FURUNO

OPERATOR'S MANUAL

MARINE RADAR

FAR-2218
FAR-2218-BB
FAR-2228
FAR-2228-BB
FAR-2238S
FAR-2238S-BB
FAR-2238S-NXT
FAR-2238S-NXT-BB
FAR-2258
FAR-2268DS
FAR-2318
FAR-2328
FAR-2338S
FAR-2338S-NXT

Model

(FISHING SPECIFICATION)

FURUNO ELECTRIC CO., LTD.

www.furuno.com

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

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・FURUNO Authorized Distributor/Dealer

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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 instructions 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 the 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: Ridderhaven 19B, 2984 BT Ridderkerk, 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.
- InstantAccess bar™ is a registered trademark of FURUNO Electric co., Ltd.
- SDHC is a registered trademark of SD-3C, LLC.
- All brand, product names, trademarks, registered trademarks, and service marks belong to their respective holders.

How to discard this product

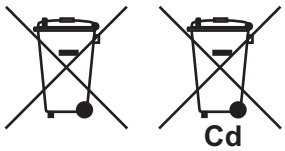
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (http://www.eiae.org/) for the correct method of disposal.

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. Follow the instructions below if a battery is used. Tape the + and - terminals of battery before disposal to prevent fire, heat generation caused by short circuit.

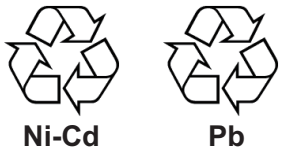
In the European Union

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



In the USA

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



In the other countries

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

⚠ SAFETY INSTRUCTIONS

The operator must read the applicable safety instructions before attempting to operate the equipment.

⚠ DANGER	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Warning, Caution Prohibitive Action Mandatory Action

⚠ WARNING

Radio Frequency Radiation Hazard

The radar antenna emits electromagnetic radio frequency (RF) energy that can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance. Distances at which RF radiation level of 100, 50 and 10 W/m^2 are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible. Ask your FURUNO representative or dealer to provide this feature.

	Model	Transceiver	Magnetron	Antenna*	100 W/m^2	50 W/m^2	10 W/m^2
Magnetron radar	FAR-2218(-BB) FAR-2318	RTR-105 (12 kW)	FNE1201	XN12CF	0.6 m	1.4 m	4.4 m
				XN20CF	0.4 m	0.9 m	3.0 m
				XN24CF	0.3 m	0.6 m	2.5 m
	FAR-2228(-BB) FAR-2328	RTR-106 (25 kW)	MG5436	XN12CF	1.3 m	2.7 m	9.5 m
				XN20CF	1.0 m	1.7 m	6.8 m
				XN24CF	0.7 m	1.3 m	5.5 m
	FAR-2238S(-BB) FAR-2338S	RTR-107 (30 kW)	MG5223F	SN24CF**	1.7 m	2.4 m	3.8 m
				SN30CF**	1.4 m	2.1 m	3.4 m
				SN36CF	N/A	0.5 m	4.6 m
	FAR-2258	RTR-122 (50 kW)	9M31	XN24AF	2.3 m	4.5 m	13.9 m
				XN30AF	2.3 m	4.3 m	13.9 m
	FAR-2268DS	RTR-129 (60 kW)	MG5240F	SN30AF**	1.42 m	3.15 m	15 m
				SN36AF**	1.3 m	3.0 m	16 m
				SN30DF**	1.65 m	3.3 m	15.6 m
Solid state radar	FAR-2238S-NXT(-BB) FAR-2338S-NXT	RTR-111 (250 W)	———	SN24CF**	N/A	N/A	N/A
				SN30CF**	N/A	N/A	N/A
				SN36CF	N/A	N/A	1.0 m

*: The following numerical values, shown in the antenna types, indicate antenna length.
[12]: 4 ft, [20]: 6.5 ft, [24]: 8 ft, [30]: 10 ft, [36]: 12 ft

**: Unavailable on IMO-type radars

⚠ WARNING

ELECTRICAL SHOCK HAZARD. Do not open the equipment.

Only qualified personnel should work inside the equipment.

Turn off the radar power switch before servicing the antenna unit. Post a warning sign near the switch indicating it should not be turned on while the antenna unit is being serviced.

If the antenna rotates while there is personnel nearby or servicing the antenna, injury or death may result.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Immediately turn off the power at the ship's mains switchboard if water leaks into the equipment or the equipment is emitting smoke or fire.

Continued use can cause fatal damage to the equipment.

Keep the area around the antenna free of ropes and other items that may get tangled.

If the antenna becomes tangled, damage to the equipment or injury to personnel may occur.

Make sure no rain or water splash leaks into the equipment.

Fire or electrical shock can result if water leaks into the equipment.

⚠ WARNING

Use the proper fuse.

Use of a wrong fuse can result in damage to the equipment or cause fire.

Keep heater away from equipment.

Heat can alter equipment shape and melt the power cord, which can cause fire or electical shock.

Do not place liquid-filled containers near the equipment.

Fire or electrical shock can result if a liquid spills into the equipment.

Do not operate the equipment with wet hands.

Electrical shock can result.

Before servicing the radar, turn off the appropriate external breaker.

Power is not removed from the radar simply by turning off its power switch.

This equipment has a valid latitude range of 85°N to 85°S. Operation outside of this range can result in a larger margin of error when calculating position, heading, bearing, etc.

⚠ WARNING

No one navigational aid should be relied upon for the safety of vessel and crew. The navigator has the responsibility to check all aids available to confirm position. Electronic aids are not a substitute for basic navigational principles and common sense.

- This TT automatically tracks automatically or manually acquired radar targets and calculates their courses and speeds, indicating them by vectors. Since the data generated by the auto plotter are based on what radar targets are selected, the radar must always be optimally tuned for use with the auto plotter, to ensure required targets will not be lost or unwanted targets such as sea returns and noise will not be acquired and tracked.
- A target does not always mean a land-mass, reef, ships or other surface vessels but can imply returns from sea surface and clutter. As the level of clutter changes with environment, the operator should properly adjust the A/C SEA, A/C RAIN and GAIN controls to be sure target echoes are not eliminated from the radar screen.

⚠ CAUTION

The plotting accuracy and response of this TT meets IMO standards. Tracking accuracy is affected by the following:

- Tracking accuracy is affected by course change. One to two minutes is required to restore vectors to full accuracy after an abrupt course change. (The actual amount depends on gyrocompass specifications.)
- The amount of tracking delay is inversely proportional to the relative speed of the target. Delay is on the order of 15 - 30 seconds for high relative speed; 30 - 60 seconds for low relative speed.
- The target tracking and pertinent vector calculation accuracy is influenced by the following:
  - Echo intensity
  - The range measurement accuracy; characterized by both random and biased measurement errors.
  - The angular measurement accuracy; characterized by beam shape, target glint and bias errors.
  - Radar transmission pulsewidth
  - Gyrocompass heading error
  - Speed log error
  - Curent and wind (set & drift)
  - Course change (own ship and target)

The data generated by TT, AIS and video plotter are intended for reference only.

Refer to official nautical charts for detailed and up-to-date information.

Do not depend on one navigation device for the navigation of the vessel.

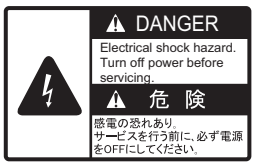
Always check your position against all available aids to navigation, for the safety of the vessel and crew.

This equipment is not suitable for use in locations where children are likely to be present.

WARNING LABEL

Warning labels are attached to the equipment. Do not remove any label. If a label is missing or damaged, contact a FURUNO agent or dealer about replacement.

DISPLAY UNIT, POWER SUPPLY UNIT & PROCESSOR UNIT
Name: Warning Label 1
Type: 86-003-1011-3
Code No.: 100-236-233-10



TRANSCEIVER UNIT (RTR-105/106/107/108/109)
Name: Warning Label
Type: 03-160-1042-0
Code No.: 100-302-750-10

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FOREWORD

A Word to the Owner of FAR-22x8/23x8 Series Marine Radar

Congratulations on your choice of the FURUNO FAR-22x8/FAR-23x8 series of radars. We are confident you will see why FURUNO has become synonymous with quality and reliability.

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

Your radar is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless installed, operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.We would appreciate hearing from you, the end-user, about whether we are achieving our goal.

Thank you for considering and purchasing FURUNO equipment.

Features

- The FAR-2xx8 series consists of the following models and configurations:
  Magnetron radar

Model	Frequency band	Size of monitor unit*	Output power	Transceiver location
FAR-2218	X-band	19.0”	12 kW	Antenna unit
FAR-2218-BB		Local supply	12 kW	
FAR-2318		23.1”/27”	12 kW	
FAR-2228		19.0”	25 kW	
FAR-2228-BB		Local supply	25 kW	
FAR-2328		23.1”/27”	12 kW	
FAR-2258		Local supply	50 kW	
FAR-2238S	S-band	19.0”	30 kW	Antenna unit
FAR-2238S-BB		Local supply	30 kW	
FAR-2338S		23.1”/27”	30 kW	
FAR-2268DS		Local supply	60 kW	

  Solid state radar

Model	Frequency band	Size of monitor unit*	Output power	Transceiver location
FAR-2238S-NXT	S-band	19.0”	250 W	Antenna unit
FAR-2238S-NXT-BB		Local supply	250 W	Antenna unit
FAR-2338S-NXT		23.1”/27”	250 W	Antenna unit

  *: Viewing distances are as follows: MU-190/MU-270W: 1020 mm; MU-231: 1200 mm.
- Two methods of operation are available: RCU-014/RCU-031 (standard supply control unit) and RCU-015/RCU-016 (optional trackball unit). The ergonomically designed palm rest on the RCU-015/RCU-016 makes them easy to use.
- Simple operation with “point-and-click” menu functionality.
- All functions can be accessed using only the trackball unit.

- TT, AIS*, Radar Map and Interswitch are supplied as standard.
  *: Requires connection to a compatible AIS transponder.
- FURUNO's unique Target Analyzer function helps to find targets in high noise areas (rain/snow), or where there is interference from surface reflections (C-types only).
- The Automatic Clutter Elimination (ACE) function detects sea and rain clutter from received echoes' and automatically reduces sea and rain clutter accordingly.
- Targets activate the user-set alarm/acquisition zone when entering or exiting the zone.
- CPA/TCPA alarms.
- Radar screen can be overlaid with the chart display (C-types only).
- Full plotter functionality (C-types only).
- The FAR-2xx8 series complies with MED 2014/90/EU* and also the following directives: IEC62388, IEC 62288, IMO MSC. 192(79)*.
  *: Excludes FAR-2258 and FAR-2268DS.

Radar Type and Function Availability

The software for advanced fishing specifications is available in two specification types, and function availability depends on specification type. The table below shows the function that have limited availability. This manual provides descriptions for all functions of this radar series, and we have endeavored to denote in the text those functions that have limited availability. For detailed information on the function availability, see the menu tree at the back of this manual.

Type abbreviations and their meanings

- IMO: Meets the IMO requirements and is compliant with IMO regulations
- C: Advanced fishing specifications

Function availability and specification type

Function	Type	
	IMO	C
Echo area configuration	No	Yes
Target Analyzer	No	Yes
Customized echo - assign name	No	Yes
Trails - 5-step gradation	No	Yes
Trail Eraser	No	Yes
Trails - Long	No	Yes
Trails - Hide	No	Yes
Trails - Narrow	No	Yes
Trails - Color	No	Yes
Echo Average level 4	No	Yes
True view	No	Yes
Marks - No. available	Max. 20,000	Max. 30,000
Area Marks	No	Max. 50
ECDIS marks	Yes	No
Marks filter	No	Yes
Mark information display	No	Yes
Mark comment display	No	Yes
Own track - Points	Max. 20,000	Memory capacity: Max. 30,000 Display capacity: Max. 10,000
Own track - Edit	No	Yes

Function	Type	
	IMO	C
Own track - Color	No	Yes
Own track - Stop/start plotting	No	Yes
Own track - Save intervals	[OFF], [DRAW ONLY] with intervals of 10s, 30s, 1min, 2min, 3min, 6min, 15min	[OFF], [TRACK INTERVAL 1], [TRACK INTERVAL 2] with time intervals of 0s to 59m59s or distance intervals of 0NM to 9.99NM.
Other tracks - Points	No	• TT targets: Memory capacity: Max. 100,000 Display capacity: Max. 10,000 • AIS targets: Memory capacity: Max. 10,000 Display capacity: Max. 10,000 • Consort vessels: Memory capacity: Max. 10,000 Display capacity: Max. 1,000 • GPS buoys: Memory capacity: Max. 10,000 Display capacity: Max. 1,000
Other tracks - Edit	No	Yes
Other tracks - Stop/start plotting	No	Yes
Other tracks - Save intervals	No	[OFF], [TRACK INTERVAL 1], [TRACK INTERVAL 2] with time intervals of 0s to 59m59s or distance intervals of 0NM to 9.99NM.
Chart Display	No	Yes
Individual contour line display	No	Yes
WPT - No. of marks	Max. 200 (+1 external)	Max. 3,500 (+100 external)
PI lines - No. of lines	Max. 6	Max. 11
PI lines - Mode	No	Yes
PI lines - Linked to EBL/VRM	No	Yes
PI lines - Color	No	Yes
Range	[0.125], [0.25], [0.5], [0.75], [1.5], [3], [6], [12], [24], [48], [96]	[0.025]*1, [0.05]*1, [0.075]*1, [0.1m]*1, [0.125]*2, [0.25], [0.5], [0.75], [1], [1.5], [2], [3], [4], [6], [8], [12], [16], [24], [32], [48], [96], [120]*3
Range unit	[NM] only	[NM], [SM], [km], [kyd]
Range rings - No. available	Fixed	Max. 6 rings
Range rings - 32 point display	No	Yes
VRM - Unit selection	No	Yes
VRM - Close distance unit	No	Yes
Cursor - Range unit selection	No	Yes
Cursor - Size	No	Yes
Cursor - Enlarged information box	No	Yes
Cursor - Color	No	Yes
Net Cursor	No	Yes
Circle Cursor	No	Yes
Plotter-related alerts (XTE, arrival, departure, intrusion, temp., sheer, depth)	No	Yes

Function	Type	
	IMO	C
Acquisition zone - Check area around ship	No	Yes
TT - Symbol selection, symbol color, individual settings for symbols	No	Yes
TT - Vector line type	No	Yes
TT - Acquisition by target type	No	Yes
TT - Lat./Long. data display	No	Yes
TT - Display up to 5 targets' data in information area	No	Yes
AIS - Symbol color	No	Yes
GPS buoy display	No	Yes
Consort vessel - display	No	Yes
Trial Maneuver	Yes	No
Data import from other equipment	No (File conversion required)	Yes
Magnetic bearing input and display	No	Yes
Alternative positioning systems (LORAN, DECCA, TOKYO datum)	No	Yes
Date/time display format selection	No	Yes
Echoes in multi-color	No	Yes
Echoes in amber color	No	Yes
Chart/Plotter brilliance adjustment	No	Yes
User settings, Pilot settings	Yes	No
Shuttle Ferry mode	Yes	No
Simplified screen layout	No	Yes
Display Scroll	No	Yes
Customizable [CURSOR] menu	No	Yes
Function keys - [CURSOR CENTER/ DISPLAY MODE] function	No	Yes
Show/hide the cursor	No	Yes
Function keys - Assign multiple functions	No	Yes
Origin marks	Max. 20	Max. 40

*1: Available only when radar is transmitting.

*2: Not available if using [km/kyd] range units and radar is transmitting.

*3: Available only when the range unit is set to [NM] or [SM].

Signal processing functions

This radar has the signal processing functions listed in the table below.

Function	Description	Reference
Interference rejector	Suppresses interference by other radars. Interference received simultaneously from multiple radars may be difficult to reduce.	See section 1.22
Echo stretch	Enlarges target echoes, especially small echoes. Suppress interference, sea clutter and rain clutter before using echo stretch, to prevent enlargement of unwanted echoes.	See section 1.23
Echo averaging	The radar samples echoes with each scan. Targets that show a large change with each scan are judged as clutter and are reduced to display only echoes from legitimate targets.	See section 1.24
Automatic clutter elimination	Discriminates clutter from the radar echo, then reduces the clutter automatically.	See section 1.25
Noise rejector	Reduces white noise then improves the on-screen S/N ratio by processing the weighted moving average filter for the received echoes in the range direction. Use this function with caution. Weak target echoes may disappear from the screen or the range resolution may worsen.	See section 1.26

Program numbers

Please access the following URL if you need software information:
http://www.furuno.com/en/merchant/radar/FAR-22x8_23x8/#SoftwareVersion

System	Program no.	Version no.	Remarks
Antenna unit (common to all antennas)			
SPU	0359281	01.xx	For magnetron radar (other than FAR-2258 and FAR-2268DS)
SPU	0359286	01.xx	For solid state radar
MTR-DRV	0359293	01.xx	
PM	0359296	01.xx	
RF-Converter	0359302	01.xx	For solid state radar
Processor Unit: RPU-025			
MAIN	0359377	50.xx	
SUB	0359380	50.xx	
Control Unit			
KEY	0359385	01.xx	RCU-014/RCU-015/RCU-016
KEY	0359464	01.xx	RCU-031
Power Supply Unit (FAR-2258/FAR-2268DS only)			
SPU	0359472	01.xx	

xx: Denotes minor changes to the software.

About the programs used in C-type radars

- Ubiquitous QuickBoot Copyright© 2015. Ubiquitous Corp. All right reserved.
- Portions of this software are copyright© 2016. The FreeType Project (www.freetype.org). All right reserved.
- This equipment includes GPL2.0, LGPL2.0, Apache, BSD, MIT or other licensed softwares. For further software information, please access the following URL: https://www.furuno.co.jp/en/contact/cnt_oss_e01.html

Terminology standards used in this manual

This manual uses the following terminology standards:

Terminology	Meaning or usage example
Select	• Use the trackball or scrollwheel on the control unit to move the cursor over the item to be “selected”, then left-click. • With a menu open: Press the appropriate menu number. • With the setting/value/menu selected: Spin the scrollwheel to highlight the item to be “selected”, then left-click
Left-click	Press the left mouse button.
Right-click	Press the right mouse button.
Control Unit	Refers to the RCU-014 Control Unit, unless otherwise specified.
Open the menu.	Press the **MENU** key to show the [MENU].
Close the menu.	Press the **MENU** key to close the [MENU].

For the sake of brevity, all procedures in this manual use the terms “Open the menu.” and “Close the menu”.

Unless otherwise stated, operations in this manual use the scrollwheel for procedures which require menu selection, or settings changed.

CE Declaration

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

SYSTEM CONFIGURATION

NOTICE

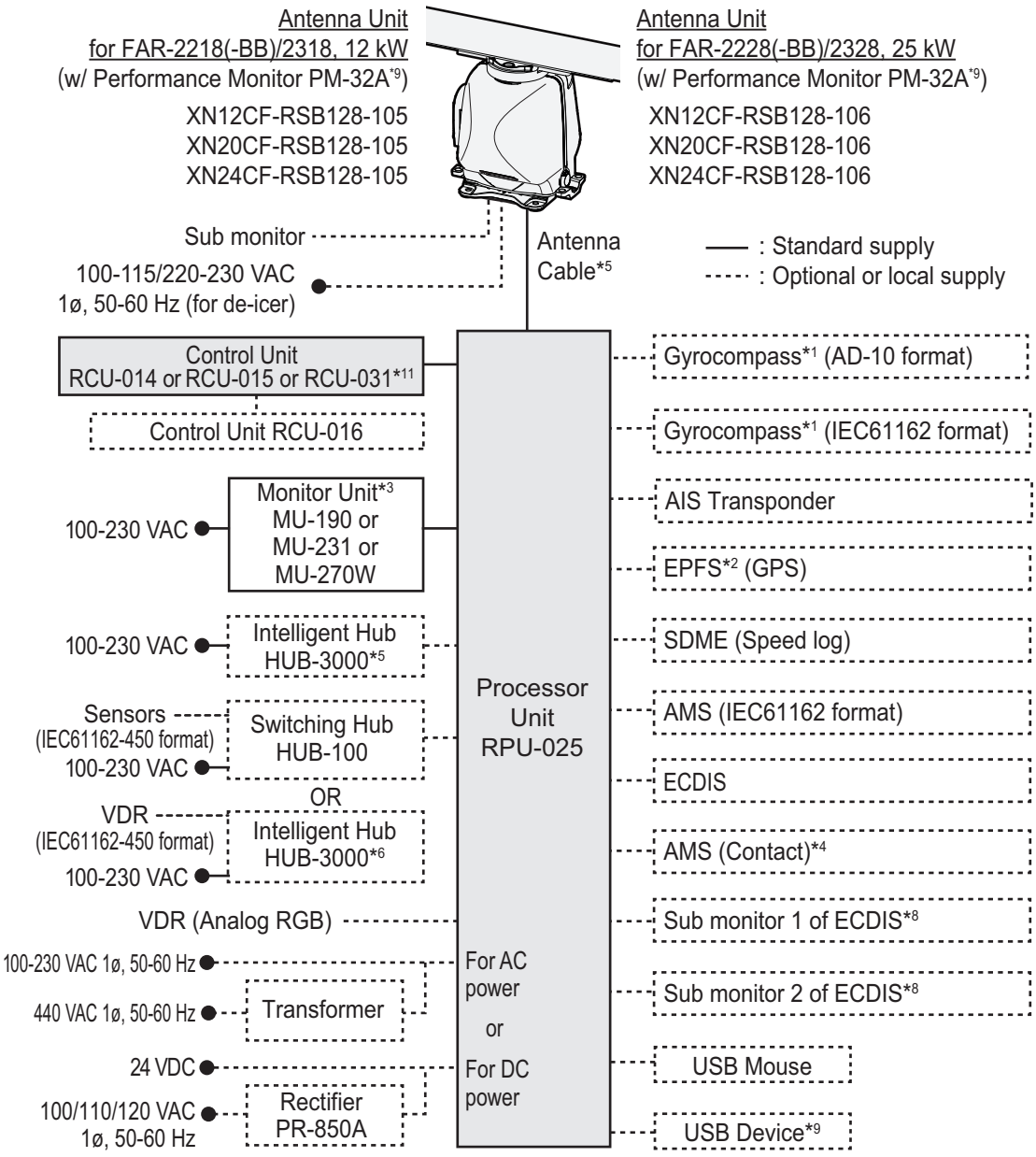
For IMO-type radars, interconnected sensors must meet the following type approval requirements. For C-type radars, it is recommended that the interconnected sensors meet these requirements:

- **Gyrocompass (or equivalent devices) meeting the requirements of the IMO resolution A.424(XI).**
- **EPFS meeting the requirements of the IMO resolution MSC.112(73).**
- **SDME meeting the requirements of IMO resolution MSC.96(72).**

The radar may be interconnected via HUB-3000 to other FURUNO processing units having approved LAN ports.

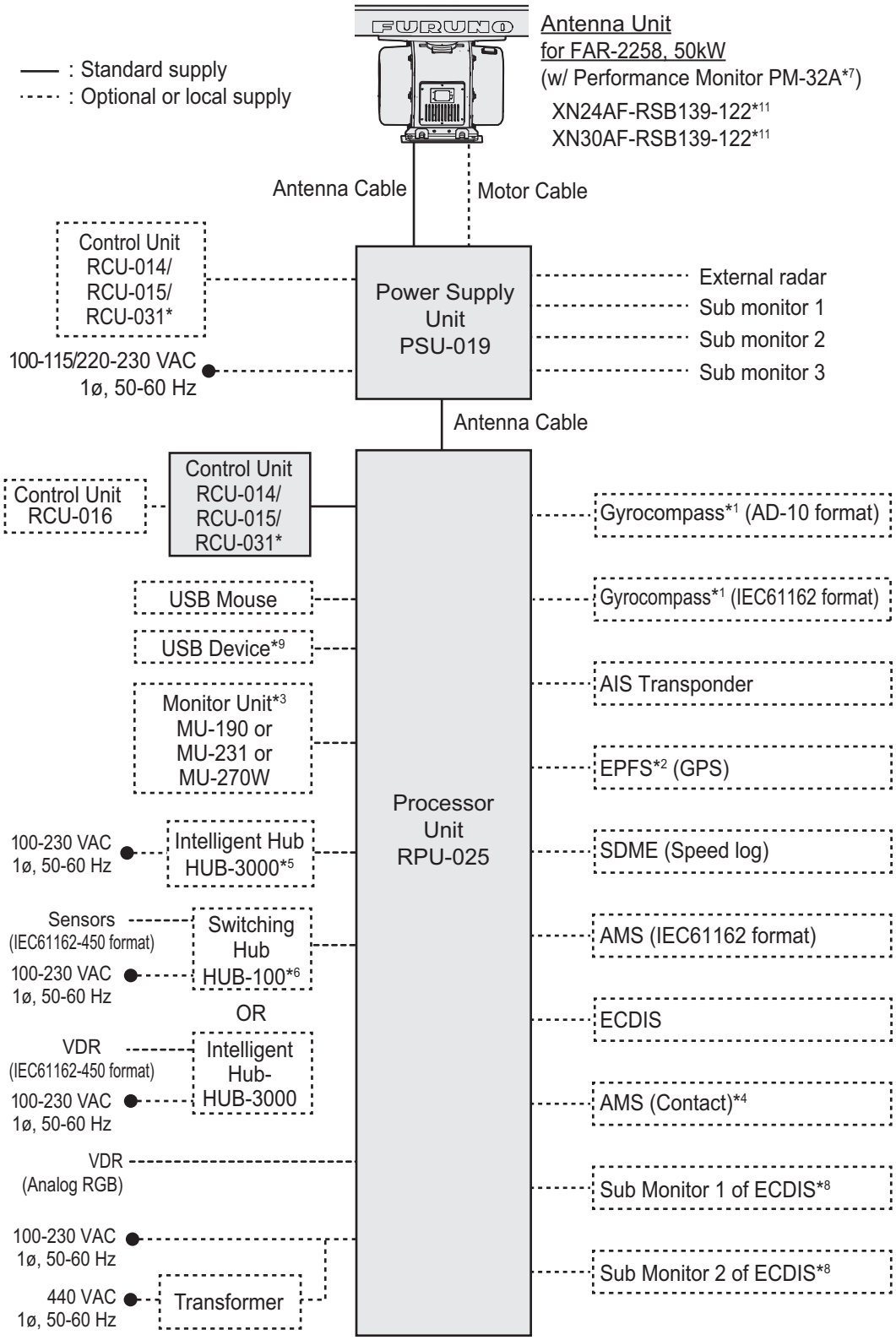
X-band: FAR-2218(-BB)/FAR-2228(-BB)/FAR-2328

Note: The footnotes for *1 to *11 are listed in "Notes" on page xxiv.



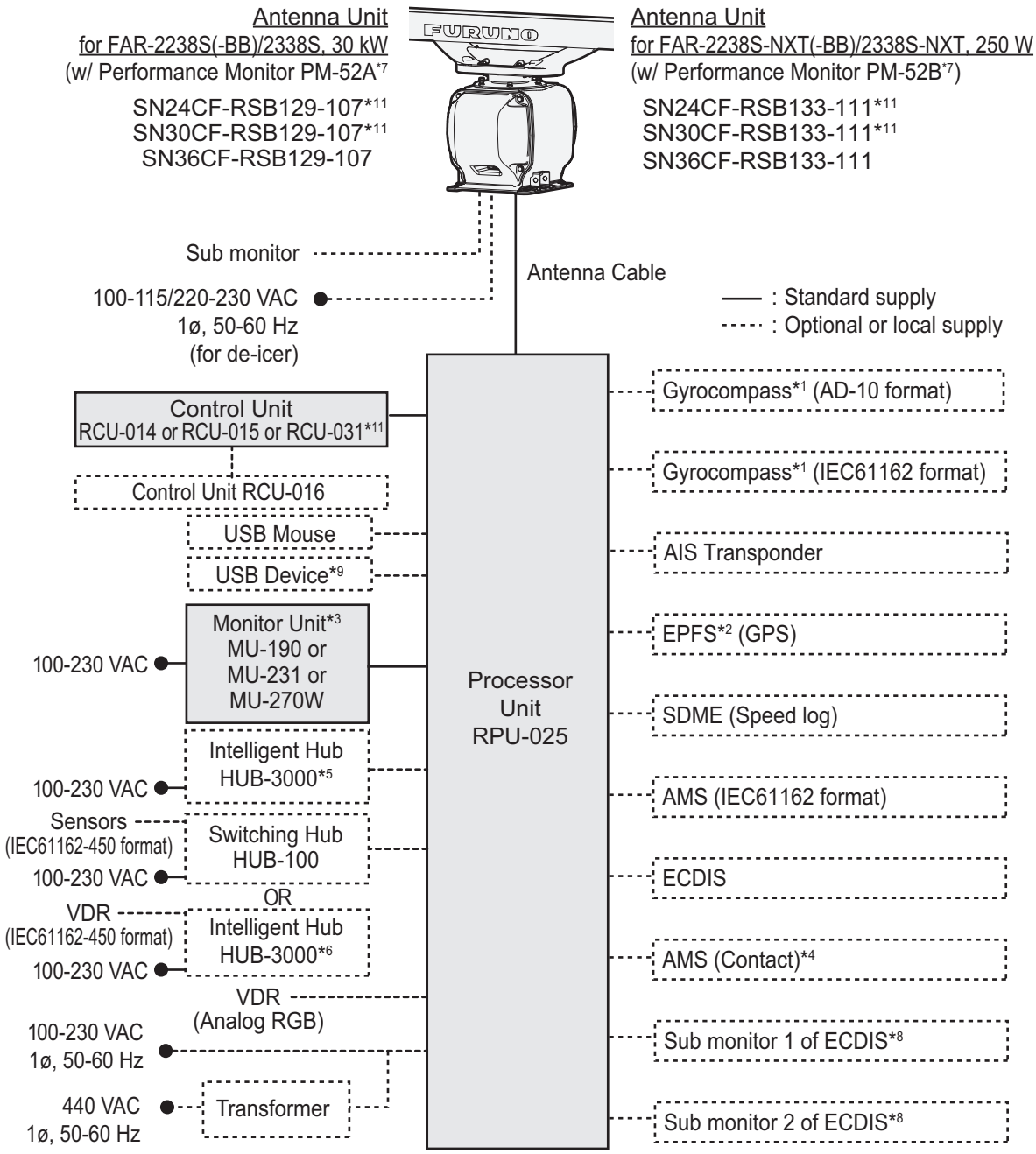
X-band: FAR-2258

Note: The footnotes for *1 to *11 are listed in "Notes" on page xxiv.



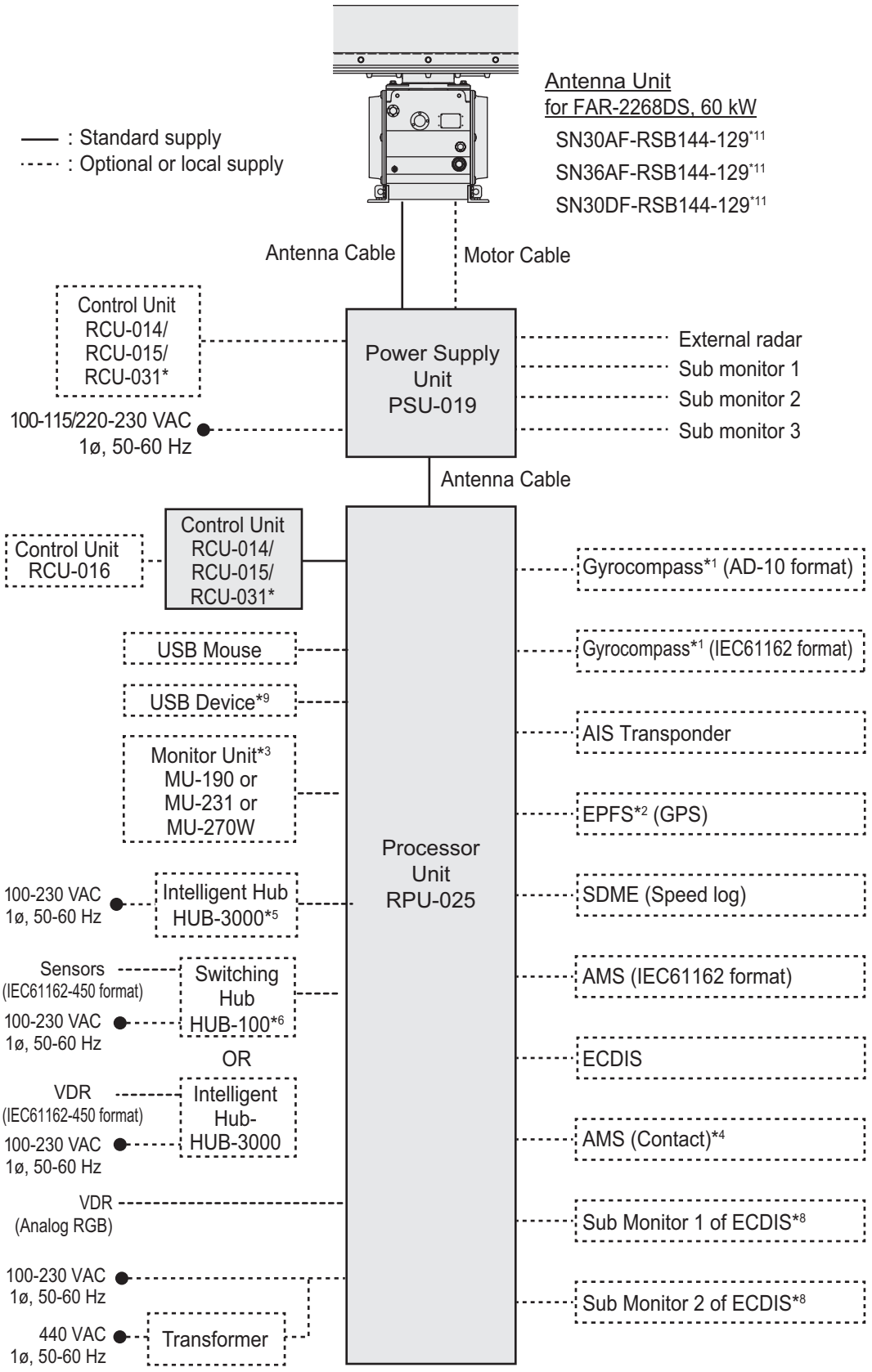
S-band: FAR-2238S(-BB)/FAR-2338S/FAR2238S-NXT(-BB)/ FAR-2338-NXT

Note: The footnotes for *1 to *11 are listed in "Notes" on page xxiv.



S-band: FAR-2268DS

Note: The footnotes for *1 to *11 are listed in "Notes" on page xxiv.



Category of units

Antenna units: Exposed to the weather.

Other units: Protected from the weather.

Notes

1) The gyrocompass must be type approved for compliance with IMO resolution A.424(XI) (and/or resolution A.821(19) for installation on HSC). The gyrocompass must also have an update rate that is adequate for the ship's rate of turn. The update rate must be better than 40 Hz (HSC) or 20 Hz (conventional vessel).
2) The EPFS must be type approved for compliance with IMO resolution MSC.112(73).
3) These monitors have been approved by the IMO, MU-190 for CAT 2 and CAT 2H, MU-231/MU-270W for CAT 1 and CAT 1H. If a different monitor is to be used on IMO vessels, its effective diameter must meet the applicable Category requirements:
   - CAT 1 and CAT 1H: effective diameter 320 mm or higher;
   - CAT 2 and CAT 2H: effective diameter 250 mm or higher.

   For installation, operation and viewing distance of other monitor, see its manuals.
   For BB type, a monitor unit is prepared by user.
4) Characteristics of contact output for Alarm:
   - (Load current) 250 mA;
   - (Polarity) Normally Open: 2 ports, Normally Close: 2 ports;
   - Serial I/O for alarm is also possible, which complies with IEC 61162-1.
5) For configurations with 3 or more radars/ECDIS (FMD-3100/FMD-3200/FMD-3300) connected, connect via the HUB-3000. For 2 radars, HUB-100 can be used. (Connection to ECDIS is not available for C-types.)
6) For configurations with a VDR connected, connect via the HUB-3000. (Connection to VDR is not available for C-types.)
7) Some antenna configurations do not have an in-built Performance Monitor. This type of antenna is not usable for IMO-type radars.
8) For connection of non-FURUNO ECDIS only. For connection of radars or plotters, the connection must be done at the radar antenna via the sub monitor connector.
9) Available for C-types only.
10) For X-Band TR-UP radars only, a junction box is required for antenna cable extension to lengths greater than 100 m. The maximum cable length is 400 m.
11) Unavailable on IMO-type radars.

1. OPERATIONAL OVERVIEW

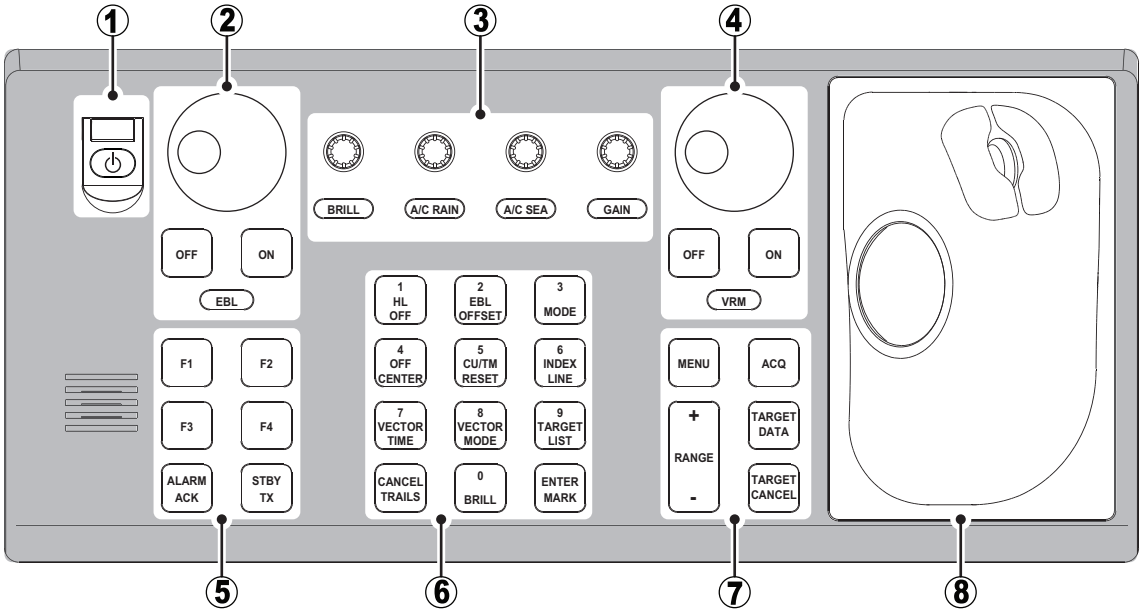
1.1 Controls Overview

Two types of control units are available for your FAR-2xx8: a full keyboard (RCU-014/ RCU-031) or palm control (RCU-015/RCU-016).

Most operations can be done with either type of Control Unit. Throughout the manual, procedures are outlined using the RCU-014, unless otherwise specified.

1.1.1 Control Unit RCU-014

You can control almost all aspects of your radar from the RCU-014. The figure and table below show an overview of the control unit with a brief description of the controls.



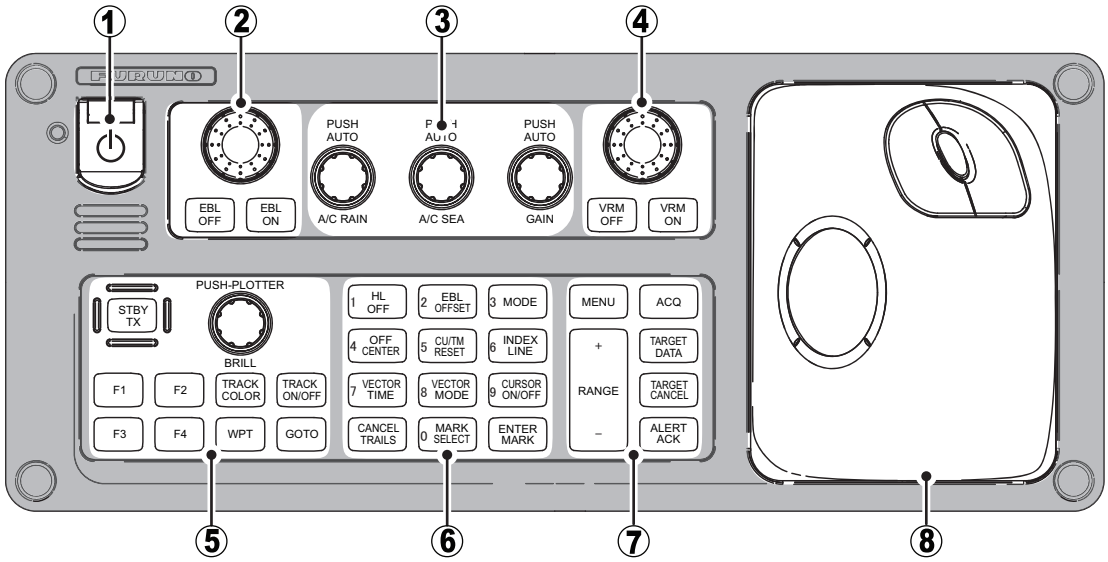
No.	Control Name	Description
1	Power button	Turn the power on or off. See section 1.2.
2	**EBL** controls	• **EBL** keys: Turn the EBLs on or off. • **EBL** knob: For IMO-types Move the selected EBL. See section 1.33. For C-types • **with the cursor shown**: adjust the direction (bearing) of EBLs, PI lines and the diamond cursor; moves the cursor up/ downwards. • **when entering marks in normal display mode**: moves the chart up/downwards.
3	**BRILL** knob	Adjust echo brilliance and screen brilliance. See section 1.3.
	A/C RAIN knob	Adjust auto/manual clutter reduction for rain. See section 1.21.
	A/C SEA knob	Adjust auto/manual clutter reduction for rough seas. See section 1.20.
	GAIN knob	Adjust the gain (sensitivity). See section 1.19.

No.	Control Name	Description
4	**VRM** controls	• **VRM** keys: Turn the VRMs on or off. • **VRM** knob: For IMO-types Move the selected VRM. See section 1.32. For C-types • **with the cursor shown**: adjust the distance (range) of VRMs or PI line intervals; moves the cursor left/rightwards. • **when entering marks in normal display mode**: moves the chart left/rightwards.
5	Functions keys (**F1** to **F4**)	• Perform a pre-registered function. See section 1.8. • **with pop up window shown**: preform the operation shown in the window.
	ALARM ACK key	Acknowledge active alerts. See section 1.53.
	STBY TX key	Toggle the radar operation between transmit (TX) and standby (STBY). See section 1.15.
6	**1**, **HL OFF** key	• **With the menu open**: Select menu item "1". • Press and hold to hide the heading line. Release to re-show the heading line. See section 1.44.1.
	2, **EBL OFFSET** key	• **With the menu open**: Select menu item "2". • Sets the positive/negative value to “+”. See section 1.13 and section 1.9. • Offset or reset the EBL. See section 1.34.
	3, MODE key	For IMO-types • **With the menu open**: Select menu item "3". • Change the orientation mode. See section 1.30. For C-types **When the MODE key is set to ORIENTATION:** Same operation as IMO-types. **When the MODE key is set to CURSOR/DISPLAY:** • With the menu open: Select menu item 3. • Show/hide the cursor.
	4, **OFF CENTER** key	• **With the menu open**: Select menu item "4". • **With the cursor shown**: enable or disable off-center. See section 1.36. • **With the cursor hidden (C-types only)**: move the screen center (OS position).
	5, **CU/TM RESET** key	• **With the menu open**: Select menu item "5". • **Course Up mode**: Reset the heading line to 000°. See section 1.30. • **True Motion mode**: Move Own Ship position 75% of the radius in opposite direction of the current heading. See section 1.30.
	6, **INDEX LINE** key	• **With the menu open**: Select menu item "6". • **Short press**: Select a PI line. See section 1.40. • **Long press**: Show or hide the selected PI line. See section 1.40.
	7, **VECTOR TIME** key	• **With the menu open**: Select menu item "7". • Change the vector time. See section 3.10.2.
	8, **VECTOR MODE** key	• **With the menu open**: Select menu item "8". • Sets the positive/negative value to “-”. See section 1.13 and section 1.9. • Toggle between true and relative vectors. See section 3.10.
	9, **TARGET LIST** key	• **With the menu open**: Select menu item "9". • Show or hide the TT/AIS target list. See section 3.9.3.

No.	Control Name	Description
6	**CANCEL TRAILS** key	Without the menu open (see section 1.37.2): • **Short press**: Change the trail display time. • **Long press**: Erase displayed trails. With the menu open (see section 1.5): • Go back one level in the menu. Closes the menu if the top level is displayed. • Cancel changes made to a menu setting.
	0, **BRILL** key	• **With the menu open**: Select menu item "0". • Change the color scheme. See section 1.46.
	ENTER MARK key	Inside the Operational Display Area (ODA): Inscribe a mark. See section 1.44. With the menu open: Confirm changes, open the selected menu. See section 1.5
7	**MENU** key	Open or close the menu the menu. See section 1.5. **Note:** The **MENU** key will not open/close the menu in the following situations: • VRM or EBL is being set. • DROP MARK or MARK is being inscribed. • Alarm Zone (AZ) or TARGET ALARM is being set.
	RANGE controls	Increase or decrease the range. See section 1.31.
	ACQ key	• Manually acquire the cursor-highlighted target for Target Tracking (TT).
	TARGET DATA key	• Show the information for the cursor-highlighted target. • Activate a sleeping AIS target. See section 3.2.
	TARGET CANCEL key	• Cancel tracking for the selected target. • Sleep the selected AIS target. • Long press: Cancel tracking for all TT targets. See section 3.2. • Delete marks/waypoints*. • Cancel character input*. *: C-type only.
8	Trackball controls	See section 1.1.3.

1.1.2 Control Unit RCU-031 (C-types only)

The figure and table below show an overview of the control unit with a brief description of the controls.



No.	Control Name	Description
1	Power button	Turn the power on or off. See section 1.2.

2	**EBL** controls	• **EBL** keys: Turn the EBLs on or off.
		• **EBL** knob:
		  • **with the cursor shown**: adjust the direction (bearing) of EBLs, PI lines and the diamond cursor; moves the cursor up/downwards.
		  • **when entering marks in normal display mode, or in standby**: moves the chart up/downwards.

3	**A/C RAIN** knob	• **Turn**: Adjust auto/manual clutter reduction for rain. See section 1.21. • **Press**: Toggle the A/C RAIN function on/off.
	A/C SEA knob	• **Turn**: Adjust auto/manual clutter reduction for rough seas. See section 1.20. • **Press**: Toggle the A/C SEA function on/off.
	GAIN knob	• **Turn**: Adjust the gain (sensitivity). See section 1.19. • **Press**: Toggle the ACE (Automatic Clutter Elimination) function on/off.

4	**VRM** controls	• **VRM** keys: Turn the VRMs on or off.
		• **VRM** knob:
		  • **with the cursor shown**: adjust the distance (range) of VRMs or PI line intervals; moves the cursor left/rightwards.
		  • **when entering marks in normal display mode, or in standby**: moves the chart left/rightwards.

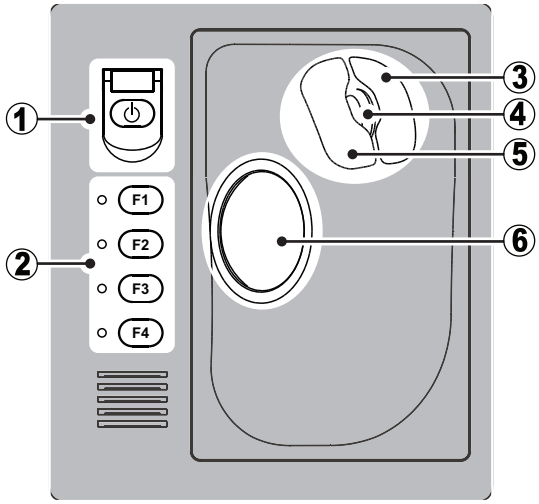
5	**STBY TX** key	Toggle the radar operation between transmit (TX) and standby (STBY). See section 1.15.
	BRILL knob	Adjust echo brilliance and screen brilliance. See section 1.3.
	Functions keys (**F1** to **F4**)	• Perform a pre-registered function. See section 1.8. • **with pop up window shown**: preform the operation shown in the window.
	TRACK COLOR key	Opens the [CHANGE TRACK COLOR] window.
	TRACK ON/OFF key	Starts/stops own ship track recording.

No.	Control Name	Description
5	**WPT** key	Opens the [WAYPOINT ENTRY] window. (Requires [ROUTE DATA SOURCE] in the [ROUTES•WAY-POINTS] to be set as [INTERNAL DATA].)
	GOTO key	Set/remove a GOTO destination.
6	**1**, **HL OFF** key	• **With the menu open**: Select menu item "1". • Press and hold to hide the heading line. Release to re-show the heading line. See section 1.44.1.
	2, **EBL OFFSET** key	• **With the menu open**: Select menu item "2". • Sets the positive/negative value to "+". See section 1.13 and section 1.9. • Offset or reset the EBL. See section 1.34.
	3, MODE key	**When the MODE key is set to ORIENTATION:** • **With the menu open**: Select menu item "3". • Change the orientation mode. See section 1.30. **When the MODE key is set to CURSOR/DISPLAY:** • With the menu open: Select menu item 3. • Show/hide the cursor.
	4, **OFF CENTER** key	• **With the menu open**: Select menu item "4". • **With the cursor shown**: enable or disable off-center. See section 1.36. • **With the cursor hidden**: move the screen center (OS position).
	5, **CU/TM RESET** key	• **With the menu open**: Select menu item "5". • **Course Up mode**: Reset the heading line to 000°. See section 1.30. • **True Motion mode**: Move Own Ship position 75% of the radius in opposite direction of the current heading. See section 1.30.
	6, **INDEX LINE** key	• **With the menu open**: Select menu item "6". • **Short press**: Select a PI line. See section 1.40. • **Long press**: Show or hide the selected PI line. See section 1.40.
	7, **VECTOR TIME** key	• **With the menu open**: Select menu item "7". • Change the vector time. See section 3.10.2.
	8, **VECTOR MODE** key	• **With the menu open**: Select menu item "8". • Sets the positive/negative value to "-". See section 1.13 and section 1.9. • Toggle between true and relative vectors. See section 3.10.
	9, **TARGET LIST** key	• **With the menu open**: Select menu item "9". • Show or hide the TT/AIS target list. See section 3.9.3.
	CANCEL TRAILS key	Without the menu open (see section 1.37.2): • **Short press**: Change the trail display time. • **Long press**: Erase displayed trails. With the menu open (see section 1.5): • Go back one level in the menu. Closes the menu if the top level is displayed. • Cancel changes made to a menu setting.
	0, **BRILL** key	• **With the menu open**: Select menu item "0". • Change the color scheme. See section 1.46.
	ENTER MARK key	Inside the Operational Display Area (ODA): Inscribe a mark. See section 1.44. With the menu open: Confirm changes, open the selected menu. See section 1.5

No.	Control Name	Description
7	**MENU** key	Open or close the menu the menu. See section 1.5. **Note:** The **MENU** key will not open/close the menu in the following situations: • VRM or EBL is being set. • DROP MARK or MARK is being inscribed. • Alarm Zone (AZ) or TARGET ALARM is being set.
	RANGE controls	Increase or decrease the range. See section 1.31.
	ACQ key	• Manually acquire the cursor-highlighted target for Target Tracking (TT).
	TARGET DATA key	• Show the information for the cursor-highlighted target. • Activate a sleeping AIS target. See section 3.2.
	TARGET CANCEL key	• Cancel tracking for the selected target. • Sleep the selected AIS target. • Long press: Cancel tracking for all TT targets. See section 3.2. • Delete marks/waypoints. • Cancel character input.
	ALARM ACK key	Acknowledge active alerts. See section 1.53.
8	Trackball controls	See section 1.1.3.

1.1.3 Control Unit RCU-015/RCU-016

The RCU-015 and RCU-016 offer an easy to use mouse-like control interface, without the bulkiness of the RCU-014. You can access all your radar functions from the RCU-015/RCU-016, however, only the function keys are available as short-cut keys.



No.	Control Name	Description
1	Power button*	Turn the power on or off. See section 1.2.
2	Functions keys (**F1** to **F4**)	Perform a pre-registered function. See section 1.8.
3	Right mouse button	Short press: • Show the pop up menu for the highlighted item. • Cancel changes to the currently selected setting. • **With TT target or mark symbol highlighted**: Open the editing window (C-types only). • **With pop up menus shown**: Hide pop up menus. Long press: • Change the screen brilliance to [50].
4	Scrollwheel	• Change settings. • Highlight a menu item. • **With TT target selected**: Change the TT target's symbol (C-types only).
5	Left mouse button	Select a highlighted object or menu item.
6	Trackball	For IMO-types • Moves the cursor. • Highlight an object or menu item. For C-types • Moves the cursor (when the cursor is shown). • Moves the chart (when the cursor is hidden). • Highlight an object or menu item.
*: The RCU-016 Control Unit has no power button. To turn the power on or off when using a RCU-016 Control Unit, use the power button on the RCU-014/RCU-015/RCU-031 Control Unit.		

About the terminology used in this manual

Unless otherwise started, the terms "click" and "left-click" mean "use the trackball to place the cursor on the specified item, then press the left mouse button". The term "right-click" means "use the trackball to place the cursor on the specified item, then press the right mouse button".

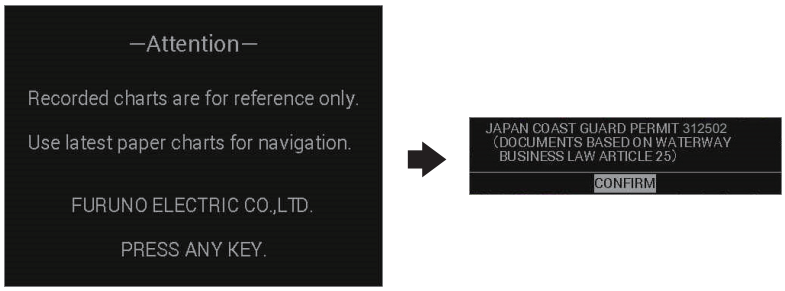
1.2 How to Turn the Radar On/Off

The power button (⏻) is located at the top-left corner of the RCU-014, RCU-015 and RCU-031 Control Units.

To turn the power on, open the power switch cover, then press the power button.

The LED to the left of the power button lights up (green color) and the system begins the startup process. The indication "Initializing....." appears at the center of the screen.

C-types also display two messages regarding charts, after the startup process is complete.



When the startup process is complete, the system begins warm-up procedures to prepare the magnetron for transmission. The warm-up can take up to three minutes.

During the warm-up, indications for total on-time (magnetron on-time since installation) and total transmission time (since installation) appear below the warm-up countdown timer. These indications are also displayed when the radar is in standby mode.

When the warm-up process is complete, the radar goes into standby (STBY) mode and the indication "RADAR STBY" (IMO-types) or "STBY" (C-types) appears. This indication also appears whenever the equipment is in STBY mode.

Note 1: For C-types, the “STBY” indication appears only once, when the equipment is turned on. Further, the numerals on the heading dial (outer-most range ring) are not shown and the AIS function is active, however the TT function is inactive while in standby (STBY) mode.

Note 2: Do not turn on the power directly after it has been turned off. Wait several seconds before you reapply the power, to be sure the radar starts up properly.

Note 3: The RCU-016 Control Unit has no power button. To turn the power on or off when using a RCU-016 Control Unit, use the power button on the RCU-014/RCU-015/RCU-031 Control Unit.

Note 4: Solid state radars do not have a magnetron, therefore they have no warming period.

To turn the power off, open the power switch cover, then press the power button.

1.3 How to Adjust the Brilliance

The screen brilliance (brightness) for monitors can be adjusted as shown below.

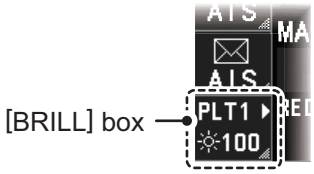
Note: The following procedure applies only to monitors supplied by FURUNO for this system. For other monitors, see the monitor operator's manual to adjust the brilliance.

Brilliance adjustment from the Control Unit (RCU-014/RCU-031)

Rotate the **BRILL** knob clockwise to increase the brilliance (brighter), or rotate the **BRILL** knob counter-clockwise to reduce the brilliance (darker).

Brilliance adjustment from the on-screen box

Select the brilliance indication in the lower half of the [BRILL] box, the spin the scrollwheel on the Control Unit upwards to reduce the brilliance (darker) or downwards to increase the brilliance (brighter).



Note: The above scrollwheel operation is based on default settings for [2 MOUSE WHEEL DIR]. See section 1.9.

1.4 Display Overview

1.4.1 Display examples

C-type radars have two display formats, [NORMAL] and [SIMPLE]. IMO-types have one standard display format. The information shown on-screen changes depending on the radar type and the display format selected.

You can change the display format for C-types from [6 DISPLAY MODE] (located in [9 INTIAL SETTINGS] → [5 OPERATION] menu; see section 1.9).

Note 1: The example screen below may differ slightly from your display, depending on the monitor used in your configuration. The overall information however, is the same.

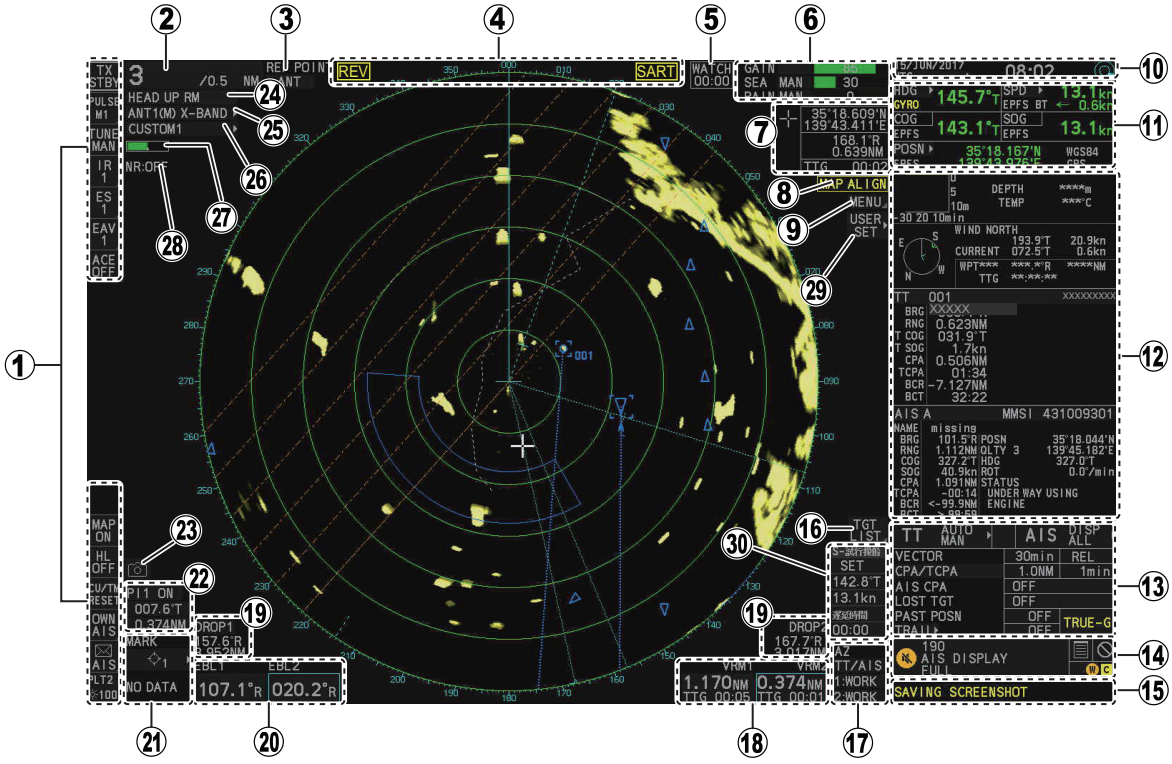
Note 2: Unless otherwise indicated, the example figures for C-type radars used in this manual are taken using the [NORMAL] display.

Display specifications

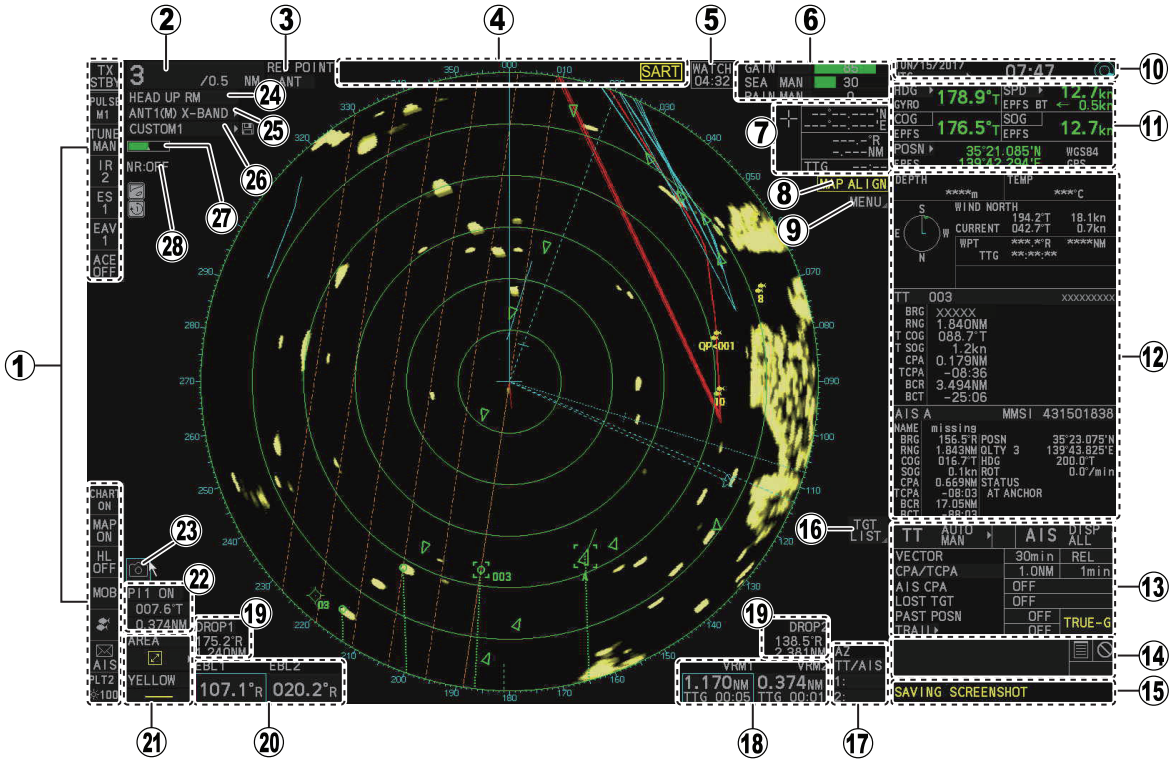
	MU-190	MU-231	MU-270W
Nominal viewing distance	1.02 m	1.20 m	1.02 m
Text height (min. font)	3.53 mm	4.23 mm	3.64 mm
Text width (min. font)	2.36 mm	2.97 mm	2.43 mm

Standard display

- IMO-type standard display



- C-type standard display

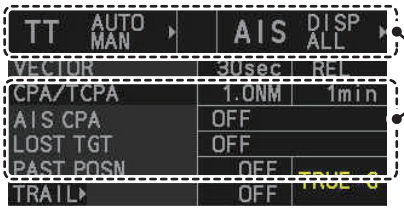


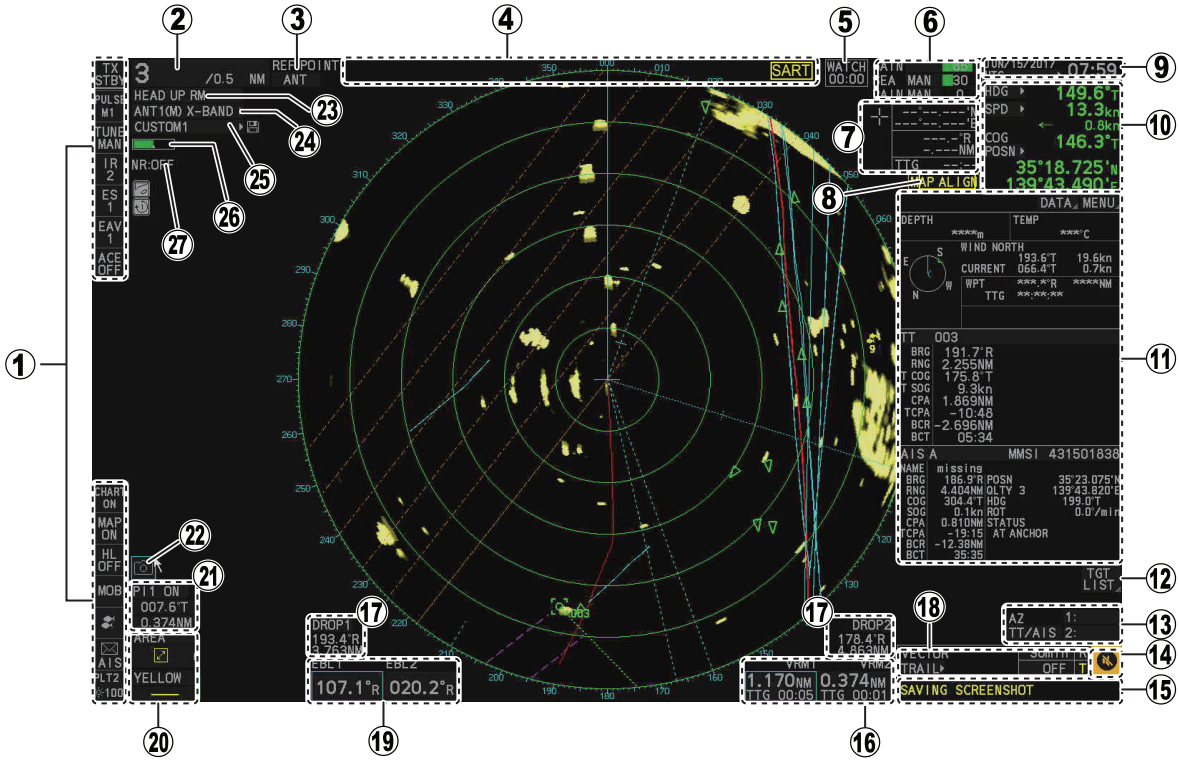
No.	Name	Description
1	InstantAccess bar™	Contains functions and features which are used regularly and allows easy access/activation. For descriptions of each button on the bar, see section 1.4.2
2	[RANGE] box	Shows/changes the current range in use.
3	[REF POINT] box	Shows/changes the point of reference.
4	Indications	Shows indications for SART, shuttle ferry mode (IMO-type only) etc.
5	[WATCH] box	• Shows the watch alert countdown timer. • Resets the watch alert countdown.
6	[ECHO ADJUST] box	Place the cursor on a box to adjust the setting. • [GAIN] bar: Shows the level of gain in use. • [SEA] bar: Shows the level and mode of sea clutter reduction. • [RAIN] bar: Shows the level and mode of rain clutter reduction.
7	Cursor position details	Shows the location (coordinates) of the cursor with the estimated TTG to the cursor position.
8	[MAP ALIGN] indication	Shows/hides the map alignment status.
9	[MENU] box	Opens/closes the menu.
10	Date/Time	• Shows date and time (with offset indication). • Working indication (blue circle) indicates that the system is working correctly. Stops rotating when the system is frozen or malfunctioning.
11	Own Ship information	Shows heading, speed, water tracking speed*1, COG, SOG*2, coordinates and sensor used for data input. *1: Drift speed and direction (port/starboard) is indicated with arrows and numerals. *2: When connected with a speed log, the indication changes to read "SLOG".
12	Information box	• Shows information for selected TT or AIS targets. • Shows the currently selected menu. • Shows navigational data. • Shows the performance monitor graph. • Shows the zoomed area.
13	TT/AIS settings	• Adjust TT/AIS vector settings. • Adjust CPA/TCPA settings. • Activate/sleep AIS targets. • Adjust lost target alert settings. • Adjust track plotting intervals. • Adjust trail times.
14	Alert box	Shows active alerts and contains the buzzer silence button and a shortcut to the alert list.
15	Guidance box	Shows operational guidance for the Control Unit's **left button** and **right button**.
16	[TGT LIST] box	Shows the target details list for tracked TTs and active AIS targets.
17	[ACQUISITION ZONE] box	• Adjust acquisition zone settings for target alarms. • Toggle between sentry zone and acquisition zone alert modes.
18	[VRM] box	• Activate/deactivate the VRM (Variable Range Marker). • Adjust the active (selected) VRM. • Shows VRM range and TTG.
19	[DROP MARK] box	Shows the bearing and range to the drop mark(s).

No.	Name	Description
20	[EBL] box	• Activate/deactivate the EBL (Electronic Bearing Line). • Adjust the active (selected) EBL. • Shows EBL bearing.
21	[MARK] box	• Selects a map mark to use. • Inscribes the selected map mark. • **Right-click**: opens the [RADAR MAP] menu (IMO-types); opens the [MARK] menu (C-types).
22	[PI Lines] box	• Selects PI line set to use. • Shows/hides the selected PI lines. • Shows the angle, reference and range interval for the PI lines.
23	Screenshot button	Saves a screenshot of the entire displayed area. **Note:** Requires SD card to be inserted in the Processor Unit. Shown in gray and not selectable if no SD card is inserted.
24	[PRESENTATION MODE] box	Change the presentation (orientation) mode for the radar images.
25	[ANTENNA SELECTION] box	Selects the antenna to use for radar images.
26	[PICTURE] box	Customize the way in which echoes are displayed.
27	[NOISE REJECTOR] indication	Shows the noise rejector function's ON/OFF status.
28	[TUNING LEVEL] bar	• Shows the level of tuning in use. See section 1.16. • Adjusts the tuning (manual only). See section 1.16.3. **Note 1:** The [TUNING LEVEL] bar is not shown for solid state radars. **Note 2:** The [TUNING LEVEL] bar is not shown on FAR-2x58 and FAR-2268DS monitors which are assigned as [SUB] at installation.
29	User settings box*	• Loads pilot settings. • Opens the [USER SET] menu.
30	[TRIAL MANEUVERS] box*	• Activates/deactivates trial maneuvers. • Sets up trial maneuver parameters.
*: Shown only for IMO-types.		

Simple display (C-types only)

Note: TT/AIS settings are not available in the simple display. To change or adjust TT/AIS settings, make the changes/adjustments at the standard display, then switch to the simple display.





No.	Name	Description
1	InstantAccess bar™	Contains functions and features which are used regularly and allows easy access/activation. For descriptions of each button on the bar, see section 1.4.2
2	[RANGE] box	Shows/changes the current range in use.
3	[REF POINT] box	Shows/changes the point of reference.
4	Indications	Shows indications for SART, etc.
5	[WATCH] box	• Shows the watch alert countdown timer. • Resets the watch alert countdown.
6	[ECHO ADJUST] box	Place the cursor on a box to adjust the setting. • [GAIN] bar: Shows the level of gain in use. • [SEA] bar: Shows the level and mode of sea clutter reduction. • [RAIN] bar: Shows the level and mode of rain clutter reduction.
7	Cursor position details	Shows the location (coordinates) of the cursor with the estimated TTG to the cursor position.
8	[MAP ALIGN] indication	Shows/hides the map alignment status.
9	Date/Time	Shows date and time (with offset indication).

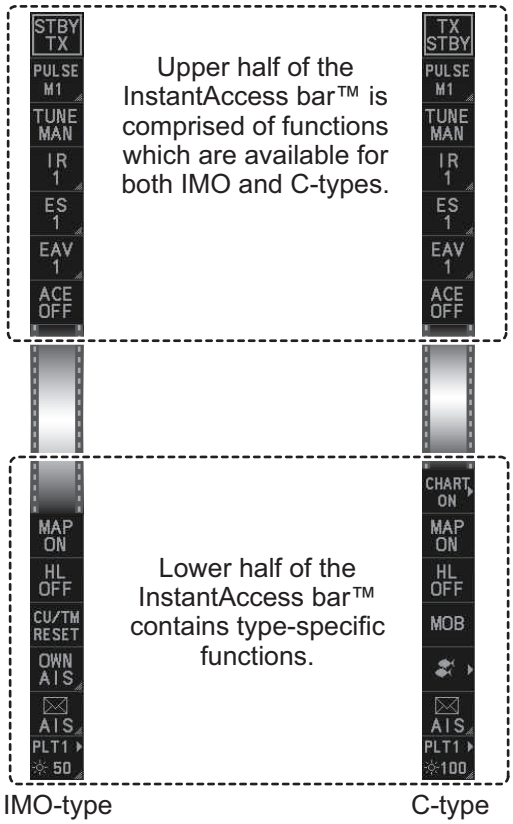
No.	Name	Description
10	Own Ship information	Shows heading, speed, water tracking speed*1, COG, SOG*2, coordinates and sensor used for data input. *1: Drift speed and direction (port/starboard) is indicated with arrows and numerals. *2: When connected with a speed log, the indication changes to read "SLOG".

11	Information box	• Click [MENU] to show the menu.
		• Click [DATA] to show the data box; the following information can be displayed.
		  • Shows information for selected TT or AIS targets.
		  • Shows navigational data.
		  • Shows the performance monitor graph.

12	[TGT LIST] box	Shows the target details list for tracked TTs and active AIS targets.
13	[ACQUISITION ZONE] box	• Adjust acquisition zone settings for target alarms. • Toggle between sentry zone and acquisition zone alert modes.
14	Alert box	Shows active alerts and contains the buzzer silence button and a shortcut to the alert list.
15	Guidance box	Shows operational guidance for the Control Unit's **left button** and **right button**.
16	[VRM] box	• Activate/deactivate the VRM (Variable Range Marker). • Adjust the active (selected) VRM. • Shows VRM range and TTG.
17	[DROP MARK] box	Shows the bearing and range to the drop mark(s).
18	Vector/Trail box	• Set vector/trail times for TT/AIS targets. • Switch between true/relative trails and vectors.
19	[EBL] box	• Activate/deactivate the EBL (Electronic Bearing Line). • Adjust the active (selected) EBL. • Shows EBL bearing.
20	[MARK] box	• Selects a map mark to use. • Inscribes the selected map mark. • **Right-click**: opens the [MARK] menu.
21	[PI Lines] box	• Selects PI line set to use. • Shows/hides the selected PI lines. • Shows the angle, reference and range interval for the PI lines.
22	Screenshot button	Saves a screenshot of the entire displayed area. **Note:** Requires SD card to be inserted in the Processor Unit. Shown in gray and not selectable if no SD card is inserted.
23	[PRESENTATION MODE] box	Change the presentation (orientation) mode for the radar images.
24	[ANTENNA SELECTION] box	Selects the antenna to use for radar images.
25	[PICTURE] box	Customize the way in which echoes are displayed.
26	[NOISE REJECTOR] indication	Shows the noise rejector function's ON/OFF status.
27	[TUNING LEVEL] bar	• Shows the level of tuning in use. See section 1.16. • Adjusts the tuning (manual only). See section 1.16.3. **Note 1:** The [TUNING LEVEL] bar is not shown for solid state radars. **Note 2:** The [TUNING LEVEL] bar is not shown on FAR-2x58 and FAR-2268DS monitors which are assigned as [SUB] at installation.

1.4.2 InstantAccess bar™

The InstantAccess bar™ contains functions and features which are used regularly and allows easy access/activation. For descriptions of each button on the bar, see the table in this section.



Button	Description
Upper Half - Common functions/features for both IMO and C-types	
STBY TX	[Standby/Transmit] button. Toggle between standby (STBY) and transmit (TX).
PULSE L	[Pulselength] button. Selects the pulselength. **Note:** The [Pulselength] button is not shown on FAR-2x58 and FAR-2268DS monitors which are assigned as [SUB] at installation; instead the button is replaced with the indication "SUB".
TUNE MAN	[Tune] button. Toggles between automatic and manual tuning. (See section 1.16.1.) **Note 1:** For SSD antennas, this button appears as "TX CH x" ("x" denotes the channel used for transmission). If your radar is receiving interference from another radar operating at the same frequency, use the [TX CH] button to change the TX frequency. **Note 2:** The [Tune] button is grayed out and inoperable on FAR-2x58 and FAR-2268DS monitors which are assigned as [SUB] at installation.
IR OFF	[Interference Rejector] button. Activates/deactivates the interference rejector feature.
ES OFF	Echo Stretch button. Activates/deactivates the echo stretch function. **Note:** This item is grayed out under the following conditions: • ACE function is active. • No position data is input (excludes Dead Reckoning).

Button	Description
EAV OFF	[Echo Average] button. Activates/deactivates the echo average function.
ACE OFF	[ACE] button. Activates/deactivates the ACE (Auto Clutter Elimination) function.
Lower Half - IMO-types	
MAP OFF	[Radar Map] button. Shows/hides the radar map marks.
HL OFF	[HEADING LINE] button. Left-click and hold to hide the heading line.
CU/TM RESET	[CU/TM RESET] button • Puts the ship's heading at the top of the screen in course-up mode the moment this button is pressed. • Resets the ship's position to a point of 75% radius opposite to the extension of the heading line passing through the display center in true motion modes.
OWN AIS	[Own Ship AIS] button. Shows the AIS VOYAGE DATA for AIS data setup.
AIS	[AIS Message] button. • Displays received AIS messages. • Opens the [AIS Message] menu.
PLT1 100	[Brilliance] button. • Adjusts the screen brilliance • Opens the [BRILLIANCE] menu. • Selects the color palette. See section 1.46.3.
Lower Half - C-types (Standard and Simple display modes)	
CHART ON	[Chart] button. • Shows/hides the chart. • Opens the [CHART] menu.
MAP OFF	[Radar Map] button. Shows/hides the radar map marks.
HL OFF	[HEADING LINE] button. Left-click and hold to hide the heading line.
MOB	[MOB] button Inserts an MOB mark at the current OS location.
	[WPT MARK] button. (Icon shown to the left changes depending on your selection.) • Left-click/Spin the scrollwheel to select a waypoint (WPT) mark icon to use. • Right-click to show the [ROUTES•WAYPOINTS] menu.
AIS	[AIS Message] button. • Displays received AIS messages. • Opens the [AIS Message] menu.
PLT1 100	[Brilliance] button. • Adjusts the screen brilliance • Opens the [BRILLIANCE] menu. • Selects the color palette. See section 1.46.3.

1.5 Menu Operations

1.5.1 How to open and close the main menu

The main menu can be accessed from the control unit or from the on-screen box. The [MAIN MENU] appears in the information box at the right side of the screen.

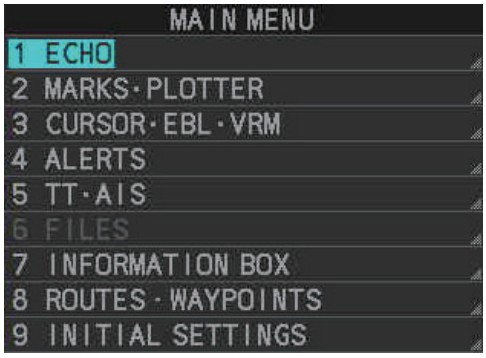
From the control unit (RCU-014/RCU-031)

Press the **MENU** key on the control panel.

From the on-screen box

Select the [MENU] box, then press the **left button**.

IMO-types' Main Menu



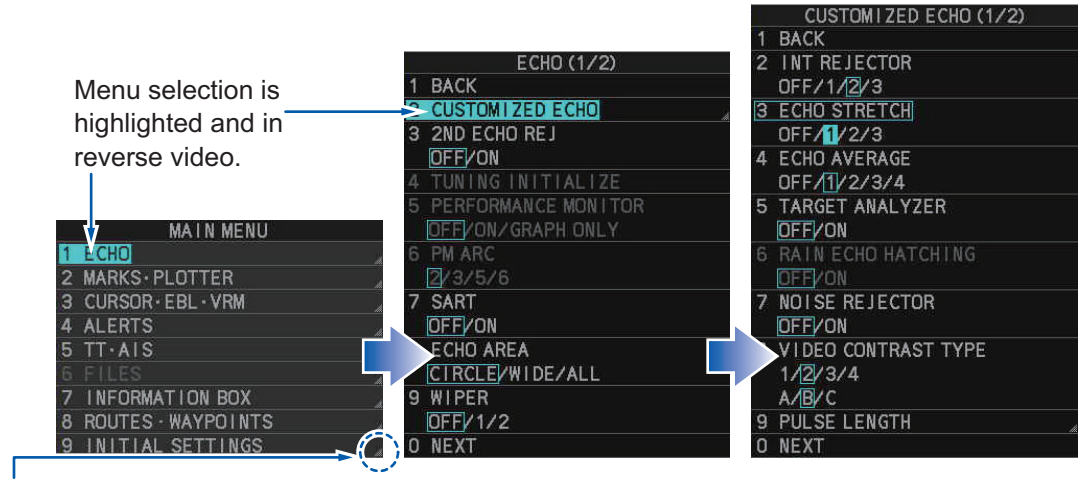
C-types' Main Menu

Note 1: For the sake of abbreviation in procedures, the above methods are written collectively as "Open the menu." and "Close the menu."

Note 2: Unless otherwise stated, this manual uses display and menu examples from the C-type.

1.5.2 How to operate the menus

1. Open the menu.
2. Roll the scrollwheel to select a menu item, then left-click. The menu item currently selected is highlighted and shown in reverse video. You can also select a menu item by pressing the corresponding numeric key on the control unit.



Select menu items with arrows (◢) to access the next menu layer.
In this example, the [ECHO] menu is accessed, then the [CUSTOMIZED ECHO] menu is accessed.

   The next menu layer appears. Menu items with arrows, as shown in the above example figure, have their own menu layer. You can select these items to show the respective menu.

3. Roll the scrollwheel to select a menu item, then left-click. You can also select a menu item by pressing the corresponding numeric key.
   When required. repeat this step to access the next menu.
   In the example, [1 ECHO] is selected, which opens the [ECHO (1/2)] menu. Next, [2 CUSTOMIZED ECHO] is selected, which opens the [CUSTOMIZED ECHO (1/2)] menu. Finally, [3 ECHO STRETCH] is selected, in order to change settings.
   Menus such as the [ECHO] menu and [CUSTOMIZED ECHO] menu have more than one page. In this case, the currently displayed page is indicated in brackets to the right of the menu title.
   To view the next page of a menu, select [0 NEXT].
   To go back one layer (or page) in the menu, left-click [1 BACK], or right-click.
4. Roll the scrollwheel to select the desired setting, then left-click. The selected setting is highlighted and displayed in reverse video.
   In the above example, the selected setting at [3 ECHO STRETCH] is [1].
5. Close the menu.

Note 1: Unless otherwise stated, operations in this manual use the scrollwheel for procedures which require menu selection, or settings changed.

Note 2: The term “Select” has the following meanings in this manual:

- Use the trackball to place the cursor on the indicated item, then left-click.
- Roll the scrollwheel to select the indicated menu option/setting.

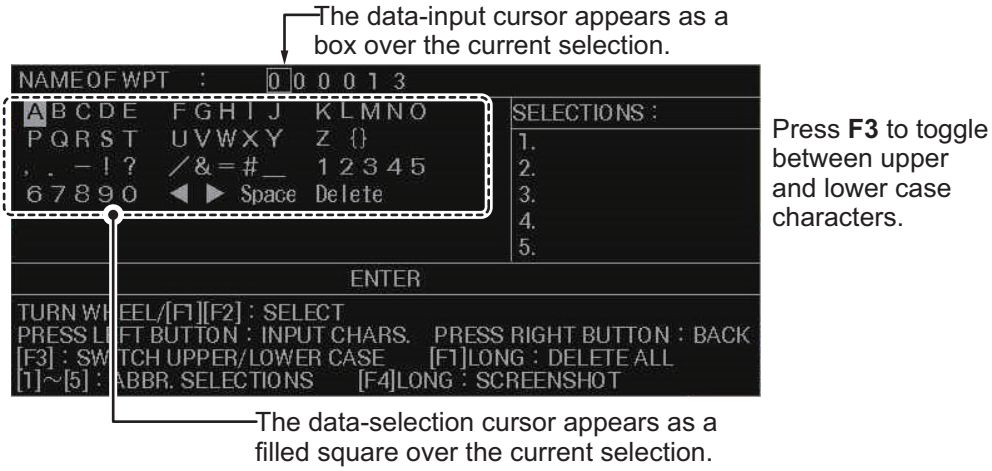
1.5.3 Alphanumeric input

When alphanumeric input is required, the software keyboard (shown in the figure below) or the alphanumeric input window (C-types only) appears.

Operating the software keyboard

Select the number/character desired with the cursor, then left-click. When you finish entering the desired numbers/characters, left-click the [END] button on the software keyboard.

Alphanumeric input window



1. Using the trackball or the scrollwheel, select the character/numeral you want to input, then left-click. The selected character/numeral appears at the location of the data-input cursor, then the data-input cursor moves to the next character/numeral.
2. Repeat step 1 as required.
   - To move the data-input cursor, select [◀] or [▶] as required.
   - To delete a character/numeral, move the data-input cursor to the character/numeral that you want to delete, then left-click [Delete].
   - To clear the input area of all characters/numerals, press and hold **F1**.
3. Select [ENTER] to complete alphanumeric input and close the window.

Note: You can store up to five “input shortcuts”. These shortcuts appear in the [SELECTIONS] column of the window. To create/edit a shortcut, press the appropriate key, as listed below.

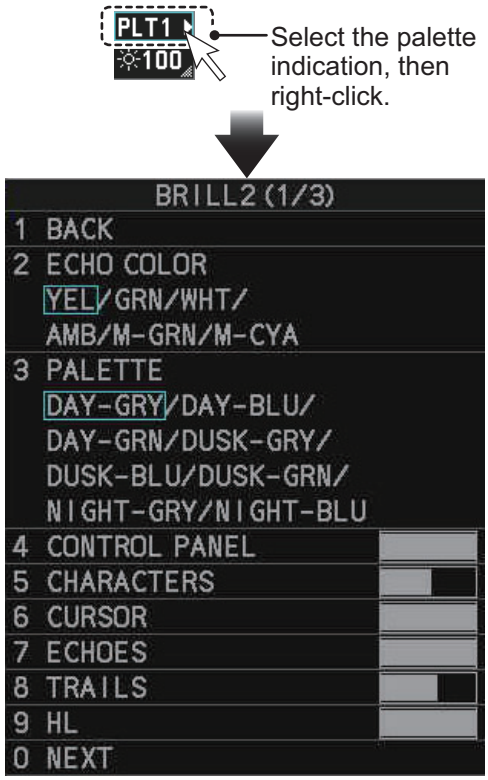
- [SELECTION 1]: **1 HL OFF**
- [SELECTION 2]: **2 EBL OFFSET**
- [SELECTION 3]: **3 MODE**
- [SELECTION 4]: **4 OFF CENTER**
- [SELECTION 5]: **5 CU/TM RESET**

If no shortcuts are registered by the user, the system stores the 5 most frequently used items to each of the shortcuts.

1.6 How to Use the On-screen Box Menus

Some radar functions can be accessed using the on-screen box as a shortcut to the respective menus. A "▶" at the right side of an on-screen box indicates that there is a menu shortcut available.

Note: The cursor changes shape according to its location. When placed outside the operational display area the cursor is an arrow ( ) shape. When placed inside the operational display area, it is a cross ( ).



For the purpose of this example, place the cursor on the palette indication (displayed as "PLTx", where x is the currently selected palette number), inside the brilliance settings box at the bottom-left of the screen.

The selected item appears highlighted with a light-blue colored box.

Right-click to show the brilliance menu.

Shortcuts are available from the following on-screen boxes/indications/buttons:

- [PICTURE] box.
- [AIS] box.*
- [TT] box.*
- [HDG] indication.
- [SPD] indication.
- [POSN] indication.
- [PLT] indication.
- [ANTENNA SELECTION] box.
- User settings box.**
- [MARK] box.
- Time indication ("UTC" or "Local").
- [TRAIL] indication.
- [CHART] button.***
- [WPT MARK] button.***

*: Not shown on C-type simple display.
**: Shown only on IMO-types.
***: Shown only on C-types.

1.7 [CURSOR] Menu and Cursor Operations

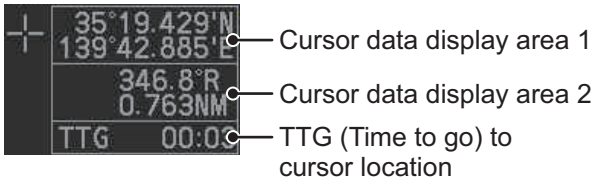
1.7.1 How to show/hide the cursor (C-type only)

You can show/hide the cursor with one of the following methods:

- Press the **9 CURSOR ON/OFF** key.
- Press the **3 MODE** key. This method requires [5 MODE KEY FUNCTION] set to [CURSOR ON-OFF] (located in [9 INITIAL SETTINGS] → page 2 of [5 OPERATIONS] menu; see section 1.9).
- Press the function key assigned with [CURSOR ON-OFF] (see section 1.8).
- Select [CURSOR ON-OFF] from the [CURSOR] menu (see section 1.7.3).

1.7.2 Cursor data box

Place the cursor on a target/echo to show information for that location in the cursor data box, located at the top-right of the display (see example figure below).



The following data can be shown in the cursor data box.

Radar type	Cursor data display area 1	Cursor data display area 2
IMO-type	Latitude/longitude for the cursor location.	• Range and bearing to the cursor location. • X/Y coordinates for the cursor location.
C-type	• Latitude/longitude for the cursor location. • Range and bearing to the cursor location. • X/Y coordinates for the cursor location. • Difference between cursor location and Loran/Decca data.*	
*: Requires [8 LORAN/DECCA] set to [ON] in the [4 CURSOR] menu (located in the [3 CURSOR•EBL•VRM] menu)		

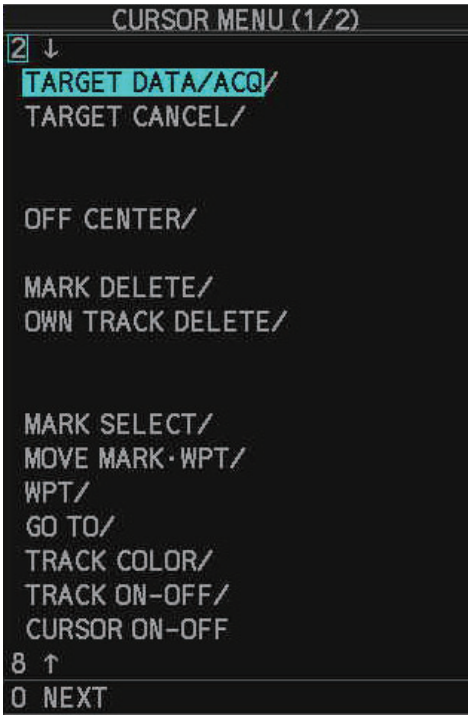
Place the cursor on the cursor data area (1 or 2) in the cursor data box, then press the **left button** to change the displayed information. For IMO-types, data area 1 is fixed at latitude/longitude and cannot be changed.

Note 1: For the X-Y co-ordinates display, the Y-axis is the upper/lower half of the screen, the upper half of the screen is “plus” and the lower part of the screen is “minus”. The X-axis is the left/right-side of the screen, right is “plus”, left is “minus”.

Note 2: Cursor data reads "- - -.-" when the cursor is placed outside the operational display area.

1.7.3 How to Use the [CURSOR] Menu

Functions that require the use of the cursor, such as EBL offset and zoom, can be activated directly from the [CURSOR] menu. Below is the procedure for choosing cursor-related functions from the [CURSOR] menu.



1. Select the operational display area, then press the **right button**.
   The [CURSOR] menu appears.
2. Select the desired function, then left-click.
3. The guidance box shows "XX / EXIT" (XX = function selected). Use the trackball to place the cursor where desired.
   Note: You can also select the cursor function, when the cursor is inside the operational display area, by spinning the scrollwheel.
4. Left-click to execute the function selected at step 3.
5. To quit the selected function, right-click when the guidance box shows "XX / EXIT" (XX = function selected).
   The table below list the contents of the cursor context menu with a brief description.

Menu Item	Description
Page 1	
[TARGET DATA / ACQ]	**TT:** Acquires target; displays data for selected tracked target. **AIS:** Activates sleeping AIS target; displays data for selected AIS target.
[TARGET CANCEL]	**TT:** Cancels tracking on selected tracked target. **AIS:** Sleeps selected AIS target.
[TT TGT DATA / ACQ]	Acquires selected echo as tracked target.
[REF MARK]*1	Inscribes reference mark, for target-based speed input.
[EBL OFFSET]	Offsets EBL to measure range and bearing between two targets.
[OFFCENTER]	Shifts screen center to selected location.
[ZOOM]	Zooms selected location.
[MARK DELETE]	Deletes selected mark (plotter mark, origin mark or waypoint mark).
[OWN TRACK DELETE]	Deletes own ship's tracks.
[MAP ALIGN]	Aligns charts (maps) with the radar picture.
[TRAIL ERASER]*2	Erases trails.
[MARK SELECT]*2	Opens the [MARK COLOR/SHAPE] window.
[MOVE MARK•WPT]*2	Moves the selected mark or waypoint.
[WPT]*2	Inserts a waypoint.
[GO TO]*2	Selects/deselect a destination.

Menu Item	Description
[TRACK COLOR]*2	Opens the [CHANGE TRACK COLOR] window.
[TRACK ON/OFF]*2	Start/stop track recording.
[CURSOR ON/OFF]*2	Show/hide the cursor.
Page 2	
[TARGET DATA / ACQ SETTING]	Change target tracking settings.
[TARGET CANCEL SETTING]	Change target cancel settings.
[CIRCLE CURSOR]*2	Insert/remove the circle cursor.
*1: For C-types, this menu item appears on page 2 of the [CURSOR] menu. *2: These menu items only appear for C-types.	

Note 1: Menu items set to [OFF] at [CURSOR MENU SELECT] (located in [9 INITIAL SETTINGS] → page 2 of the [5 OPERATION] menu) are not shown in the [CURSOR] menu.

Note 2: The following [CURSOR] menu items appear for C-types when the cursor is shown.

- [TARGET CANCEL]
- [EBL OFFSET]
- [MAP ALIGN]
- [TT TGT DATA / ACQ]
- [ZOOM]
- [TRAIL ERASER]
- [REF MARK]
- [MARK DELETE]
- [MOVE MARK•WPT]

Note 3: The following items are not shown in the CURSOR menu when the radar is transmitting.

- [TT TGT DATA / ACQ]
- [ZOOM]
- [REF MARK]
- [MAP ALIGN]
- [EBL OFFSET]
- [TRAIL ERASER]

1.7.4 How to change the cursor data attributes (C-type only)

You can change the cursor bearing reference, cursor range unit, cursor size and also align the cursor by latitude/longitude. Changing some of these settings affects the indications in the cursor data display.

1. Open the menu.
2. Select [3 EBL•VRM•CURSOR SET].
3. Select [4 CURSOR]. The [CURSOR] menu appears.

4. Select the item you want to change, referring to the list below.
   - [2 CURSOR BEARING]: Sets the bearing reference.
   - [3 CURSOR RANGE]: Sets the unit of measurement for cursor range.
     Note: If a different measurement unit is used for short distances, adjust the setting (see section 1.32.4).
   - [4 CURSOR SIZE]: Sets the cursor size.
   - [5 CURSOR L/L ALIGN]*: Sets whether to align the cursor with latitude/longitude.

   - [6 ENLARGED CURSOR INFO]: Sets whether to show enlarged cursor data box contents in a separate window. You can move the enlarged data box with the following procedure:
     1) Place the cursor on the enlarged data box, then left-click.
     2) Use the trackball to move the data box to the desired location.
     3) Left-click to “anchor” the box at the new location.
   - [7 CURSOR COLOR]: Sets the color for the cursor.
   - [8 LORAN/DECCA]: Sets whether to show LORAN/DECCA data in the cursor data box.

   *: For IMO-types, this menu item is located in [MAIN MENU] → [3 NAV TOOLS] → [3 EBL•VRM•CURSOR SET].

5. Close the menu.

1.8 Function Keys

Some menu functions and menus can be assigned to a function key. This allows one-touch access to the assigned function or menu.

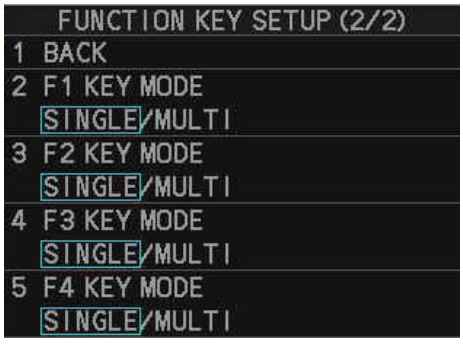
1.8.1 How to set the function key mode (C-types only)

You can set the function keys to have on of the following modes:

- SINGLE: One function per function key, activated when the key is pressed.
- MULTI: Multiple functions per function key. A function selection window appears when the key is pressed.

To set the function mode, do the following:

1. Open the [MAIN MENU].
2. Select [9 INITIAL SETTINGS].
3. Select [6 FUNCTION KEY SETUP].
4. [0 NEXT] to show the second page of the menu.
5. Select the appropriate function key whose mode you want to change.
6. Select [SINGLE] or [MULTI], as required.
7. Close the menu.



1.8.2 How to use the function keys

To activate an assigned function, press the corresponding function key (**F1**, **F2**, **F3** or **F4**). The pre-assigned (default) functions differ, depending on your radar type (C-types or IMO-type) and the selected mode (C-types only).

Default functions for C-types using [SINGLE] mode and IMO-types

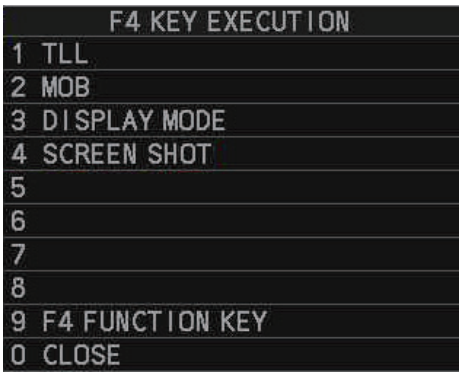
Function key	IMO-type default	C-type default
F1	IR (Interference Rejector)	TRK COLOR SEL
F2	ES (Echo Stretch)	TRK INTVL
F3	AUTO-SEA	MARK SELECT
F4	AUTO-RAIN	TLL

Default function for C-types using [MULTI] mode

F1	F2	F3	F4
2 TRK COLOR SEL	2 TRK INTVL	2 MARK SELECT	2 TLL
3 IR	3 CHART DISPLAY	3 WPT	3 MOB
4 ES	4 NAV AIDS	4 GO TO	4 DISPLAY MODE
5 EAV	5 OWN TRACK DISPLAY	5 TRK COLOR SEL	5 SCREEN SHOT
6 ACE	6 TT-DISP	6 TRK INTVL	6 (Not assigned)
7 AUTO-SEA	7 AIS-DISP	7 CURSOR ON-OFF	7 (Not assigned)
8 AUTO-RAIN	8 ((Not assigned))	8 (Not assigned)	8 (Not assigned)
9 (Not assigned)	9 (Not assigned)	9 (Not assigned)	9 (Not assigned)

To activate an assigned function [MULTI] mode, do the following:

1. Press the function key that contains the function you want to use.
   The corresponding menu appears. (**F4** is pressed in the following example.)



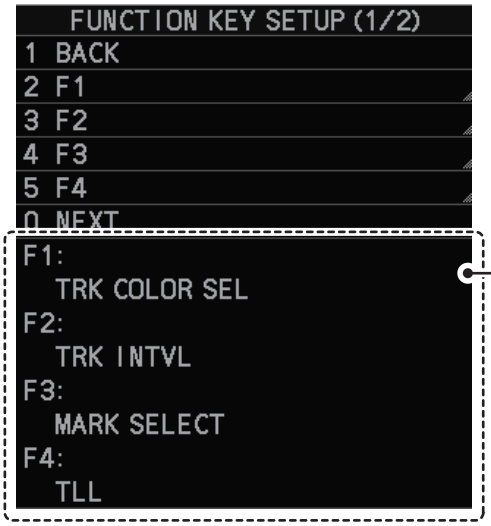
2. Select the appropriate function.

Note: You can select [9 Fx FUNCTION KEY] (where “x” is the number of the selected function key) to access the function key setup menu.

1.8.3 How to change the function(s) assigned to a key

You can change the function assigned to each key using the following procedure.

1. Open the [MAIN MENU].
2. Select [9 INITIAL SETTINGS].
3. Select [6 FUNCTION KEY SETUP]. The function key setup menu appears.



4. Select the function key to set up.
   Note: If the selected key's mode is set to [MULTI], the function selection menu appears after you select the function key.
5. Referring to the table of available functions below, select a function category, then left-click.
   You can check the currently assigned functions in the bottom half of the menu.

Function category	Available functions
[2 ECHO]	CUSTOM SELECT, IR, ES, EAV, NOISE REJ, ANT SELECT, PULSE LENGTH, AUTO-SEA, AUTO-RAIN, TUNE SELECT*4, TX CHANNEL*3, 2ND ECHO REJ, STC CURVE, STC RANGE, PM, SART, ECHO TRAIL, TRAIL T/R, WIPER*1, ACE, ACE HIGH SENSITIVITY, TARGET ANALYZER
[3 STD KEY]	ALERT ACK, STBY TX, HL OFF, EBL OFFSET, ORIENTATION-MODE, OFF CENTER, CU-TM RESET, PI LINE, VECTOR TIME, VECTOR MODE, TARGET LIST, BRILL, MARK, MENU, RANGE UP, RANGE DOWN, ACQ, TARGET DATA, TARGET CANCEL
[4 TT•AIS]	TT-DISP, AIS-DISP, TARGET DATA & ACQ, PAST POSN INTERVAL, REF MARK, CPA LIMIT, CPA, TCPA, AZ1, AZ2, TARGET LIST SORT, TRIAL MANEUVER*2, TRIAL MODE CHANGE*2, ASSOCIATION, AIS MESSAGE, AIS SCALED SYMBOL, CONSORT-DISP*1, GPS BUOY-DISP*1, CONSORT LIST*1, GPS BUOY LIST*1, CONSORT MESSAGES*1
[5 DELETE DATA]	MARK DELETE, MARK ALL DELETE, OWN TRK DELETE, OWN TRK ALL DELETE, TGT TRK DELETE*1, TGT TRK ALL DELETE*1
[6 OPERATION]	BUZZER STOP, ECHO AREA*1, ECHO COLOR, PALETTE, RING(ON/OFF), ZOOM, MOB*2, ALARM1, ALARM2, WATCH ALERT RESET, TLL*1, MAP ALIGN, ANCHOR WATCH, DROP MARK, SCREEN SHOT, CHART DISPLAY*1, NAV AIDS*1, CURSOR ON-OFF*1, CURSOR CENTER/DISPLAY MODE*1

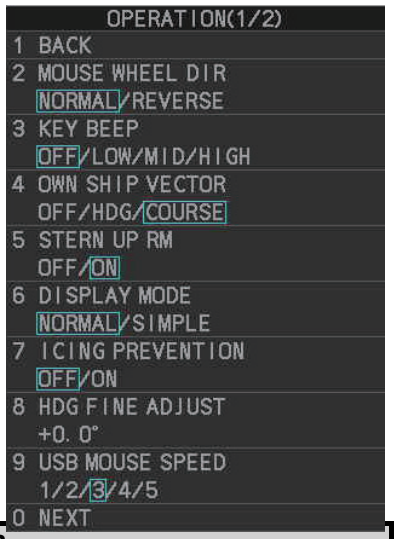
Function category	Available functions
[7 PLOTTER]*1	WPT, GO TO, WAYPOINT LIST, MARK SELECT, TRK COLOR SEL, TRK INT-VL, PLOTTER, EDIT TRACK, MARK SIZE, WAYPOINT MARK, OWN TRACK DISPLAY, TRK ROUTE CONVERSION, GRID, ENLARGED CURSOR INFO, TRK TEMP DATA DISP, TRK DEPTH DATA DISP
[8 PICTURE]*1	PICTURE1 through PICTURE12
*1: C-types only; *2: IMO-types only; *3: Used for SSD radars only; *4: Used for magnetron radars only.	

6. Repeat the procedure as necessary to set up other function keys.
7. Close the menu.

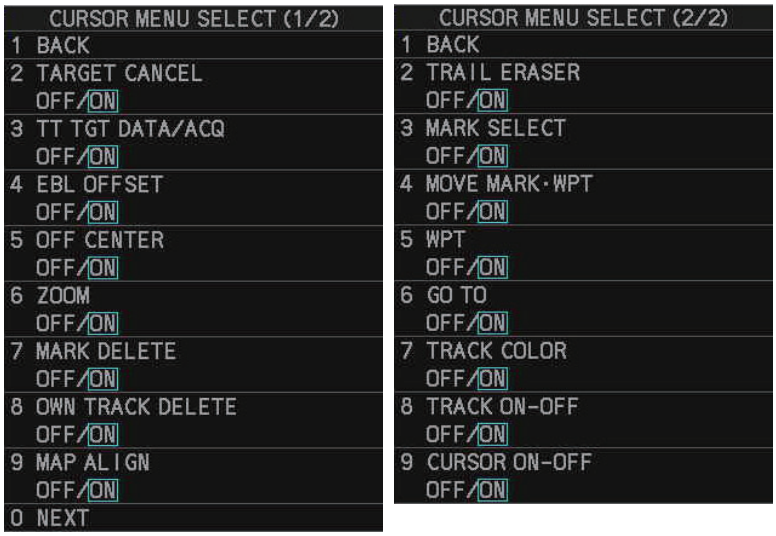
1.9 How to Customize Operation

Several operation items can be customized to suit your needs.

1. Open the menu.
2. Select [9 INITIAL SETTING].
3. Select [5 OPERATION]. The [OPERATION] menu appears.
4. Referring to the table below, press the menu item number to select the appropriate menu item to customize.



Menu items	Description
Page 1	
[2 MOUSE WHEEL DIR]	Sets the direction of the wheel drive (scrollwheel). • [NORMAL]: Scroll downwards to increase, or upwards to decrease the value. • [REVERSE]: Scroll directions are reverse of [NORMAL].
[3 KEY BEEP]	Changes the key beep volume. Select [OFF] to silence the key beeps. Select [LOW], [MID], [HIGH] to adjust the volume for key beeps.
[4 OWN SHIP VECTOR]	Select how the own ship vector is displayed. • [OFF]; Own ship vector is not displayed. • [HDG]: Vector is displayed in heading direction. • [COURSE]: Vector is displayed in course direction.
[5 STERN UP RM]*1	Select [ON] to show [STERN UP RM] orientation in the selection cycle (see section 1.30).
[6 DISPLAY MODE]*1	Switch between [SIMPLE] and [NORMAL] display mode. See section 1.4.1 for display examples. **Note:** TT/AIS settings are not available in the simple display. To change or adjust TT/AIS settings, make the changes/adjustments at the standard display, then switch to the simple display.
Continued on following page	
Continued from previous page	

Menu items	Description
[6 SHUTTLE FERRY]*2	Sets the shuttle ferry mode to use. • [OFF]: Shuttle ferry mode is deactivated. • [MODE1]: Shuttle ferry mode is activated. See "Shuttle ferry mode (IMO-types only)" on next page. • [MODE2]: Shuttle ferry mode is activated. See "Shuttle ferry mode (IMO-types only)" on next page. **Note:** Shuttle ferry mode requires an external switch.
[7 ICING PREVENTION]	Select [ON] to rotate the antenna without transmission, to prevent ice buildup. See section 1.54.
[8 HDG FINE ADJUST]	Adjusts the heading line location. 0.0°, the default setting, shows the heading line pointing towards the top of the screen.
[9 USB MOUSE SPEED]	Adjust the USB mouse sensitivity. A higher value increase the mouse cursor's movement speed.
Page 2	
[2 AUTO COURSE UP RESET]	Select [ON] to enable, or [OFF] to disable the automatic reset of the screen when using COURSE UP orientation and your course is more than 22.5° to either side the center of the screen.
[3 DISPLAY SCROLL]*1	Select [ON] to enable, [OFF] to disable display scrolling. When set to [ON], move the cursor to the edge of the screen in the direction you want to scroll.
[4 CURSOR MENU SELECT]*1	Open the [CURSOR MENU SELECT] menu. You can show/hide menu items which appear in the [CURSOR] menu. Select [OFF] to hide, [ON] to show the menu item. 
[5 MODE KEY FUNCTION]*1	Set the behavior of the [3 MODE] key. • [ORIENTATION]: change the orientation mode with each press. • [CURSOR ON-OFF]: Show/hide the cursor with each press.
[6 TRAIL TIME LINK]*1	• [NO LINK]: Trail time is not linked with changes in range. • [LINK RANGE]: Link [TRAIL TIME] with the range. As the range changes, the trail time is also automatically regulated to show a constant trail. When linked, the trail time indication appears in yellow color. **Note 1:** When using a range that is valid only when in stand-by mode, the trail time is automatically adjusted to match either the maximum or minimum range available in transmit mode. **Note 2:** Linking is only applied when [TRAIL TIME] is set to [NORMAL] (see section 1.37.2).