMC>RMA
Course (magnetic):	VTG
Ground speed:	VTG>RMC>RMA
Water speed:	VHW
Distance to waypoint:	BWC>RMB
Bearing to waypoint (true):	BWC>RMB
Bearing to waypoint (magnetic):	BWC
Heading (true):	HDT>VHW
Heading (magnetic):	HDG>VHW
Cross track error:	XTE>RMB
Atmospheric pressure:	MDA
Water temperature:	MTW
Wind speed and angle (true/apparent):	MWV

Output data sentences

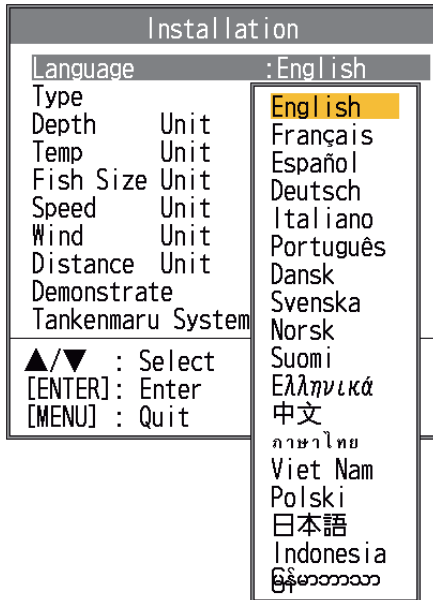
Sentence	Meaning
DBS	Depth from sea surface
DBT	Depth below transducer
DPT	Depth
MTW*	Water temperature
RMB*	Recommended minimum navigation information
TLL*	Target position, output by MARK key.
VHW*	Speed through the water

*Available with connection of applicable sensor or navaid.

4.10 Adjustments after Installation

Language

1. Press the /BRILL key to show the [Installation] menu.

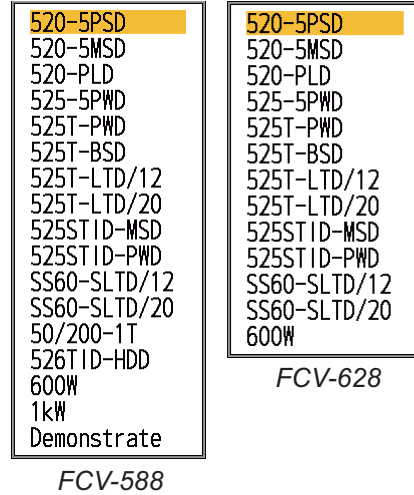


2. Select your language, then press the **ENTER** key. The units for depth, water temperature, fish length, ship speed, wind speed and distance are set according to the language selected. Continue the procedure to select the transducer, and set up the Tankenmaru system and NMEA port.

Transducer

If you have the transducer 525STID-MSD or 525STID-PWD, skip this procedure.

1. Select [Type] from the [Installation] menu, then press the **ENTER** key.



2. Select your transducer, then press the **ENTER** key. Select [600W] for the 600 W transducer, [1kW] for the 1 kW transducer, not listed in the following table.

Transducer (option)	
600 W	520-5PSD, 520-5MSD, 520-PLD, 525-5PWD, 525T-PWD, 525T-BSD, 525T-LTD/12, 525T-LTD/20, 525STID-MSD, 525STID-PWD, SS60-SLTD/12, SS60-SLTD/20
1 kW	50/200-1T, 526TID-HDD

Note: Do not use a 600W transducer in the 1kW setting. The transducer will be damaged.

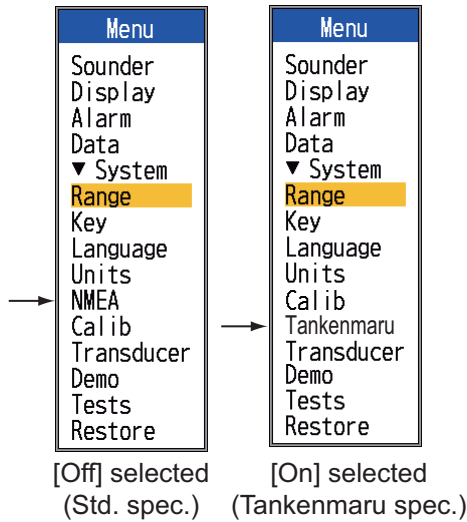
3. Press the **MENU/ESC** key to finish.

If you have the Tankenmaru system, go to the next section. To set up external equipment, go to “NMEA”.

Tankenmaru

The Tankenmaru system outputs the video signal from your fish finder to a Tankenmaru-equipped display device, via a radio transmitter. The radio transmitter and display device are products of the Shimano Corporation. For how to install the Tankenmaru unit see its installation manual.

1. Select [Tankenmaru System] from the Installation menu, then press the **ENTER** key.
2. Select [On], then press the **ENTER** key to activate the Tankenmaru system. The [System] menu changes as below.

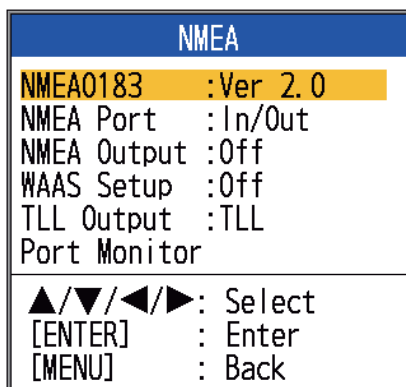


3. Press the **MENU/ESC** key to finish.

NMEA

The NMEA port is disabled when the Tankenmaru is active.

1. Press the **MENU/ESC** key.
2. Select [NMEA] from the Installation menu, then press the **ENTER** key.



Set the menu items according to the equipment connected to the fish finder.

[NMEA0183]: Select NMEA0183 version of nav equipment connected to "12-24 VDC/NMEA" port among [Ver 1.5], [Ver 2.0] and [Ver 3.0]. The NMEA0183 port outputs the echo data when [ECHO] is selected (baud rate: 38,400). This feature is specialized for researchers. Do not select [ECHO] under normal operation because the equipment cannot receive data from a navigator.

[NMEA Port]: The NMEA terminals in the "12-24 VDC/NMEA" port can function as input ports or input/output port. Change the setting to "In/In" when connecting GP-320B and a wind sensor. When connecting the GP-320B and a wind sensor, first turn on "WAAS Setup" and then select [In/In] as the [NMEA Port] setting. Only a wind speed/angle sensor that outputs the MWV sentence can be connected.

[In/Out]: Input and Output (default setting)

[In/In]: Input only (Available with connection of both the GP-320B and a wind sensor.)

[NMEA Output]: Select what data sentences to output.

[Off]: Output the "output data sentences".

[On]: Output the "output data sentences" and sentences which are input from other equipment.

[WAAS Setup]: Select how to use the WAAS signal when connecting with a WAAS receiver, for example GP-320B. The message types (WAAS-00 to WAAS-27) are used as WAAS correction. Select [WAAS-00] to enable WAAS.

Note: This function is available only when [In/Out] is selected at [NMEA Port].

[TLL Output]: Output the position specified by the **MARK** key to the plotter connected.

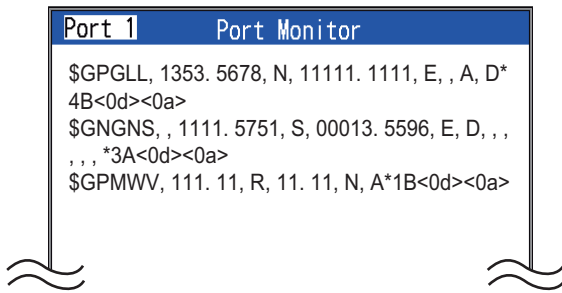
[Off]: Do not output latitude/longitude.

[TLL]: Output latitude/longitude.

[FURUNO-TLL]: Output latitude/longitude, depth and water temperature. Requires [FURUNO-TLL] enabled device.

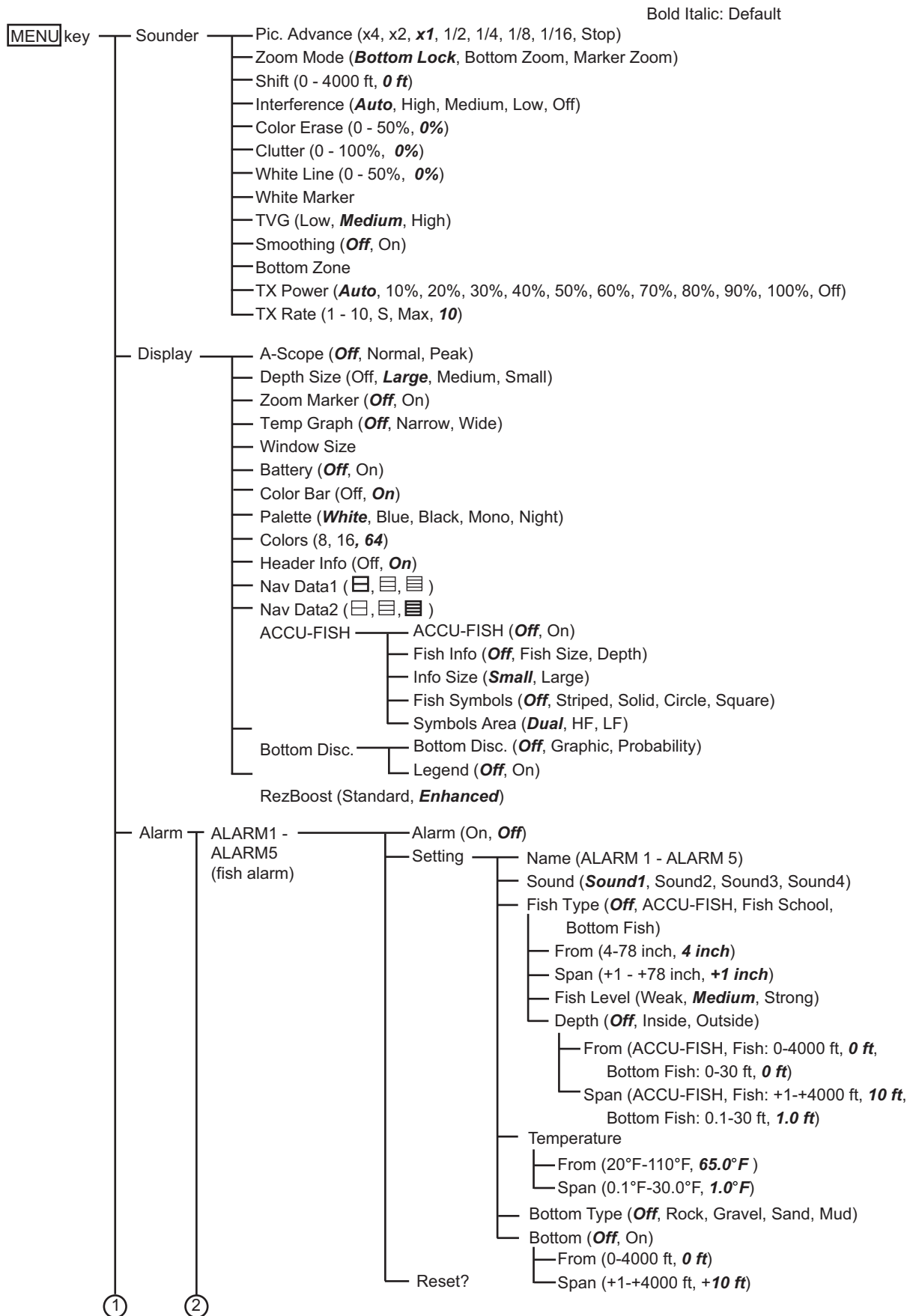
4. INSTALLATION

[Port Monitor]: Port Monitor shows the data sentences input to the [12-24 VDC/NMEA] port.

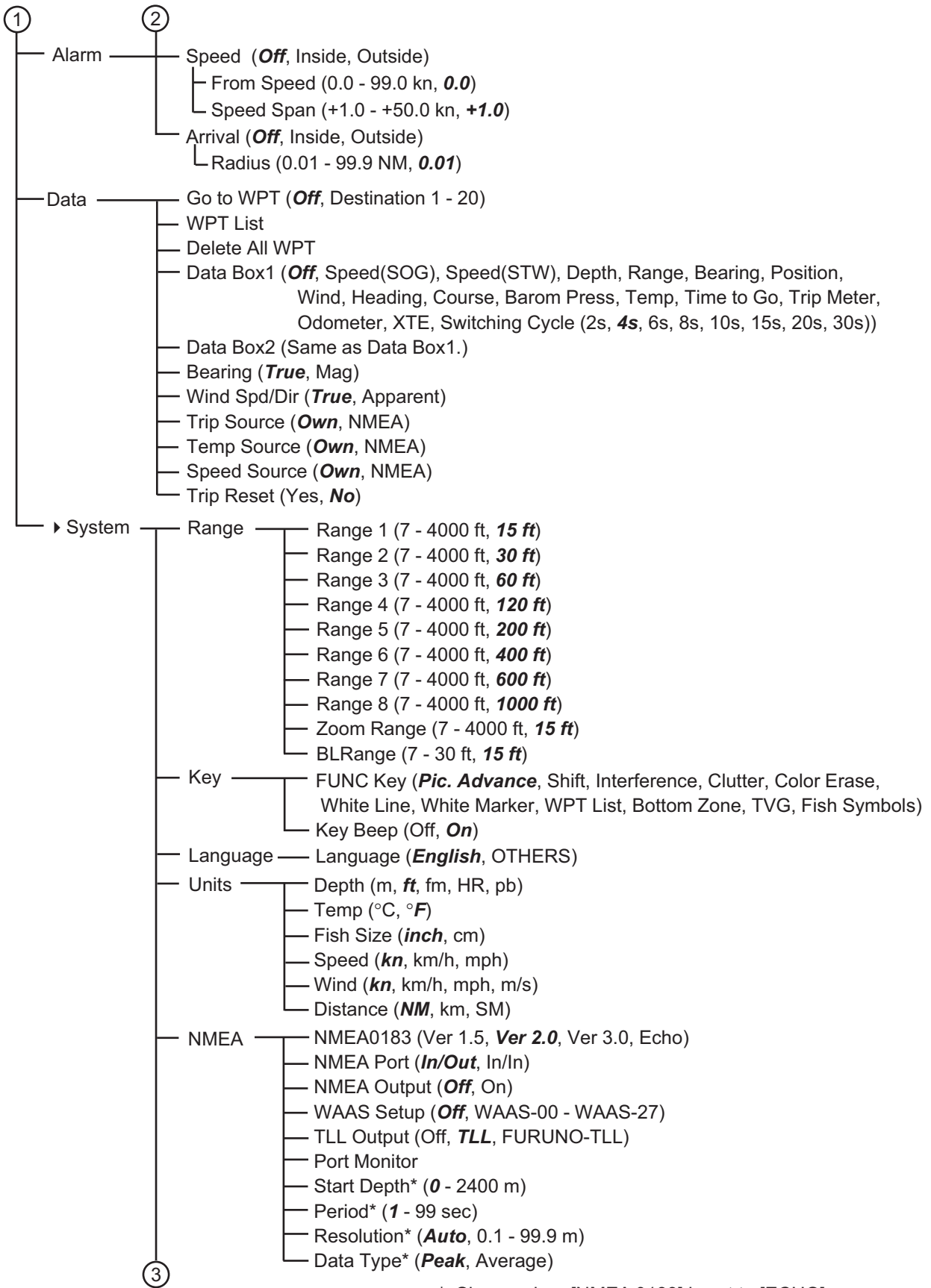


Press the **ENTER** key to display the latest data sentence information. To display this information on the Port 2 screen when two sensors are connected, set [NMEA Port] in the [NMEA] menu to [In/In].

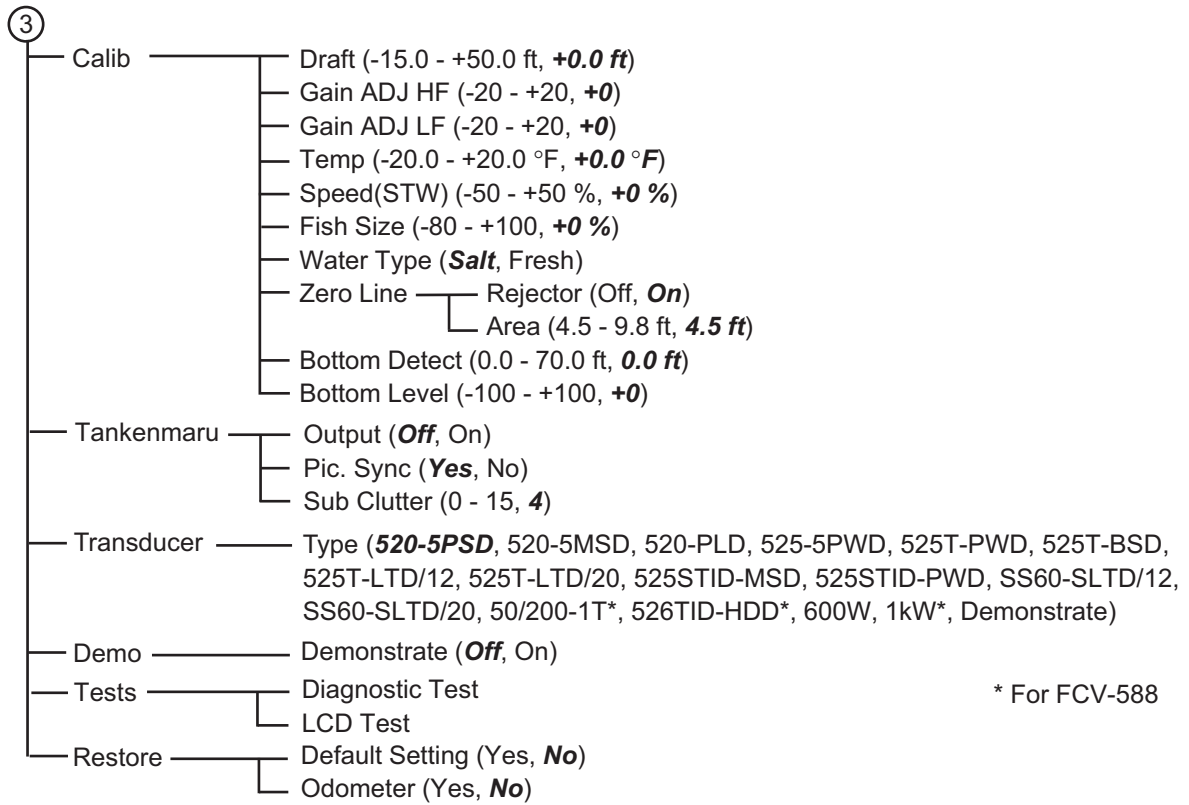
APPENDIX 1 MENU TREE



APPENDIX 1 MENU TREE



*: Shown when [NMEA 0183] is set to [ECHO].



APPENDIX 2 INSTALLATION FOR TRANSDUCER (THRU-HULL MOUNT)

This appendix provides a copy of the installation instructions for AIRMAR transducer.

525T-LTD/12 and 525T-LTD/20 corresponds to B60, SS60-SLTD/12 and SS60-SLTD/20 to SS60.

Thru-Hull

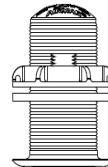
Tilted Element™ Transducer

Tilt Angles: 0°, 12°, 20°

**Models: B60, B75H/M/L, B150M, B619
P19, SS60, SS150M, SS565, SS619**

U.S. Patent No. 7,369,458. UK Patent No. 2 414 077. U.S. Patent Pending
17-364-01 rev. 07 01/12/13

Record the information found on the cable tag for future reference.
Part No. _____ Date _____ Frequency _____ kHz



P19

Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.

WARNING: Always wear safety goggles and a dust mask when installing.

WARNING: Immediately check for leaks when the boat is placed in the water. Do not leave the boat unchecked for more than three hours. Even a small leak may allow considerable water to accumulate.

WARNING: B150M, B619, SS150M, SS619 - Do not use the spacer if there is insufficient space to tighten the nut, or it is within 11 mm (1/2") of the top of the housing.

WARNING: Stainless steel housing in a metal hull - Be sure the washer contacts the hull. Do not tighten the hull nut with the washer against the isolation bushing, as the housing will not be firmly installed. If necessary, sand the isolation bushing until the washer rests against the hull.

CAUTION: CHIRP transducer - Do not install in the engine compartment or other hot place. The transducer may fail if it overheats.

CAUTION: CHIRP transducer - Always operate the transducer in water. Operating in air will allow the transducer to overheat resulting in failure.

CAUTION: The arrow on the top of the transducer must point toward the keel or centerline of the boat. This will align the angle of the element inside the transducer with the deadrise angle of your hull.

CAUTION: Never pull, carry, or hold the transducer by its cable; this may sever internal connections.

CAUTION: Plastic housing - Never use a fairing with a plastic housing; the protruding sensor would be vulnerable to damage from impact.

CAUTION: Metal housing - Never install a metal housing on a vessel with a positive ground system.

CAUTION: Stainless steel housing in a metal hull - The stainless steel housing must be isolated from a metal hull to prevent electrolytic corrosion. Use the isolation bushing supplied.

CAUTION: Never use solvents. Cleaners, fuel, sealant, paint and other products may contain solvents that can damage plastic parts, especially the transducer's face.

IMPORTANT: Read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

Applications

- **Plastic** housing recommended for fiberglass or metal hulls only. Never install a plastic housing in a wood hull since swelling of the wood can fracture the plastic.
- **Bronze** housing recommended for fiberglass or wood hulls. Never install a bronze housing in a metal hull, because electrolytic corrosion will occur.
- **Stainless steel** housing compatible with all hull materials. Recommended for metal hulls to prevent electrolytic corrosion provided the stainless steel housing is isolated from the metal hull.

Match Tilt Angle of Transducer to Deadrise

Be sure the tilt angle of your transducer model matches the deadrise angle of your boat at the mounting location. The tilt angle is printed on the top of the transducer (see Figure 1). To measure the deadrise angle of your hull at the selected mounting location, use an angle finder or a digital level (see Figure 2).

- **0°** models - For hull deadrise angles from 0° to 7°
- **12°** models - For hull deadrise angles from 8° to 15°
B75H-12° - For hull deadrise angles from 6° to 15°
B75M-12° - For hull deadrise angles from 6° to 15°
B75L-12° - For hull deadrise angles from 0° to 24°
- **20°** models - For hull deadrise angles from 16° to 24°

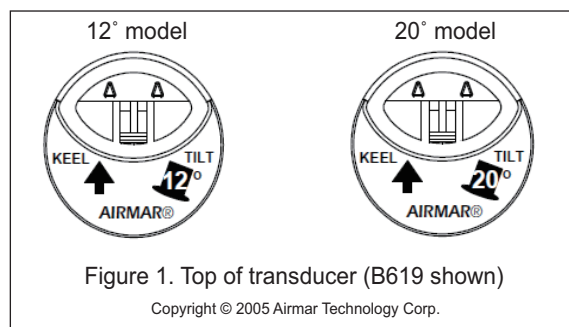


Figure 1. Top of transducer (B619 shown)

Copyright © 2005 Airmar Technology Corp.

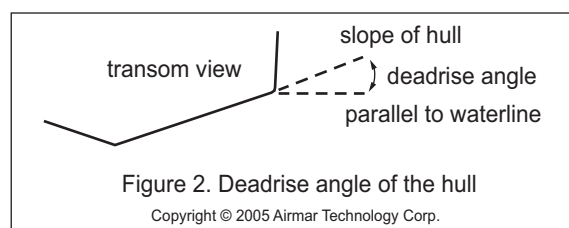


Figure 2. Deadrise angle of the hull

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Identify Your Model

The model name is printed on the cable tag.

Model (Housing)	Hull Material	Outside Hull Hole Saw Size	Cored Fiberglass Hull Interior Hole Saw Size
P19	Fiberglass metal	51 mm or 2"	60 mm or 2-3/8"
B150M B619 SS150M SS619	Fiberglass wood	51 mm or 2"	60 mm or 2-3/8"
SS150M SS619	Metal	57 mm or 2-1/4"	NA
B60 SS60 SS56	Fiberglass wood	60 mm or 2-3/8"	80 mm or 3-1/8"
B75H/M/L	Fiberglass wood	70 mm or 2-3/4"	80 mm or 3-1/8"
SS60 SS565	Metal	70 mm or 2-3/4"	NA

Tools & Materials

- Safety goggles
- Dust mask
- Angle finder
- Electric drill with 10 mm (3/8") or larger chuck capacity
- Drill bit: 3 mm or 1/8"
- Hole saw (see table above)
- Countersink tool (installing SS565)
- Sandpaper
- Mild household detergent or weak solvent (such as alcohol)
- File (installation in a metal hull)
- Marine sealant (suitable for below waterline)
- Slip-joint pliers (installing a metal housing)
- Grommet(s) (some installations)
- Cable ties
- Water-based anti-fouling paint (**mandatory in salt water**)
- Installation in a cored fiberglass hull (see page AP-7):
 - Hole saw for hull interior (see table above)
 - Fiberglass cloth and resin
 - or Cylinder, wax, tape, and casting epoxy

Mounting Location

CAUTION: Do not mount near water intake or discharge openings or behind strakes, fittings, or other hull irregularities.

CAUTION: Do not mount in line with trailer rollers or bunks that may damage the transducer's face.

- The water flowing under the hull must be smooth with a minimum of bubbles and turbulence (especially at high speeds).
- The transducer must be continuously immersed in water.
- The transducer beam must be unobstructed by the keel or propeller shaft(s).
- Choose a location away from interference caused by power and radiation sources such as: the propeller(s) and shaft(s), other machinery, other echosounders, and other cables. The lower the noise level, the higher the echosounder gain setting that can be used.
- **CHIRP transducer** - Mount in a cool well-ventilated area away from the engine to avoid overheating.

Hull Types (see Figure 3)

- **Displacement hull powerboats** - Locate amidships near the centerline. The starboard side of the hull where the propeller blades are moving downward is preferred.
- **Planing hull powerboats** - Mount well aft, on or near the centerline, and well inboard of the first set of lifting strakes to ensure that the transducer will be in contact with the water at high speeds. The starboard side of the hull where the propeller blades are moving downward is preferred.
- **Outboard and I/O** - Mount just forward of the engine(s).
- **Inboard** - Mount well ahead of the propeller(s) and shaft(s).
- **Stepped hull** - Mount just ahead of the first step.
- **Boat capable of speeds above 25 kn (29 MPH)** - Review the installation location and operating results of similar boats before proceeding.
- **Fin keel sailboats** - Mount on or near the centerline and forward of the fin keel 300 - 600 mm (1 - 2').
- **Full keel sailboats** - Locate amidships and away from the keel.

Installation

Hole Drilling

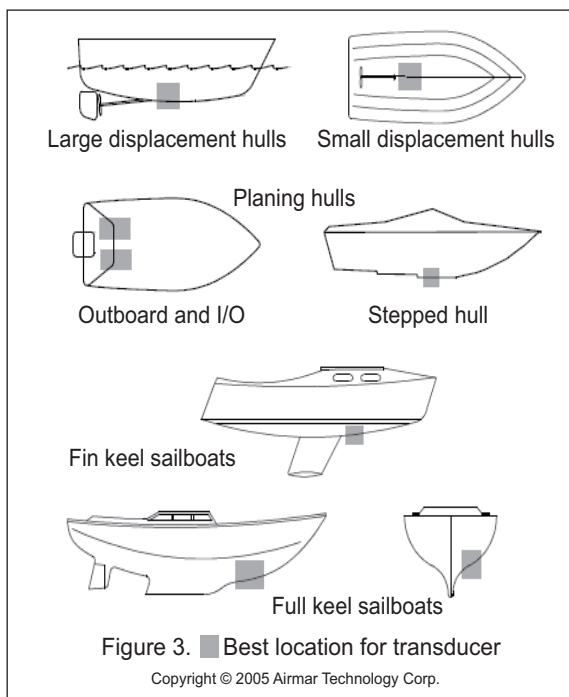
Cored fiberglass hull - Follow separate instructions on page AP-7.

1. Drill a 3 mm or 1/8" pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside.
2. Using the appropriate size outside hull hole saw, cut a hole from outside of the hull perpendicular to the hull surface (see table above).
 - SS565** - Use a countersink tool to create a "seat" in the hull.
3. Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
 - Metal hull** - Remove all burrs with a file and sandpaper.

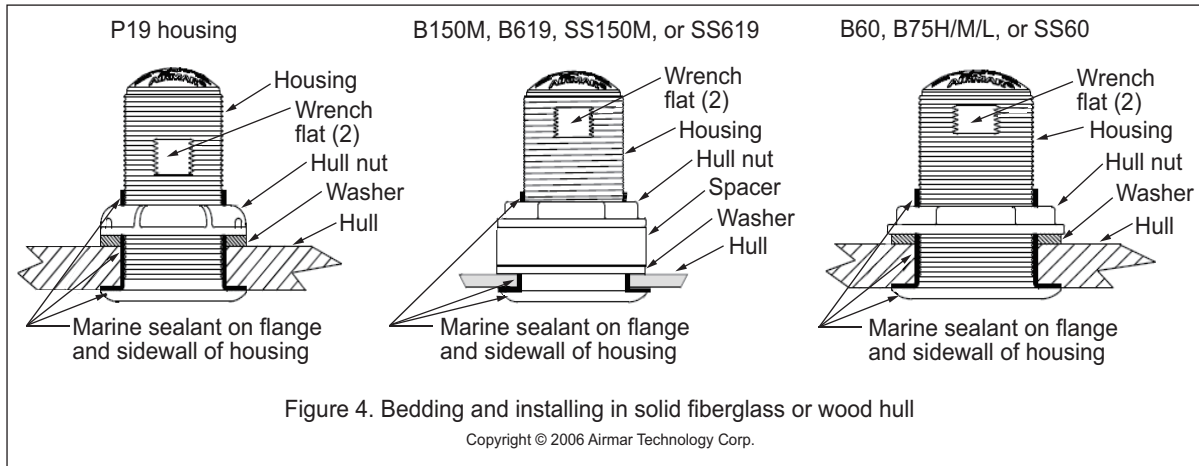
Bedding

CAUTION: Be sure the surfaces to be bedded are clean and dry.

Apply a 2 mm (1/16") thick layer of marine sealant around the flange of the housing that contacts the hull and up the sidewall of the housing (see Figure 4 or 5). The sealant must extend 6 mm (1/4") higher than the combined thickness of the hull, washer(s), hull nut, and any spacer. This will ensure there is marine sealant in the threads to seal the hull and to hold the hull nut securely in place.



APPENDIX 2 INSTALLATION FOR TRANSDUCER (THRU-HULL MOUNT)



Stainless steel housing in a metal hull - To prevent electrolytic corrosion, the stainless steel housing must be isolated from the metal hull. Slide the isolation bushing onto the housing (see Figure 5). Apply additional marine sealant to the surfaces of the bushing that will contact the hull, filling any cavities in and around the isolation bushing.

Installing

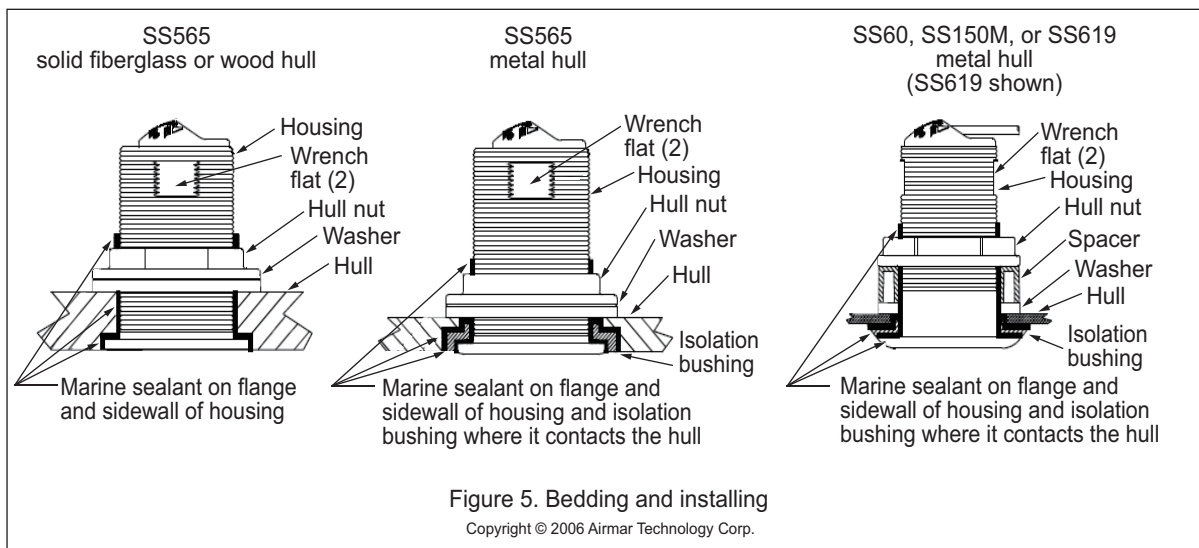
1. From outside the hull, thread the cable through the mounting hole. Push the housing into the mounting hole using a twisting motion to squeeze out excess sealant.
 - 12° and 20° models** - From inside the hull, point the arrow on the top of the transducer (and the cable exit) toward the KEEL or centerline of the boat (see Figure 1). This will align the angle of the element inside the transducer with the deadrise angle of your hull.
2. Slide the washer onto the housing (see Figure 4 or 5).
 - B150M, B619, SS150M, SS619** - Also slide the spacer onto the housing and rest it against the washer. Do not use the spacer if there is insufficient space to tighten the nut or it is within 11 mm (1/2") of the top of the housing.
 - Stainless steel housing in a metal hull** - Be sure the washer contacts the hull. Do not tighten the hull nut with the washer against the isolation bushing, as the housing will not be firmly installed. If necessary, sand the isolation bushing until the washer rests against the hull.
3. Screw the hull nut in place.
 - Plastic housing** - Do not clamp tightly on the wrench flats to avoid possibly fracturing the housing.

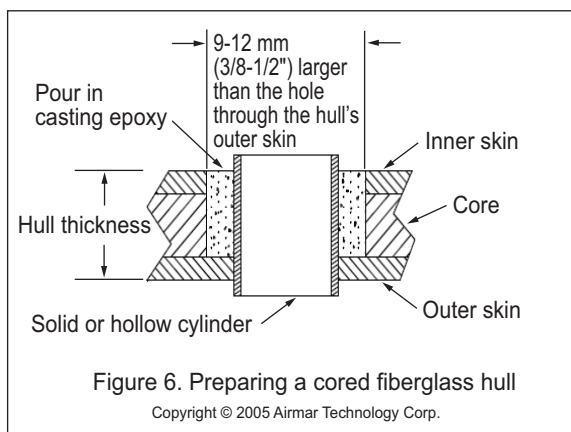
- Plastic hull nut** - Hand-tighten only. Do not over tighten.
 - Metal hull nut** - Tighten with slip-joint pliers.
 - Metal hull** - Use the spacer if there are not enough threads to tighten the hull nut against the hull.
 - Cored Fiberglass Hull** - Do not over tighten, crushing the hull.
 - Wood hull** - Allow the wood to swell before tightening the hull nut.
4. Remove any excess marine sealant on the outside of the hull to ensure smooth water flow under the transducer.

Cable Routing & Connecting

CAUTION: If your transducer came with a connector, do not remove it to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions provided. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the sensor warranty.

1. Route the cable to the instrument, being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. Use grommets to prevent chaffing. To reduce electrical interference, separate the transducer cable from other electrical wiring and the engine. Coil any excess cable and secure it in place using cable ties to prevent damage.
2. Refer to the echosounder owner's manual to connect the transducer to the instrument.





Checking for Leaks

When the boat is placed in the water, **immediately** check around the transducer for leaks. Note that very small leaks may not be readily observed. Do not leave the boat in the water for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat "Bedding" and "Installing" **immediately** (see pages AP-5 to AP-6).

Installation in a Cored Fiberglass Hull

The core (wood or foam) must be cut and sealed carefully. The core must be protected from water seepage, and the hull must be reinforced to prevent it from crushing under the hull nut allowing the housing to become loose.

CAUTION: Completely seal the hull to prevent water seepage into the core.

1. Drill a 3 mm or 1/8" pilot hole from inside the hull (see Figure 6). If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside. (If the hole is drilled in the wrong location, drill a second hole in a better location. Apply masking tape to the outside of the hull over the incorrect hole and fill it with epoxy.)
2. Using the appropriate size outside hull hole saw, cut a hole from outside the hull through the outer skin only (see table on page AP-5).
3. From inside the hull, using the appropriate size hull interior hole saw, cut through the inner skin and most of the core. The core material can be very soft. Apply only light pressure to the hole saw after cutting through the inner skin to avoid accidentally cutting the outer skin.
4. Remove the plug of core material, so the inside of the outer skin and the inner core of the hull is fully exposed. Sand and clean the inner skin, core, and the outer skin around the hole.
5. If you are skilled with fiberglass, saturate a layer of fiberglass cloth with a suitable resin and lay it inside the hole to seal and strengthen the core. Add layers until the hole is the correct diameter.
Alternatively, a hollow or solid cylinder of the correct diameter can be coated with wax and taped in place. Fill the gap between the cylinder and hull with casting epoxy. After the epoxy has set, remove the cylinder.

6. Sand and clean the area around the hole, inside and outside, to ensure that the marine sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
7. Proceed with "Bedding" on page AP-5.

Maintenance & Replacement

Anti-fouling Paint

Surfaces exposed to salt water must be coated with anti-fouling paint. Use water-based anti-fouling paint only. Never use ketone-based paint, since ketones can attack many plastics possibly damaging the transducer. Reapply anti-fouling paint every 6 months or at the beginning of each boating season.

Cleaning

Aquatic growth can accumulate rapidly on the transducer's face, reducing its performance within weeks. Clean the surface with a Scotch-Brite® scour pad and mild household detergent, being careful to avoid making scratches. If the fouling is severe, lightly wet sand it with fine grade wet/dry paper.

Replacement Transducer & Parts

The information needed to order a replacement transducer is printed on the cable tag. Do not remove this tag. When ordering, specify the part number, date, and frequency in kHz. For convenient reference, record this information on the top of page AP-4.

Lost, broken, and worn parts should be replaced immediately.

Model	Hull Nut	Washer	Spacer	Isolation Bushing
P19	04-004	09-452	-	-
B60	02-133-01	09-813-01	-	-
B75H/M/L	02-143-01	09-1012-01	-	-
B150M B619	02-030	09-452	04-646-01	-
SS60	02-563-01	09-813-01	-	04-660-01
SS150M SS619	02-520-02	09-452	04-646-01	04-186-1
SS565	02-563-01	09-813-01	-	04-589-01

Obtain parts from your instrument manufacturer or marine dealer.

Gemeco
(USA)

Tel:803-693-0777
Fax:803-693-0477
email:sales@gemeco.com

Airmar EMEA
(Europe, Middle East, Africa)

Tel:+33.(0)2.23.52.06.48
Fax:+33.(0)2.23.52.06.49
email:sales@airmar-emea.com

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APPENDIX 3 INSTALLATION OF TEMPERATURE SENSORS

The installation instructions in this chapter are copied from the manufacturer's (AIRMAR® Technology Corporation) installation guide, which is included with your sensor.

The model numbers mentioned within the documentation should be read as follows:

- T42 → T-04MSB
- T80 → T-04MTB

OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

Thru-Hull, Analog

High-Precision Temperature Sensor

Model T42

Record the information found on the cable tag for future reference.

Part No. _____ Date _____

05/28/14

17-437-02 rev. 01

Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.

WARNING: Always wear safety goggles and a dust mask when installing.

WARNING: Immediately check for leaks when the boat is placed in the water. Do not leave the boat unchecked for more than three hours. Even a small leak can allow considerable water to accumulate.

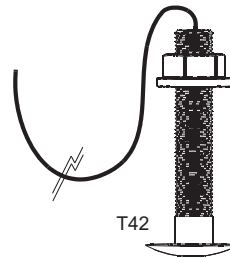
CAUTION: Never install a bronze sensor in a metal hull because electrolytic corrosion will occur.

CAUTION: Never install a metal sensor on a vessel with a positive ground system.

CAUTION: Never pull, carry, or hold the sensor by its cable; this may sever internal connections.

CAUTION: Never use solvents. Cleaner, fuel, sealant, paint, and other products may contain solvents that can damage plastic parts, especially the sensor's face.

IMPORTANT: Read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.



Tools & Materials

Safety goggles

Dust mask

Electric drill

Drill bit/hole saw/spade bit:

Pilot hole 3mm or 1/8"

T42 22mm or 7/8"

Sandpaper

Mild household detergent or weak solvent (alcohol)

Marine sealant (suitable for below waterline)

Slip-joint pliers

Installation in a cored fiberglass hull (see page 2)

Hole saw for hull interior: 30mm or 1-1/4"

Cylinder, wax, tape, and casting epoxy

Water-based anti-fouling paint (**mandatory in salt water**)

Sensor Installation

Hole Drilling

Cored fiberglass hull — Follow separate instructions on page 2.

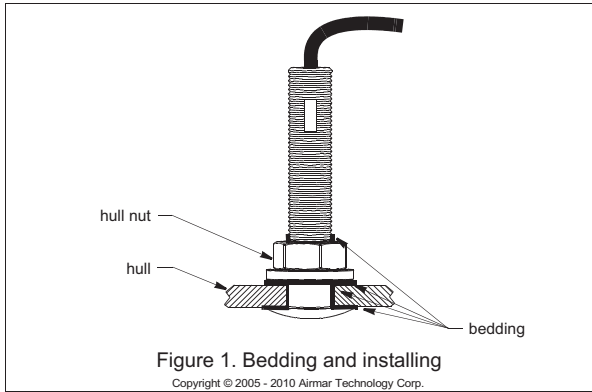
1. Drill a 3mm or 1/8" pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside.
2. Using the appropriate drill bit, cut a hole perpendicular to the hull from outside the boat.
3. Sand and clean the area around the hole, inside and outside, to ensure that the marine sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.

Applications

- Bronze sensor recommended for fiberglass or wood hull only.
- The hull must be a minimum of 8mm (5/16") thick at the mounting location.

Mounting Location

Choose a location where the temperature sensor will be in contact with the water at all times.



Bedding

CAUTION: Be sure all surfaces to be bedded are clean and dry.

1. Remove the hull nut (see Figure 1).
2. Apply a 2 mm (1/16") thick layer of marine sealant around the flange of the sensor that will contact the hull and up the stem. The sealant must extend 6mm (1/4") higher than the combined thickness of the hull and the hull nut. This will ensure that there is marine sealant in the threads to seal the hull and hold the hull nut securely in place.
3. Apply a 2 mm (1/16") thick layer of marine sealant to the flange of the hull nut that will contact the hull.

Installing

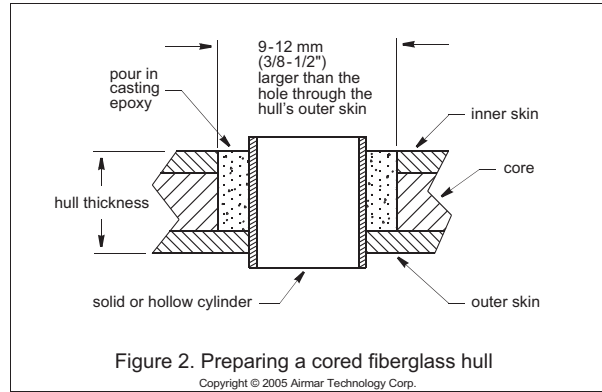
1. From outside the hull, thread the cable through the mounting hole.
2. Push the sensor into the mounting hole using a twisting motion to squeeze out excess marine sealant (see Figure 1).
3. From inside the hull, slide the hull nut onto the cable. Screw the hull nut in place. Tighten it with slip-joint pliers.
Cored fiberglass hull—Do not over tighten, crushing the hull.
Wood hull—Allow for the wood to swell before tightening.
4. Remove any excess marine sealant on the outside of the hull to ensure smooth water flow over the sensor.

Checking for Leaks

When the boat is placed in the water, **immediately** check around the thru-hull sensor for leaks. Note that very small leaks may not be readily observed. Do not to leave the boat in the water for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat "Bedding" and "Installing" **immediately** (see page 2).

Cable Routing & Connecting

CAUTION: If the sensor came with a connector, do not remove it to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions supplied. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the sensor warranty.



1. Route the cable to the instrument being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. Use grommet(s) to prevent chafing. To reduce electrical interference, separate the transducer cable from other electrical wiring and the engine. Coil any excess cable and secure it in place with cable ties to prevent damage.
2. Refer to the instrument owner's manual to connect the transducer to the instrument.

Installation in a Cored Fiberglass Hull

The core (wood or foam) must be cut and sealed carefully. The core must be protected from water seepage, and the hull must be reinforced to prevent it from crushing under the hull nut allowing the sensor to become loose.

CAUTION: Completely seal the hull to prevent water seepage into the core.

1. Drill a 3mm or 1/8" pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside. (If the hole is drilled in the wrong location, drill a second hole in a better location. Apply masking tape to the outside of the hull over the incorrect hole and fill it with epoxy.)
2. Using the 21mm or 7/8" drill bit, cut a hole from outside the hull through the *outer* skin only (see Figure 2).
3. From inside the hull using the 30mm or 1-1/4" hole saw, cut through the *inner* skin and most of the core. The core material can be very soft. Apply only light pressure to the hole saw after cutting through the inner skin to avoid accidentally cutting the *outer* skin.
4. Remove the plug of core material so the *inside* of the outer skin and the inner core of the hull is fully exposed. Clean and sand the inner skin, core, and the outer skin around the hole.
5. Coat a hollow or solid cylinder of the correct diameter with wax and tape it in place. Fill the gap between the cylinder and hull with casting epoxy. After the epoxy has set, remove the cylinder.
6. Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
7. Proceed with "Bedding" and "Installing" (see page 2).

OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

Surface Mount, Analog Temperature Sensor

Model T80

Record the information found on the cable tag for future reference.

Part No. _____ Date _____



05/28/14

17-584-01 rev. 01

Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.

WARNING: Always wear safety goggles and a dust mask when installing.

WARNING: Below the waterline mount—When the boat is placed in the water, immediately check for leaks around the screws and any other holes drilled in the hull.

CAUTION: Installation on a metal hull—The stainless steel housing must be isolated from a metal hull to prevent electrolytic corrosion. Use marine sealant.

CAUTION: Never install a metal sensor on a vessel with a positive ground system.

IMPORTANT: Read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

Tools & Materials

- Safety goggles
- Dust mask
- Pencil
- Electric drill
- Drill bit/hole saw/spade bit:
 - Pilot holes 3 mm or 1/8"
 - Transom hole (some installations) 18 mm or 3/4"
- 2 Stainless steel, self-tapping screws 4 x 18mm or #8 x 3/4"
- Marine sealant (suitable for below waterline)
- Screwdriver(s)
- Cable clamp(s) (some installations)
- Grommet(s) (some installations)
- Cable ties

Installation

Mounting on the transom

CAUTION: Mount the sensor as close to the centerline (keel) of the boat as possible to ensure the sensor remains in the water when the boat is turning (see Figure1).

CAUTION: Fiberglass hull—Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.

CAUTION: If the sensor came with a connector, do not remove it to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions provided. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the sensor warranty.

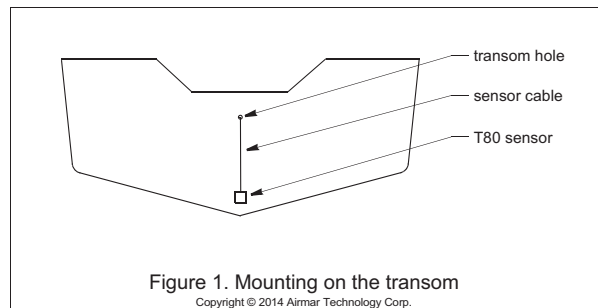
Applications

- Measures air or water temperature.
- Stainless steel sensor is compatible with all hull materials. Recommended for aluminum hulls to prevent electrolytic corrosion, provided the stainless steel sensor is isolated from the metal hull by using marine sealant.

Mounting Location

The sensor can be mounted anywhere that you want to know the temperature. For example, you can mount the sensor on the transom, in the live well, or in the engine compartment.

If you are measuring water temperature, choose a location where the sensor will be in contact with the water at all times.



APPENDIX 3 INSTALLATION OF TEMPERATURE SENSORS

Mount the sensor near the centerline and close to the bottom of the transom.

Route the sensor cable over the transom, through a drain hole, or through a hole that you have drilled in the transom **above the waterline**.

1. Place the sensor against the hull and mark the position of the screw holes with a pencil.
2. Using a 3mm or 1/8" drill bit, drill pilot holes at the marked locations, 10mm (3/8") deep.
3. Apply marine sealant to the threads of the purchased screws to prevent water from seeping into the transom.
4. Screw the temperature sensor to the hull.
5. If a hole must be drilled through the transom, choose a location **well above the waterline**. Check for obstructions such as trim tabs, pumps, or wiring inside the hull. Mark the location with a pencil. Drill a hole through the transom using the appropriate size hole saw or spade bit (to accommodate the connector). Do NOT remove the connector.
6. Route the cable over or through the transom.
7. On the outside of the hull, secure the cable against the transom using a purchased cable clamp(s). Mark the position of the screw hole(s) with a pencil.
8. Using a 3mm or 1/8" drill bit, drill a pilot hole(s) at the marked locations, 10mm (3/8") deep.
9. Apply marine sealant to the threads of the screw(s) to prevent water from seeping into the transom.
10. Fasten the cable clamp(s) in place.
11. If a hole has been drilled through the transom, apply marine sealant to the space around the cable leading through the transom.

Cable Routing & Connecting

1. Route the cable to the instrument, being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. To reduce electrical interference, separate the sensor cable from other electrical wiring and sources of noise. Coil any excess cable and secure it in place with cable ties to prevent damage.
2. Refer to the instrument owner's manual to connect the sensor to the instrument.

Replacement Sensor & Parts

The information needed to order a replacement sensor is printed on the cable tag. Do not remove this tag. When ordering, specify the part number and date. For convenient reference, record this information at the top of page one.

Obtain parts from your instrument manufacturer or marine dealer.

Gemeco
(USA)

Tel: 803-693-0777
Fax: 803-693-0477
email: sales@gemeco.com

Airmar EMEA
(Europe, Middle East, Africa)

Tel: +33.(0)2.23.52.06.48
Fax: +33.(0)2.23.52.06.49
email: sales@airmar-emea.com



35 Meadowbrook Drive, Milford, New Hampshire 03055-4613, USA
•www.airmar.com

SPECIFICATIONS OF FISH FINDER FCV-628/588

1 GENERAL

- 1.1 TX frequency 50 kHz and 200 kHz
- 1.2 Transmit method Single or dual frequency transmitting
- 1.3 Output power
 - FCV-628 600 W
 - FCV-588 600/1000 W
- 1.4 TX rate Max. 3,000 pulse/min
- 1.5 Pulse length 0.04 to 3.0 ms
- 1.6 Sensitivity 10 dB μ V

2 DISPLAY UNIT

- 2.1 Display system
 - FCV-628 5.7-inch color LCD, 87 mm (W) x 116 mm (H), 480 x 640 dots
 - FCV-588 8.4-inch color LCD, 128 mm (W) x 171 mm (H), 480 x 640 dots
- 2.2 Brilliance 800 cd/m² typical
- 2.3 Display mode Single frequency (high or low freq.), Dual frequency, Zoom (high or low freq.), Nav data 1/2, A-scope
- 2.4 Expansion mode Bottom lock, Bottom zoom, Marker zoom
- 2.5 Basic range

Unit	Basic Range								Setting Range
	1	2	3	4	5	6	7	8	
m	5	10	20	40	80	150	200	300	2 to 1,200
ft	15	30	60	120	200	400	600	1,000	7 to 4,000
fm	3	5	10	20	40	80	100	150	1 to 650
pb	3	5	10	20	50	100	150	200	1 to 800
HR*	4	8	15	30	50	100	150	200	1 to 700

*: Japanese unit of depth measurement

- 2.6 Range shift 0 to 1,200 m, 0 to 4,000 ft, 0 to 650 fm, 0 to 800 pb, 0 to 700 HR
- 2.7 Zoom range
 - Bottom lock expansion: 2 to 10 m, 7 to 30 ft
 - Bottom and Marker zoom: 2 to 1,200 m, 7 to 4,000 ft
- 2.8 Picture advance speed 8 steps (Lines/TX; x4, x2, x1, 1/2, 1/4, 1/8, 1/16 or Stop)
- 2.9 Function settings Picture advance, Shift, Interference, Clutter, Color erase, White line, White marker, WPT list, Bottom zone, TVG, Fish symbols
- 2.10 Bottom discrimination 4 types
- 2.11 Fish size assessment Large or Small (symbol: 4 types)
- 2.12 RezBoost™ Specified transducer required
- 2.13 Display color
 - Echo color: 8/16/64 colors according to echo intensity
 - Palette: white, blue, black, monochrome or night vision
- 2.14 Auto-selection of frequency TD-ID output (for specified transducer)
- 2.15 Power output for external equipment 12 VDC: 0.11 A max.

3 INTERFACE

- 3.1 Data format IEC61162-1 (NMEA0183 Ver 1.5/2.0/3.0)
- 3.2 Data sentences
- 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

4 POWER SUPPLY

- FCV-628 12-24 VDC: 1.1-0.5 A
- FCV-588 12-24 VDC: 1.3-0.6 A




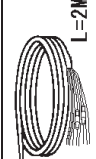


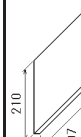


5 ENVIRONMENTAL CONDITION

- 5.1 Ambient temperature -15 °C to +55 °C
- 5.2 Relative humidity 93 % or less at 40 °C
- 5.3 Degree of protection IP56
- 5.4 Vibration IEC60945 Ed.4

6 UNIT COLOR

N2.5 (fixed)

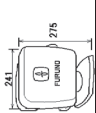


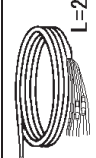

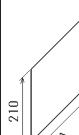



026P-X-9851 -1 1/1
PACKING LIST
 FCV-628-J/E
 A-1

NAME	UNIT	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット	UNIT			
指示器			CV-628-J/E	1
DISPLAY UNIT			000-027-525-00 **	
予備品	SPARE PARTS			
予備品			SP02-05001	1
SPARE PARTS			001-384-040-00	
付属品	ACCESSORIES			
付属品			FP02-05501	1
ACCESSORIES			001-384-090-00	
工事材料	INSTALLATION MATERIALS			
ケーブル(クシロ)			KON-004-02M	1
CABLE ASSEMBLY			000-156-405-14	
工事材料			CP02-07901	1
INSTALLATION MATERIALS			001-384-060-00	
図書	DOCUMENT			
フラッシュマウント用型紙			C22-00502-*	1
FLUSH MOUNTING TEMPLATE			000-169-612-1*	
取扱説明書			OM*-23890-*	1
OPERATOR'S MANUAL			000-190-554-1* **	
操作要領書(多言)			MLG-23890-*	1
OPERATOR'S GUIDE (MLG)			000-190-558-1*	(*)
操作要領書(和)			OSJ-23890-*	1
OPERATOR'S GUIDE			000-190-556-1*	(*)

1.コト番号末尾の[*]は、選択品の代表コードを表します。
 CODE NUMBER ENDING WITH "*" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.
 2. (*)の操作要領書は仕様により選択。
 CHOOSE THE OPERATOR'S GUIDE MARKED(*) ACCORDING TO EQUIPMENT SPECIFICATION.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

026P-X-9851 -1 1/1
PACKING LIST
 FCV-588-J/E
 A-2

NAME	UNIT	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット	UNIT			
指示器			CV-588-J/E	1
DISPLAY UNIT			000-027-528-00 **	
予備品	SPARE PARTS			
予備品			SP02-05001	1
SPARE PARTS			001-384-040-00	
付属品	ACCESSORIES			
付属品			FP02-05601	1
ACCESSORIES			001-384-260-00	
工事材料	INSTALLATION MATERIALS			
ケーブル(クシロ)			KON-004-02M	1
CABLE ASSEMBLY			000-156-405-14	
工事材料			CP02-07901	1
INSTALLATION MATERIALS			001-384-060-00	
図書	DOCUMENT			
フラッシュマウント用型紙			C22-00504-*	1
FLUSH MOUNTING TEMPLATE			000-169-613-1*	
取扱説明書			OM*-23890-*	1
OPERATOR'S MANUAL			000-190-554-1* **	
操作要領書(多言)			MLG-23890-*	1
OPERATOR'S GUIDE (MLG)			000-190-558-1*	(*)
操作要領書(和)			OSJ-23890-*	1
OPERATOR'S GUIDE			000-190-556-1*	(*)

1.コト番号末尾の[*]は、選択品の代表コードを表します。
 CODE NUMBER ENDING WITH "*" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.
 2. (*)の操作要領書は仕様により選択。
 CHOOSE THE OPERATOR'S GUIDE MARKED(*) ACCORDING TO EQUIPMENT SPECIFICATION.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

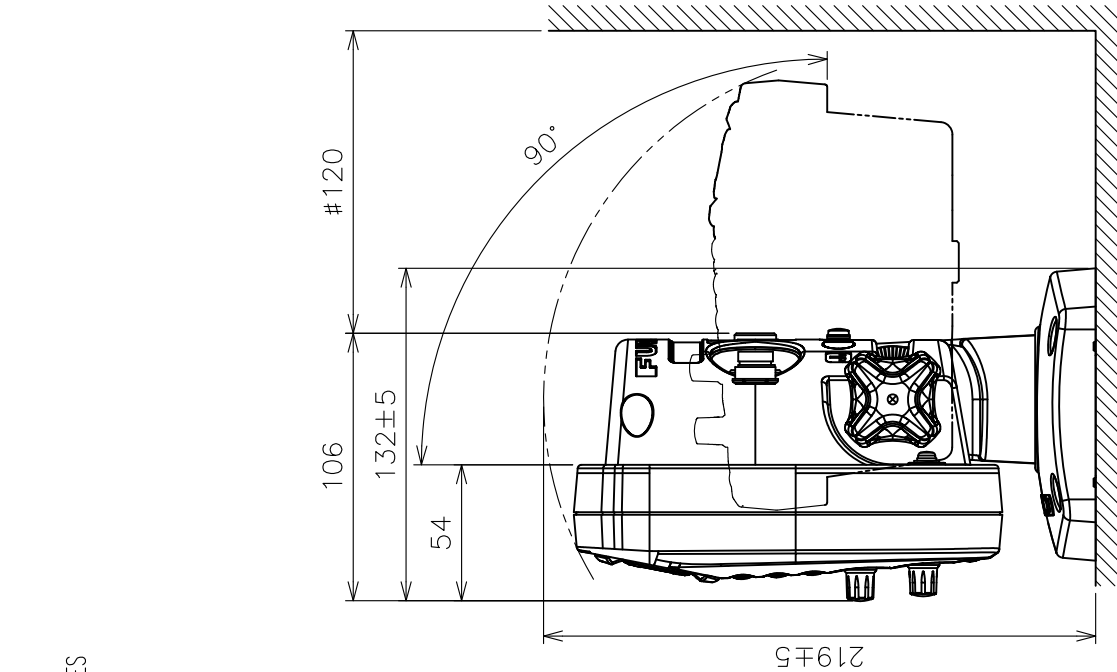
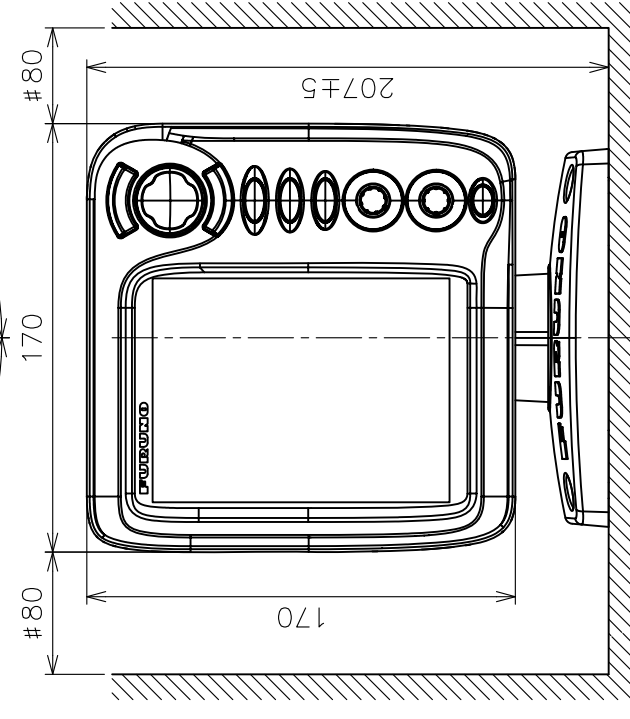
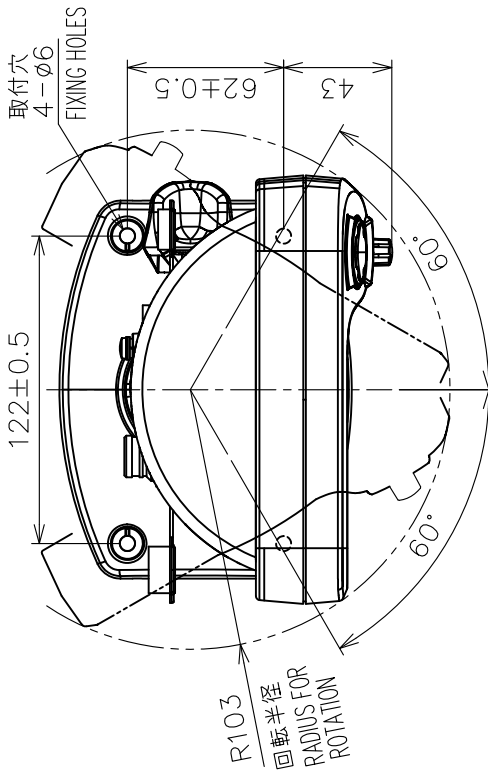
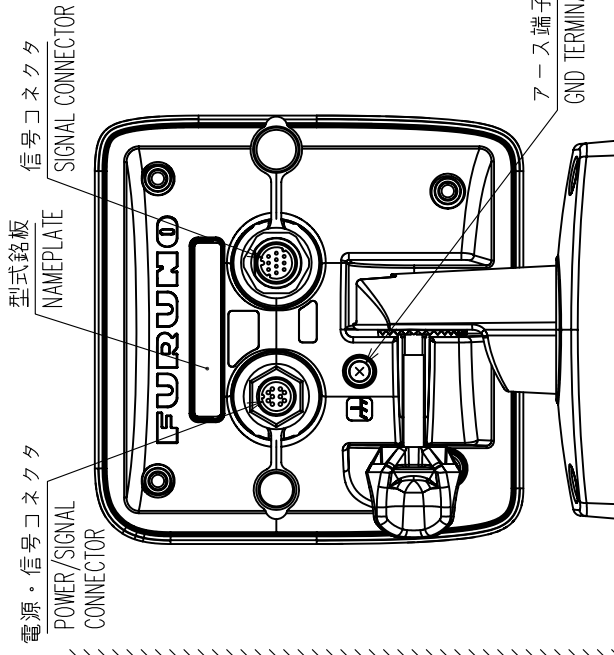


表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

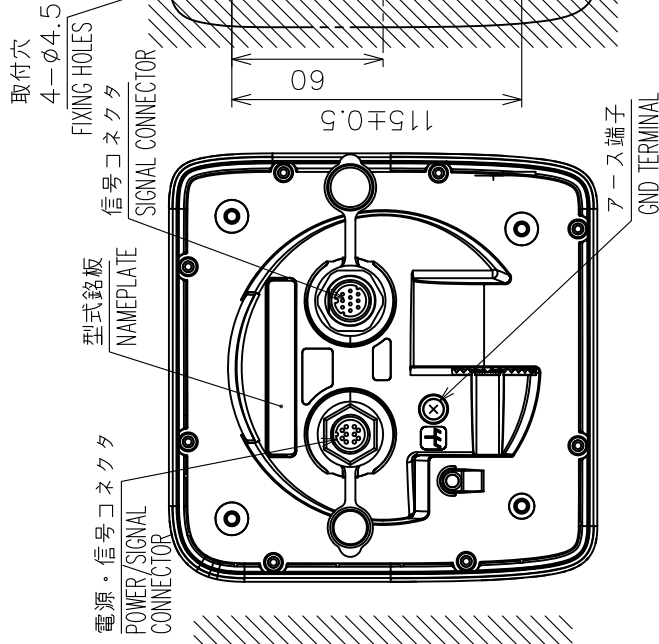
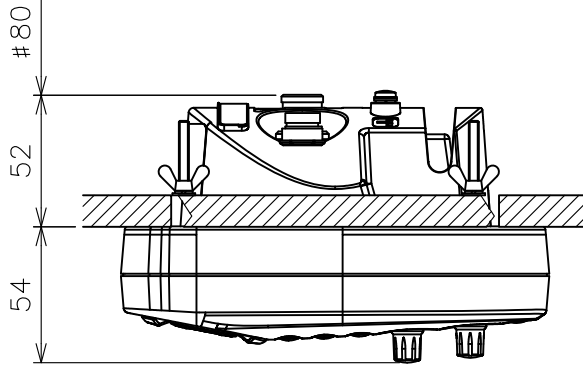
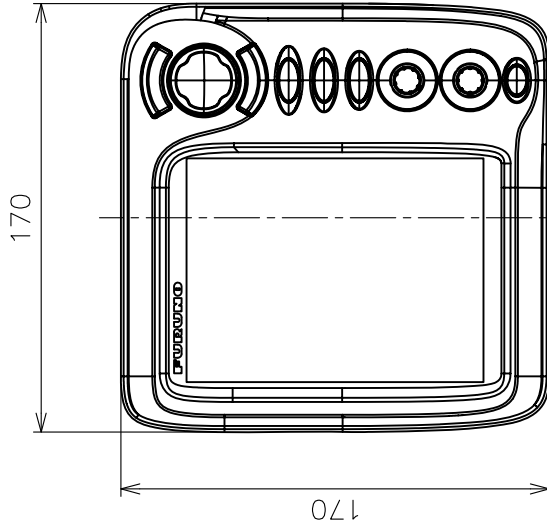
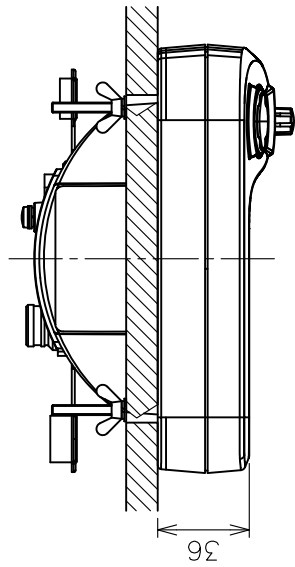


- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービス空間寸法とする。
 3) 取付用ネジは+トラスタッピンネジ呼び5×2.5を使用のこと。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE TAPPING SCREWS φ5x2.5 FOR FIXING THE UNIT.

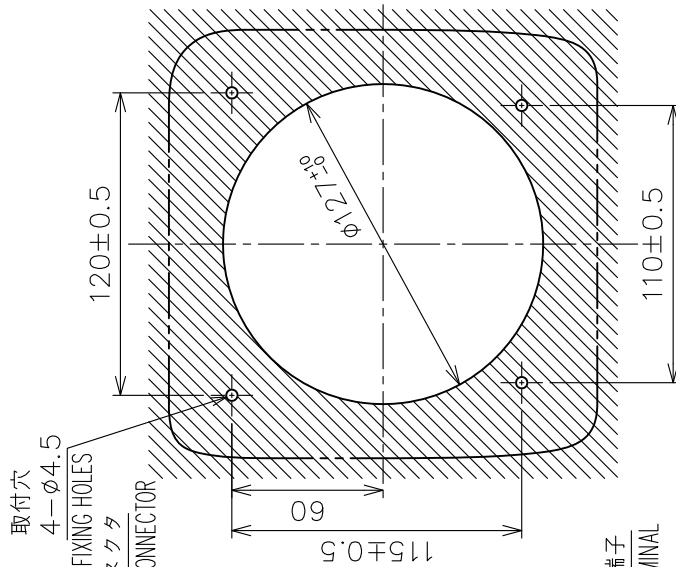
DRAWN	19/Feb/2015	T.YAMASAKI	TITLE	CV-628
CHECKED	19/Feb/2015	H.MAKI	名称	指示器 (卓上装備)
APPROVED	13/Jun/2012	Y.NISHIYAMA	名称	外寸図
SCALE	1/3	1/3	NAME	DISPLAY UNIT (TABLETOP MOUNT)
DMC.No.	C2390-G01-A	REF.No.	02-174-100G-1	OUTLINE DRAWING

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3



取付穴寸法
CUTOUT DIMENSIONS



DRAWN	19/Feb/2015	T. YAMASAKI	TITLE	CV-628
CHECKED	19/Feb/2015	H. MAKI	名称	指示器 (埋込装備)
APPROVED	13/Jun/2012	Y. NISHIYAMA	外寸図	
SCALE	1/3	WASS 0.90	NAME	DISPLAY UNIT (FLUSH MOUNT)
DWG.No.	C2390-G02-A	REF.No.	02-174-110G-1	OUTLINE DRAWING

- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービスマン間寸法とする。
 3) 取付はM4×50寸切りボルト、M4平座金・バネ座金・蝶ナットを使用のこと。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE M4x50 STUD BOLTS AND M4 P.W./ S.W./ WING NUT FOR FIXING THE UNIT.

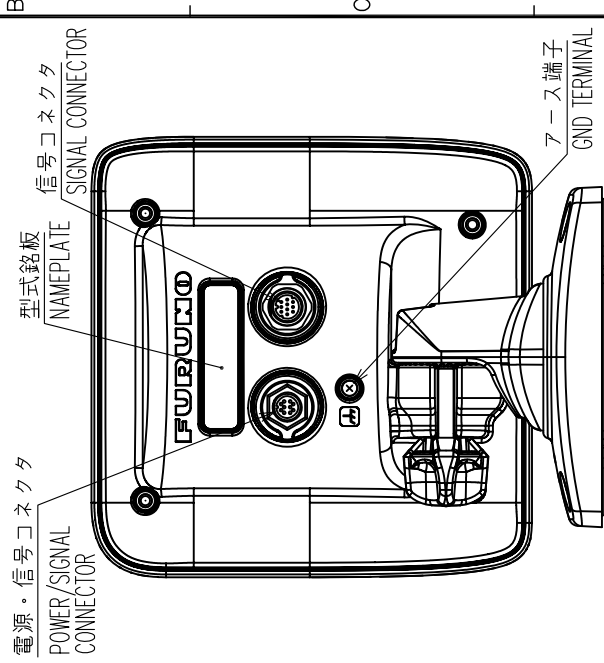
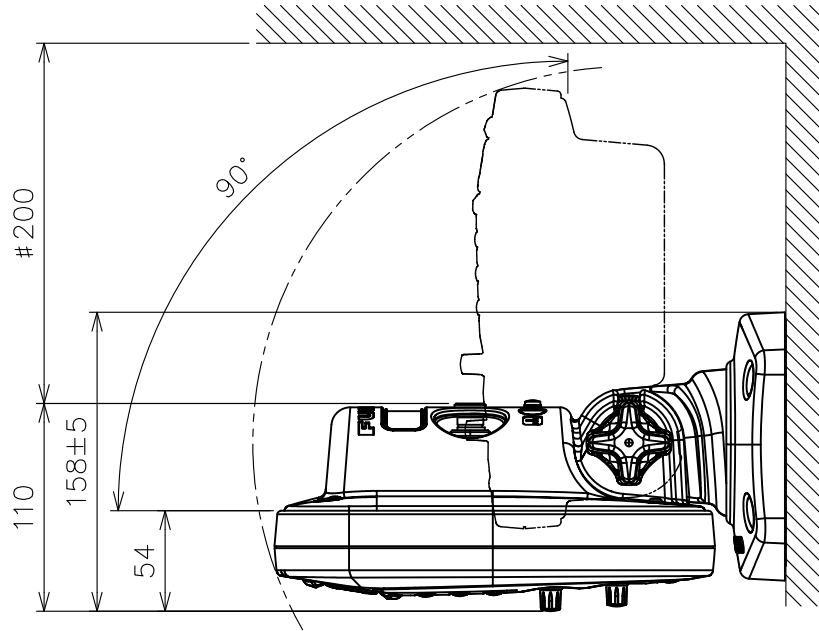
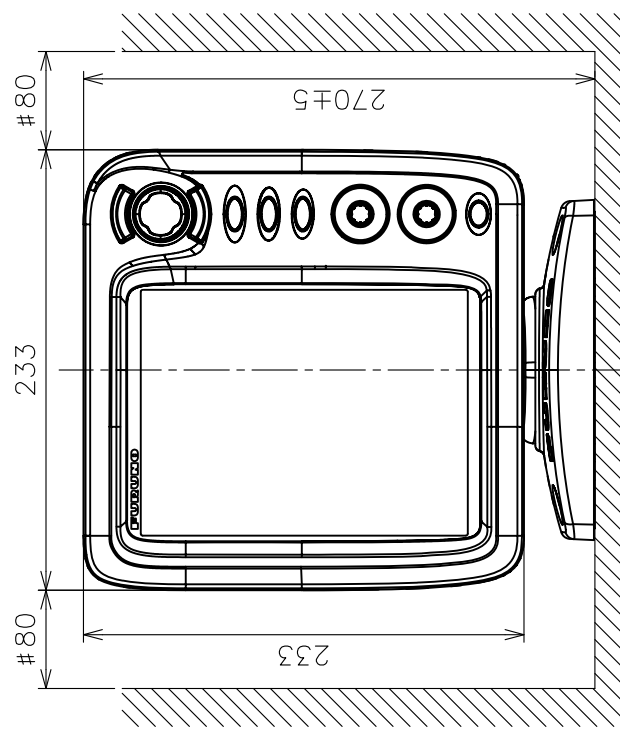
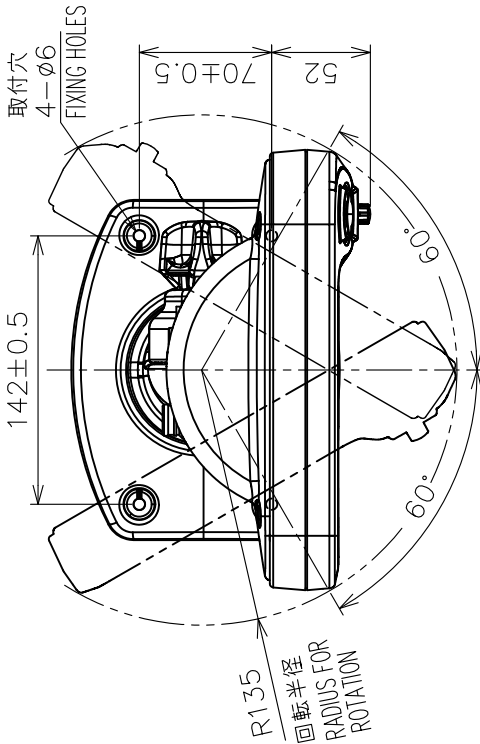


表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービスクリアランスとする。
 3) 取付用ネジはトラスタピンネジ呼び径5×2.5を使用のこと。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. # MINIMUM SERVICE CLEARANCE.
 3. USE TAPPING SCREWS φ5x2.5 FOR FIXING THE UNIT.

DRAWN	19/Feb/2015	T. YAMASAKI	TITLE	CV-588
CHECKED	19/Feb/2015	H. MAKI	名称	指示器 (卓上装備)
APPROVED	13/Jun/2012	Y. NISHIYAMA	NAME	DISPLAY UNIT (TABLETOP MOUNT)
SCALE	1/4	WASS 2.3	OUTLINE DRAWING	
DMC No.	C2389-G01-A	REF.No.	02-175-100G-1	

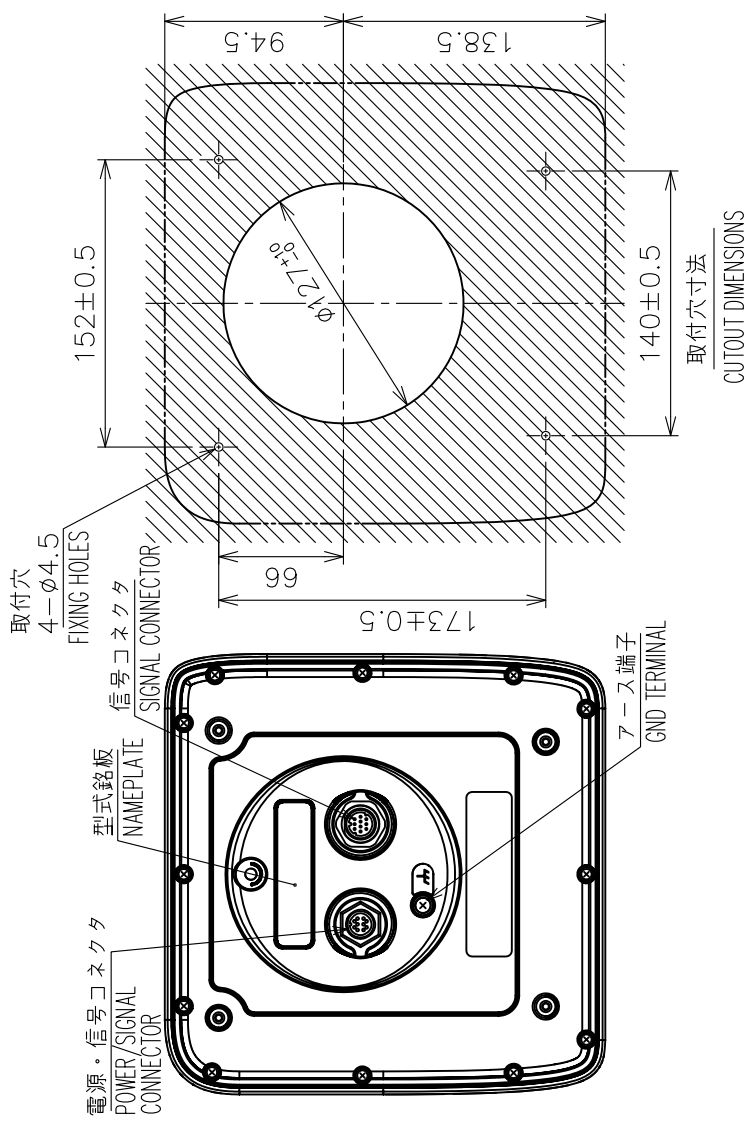
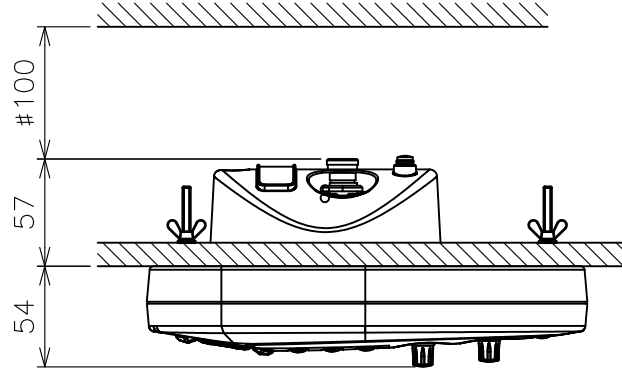
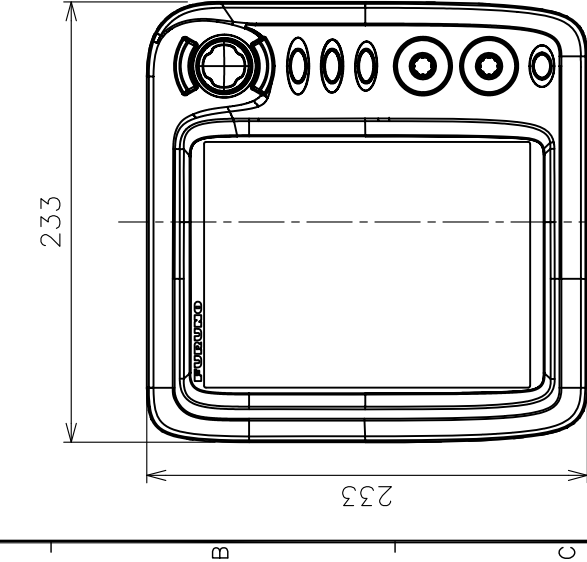
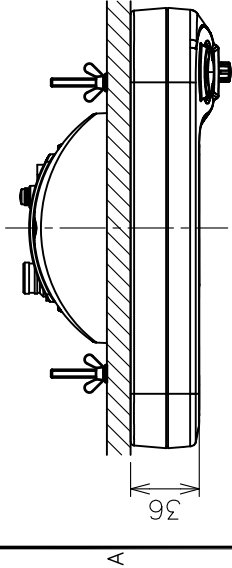


表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービスマウントとする。
 3) 取付はM4×50寸切りボルト、M4平座金、M4平座金・バネ座金・蝶ナットを使用のこと。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE M4x50 STUD BOLTS AND M4 P.W./ S.W./ WING NUT FOR FIXING THE UNIT.

DRAWN	19/Feb/2015	T.YAMASAKI	TITLE	CV-588
CHECKED	19/Feb/2015	H.MAKI	名称	指示器 (埋込装備)
APPROVED	13/Jun/2012	Y.NISHIYAMA	外寸図	
SCALE	1/4	1/6	NAME	DISPLAY UNIT (FLUSH MOUNT)
DWG.No.	C2389-G02-A	REF.No.	02-175-110G-1	OUTLINE DRAWING

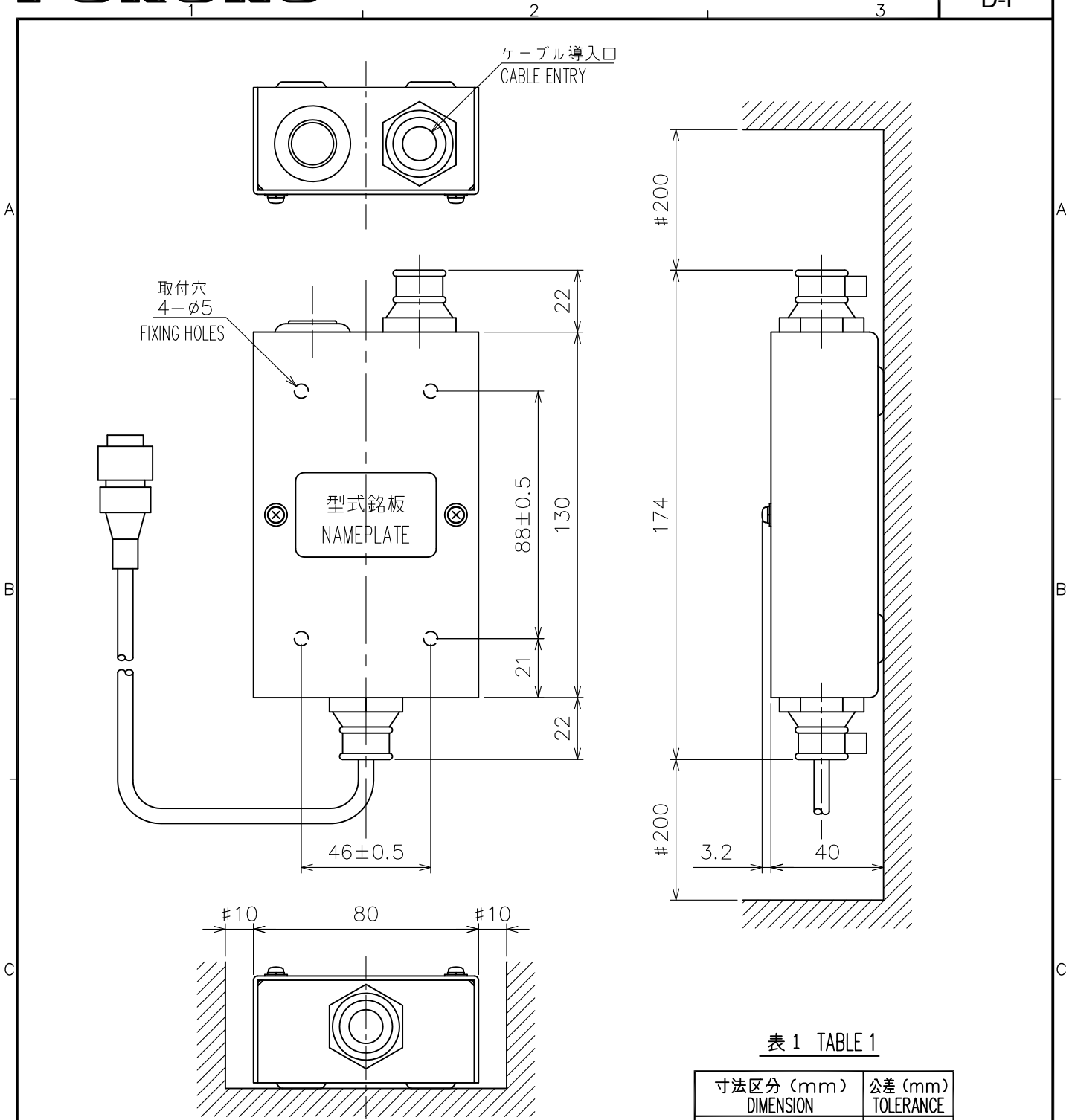


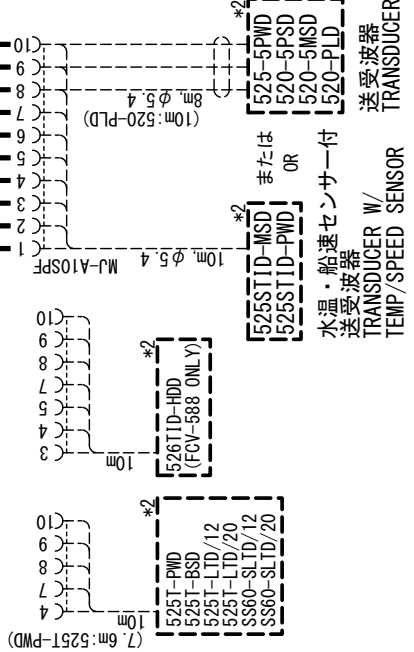
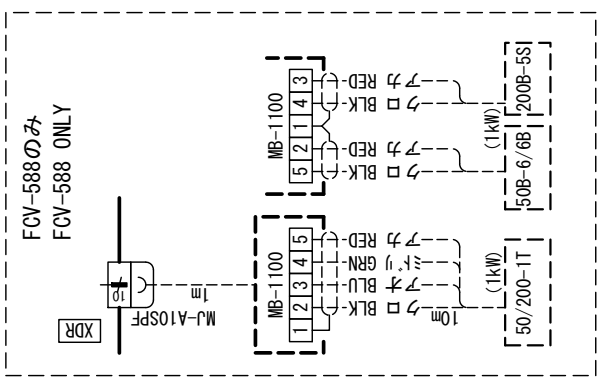
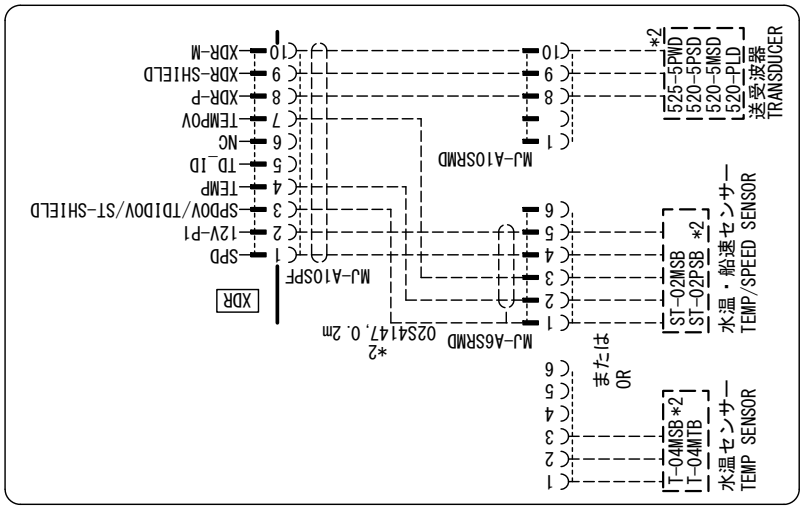
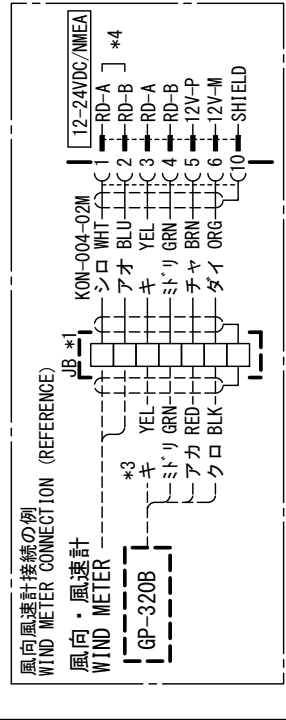
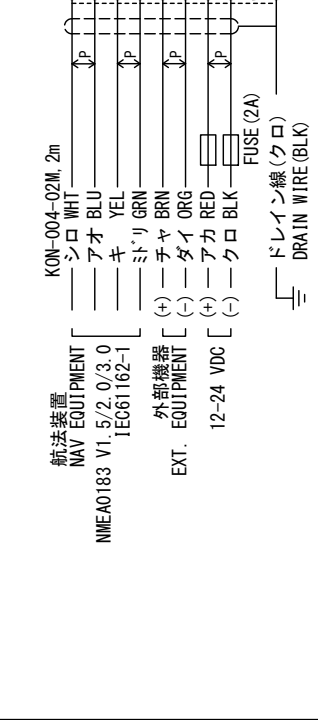
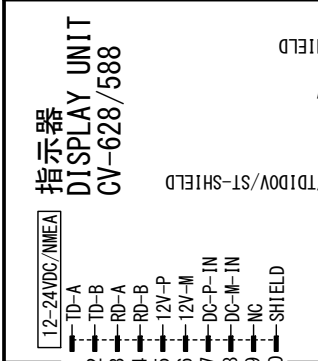
表 1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	± 1.5
$50 < L \leq 100$	± 2.5
$100 < L \leq 500$	± 3

- 注 記
- 1) 指定外の寸法公差は表 1 による。
 - 2) # 印寸法は最小サービス空間寸法とする。
 - 3) 取付にはタッピンネジ呼び 4 を使用のこと。

- NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE TAPPING SCREWS $\phi 4$ FOR FIXING THE UNIT.

DRAWN	12/Mar/2015 T.YAMASAKI	TITLE	MB-1100	
CHECKED	12/Mar/2015 H.MAKI	名称	分配箱	
APPROVED		外寸図		
SCALE	1/2	MASS	0.30 $\pm 10\%$ kg	
DWG. No.	C2375-G03-C	質量はケーブル (1m) を含む。 MASS INCLUDES 1 m CABLE.	NAME	MATCHING BOX
	REF. No.	02-155-200G-2		OUTLINE DRAWING



注記

- * 1) 造船所手配。
- * 2) オプション。
- * 3) コネクタを切断して接続する。
- * 4) メニューの設定変更で '入' に切替。
- * 5) ケーブル延長の場合、ACCU-FISH性能低下の恐れあり。

NOTE

- *1: SHIPYARD SUPPLY.
- *2: OPTION.
- *3: CONNECT CORES TO JUNCTION BOX AFTER THE PLUG IS REMOVED.
- *4: CHANGE SETTING TO 'IN' FROM MENU.
- *5: ACCU-FISH PERFORMANCE MAY BE DECLINED BY CABLE EXTENSION.

DRAWN	31/Oct/2016	I. YAMASAKI	TITLE	FCV-628/588
CHECKED	31/Oct/2016	H. MAKI	名称	カラーLCD魚探
APPROVED	5/Dec/2016	H-MAKI	相互結線図	
SCALE		MASS	NAME	FISH FINDER
DWG. No.	C2390-C01-C	REF. No.	02-174-1001-1	INTERCONNECTION DIAGRAM

INDEX

A

ACCU-FISH alarm.....	15
ACCU-FISH setup.....	11, 12
Arrival alarm.....	17
A-scope display.....	10

B

Battery.....	24
Battery voltage alert.....	31
Bearing source.....	25
Bottom discrimination display.....	13
Bottom fish alarm.....	15
Bottom lock display.....	3
Bottom type alarm.....	16
Bottom zone.....	23
Bottom zoom display.....	4
BRILL key.....	2
Brilliance.....	2

C

Calib menu.....	27
Cleaning.....	30
Clutter.....	9
Color bar.....	24
Color erase.....	10
Colors.....	24
Controls.....	1

D

Data menu.....	25
Default settings.....	33
Demo menu.....	28
Depth indication size.....	23
Depth measurement.....	6
Diagnostic test.....	32
Display menu.....	23
Dual frequency display.....	3

F

Fish alarm.....	15
FUNC key.....	18
Fuse replacement.....	31

G

Gain adjustment.....	5
GAIN knob.....	5

H

Header info.....	24
Header scale.....	24
HF display.....	2

I

Interference.....	9
-------------------	---

K

Key menu.....	26
---------------	----

L

Language menu.....	26
LCD test.....	33
LF display.....	2

M

Maintenance.....	30
Marker zoom display.....	4
MODE knob.....	2

N

Nav data display.....	4, 20
-----------------------	-------

P

Palette.....	24
Picture advance speed.....	8

R

Range.....	5
RANGE key.....	5
Range menu.....	26
Range shift.....	7
RezBoost.....	14

S

Shifting range.....	7
Smoothing.....	22
Sounder menu.....	22
Speed alarm.....	17
Speed source.....	25
System configuration.....	vi
System menu.....	26

T

Tankenmaru menu.....	29
Transducer maintenance.....	30
Transducer menu.....	28
Trip reset.....	25
Trip source.....	25
Troubleshooting.....	31
TVG.....	22
TX power.....	23
TX rate.....	23

U

Units menu.....	27
-----------------	----

V

VRM.....	6
----------	---

W

Water temperature alarm.....	16
Water temperature graph.....	24
Water temperature source.....	25
Waypoints.....	18, 19, 20
White line.....	22
Wind speed and direction source.....	25
Window size.....	24

INDEX

Z

Zoom marker.....23

FURUNO Worldwide Warranty for Pleasure Boats (Except North America)

This warranty is valid for products manufactured by Furuno Electric Co. (hereafter FURUNO) and installed on a pleasure boat. Any web based purchases that are imported into other countries by anyone other than a FURUNO certified dealer may not comply with local standards. FURUNO strongly recommends against importing these products from international websites as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries as described previously shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

This warranty is in addition to the customer's statutory legal rights.

1. Terms and Conditions of Warranty

FURUNO guarantees that each new FURUNO product is the result of quality materials and workmanship. The warranty is valid for a period of 2 years (24 months) from the date of the invoice, or the date of commissioning of the product by the installing certified dealer.

2. FURUNO Standard Warranty

The FURUNO standard warranty covers spare parts and labour costs associated with a warranty claim, provided that the product is returned to a FURUNO national distributor by prepaid carrier.

The FURUNO standard warranty includes:

- Repair at a FURUNO national distributor
- All spare parts for the repair
- Cost for economical shipment to customer

3. FURUNO Onboard Warranty

If the product was installed/commissioned and registered by a certified FURUNO dealer, the customer has the right to the onboard warranty.

The FURUNO onboard warranty includes

- Free shipping of the necessary parts
- Labour: Normal working hours only
- Travel time: Up to a maximum of two (2) hours
- Travel distance: Up to a maximum of one hundred and sixty (160) KM by car for the complete journey

4. Warranty Registration

For the Standard Warranty - presentation of product with serial number (8 digits serial number, 1234-5678) is sufficient. Otherwise, the invoice with serial number, name and stamp of the dealer and date of purchase is shown.

For the Onboard Warranty your FURUNO certified dealer will take care of all registrations.

5. Warranty Claims

For the Standard Warranty - simply send the defective product together with the invoice to a FURUNO national distributor. For the Onboard Warranty – contact a FURUNO national distributor or a certified dealer. Give the product's serial number and describe the problem as accurately as possible.

Warranty repairs carried out by companies/persons other than a FURUNO national distributor or a certified dealer is not covered by this warranty.

6. Warranty Limitations

When a claim is made, FURUNO has a right to choose whether to repair the product or replace it.

The FURUNO warranty is only valid if the product was correctly installed and used. Therefore, it is necessary for the customer to comply with the instructions in the handbook. Problems which result from not complying with the instruction manual are not covered by the warranty.

FURUNO is not liable for any damage caused to the vessel by using a FURUNO product.

The following are excluded from this warranty:

- a. Second-hand product
- b. Underwater unit such as transducer and hull unit
- c. Routine maintenance, alignment and calibration services.
- d. Replacement of consumable parts such as fuses, lamps, recording papers, drive belts, cables, protective covers and batteries.
- e. Magnetron and MIC with more than 1000 transmitting hours or older than 12 months, whichever comes first.
- f. Costs associated with the replacement of a transducer (e.g. Crane, docking or diver etc.).
- g. Sea trial, test and evaluation or other demonstrations.
- h. Products repaired or altered by anyone other than the FURUNO national distributor or an authorized dealer.
- i. Products on which the serial number is altered, defaced or removed.
- j. Problems resulting from an accident, negligence, misuse, improper installation, vandalism or water penetration.
- k. Damage resulting from a force majeure or other natural catastrophe or calamity.
- l. Damage from shipping or transit.
- m. Software updates, except when deemed necessary and warrantable by FURUNO.
- n. Overtime, extra labour outside of normal hours such as weekend/holiday, and travel costs above the 160 KM allowance
- o. Operator familiarization and orientation.

FURUNO Electric Company, March 1, 2011

FURUNO Warranty for North America

FURUNO U.S.A., Limited Warranty provides a twenty-four (24) months LABOR and twenty-four (24) months PARTS warranty on products from the date of installation or purchase by the original owner. Products or components that are represented as being waterproof are guaranteed to be waterproof only for, and within the limits, of the warranty period stated above. The warranty start date may not exceed eighteen (18) months from the original date of purchase by dealer from Furuno USA and applies to new equipment installed and operated in accordance with Furuno USA's published instructions.

Magnetrons and Microwave devices will be warranted for a period of 12 months from date of original equipment installation.

Furuno U.S.A., Inc. warrants each new product to be of sound material and workmanship and through its authorized dealer will exchange any parts proven to be defective in material or workmanship under normal use at no charge for a period of 24 months from the date of installation or purchase.

Furuno U.S.A., Inc., through an authorized Furuno dealer will provide labor at no cost to replace defective parts, exclusive of routine maintenance or normal adjustments, for a period of 24 months from installation date provided the work is done by Furuno U.S.A., Inc. or an AUTHORIZED Furuno dealer during normal shop hours and within a radius of 50 miles of the shop location.

A suitable proof of purchase showing date of purchase, or installation certification must be available to Furuno U.S.A., Inc., or its authorized dealer at the time of request for warranty service.

This warranty is valid for installation of products manufactured by Furuno Electric Co. (hereafter FURUNO). Any purchases from brick and mortar or web-based resellers that are imported into other countries by anyone other than a FURUNO certified dealer, agent or subsidiary may not comply with local standards. FURUNO strongly recommends against importing these products from international websites or other resellers, as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries, as described previously, shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

WARRANTY REGISTRATION AND INFORMATION

To register your product for warranty, as well as see the complete warranty guidelines and limitations, please visit www.furunousa.com and click on "Support". In order to expedite repairs, warranty service on Furuno equipment is provided through its authorized dealer network. If this is not possible or practical, please contact Furuno U.S.A., Inc. to arrange warranty service.

FURUNO U.S.A., INC.
Attention: Service Coordinator
4400 N.W. Pacific Rim Boulevard
Camas, WA 98607-9408
Telephone: (360) 834-9300
FAX: (360) 834-9400

Furuno U.S.A., Inc. is proud to supply you with the highest quality in Marine Electronics. We know you had several choices when making your selection of equipment, and from everyone at Furuno we thank you. Furuno takes great pride in customer service.

EC Declaration of Conformity



We **FURUNO ELECTRIC CO., LTD.**

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

declare under our sole responsibility that the product

FISH FINDER FCV-588 and FCV-628

(Model name, type number)

to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

IEC 60945 Ed.4.0: 2002 incl. Corr. 1: 2008
IEC 60945 Ed.3.0: 1996, clauses 10.2 and 10.3

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see

- Test Report FLI 12-14-138, FLI 12-14-139 and FLI 12-14-140, March 26, 2015 prepared by Furuno Labotech International Co., Ltd.

This declaration is issued according to the Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

On behalf of Furuno Electric Co., Ltd.

Nishinomiya City, Japan
April 20, 2016

(Place and date of issue)

Yoshitaka Shogaki
Department General Manager
Quality Assurance Department

(name and signature or equivalent marking of authorized person)