FURUNO

OPERATOR'S MANUAL

FLEX FUNCTION DISPLAY

Model **SFD-1010/1012**



(Product Name: SINGLE FUNCTION DISPLAY)

MTC Multi Touch Control
TruEcho CHIRP
FDF FURUNO Digital Filter
BDS Bottom Discrimination Sounder
ACCU-FISH
MULTI BEAM
Target Tracking
NMEA2000 Certified

FURUNO ELECTRIC CO., LTD.

www.furuno.com

FURUNO ELECTRIC CO., LTD.

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

・FURUNO Authorized Distributor/Dealer

All rights reserved. Printed in Japan

A : JUL. 2022
C : JUL. 11, 2025

Pub. No. OME-45170-C

(TASU) SFD-1010/1012

0001002742O

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 void 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 void 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: Siriusstraat 86, 5015 BT, Tilburg, The Netherlands
- The following concern acts as our importer in UK, as defined in SI 2016/1025 as amended SI 2019/470.
  - Name: FURUNO (UK) LTD.
  - Address: West Building Penner Road Havant Hampshire PO9 1QY, U.K.
- All brand and product names, trademarks, registered trademarks, and service marks belong to their respective holders.

How to discard this product

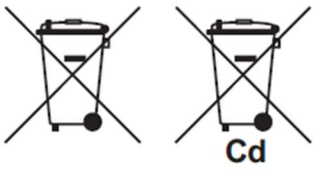
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (http://www.eiae.org/) for the correct method of disposal.

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. If a battery is used, tape + and - terminals of the battery before disposal to prevent fire, heat generation caused by short circuit.

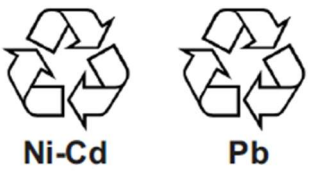
In the European Union

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

Be sure to observe the safety instructions

Be sure to observe the following instructions to prevent danger to yourself and others and damage to your property. The levels of danger and damage that may result when displayed contents are ignored or the equipment is used incorrectly are classified and indicated in this manual as shown below. Pay sufficient attention to those dangers and damage.

⚠ **WARNING**	Indicates a condition that can cause death or serious injury if used incorrectly.
⚠ **CAUTION**	Indicates a condition that can cause minor or moderate injury or damage to property if used incorrectly.

⚠ **Warning, Caution** ⃠ **Prohibitive Action** ❗ **Mandatory Action**

⚠ WARNING



Never look at the radio emitting surface of antenna at a close distance during radar transmission.

Exposing yourself to the transmitting radio waves can be harmful, particularly to your eyes.
Distances at which radiation power density of 100 W/m^2 or 10 W/m^2 exists vary by the type of antenna unit.
If the antenna unit is installed at a close distance in front of the wheel house, the transmission only within a certain range can be halted. For details, contact our service representative.

Antenna model	Distance (m) at 100 W/m^2	Distance (m) at 10 W/m^2
DRS4DL+	N/A	0.9

⚠ WARNING

❗ **Use the proper fuse.**
Use of a wrong fuse can result in serious accident or malfunction.

⃠ **Do not place liquid-filled containers on the equipment.**
Fire or electrical shock can occur if liquid spills into the equipment.

⚠ WARNING



Never remove cover.
High voltage is used inside.
Electrical shock may result if you touch high voltage components.
In case of malfunction, contact your dealer.



Before operating this equipment, be sure to check that there is no one near the antenna unit.
If you suddenly rotate the antenna unit, it may strike the head of a person working near the antenna unit or make him/her fall from the radar mast, which can result in death.



Never disassemble or modify the equipment.
Fire, electrical shock or injury can result.

❗ **Immediately turn off the power at the switchboard if water leaks into the equipment.**
Fire or electrical shock can result.

❗ **Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire.**
Fire or electrical shock can result. Be sure to contact your dealer.



Do not operate the equipment with wet hands.
Electrical shock can result.

Safety Instructions on Target Tracking (TT)

⚠ WARNING

This function is not a substitute for safety monitoring using human vision and human judgment. It is intended to aid the monitoring of courses for the safe navigation of vessel. Relying too much on the monitoring function or incorrect use of the function can end up incurring danger. Pay sufficient attention to the following points.

Depending on the radar setting, targets are not acquired or unwanted targets such as sea clutter are tracked. In some cases, radar settings may be inappropriate for this function. Adjust each knob of radar according to each situation.

A target may not be properly acquired or tracked when sea clutter or rain clutter is strong and wide, when the target is in low clouds or when there is too much interference or noise.
Adjust the sea clutter or rain clutter controls to suppress them on the screen. Be careful not to lower the gain or suppress the sea clutter too much to make sure that necessary targets are not eliminated from the radar screen.

⚠ CAUTION

About plotting accuracy
The plotting accuracy and response speed of this TT meet the International Maritime Organization (IMO) standards. Tracking accuracy is affected by the following.

Tracking accuracy is not affected by slow course change of own ship. However, abrupt course change affects all tracking targets and one to two minutes is required to restore full accuracy for those targets. (The degree of impact depends on gyrocompass.)

When the relative speed of other ship is high, target course display is delayed by 15 to 30 seconds.
When the relative speed of other ship is low (close to 0), target course display is delayed by 30 to 60 seconds.
The accuracy slightly drops during course change but soon recovers.

About display accuracy
The display accuracy may be affected by the following.

1) Fluctuation of radar reflection intensity
2) Fluctuation of radar reception pulse length
3) Bearing error caused by radar
4) Bearing error caused by heading sensor

Safety Instructions on Installation

⚠ WARNING

Be sure to turn off the power at the switchboard before installing the equipment.
Fire or electrical shock can result.

Make sure no water leaks in at the transducer or water temperature sensor mounting location.
Water leakage can sink the vessel. Install the equipment carefully so that the transducer and/or sensor will not come off or drop off by ship's vibration.
The installer is responsible for the proper installation of the equipment.

Use the specified power cable / data cable.
Use of other power cable / data cable can cause serious accident or fire.

⚠ CAUTION

Do not install the transducer in a place where air bubbles and noise are present.
The equipment performance will be affected.

The following are guidelines for handling of the transducer cable.
- **Keep on-board oils (lubricant, fuels) away from the cable.**
- **Locate cable in a safe place to avoid risk of damage during on-board work.**
- **Do not paint the cable.**

The cable may become corroded or damaged, leading to malfunction.

The sheath of the transducer cable is made of chloroprene rubber (or polychloride vinyl), which can be deteriorated by organic solvent (such as toluene) contained in marine paint, etc.

Do not turn on the equipment with the transducer out of water.
The transducer can be damaged.

Observe the following compass safe distances.
Otherwise, the ship may not be steered safely.

Model	Standard compass	Steering compass
SFD-1010	1.00m	0.70m
SFD-1012	0.30m	0.30m

TABLE OF CONTENTS

FOREWORD xi
SYSTEM CONFIGURATION xiv
EQUIPMENT LIST xvii
1. BASIC OPERATION 1-1
1.1 Controls 1-1
1.2 Turning Power On/Off 1-4
1.3 How to Adjust the Brilliance 1-5
1.3.1 How to adjust the brilliance of display 1-5
1.3.2 How to adjust the brilliance of panel keys 1-5
1.4 Description of Menu Setting Window 1-6
1.4.1 List-type window 1-6
1.4.2 Adjustment-type window 1-6
1.4.3 Toggle-type window 1-7
1.4.4 Confirmation-type window 1-7
1.4.5 Popup-type window 1-7
1.5 Display Indications 1-8
1.5.1 Radar display 1-8
1.5.2 Fish finder display 1-10
1.5.3 Multi beam sonar display 1-12
2. RADAR 2-1
2. 1 Basic operation of radar 2-1
2.1.1 Transmission/stand-by 2-1
2.1.2 Working Indicator 2-2
2.1.3 Screen display examples, InstantAccess™ Bar items 2-3
2.1.4 Overview of menu operations 2-4
2.1.5 Tuning 2-5
2. 2 Display Modes 2-6
2.2.1 Selecting a display mode 2-6
2.2.2 Description of display modes 2-7
2. 3 How to Select a Range 2-7
2. 4 How to Adjust the Gain 2-8
2. 5 How to Reduce Sea Clutter 2-8
2. 6 How to Reduce Rain Clutter 2-11
2. 7 Cursor 2-12
2. 8 Heading Line and North Marker 2-13
2.8.1 Heading line 2-13
2.8.2 How to adjust the heading line 2-13
2.8.3 How to erase the heading line temporarily 2-14
2.8.4 North marker 2-14
2. 9 Interference Rejection 2-15
2. 10 Noise Rejection 2-16
2. 11 How to Measure the Range to a Target 2-17
2.11.1 How to adjust the brilliance of fixed range rings 2-17
2.11.2 How to measure the range with the Variable Range Marker (VRM) 2-19
2.11.3 How to change the VRM unit of measurement 2-19

2. 12 How to Measure the Target Bearing 2-20
2.12.1 How to measure the bearing using Electronic Bearing Lines (EBL) 2-20
2.12.2 How to change the bearing reference for EBL 2-21
2. 13 Target Alert 2-21
2.13.1 How to set an alert zone 2-21
2.13.2 How to show, hide the alert zone 2-22
2.13.3 How to set the conditions for activating a target alert 2-22
2.13.4 How to turn the target alert alarm on/off 2-23
2.13.5 How to turn on/off the automatic acquisition function of target alert 2-23
2.13.6 How to acknowledge the target alert 2-23
2. 14 How to Set the Buzzer 2-23
2. 15 Watchman 2-24
2. 16 Off-Center (Shifting the Screen Center) 2-25
2. 17 Zoom 2-26
2.17.1 How to change a zoom mode 2-26
2.17.2 How to use the zoom function 2-27
2. 18 Echo Trail 2-28
2.18.1 How to change the echo trail time and start echo trails 2-28
2.18.2 How to reset the echo trails 2-28
2.18.3 How to change the trail mode 2-29
2.18.4 How to change the trail gradation 2-30
2.18.5 How to change the trail color 2-31
2.18.6 How to change the trail level 2-31
2. 19 Assigning Functions to the Function Keys 2-32
2.19.1 How to assign functions to the function keys 2-32
2.19.2 How to operate the function keys 2-32
2. 20 Echo Averaging 2-33
2. 21 How to Set the Display Curve 2-34
2. 22 Alert List 2-35
2. 23 Screen Display Colors 2-35
2.23.1 How to change the displays colors 2-35
2.23.2 User setting 2-36
2.23.3 How to change the brilliance of marks, heading line and characters 2-38
2. 24 TT Operation 2-39
2.24.1 TT display [On]/[Off] 2-39
2.24.2 How to change the TT symbol (acquisition symbol) color 2-40
2.24.3 How to acquire and track targets 2-41
2.24.4 How to cancel the tracking 2-42
2.24.5 Lost target 2-42
2.24.6 TT All Cancel 2-43
2.24.7 How to display the TT vector 2-44
2.24.8 How to display TT data 2-45
2.24.9 Past position display 2-45
2.24.10 How to set a collision alert (CPA/TCPA alert) 2-47
2.24.11 Proximity alert 2-48
2. 25 Test Menus 2-49
2.25.1 Self-diagnostic test 2-49
2.25.2 LCD test 2-50

2.25.3 Radar sensor test 2-51
2. 26 Initialization Menu 2-52
2. 27 Installation Menu 2-53
2. 28 Service Menu 2-57
2.28.1 Antenna rotation 2-57
2.28.2 Operating time 2-58
2.28.3 Transmission time 2-59
3. FISH FINDER 3-1
3. 1 Basic Operation of Fish Finder 3-1
3.1.1 Transmission/stand-by 3-1
3.1.2 Screen display examples, InstantAccess™ Bar items 3-2
3.1.3 Overview of menu operations 3-3
3. 2 Display Modes 3-4
3.2.1 How to Select a display mode 3-4
3.2.2 Description of display modes 3-5
3. 3 How to Select a Range 3-7
3. 4 Adjusting the Gain 3-8
3.4.1 How to set up the auto mode 3-8
3.4.2 How to set up the manual mode 3-9
3. 5 How to Measure the Time and Depth to Objects 3-10
3. 6 Shifting the Display Range (Shift Function) 3-11
3. 7 Picture Advance Speed 3-12
3. 8 How to Reduce Interference 3-13
3. 9 How to Reduce Low Level Noise 3-13
3. 10 How to Erase Weak Echoes 3-14
3. 11 A-Scope Display 3-14
3. 12 How to Adjust the Window Size 3-15
3. 13 Screen Display Colors 3-16
3.13.1 How to select display colors 3-16
3. 14 Header 3-17
3.14.1 Header information 3-17
3.14.2 Header scale 3-18
3. 15 ACCU-FISH™ 3-19
3.15.1 How to activate and set up ACCU-FISH™ 3-19
3.15.2 Calibration of fish size values 3-20
3. 16 Bottom Discrimination Function 3-21
3. 17 Alarms 3-23
3.17.1 Description of alarms 3-24
3.17.2 Fish alarm 3-24
3.17.3 Water temperature alarm 3-27
3.17.4 Water depth alarm 3-28
3.17.5 Ship speed alarm 3-28
3. 18 How to Display Past Pictures 3-29
3. 19 How to Reduce the Short Distance Gain (TVG Function) 3-30
3. 20 Water Temperature Graph 3-31
3. 21 How to Interpret the Display 3-32
3. 22 System Menu 3-36
3.22.1 How to display the system menu 3-36

3.22.2 Range menu 3-37
3.22.3 Keypad menu 3-37
3.22.4 Language menu 3-38
3.22.5 Units menu 3-38
3.22.6 Calibration menu 3-38
3.22.7 Import/Export Settings, Ejecting USB Storage Safely menu 3-41
3.22.8 Demonstration menu 3-41
3.22.9 Tests 3-41
3.22.10 Initialization 3-43
4. MULTI BEAM SONAR DFF-3D 4-1
4. 1 Basic Operation of DFF-3D 4-1
4.1.1 Transmission/stand-by 4-1
4.1.2 General description of menu operation 4-2
4.1.3 Background color 4-3
4.1.4 How to adjust the bottom range shift 4-3
4.1.5 How to change the transmission rate 4-4
4. 2 Display Screens Overview 4-6
4. 3 Multi Beam Fish Finder Display 4-11
4.3.1 How to switch between single beam and triple beam 4-11
4.3.2 How to set the TX beam angle 4-12
4.3.3 How to set the TX beam width 4-12
4.3.4 How to change the picture advance speed 4-12
4.3.5 How to show or hide the depth and gain indications 4-13
4. 4 Side Scan Display 4-14
4.4.1 How to change the picture advance speed 4-14
4.4.2 How to change echo color 4-15
4. 5 Cross Section (SONAR) Display 4-16
4.5.1 How to show or hide the grid 4-16
4.5.2 Zoom display 4-17
4.5.3 How to smooth echoes (distance) 4-17
4.5.4 How to smooth echoes (time) 4-18
4.5.5 How to apply correction to the speed of sound 4-18
4. 6 3D Sounder History Display 4-21
4.6.1 How to move, zoom in, zoom out the viewpoint position 4-21
4.6.2 School of fish icon 4-23
4.6.3 How to stop and restart the display advancement 4-24
4.6.4 How to adjust the echo detection level 4-25
4.6.5 How to calibrate the bottom echo 4-25
4.6.6 How to use the bathymetry smoothing 4-26
4.6.7 How to use terrain shading 4-27
4.6.8 How to change the picture advance speed 4-28
4.6.9 Bottom depth shading, fish depth shading 4-29
4.6.10 Current (tide) setting 4-32
4.6.11 Net setting 4-33
4. 7 PBG 4-34
4.7.1 PBG Recording 4-34
4.7.2 How to show/hide heding line 4-35
4.7.3 How to show/hide COG line 4-36

4.7.4 Off Center 4-38
4.7.5 Terrain Shading 4-38
4.7.6 Depth Shading Setting 4-39
4.7.7 How to show/hide the grid and change its interval 4-41
4.7.8 Contour Line 4-42
4.7.9 Depth Text 4-43
4.7.10 Track 4-44
4.7.11 How to Measure Depth 4-45
4.7.12 Recording Limiter 4-46
4.7.13 Single Beam Rec. Radius 4-47
4.7.14 PBG Range 4-48
4.7.15 How to Import/Export and Eject USB Storage 4-49
4.7.16 Delete Spot PBG Data 4-50
4.7.17 How to Delete All PBG Data 4-51
4. 8 DISPLAY Menu 4-52
4.8.1 Individual setting 4-52
4.8.2 Screen setup 4-53
4. 9 Settings of ALARM 4-54
4.9.1 How to set a fish alarm 4-54
4.9.2 How to set the water temperature alarm 4-55
4.9.3 How to set the depth alarm 4-55
4.9.4 How to set the speed alarm 4-56
4. 10 DATA Menu 4-57
4. 11 IA BAR Menu 4-58
4. 12 SYSTEM Menu 4-60
4. 13 Demo 4-62
4. 14 Test Menus 4-63
4. 15 Reset Menu 4-66
4. 16 Single Beam PBG 4-66
4.16.1 Single Beam Rec. Radius 4-67
5. INSTALLATION 5-1
5. 1 Mounting 5-1
5.1.1 Place suitable for mounting 5-1
5.1.2 Desktop mount 5-1
5.1.3 Flush mount 5-3
5. 2 Wiring 5-7
5.2.1 Main body (rear) interface 5-7
5.2.2 Waterproofing of each interface 5-7
5.2.3 Multi cable 5-8
5.2.4 Isolation and protection of unused conductors 5-9
5.2.5 How to connect the external buzzer 5-9
5. 3 Radar sensor, fish finder and multi beam sonar connections 5-10
5. 4 VIDEO-IN/OUT and USB Connector 5-11
5. 5 NMEA2000 Connector 5-11
5. 6 Home Screen 5-14
5. 7 Radar 5-18
5.7.1 How to adjust the heading line 5-18
5.7.2 How to adjust the sweep timing 5-18

5.7.3 How to adjust the main bang 5-19
5.7.4 How to show the own ship mark 5-20
5.7.5 How to set a sector blank 5-21
5.7.6 Data Source Settings 5-23
5.7.7 NMEA0183#1、NMEA0183#2 5-24
5.7.8 NMEA2000 5-25
5. 8 Fish Finder 5-26
5.8.1 Fish finder source menu 5-26
5.8.2 Transducer settings 5-26
5.8.3 Chirp frequency setting 5-30
5.8.4 Motion sensor settings 5-31
5.8.5 Bottom detection level 5-32
5.8.6 External KP 5-32
5.8.7 Data Source Settings 5-33
5.8.8 NMEA0183#1、NMEA0183#2 5-34
5.8.9 NMEA2000 5-35
5.8.10 How to change the screen orientation 5-36
5. 9 Multi Beam Sonar 5-36
5.9.1 Transducer Setup menu 5-36
5.9.2 GPS Antenna Position menu 5-37
5.9.3 Motion Sensor Setup menu 5-37
5.9.4 External KP menu 5-38
5.9.5 Data Source Settings 5-39
5.9.6 NMEA0183#1、NMEA0183#2 5-40
5.9.7 TLL Output menu 5-40
5.9.8 NMEA2000 5-41
5. 10 Language Setting 5-42
5. 11 Motion Sensor Setting 5-43
5. 12 SCX Setting 5-44
6. MAINTENANCE, TROUBLESHOOTING 6-1
6. 1 Periodic Checks 6-1
6. 2 Replacing the Fuse 6-2
6. 3 Troubleshooting 6-2
6.3.1 General problems 6-2
6.3.2 Radar problems 6-3
6.3.3 Fish finder problems 6-3
6. 4 Alert List 6-4
6.4.1 Radar 6-4
6.4.2 Fish finder 6-4
6.4.3 Multi beam sonar 6-4
6.4.4 Single Beam PBG 6-5
APPX.1 MENU TREES AP-1
SPECIFICATIONS SP-1
PACKING LIST(S) A-1
OUTLINE DRAWING(S) D-1
INTERCONNECTION DIAGRAM(S) S-1
INDEX IN-1

FOREWORD

Thank you for purchasing FURUNO equipment. Since its foundation in 1948, FURUNO Electric Company has been manufacturing and selling a variety of marine electronics equipment and has been enjoying a high reputation for performance, quality and reliability from users around the world. This equipment is designed and manufactured under a strict quality control system to ensure its performance and durability. Please carefully read this manual to fully enjoy the original performance of this equipment.

Features

This equipment is a display/control unit for network fish finders, radar, multi beam sonar and single beam PBG.
By selecting a radar, a fish finder, multi beam sonar, or Single beam PBG in menu, you can switch the display and control for the selected unit. The unit can be mounted both in portrait and landscape orientations to fit various locations.

Major features are as follows.

Radar

Compatible with DRS series (DRS4DL+/DRS4DL X-Class).

- Picture adjustment (gain, sea surface, rain/snow), tuning, pulse length, display range, interference rejection
- Antenna rotation control, transmission stop area
- TT control
- Display mode: Head-up, course-up, north-up

Fish finder

Compatible with DFF series (DFF1/DFF1-UHD/DFF3/BBDS1/DFF3-UHD).
Available functions differ according to the connected model and transducers.

- Picture adjustment (gain/TVG), display range, interference rejection, clutter, color erase
- White marker, bottom discrimination, fish size display
  Note1: Bottom discrimination function is available on DFF1-UHD and BBDS1.
  Note2: Fish size display is available when using DFF1, DFF1-UHD, DFF3 and BBDS1, DFF3-UHD.
- Display mode: Single frequency display, dual frequency display, zoom display, A-scope, bottom zoom, bottom lock display, marker zoom

Multi beam sonar

DFF-3D can be operated.

- Display adjustment (Gain/TVG), Range, Interference Rejector and Clutter.
- Shows the White Edge and Fish Size.
- Display Mode: Multi beam fish finder (Single or Triple Beam), Side scan, Cross section, 3D history, PBG, Overlay current data and Display of simulated net mark.

Single beam PBG

Records PBG by using the fish finder depth data (NMEA 0183/NMEA 2000/LAN).

・Single Beam PBG Range

・Display Mode: PBG

Controls

Allows touchscreen and hardware key controls.

LCD panel

High brilliance LCD (800cd/m^2) display. Glass filter with AR/AF coating reduces reflection and fingerprints on LCD.

Network (wired LAN)

Fish finder sensor, multi beam sonar, radar sensor connected via Ethernet port.(1 port)
This model can be used as the sub-display unit of the NavNet TZtouch series.

・TZTXL: TZT10X/13X/16X/22X/24X/BBX(V25.11)

・TZT3: TZT9F/12F/16F/19F(V3.80)

・TZT2: TZT2BB(V9.80)

Note1: Not compatible with the display/operation of built-in fish finders of NavNet series (however, depth information from built-in fish finders of SFD-1010/1012 can be Used as a PBG data source).

Note2: When using the SFD and NavNet on the same network, the following settings are required for sharing navigation data.
[MENU] > [SYSTEM] > [Data Source] > [NAVNET Sync] > [On]

USB2.0

Trackball control unit (RCU-030) can be connected.
Software can be updated via a USB port. (1 port)

NMEA 0183

Data input/output through NMEA 0183 port (Input/Output: 2 ports).

NMEA 2000

NMEA 2000 equipment can be connected via the NMEA 2000 port. (1 port)

HDMI (video) output

Contents displayed on the screen can be duplicated and displayed on an externally-connected LCD display.
(Output 1 port, 1280x720/720x1280 (HD) for the HDMI output.)

Hanger

Hangers are included for portrait mount and landscape mount of display unit.

Software used in this product

This product includes software to be licensed under the GNU General Public License (GPL) version 2.0, GNU Lesser General Public Software License (LGPL) version 2.0, Apache, BSD, MIT and others. The program(s) is/are free software(s), and you can copy it and/or redistribute it and/or modify it under the terms of the GPL version 2.0 or

LGPL version 2.0 as published by the Free Software Foundation. Please access to the following URL if you need source codes:
https://www.furuno.co.jp/contact/cnt_oss01.html.

Program no.

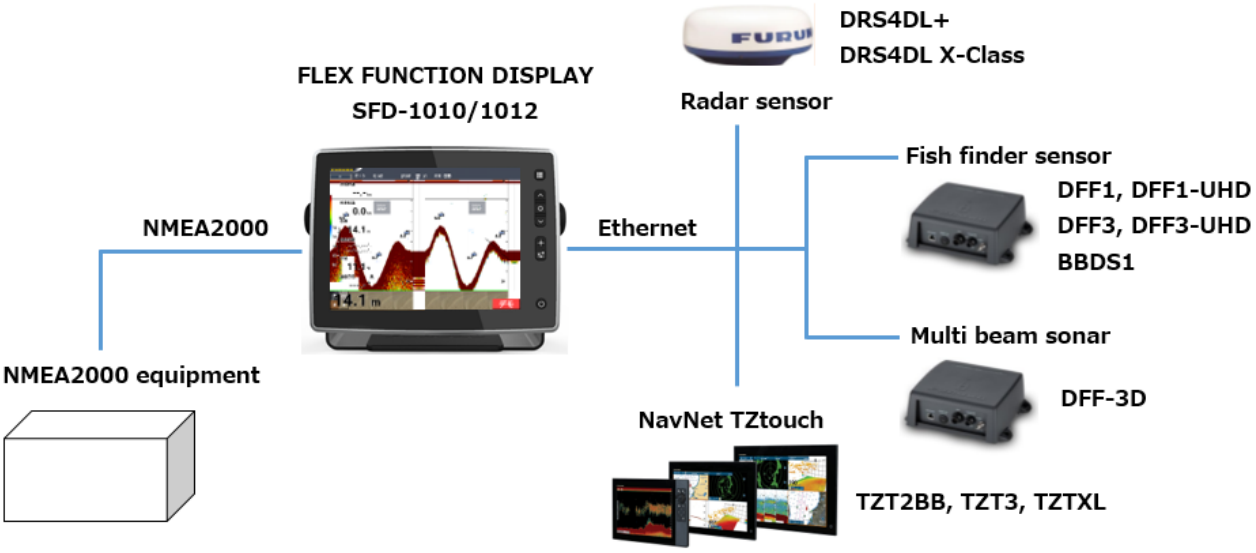
System1: 1950222-x.x.x
System2: 1950223- x.x.x
Application: 1950228- x.x.x
x：Minor change of software

CE/UKCA declaration

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

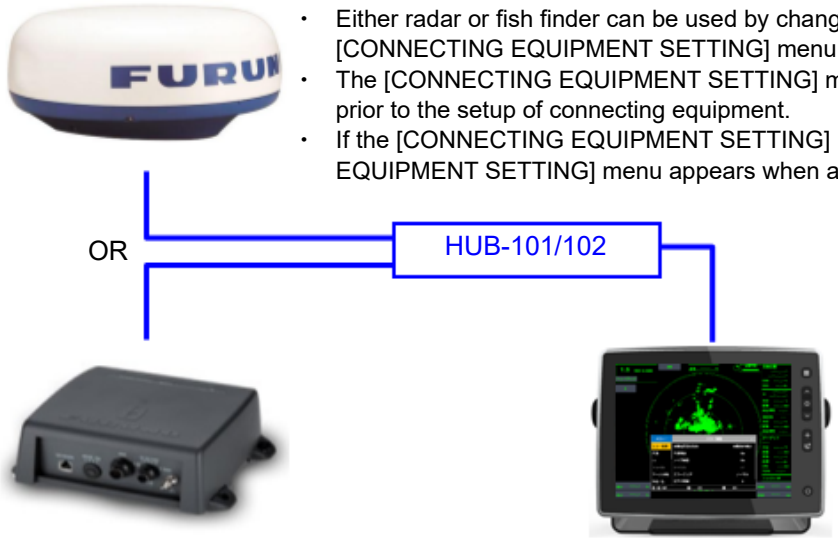
SYSTEM CONFIGURATION

○ Connectable equipment



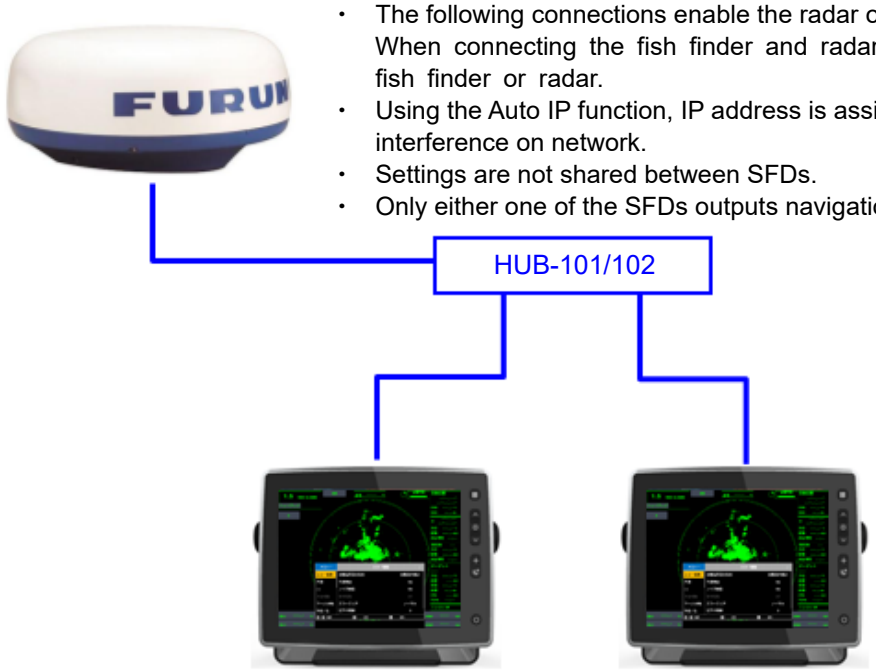
*: One unit of radar sensor, fish finder sensor and multi beam sonar can be connected at the same time.
*: Two units of SFD-1010/1012 can be connected to the same network as the maximum.

○ Configuration with one display unit



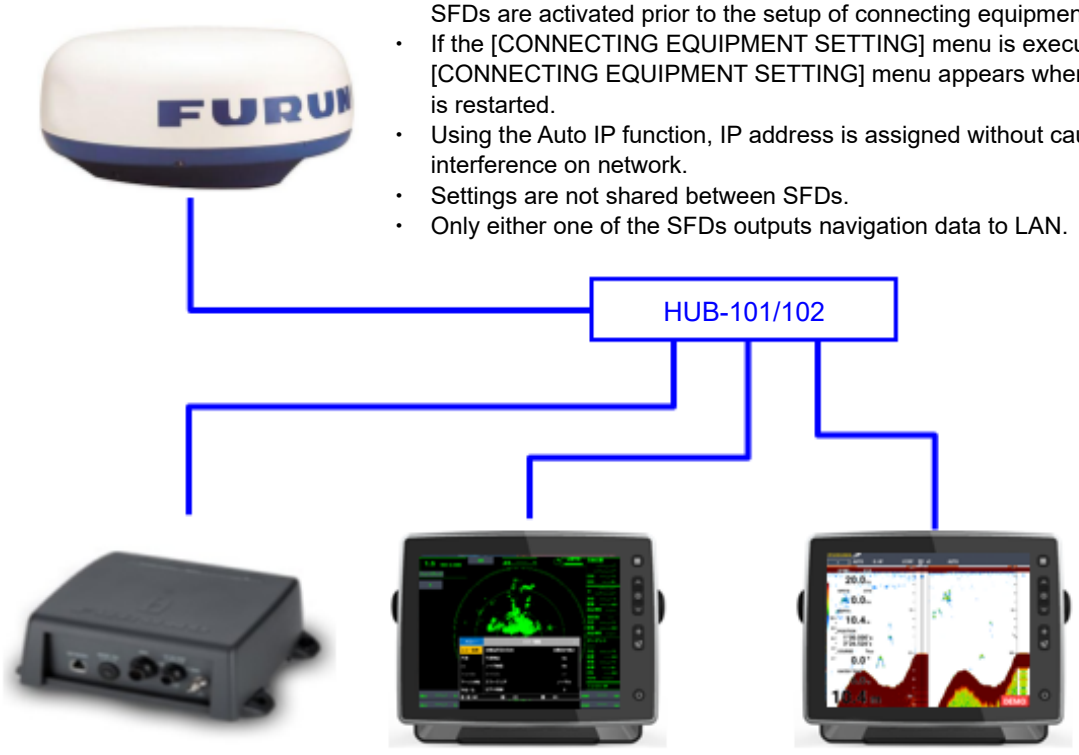
- Either radar or fish finder can be used by changing the sensor selection in the [CONNECTING EQUIPMENT SETTING] menu.
- The [CONNECTING EQUIPMENT SETTING] menu appears if the SFD is activated prior to the setup of connecting equipment.
- If the [CONNECTING EQUIPMENT SETTING] menu is executed, the [CONNECTING EQUIPMENT SETTING] menu appears when an application is restarted.

○ Configuration with two display units (1)



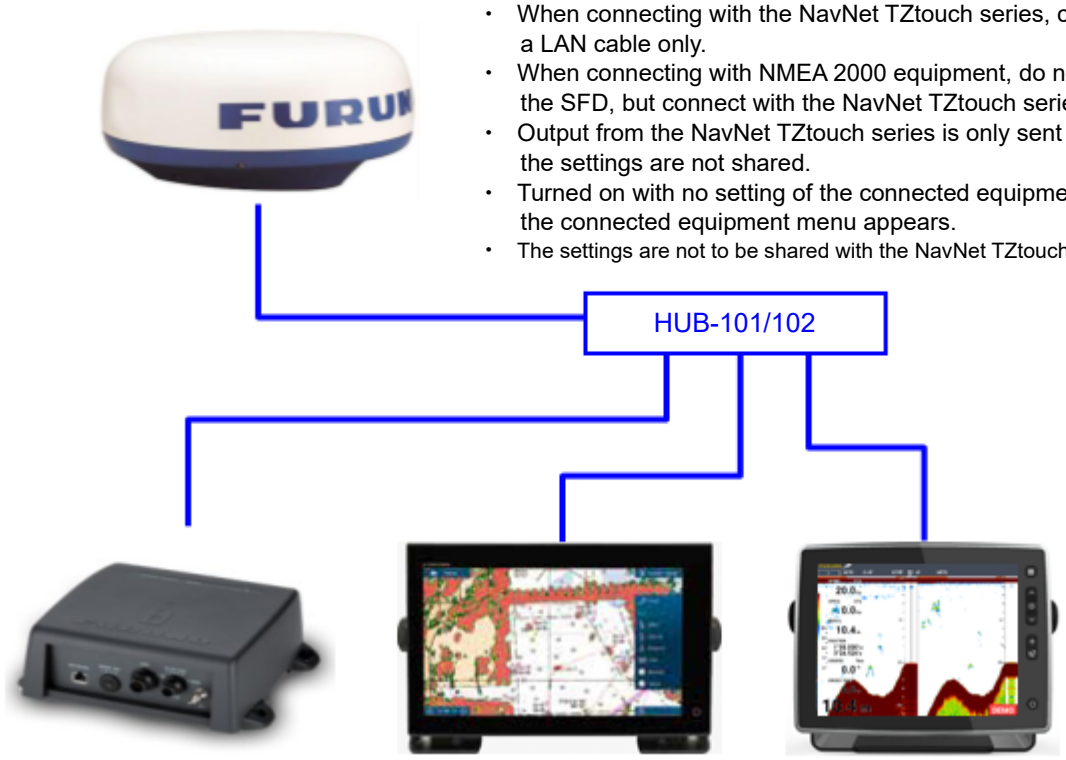
- The following connections enable the radar operations from both SFDs. When connecting the fish finder and radar, both SFDs can operate fish finder or radar.
- Using the Auto IP function, IP address is assigned without causing interference on network.
- Settings are not shared between SFDs.
- Only either one of the SFDs outputs navigation data to LAN.

○ Configuration with two display units (2)



- Both SFDs can be used for display and control of radar or fish finder by selecting a sensor to use in the [CONNECTING EQUIPMENT SETTING] menu.
- The [CONNECTING EQUIPMENT SETTING] menu appears if the SFD or SFDs are activated prior to the setup of connecting equipment.
- If the [CONNECTING EQUIPMENT SETTING] menu is executed, the [CONNECTING EQUIPMENT SETTING] menu appears when an application is restarted.
- Using the Auto IP function, IP address is assigned without causing interference on network.
- Settings are not shared between SFDs.
- Only either one of the SFDs outputs navigation data to LAN.

○ Configuration with two display units (3)



- When connecting with the NavNet TZtouch series, connect with a LAN cable only.
- When connecting with NMEA 2000 equipment, do not connect with the SFD, but connect with the NavNet TZtouch series.
- Output from the NavNet TZtouch series is only sent to the SFD and the settings are not shared.
- Turned on with no setting of the connected equipment, the connected equipment menu appears.
- The settings are not to be shared with the NavNet TZtouch series and SFDs.

EQUIPMENT LIST

Standard supply

SFD-1010

Name	Type	Code No.	Qty.	Remarks
Display Unit	SFD-1010	000-038-078	1	
Spare Parts	SP03-17801	001-600-090	1	
Accessories	CP19-02801	001-600-100	1	
Installation Materials	FP02-05700	000-011-976	1	

SFD-1012

Name	Type	Code No.	Qty.	Remarks
Display Unit	SFD-1012	000-038-080	1	
Spare Parts	SP03-17801	001-600-090	1	
Accessories	CP19-02801	001-600-100	1	
Installation Materials	FP02-05700	000-011-976	1	

Optional supply

Name	Type	Code No.	Remarks
Trackball Control Unit	RCU-030	000-024-900	
External Alarm Buzzer	OP03-136	000-086-443	
NMEA Data Converter	IF-NMEA2K2	000-020-510	
Junction Box	FI-5002	005-008-400	
CAN bus Cable Assembly	CB-05PM+05BF-010	000-167-968-11	w/connectors (φ10), 1m
	CB-05PM+05BF-020	000-167-969-11	w/connectors (φ10), 2m
	CB-05PM+05BF-060	000-167-970-11	w/connectors (φ10), 6m
	CB-05BFFM-010	000-167-971-11	w/connector (φ10), 1m
	CB-05BFFM-020	000-167-972-11	w/connector (φ10), 2m
	CB-05BFFM-060	000-167-973-11	w/connector (φ10), 6m
CAN bus Connector	NC-050505-FMF-TS001	000-160-507-10	Mini style: 2 Micro style: 1
	LTWMN-05AMMT-L8001	000-160-508-10	Mini style, Male, Termination resistor
	LTWMN-05AFFT-SL8001	000-160-509-10	Mini style, Female, Termination resistor

EQUIPMENT LIST

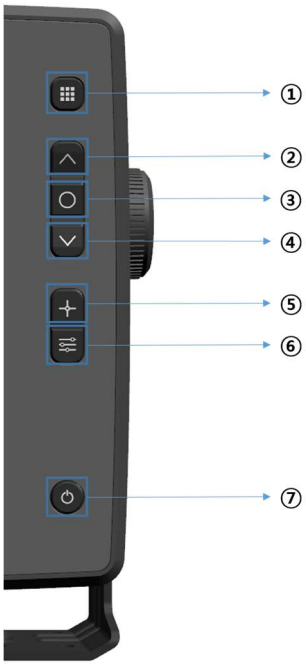
Name	Type	Code No.	Remarks
CAN bus Connector	FRU-0505-FF-IS	000-172-037-11	w/Termination resistor, Micro style
NMEA2000 Cable	FRU-NMEA-PMMFF-010	000-194-600-11	
	FRU-NMEA-PMMFF-020	000-194-601-11	
	FRU-NMEA-PMMFF-060	000-194-602-11	
	FRU-NMEA-PFF-010	000-194-604-10	
	FRU-NMEA-PFF-020	000-194-605-10	
	FRU-NMEA-PFF-060	000-194-606-10	
NMEA2000 Connector	FRU-MM1MF1MF1001	000-194-633-10	
NMEA 2000 Terminator	FRU-MM1000000001	000-194-634-10	
	FRU-MF000000001	000-194-635-10	
Joint Box	TL-CAT-012	000-167-140-10	For LAN cable extension
LAN Cable Assembly	MOD-Z073-030+(3m) 19S1146	000-167-171-11	Straight 2 pairs, 3m
	MOD-Z072-020+(2m) 19S1181	000-167-175-11	Cross pair, 2m
	MOD-Z072-050+(5m) 19S1181	000-167-176-11	Cross pair, 5m
	MOD-Z072-100+(10m) 19S1181	000-167-177-11	Cross pair, 10m
Rectifier	PR-241	-	
Ferrite Core	OP86-11	001-594-450	For PR-241
Ethernet Hub	HUB-101	-	
	HUB-102	-	
Flush Mount Kit	OP19-27	000-199-172-10	For SFD-1010
	OP19-28	000-199-173-10	For SFD-1012

1 BASIC OPERATION

1.1 Controls

This equipment is operated with a touchscreen and hardware keys.

Description of keys



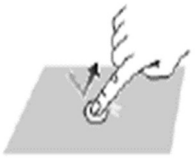
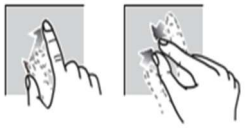
	When using radar	When using fish finder	When using multi beam sonar
①	MENU/ESC		
②	Move cursor, change range		
③	ENTER		ENTER / Switch active window
④	Move cursor, change range		
⑤	TLL		Fixed mark, TLL
⑥	Menu for various adjustments	Popup menu	
⑦	Power/brilliance		

No.	Name of key	Brief description of operation
①	[MENU/ESC]	• Opens/closes the menu. • Returns to the higher level when a lower level menu is selected.
②	When controlling radar: [UP/RIGHT ARROW] (arrow key)	• Raises the range. • When selecting a menu, moves cursor upward for horizontal mounting and downward for horizontal mounting.
	When controlling fish finder: [UP/RANGE-UP]	• Changes display range when [AUTO RANGE] of popup menu is set to [OFF].
③	[ENTER]	• Enters an item selected with cursor.
④	When controlling radar: [DOWN/LEFT ARROW] (arrow key)	• Lowers the range. • When selecting a menu, moves cursor upward in horizontal mode and downward in vertical mode.
	When controlling fish finder: [DOWN/RANGE-DOWN]	• Changes display range when [AUTO RANGE] of popup menu is set to [OFF].

⑤	When operating radar: TLL	• Outputs TLL.
	When operating fish finder: Fixed mark, TLL	• Displays fixed mark at selected location. • Outputs TLL.
⑥	When using radar: [PICTURE CONTROL] menu	• Opens/closes the [PICTURE CONTROL] menu. • Adjusts the gain, sea clutter reduction level and rain clutter reduction level. Rejects interference and noise. • The menu cycles through gain, sea clutter, rain clutter, picture zoom, interference rejection and noise rejection.
	When using fish finder: [POPUP] menu	• Opens/closes the [POPUP] menu. • The menu cycles through [Auto Range] → [Range] → [Modes] → [Auto Gain Adjust] → [Offset HF] → [Offset LF] → [Gain Adjust HF] → [Gain Adjust LF] →
	When using multi beam sonar: [POPUP] menu	• Opens/closes the [POPUP] menu. • Moves through [POPUP] menu. The selections of [POPUP] menu differs after [Range Auto] → [Range] → [Mode] according to the selected mode. - Multi beam fish finder mode: Moves as [MB Gain Auto] → [MB Gain Offset] → [MB Gain] → [MB Beam Angle] → [MB Beam Width] → - Side scan mode: Moves as [SS Gain Auto] → [SS Gain Offset] → [SS Gain] → - Cross section mode: Moves as [CS&3D Gain Auto] → [CS&3D Gain Offset] → [CS&3D Gain] → - 3D History mode: Moves as [CS&3D Gain Auto] → [CS&3D Gain Offset] → [CS&3D Gain] → [Pause]/[Resume] → - PBG mode : Start PBG Recording(Stop)→ Start Track Recording(Stop)→ PBG Mode: Moves as [ ]…
⑦	[POWER/BRILLIANCE]	• When the power is off. - Turns power on. • When the power is on. - Short press: Displays the [BRILLIANCE] menu. - Pressing and holding for two seconds: Displays the power-off notification menu. - Pressing and holding for five seconds: Turns the power off.

Touch control description

A finger or two are used for touch control. The basic operations are as shown below.

Touch control		Function
 Tap	Lightly touch the screen with your finger and then remove your finger from the screen.	Select a menu item. Select a target object or a point on the screen to display the [POPUP] menu.
 Drag	Slide your finger across the screen.	Scroll the menu. Move points and veering points. Display past pictures on the fish finder screen.
 Pinch	Move two fingers on the screen as to pinch or stretch.	Enlarge or downsize the bottom echo. Zoom in or out the display from the center of pinching/ stretching action.

*: Pinch action is available only when using the DFF-3D function.

Notes for touch control

- A large amount of waterdrops on the screen can cause improper operation. Waterdrops on the screen can cause slow touch response. Wipe the screen to remove the waterdrops before use.
- This equipment uses a capacitive touch screen. Tap the screen with your fingertips directly. Do not use sharp objects (needle, pen, nail) or a stylus pen. Also, be careful not to scratch the screen.
- Tapping the screen with gloved fingers may cause improper operation.
- Do not operate the equipment with objects placed on the screen. The touch control can fail to work properly if objects other than fingertips are touching the screen.
- Keep the equipment away from a radio antenna, fluorescent light, solenoid valve or other electronic devices to prevent false operation from noise.
- The panel is made of glass. If the panel is cracked or damaged, do not touch it or try to repair it yourself. Damage caused by improper handling will void the warranty.

Locking the touch screen

The touch screen can be locked to prevent erroneous operation.

Key control:

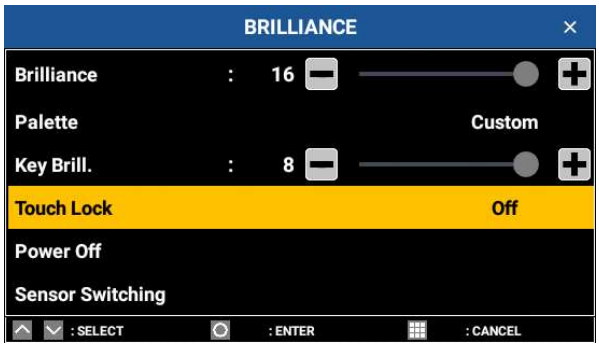
1. Short press the **POWER/BRILLIANCE** key to open the [BRILLIANCE] menu.
2. Select the [LOCK TOUCH SCREEN] menu with the arrow keys, then press the **ENTER** key.
3. Select [ON] with the arrow keys, then press the **ENTER** key.
   All screen-based controls are disabled.

Touch control:

1. Short press the **POWER/BRILLIANCE** key to open the [BRILLIANCE] menu.
2. Tap the [LOCK TOUCH SCREEN] menu.
3. Tap [ON].
   All screen-based controls are disabled.

How to unlock the touch screen:

1. Short press the **POWER/BRILLIANCE** key to open the [BRILLIANCE] menu.
2. Select the [LOCK TOUCH SCREEN] menu with the arrow keys, then press the **ENTER** key.
3. Select [OFF] with the arrow keys, then press the **ENTER** key.
4. Tap [x] on the title bar to close the [BRILLIANCE] menu.



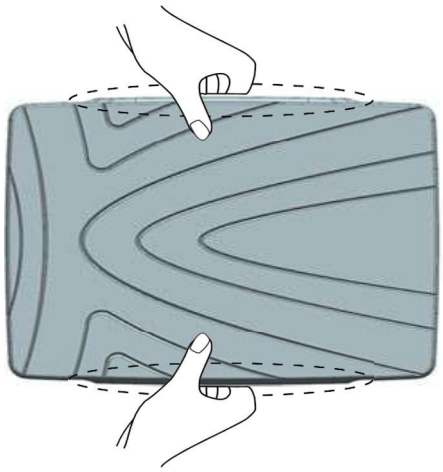
When using radar



When using fish finder/multi beam sonar

How to remove the hard cover

Place your thumbs as close to the center of the hard cover as possible, as shown in the illustration, then remove the cover while pressing the center area with your thumbs.



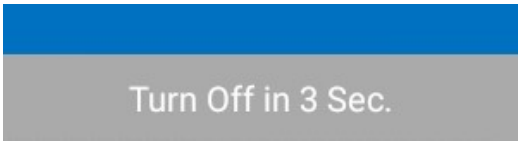
1.2 Turning Power On/Off

Turning power on

Press the **POWER/BRILLIANCE** key so that the equipment beeps and the power is turned on.

How to turn off the power with a long press of the POWER/BRILLIANCE key

Press and hold the **POWER/BRILLIANCE** key for two seconds. The time left before the power off is shown on the screen. Press and hold the **POWER/BRILLIANCE** key for another three seconds to turn off the equipment.



Radar and fish finder power-off popup

Turning power off

[BRILLIANCE] menu:

Short press the **POWER/BRILLIANCE** key to display the [BRILLIANCE] menu.

Key control:

In the [BRILLIANCE] menu, select [POWER OFF] with the arrow keys and the **ENTER** key, select [YES] in the popup window, and then press the **ENTER** key to turn off the power.

Touch control:

Tap [POWER OFF], then tap [YES] in the popup window to turn off the power.

1.3 How to Adjust the Brilliance

1.3.1 How to adjust the brilliance of display

Touch control:

1. Press the **POWER/BRILLIANCE** key.
2. Drag the slider bar on the right side of the [BRILLIANCE] menu.
   Tap [+] or [-] for fine adjustment.
3. Tap [x] on the title bar to close the [BRILLIANCE] menu.

Key control:

1. Press the **POWER/BRILLIANCE** key.
2. Select the [BRILLIANCE] menu with the arrow keys, then press the **ENTER** key.
3. Press the arrow keys for adjustment.
4. Press the **ENTER** key to confirm.
5. Press the **MENU/ESC** key to close the [BRILLIANCE] menu.

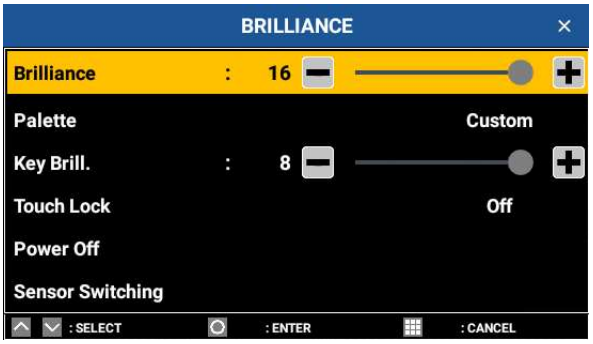
1.3.2 How to adjust the brilliance of panel keys

Touch control:

1. Press the **POWER/BRILLIANCE** key.
2. Drag the slider bar on the right side of the [BRILLIANCE] menu to adjust the brilliance. Tap [+] or [-] for fine adjustment.
3. Tap [x] on the title bar to close the [BRILLIANCE] menu.

Key control:

1. Press the **POWER/BRILLIANCE** key.
2. Select the [KEY BRILLIANCE] menu with the arrow keys, then press the **ENTER** key.
3. Press the arrow keys for adjustment.
4. Press the **ENTER** key to confirm.
5. Press the **MENU/ESC** key to close [MENU].



When using radar

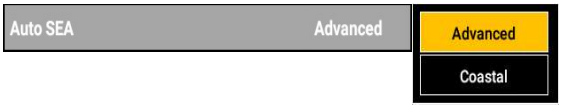


When using fish finder/ Multi beam sonar

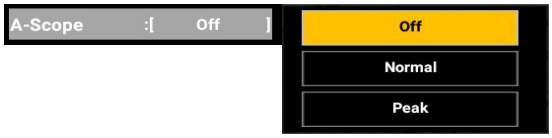
1.4 Description of Menu Setting Window

1.4.1 List-type window

- Select an option by tapping the display or key control.
- Press the **ENTER** key or tap an option to select, then the selected option is entered and the option window closes.
- Close option window without saving: Tap any location other than the option window.



Radar



Fish finder/ Multi beam sonar

1.4.2 Adjustment-type window

- Select an option by tapping the display or key control.
- Tap the slider bar or pressing **Up/Range** key or **Down/Range** key to adjust the increase/decrease of the setting value.
- Press the **Up/Range** key or **Down/Range** key to increase/decrease the setting value faster.
- Setting value can be set only between selectable range.



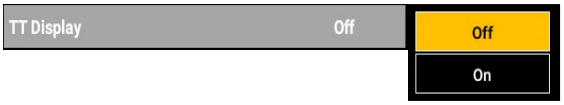
Radar



Fish finder/ Multi beam sonar

1.4.3 Toggle-type window

- Select an option by tapping the display or key control.
- When the settings are only [On] or [Off], the setting window is referred as toggle-type window.



Radar



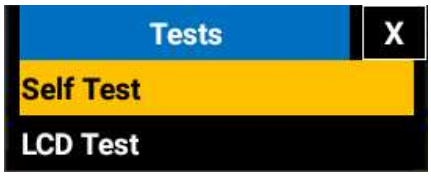
Fish finder/ Multi beam sonar

1.4.4 Confirmation-type window

- Select an option by tapping the display or key control.
- Appears when proceeding with test-related menu, such as self-test, LCD pattern test, etc.



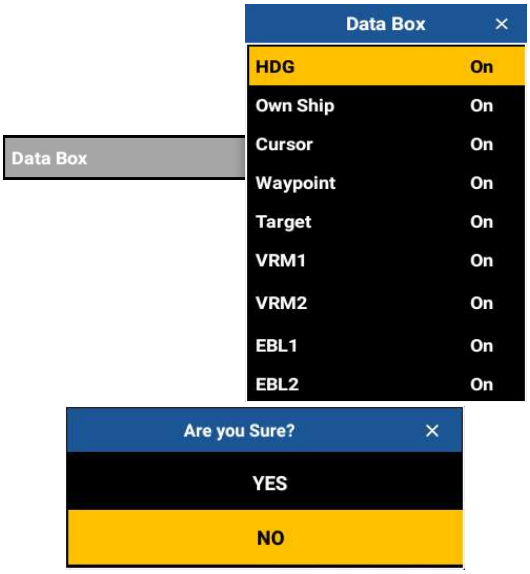
Radar



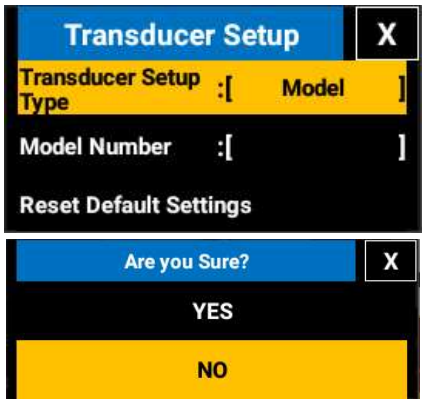
Fish finder/ Multi beam sonar

1.4.5 Popup-type window

- Select an option by tapping the display or key control.
- Shows options on the display position isolated from the selecting menu.
- By selecting a menu, the popup-type window appears on display to avail selection.



Radar



Fish finder/ Multi beam sonar

1.5 Display Indications

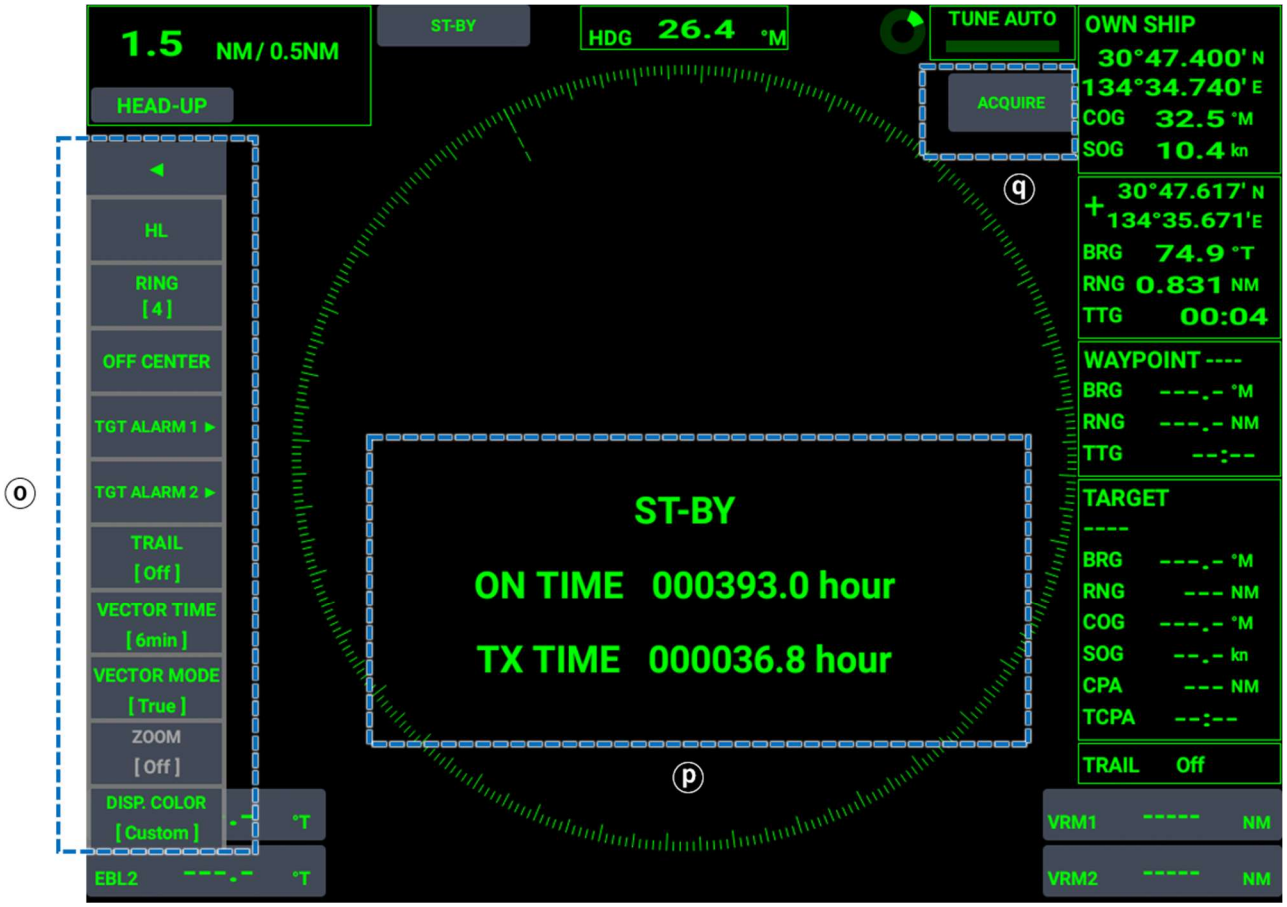
1.5.1 Radar display

The display screen provides various alphanumeric indications which show operational status and data input from external equipment. Whenever a change occurs, the display indications change accordingly.



No.	Name	Description	Touch control
ⓐ	Range box	Changes the display range.	Disabled
ⓑ	Fixed range ring box	Displays the range of the fixed range rings.	Disabled
ⓒ	ST-BY/TX box	Changes between the ST-BY and the TX modes.	Enabled
ⓓ	Heading box	Displays heading.	Disabled
ⓔ	Working Indicator	Checks the radar working condition.	Disabled
ⓕ	Tuning box	Displays tuning setting.	Disabled
ⓖ	Mode box	Shows the display mode (Head-Up, North-Up, Course-Up) currently selected.	Enabled
ⓗ	Own-ship's position box	Displays information on own ship's position.	Disabled
ⓘ	Cursor box	Displays information on cursor position.	Disabled

No.	Name	Description	Touch control
ⓙ	Waypoint information box	Displays the time to go to a destination (factory default setting), bearing and range.	Disabled
ⓚ	Target data box	Displays target information.	Disabled
ⓛ	Trail time box	Displays the set trail time.	Disabled
ⓜ	EBL box 1 / EBL box 2	Activates/deactivates the EBL1 and EBL2. Adjusts the bearing to the EBL.	Enabled
ⓝ	VRM1 box 1 / VRM1 box 2	Activates/deactivates the VRM1 and VRM2. Adjusts the range to the VRM.	Enabled

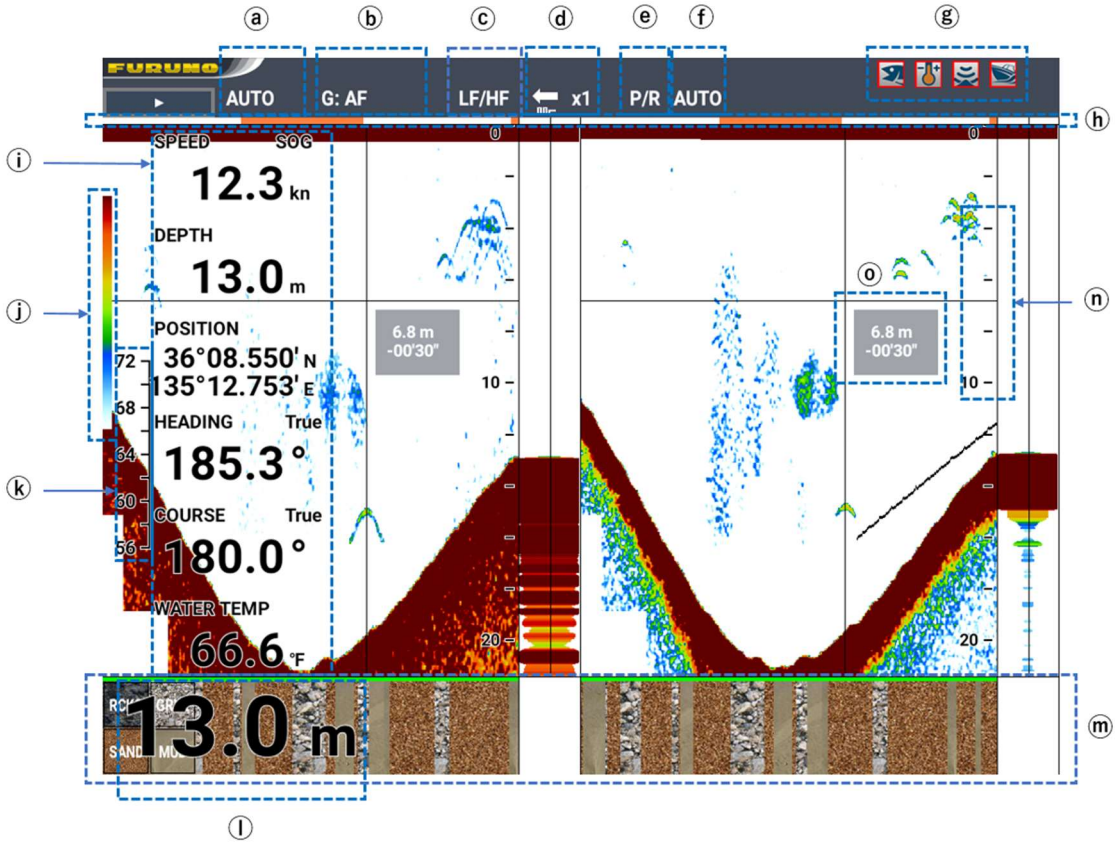


No.	Name	Description	Touch control
ⓞ	InstantAccess™ Bar *		Enabled
ⓟ	Transmission status indication	Displays the ON time, including warmup time, and transmission time.	Disabled
ⓠ	Acquire/cancel box	Starts/cancels the acquisition of a target.	Enabled

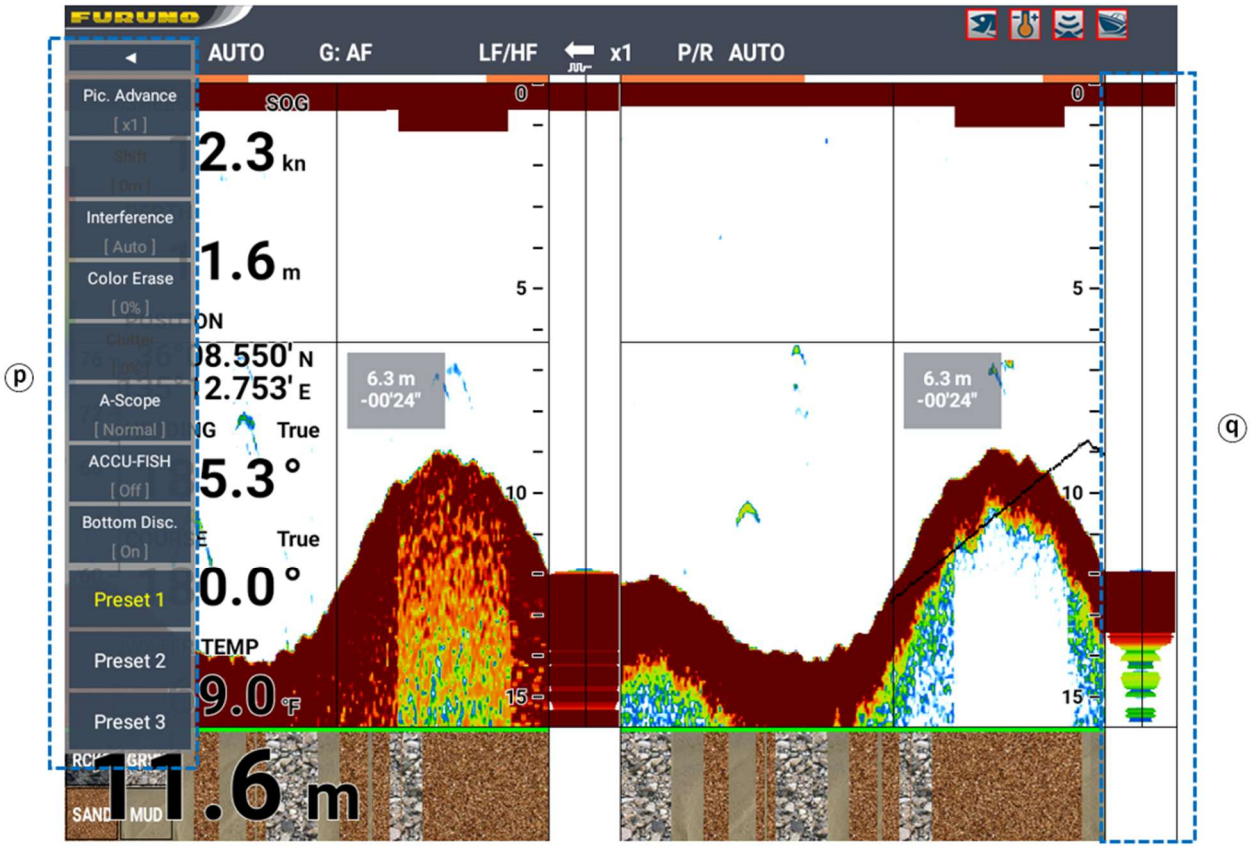
*: InstantAccess™ Bar is a function to quickly access the frequently used menus.

1.5.2 Fish finder display

Information showing various setting status is displayed on the screen. If any changes are made to these settings, the contents displayed in the information box change accordingly.



No.	Name	Description	Touch control
ⓐ	Range box	Displays range setting.	Disabled
ⓑ	Gain	Displays the gain status.	Disabled
ⓒ	Mode	Displays the selected display mode.	Disabled
ⓓ	Picture advance	Displays picture advance speed.	Disabled
ⓔ	Transmission output	Displays transmission output setting.	Disabled
ⓕ	Interference rejection	Displays interference rejection setting.	Disabled
ⓖ	Fish school alarm box	Displays currently active alarm.	Disabled
ⓗ	Minute marker	Displays the progress time or range.	Disabled
ⓘ	Data box	Displays the settings of the items set in [DATA] → [DATA DISPLAY].	Disabled
ⓙ	Color bar	Displays a color bar.	Disabled
ⓚ	Water temperature scale	Measures the water temperature.	Disabled
ⓛ	Depth	Displays depth.	Disabled
ⓜ	Bottom discrimination	Displays a bottom discrimination result.	Disabled
ⓝ	Depth scale	Measures the water depth.	Disabled
ⓞ	VRM view	Displays the depth of tapped location and the time elapsed after the tapping.	Enabled

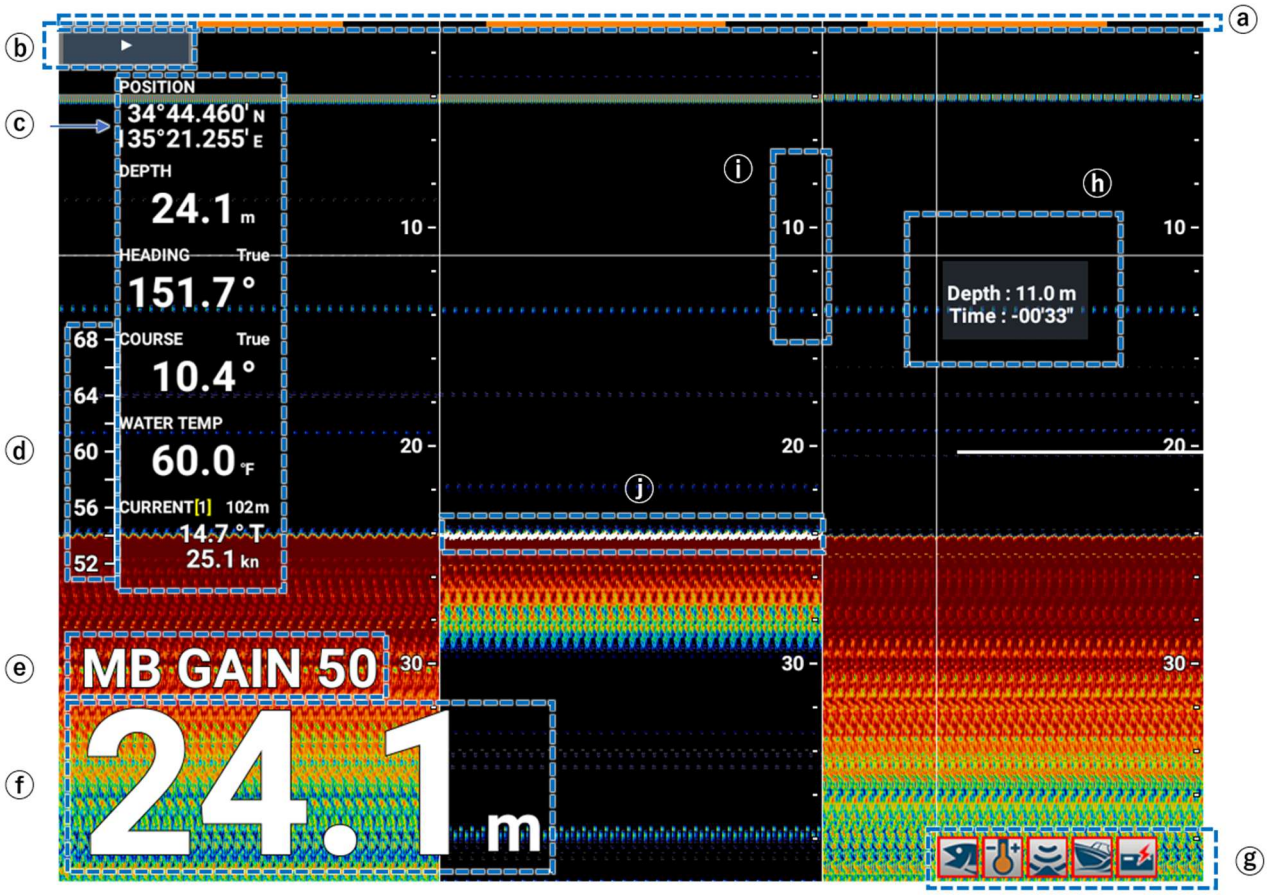


No.	Name	Description	Touch control
ⓟ	InstantAccess™ Bar	Displays the InstantAccess™ Bar menu.	Enabled
ⓠ	A-Scope	Displays echo strength with width and color brightness.	Disabled

1.5.3 Multi beam sonar display

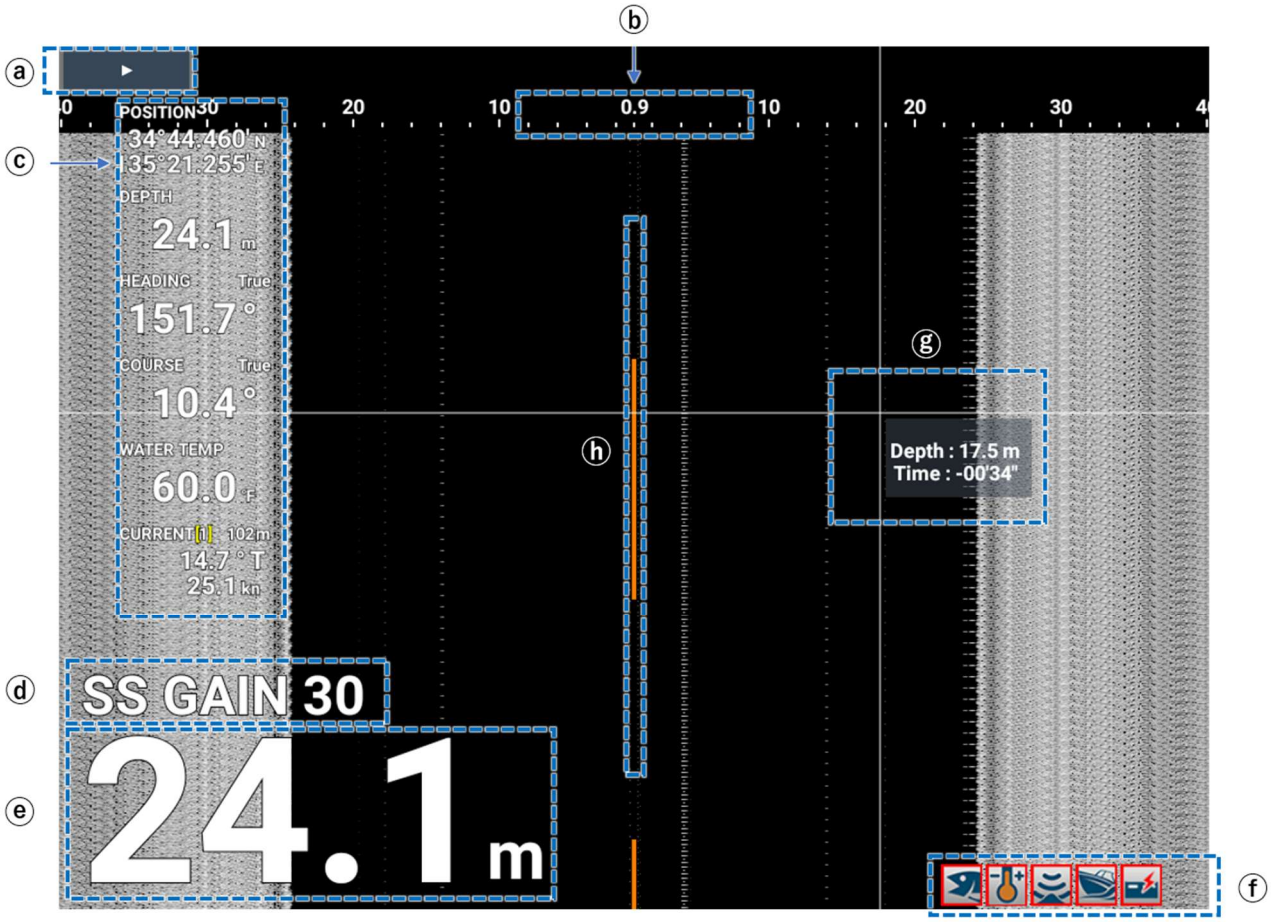
Information showing various setting status is displayed on the screen. If any changes are made to these settings, the contents displayed in the information box change accordingly.

Multi beam fish finder



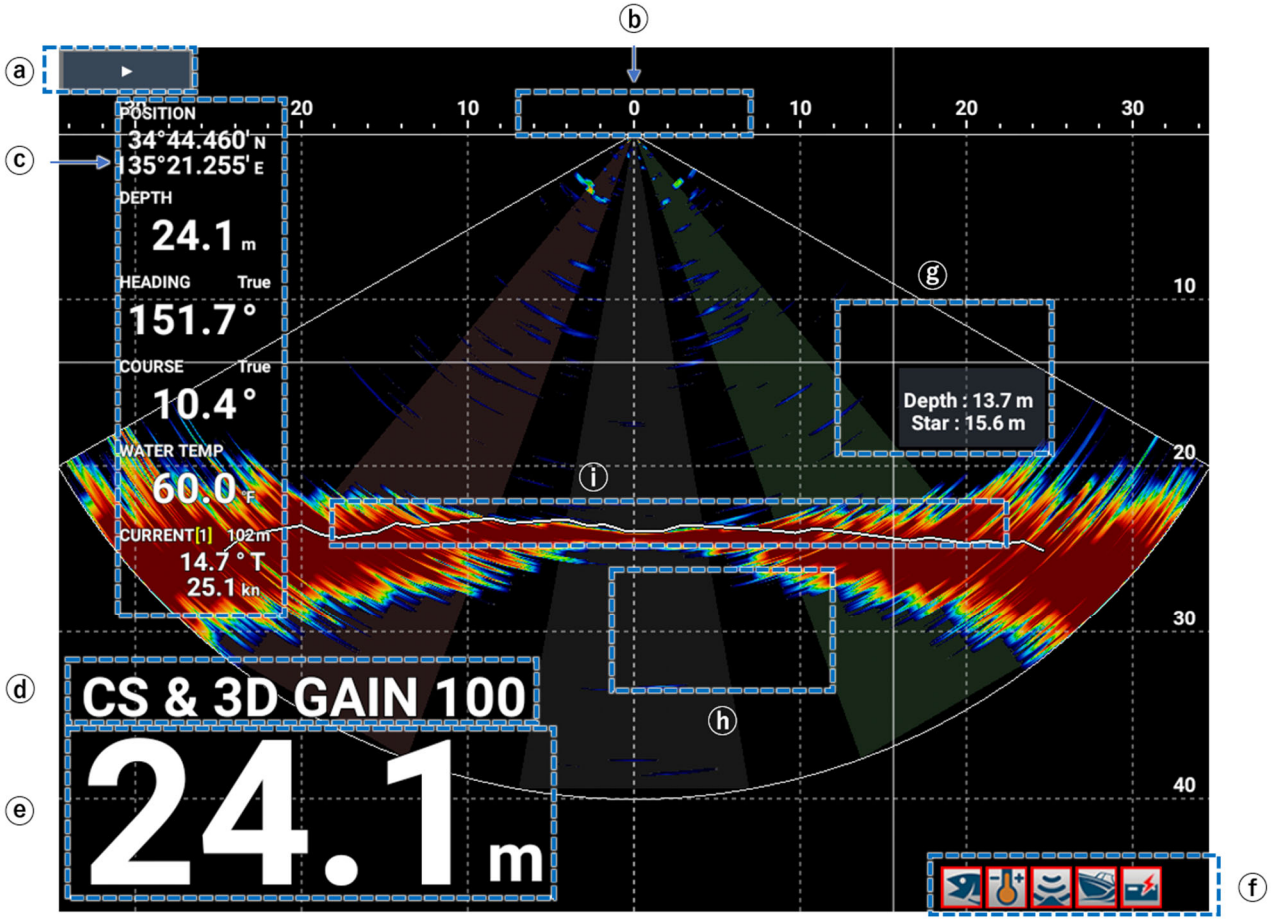
No.	Name	Description	Touch control
ⓐ	Minute marker	Displays the progress time or range.	Disabled
ⓑ	InstantAccess™ Bar		Enabled
ⓒ	Data box	Displays the settings of the items set in [DATA] → [DATA DISPLAY].	Disabled
ⓓ	Water temperature scale	Measures the water temperature.	Disabled
ⓔ	Gain	Displays the gain status.	Disabled
ⓕ	Depth	Displays the depth.	Disabled
ⓖ	Alarm box	Displays the occurring alarms.	Disabled
ⓗ	VRM view	Displays the water depth of tapped location and time passed after the tap.	Enabled
ⓘ	Depth scale	Measures the water depth.	Disabled
ⓙ	White edge	Displays the white edge.	Disabled

Side scan



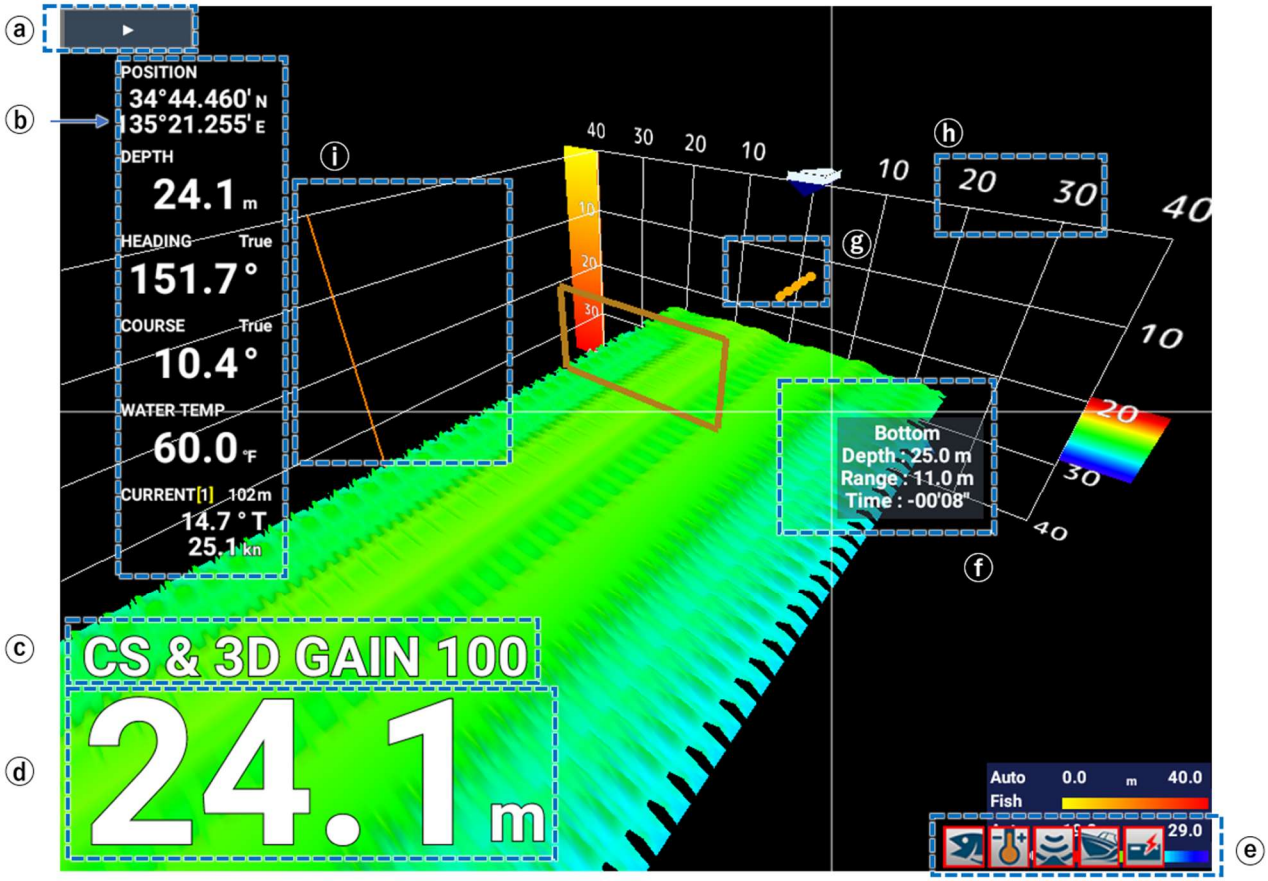
No.	Name	Description	Touch control
ⓐ	InstantAccess™ Bar		Enabled
ⓑ	Depth scale	Measures the water depth.	Disabled
ⓒ	Data box	Displays the settings of the items set in [DATA] → [DATA DISPLAY].	Disabled
ⓓ	Gain	Displays the gain status.	Disabled
ⓔ	Depth	Displays depth.	Disabled
ⓕ	Alarm box	Displays the occurring alarms.	Disabled
ⓖ	VRM view	Displays the water depth of tapped location and time passed after the tap.	Enabled
ⓗ	Minute marker	Displays the progress time or range.	Disabled

Cross section display

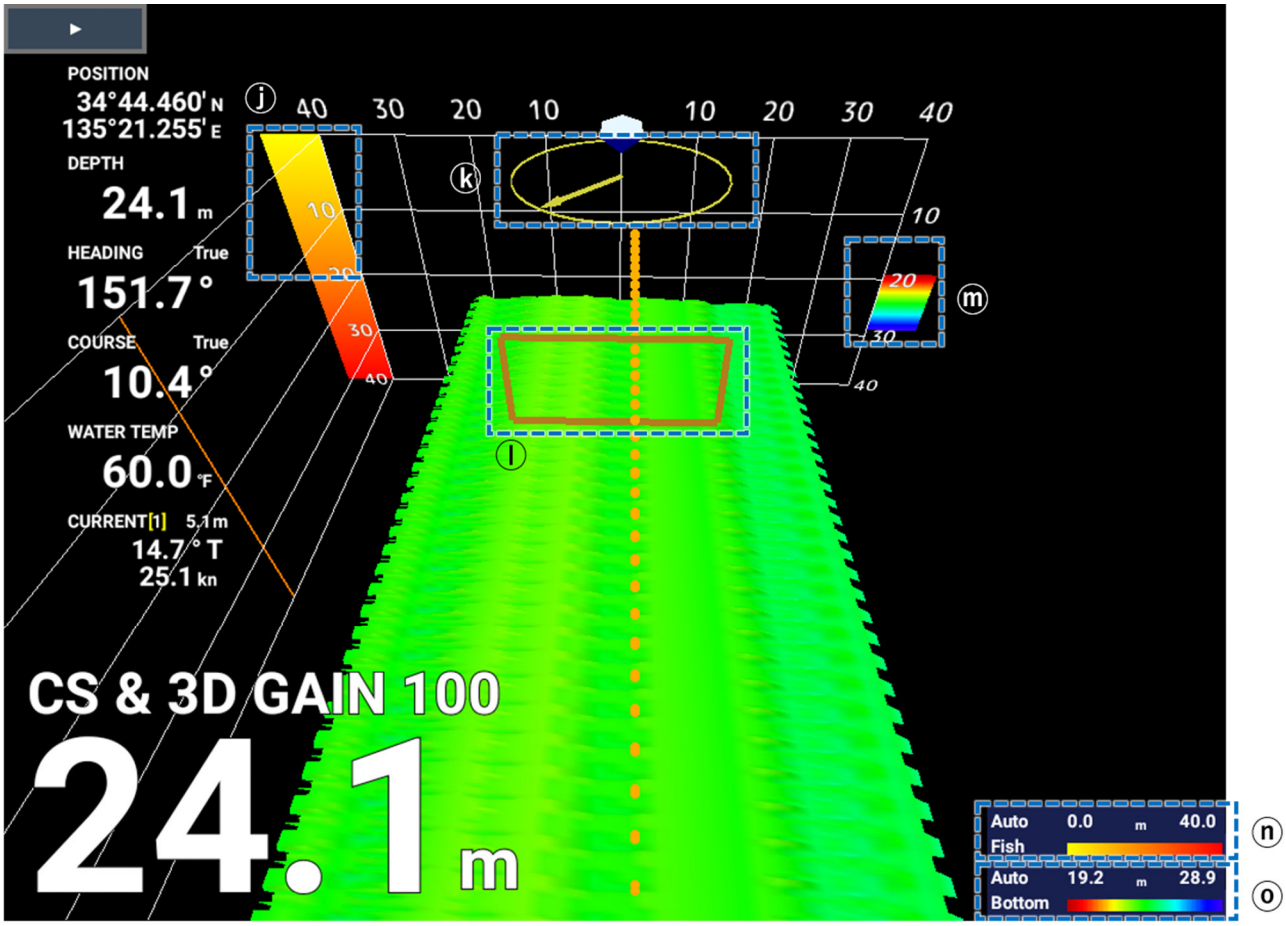


No.	Name	Description	Touch control
ⓐ	InstantAccess™ Bar		Enabled
ⓑ	Depth scale	Measures the water depth.	Disabled
ⓒ	Data box	Displays the settings of the items set in [DATA] → [DATA DISPLAY].	Disabled
ⓓ	Gain	Displays the gain status.	Disabled
ⓔ	Depth	Displays depth.	Disabled
ⓕ	Alarm box	Displays the occurring alarms.	Disabled
ⓖ	VRM view	Displays the water depth of tapped location and Port or Star(board) according to the location tapped.	Enabled
ⓗ	Grid	Displays the grid.	Disabled
ⓘ	Bottom line	Displays the bottom (seabed) line.	Disabled

3D history display

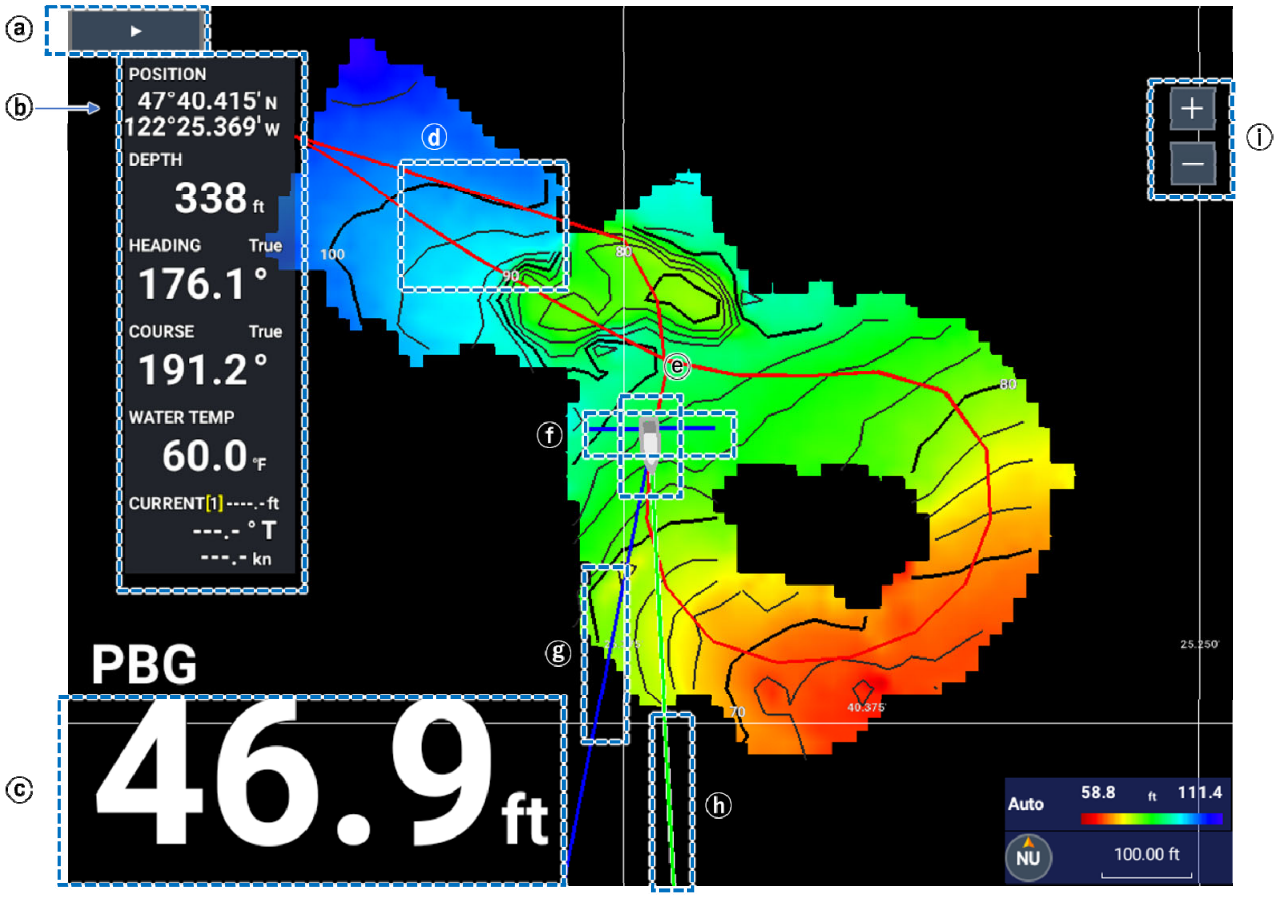


No.	Name	Description	Touch control
ⓐ	InstantAccess™ Bar		Enabled
ⓑ	Data box	Displays the setting of an item set in [DATA] → [DATA DISPLAY].	Disabled
ⓒ	Gain	Displays the gain status.	Disabled
ⓓ	Depth	Displays depth.	Disabled
ⓔ	Alarm box	Displays the occurring alarms.	Disabled
ⓕ	VRM view	The information displayed changes according to the item tapped. **Other than seabed, school of fish**: Displays the water depth of the tapped location. **Seabed**: The depth to the seabed and time elapsed since tapped are shown. **School of fish**: The depth to the seabed and time elapsed since tapped are shown.	Enabled
ⓖ	Fish icon	Displays fish icon.	Enabled
ⓗ	Depth scale	Measures the water depth.	Disabled
ⓘ	Header scale	Displays header scale.	Disabled

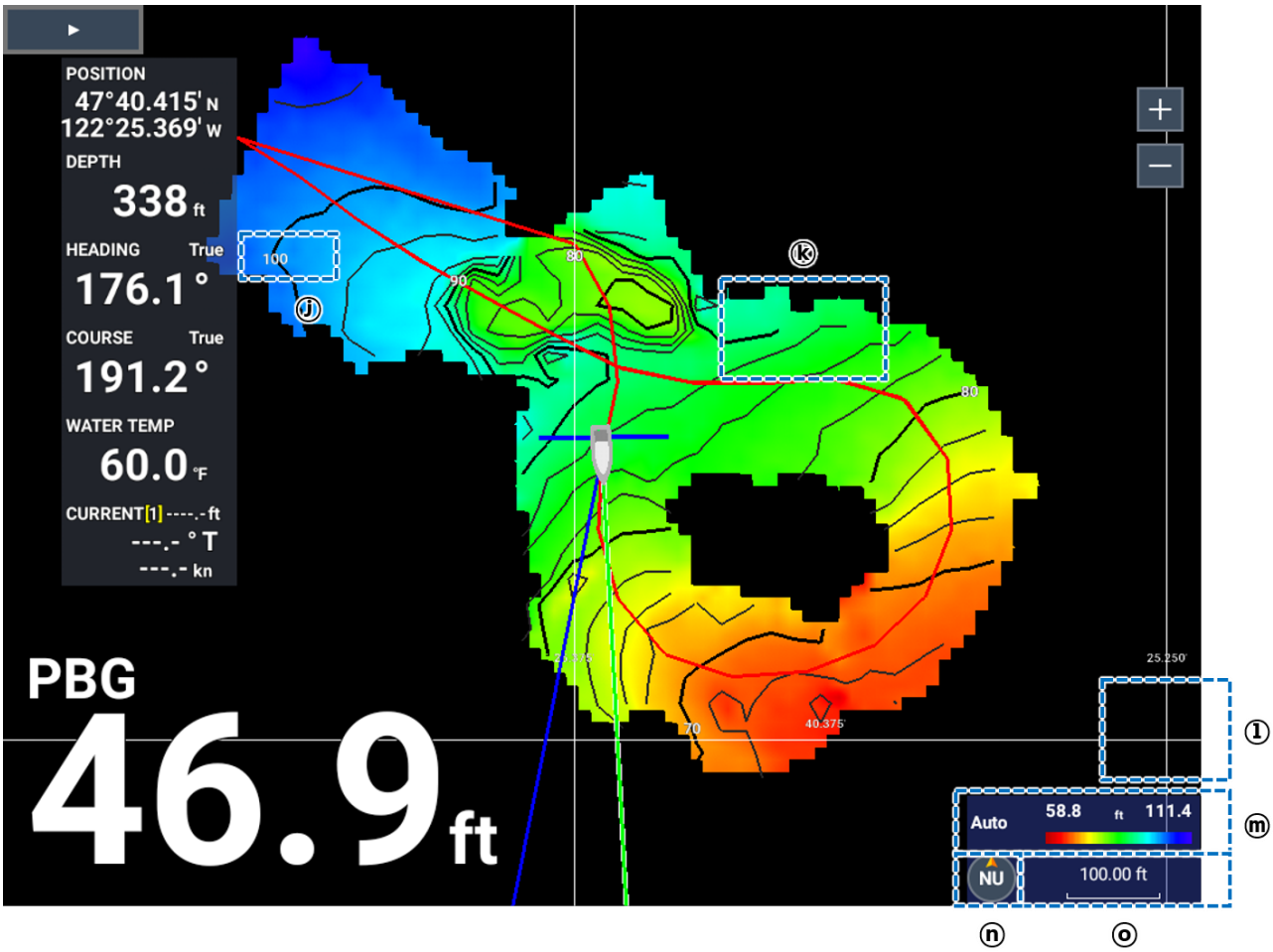


No.	Name	Description	Touch control
ⓙ	Bottom depth/ gradation	Displays the legacy of bottom depth and gradation.	Disabled
ⓚ	Current	Displays the water current.	Disabled
ⓛ	Net	Displays the net.	Disabled
ⓜ	School of fish depth/ gradation	Displays the legacy of fish school depth and gradation.	Disabled
ⓝ	School of fish color bar	Displays the color bar for fish school depth.	Disabled
ⓞ	Bottom color bar	Displays the bottom color bar.	Disabled

PBG display



No.	Name	Description	Touch control
ⓐ	InstantAccess™ Bar		Enabled
ⓑ	Data box	Displays the setting of an item set in [DATA] → [DATA DISPLAY].	Disabled
ⓒ	Depth	Displays depth.	Disabled
ⓓ	Track Recording Line	Displays own ship trails.	Disabled
ⓔ	Own-ship's	Displays own ship position.	Disabled
ⓕ	PBG Recording Line	Displays the sea bottom position to record.	Disabled
ⓖ	COG Line	Displays the own ship's COG line.	Disabled
ⓗ	Heading Line	Displays the heading line of own ship.	Disabled
ⓘ	Range Up / Down	Changes the display range size.	Enabled



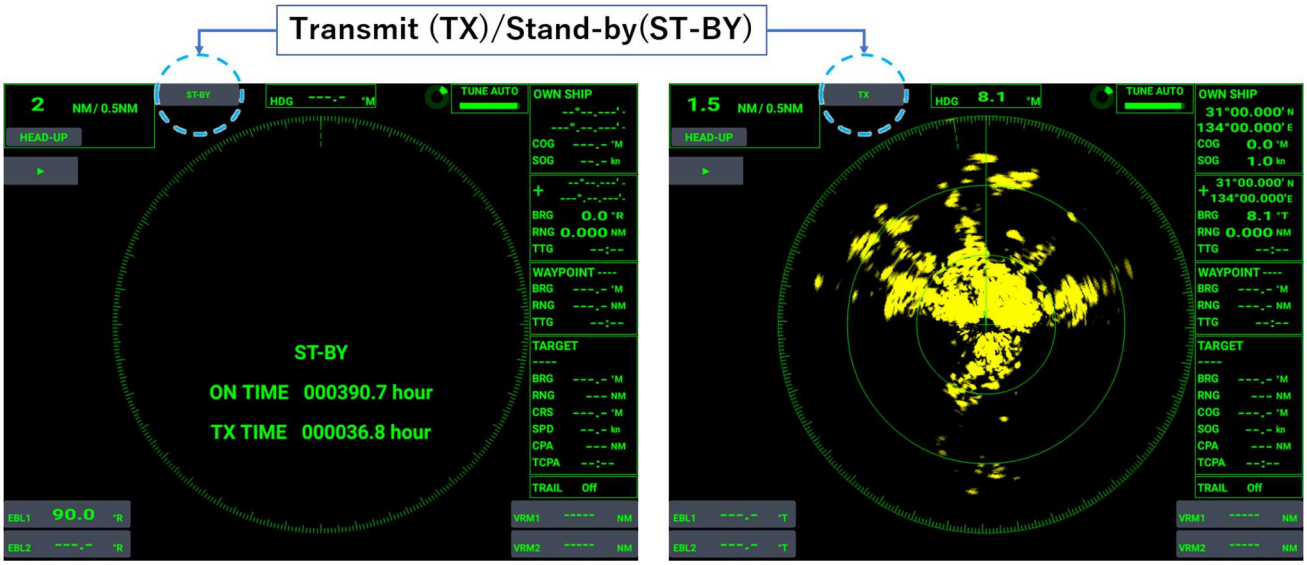
No.	Name	Description	Touch control
ⓙ	Contour Line	Displays the contour lines.	Disabled
ⓚ	Depth Text	Displays the depth of each contour line.	Disabled
ⓛ	Grid	Displays the latitude and longitude lines.	Disabled
ⓜ	Depth Color Bar	Displays the color bar of bottom depth.	Disabled
ⓝ	Display Mode	Displays/changes the display mode of the currently displayed screen. The orange arrow points north.	Enabled
ⓞ	Range Scale	Displays the range scale.	Disabled

2 RADAR

2.1 Basic Operation of Radar

2.1.1 Transmission/stand-by

When the magnetron is warmed, the indication “ST-BY” appears on the display, telling you that the radar is ready for transmission.
To start the transmission, tap [ST-BY] in the [ST-BY]/ [TX] box at the upper left corner of the screen. The indication changes from [ST-BY] to [TX] and the transmission is started.
To shift to the stand-by mode, take the similar steps to change the indication to [ST-BY].

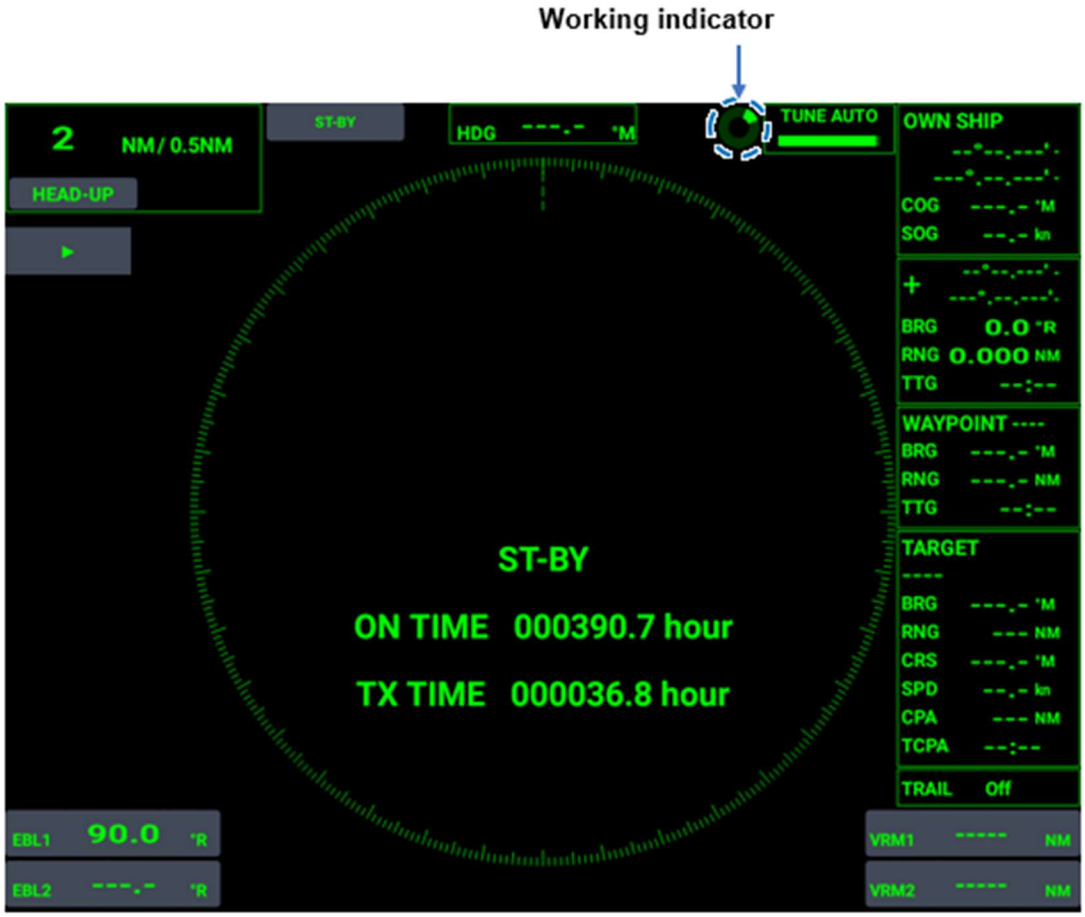


The magnetron life gets shorter in proportion to the transmission state. Keep the unit in stand-by when transmission is not required.

Note: To shorten the warm-up time (90 sec.) at startup, the power is supplied to the antenna unit even when the display unit is turned off (radio waves are not transmitted), which means that the stand-by power is consumed. When not using a battery-powered radar for a long time, be sure to turn off the breaker to stop the power supply to the antenna unit.

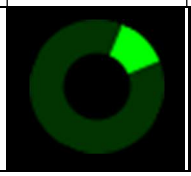
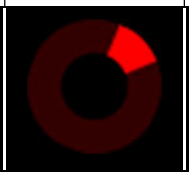
2.1.2 Working indicator

The working indicator shows the working status of the radar sensor (working normally or rotation stopped, etc.).
When the radar is working normally, the working indicator rotates clockwise steadily. However, when the radar rotation is stopped, the working indicator stops rotating.

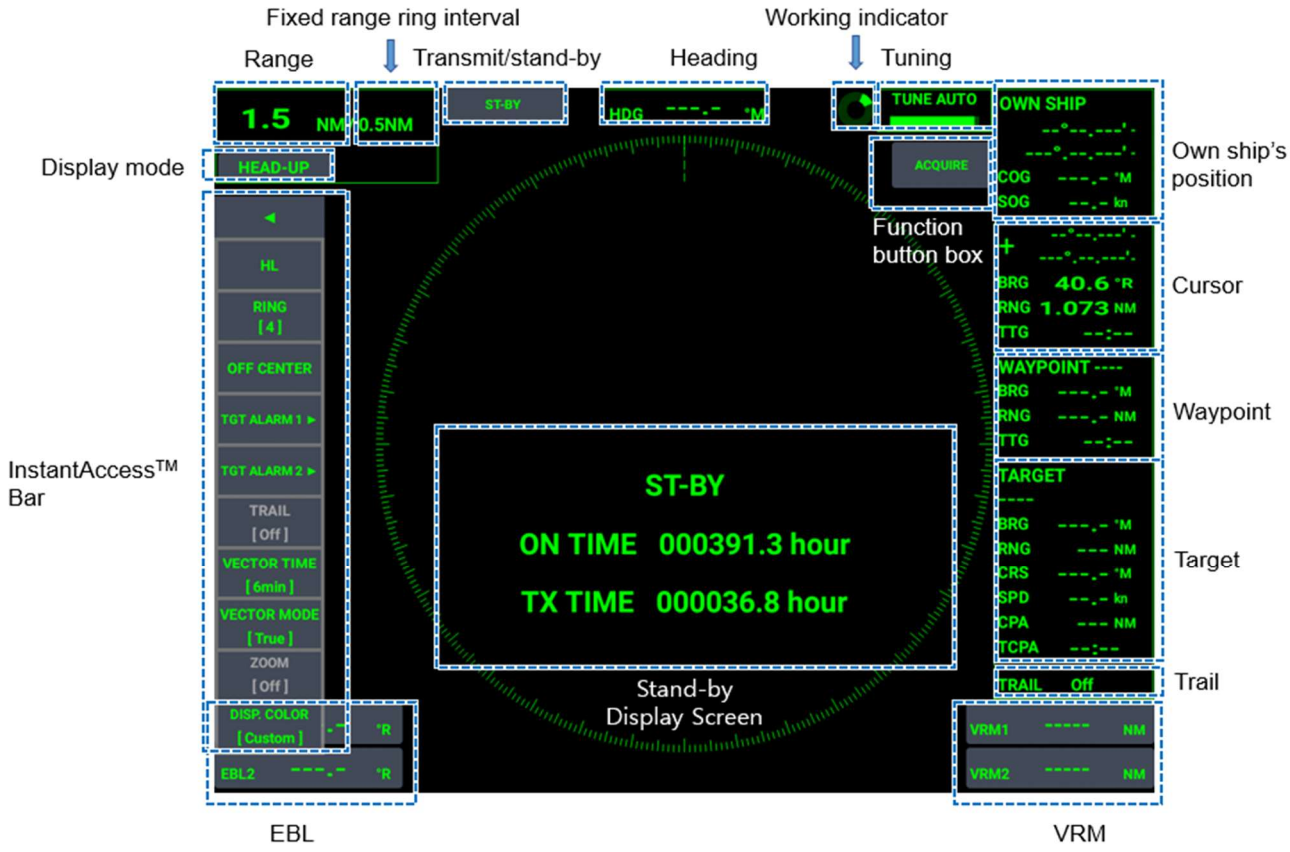


Note1: The working indicator cannot be switched on and off. It always appears.

Note2: The color of the working indicator changes according to the setting of [Character Color] (Green, Red or White).

Character Color	Green	Red	White
Indicator Color			

2.1.3 Screen display examples, InstantAccess™ Bar items

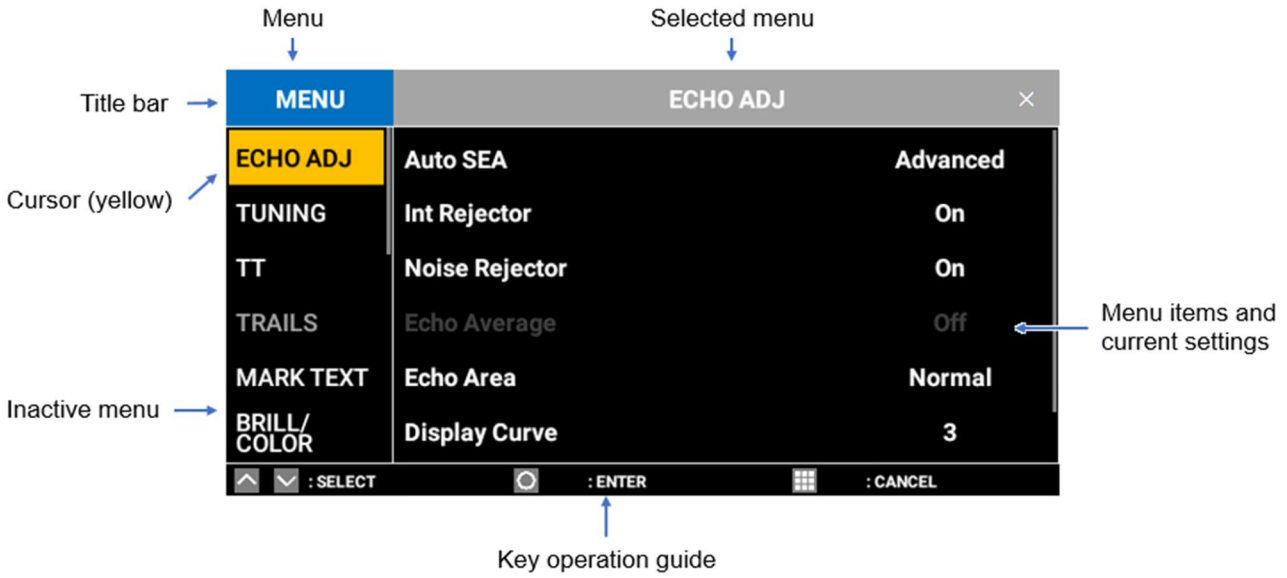


You can set the following contents from the InstantAccess™ Bar.

Item	Content
HL	Erases the heading line temporarily.
RING	Adjusts range ring brilliance.
OFF CENTER	Shifts own ship position to selected location.
TGT ALARM 1	Sets the no.1 acquisition zone.
TGT ALARM 2	Sets the no.2 acquisition zone.
TRAIL	Turns off the trail function and displays the set trail time.
VECTOR TIME	Sets the vector time.
VECTOR MODE	Sets the vector mode.
F1	The function set in [MENU] → [OTHERS] → [F1 SETTING].
F2	The function set in [MENU] → [OTHERS] → [F2 SETTING].

2.1.4 Overview of menu operations

17 menus are available. This section describes basic menu items.
To select a menu, tap a menu or move the cursor onto the menu you want to select with the arrow keys, then press the **ENTER** key.

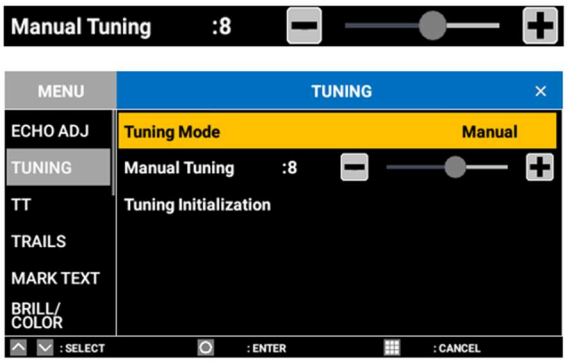


Description of menus

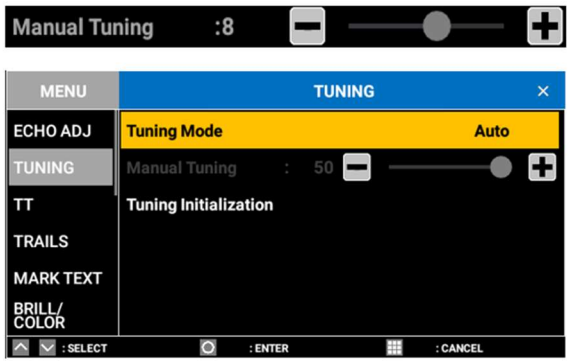
Menu	Description
ECHO ADJ (ADJUST)	For adjustment related to radar echoes
TUNING	For tuning adjustment
TT	For settings and adjustment related to TT indications
TRAILS	For settings related to echo trails
MARK TEXT	For setting the transparency of own ship's mark and menus and for setting the data box
BRILL/COLOR	For brilliance and color adjustment
ALERT SETTINGS	For settings and adjustment related to alerts
ALERT LIST	A list of alert messages
OTHERS	For other settings and adjustment
I/O PORT	For I/O port settings
UNITS	For setting units
SECTOR BLANKS	For settings related to transmission stop area
TESTS	System diagnosis and LCD test
SCANNER SETUP	For settings related to antenna
RESET	For settings related to the internal memory
INSTALLATION	Default settings
SERVICE	For adjustment related to antenna rotation speed

2.1.5 Tuning

After radar transmission is started, tune the receiver. This radar can tune the receiver automatically or manually. The tuning mode is set to [Auto] as a factory default.



Tuning mode - Manual



Tuning mode - Auto

How to change to manual tuning and tune the receiver

Take the following steps to manually tune the receiver.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TUNING].
3. Tap [Tuning Mode] so that the [Manual]/[Auto] selection box appears.
4. Tap [Manual] to set a tuning mode.
5. Tap [Manual Tuning], and drag the slider bar on the right of the menu or tap [+] or [-] to set the tuning level.
6. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TUNING] with the arrow keys, then press the **ENTER** key.
3. Select [Tuning Mode], then press the **ENTER** key.
   The [Manual]/[Auto] selection box appears.
4. Select [Manual] with the arrow keys, then press the **ENTER** key.
5. Select [Manual Tuning] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar.
6. Use the arrow keys for adjustment, then press the **ENTER** key.
7. Press the **MENU/ESC** key to close [MENU].

2.2 Display Modes

This radar has three display modes available. All modes except head-up require a heading signal.

HEAD-UP: Heading line is always oriented toward the top of the screen.

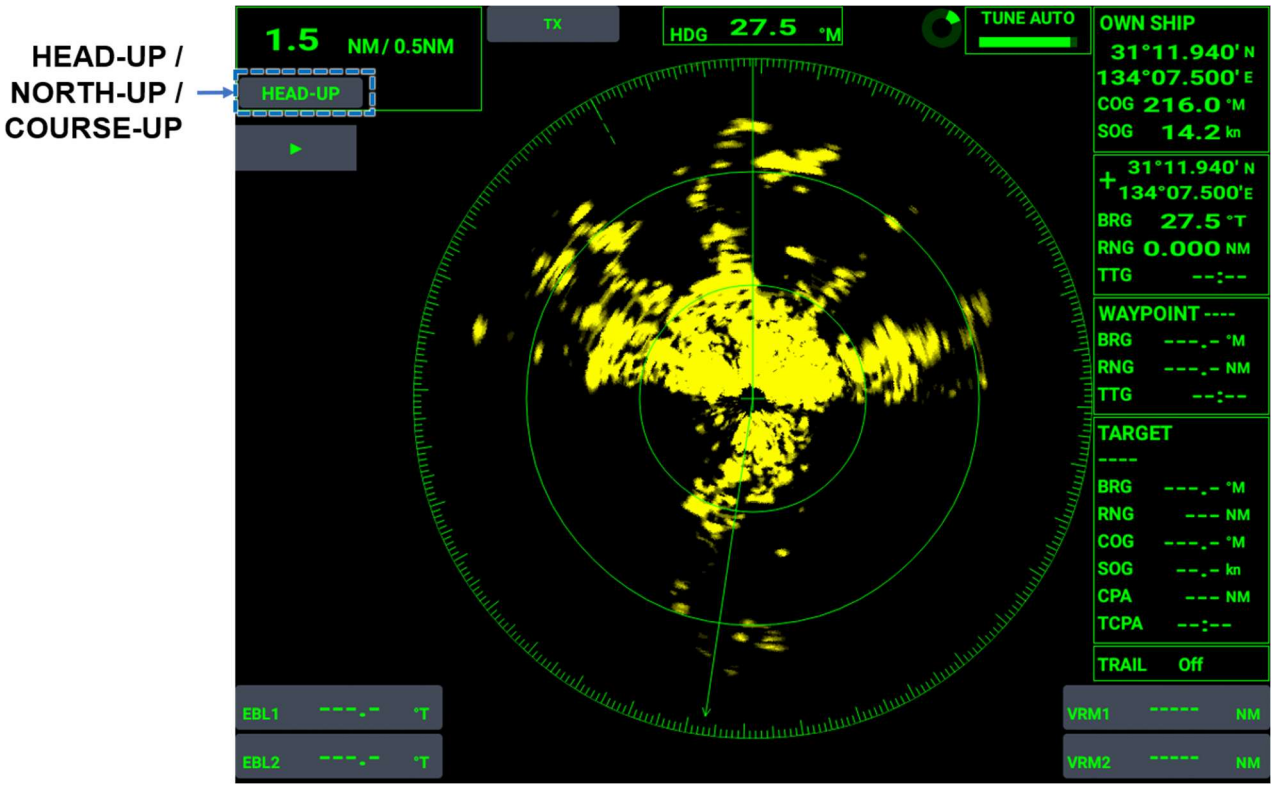
NORTH-UP: Bearing scale is stabilized with reference to north.

COURSE-UP: The heading line is directed toward the desired direction (such as destination or port) at the moment course up is selected. The heading (set course) is fixed toward the top of the screen. The bearing scale rotates.

Note: NORTH-UP and COURSE-UP require heading signals. If the heading signal is disrupted during NORTH-UP or COURSE-UP, the mode automatically When the compass sensor is reconnected, it will automatically switch to the North Up or Course Up mode which is previously set .

2.2.1 Selecting a display mode

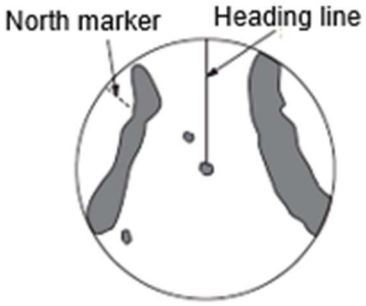
1. Tap the mode box at the upper left of the screen.
2. Each time you tap, the mode changes in the order of “HEAD-UP” → “NORTH-UP” → “COURSE-UP”... Select the display mode needed.



2.2.2 Description of display modes

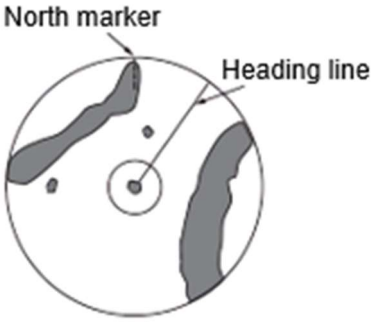
HEAD-UP

A mode in which the heading line is always indicated toward the top of the screen.
Since targets are shown as if they are seen from a bridge, this mode is suitable for ship handling in narrow channels and crowded sea areas.
However, the target picture becomes unstable with own ship's turns or yawing.
The short dotted line on the bearing scale is the north marker, indicating north.



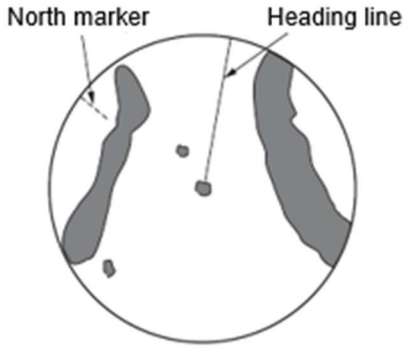
NORTH-UP

True north is stabilized at the top of the screen (0°).
The heading line moves according to the course change of own ship. This mode displays fixed targets as if they are on the chart.
Even with own ship's turns or yawing, the fixed targets are stable on the screen and stable picture is displayed. This mode is suitable for ocean voyage, ship position measurement, ship course monitoring and so on.



COURSE-UP

When the COURSE-UP mode is selected the heading line is oriented toward the desired direction (such as a destination or a port), the heading (set course) at that moment is fixed toward the top of the screen (the bearing scale also rotates). Then, the heading line moves according to the course change of own ship. Since the initially set heading is displayed always at the top of the screen, you can know the difference between the set course and the current course. Even with own ship's turns or yawing, the fixed targets are stable on the screen and stable picture is displayed. To set a new course, select [COURSE-UP] in [DISPLAY MODE] box again.



2.3 How to Select a Range

The selected range scale, fixed range ring interval and transmission pulse length are shown at the upper left corner on the screen. (The display unit is selectable from NM, km and SM.) When a target deemed dangerous comes closer, adjust the range scale (such that the target appears in 50-90% of the display radius from own ship) to make the positional relation between the target and own ship apparent.

How to expand or reduce the range

Expand or reduce the detection range with the arrow keys to adjust the range.

2.4 How to Adjust the Gain

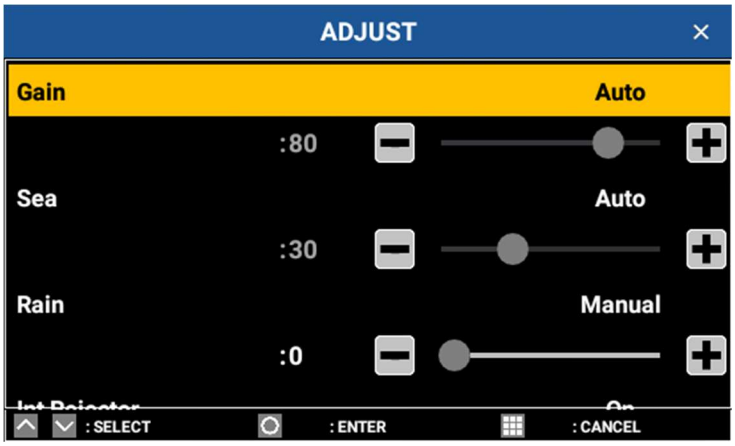
To properly display a target, the gain needs to be adjusted according to signal strength. You can select [Manual] or [Auto] and also adjust the gain strength from the [ADJUST] menu.
When adjusting the gain, increase the gain until just before background noise appears on the display. If you do not use enough gain, weak echoes are erased. If more gain than necessary is used, the backgroung noise hides both weak and strong targets.

Touch control:

1. Press the [ADJUST] key to open the [ADJUST] menu.
2. Tap the [Gain] menu to open the [Manual]/[Auto] selection box.
3. Tap [Manual].
4. Drag the slider bar of the [Gain] menu or tap [+] or [-] to adjust the gain.
5. Tap [x] on the title bar to close the [ADJUST] menu.

Key control:

1. Press the [ADJUST] key to open the [ADJUST] menu.
2. Select [Gain] with the arrow keys, then press the **ENTER** key.
   The [Manual]/[Auto] selection box appears.
3. Select [Manual] with the arrow keys, then press the **ENTER** key.
4. Select the slider bar of the [Gain] menu with the arrow keys, then press the **ENTER** key.
5. Use the arrow keys for adjustment, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [ADJUST].



Note: The procedures after step 3 are for when [Manual] is selected. When [Auto] is selected, the gain will be automatically adjusted and cannot be adjusted with the slider bar.

2.5 How to Reduce Sea Clutter

In stormy weather, sea clutter can extend further around the own ship, making it difficult to identify targets on the screen. In such a case, use the sea clutter reduction function to suppress the sea clutter.
You can select [Manual] or [Auto] and also adjust the sea clutter reduction level from the [ADJUST] menu.

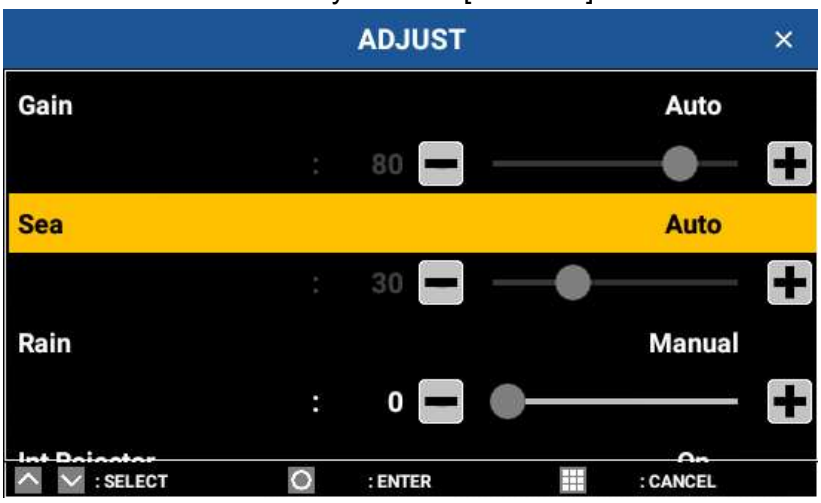
Manual adjustment

Touch control:

1. Press the [ADJUST] key to open the [ADJUST] menu.
2. Tap the [Sea] menu to open the [Manual]/[Auto] selection box.
3. Tap [Manual].
4. Drag the slider bar of the [Sea] menu or tap [+] or [-] to adjust the sea clutter level.
5. Tap [x] on the title bar to close the [ADJUST] menu.

Key control:

1. Press the [ADJUST] key to open the [ADJUST] menu.
2. Select [Sea] with the arrow keys, then press the **ENTER** key.
   The [Manual]/[Auto] selection box appears.
3. Select [Manual] with the arrow keys, then press the **ENTER** key.
4. Select the slider bar of the [Sea] menu with the arrow keys, then press the **ENTER** key.
5. Adjust the sea clutter level with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [ADJUST].



Note: The procedures after step 3 are for when [Manual] is selected. When [Auto] is selected, the sea clutter will be automatically adjusted and cannot be adjusted with the slider bar.

Automatic adjustment

For automatic sea clutter suppression, there are two modes: [Advanced] and [Coastal]. Use [Advanced] under normal circumstances and use [Coastal] when reflections and clutter are not sufficiently removed under [Advanced].
When set to [Coastal], the degree of sea clutter suppression is greater.
Select an automatic sea clutter suppression method with the following procedures.

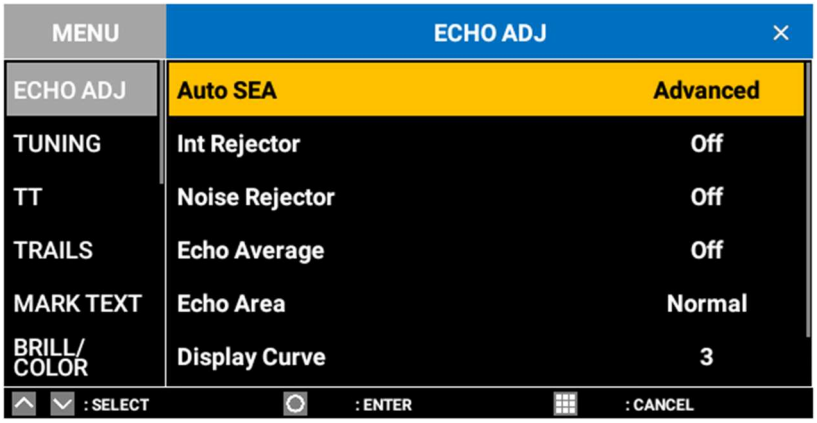
Touch control:

1. Press the **MENU** key to display menu.
2. Tap [ECHO ADJ] menu.
3. Tap [Auto SEA] menu.
   [Advanced]/[Coastal] selection box appears.

4. Tap either [Advanced]/[Coastal].
5. Tap [x] on the title bar to close the [ADJUST] menu.

Key control:

1. Press the **MENU** key to display menu.
2. Select [ECHO ADJ] menu with the arrow keys, then press the **ENTER** key.
3. Select [Auto SEA] menu with the arrow keys, then press the **ENTER** key. [Advanced]/[Coastal] selection box appears.
4. Select either [Advanced]/[Coastal] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU** key to close [MENU].



2.6 How to Reduce Rain Clutter

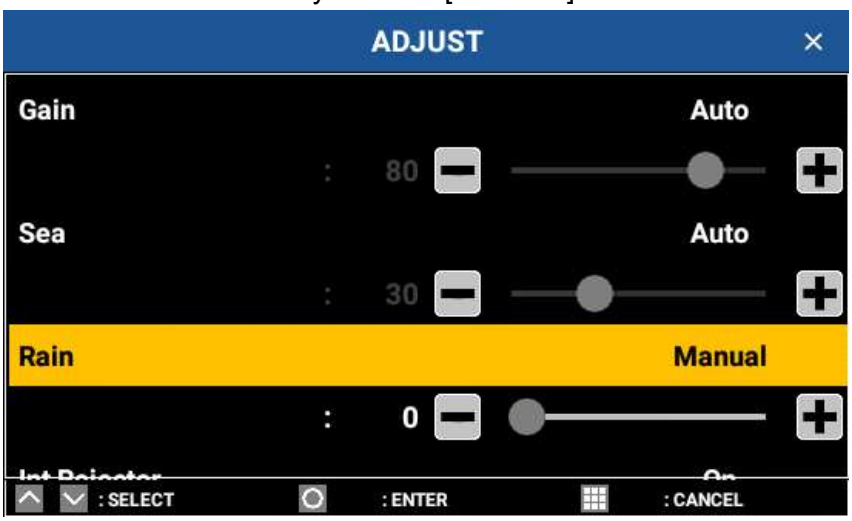
Radio waves transmitted from the antenna and reflected by rain or snow appear in the picture on the screen. Use the rain clutter reduction function when rain clutter masks the targets. The rain clutter reduction level is adjusted in the similar manner as that for the sea clutter reduction. The effect is not limited to the area around the own ship but for a long distance. The higher the setting, the greater the anti-clutter effect becomes. You can select [Manual] or [Auto] and also adjust the rain clutter reduction level from the [ADJUST] menu.

Touch control:

1. Press the [ADJUST] key to open the [ADJUST] menu.
2. Tap the [Rain] menu to open the [Manual]/[Auto] selection box.
3. Tap [Manual].
4. Drag the slider bar of the [Rain] menu or tap [+] or [-] to adjust the rain clutter level.
5. Tap [x] on the title bar to close the [ADJUST] menu.

Key control:

1. Press the [ADJUST] key to open the [ADJUST] menu.
2. Select [Rain] with the arrow keys, then press the **ENTER** key.
   The [Manual]/[Auto] selection box appears.
3. Select [Manual] with the arrow keys, then press the **ENTER** key.
4. Select the slider bar of the [RAIN] menu with the arrow keys, then press the **ENTER** key.
5. Adjust the rain clutter level with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [ADJUST].

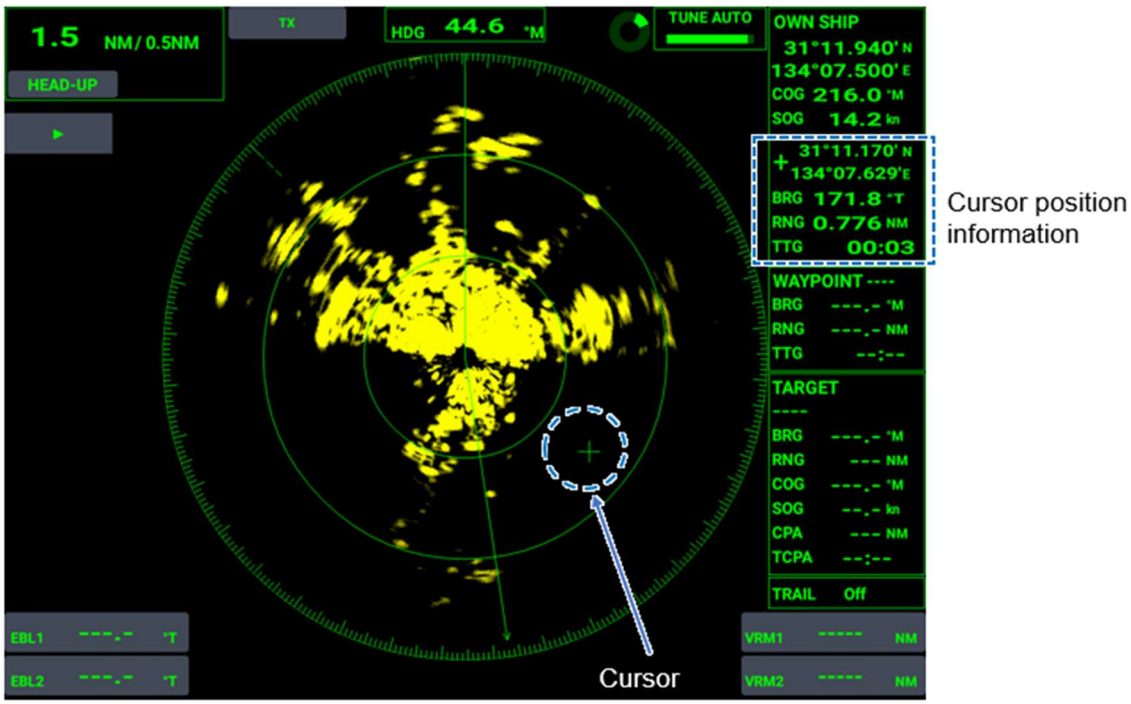


Note: If [Auto] is selected in Step 3, the slider bar is disabled because the rain clutter reduction level is automatically adjusted.

2.7 Cursor

The cursor can be used for measuring the distance and bearing between own ship and targets as well as for checking the latitude and longitude position of targets. Drag the + cursor on the target to display the distance/bearing and latitude/longitude information in the + cursor data box at the top right of the screen.

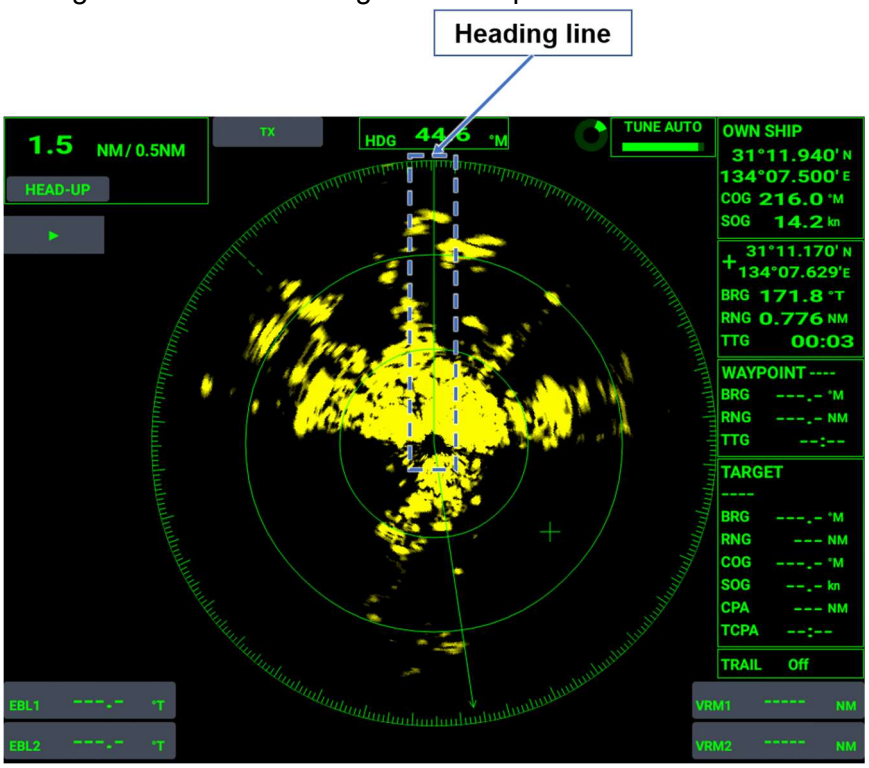
Note: To display the information, own ship's positional information and heading signal are required.



2.8 Heading Line and North Marker

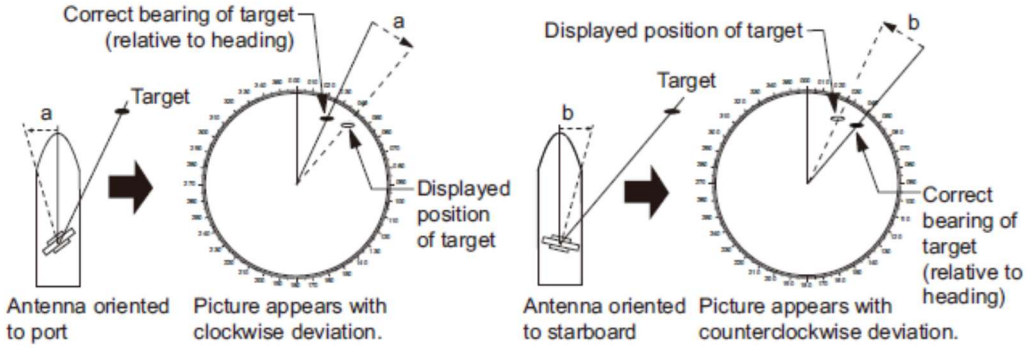
2.8.1 Heading line

The heading line shows the own ship's heading. In the HEAD-UP mode, the heading line appears right above own ship (0°). In the NORTH-UP and the COURSE-UP modes, the heading line moves according to own ship's movement.



2.8.2 How to adjust the heading line

A small but conspicuous target dead ahead may appear on the heading line (zero degrees) even if you installed the antenna unit facing straight ahead in the direction of the bow. It is because of the difficulty in achieving accurate initial positioning of the antenna unit in practice. The following adjustment will rectify this error.



1. Select a stationary target echo at a range between 0.125 and 0.25 NM, preferably near the heading line.

Note: Refer to section 1.1 for setting the display range. Refer to section 2.2 for how to change the display mode.

2. Turn own ship's heading to the center of the target.
3. Press the **MENU** key to display the menu.
4. Select [SCANNER SETUP].
5. Select [Heading Alignment].
6. Tap [+]/[-] key or drag the slider bar so that the target appears at the top of display. (Setting range: 0 to 359 degrees)
7. Confirm that the target echo is displayed at the correct bearing on the screen.

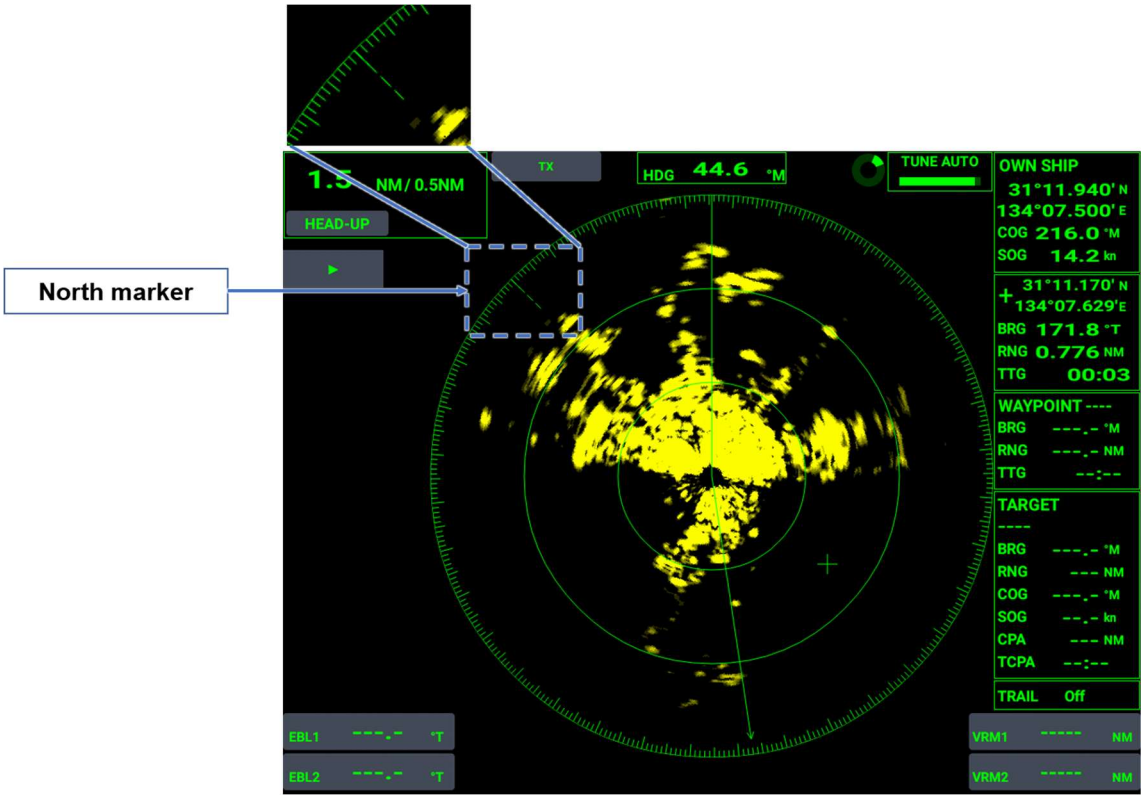
2.8.3 How to erase the heading line temporarily

To check a small target in the heading direction, erase the heading line temporarily.

1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap [HL] on the InstantAccess™ Bar and hold.
   While tapping [HL], echo, text box and bearing are shown, but other items (such as heading line, range marker, own ship mark, EBL, VRM, alarm zone, zoom zone, TT, sector blank, north mark and cursor) will disappear.

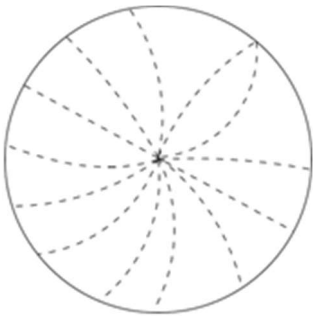
2.8.4 North marker

The north marker always points true north.



2.9 Interference Rejection

When radars using the same frequency band (X band: 9 GHz) are in the vicinity of the own ship, interference may appear on the screen. It is seen in irregular patterns, as several dotted lines extending from the center to the edge of the picture on the screen. Such noise can be rejected using the interference rejection function. There are two methods for setting the interference rejection.



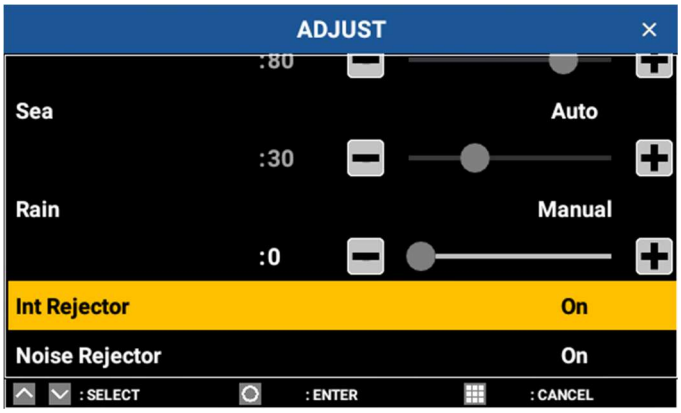
Using the [ADJUST] menu for interference rejection

Touch control:

1. Press the **ADJUST** key to open the [ADJUST] menu.
2. Tap the [Int Rejector] menu to open the [Off]/[On] selection box.
3. Tap [On].
4. Tap [x] on the title bar to close the [ADJUST] menu.

Key control:

1. Press the **ADJUST** key to open the [ADJUST] menu.
2. Select [Int Rejector] with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
3. Select [On] with the arrow keys, then press the **ENTER** key.
4. Press the **MENU/ESC** key to close [ADJUST].



Using the [ECHO ADJUST] menu for interference rejection

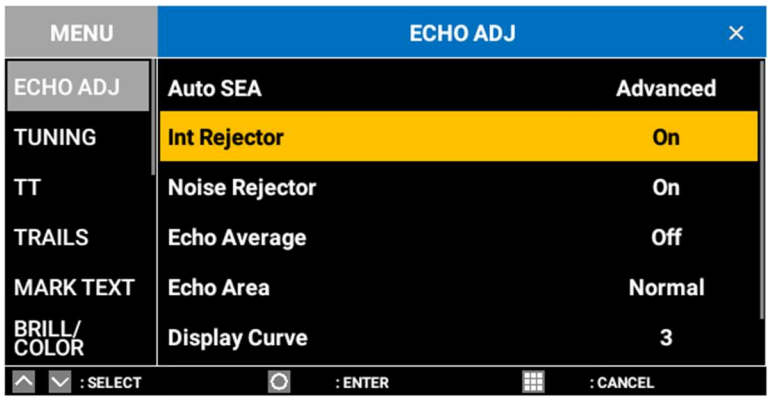
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap the [ECHO ADJ] menu.
3. Tap the [Int Rejector] menu.
   The [Off]/[On] selection box appears.
4. Tap [On].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].

2. Select the [ECHO ADJUST] menu with the arrow keys, then press the **ENTER** key.
3. Select [Int Rejector] with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
4. Select [On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.10 Noise Rejection

Numerous white speckles (white noise) appearing on the screen can be rejected with the following procedure. Noise rejection can be set in two ways. Noise Rejector is only DRS4DL+.

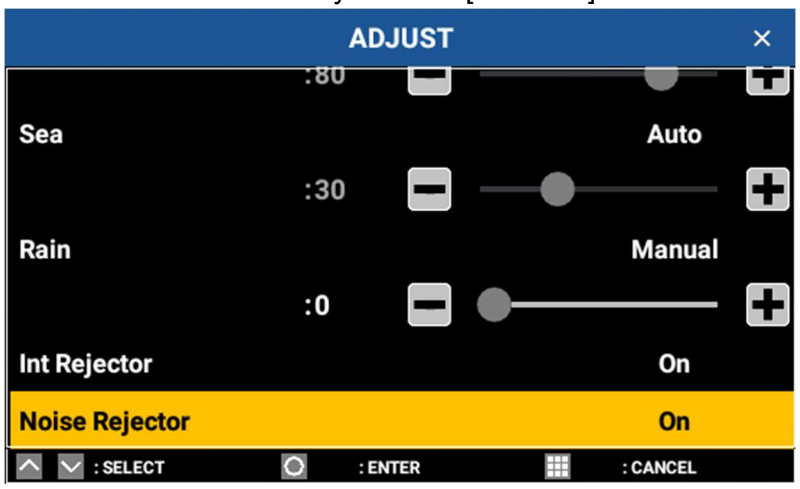
Using the [ADJUST] menu for noise rejection

Touch control:

1. Press the **ADJUST** key to open the [ADJUST] menu.
2. Tap the [Noise Rejector] menu to open the [Off]/[On] selection box.
3. Tap [On].
4. Tap [x] on the title bar to close the [ADJUST] menu.

Key control:

1. Press the **ADJUST** key to open the [ADJUST] menu.
2. Select [Noise Rejector] with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
3. Select [On] with the arrow keys, then press the **ENTER** key.
4. Press the **MENU/ESC** key to close [ADJUST].



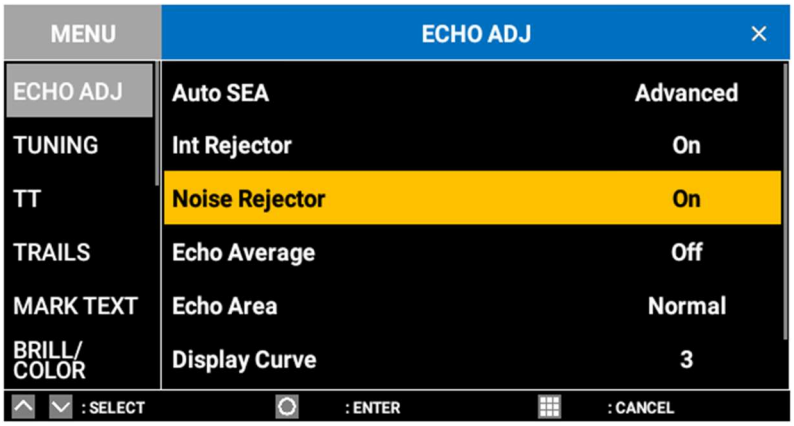
Using the [ECHO ADJUST] menu for interference rejection

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap the [ECHO ADJUST] menu.
3. Tap the [Noise Rejector] menu.
   The [Off]/[On] selection box appears.
4. Tap [On].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select the [ECHO ADJUST] menu with the arrow keys, then press the **ENTER** key.
3. Select [Noise Rejector] with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
4. Select [On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.11 How to Measure the Range to a Target

The range to a target can be measured in three ways: with the fixed range rings, with the cursor, or with the Variable Range Marker (VRM). Refer to Section 2.12.1 for the method using the cursor. Use the fixed range rings (concentric circles centered on own ship) to get an estimate of the range to a target. The interval between the fixed range rings appears at the upper-left position on the screen (refer to Section 2.1.3), which is determined by the range scale selected. Count the number of fixed range rings between own ship and the target, and estimate the distance from the fixed range ring located nearest from the target.

2.11.1 How to adjust the brilliance of fixed range rings

The brilliance of fixed range rings can be adjusted in three ways.

Using the [BRILLIANCE/COLOR] menu

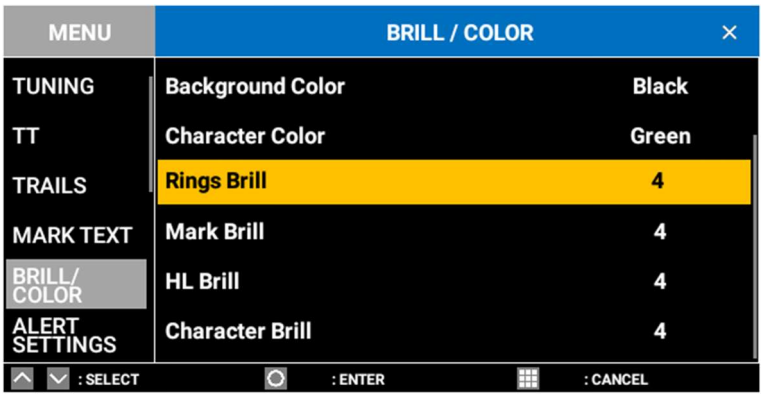
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [BRILL/COLOR].

3. Tap [Rings Brill].
   The [Off]/[1]/[2]/[3]/[4] selection box appears.
4. Tap [Off], [1], [2], [3] or [4].
5. Tap [x] on the title bar to close [MENU].

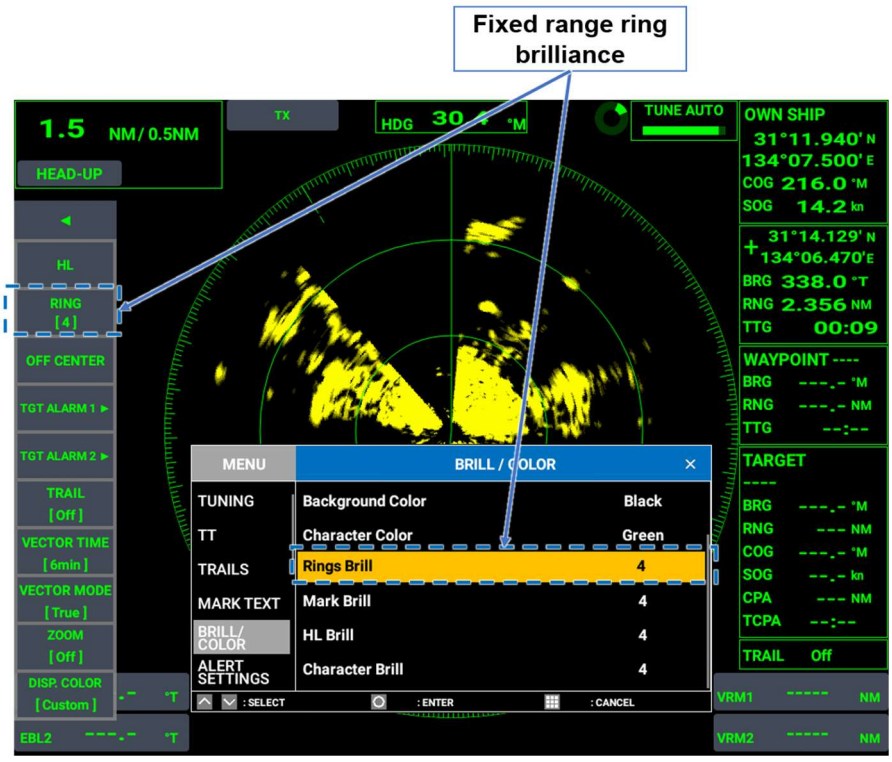
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [BRILL/COLOR] with the arrow keys, then press the **ENTER** key.
3. Select [Rings Brill] with the arrow keys, then press the **ENTER** key. The [Off]/[1]/[2]/[3]/[4] selection box appears.
4. Select [Off], [1], [2], [3] or [4] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



<u>Using the InstantAccess™ Bar for noise rejection:</u>

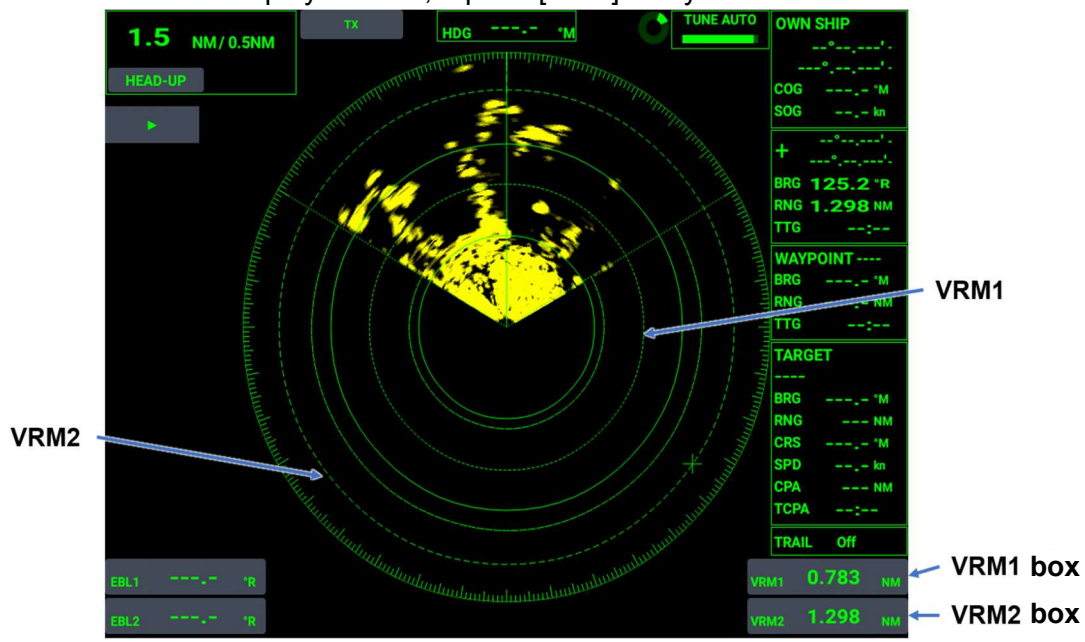
1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar, then tap [Rings Brill].
   The ring brilliance changes in order of [Off] → [1] → [2] → [3] → [4]...
   ([Off]: Lowest brilliance. Darkest. [4]: Highest brilliance. Brightest.)



2.11.2 How to measure the range with the Variable Range Marker (VRM)

There are two VRMs, VRM1 and VRM2, which appear as dashed rings on the screen so that you can distinguish them from the fixed range rings. VRM1 and VRM2 can be distinguished from each other by the different lengths of their dashes. The dashes on VRM2 are longer than those of the VRM1.

1. Tap the [VRM1] box or the [VRM2] box, whichever you want to set, at the lower right of the screen.
2. After the box starts flashing, drag the VRM shown on the screen.
3. Move the VRM onto the object whose range you want to measure, then press the **ENTER** key to confirm the location.
4. To erase the displayed VRM, tap the [VRM] box you have set.



2.11.3 How to change the VRM unit of measurement

VRMs can be displayed in the following units of measurement: Nautical Miles (NM), kilometers (km), Statute Miles (SM), kiloyards (KYD), and Nautical Miles and Yard (NM&YD). Changing the VRM unit also changes the range unit of cursor position.

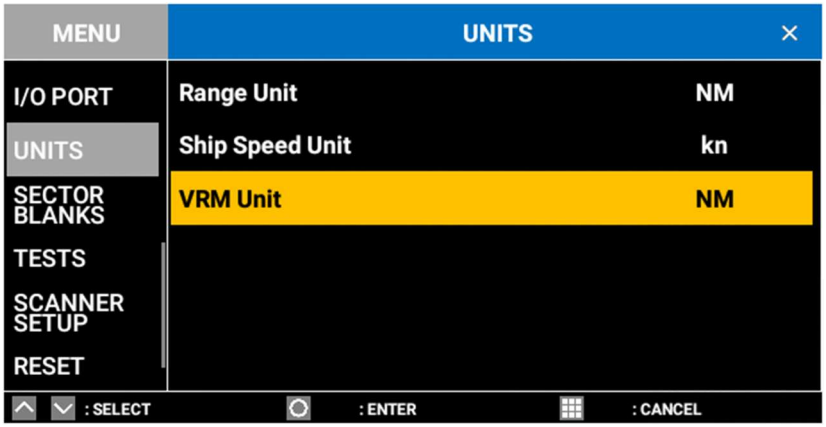
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [UNITS].
3. Tap [VRM Unit].
   The [NM]/[km]/[SM]/[KYD]/[NM&YD] selection box appears.
4. Tap [NM], [km], [SM], [KYD] or [NM&YD].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [UNITS] with the arrow keys, then press the **ENTER** key.
3. Select [VRM Unit] with the arrow keys, then press the **ENTER** key.
   The [NM]/[km]/[SM]/[KYD]/[NM&YD] selection box appears.

4. Select [NM], [km], [SM], [KYD] or [NM&YD] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

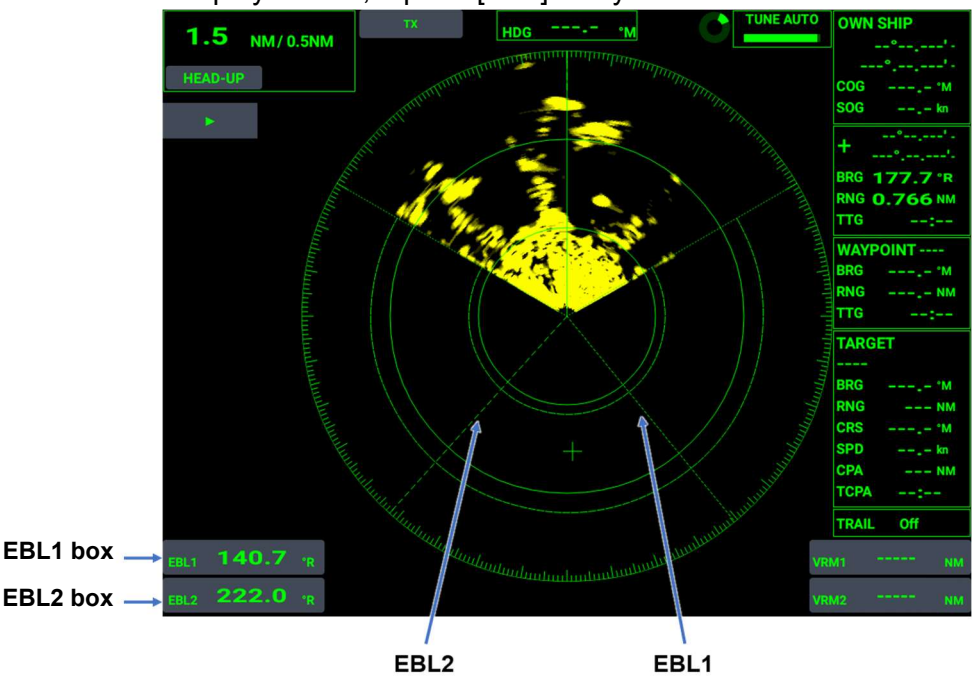


2.12 How to Measure the Target Bearing

The Electronic Bearing Lines (EBLs) are used to take bearings of targets. There are two EBLs, EBL1 and EBL2. Each EBL is shown as a dashed line to differentiate itself from the heading line. EBL1 and EBL2 can be distinguished from each other by the different lengths of their dashes. The dashes on EBL2 are longer than those of the EBL1.

2.12.1 How to measure the bearing using Electronic Bearing Lines (EBL)

1. Tap the [EBL1] box or the [EBL2] box, whichever you want to set, at the lower left of the screen.
2. After the box starts flashing, drag the EBL shown on the screen.
3. Move the EBL onto the echo whose bearing you want to measure, then press the **ENTER** key to confirm the location.
4. To erase the displayed EBL, tap the [EBL] box you have set.



2.12.2 How to change the bearing reference for EBL

"R" is indicated in the EBL box if the EBL readout is relative to own ship's heading, and "T" is indicated if it is referenced to the north (true bearing). The indication can be switched between relative bearing and true bearing when the display mode is HEAD-UP. For other display modes, the indication is always fixed to relative bearing.

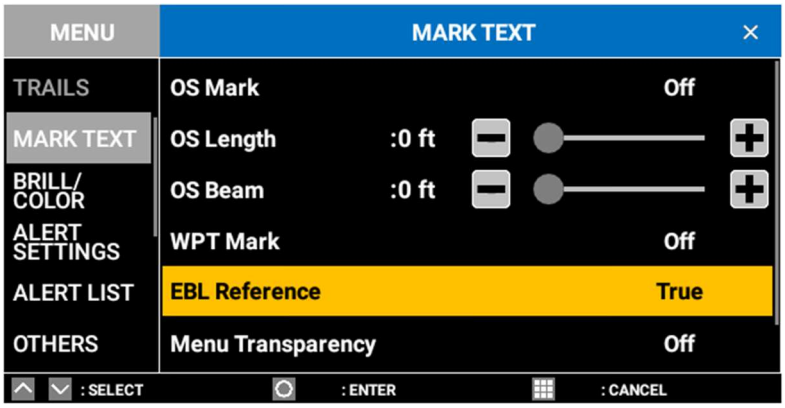
Note: The heading signal is required for indication in true bearing.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [MARK TEXT].
3. Tap [EBL Reference].
   The [Relative]/[True] selection box appears.
4. Tap [Relative] or [True].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [MARK TEXT] with the arrow keys, then press the **ENTER** key.
3. Select [EBL Reference] with the arrow keys, then press the **ENTER** key.
   The [Relative]/[True] selection box appears.
4. Select [Relative] or [True] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.13 Target Alert

The target alert function alerts you with an aural alarm when other ships, islands or reefs enter or exit (selectable on menu) a set area.

2.13.1 How to set an alert zone

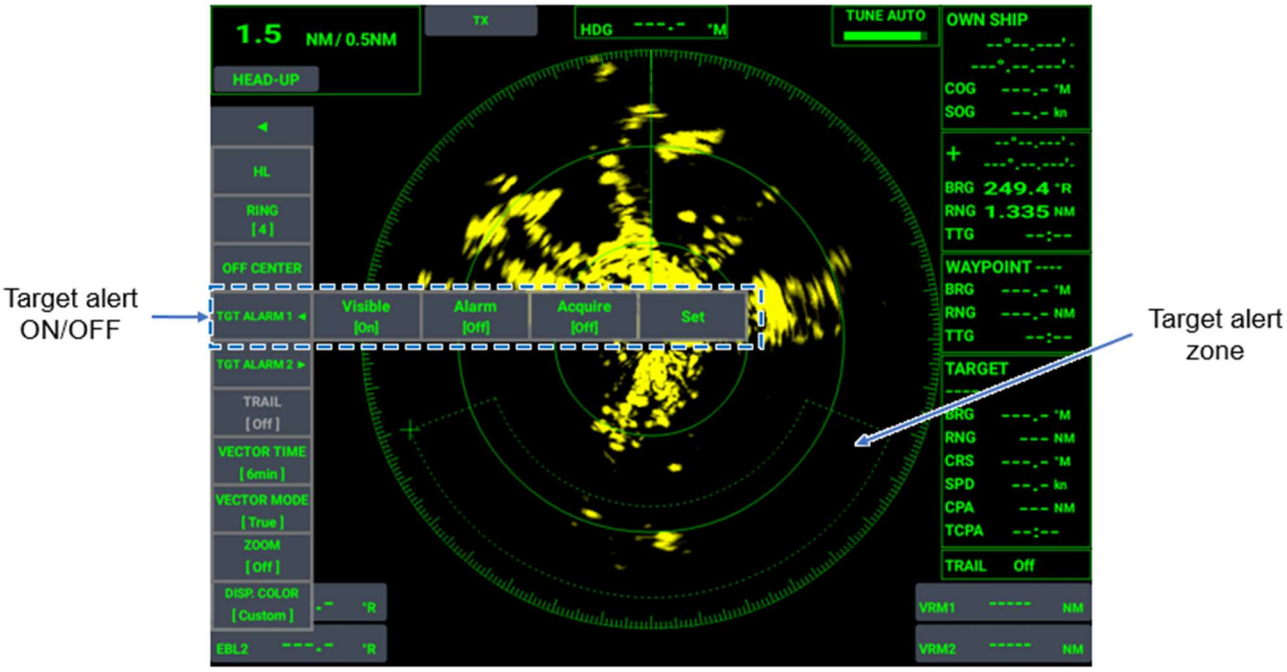
Take the following steps to set an alert zone.

1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap [TGT ALARM 1] or [TGT ALARM 2].
3. Tap [SET].
   [Enter Start Position] and [Cancel] appear at the upper right of the screen.
4. Tap the starting point for the alert zone to move the cursor there.

5. Tap [Enter Start Position].
   The indication changes from [Enter Start Position] to [Enter End Position].
6. Tap the ending point for the alert zone, and the cursor moves to that point.
7. Tap [Enter End Position] so that the fan-shaped zone is set as a target alert zone.

Note 1: To cancel the alert zone setting, tap [Cancel]. If an alert zone has already been set, existing settings are restored.

Note 2: The [TGT ALARM 1] zone and the [TGT ALARM 2] zone can overlap one another.



2.13.2 How to show, hide the alert zone

Take the following steps to display the target alert zone.

1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap [TGT ALARM 1] or [TGT ALARM 2].
3. Tap [Show Alarm Zone] and set to [On].
   To hide the alert zone, set to [Off] in step 3.

2.13.3 How to set the conditions for activating a target alert

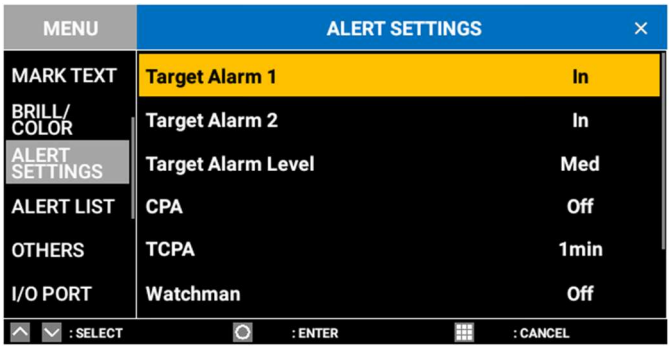
Take the following procedure to set the target alert triggering conditions.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALERT SETTINGS].
3. Tap [Target Alarm 1] or [Target Alarm 2].
   The [In]/[Out] selection box appears.
4. Tap [In] or [Out].
   [In]: Activates alarm when a target enters the alert zone.
   [Out]: Activates alarm when a target exits the alert zone.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALERT SETTINGS] with the arrow keys, then press the **ENTER** key.
3. Select [Target Alarm 1] or [Target Alarm 2] with the arrow keys, then press the **ENTER** key.
   The [In]/[Out] selection box appears.
4. Select [In] or [Out] with the arrow keys, then press the **ENTER** key.
   [In]: Activates alarm when a target enters the alert zone.
   [Out]: Activates alarm when a target exits the alert zone.
5. Press the **MENU/ESC** key to close [MENU].



2.13.4 How to turn the target alert alarm on/off

Take the following steps to turn on the target alert alarm.

1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap [TGT ALARM 1] or [TGT ALARM 2].
3. Tap [Alarm] and set to [On].
   To turn off the target alert alarm, set [Alarm] to [Off] in Step 3.

2.13.5 How to turn on/off the automatic acquisition function of target alert

The target alarm feature can be used to automatically acquire (and track) targets.

1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap [TGT ALARM 1] or [TGT ALARM 2].
3. Tap [ACQUIRE] and set to [On].
   To disable automatic acquisition of targets, set [ACQUIRE] to [Off] in step 3.

2.13.6 How to acknowledge the target alert

When a target breaches the alert zone, an audiovisual alert is released. Press the **ENTER** key to acknowledge the alert.

2.14 How to Set the Buzzer

The panel buzzer sounds against various conditions. An external buzzer may be connected to sound in a remote location. You can disable or enable the buzzer(s) as follows:

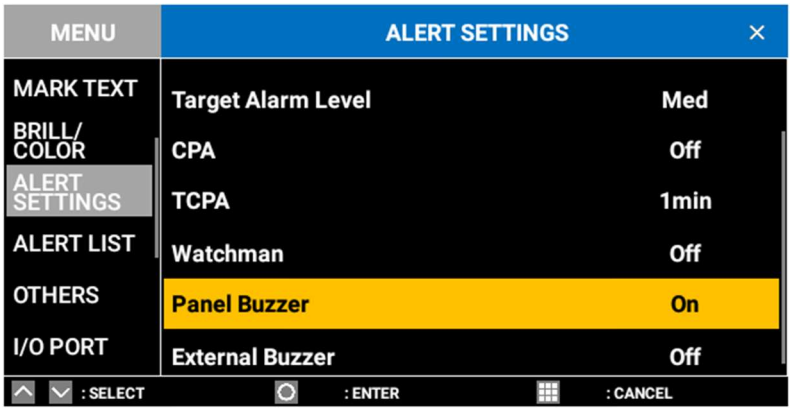
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALERT SETTINGS].

3. Tap [Panel Buzzer] or [External Buzzer].
   The [On]/[Off] selection box appears.
4. Tap [On] or [Off].
5. Tap [x] on the title bar to close [MENU].

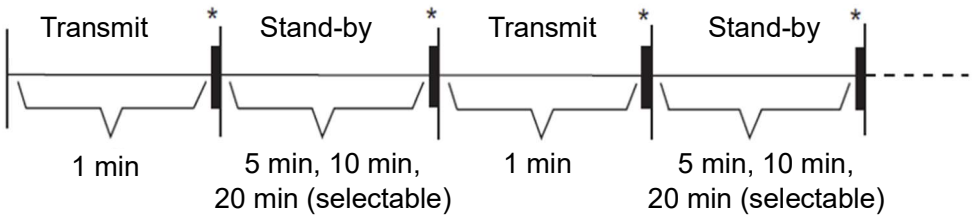
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALERT SETTINGS] with the arrow keys, then press the **ENTER** key.
3. Select [Panel Buzzer] or [External Buzzer] with the arrow keys, then press the **ENTER** key.
   The [On]/[Off] selection box appears.
4. Select [On] or [Off] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.15 Watchman

The watchman function transmits the radar for one minute and then enters stand-by for a certain period of time alternately. By automatically switching the state between transmission and stand-by, unnecessary use of the magnetron can be avoided. Additionally, the watchman can be used together with the target alarm to watch for possible collision.



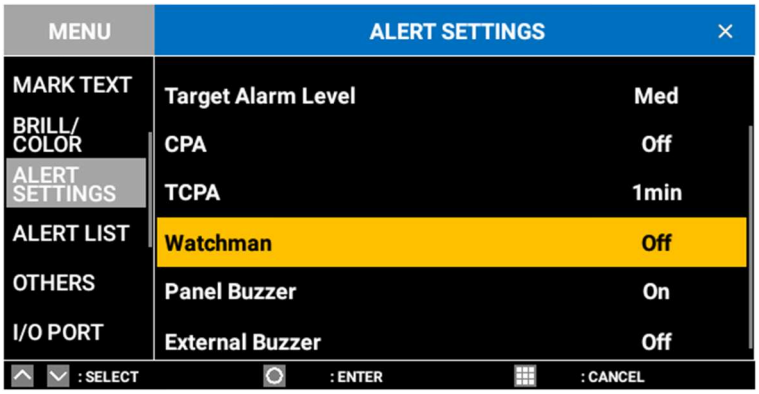
Note: If a target enters an acquisition zone while the watchman is active, the watchman is forcibly cancelled and the radar continuously acquires the target.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALERT SETTINGS].
3. Tap [Watchman].
   The [Off]/[5min]/[10min]/[20min] selection box appears.
4. Tap [Off]/[5min]/[10min]/[20min].
5. Tap [x] on the title bar to close [MENU].

Key control:

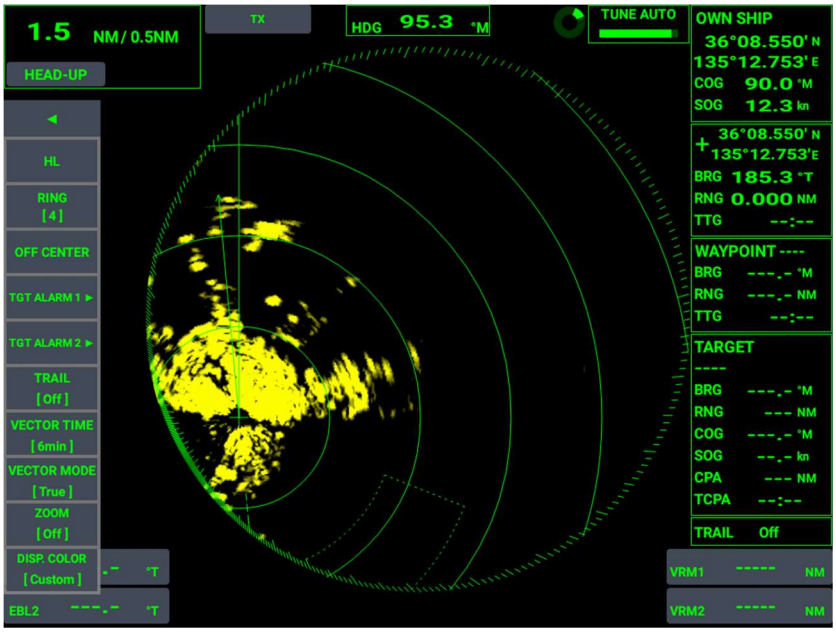
1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALERT SETTINGS] with the arrow keys, then press the **ENTER** key.
3. Select [Watchman] with the arrow keys, then press the **ENTER** key.
   The [Off]/[5min]/[10min]/[20min] selection box appears.
4. Select [Off]/[5min]/[10min]/[20min] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.16 Off-Center (Shifting the Screen Center)

Off-center allows you to expand the view field in the direction you wish to see without switching to a larger range scale, by shifting the center (own ship position) on the screen. The own ship's position can be off-centered to any point within 75% of the effective radius of the radar.

1. Tap at a position where you wish to move the picture center to, and the cursor appears at that position.
2. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
3. Tap [OFF CENTER] on the InstantAccess™ Bar. The picture center moves to the cursor position.



To disable off-center and return the own ship to the screen center, tap [OFF CENTER] again.

2.17 Zoom

The zoom function can enlarge a part of the radar picture as large as twice the normal viewing size.

2.17.1 How to change a zoom mode

You can select a zoom mode from three types, [Relative], [True] and [Target].

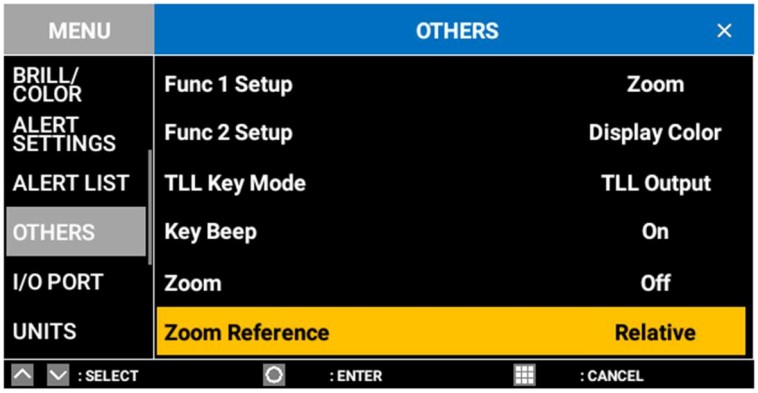
Relative: The set zoom cursor is fixed to the constant range and bearing from own ship.
True: The set zoom cursor is fixed to a lontitude/latitude of the cursor position.
Target: The set zoom cursor is fixed to a tracked target.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [OTHERS].
3. Tap [Zoom Reference].
   The [Relative]/[True]/[Target] selection box appears.
4. Tap [Relative], [True] or [Target].
5. Tap [x] on the title bar to close [MENU].

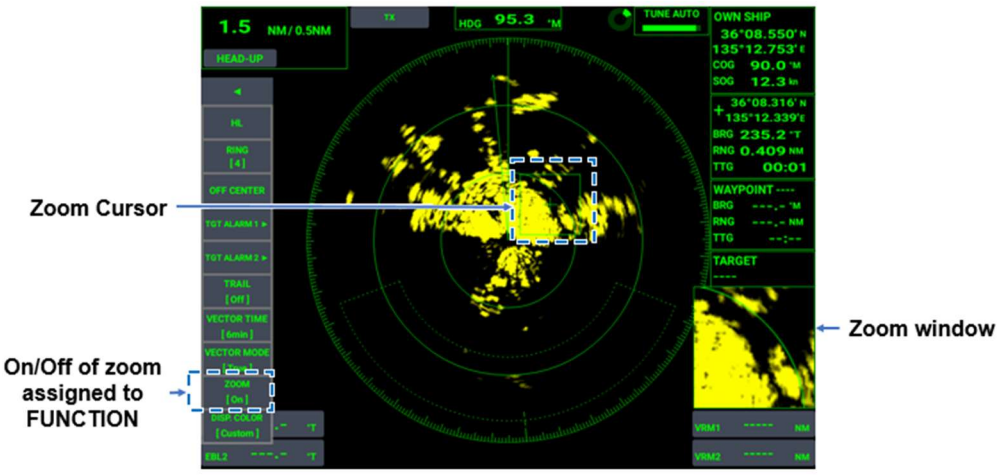
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [OTHERS] with the arrow keys, then press the **ENTER** key.
3. Select [Zoom Reference] with the arrow keys, then press the **ENTER** key.
   The [Relative]/[True]/[Target] selection box appears.
4. Select [Relative], [True] or [Target] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.17.2 How to use the zoom function

There are two ways to use the zoom function: from the InstantAccess™ Bar and from the menu.



Using the InstantAccess™ Bar

Tap [▶] on the left side of the screen to open the InstantAccess™ Bar, then tap [ZOOM]. The zoom function cycles through [On] and [Off] with each tap.

Note: This method is allowed only when [F1 SETTING] or [F2 SETTING] in the [OTHERS] menu is set to [ZOOM].

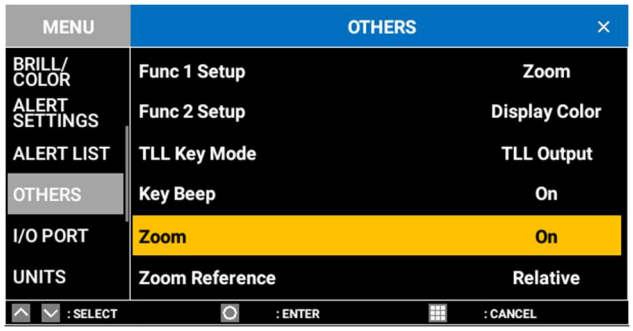
Using the menu

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [OTHERS].
3. Tap [ZOOM].
   The [On]/[Off] selection box appears.
4. Tap [On] or [Off].
5. Tap [x] on the title bar to close [MENU].

Key control:

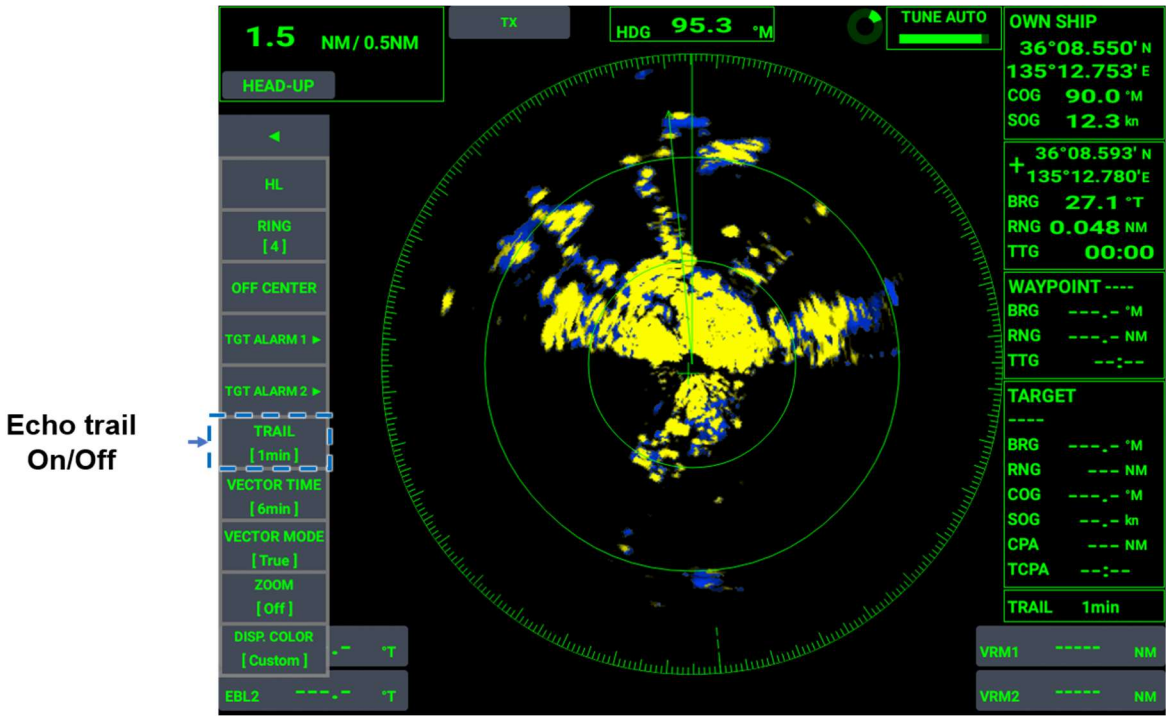
1. Press the **MENU/ESC** key to open [MENU].
2. Select [OTHERS] with the arrow keys, then press the **ENTER** key.
3. Select [ZOOM] with the arrow keys, then press the **ENTER** key.
   The [On]/[Off] selection box appears.
4. Select [On] or [Off] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.18 Echo Trail

Echo trails show the trails of other ships with a color different from the current echo color, which is useful for monitoring ship movement. Relative trails and true trails are available in the echo trail mode. True echo trails require heading and speed signals and position information.

2.18.1 How to change the echo trail time and start echo trails



Tap [▶] on the left side of the screen to open the InstantAccess™ Bar, then tap [TRAIL]. For each tap of [TRAIL], trail time changes as [Off] → [15s] → [30s] → [1min] → [6min] → [10min] → [15min] → [30min] → [Cont.]…. After selecting desired trail time, tap [◀] to close the InstantAccess™ Bar.

2.18.2 How to reset the echo trails

The displayed echo trails can be erased and fresh echo trails started.

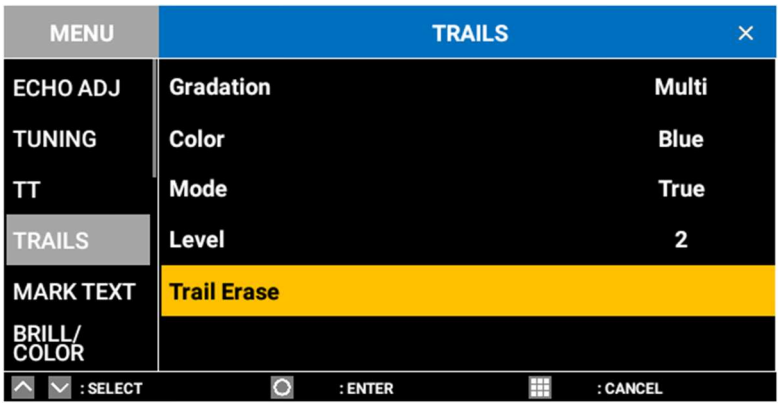
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TRAILS].
3. Tap [Trail Erase].
   The [YES]/[NO] selection box appears.
4. Tap [YES] or [NO].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TRAILS] with the arrow keys, then press the **ENTER** key.

3. Select [Trail Erase] with the arrow keys, then press the **ENTER** key.
   The [YES]/[NO] selection box appears.
4. Select [YES] or [NO] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.18.3 How to change the trail mode

[True] trails and [Relative] trails are available in the echo trail mode.

True trails: True trails indicate the true movement of other ships relative to a landmass irrespective of own ship's movement, which means that stationary targets are not tracked.
True trails require heading and speed signals and position information.

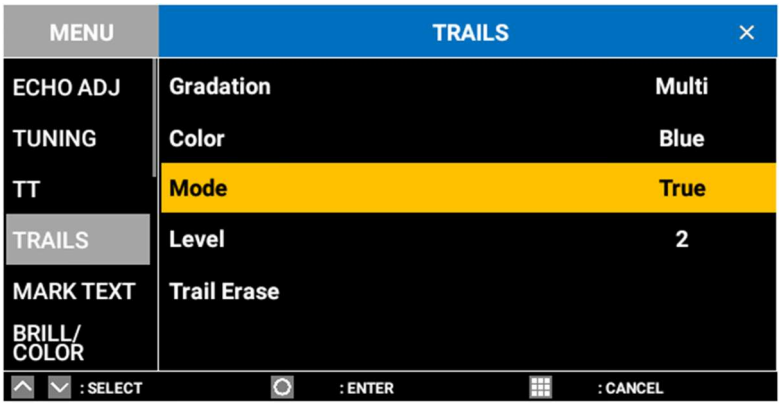
Relative trails: Relative trails show other ships' movements relative to own ship. Since the movement of own ship and other ships are synthesized, relative trails are effective when you want to see the relative movements for avoiding collision, etc. Trails of stationary targets are also shown.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TRAILS].
3. Tap [Mode].
   The [Relative]/[True] selection box appears.
4. Tap [Relative] or [True].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TRAILS] with the arrow keys, then press the **ENTER** key.
3. Select [Mode] with the arrow keys, then press the **ENTER** key.
   The [Relative]/[True] selection box appears.
4. Select [Relative] or [True] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.18.4 How to change the trail gradation

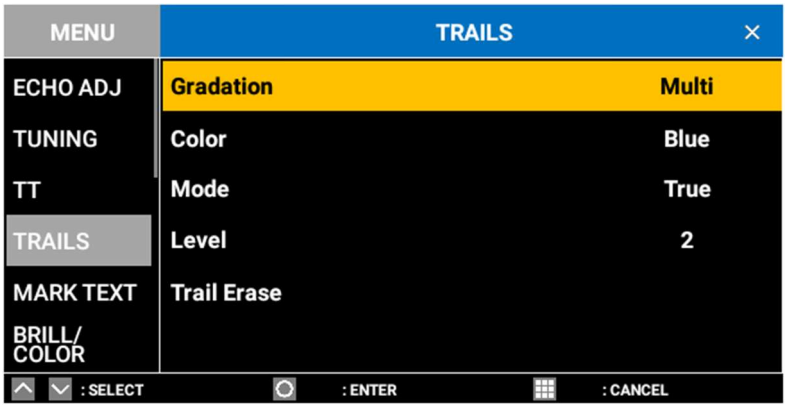
The target trails can be displayed in a single tone of the same density or with gradual shading that fades with time.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TRAILS].
3. Tap [Gradation].
   The [Single]/[Multi] selection box appears.
4. Tap [Single] or [Multi].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TRAILS] with the arrow keys, then press the **ENTER** key.
3. Select [Gradation] with the arrow keys, then press the **ENTER** key.
   The [Single]/[Multi] selection box appears.
4. Select [Single] or [Multi] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.18.5 How to change the trail color

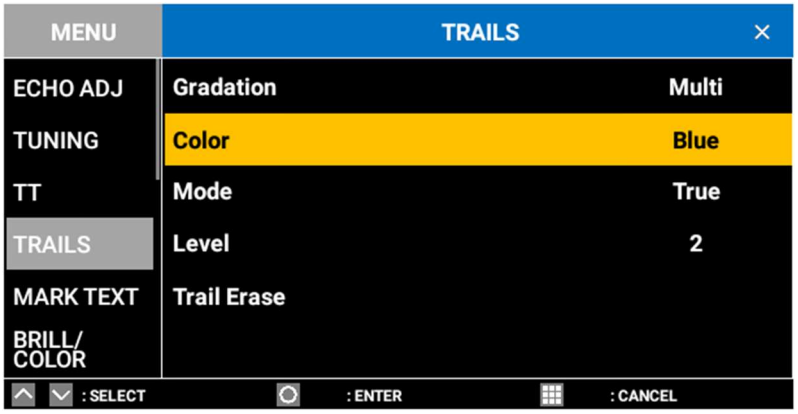
The trail color can be selected among blue, yellow and green.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TRAILS].
3. Tap [Color].
   The [Blue]/[Yellow]/[Green] selection box appears.
4. Tap [Blue], [Yellow] or [Green].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TRAILS] with the arrow keys, then press the **ENTER** key.
3. Select [COLOR] with the arrow keys, then press the **ENTER** key.
   The [Blue]/[Yellow]/[Green] selection box appears.
4. Select [Blue], [Yellow] or [Green] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.18.6 How to change the trail level

The signal strength for displaying the trails can be selected.

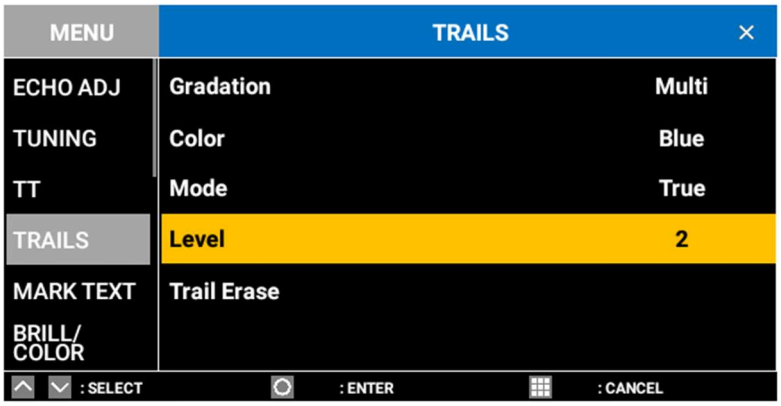
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TRAILS].
3. Tap [Level].
   The [1]/[2]/[3] selection box appears.
4. Tap [1], [2] or [3].
   [1]: Trails are shown even for weak signals.
   [2]: Normal setting
   [3]: Trails are shown only for strong signals.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TRAILS] with the arrow keys, then press the **ENTER** key.
3. Select [Level] with the arrow keys, then press the **ENTER** key.
   The [1]/[2]/[3] selection box appears.

4. Select [1], [2] or [3] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.19 Assigning Functions to the Function Keys

Functions in the menu can be assigned to the function keys [F1] and [F2].
The function assigned to **F1** button appears at the second from the bottom of the InstantAccess™ Bar and the function assigned to **F2** button appears at its bottom.

2.19.1 How to assign functions to the function keys

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [OTHERS].
3. Tap [Func 1 Setup] or [Func 2 Setup].
   The [Zoom]/[Display Color]/[Trail Mode]/[OS Mark]/[WPT Mark]/[Echo Average]/[Bird Mode] selection box appears.
4. Tap [Zoom], [Display Color], [Trail Mode], [OS Mark], [WPT Mark], [Echo Average] or [Bird Mode].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [OTHERS] with the arrow keys, then press the **ENTER** key.
3. Select [Func 1 Setup] or [Func 2 Setup] with the arrow keys, then press the **ENTER** key.
   The [Zoom]/[Display Color]/[Trail Mode]/[OS Mark]/[WPT Mark]/[Echo Average]/[Bird Mode] selection box appears.
4. Select [Zoom], [Display Color], [Trail Mode], [OS Mark], [WPT Mark], [Echo Average] or [Bird Mode] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

2.19.2 How to operate the function keys

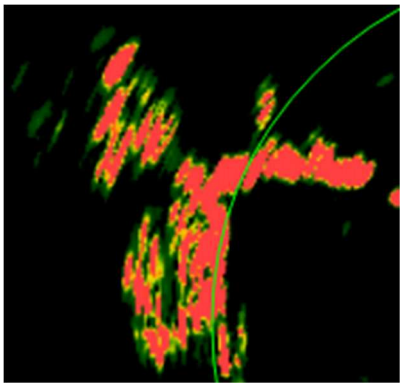
1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap **F1** button which appears as the second item from the bottom of the InstantAccess™ Bar or **F2** button which appears at its bottom.

2.20 Echo Averaging

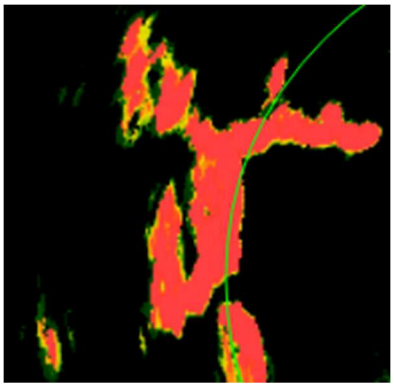
The echo averaging function allows you to change the brilliance of targets in sea clutter, which makes it easier to discriminate small targets from sea clutter.

Note 1: Do not use the echo averaging function under heavy pitching and rolling; loss of targets can result.

Note 2: This function requires heading signal and position information. If either signal is interrupted, the echo averaging function is automatically disabled.
Before using the echo averaging function, be sure to set sea clutter to the level where a little sea clutter is shown on the screen, with the sea clutter reduction function.



Echo averaging: Off



Echo averaging: On

[Off]: Turns off the echo averaging function.
[On]: Discriminates targets from the sea surface and reduces the glow of unstable echoes.

There are three ways to access the echo averaging function.

Using the InstantAccess™ Bar

Tap [▶] on the left side of the screen to open the InstantAccess™ Bar, then tap [ECHO AVERAGE]. The echo averaging function switches between [On] and [Off] with each tap.

Note: This method is allowed only when [Func 1 Setup] or [Func 2 Setup] in the [OTHERS] menu is set to [Echo Average].

Using the menu

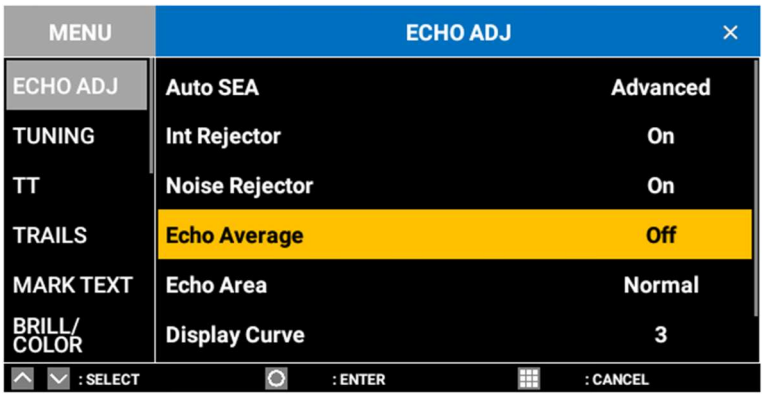
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ECHO ADJ].
3. Tap [Echo Average].
   The [On]/[Off] selection box appears.
4. Tap [On] or [Off].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ECHO ADJ] with the arrow keys, then press the **ENTER** key.

3. Select [Echo Average] with the arrow keys, then press the **ENTER** key.
   The [On]/[Off] selection box appears.
4. Select [On] or [Off] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.21 How to Set the Display Curve

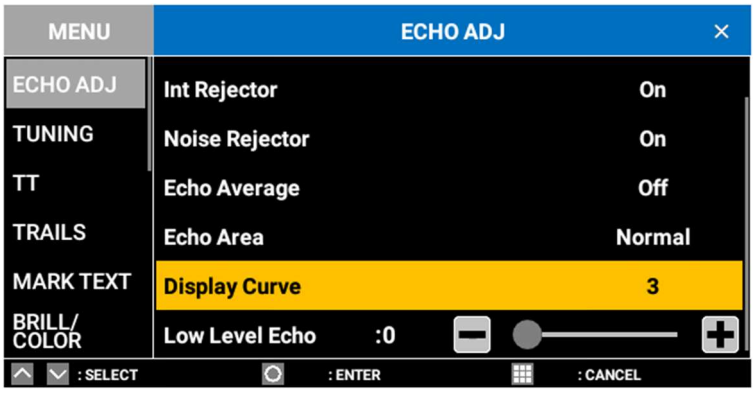
The optimum display curves changes with sea conditions and desired targets. Unwanted weak echoes (such as sea clutter) can be suppressed.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ECHO ADJ].
3. Tap [Display Curve].
   The [1]/[2]/[3] selection box appears.
4. Tap [1], [2] or [3].
   [1]: Suppresses the display of weak echoes.
   [2]: Normal setting
   [3]: Displays weak echoes with emphasis.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ECHO ADJ] with the arrow keys, then press the **ENTER** key.
3. Select [Display Curve] with the arrow keys, then press the **ENTER** key.
   The [1]/[2]/[3] selection box appears.
4. Select [1], [2] or [3] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.22 Alert List

Currently active alerts are listed on the alert list. The list can be displayed as shown below.

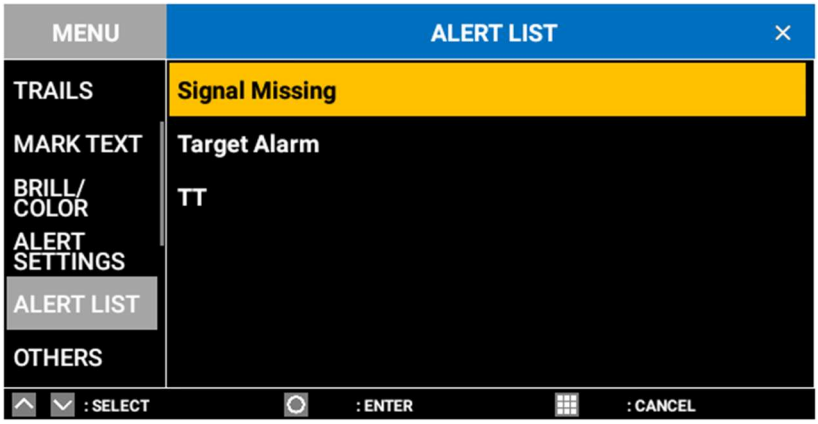
Note: Unacknowledged alerts are not shown.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALERT LIST].
   The currently active alerts are shown on the right side.
3. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALERT LIST] with the arrow keys, then press the **ENTER** key.
   The currently active alerts are shown on the right side.
3. Press the **MENU/ESC** key to close [MENU].



2.23 Screen Display Colors

The color for the items listed in the table below can be changed according to the aytime and nighttime situations.

2.23.1 How to change the displays colors

This equipment provides four color combinations ([DAY], [NIGHT], [DUSK] and [USER SETTING]) that can be changed according to the surrounding brightness. The factory default color combinations are as follows.

Displayed items and colors

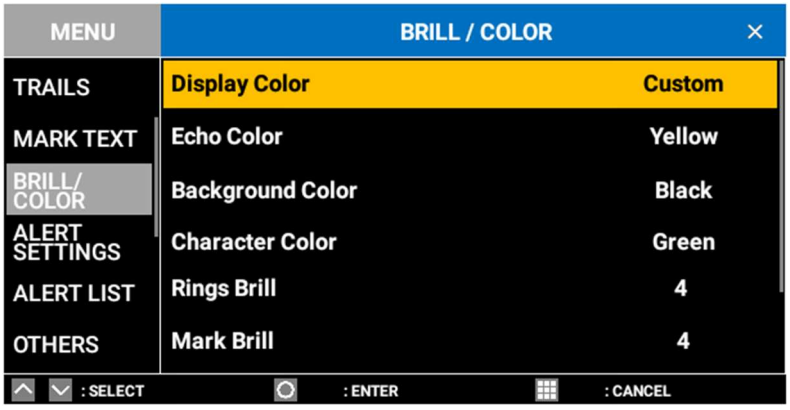
Displayed item	Day	Dusk	Night	User setting (Below shows initial settings)
Characters	Black	Green	Red	Green
Fixed range rings	Green	Green	Red	Green
Echo	Yellow	Green	Green	Multiple colors
Background	White	Blue	Black	Black

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [BRILL/COLOR].
3. Tap [Display Color].
   The [Day]/[Dusk]/[Night]/[Custom] selection box appears.
4. Tap [Day], [Dusk], [Night] or [Custom].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [BRILL/COLOR] with the arrow keys, then press the **ENTER** key.
3. Select [Display Color] with the arrow keys, then press the **ENTER** key.
   The [Day]/[Dusk]/[Night]/[Custom] selection box appears.
4. Select [Day], [Dusk], [Night] or [Custom] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.23.2 User setting

When [Custom] is selected in the [Display Color] menu, [Echo Color], [Background Color] and [Character Color] can be set.

How to change the echo display color

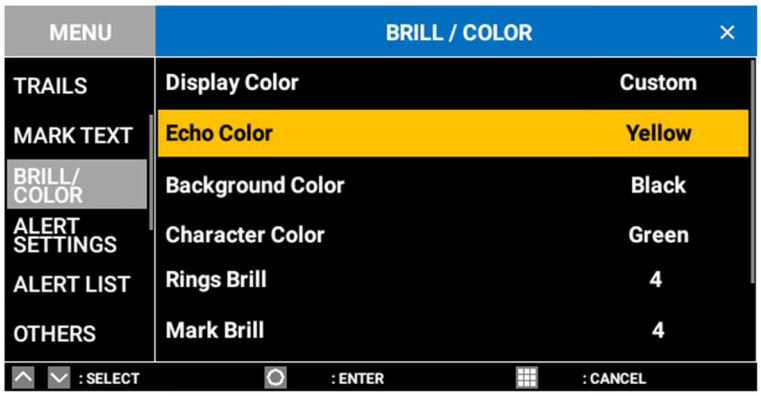
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [BRILL/COLOR].
3. Tap [Echo Color].
   The [Multi]/[Green]/[Yellow] selection box appears.
4. Tap [Multi], [Green] or [Yellow].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [BRILL/COLOR] with the arrow keys, then press the **ENTER** key.
3. Select [Echo Color] with the arrow keys, then press the **ENTER** key.
   The [Multi]/[Green]/[Yellow] selection box appears.
4. Select [Multi], [Green] or [Yellow] with the arrow keys, then press the **ENTER** key.

5. Press the **MENU/ESC** key to close [MENU].



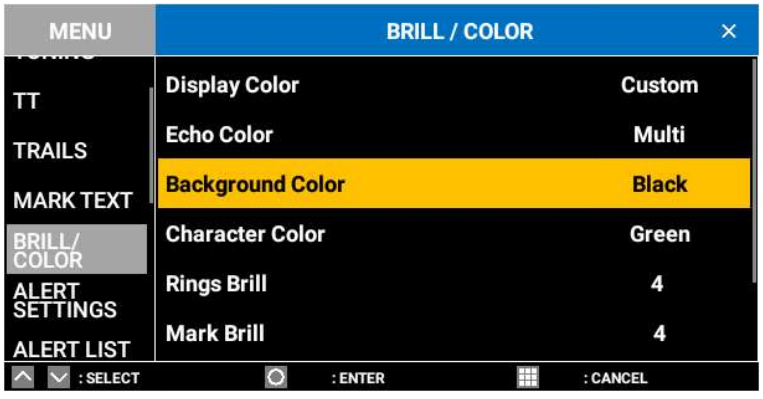
How to change the background color

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [BRILL/COLOR].
3. Tap [Background Color].
   The [Black]/[Navy]/[Blue]/[White] selection box appears.
4. Tap [Black], [Navy], [Blue] or [White].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [BRILL/COLOR] with the arrow keys, then press the **ENTER** key.
3. Select [Background Color] with the arrow keys, then press the **ENTER** key.
   The [Black]/[Navy]/[Blue]/[White] selection box appears.
4. Select [Black], [Navy], [Blue] or [White] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



How to change the display color of fixed range rings, VRM, EBL, marks and characters

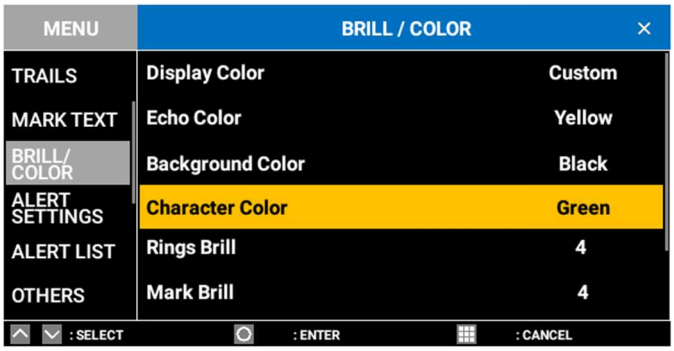
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [BRILL/COLOR].

3. Tap [Character Color].
   The [Green]/[Red]/[White] selection box appears.
4. Tap [Green], [Red] or [White].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [BRILL/COLOR] with the arrow keys, then press the **ENTER** key.
3. Select [Character Color] with the arrow keys, then press the **ENTER** key.
   The [Green]/[Red]/[White] selection box appears.
4. Select [Green], [Red] or [White] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



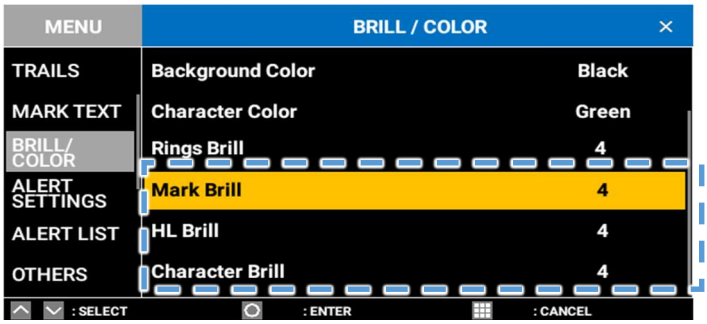
2.23.3 How to change the brilliance of marks, heading line and characters

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [BRILL/COLOR].
3. Tap [Mark Brill], [HL Brill] or [Character Brill].
   The [1]/[2]/[3]/[4] selection box appears.
4. Tap [1], [2], [3] or [4].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [BRILL/COLOR] with the arrow keys, then press the **ENTER** key.
3. Select [Mark Brill], [HL Brill] or [Character Brill] with the arrow keys, then press the **ENTER** key.
   The [1]/[2]/[3]/[4] selection box appears.
4. Select [1], [2], [3] or [4] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.24 TT Operation

The TT (Target Tracking) function manually or automatically acquires and tracks targets displayed on the screen. Once a target is acquired, it is automatically tracked within the range of 0 to 16 NM.

- DRS4DL+ : maximum is 30.
- DRS4DL X-Class : maximum is 50.
- The acquisition range is 0.1 NM to 16 NM.
- The tracking range is 0 NM to 16 NM.
- The target's speed and course can be indicated with a vector.
- The target data figures can be displayed in the data box.
- There are two ways to cancel the acquisition; [Erase Lost TT Target] and [TT All Cancel].

2.24.1 TT display [On]/[Off]

Take the following steps to switch the TT display between [On] or [Off].

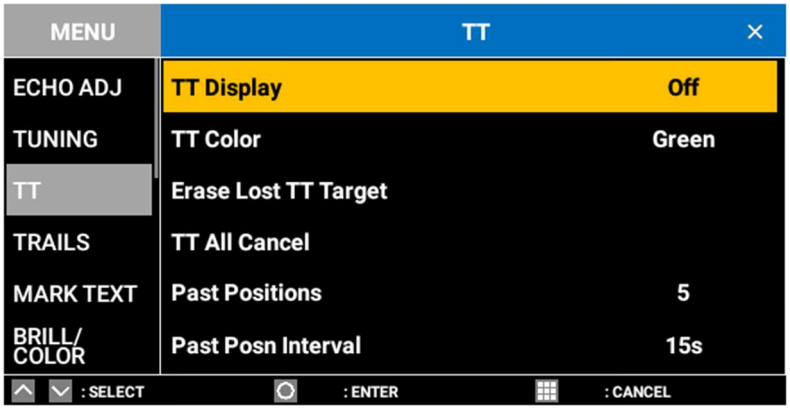
Note: A target once acquired is retained in the memory as an acquired target. This means that a target is displayed in the acquired state if you select [Off] and then [On] in the [TT Display] menu.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TT].
3. Tap [TT Display].
   The [On]/[Off] selection box appears.
4. Tap [On] or [Off].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TT] with the arrow keys, then press the **ENTER** key.
3. Select [TT Display] with the arrow keys, then press the **ENTER** key.
   The [On]/[Off] selection box appears.
4. Select [On] or [Off] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.24.2 How to change the TT symbol (acquisition symbol) color

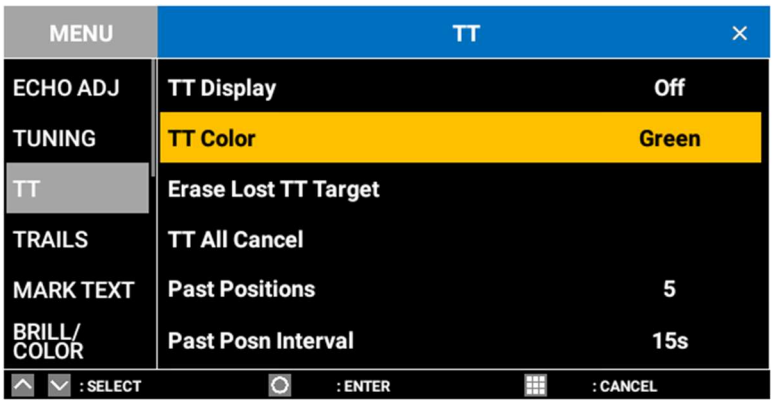
You can select the acquisition symbol color among green, red, blue, white and black.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TT].
3. Tap [TT Color].
   The [Green]/[Red]/[Blue]/ [White]/[Black] selection box appears.
4. Tap [Green], [Red], [Blue], [White] or [Black].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TT] with the arrow keys, then press the **ENTER** key.
3. Select [TT COLOR] with the arrow keys, then press the **ENTER** key.
   The [Green]/[Red]/[Blue]/ [White]/[Black] selection box appears.
4. Select [Green], [Red], [Blue], [White] or [Black] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

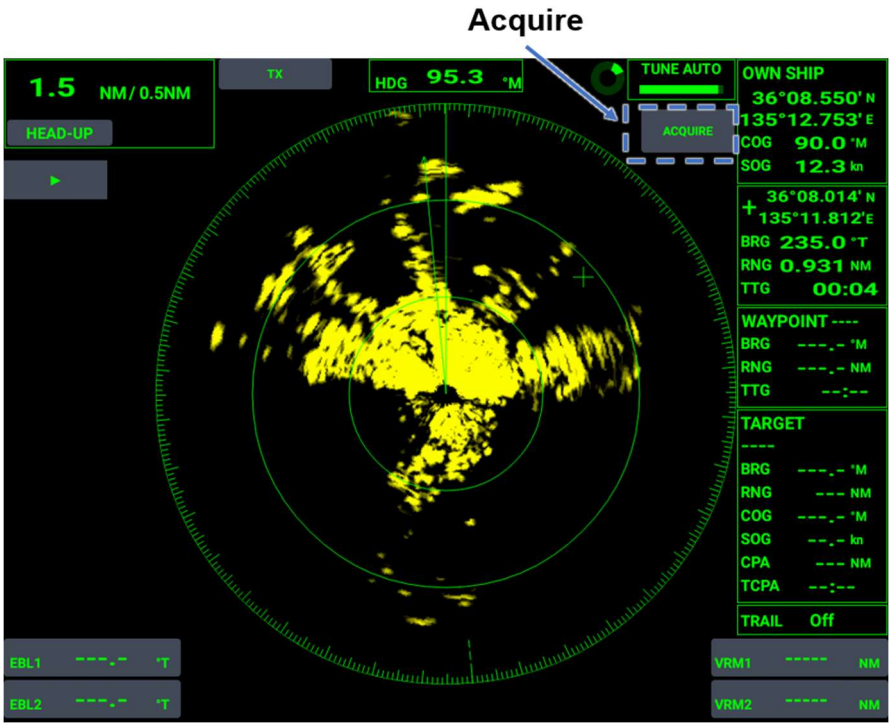


2.24.3 How to acquire and track targets

This equipment can manually or automatically acquire and track targets.

How to manually acquire targets

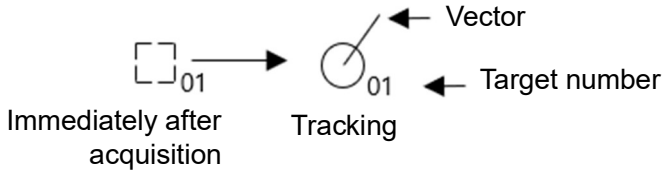
1. Tap the target to acquire, and the cursor appears.
2. Tap the [ACQUIRE] button displayed below the data box.



Note: If any of the following conditions is not met, the manual acquisition is not activated and error sound beeps.

- The communication connection to the antenna unit is blocked.
- The capacity for manual target acquisition is reached.
- The [TT DISPLAY] menu is set to [Off].
- The bearing signal becomes lost.
- Out of acquisition range

Right after the acquisition, the acquisition symbol is shown as a dashed square. If the target is consistently shown for about 1 minute, the acquisition symbol changes into a solid-line circle. If tracking is successful after about 3 minutes, a vector indicating the direction of movement appears. If acquisition fails, the acquisition symbol flashes.



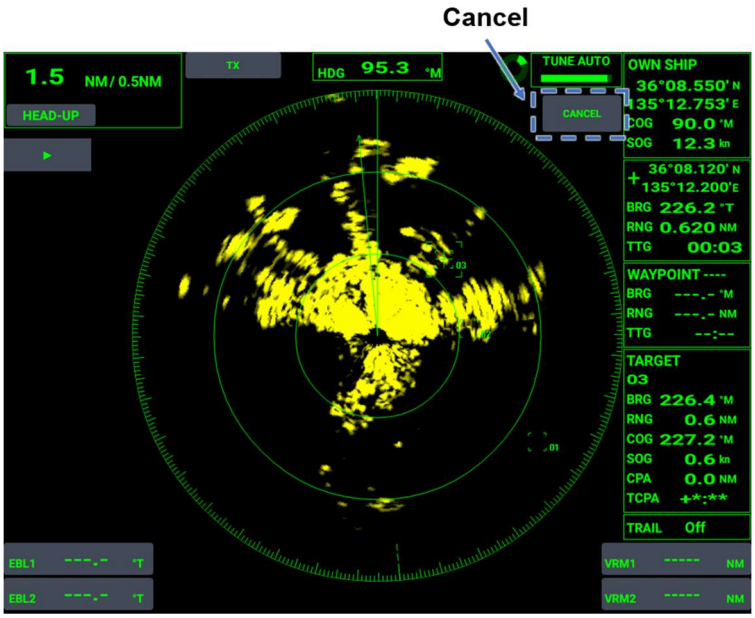
Target numbers

Target numbers are assigned in ascending order. If a number is not used due to a loss of targets, etc., and then a new target is acquired, an assignable number is searched in order from the smallest number and an unused number is assigned.

2.24.4 How to cancel the tracking

How to cancel tracking of individual targets

1. Tap the acquisition symbol of the target for which you want to cancel tracking, and the cursor appears on the target.
2. Tap [CANCEL] shown on the right side of the screen.



2.24.5 Lost target

Targets cannot be tracked if echoes from the tracking target disappear. When a target is lost, an alarm sounds and the target symbol changes into a lost target symbol (flashing) and the alert message “LOST” appears at the lower part of the screen. If the target is lost near the own ship, confirm your safety.

If a target once lost is acquired again, the normal acquisition symbol is restored. To erase the lost target symbol, tap the lost target symbol, then press the **MENU/ESC** key. If the symbol is left flashing, the lost target symbol disappears in about 1 minute.

Take the following steps to cancel the lost target tracking.

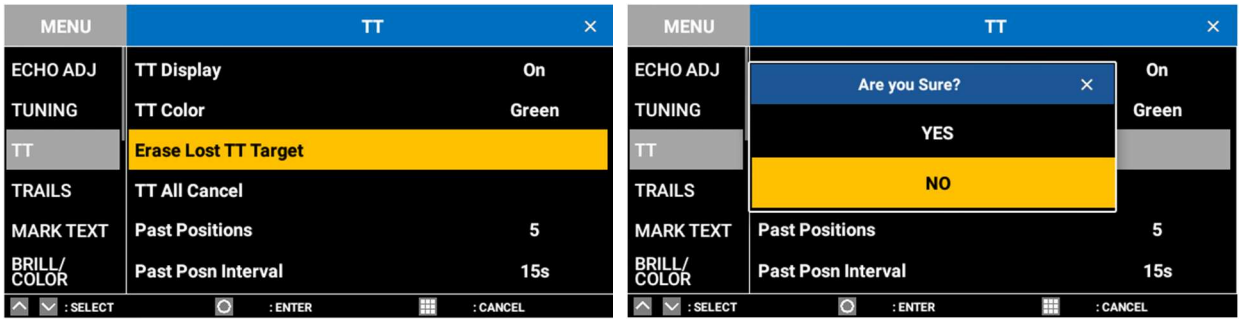
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TT].
3. Tap [Erase Lost TT Target].
   A popup message appears.
4. Tap [Yes] or [No].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TT] with the arrow keys, then press the **ENTER** key.
3. Select [Erase Lost TT Target] with the arrow keys, then press the **ENTER** key.
   A popup message appears.

4. Select [Yes] or [No] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.24.6 TT All Cancel

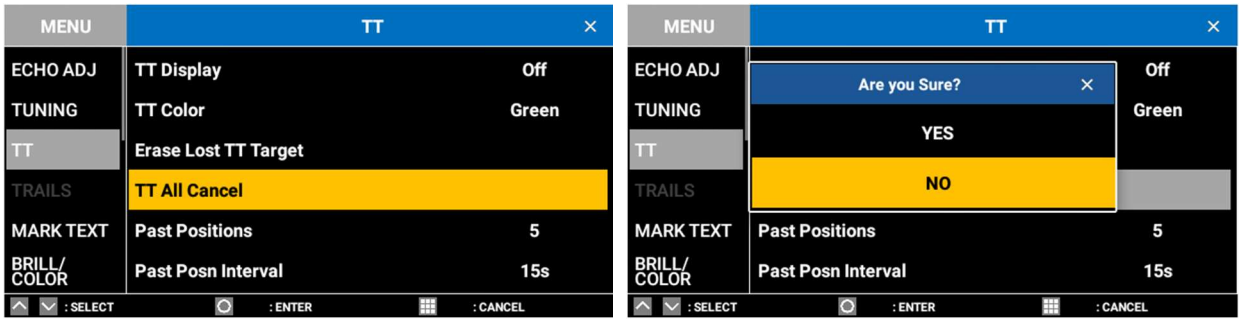
Take the following steps to cancel all TT and erase the symbols.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TT].
3. Tap [TT All Cancel].
   A popup message appears.
4. Tap [Yes] or [No].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TT] with the arrow keys, then press the **ENTER** key.
3. Select [TT All Cancel] with the arrow keys, then press the **ENTER** key.
   A popup message appears.
4. Select [Yes] or [No] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.24.7 How to display the TT vector

What is a vector?

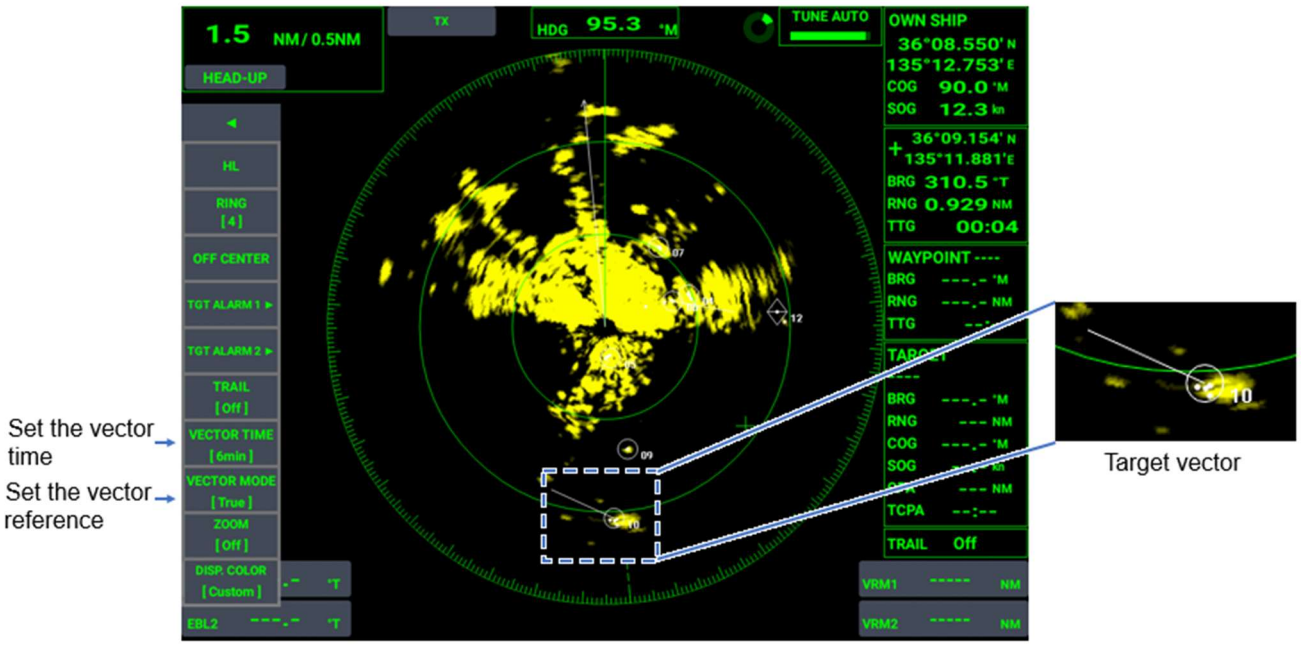
A vector is a line extending from the center of a tracked target, and it shows the speed and course of the target. The vector tip shows an estimated position of the target after the selected vector time elapses. By extending the vector length, the risk of collision with any target can be estimated. The vector color is the same as the symbol color of TT targets.

How to set the vector time

1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap [VECTOR TIME] on the InstantAccess™ Bar.
3. The time cycles through [1 min], [3 min], [6 min], [10 min], [15 min] and [30 min] with each tap. Select a vector time.
4. Tap [◀] to close the InstantAccess™ Bar.

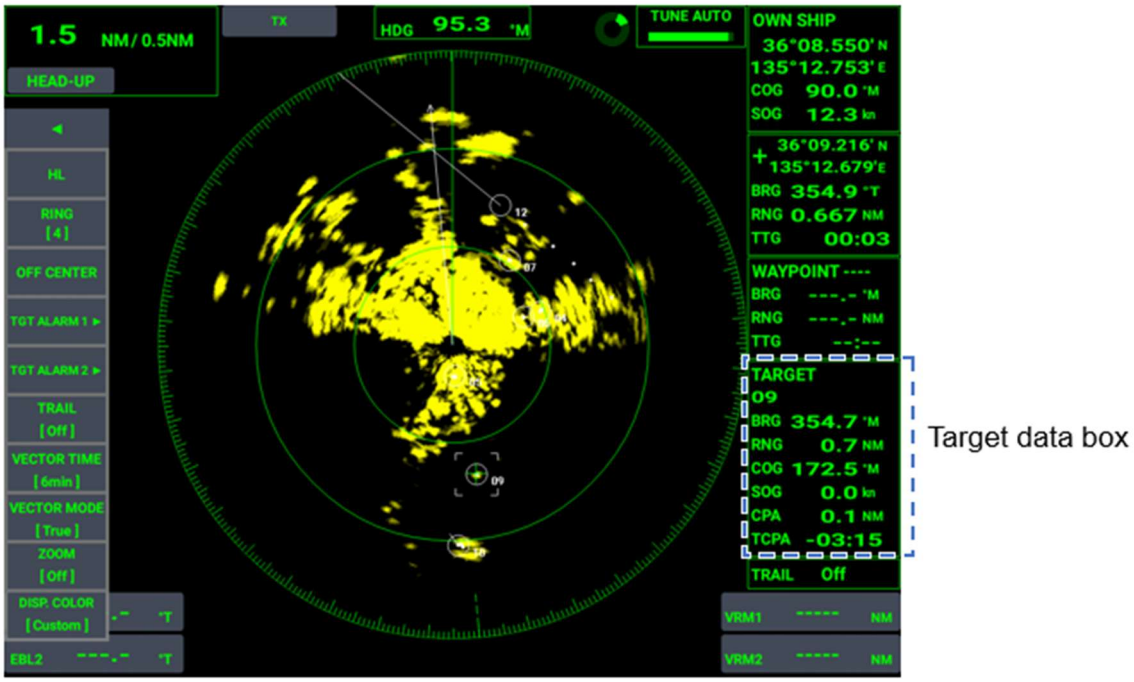
How to set vector reference

1. Tap [▶] on the left side of the screen to open the InstantAccess™ Bar.
2. Tap [VECTOR MODE] on the InstantAccess™ Bar.
3. The vector reference cycles through [True] and [Relative] with each tap. Select a vector reference.
   - [True]: Indicates the true movement of own ship and other ship relative to a landmass. Use this mode to easily identify a moving target from a fixed target.
   - [Relative]: Indicates the movement of other ship relative to own ship. This mode is suitable for determining dangerous targets for own ship and for evaluating the risk of collision. The vector tip of a target on a collision course is directed toward own ship.
4. Tap [◀] to close the InstantAccess™ Bar.



2.24.8 How to display TT data

Data on tracked targets (bearing, course, range, speed, CPA, TCPA) are displayed in the data box on the right side of the screen. Set the [TT DISPLAY] menu in the [TT] menu to [On] to show the data.



1. Tap a TT target whose information you want to view.
2. The [+] cursor moves onto the TT symbol.
   [TT DATA BOX] shows the TT information for the TT currently selected.
   When a TT is deleted, the [TT DATA BOX] information is also deleted.

2.24.9 Past position display

The past position display shows equally time-spaced dots marking the past positions of any targets being tracked.
A new dot is added every minute (or at other preset time intervals) until the preset number is reached. If a target changes its speed, the spacing will be uneven. If it changes the course, its plotted course will not be a straight line.

How to set the number of tracks points to show

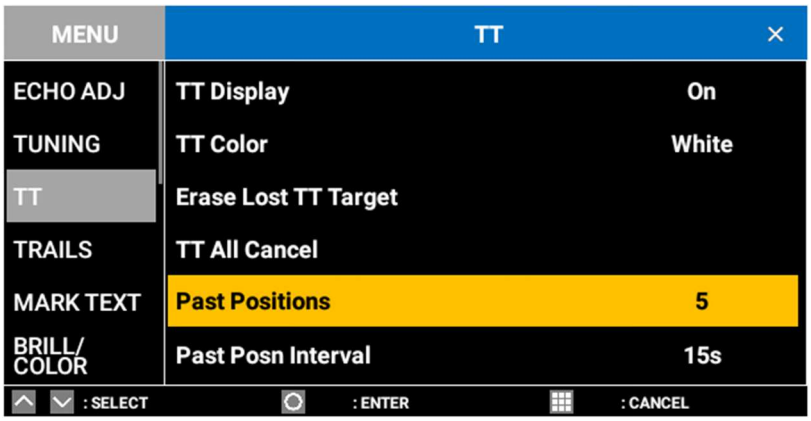
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TT].
3. Tap [Past Positions].
   The [Off]/[5]/[10] selection box appears.
4. Tap [Off], [5] or [10].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TT] with the arrow keys, then press the **ENTER** key.

3. Select [Past Positions] with the arrow keys, then press the **ENTER** key.
   The [Off]/[5]/[10] selection box appears.
4. Select [Off], [5] or [10] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



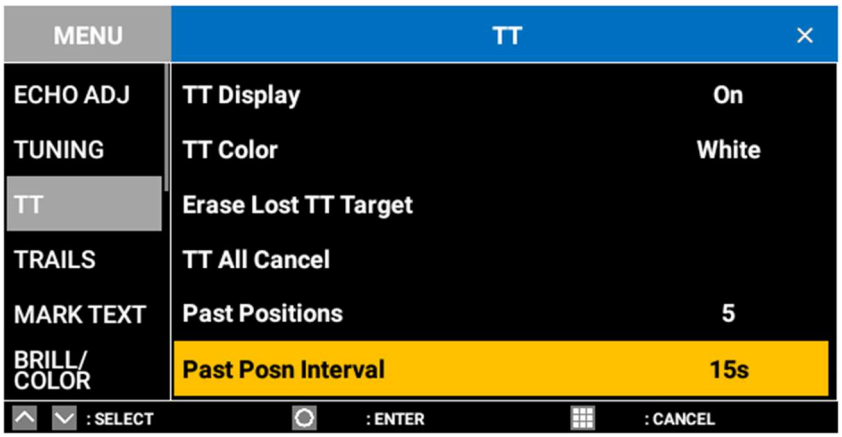
How to display past position points and select the plotting interval

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TT].
3. Tap [Past Posn Interval].
   The [15 s]/[30 s]/[1 min]/[2 min]/[3 min]/[6 min]/[12 min] selection box appears.
4. Tap [15 s], [30 s], [1 min], [2 min], [3 min], [6 min] or [12 min].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TT] with the arrow keys, then press the **ENTER** key.
3. Select [Past Posn Interval] with the arrow keys, then press the **ENTER** key.
   The [15 s]/[30 s]/[1 min]/[2 min]/[3 min]/[6 min]/[12 min] selection box appears.
4. Select [15 s], [30 s], [1 min], [2 min], [3 min], [6 min] or [12 min] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.24.10 How to set a collision alert (CPA/TCPA alert)

To avoid collision with other ships, preset a threshold for CPA (Closest Point of Approach to own ship by other ships) and TCPA (Time to Closest Point of Approach). If both the CPA and TCPA of a tracking target becomes smaller than these two thresholds, the target is recognized as a dangerous target (lit in red) and an alert message appears simultaneously in the “ALERT LIST” window. If both the CPA and TCPA of a sleeping target becomes smaller than the thresholds, the target is automatically activated to become a dangerous target.
To silence the aural alarm and erase the alert message, press any key on the key pad. The dangerous target remains displayed until the dangerous state is removed.

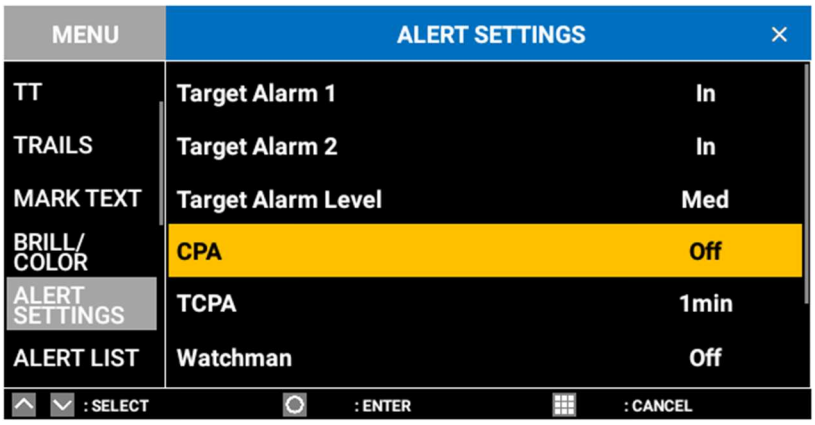
How to set the CPA threshold

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALERT SETTINGS].
3. Tap [CPA].
   The [Off]/[0.5NM]/[1NM]/[2NM]/[3NM]/[5NM]/[6NM] selection box appears.
4. Tap [Off]/[0.5NM]/[1NM]/[2NM]/[3NM]/[5NM]/[6NM].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALERT] with the arrow keys, then press the **ENTER** key.
3. Select [CPA] with the arrow keys, then press the **ENTER** key.
   The [Off]/[0.5NM]/[1NM]/[2NM]/[3NM]/[5NM]/[6NM] selection box appears.
4. Select [Off]/[0.5NM]/[1NM]/[2NM]/[3NM]/[5NM]/[6NM] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



How to set the TCPA threshold

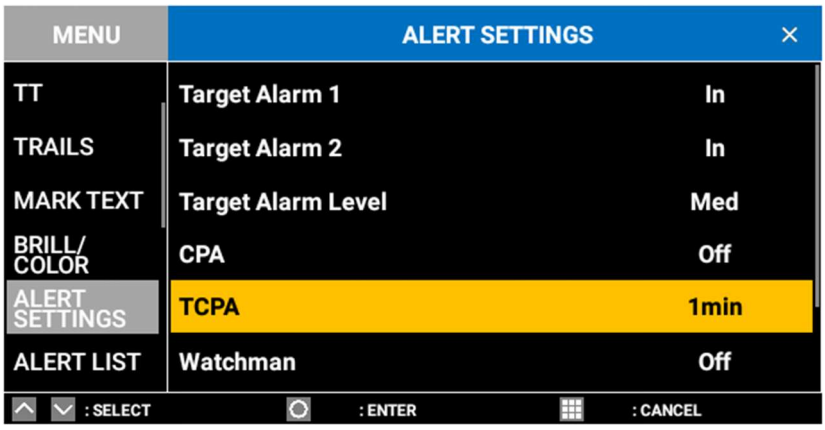
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALERT SETTINGS].
3. Tap [TCPA].
   The [30 s]/[1 min]/[2 min]/[3 min]/[4 min]/[5 min]/6 min]/[12 min] selection box appears.

4. Tap [30 s], [1 min], [2 min], [3 min], [4 min], [5 min], [6 min] or [12 min].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALERT SETTINGS] with the arrow keys, then press the **ENTER** key.
3. Select [TCPA] with the arrow keys, then press the **ENTER** key.
   The [30 s]/[1 min]/[2 min]/[3 min]/[4 min]/[5 min]/6 min]/[12 min] selection box appears.
4. Select [30 s], [1 min], [2 min], [3 min], [4 min], [5 min], [6 min] or [12 min] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



2.24.11 Proximity alert

The proximity alert sounds an alarm when the range to target becomes smaller than the set value. When the alert state is activated, the target acquisition symbol becomes red an alarm sounds, and the alert message [Proximity] shown at the lower part of the screen. To silence the aural alarm and erase the alert message, press any key on the key pad. The dangerous target is displayed until the range to the target becomes larger than the set value, the range setting of the proximity alert is changed, or the proximity alert function is turned off.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALERT SETTINGS].
3. Tap [Proximity].
   The [Off]/[0.5NM]/[1NM]/[2NM]/[3NM]/[5NM]/[6NM]/[12NM]/[24NM] selection box appears.
4. Tap [Off], [0.5NM], [1NM], [2NM], [3NM], [5NM], [6NM], [12NM] or [24NM].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALERT SETTINGS] with the arrow keys, then press the **ENTER** key.
3. Select [Proximity] with the arrow keys, then press the **ENTER** key.
   The [Off]/[0.5NM]/[1NM]/[2NM]/[3NM]/[5NM]/[6NM]/[12NM]/[24NM] selection box appears.

4. Tap [Off], [0.5NM], [1NM], [2NM], [3NM], [5NM], [6NM], [12NM] or [24NM] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

2.25 Test Menus

2.25.1 Self-diagnostic test

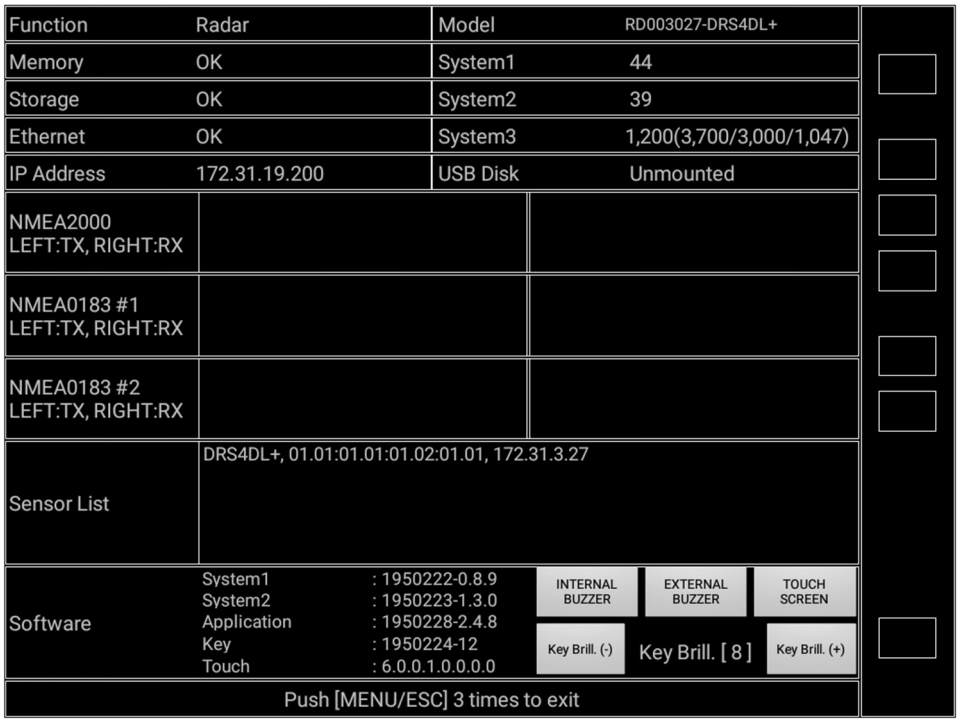
[Self Test] checks the connection state, the data from external equipment, and the key pad for proper operation. Take the following steps to execute the self-diagnostic test.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TESTS].
3. Tap [Self Test].
   The self-diagnostic test screen appears.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TESTS] with the arrow keys, then press the **ENTER** key.
3. Select [Self Test] with the arrow keys, then press the **ENTER** key.
   The self-diagnostic test screen appears.



Items checked in the self-diagnostic test are as follows.

Items	Descriptions
Function	Shows the currently active functions.
Model	Shows the name(s) of currently active sensors.
Memory	Executes various system memory-related operations and displays the results.

Items	Descriptions
Destination to save	Writes into and reads from the system memory and displays the results.
Ethernet	Shows whether wired LAN is connected or not.
IP address	Shows the IP address for this equipment.
System 1	Shows the system 1 test results. (For the service technician)
System 2	Shows the system 2 test results. (For the service technician)
System 3	Shows the system 3 test results. (For the service technician)
USB disc	Shows whether USB memory is connected to the USB port or not.
NMEA 2000	Shows output data in the left box and input data in the right box.
NMEA 0183 #1	
NMEA 0183 #2	
Sensor list	Shows a list of sensors detected.
Software	Shows the version of system 1, system 2 and application.
Internal buzzer	Tap to turn on/off the internal buzzer.
External buzzer	Tap to turn on/off the external buzzer (if connected).
Touch screen	1) Touch anywhere on the screen. A white screen appears and displays red dots at the locations touched on the screen. 2) Drag finger across the screen. Red lines are drawn where finger is dragged.

To quit the test, press the **MENU/ESC** key three times.

2.25.2 LCD test

The [LCD Test] checks the LCD for proper operation. Take the following steps to test the LCD.

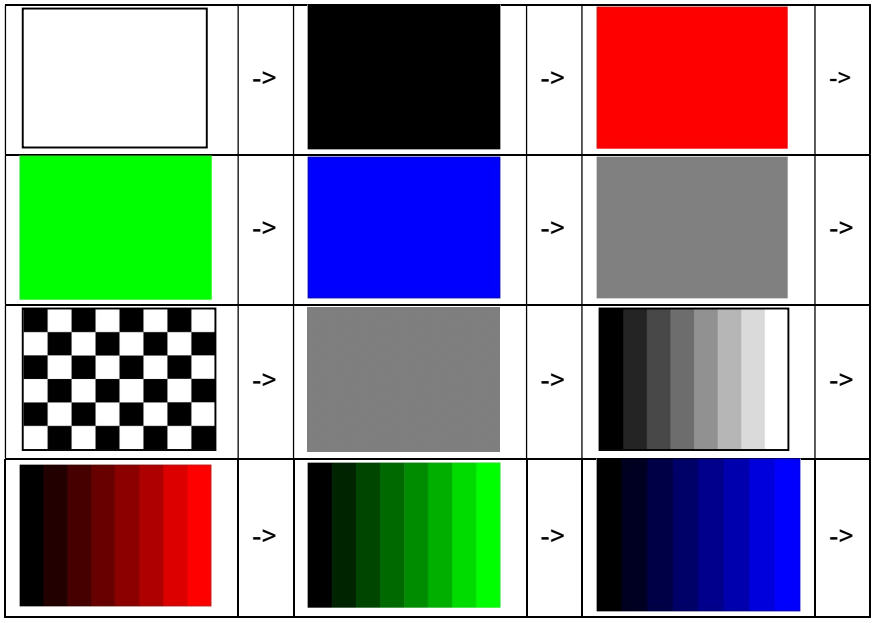
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TESTS].
3. Tap [LCD Test].
   The LCD pattern test screen appears.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TESTS] with the arrow keys, then press the **ENTER** key.
3. Select [LCD Test] with the arrow keys, then press the **ENTER** key.
   The LCD pattern screen appears.

Tap the screen to change the color. Check if the colors are normal.



To quit the test, press the **MENU/ESC** key.

2.25.3 Radar sensor test

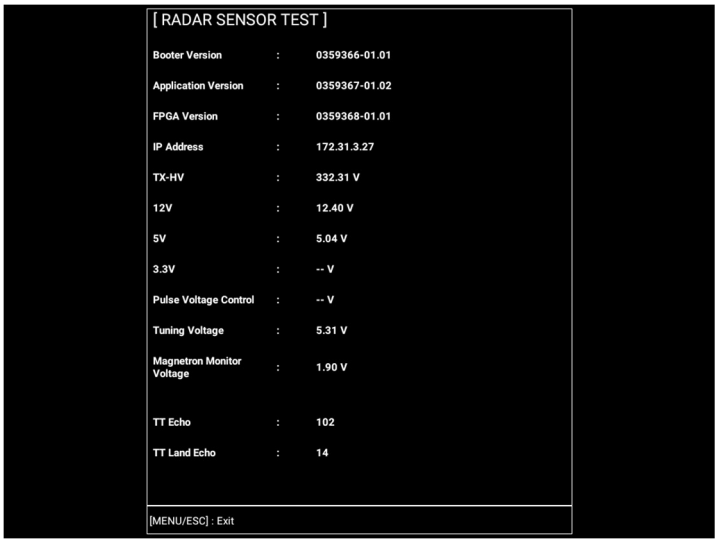
The [Radar Sensor Test] checks whether radar sensors are properly connected or not.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [TESTS].
3. Tap [Radar Sensor Test].
   The antenna unit test screen appears.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [TESTS] with the arrow keys, then press the **ENTER** key.
3. Select [Radar Sensor Test] with the arrow keys, then press the **ENTER** key.
   The antenna unit test screen appears.



To quit the test, press the **MENU/ESC** key.

2.26 Initialization Menu

This menu initializes the selected memory.

How to initialize the sensor memory

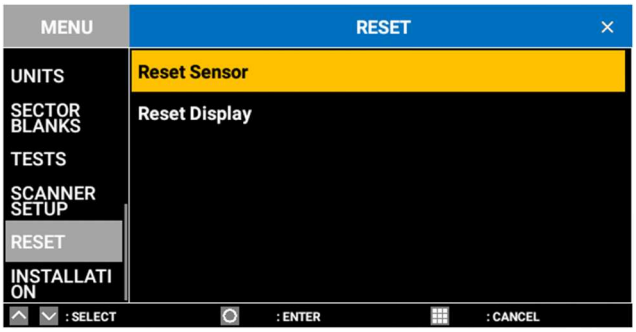
Take the following steps to initialize the sensor memory.

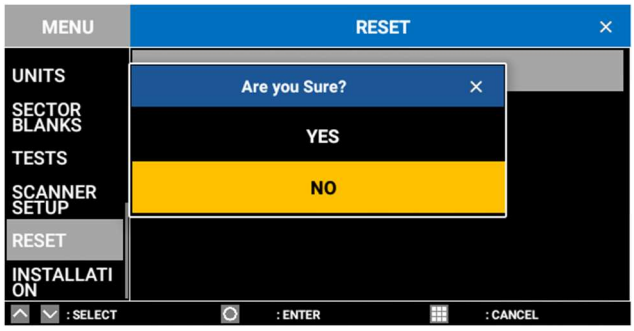
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [RESET].
3. Tap [Reset Sensor].
   A popup message appears.
4. Tap [YES] or [NO].
5. Tap [x] on the title bar to close.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [RESET] with the arrow keys, then press the **ENTER** key.
3. Select [Reset Sensor] with the arrow keys, then press the **ENTER** key.
   A popup message appears.
4. Select [YES] or [NO] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].





How to initialize the display

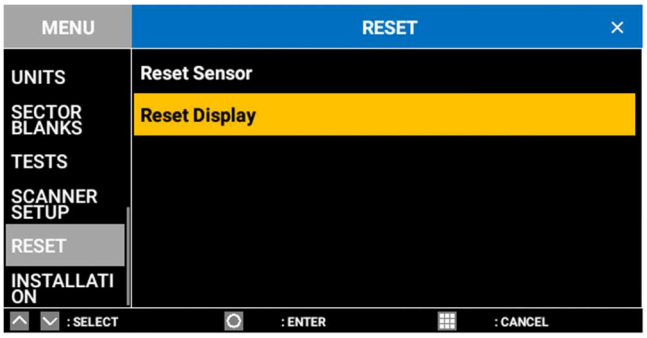
Take the following steps to initialize the display unit memory.

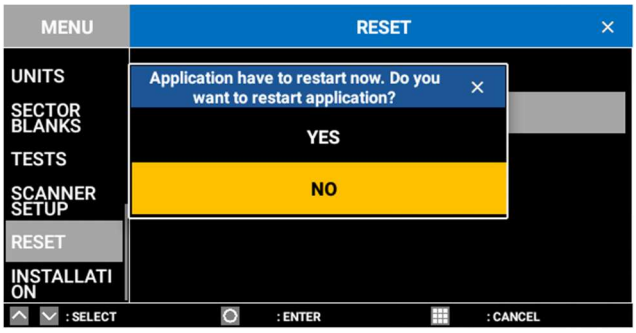
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [RESET].
3. Tap [Reset Display].
   A popup message appears.
4. Tap [YES] or [NO].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [RESET] with the arrow keys, then press the **ENTER** key.
3. Select [Reset Display] with the arrow keys, then press the **ENTER** key.
   A popup message appears.
4. Select [YES] or [NO] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

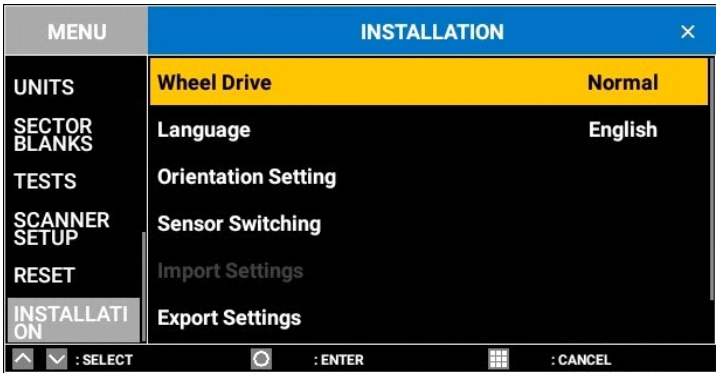




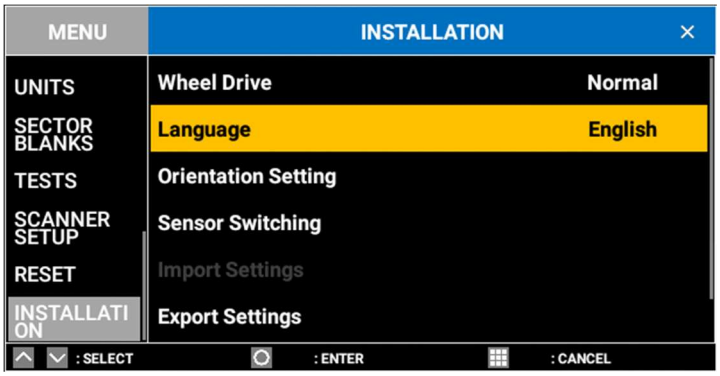
2.27 Installation Menu

The [INSTALLATION] menu provides the following items.

[Wheel Drive]: Scrolling direction of the mouse wheel can be selected from [Normal] or [Reverse].



[Language]: Select the display language to use.



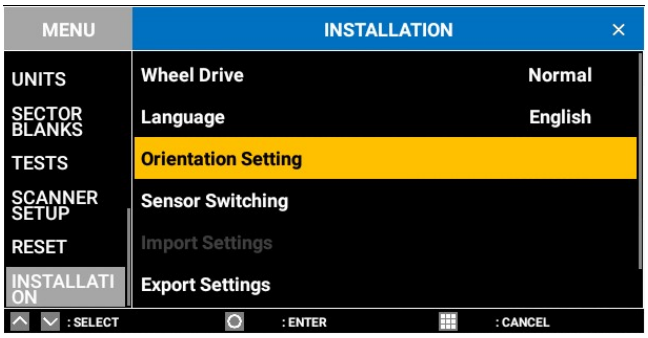
[Orientation Setting]: Change the screen orientation, between landscape and portrait.

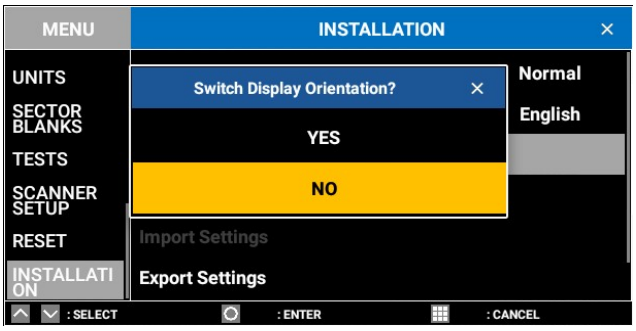
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [INSTALLATION] menu.
3. Tap [Orientation Switching].
   A popup message appears.
4. Tap [YES] or [NO].
   Tapping “YES” automatically restarts the equipment and changes the screen orientation.
5. In the case of “NO”, tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [INSTALLATION] menu with the arrow keys, then press the **ENTER** key.
3. Select [Orientation Setting] with the arrow keys, then press the **ENTER** key.
   A popup message appears.
4. Select [YES] or [NO] with the arrow keys, then press the **ENTER** key.
   Selecting “YES” automatically restarts the equipment and changes the screen orientation.
5. In the case of “NO”, press the **MENU/ESC** key to close [MENU].





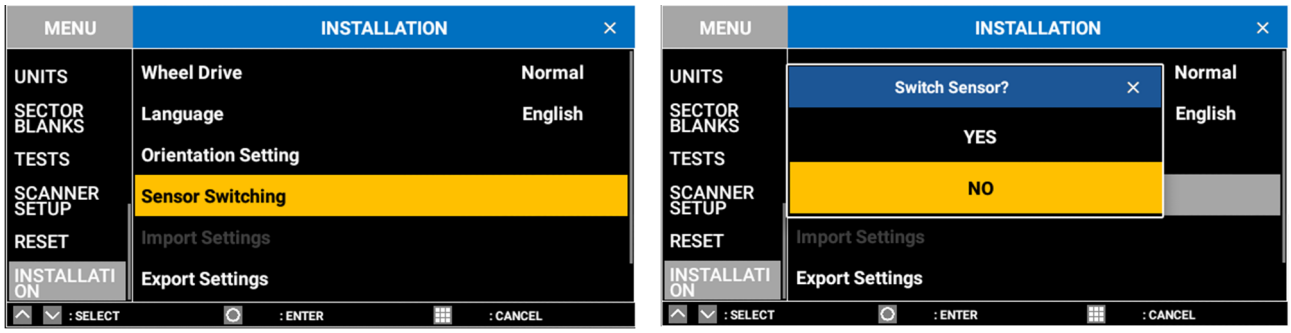
[Sensor Switching]: Change the radar sensor to use. The radar stops rotating, then the radar sensor selection window appears. Select the radar sensor as shown below.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [INSTALLATION] menu.
3. Tap [Sensor Switching].
   A popup message appears.
4. Tap [YES] or [NO].
   Tapping [YES] automatically moves to the sensor selection screen.
5. In the case of “NO”, tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [INSTALLATION] menu with the arrow keys, then press the **ENTER** key.
3. Select [Sensor Switching] with the arrow keys, then press the **ENTER** key.
   A popup message appears.
4. Select [YES] or [NO] with the arrow keys, then press the **ENTER** key.
   Selecting [YES] automatically moves to the sensor selection screen.
5. In the case of “NO”, press the **MENU/ESC** key to close [MENU].



[Import Settings] : Imports the sensor settings file stored on the USB. If the USB is not connected to the device, or if there is no file related to the sensor stored on the USB, the menu will be disabled and cannot be selected.

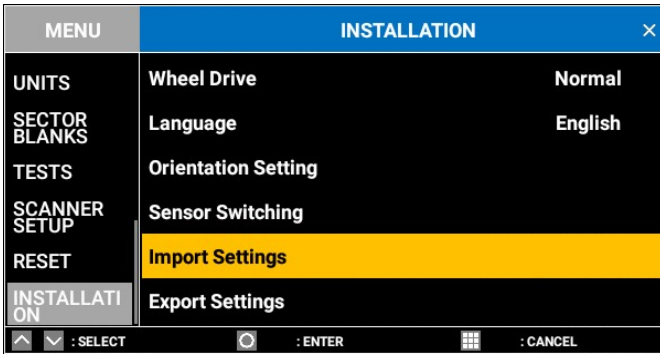
Functions to reading/writing the setting values from the external memory is added.
Note1: Remove the USB memory stick after selecting the menu to safely remove it.
Note2: The setting values are independent for each sensor, so it is necessary to read/write The values for each sensor separately.

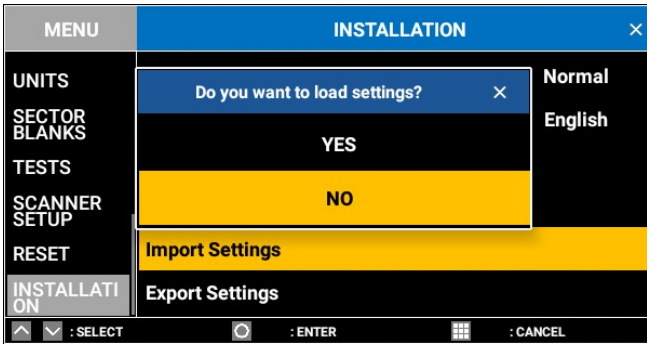
Touch control

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [INSTALLATION].
3. Tap [Import Settings].
4. Select the setting file to import.
   Pop-up message appears.
5. Tap [Yes] or [No].
   When you tap [Yes], the application or power restart after a short period of time and load the values from the selected settings file.
6. When you tap [No], tap [x] on the title bar to close [MENU].

Key control

1. Press the **MENU/ESC** key to open [MENU].
2. Select [INSTALLATION] with the arrow keys, then press the **ENTER** key.
3. Select [Import Settings] with the arrow keys, then press the **ENTER** key.
4. Select the setting file to import with the arrow keys, then press the **ENTER** key.
   Pop-up message appears.
5. Select [Yes] or [No] with the arrow keys, then press the **ENTER** key.
   When you tap [Yes], the application or power restart after a short period of time and load the values from the selected settings file.
6. When you select [No], press the **MENU/ESC** key to close [MENU].





[Export Settings] : Exports the currently set sensor values to the connected USB device. If no USB device is connected, a message indicating that no USB device is connected is displayed.

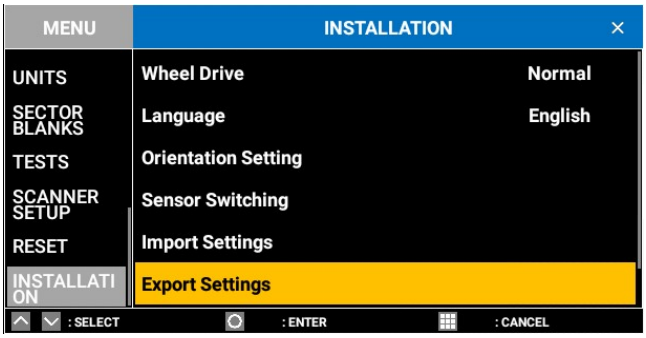
Note1: Remove the USB memory stick after selecting the menu to safely remove it.
Note2: The setting values are independent for each sensor, so it is necessary to read/write the values for each sensor separately.

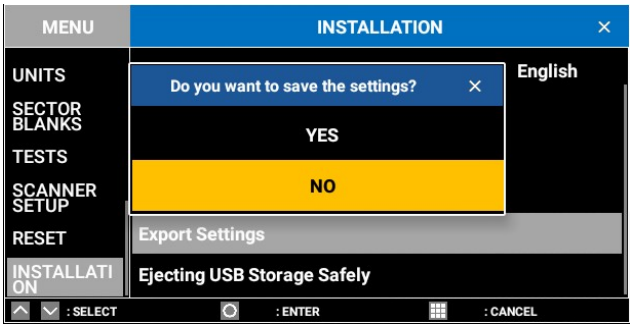
Touch control

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [INSTALLATION].
3. Tap [Export Settings].
   Pop-up message appears.
4. Tap [Yes] or [No].
   Tap [Yes] to export the settings file to the USB. A “Success” message will appear on the screen.
5. When you tap [No], tap [x] on the title bar to close [MENU].

Key control

1. Press the **MENU/ESC** key to open [MENU].
2. Select [INSTALLATION] with the arrow keys, then press the **ENTER** key.
3. Select [Export Settings] with the arrow keys, then press the **ENTER** key.
   Pop-up message appears.
4. Select [Yes] or [No] with the arrow keys, then press the **ENTER** key.
   Select [Yes] with the arrow keys to export the settings file to the USB. A “Success” message will appear on the screen.
5. When you select [No], press the **MENU/ESC** key to close [MENU].





[Ejecting USB Storage Safely] : USB memory sticks can be safely removed.

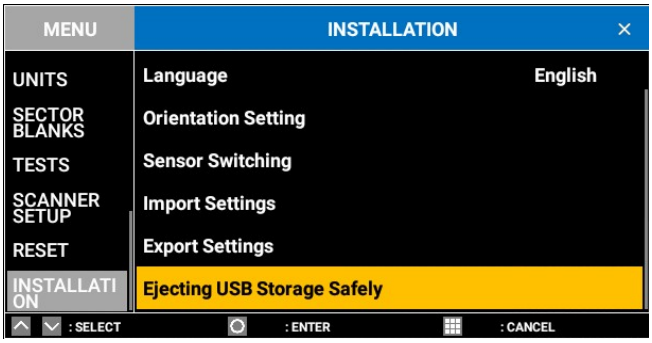
Note1: Remove the USB memory stick after selecting the menu to safely remove it.
Note2: The setting values are independent for each sensor, so it is necessary to read/write the values for each sensor separately.

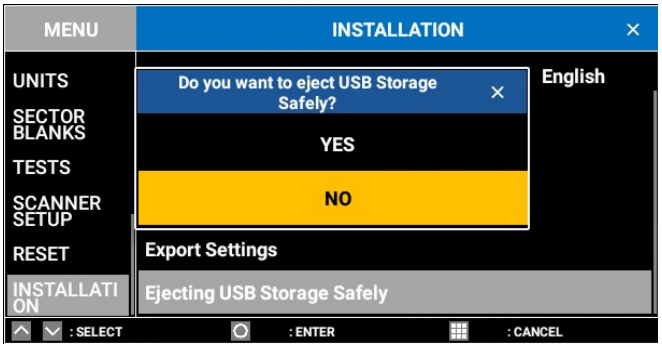
Touch control

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [INSTALLATION].
3. Tap [Ejecting USB Storage Safely].
   Pop-up message appears.
4. Tap [Yes] or [No].
   When you tap [Yes], A “Success” message will appear on the screen.
5. When you tap [No], tap [x] on the title bar to close [MENU].

Key control

1. Press the **MENU/ESC** key to open [MENU].
2. Select [INSTALLATION] with the arrow keys, then press the **ENTER** key.
3. Select [Ejecting USB Storage Safely] with the arrow keys, then press the **ENTER** key.
   Pop-up message appears.
4. Select [Yes] or [No] with the arrow keys, then press the **ENTER** key.
   When you select [Yes], A “Success” message will appear on the screen.
5. When you select [No], press the **MENU/ESC** key to close [MENU].





2.28 Service Menu

To show the [SERVICE] menu, press the **TLL** key five times while pressing the **MENU/ESC** key.

2.28.1 Antenna rotation

Take the following steps to start or stop antenna rotation.

Touch control:

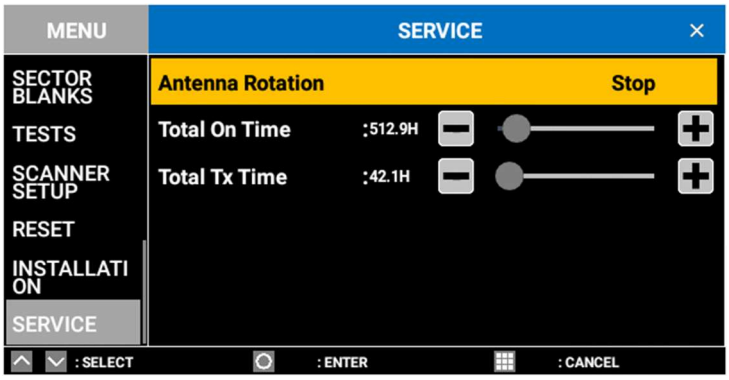
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SERVICE].
3. Tap [ANTENNA ROTATION].
   The [ROTATE]/[STOP] selection box appears.
4. Tap [ROTATE] or [STOP].

4. Tap [ROTATE] or [STOP].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SERVICE] with the arrow keys, then press the **ENTER** key.
3. Select [ANTENNA ROTATION] with the arrow keys, then press the **ENTER** key.
   The [ROTATE]/[STOP] selection box appears.
4. Select [ROTATE] or [STOP] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

Note: The [ANTENNA ROTATION] menu is disabled when the radar is in the transmission state.



2.28.2 Operating time

You can see the radar sensor total on time as follows.

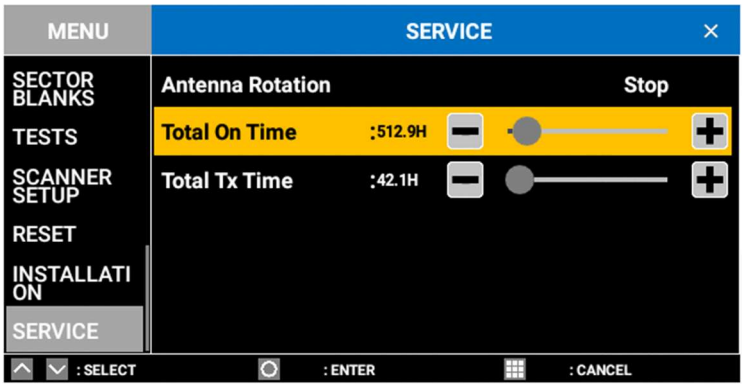
Note: This menu is for use by the service technician. Do not change the indication.

Touch control:

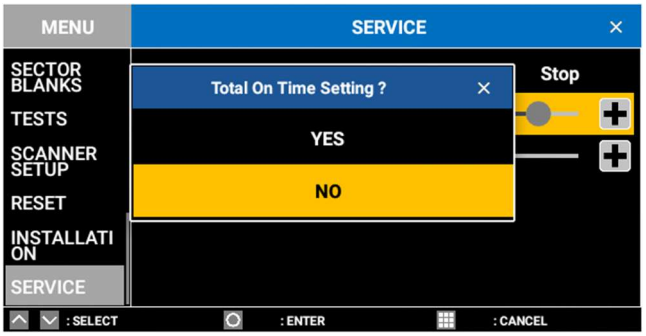
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SERVICE].
3. Tap [OPERATING TIME].
   The cursor moves to the slider bar on the right side of the menu.
4. For the service technician: Drag the slider bar or tap [+] or [-] to adjust the operating time.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SERVICE] with the arrow keys, then press the **ENTER** key.
3. Select [OPERATING TIME] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
4. For the service technician: Adjust the operating time with the arrow keys.
5. Press the **MENU/ESC** key to close [MENU].



Note: After setting the total on time, a popup asks if you are sure to change the setting. Select [YES] to change the setting, or [NO] to escape and keep the previous setting.



2.28.3 Transmission time

Take the following steps to check the total transmission time.

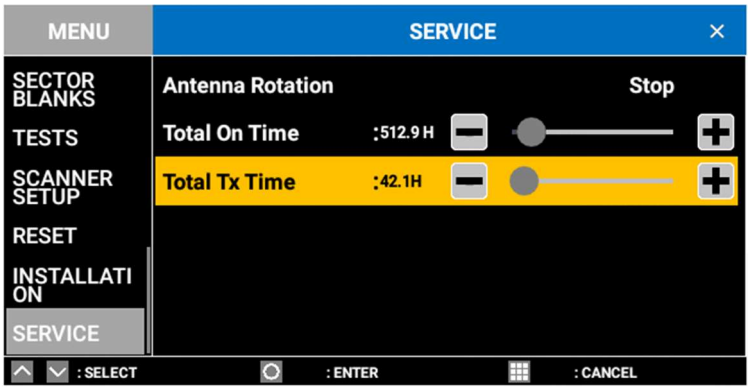
Note: This menu is for use by the service technician. Do not change the indication.

Touch control:

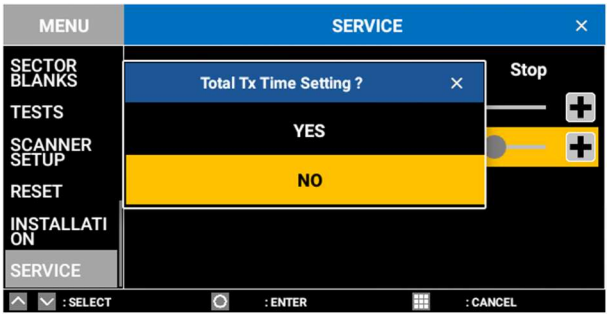
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SERVICE].
3. Tap [TRANSMISSION TIME].
   The cursor moves to the slider bar on the right side of the menu.
4. For the service technician: Drag slider bar or tap [+] or [-] to adjust the transmission time.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SERVICE] with the arrow keys, then press the **ENTER** key.
3. Select [TRANSMISSION TIME] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
4. For the service technician: Adjust the transmission time with the arrow keys.
5. Press the **MENU/ESC** key to close [MENU].



Note: After setting the total TX time, a popup asks if you are sure to change the setting. Select [YES] to change the setting, or [NO] to escape and keep the previous setting.



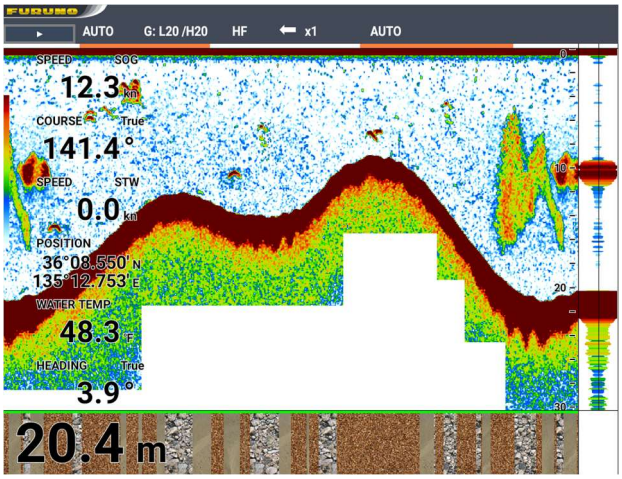
3 FISH FINDER

3.1 Basic Operation of Fish Finder

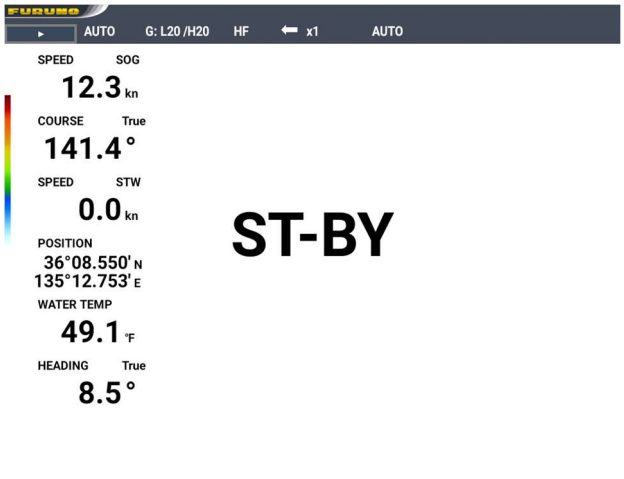
3.1.1 Transmission/stand-by

To start transmission, open the [MENU], select [SOUNDER], then set [Transmit] to [On].
To enter the stand-by mode, set [Transmit] to [Off]. [Off] in a similar manner.



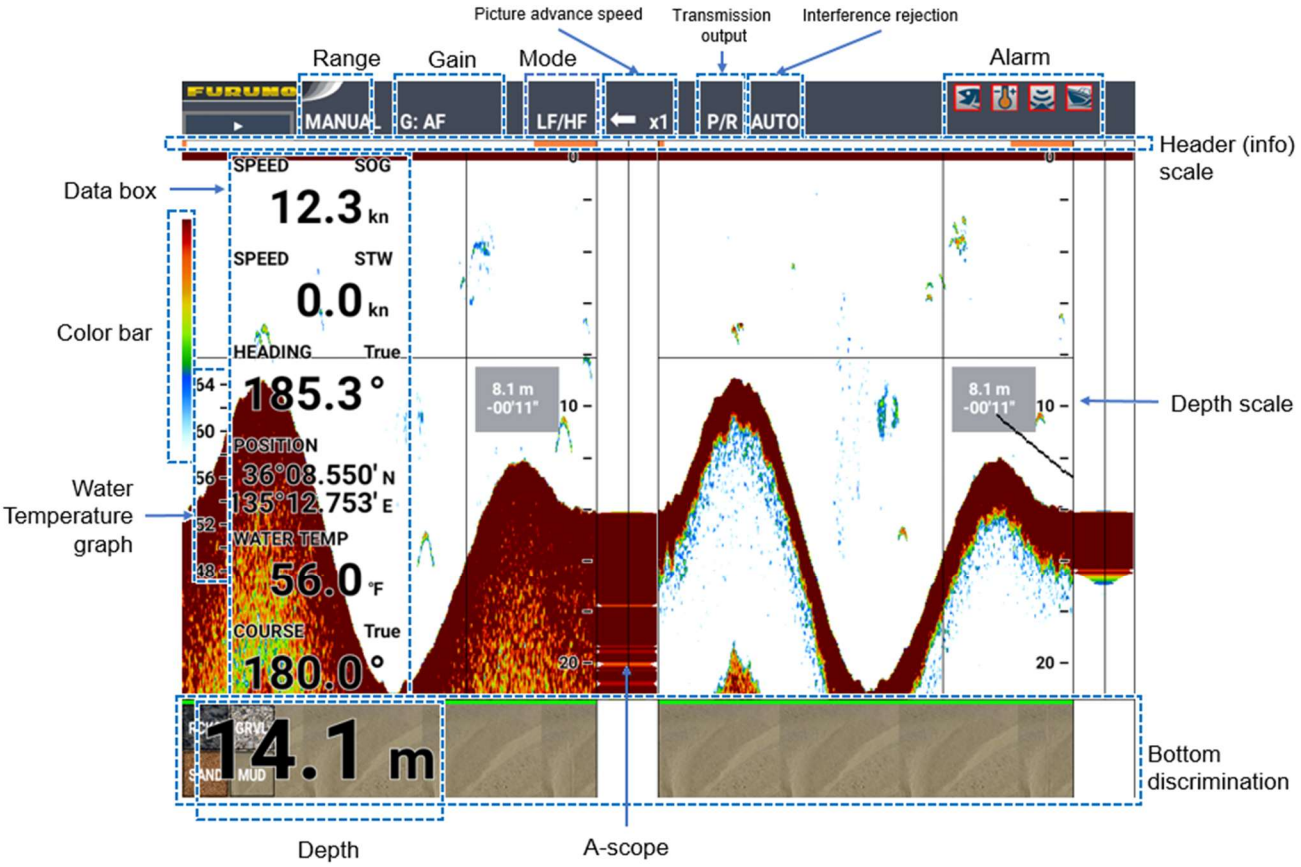


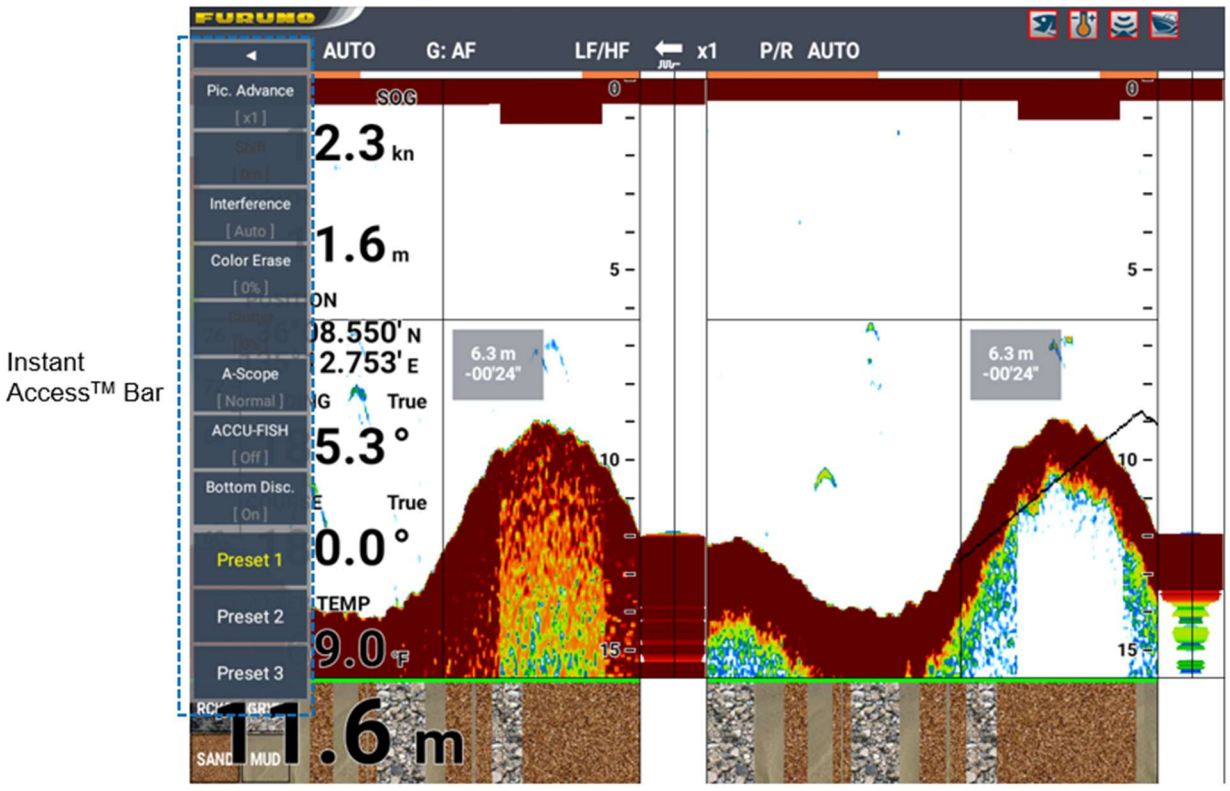
Transmission On state



Transmission Off state

3.1.2 Screen display examples, InstantAccess™ Bar items



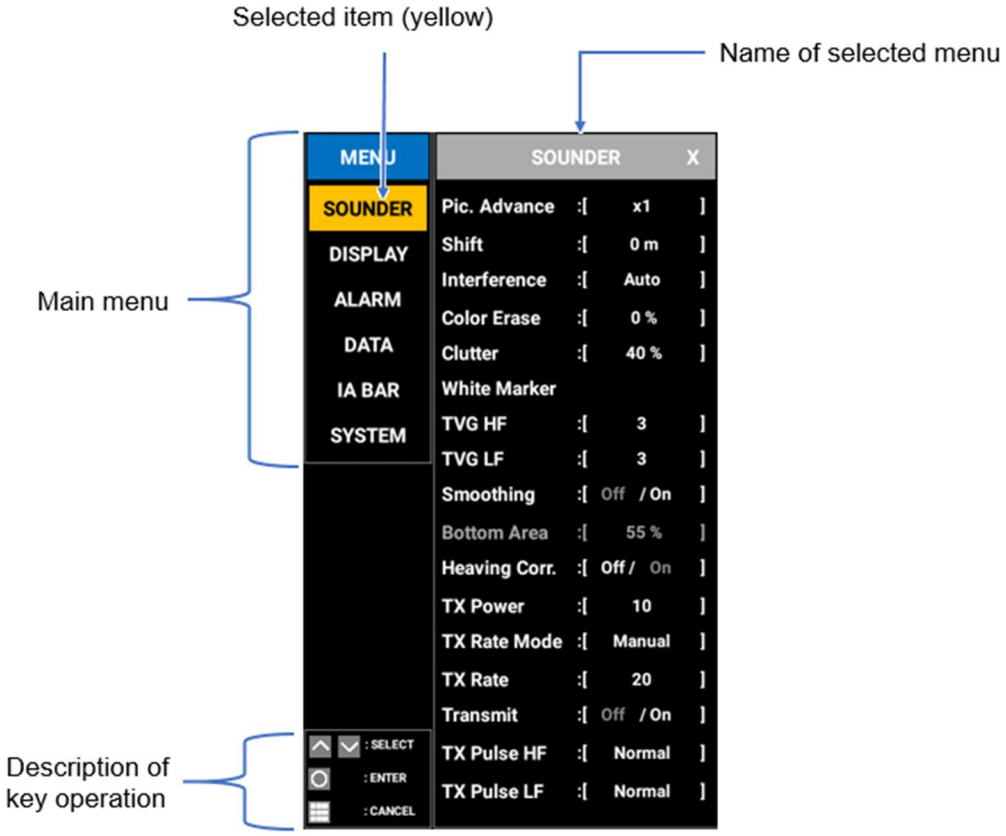


The contents of InstantAccess™ Bar can be set at [IA BAR] in [MENU].

Items	Contents
Function 1 to Function 8	Selected menu on [MENU] - [IA BAR] menu appear.
Preset 1 to Preset 3	Each preset menu (Function 1 to Function 8) can be selected on [MENU] – [IA BAR] menu.

3.1.3 Overview of menu operations

This equipment has six menus related to fish finder operations: [SOUNDER], [DISPLAY], [ALARM], [DATA], [IA BAR] and [SYSTEM]. This section describes basic menu operations.



Description of menus

Menu	Description
SOUNDER	For settings and adjustment related to fish finding.
DISPLAY	For settings and adjustment related to the screen.
ALARM	For settings related to fish finder alarms.
DATA	For settings related to data displayed on the screen and to sensor data.
IA BAR	For settings of menus assigned to the [IA BAR].
SYSTEM	For settings related to the system.

3.2 Display Modes

There are nine fish finder display modes in total. Select a mode according to your purpose.

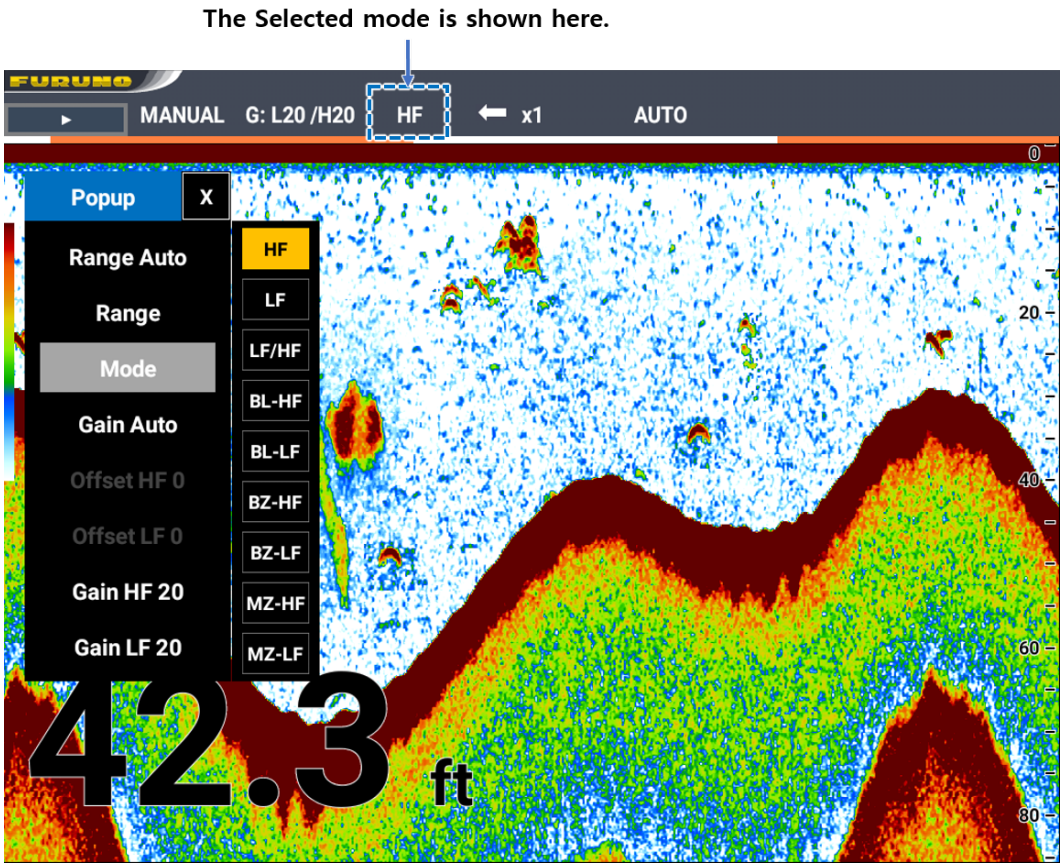
3.2.1 How to Select a display mode

Touch control:

1. Press the **Popup** menu key to open the [Popup] menu.
2. Tap [Mode].
3. Tap a display mode you want to display on the screen.
4. Tap [x] on the title bar to close [MENU].

Key control:

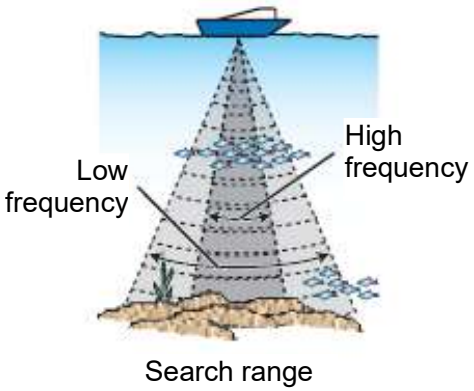
1. Press the **Popup** menu key to open the [Popup] menu.
2. Select [Mode] with the arrow keys, then press the **ENTER** key.
3. Select the display mode you want to display on the screen with the arrow keys, then press the **ENTER** key.
4. Press the **MENU/ESC** key to close [MENU].



3.2.2 Description of display modes

Single frequency display

Low frequency or high frequency picture appears on the entire screen.



Low frequency

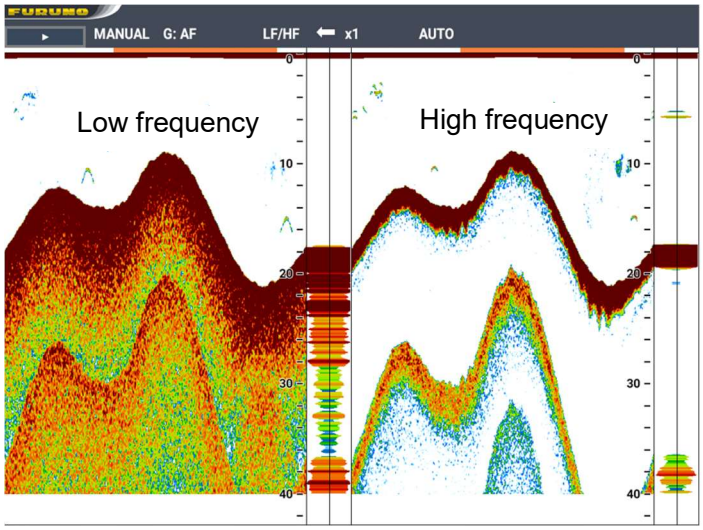
The lower the frequency of the ultrasonic waves emitted into the sea, the wider the search range and the deeper a school of fish can be detected.

High frequency

The higher the frequency, the sharper the emission angle (beam width) of ultrasonic waves and the less the waves are susceptible to noise and air bubbles in the sea, thus providing detection of schools of fish at high resolution. This frequency is useful for detailed observation of schools of fish.

Dual frequency display

The high frequency picture appears on the right half of the screen, and the low frequency picture appears on the left half. Since the observation range (beam width) and the species of fish on the screen vary by frequency, you can distinguish between different fish species and can learn whether you are approaching the center of a fish school or not.



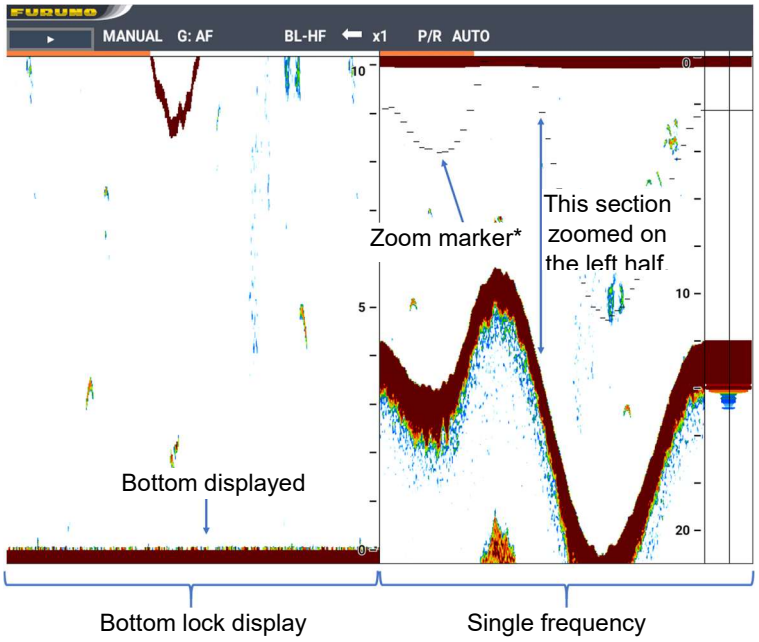
	Beam width	Resolution	Detection range	Tail
Low frequency	Wide	Low	Deep	Long
High frequency	Narrow	High	Shallow	Short

Zoom displays (low frequency / high frequency)

This mode expands a part of the single frequency picture (low frequency or high frequency). There are three types of enlarged displays, "bottom lock", "bottom zoom" and "marker zoom".

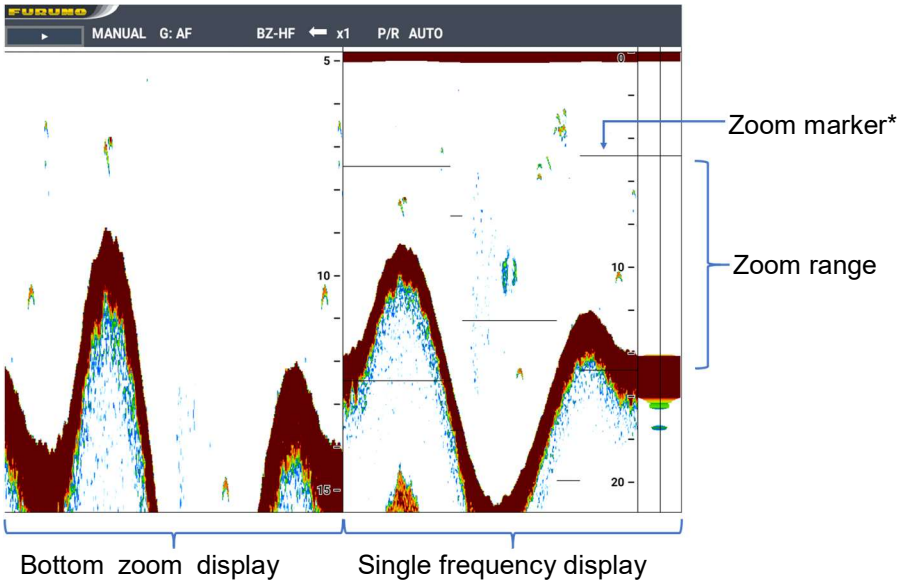
Bottom lock display

This mode provides a “low frequency” picture on the right half of the screen and a picture of the bottom is expanded onto the left half of the screen.
Since the bottom is displayed flat regardless of its rugged condition, this mode is useful for detecting bottom fish (schools of fish near the bottom). Also, the distance between a school of fish and the bottom is clearly displayed, which can be helpful in determining fish species.



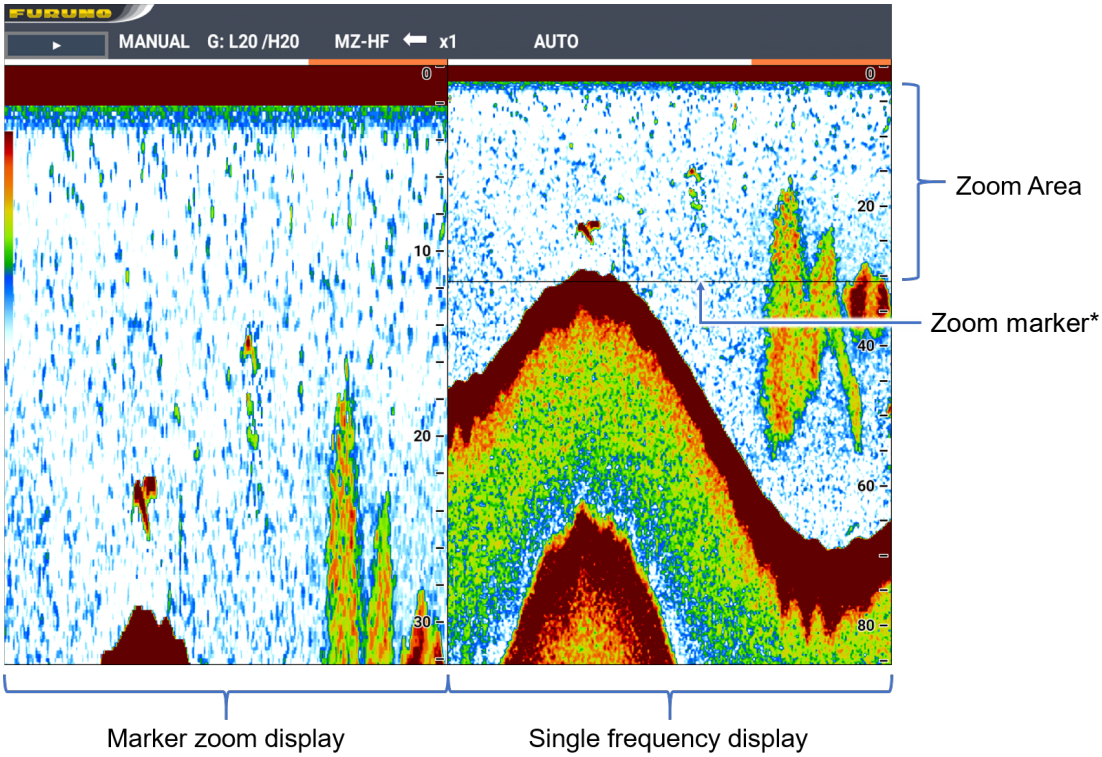
Bottom zoom

This mode provides a “low frequency” picture on the right half of the screen and a picture of the bottom is expanded onto the left half of the screen.
This is useful for detailed observation of bottom contour and bottom material changes. When the bottom echo goes beyond the boundary defined by the zoom range marker, the display is automatically shifted to keep the bottom echo within the lower part of the zoom range.



Marker Zoom

The single frequency picture is shown on the right half of the screen, and the area set by the zoom marker is enlarged on the left half of the screen.



*: The zoom marker may not be displayed depending on the range and zoom range settings. If it is not displayed, change the values for [Range] or [Zoom Range].

3.3 How to Select a Range

The range can be selected automatically or manually.

Note 1: This operation cannot be conducted when the bottom discrimination feature is set to [On].

Note 2: When selecting the same fish finder source on two SFD, set [RANGE 1] through [RANGE 8] of the [RANGE] menu in the [SYSTEM] menu of both SFDs to the same value.

How to select a range mode

Touch control:

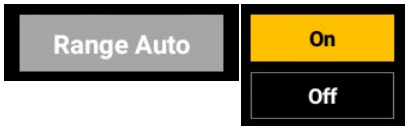
1. Press the **Popup** menu key to open the [Popup] menu.
2. Tap [Range Auto].
3. Tap [On] or [Off].
4. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **Popup** menu key to open the [Popup] menu.
2. Select [Range Auto] with the arrow keys, then press the **ENTER** key.
3. Select [On] or [Off] with the arrow keys, then press the **ENTER** key.
4. Press the **MENU/ESC** key to close [MENU].

Auto

By selecting [On] in [Range Auto], the range automatically changes to display the sea bottom always within the designated range on the screen. (Note that the shift function is inoperative in the auto mode.) [Auto] is shown at the top of the screen.



Manual

By selecting [Off] in [Range Auto], the range can be selected from the eight ranges. Select a range from **Popup** menu ➔ [Range]. [Manual] is shown at the top of the screen.



3.4 Adjusting the Gain

The gain may be adjusted automatically ([Fishing] or [Cruising]) or manually.

⚠ CAUTION

Adjust the "gain" carefully.
If the gain is too low, weak signals may not be shown. If the gain is too high, noise appears and may mask echoes. Further, if the bottom echo is displayed incorrectly or the depth indication is unstable, grounding can occur if the vessel is being steered in shallow waters.

3.4.1 How to set up the auto mode

Major features of the auto mode

- The gain, clutter and TVG are automatically adjusted.
- The gain is automatically adjusted to display the bottom in reddish brown.
- "Clutter" (see section 3.9), which erases faint echoes, automatically works to suppress faint echoes from murky water and plankton, to show clear pictures.
- "TVG" is automatically activated. (see section 3.19)
- The gain balance between low frequency and high frequency is automatically adjusted.
- The range automatically changes to always display the bottom.

The Auto mode function has two modes, the [Fishing] mode and the [Cruising] mode.

- [Fishing]
  This mode clearly displays weak echoes from schools of fish so it is useful for searching for schools of fish. [AF] is shown at the top of the screen.

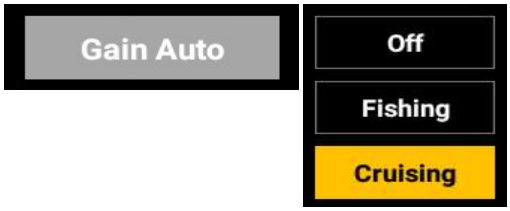
- [Cruising]
  This mode clearly displays stronger echoes and suppresses weak echoes so it is suitable for cruising to a fishing ground. [AC] is shown at the top of the screen. It is useful if you select [Cruising] for cruising to a fishing ground and change it to [Fishing] when you arrive there.

To further decrease or increase the gain, an offset value may be applied [Offset HF] and [Offset LF]. Also, clutter reduction and close range gain reduction are automatically activated.

- If you select [Off], adjust the gain manually. The controls for manual gain adjustment appear at the top of the screen.

Touch control:

1. Press the **Popup** menu key to open the [Popup] menu.
2. Tap [Gain Auto].
3. Tap [Fishing] or [Cruising].
4. Tap [x] on the title bar to close [MENU].

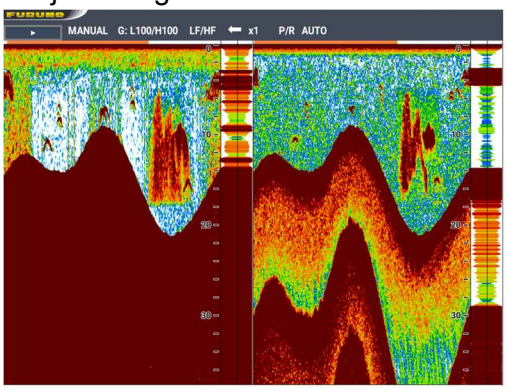


Key control:

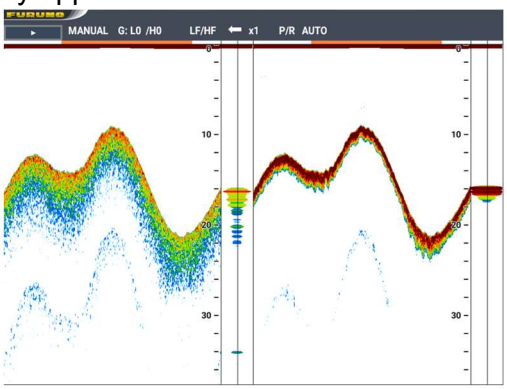
1. Press the **Popup** menu key to open the [Popup] menu.
2. Select [Gain Auto] with the arrow keys, then press the **ENTER** key.
3. Select [Fishing] or [Cruising] with the arrow keys, then press the **ENTER** key.
4. Press the **MENU/ESC** key to close [MENU].

3.4.2 How to set up the manual mode

To always show the underwater images correctly, the gain needs to be adjusted according to signal strength.
Adjust the gain to the level where noise faintly appears on the screen.



Gain adjustment 100



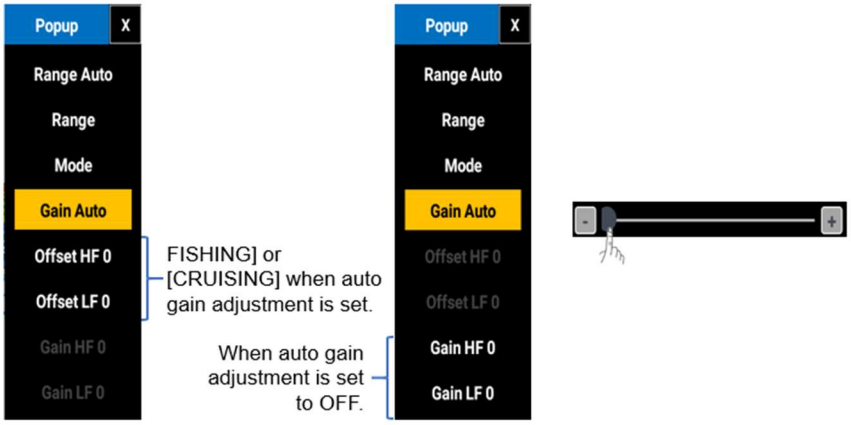
Gain adjustment 0

Touch control:

1. Press the **Popup** menu key to open the [Popup] menu.
2. Tap [Gain Auto].
3. Tap [Off].
4. Tap [Gain HF] or [Gain LF] and drag the slider bar displayed below it, or tap [+] or [-] to set the gain adjustment level.
5. Tap [x] on the title bar to close [MENU].

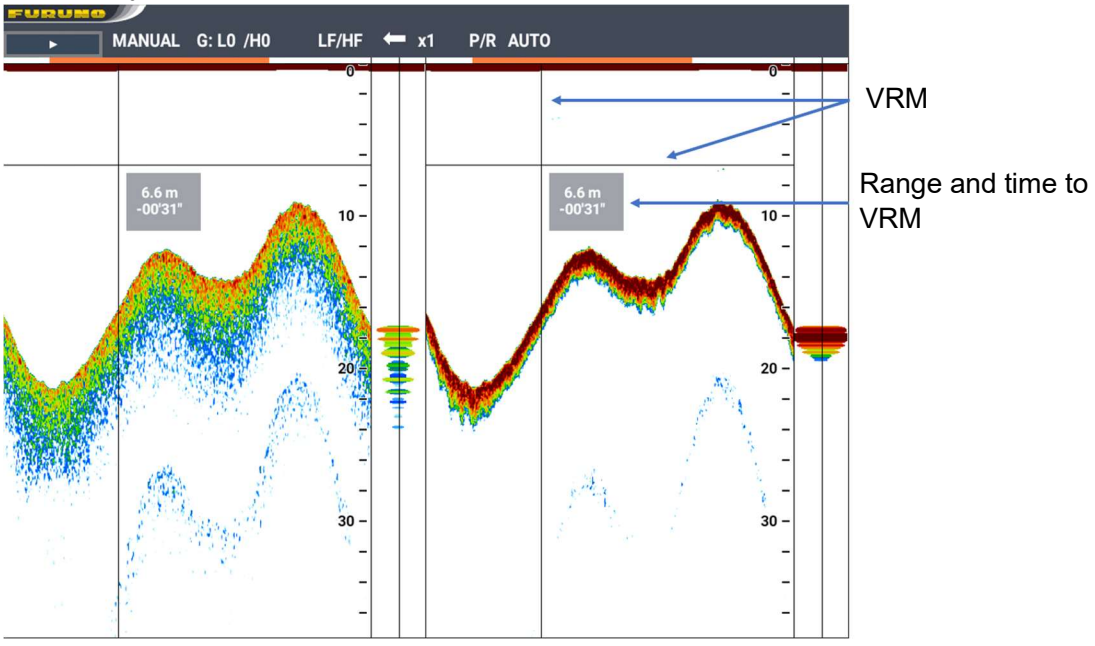
Key control:

1. Press the **Popup** menu key to open the [Popup] menu.
2. Select [Gain Auto] with the arrow keys, then press the **ENTER** key.
3. Select [Off] with the arrow keys, then press the **ENTER** key.
4. Select [Gain HF] or [Gain LF] with the arrow keys, then press the **ENTER** key.
5. Set the gain adjustment level with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [MENU].



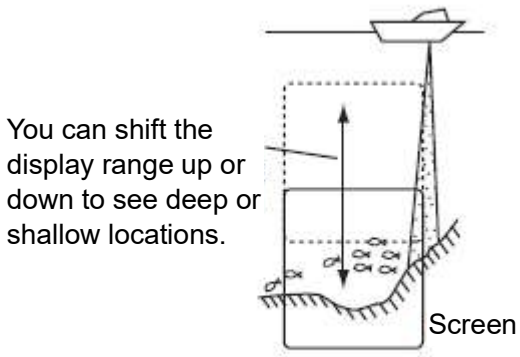
3.5 How to Measure the Time and Depth to Objects

The VRM (Variable Range Marker) measures the time and depth from own ship to an object (a school of fish, bottom, etc.). You can display the marker by tapping the object for which you want to take measurements.



3.6 Shifting the Display Range (Shift Function)

The current display range can be shifted up and down to see deeper or shallower places. This up and down shifting movement is called the “shift”.



Principle of shifting

Note: This function is inoperative when auto range is enabled.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SOUNDER].
3. Tap [Shift] and drag the slider bar displayed on the right, or tap [+] or [-] to set the shift level.
4. Tap [x] on the title bar to close [MENU].

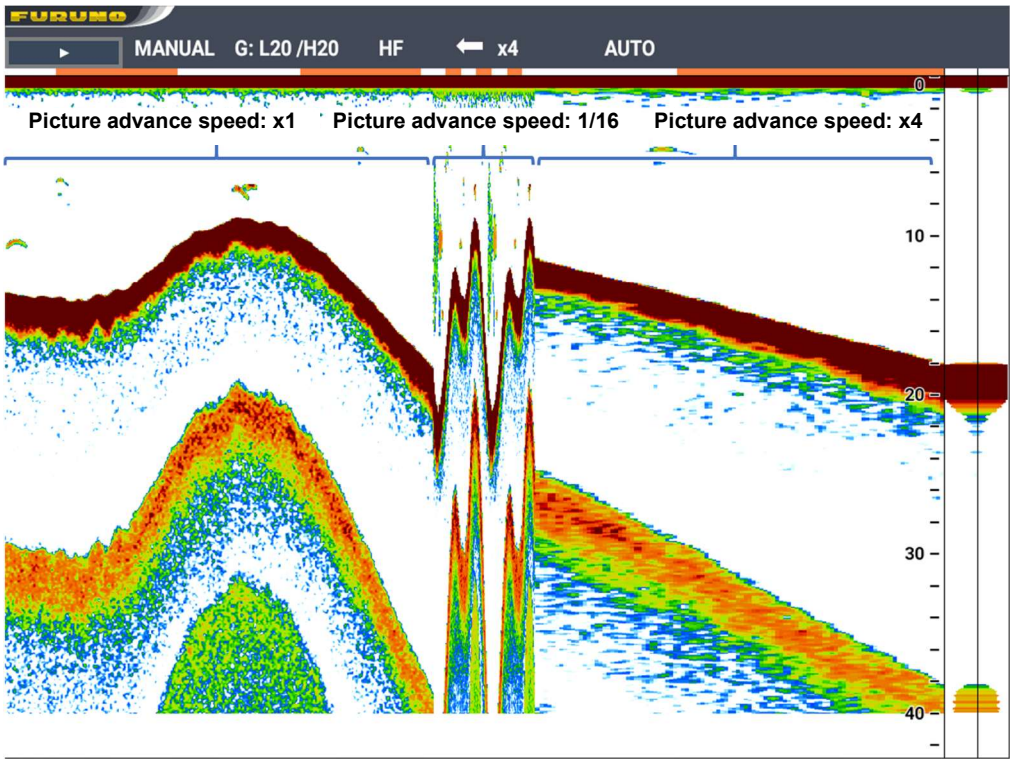
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [Shift] with the arrow keys, then press the **ENTER** key.
4. Set the shift level with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

Note: Pictures are not be displayed when a shift value larger than the bottom depth is set.

3.7 Picture Advance Speed

The same school of fish or the same bottom appears differently on the screen according to the picture advance speed. The fast advance speed expands the pictures horizontally and a slow advance speed contracts them horizontally. Use a fast advance speed to precisely observe a rugged bottom. Use a slow advance speed to monitor a smooth bottom with few undulations, etc.



Touch control:

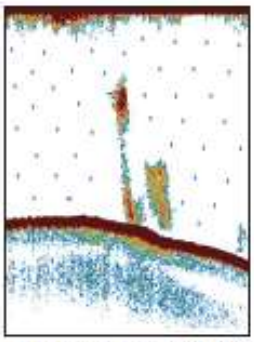
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SOUNDER].
3. Tap [Pic. Advance].
   The [Stop]/[1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Tap [Stop], [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4].
5. Tap [x] on the title bar to close [MENU].

Key control:

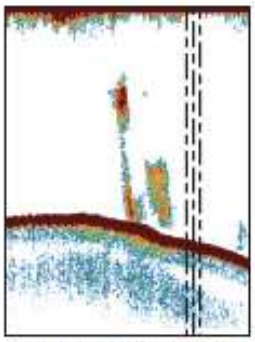
1. Press the **MENU/ESC** key to open [MENU].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [Pic. Advance] with the arrow keys, then press the **ENTER** key.
   The [Stop]/[1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Select [Stop], [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

3.8 How to Reduce Interference

The noise induced by own ship's electrical equipment and the periodic interference from other ship's fish finder can be reduced. Turn off the interference rejection function when there is little interference so that weak echoes are not missed.



Interference from other fish finder



Interference from electrical equipment

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SOUNDER].
3. Tap [Interference].
   The [Off]/[Low]/[Medium]/[High]/[Auto] selection box appears.
4. Tap [Off], [Low], [Medium], [High] or [Auto].
5. Tap [x] on the title bar to close [MENU].

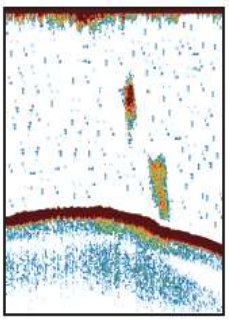
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [Interference] with the arrow keys, then press the **ENTER** key.
   The [Off]/[Low]/[Medium]/[High]/[Auto] selection box appears.
4. Select [Off], [Low], [Medium], [High] or [Auto] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

3.9 How to Reduce Low Level Noise

Speckles caused by murky water or the like may appear over the screen, making it difficult to see the images. The clutter reduction function can eliminate unnecessary speckles and clearly show the echo traces of schools of fish.

Note: This operation is disabled when [Gain Auto] is set to [Fishing] or [Cruising].



Low Level Noise

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SOUNDER].
3. Tap [Clutter] and drag the slider bar displayed on the right, or tap [+] or [-] to set the clutter level.
4. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [Clutter] with the arrow keys, then press the **ENTER** key.
4. Set the clutter level with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

3.10 How to Erase Weak Echoes

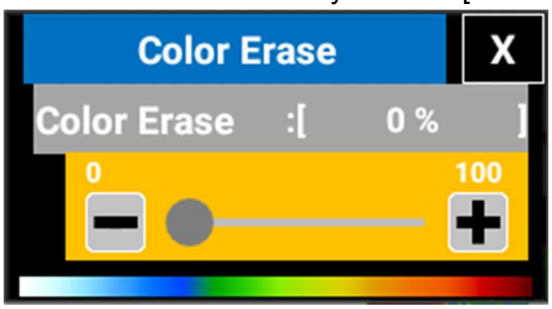
Unnecessary noise faintly appearing over the screen can be erased by the [Color Erase] function. This function erases weaker echoes sequentially so it is effective to use it when you want to see only a large school of fish or to make the interfered pictures clearer.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SOUNDER].
3. Tap [Color Erase] and drag the slider bar displayed on the right, or tap [+] or [-] to set the color erase level.
4. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [Color Erase] with the arrow keys, then press the **ENTER** key.
4. Set the color erase level with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



3.11 A-Scope Display

The strength of the current echo (shown at the right end on the single frequency display) may be shown with an amplitude picture called the “A-scope”. The A-scope screen shows strong echoes with large amplitude and weak echoes in small amplitude. The A-scope display tells you the echo strength at a glance so you can easily determine the kind of school of fish, bottom and geological features.

Touch control:

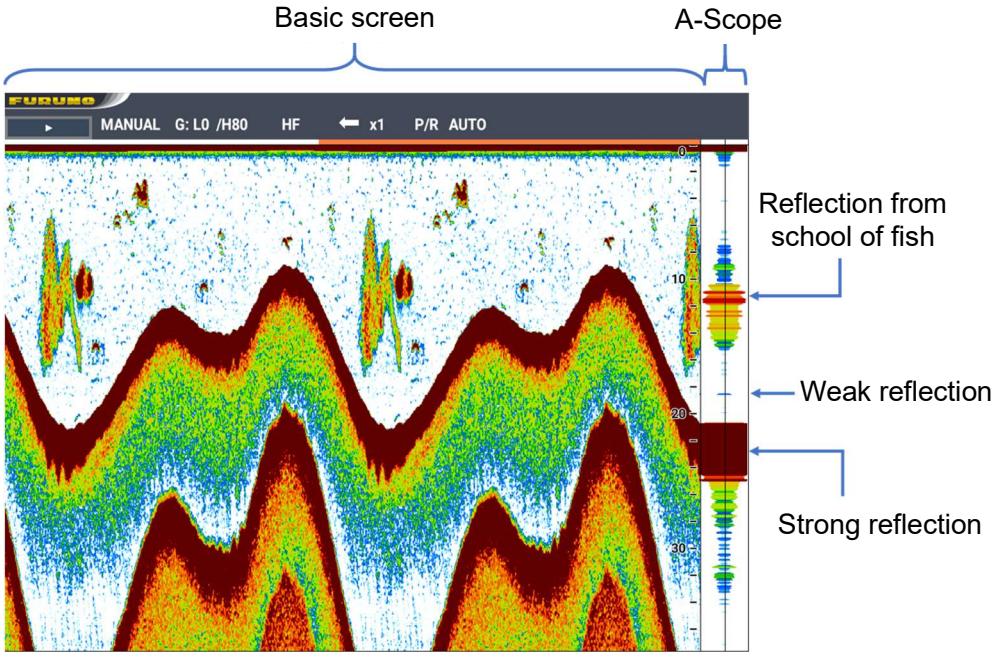
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].
3. Tap [A-Scope].
   The [Off]/[Normal]/[Peak] selection box appears.
4. Tap [Off], [Normal] or [Peak].
   Normal: Shows an amplitude picture for each transmission.

Peak: Shows an amplitude picture for each transmission plus the maximum amplitude picture for last five seconds in dots.

5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [A-Scope] with the arrow keys, then press the **ENTER** key.
   The [Off]/[Normal]/[Peak] selection box appears.
4. Select [Off], [Normal] or [Peak] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



3.12 How to Adjust the Window Size

The left and right window sizes can be adjusted when using a display mode other than the single frequency display. Left window becomes wider with a minus (-) value setting for the window size, and the right windows becomes wider with a plus (+) value setting.

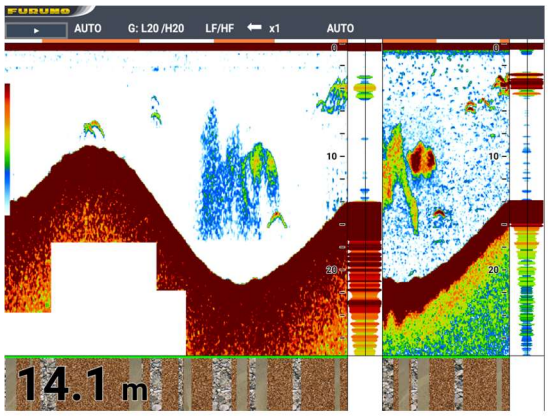


Touch control:

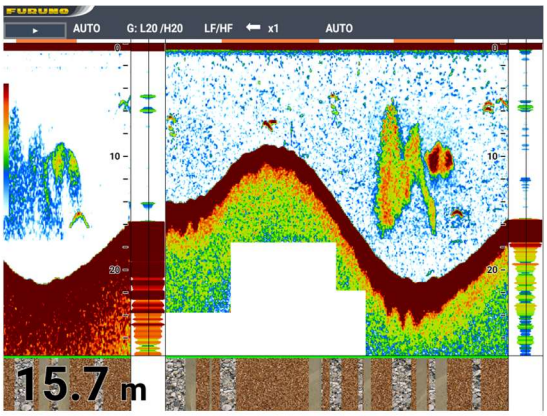
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].
3. Tap [Window Size] and drag the slider bar displayed on the right, or tap [+] or [-] to set the window size.
4. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Window Size] with the arrow keys, then press the **ENTER** key.
4. Set the window size with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



Window size adjustment: -20



Window size adjustment: 20

3.13 Screen Display Colors

The echo color and background color for the fish finder display can be changed to meet ambient lighting conditions.

3.13.1 How to select display colors

This equipment provides seven color combinations ([White], [Blue], [Black], [Yellow], [Green], [Mono] and [Night]) which change display colors to meet ambient lighting conditions.

Displayed items and colors

Background	Characters	Echo
White	Black	Multiple colors
Blue	White	
Black	White	
Yellow	Black	
Green	Black	
Monochrome	Black	Black
Night	White	Blue

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].
3. Tap [Palette].
   The [White]/[Blue]/[Black]/[Mono]/[Night] selection box appears.
4. Tap [White], [Blue], [Black], [Mono] or [Night].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Palette] with the arrow keys, then press the **ENTER** key.
   The [White]/[Blue]/[Black]/[Mono]/[Night] selection box appears.
4. Select [White], [Blue], [Black], [Mono] or [Night] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

3.14 Header

3.14.1 Header information

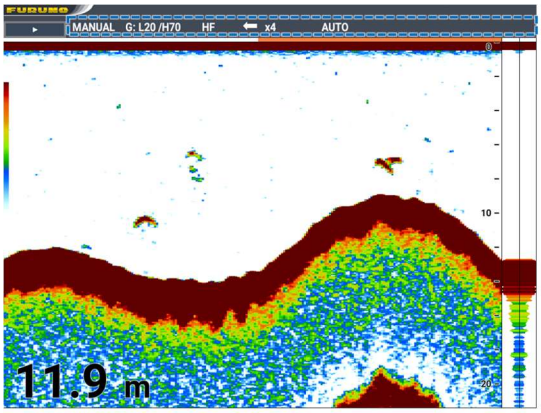
The header info, which appears at the top of the screen, provides various operational information. You can turn it on or off as follows.

Touch control:

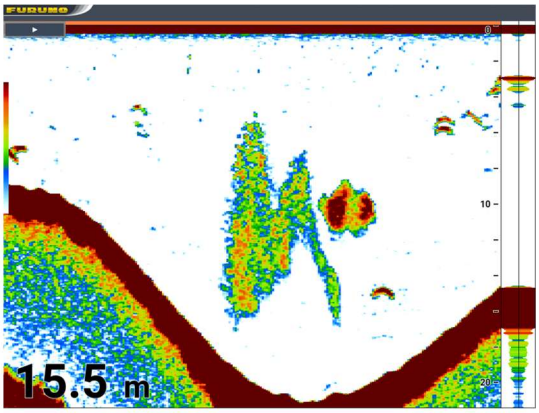
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].
3. Tap [Header Info]. The [Off]/[On] selection box appears.
4. Tap [Off] or [On].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Header Info] with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
4. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



Header info: ON



Header info: OFF

3.14.2 Header scale

Select the method to show the header scale (time mark or range mark).
When the header scale is shown as a time marker, orange and white bar appear for 30 seconds each.
When the header scale is shown as a range marker, green and white bars appear for 0.3 NM each.

Note: Speed data is required to show the range marker. If speed data is not input, only the white bar appears.

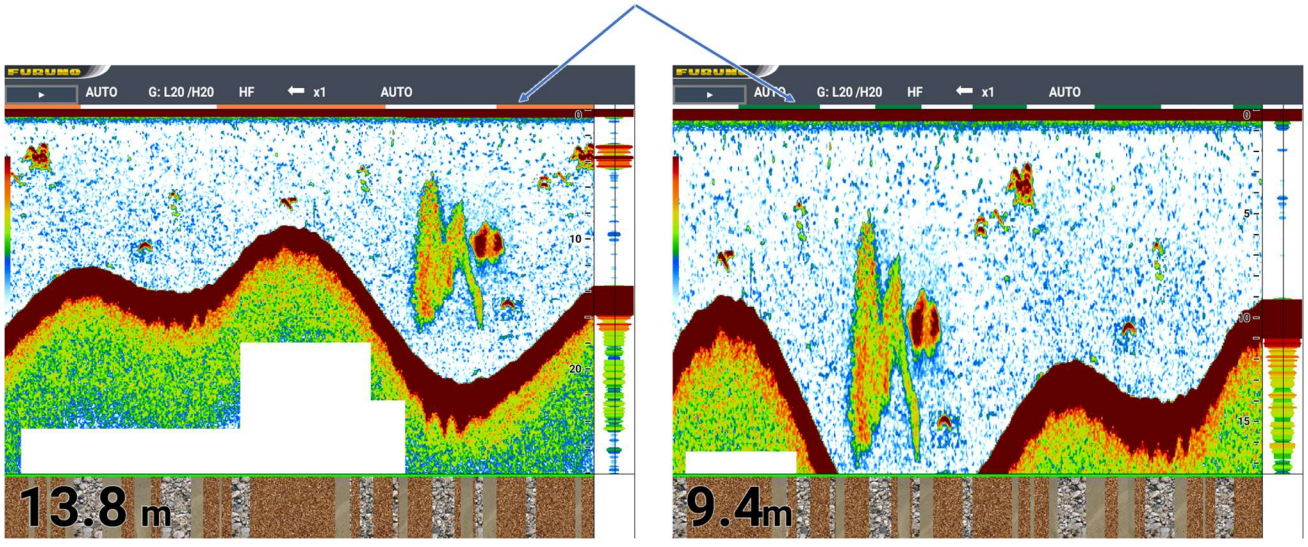
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].
3. Tap [Header Scale].
   The [Time]/[Distance] selection box appears.
4. Tap [Time] or [Distance].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Header Scale] with the arrow keys, then press the **ENTER** key.
   The [Time]/[Distance] selection box appears.
4. Select [Time] or [Distance] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

Header scale



When [Time] is selected

When [Distance] is selected

3.15 ACCU-FISH™

ACCU-FISH™, which requires a DFF series transducer or BBDS1, measures the size and depth of individual fish and marks them with the ACCU-FISH™ icon.

- ACCU-FISH™ operates both in the high frequency and low frequency modes.

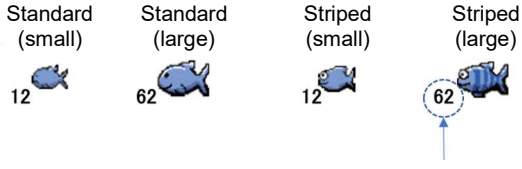
Notes

- The fish size (fish length) value is shown is for reference purposes. The actual size may be different.
- Reflection intensity varies depending on the type of fish. If the displayed size is different from the fish you actually caught, apply an offset (see page 3-20).
- When the ACCU-FISH™ function is active, the high and low frequencies are alternately transmitted even in the single frequency display mode.
- A fish whose depth is shallower than 2 m or greater than 100 m cannot be detected.
- This function cannot be used with a transducer installed inside the hull since a fish may not be detected depending on the transducer's frequency. Even if a fish is detected, the fish size indicated may be smaller than actual size.
- In a school of fish, echoes overlap one another, so the margin of error in fish size will be greater.
- The sea bottom must be present on the screen to show the fish symbols.

3.15.1 How to activate and set up ACCU-FISH™

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].
3. Tap [ACCU-FISH].
4. Tap [ACCU-FISH] in the lower level.
   The [Off]/[On] selection box appears.
5. Tap [Off] or [On].
6. Tap [Fish Info].
   The [Off]/[Fish Size]/[Water Depth] selection box appears.
7. Tap [Off], [Fish Size] or [Water Depth].
8. Tap [Info Size].
   The [Small]/[Large] selection box appears.
9. Tap [Small] or [Large].
10. Tap [Fish Symbols].
    The [Off]/[Striped]/[Solid]/[Circle]/[Square] selection box appears.
11. Tap [Off], [Striped], [Solid], [Circle] or [Square].



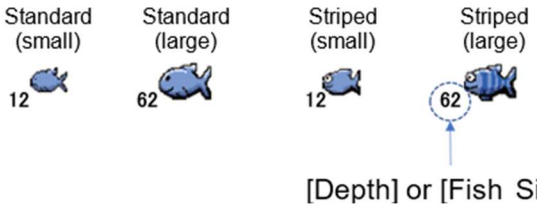
[Depth] or [Fish Size]

	Symbol 1	Symbol 2	Symbol 3	Symbol 4
Large fish (50 cm or more)				
Small fish (10 to 49 cm)				

12. Tap [Symbols Area].
    The [Dual]/[HF]/[LF] selection box appears.
13. Tap [Dual], [HF] or [LF].
14. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [ACCU-FISH] with the arrow keys, then press the **ENTER** key.
4. Select [ACCU-FISH] in the lower level with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
5. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
6. Select [Fish Info] with the arrow keys, then press the **ENTER** key.
   The [Off]/[Fish Size]/[Water Depth] selection box appears.
7. Select [Off], [Fish Size] or [Water Depth] with the arrow keys, then press the **ENTER** key.
8. Select [Info Size] with the arrow keys, then press the **ENTER** key.
   The [Small]/[Large] selection box appears.
9. Select [Small] or [Large] with the arrow keys, then press the **ENTER** key.
10. Select [Fish Symbols] with the arrow keys, then press the **ENTER** key.
    The [Off]/[Striped]/[Solid]/[Circle]/[Square] selection box appears.
11. Select [Off], [Striped], [Solid], [Circle] or [Square] with the arrow keys, then press the **ENTER** key.



	Symbol 1	Symbol 2	Symbol 3	Symbol 4
Large fish (50 cm or more)				
Small fish (10 to 49 cm)				

12. Select [Symbols Area] with the arrow keys, then press the **ENTER** key.
    The [Dual]/[HF]/[LF] selection box appears.
13. Select [Dual], [HF] or [LF] with the arrow keys, then press the **ENTER** key.
14. Press the **MENU/ESC** key to close [MENU].

3.15.2 Calibration of fish size values

Calibration is required when the size of fish you actually caught and the indicated value do not match.

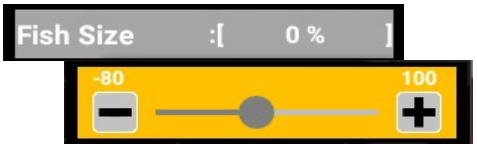
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Calibration].
4. Tap [Fish Size] and drag the slider bar displayed below the menu, or tap [+] or [-] to set the calibration level of fish size.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Calibration] with the arrow keys, then press the **ENTER** key.
4. Select [Fish Size] with the arrow keys, then press the **ENTER** key.
5. Set the calibration level of fish size with the arrow keys, then press the **ENTER** key.

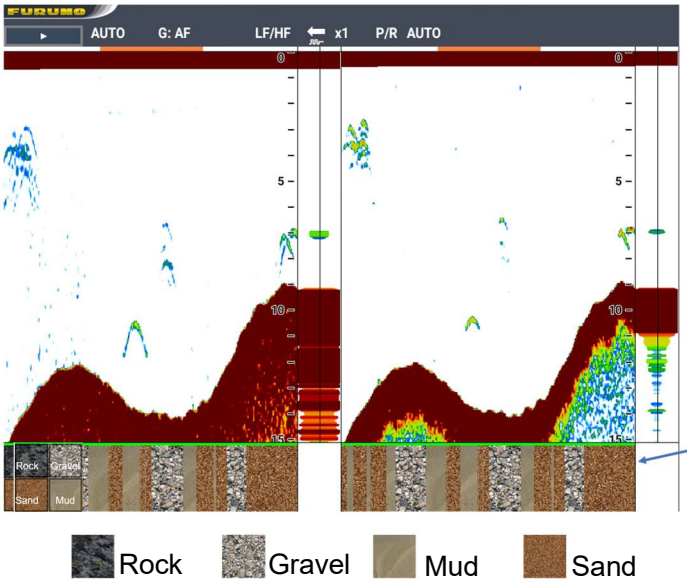
6. Press the **MENU/ESC** key to close [MENU].



Setting	Revised size displayed
+100	2 times
+50	1.5 times
-50	1/2
-65	1/3
-75	1/4
-80	1/5

3.16 Bottom Discrimination Function

The bottom discrimination function analyzes the bottom composition (rocks, gravel, sand, mud) and shows the results in a colorful graphic display. This feature requires a transducer that supports bottom discrimination, or Bottom Discrimination Sounder BBDS1. The bottom material information appears at the bottom of the screen when the bottom discrimination function is turned on. The information can be displayed in all window sizes, including single frequency display and dual frequency display.



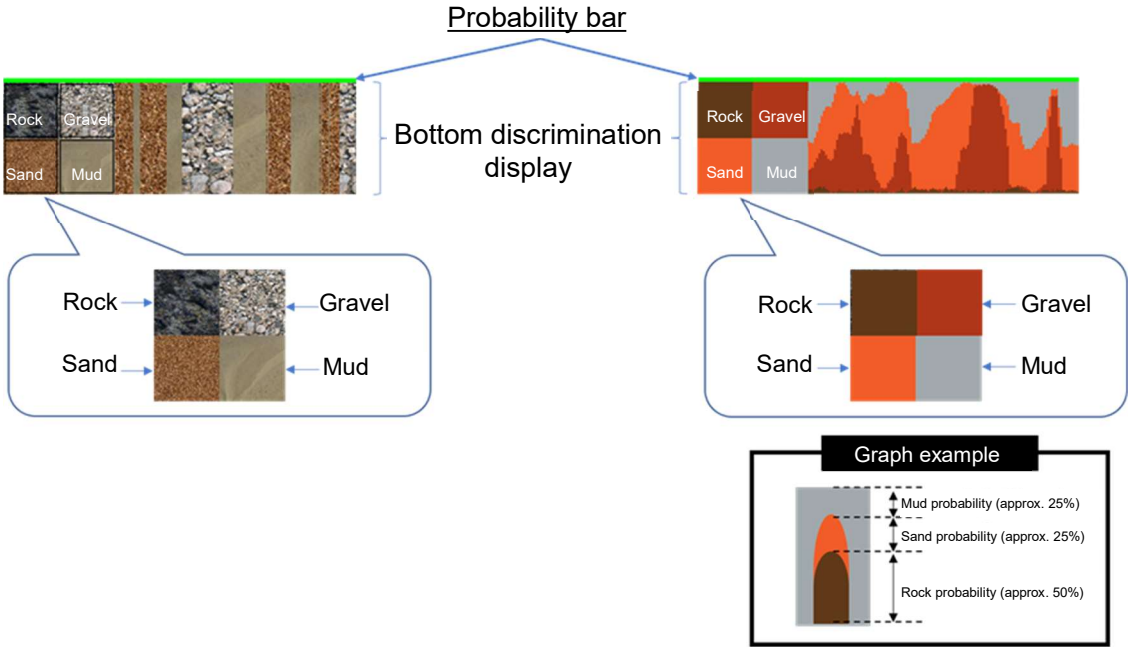
Bottom discrimination display

Probability bar
Indicates the degree of trust for bottom discrimination display, with colors.
(Green, Normal; Yellow, Caution; Background color, Abnormal)

Rock Gravel Mud Sand

The most probable bottom material is indicated.

There are two bottom discrimination displays as follows.



Graphic display
The most probable bottom material is indicated.

Probability display
The probability of bottom material is indicated graphically.

Notes

- The bottom discrimination function is intended to provide an estimate of bottom composition. Actual composition may be different from the discrimination result.
- The transducers that support the bottom discrimination function are as follows:

	Transducer (optional)
600W	520-5PSD, 520-5MSD, 520-PLD, 525-5PWD, 525T-PWD, 525T-BSD, 525T-LTD/12, 525T-LTD/20, 585STID-MSD, 585STID-PWD, SS60-SLTD/12, SS60-SLTD/20
1kW	50/200-1T, 526TID-HDD

- When the bottom discrimination function is active, the high and low frequencies are alternately transmitted even in the single frequency display mode. Also, the transmission interval of this equipment becomes slower than conventional fish finders.
- Use this function at the water depth of 5 to 100 m.
- Use this function at the ship speed of 10 knots or less.
- This bottom discrimination function uses the range from the boat's draft; therefore, be sure to enter the ship's draft.
- If transducers are not mounted straightly, the bottom material may not be analyzed accurately.

How to activate the bottom discrimination function

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].

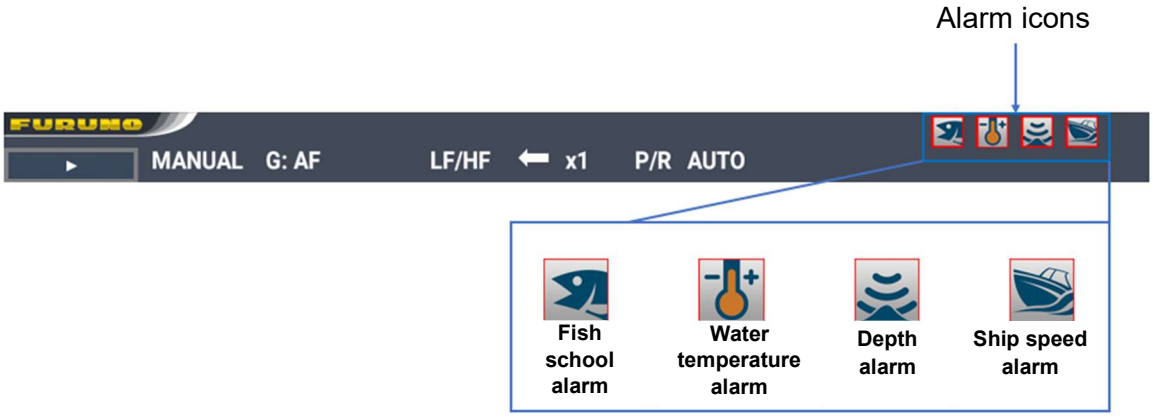
3. Tap [Bottom Disc.].
4. Tap [Bottom Disc.] in the lower level.
   The [Off]/[On] selection box appears.
5. Tap [Off] or [On].
6. Tap [Type View].
   The [Graphic]/[Probability] selection box appears.
7. Tap [Graphic] or [Probability].
8. Tap [Legend].
   The [Off]/[On] selection box appears.
9. Tap [Off] or [On].
10. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Bottom Disc.] with the arrow keys, then press the **ENTER** key.
4. Select [Bottom Disc.] in the lower level with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
5. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
6. Select [Type View] with the arrow keys, then press the **ENTER** key.
   The [Graphic]/[Probability] selection box appears.
7. Tap [Graphic] or [Probability].
8. Select [Legend] with the arrow keys, then press the **ENTER** key.
   The [Off]/[On] selection box appears.
9. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
10. Press the **MENU/ESC** key to close [MENU].

3.17 Alarms

This fish finder has four alarms. When an alarm is set and the conditions of the alarm are met, the audio alarm sounds and the alarm icon appears at the top right corner of the screen. 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.



3.17.1 Description of alarms

Fish alarms

Three fish alarms are provided: normal alarm, bottom lock fish alarm and normal/bottom lock fish alarm.

Normal alarm

This alarm alerts you, with the audio alarm, to a school of fish in the set alarm zone.

Bottom lock fish alarm

This alarm sounds when a school of fish appears within the alarm zone above the bottom.
This alarm is available only when the bottom lock display is active.

3.17.2 Fish alarm

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap [Alarm] in the lower level.
   The [Off]/[Normal]/[BL Fish]/[Normal/BL] selection box appears.
4. Tap [Off], [Normal], [BL Fish] or [Normal/BL].
5. Tap [x] on the title bar to close [MENU].

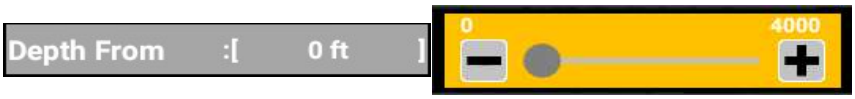
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select [Alarm] in the lower level with the arrow keys, then press the **ENTER**] key.
   The [Off]/[Normal]/[BL Fish]/[Normal/BL] selection box appears.
4. Select [Off], [Normal], [BL Fish] or [Normal/BL], then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

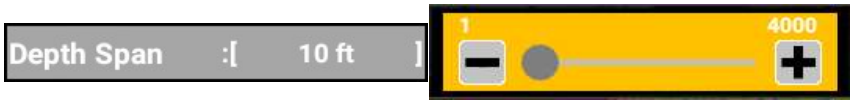
• **When [Normal] is selected**

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap [Depth From] and drag the slider bar to set the starting depth of the alarm range.



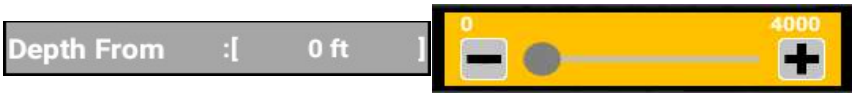
4. Tap [Depth Span] and drag the slider bar to set the depth of the alarm range.



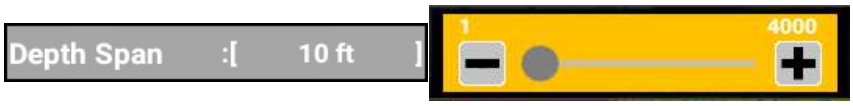
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select the [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select [Depth From] with the arrow keys, then press the **ENTER** key.
4. Select the starting depth of the alarm range with the arrow keys, then press the **ENTER** key.



5. Select [Depth Span] with the arrow keys, then press the **ENTER** key.



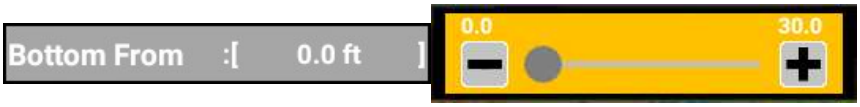
6. Select the depth of the alarm range with the arrow keys, then press the **ENTER** key.
7. Press the **MENU/ESC** key to close [MENU].

• **When [BOTTOM FISH] is selected**

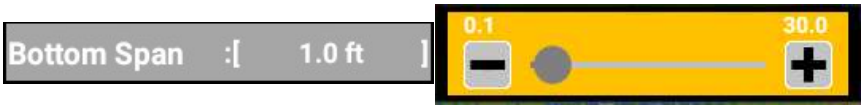
(This is available when the BL/HF mode or the BL/LF mode is selected.)

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap [Bottom From] and drag the slider bar to set the starting depth of the alarm range.



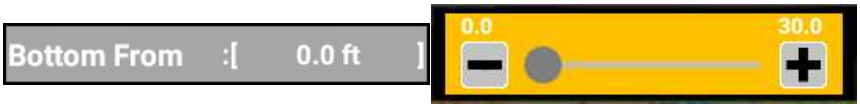
4. Tap [Bottom Span] and drag the slider bar to set the depth of the alarm range.



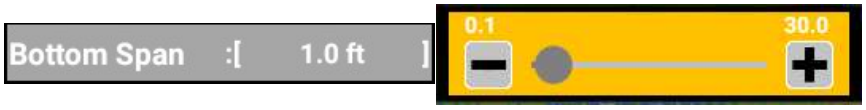
5. Tap [x] on the title bar to close [MENU].

Key control:

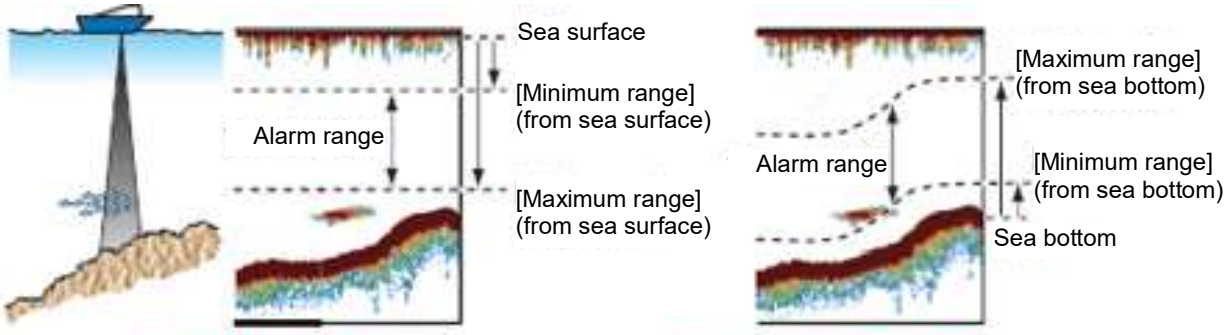
1. Press the **MENU/ESC** key to open [MENU].
2. Select the [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select [Bottom From] with the arrow keys, then press the **ENTER** key.
4. Select the starting depth of the alarm range with the arrow keys, then press the **ENTER** key.



5. Select [Bottom Span] with the arrow keys, then press the **ENTER** key.
6. Select the depth of the alarm range with the arrow keys, then press the **ENTER** key.



• **When [NORMAL/BOTTOM FISH] is selected**
Set all of the [Depth From], [Depth Span], [Bottom From] and [Bottom Span] items described above.



Normal (fish) alarm BL FISH (bottom lock fish) alarm

• **How to set the alarm sound**

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap [Sound].
   The [Sound 1]/[Sound 2]/[Sound 3]/[Sound 4] selection box appears.
4. Tap [Sound 1], [Sound 2], [Sound 3] or [Sound 4].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select [Sound] with the arrow keys, then press the **ENTER** key.
   The [Sound 1]/[Sound 2]/[Sound 3]/[Sound 4] selection box appears.
4. Select [Sound 1], [Sound 2], [Sound 3] or [Sound 4] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

• **How to set the alarm level**

Set the minimum echo strength level which triggers the alarm.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap [Fish Level].
   The [Weak]/[Medium]/[Strong] selection box appears.
4. Tap [Weak], [Medium] or [Strong].

The default level is [Medium].
[Weak]: Echoes stronger than light-blue indication
[Medium]: Echoes stronger than yellow indication
[Strong] Echoes stronger than red indication

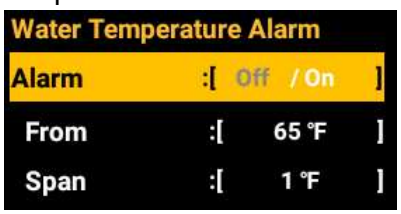
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [Alarm] with the arrow keys, then press the **ENTER** key.
3. Select [Fish Level] with the arrow keys, then press the **ENTER** key.
   The [Weak]/[Medium]/[Strong] selection box appears.
4. Select [Weak], [Medium] or [Strong] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

3.17.3 Water temperature alarm

The water temperature alarm alerts you with the audio alarm when the water temperature is within the set range.



Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM], then tap [Alarm] below [Water Temperature Alarm].
3. Tap [On].
4. Tap [From] and drag the slider bar displayed on the right, or tap [+] or [-] to set the starting temperature for the water temperature alarm.
5. Tap [Span] and drag the slider bar displayed on the right, or tap [+] or [-] to set a range of water temperature alarm.
6. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select [Alarm] below [Water Temperature Alarm] with the arrow keys, then press the **ENTER** key.
4. Select [On] with the arrow keys, then press the **ENTER** key.
5. Select [From] with the arrow keys, then press the **ENTER** key.
6. Set the starting temperature for the water temperature alarm with the arrow keys, then press the **ENTER** key.
7. Select [Span] with the arrow keys, then press the **ENTER** key.
8. Set a range of water temperature alarm with the arrow keys, then press the **ENTER** key.
9. Press the **MENU/ESC** key to close [MENU].

3.17.4 Water depth alarm

The water depth alarm alerts you with the audio alarm when the water depth is within the set range.



Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM], then tap [Alarm] below [Depth Alarm].
3. Tap [On].
4. Tap [From] and drag the slider bar displayed on the right, or tap [+] or [-] to set the starting depth for the water depth alarm.
5. Tap [Span] and drag the slider bar displayed on the right, or tap [+] or [-] to set the starting depth for the water depth alarm.
6. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select [Alarm] below [Depth Alarm] with the arrow keys, then press the **ENTER** key.
4. Select [On] with the arrow keys, then press the **ENTER** key.
5. Select [From] with the arrow keys, then press the **ENTER** key.
6. Set the starting depth for the water depth alarm with the arrow keys, then press the **ENTER** key.
7. Select [Span] with the arrow keys, then press the **ENTER** key.
8. Set a range of water depth alarm with the arrow keys, then press the **ENTER** key.
9. Press the **MENU/ESC** key to close [MENU].

3.17.5 Ship speed alarm

The ship speed alarm alerts you with the audio alarm when the ship speed is within the set range.



Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM], then tap [Alarm] below [Speed Alarm].
3. Tap [On].
4. Tap [From] and drag the slider bar displayed on the right, or tap [+] or [-] to set the starting ship speed for the ship speed alarm.

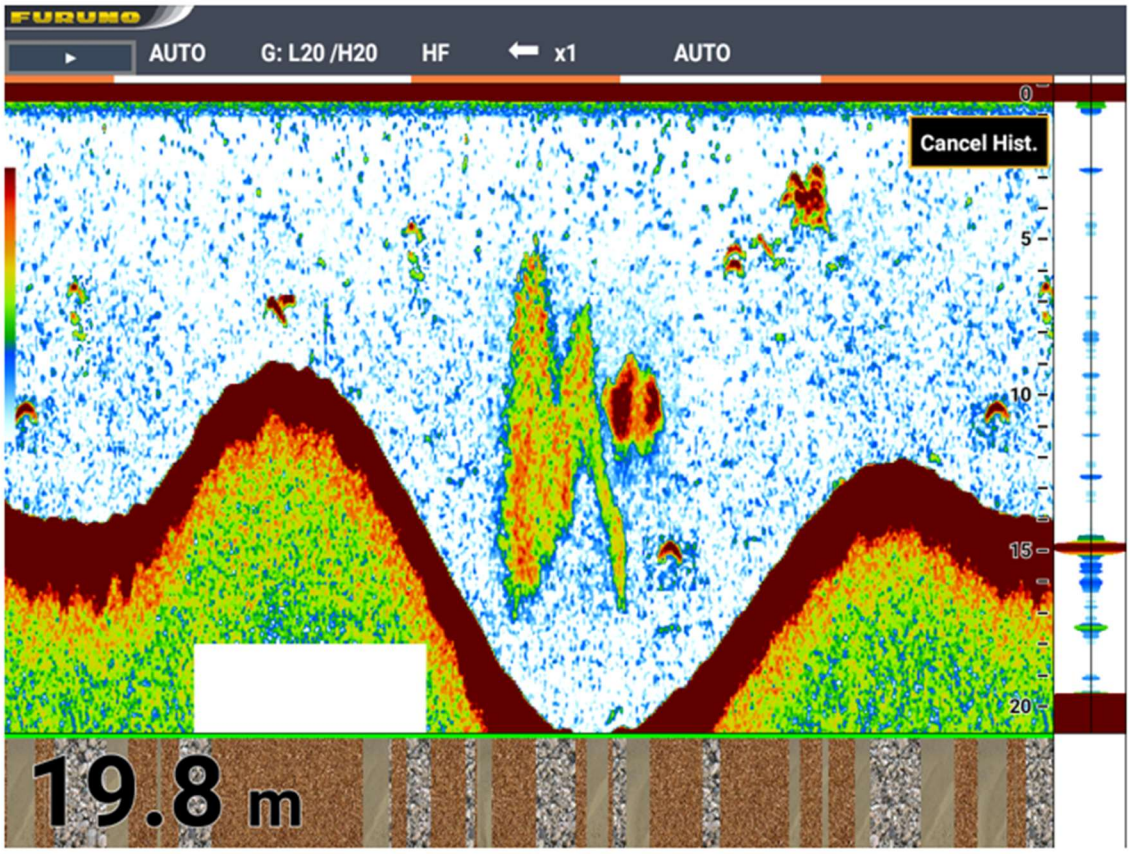
5. Tap [Span] and drag the slider bar displayed on the right, or tap [+] or [-] to set a range of ship speed alarm.
6. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select [Alarm] below [Speed Alarm] with the arrow keys, then press the **ENTER** key.
4. Select [On] with the arrow keys, then press the **ENTER** key.
5. Select [From] with the arrow keys, then press the **ENTER** key.
6. Set the starting ship speed for the water depth alarm with the arrow keys, then press the **ENTER** key.
7. Select [Span] with the arrow keys, then press the **ENTER** key.
8. Set a range of ship speed alarm with the arrow keys, then press the **ENTER** key.
9. Press the **MENU/ESC** key to close [MENU].

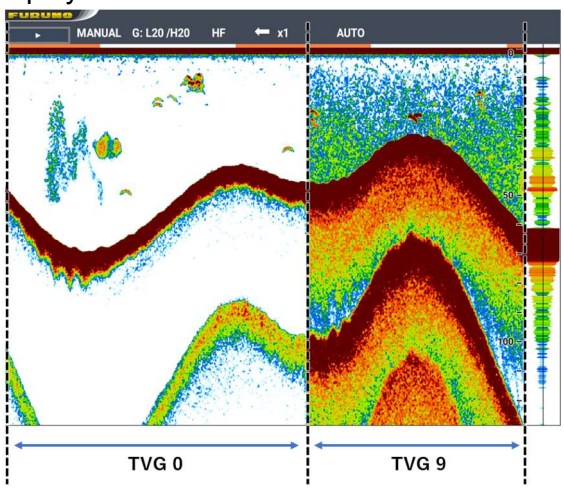
3.18 How to Display Past Pictures

The past pictures which have disappeared from the screen can be displayed. To switch the display to the past picture screen, swipe to the right on the fish finder display. To return to the normal screen (present picture), tap [Cancel Hist.], shown at the top right corner of the screen.

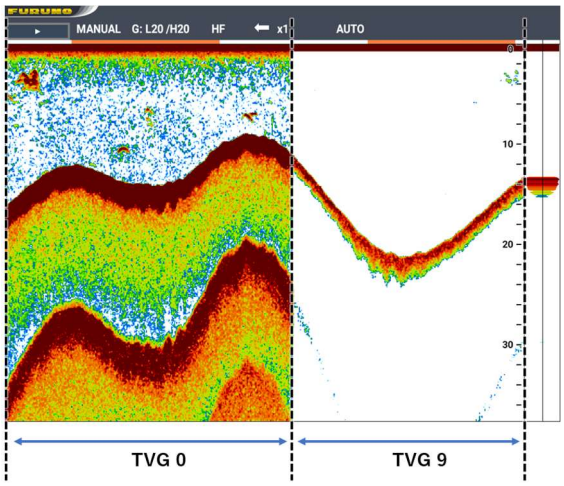


3.19 How to Reduce the Short Distance Gain (TVG Function)

When two schools of fish are of the same size, a school of fish in deep water is displayed in a weaker color than that in shallow water because of the properties of the ultrasound waves. The TVG function automatically adjusts the gain according to the depth and the TVG level. So schools of fish of the same size but at different depths are displayed in the same color.



DFF1, DFF1-UHD, BBDS1



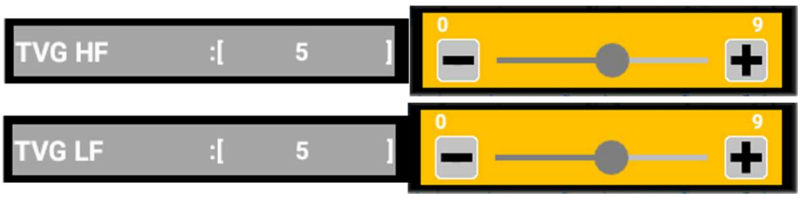
DFF3, DFF3-UHD

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SOUNDER], then tap [ON].
3. Tap [TVG HF] or [TVG LF] and drag the slider bar displayed on the right side, or tap [+] or [-] to set the TVG level.
4. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [TVG HF] or [TVG LF] with the arrow keys, then press the **ENTER** key.
4. Set the TVG level with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



Depending on the fish finder connected, the TVG function operates differently as follows.

Connected fish finder	How TVG function operates
DFF1, DFF1-UHD, BBDS1	The higher the TVG level value, the more the gain increases at short distance.
DFF3, DFF3-UHD	The higher the TVG level value, the more the gain decreases at short distance.

3.20 Water Temperature Graph

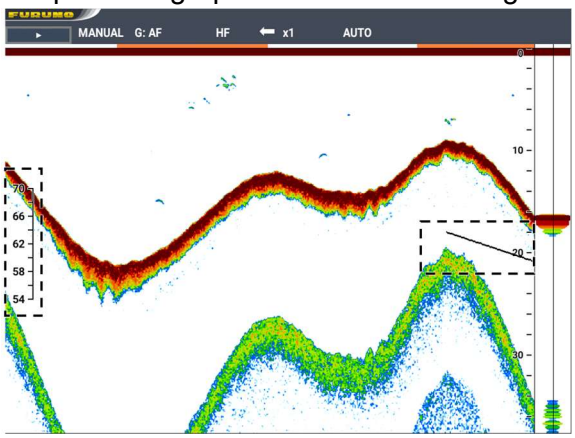
The changes in water temperature can be displayed on the fish finder display, in graph form. To display the water temperature graph, a water temperature sensor is required. Take the following steps to display the water temperature graph.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [DISPLAY].
3. Tap [Temp Graph].
   The [Off]/[Narrow]/[Wide] selection box appears.
4. Tap [Off], [Narrow] or [Wide].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Temp Graph] with the arrow keys, then press the **ENTER** key.
   The [Off]/[Narrow]/[Wide] selection box appears.
4. Select [Off] , [Narrow] or [Wide] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].
   A water temperature scale appears on the left side of the screen, and a water temperature graph is drawn from the right end to the left end of the screen.



Take the following steps to change the water temperature unit.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Units].
4. Tap [Temperature].
   The [°C]/[°F] selection box appears.
5. Tap [°C] or [°F].
6. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Units] with the arrow keys, then press the **ENTER** key.

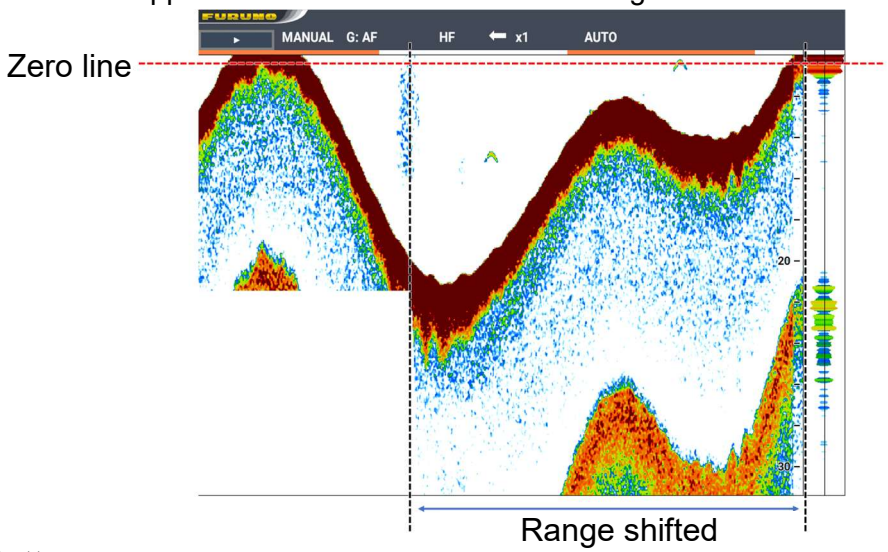
4. Select [Temperature] with the arrow keys, then press the **ENTER** key.
   The [°C]/[°F] selection box appears.
5. Select [°C] or [°F] with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [MENU].

3.21 How to Interpret the Display

This section describes how to interpret actual pictures using picture examples.

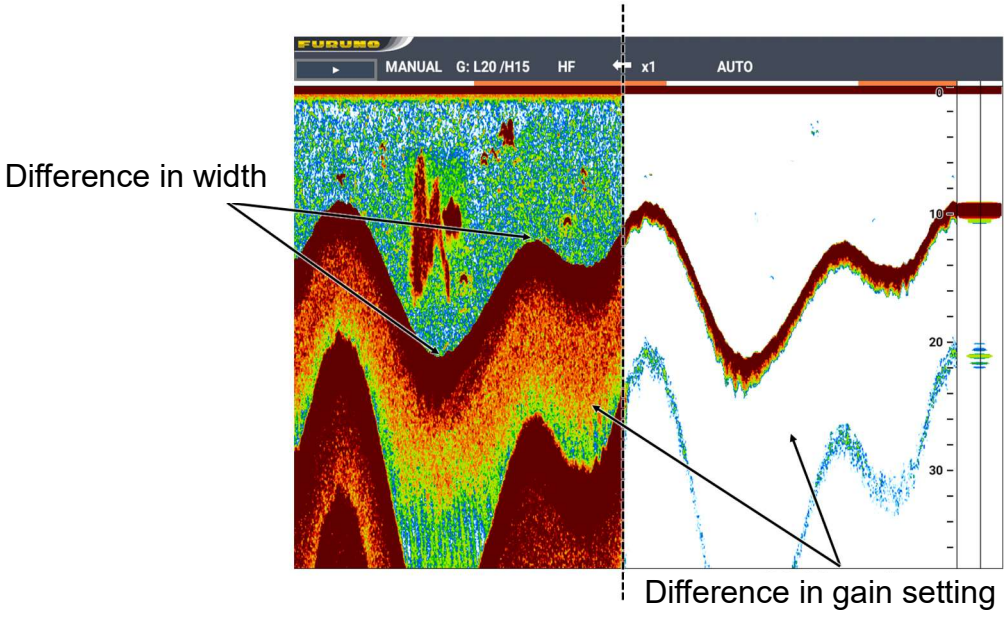
Zero line

The zero line shows the signals emitted from transducers and corresponds to the transducer's position.
The line disappears from the screen when the range is shifted.



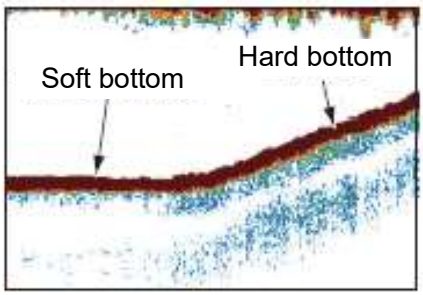
Bottom

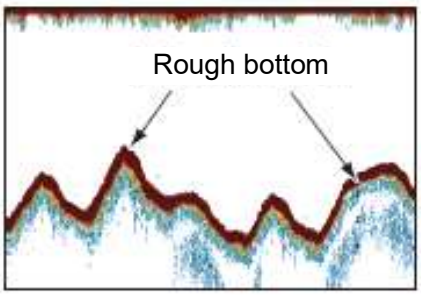
The bottom is usually shown in reddish brown or red because of strong reflection signal from the bottom. The display colors and the width change with the bottom conditions, depth, fish finder frequency, pulse length and gain setting.
The "bottom condition" can be analyzed more clearly for operation by making good use of changes in display colors and width of color pictures.



Bottom contour

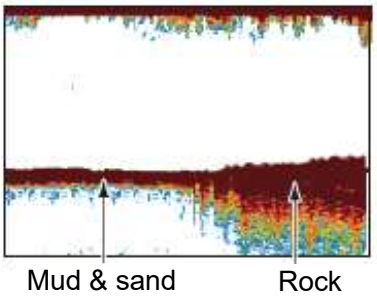
For the hard rock bottom, the echoes are largely shown in reddish-brown or red with a long tail on the screen. For the mud, gravel or algae bottom, the echo screen has less red with a short tail. When the bottom is flat without any bottom material changes, a bottom picture with a uniform width is shown. A longer tail appears on slopes and drop-offs because the travel time to the bottom is different at both edges of the ultrasonic beam. However, even when the tail is long, the visual width becomes narrower because the picture shows a sloped bottom. For the rough bottom, echoes are reflected on many different planes, which displays echoes in many layers, which gives a 3D effect.





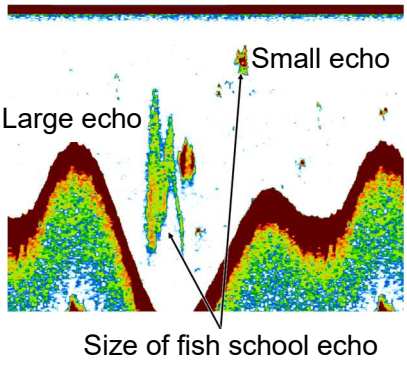
Bottom material

The bottom material can be determined from the bottom picture colors and the tail length. For the hard rock bottom, the echoes are largely shown in reddish-brown or red with a long tail on the screen. For the mud, gravel or algae bottom, the echo screen has less red with a short tail.



Fish quantity estimation

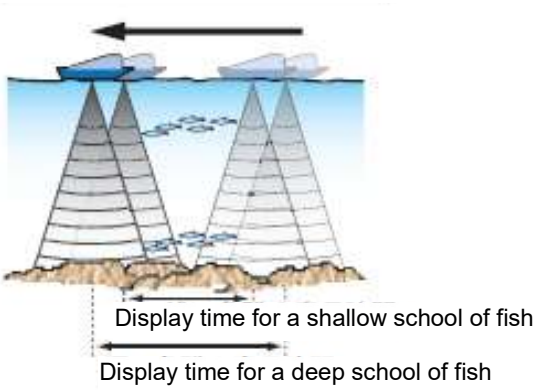
The size and display colors of a school of fish are indicators of the approximate quantity of fish.



Size of a school of fish

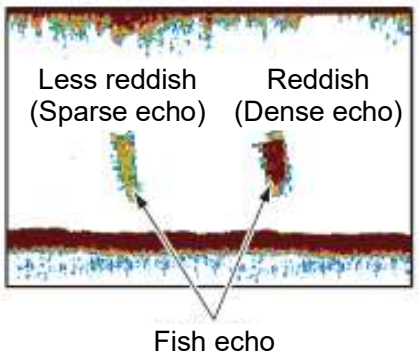
If two fish echoes appear at different depths with the same size, the school of fish at the shallower depth is actually larger, which you should be cautious of. This is because the conical ultrasonic beam propagates longer to a school of fish in deep water and thus the school of fish is displayed longer. The size of fish echoes also varies with the own ship's speed and picture advance speed settings.

Difference in fish school depth and display time

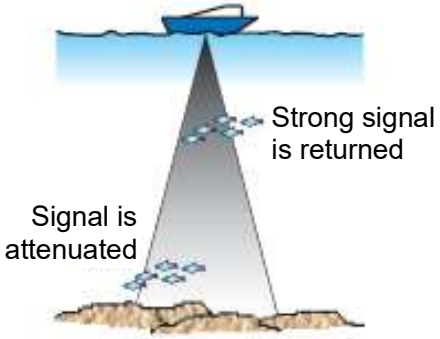


Display colors of a school of fish

A school of fish of the same size but with a higher density gives a stronger reflection signal. The ultrasonic wave attenuates as it propagates deeper and the school of fish in deep water is displayed in a weaker color than those of the same density in shallow water. This means that if two schools appear with the same display color in shallow water and deep water, the one in deeper water is actually denser. By constantly comparing actual fish volume against these references in each case, you will be able to analyze the schools of fish more accurately. Raising the clutter value sequentially erases colors from weaker one, such as for plankton, so that the schools of fish can be recognized more easily.

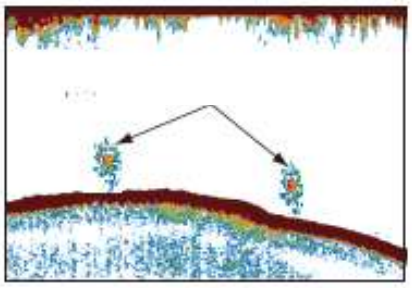


Difference in signal strength



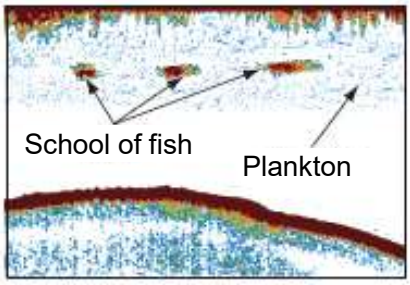
Bottom fish discrimination

The echoes from the bottom are stronger than those from the schools of fish. So you can distinguish between them by display colors. With proper gain calibration, the bottom echoes are shown in reddish-brown or red and the school of fish echoes are shown in weaker color.



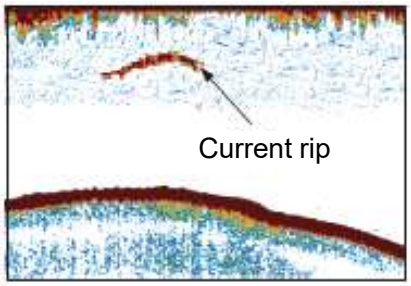
Plankton (DSL) layer

A green to blue echo layer sometimes appears between a zero line and the bottom. This echo is generated by a mass of microorganisms, commonly called “dirt” or “plankton (DSL)”, which usually moves down in the day and up at night. As fish gather to eat them, you can operate the ship according to this layer’s echoes instead of schools of fish echoes, depending on the fish type.



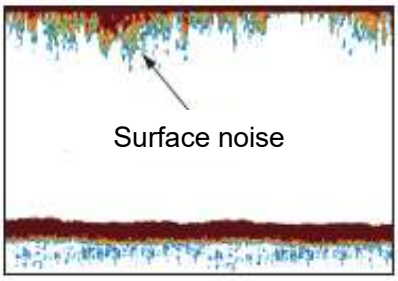
Current rip

When two ocean currents of different speeds, directions and water temperatures meet, a current rip occurs. A current rip appears on the screen as shown in the right illustration when air bubbles are caused or plankton has gathered. For such places, discrimination of current rip is important because fish gather to eat the plankton.



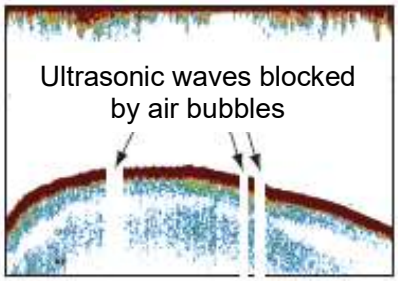
Surface noise

This noise appears near the sea surface on the screen when the sea is rough or the ship moves over other ship’s wake. It is mainly caused by the air bubbles in the surface layer. This noise can be reduced on this equipment by adjusting the clutter value.



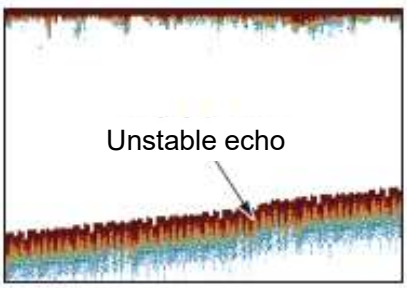
Air bubbles in the water

When the sea is rough or the ship makes a quick turn or a backward movement, air bubbles can occur, interrupting the propagation of ultrasonic waves and breaking pictures. These air bubbles can occur with the low frequency ultrasonic waves, and it is difficult to eliminate the effect of air bubbles completely. If air bubbles frequently occur in the situation where they are unlikely to occur, the installation position of the transducer needs to be reconsidered.



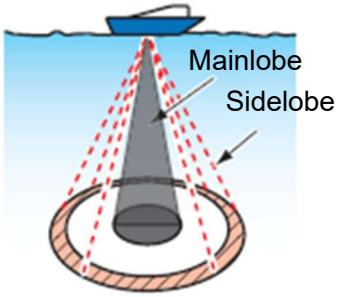
Unstable bottom echo

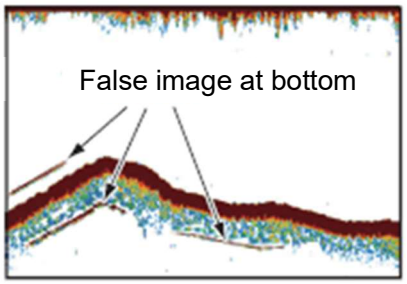
The bottom echoes can have a saw-tooth appearance. This occurs in heavy weather because pitching and rolling changes the direction of the ultrasonic pulses and the vertical motion of the ship causes the distance to the bottom to slightly change.



False echo at bottom

Images with a weak color similar to the bottom color may appear above the bottom line when the bottom is steep or rubbed, or may appear below the bottom line when the bottom is flat. Ultrasonic waves are emitted perpendicular to the transducer face. Actually, a weak beam (sidelobe) is also emitted obliquely downward as shown in the illustration below. When echoes reflected from this sidelobe are strong, false images are displayed at the bottom.

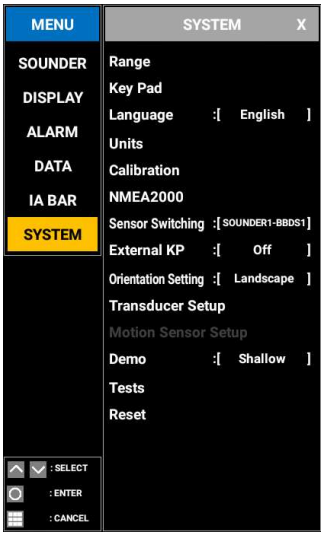




3.22 System Menu

3.22.1 How to display the system menu

The system menu consists of items which do not require frequent setting changes.



Touch control:

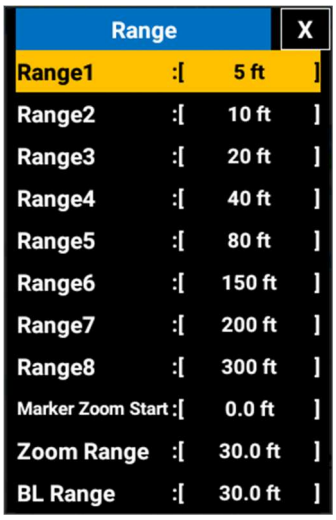
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].

Key control:

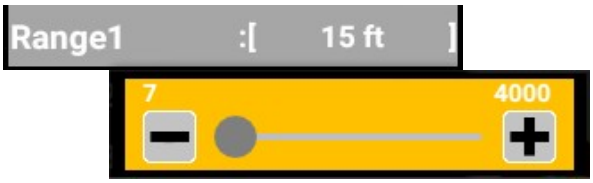
1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.

3.22.2 Range menu

Change the factory default range if it is inappropriate for the purpose of use.

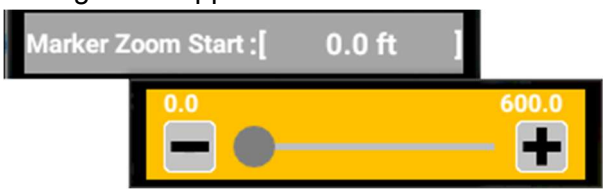


Note: When connecting multiple SFDs, the preset values of all ranges need to be matched with each other.



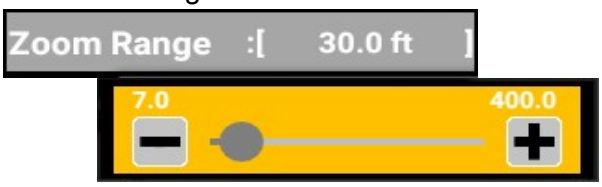
Marker Zoom Start

Changes the upper limit of marker zoom area.



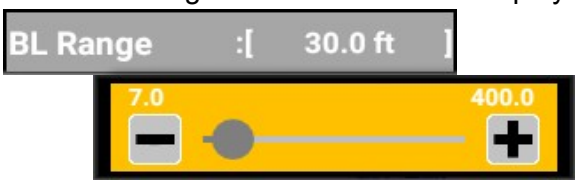
Zoom range

Select the range to zoom in the bottom zoom or Marker Zoom.



Bottom lock range

Select the range for the bottom lock display.



3.22.3 Keypad menu

Key brilliance setting

Each tap changes the setting between the levels 1 to 8.

Key beep

Select whether to turn the key beep On or Off.



3.22.4 Language menu

Language

The display language can be switched between Japanese, English, French, Spanish, Greek, Korean, and Chinese.



3.22.5 Units menu

Depth

Select a unit of depth. ([m], [ft], [fm], [HR] (Hiro, Japanese), [pb])

Water temperature

Select a unit of water temperature. (°C, °F)

Fish size

Select a unit of fish size. (inch･cm)

Ship speed

Select a unit of ship speed. (kn･km/h･mph)

Wind speed

Select a unit of wind speed. (kn･km/h･mph･m/s)

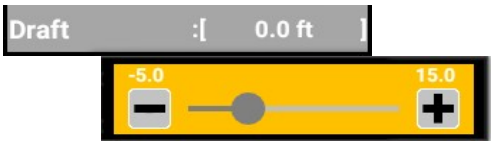


3.22.6 Calibration menu

Draft

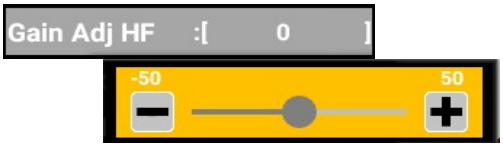
To show the depth from the sea surface, set your ship's draft.

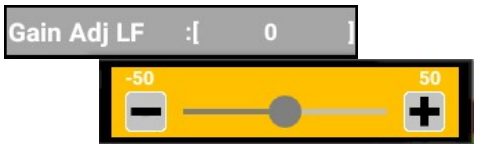




Gain HF, Gain LF

Adjust the gain when you want to set the gain higher or lower, or balance the gain for the low and high frequencies.

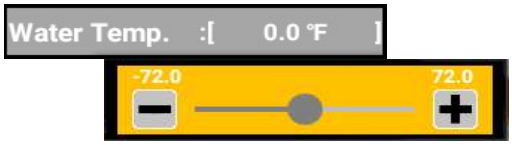




Water temperature

Correct any wrong water temperature data.

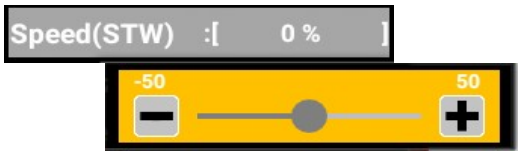
Example: If the water temperature indication is 2°C higher than actual water temperature, enter -2.0.



Speed Through the Water (STW)

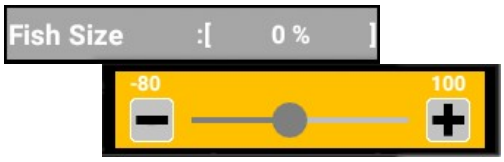
Correct any wrong ship-speed data.

Example: If the speed indication is 10% lower than actual ship speed, enter +10.



Fish size

Correct any wrong indication of fish size.



Setting	Revised size displayed
+100	2 times
+50	1.5 times
-50	1/2
-65	1/3
-75	1/4
-80	1/5

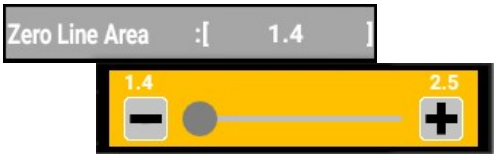
Zero line rejector

When turned on, the zero line rejector functions to distinguish fish echoes near the surface. The tail length of the zero line changes with transducer type and installation state. When using a transducer with a zero line of 1.4 m or more, change the setting for [Zero Line Rejector], as shown below.



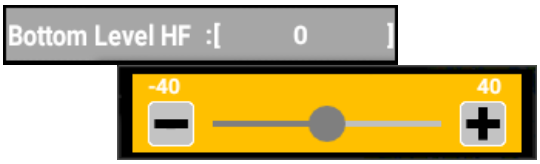
Zero line rejection area

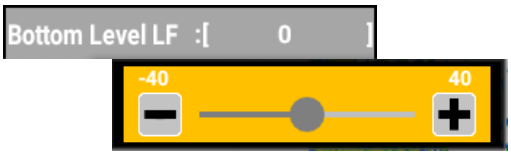
This menu appears only when DFF3, DFF3-UHD are used. If the zero line tail is long, increase the value. If this does not delete the zero line, lower the transmission output value.

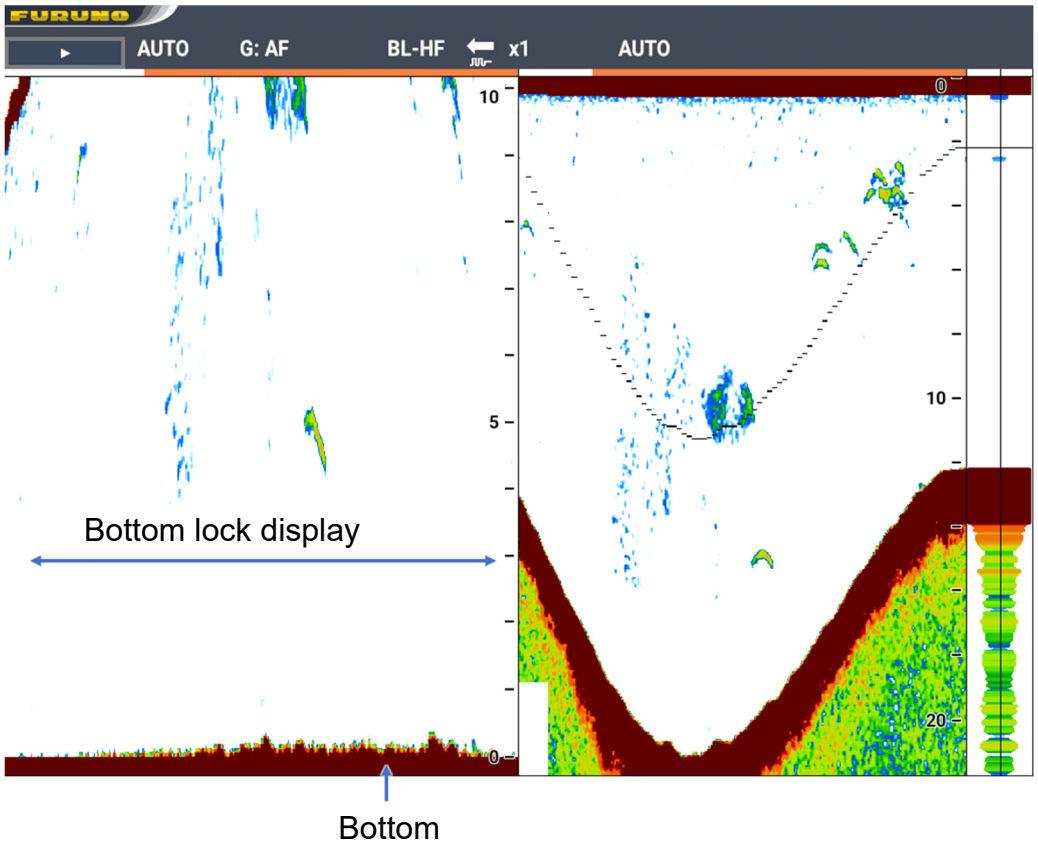


Bottom detection level (LF), bottom detection level (HF)

In the factory default setting (0), the equipment judges consecutive strong echoes to be bottom echoes. If the depth indication is unstable, adjust the bottom detection level. If lines extend upward from the bottom line in the bottom lock display, lower the bottom detection level to erase these lines.





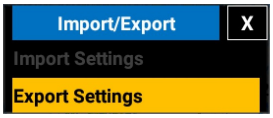


3.22.7 Import/Export Settings, Ejecting USB Storage Safely menu

Import Settings

This menu is available only when a USB device is connected and a sensor settings file is saved on the USB device. The saved settings in the selected file will be applied to the SFD.

When a USB device is not connected or there is no sensor settings file on the connected USB device.



When a USB device is connected and there is a sensor settings file on the USB device.



Export Settings

When a USB device is connected to the SFD, the settings of the currently activated application and connected sensors will be saved to the USB device.



Ejecting USB Storage Safely

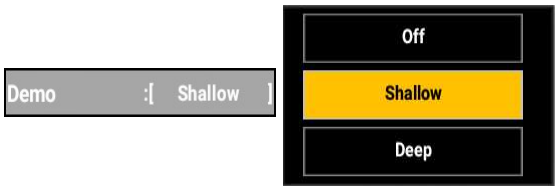
The connected USB device can be ejected safely after selecting this menu.



3.22.8 Demonstration menu

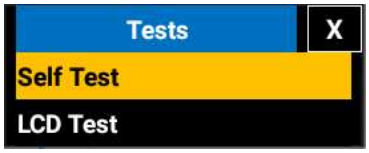
The demonstration mode displays fish echoes obtained from the built-in memory data without actually sending or receiving ultrasonic signals. All keys and menus are operative as usual. You can practice the operation and learn how to interpret the pictures even when the ship is anchored.
When the demonstration mode is active, [DEMO] appears at the bottom right corner on the screen.

[Off]: Turns off the demonstration mode.
[Shallow]: Displays demonstration pictures in shallow water.
[Deep]: Displays demonstration pictures in deep water.



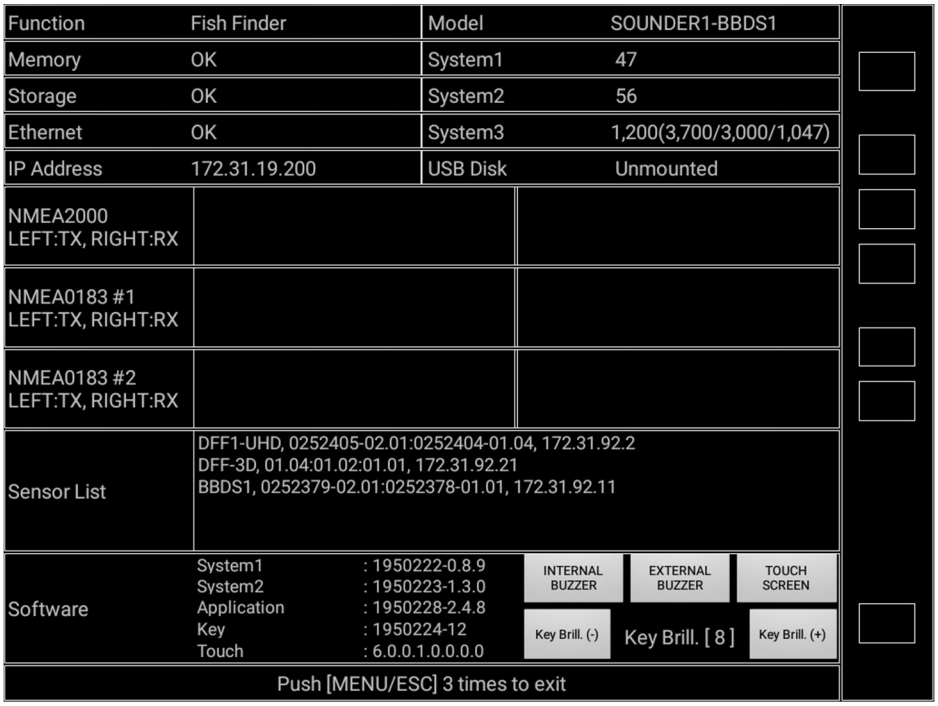
3.22.9 Tests

You can select various menus related to testing.



Self-diagnostic test

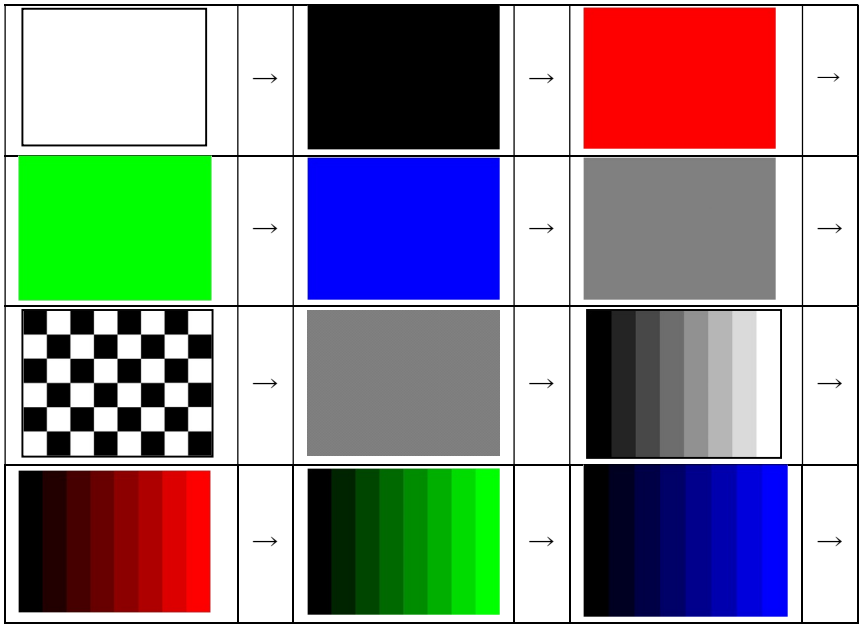
The self-diagnostic test allows you to check the connection status and data from equipment connected to this equipment, as well as to test the key-initiated operations.



Function	Shows the currently active function.
Model	Shows the currently connected sensor model.
Memory	Executes various system memory-related operations and displays the results.
Destination to save	Writes into and reads from the system memory and displays the results.
Ethernet	Shows whether LAN is connected or not.
IP address	Shows the IP address of current SFD.
System 1	Shows the system 1 results.
System 2	Shows the system 2 results.
System 3	Shows the system 3 results.
USB disc	Shows whether USB memory is connected to the USB port or not.
NMEA 2000	Displays output in the left window and output data in the right window.
NMEA 0183 #1	
NMEA 0183 #2	
Sensor list	Shows a list of sensors currently detected by SFD.
Software	Shows versions for System1, System2, Application, Key, Touch.
Internal buzzer	Tap to turn on/off the internal buzzer.
External buzzer	Tap to turn on/off the external buzzer (if connected).
Touch screen	1) Touch anywhere on the screen. A white screen appears and displays red dots at the locations touched on the screen. 2) Drag finger across the screen. Red lines are drawn where finger is dragged.

LCD patterns

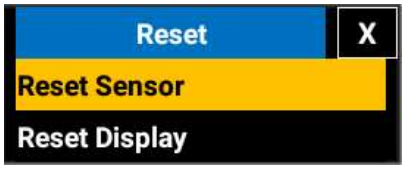
LCD patterns are used for testing the LCD for proper operation.
Tap the screen to change the color. Check that all colors are displayed correctly.



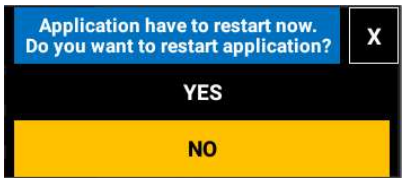
3.22.10 Initialization

You can select various menus related to initialization.

[Reset Sensor]: Initializes the sensor memory.
[Reset Display]: Initializes the display unit memory.



Select [Reset Display] to show the restart screen.



Select [YES] to reset. A message appears during the resetting, then the applicable default settings are restored.



This page is intentionally left blank.

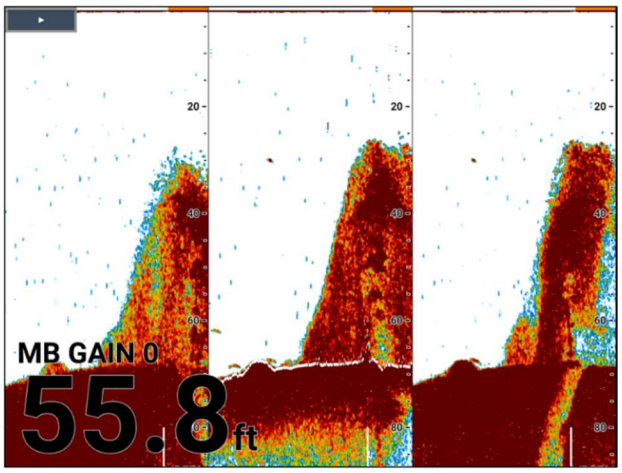
4 MULTI BEAM SONAR DFF-3D

4.1 Basic Operation of DFF-3D

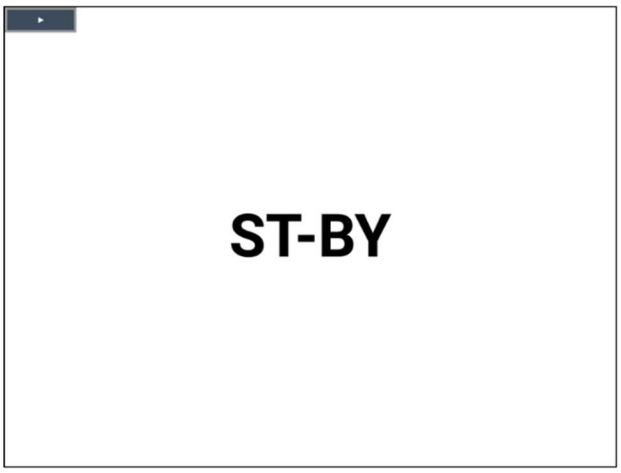
4.1.1 Transmission/stand-by

Press the **MENU/ESC** key to open [MENU] and set [Transmit] menu to [On] to start transmission from the transducer. To stop the transmission, set the [Transmit] to [Off].





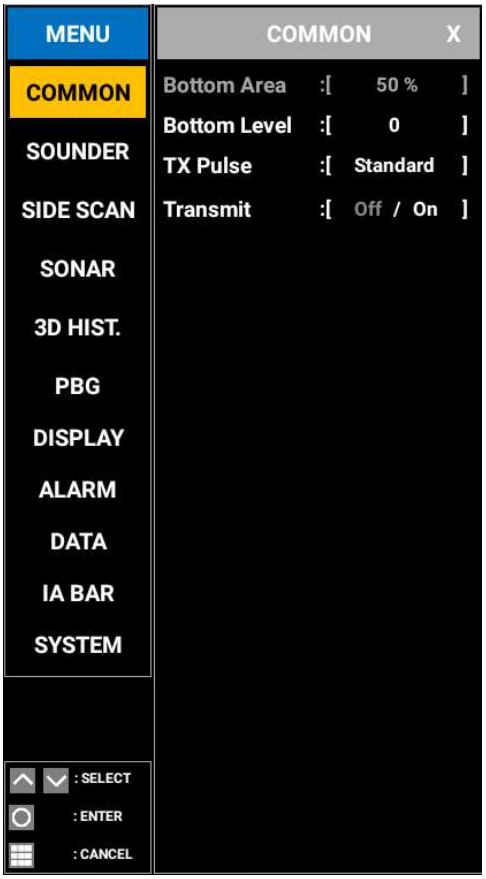
When transmission is On



When transmission is Off

4.1.2 General description of menu operation

The multi beam sonar has 11 menus, [COMMON], [SOUNDER], [SIDE SCAN], [SONAR], [3D HIST.], [PBG], [DISPLAY], [ALARM], [DATA], [IA BAR] and [SYSTEM]. This section introduce the basic operation of these menus.



Menu description

Menu	Description
COMMON	Common menus and settings for using the multi fish finder, side scan, sonar.
SOUNDER	Menus and settings for using the multi beam fish finder.
SIDE SCAN	Menus and settings for using the side scan display.
SONAR	Menus and settings for using the sonar.
3D HIST.	Menus and settings for using the 3D history display.
PBG	Menus and settings for using the PBG.
DISPLAY	Menus and settings for the display.
ALARM	Menus and settings for the multi beam sonar alarms.
DATA	Menus and settings for selecting what data to display.
IA BAR	Menus to register to the IA bar.
SYSTEM	Menus about the system.

4.1.3 Background color

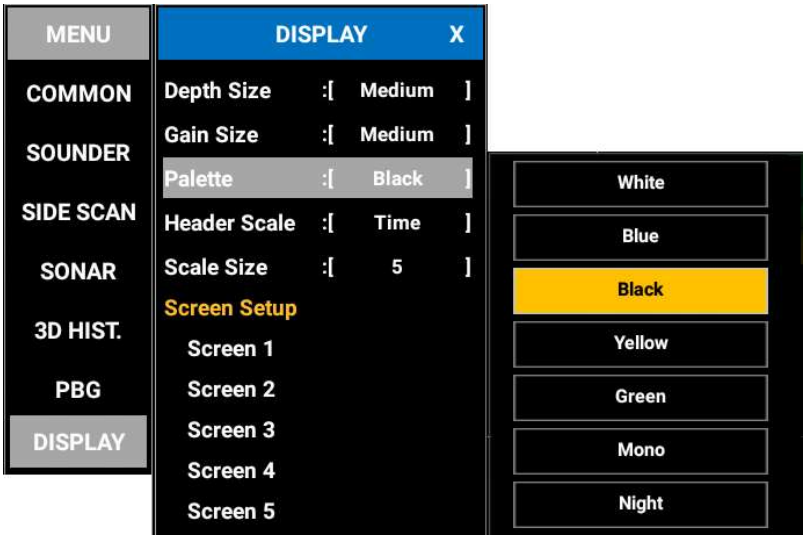
Background color can be changed as shown below.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [DISPLAY].
3. Tap [Palette].
   [White]/[Blue]/[Black]/[Yellow]/[Green]/[Mono]/[Night] selection box appears.
4. Tap [White], [Blue], [Black], [Yellow], [Green], [Mono] or [Night].
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Palette], then press the **ENTER** key.
   [White]/[Blue]/[Black]/[Yellow]/[Green]/[Mono]/[Night] selection box appears.
4. Select [White], [Blue], [Black], [Yellow], [Green], [Mono] or [Night] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [Menu].



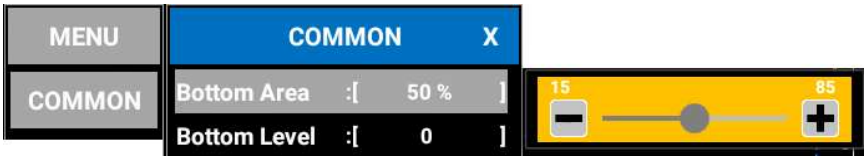
4.1.4 How to adjust the bottom range shift

The bottom range shift feature changes the location at which the bottom appears on the screen. This is particularly useful when the bottom is “off-screen”.

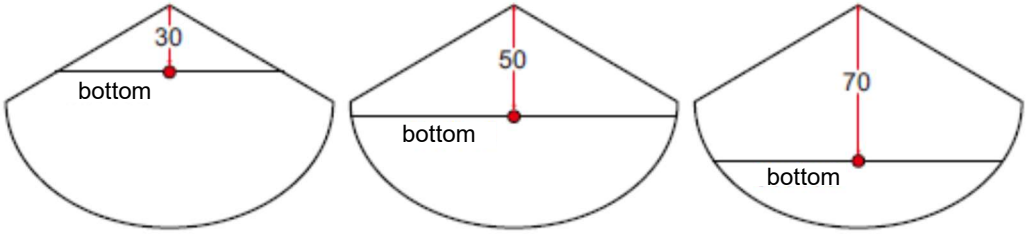
Note: This feature requires [Auto Range] to be active.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [COMMON].
3. Tap [Bottom Area]. Drag the slider bar or tap [+] or [-] to adjust the value. (Setting range: 15% to 85%)



A lower value places the bottom at a higher location on-screen. A higher value places the bottom at a lower location on-screen.



4. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [COMMON] with the arrow keys, then press the **ENTER** key.
3. Select [Bottom Area] with the arrow keys, then press the **ENTER** key.
   A slider bar appears at the right side of menu.
4. Set a value with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [Menu].

4.1.5 How to change the transmission rate

You can adjust the rate at which the sonar beam is transmitted, using one of the three available settings. Each setting has distinct characteristics, allowing for a broad range of applications.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SYSTEM].
3. Tap [Transducer Setup].
4. Tap [Transmit Rate Mode].
   [Manual]/[Auto]/[Max] selection box appears.
5. Tap [Manual], [Auto] or [Max].
6. Tap [×] on the title bar to close [MENU].

Key control:

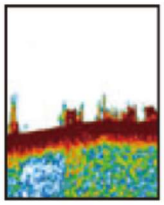
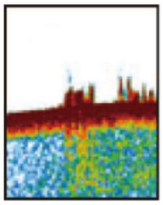
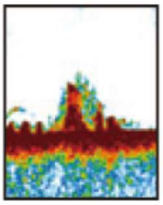
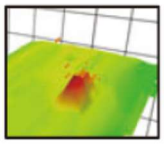
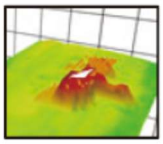
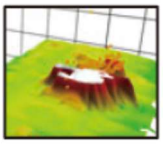
1. Press the **MENU/ESC** key to open [Menu].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Transducer Setup] with the arrow keys, then press the **ENTER** key.
4. Select [Transmit Rate Mode] with the arrow keys, then press the **ENTER** key.
   [Manual]/[Auto]/[Max] selection box appears.
5. Select [Manual], [Auto] or [Max] with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [Menu].



The difference between [Manual], [Auto] and [Max] are as follows.

Setting	Characteristics
[Manual]	Transmit rate changes according to the selected range. A shorter range has a faster transmission rate; a longer range has a slower rate.
[Auto]	Transmit rate changes according to vessel speed. Slow speeds have a slower transmission rate; high speeds have a faster rate. **Note:** Speeds of 20 kn or higher are fixed at a transmission rate of 20.
[Max]	Transmit rate changes according to detected depth. Shallow depths have a faster transmission rate; deeper waters have a slower rate. **Note:** Where the selected range exceeds the detected depth, the transmission rate may exceed 20.

Note: Adjustments made to the transmission rate also affect how the on-screen display appears for the Multi-Sounder and 3D Sounder History features.

Display Screen	Rate = 0	Rate = 10	Rate = 20
Multi Sounder			
3D History			

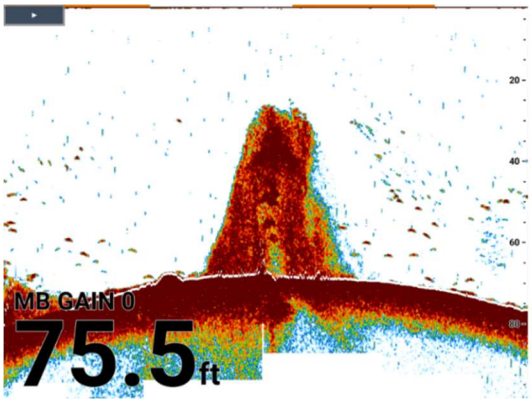
4.2 Display Screens Overview

Active window switches when the multi-display is selected and the **ENTER** key is pressed. Pop-up menu also changes to the corrresponding menu of selected window.

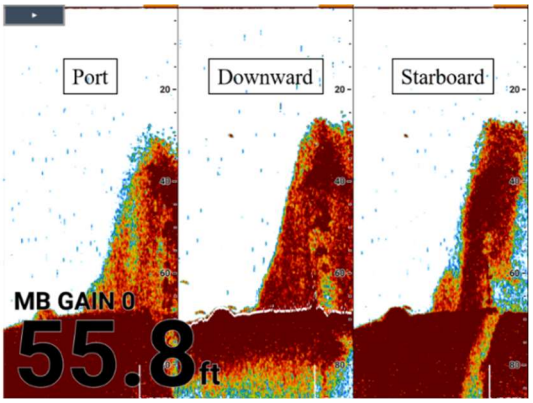
Note: Gain for the multi beam fish finder, side scan, cross section and 3D history can be individually changed. Refer to section 3.4 How to Adjust the Gain for details.

Multi beam fish finder display

Multi beam fish finder operates similar to the conventional fish finder, providing information about the bottom and underwater conditions. The video display scrolls from the right to left with the passing of time.
The echoes appearing at the right edge of the display are the latest echoes. Echoes from individual fish, schools of fish and the bottom are shown. With the gain set properly, the distance to the bottom appears on the screen. Past echoes can be displayed.
The gain, clutter suppressor and TVG are adjusted according to the mode selected, auto fishing or auto cruising. Manual adjustment of those controls is also possible.
The single beam presentation displays the information detected by the downward-looking beam. The triple beam presentation displays the information detected by the port beam, starboard beam, and downward-looking beam.



Single beam display



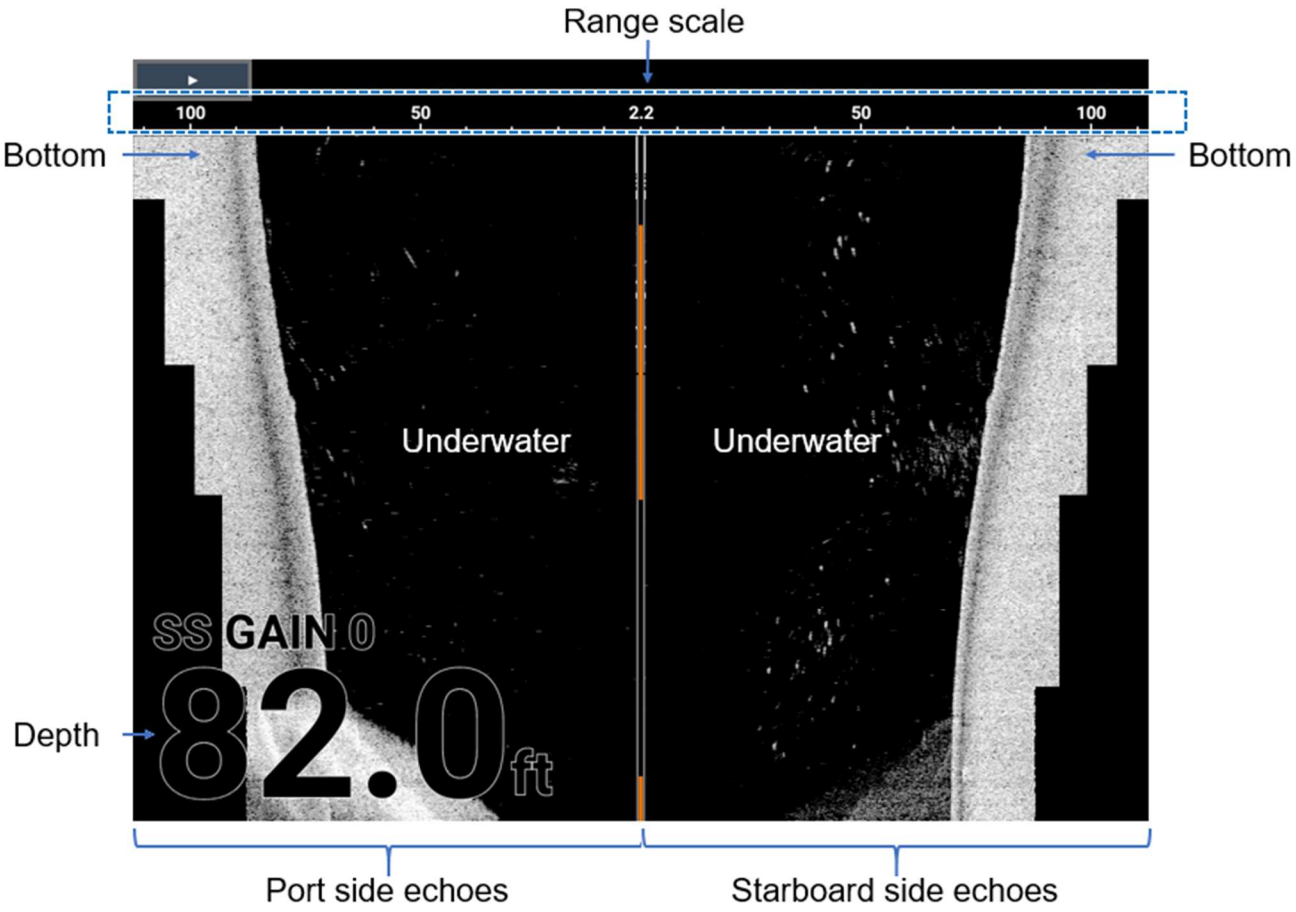
Triple beam display

Side scan display

The side scan display shows the echoes received from the port and starboard directions.

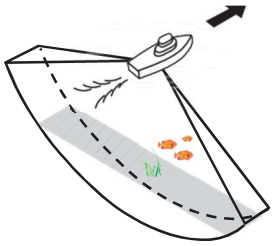
The side scan display starts from the center of the vessel, and traces in the port and starboard directions. The most recent echoes are at the top of the screen and the oldest are at the bottom of the screen.

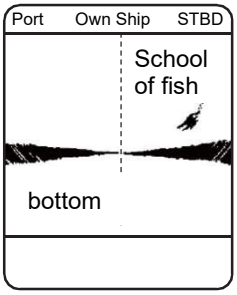
The side scan display is different from the other modes employed by this equipment – it clearly displays the shape of echoes (fish reef, etc.).

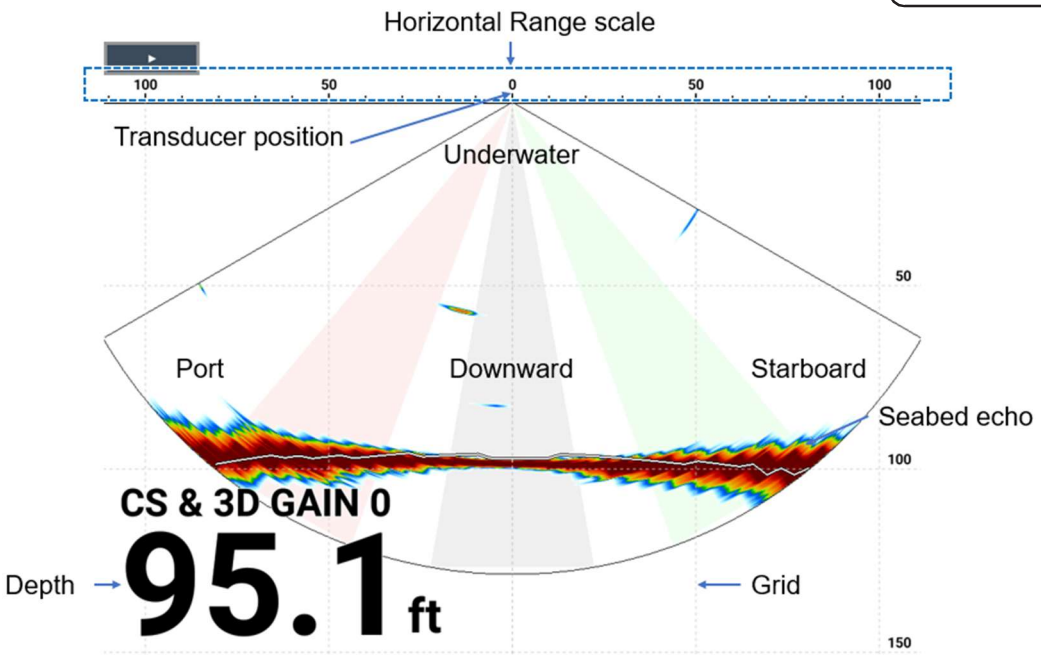


Cross section display

The cross section display shows bottom and underwater conditions. This multi beam fish finder uses a 120° beam (downward to port 60°; downward to starboard 60°), providing highly accurate underwater images.

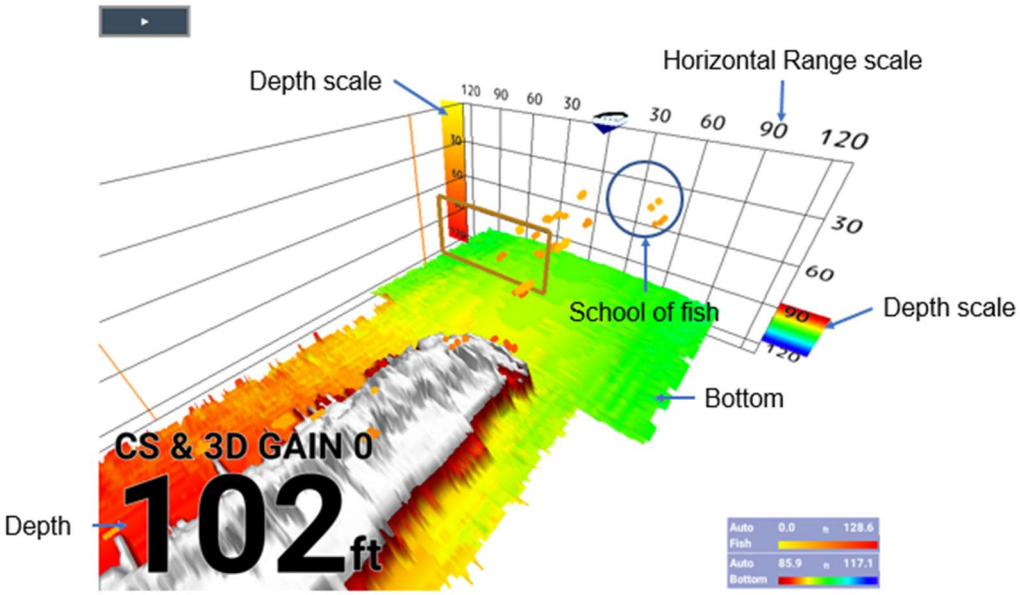






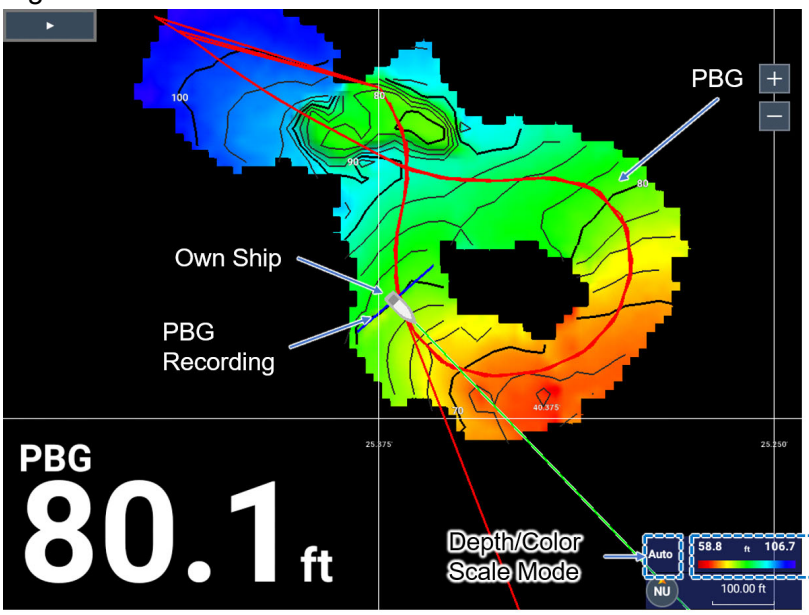
3D history display

The 3D history provides a 3D graphic of the past bottom and underwater echoes detected by your vessel. The display can be used to detect school of fish.



PBG

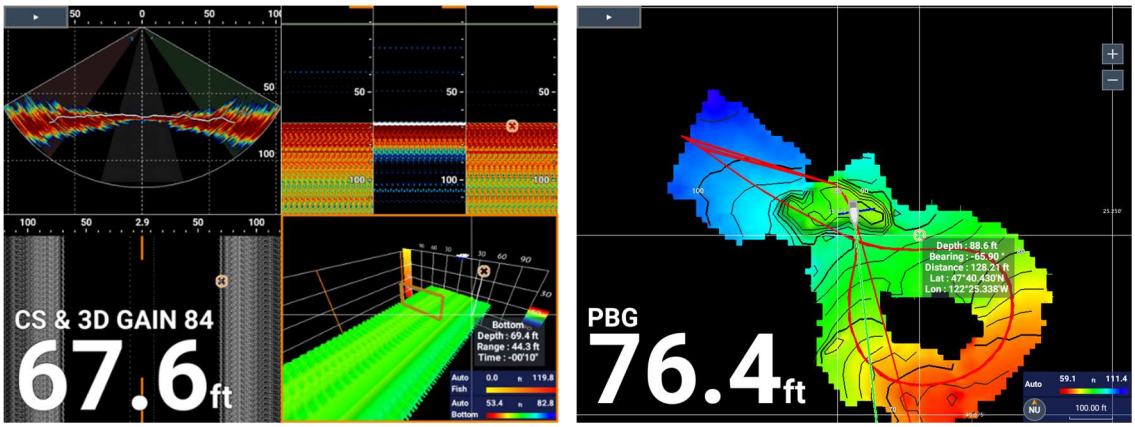
The PBG (Personal Bathymetric Generator) feature efficiently detects and records an area approximately twice the water depth (90° to the left and right of the vessel) to create a high-definition seabed maps, which are displayed it in different colors together with contour lines.



Depth/Color Scale
The minimum detected depth is displayed on the left side, and the maximum detected depth is displayed on the right side.

How to enter and display the TLL marker()

The TLL function, which requires positional data and time, puts the TLL marker on the corresponding location on the multi beam sounder display.
To mark a position on the multi beam sonar, press the **TLL** key. The TLL marker (see the figure below) is placed at the corresponding location on the multi beam sonar display. The displayed data and action taken after registration of a marker depends on status of the cursor.
Cursor shown: Display of latitude/longitude and water depth at the time the marker is registered. This information is output to connected navigational equipment.
Cursor not shown: Display of latitude/longitude and water depth at the time the marker is registered. The TLL marker appears in downward location in case of multi beam fish finder and 3D history and PBG modes.
The maximum number of registerable TLL markers is 20 for each display mode. When that amount is exceeded in a given mode, the oldest marker is deleted. The TLL marker is deleted when the power is turned off.



Example of TLL mark

The tables on the next page show function availability according to the latitude/longitude, and the presence or absence of heading data. Refer to the illustration on page 4-6 “Triple beam display” about the port, downward and starboard displays. If there is no latitude/longitude data, none of the functions below are available.

When multi beam fish finder mode is used

● With latitude/longitude and heading

Item	Port	Down	Starboard
TLL mark registration	○	○	○

● Without latitude/longitude and heading

Item	Port	Down	Starboard
TLL mark registration	×	○	×

When side scan mode is used

● With latitude/longitude and heading

Item	Port	Starboard
TLL mark registration	○	○

● Without latitude/longitude and heading

Item	Port	Starboard
TLL mark registration	×	×

When sonar mode is used

● With latitude/longitude and heading

Item	Sonar
TLL mark registration	○

● Without latitude/longitude and heading

Item	Sonar
TLL mark registration	×

When 3D history mode is used

● With latitude/longitude and heading

Item	School of fish	Bottom	Position
TLL mark registration	○	○	○

● Without latitude/longitude and heading

Item	School of fish	Bottom	Position
TLL mark registration	×	×	○

When PBG mode is used

● With latitude/longitude and heading

Item	PBG
TLL mark registration	○

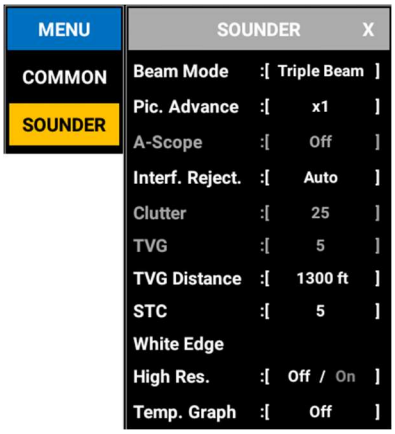
● Without latitude/longitude and heading

Item	PBG
TLL mark registration	○*

*: Only POSITION can be registered with the TLL mark.

4.3 Multi Beam Fish Finder Display

This section covers the functions available with the multi beam fish finder display which you access from the [SOUNDER] menu.
To show the [SOUNDER] menu, press the **MENU/ESC** key to open [MENU], then tap [SOUNDER] menu. Or use the arrow keys to select [SOUNDER] menu, then press the **ENTER** key.



[SOUNDER] menu

4.3.1 How to switch between single beam and triple beam

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SOUNDER].
3. Tap [Beam Mode].
   [Single]/[Triple] selection box appears.

4. Tap [Single] or [Triple].
   Note: A-Scope is unavailable when [Triple] is selected.
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [Beam Mode] with the arrow keys, then press the **ENTER** key.
   [Single]/[Triple] selection box appears.
4. Select [Single] or [Triple] with the arrow keys, then press the **ENTER** key.
   Note: A-Scope is unavailable when [Triple] is selected.
5. Press the **MENU/ESC** key to close [Menu].



4.3.2 How to set the TX beam angle

You can set the TX beam angle for the port, starboard and downward beams.

1. Open the pop-up menu by pressing the **POP-UP** key while displaying the Multi Beam fish finder.
2. Select [Beam Angle].
   Select beam angle from [20], [30], [40] or [50].

4.3.3 How to set the TX beam width

You can set the TX beam width for the port, starboard and downward beams.

1. Open the pop-up menu by pressing the **POP-UP** key while displaying the Multi Beam fish finder.
2. Select [Beam Width].
   Select beam width from [20], [30] or [40].

4.3.4 How to change the picture advance speed

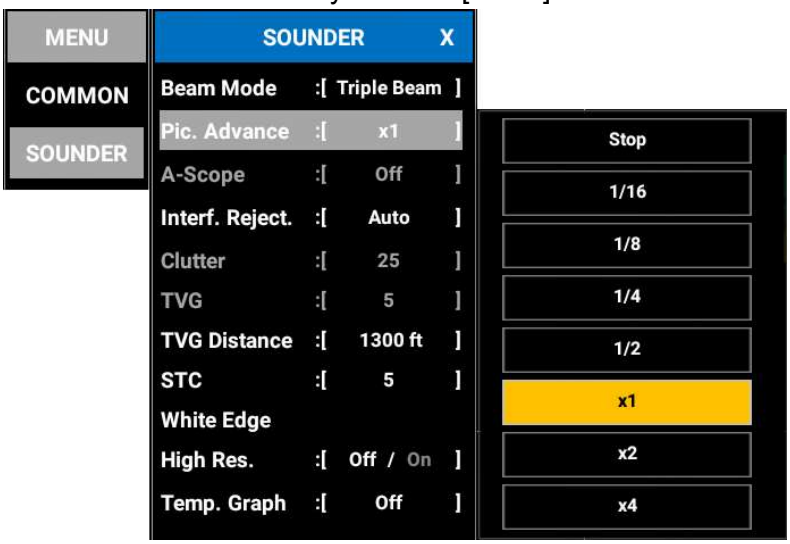
The picture advance speed determines how quickly vertical scan lines move across the display. When viewing a bottom with sharp rises and falls, such as a reef-bed or submerged wreck, a fast advance speed helps to “smooth” out the bottom for easier viewing. On the other hand, when viewing a smooth bottom with little to no undulations, a slow advance speed helps to identify rises and falls.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SOUNDER].
3. Tap [Pic. Advance].
   [Stop]/[1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Tap [Stop], [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4].
   The fastest speed is [4/1] and slowest speed is [1/16]. [4/1] means four times normal speed and [1/16] means sixteen times slower than normal speed.
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SOUNDER] with the arrow keys, then press the **ENTER** key.
3. Select [Pic. Advance] with the arrow keys, then press the **ENTER** key.
   [Stop]/[1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Select [Stop], [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4] with the arrow keys, then press the **ENTER** key.
   The fastest speed is [4/1] and slowest speed is [1/16]. [4/1] means four times normal speed and [1/16] means sixteen times slower than normal speed.
5. Press the **MENU/ESC** key to close [Menu].



4.3.5 How to show or hide the depth and gain indications

You can show or hide the depth and gain at the bottom left corner of the display. The size of indication can be selected as well.

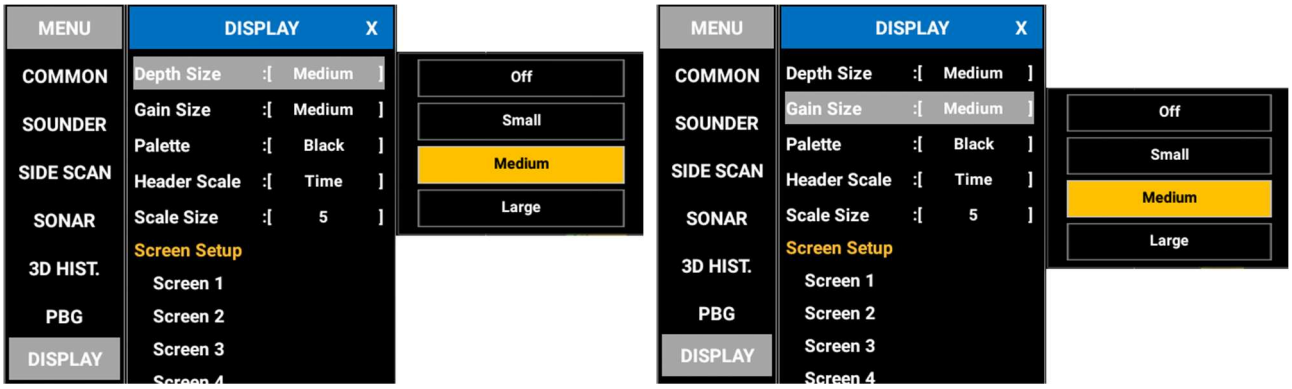
Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [DISPLAY].
3. Tap [Depth Size].
   [Off]/[Small]/[Medium]/[Large] selection box appears.
4. Tap [Off], [Small], [Medium] or [Large].
5. Tap [Gain Size].
   [Off]/[Small]/[Medium]/[Large] selection box appears.
6. Tap [Off], [Small], [Medium] or [Large].
7. Tap [×] on the title bar to close [MENU].

Key control:

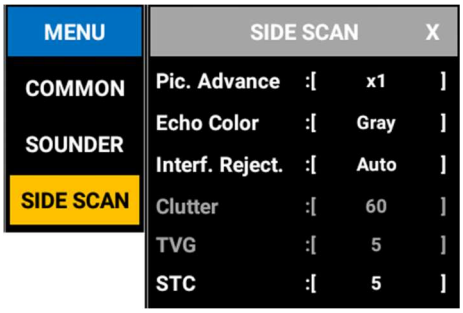
1. Press the **MENU/ESC** key to open [Menu].
2. Select [DISPLAY] with the arrow keys, then press the **ENTER** key.
3. Select [Depth Size] with the arrow keys, then press the **ENTER** key.
   [Off]/[Small]/[Medium]/[Large] selection box appears.
4. Select [Off], [Small], [Medium] or [Large] with the arrow keys, then press the **ENTER** key.

5. Select [Gain Size] with the arrow keys, then press the **ENTER** key. [Off]/[Small]/[Medium]/[Large] selection box appears.
6. Select [Off], [Small], [Medium] or [Large] with the arrow keys, then press the **ENTER** key.
7. Press the **MENU/ESC** key to close [Menu].



4.4 Side Scan Display

This section covers the functions available with the side scan display.
To show the [SIDE SCAN] menu, press the **MENU/ESC** key to open [MENU], then tap [SIDE SCAN] menu.
Or use the arrow keys to select [SIDE SCAN] menu, then press the **ENTER** key.



[SIDE SCAN] menu

4.4.1 How to change the picture advance speed

The picture advance speed can be changed to better observe bottom conditions. When viewing a bottom with sharp rises and falls, such as a reef-bed or submerged wreck, a fast advance speed helps to “smooth” out the bottom for easier viewing. On the other hand, when viewing a smooth bottom with little to no undulations, a slow advance speed helps to identify rises and falls.

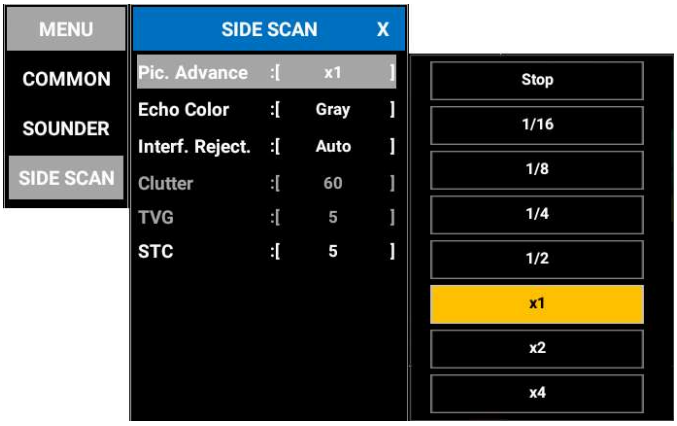
Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SIDE SCAN].
3. Tap [Pic. Advance].
   [Off]/[1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Tap [Off], [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4].
   The fastest speed is [4/1] and slowest speed is [1/16]. [4/1] means four times normal speed and [1/16] means sixteen times slower than normal speed.
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SIDE SCAN] with the arrow keys, then press the **ENTER** key.

3. Select [Pic. Advance] with the arrow keys, then press the **ENTER** key.
   [Off]/[1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Select [Off], [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4] with the arrow keys, then press the **ENTER** key.
   The fastest speed is [4/1] and slowest speed is [1/16]. [4/1] means four times normal speed and [1/16] means sixteen times slower than normal speed.
5. Press the **MENU/ESC** key to close [Menu].



4.4.2 How to change echo color

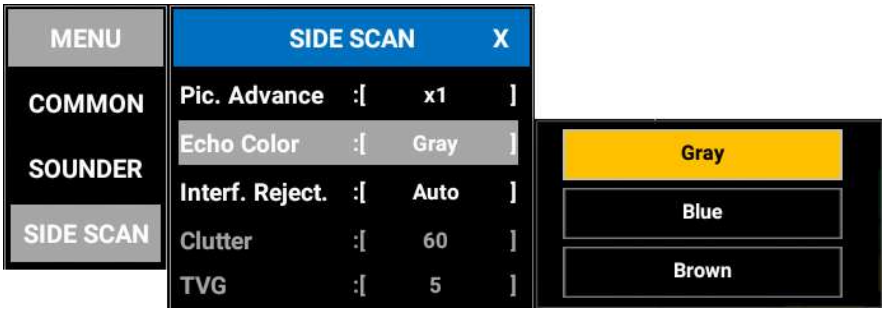
You can select the echo color as follows.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SIDE SCAN].
3. Tap [Echo Color].
   [Gray]/[Blue]/[Brown] selection box appears.
4. Tap [Gray], [Blue] or [Brown].
5. Tap [×] on the title bar to close [MENU].

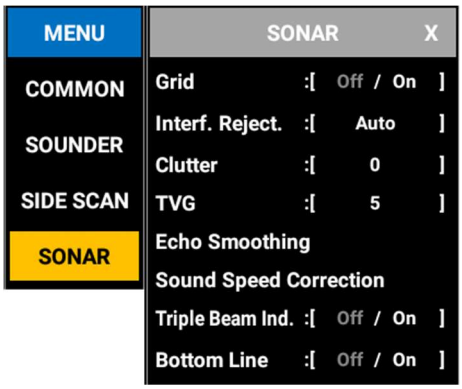
Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SIDE SCAN] with the arrow keys, then press the **ENTER** key.
3. Select [Echo Color] with the arrow keys, then press the **ENTER** key.
   [Gray]/[Blue]/[Brown] selection box appears.
4. Select [Gray], [Blue] or [Brown] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [Menu].



4.5 Cross Section (SONAR) Display

This section covers the functions available with the cross section display. To show the [SONAR] menu, press the **MENU/ESC** key to open [MENU], then tap [SONAR] menu. Or use the arrow keys to select [SONAR] menu, then press the **ENTER** key.



[SONAR] menu

4.5.1 How to show or hide the grid

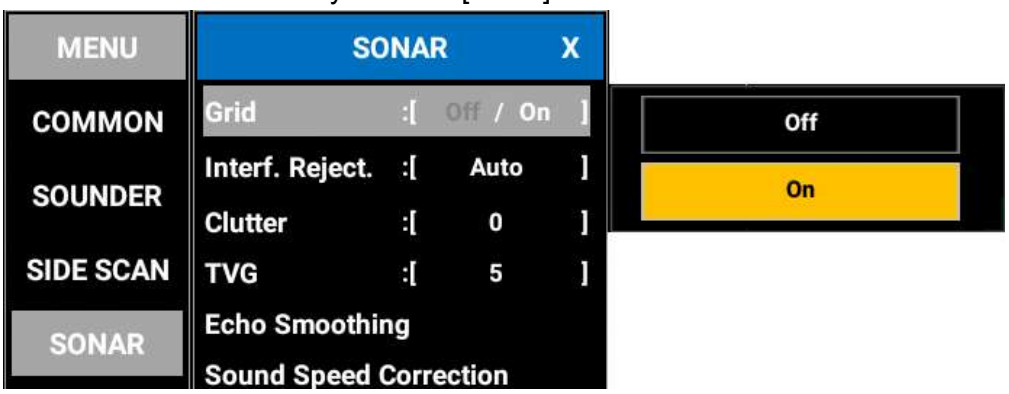
The grid, which is useful for measuring the distance to a target, can be shown or hidden as follows.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SONAR].
3. Tap [Grid].
   [Off]/[On] selection box appears.
4. Tap [Off] or [On].
5. Tap [×] on the title bar to close [MENU].

Key control:

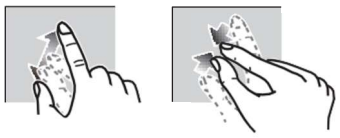
1. Press the **MENU/ESC** key to open [Menu].
2. Select [SONAR] with the arrow keys, then press the **ENTER** key.
3. Select [Grid] with the arrow keys, then press the **ENTER** key.
   [Off]/[On] selection box appears.
4. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [Menu].



4.5.2 Zoom display

The bottom echo can be zoomed by pinching the screen as shown right.

With pinch actions, selected area and echo can be zoomed in or zoomed out.



Zoom in Zoom out

When connecting trackball control unit RCU-030, the same operation can be done with the scroll wheel.

4.5.3 How to smooth echoes (distance)

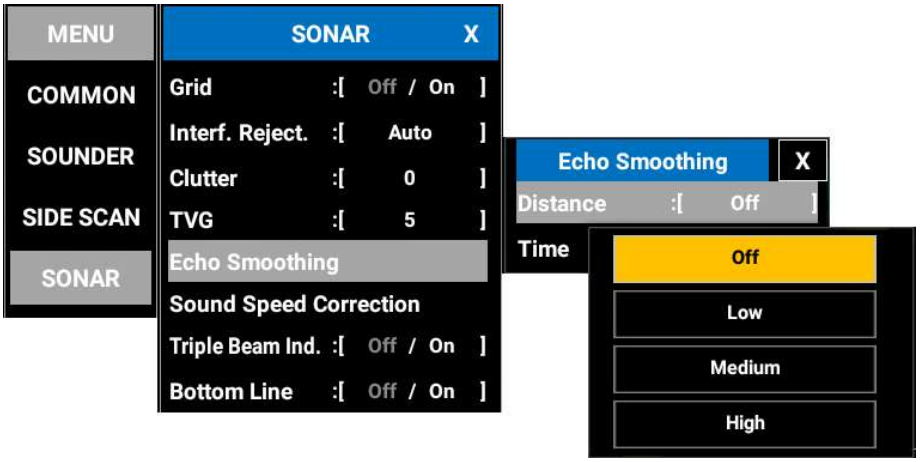
If echoes are “disconnected” because of an undulating bottom, change the setting of [Echo Smoothing] – [Distance] to [Low], [Medium] or [High] as necessary. Smoothing is done in the range direction to smooth the echo presentation.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SONAR].
3. Tap [Echo Smoothing].
4. Tap [Distance].
   [Off]/[Low]/[Medium]/[High] selection box appears.
5. Tap [Off], [Low], [Medium] or [High].
6. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SONAR] with the arrow keys, then press the **ENTER** key.
3. Select [Echo Smoothing] with the arrow keys, then press the **ENTER** key.
4. Select [Distance] with the arrow keys, then press the **ENTER** key.
   [Off]/[Low]/[Medium]/[High] selection box appears.
5. Select [Off], [Low], [Medium] or [High] with remove one space the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [Menu].



4.5.4 How to smooth echoes (time)

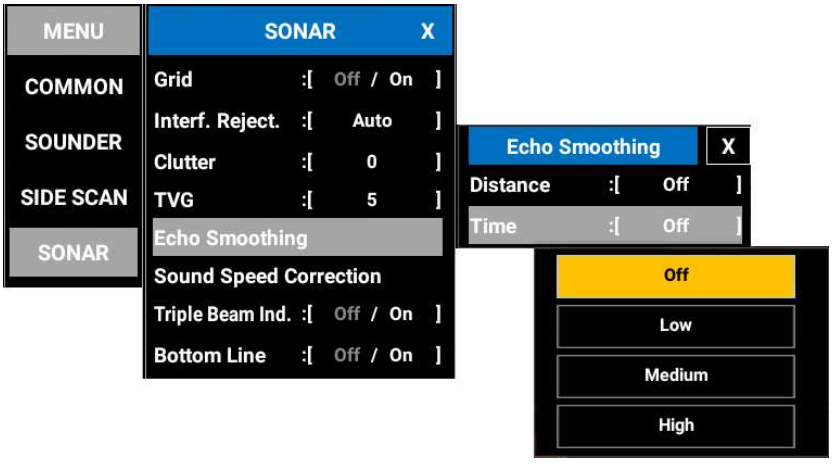
If echoes are difficult to see because they appear “speckled”, use the echo smoothing feature to suppress the speckling by time, by changing the setting of [Echo Smoothing] – [Time] to [Low], [Medium] or [High] as necessary.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SONAR].
3. Tap [Echo Smoothing].
4. Tap [Time].
   [Off]/[Low]/[Medium]/[High] selection box appears.
5. Tap [Off], [Low], [Medium] or [High].
6. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SONAR] with the arrow keys, then press the **ENTER** key.
3. Select [Echo Smoothing] with the arrow keys, then press the **ENTER** key.
4. Select [Distance] with the arrow keys, then press the **ENTER** key.
   [Off]/[Low]/[Medium]/[High] selection box appears.
5. Select [Off], [Low], [Medium] or [High] with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [Menu].



4.5.5 How to apply correction to the speed of sound

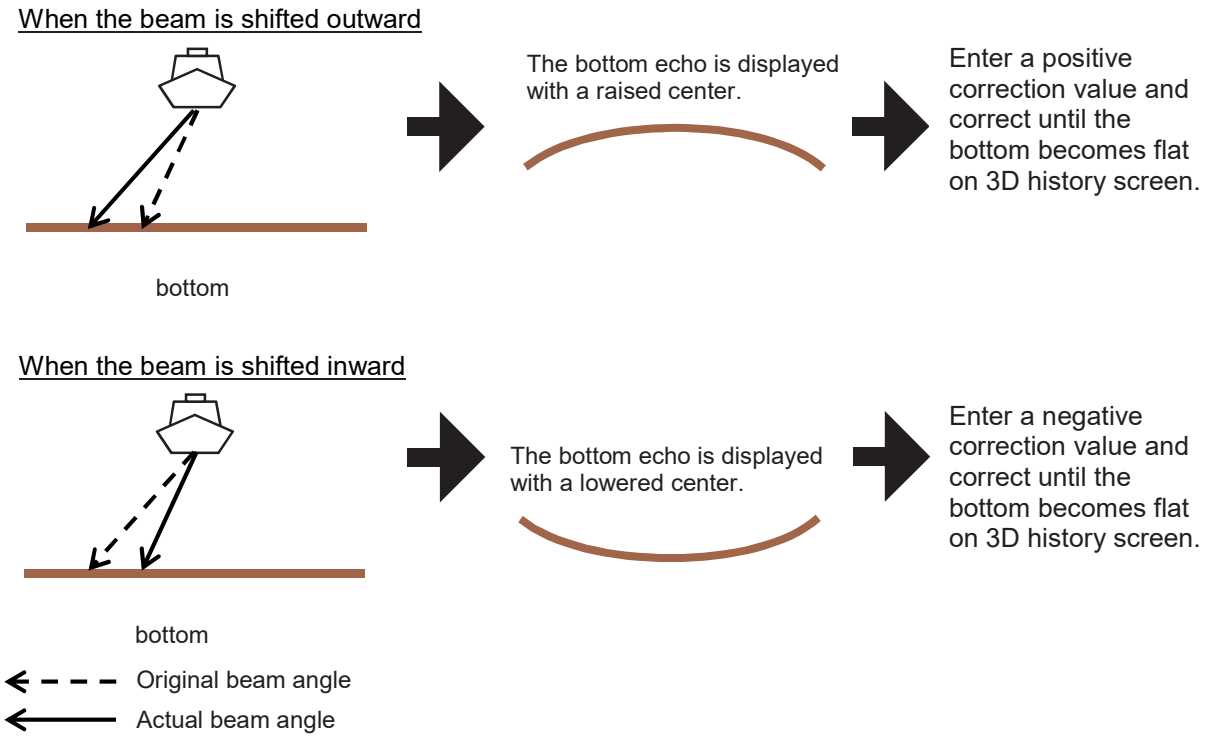
Even though the sea bottom is flat, the left or right edge, or up or down may be distorted. To compensate for this problem, adjust the speed of sound, automatically or manually.

Correction to the speed of sound

The speed of sound through water may increase or decrease depending on the water temperature and salinity. The DFF-3D transmits multiple beams at various angles to generate echoes in a 120° range to the left and right, but when the speed of sound changes, the transmission angle shifts outward or inward from the original angle. The DFF-3D is designed to automatically correct this deviation,

but if the speed of sound changes beyond the correction range, the center of the bottom will rise or fall. In such cases, correct the speed of sound from the [Sound Speed Correction] menu.

Note: Do the adjustment where the bottom is flat.



Automatic correction

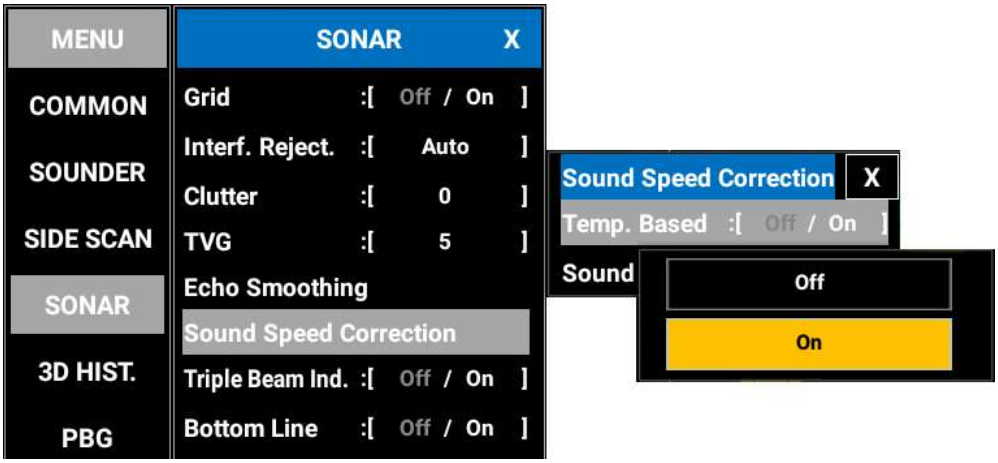
The speed of sound is automatically corrected based on the water temperature.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SONAR].
3. Tap [Sound Speed Correction].
4. Tap [Temp. Based].
   [Off]/[On] selection box appears.
5. Tap [Off] or [On].
6. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SONAR] with the arrow keys, then press the **ENTER** key.
3. Select [Sound Speed Correction] with the arrow keys, then press the **ENTER** key.
4. Select [Temp. Based] with the arrow keys, then press the **ENTER** key.
   [Off]/[On] selection box appears.
5. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [Menu].



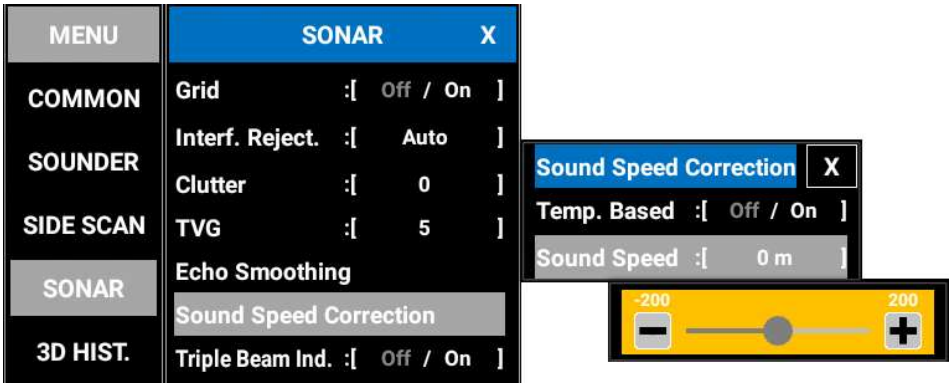
Manual correction

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [SONAR].
3. Tap [Sound Speed Correction].
4. Tap [Sound Speed]. Drag the slider bar which appears below menu or tap [+] or [-] to adjust the value. (Setting range: -200 to 200)
5. Tap [×] on the title bar to close [MENU].

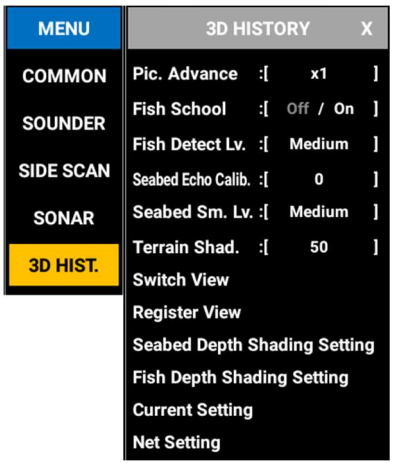
Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [SONAR] with the arrow keys, then press the **ENTER** key.
3. Select [Sound Speed Correction] with the arrow keys, then press the **ENTER** key.
4. Select [Sound Speed] with the arrow keys, then press the **ENTER** key.
5. Drag the slider bar which appears below menu or tap [+] or [-] to adjust the value. (Setting range: -200 to 200)
6. Press the **MENU/ESC** key to close [Menu].



4.6 3D Sounder History Display

This section covers the functions available with the 3D sounder history display. The 3D sounder history is able to display up to 500 past transmissions.
To show [3D HIST.] menu, press the **MENU/ESC** key to open [MENU], then tap [3D HIST] menu. Or use the arrow keys to select [3D HIST.] menu, then press the **ENTER** key.

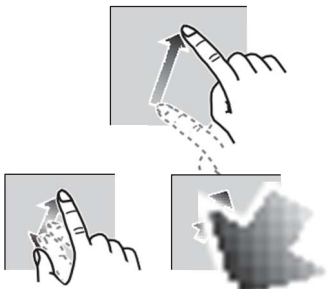


[3D HIST.] menu

4.6.1 How to move, zoom in, zoom out the viewpoint position

How to move the viewpoint
The view point can be moved by dragging.

How to zoom in, zoom out
The display range can be zoomed in or out by pinching.



Zoom in Zoom out

How to register or recall the vewpoint
The view point set with above operations can be registered to the unit and the viewpoint be recalled.

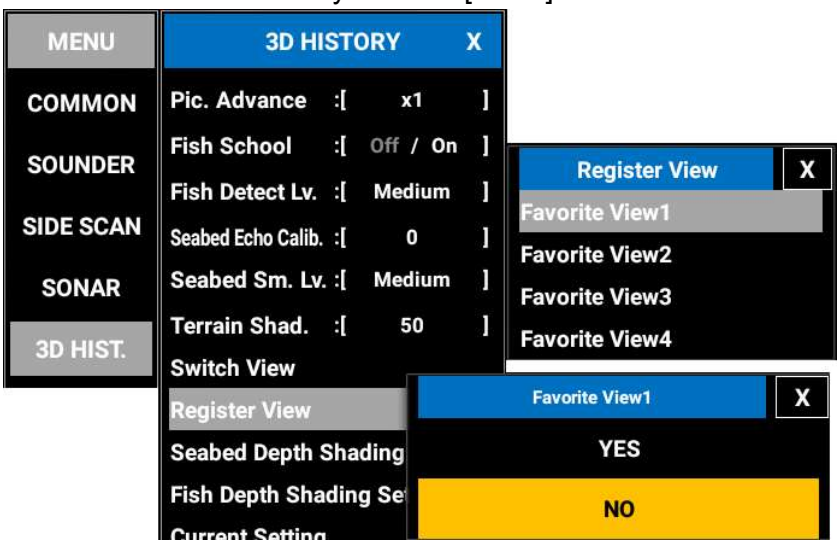
Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Register View].
   [Favorite View1]/[Favorite View2]/[Favorite View3]/[Favorite View4] selection box appears.
4. Tap [Favorite View1], [Favorite View2], [Favorite View3] or [Favorite View4].

5. Pop-up window for the selected item appears. Tap [YES] or [NO], or select either of them with the arrow keys, then press the **ENTER** key.
   Current view point is registered to the selected number.
6. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Register View] with the arrow keys, then press the **ENTER** key.
   [Favorite View1]/[Favorite View2]/[Favorite View3]/[Favorite View4] selection box appears.
4. Select [Favorite View1], [Favorite View2], [Favorite View3] or [Favorite View4] with the arrow keys, then press the **ENTER** key.
5. Pop-up window for the selected item appears. Select [YES] or [NO] with the arrow keys, then press the **ENTER** key.
   When selected [YES], current view point is registered to the selected number.
6. Press the **MENU/ESC** key to close [Menu].



How to reset the view point to the registered view point or restore default view

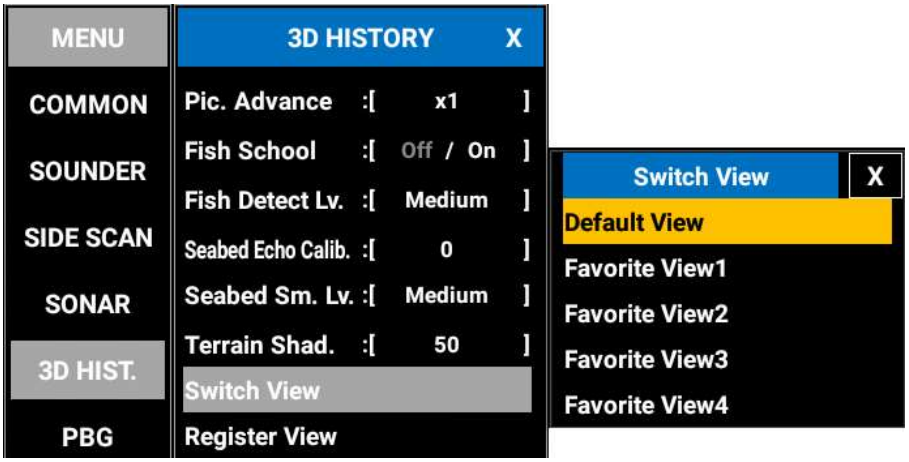
If you get lost in viewpoint or zoom, you can reset the viewpoint to the registered view point or restore the default view as follows.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Switch View].
   [Defalt View]/[Favorite View1]/[Favorite View2]/[Favorite View3]/[Favorite View4] selection box appears.
4. Tap [Default View], [Favorite View1], [Favorite View2], [Favorite View3] or [Favorite View4] selection box appears.
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Switch View] with the arrow keys, then press the **ENTER** key.
4. [Defalt View]/[Favorite View1]/[Favorite View2]/[Favorite View3]/[Favorite View4] selection box appears.
5. Select [Default View], [Favorite View1], [Favorite View2], [Favorite View3] or [Favorite View4] with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [Menu].



4.6.2 School of fish icon

A detected school of fish can be marked with a “dot” mark for easy identification.

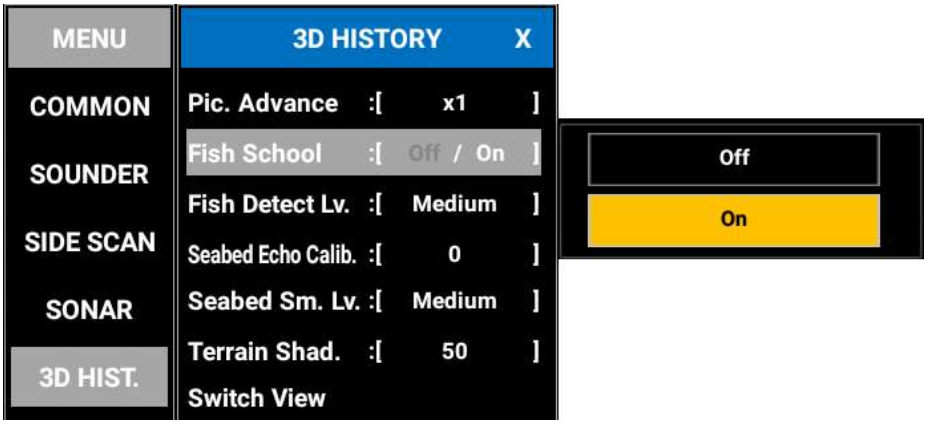


Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Fish School].
   [Off]/[On] selection box appears.
4. Tap [Off] or [On].
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Fish School] with the arrow keys, then press the **ENTER** key.
   [Off]/[On] selection box appears.
4. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [Menu].



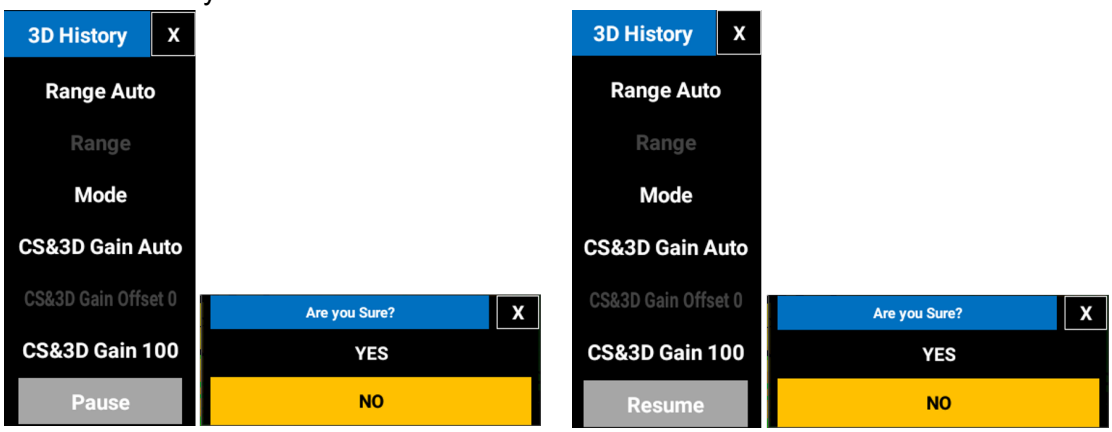
4.6.3 How to stop and restart the display advancement

You can stop the advancement of history display to observe the distribution of sea floor topography and school of fish.

1. Press the **MENU/ESC** key while [3D HIST.] is shown and open pop-up menu.
2. Tap [Pause] or select [Pause] with the arrow keys, then press the **ENTER** key.
3. Pop-up window “Are you Sure?” appears.
4. Tap [YES] or [NO], or select either of them with the arrow keys, then press the **ENTER** key.

To restart the display advancement,

1. Press the **MENU/ESC** key while [3D HIST.] is shown and open pop-up menu.
2. Open the pop-up menu by pressing the **POP-UP** key, then tap [Restart] or select [Restart] with arrow keys, then press the **ENTER** key.
3. Pop-up window “Are you Sure?” appears.
4. Tap [YES] or [NO], or select either of them with the arrow keys, then press the **ENTER** key.



4.6.4 How to adjust the echo detection level

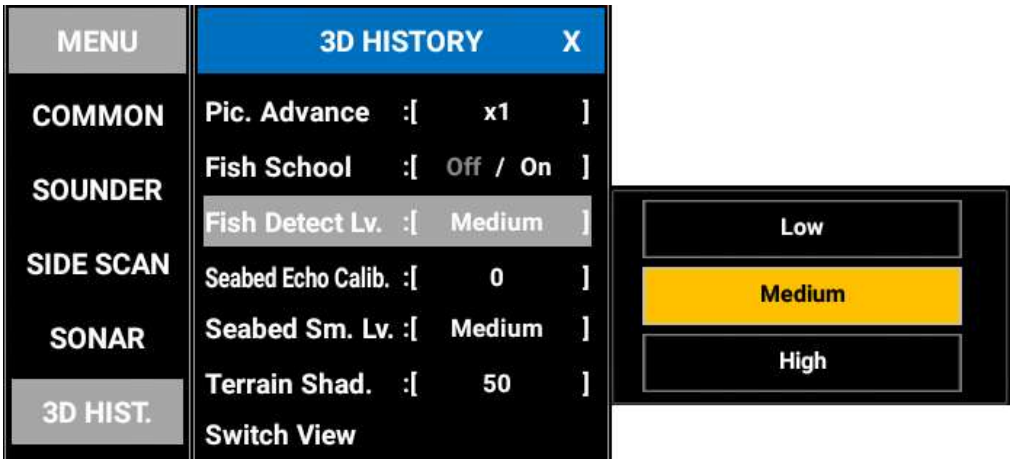
Adjust the echo detection level if the detection of school of fish is unstable.

Touch screen:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Fish Detect Lv.].
   [Low]/[Medium]/[High] selection box appears.
4. Tap [Low], [Medium] or [High].
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Fish Detect Lv.] with the arrow keys, then press the **ENTER** key.
   [Low]/[Medium]/[High] selection box appears.
4. Select [Low], [Medium] or [High] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [Menu].



4.6.5 How to calibrate the bottom echo

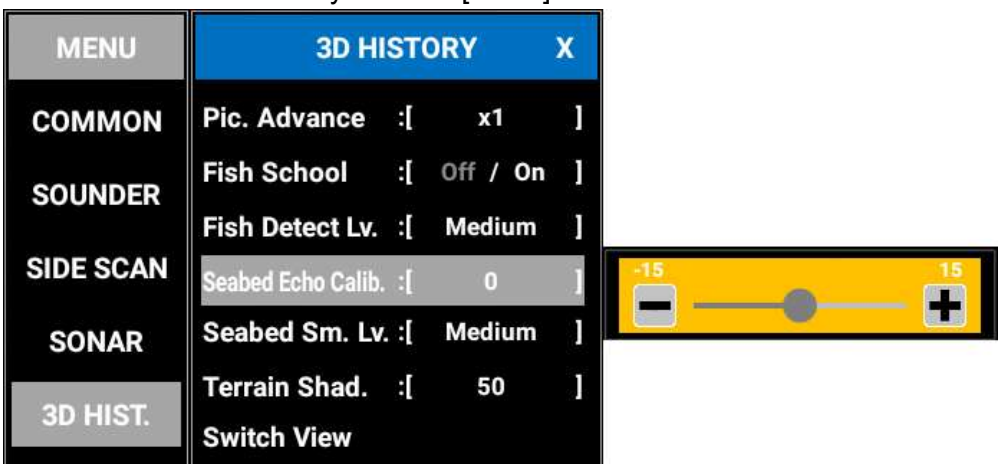
If schools of fish or a fish reef are detected and displayed as the bottom echo, adjust the strength of the bottom echo as shown below to correctly identify the bottom echo.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Bottom Echo Calib.]. Drag the slider bar which appears below menu or tap [+] or [-] to adjust the value. (Setting range: -15 to 15)
   Larger number helps distinguish bottom fish from the bottom echo; however, it becomes difficult to distinguish a fish bed. Smaller number helps distinguish a fish bed; however, it becomes difficult to distinguish bottom fish from the bottom echo.
4. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Bottom Echo Calib.] with the arrow keys, then press the **ENTER** key.
4. Tap [Bottom Echo Calib.]. Drag the slider bar which appears below menu or tap [+] or [-] to adjust the value. (Setting range: -15 to 15)
   Larger number helps distinguish bottom fish from the bottom echo; however, it becomes difficult to distinguish a fish bed. Smaller number helps distinguish a fish bed; however, it becomes difficult to distinguish bottom fish from the bottom echo.
5. Press the **MENU/ESC** key to close [Menu].



4.6.6 How to use the bathymetry smoothing

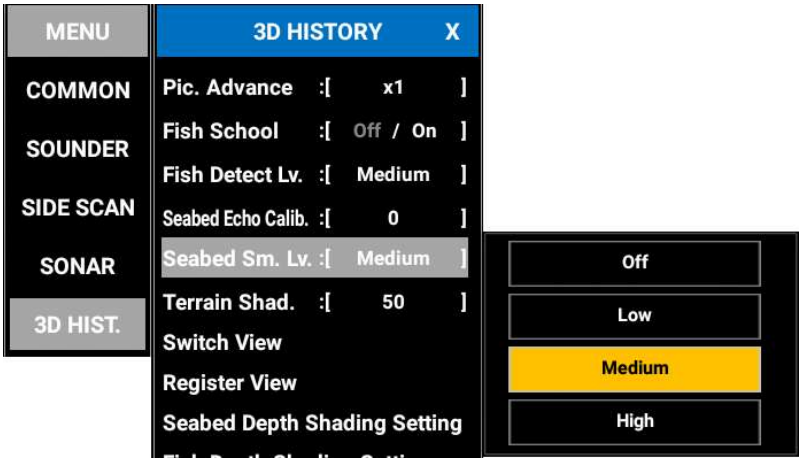
If the bottom echo is uneven and difficult to monitor, adjust the bathymetry smoothing level to smooth the bottom echo.

Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Bottom Sm. Lv.].
   [Off]/[Low]/[Medium]/[High] selection box appears.
4. Tap [Off], [Low], [Medium] or [High].
   Select [Off] to stop smoothing.
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Bottom Echo Calib.] with the arrow keys, then press the **ENTER** key.
   [Off]/[Low]/[Medium]/[High] selection box appears.
4. Select [Off], [Low], [Medium] or [High] with the arrow keys, then press the **ENTER** key.
   Select [Off] to stop smoothing.
5. Press the **MENU/ESC** key to close [Menu].



4.6.7 How to use terrain shading

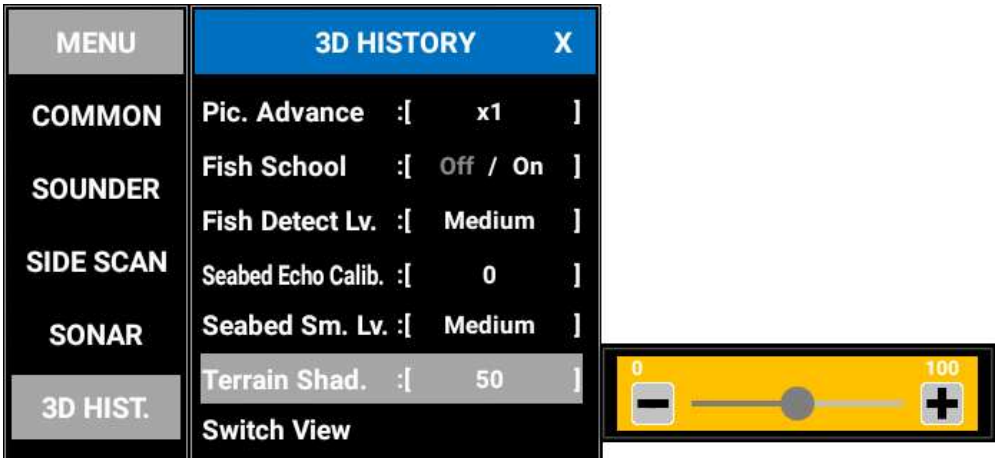
The thickness of the bottom terrain shading can be adjusted.

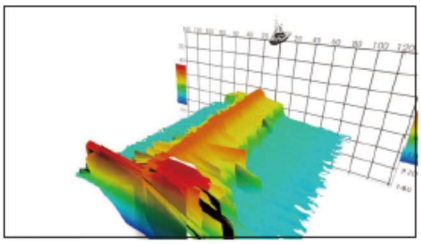
Touch control:

1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Terrain Shad.]. Drag the slider bar which appears below menu or tap [+] or [-] to adjust the value. (Setting range: 0 to 100)
4. Tap [×] on the title bar to close [MENU].

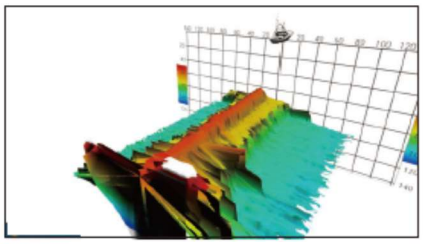
Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Terrain Shad.] with the arrow keys, then press the **ENTER** key.
4. Tap [Terrain Shad.]. Drag the slider bar which appears below menu or tap [+] or [-] to adjust the value. (Setting range: 0 to 100)
5. Press the **MENU/ESC** key to close [Menu].

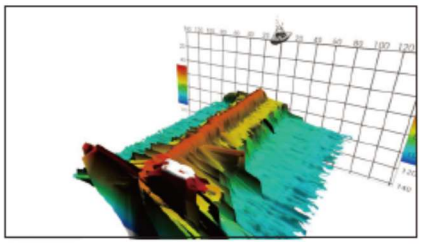




Setting: 0



Setting: 50



Setting: 100

4.6.8 How to change the picture advance speed

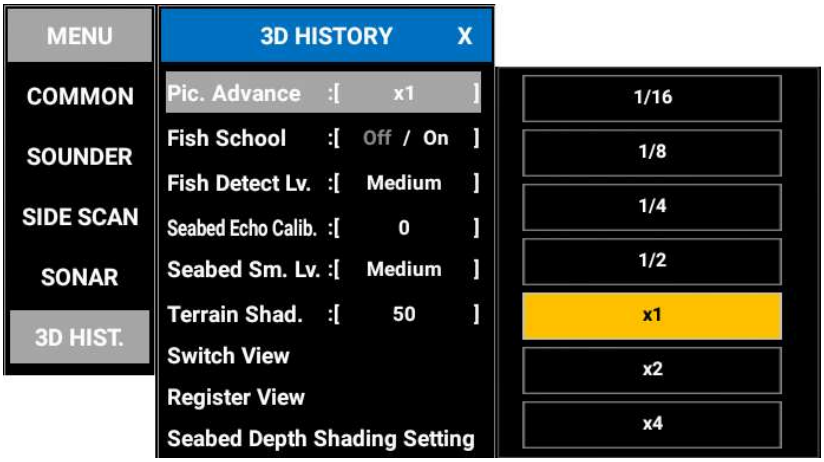
The picture advance speed for the 3d history display sets how quickly vertical scan lines move across the display. Even when viewing the same bottom or a school of fish, how those are displayed changes according to the picture advance speed. When viewing a bottom with sharp rises and falls such as a reef-bed or submerged wreck, a fast advance speed helps to “smooth out” the bottom for easier viewing. On the other hand, when viewing a smooth bottom with little to no undulations, a slow advance speed helps to identify rises and falls.

Touch control:

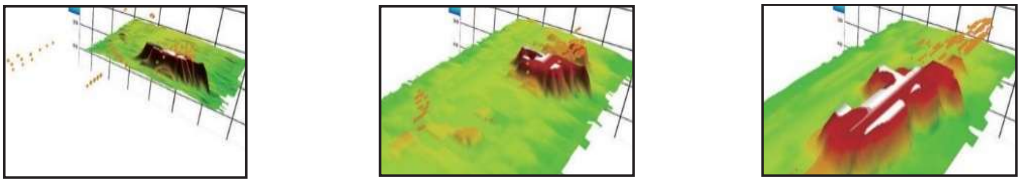
1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Pic. Advance].
   [Stop]/[1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Tap [Stop], [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4].
   The fastest speed is [4/1] and slowest speed is [1/16]. [4/1] means four times normal speed and [1/16] means sixteen times slower than normal speed.
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Pic. Advance] with the arrow keys, then press the **ENTER** key.
   [1/16]/[1/8]/[1/4]/[1/2]/[x1]/[x2]/[x4] selection box appears.
4. Select [1/16], [1/8], [1/4], [1/2], [x1], [x2] or [x4] with the arrow keys, then press the **ENTER** key.
   The fastest speed is [4/1] and slowest speed is [1/16]. [4/1] means four times normal speed and [1/16] means sixteen times slower than normal speed.
5. Press the **MENU/ESC** key to close [Menu].



[1/4] [1/1] [x4]



4.6.9 Bottom depth shading, fish depth shading

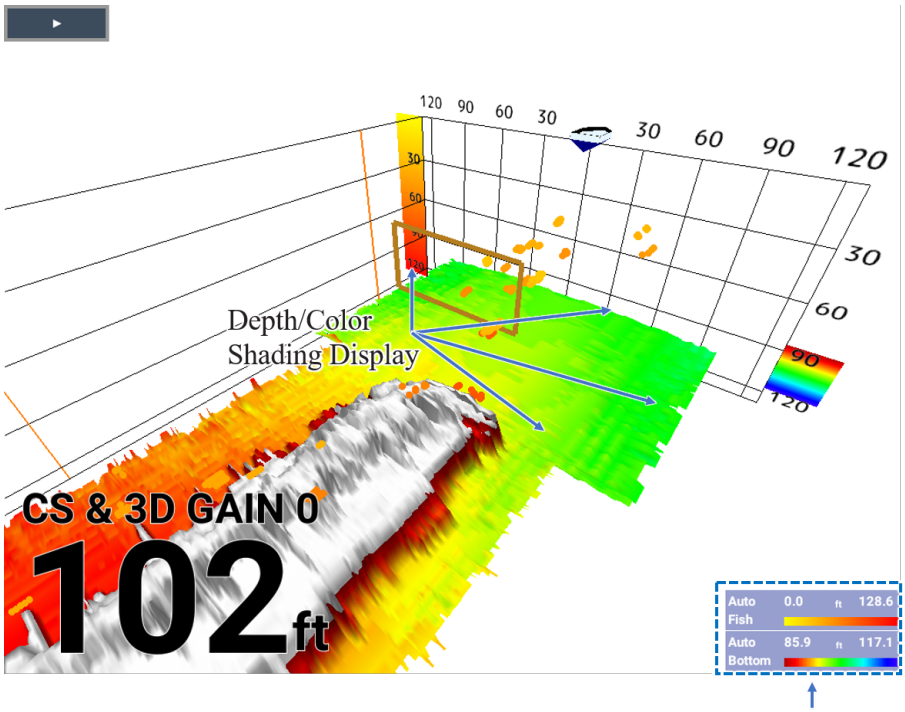
The bottom echo and schools of fish can be shown in shades of colors according to depth, to help you see the differences in depths more easily.

Color shading display mode

The [Bottom Depth Shading Setting] changes echo color depending on the bottom depth. The [Fish Depth Shading Setting] changes echo color depending on the depth at where the school of fish is detected.

- [Bottom Depth Shading Setting] : The bottom echo color set to multi tone or single tone.
- [Fish Depth Shading Setting] : The schools of fish echo color set to single color, multi tone or single tone.

Note: The bottom is shown in white when its strength is greater than the strongest color shown on the color bar. A school of fish is transparent when its strength is greater than the strongest color shown on the color bar.



[Seabed Depth Shading Setting] color bar, [Fish Depth Shading Setting] color bar

Touch control:

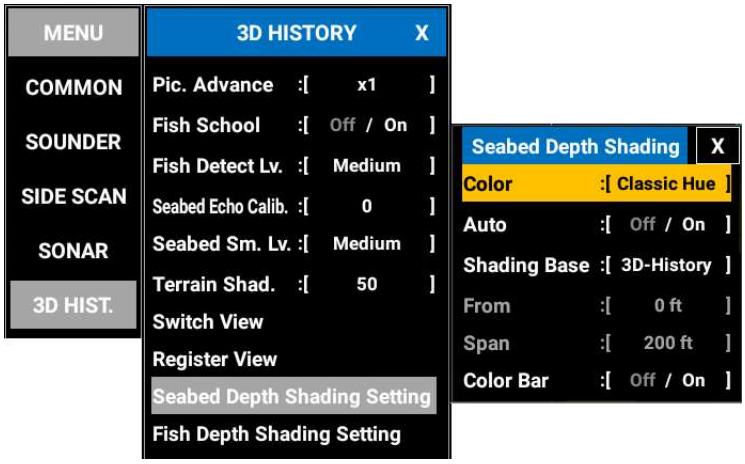
1. Press the **MENU/ESC** key to open [Menu].
2. Tap [3D HIST.].
3. Tap [Seabed Depth Shading Setting] or [Fish Depth Shading Setting].

Key control:

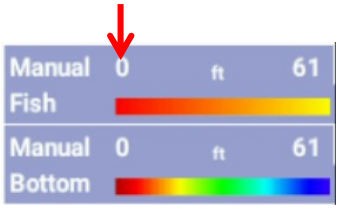
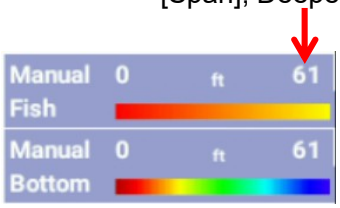
1. Press the **MENU/ESC** key to open [Menu].
2. Select [3D HIST.] with the arrow keys, then press the **ENTER** key.
3. Select [Seabed Depth Shading Setting] or [Fish Depth Shading Setting] with the arrow keys, then press the **ENTER** key.

Settings

The following settings are available.



Common items with [Bottom Depth Shading Setting] and [Fish Depth Shading Setting]

Item	Description	Setting range (option)
[Auto]	Automatically set the depth to display with the shading. When [Auto] is [On] When [Auto] is [Off] 	[On], [Off]
[From]	Use the slider bar to set the shallowest depth to start shading. [Auto] must be [On] to set the depth. Press the **MENU/ESC** key after setting. [From], Shallowest depth 	0 ～ 1200 m
[Span]	Use the slider bar to set the deepest depth to finish shading. [Auto] must be [On] to set the depth. Press the **MENU/ESC** key after setting. [Span], Deepest depth 	1 ～ 1200 m
[Color Bar]	Set to display the color bar at the right bottom of display or not. Press the **MENU/ESC** key after setting.	[On], [Off]

Menu only for the [Bottom Depth Shading Setting]

[Shading Base]	Sets the base for automatically setting the color scale. For [3D History], the range is set based on the most recent seabed echoes. For [PBG], the range is set based on the water depth within the display range of the PBG screen.	[3D History], [PBG]

The difference between the [Bottom Depth Shading Setting] menu and the [Fish Depth Shading Setting] menu is the echo color that can be set.

[Bottom Depth Shading Setting] menu

Item	Description	Setting range (option)
[Color]	Set the echo color in multi tone or single tone.	[Clsssic Hue], [Invert Classic Hue], [Red Hue], [Blue Hue], [Green Hue], [Yellow Hue], [Gray Hue], [Brown Hue]

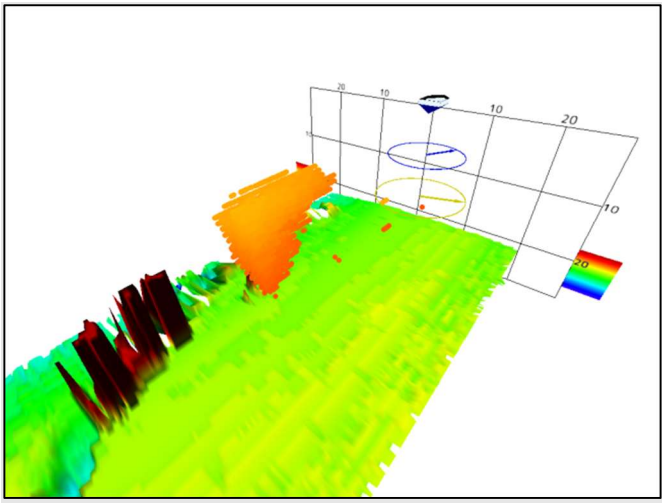
The difference between [Bottom Depth Shading Setting] and [Fish Depth Shading Setting] is the echo colors to be set.

[Fish Depth Shading Setting] menu

Item	Description	Setting range (option)
[Color]	Set the echo color in single color, multi tone or single tone.	[Classic Hue], [Invert Classic Hue], [Red Hue], [Blue Hue], [Green Hue], [Yellow Hue], [Gray Hue], [Brown Hue], [Red], [Green], [Blue], [Cyan], [Magenta], [Black or White], [Pink], [Light Green], [Yellow]

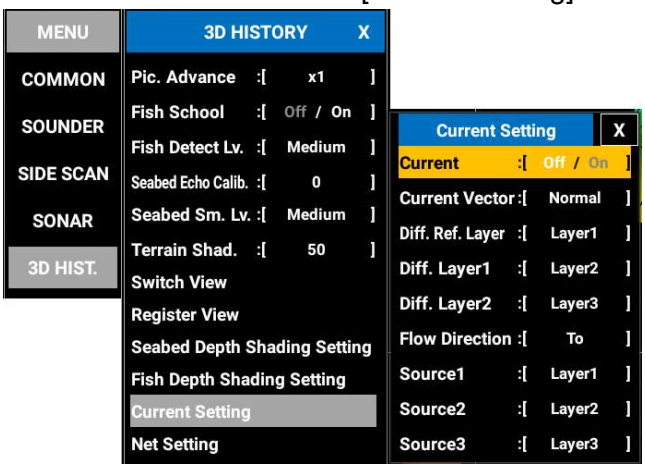
4.6.10 Current (tide) setting

When connected with the Current Indicator (CI-68) and [Current] menu of [Current Setting] is set to [On], the current vector is shown. Up to three current vectors can be displayed and the layer can be selected.



Example of Current Vector Indication

Menu items included in the [Current Setting] menu and their settings are as follows.



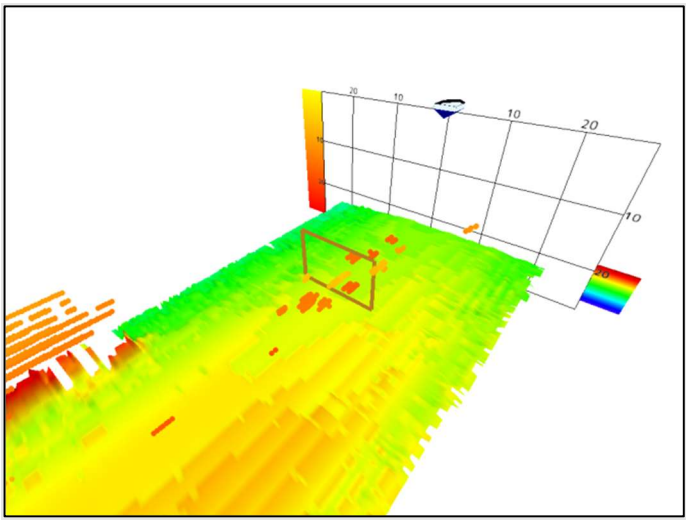
Menu	Description	Setting range (Option)
[Current]	Set to show the current vector or not.	[On], [Off]

[Current Vector]	Sets the configuration of the current mark.	[Normal], [Long], [Normal/Thick], [Long/Thick]
[Diff. Ref. Layer]	Set the basic layer to show the differences between (among) other currents.	[Layer1], [Layer2], [Layer3], [Layer4], [Layer5]
[Diff. Layer1]	Select the layer to compare with the basic layer.	[Layer1], [Layer2], [Layer3], [Layer4], [Layer5]
[Diff. Layer2]	Select the layer to compare with the basic layer.	[Layer1], [Layer2], [Layer3], [Layer4], [Layer5]
[Flow Direction]	Select the tide direction to display. The direction the tide is flowing to, or the direction the tide is flowing from.	[To], [From]
[Source1]	Select which layer to show the tide vector.	[Layer1], [Layer2], [Layer3], [Layer4], [Layer5], [Diff Layer1], [Diff Layer2]
[Source2]		
[Source3]		

4.6.11 Net setting

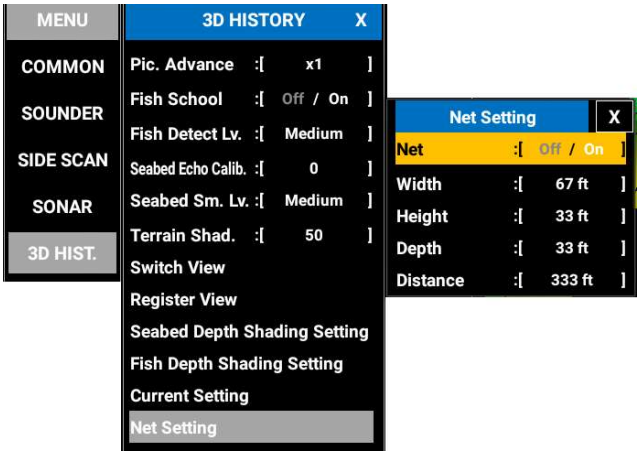
You can show simulated net movement on the display. The width, height, depth and distance between the net can be adjusted.

Note: This function calculates probable net movement and thus does not guarantee the position of the net in the water. Observe the net to make sure it does not get snagged by some object and that it is actually catching fish.



Example of net display

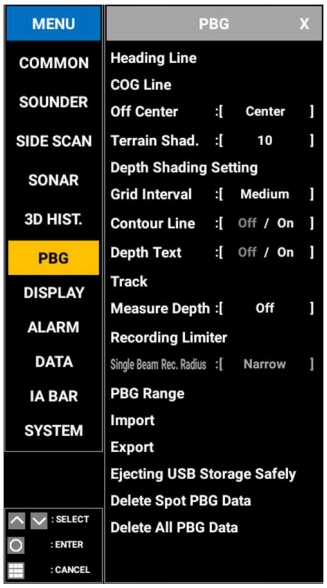
The [Net Setting] menu sets the characteristics of the net.



Menu	Description	Setting range (Option)
[Net]	To show the net mark or not.	[On], [Off]
[Width]	Set the net width.	[1 m]～[1200 m]
[Height]	Set the net height.	[1 m]～[1200 m]
[Depth]	Set the net depth.	[1 m]～[1200 m]
[Distance]	Set the distance between own ship and net.	[1 m]～[1200 m]

4.7 PBG

The PBG (Personal Bathymetric Generator) feature efficiently detects and records an area approximately twice the water depth (90° to the left and right of the vessel) to create a high-definition seabed maps, which are displayed it in different colors together with contour lines. Tide heights are automatically corrected based on information from the nearest tide station. To display the [PBG] menu, press the **MENU/ESC** key to open the menu, and tap the [PBG] menu or select the [PBG] menu with the arrow keys and press the **ENTER** key.



[PBG] menu

4.7.1 PBG Recording

Seabed topographic map is recorded as own ship moves.

Note1: Requires position and heading data.

Note2: PBG recording automatically stops when importing and exporting the settings (refer to the 4.7.16).

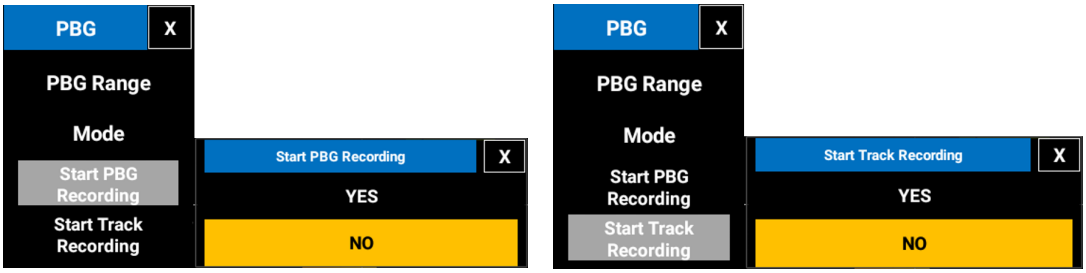
Note3: PBG recording automatically stops when the [Spot Deletion Mode] is set to [ON] (refer to the 4.7.17).

Start PBG recording

1. Open the pop-up menu by pressing the **POP-UP** key.
2. Tap [PBG] or select it by arrow keys, then tap [Start PBG Recording] or select it by arrow keys and press **ENTER** key.
3. Pop-up menu [Start Track Recording] appears.
4. Tap [YES] or [NO] or select either of those by arrow keys, then press **ENTER** key.

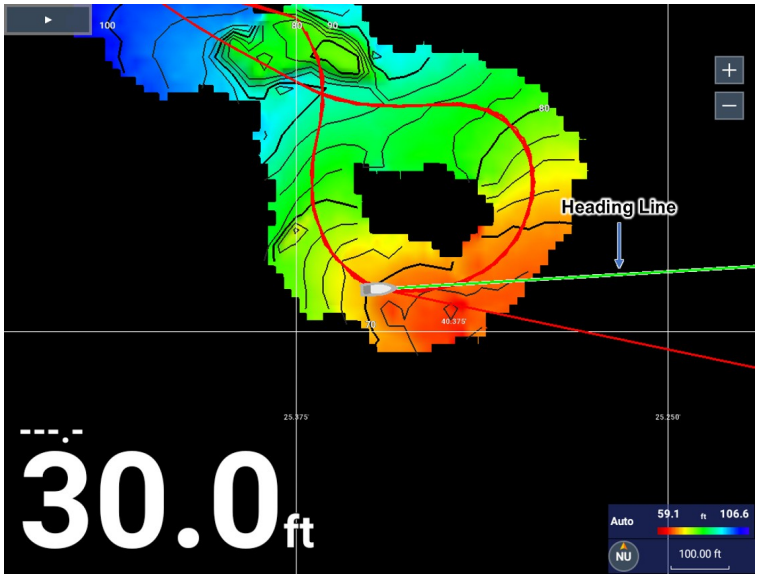
Stop PBG recording

1. Open the pop-up menu by pressing the **POP-UP** key. Tap [Stop PBG Recording] or select it by arrow keys and press **ENTER** key.
2. Pop-up menu [Stop Track Recording] appears.
3. Tap [YES] or [NO] or select either of those by arrow keys, then press **ENTER** key.



4.7.2 How to show/hide heding line

The heading direction of own ship can be shown with a line as a heading line.



Touch control:

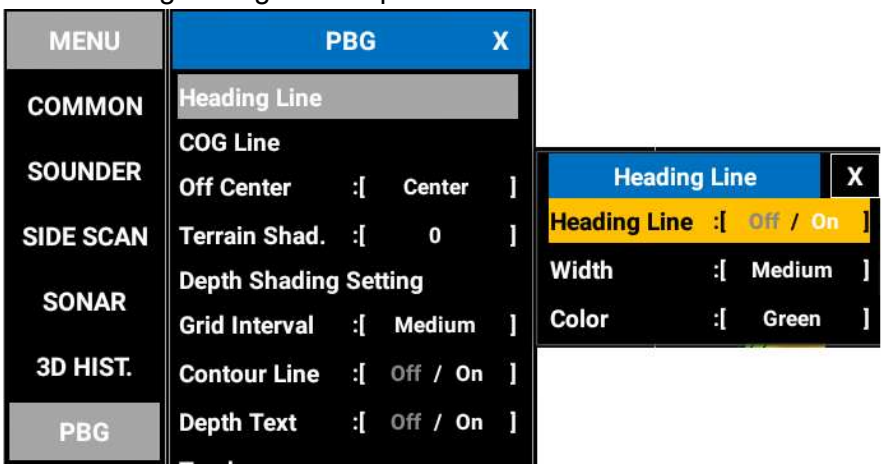
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Heading Line].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Heading Line] with the arrow keys, then press the **ENTER** key.

Settings

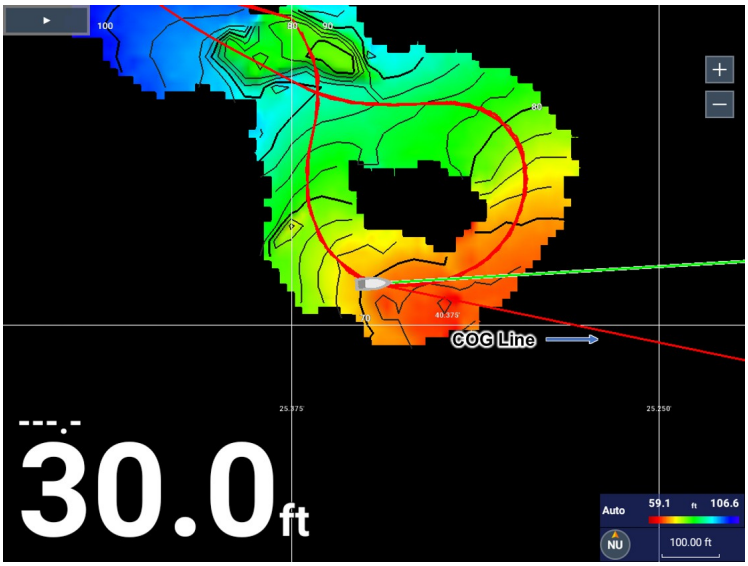
The following settings are required.



Item	Description	Setting range (options)
[Heading Line]	Sets to show or hide the heading line.	[Off] , [On]
[Width]	Sets the width of the heading line.	[Narrow], [Medium], [Wide]
[Color]	Sets the color of the heading line.	[Red], [Green], [Blue]

4.7.3 How to show/hide COG line

The course and speed of own ship can be shown with a line as a COG line.



Touch control:

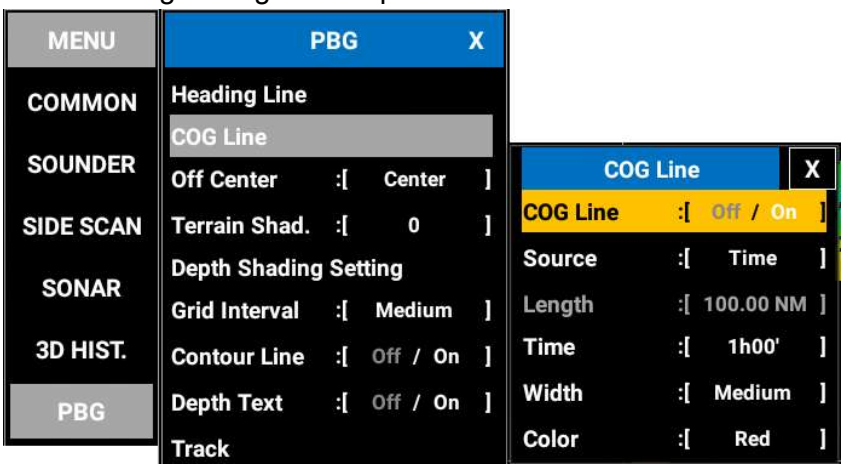
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [COG Line].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [COG Line] with the arrow keys, then press the **ENTER** key.

Settings

The following settings are required.



Item	Description	Setting range (options)
[COG Line]	Sets to show or hide the COG line.	[Off], [On]
[Source]	Sets the input data used to display the COG line.	[Time], [Distance]
[LENGTH]	Select [Data Source] → [Distance] to enable, and the COG line is displayed based on the distance you set.	0.01 ～ 999.00 NM
[Time]	Select [Data Source] → [Time] to enable and to display COG lines with the set time reference.	[0'10s], [0'30s], [1'00s], [2'00s], [5'00s], [10'00s], [15'00s], [30'00s], [1h00'], [2h00'], [3h00'], [6h00'], [12h00'], [1d00h]
[Width]	Sets the width of the COG line.	[Narrow], [Medium], [Wide]
[Color]	Sets the color of the COG line.	[Red], [Green], [Blue]

4.7.4 Off Center

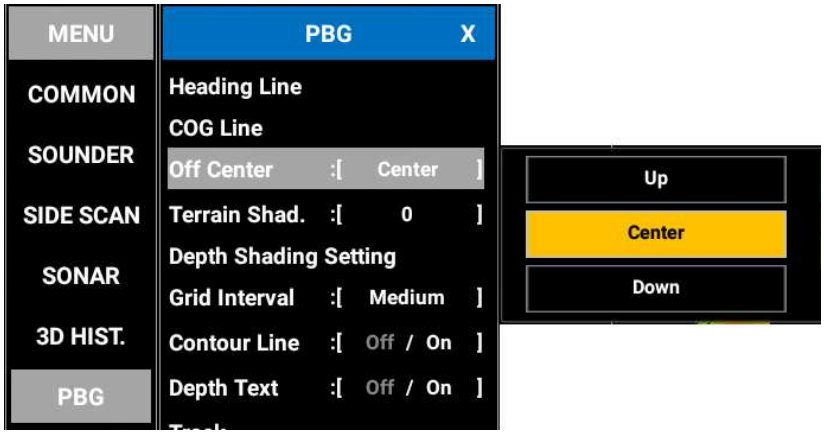
This function changes the vessel's position to a set value to display a wider view of a particular direction or area.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Off Center].
   [Up], [Center], [Down] selection box appears.
4. Tap either of [Up], [Center] or [Down].
5. Tap the "X" on the title bar to close the [MENU].

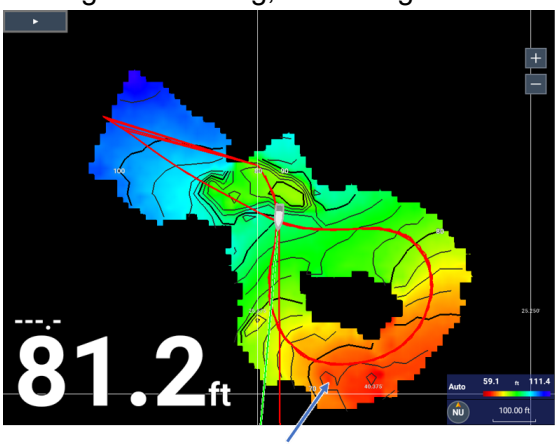
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Off Center] with the arrow keys, then press the **ENTER** key.
   [Up], [Center], [Down] selection box appears.
4. Select [Up], [Center] or [Down] with the arrow keys, then press the **ENTER** key
5. Press the **MENU/ESC** key to close [MENU].

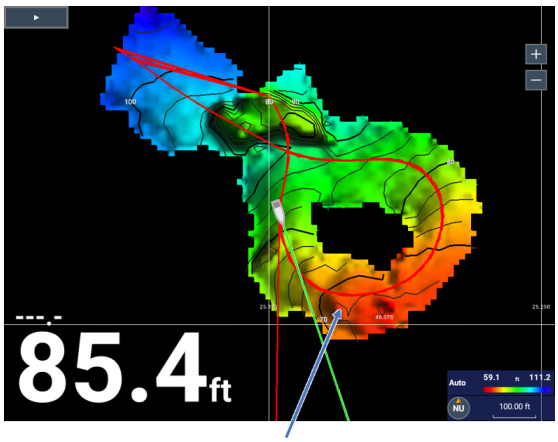


4.7.5 Terrain Shading

This function displays the difference in elevation of the terrain in the form of shading. The larger the setting, the stronger the shading.



Terrain Shading : 0



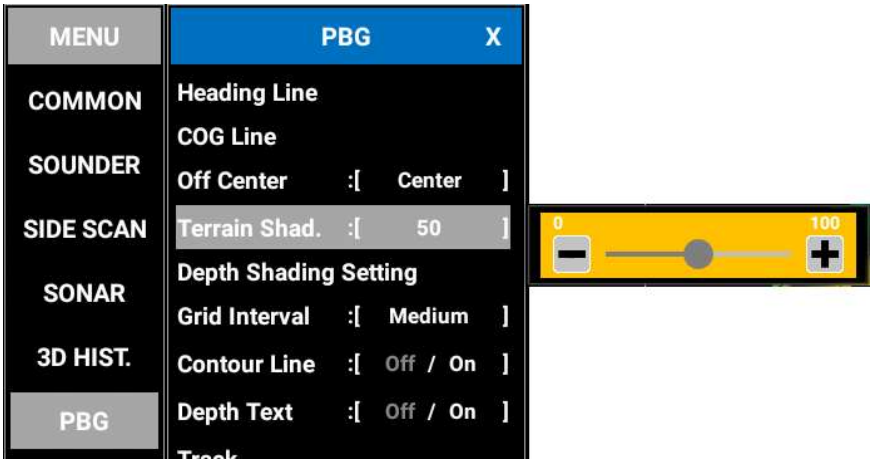
Terrain Shading : 100

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Terrain Shad.] and drag the slide bar that appears below the menu or tap [+]/[-] to set the height difference shading intensity.
   (Setting range: 0～ 100)
4. Tap the "X" on the title bar to close the [MENU].

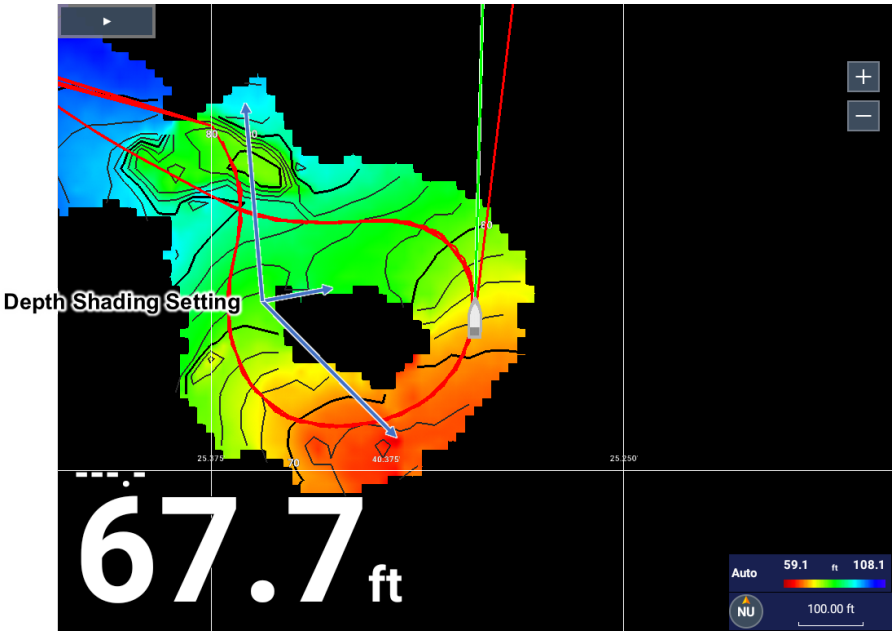
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Terrain Shad.] with the arrow keys, then press the **ENTER** key.
4. Drag the slide bar that appears below the menu or tap [+]/[-] to set the height difference shading intensity. (Setting range: 0～ 100)
5. Press the **MENU/ESC** key to close [MENU].



4.7.6 Depth Shading Setting

The seafloor can be displayed in different colors for different depths.
This is convenient because you can see the difference in depth at a glance.



Touch control:

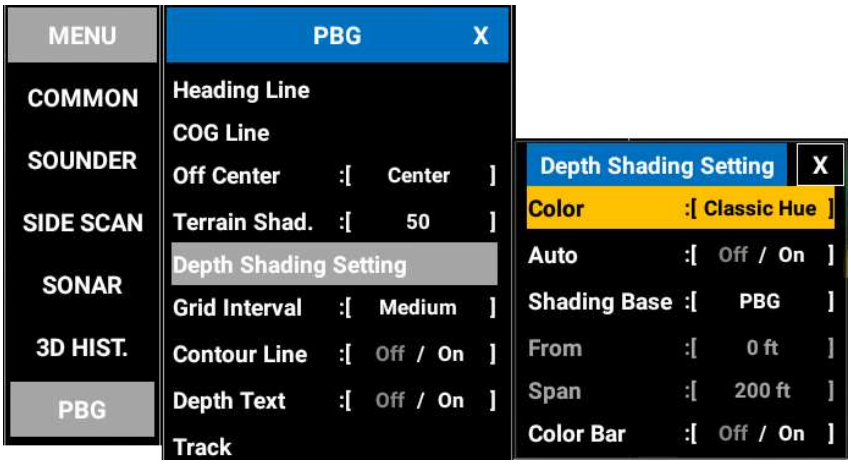
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Depth Shading Setting].

Key control:

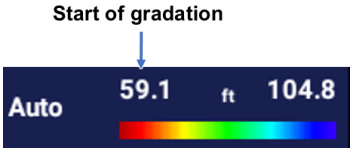
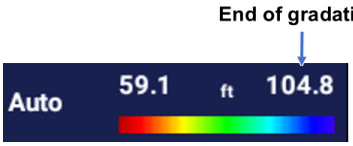
1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Depth Shading Setting] with the arrow keys, then press the **ENTER** key.

Settings

The following settings are required.



Item	Description	Setting range (options)
[Color]	Sets the seafloor color to be displayed in multi-tonal or mono-tonal.	[Classic Hue], [Inv. Classic Hue], [Red Hue], [Blue Hue], [Green Hue], [Yellow Hue], [Gray Hue], [Brown Hue]
[Auto]	Automatically sets the range of depth to display gradations. When set to [On]  When set to [Off] 	[On] (Automatic), [Off] (Manual)
[Shading Base]	Sets the base for automatically setting the gradation display. For [3D History], set the range based on the most recent seabed echo. For [PBG], set the range from the water depth within the display range of the PBG screen.	[3D History] , [PBG]

[From]	Use the slide bar to set the shallowest depth (minimum value) to display gradation. This setting is valid only when [Auto] is set to [Off]. After setting, press the **MENU/ESC** key to close [Menu]. 	0 ～ 1200 m
[Span]	Use the slide bar to set the range of depth to display gradation. This setting is valid only when [Auto] is set to [Off]. After setting, press the **MENU/ESC** key to close the [Menu]. 	1 ～ 1200 m
[Color Bar]	Set to show/hide the color bar in the lower right corner of the screen. After setting, press the **MENU/ESC** key to close the [Menu].	[On] (Show), [Off] (Hide)

4.7.7 How to show/hide the grid and change its interval

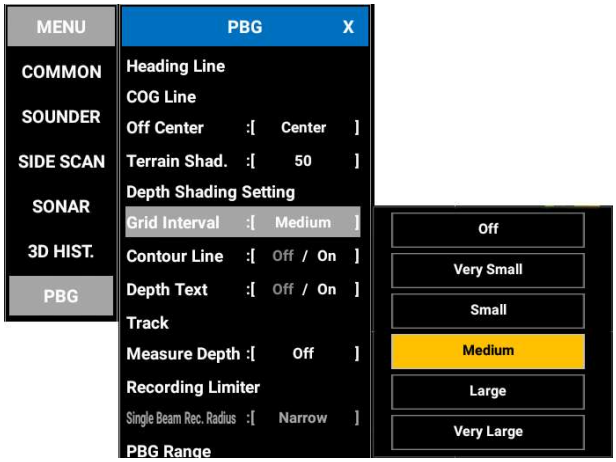
The grid can be shown/hidden and its interval can be set to easily measure the distance between two objects.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Grid Interval].
   [Off]/[Very Small]/[Medium]/[Large]/[Very Large] selection box appears.
4. Tap either of [Off]/[Very Small]/[Medium]/[Large]/[Very Large].
5. Tap the "X" on the title bar to close the [MENU].

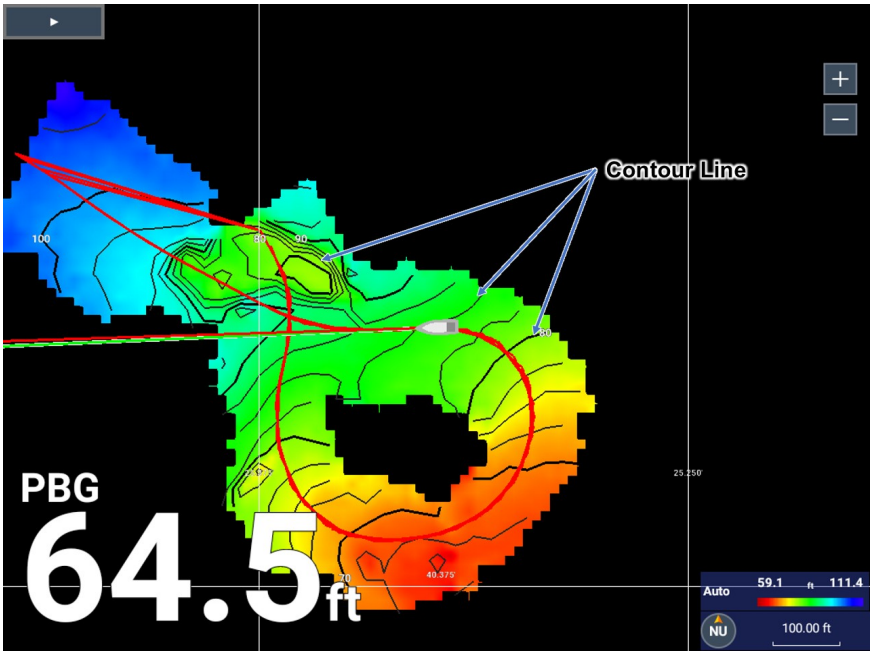
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Grid Interval] with the arrow keys, then press the **ENTER** key.
   [Off]/[Very Small]/[Medium]/[Large]/[Very Large] selection box appears.
4. Select either of [Off]/[Very Small]/[Medium]/[Large]/[Very Large] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



4.7.8 Contour Line

Shows the same seabed depth with contour lines.

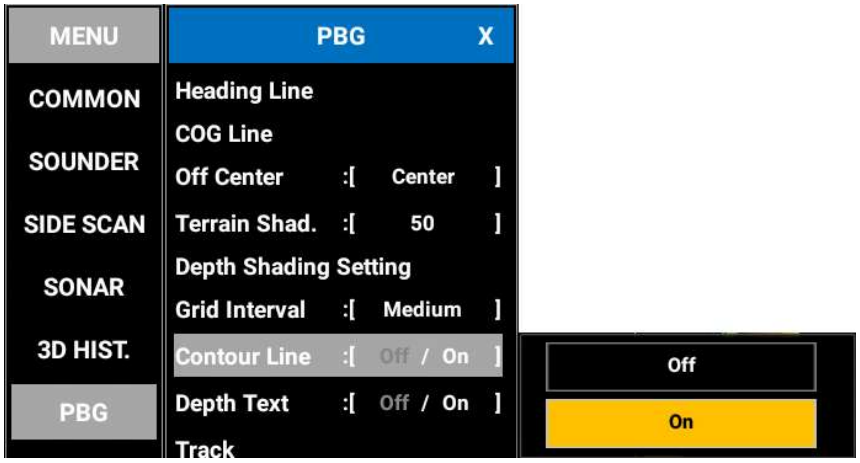


Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Contour Line].
   [Off]/[On] selection box appears.
4. Tap either of [Off] or [On].
5. Tap the "X" on the title bar to close the [MENU].

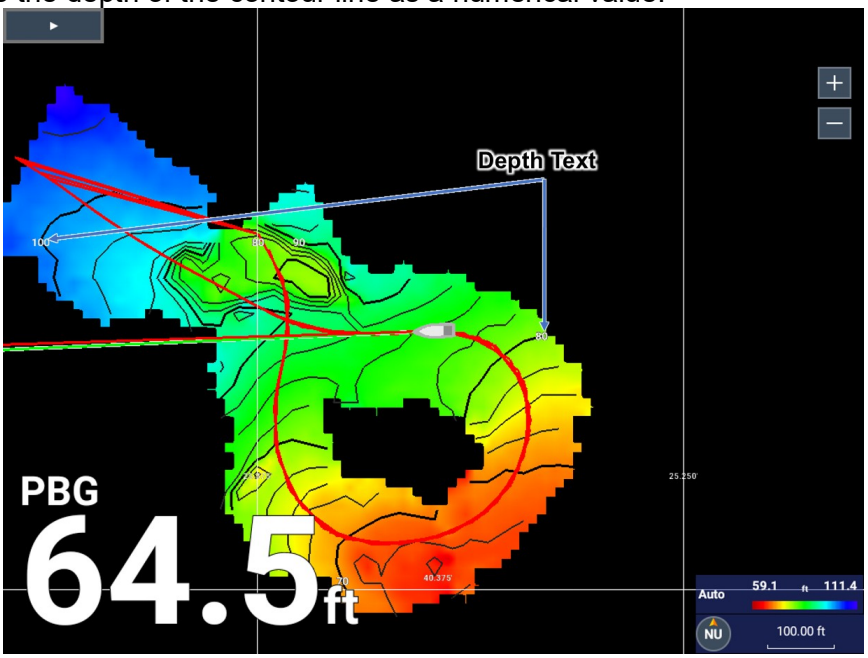
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Contour Line] with the arrow keys, then press the **ENTER** key.
   [Off]/[On] selection box appears.
4. Select either of [Off] or [On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



4.7.9 Depth Text

Displays the depth of the contour line as a numerical value.



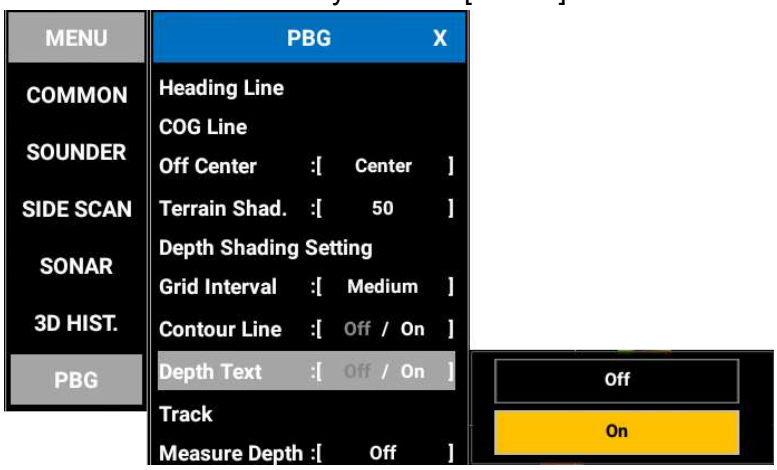
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Depth Text].
   [Off]/[On] selection box appears.
4. Tap either of [Off]/[On].
5. Tap the "X" on the title bar to close the [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Depth Text] with the arrow keys, then press the **ENTER** key
   [Off]/[On] selection box appears.
4. Select either of [Off]/[On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].

5. Press the **MENU/ESC** key to close [MENU].



4.7.10 Track

This function records and displays the route traveled by the ship on the screen, and various settings for the wake function can be made in the menu.

Note: The maximum number of track points is 1,000. When the maximum number is reached, the oldest track points will be automatically deleted.

Touch control:

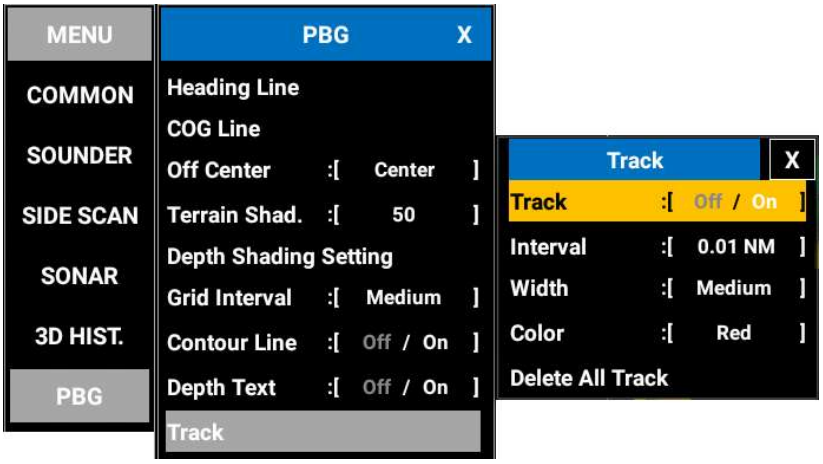
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Track].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Track] with the arrow keys, then press the **ENTER** key.

Settings

The following settings are required.



Item	Description	Setting range (options)
[Track]	Sets to display own ship's track or not.	[Off], [On]

[Width]	Sets the width of the track line.	[Narrow], [Medium], [Wide]
[Color]	Sets the color of the track line.	[Red], [Green], [Blue]
[Delete All Track]	Delete all tracks.	[YES], [NO]

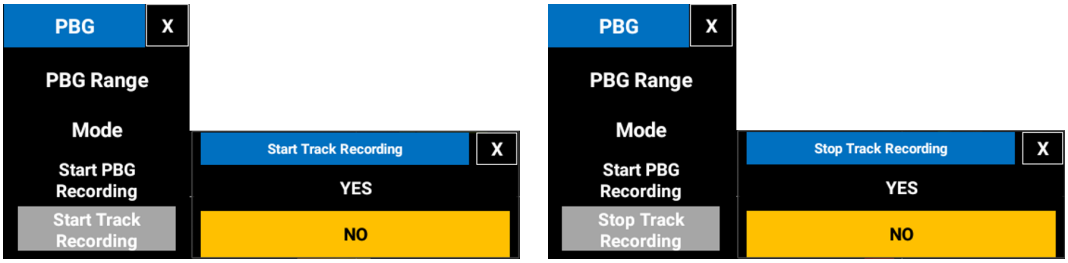
The following procedure is used to start and stop the wake function.

Start Track Recording

1. Press the **Popup** menu key while the PBG screen is displayed to open the pop-up menu.
2. Tap [Start Track Recording] or select it with arrow keys, then press the **ENTER** key.
3. Popup menu [Start Track Recording] appears.
4. Tap [Yes]/[No] or select either of those with arrow keys, then press the **ENTER** key.

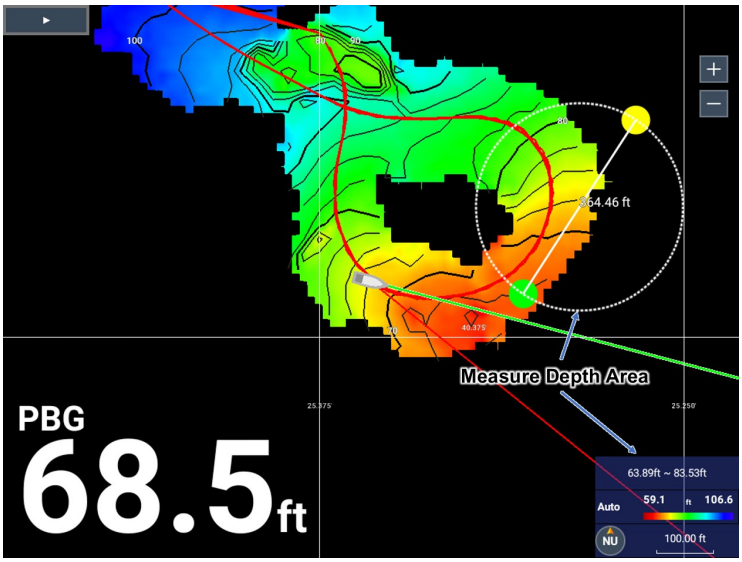
Stop Track Recording

1. Press the **Popup** menu key while the PBG screen is displayed to open the pop-up menu.
2. Tap [Stop Track Recording] or select it with arrow keys, then press the **ENTER** key.
3. Popup menu [Stop Track Recording] appears
4. Tap [Yes]/[No] or select either of those with arrow keys, then press the **ENTER** key.



4.7.11 How to Measure Depth

Measures the water depth within a specified area and displays the shallowest and deepest values.



When the [Measure Depth] function is turned on, a window appears on the screen showing the green and yellow points, a circle with the two points as diameters (measurement range), and the shallowest and deepest values within the recording

range in the lower right corner.
Drag each point to zoom in and out of the circle to specify the area to measure the depth.

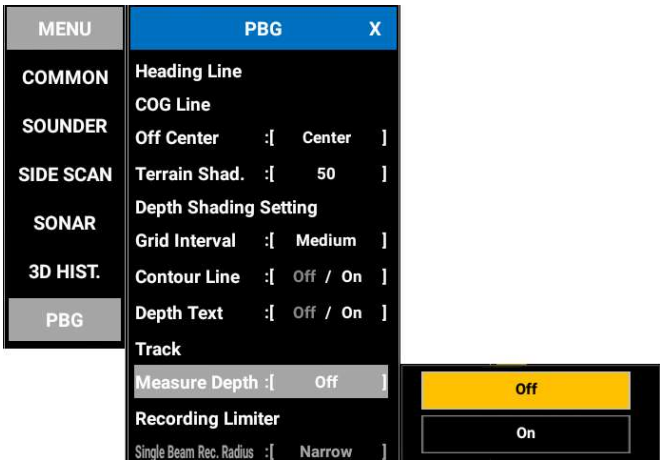
Note: The [Measure Depth] function automatically changes to [Off] when both the green and yellow points disappear from the screen.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Measure Depth].
   [Off]/[On] selection box appears.
4. Tap either of [Off]/[On].
5. Tap the "X" on the title bar to close [Menu].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Measure Depth] with the arrow keys, then press the **ENTER** key.
   [Off]/[On] selection box appears.
4. Select either of [Off]/[On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



4.7.12 Recording Limiter

Sets the conditions under which PBG recording stops.

Touch control:

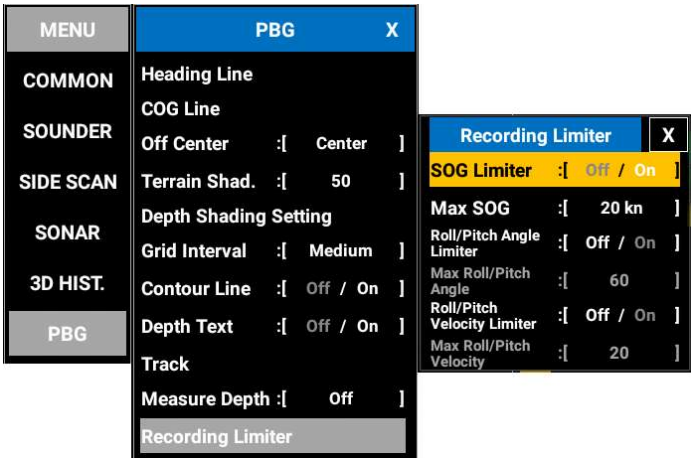
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Recording Limiter].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Recording Limiter] with the arrow keys, then press the **ENTER** key.

Settings

The following settings are required.



Item	Description	Setting range (options)
[SOG Limiter]	Sets whether to use speed limit.	[Off], [On]
[Max SOG]	Sets the maximum SOG. Available when [SOG Limiter] is [On].	1~99
[Roll/Pitch Angle Limiter]	Enables/disables the use of roll/pitch angle limits.	[Off], [On]
[Max Roll/Pitch Angle]	Sets the maximum angle of roll and pitch. Available when [Roll/Pitch Angle Limiter] is [On].	1~90°
[Roll/Pitch Velocity Limiter]	Enables/disables the use of roll/pitch speed limits.	[Off], [On]
[Max Roll/Pitch Velocity]	Sets the maximum roll/pitch speed. Available when [Roll/Pitch Velocity Limiter] is [On].	1~90°/seconds

4.7.13 Single Beam Rec. Radius

The [Single Beam Rec. Radius] menu is enabled by selecting Single Beam PBG from the HOME menu.
The relevant menu is explained in section 4.16 Single Beam PBG.

4.7.14 PBG Range

In the [PBG Range] menu, the [Range 1]～ [Range 8] which are used for manual ranges can be set from the pop-up menu.

Touch control:

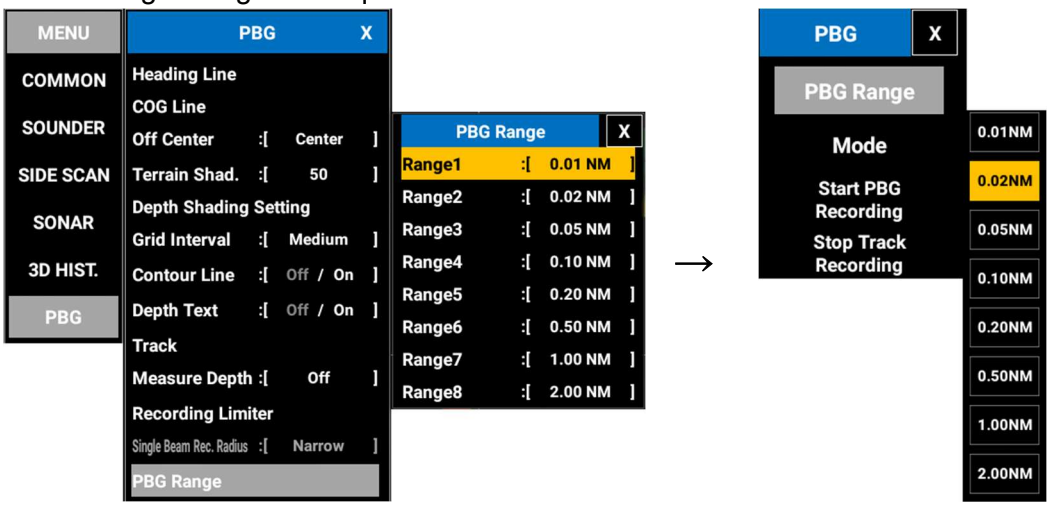
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [PBG Range].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [PBG Range] with the arrow keys, then press the **ENTER** key.

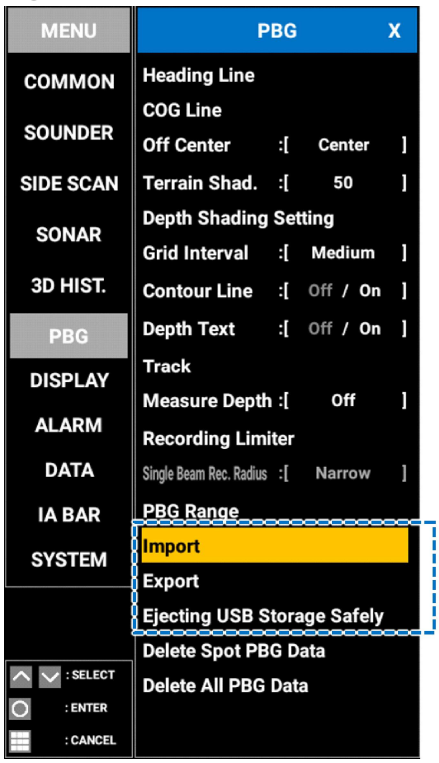
Settings

The following settings are required.



4.7.15 How to Import/Export and Eject USB Storage

This menu is used when you want to save the current PBG data to USB Storage.



Touch control:

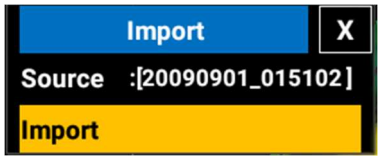
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap either of [Import], [Export] or [Ejecting USB Storage Safely].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select either of [Import], [Export] or [Ejecting USB Storage Safely] with the arrow keys, then press the **ENTER** key.

Import

Import the PBG data stored in USB storage.

Item	Description
[Source]	This menu is available only if a PBG data file exists on the connected USB storage; a PBG data file can be selected. → 
[Import]	The seabed map of the file selected in [Source] will be reflected in the SFD. *The overlapping areas will be the intermediate depths.

Export

Saves the PBG data of the currently displayed screen to the USB storage.

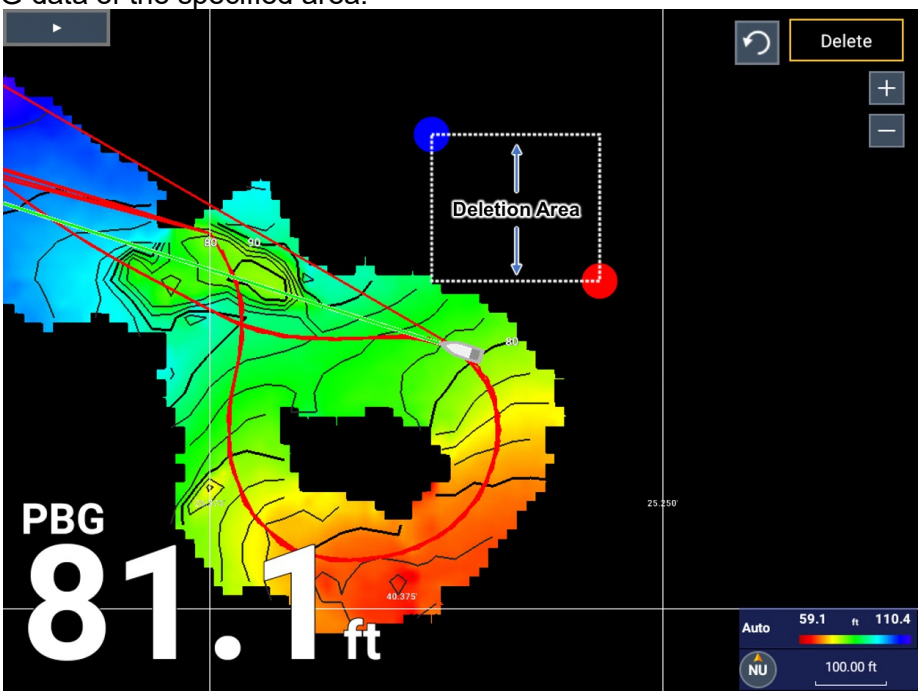
Ejecting USB Storage Safely

The connected USB storage can be safely disconnected.

Note: Make sure to select this menu when removing the USB memory device from the SFD.

4.7.16 Delete Spot PBG Data

Delete PBG data of the specified area.



When [Delete Spot PBG Data] → [Spot Deletion Mode] menu is set to [On], a red and blue point, that shows the deletion area, appears.
Each point can be dragged to make the deletion area large or small.

Functions of the buttons on the upper right side of display are as follows.

Item	Descriptions
[Delete]	 The specified PBG data is deleted when selected [YES]. Returns to the status to specify deletion area when selected [NO].
	The status to specify deletion area will be canceled.

Touch control:

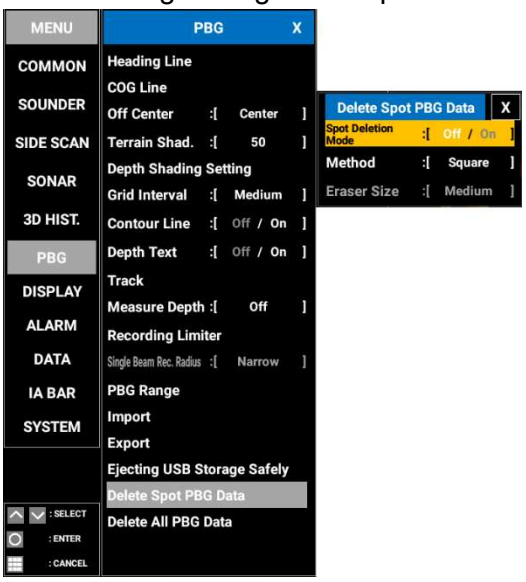
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Delete Spot PBG Data].

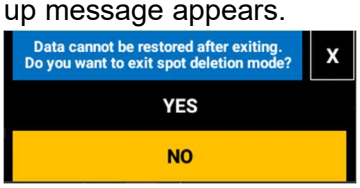
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Delete Spot PBG Data] with the arrow keys, then press the **ENTER** key.

Settings

The following settings are required.



Item	Description	Setting range (options)
[Spot Deletion Mode]	Sets to activate the PBG Spot Deletion function or not. When setting this function [Off] from [On], below pop-up message appears.  When [YES] is selected, the seabed map which are deleted according to the selected area will be saved. When [NO] is selected, display returns to the status to specify deletion area.	[Off]、[On]
[Method]	Select the method of [Delete Spot PBG Data]. [Eraser]: Specify the area to delete by dragging the points. After specifying the area, tap [Delete] button to delete the area. [Square]: Specify the area to delete with a square mark. [Circle]: Specify the area to delete with a circle mark.	[Eraser], [Square], [Circle]
[Eraser Size]	Available only when the [Method] is set to [Eraser]. Sets the size of [Eraser].	[Small], [Medium], [Large]

4.7.17 How to Delete All PBG Data

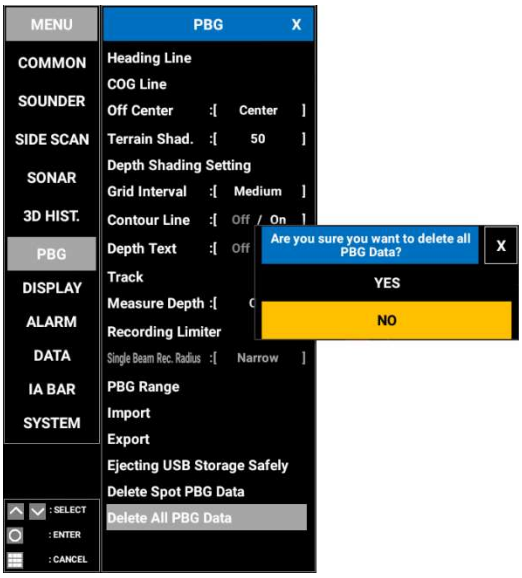
Delete all PBG data stored in the database.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Delete All PBG Data].

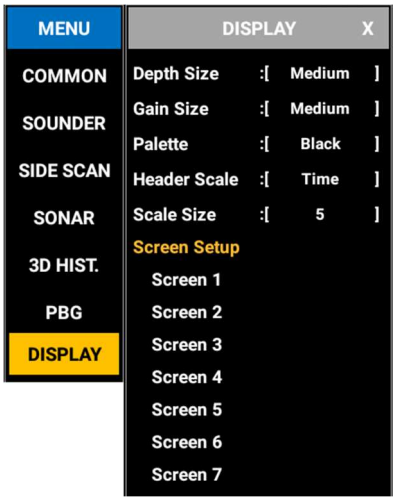
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Delete All PBG Data] with the arrow keys, then press the **ENTER** key.



4.8 DISPLAY Menu

This section covers the functions available with the [DISPLAY] menu.
To show the menu, press the **MENU/ESC** key to open [MENU], then tap [DISPLAY]. Or use the arrow keys to select [DISPLAY], then press the **ENTER** key.



[DISPLAY] menu

4.8.1 Individual setting

Menu items included in the [DISPLAY] menu and their settings are as follows.

Menu	Description	Setting range (Option)
[Depth Size]	Set the character size for the depth indication.	[Off], [Small], [Medium], [Large]
[Gain Size]	Set the character size for the gain indication.	[Off], [Small], [Medium], [Large]
[Palette]	Set the background color.	[White], [Blue], [Black], [Yellow], [Green], [Mono], [Night]

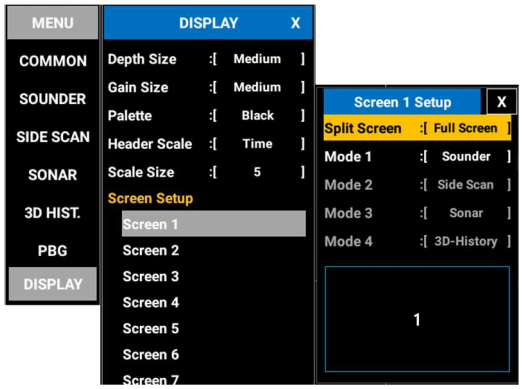
[Header Scale]	Set the header scale criterion.	[Off], [Time], [Distance]
[Scale Size]	Set the character size of scale.	[1]～[10]

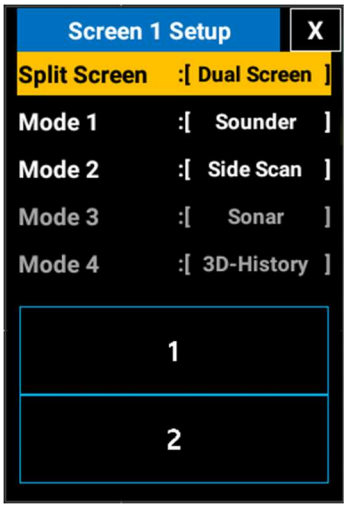
4.8.2 Screen setup

You can set the screen configuration to use and switch the configuration from the pop-up menu.

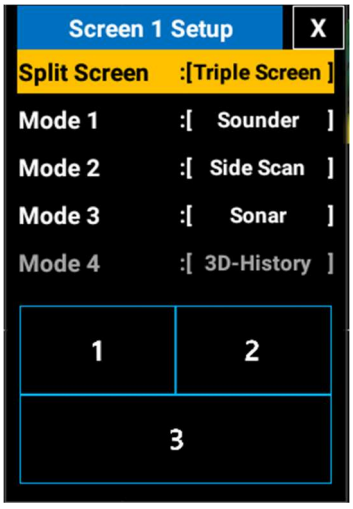
Recording the screen arrangement

You can make the screen configurations with [Split Screen] in the [DISPLAY] menu. The choices are [Full Screen], [Dual Screen], [Triple Screen], and [Quad Screen]. You can make a maximum of seven screen configurations. The configuration for the selected split screen type can be seen at the bottom of the pop-up window.

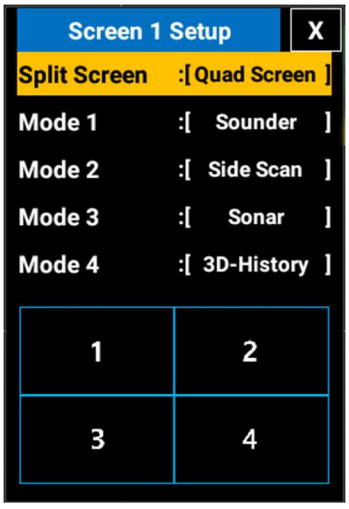




When [Dual Screen] is selected

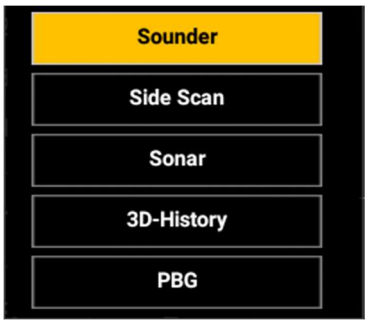


When [Triple Screen] is selected



When [Quad Screen] is selected

Select which mode to display on the [Mode 1] to [Mode 4] menu item, [Multi Beam], [Side Scan], [Sonar], [3D-History] or [PBG].



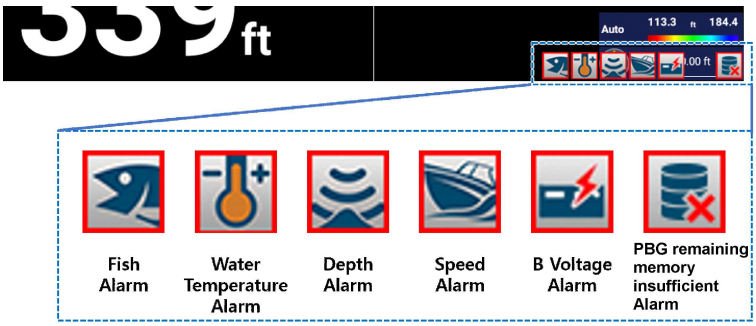
Swiching the screen from the pop-up menu

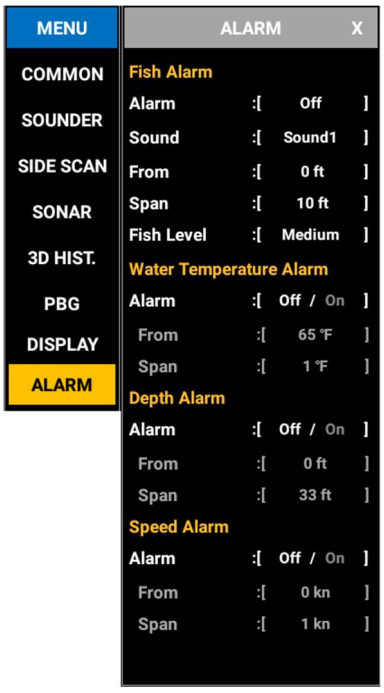
Press the **POP-UP** key to open pop-up menu, then select [Screen1] to [Screen7] from [Mode] menu to switch to the saved screen configuration screen.



4.9 Settings of ALARM

There are six alarm functions. When any of these alarms is set and reaches to the alarm condition, an alarm sounds and relevant alarm icon appears at the lower right corner of the screen. Press any key to stop the alarm sound. However, the alarm icon remains on the display. The alarm icon remains visible until the cause of the alarm is cleared.





[ALARM] Menu

4.9.1 How to set a fish alarm

The fish school alarm sounds when a school of fish appears within the set alarm range.

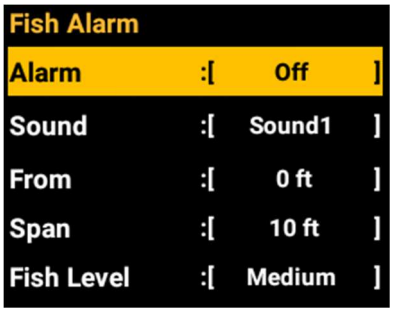
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap any of the settings below the [Fish Alarm], which are [Alarm], [Sound], [From], [Span] or [Fish Level].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select any of the settings below the [Fish Alarm], which are [Alarm], [Sound], [From], [Span] or [Fish Level] with the arrow keys, then press the **ENTER** key.

[Alarm]
Select from [Off], [Single Beam] or [Triple Beam].
[Sound]
Select from [Sound1], [Sound2], [Sound3] or [Sound4].
[From]
Set the depth to start the alarm area.
[Span]
Set the depth to limit the alarm area.
[Fish Level]
Select from [Low], [Medium] or [High].



[Fish Alarm] Menu

4.9.2 How to set the water temperature alarm

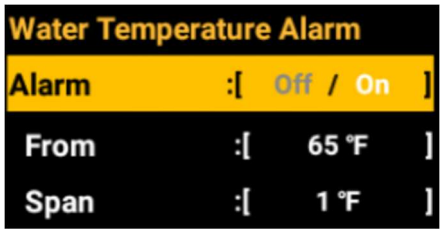
The water temperature alarm sounds when a school of fish appears within the set alarm range.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap any of the settings below the [Water Temperature Alarm], which are [Alarm], [From] or [Span].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select any of the settings below the [Water Temperature Alarm], which are [Alarm], [From] or [Span] with the arrow keys, then press the **ENTER** key.



4.9.3 How to set the depth alarm

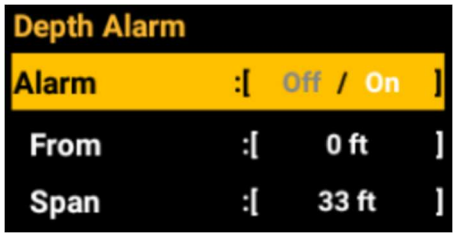
Depth alarm is a function that sounds an alarm when the water depth is within a set range.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap any of the settings below the [Depth Alarm], which are [Alarm], [From] or [Span].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select any of the settings below the [Depth Alarm], which are [Alarm], [From] or [Span] with the arrow keys, then press the **ENTER** key.



4.9.4 How to set the speed alarm

Speed alarm is a function that sounds an alarm when the water depth is within a set range.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [ALARM].
3. Tap any of the settings below the [Speed Alarm], which are [Alarm], [From] or [Span].

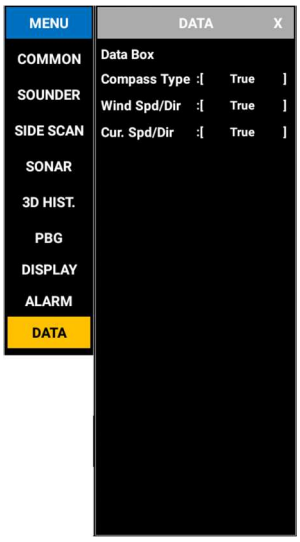
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [ALARM] with the arrow keys, then press the **ENTER** key.
3. Select any of the settings below the [Speed Alarm], which are [Alarm], [From] or [Span] with the arrow keys, then press the **ENTER** key.



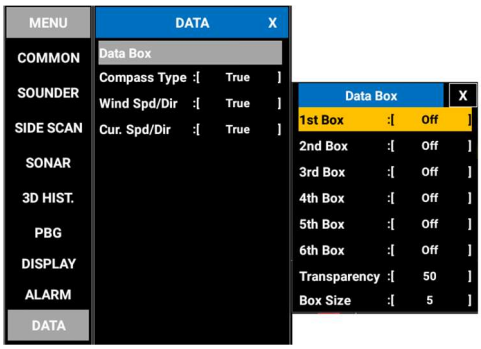
4.10 DATA Menu

This section covers the functions available with the [DATA] menu.
To show the [DATA] menu, press the **MENU/ESC** key to open [MENU], then tap [DATA]. Or use the arrow keys to select [DATA], then press the **ENTER** key.



[Data Box]

The [Data Box] menu, selects what data to display in the data box, located at the left side of the screen. The transparency of data box and the size of data box can be selected.
The data available to show in the [1st Box] to [6th Box] is shown on the next page.

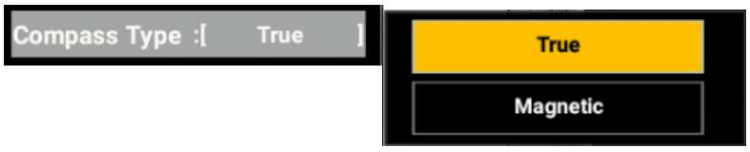


- [Off]
- [SOG]
- [STW]
- [Depth]
- [Position]
- [Wind]
- [Heading]
- [Course]
- [Barom. Press]
- [W. Temp.]
- [Current 1]
- [Current 2]
- [Current 3]

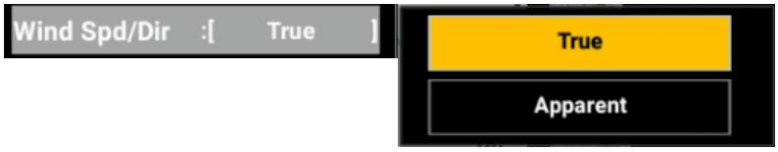
The transparency of the data box is selectable from [0] (background of data box is not transparent) to [100] (background of data box is completely transparent).
[Box Size] sets the size of the data in the data, box, from [1] (small) to [10] (large).

[Compass Type], [Wind Spd/Dir], [Cur. Spd/Dir]

[Compass Type]: Select the bearing display format, [True] or [Magnetic].



[Wind Spd/Dir]: Select the wind direction and speed display format, [True] or [Apparent].



[Cur. Spd/Dir]: Select the current (tide) speed and direction display format, [Apparent] or [Compass Direction] (16 bearing display).

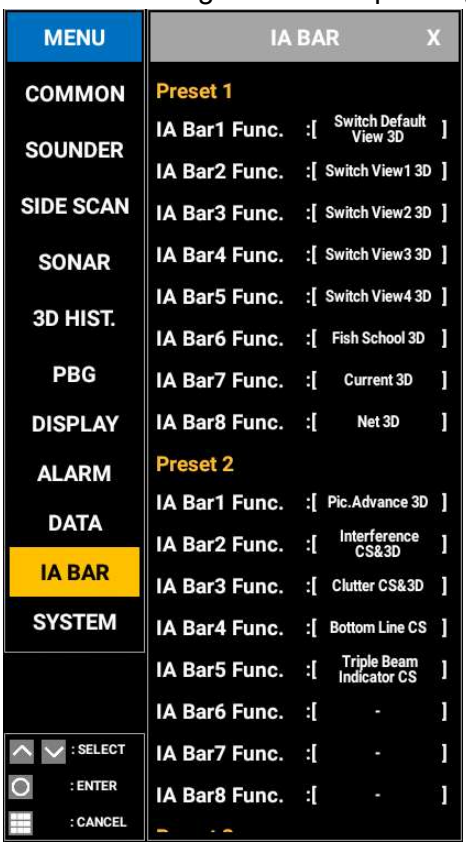


4.11 IA BAR Menu

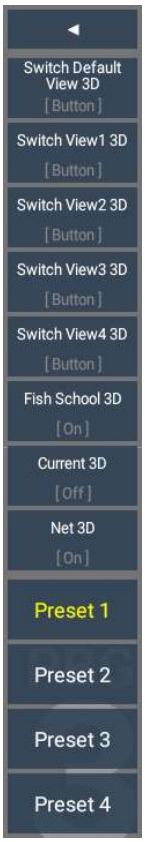
This section covers the functions available with the [IA BAR] menu.
To show the [IA BAR] menu, press the **MENU/ESC** key to open [MENU], then tap [IA BAR]. Or use the arrow keys to select [IA BAR], then press the **ENTER** key.

[Preset 1] to [Preset 4]

A maximum of eight functions ([IA Bar 1 Func.] to [IA Bar 2 Func.]) can be registered to the IA bar. Four sets of user-settable configurations are provided to set up the bar according to various operating conditions.



[IA BAR] menu



When [Preset 1] is selected



When [Preset 2] is selected

The following items can be registered in the IA bar configurations.

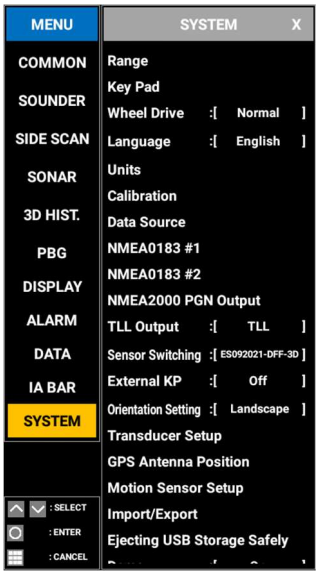
・[-] (Off)	・[Net 3D]
・[Bottom Area]	・[Net Width 3D]
・[Bottom Level]	・[Net Height 3D]
・[TX Pulse]	・[Net Depth 3D]
・[Transmit]	・[Net Hist 3D]
・[Pic. Advance MB]	・[Heading Line PBG]

・[Pic. Advance SS]	・[Heading Line Width PBG]
・[Pic. Advance 3D]	・[Heading Line Color PBG]
・[Interference MB]	・[COG Line PBG]
・[Interference SS]	・[COG Line Source PBG]
・[Interference CS&3D]	・[COG Line Length PBG]
・[Clutter MB]	・[COG Line Time PBG]
・[Clutter SS]	・[COG Line Width PBG]
・[Clutter CS&3D]	・[COG Line Color PBG]
・[TVG MB]	・[Off Center PBG]
・[TVG SS]	・[Seabed Color PBG]
・[TVG CS&3D]	・[Auto Seabed Shading PBG]
・[TVG Dist. MB]	・[Seabed Shading From PBG]
・[STC MB]	・[Seabed Shading Span PBG]
・[STC SS]	・[Seabed Color Bar PBG]
・[Beam Mode MB]	・[Contour Line PBG]
・[A-Scope MB]	・[Depth Text PBG]
・[White Edge MB]	・[Track PBG]
・[White Edge Width MB]	・[Track Interval PBG]
・[High Resolution MB]	・[Track Width PBG]
・[Temp. Graph MB]	・[Track Color PBG]
・[Echo Color SS]	・[Delete All Track PBG]
・[Grid CS]	・[Measure Depth PBG]
・[Dist. Smoothing CS&3D]	・[Rec. Radius PBG]
・[Time Smoothing CS&3D]	・[Spot Deletion Mode PBG]
・[Sound Spd. Corr. CS&3D]	・[Spot Deletion Method PBG]
・[Temp. Based Corr. CS&3D]	・[Eraser Size PBG]
・[Triple Beam Indicator CS]	・[Depth Size]
・[Bottom Line CS]	・[Gain Size]
・[Fish School 3D]	・[Palette]
・[Fish Detection Level 3D]	・[Header Scale]
・[Seabed Echo Calib. 3D]	・[Scale Size]
・[Seabed Sm. Lv. 3D]	・[Screen1 Split] to [Screen7 Split]
・[Terrain Shading 3D]	・[Screen1 Mode1] to [Screen7 Mode1]
・[Switch Default View 3D]	・[Screen1 Mode2] to [Screen7 Mode2]
・[Switch View1 3D]	・[Screen1 Mode3] to [Screen7 Mode3]
・[Switch View2 3D]	・[Screen1 Mode4] to [Screen7 Mode4]
・[Switch View3 3D]	・[Fish Alarm]
・[Switch View4 3D]	・[Fish Alm. Sound]
・[Register View1 3D]	・[Fish Alm. From]
・[Register View2 3D]	・[Fish Alm. Span]
・[Register View3 3D]	・[Fish Alm. Level]
・[Register View4 3D]	・[Water Temp. Alarm]
・[Seabed Color 3D]	・[Water Temp. Alm. From]
・[Auto Seabed Shading 3D]	・[Water Temp. Alm. Span]
・[Seabed Shading From 3D]	・[Depth Alarm]
・[Seabed Shading Span 3D]	・[Depth Alm. From]
・[Seabed Color Bar 3D]	・[Depth Alm. Span]
・[Fish Color 3D]	・[Speed Alarm]
・[Auto Fish Shading 3D]	・[Speed Alm. From]
・[Fish Shading From 3D]	・[Speed Alm. Span]

・[Fish Shading Span 3D]	The alphabets at the end of each menu indicate the screen on which the menu is used.
・[Fish Color Bar 3D]	
・[Current 3D]	
・[Current Vector 3D]	
・[Current Diff. Reference Layer]	
・[Current Diff. Layer1 3D]	MB：Multi Beam fish finder SS： Side Scan CS：Cross Section 3D：3D History PBG：PBG
・[Current Diff. Layer 2 3D]	
・[Current Flow Dir 3D]	
・[Water Current Source1 3D]	
・[Water Current Source 2 3D]	
・[Water Current Source 3 3D]	

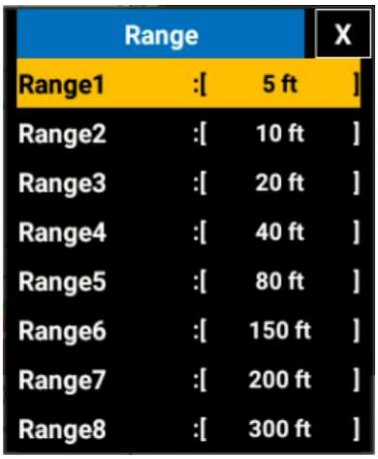
4.12 SYSTEM Menu

This section covers the functions available with the [SYSTEM] menu.
To show the [SYSTEM] menu, press the **MENU/ESC** key to open [MENU], then tap [SYSTEM]. Or use the arrow keys to select [SYSTEM], then press the **ENTER** key.

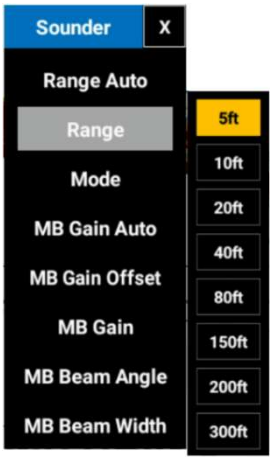


[Range] menu

Ranges to select from the pop-up menu can be set on the [Range] menu. The value set on [Range1] to [Range8] appear on the pop-up menu.



[Range] menu



Pop-up menu

The default value of range is set to [Range4].

The selectable minimum and maximum ranges for each unit are as follows.

Unit	Range
m	5～1200
ft	20～4000
fm	3～650
HR	4～800
pb	4～750

The default value for each unit is as follows.

	初期値							
Unit	Range1	Range2	Range3	Range4	Range5	Range6	Range7	Range8
m	5	10	20	40	80	150	200	300
ft	20	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	4	5	10	30	50	100	150	200

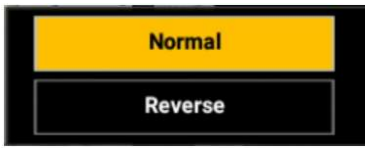
[Key Pad] menu

Key brilliance and key beep can be set from the [Key Pad] menu.
[Key Beep] enables or disables the beep that sounds with touch control operation.



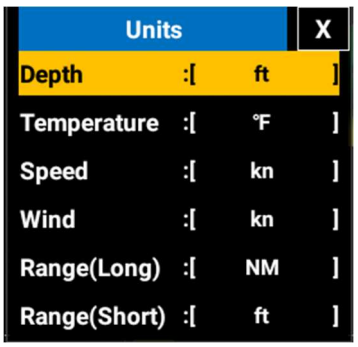
[Wheel Drive] menu

Scroll direction when using the wheel of track ball control unit RCU-030 can be changed with [Wheel Drive] menu.



[Units] menu

The units for displaying water depth, water temperature, ship speed and wind speed can be set from the [Units] menu.
Water Depth: [m], [ft], [fm], [HR], [pb]
Water Temperature: [℃], [°F]
Ship speed: [kn], [km/h], [mph]
Wind speed: [kn], [km/h], [mph], [m/s]
Range(Long): [NM], [km], [Mile]
Range(Short): [ft], [m], [yd]



[Calibration] menu

The following items can be set on the [Calibration] menu.

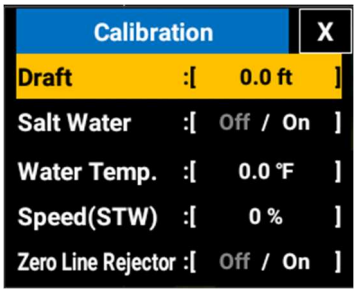
・[Draft]: Offset of draft, Draft value can be offset between 0 and 50 m.

・[Salt Water]: Select the water type. [On] for saltwater; [Off] for freshwater. When it is used in salt water, the speed of sound will be faster.

・[Water Temp.]: Offset the water temperature, between -40.0 and 40.0 ◦C.

・[Speed (STW)]: Offset the speed through water, between -50 ～ 50%.

・[Zero Line Rejector]: Set to use the zero line rejector or not.



[Import/Export], [Ejecting USB Storage Safely] menu

The following can be set in the [Import/Export] and [Ejecting USB Storage Safely] menu.

・ [Import] ：This menu is available only if a sensor setting data exists on the connected USB storage; a sensor settings will be applied to SFD.

・ [Export]：The settings for the currently connected sensor and application will be saved to the USB storage when a USB storage is connected to the SFD.





・[Ejecting USB Storage Safely] ：The connected USB storage can be safely disconnected. Make sure to select this menu when removing the USB memory device from the SFD.

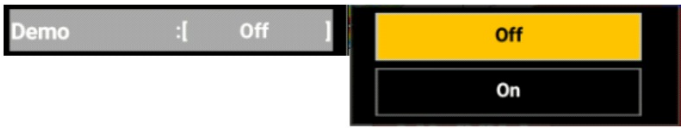


Functions to reading/writing the setting values from the external memory is added.
* Remove the USB memory stick after selecting the menu to safely remove it.
* The setting values are independent for each sensor, so it is necessary to read/write the values for each sensor separately.

4.13 Demo

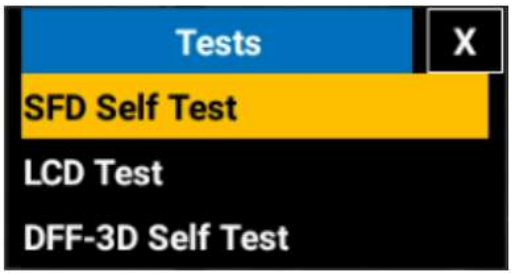
The demo mode uses the echo data stored in the internal memory to provide simulated operation of the equipment. All keys and menus are fully operable. When the demo mode is active, “DEMO” appears at the bottom center of the display.

[Off]: Turn the demo mode off.
[On]: Show the demo mode on.



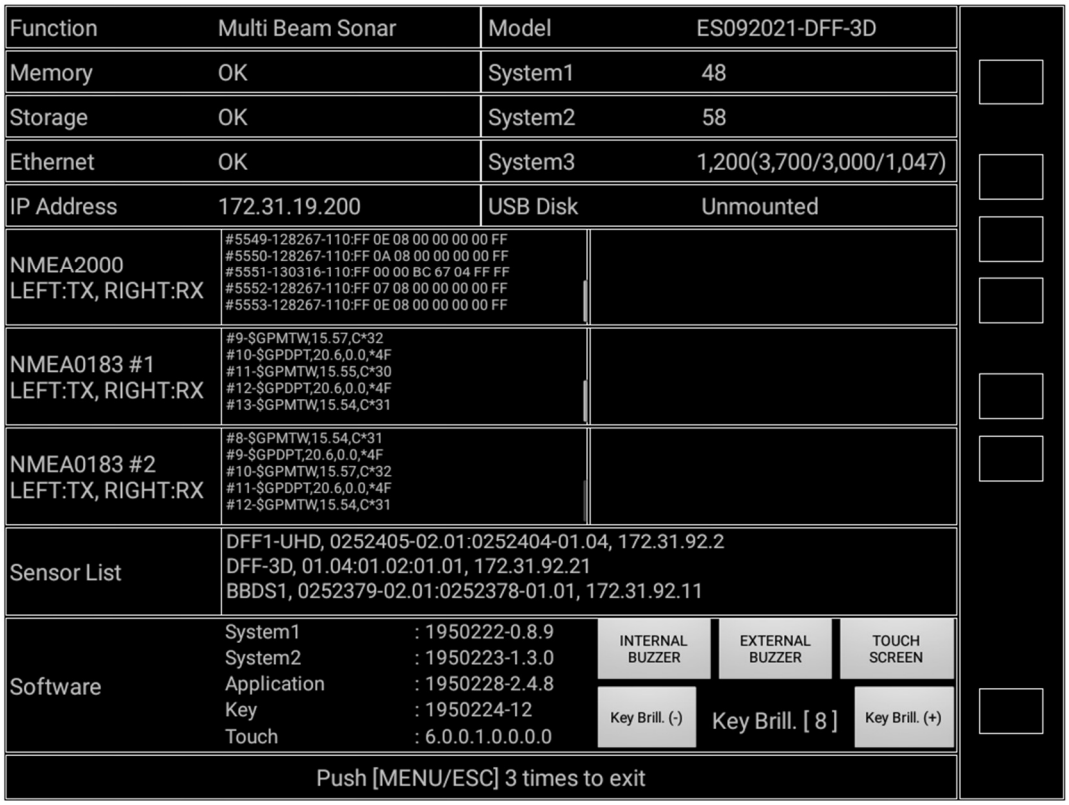
4.14 Test Menus

Menus for each test.



SFD self test

[Self Test] is provided to check the connection state and information from external equipment. Additionally it checks controls for proper operation. Take the following steps to execute the self-diagnostic test.

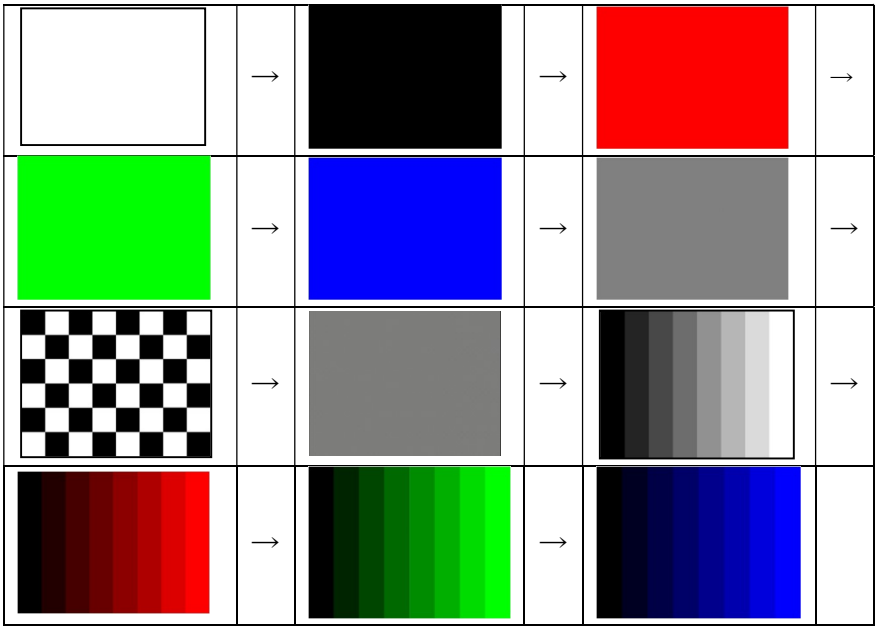


Function	Shows the currently active function.
Model	Shows the sensor currently connected.
Memory	Executes various system memory-related operations. And displays the results.
Storage	Writes into and reads from memory in the equipment and displays the results.
Ethernet	Shows whether LAN is connected or not.
IP Address	Shows the IP address for this equipment.
System 1	Shows the system 1 test results. (Menu for field engineers)

System 2	Shows the system 2 test results. (Menu for field engineers)
System 3	Shows the system 3 test results. (Menu for field engineers)
USB Disk	Shows whether a USB memory is connected to the USB port or not.
NMEA 2000	Shows output data in the left box and input data in the right box.
NMEA 0183 #1	
NMEA 0183 #2	
Sensor list	Shows a list of sensors detected.
Software	Shows the version of system 1, system 2 and application.
Internal buzzer	Tap to turn on/off the internal buzzer.
External buzzer	Tap to turn on/off the external buzzer (if connected).
Touch screen	Checks the touch screen for proper operation. Touch the screen. A white screen appears, and a red dot is displayed at the touched position. Drag your finger across the screen. A red line follows finger movement.
Key Brill [-], Key Brill [+]	Tap each pad to check if brilliance is decreased, increased properly.

LCD patterns

The [LCD Test] tests the LCD for proper display of colors. Tap the screen to change the color. Check colors for correctness.



DFF-3D self test

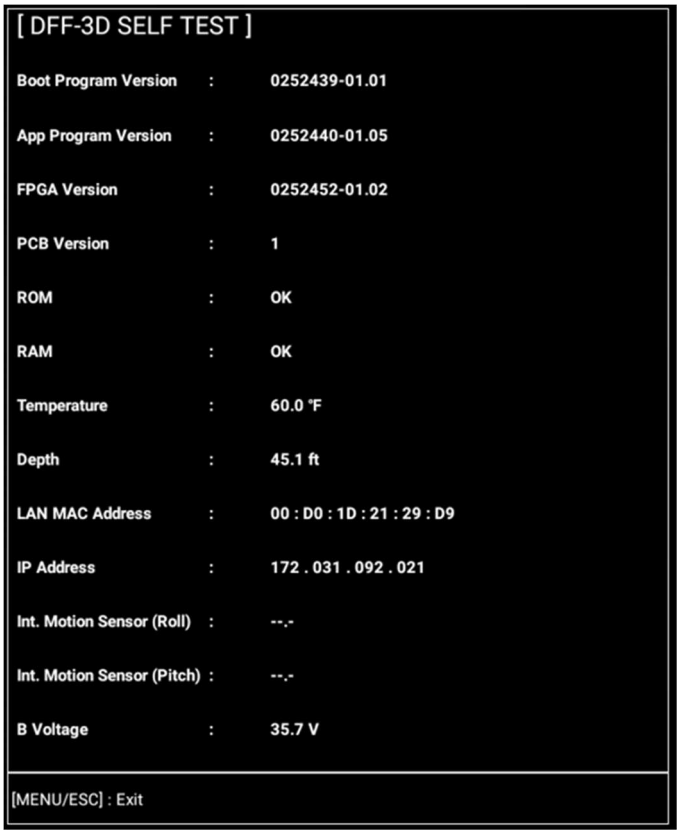
Check connected sensors are available on [DFF-3D Self Test].

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Tests].
4. Tap [DFF-3D Self Test].
   The DFF-3D Self Test screen appears.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Tests] with the arrow keys, then press the **ENTER** key.
4. Select [DFF-3D Self Test] with the arrow keys, then press the **ENTER** key.
   The DFF-3D Self Test screen appears.



Items to be checked with the DFF-3D self test are as follows.

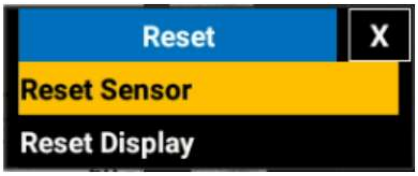
1	Boot Program Version	Shows Boot Program Version.
2	App Program Version	Shows Application Program Version.
3	FPGA Version	Shows FPGA Program Version.
4	PCB Version	Shows PCB Version.
5	ROM	Shows ROM check result.
6	RAM	Shows RAM check result.
7	Temperature	Shows water temperature.
8	Depth	Shows depth.
9	LAN MAC address	Shows the LAN MAC address.
10	IP address	Shows the IP address of the unit.
11	Int. Motion Sensor (Roll)	Shows the output (roll) of the internal motion sensor.
12	Int. Motion Sensor (Pitch)	Shows the output (pitch) of the internal motion sensor.
13	B Voltage	Shows the battery voltage.

※Monitoring menu is limited menu only for the service man who fix the equipment.

4.15 Reset Menu

The Initializtion menu restores default settings for the memories of the sensors and display unit.

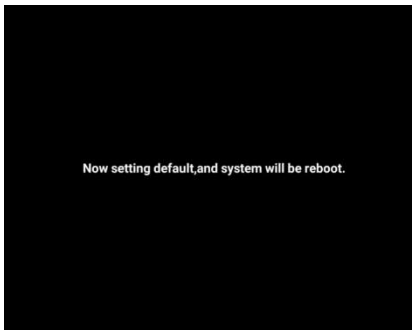
[Reset Sensor]: Inializes the sensor memory.
[Reset Display]: Initialize the memory of display unit.



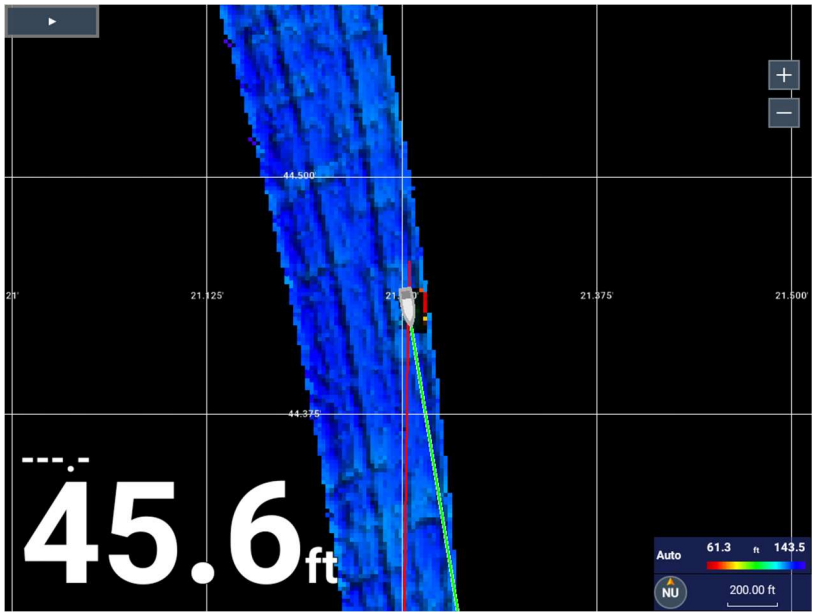
When [Reset Display] is selected, pop-up window to request for your confirmation of rebooting the display unit appears.



After selecting [YES], a message announces that the display unit is being rebooted, then the default settings for the display unit are restored.



4.16 Single Beam PBG



Single-beam PBG is available by selecting [SINGLE BEAM PBG] on the sensor selection screen. PBG seabed map data is recorded using bathymetry data (NMEA 0183/NMEA 2000/LAN) from a fish finder.



Note: Single-beam PBG can always be selected regardless of whether or not a fish finder sensor or multi-beam sonar is connected.

FCV series	FCV-38, FCV-2100, FCV-1900/B/G, FCV-295/1150, FCV-585/620, FCV-588/628, FCV-688	NMEA 0183
	FCV-600/800	NMEA 0183/2000
GPS/WAAS Color Chart Plotter with Fish Finder	GP-3700F, GP-1871F/1971F	NMEA 0183/2000
Network Fish Finder	BBDS1, DFF1-UHD, DFF3, DFF3-UHD	Ethernet
NavNet series	TZtouchXL, TZtouch3, TZT2BB	Ethernet

4.16.1 Single Beam Rec. Radius

The setting of the [Single Beam Rec. Radius] is available only when selecting the single beam PBG and sets the radius to record the single beam PBG.

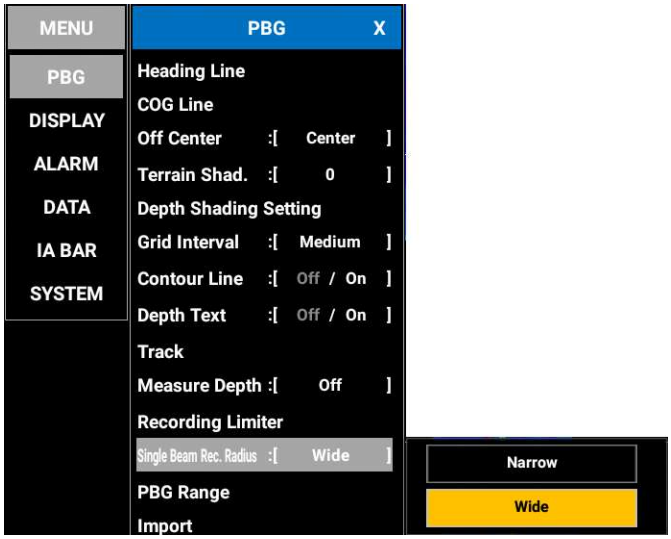
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [PBG].
3. Tap [Single Beam Rec. Radius].
   [Narrow]/[Wide] selection box appears.
4. Tap either [Narrow] or [Wide].
5. Tap the "X" on the title bar to close the [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [PBG] with the arrow keys, then press the **ENTER** key.
3. Select [Single Beam Rec. Radius] with the arrow keys, then press the **ENTER** key.
   [Narrow]/[Wide] selection box appears.

4. Select [Narrow] or [Wide] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [Menu].



5 INSTALLATION

5.1 Mounting

5.1.1 Place suitable for mounting

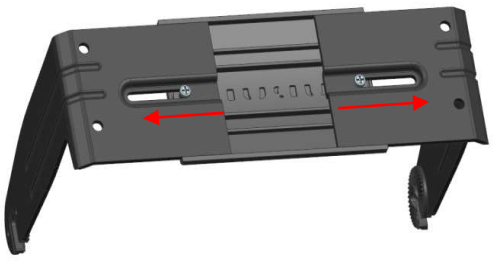
When selecting a mounting location, keep the following in mind:

- The temperature at the mounting location shall be between -15°C and +55°C.
- The humidity at the mounting location shall be 93% or less (at 40°C).
- Locate the equipment away from exhaust pipes and exhaust ports.
- The mounting location shall be well ventilated.
- Mount the equipment where shock and vibration are minimal.
- Keep the equipment away from electromagnetic field generating equipment such as motors and generators.
- Choose a location that allows easy access for maintenance and inspection. Leave servicing space around the equipment, as shown in the outline drawing at the end of this manual.
- Do not mount the equipment on the overhead.
- A magnetic compass will be affected if the equipment is placed too close to it. Keep the compass safe distance shown in the Safety Instructions.

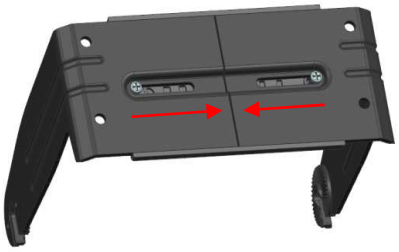
5.1.2 Desktop mount

1. Adjust the hanger width.
   For landscape mounting, open the hanger to the maximum width.
   For portrait mounting, close the hanger to the minimum width.

1. Loosen the fixing screws. 2. Adjust the hanger width. 3. Tighten the fixing screws.

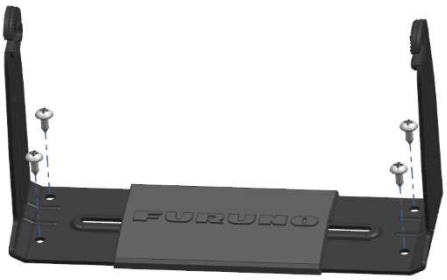


Landscape mounting

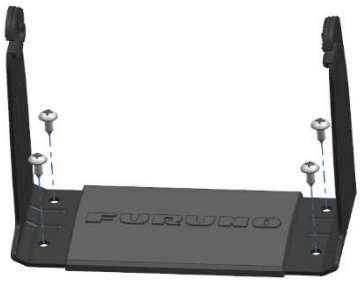


Portrait mounting

2. Fix the hanger to the mounting location with the supplied self-tapping screws (M5×20, 4 pcs).



Landscape mounting



Portrait mounting

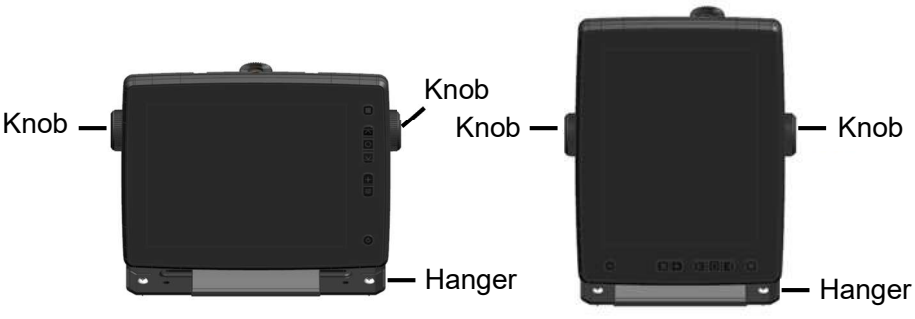
3. Put the equipment on a soft clean location with its screen facing downward. Then tighten hanger knobs, leaving approximately 15 mm space on both sides.





4. Set the display unit to the hanger and securely tighten the knobs.





Note: When mounting the display unit to the hanger, make sure that the display unit and the hanger are precisely positioned at the connecting parts.

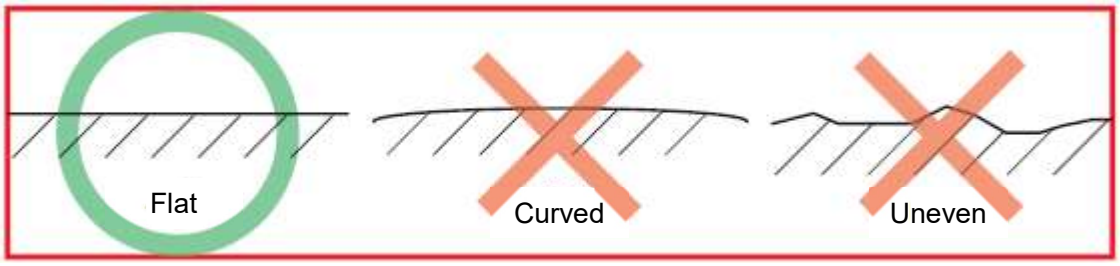
5. After installing the equipment to the hanger, tighten the supplied knob into the upper knob-mounting hole.



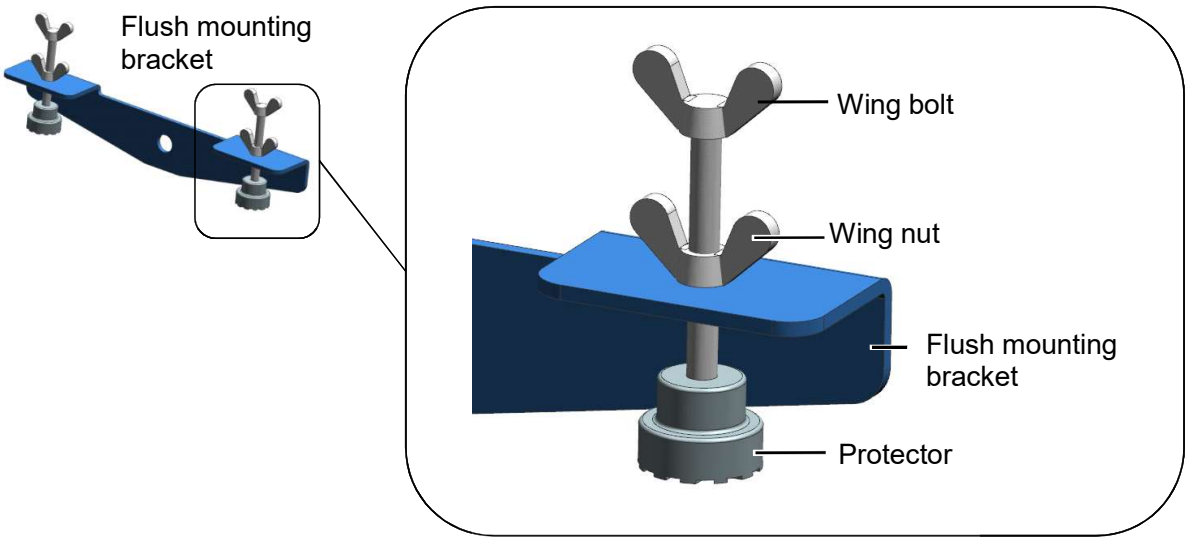
5.1.3 Flush mount

This equipment can be mounted horizontally and vertically.
Read the contents of this section carefully and mount this equipment on a flat surface.
Improper mounting may cause failures with the display screen of this equipment.

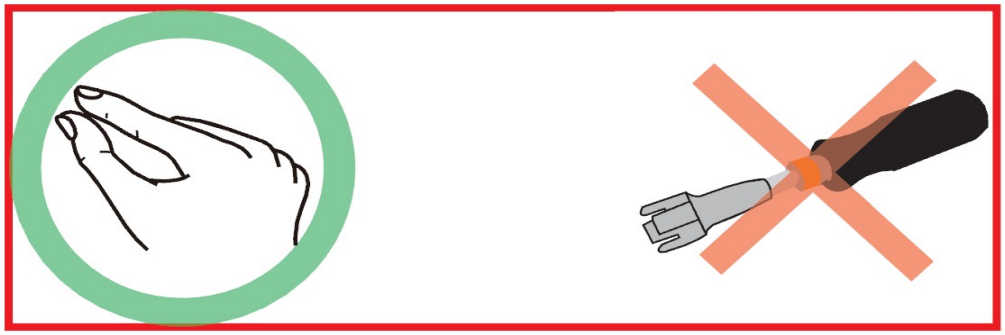
Note: Check that the mounting surface is flat, even and without curve.



1. Make a mounting hole at mounting location by using the enclosed template for SFD-1010 or SFD-1012.
2. Wing nut and wing bolt attached to flush mounting brackets (2 in total) to move the protector part toward the brackets.



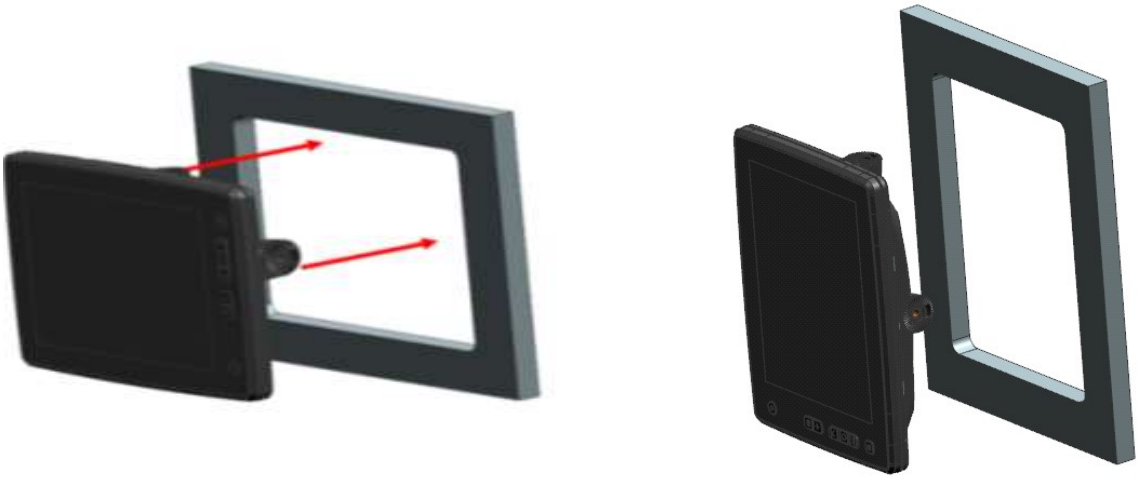
Note: Be sure to manually tighten the wing bolts without using any tools. When tightening the wing bolts, gradually tighten four wing bolts equally. You can use tools to tighten the wing nuts.



3. Align the adhesive surface of mounting sponge to the backside of this equipment, and attach the mounting sponge to the equipment.

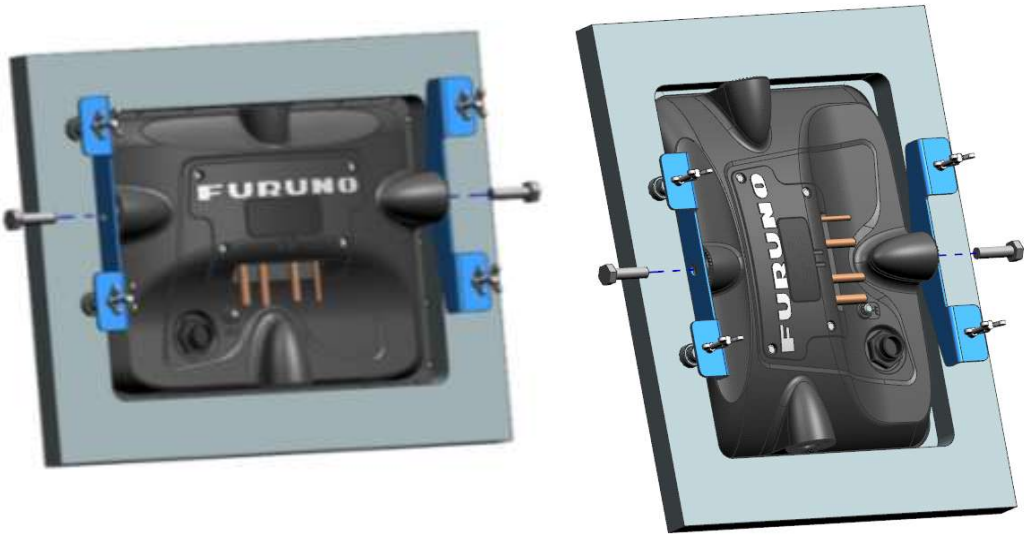


4. Referring to section 5.2, connect all cables at the rear side of the SFD-1010 or SFD-1012.
5. Insert the SFD-1010 or SFD-1012 body into the mounting hole made at step 1.



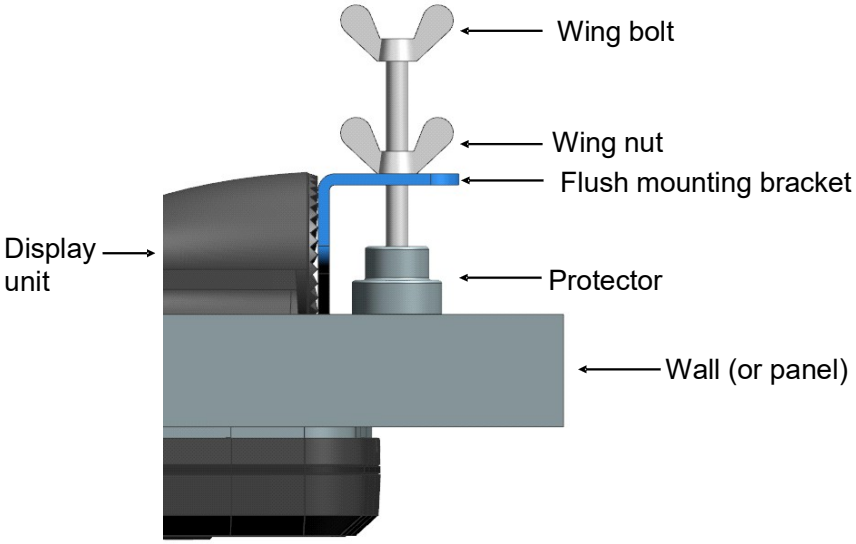
Insert SFD into mounting hole

6. Fix flush mounting brackets and main body with hexagon bolts (2 pcs.).
7. Manually and securely tighten wing bolts (four in total) attached to the flush mounting bracket so that the protector of the flush mounting assembly touches the wall.

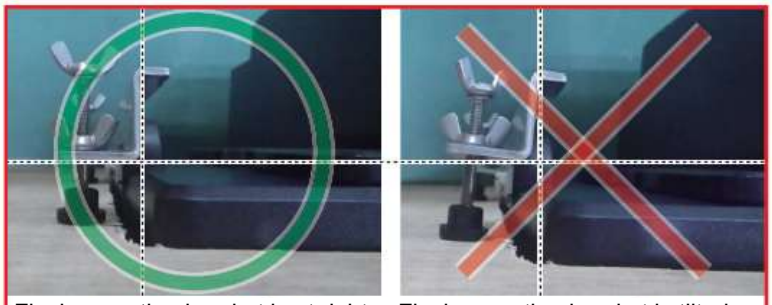


Fix main body with flush mounting brackets

8. Securely tighten wing nuts (four in total). (The use of tools is allowed.)



Note: Do not tighten the wing bolts excessively; flush mounting brackets or wing bolts may be tilted or distorted. Referring to the figures below, check for any tilt or distortion.

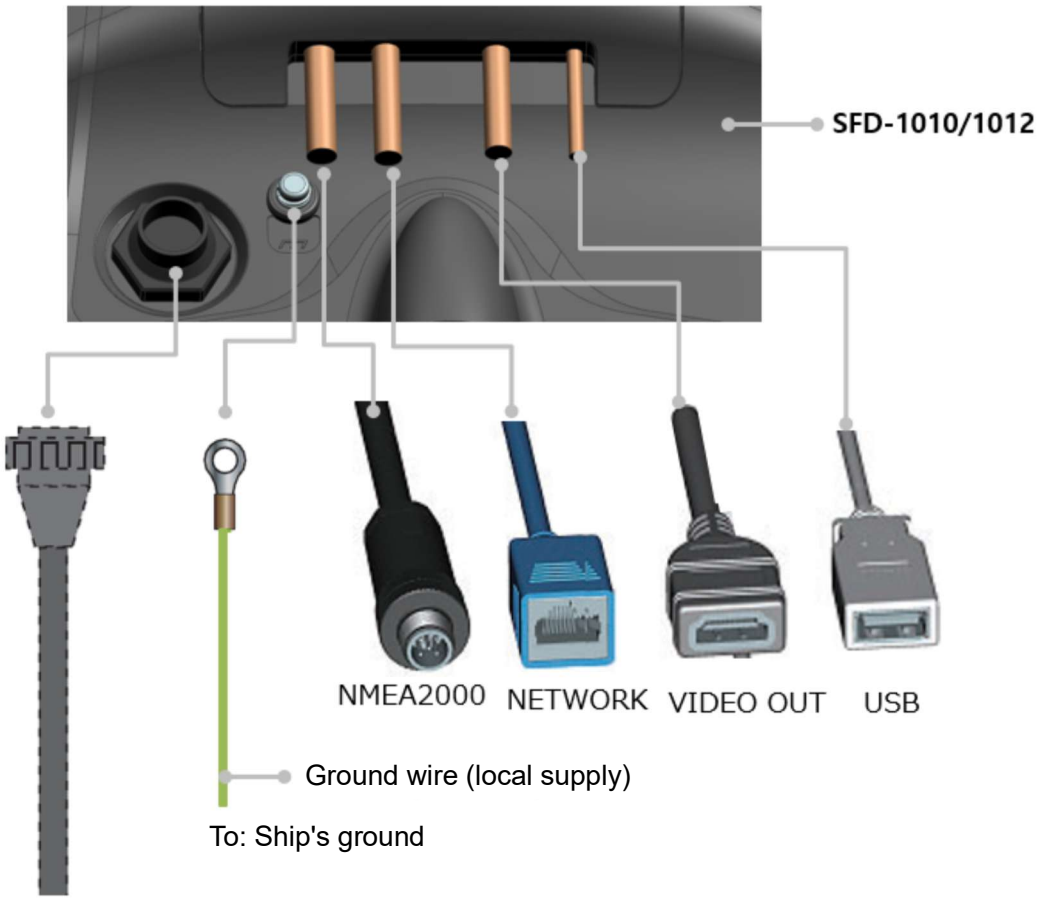


Flush mounting bracket is at right angle.

Flush mounting bracket is tilted inward from the right angle.

5.2 Wiring

5.2.1 Main body (rear) interface



Power/signal connector (FRU-CF-F01)

Note:

- Individually isolate unused conductors using vinyl tape to prevent the conductors from touching each other.
- Cable assembly connectors are easily broken. Plug or unplug them carefully.
- Do not shorten the cables.

5.2.2 Waterproofing of each interface

When mounting this equipment at locations subject to water splash or in high humidity, waterproof each connector and multi cable as shown below.

Waterproofing of connecting portions

1. Wrap self-vulcanizing tape around an area of approximately 30 mm from each side of the junction.
2. Wrap vinyl tape around an area of approximately 50 mm from each side of the junction.
3. Secure both ends of the tape with zip ties to prevent the tape from unraveling.

Note: The above tape treatment prevents disconnection of cables.

Step 1



Wrap self-vulcanizing tape around the junction.

Step 2



Wrap vinyl tape around an area of approximately 50 mm from each side of the junction, then secure both ends of the tape with zip ties.

Waterproofing of unused terminals

Waterproof unused terminals as shown below.

1. Wrap vinyl tape around connecting parts.
2. Wrap vinyl tape around an area of approximately 50 mm from each side of the junction. Secure one end of the tape with a zip tie to prevent the tape from unraveling.

Step 1

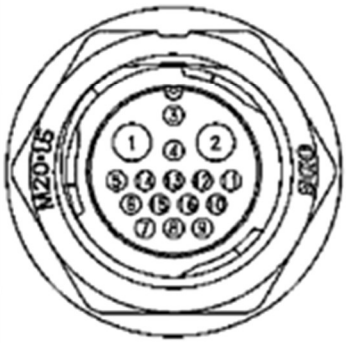


Step 2

5.2.3 Multi cable

Use the multi cable to connect an external buzzer and network power switch.
The multi cable has 16 core wires.

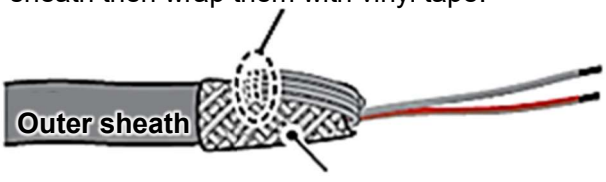
Refer to the table on the next page for pin arrangement on the multi cable.

Connector		Color	Remarks	
1	DC-P-IN (+)	Red	Input power, 12-24 VDC	
2	DC-M-IN (-)	Black		
3	TD1-A	White	(Unused)	
4	TD1-B	Blue		
5	RD1-H	Yellow		
6	RD1-C	Light green		
7	TD2-A	White/orange	(Unused)	
8	TD2-B	Blue/orange		
9	RD2-H	Yellow/orange		
10	RD2-C	Light green/ orange		
11	NC	Yellow/gray	(Unused)	
12	NC	Light green/ gray		
13	12V-P (+)	Red/white	Buzzer power, buzzer GND, 12 VDC	
14	12V-M (-)	Black/white		
15	External buzzer	Purple	External buzzer	
16	Shield	Black	Ground wire (connect to switchboard)	

5.2.4 Isolation and protection of unused conductors

1. Make a slit in shrink tubes, outer sheath and inner sheath.
2. Peel back the outer and inner sheaths, then fold them back toward the outer sheath.
3. Individually isolate unused conductors using vinyl tape, then secure them to the outer sheath with vinyl tape.

Fold back unused conductors with inner sheath then wrap them with vinyl tape.



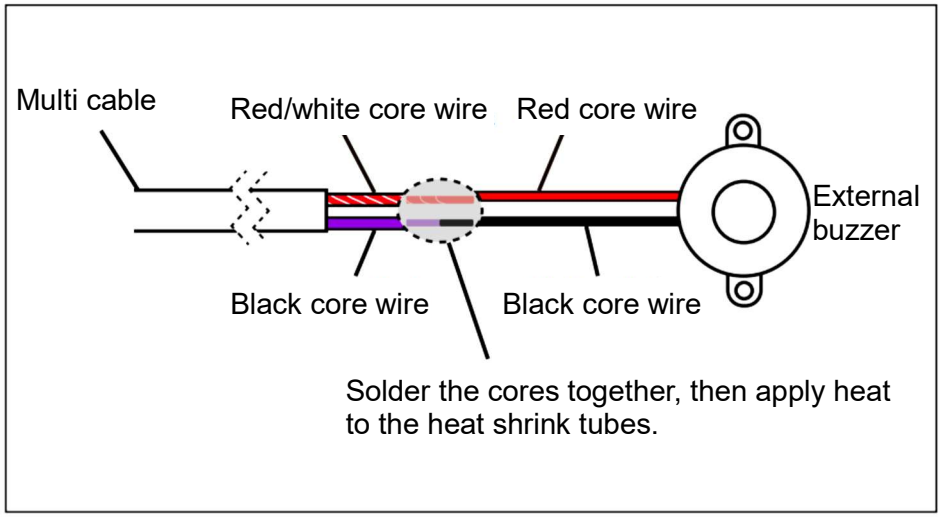
Secure unused conductors to outer sheath with vinyl tape.



5.2.5 How to connect an external buzzer

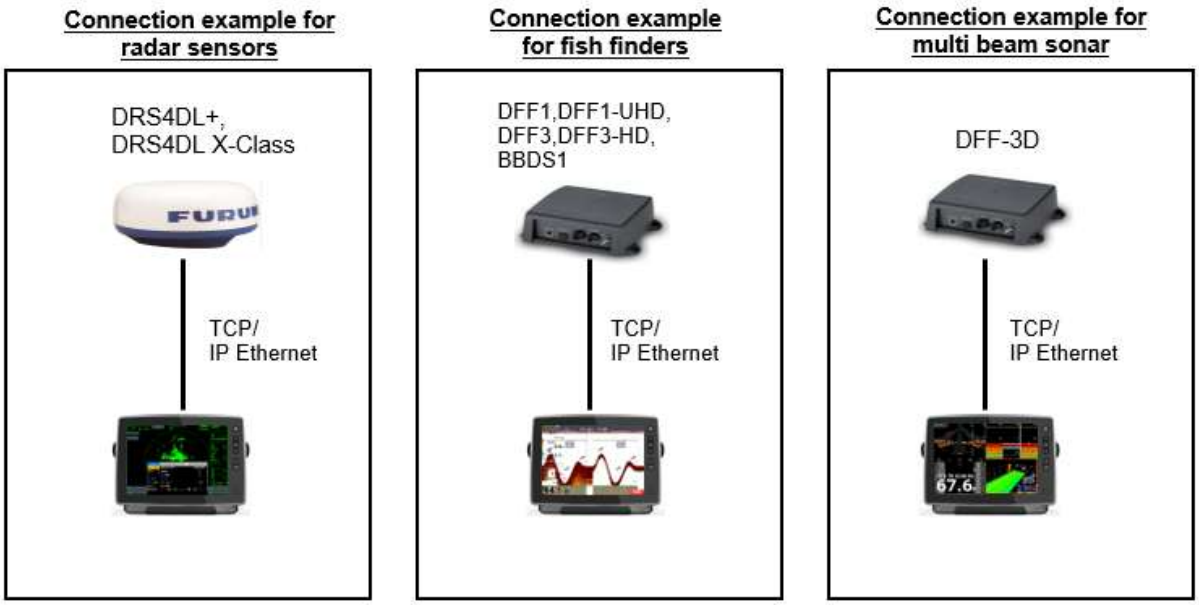
1. Cut the external buzzer cable to a length appropriate for the installation, then cut off the XH connector.
2. Insert heat shrink tube over each core wire.
3. Solder the conductors of the multi cable and the external buzzer cable together.
4. Move the heat shrink tubes over the soldered parts, then apply heat to the tubes to shrink them.

How to connect an external buzzer



5.3 Radar sensor, fish finder and multi beam sonar connections

Radar/fish finder/multi beam sonar display and information from network equipment can be shared via TCP/IP Ethernet.
The illustrations below provide example connections with radar, fish finder, and multi beam sonar. Refer to the sections 5.4 and 5.5 about the required cables.



*: One radar, fish finder and multi beam sonar unit can be connected to one SFD.
*: Maximum two SFDs can be connected to the same network.

Version of sensors

Model	Version
DRS4DL+	0359367-01.03 or later
DFF1	0252353-03.01 or later
DFF1－UHD	0252405-03.04 or later
DFF3	0252362-02.01 or later
BBDS1	0252379-02.01 or later
DFF－3D	0252440-01.05 or later
DRS4DL X-Class	0359571-01.03 or later
DFF3-UHD	0252482-02.04 or later

5.4 VIDEO-IN/OUT and USB Connector

Video output (for external HDMI monitor)

With connection of a HDMI monitor, the pictures on the SFD can be seen in a remote location. This equipment is compatible with the wide-screen HDMI monitors which meet the following requirements:

Resolution	Vertical frequency	Horizontal frequency	Pixel clock frequency
1280 × 720	60 Hz	45 kHz	74.250 MHz

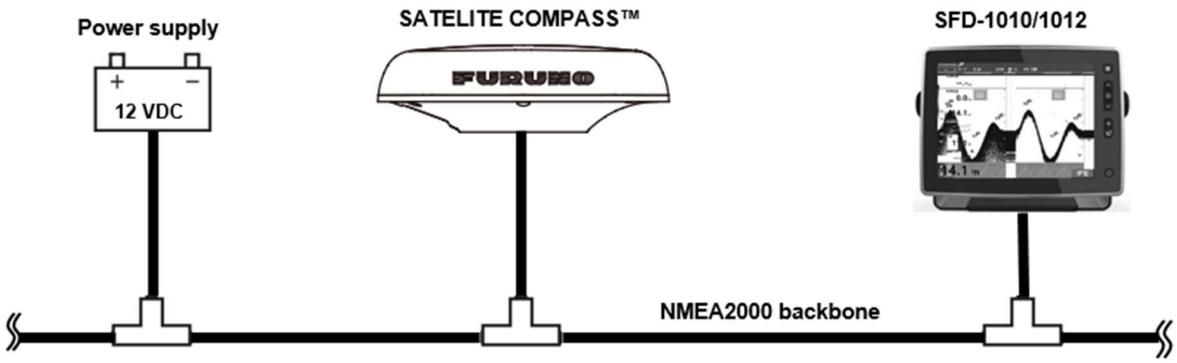
USB port

This equipment has one USB (Ver. 2.0) port.

5.5 NMEA 2000 Connector

This connector can share data with NMEA 2000 compatible devices.

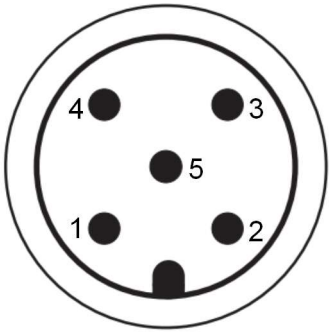
NMEA 2000 network connection



***: Requires network power source and termination resistor.**

***: SFD-1010/1012 requires 12 VDC. Not adaptive to 24 VDC.**

Pin layout



Connector		Connector terminal color
1	Shield	Bare
2	+Voltage	Red
3	-Voltage	Black
4	CAN_H	White
5	CAN_L	Blue

NMEA 2000 PGN

Input PGN

PGN	Name	PGN	Name
059392	ISO Acknowledgment	129025	Position: Rapid Update
059904	ISO Request	129026	COG & SOG: Rapid Update
060160	ISO Transport Protocol: Data Transfer	129029	GNSS Position Data
060416	ISO Transport Protocol: Connection Management	129284	Navigation Data
060928	ISO Address Claim	129538	GNSS Control Status(When connected to SCX-20)
065240	ISO Commanded Address	130306	Wind Data
065280	Heave	130310	Environmental Parameters (not recommended)
126208	NMEA - Request group function	130311	Environmental Parameters (not recommended)
	NMEA - Command group function	130312	Temperature (not recommended)
	NMEA - Acknowledge group function	130314	Actual Pressure
126464	Transmit PGN's group function	130316	Temperature: Extended Range
126720	GMM Message (Proprietary PGN) (When connected to SCX-20)	130577	Direction Data
126992	System Time	130816	Self Test Report(Proprietary PGN) (When connected to SCX-20)
126996	Product Information	130817	Furuno GNSS Control Status (Proprietary PGN) (When connected to SCX-20)
127250	Own Ship Heading	130818	Heading & Attitude Sensor Control Status (Proprietary PGN) (When connected to SCX-20)
127252	Heave	130819	Motion Sensor Control Status (Proprietary PGN) (When connected to SCX-20)
127257	Attitude	130822	Unit Division Code(Proprietary PGN)
127258	Magnetic Variation	130833	Device Position and Ship Dimension Report (Proprietary PGN) (When connected to SCX-20)

128259	Speed: Water Referenced	130834	Position of Speed Measurement (Proprietary PGN) (When connected to SCX-20)
128267	Depth	130848	Water Current Layer(Proprietary PGN)

Output PGN

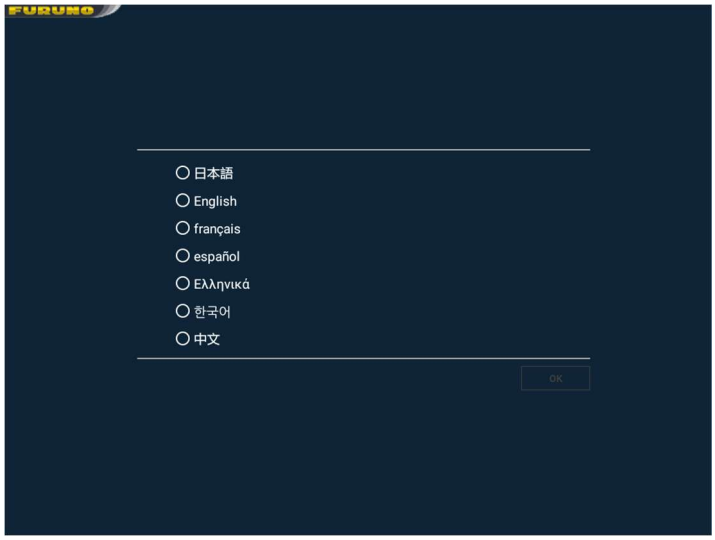
PGN	Name
059392	ISO Acknowledgment
059904	ISO Request
060160	—
060416	—
060928	ISO Address Claim
061184	Self Test Group Function (Proprietary PGN) (When connected to SCX-20)
126208	NMEA - Request group function (When connected to SCX-20)
	NMEA - Command group function (When connected to SCX-20)
	NMEA - Acknowledge group function
126464	Transmit/Receive PGN List Group type of function
126720	Memory Clear Group Function (Proprietary PGN) (When connected to SCX-20)
	Reset Group Function (Proprietary PGN) (When connected to SCX-20)
	GMM Message (Proprietary PGN) (When connected to SCX-20)
126993	Heartbeat
126996	Product Information
126998	Configuration Information
127257	Attitude
128259	Speed: Water Referenced
128267	Depth
130310	Environmental Parameters (not recommended)
130312	Temperature (not recommended)
130316	Temperature: Extended Range

5.6 Home Screen

You can perform the following operation from the home screen.

Selecting a language

The language selection screen appears at initial power up or when initializing the device with radar, fishfinder or multi beam sonar.



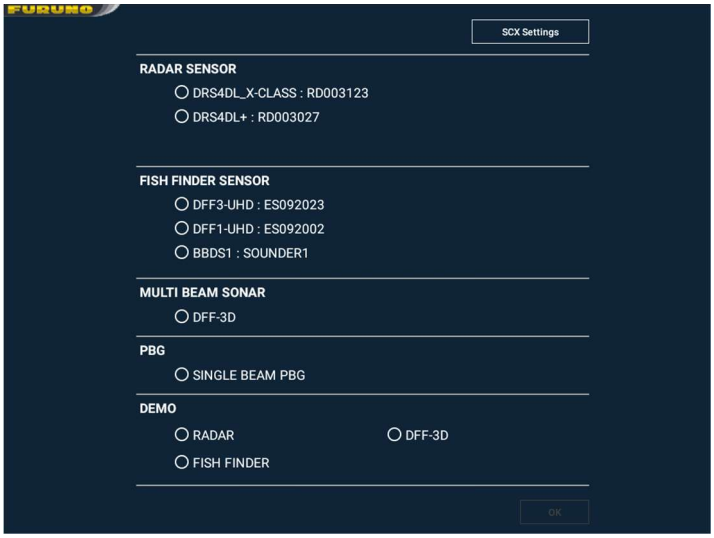
Selecting screen orientation

After selecting a language, select the screen orientation from portrait or landscape, then select the sensor. The selected orientation is affected after the equipment is restarted.



Selecting a sensor

- Appears at initial power up after installation.
- Switch functions among radar, fish finder, multi beam sonar.
- Switch between multiple sensors of the same category.
- Connected sensors are shown in white characters.

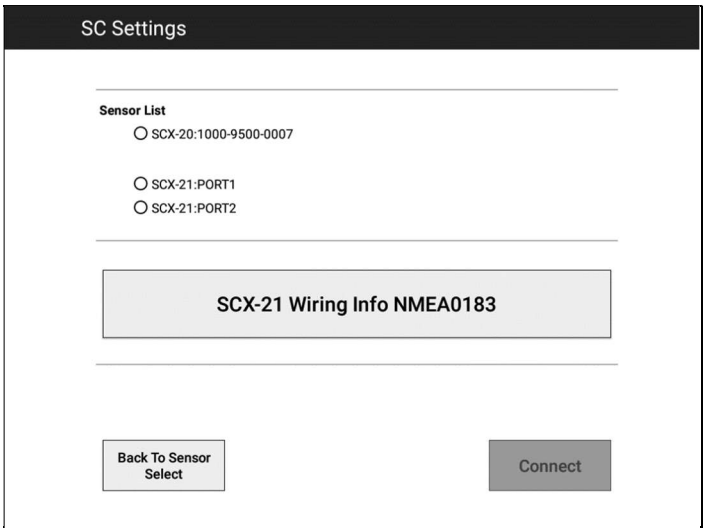


Conditions for displaying this screen

- The first time the display unit is started.
- When changing a sensor while using a radar, fishfinder or multi beam sonar.

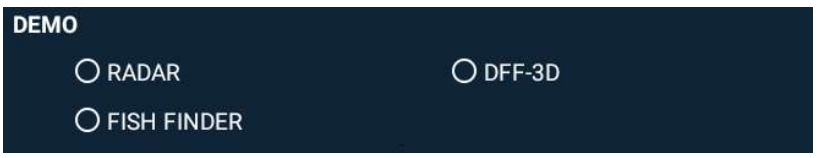
Installation setting of the SCX-20/21

SCX-20/21 settings are available from the sensor switching screen. Tap SCX Settings at the right upper corner of the screen to show the settings (refer to 5.12 SCX Setting).



Demo display

On the sensor selection screen, you can select a demo display of a fish finder, radar or DFF-3D.



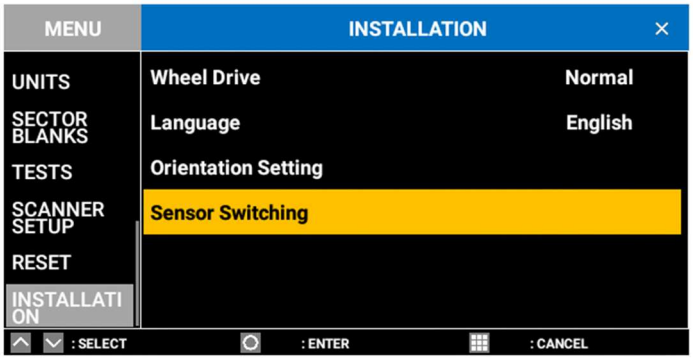
How to change the sensor

There are two ways to change the sensor to use as follows.

When using radar

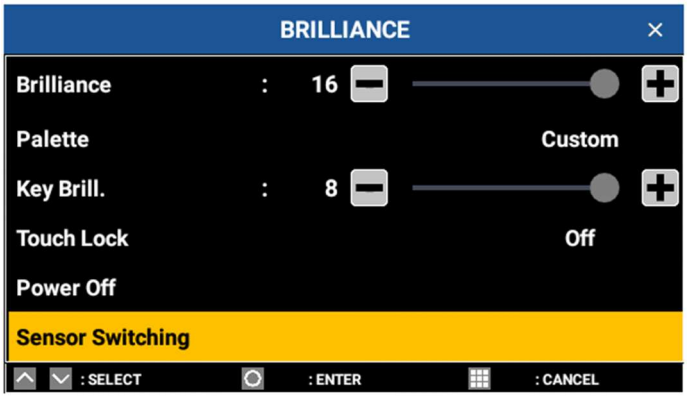
Change from [MENU]

1. Select [MENU] → [INSTALLATION] → [Sensor Switching].
2. The pop-up window asks if you are sure to proceed. Select [YES].



Change from [BRILLIANCE]

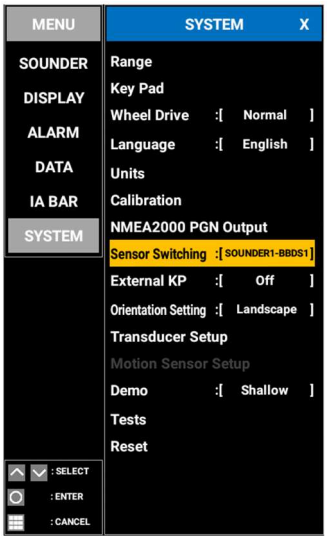
1. Press POWER/BRILLIANCE key.
2. Select [Sensor Switching].
3. The pop-up window asks if you are sure to proceed. Select [YES].



When using fish finder

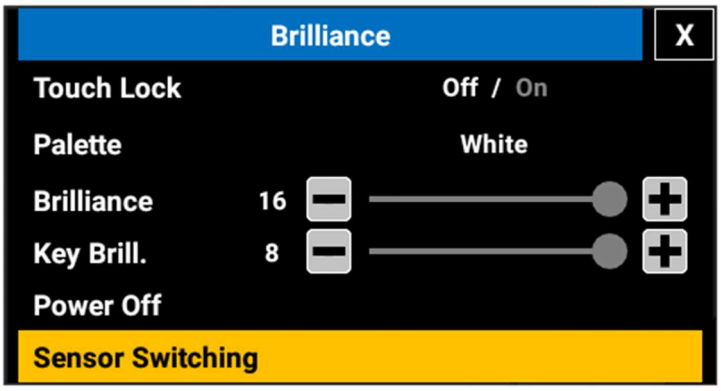
Change from [MENU]

1. Select [MENU] → [SYSTEM] → [Sensor Switching].
2. The pop-up window asks if you are sure to proceed. Select [YES].



Change from [BRILLIANCE]

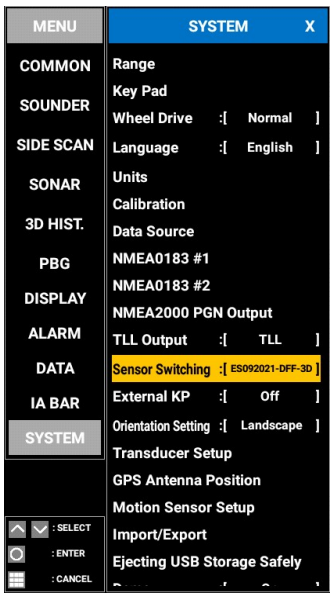
1. Press POWER/BRILLIANCE key.
2. Select [Sensor Switching].
3. The pop-up window asks if you are sure to proceed. Select [YES].



When using multi beam sonar

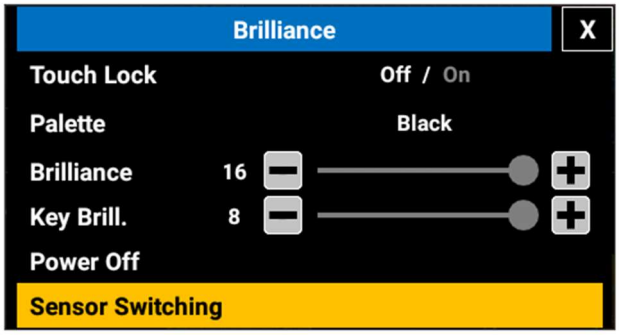
Change from [MENU]

1. Select [MENU] → [SYSTEM] → [Sensor Switching].
2. The pop-up window asks if you are sure to proceed. Select [YES].



Change from [BRILLIANCE]

1. Press POWER/BRILLIANCE key.
2. Select [Sensor Switching].
3. The pop-up window asks if you are sure to proceed. Select [YES].



5.7 Radar

5.7.1 How to adjust the heading line

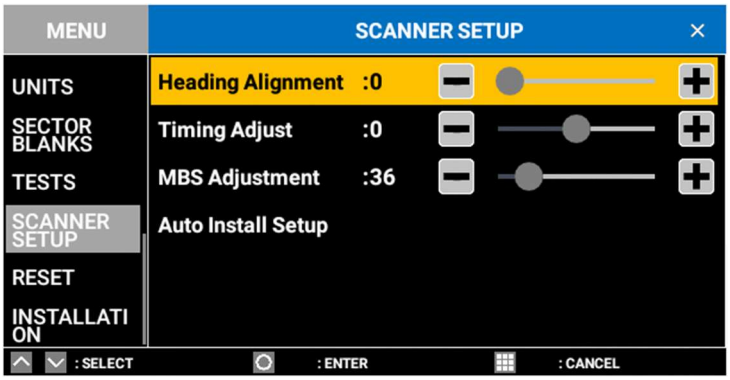
Adjust the heading line so that the antenna and heading directions match, to ensure that echoes are shown at their correction positions.
Take the following steps to adjust the heading line.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SCANNER SETUP].
3. Tap [Heading Alignment].
   The cursor moves to the slider bar on the right side of the menu.
4. Drag the slider bar or tap [+] or [-] to set the heading line bearing.
5. Tap [x] on the title bar to close [MENU].

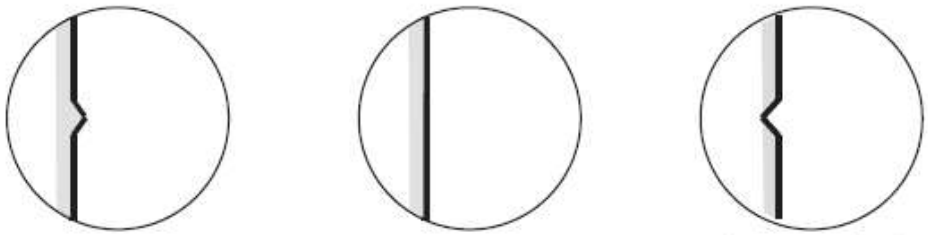
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SCANNER SETUP] with the arrow keys, then press the **ENTER** key.
3. Select [Heading Alignment] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
4. Set the heading line bearing with the arrow keys.
5. Press the **MENU/ESC** key to close [MENU].



5.7.2 How to adjust the sweep timing

Radar calculates a range to a target by measuring the time required from the moment the transmitted echo reaches a target to the moment it is received by their radar antenna. The received echo is displayed on the screen according to the measured time. The sweep timing of the antenna unit differs depending on the length of the signal cable between the control unit and the antenna unit. If sweep timing is not adjusted correctly, the echo of from a "straight" target is not displayed straightly.



(1) Center area pulled inward

(2) Correct

(3) Center area pushed outward

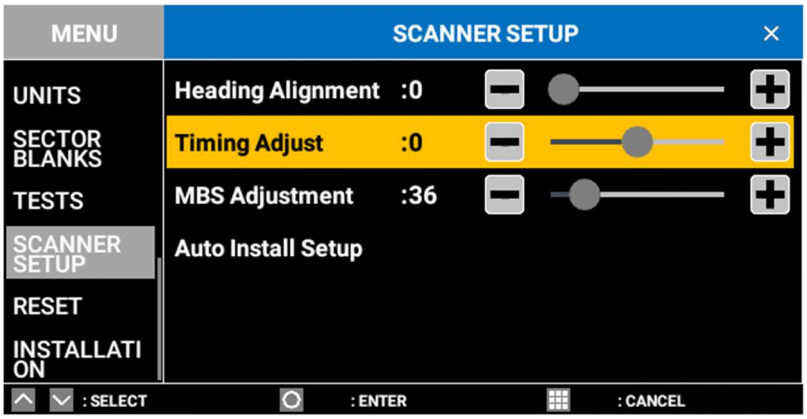
Take the following steps to adjust the timing.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SCANNER SETUP].
3. Tap [Timing Adjust].
   The cursor moves to the slider bar on the right side of the menu.
4. Drag the slider bar or tap [+] or [-] to set the timing.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SCANNER SETUP] with the arrow keys, then press the **ENTER** key.
3. Select [Timing Adjust] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
4. Adjust the timing with the arrow keys.
5. Press the **MENU/ESC** key to close [MENU].



5.7.3 How to adjust the main bang

Adjust the main bang suppression level if main bang appears (at the screen center).

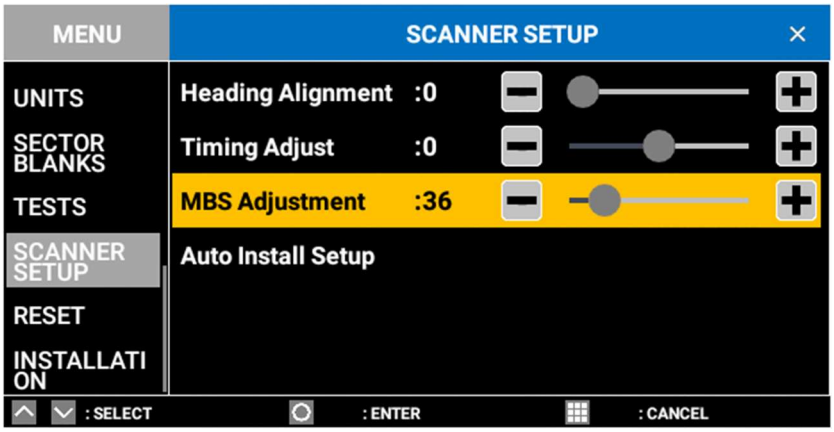
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SCANNER SETUP].
3. Tap [MBS Adjustment].
   The cursor moves to the slider bar on the right side of the menu.
4. Drag the slider bar or tap [+] or [-] to adjust the main bang suppression level.

5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SCANNER SETUP] with the arrow keys, then press the **ENTER** key.
3. Select [MBS Adjustment] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
4. Adjust the main bang suppression level with the arrow keys.
5. Press the **MENU/ESC** key to close [MENU].



5.7.4 How to show the own ship mark

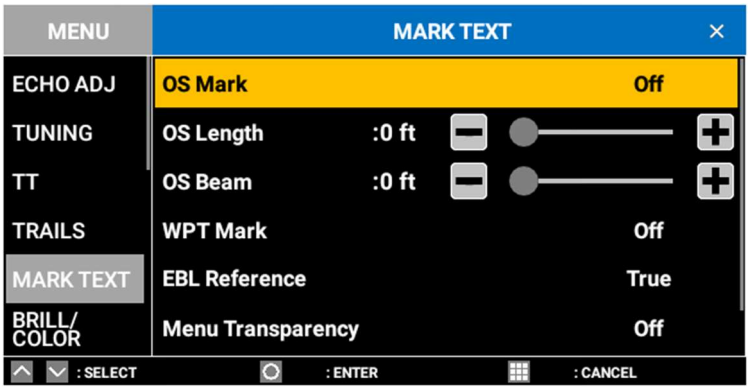
The own ship mark can be displayed on the screen.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [MARK TEXT].
3. Tap [OS MARK].
   The [On]/[Off] selection box appears.
4. Tap [On] or [Off].
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [MARK TEXT] with the arrow keys, then press the **ENTER** key.
3. Select [OS MARK] with the arrow keys, then press the **ENTER** key.
   The [On]/[Off] selection box appears.
4. Select [On] or [Off] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



How to show the own ship mark in scale

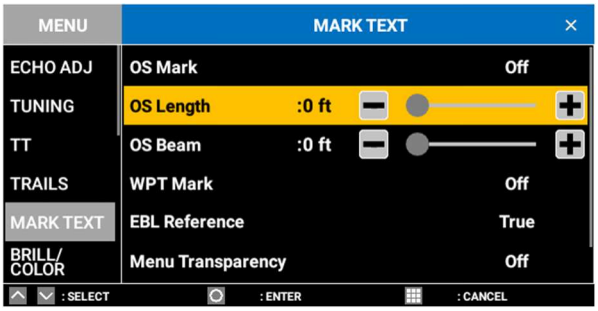
The own ship mark can be displayed in true scale by entering your ship's length and width.

Touch control:

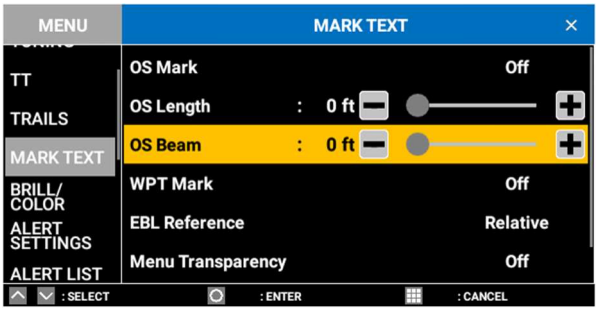
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [MARK TEXT].
3. Tap [OS Length] or [OS Beam].
   The cursor moves to the slider bar on the right side of the menu.
4. Drag the slider bar or tap [+] or [-] to set the own ship's length and width.
5. Tap [x] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [MARK TEXT] with the arrow keys, then press the **ENTER** key.
3. Select [OS Length] or [OS Beam] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
4. Set the own ship's length and width with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



OS Length



OS Beam

5.7.5 How to set a sector blank

If the antenna unit is installed near the wheelhouse, the crews are exposed to the transmitted radio waves at an extremely close range, which can be harmful to the human body (especially the eyes). Also, if the antenna unit is installed near the mast, its echo appears in the radar picture. In such cases, set a sector blank to stop the transmission within the designated range. A maximum of two sector blank areas can be set.

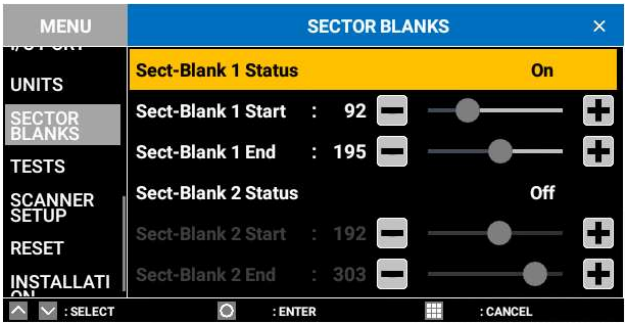
Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SECTOR BLANKS].
3. Tap [Sect-Blank 1 Status] or [Sect-Blank 2 Status].
   The [On]/[Off] selection box appears.
4. Tap [On] or [Off].
5. Tap [Sect-Blank 1 Start] or [Sect-Blank 2 Start].
   The cursor moves to the slider bar on the right side of the menu.
6. Drag the slider bar or tap [+] or [-] to set the start bearing.
7. Tap [Sect-Blank 1 End] or [Sect-Blank 2 End].
   The cursor moves to the slider bar on the right side of the menu.
8. Drag the slider bar or tap [+] or [-] to set the end bearing.
9. Tap [x] on the title bar to close [MENU].

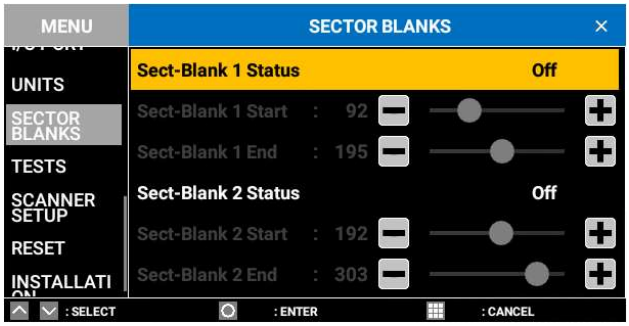
Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SECTOR BLANKS] with the arrow keys, then press the **ENTER** key.
3. Select [Sect-Blank 1 Status] or [Sect-Blank 2 Status] with the arrow keys, then press the **ENTER** key.
   The [On]/[Off] selection box appears.
4. Select [On] or [Off] with the arrow keys, then press the **ENTER** key.
5. Select [Sect-Blank 1 Start] or [Sect-Blank 2 Start] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
6. Set the start bearing with the arrow keys.
7. Select [Sect-Blank 1 End] or [Sect-Blank 2 End] with the arrow keys, then press the **ENTER** key.
   The cursor moves to the slider bar on the right side of the menu.
8. Set the end bearing with the arrow keys.
9. Press the **MENU/ESC** key to close [MENU].

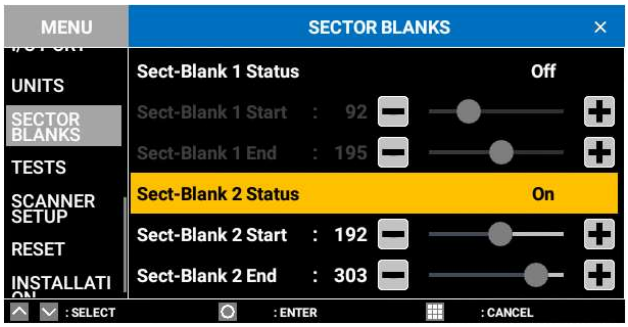
Note: You cannot set the start bearing and the end bearing when [Sect-Blank 1 Status] or [Sect-Blank 2 Status] is set to [Off].



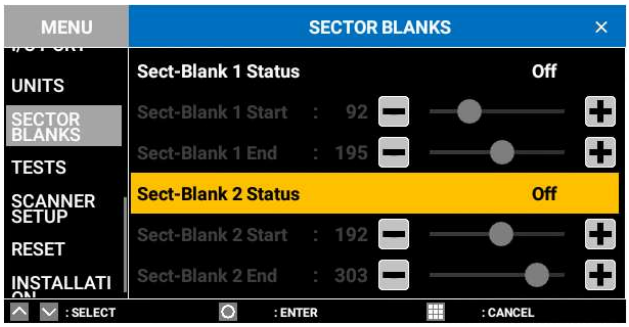
Sect-Blank 1 Status [On]



Sect-Blank 1 Status [Off]



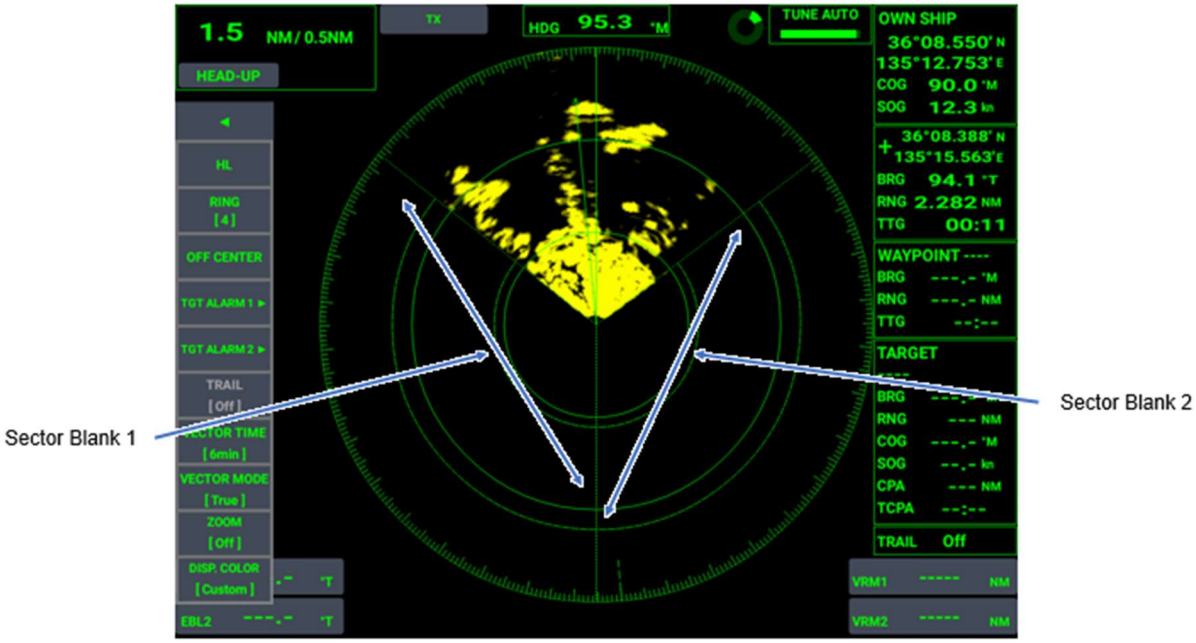
Sect-Blank 2 Status [On]



Sect-Blank 2 Status [Off]

Sector blank area

Set [Sect-Blank 1 Status] or [Sect-Blank 2 Status] to [On], to show set sector blank on the screen (with a line).



5.7.6 Data Source Settings

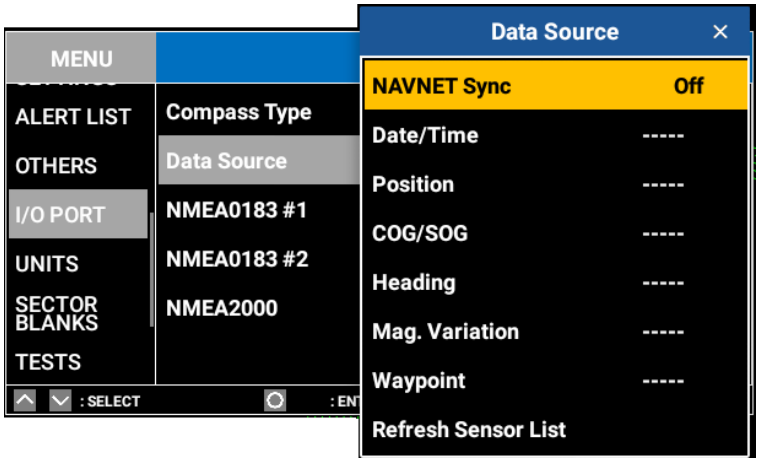
Select the sensor you want to use as a data source.

Touch control

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [I/O port].
3. Tap [Data Source].

Key control

1. Press the **MENU/ESC** key to open [MENU].
2. Select [I/O port] with the arrow keys, then press the **ENTER** key.
3. Select [Data Source] with the arrow keys, then press the **ENTER** key.



Item	Description	Setting range (options)
[NAVNET Sync]	Synchronizes with the NAVNET device data source settings when connected to a NAVNET device. ※When using the NAVNET device, connect the NAVNET device and this unit via LAN.	[Off], [On]
[Date/Time]	Select a sensor for date/time.	[LAN], [NMEA0183#1], [NMEA0183#2], [NMEA2000]
[Position]	Select a sensor for your ship's position.	
[COG/SOG]	Select a sensor for COG/SOG.	
[Heading]	Select a sensor for heading.	
[Mag. Variation]	Select a sensor for magnetic variation.	
[Waypoint]	Select a sensor for waypoint.	[NMEA0183#1], [NMEA0183#2], [NMEA2000]
[Refresh Sensor List]	Refresh NMEA2000 equipment list.	

Note: When [NAVNET Sync] is set to [On] or other settings on the [Data Source] is set to [LAN], navigation data is not output to LAN.
Set up the system to output appropriate navigation data to the network sensor.

5.7.7 NMEA0183#1、NMEA0183#2

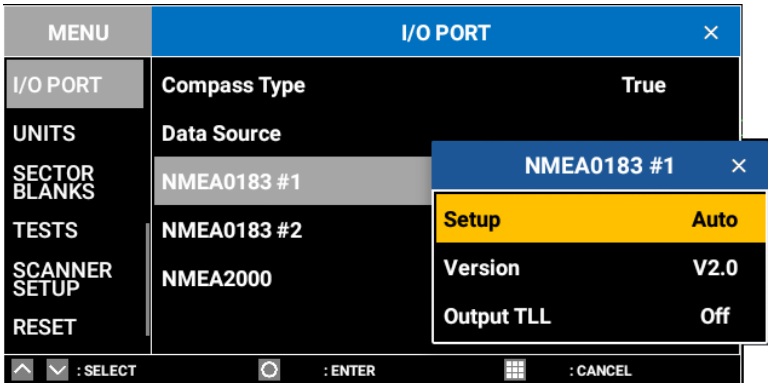
Output NMEA0183 sentence is set on the [NMEA0183#1] menu and [NMEA0183#2] menu.

Touch control

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [I/O port].
3. Tap [NMEA0183#1] or [NMEA0183#2].

Key control

1. Press the **MENU/ESC** key to open [MENU].
2. Select [I/O port] with the arrow keys, then press the **ENTER** key.
3. Select [NMEA0183#1] or [NMEA0183#2] with the arrow keys, then press the **ENTER** key.



[Setup]: Select communication settings from [Auto], [4800bps], and [38400bps].
[Version]: Select the version of the NMEA0183 sentence to output from [V1.5], [V2.0] or [V3.0].
[Output TLL]: Select whether to output TLL sentences.

5.7.8 NMEA2000

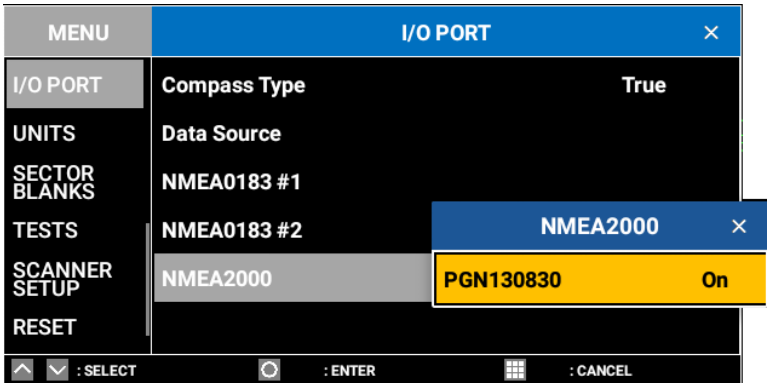
Configure settings related to the NMEA2000. Set which of the NMEA2000 PGN items to output.

Touch control

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [I/O port].
3. Tap [NMEA2000].

Key control

1. Press the **MENU/ESC** key to open [MENU].
2. Select [I/O port] with the arrow keys, then press the **ENTER** key.
3. Select [NMEA2000] with the arrow keys, then press the **ENTER** key.



[PGN130830]: Select whether to output PGN sentences for TLL data.

5.8 Fish Finder

5.8.1 Fish finder source menu

Model

The fish finder source (model name) currently selected is shown in the [Sensor Switching] menu. To change the sensor, do the following.

Touch control:

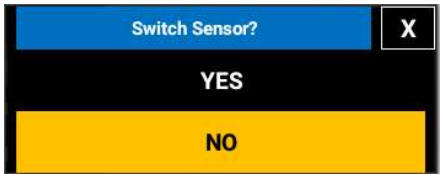
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Sensor Switching].
   You are asked if you are sure to proceed.
4. Tap [YES]/[NO].
5. Tap [×] on title bar and close the [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Sensor Switching] with the arrow keys, then press the **ENTER** key.
   You are asked if you are sure to proceed.
4. Select [YES]/[NO] with arrow key, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



To change the sensor type, tap the name of the transducer model currently connected to show the pop-up window displayed below. Tap to select [YES] to restart. When the sensor selection screen appears, select a sensor.



5.8.2 Transducer settings

This section shows how to enter transducer settings. The settings change according to the transducer and fish finder.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Transducer Setup].
   You are asked if you are sure to proceed.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Transducer Setup], then press the **ENTER** key.
   You are asked if you are sure to proceed.

Menu	Description
[Setting Method]	Select the method for entering transducer settings. For TDID, this menu appears only when a transducer that supports TDID is connected.
[Model Number] 1)	Select a model number of the connected transducer.
[Model Number(HF)] 2)	Select the type of connected transducer for high frequencies.
[Model Number(LF)] 2)	Select the type of connected transducer for low frequencies.
[HF (MIN)] 3)	Indicates the minimum frequency of the transducer connected to high frequency.
[HF (MAX)] 3)	Indicates the maximum frequency of the transducer connected to high frequency.
[LF (MIN)] 3)	Indicates the minimum frequency of the transducer connected to low frequency.
[LF (MAX)] 3)	Indicates the maximum frequency of the transducer connected to low frequency.
[Initialize]	Initializes all settings.

1) These items appear when sensors other than DFF3-UHD is used.
2) These items appear only when DFF3-UHD is used.
3) These items appear only when DFF3 is used.

When [MODEL] is selected in transducer settings and DFF3 is connected

Menu	Description
[HF]	Select the model name of the transducer connected to the high frequency port.
[LF]	Select the model name of the transducer connected to the low frequency port.

When [MANUAL] is selected in transducer settings

Menu	Description
[Transducer Power HF]	This menu appears when DFF1-UHD is connected. High frequency transmission power is fixed to 1 kW.
[Transducer Power LF]	This menu appears when DFF1-UHD is connected. Low frequency transmission power is fixed to 1 kW.

When [MODEL] is selected in transducer settings

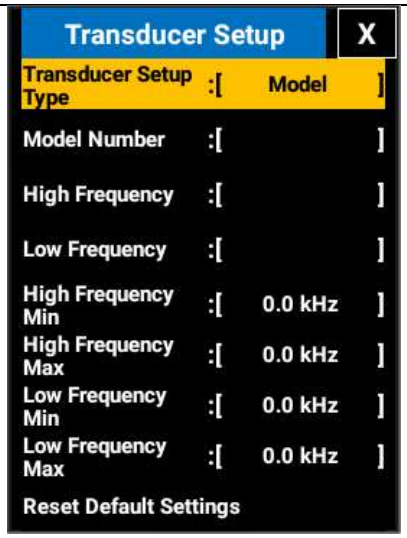
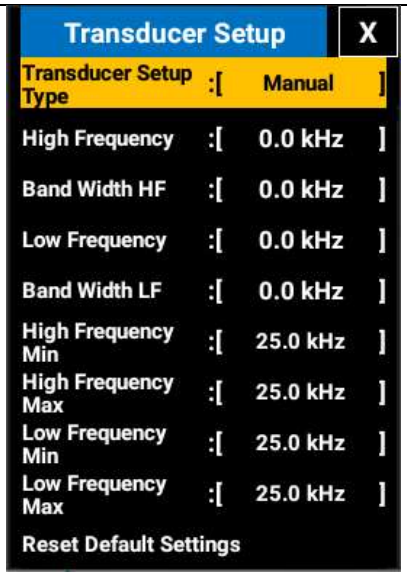
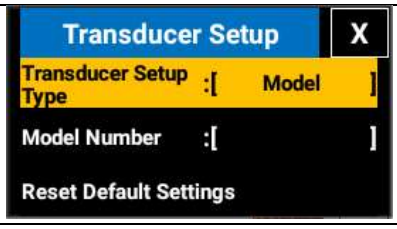
Menu	Description
[HF]	Set the frequency of the connected transducer to high frequency.
[Transducer Power HF]	This menu appears when DFF1 or BBDS1 is connected. Set the high frequency transmission power.
[Bandwidth HF]	This menu appears when DFF3 is connected. Set the frequency bandwidth of the transducer connected to high frequency.
[LF]	Set the frequency of the connected transducer to low frequency.
[Transducer Power LF]	This menu appears when DFF1 or BBDS1 is connected. Set the low frequency transmission power.
[Bandwidth	This menu appears when DFF3 is connected.

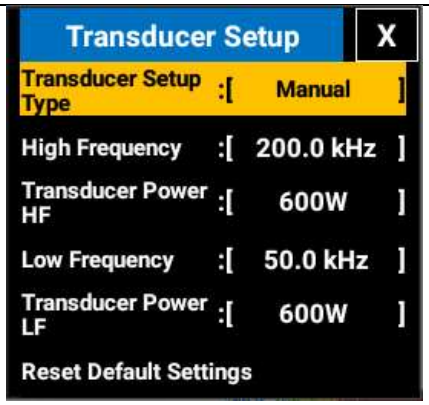
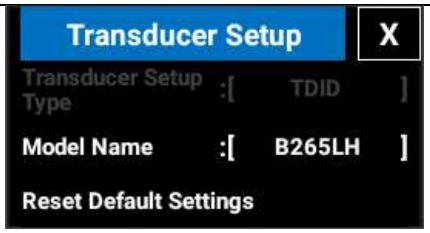
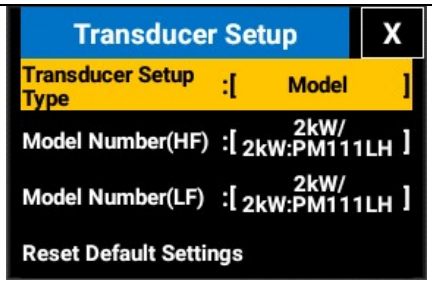
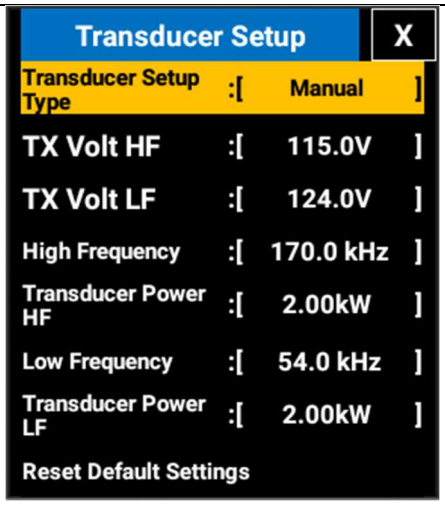
LF]	Set the frequency bandwidth of the transducer connected to low frequency.

When [TDID] is selected in transducer settings

Menu	Description
[Model Name]	The name of the transducer connected.

The menus to be set in the transducer settings for each sensor are as follows.

Sensor	Transducer setting	Menu
DFF3	**Model**	
	Manual	
DFF1 & BBDS1	**Model**	

DFF1 & BBDS1	**Manual**		
DFF1-UHD	**TDID**		
DFF3-UHD	**Model**		
DFF3-UHD	**Manual**		

5.8.3 Chirp frequency setting

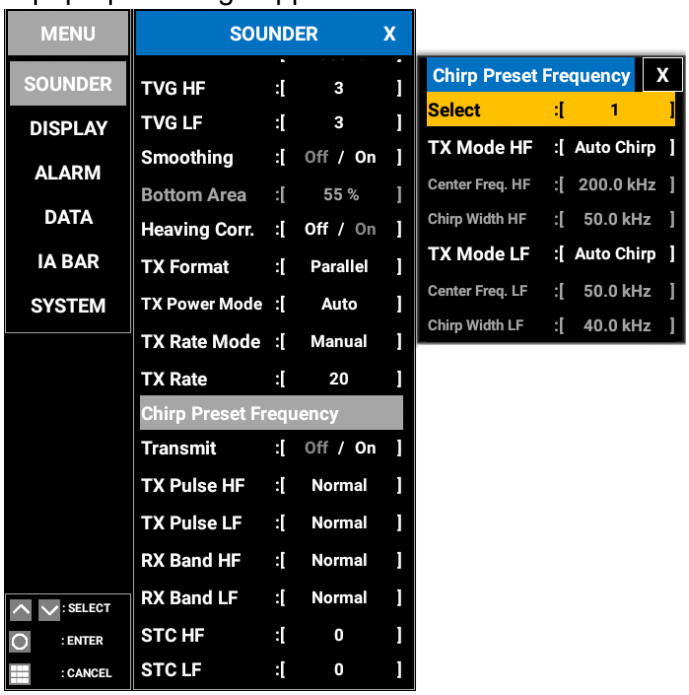
You can set the frequency change of the signal to be transmitted.
This item is available when the DFF3-UHD is connected and the [Transducer Settings] → [Setting Method] is set to [Type].

Touch control:

1. Press the **MENU/ESC** key to open menu.
2. Tap [SOUNDER].
3. Tap [Chirp Preset Frequency].
   A pop-up message appears.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SOUNDER] with arrow keys, then press the **ENTER** key.
3. Select [Chirp Preset Frequency] with arrow key, then press the **ENTER** key.
   A pop-up message appears.



Item	Description	Setting range (Options)
[Select]	Selects a preset for chirp settings.	[1], [2], [3],
[TX Mode HF][1)]	Selects the transmission mode for high-frequency.	[Auto Chirp], [Manual Chirp], [CW]
[TX Mode LF]	Selects the transmission mode for low-frequency.	
[Center Freq. HF][2)]	Sets the center frequency of the high frequency.	Menu differs according to the settings as [Model (HF)], [Model (LF)].
[Center Freq. LF]	Sets the center frequency of the low frequency.	
[Chirp Width HF][3)]	Sets the frequency bandwidth for high-frequency Chirp.	
[Chirp Width LF]	Sets the frequency bandwidth for low-frequency Chirp.	

1) Menu changes as [TX Mode HF]↔[TX Mode MF] according to the setting of [Model (HF)].
2) Menu changes as [Center Freq. HF]↔[Center Freq. MF] according to the setting of [Model (HF)].
3) Menu changes as [Chirp Width HF]↔[Chirp Width MF] according to the setting of [Model (HF)].

5.8.4 Motion sensor settings

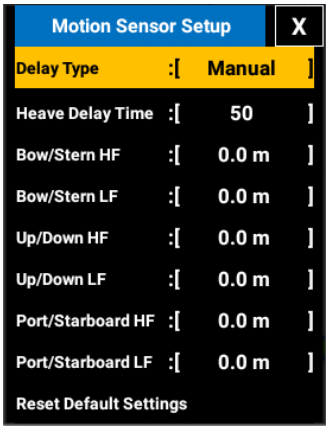
If a motion sensor is connected, do the procedure below to display the bottom and schools of fish more clearly.
Refer to 5.11 Motion Sensor Setting.

Touch control:

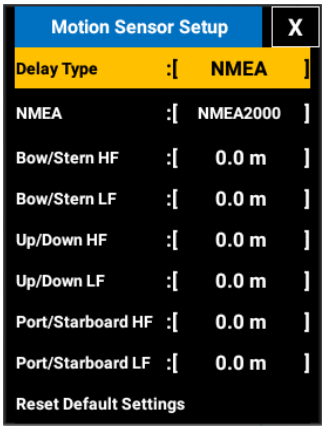
1. Press the **MENU/ESC** key to open menu.
2. Tap [SYSTEM].
3. Tap [Motion Sensor Setup].
   You are asked if you are sure to proceed.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press the **ENTER** key.
3. Select [Motion Sensor Setup] with arrow key, then press the **ENTER** key.
   You are asked if you are sure to proceed.



Motion sensor type setting: Manual



Motion sensor type setting: Communication standards

Note: These menus are inoperative when [SOUNDER] – [Heave Correction] is set to [Off].

Menu	Description
[Delay Time Setting Method]	Select a heave data correction method.
[Heave Delay Time]	This menu appears when [Manual] is selected for the delay time setting method. If there is a delay of the motion sensor data (from their time of validity to the time when the data is available at the interface port) set it here.
[NMEA]	This menu appears when [NMEA] is selected for the delay time setting method.
[Heading/stern (HF)]	Set the distance from the motion sensor to the transducer on the high frequency side.
[Heading/stern (LF)]	Set the distance from the motion sensor to the transducer on the low frequency side.
[Up/down (HF)]	Set the vertical distance from the motion sensor to the transducer on the high frequency side.

[Up/down (LF)]	Set the vertical distance from the motion sensor to the transducer on the low frequency side.
[Port side / Bow side (HF)]	Set the distance from the motion sensor to the transducer on the high frequency side, in the port side / bow side directions.
[Port side / Bow side (LF)]	Set the distance from the motion sensor to the transducer on the low frequency side, in the port side / bow side directions.
[RESET]	Initializes all settings.

5.8.5 Bottom detection level

Continuous strong echo level is recognized as bottom (bottom). [Bottom Level HF] and [Bottom Level LF] is set to [0] as factory default.
When depth data is unstable or not shown on the display, increase the setting on the menu.
The setting range is -40 to 40. When blank lines appear on the bottom zoom mode display, decrease the setting on the menu, so that the lines disappear.
Use caution when adjusting the level. If the level is too high, bottom fish are recognized as the bottom (bottom).

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Calibration].
   Related menu appears.
4. Tap [Bottom Level HF] or [Bottom Level LF], then drag the slider bar or tap [+] or [-] to set the level.
5. Tap [×] on title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Calibration] with the arrow keys, then press the **ENTER** key.
   Related menu appears.
4. Select [Bottom Level HF] or [Bottom Level LF] with the arrow keys, then press the **ENTER** key.
5. Set the bottom detection level with the arrow keys, then press the **ENTER** key.
6. Press the **MENU/ESC** key to close [MENU].

5.8.6 External KP

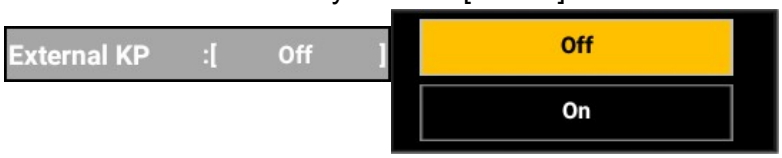
The [External KP] menu enables, disables use of an external KP. Normally, the internal KP is used. Set to [On] when using an external KP.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [External KP]. [Off]/[On] selection box appears.
4. Tap [Off] or [On].
5. Tap [×] on title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [External KP] with the arrow keys, then press the **ENTER** key. [Off]/[On] selection box appears.
4. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



5.8.7 Data Source Settings

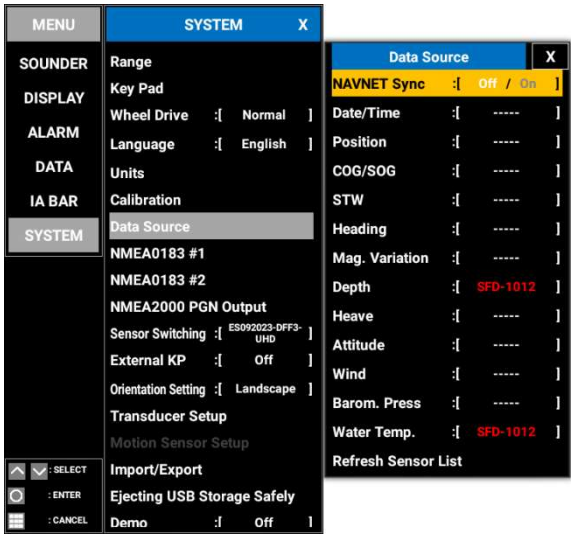
The sensor of data source can be selected.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Data Source].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Data Source], then press the **ENTER** key.



Item	Description	Setting range (Options)
[NAVNET Sync]	Synchronizes with the NAVNET device data source settings when connected to a NAVNET device. **Note:** When using the NAVNET device, connect the NAVNET device and this unit via LAN.	[Off], [On]
[Date/Time]	Select a sensor for date/time.	[LAN],

[Position]	Select a sensor for your ship's position.	[NMEA 0183#1], [NMEA 0183#2], [NMEA 2000]
[COG/SOG]	Select a sensor for COG/SOG.	
[STW]	Select a sensor for STW.	
[Heading]	Select a sensor for heading.	
[Mag. Variation]	Select a sensor for magnetic variation.	
[Depth]	Select a sensor for depth.	[LAN], [NMEA2000]
[Heave]	Select a sensor for heave.	[LAN], [NMEA 0183#1], [NMEA 0183#2], [NMEA 2000]
[Roll/Pitch]	Select a sensor for roll/pitch.	
[Wind]	Select a sensor for wind speed.	
[Barom. Press]	Select a sensor for atmospheric pressure.	
[Water Temp.]	Select a sensor for water temperature.	
[Refresh Sensor List]	Refresh NMEA 2000 equipment list.	

Note: When [NAVNET Sync] is set to [On] or other settings on the [Data Source] is set to [LAN], navigation data is not output to LAN.
Set up the system to output appropriate navigation data to the network sensor.

5.8.8 NMEA 0183#1、NMEA 0183#2

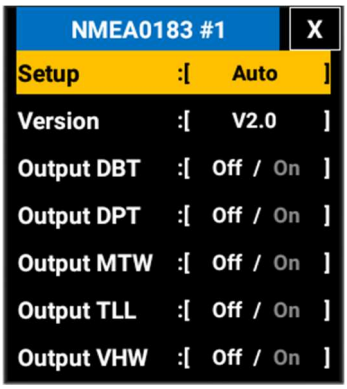
The [NMEA 0183 #1] menu and the [NMEA 0183 #2] menu set the NMEA 0183 sentences.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [NMEA 0183 #1] or [NMEA 0183 #2].
   Pop-up message appears.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [NMEA 0183 #1] or [NMEA 0183 #2] with the arrow keys, then press the **ENTER** key.
   Pop-up message appears.



[Setup]: Select communication settings from [Auto], [4800bps], and [38400bps].
[Version]: Select the version of the NMEA 0183 sentence to output from [V1.5], [V2.0] or [V3.0].
[Output DBT]: Select whether to output DBT sentence.
[Output DPT]: Select whether to output DPT sentence.
[Output MTW]: Select whether to output MTW sentence.
[Output TLL]: Select whether to output TLL sentence.
[Output VHW]: Select whether to output VHW sentence.

5.8.9 NMEA 2000

Set the following items related to NMEA 2000.

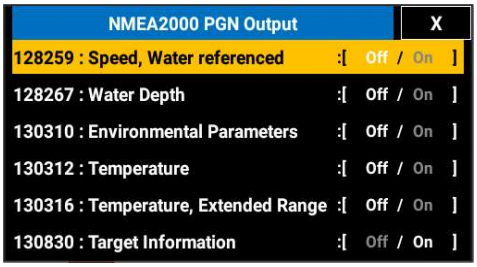
Touch control:

4. Press the **MENU/ESC** key to open [MENU].
5. Tap [SYSTEM].
6. Tap [NMEA 2000 PGN Output].
   Related menu appears.

Key control:

4. Press the **MENU/ESC** key to open [MENU].
5. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
6. Select [NMEA 2000 PGN Output], then press the **ENTER** key.
   Related menu appears.

- 128259 : Speed, Water referenced
- 128267 : Water Depth
- 130310 : Environmental Parameters
- 130312 : Temperature
- 130316 : Temperature, Extended Range
- 130830 : Target Information



Turn output of each PGN/sentence on or off as appropriate.

5.8.10 How to change the screen orientation

You can select landscape or portrait orientation for the monitor screen.

Touch control:

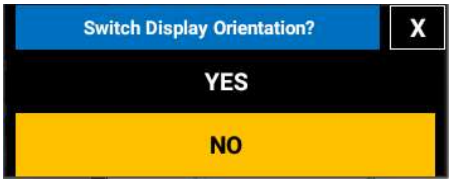
1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Orientation Setting].
   You are asked if you are sure to proceed.
4. Tap [YES] or [NO].
5. Tap [×] on the title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press the **ENTER** key.
3. Select [Orientation Settings] with arrow keys, then press the **ENTER** key.
   You are asked if you are sure to proceed.
4. Select [YES] or [NO] with arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



[Orientation Setting] shows the current orientation setting (landscape or portrait).
Tap [Orientation Setting]➔[YES] to change the screen orientation.



5.9 Multi Beam Sonar

5.9.1 Transducer Setup menu

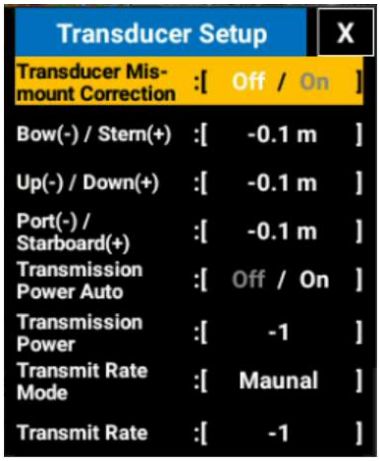
Set up the transducer on the [Transducer Setup] menu.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Transducer Setup].
   Related menu appears.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press the **ENTER** key.
3. Select [Transducer Setup], then press the **ENTER** key.
   Related menu appears.



[Transducer Mismount Correction]: Data correction when the transducer is installed 180° in the opposite direction.
[Bow(-)/Stern(+)], [Up(-)/Down(+)], [Port(-)/Starboard(+)]: Refer to section 5.11 about these menus.
[Transmission Power Auto]: Turn on to automatically adjust TX power.
[Transmission Power]: Select the strength of transmission for when [Off] is selected on [Transmission Power Auto] menu.
[Transmission Rate Mode], [Transmit Rate]: Select the transmission rate to be changed [Manual] or [Auto]. When [Manual] is selected on [Transmission Rate Mode], the [Transmit Rate] can be adjusted between [0] and [20].

5.9.2 GPS Antenna Position menu

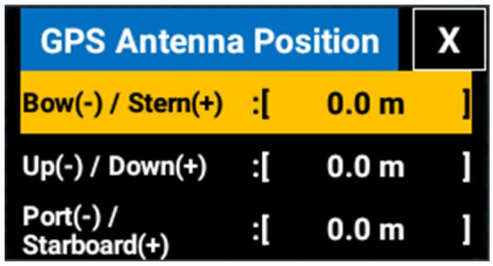
Refer to section 5.11 regarding [Bow(-)/Stern(+)], [Up(-)/Down(+)] and [Port(-)/Starboard(+)] of this menu.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [GPS Antenna Position].
   Related menus appear.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press the **ENTER** key.
3. Select [GPS Antenna Position] with arrow key, then press the **ENTER** key.
   Related menus appear.



5.9.3 Motion Sensor Setup menu

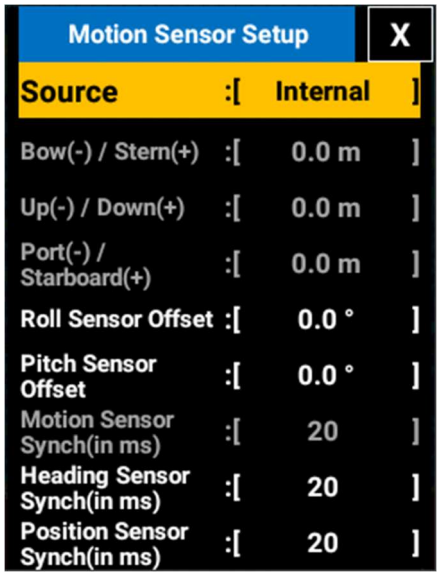
Refer to the Operator' Manual of DFF-3D (OME-13250-*), Multibeam Sonar menu and Transducer Setup menu in section 3.3 regarding [Bow(-)/Stern(+)], [Up(-)/Down(+)] and [Port(-)/Starboard(+)] of this menu.
[Roll Sensor Offset], [Pitch Sensor Offset]: Apply an offset to the internal roll and pitch sensors. (Seeting range: -45 to +45)
[Motion Sensor Synch. (in ms)], [Heading Sensor Synch. (in ms)], [Position Sensor Synch. (in ms)]: Set the offset time to synchronize the received signal from each sensor.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Motion Sensor Setup].
   Related menus appear.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press ENTER key.
3. Select [Motion Sensor Setup], then press ENTER key.
   Related menus appear.



5.9.4 External KP menu

The [External KP] menu enables, disables use of an external KP. Normally, the internal KP is used. Set to [On] when using an external KP.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [External KP]. [Off]/[On] selection box appears.
4. Tap [Off] or [On].
5. Tap [×] on title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [External KP] with the arrow keys, then press the **ENTER** key.
   [Off]/[On] selection box appears.
4. Select [Off] or [On] with the arrow keys, then press the **ENTER** key.
   Press the **MENU/ESC** key to close [MENU].



5.9.5 Data Source Settings

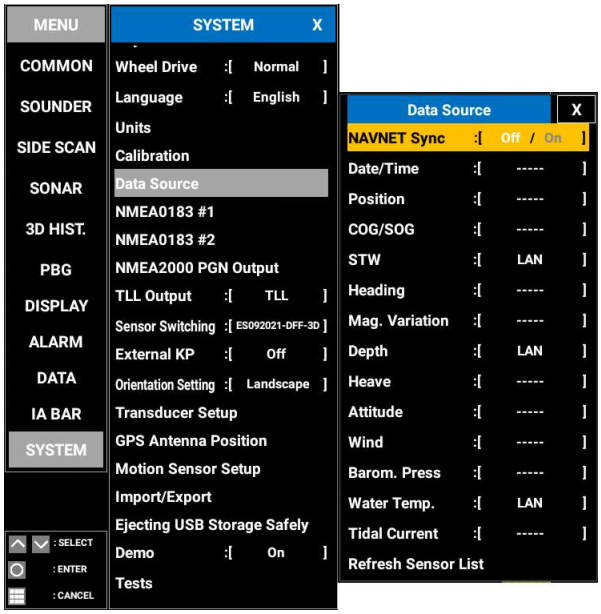
Select a data source sensor.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [Data Source].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with the arrow keys, then press the **ENTER** key.
3. Select [Data Source] with the arrow keys, then press the **ENTER** key.



Item	Description	Setting range (Options)
[NAVNET Sync]	Synchronizes with the NAVNET device data source settings when connected to a NAVNET device. **Note:** When using the NAVNET device, connect the NAVNET device and this unit via LAN.	[Off], [On]
[Date/Time]	Select a sensor for date/time.	[LAN], [NMEA 0183#1], [NMEA 0183#2], [NMEA 2000]
[Position]	Select a sensor for your ship's position.	
[COG/SOG]	Select a sensor for COG/SOG.	
[STW]	Select a sensor for STW.	
[Heading]	Select a sensor for heading.	
[Mag. Variation]	Select a sensor for magnetic variation.	
[Depth]	Select a sensor for depth.	
[Heave]	Select a sensor for heave.	
[Roll/Pitch]	Select a sensor for roll/pitch.	
[Wind]	Select a sensor for wind speed.	
[Barom. Press]	Select a sensor for atmospheric pressure.	

[Water Temp.]	Select a sensor for water temperature.	
[Tidal Current]	Select a sensor for tidal current.	[NMEA 0183#1], [NMEA 0183#2], [NMEA 2000]
[Refresh Sensor List]	Refresh NMEA 2000 equipment list.	

Note: When [NAVNET Sync] is set to [ON] or other settings on the [Data Source] is set to [LAN], navigation data is not output to LAN.
Set up the system to output appropriate navigation data to the network sensor.

5.9.6 NMEA 0183 #1, NMEA 0183 #2

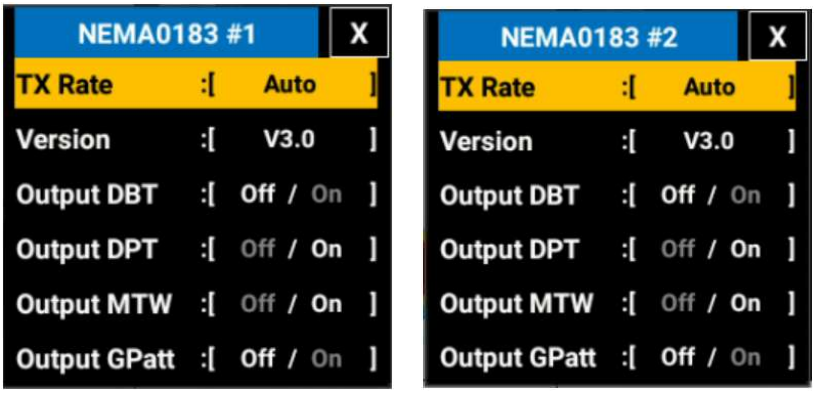
Use the [NMEA 0183 #1] and [NMEA 0183 #2] turn output of NMEA sentences on or off.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [NMEA 0183 #1] or [NMEA 0183 #2].
   Related menus appear.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press the **ENTER** key.
3. Select [NMEA 0183 #1] or [NMEA 0183 #2] with arrow keys, then press the **ENTER** key.
   Related menus appear.



[Setup]: Select communication settings from [Auto], [4800bps], and [38400bps].
[Version]: NMEA 0183 sentence version can be selected from [V1.5], [V2.0] and [V3.0].
[Output DBT]: Set to output DBT sentence or not.
[Output DPT]: Set to output DPT sentence or not.
[Output MTW]: Set to output MTW sentence or not.
[Output GPatt]: Set to output Gpatt sentence or not.

5.9.7 TLL Output menu

The [TLL Output] menu enables, disables TTL output and selects the TLL output format.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].

3. Tap [TLL Output]. [Off]/[On] selection box appears.
4. Tap either [Off], [TLL] or [FURUNO-TLL].
5. Tap [×] on title bar to close [MENU].

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press the **ENTER** key.
3. Select [TLL Output] with arrow keys, then press the **ENTER** key. [Off]/[TLL]/[FURUNO-TLL] selection box appears.
4. Select [Off], [TLL] or [FURUNO-TLL] with arrow keys, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close [MENU].



5.9.8 NMEA 2000

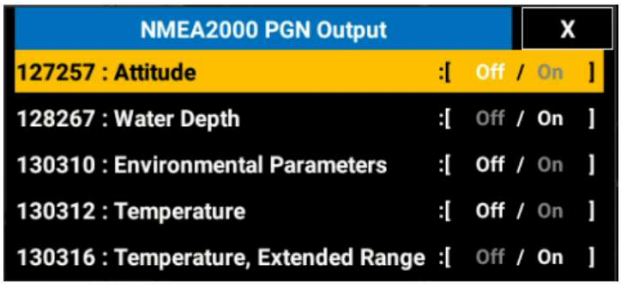
Configure settings related to the NMEA 2000.

Touch control:

1. Press the **MENU/ESC** key to open [MENU].
2. Tap [SYSTEM].
3. Tap [NMEA 2000 PGN Output]. Related menus appear.

Key control:

1. Press the **MENU/ESC** key to open [MENU].
2. Select [SYSTEM] with arrow keys, then press the **ENTER** key.
3. Select [NMEA 2000 PGN Output] with arrow keys, then press the **ENTER** key. Related menus appear.



The [NMEA 2000 PGN Output] menu turns output of individual NMEA 2000 PGN sentence(s) on or off.
[127257: Attitude]: Output own ship's attitude.
[128267: Water Depth]: Output water depth.
[130310: Environment Parameters]: Output environmental parameters.
[130312: Temperature]: Output water temperature data from the connected water temperature sensor.
[130316: Temperature,EXT. Range]: Output water temperature sensor-fed water temperature that is exceeding the measurement range of the sensor.

5.10 Language Setting

You can change the display language setting.



Language selection menu for radar

You can select a language to use from the language selection menu.

1. Move to [MENU] → [INSTALLATION] menu → [Language].
2. Select a language in the [Language] menu.

Language selection menu for fish finder

You can select a language to use from the language selection menu.

1. Move to [MENU] → [SYSTEM] menu → [Language].
2. Select a language in the [Language] menu.

Language selection menu for multi beam sonar

You can select a language to use from the language selection menu.

1. Move to [MENU] → [SYSTEM] menu → [Language].
2. Select a language in the [Language] menu.

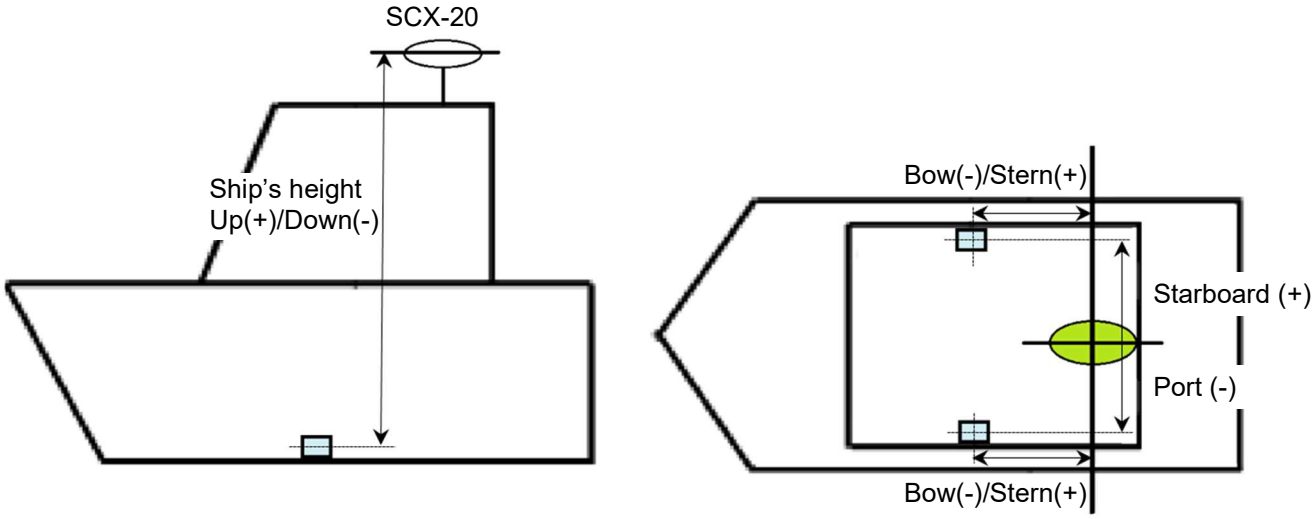
5.11 Motion Sensor Setting

The motion sensor stabilizes the picture in rough seas to provide clear images of schools of fish and the bottom.

Note: Set the Satellite Compass as shown in the table below to use the heave function. See respective operator's manual for the procedure.

	CANbus
PGN	Heave：65280 Attitude：127257

When connecting satellite compass SCX-20, enter the distance between the SCX antenna and transducer (HF/LF) as follows.

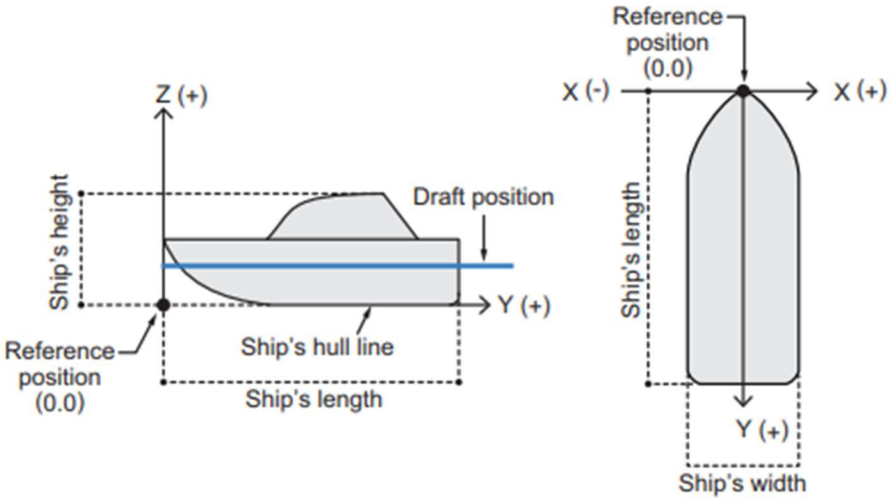


Menu Item	Descriiption	Option Range
[Bow/Stern(HF)]	Set the distance (m) from the motion sensor to the transducer from bow to stern. (In above example, Bow/Stern setting are "+" for both HF and LF.	-99.9 ～ +99.9
[Bow/Stern(LF)]		-99.9 ～ +99.9
[Up/Down(HF)]	Set the height (m) from the motion sensor to the transducer.	0.00 ～ +99.9
[Up/Down(LF)]		0.00 ～ +99.9
[Port/Starboard(HF)]	Set the distance from the motion sensor to the transducer (m) from port to starboard. If the transducer is installed to the starboard, set to "+". (In above example, port/starboard settings are HF : "+",LF : "—".)	-99.9 ～ +99.9
[Port/Starboard(LF)]		-99.9 ～ +99.9

5.12 SCX Setting

Ship dimensions, ANT/CALC-SPD position

Enter the appropriate value according to the ship's dimensions, to improve the accuracy of the 3-axis speed. The reference position for mounting position and calculating position of the 3-axis speed are shown in the figure below.



Menu Item	Description
[Ship's Width]	Set the ship's width, calculated from the port-side to starboard-side of the widest section of the vessel (Setting range: 1.0 to 999.9 m).
[Ship's Length]	Set the ship's length, calculated to the bow-tip to the stern, along the center of the vessel (Setting range: 1.0 to 999.9 m).
[Ship's Height]	Set the ship's height, calculated to the bottom of the keel to the top of the mast (Setting range: 1.0 to 199.9 m).
[ANT Position X0]	Set the port-starboard (Lateral) position of the SATELLITE COMPASS™. Enter negative value for port-side, positive value for starboard-side. The center of the vessel is "0".
[ANT Position Y0]	Set the bow-stern (Longitudinal) position of the SATELLITE COMPASS™. Set the distance from the bow to the stern with the bow as 0 m.
[ANT Position Z0]	Set the height of the SATELLITE COMPASS™, from the bottom of the ship.
[CALC-SPD-POSN Y1 (Bow)]	Set the bow-stern position for calculating the 3-axis speed. Ship's speed can be measured at two locations in addition to the antenna position. Enter the backward distance from the reference position (Fwd Center of the bow) to the position where you want to measure the ship's speed. Normally, keep the default settings. **Note:** The value for [CALC-SPD-Y1] is set to 0 m as default. [CALC-SPD-Y2] is automatically set to the ship's length(set previously, in the same menu). For most vessels, these two settings do not require adjustment. On large vessels, where speed and location is required at locations other than the bow, such as for
[CALC-SPD-POSN Y2 (Stern)]	

	docking, these two values should be adjusted as required. For all vessels, [CALC-SPD-Z] should be set to the vessel's draft value. For further information, contact a FURUNO dealer.
[CALC-SPD-POSN Z (Height)]	Set the height for calculating the 3-axis speed. Enter the distance from the bottom of the ship to the position where you want to measure the ship's speed. For example, enter the draft value when you want to measure the speed at draft position.

Note: For other details, refer to the Operator's Manual of the each model.

This page is intentionally left blank.

6 MAINTENANCE, TROUBLESHOOTING

This chapter contains maintenance and troubleshooting instructions to be followed to maintain optimum performance of the equipment for an extended period.

NOTICE

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

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

6.1 Periodic Checks

Periodic checks and maintenance are important for proper operation of any electronic system. The table below shows the check points and intervals at which to do the checks.

Check interval	Item	Check point	Remedy
As required	LCD	Check if LCD is dimmed by dust or dirt built up on the surface.	Wipe the LCD with great care to prevent scratching. Wipe the LCD gently with tissue wetted with a commercially available OA display cleaner. To remove mud or salt, wipe the LCD with tissue wetted with extra OA display cleaner. Change paper frequently so the dirt will not scratch the LCD surface. Do not use thinners, acetone, alcohol, benzine or other organic solvents. Do not use commercially available degreaser or antifog solution on the LCD, as they can strip the coating on the LCD (filtered surface).
3 to 6 months	Earth terminal on display unit	Check for loosened or rusted terminals.	Tighten loosened terminals, if any. Remove rust from terminals, if any. Replace terminals as needed.
	Display unit connectors	Check for loose connections.	Tightly connect loosened connectors.

6.2 Replacing the Fuse

If the equipment cannot be turned on, its fuse may have blown. The fuse (model: FGBO-A 250V 5A PBF, code No. 000-155-840-10) is located in the fuse box of the power cable. Replace it with the proper fuse. If the fuse blows again after the replacement, contact your dealer, agent or FURUNO's local branch or local sales office.

⚠ WARNING

Use the proper fuse.
Use of a wrong fuse can cause a serious accident or fire.

6.3 Troubleshooting

If you suspect a malfunction, check the following points first. Never attempt to open the cover even when you cannot restore normal operation. In such case, contact your dealer, agent or FURUNO's local branch or local sales office.

6.3.1 General problems

Problem	Remedy
Power does not turn on.	• Check if the fuse has blown. • Check if the power connector is tightly connected. • Check for corrosion of power cable connector. • Check for damage on the power cable. • Check if onboard power voltage meets the rated voltage.
Picture freezes.	Press and hold the power key until the display is dimmed to restart the system.
No response to a touch control.	• Check if touch control locking is set to [OFF] in [BRILLIANCE MENU]. • Turn the unit off and on. If normal operation is not restored, contact your dealer or FURUNO's branch or sales office.
Proper picture is not displayed.	• Reset the power. If proper picture is still not displayed, contact a FURUNO agent or dealer for advice.

6.3.2 Radar problems

Problem	Remedy
No picture appears after the [TRANSMIT] icon is tapped on the radar screen and transmission has started.	• Tap the [TRANSMIT] icon again. • Check if the antenna cable is tightly connected. • Check if the radar source setting is correct.
Points and characters appear but no echo appears.	Check if the antenna cable is tightly connected.
Picture not updated or freeze-up.	• Check the antenna cable. • Turn off and on this equipment.
Radar is properly tuned but gain is poor.	Magnetron in the radar sensor may have deteriorated. Contact a FURUNO agent or dealer for advice.
Range changed but radar picture does not change.	• Raise or lower the range on the radar screen. • Turn this unit off and on.
Many sea surface echoes appear around own ship.	Adjust sea clutter reduction level.
Fixed range rings are not displayed.	Check if fixed range ring brilliance is set to [OFF] on Instant Access™ Bar or in [BRILLIANCE/COLOR].
When you tap the [TX] icon, transmission screen appears but the radar soon enters the stand-by state.	This problem occurs when the overload protection has activated. If this occurs, turn off all equipment in the network. Wait a few seconds, then turn on all the equipment.

6.3.3 Fish finder problems

Problem	Remedy
You selected a fish finder display, but no fish finder picture appears.	• Check if the signal cable of the external fish finder is tightly connected. • Check if the fish finder source setting is correct. • Check if the external fish finder is properly connected.
Points and characters appear but no fish finder picture appears.	Check if the transducer cable is properly connected.
The fish finder picture appears but zero line does not appear.	• The picture may be shifted. Check the range shift setting from [MENU] → [FISH FINDER SETTING] → [SHIFT] menu. • Check if the draft setting is [0] or higher.
The picture gain is too low.	• Carefully scrape off oysters and barnacles adhering to the transducer face.
The depth indication does not appear.	• Manually adjust the gain to display the bottom picture in reddish-brown. • Adjust the bottom detection level.
Heavy interference or noise appears on the display.	• Check if the transducer cable is routed near the engine. • Make sure that the equipment is grounded. • Check if another fish finder near your ship uses the same frequency as your fish finder. • Change the interference rejection setting in [MENU] → [FISH FINDER SETTING] → [INTERFERENCE REJECTION] menu.

6.4 Alert List

6.4.1 Radar

Type	Alarm	Description
No Signal Alert	Trigger	No trigger signal input.
	Heading line	No heading signal input.
	Bearing	No bearing information input.
	Video	No video signal input.
	Own Ship Position	No own ship position input from NMEA network.
	NMEA Heading	No heading direction information input from NMEA network.
	No Radar Signal	No input from antenna unit for one minute.
Alarm Zone	In	Target entered the alarm zone.
	Out	Target the alarm zone.
TT	Dangerous Target	Risk of collision with a target, judging from the settings of CPA and TCPA.
	Target Lost	Target is lost.
	Approaching	Target is closer to own ship than the approaching alarm range.
Watchman	Watchman_TX_Start	When watchman alarm starts.
	Watchman_TX_Stop	When watchman alarm stops.

6.4.2 Fish finder

Alarm	Description
Fish School Alarm	Alarm for schools of fish.
Water Depth Alarm	Alarm for water depth.
Water Temperature Alarm	Alarm for water temperature.
Ship Speed Alarm	Alarm for ship speed.
No Position or Time	TLL key is pressed (to output position data), but no position information.

6.4.3 Multi beam sonar

Alarm	Description
Fish School Alarm	Alarm for schools of fish.
Water Depth Alarm	Alarm for water depth.
Water Temperature Alarm	Alarm for water temperature.
Ship Speed Alarm	Alarm for ship speed.
No Position or Time	There is no heading data. TLL key is pressed (to output position data), but no position information.
B. Volt Alarm	Alarm for the battery voltage.
PBG remaining memory insufficient Alarm	Insufficient free space for PBG seabed map data. Delete some PBG data with referring to the 4.7.16 Delete Spot PBG Data and secure memory.

6.4.4 Single Beam PBG

Alarm	Description
Water Depth Alarm	Seabed depth is shallower than the value set.
Water Temperature Alarm	Sea surface temperature is lower than the value set, higher than the value set, or when the sea surface temperature is within the set range or outside the set range with the minimum and maximum temperatures set.
Ship Speed Alarm	The speed of own ship is slower or faster than the value set.
No Position or Time	No heading data or position data when entering **TLL** key.
PBG remaining memory insufficient Alarm	Insufficient free space for PBG seabed map data. Delete some PBG data with referring to the 4.7.16 Delete Spot PBG Data and secure memory.

This page is intentionally left blank.

APPX.1 MENU TREES

RADAR MENU TREE



Factory default: ***Italic Bold***

- **ECHO ADJ**
  - Auto SEA (***Advanced***, Coastal)
  - Int Rejector (Off, ***On***)
  - Noise Rejector (Off, ***On***)
  - Echo Average (***Off***, On)
  - Echo Area (***Normal***, Full)
  - Display Curve (1, 2, ***3***)
  - Low Level Echo (0 - 11, ***0***)
- **TUNING**
  - Tuning Mode (Manual, ***Auto***)
  - Manual Tuning (-50 - 50, ***8***)
  - Tuning Initialization
- **TT**
  - TT Display (***Off***, On)
  - TT Color (***Green***, Red, Blue, White, Black)
  - Erase Lost TT Target
  - TT All Cancel
  - Past Positions (Off, ***5***, 10)
  - Past Posn Interval (***15s***, 30s, 1min, 2min, 3min, 6min, 12min)
- **TRAIL**
  - Gradation (Single, ***Multi***)
  - Color (***Blue***, Yellow, Green)
  - Mode (Relative, ***True***)
  - Level (1, ***2***, 3)
  - Trail Erase

(Continued on next page)

(Continued from previous page)

- **MARK TEXT**
  - OS Mark (***Off***, On)
  - OS Length (0 - 999, ***0***)
  - OS Beam (0 - 999, ***0***)
  - WPT Mark (***Off***, On)
  - EBL Reference (***Relative***, True)
  - Menu Transparency (***Off***, 1, 2, 3, 4)
  - Data box
    - HDG (Off, ***On***)
    - Own Ship (Off, ***On***)
    - Cursor (Off, ***On***)
    - Waypoint (Off, ***On***)
    - Target (Off, ***On***)
    - VRM1 (Off, ***On***)
    - VRM2 (Off, ***On***)
    - EBL1 (Off, ***On***)
    - EBL2 (Off, ***On***)
- **BRILL/COLOR**
  - Display Color (Day, Dusk, Night, ***Custom***)
  - Echo Color (***Multi***, Green, Yellow)
  - Background Color (***Black***, DK Blue, Blue, White)
  - Character Color (***Green***, Red, White)
  - Rings Brill (Off, 1, 2, 3, ***4***)
  - Mark Brill (1, 2, 3, ***4***)
  - HL Brill (1, 2, 3, ***4***)
  - Character Brill (1, 2, 3, ***4***)
- **ALERT SETTINGS**
  - Target Alert 1 (***In***, Out)
  - Target Alert 2 (***In***, Out)
  - Target Alarm Level (Low, ***Med***, High)
  - CPA (***Off***, 0.5NM, 1NM, 2NM, 3NM, 5NM, 6NM)
  - TCPA (30s, ***1min***, 2min, 3min, 4min, 5min, 6min, 12min)
  - Proximity **(*Off***, 0.5NM, 1NM, 2NM, 3NM, 5NM, 6NM, 12NM)
  - Watchman (***Off***, 5min, 10min, 20min)
  - Panel Buzzer (Off, ***On***)
  - External Buzzer (***Off***, On)

(Continued on next page)

(Continued from previous page)

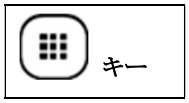
- **ALERT LIST**
  - Signal Missing (TRIGGER, HEADING, BEARING, VIDEO, POSITION, NMEA_HDG, ANT_ERR)
  - Target Alarm (IN, OUT)
  - TT (COLLISION, LOST, PROXIMITY)
- **OTHERS**
  - Func 1 Setup (***Zoom***, Display Color, Trail Mode, OS Mark, WPT Mark, Echo Average)
  - Func 2 Setup (Zoom, ***Display Color***, Trail Mode, OS Mark, WPT Mark, Echo Average)
  - TLL Key Mode (***TLL Output***, Origin Mark, Both)
  - Key Beep (Off, ***On***)
  - Zoom (***Off***, On)
  - Zoom Reference (***Relative***, True, Target)
- **I/O PORT**
  - Compass Type (**True**, Magnetic)
  - Data Source
    - NAVNET (**Off**, On)
    - Data/Time (LAN, NMEA 2000 Sensor, ***NMEA 0183 #1***, NMEA 0183 #2)
    - Position (LAN, NMEA 2000 Sensor, ***NMEA 0183 #1***, NMEA 0183 #2)
    - COG/SOG (LAN, NMEA 2000 Sensor, ***NMEA 0183 #1***, NMEA 0183 #2)
    - Heading (LAN, NMEA 2000 Sensor, ***NMEA 0183 #1***, NMEA 0183 #2)
    - Mag. Variation (LAN, NMEA 2000 Sensor, ***NMEA 0183 #1***, NMEA 0183 #2)
    - Waypoint (NMEA 2000 Sensor, ***NMEA 0183 #1***, NMEA 0183 #2)
    - Refresh Sensor List
  - NMEA0183 #1
    - Setup (***Auto***, 4800bps, 38400bps)
    - Version (V1.5, ***V2.0***, V3.0)
    - Output TLL (***Off***, On)
  - NMEA0183 #2
    - Setup (***Auto***, 4800bps, 38400bps)
    - Version (V1.5, ***V2.0***, V3.0)
    - Output TLL (***Off***, On)
  - NMEA2000
    - PGN130830 (***Off***, On)
- **UNITS**
  - Range Unit (***NM***, km, SM)
  - Ship Speed Unit (***kn***, km/h, mph)
  - VRM Unit (***NM***, km, SM, KYD, NM&YD)
- **SECTOR BLANKS**
  - Sect-Blank 1 Status (***Off***, On)
  - Sect-Blank 1 Start (0 - 359, ***0***)
  - Sect-Blank 1 End (0 - 359, ***0***)
  - Sect-Blank 2 Status (***Off***, On)
  - Sect-Blank 2 Start (0 - 359, ***0***)
  - Sect-Blank 2 End (0 - 359, ***0***)

(Continued on next page)

(Continued from previous page)

- **TESTS**
  - Self Test
  - LCD Test
  - Radar Sensor Test
- **SCANNER SETUP**
  - Heading Alignment (0 - 359, ***0***)
  - Timing Adjust (-50 - 50, ***0***)
  - MBS Adjustment (0 - 255, ***36***)
  - Auto Install Setup
- **RESET**
  - Reset Sensor
  - Reset Display
- **INSTALLATION**
  - Wheel Drive (***Normal***, Reverse)
  - Language (日本語, English, français, español, Ελληνικά, 한국어, 中文)
  - Orientation Setting
  - Sensor Switching
  - Import Settings
  - Export Settings
  - Ejecting USB Storage Safely
- **SERVICE**
  - Antenna Rotation (Rotate, Stop)
  - Total On Time (0.0 - 999999.9, ***0.0***)
  - Total Tx Time (0.0 - 999999.9, ***0.0***)

FISH FINDER MENU TREE



Factory default: *Italic Bold*

- SOUNDER
  - Pic. Advance (Stop, 1/16, 1/8, 1/4, 1/2, ***x1***, x2, x4)
  - Shift[*1]
  - Interference (Off, Low, Medium, High, ***Auto***)
  - Color Erase (0 - 100, ***0***)
  - Clutter (0～100)[*2]
  - Color Range Expansion (***Off***, On)
  - Echo Stretch (***Off***, On)
  - White Marker
    - White Marker (***Off***, On)
    - Marker Position (0 - 15, ***0***)
  - TVG Distance HF[*3]
  - TVG Distance LF[*3]
  - TVG HF (0～9)[*4]
  - TVG LF (0～9)[*4]
  - Smoothing (Off, ***On***)
  - Bottom Area (15～85, ***55***)
  - Heaving Corr. (***Off***, On)
  - TX Format (***Parallel***, Sequential A, Sequential B)
  - TX Power[*5]
  - TX Power Mode (***Manual***, Auto)
  - TX Rate Mode[*6]
  - TX Rate (0～20, ***20***)
  - Chirp Preset Frequency
    - Select (1, 2, 3)
    - TX Mode HF (Auto Chirp, Manual Chrip, CW)[*7]
    - TX Mode LF (Auto Chirp, Manual Chrip, CW)[*7]
    - Center Freq. HF[*8]
    - Center Width HF[*8]
    - Center Freq. LF[*8]
    - Center Width LF[*8]
  - Transmit (Off, ***On***)
  - TX Pulse HF (Short 1, Short 2, ***Normal***, Long)
  - TX Pulse LF (Short 1, Short 2, ***Normal***, Long)
  - RX Band HF (Narrow, ***Normal***, Wide)
  - RX Band LF (Narrow, ***Normal***, Wide)
  - STC HF (0 - 10, ***0***)
  - STC LF (0 - 10, ***0***)
  - Freq. Adj. HF (-50 - 50, ***0***)
  - Freq. Adj. LF (-50 - 50, ***0***)

*1:

	DFF1, BBDS1, DFF1-UHD, DFF3	DFF3-UHD
m	0.0～1200.0, ***0.0***	0.0～2000.0, ***0.0***
ft	0.0～4000.0, ***0.0***	0.0～6000.0, ***0.0***

*2: Factory default for DFF1, BBDS1 and DFF1-UHD: ***0***
Factory default for DFF3: ***40***

*3:

m	30～1000, ***200***
ft	100～3000, ***600***

*4: Factory default for DFF1, BBDS1 and DFF1-UHD: ***5***
Factory default for DFF3: ***3***

*5: Factory default for DFF1, BBDS1 and DFF3: ***10***
Factory default for DFF1-UHD: ***Synchronous with ship speed***

*6: Factory default for DFF1,BBDS1,DFF1-UHD (***Manual***, Auto)
Factory default for DFF3 (***Manual***, Auto, Max)
Factory default for DFF3-UHD ***Manual*** fixed

*7: [Transducer Setup]→[Transducer Setup Type] settings
Menu name changed. [HF] ↔ [MF]

*8: [Transducer Setup]→[Transducer Setup Type] settings
Menu name and setting range values changed. [HF]↔[MF]

(Continued on next page)

(Continued from previous page)

- DISPLAY
  - A-Scope (***Off***, Normal, Peak)
  - Depth Size (Off, Small, ***Medium***, Large)
  - Zoom Marker (Off, ***On***)
  - Temp Graph (***Off***, Narrow, Wide)
  - Window Size (-20 - 20, ***0***)
  - Color Bar (Off, ***On***)
  - Palette (***White***, Blue, Black, Yellow, Green, Mono, Night)
  - Header Info (Off, ***On***)
  - Header Scale (***Time***, Distance)
  - Scale Size (1 - 10, ***5***)
  - ACCU-FISH
    - ACCU-FISH (***Off***, On)
    - Fish Info (***Off***, Fish Size, Depth)
    - Info Size (Small, ***Large***)
    - Fish Symbol (Off, ***Striped***, Solid, Circle, Square)
    - Symbols Area (***Dual***, HF, LF)
    - Fish Detect From[*9]
    - Fish Detect Span[*9]
  - Bottom Disc.
    - Bottom Disc. (***Off***, On)
    - Type View (***Graphic***, Probability)
    - Legend (***Off***, On)

[*9]:

	cm	inch
Fish Detect From	10～199, ***10***	4～78, ***4***
Fish Detect Span	1～199, ***150***	1～78, ***50***

- ALARM
  - Fish Alarm
    - Alarm (***Off***, Normal, BL Fish, Normal&BL)
    - Sound (***Sound1***, Sound2, Sound3, Sound4)
    - Depth From[*10]
    - Depth Span[*10]
    - Bottom From[*10]
    - Bottom Span[*10]
    - Fish Level (Weak, ***Medium***, Strong)
  - Water Temperature Alarm
    - Alarm (***Off***, On)
    - From[*10]
    - Span[*10]
  - Depth Alarm
    - Alarm (***Off***, On)
    - From[*10]
    - Span [*10]
  - Speed Alarm
    - Alarm (***Off***, On)
    - From (0～180, ***0***)
    - Span (1～90, ***1***)

[*10]:

	ft	**m**
Depth From	0～4000, ***0ft***	0～1200, ***0m***
Depth Span	1～4000, **10ft**	1～1200, ***10m***
Bottom From	0.0～30.0, ***0.0ft***	0.0～10.0, ***0.0m***
Bottom Span	0.1～30.0, ***1.0ft***	0.1～10.0, ***1.0m***
Water Temperature Alarm From	23～113, ***65℉***	-5～40, ***20℃***
Water Temperature Alarm Span	33～86, ***1℉***	1～30, ***1℃***
Depth Alarm From	0～4000, ***0ft***	0～1200, ***0m***
Depth Alarm Span	1～4000, ***10ft***	1～1200, ***10m***

(Continued on next page)

(Continued from previous page)

- DATA
  - Data Box
    - 1st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom. Press, W. Temp.)
    - 2nd Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom. Press, W. Temp.)
    - 3rd Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom. Press, W. Temp.)
    - 4th Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom. Press, W. Temp.)
    - 5th Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom. Press, W. Temp.)
    - 6th Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom. Press, W. Temp.)
    - Transparency (0 - 100, ***100***)
    - Box Size (1 - 10, ***10***)
  - Compass Type (***True***, Magnetic)
  - Wind Spd/Dir (***True***, Relative)
- IA BAR
  - Preset 1
    - IA Bar1 Func. (***Pic. Advance***)*11
    - IA Bar2 Func. (***Shift***)*11
    - IA Bar3 Func. (***Interference***)*11
    - IA Bar4 Func. (***Color Erase***)*11
    - IA Bar5 Func. (***Clutter***)*11
    - IA Bar6 Func. (***A-Scope***)*11
    - IA Bar7 Func. (***ACCU-FISH***)
    - IA Bar8 Func. (***Bottom Disc.***)*11
  - Preset 2
    - IA Bar1 Func.*11
    - IA Bar2 Func.*11
    - IA Bar3 Func.*11
    - IA Bar4 Func.*11
    - IA Bar5 Func.*11
    - IA Bar6 Func.*11
    - IA Bar7 Func.*11
    - IA Bar8 Func.*11
  - Preset 3
    - IA Bar1 Func.*11
    - IA Bar2 Func.*11
    - IA Bar3 Func.*11
    - IA Bar4 Func.*11
    - IA Bar5 Func.*11
    - IA Bar6 Func.*11
    - IA Bar7 Func.*11
    - IA Bar8 Func.*11

(Continued on next page)

*11: Functions assignable to the preset menus of InstantAccess™ Bar are shown in the table on the next page.

List of functions assignable to the preset menus		
-	TX Pulse HF	Bottom Disc.
Pic. Advance	TX Pulse LF	Bottom Disc. Type View
Shift	RX Band HF	Bottom Disc. Legend
Interference	RX Band LF	Fish Alarm
Color Erase	A-Scope	Fish Alm. Sound
Clutter	Depth Size	Fish Alm. Depth From
White Marker	Zoom Marker	Fish Alm. Depth Span
Marker Position	Temp Graph	Fish Alm. Bottom From
TVG HF	Window Size	Fish Alm. Bottom Span
TVG LF	Color bar	Fish Alm. Level
Smoothing	Palette	Water Temp. Alarm
Bottom Area	Header Info	Water Temp. Alm. From
Heaving Corr.	Header Scale	Water Temp. Alm. Span
TX Power	Scale Size	Depth Alarm
TX Rate Mode	ACCU-FISH	Depth Alm. From
TX Rate	ACCU-FISH Fish Info	Depth Alm. Span
Transmit	ACCU-FISH Info Size	Speed Alarm
STC HF	ACCU-FISH Symbols	Speed Alarm From
STC LF	ACCU-FISH Symbols Area	Speed Alarm Span
Freq. Adj. HF	ACCU-FISH Fish Detect From	Temp. Port
Freq. Adj. LF	ACCU-FISH Fish Detect Span	

(Continued from previous page)

- SYSTEM
  - Range
    - Range 1[*12]
    - Range 2[*12]
    - Range 3[*12]
    - Range 4[*12]
    - Range 5[*12]
    - Range 6[*12]
    - Range 7[*12]
    - Range 8[*12]
    - Marker Zoom Start[*13]
    - Zoom Range*[14]
    - BL Range[*15]
  - Key Pad
    - Key Brill. (1 - 8, ***8***)
    - Key Beep (Off , ***On***)
  - Wheel Drive (***Normal***, Reverse)
  - Language (日本語, English, français, español, Ελληνικά, 한국어, 中文)
  - Units
    - Depth (m, ft, fm, HR, pb)[*16]
    - Temperature (°C, °F)[*16]
    - Fish Size (inch, cm)[*16]
    - Speed (***kn***, km/h, mph)
    - Wind (***kn***, km/h, mph, m/s)
  - Calibration
    - Draft (-5.0 - 15.0, ***0.0***)
    - Gain Adj HF (-50 - 50, ***0***)
    - Gain Adj LF (-50 - 50, ***0***)
    - Water Temp.[*17]
    - Speed(STW) (-5.0 - 5.0, ***0***)
    - Fish Size (-80 - 100, ***0***)
    - Zero Line Rejector (Off, ***On***)
    - Zero Line Area (1.4 - 2.5, ***1.4***)
    - Bottom Level HF (-40 - 40)[*18]
    - Bottom Level LF (-40 - 40)[*18]

*12:

	DFF1, BBDS1, DFF1-UHD	DFF3, DFF3-UHD
m	2～1200, ***5***	2～3000, ***5***
	2～1200, ***10***	2～3000, ***10***
	2～1200, ***20***	2～3000, ***20***
	2～1200, ***40***	2～3000, ***40***
	2～1200, ***80***	2～3000, ***80***
	2～1200, ***150***	2～3000, ***150***
	2～1200, ***200***	2～3000, ***300***
	2～1200, ***300***	2～3000, ***1500***
ft	7～4000, ***15***	7～9000, ***15***
	7～4000, ***30***	7～9000, ***30***
	7～4000, ***60***	7～9000, ***60***
	7～4000, ***120***	7～9000, ***120***
	7～4000, ***200***	7～9000, ***200***
	7～4000, ***400***	7～9000, ***400***
	7～4000, ***600***	7～9000, ***1000***
	7～4000, ***1000***	7～9000, ***4500***

*13:

	DFF1, BBDS1, DFF1-UHD	DFF3	DFF3-UHD
m	0～1200, ***0***	0～3000, ***0***	0～4800, ***0***
ft	0～4000, ***0***	0～1200, ***0***	0～14400, ***0***

*14:

	DFF1, BBDS1, DFF1-UHD	DFF3	DFF3-UHD
m	2.0～120.0, ***10.0***	2.0～200.0, ***10.0***	1.0～200.0, ***2.0***
ft	7.0～400.0, ***30.0***	7.0～600.0, ***30.0***	3.0～600.0, ***7.0***

*15:

	DFF1, BBDS1	DFF1-UHD
m	2.0～120.0, ***10***	3.0～200.0, ***10***
ft	7.0～400.0, ***30.0***	7.0～400.0, ***30.0***
	DFF3	**DFF3-UHD**
m	2.0～200.0, ***10***	1.0～200.0, ***2.0***
ft	7.0～600.0, ***30.0***	3.0～600.0, ***7.0***

*16:

Language	Depth	Water temperature	Fish size
English	***ft***	***℉***	***inch***
Japanese	***m***	***℃***	***cm***

*17:

℃	-40.0 seeperat***0***
℉	-72.0 - +72.0, ***0***

*18: Factory default for DFF1 and BBDS1: ***-20***
Factory default for DFF3, DFF1-UHD and DFF3-UHD: ***0***

(Continued on next page)

(Continued from previous page)

- Data Source
  - NAVNET Sync (***Off***, On)
  - Date/Time (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - Position (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - COG/SOG (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - STW (***LAN***, NMEA2000 Sensor, NMEA0183#1, NMEA0183#2)
  - Heading (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - Mag. Variation (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - Depth (***LAN***, NMEA2000 Sensor)
  - Heave (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - Attitude (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - Wind (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - Barom. Press (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
  - Water Temp. (***LAN***, NMEA2000 Sensor, NMEA0183#1, NMEA0183#2)
  - Refresh Sensor List
- NMEA0183 #1
  - Setup (***Auto***, 4800bps, 38400bps)
  - Version (V1.5, ***V2.0***, V3.0)
  - Output DBK (***Off***, On)
  - Output DPT (***Off***, On)
  - Output MTW (***Off***, On)
  - Output TLL (***Off***, On)
  - Output VHW (***Off***, On)
- NMEA0183 #2
  - Setup (***Auto***, 4800bps, 38400bps)
  - Version (V1.5, ***V2.0***, V3.0)
  - Output DBK (***Off***, On)
  - Output DPT (***Off***, On)
  - Output MTW (***Off***, On)
  - Output TLL (***Off***, On)
  - Output VHW (***Off***, On)
- NMEA2000 PGN Output
  - 128259 : Speed, Water referenced (***Off***, On)
  - 128267 : Water Depth (***Off***, On)
  - 130310 : Environmental Parameters (***Off***, On)
  - 130312 : Temperature (***Off***, On)
  - 130316 : Temperature, Extended Range (***Off***, On)
  - 130830 : Target Information (Off, ***On***)
- Sensor Switching
- External KP (Off, On)
- Orientation Setting

(Continued on next page)

(Continued from previous page)

- Transducer Setup
  - Transducer Setup Type (Model, ***Manual***, TDID)
  - Model Number (displays setting window)
  - Model Number(HF)
  - Model Number(LF)
  - Model Name
  - TX Volt HF
  - TX Volt LF
  - High Frequency
  - Transducer Power HF
  - Band Width HF
  - Low Frequency
  - Transducer Power LF
  - Band Width LF
  - High Frequency Min
  - High Frequency Max
  - Low Frequency Min
  - Low Frequency Max
  - Reset Default Settings
- Motion Sensor Setup
  - Delay Type (***Manual***, NMEA)
  - Heave Delay Time (0 - 200, ***0***)
  - NMEA (***NMEA 2000***, NMEA 0183)
  - Bow/Stern HF (-99.9 - 99.9, ***0.0***)
  - Bow/Stern LF (-99.9 - 99.9, ***0.0***)
  - Up/Down HF (0.0 - 99.9, ***0.0***)
  - Up/Down LF (0.0 - 99.9, ***0.0***)
  - Port/Starboard HF (-99.9 - 99.9, ***0.0***)
  - Port/Starboard LF (-99.9 - 99.9, ***0.0***)
  - Reset Default Settings
- Import/Export
  - Import Settings
  - Export Settings
- Ejecting USB Storage Safely
- Temp. Port (***MJ***, High Freq., Low Freq.)
- Demo (***Off***, Shallow, Deep)
- Tests
  - Self Test
  - LCD Test
- Reset
  - Reset Sensor
  - Reset Display

DFF-3D MENU TREE

key

Factory default: *Italic Bold*

- COMMON
  - Bottom Area (15 ~ 85, ***50***)
  - Bottom Level (-40 ~ 40, ***0***)
  - TX Pulse (Short1, Short2, ***Standard***, Long)
  - Transmit (***Off***, On)
- SOUNDER
  - Beam Mode (Single Beam, ***Triple Beam***)
  - Pic. Advance (Stop, 1/16, 1/8, 1/4, 1/2, ***x1***, x2, x4)
  - A-Scope (***Off***, Normal, Peak)
  - Interf. Reject. (Off, Low, Medium, High, ***Auto***)
  - Clutter (0 ~ 100, ***25***)
  - TVG (0 ~ 9, ***5***)
  - TVG Distance[*1]
  - STC (0 ~ 10, ***5***)
  - White Edge
    - White Edge (Off, ***On***)
    - Width (1 ~ 10, ***5***)
  - High Res. (***Off***, On)
  - Temp. Grpah. (***Off***, Narrow, Wide)
- SIDE SCAN
  - Pic. Advance (Stop, 1/16, 1/8, 1/4, 1/2, ***x1***, x2, x4)
  - Echo Color (***Gray***, Blue, Brown)
  - Interf. Reject. (Off, Low, Medium, High, ***Auto***)
  - Clutter (0 ~ 100, ***0***)
  - TVG (0 ~ 9, ***5***)
  - STC (0 ~ 10, ***5***)
- SONAR
  - Grid (Off, ***On***)
  - Interf. Reject. (Off, Low, Medium, High, ***Auto***)
  - Clutter (0 ~ 100, ***0***)
  - TVG (0 ~ 9, ***5***)
  - Echo Smoothing
    - Distance (Off, Low, ***Medium***, High)
    - Time (Off, Low, ***Medium***, High)
  - Sound Speed Correction
    - Temp. Based (-200 ~ 200, ***0***)
    - Sound Speed (Off, ***On***)
  - Triple Beam Ind. (Off, ***On***)
  - Bottom Line (Off, ***On***)

(Continued on next page)

[*1]:

English	Japanese
30～3280, **1300ft**	10～1000, **400m**

(Continued from previous page)

- 3D HIST.
  - Pic. Advance (1/16, 1/8, 1/4, 1/2, ***x1***, x2, x4)
  - Fish School (Off, ***On***)
  - Fish Detect Lv. (Low, ***Medium***, High)
  - Seabed Echo Calib. (-15 ~ 15, ***0***)
  - Seabed Sm. Lv. (Off, Low, ***Medium***, High)
  - Terrain Shad. (0 ~ 100, ***50***)
  - Switch View
    - Default View
    - Favorite View1
    - Favorite View2
    - Favorite View3
    - Favorite View4
  - Register View
    - Favorite View1
    - Favorite View2
    - Favorite View3
    - Favorite View4
  - Seabed Depth Shading Setting
    - Color (***Classic Hue***, Invert Classic Hue, Red Hue, Blue Hue, Green Hue, Yellow Hue, Gray Hue, Brown Hue)
    - Auto (Off, ***On***)
    - Shading Base (***3D-History***, PBG)
    - From[*2]
    - Span[*2]
    - Color Bar (Off, ***On***)
  - Fish Depth Shading Setting
    - Color (***Classic Hue***, Invert Classic Hue, Red Hue, Blue Hue, Green Hue, Yellow Hue, Gray Hue, Brown Hue, Red, Green, Blue, Cyan, Magenta, Black or White, Pink, Light Green, Yellow)
    - Auto (Off, ***On***)
    - From[*2]
    - Span[*2]
    - Color Bar (Off, ***On***)
  - Current Setting
    - Current (***Off***, On)
    - Current Vector (***Normal***, Long, Normal/Thick, Long/Thick)
    - Diff. Ref. Layer (***Layer1***, Layer2, Layer3, Layer4, Layer5)
    - Diff. Layer1 (Layer1, ***Layer2***, Layer3, Layer4, Layer5)
    - Diff. Layer2 (Layer1, Layer2, ***Layer3***, Layer4, Layer5)
    - Flow Direction (Form, ***To***)
    - Source1 (***Layer1***, Layer2, Layer3, Layer4, Layer5, Diff Layer1, Diff Layer2)
    - Source2 (Layer1, ***Layer2***, Layer3, Layer4, Layer5, Diff Layer1, Diff Layer2)
    - Source3 (Layer1, Layer2, ***Layer3***, Layer4, Layer5, Diff Layer1, Diff Layer2)
  - Net Setting
    - Net (Off, ***On***)
    - Width[*3]
    - Height[*3]
    - Depth[*3]
    - Distance[*3]

*2:

	English	Japanese
From	0～4000, ***0ft***	0～1200, ***0m***
Span	1～4000, ***200ft***	1～1200, ***61m***

*3:

	English	Japanese
Width	1～4000, ***67ft***	1～1200, ***20m***
Height	1～4000, ***33ft***	1～1200, ***10m***
Depth	1～4000, ***33ft***	1～1200, ***10m***
Distance	1～4000, ***330ft***	1～1200, ***100m***

(Continued on next page)

(Continued from previous page)

- PBG
  - Heading Line
    - Heading Line (Off, ***On***)
    - Width (Narrow, ***Medium***, Wide)
    - Color (Red, ***Green***, Blue)
  - COG Line
    - COG Line (Off, ***On***)
    - Source (***Time***, Distance)
    - Length (0.01～999.00, ***100.00***)
    - Time (0'10s, 0'30s, 1'00s, 2'00s, 5'00s, 10'00s, 15'00s, 30'00s, ***1h00'***, 2h00', 3h00', 6h00', 12h00', 1d00h)
    - Width (Narrow, ***Medium***, Wide)
    - Color (***Red***, Green, Blue)
  - Off Center (Up, ***Center***, Down)
  - Terrain Shad. (0~100, ***10***)
  - Depth Shading Setting
    - Color (***Classic Hue***, Inv. Classic Hue, Red Hue, Blue Hue, Green Hue, Yellow Hue, Gray Hue, Brown Hue)
    - Auto (Off, ***On***)
    - Shading Base (3D-History, ***PBG***)
    - From[*4]
    - Span[*4]
    - Color Bar (Off, ***On***)
  - Grid Interval (Off, Very Small, Small, ***Medium***, Large, Very Large)
  - Contour Line (Off, ***On***)
  - Depth Text (Off, ***On***)
  - Track
    - Track (Off, ***On***)
    - Interval (0.01 ~ 20.00, ***0.01***)
    - Width (Narrow, ***Medium***, Wide)
    - Color (***Red***, Green, Blue)
    - Delete All Track
  - Measure Depth (***Off***, On)
  - Recording Limiter
    - SOG Limiter (Off, ***On***)
    - Max SOG (1～99, ***20***)
    - Roll/Pitch Angle Limiter (***Off***, On)
    - Max Roll/Pitch Angle (1～90, ***60***)
    - Roll/Pitch Velocity Limiter (***Off***, On)
    - Max Roll/Pitch Velocity (1～90, ***20***)
  - Single Beam Rec. Radius (Narrow, ***Wide***)
  - PBG Range
    - Range1 (0.01 ~ 10, ***0.01***)
    - Range2 (0.01 ~ 10, ***0.02***)
    - Range3 (0.01~10, ***0.05***)
    - Range4 (0.01~10, ***0.1***)
    - Range5 (0.01~10, ***0.2***)
    - Range6 (0.01~10, ***0.5***)
    - Range7 (0.01~10, ***1***)
    - Range8 (0.01~10, ***2***)

(Continued on next page)

*4:

	English	Japanese
From	0～4000, ***0ft***	0～1200, ***0m***
Span	1～4000, ***200ft***	1～1200, ***61m***

- (Continued from previous page)
- Import
  - Source
  - Import
- Export
- Ejecting USB Storage Safely
- Delete Spot PBG Data
  - Spot Deletion Mode (***Off***, On)
  - Method (***Eraser***, Square, Circle)
  - Eraser Size (Small, ***Medium***, Large)
- Delete All PBG Data

- DISPLAY
  - Depth Size (Off, Small, ***Medium***, Large)
  - Gain Size (Off, Small, ***Medium***, Large)
  - Palette (White, Blue, ***Black***, Mono, Night)
  - Header Scale (Off, ***Time***, Distance)
  - Scale Size (1 ~ 10, ***5***)
  - Screen Setup
    - Screen1
      - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
      - Mode 1 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 2 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 3 (Sounder, Side Scan, ***Sonar***, 3D-History)
      - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)
    - Screen2
      - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
      - Mode 1 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 3 (Sounder, Side Scan, ***Sonar***, 3D-History)
      - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)
    - Screen3
      - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
      - Mode 1 (Sounder, Side Scan, ***Sonar***, 3D-History)
      - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)
    - Screen4
      - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
      - Mode 1 (Sounder, Side Scan, Sonar, ***3D-History***)
      - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 4 (Sounder, Side Scan, ***Sonar***, 3D-History)
    - Screen5
      - Split Screen (Full Screen, ***Dual Screen***, Triple Screen, Quad Screen)
      - Mode 1 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 2 (Sounder, Side Scan, Sonar, ***3D-History***)
      - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 4 (Sounder, Side Scan, ***Sonar***, 3D-History)

(Continued on next page)

(Continued from previous page)

- Screen6
  - Split Screen (Full Screen, Dual Screen, ***Triple Screen***, Quad Screen)
  - Mode 1 (Sounder, Side Scan, ***Sonar***, 3D-History)
  - Mode 2 (Sounder, Side Scan, Sonar, ***3D-History***)
  - Mode 3 (***Sounder***, Side Scan, Sonar, 3D-History)
  - Mode 4 (Sounder, ***Side Scan***, Sonar, 3D-History)
- Screen7
  - Split Screen (Full Screen, Dual Screen, Triple Screen, ***Quad Screen***)
  - Mode 1 (Sounder, Side Scan, ***Sonar***, 3D-History)
  - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
  - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
  - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)

- ALARM
  - Fish Alarm
    - Alarm (***Off***, Single Beam, Triple Beam)
    - Sound (***Sound1***, Sound2, Sound3, Sound4)
    - From*5
    - Span*5
    - Fish Level (Low, ***Medium***, High)
  - Water Temperature Alarm
    - Alarm (***Off***, On)
    - From*5
    - Span*5
  - Depth Alarm
    - Alarm (***Off***, On)
    - From*5
    - Span*5
  - Speed Alarm
    - Alarm (***Off***, On)
    - From(0 ~ 99, ***0***)
    - Span (1 ~ 50, ***1***)

*5:

	English	Japanese
Fish Alarm (From)	0～4000, ***0ft***	0～1200, ***0m***
Fish Alarm (Span)	1～4000, ***200ft***	1～1200, ***61m***
Water Temperature Alarm (From)	23～113, ***65°F***	-5～45, ***20°C***
Water Temperature Alarm (Span)	1～54, ***1°F***	1～30, ***1°C***
Depth Alarm (From)	0～4000, ***0ft***	0～1200, ***0m***

- DATA
  - Data Box
    - 1st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 2nd Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 3rd Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 4st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 5st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 6st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - Transparency (0～100, ***50***)
    - Box Size (1～10, ***5***)

(Continued on next page)

(Continued from previous page)

- Compass Type (***True***, Magnetic)
- Wind Spd/Dir (***True***, Apparent)
- Cur. Spd/Dir (***True***, Apparent, Compass Direction)

- IA BAR
  - Preset 1
    - IA Bar1 Func. (***Switch Default View 3D***)*6
    - IA Bar2 Func. (***Switch View1 3D***)*6
    - IA Bar3 Func. (***Switch View2 3D***)*6
    - IA Bar4 Func. (***Switch View3 3D***)*6
    - IA Bar5 Func. (***Switch View4 3D***)*6
    - IA Bar6 Func. (***Fish School 3D***)*6
    - IA Bar7 Func. (***Current 3D***)*6
    - IA Bar8 Func. (***Net 3D***)*6
  - Preset 2
    - IA Bar1 Func. (***Pic. Advance 3D***)*6
    - IA Bar2 Func. (***Interference CS&3D***)*6
    - IA Bar3 Func. (***Clutter CS&3D***)*6
    - IA Bar4 Func. (***Bottom Line CS***)*6
    - IA Bar5 Func. (***Triple Beam Indicator CS***)*6
    - IA Bar6 Func.*6
    - IA Bar7 Func.*6
    - IA Bar8 Func.*6
  - Preset 3
    - IA Bar1 Func. (***Pic. Advance MB***)*6
    - IA Bar2 Func. (***Interference MB***)*6
    - IA Bar3 Func. (***Clutter MB***)*6
    - IA Bar4 Func. (***A-Scope MB***)*6
    - IA Bar5 Func. (***Beam Mode MB***)*6
    - IA Bar6 Func. (***Fish Alarm***)*6
    - IA Bar7 Func.*6
    - IA Bar8 Func.*6
  - Preset 4
    - IA Bar1 Func. (***Pic. Advance SS***)*6
    - IA Bar2 Func. (***Interference SS***)*6
    - IA Bar3 Func. (***Clutter SS***)*6
    - IA Bar4 Func. (***Echo Color SS***)*6
    - IA Bar5 Func.*6
    - IA Bar6 Func.*6
    - IA Bar7 Func.*6
    - IA Bar8 Func.*6

(Continued on next page)

*6: Functions assignable to the preset menus of Instant Access Bar™ are shown in the table on the next page.

List of functions assignable to the preset menus

-	Switch View3 3D	Auto Seabed Shading Base	Screen5 Mode1
Bottom Area	Switch View4 3D	Seabed Shading From PBG	Screen5 Mode2
Bottom Level	Register View1 3D	Seabed Shading Span PBG	Screen5 Mode3
TX Pulse	Register View2 3D	Seabed Color Bar PBG	Screen5 Mode4
Transmit	Register View3 3D	Contour Line PBG	Screen6 Split
Pic. Advance MB	Register View4 3D	Depth Text PBG	Screen6 Mode1
Pic. Advance SS	Seabed Color 3D	Track PBG	Screen6 Mode2
Pic. Advance 3D	Auto Seabed Shading 3D	Track Interval PBG	Screen6 Mode3
Interference MB	Seabed Shading From 3D	Track Width PBG	Screen6 Mode4
Interference SS	Seabed Shading Span 3D	Track Color PBG	Screen7 Split
Interference CS&3D	Seabed Color Bar 3D	Delete All Track PBG	Screen7 Mode1
Clutter MB	Fish Color 3D	Measure Depth PBG	Screen7 Mode2
Clutter SS	Auto Fish Shading 3D	Rec. Radius PBG	Screen7 Mode3
Clutter CS&3D	Fish Shading From 3D	Spot Deletion Mode PBG	Screen7 Mode4
TVG MB	Fish Shading Span 3D	Spot Deletion Method PBG	Fish Alarm
TVG SS	Fish Color Bar 3D	Eraser Size PBG	Fish Alm. Sound
TVG CS&3D	Current 3D	Depth Size	Fish Alm. From
TVG Dist. MB	Current Vector 3D	Gain Size	Fish Alm. Span
STC MB	Current Diff. Ref. Layer 3D	Palette	Fish Alm. Level
STC SS	Current Diff. Layer1 3D	Header Scale	Water Temp. Alarm
Beam Mode MB	Current Diff. Layer2 3D	Scale Size	Water Temp. Alm. From
A-Scope MB	Current Flow Dir 3D	Screen1 Split	Water Temp. Alm. Span
White Edge MB	Water Current Source1 3D	Screen1 Mode1	Depth Alarm
White Edge Width MB	Water Current Source2 3D	Screen1 Mode2	Depth Alm. From
High Resolution MB	Water Current Source3 3D	Screen1 Mode3	Depth Alm. Span
Temp. Graph MB	Net 3D	Screen1 Mode4	Speed Alarm
Echo Color SS	Net Width 3D	Screen2 Split	Speed Alm. From
Gird SS	Net Height 3D	Screen2 Mode1	Speed Alm. Span
Dist. Smoothing CS&3D	Net Depth 3D	Screen2 Mode2	
Time Smoothing CS&3D	Net Hist 3D	Screen2 Mode3	
Sound Spd. Corr. CS&3D	Heading Line PBG	Screen2 Mode4	
Temp. Based Corr. CS&3D	Heading Line Width PBG	Screen3 Split	
Triple Beam Indicator CS	Heading Line Color PBG	Screen3 Mode1	
Bottom Line CS	COG Line PBG	Screen3 Mode2	
Fish School 3D	COG Line Source PBG	Screen3 Mode3	
Fish Detection Level 3D	COG Line Length PBG	Screen3 Mode4	
Seabed Echo Calib. 3D	COG Line Time PBG	Screen4 Split	
Seabed Sm. Lv. 3D	COG Line Width PBG	Screen4 Mode1	
Terrain Shading 3D	COG Line Color PBG	Screen4 Mode2	
Switch Default View 3D	Off Center PBG	Screen4 Mode3	
Switch View1 3D	Seabed Color PBG	Screen4 Mode4	
Switch View2 3D	Auto Seabed Shading PBG	Screen5 Split	

(Continued from previous page)

- SYSTEM
  - Range
    - Range1[*7]
    - Range2[*7]
    - Range3[*7]
    - Range4[*7]
    - Range5[*7]
    - Range6[*7]
    - Range7[*7]
    - Range8[*7]
  - Key Pad
    - Key Brill. (1～8, ***8***)
    - Key Beep (Off, ***On***)
  - Wheel Drive (***Normal***, Reverse)
  - Language (日本語, English, Français, Español, Ελληνικά, 한국어, 中文)
  - Units
    - Depth (m, ft, fm, HR, pb)[*8]
    - Temperature (°C,°F)[*8]
    - Speed (***kn***, km/h, mph)
    - Wind (***kn***, km/h, mph, m/s)
    - Range(Long) (***NM***, km, mile)
    - Range(Short) (ft, m, yd) [*8]
  - Calibration
    - Draft (-5.0～15.0, ***0.0***)
    - Salt Water (Off, ***On***)
    - Water Temp.[*9]
    - Speed(STW) (-5.0～5.0, ***0***)
    - Zero Line Rejector (Off, ***On***)
  - Data Source
    - NAVNET Sync (***Off***, On)
    - Date/Time (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Position (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - COG/SOG (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - STW (***LAN***, NMEA2000 Sensor, NMEA0183#1, NMEA0183#2)
    - Heading (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Mag. Variation (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Depth (***LAN***, NMEA2000 Sensor)
    - Heave (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Attitude (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Wind (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Barom. Press (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Water Temp. (***LAN***, NMEA2000 Sensor, NMEA0183#1, NMEA0183#2)
    - Tidal Current (NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Refresh Sensor List

(Continued on next page)

*7:

	English	Japanese
Range1	20～4000, ***20ft***	5～1200, ***5m***
Range2	20～4000, ***30ft***	5～1200, ***10m***
Range3	20～4000, ***60ft***	5～1200, ***20m***
Range4	20～4000, ***120ft***	5～1200, ***40m***
Range5	20～4000, ***200ft***	5～1200, ***80m***
Range6	20～4000, ***400ft***	5～1200, ***150m***
Range7	20～4000, ***600ft***	5～1200, ***200m***
Range8	20～4000, ***1000ft***	5～1200, ***300m***

*8:

Language	Depth	Temperature	Range(Short)
English	***ft***	***°F***	***ft***
Japanese	***m***	***°C***	***m***

*9

°C	-40.0 – 40.0, ***0***
°F	-72.0 - +72.0, ***0***

(Continued from previous page)

- NMEA0183 #1
  - TX Rate (***Auto***, 4800bps, 38400bps)
  - Version (V1.5, V2.0, ***V3.0***)
  - Output DBT (***Off***, On)
  - Output DPT (Off, ***On***)
  - Output MTW (Off, ***On***)
  - Output GPatt (***Off***, On)
- NMEA0183 #2
  - TX Rate (***Auto***, 4800bps, 38400bps)
  - Version (V1.5, V2.0, ***V3.0***)
  - Output DBT (***Off***, On)
  - Output DPT (Off, ***On***)
  - Output MTW (Off, ***On***)
  - Output GPatt (***Off***, On)
- NMEA2000 PGN Output
  - 127257 : Attitude (***Off***, On)
  - 128267 : Water Depth (Off, ***On***)
  - 130310 : Environmental Parameters (***Off***, On)
  - 130312 : Temperature (***Off***, On)
  - 130316 : Temperature, Extended Range (Off, ***On***)
- TLL Output (Off, ***TLL***, FURUNO-TLL)
- Sensor Switching
- External KP (***Off***, On)
- Orientation Setting
- Transducer Setup
  - Transducer Mis-Mount Correction (***Off***, On)
  - Bow(-)/Stern(+) (-100 ~ +100, ***0***)
  - Up(-)/Down(+) (-100 ~ +100, ***0***)
  - Port(-)/Starboard(+) (-100 ~ +100, ***0***)
  - Transmission Power Auto (Off, ***On***)
  - Transmission Power (0~10, ***10***)
  - Transmit Rate Mode (***Manual*****,** Auto, Max)
  - Transmit Rate (0~20, ***20***)
- GPS Antenna Position
  - Bow(-)/Stern(+) (-100 ~ +100, ***0***)
  - Up(-)/Down(+) (-100 ~ +100, ***0***)
  - Port(-)/Starboard(+) (-100 ~ +100, ***0***)
- Motion Sensor Setup
  - Source (SC/SCX, ***Internal***, Off)
  - Bow(-)/Stern(+) (-100 ~ +100, ***0***)
  - Up(-)/Down(+) (-100 ~ +100, ***0***)
  - Port(-)/Starboard(+) (-100 ~ +100, ***0***)
  - Roll Sensor Offset (-45~+45, ***0***)
  - Pitch Sensor Offset (-45~+45, ***0***)
  - Motion Sensor Synch(in ms) (0~400, ***20***)
  - Heading Sensor Synch(in ms) (0~3500, ***20***)
  - Position Sensor Synch(in ms) (0~3500, ***20***)

(Continued on next page)

(Continued from previous page)

- Import/Export
  - Import Settings
  - Export Settings
- Ejecting USB Storage Safely
- Demo (***Off***, On)
- Tests
  - SFD Self Test
  - LCD Test
  - DFF-3D Self Test
- Reset
  - Reset Sensor
  - Reset Display

SINGLE BEAM PBG MENU TREE



Factory default: *Italic Bold*

- PBG
  - Heading Line
    - Heading Line (Off, ***On***)
    - Width (Narrow, ***Medium***, Wide)
    - Color (Red, ***Green***, Blue)
  - COG Line
    - COG Line (Off, ***On***)
    - Source (***Time***, Distance)
    - Length (0.01～999.00, ***100.00***)
    - Time (0'10s, 0'30s, 1'00s, 2'00s, 5'00s, 10'00s, 15'00s, 30'00s, ***1h00'***, 2h00', 3h00', 6h00', 12h00', 1d00h)
    - Width (Narrow, ***Medium***, Wide)
    - Color (***Red***, Green, Blue)
  - Off Center (Up, ***Center***, Down)
  - Terrain Shad. (0~100, ***10***)
  - Depth Shading Setting
    - Color (***Classic Hue***, Inv. Classic Hue, Red Hue, Blue Hue, Green Hue, Yellow Hue, Gray Hue, Brown Hue)
    - Auto (Off, ***On***)
    - Shading Base (3D-History, ***PBG***)
    - From*4
    - Span*4
    - Color Bar (Off, ***On***)
  - Grid Interval (Off, Very Small, Small, ***Medium***, Large, Very Large)
  - Contour Line (Off, ***On***)
  - Depth Text (Off, ***On***)
  - Track
    - Track (Off, ***On***)
    - Interval (0.01～20.00, ***0.01***)
    - Width (Narrow, ***Medium***, Wide)
    - Color (***Red***, Green, Blue)
    - Delete All Track
  - Measure Depth (***Off***, On)
  - Recording Limiter
    - SOG Limiter (Off, ***On***)
    - Max SOG (1～99, ***20***)
    - Roll/Pitch Angle Limiter (***Off***, On)
    - Max Roll/Pitch Angle (1～90, ***60***)
    - Roll/Pitch Velocity Limiter (***Off***, On)
    - Max Roll/Pitch Velocity (1～90, ***20***)
  - Single Beam Rec. Radius (Narrow, ***Wide***)

(Continued on next page)

(Continued from previous page)

- PBG Range
  - Range1 (0.01~10, ***0.01***)
  - Range2 (0.01~10, ***0.02***)
  - Range3 (0.01~10, ***0.05***)
  - Range4 (0.01~10, ***0.1***)
  - Range5 (0.01~10, ***0.2***)
  - Range6 (0.01~10, ***0.5***)
  - Range7 (0.01~10, ***1***)
  - Range8 (0.01~10, ***2***)
- Import
  - Source
  - Import
- Export
- Ejecting USB Storage Safely
- Delete Spot PBG Data
  - Spot Deletion Mode (***Off***, On)
  - Method (***Eraser***, Square, Circle)
  - Eraser Size (Small, ***Medium***, Large)
- Delete All PBG Data

- DISPLAY
  - Depth Size (Off, Small, ***Medium***, Large)
  - Gain Size (Off, Small, ***Medium***, Large)
  - Screen Setup
    - Screen1
      - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
      - Mode 1 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 2 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 3 (Sounder, Side Scan, ***Sonar***, 3D-History)
      - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)
    - Screen2
      - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
      - Mode 1 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 3 (Sounder, Side Scan, ***Sonar***, 3D-History)
      - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)
    - Screen3
      - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
      - Mode 1 (Sounder, Side Scan, ***Sonar***, 3D-History)
      - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
      - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
      - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)

(Continued on next page)

(Continued from previous page)

- Screen4
  - Split Screen (***Full Screen***, Dual Screen, Triple Screen, Quad Screen)
  - Mode 1 (Sounder, Side Scan, Sonar, ***3D-History***)
  - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
  - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
  - Mode 4 (Sounder, Side Scan, ***Sonar***, 3D-History)
- Screen5
  - Split Screen (Full Screen, ***Dual Screen***, Triple Screen, Quad Screen)
  - Mode 1 (***Sounder***, Side Scan, Sonar, 3D-History)
  - Mode 2 (Sounder, Side Scan, Sonar, ***3D-History***)
  - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
  - Mode 4 (Sounder, Side Scan, ***Sonar***, 3D-History)
- Screen6
  - Split Screen (Full Screen, Dual Screen, ***Triple Screen***, Quad Screen)
  - Mode 1 (Sounder, Side Scan, ***Sonar***, 3D-History)
  - Mode 2 (Sounder, Side Scan, Sonar, ***3D-History***)
  - Mode 3 (***Sounder***, Side Scan, Sonar, 3D-History)
  - Mode 4 (Sounder, ***Side Scan***, Sonar, 3D-History)
- Screen7
  - Split Screen (Full Screen, Dual Screen, Triple Screen, ***Quad Screen***)
  - Mode 1 (Sounder, Side Scan, ***Sonar***, 3D-History)
  - Mode 2 (***Sounder***, Side Scan, Sonar, 3D-History)
  - Mode 3 (Sounder, ***Side Scan***, Sonar, 3D-History)
  - Mode 4 (Sounder, Side Scan, Sonar, ***3D-History***)

- ALARM
  - Water Temperature Alarm
    - Alarm (***Off***, On)
    - From
    - Span
  - Depth Alarm
    - Alarm (***Off***, On)
    - From
    - Span
  - Speed Alarm
    - Alarm (***Off***, On)
    - From(0 ~ 99, ***0***)
    - Span (1 ~ 50, ***1***)

(Continued on next page)

(Continued from previous page)

- DATA
  - Data Box
    - 1st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 2nd Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 3rd Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 4st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 5st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - 6st Box (***Off***, SOG, STW, Depth, Position, Wind, Heading, Course, Barom.Press, W. Temp., Current1, Current2, Current3)
    - Transparency (0 ~ 100, ***50***)
    - Box Size (1 ~ 10, ***5***)
  - Compass Type (***True***, Magnetic)
  - Wind Spd/Dir (***True***, Apparent)
  - Cur. Spd/Dir (***True***, Apparent, Compass Direction)
- IA BAR*1
  - Preset 1
    - IA Bar1 Func. (***Switch Default View 3D***)
    - IA Bar2 Func. (***Switch View1 3D***)
    - IA Bar3 Func. (***Switch View2 3D***)
    - IA Bar4 Func. (***Switch View3 3D***)
    - IA Bar5 Func. (***Switch View4 3D***)
    - IA Bar6 Func. (***Fish School 3D***)
    - IA Bar7 Func. (***Current 3D***)
    - IA Bar8 Func. (***Net 3D***)
  - Preset 2
    - IA Bar1 Func. (***Pic. Advance 3D***)
    - IA Bar2 Func. (***Interference CS&3D***)
    - IA Bar3 Func. (***Clutter CS&3D***)
    - IA Bar4 Func. (***Bottom Line CS***)
    - IA Bar5 Func. (***Triple Beam Indicator CS***)
    - IA Bar6 Func.
    - IA Bar7 Func.
    - IA Bar8 Func.
  - Preset 3
    - IA Bar1 Func. (***Pic. Advance MB***)
    - IA Bar2 Func. (***Interference MB***)
    - IA Bar3 Func. (***Clutter MB***)
    - IA Bar4 Func. (***A-Scope MB***)
    - IA Bar5 Func. (***Beam Mode MB***)
    - IA Bar6 Func. (***Fish Alarm***)
    - IA Bar7 Func.
    - IA Bar8 Func.

(Continued on next page)

*1: For information on Instant Access Bar™, refer to DFF-3D Menu Tree*5

(Continued from previous page)

- Preset 4
  - IA Bar1 Func. (***Pic. Advance SS***)
  - IA Bar2 Func. (***Interference SS***)
  - IA Bar3 Func. (***Clutter SS***)
  - IA Bar4 Func. (***Echo Color SS***)
  - IA Bar5 Func.
  - IA Bar6 Func.
  - IA Bar7 Func.
  - IA Bar8 Func.

- SYSTEM
  - Key Pad
    - Key Brill. (1~8, ***8***)
    - Key Beep (Off, ***On***)
  - Wheel Drive (***Normal***, Reverse)
  - Language (日本語, English, Français, Español, Ελληνικά, 한국어, 中文)
  - Units
    - Depth (m, ***ft***, fm, HR, pb)
    - Temperature (°C,***°F***)
    - Speed (***kn***, km/h, mph)
    - Wind (***kn***, km/h, mph, m/s)
    - Range(Long) (***NM***, km, mile)
    - Range(Short) (***ft***, m, yd)
  - Calibration
    - Water Temp. (-72.0 ~ 72.0, ***0.0***)
    - Speed(STW) (-50 ~ 50, ***0***)
  - Data Source
    - NAVNET Sync (***Off***, On)
    - Date/Time (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Position (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - COG/SOG (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - STW (***LAN***, NMEA2000 Sensor, NMEA0183#1, NMEA0183#2)
    - Heading (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Mag. Variation (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Depth (***LAN***, NMEA2000 Sensor)
    - Heave (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Attitude (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Wind (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Barom. Press (LAN, NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Water Temp. (***LAN***, NMEA2000 Sensor, NMEA0183#1, NMEA0183#2)
    - Tidal Current (NMEA2000 Sensor, ***NMEA0183#1***, NMEA0183#2)
    - Refresh Sensor List

(Continued on next page)

(Continued from previous page)

- NMEA0183 #1
  - TX Rate (***Auto***, 4800bps, 38400bps)
  - Version (V1.5, V2.0, ***V3.0***)
  - Output DBT (***Off***, On)
  - Output DPT (Off, ***On***)
  - Output MTW (Off, ***On***)
  - Output GPatt (***Off***, On)
- NMEA0183 #2
  - TX Rate (***Auto***, 4800bps, 38400bps)
  - Version (V1.5, V2.0, ***V3.0***)
  - Output DBT (***Off***, On)
  - Output DPT (Off, ***On***)
  - Output MTW (Off, ***On***)
  - Output GPatt (***Off***, On)
- NMEA2000 PGN Output
  - 127257 : Attitude (***Off***, On)
  - 128267 : Water Depth (Off, ***On***)
  - 130310 : Environmental Parameters (***Off***, On)
  - 130312 : Temperature (***Off***, On)
  - 130316 : Temperature, Extended Range (Off, ***On***)
- TLL Output (Off, ***TLL***, FURUNO-TLL)
- Sensor Switching
- Orientation Setting
- Import/Export
  - Import Settings
  - Export Settings
- Ejecting USB Storage Safely
- Tests
  - SFD Self Test
  - LCD Test
- Reset
  - Reset Display

SPECIFICATIONS OF FLEX FUNCTION DISPLAY
SFD-1010/1012

1. DISPLAY FUNCTIONS

(1)	Screen	
	SFD-1010	10.4-inch color TFT LCD, 1024 x 768 (XGA)
	SFD-1012	12.1-inch color TFT LCD, 1024 x 768 (XGA)
(2)	Brilliance	800 cd/m² or more
(3)	View angle	Up/Down/Left/Right 80° or more
(4)	Touch panel method	Electrostatic sensing
(5)	Indication data	
	Navigations	Course, Own ship's position (L/L), COG/SOG, Heading, Waypoint
	Weather information	Barom. Press, Depth, Water Temperature, Current, Wind
(6)	Language	English (USA/UK), Japanese, Spanish, French, Greek, Chinese, Korean

2. RADAR FUNCTION

(1)	Orientation mode	Head-up, North-up, Course-up
(2)	Echo trail	15/30 sec, 1/3/6/15/30 min. or continuous
(3)	ARPA targets	DRS4DL+：0～30、DRS4DL X-Class：0～50
(4)	Alarms	
	Signal missing	TRIGGER,HEADING,BEARING,VIDEO,POSITION, NMEA_HDG,ANT_ERR
	Target alarm 1, 2	IN,OUT
	TT	COLLISION,LOST,PROXIMITY

3. FISH FINDER FUNCTION

(1)	Color indication	Depend on the external sounder output
(2)	Display mode	Single frequency, Dual frequency, Zoom, A-scope
(3)	Expansion mode	Bottom-lock expansion, Bottom zoom, Zoom Marker
(4)	Alarms	Fish, Speed, Depth, Water Temperature

4. MULTI BEAM SONAR FUNCTION (DFF-3D CONNECTED)

(1)	Display mode	Multi beam sounder, Side scan, Sonar, 3D-History, PBG
(2)	Depth range	1200 m max. (4000 ft, 650 fm, 800 HR, 750 pb)
(3)	Adjustment	Video, Brilliance, Key Brilliance
(4)	Alarms	B voltage, Fish, Speed, Depth, Water Temperature, PBG remaining memory insufficient Alarm

5. Single beam PBG

(1)	Display mode	PBG
(2)	Alarms	Speed, Depth, Water Temperature, PBG remaining memory insufficient Alarm

6. INTERFACE

(1)	Number of ports	
	Serial	2 ports, NMEA0183
	LAN	1 port, Ethernet 100Base-TX, RJ45
	USB	1 port, USB2.0 (type-A), for maintenance **Note:** USB operation only supports RCU-030 connection, not USB mouse/remote controller.

	NMEA2000	1 port
	HDMI Output	1 port, 1280 × 720 (HD), non-interlace
	EXT BUZZER	1 port, 12 VDC: 250 mA
(2)	NMEA0183 (Port1 Port2) Data sentences	
	Input	BWC, BWR, CUR, DPT, GGA, GLL, GNS, HDG, HDT, MDA, MTW, MWV, RMA, RMB, RMC, THS, VHW, VTG, ZDA, GPatt, GPhve
	Output	DBT, DPT, MTW, TLL, GPatt, SDmrk
(3)	NMEA2000 PGN	
	Input(RADAR)	059392/904, 060160/416/928, 065240, 126208/464/992/996, 127250/257/258, 128259, 129025/026/029, 130577/822
	Input(FISH FINDER)	059392/904, 060160/416/928, 065240/280, 126208/464/992/996, 127250/252/257/258, 128259/267, 129025/026/029, 130306/310/311/312/314/316/577/822
	Input(DFF3D)	059392/904, 060160/416/928, 065240/280, 126208/464/992/996, 127250/252/257/258, 128259/267, 129025/026/029, 130306/310/311/312/314/316/577/822/848
	Input(Single beam PBG)	059392/904, 060160/416/928, 065240/280, 126208/464/992/996, 127250/252/257/258, 128259/267, 129025/026/029, 130306/310/311/312/314/316/577/822/848
	Input(SCX)	059392/904, 060160/416/928, 065240, 126208/720/996, 129538, 130816/817/818/819/833/834
	Output(RADAR)	059392/904, 060928, 126208(#1=2)/464/993/996/998, 130830
	Output(FISH FINDER)	059392/904, 060928, 126208(#1=2)/464/993/996/998, 128259/267, 130310/312/316/830
	Output(DFF3D)	059392/904, 060928, 126208(#1=2)/464/993/996/998, 127257, 128267, 130310/312/316/830
	Output(Single beam PBG)	059392/904, 060928, 126208(#1=2)/464/993/996/998, 127257, 128267, 130310/312/316/830
	Output(SCX)	059392/904, 060928, 061184, 126208/464/993/720/996/998

7. POWER SUPPLY

(1)	Flex function display	
		12-24 VDC (10.8-31.2 V): 3.0-1.5 A
(2)	Rectifier (option)	
	PR-62	100/115/220/230 VAC, 1 phase, 50/60 Hz
	RU-1746B-2	100/110/115/220/230 VAC, 1 phase, 50/60 Hz
	RU-3423	100/110/115/220/230 VAC, 1 phase, 50/60 Hz

7. ENVIRONMENTAL CONDITIONS

(1)	Ambient temperature	-15°C to +55°C
(2)	Relative humidity	93% or less at +40°C
(3)	Degree of protection	IP25
(4)	Vibration	IEC 60945 Ed.4

8. UNIT COLOR

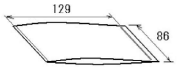
N1.0

FURUNO

CODE NO.	000-011-976-00	01SD-X-9503-0
TYPE	FP02-05700	1/1

付属品表

ACCESSORIES

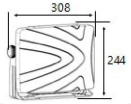
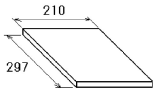
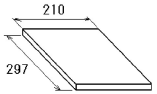
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		02-155-1082-2 CODE NO. 100-332-652-10	1	

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

PACKING LIST

01SD-X-9851-0　1/1

SFD-1010

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
指示部 DISPLAY UNIT		SFD-1010-＊ 000-038-078-00　＊＊	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP03-17801 001-600-090-00	1
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP02-05700 000-011-976-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP19-02801 001-600-100-00	1
図書 DOCUMENT			
操作要領書 OPERATOR'S GUIDE		OS*-45170-* 000-197-914-1＊　＊＊	1
使用上のご注意 NOTICE FOR USING		*42-02108-* 000-199-229-1＊　＊＊	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。

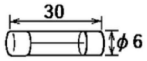
CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

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

FURUNO

CODE NO.	001-600-090-00	01SD-X-9301-0 1/1
TYPE	SP03-17801	BOX NO.

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGBO-A 250V 5A PBF	1	1	2	000-155-840-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.		1/1

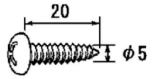
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING　FOR REFERENCE ONLY.）

FURUNO

CODE NO.	001-600-100-00	01SD-X-9402-0
TYPE	CP19-02801	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
2	ｹｰﾌﾞﾙ(ｸﾐﾋﾓ) CABLE ASSEMBLY		FRU-CF-F01-A CODE NO. 000-198-451-10	1	

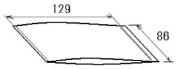
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
FURUNO ELECTRIC CO.,LTD

FURUNO

CODE NO.	000-011-976-00	01SD-X-9503-0
TYPE	FP02-05700	1/1

付属品表

ACCESSORIES

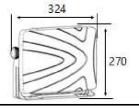
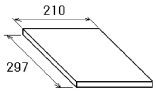
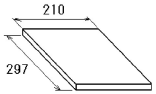
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		02-155-1082-2 CODE NO. 100-332-652-10	1	

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

PACKING LIST

01SD-X-9852-0 1/1

SFD-1012

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
指示部 DISPLAY UNIT		SFD-1012-＊ 000-038-080-00 ＊＊	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP03-17801 001-600-090-00	1
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP02-05700 000-011-976-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP19-02801 001-600-100-00	1
図書 DOCUMENT			
操作要領書 OPERATOR'S GUIDE		OS*-45170-* 000-197-914-1＊ ＊＊	1
使用上のご注意 NOTICE FOR USING		*42-02108-* 000-199-229-1＊ ＊＊	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。

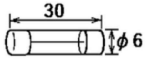
CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

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

FURUNO

CODE NO.	001-600-090-00	01SD-X-9301-0 1/1
TYPE	SP03-17801	BOX NO.

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGBO-A 250V 5A PBF	1	1	2	000-155-840-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.		1/1

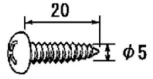
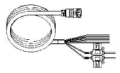
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING　FOR REFERENCE ONLY.）

FURUNO

CODE NO.	001-600-100-00	01SD-X-9402-0
TYPE	CP19-02801	1/1

工事材料表

INSTALLATION MATERIALS

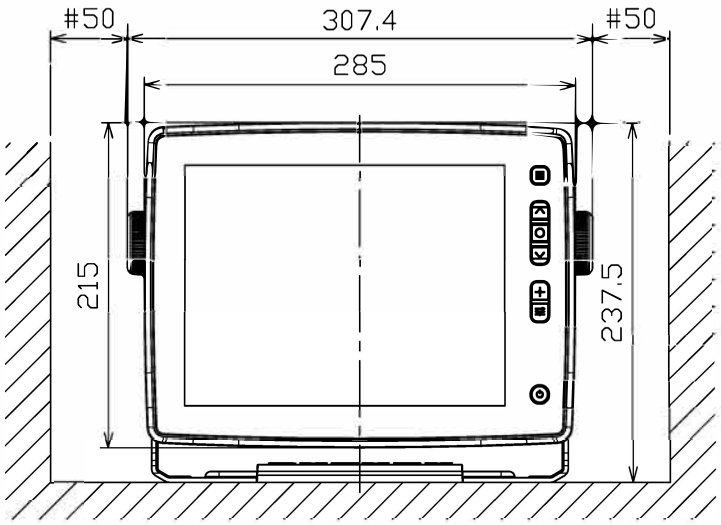
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
2	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CABLE ASSEMBLY		FRU-CF-F01-A CODE NO. 000-198-451-10	1	

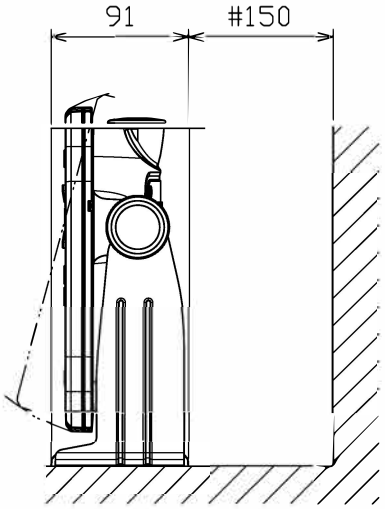
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
FURUNO ELECTRIC CO.,LTD

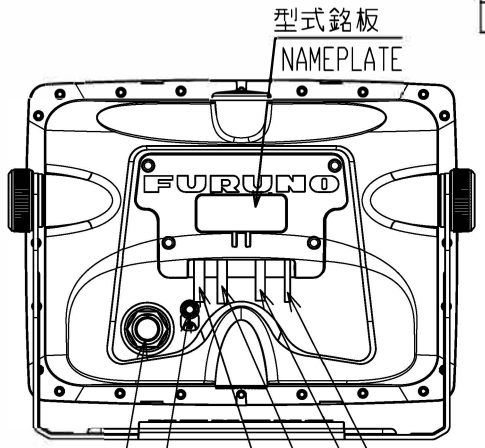
FURUNO

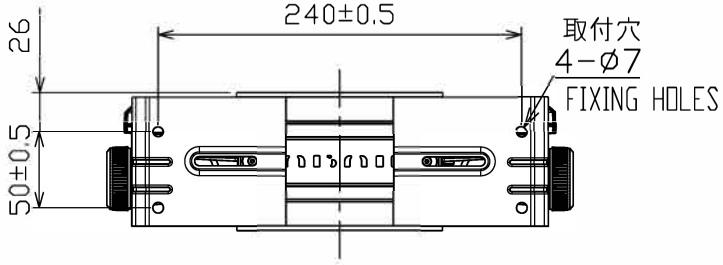
表1 TABLE 1

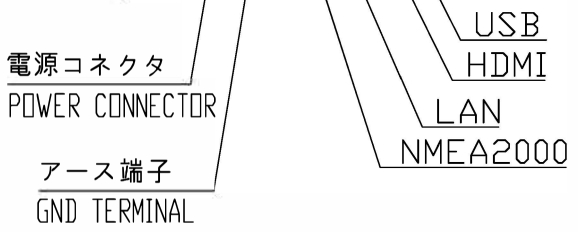
寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3











注記
1）指定なき寸法公差は表1による。
2）＃印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径5×20を使用のこと。

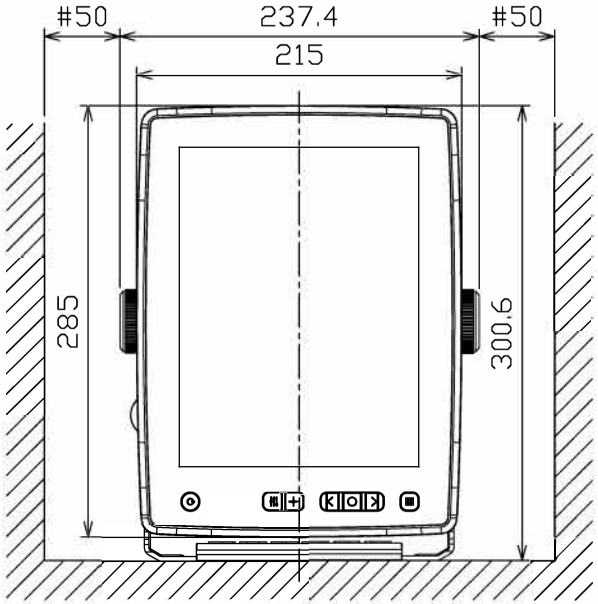
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

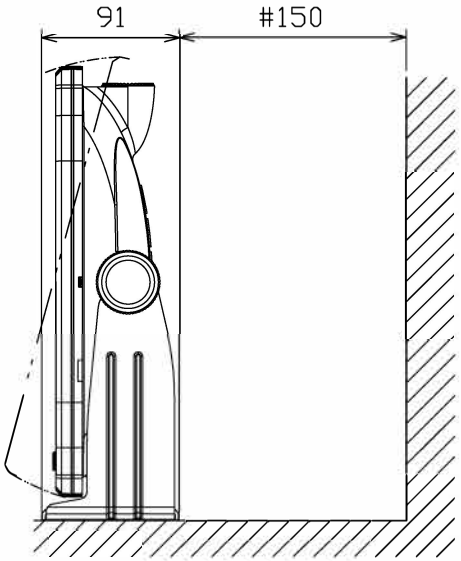
DRAWN 26/Jul/2021 U.PODDAR		TITLE SFD-1010
CHECKED 26/Jul/2021 T.YAMASAKI		名称 シングルファンクションディスプレイ(卓上装備)
APPROVED 6/Jul/2022 H.MAKI		外寸図
SCALE 1/5 MASS 2.4 ±10% kg		NAME SINGLE FUNCTION DISPLAY (TABLETOP MOUNT)
DWG.No. C4517-G01- A	REF.No. SFD-1010-HANGER-01-2D	OUTLINE DRAWING

牧宏昌

FURUNO ELECTRIC CO., LTD.

FURUNO





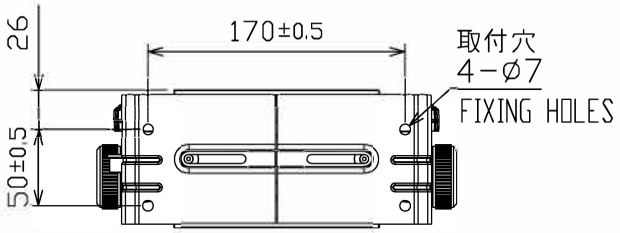
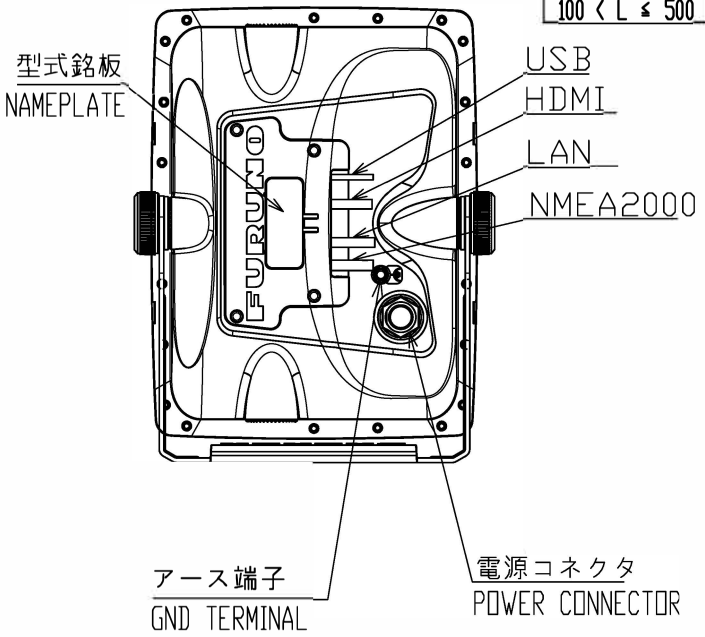


表 1 TABLE 1

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



注記
1）指定なき寸法公差は表1による。
2）＃印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径5×20を使用のこと。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. USE TAPPING SCREWS Ø5x20 FOR FIXING THE UNIT.

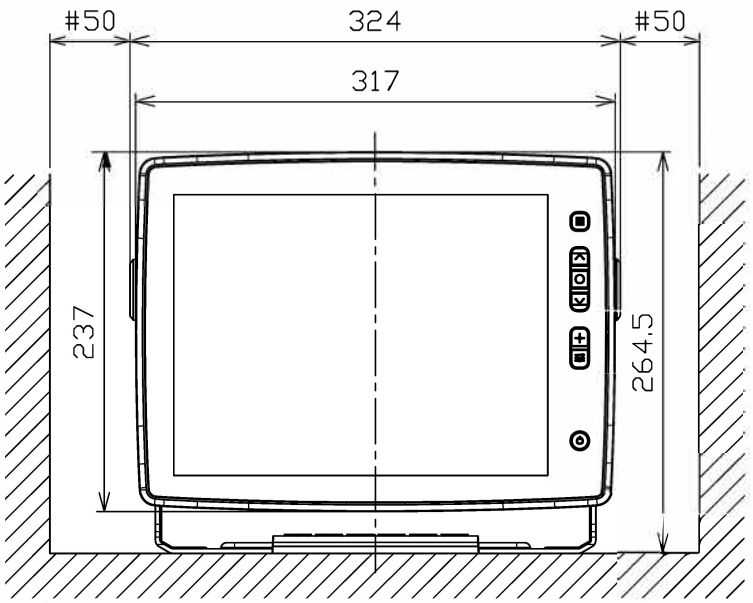
DRAWN 16/Aug/2021 U.PODDAR		TITLE SFD-1010
CHECKED 16/Aug/2021 T.YAMASAKI		名称 シングルファンクションディスプレイ（卓上装備）
APPROVED 6/Jul/2022 H.MAKI		外寸図
SCALE 1/5 MASS 2.4 ±10% kg		NAME SINGLE FUNCTION DISPLAY (TABLETOP MOUNT)
DWG.No. C4517-G02- A	REF.No. SFD-1010-HANGER-02-2D	OUTLINE DRAWING

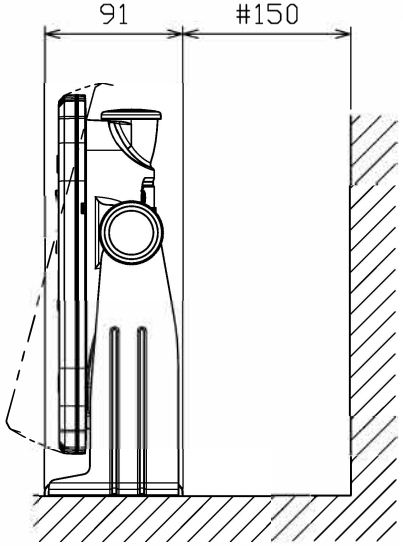
FURUNO ELECTRIC CO., LTD.

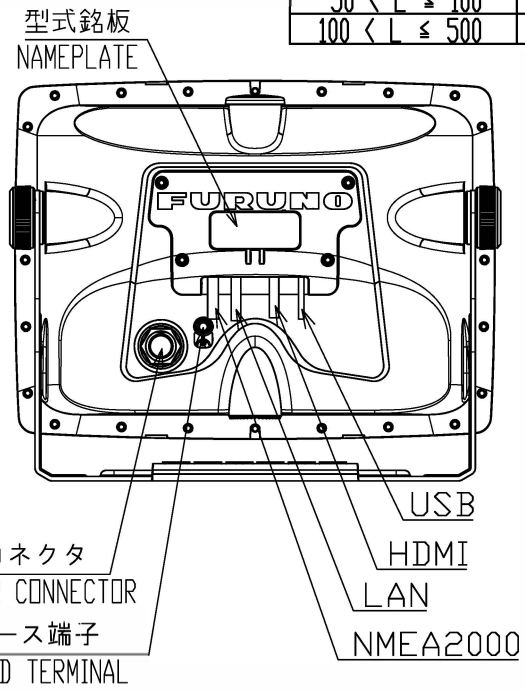
FURUNO

表1 TABLE 1

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







注記
1）指定なき寸法公差は表1による。
2）#印は最小サービス空間寸法とする。
3）取付ネジはタッピンネジ呼び径5×20を使用のこと。

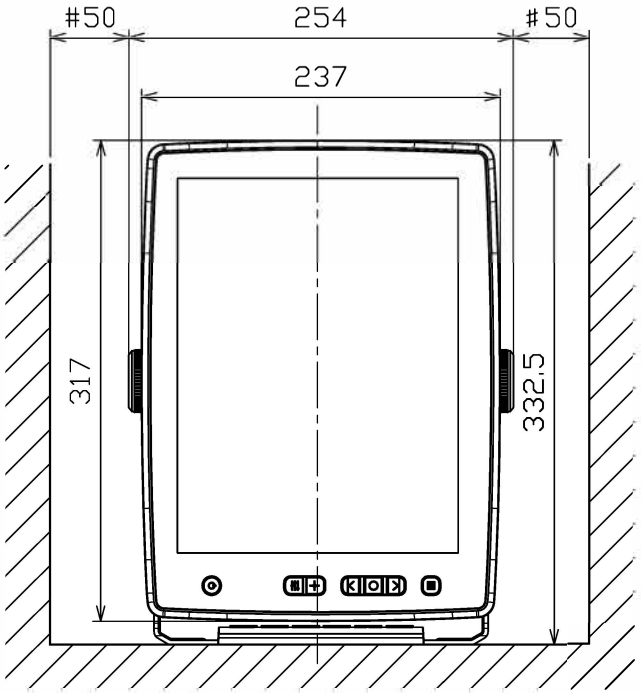
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

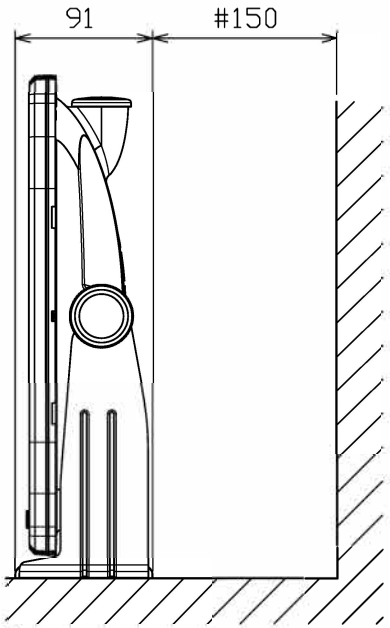
DRAWN 2/Aug/2021 U.PODDAR		TITLE SFD-1012
CHECKED 2/Aug/2021 T.YAMASAKI		名称 シングルファンクションディスプレイ（卓上装備）
APPROVED 6/Jul/2022 H.MAKI		外寸図
SCALE 1/5 MASS 2.6 ±10% kg	質量は複合信号ケーブルを含む。 MASS INCLUDES MULTI-SIGNAL CABLE.	NAME SINGLE FUNCTION DISPLAY(TABLETOP MOUNT)
DWG.No. C4518-G01- A	REF.No. SFD-1012-MOUNT-02-2D	OUTLINE DRAWING

牧宏昌

FURUNO ELECTRIC CO., LTD.

FURUNO





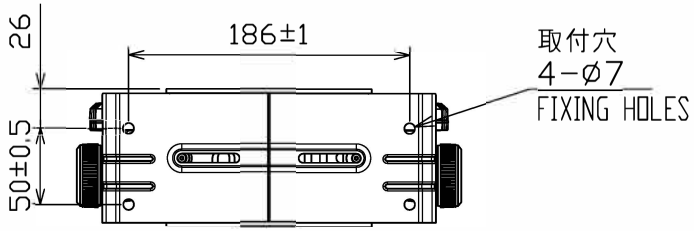
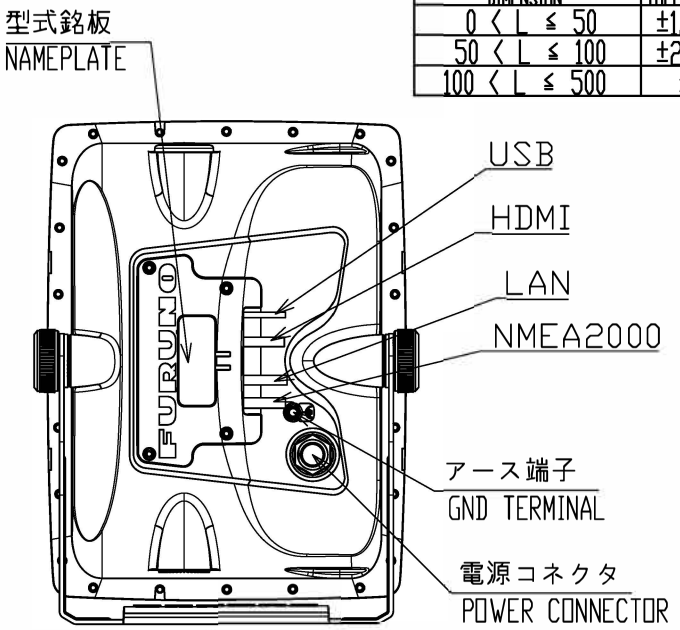


表1 TABLE 1

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



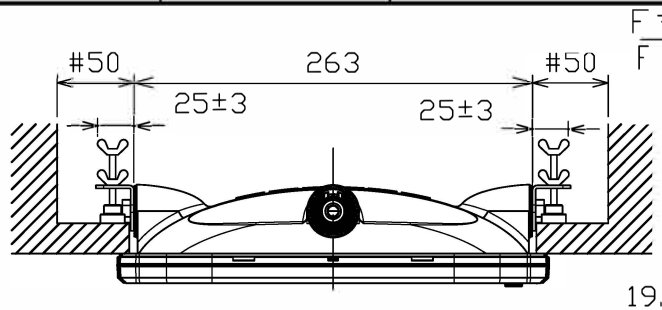
注記
1）指定なき寸法公差は表1による。
2）#印は最小サービス空間寸法とする。
3）取付ネジはタッピンネジ呼び径5×20を使用のこと。

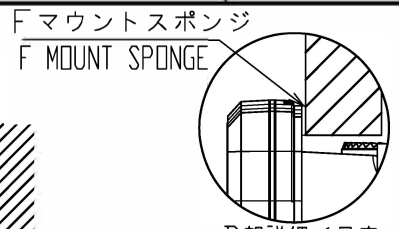
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN 2/Aug/2021 U.PODDAR		TITLE	SFD-1012
CHECKED 2/Aug/2021 T.YAMASAKI		名称	シングルファンクションディスプレイ（卓上装備）
APPROVED 6/Jul/2022 H.MAKI			外寸図
SCALE 1/5 MASS 2.6 ±10% kg	質量は複合信号ケーブルを含む。 MASS INCLUDES MULTI-SIGNAL CABLE.	NAME	SINGLE FUNCTION DISPLAY(TABLETOP MOUNT)
DWG.No. C4518-G02- A	REF.No. SFD-1012-HANGER-02-2D		OUTLINE DRAWING

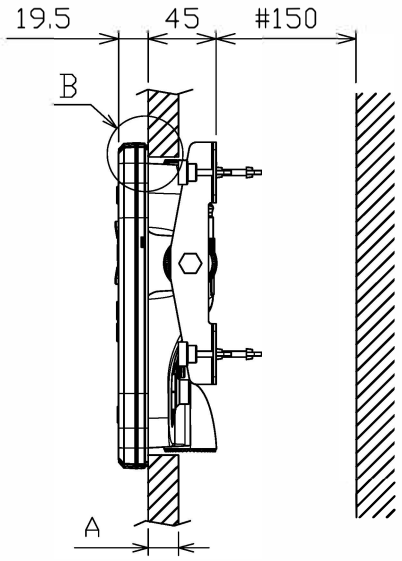
FURUNO ELECTRIC CO., LTD.

FURUNO





B部詳細（尺度：1/2）
DETAIL FOR B (SCALE: 1/2)



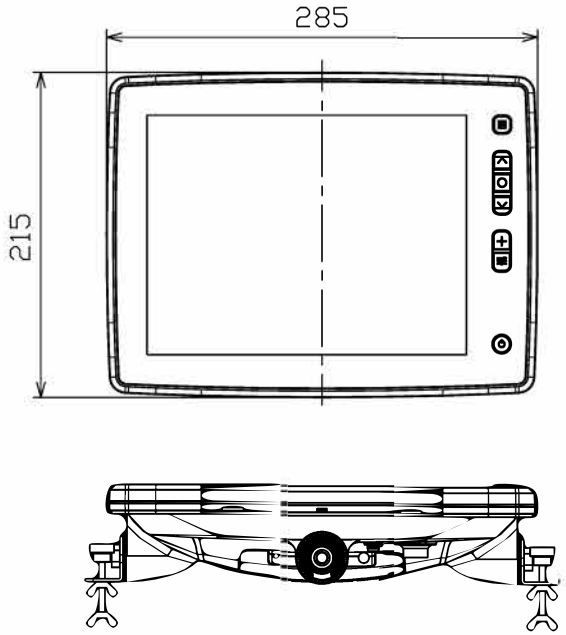
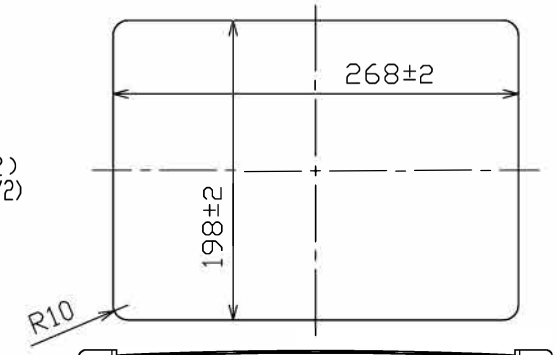
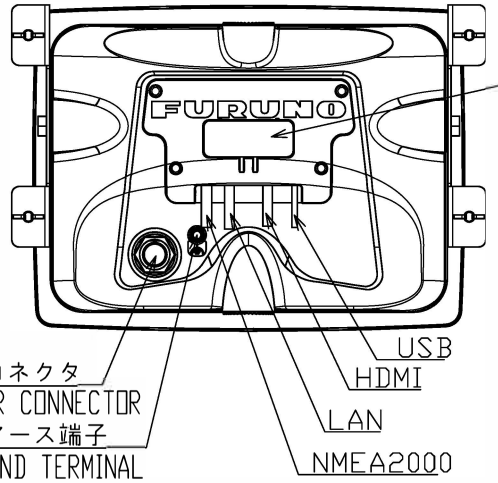


表1 TABLE 1

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



取付穴寸法
CUTOUT DIMENSIONS



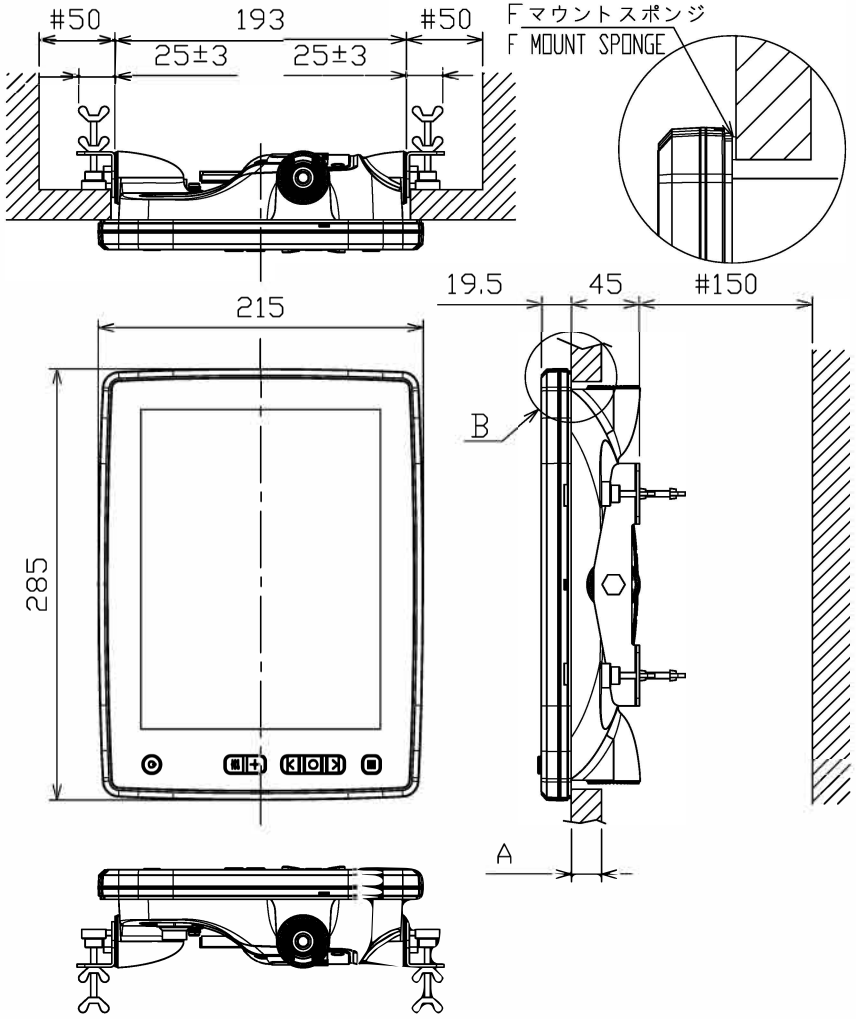
注記
1）指定なき寸法公差は表1による。
2）＃印は最小サービス空間寸法とする。
3）壁の厚さ（A）は最小5、最大20とする。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. BULKHEAD THICKNESS (A): 5≤A≤20.

DRAWN 27/Jul/2021 U.PODDAR		TITLE	SFD-1010
CHECKED 27/Jul/2021 T.YAMASAKI		名称	シングルファンクションディスプレイ（埋込装備S）
APPROVED 6/Jul/2022 H.MAKI			外寸図
SCALE 1/5 MASS 2.1 ±10% kg	質量は複合信号ケーブルを含む。 MASS INCLUDES MULTI-SIGNAL CABLE.	NAME	SINGLE FUNCTION DISPLAY(FLASH MOUNT S)
DWG.No. C4517-G03- A	REF.No. SFD-1010-MOUNT-01-2D		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

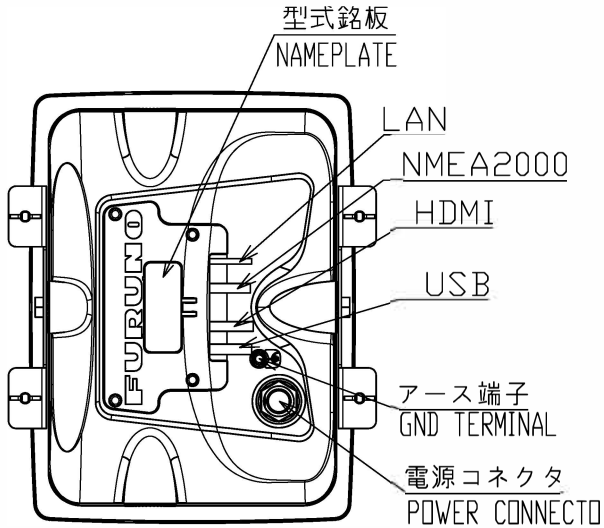
FURUNO

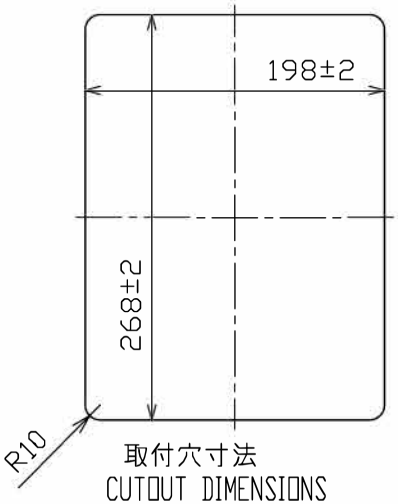


B部詳細(尺度：1/2)
DETAIL FOR B (SCALE: 1/2)

表1 TABLE 1

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





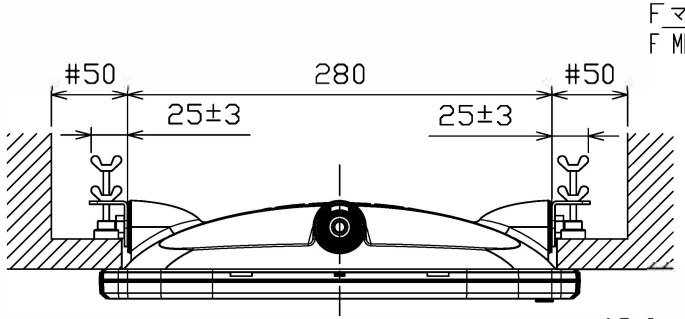
注記
1）指定なき寸法公差は表1による。
2）＃印は最小サービス空間寸法とする。
3）壁の厚さ（A）は最小5、最大20とする。

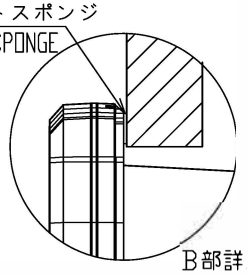
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. BULKHEAD THICKNESS (A): 5≤A≤20.

DRAWN 29/Jul/2021 U.PODDAR		TITLE	SFD-1010
CHECKED 29/Jul/2021 T.YAMASAKI		名称	シングルファンクションディスプレイ（埋込装備S）
APPROVED 6/Jul/2022 H.MAKI			外寸図
SCALE 1/5 MASS 2.1 ±10% kg	質量は複合信号ケーブルを含む。 MASS INCLUDES MULTI-SIGNAL CABLE.	NAME	SINGLE FUNCTION DISPLAY(FLASH MOUNT S)
DWG.No. C4517-G04- A	REF.No. SFD-1010-MOUNT-02-2D		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

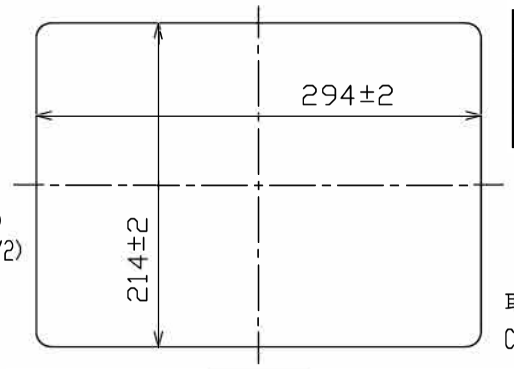




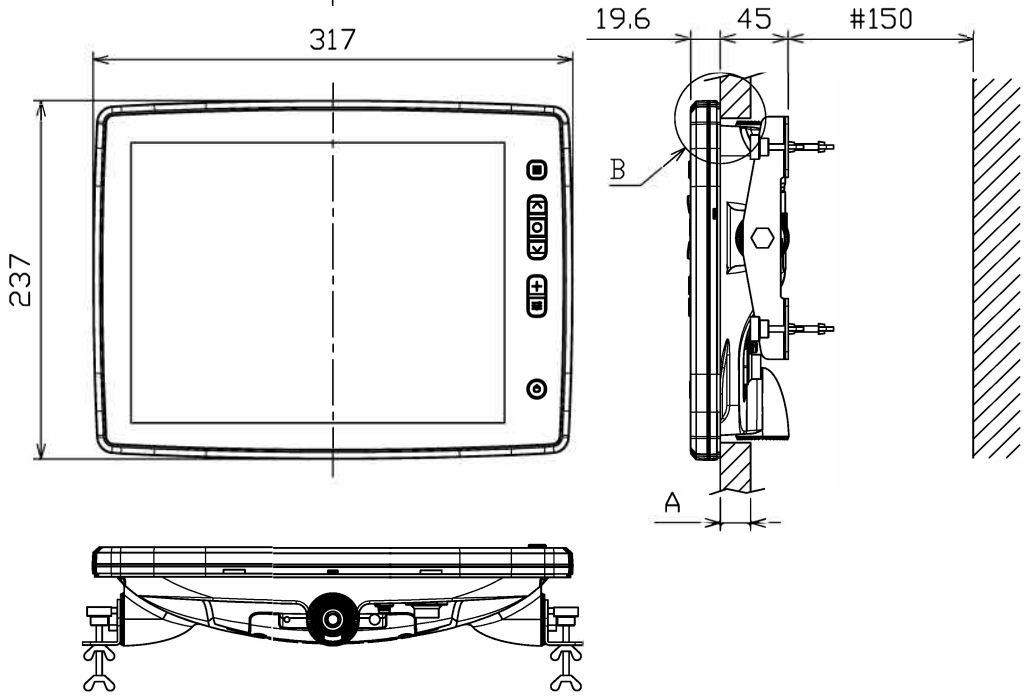
B部詳細（尺度：1/2）
DETAIL FOR B (SCALE: 1/2)

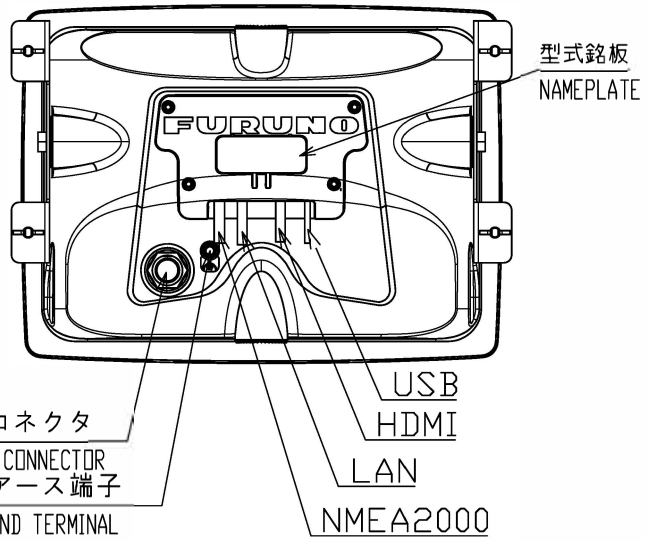
表1 TABLE 1

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



取付穴寸法
CUTOUT DIMENSIONS





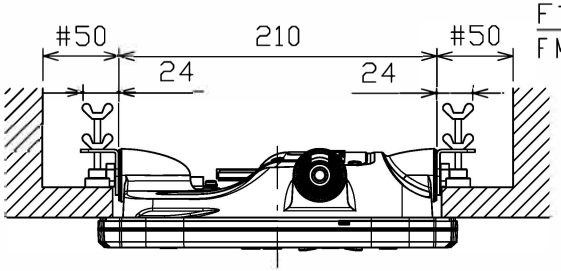
注記
1）指定なき寸法公差は表1による。
2）#印は最小サービス空間寸法とする。
3）壁の厚さ（A）は最小5、最大20とする。

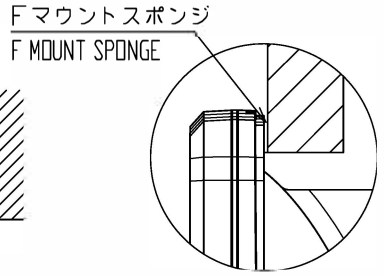
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. BULKHEAD THICKNESS (A): 5≤A≤20.

DRAWN 3/Aug/2021 U.PODDAR		TITLE	SFD-1012
CHECKED 3/Aug/2021 T.YAMASAKI		名称	シングルファンクションディスプレイ（埋込装備S）
APPROVED 6/Jul/2022 H.MAKI			外寸図
SCALE 1/5 MASS 2.4 ±10% kg	質量は複合信号ケーブルを含む。 MASS INCLUDES MULTI-SIGNAL CABLE.	NAME	SINGLE FUNCTION DISPLAY(FLASH MOUNT S)
DWG.No. C4518-G03- A	REF.No. SFD-1012-MOUNT-02-2D		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

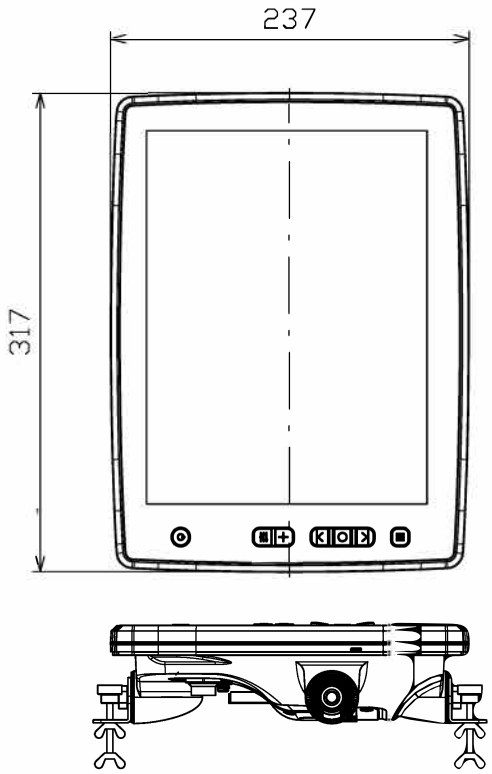


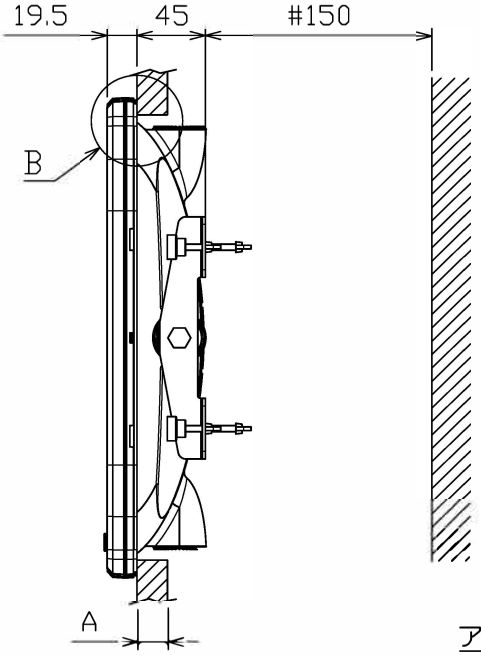


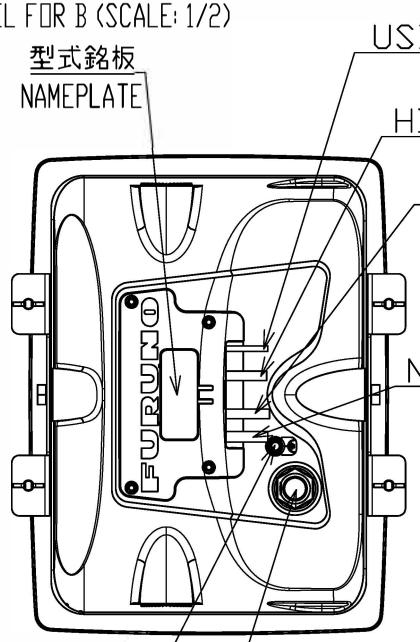
B部詳細(尺度：1/2)
DETAIL FOR B (SCALE: 1/2)

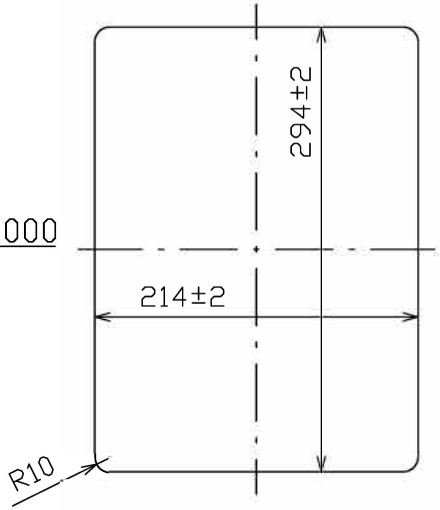
表1 TABLE 1

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









取付穴寸法
CUTOUT DIMENSIONS

アース端子
GND TERMINAL

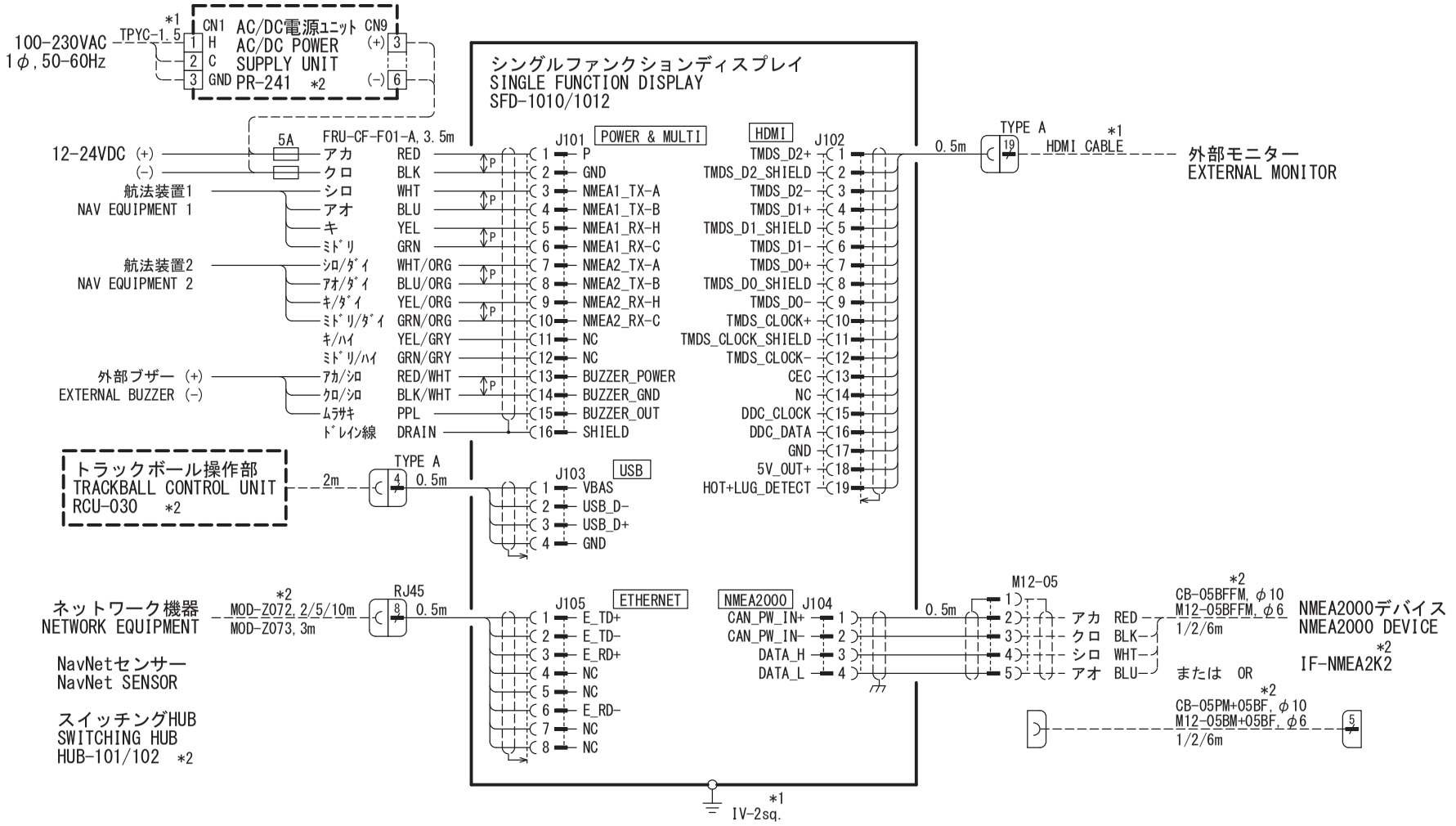
電源コネクタ
POWER CONNECTOR

注記
1）指定なき寸法公差は表1による。
2）#印は最小サービス空間寸法とする。
3）壁の厚さ（A）は最小5、最大20とする。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICES CLEARANCE.
3. BULKHEAD THICKNESS (A): 5≦A≦20.

DRAWN 3/Aug/2021 U.PODDAR		TITLE	SFD-1012
CHECKED 3/Aug/2021 T.YAMASAKI		名称	シングルファンクションディスプレイ（埋込装備S）
APPROVED 6/Jul/2022 H.MAKI			外寸図
SCALE 1/5 MASS 2.4 ±10% kg	質量は複合信号ケーブルを含む。 MASS INCLUDES MULTI-SIGNAL CABLE.	NAME	SINGLE FUNCTION DISPLAY(FLASH MOUNT S)
DWG.No. C4518-G04-A	REF.No. SFD-1012-MOUNT-02-2D		OUTLINE DRAWING

FURUNO



注記
＊１）造船所手配。
＊２）オプション。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.

DRAWN 25/Oct/2024 T. YAMASAKI			TITLE SFD-1010/1012
CHECKED 30/Oct/2024 A. Murao			名称 シングルファンクションディスプレイ
APPROVED 30/Oct/2024 A. Murao			相互結線図
SCALE	MASS kg		NAME SINGLE FUNCTION DISPLAY
DWG. No. C4517-C01- C	REF. No.		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

INDEX

Numerics

3D Sounder History Display 4-21
Bathymemtry smoothing 4-26
Calibration of bottom echo 4-25
Current setting 4-32
Fish school echo detection level 4-25
Moving, zoom in, zoom out, registering and recalling the viewpoint position 4-21
Net setting 4-33
Picture advance speed 4-28
School of fish data and icon 4-23
Bottom depth shading, fish depth shading 4-29
Stopping display advancement 4-24
Terrain shading 4-27

A

Adjust the bottom range shift 4-3
Changing the transmission rate 4-4
Adjusting Gain (Radar) 2-8
Alarm setting (DFF-3D) 4-54
Fish Alarm Setting 4-54
Water Temperature Alarm Setting 4-55
Water Depth Alarm Setting 4-55
Ship Speed Alarm Setting 4-56
Alarm setting (Fish Finder) 3-23
Description of each alarm function 3-24
Fish Alarm Setting 3-24
Water Temperature Alarm Setting 3-27
Water Depth Alarm Setting 3-28
Ship Speed Alarm Setting 3-28
Alert List (Radar) 2-35
Alert List 6-4
Fish Finder 6-4
Multi Beam Sonar 6-4
Radar 6-4
Single Beam PBG 6-5
A-Scope Display 3-14

B

Background color setting 4-3
Basic operation of DFF-3D 4-1
Menu operation 4-2
Transmission/stand-by 4-1
Bottom Discrimination Function 3-21
Brill Adjustment 1-5
Buzzer 2-23

C

Changing Picture Advance Speed 3-12
Connection of each sensor 5-10
Controls 1-1
Cross Section 4-16
Sound Speed Correction 4-18
Showing/Hiding Grid 4-16
Smoothing echoes (distance) 4-17
Smoothing echoes (time) 4-18
Zoom display 4-17
Cursor 2-12

D

Data (DFF-3D) 4-57
Demo (DFF-3D) 4-62
DFF-3D Self Test 4-63
Display 4-6
Display Brilliance 1-5
Display Brilliance 1-5
Panel Brilliance 1-5
Display Curve 2-34
Display indications 1-8
Fish Finder display 1-10
Radar display 1-8
Multi Beam Sonar Display 1-12
3D History mode 1-15
Cross Section mode 1-14
Multi beam fish finder Mode 1-12
PBG display 1-17
Side Scan Mode 1-13
Display Modes (Fish Finder) 3-4
Display Modes 3-5
Selecting a display mode 3-4
Display Modes (Radar) 2-6
Display Modes 2-7
Selecting a display mode 2-6
Display Range (Shift Function) 3-11
Display setting 4-52
Screen setting 4-53
Individual setting 4-52

E

Echo Averaging Function 2-33
Echo trail function 2-28
Adjust trail color 2-31
Echo Trails Reset 2-28
Echo Trail Time 2-28
Trail Gradation 2-30
Trail Mode 2-29
Trail Level 2-31
Erasing Weak Echoes 3-14

F

Function Assignment to the Function keys 2-32
Function Assignment to the Function keys 2-32
Function keys operation 2-32
Fish Finder operation 3-1
Menu operation 3-3
Screen display examples, InstantAccess™ Bar items 3-2
Transmission/Stand-by 3-1
Fish Information Display (ACCU-FISH™ Function) 3-19
Fish Size Value Calibration 3-20
ACCU-FISH™ Activation 3-19

G

Gain Adjustment 3-8
Setting Auto Mode 3-8
Setting Manual Mode 3-9

H

Header 3-17
Header Information 3-17
Header Scale 3-18
Heading Line and North Marker 2-13
Erasing the heading line temporarily 2-14
Heading Line 2-13
Heading Line Angle Adjustment 2-13
North marker 2-14

I

IA bar 4-58
Initial setting 5-14
Fish Finder 5-26
Bottom Detection Level 5-32
Chirp frequency setting 5-30
Data Source Settings 5-33
External KP 5-32
Fish Finder Source 5-26
Motion Sensor 5-31
NMEA0183 #1, #2 5-34
NMEA2000 5-35
Transducer 5-26
Screen Orientation 5-30
Home screen 5-14
Multi Beam Sonar 5-36
Data Source Settings 5-39
External KP 5-38
GPS Antenna Position 5-37
Motion Sensor 5-37
NMEA0183 #1, #2 5-40
NMEA2000 5-41
TLL Output 5-40
Transducer 5-36
Radar 5-18
Data Source Settings 5-23
Heading line 5-18
Main bang 5-19
NMEA0183 #1, #2 5-24
NMEA2000 5-25
Own ship mark 5-20
Own ship mark size 5-21
Timing 5-18
Sector Blank 5-21
Installation Menu 2-53
Initialization Menu 2-52
Interference Rejection 2-15

L

Language 5-42

M

Menu Setting Window 1-6
Adjustment-type window 1-6
Confirmation-type window 1-7
List-type window 1-6
Popup-type window 1-7
Toggle-type window 1-7
Motion Sensor Setting 5-43
Mounting 5-1
Desktop mount 5-1
Flush mount 5-3
Mounting Place 5-1

Multi beam fish finder 4-11
Depth and gain indications 4-13
Picture Advance Speed 4-12
Single beam/Triple beam 4-11
TX beam angle 4-12
TX beam width 4-12

N

NMEA2000 connector 5-11
Noise Rejection 2-16

O

Off center 2-25

P

PBG 4-34
COG line 4-36
Contour Line 4-42
Delete All PBG Data 4-51
Delete Spot PBG Data 4-50
Depth Shading Setting 4-39
Depth Text 4-43
Grid and change its interval 4-41
Heding line 4-35
Import/Export and Eject USB Storage 4-49
Measure Depth 4-45
Off Center 4-38
PBG Range 4-48
PBG Recording 4-34
Recording Limiter 4-46
Single Beam Rec. Radius 4-47
Terrain Shading 4-38
Track 4-44
Past Pictures Display 3-29
Periodic Checks 6-1
Picture Interpretation 3-32
Power On/Off 1-4

R

Radar operation 2-1
Menu operation 2-4
Screen display examples, InstantAccess™ Bar 2-3
Transmissions/stand-by 2-1
Tuning 2-5
Working indicator 2-2
Radar Self Test 2-49
Range 3-7
Range sca le 2-7
Range to a Target 2-17
Fixed range rings brilliance 2-17
Variable Range Marker (VRM) 2-19
VRM unit 2-19
Reducing Interference 3-13
Reducing Rain Clutter 2-11
Reducing Sea Clutter 2-8
Reducing the Short Distance Gain (TVG Function) 3-30
Replacing the Fuse 6-2

S

Screen Display Colors (Fish Finder) 3-16
Display Colors 3-16
Screen Display Colors (Radar) 2-35
Brilliance of marks, heading line and characters 2-38
Display Colors 2-35
User setting 2-36
SCX Setting 5-44
Service Menu 2-57
Antenna rotation 2-57
Operating time 2-58
Transmission time 2-59
Side scan 4-14
Echo color 4-15
Picture Advance Speed 4-15
Single Beam PBG 4-66
Single Beam Rec. Radius 4-67
System menu (DFF-3D) 4-60
System menu (Fish Finder) 3-36
Calibration menu 3-38
Demonstration menu 3-41
Import/Export Settings, Ejecting USB Storage Safely menu 3-41
Initialization 3-43
Keypad menu 3-37
Language menu 3-38
Range menu 3-37
System menu 3-36
Tests 3-41
Units menu 3-38

T

Target Alert 2-21
Acknowledge Alert 2-23
Alarm On/Off 2-23

Alert zone 2-21
Alert zone, show/hide 2-22
Automatic acquisition 2-23
Target alert activation 2-22
Target Bearing 2-20
Electronic Bearing Lines (EBL) 2-20
EBL Reference 2-21
Test Menus (DFF-3D) 4-63
Test Menus (Radar) 2-49
Antenna Test 2-51
LCD Pattern 2-50
Self Test 2-49
Time and Depth to Objects 3-10
Troubleshooting 6-2
Fish finder problems 6-3
Genral problems 6-2
Radar problems 6-3
TT operation 2-39
Cancel Tracking 2-42
Collision alert 2-47
Erasing all targets 2-43
Lost target 2-42
Proximity alert 2-47
Target acquisition and tracking 2-41
Target data (TT data) 2-45
Track display 2-45
TT display [On]/[Off] 2-39
TT symbol color 2-40
TT vector display 2-44

V

VIDEO-IN/OUT and USB Connector 5-11

W

Wiring 5-7
External buzzer 5-9
Interface waterproof 5-7
Main body (rear) interface 5-7
Multi cable 5-8
Unused conductors 5-9
Water Temperature Graph 3-31
Window Size Adjustment 3-15

Z

Zoom 2-26
Zoom mode 2-26
Zoom function 2-27

Declaration of Conformity

[SFD-1010/1012]

Bulgarian (BG)	С настоящото Furuno Electric Co., Ltd. декларира, че гореспоменат тип радиосъоръжение е в съответствие с Директива 2014/53/EC, SI 2017/1206. Цялостният текст на EC/UK декларацията за съответствие може да се намери на следния интернет адрес:
Spanish (ES)	Por la presente, Furuno Electric Co., Ltd. declara que el tipo de equipo radioeléctrico arriba mencionado es conforme con la Directiva 2014/53/UE, SI 2017/1206. El texto completo de la declaración de conformidad de la EU/UK está disponible en la siguiente dirección Internet:
Czech (CS)	Tímto Furuno Electric Co., Ltd. prohlašuje, že výše zmíněné typ rádiového zařízení je v souladu se směrnicí 2014/53/EU, SI 2017/1206. Úplné znění EU/SK prohlášení o shodě je k dispozici na této internetové adrese:
Danish (DA)	Hermed erklærer Furuno Electric Co., Ltd., at ovennævnte radioudstyr er i overensstemmelse med direktiv 2014/53/EU, SI 2017/1206. EU/UK-overensstemmelseserklæringens fulde tekst kan findes på følgende internetadresse:
German (DE)	Hiermit erklärt die Furuno Electric Co., Ltd., dass der oben genannte Funkanlagentyp der Richtlinie 2014/53/EU, SI 2017/1206 entspricht. Der vollständige Text der EU/UK-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar:
Estonian (ET)	Käesolevaga deklareerib Furuno Electric Co., Ltd., et ülalmainitud raadioseadme tüüp vastab direktiivi 2014/53/EL, SI 2017/1206 nõuetele. EL/GB vastavusdeklaratsiooni täielik tekst on kättesaadav järgmisel internetiaadressil:
Greek (EL)	Με την παρούσα η Furuno Electric Co., Ltd., δηλώνει ότι ο προαναφερθέντας ραδιοεξοπλισμός πληροί την οδηγία 2014/53/ΕΕ, SI 2017/1206. Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ/UK διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο:
English (EN)	Hereby, Furuno Electric Co., Ltd. declares that the above-mentioned radio equipment type is in compliance with Directive 2014/53/EU, SI 2017/1206. The full text of the EU/UK declaration of conformity is available at the following internet address:
French (FR)	Le soussigné, Furuno Electric Co., Ltd., déclare que l'équipement radioélectrique du type mentionné ci-dessus est conforme à la directive 2014/53/UE, SI 2017/1206. Le texte complet de la déclaration UE/RU de conformité est disponible à l'adresse internet suivante:
Croatian (HR)	Furuno Electric Co., Ltd. ovime izjavljuje da je gore rečeno radijska oprema tipa u skladu s Direktivom 2014/53/EU, SI 2017/1206. Cjeloviti tekst EU/UK izjave o sukladnosti dostupan je na sljedećoj internetskoj adresi:
Italian (IT)	Il fabbricante, Furuno Electric Co., Ltd., dichiara che il tipo di apparecchiatura radio menzionato sopra è conforme alla direttiva 2014/53/UE, SI 2017/1206. Il testo completo della dichiarazione di conformità UE/RU è disponibile al seguente indirizzo Internet:
Latvian (LV)	Ar šo Furuno Electric Co., Ltd. deklarē, ka augstāk minēts radioiekārta atbilst Direktīvai 2014/53/ES, SI 2017/1206. Pilns ES/AK atbilstības deklarācijas teksts ir pieejams šādā interneta vietnē:
Lithuanian (LT)	Aš, Furuno Electric Co., Ltd., patvirtinu, kad pirmiau minėta radijo įrenginių tipas atitinka Direktyvą 2014/53/ES, SI 2017/1206. Visas ES/JK atitikties deklaracijos tekstas prieinamas šiuo interneto adresu:
Hungarian (HU)	Furuno Electric Co., Ltd. igazolja, hogy fent említett típusú rádióberendezés megfelel a 2014/53/EU, SI 2017/1206 irányelvnek. Az EU/EK-megfelelőségi nyilatkozat teljes szövege elérhető a következő internetes címen:
Maltese (MT)	B'dan, Furuno Electric Co., Ltd., niddikjara li msemmija hawn fuq-tip ta' tagħmir tar-radju huwa konformi mad-Direttiva 2014/53/UE, SI 2017/1206. It-test kollu tad-dikjarazzjoni ta' konformità tal-UE/RU huwa disponibbli f'dan l-indirizz tal-Internet li ġej:
Dutch (NL)	Hierbij verklaar ik, Furuno Electric Co., Ltd., dat het hierboven genoemde type radioapparatuur conform is met Richtlijn 2014/53/EU, SI 2017/1206. De volledige tekst van de EU/VK-conformiteitsverklaring kan worden geraadpleegd op het volgende internetadres:
Polish (PL)	Furuno Electric Co., Ltd. niniejszym oświadcza, że wyżej wymieniony typ urządzenia radiowego jest zgodny z dyrektywą 2014/53/UE, SI 2017/1206. Pełny tekst deklaracji zgodności UE/UK jest dostępny pod następującym adresem internetowym:
Portuguese (PT)	O(a) abaixo assinado(a) Furuno Electric Co., Ltd. declara que o mencionado acima tipo de equipamento de rádio está em conformidade com a Diretiva 2014/53/UE, SI 2017/1206. O texto integral da declaração de conformidade da EU/UK está disponível no seguinte endereço de Internet:
Romanian (RO)	Prin prezenta, Furuno Electric Co., Ltd. declară că echipamentul radio menționat mai sus este în conformitate cu Directiva 2014/53/UE, SI 2017/1206. Textul integral al declarației de conformitate UE/RU este disponibil la următoarea adresă internet:
Slovak (SK)	Furuno Electric Co., Ltd. týmto vyhlasuje, že vyššie spomínané rádiové zariadenie typu je v súlade so smernicou 2014/53/EÚ, SI 2017/1206. Úplné EÚ/SK vyhlásenie o zhode je k dispozícii na tejto internetovej adrese:
Slovenian (SL)	Furuno Electric Co., Ltd. potrjuje, da je zgoraj omenjeno tip radijske opreme skladen z Direktivo 2014/53/EU, SI 2017/1206. Celotno besedilo izjave EU/ZK o skladnosti je na voljo na naslednjem spletnem naslovu:
Finnish (FI)	Furuno Electric Co., Ltd. vakuuttaa, että yllä mainittu radiolaitetyyppi on direktiivin 2014/53/EU, SI 2017/1206 mukainen. EU/UK-vaatimustenmukaisuusvakuutuksen täysimittainen teksti on saatavilla seuraavassa internetosoitteessa:
Swedish (SV)	Härmed försäkrar Furuno Electric Co., Ltd. att ovan nämnda typ av radioutrustning överensstämmer med direktiv 2014/53/EU, SI 2017/1206. Den fullständiga texten till EU/Storbritannien-försäkran om överensstämmelse finns på följande webbadress:

Online Resource
http://www.furuno.com/en/support/red_doc

Notice for radiated immunity

The test for the radiated immunity is performed up to 2.7 GHz only without the special condition of spot frequency being applied. There is a chance that this equipment may interfere with allocated services in the frequency range of 2.7 GHz to 6 GHz, particularly in harbors, rivers, lake banks, etc.