

FURUNO

OPERATOR'S MANUAL

CHART RADAR

FAR-3015
FAR-3210(-BB)
FAR-3310
FAR-3025
FAR-3220(-BB)
FAR-3320
FAR-3220W-BB
FAR-3320W
FAR-3035S
FAR-3230S(-BB)
FAR-3330S
FAR-3230SW-BB
FAR-3330SW
FAR-3035S-NXT
FAR-3230S-SSD(-BB)
FAR-3330S-SSD
FAR-3025-NXT
FAR-3025-NXT-MARK-2
FAR-3220-NXT(-BB)
FAR-3320-NXT

Model

(Product Name: MARINE RADAR)

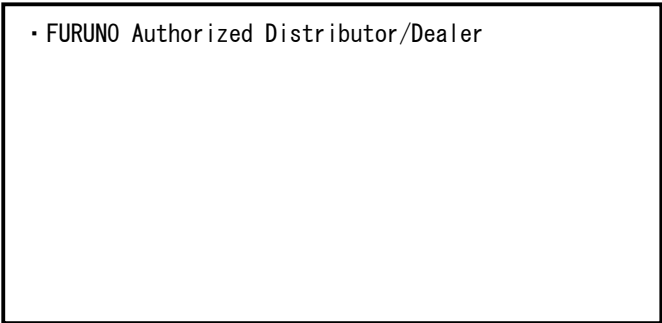
FURUNO ELECTRIC CO., LTD.

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

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(REFU) FAR-3xxx series



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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: Rotterdamseweg 30A, 2921 AP, Krimpen aan den IJssel, 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, product names, trademarks, registered trademarks, and service marks belong to their respective holders.
- Windows is a registered trademark of the Microsoft Corporation of the USA and other countries.
- InstantAccess bar is a trademark of FURUNO Electric Co., Ltd.

How to dispose of this product

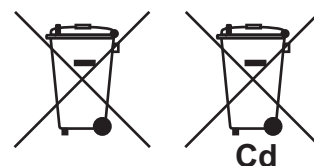
Dispose of this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

How to dispose of a used battery

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

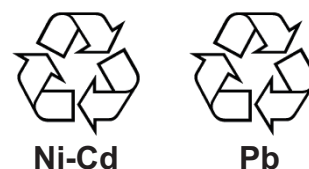
In the European Union

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

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



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



Do not open the equipment.

The equipment uses high voltage that can cause electrical shock. Refer any repair work to a qualified technician.



Before turning on the radar, be sure no one is near the antenna.

Prevent the potential risk of being struck by the rotating antenna, which can result in serious injury or death.



If water leaks into the equipment or something is dropped into the equipment, immediately turn off the power at the switchboard.

Fire or electrical shock can result.



If the equipment is giving off smoke or fire, immediately turn off the power at the switchboard.

Fire or electrical shock can result.



If you feel the equipment is acting abnormally or giving off strange noises, immediately turn off the power at the switchboard and contact a FURUNO service technician.



Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.



WARNING



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

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



Do not place liquid-filled containers on or 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.



Keep objects away from the open-type antenna unit, so as not to impede rotation of the antenna.

Fire, electrical shock or serious injury can result.



Use the proper fuse.

Use of the wrong fuse can cause fire or damage the equipment.

⚠ 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/m² are given in the table below.

Magnetron radar

Radar model	Transceiver	Magnetron	Antenna	100W/m ²	50W/m ²	10W/m ²
FAR-3015	RTR-131	FNE1201	XN12AF	0.25 m	0.73 m	4.2 m
			XN20AF	0.17 m	0.42 m	2.6 m
			XN24AF	N/A	0.28 m	1.73 m
FAR-3210/ FAR-3210-BB/ FAR-3310	RTR-105		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-3025	RTR-132	MG5436	XN12AF	0.82 m	1.8 m	8.84 m
			XN20AF	0.51 m	0.93 m	5.76 m
			XN24AF	0.3 m	0.7 m	4.01 m
FAR-3220/ FAR-3220-BB/ FAR-3320	RTR-106		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-3220W-BB/ FAR-3320W	RTR-108	MG5436	XN20CF	0.5 m	1.2 m	5.5 m
			XN24CF	0.3 m	0.9 m	4.0 m
FAR-3035S/ FAR-3230S/ FAR-3230S-BB/ FAR-3330S	RTR-107	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-3230SW-BB/ FAR-3330SW	RTR-109	MG5223F	SN36CF	N/A	0.26 m	2.3 m

Solid state radar

Radar model	Transceiver	Antenna	100W/m ²	50W/m ²	10W/m ²
FAR-3035S-NXT/ FAR-3230S-SSD/ FAR-3230S-SSD-BB/ FAR-3330S-SSD	RTR-111	SN24CF	N/A	N/A	N/A
		SN30CF	N/A	N/A	N/A
		SN36CF	N/A	N/A	1.0 m
FAR-3025-NXT/ FAR-3220-NXT/ FAR-3220-NXT-BB/ FAR-3320-NXT	RTR-123	XN12CF	0.3 m	0.7 m	3.3 m
		XN20CF	0.24 m	0.32 m	1.9 m
		XN24CF	0.19 m	0.29 m	1.6 m
FAR-3025-NXT-MARK-2	RTR-137	XN12AF	0.31 m	0.67 m	3.57 m
		XN20AF	0.21 m	0.52 m	3.36 m
		XN24AF	0.16 m	0.34 m	2.3 m

⚠ WARNING



The TT function is a valuable aid to navigation. However, the navigator must check all aids available to avoid collision.

- The TT automatically tracks an automatically or manually acquired radar target and calculates its course and speed, indicating them with a vector. Since the data generated by the TT depends on the selected radar targets, the radar must be optimally tuned for use with the TT, to ensure required targets will not be lost or unnecessary targets, like sea returns and noise, will not be acquired and tracked.
- A target is not always a landmass, reef, ship, but can also be returns from the sea surface and from clutter. As the level of clutter changes with the environment, the operator must correctly adjust the sea and rain clutter controls and the gain control so that the target echoes do not disappear 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 approx. 15-30 seconds for the higher relative speed; approx. 30-60 seconds for the lower relative speed. The following factors can affect accuracy:
 - Echo intensity
 - Radar transmission pulse length
 - Radar bearing error
 - Gyrocompass error
 - Course change (own ship and targets)



Handle the LCD carefully.

The LCD is made of glass, which can cause injury if broken.



The data presented by this equipment is intended as a source of navigation information.

The prudent navigator never relies exclusively on any one source of navigation information, for safety of vessel and crew.

Warning Label(s)

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



Name: Warning Label 1
Type: 86-003-1011-3



Name: Warning Sticker
Type: 03-142-3201-0

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FOREWORD

Congratulations on your choice of the FURUNO FAR-3xxx Series Chart Radar. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

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

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

Features

The FAR-3xxx series Chart Radar is the product of FURUNO's extensive experience in computer technology and marine electronics. This radar displays radar targets, electronic charts, nav lines, Tracked Target (TT) data, AIS objects and other navigation data on a display.

The main features of this series are

- Complies with IMO A.278(VIII), IMO A.694(17), IMO MSC.36(63), IMO MSC.97(73), IMO MSC.191(79), IMO MSC.192(79), IMO MSC.302(87), IMO MSC.232(82) Appendix 6, IMO MSC.1/Circ.1349, ITU M.1177-4, IEC 60945 Ed.4, IEC 61162-1 Ed.5, IEC 61162-2 Ed.1, IEC 61162-450 Ed.1, IEC 62288 Ed.3, IEC 62388 Ed.2, IEC 61174 Ed.4
- The FAR-3xxx series consists of the following models and configurations:

Model	Frequency band	Size of monitor unit	Output power	Transceiver location
Magnetron radar				
FAR-3015	X-band	19.0"/27"	12 kW	Antenna unit
FAR-3210		19.0"	12 kW	Antenna unit
FAR-3210-BB		Local supply	12 kW	Antenna unit
FAR-3310		23.1"/27"	12 kW	Antenna unit
FAR-3025		19.0"/27"	25 kW	Antenna unit
FAR-3220		19.0"	25 kW	Antenna unit
FAR-3220-BB		Local supply	25 kW	Antenna unit
FAR-3320		23.1"/27"	25 kW	Antenna unit
FAR-3220W-BB		Local supply	25 kW	Transceiver unit
FAR-3320W		23.1"/27"	25 kW	Transceiver unit
FAR-3035S	S-band	19.0"/27"	30 kW	Antenna unit
FAR-3230S		19.0"	30 kW	Antenna unit
FAR-3230S-BB		Local supply	30 kW	Antenna unit
FAR-3330S		23.1"/27"	30 kW	Antenna unit
FAR-3230SW-BB		Local supply	30 kW	Transceiver unit
FAR-3330SW		23.1"/27"	30 kW	Transceiver unit
Solid state radar				
FAR-3035S-NXT	S-band	19.0"/27"	250 W	Antenna unit
FAR-3230S-SSD		19.0"	250 W	Antenna unit
FAR-3230S-SSD-BB		Local supply	250 W	Antenna unit
FAR-3330S-SSD		23.1"/27"	250 W	Antenna unit

Model	Frequency band	Size of monitor unit	Output power	Transceiver location
FAR-3025-NXT	X-band	19.0"/27"	600 W*	Antenna unit
FAR-3025-NXT-MARK-2		19.0"/27"	600 W*	Antenna unit
FAR-3220-NXT		19.0"	600 W*	Antenna unit
FAR-3220-NXT-BB		Local supply	600 W*	Antenna unit
FAR-3320-NXT		23.1"/27"	600 W*	Antenna unit

*: 500 W for a Japanese flag vessel.

- New HMI (Human Machine Interface) gives improved operability.
- Accepts SXGA, UXGA video inputs.
- The following monitors have been approved by the IMO under the following categories:
 - MU-231/MU-270W: CAT 1C and CAT 1HC; effective diameter: 320 mm or higher
 - MU-190/MU-192: CAT 2C and CAT 2HC; effective diameter 250 mm or higher
- Radar, chart and chart radar modes. (The chart radar mode does not meet the criteria for navigation aid for Japanese flag vessels as defined by Japanese law.)
- Many warning features to support safer and more efficient navigation.
- Grounding warnings, safe depth contours.
- Chart database loaded and updated using CD-ROMs.
- Tracked Target (TT) data and AIS data to aid in collision avoidance.
- AIS messaging.
- Route created in chart mode can be displayed on the radar.
- Route planning and route monitoring facilities in the chart mode.

Signal Processing Functions

This radar has the signal processing functions described in the table below. All signal processing functions are set with the picture preset feature.

Signal processing function	Description	Section
Interference rejector	Suppress interference transmitted by other radars. Interference received simultaneously from many radars can be difficult to reduce.	2.7
Echo stretch	Enlarge target echoes, especially small echoes. Suppress interference, sea clutter and rain clutter before using echo stretch, to prevent the enlargement of unwanted echoes.	2.8
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.	2.9
Automatic clutter elimination	Discriminate the clutter from the radar echo then reduce the clutter automatically.	2.10
Noise rejector	Reduce the 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.	2.11

Standards Used in this Manual

- Three types of Control Units are available: Radar Control Unit RCU-025 (radar controls with trackball module), ECDIS Control Unit RCU-024 (alphabet keyboard, controls, trackball mod-

ule) and Trackball Control Unit RCU-026 (trackball module only). Unless noted otherwise, "Control Unit" refers to the RCU-025.

- The system can be operated with the controls of the Radar Control Unit, ECDIS Control Unit or a trackball module. The descriptions in this manual use the trackball module.
- Unless noted otherwise, "click" means to push the left button on a trackball module.
- The keys and controls of the Radar Control Unit are shown in bold face; for example, the **ENTER** key.
- The buttons on the InstantAccess bar™, Status bar and menu items are shown in brackets; for example, the [TUNE] button.
- Context-sensitive menus are available with many buttons, and boxes and objects. Right-click an item to display the related context-sensitive menu.
- This radar is available in three types of specifications: IMO, A, or B. This manual provides the descriptions for the B type, of which some functions are not available with the IMO or A type. See the menu tree in Appendix 1 for function availability.
- The display colors mentioned in this manual are those with the color palette setting "Day-Gray".
- InstantAccess bar™ is a trademark of FURUNO Electric Co., Ltd.

Program Number

System	Program no.	Version no.	Remarks
Antenna unit			
SPU	0359281	01.xx/02.xx	For magnetron radar
	0359286	01.xx/02.xx	For S-band solid state radar
	0359477	01.xx/02.xx	For X-band solid state radar
	0359560	01.xx/02.xx	For MARK-2 magnetron state radar
	0359595	01.xx/02.xx	For MARK-2 X-band solid state radar
MTR-DRV	0359293	01.xx	
PM	0359296	01.xx	
RF-Converter	0359302	01.xx	For S-band solid state radar
RF-Converter	0359414	01.xx	For X-band solid state radar
Power supply unit			
PSU-Control	0359299	01.xx	
Processor Unit: EC-3000/3005			
Main	0359266	05.xx	

xx: Minor change

The latest IHO standard can be found at <http://www.iho.int>

Virus Prevention

This equipment is not equipped with a virus checker. This equipment operates in real time; therefore, having a virus checker that periodically checks the equipment for viruses would increase the processing load, which can affect operation. However, you can avoid viruses by following the instructions in this section.

When you update a chart

The PC and medium (USB flash memory, etc.) used to download and store an update for an existing chart or a new chart may be infected with a virus. Check the PC and the medium for viruses

with a commercial virus checker - BEFORE you connect them to this equipment. Be sure the virus checker contains the latest virus definition files.

Network connection

The equipment receives and displays information from various navigation equipment and radar via a LAN. A PC and other equipment connected to a network can carry viruses. To prevent the introduction of a virus to the LAN, DO NOT connect the system or HUB to an external network, including other shipboard LAN.

Do not install 3rd party programs in the system

Programs installed via an external network can carry viruses that can cause the system to malfunction. Do not install any Windows® software.

Open Source Software

This product includes software to be licensed under the GNU General Public License (GPL), GNU Lesser General Public License (LGPL), BSD, Apache, 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 or LGPL as published by the Free Software Foundation. Please access the following URL if you need source codes: https://www.furuno.co.jp/en/contact/cnt_oss_e01.html

This product uses the software module that was developed by the Independent JPEG Group.

Reverse engineering

Reverse engineering (disassemble, decompile) of the software of this equipment is prohibited. However, reverse engineering is permitted under the following conditions:

- The library used for the reverse engineering (GNU Library General Public License Version 2, GNU Lesser General Public License Version 2.1, or later editions) is clearly noted.
- The reverse engineered software is used only within the scope outlined under the appropriate license.

CE/UKCA declaration

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

Disclosure of Information about China RoHS

With regards to China RoHS information for our products, please refer to our website (www.furuno.com).

Importable files

This radar can import the following file types. It cannot import or execute other files. However, even if the file type is importable, it cannot be imported if the format is incorrect.

Route: .RTZ, .RTZP, .CSV, .TXT
User chart: .XML
User settings: .ZIP

ENC license file: .TXT
ENC data file: .ZIP
Radar map: .MRK

SYSTEM CONFIGURATIONS

NOTICE

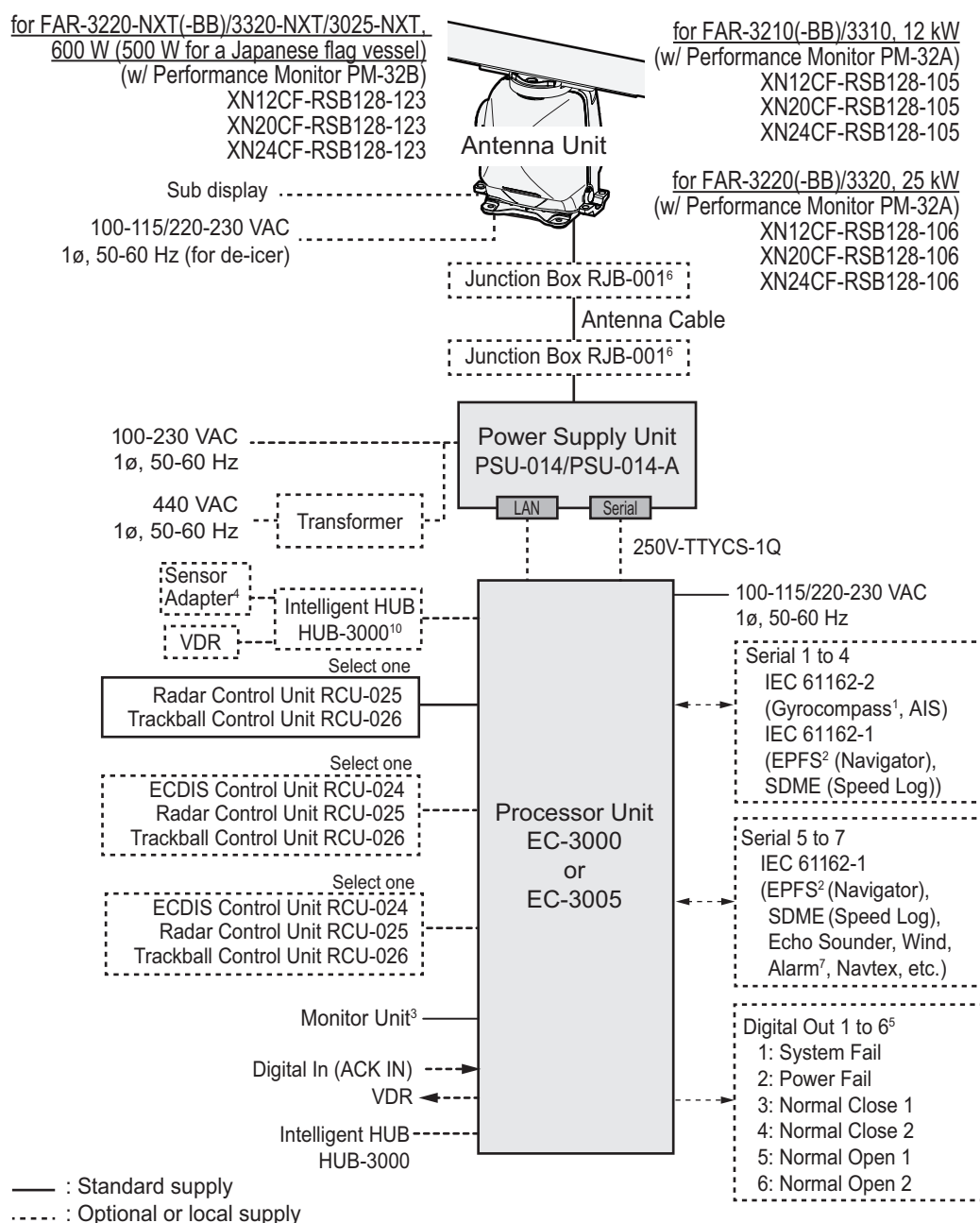
The radar(s) must be interconnected to the following type approved sensors:

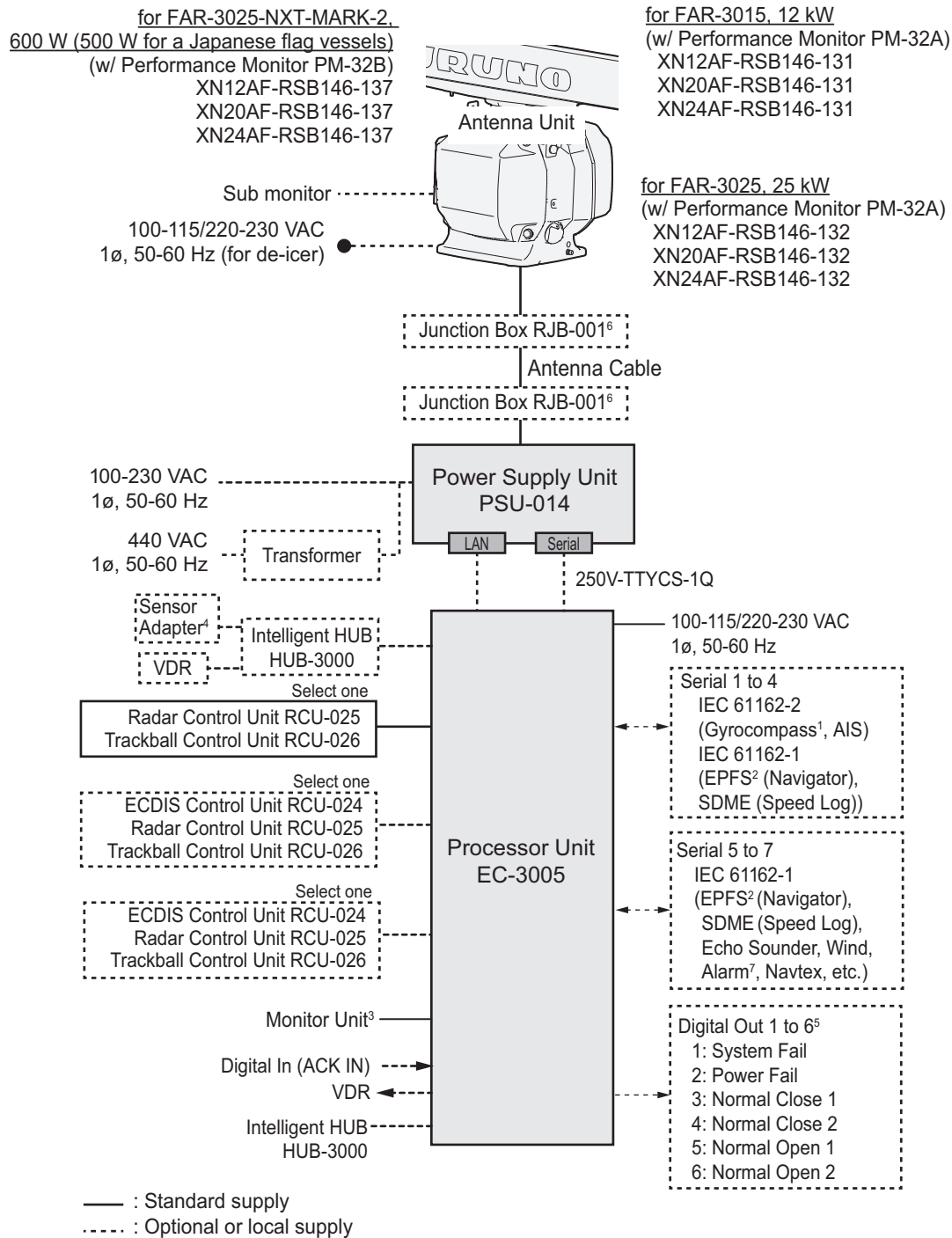
- Gyrocompass meeting the requirements of the IMO resolution A.424(XI).
- EPFS meeting the requirements of the IMO resolution MSC.112(73).
- SDME meeting the requirements of IMO resolution MSC.96(72).

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

Basic configuration is shown with solid line.

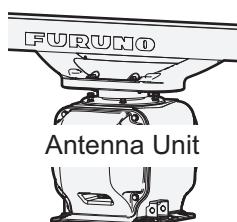
X-band (TR-UP, CF antenna)



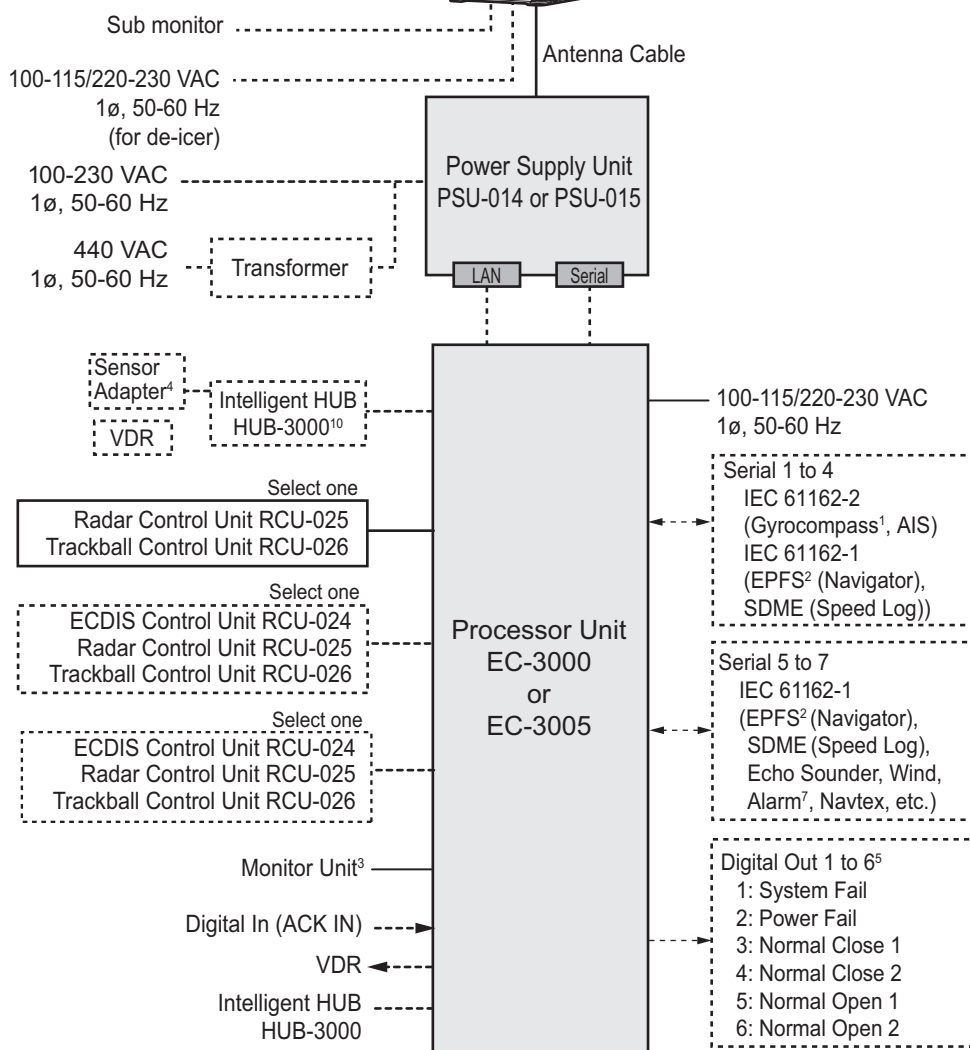
X-band (TR-UP, AF antenna)

S-band (TR-UP)

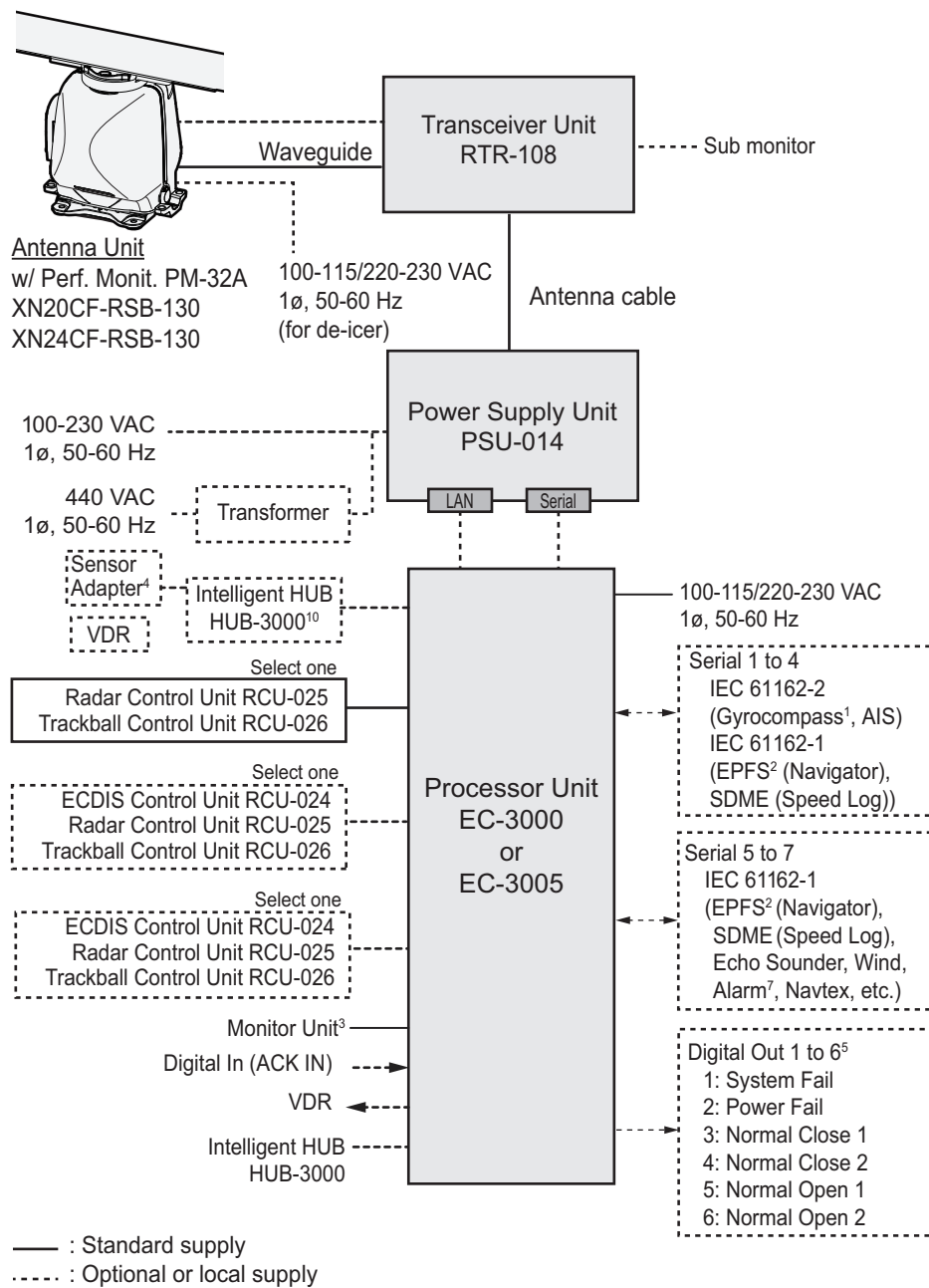
for FAR-3230S(-BB)/3330S/3035S, 30 kW
(w/Performance Monitor PM-52A)
SN24CF-RSB129-107
SN30CF-RSB129-107
SN36CF-RSB129-107



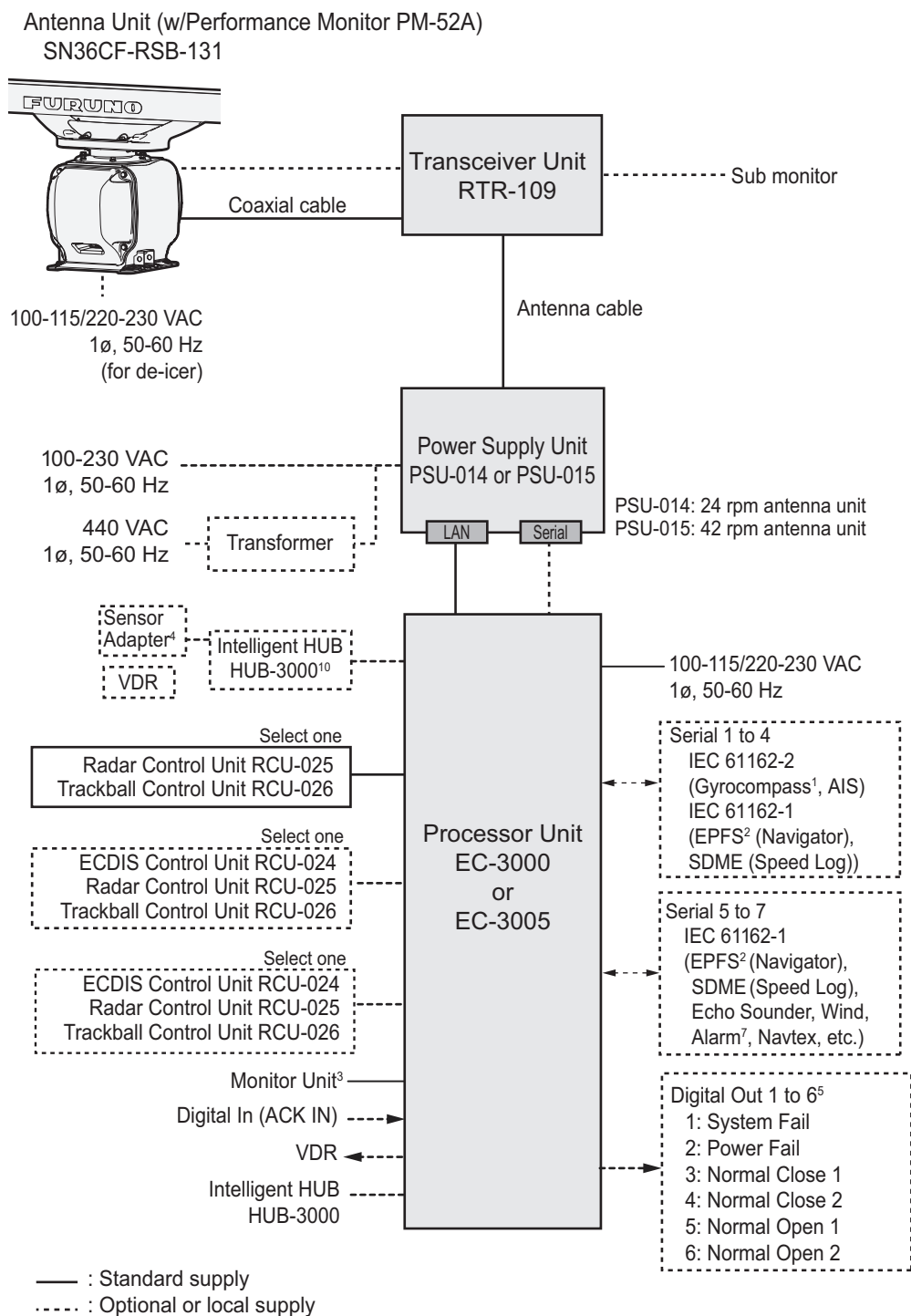
for FAR-3230S-SSD(-BB)/3330S-SSD/3035S-NXT, 250 W
(w/Performance Monitor PM-52B)
SN24CF-RSB133-111
SN30CF-RSB133-111
SN36CF-RSB133-111



—— : Standard supply
..... : Optional or local supply

X-band (TR-DOWN)

S-band (TR-DOWN)



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.96(72).
- 3) The monitors listed in the following table have been approved by the IMO.
If a different monitor is to be used on IMO vessels, its effective diameter must meet the applicable Category requirements.
 - CAT 1C and CAT 1HC: effective diameter of 320 mm or higher
 - CAT 2C and CAT 2HC: effective diameter of 250 mm or higher

Category	Manufacturer	Model	Viewing distance
CAT 1C and CAT 1HC	FURUNO	MU-231	1.02 m
		MU-231CE	1.02 m
		MU-270W	1.02 m
	Hatteland Technology	JH 23T12 FUD*	1.02 m
		JH 23T14 FUD	1.01 m
		HD 26T22 FUD	0.99 m
		HD 26T21 MMD	0.99 m
		HD 27T22 FUD/HD 27T27 FUD	1.07 m
		HD 32T22 FUD*/HD 32T40 FUD*	1.15 m
		HD 55T22 FUD*/HD 55T40 FUD*	1.95 m
	North Invent	WA270-01.MON.01	1.07 m
		WE270FU	1.07 m
		WA460-01.MON.01	1.64 m
CAT 2C and CAT 2HC	FURUNO	MU-190	1.02 m
		MU-192	1.02 m
		MU-201CE	1.08 m
	Hatteland Technology	JH 19T14 FUD/JH 19T27 FUD	1.02 m
		JH 20T17 FUD	0.88 m
		JH 21T27 FUD	0.93 m
		HD 19T22 FUD/HD 19T27 FUD	1.01 m
		HD 24T22 FUD/HD 24T27 FUD	0.86 m

*: For use with radar only; do not use the chart function, and do not use for Back-up ECDIS.
For installation and operation of other monitors, see the respective manuals.
For BB types, a monitor unit is prepared by the user.

- 4) The sensor adapters are Control Serial MC-3000S, Analog IN MC-3010A, Digital IN MC-3020D and Digital OUT MC-3030D.
- 5) 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.

SYSTEM CONFIGURATIONS

- 6) Junction boxes are required for antenna cable length greater than 100 m. Max. length is 400 m.
- 7) The ALR format is not BAM-compliant and shall not be used for new installation. It may be used for retrofitting on ships-in-operation only.
- 8) When using this unit as a Back-up ECDIS, the setup of the Back-up ECDIS must be completed by a FURUNO approved service engineer.
- 9) When setting up Operator Fitness and connecting this unit to the BNWAS, ensure the Monitor Unit and Control Unit are installed on the bridge where proper look-out can be carried out.
- 10) For FAR-3xx0 series radar, you can use switching HUB (HUB-100) for connection to a IEC61162-450 Ed.1 network.

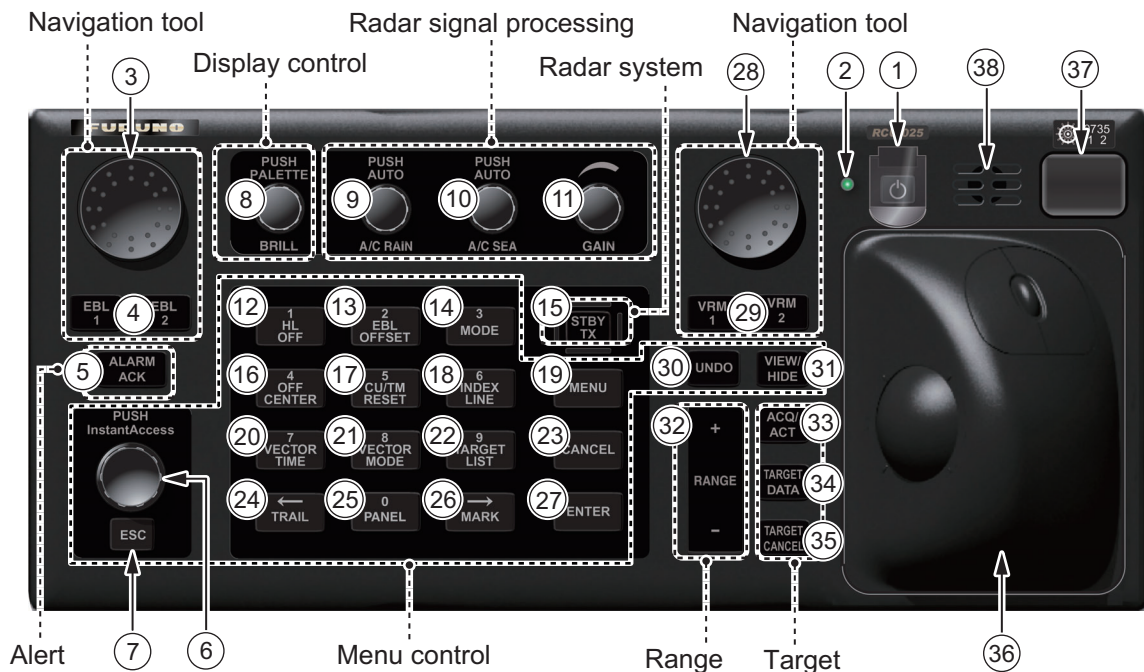
1. OPERATIONAL OVERVIEW

1.1 Radar Control Unit RCU-025

1

1.1.1 Radar Control Unit RCU-025 description

The Radar Control Unit RCU-025 consists of various controls and a trackball module (trackball, scrollwheel and left and right buttons). The trackball module functions like a PC mouse. The user rolls the trackball and operates the left and right buttons and the scrollwheel to do various functions.



When you press the correct key, a single beep sounds to alert you to correct operation. For wrong operation, several beeps sound. You can select the loudness of the beep or deactivate the beep on the [Customize] menu.

No.	Control	Description
1		Turns the system on or off. (For configurations using a FURUNO monitor with the slide switch ON, this key also turns the monitor unit on or off.)
2	Status LED	The color and state of the LED change according to system or alert status. Green, lighting: Normal operation status; no alerts generated. Green, flashing: The heater on the CPU board is on, because ambient temperature is not at least 0°C. The heater takes about two minutes to warm the processor unit. The LED lights green after the heater goes off. Red, lighting: Acknowledged alert or SYSTEM FAIL. SYSTEM FAIL occurs when there is trouble in the Processor Unit or communication failure between the Processor Unit and a Control Unit. Each Control Unit detects trouble and its lamp flashes in red and the buzzer sounds. If this condition occurs at the No. 1 Control Unit, the SYSTEM FAIL signal is output. Red, flashing: Unacknowledged alert or SYSTEM FAIL.
3	Rotary control, EBL1, EBL2	Rotary control: Adjusts the active EBL. EBL1, EBL2: Activates or deactivates the respective EBL.

1. OPERATIONAL OVERVIEW

No.	Control	Description
5	ALARM ACK	- Acknowledges unacknowledged alert. - Silences the audio alarm.
6	InstantAccess knob	Selects the buttons on the InstantAccess bar™.
7	ESC	Goes back one step in current operating sequence on the InstantAccess bar™.
8	BRILL	Rotate: Adjusts the brilliance of the display. Push: Selects a color palette.
9	A/C RAIN	Rotate: Suppresses rain clutter. Push: Toggles between manual and automatic rain clutter adjustment.
10	A/C SEA	Rotate: Suppresses sea clutter. Push: Toggles between manual and automatic sea clutter adjustment.
11	GAIN	Rotate: Adjusts the sensitivity of the radar receiver.
12	HL OFF	- Temporarily erases everything except radar echoes when pressed and held down. - Enters the numeric 1. - Selects like-numbered menu item.
13	EBL OFFSET	- Activates or deactivates the offset EBL. - Enters the numeric 2. - Selects like-numbered menu item.
14	MODE	- Selects a presentation mode. - Enters the numeric 3. - Selects like-numbered menu item.
15	STBY TX	Toggles the radar between standby and TX.
16	OFF CENTER	- Puts sweep origin at the cursor location. - Enters the numeric 4. - Selects like-numbered menu item.
17	CU/TM RESET	Course-up: Resets heading line to 000°. True motion: Moves own ship position 75% of the radius in stern direction. - Enters the numeric 5. - Selects like-numbered menu item.
18	INDEX LINE	- Selects an index line (in the PI line box). - Long-press to activate or deactivate selected index line. - Enters the numeric 6. - Selects like-numbered menu item.
19	MENU	Opens, closes the menu.
20	VECTOR TIME	- Sets the vector time (length) for TT and AIS objects. - Enters the numeric 7. - Selects like-numbered menu item.
21	VECTOR MODE	- Sets the vector mode (relative, true) for TT and AIS objects. - Enters the numeric 8. - Selects like-numbered menu item.
22	TARGET LIST	- Displays AIS, TT data in the target list. - Enters the numeric 9. - Selects like-numbered menu item.
23	CANCEL	Cancels the changes made on the currently selected menu.
24	TRAIL	- Goes back one page in the menu. - Moves cursor leftward in text box. - Turns the echo trail display on or off. - Long-press to reset all trails.

No.	Control	Description
25	PANEL	- Adjusts the backlighting of the keys. - Enters the numeric 0. - Selects like-numbered menu item.
26	MARK	- Goes forward one page in the menu. - Moves cursor rightward in text box. - Inputs selected mark on the radar screen, at the position selected.
27	ENTER	Confirms selection on menu.
28 29	Rotary control, VRM1, VRM2	Rotary control: Adjusts the diameter of the active VRM. VRM1, VRM2: Activates or deactivates the respective VRM.
30	UNDO	Undoes edit or text input when creating a radar map, route, user chart.
31	VIEW/HIDE	Radar mode, chart radar mode: Shows or hides the AZ box, Drop mark boxes, Mark box, PI line box, Trial box, InstantAccess bar™ (B-types only). Chart for radar mode: Shows or hides the EBLs, InstantAccess bar™, [Overlay/NAV Tools] box, [Route information] box, VRMs.
32	RANGE	Selects radar range (radar and chart radar modes), chart scale (chart mode).
33	ACQ/ACT	TT: Acquires cursor-selected target, for target tracking. AIS: Activates cursor-selected sleeping AIS target.
34	TARGET DATA	Displays the detailed data for selected TT, AIS object, in the TT/AIS information box.
35	TARGET CANCEL	TT: Stops tracking cursor-selected tracked target. AIS: Sleeps cursor-selected activated AIS target. - Long-press to erase all displayed TT target data.
36	Trackball module	The trackball module is the same as that used in the Trackball Control Unit RCU-026. See the description in the next section.
37	USB port	For connection of USB flash memory (FAT16 or FAT32 format). Do not connect a USB HDD or PC keyboard. The DVD drive (Maker: TEAC, Type: PU-DVR10) is for chart updates.
38	Speaker	Activates key beeps and alert sounds. Note: A thin waterproofing sheet is attached to the speaker on the control unit. Do not insert brushes or other objects into the speaker holes when cleaning them. If the sheet is torn, the speaker may be damaged if water leaks through the holes.

1.1.2 Operator fitness

The system outputs the operator fitness signal when a key or button is pressed, the trackball is moved or a rotary control is rotated.

1.2 Trackball Control Unit RCU-026

1.2.1 Trackball Control Unit RCU-026 description

The Trackball Control Unit RCU-026 has a power switch, a trackball module (trackball, scrollwheel and left and right mouse buttons), a status LED, and a USB port. The trackball module functions like a PC mouse; the user rolls the trackball and operates the left and right buttons and the scrollwheel to do various functions.



Note: RCU-030 (optional unit) has a trackball module name the same as RCU-026.

No.	Control	Description
1	Power switch	Turns the system on or off. (For configurations using a FURUNO monitor with the slide switch ON, this key also turns the monitor unit on or off.)
2	Status LED	The color and state of the LED change according to system or alert status. See the Status LED description on page 1-1.
3	Left button	- Does the operation related to the object selected. - Confirms the operation done for the object selected.
4	Scrollwheel	- Selects menu options. - Selects chart scale. - Sets numeric data. (The scrollwheel does not have a "push" function.)
5	Right button	- Displays context-sensitive menu when the cursor is put in the display area. - Cancels operation done on the object selected.
6	Trackball	- Moves the cursor. - Selects an object.
7	USB port	For connection of USB flash memory (FAT16 or FAT32 format). Do not connect a USB HDD or PC keyboard. The DVD drive (Maker: TEAC, Type: PU-DVR10) is for chart updates.

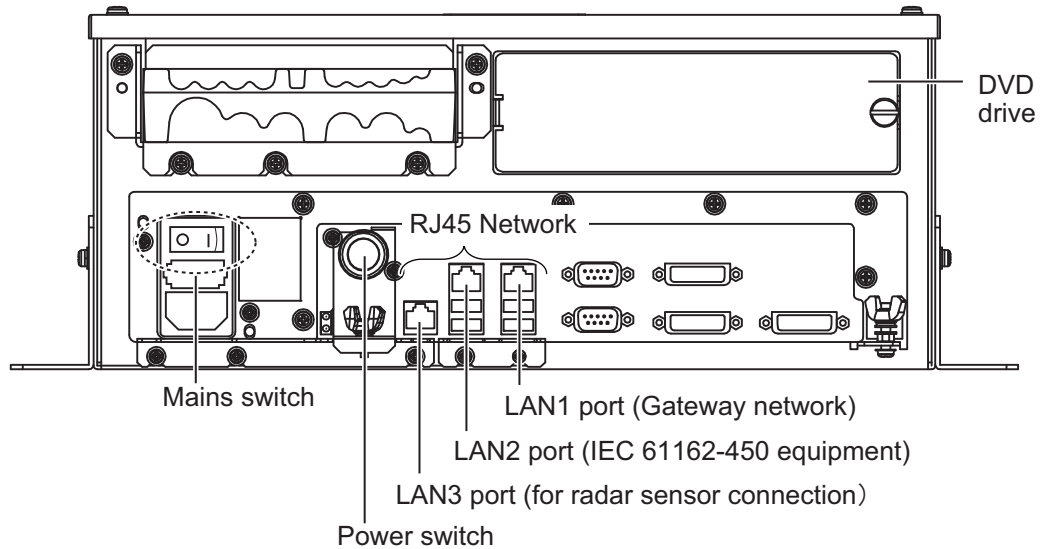
1.2.2 Operator fitness

The system outputs the operator fitness signal when a key or button is pressed, the trackball is moved or a rotary control is rotated.

1.3 Processor Unit

The Processor Unit is the heart of the chart system, and is mainly responsible for the chart management, route planning and route navigation.

The Processor Unit has two power switches. The Mains switch controls the power from the switchboard, and the Power switch controls the power to the chart radar system.



Note 1: Do not operate the chart radar with a DVD or CD inserted in the DVD drive, to prevent damage to the drive and media. Remove media from the drive after usage. Insert media only to update charts. After completion of an update, remove the media from its drive and store it in its case. Store media out of direct sunlight, in a place where temperature and humidity are moderate and stable.

Note 2: To keep the system stable, restart the unit at least once every two weeks.

Note 3: Close the lid of the DVD drive when the drive is not in use.

1.4 How to Turn the System On/Off

Normally, leave the power switches at the front of the Processor Unit on and control the power with the power switch on a Control Unit (RCU-025, RCU-026). The monitor unit is powered independently.

How to power the system

Push the mains switch on the Processor Unit for the "I" position. Turn on the power switch on the Processor Unit or a Control Unit. The start-up display appears on the monitor.

After the power is applied, the program starts up and about one minute later the bearing scale appears. The radar then goes into three minutes of warm-up time to warm the magnetron, which transmits radar pulses. The timer at the center of the screen counts the time remaining for warm-up. When the timer shows 0:00, the indication "ST-BY" appears at the screen center. The radar is now ready to transmit radar pulses. In the stand-by condition, no radar pulses are transmitted and TT nor AIS is active.

The settings on the menus are stored in a non-volatile memory (hard disk) and are preserved when the power is turned off.

Note 1: The solid state radar does not have a magnetron, therefore it has no warming period.

Note 2: If the ambient temperature is less than 0°C (32°F) when the power is applied, nothing appears on the display and the Status LED on the Control Unit flashes. This is because the heater is warming the unit. The display appears in approx. two minutes.

How to power off the system

Press the power switch on the Processor Unit or a Control Unit. Push the Mains switch for the "O" position.

Note: Provided that the radar was once in use with the transmitter tube (magnetron) still warm, you can put the radar in transmit state without three minutes of warm-up. If the Power switch was turned off by mistake or the like and you wish to restart the radar promptly, turn on the Power switch not later than 10 seconds after power-off.

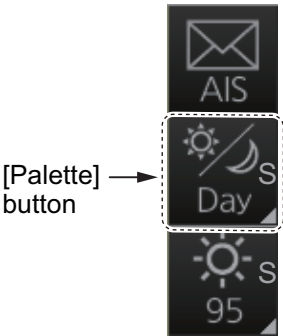
1.5 How to Select a Color Palette

This radar provides three sets of color and brilliance sets (palette), day, dusk and night, to match any ambient lighting condition. The default specifications of each palette are as shown in the table below. The panel dimmer setting is automatically changed, and the number of steps depends on the color palette selected.

Palette	Brilliance		Panel dimmer (step)	Text color	Background color
	19" display unit	23"/27" display unit			
Day-gray	110cd/m ²	120cd/m ²	9	White	Gray
Day-blue	110cd/m ²	120cd/m ²	9	White	Blue
Dusk-gray	50cd/m ²	50cd/m ²	8	Light gray	Dark gray
Dusk-blue	50cd/m ²	50cd/m ²	8	Light gray	Dark blue
Night-gray	5cd/m ²	5cd/m ²	5	Orange	Dark gray
Night-blue	5cd/m ²	5cd/m ²	5	Light gray	Dark blue

To select a palette, do the following:

1. Click the [Palette] button.



2. Click [Day], [Dusk] or [Night] as appropriate. For example, select [Day] to show its options.



3. Click the palette (gray, blue) desired.

Note 1: A palette can also be selected by pushing the **BRILL** control on the Control Unit.

Note 2: S or L appears at the right edge of the button to denote sharing method. See section 22.7.

1.6 How to Adjust the Display Brilliance, Control Unit Backlighting

The brilliance setting is defined according to the color palette setting (see section 1.5). However, manual adjustment of the brilliance is also possible.

Note 1: Use a serial cable for brilliance adjustment to make the connection between the Processor Unit and the Control Unit.

Note 2: For details regarding your monitor, see its operator's manual.

Note 3: Improper brilliance may affect the visibility of information, especially on the night display.

Note 4: S or L appears at the right edge of the button to denote sharing method. See section 22.7.

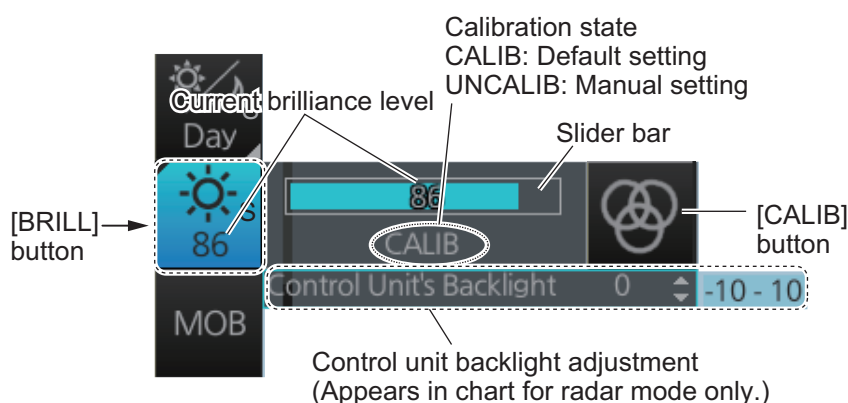
1.6.1 Manual brilliance adjustment

How to adjust the brilliance manually with the BRILL control

Operate the **BRILL** control to adjust brilliance. Turn it clockwise to increase the brilliance; counterclockwise to decrease the brilliance. Watch the brilliance level indication on the [BRILL] button (see the illustration below) to see the current brilliance level.

How to adjust the brilliance manually with the InstantAccess knob

1. Push the **InstantAccess** knob.
2. Rotate the knob to select the [BRILL] button then push the knob to show the brilliance adjustment window.



3. Push the knob, rotate the knob to set the brilliance then push the knob to confirm the setting. The calibration state indication changes to "UNCALIB".
4. To restore the default setting, rotate the knob to select the [CALIB] button then push the knob. The calibration state indication changes to "CALIB".

Manual brilliance adjustment with the trackball module

1. Click the [BRILL] button on the InstantAccess bar™ to show the brilliance adjustment window.
2. **For coarse adjustment**, put the cursor on a location within the slider bar area then push the left button. **For fine adjustment**, put the cursor on the end of the slider bar and roll the trackball while holding down the left button.

3. Release the left button to confirm setting. The calibration state indication changes to "UNCALIB".
4. To restore the default setting, click the [CALIB] button. The calibration state indication changes to "CALIB".

1.6.2 Control unit backlighting

How to adjust the brilliance manually with the control unit (RCU-025)

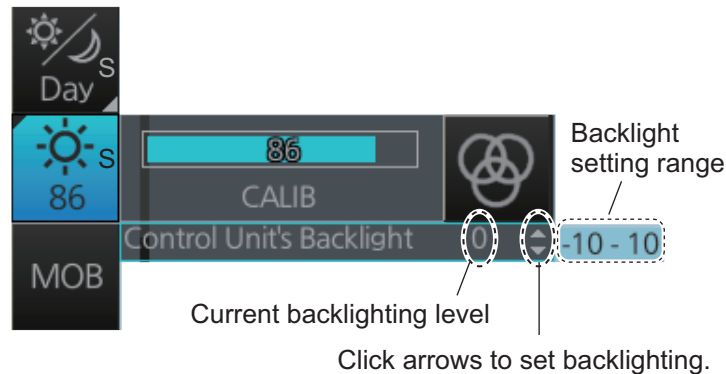
Push the **PANEL** key to adjust backlighting of the control unit.

How to adjust the brilliance manually on the menu (For Radar mode and Chart radar mode)

1. Right-click the **BRILL** button on the InstantAccess bar™ then select [Brill Menu].
2. Adjust the backlighting on the [1 CONTROL PANEL] menu.

How to adjust the brilliance manually with the InstantAccess knob (For chart mode)

1. Push the **InstantAccess** knob.
2. Rotate the knob to select the [BRILL] button then push the knob to show the brilliance adjustment window.
3. Put the cursor on the backlighting setting, and up and down arrows appear. Click the arrows to adjust the backlighting.



1.7 Display Modes

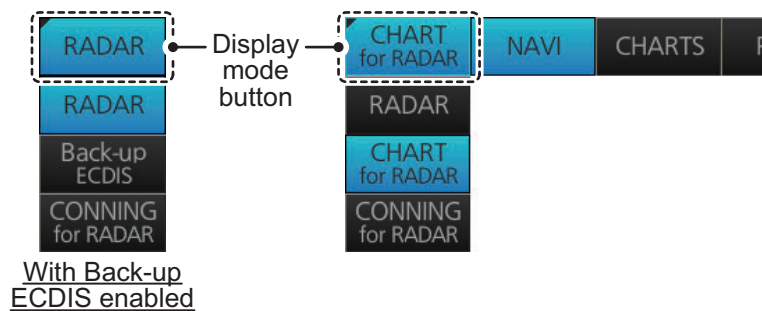
This chart radar has the following display modes:

- [RADAR]: - The **radar mode** provides the traditional radar display.
- The **chart radar mode** overlays the electronic chart on the radar image.
- [CHART for RADAR]: The **chart mode** shows the electronic charts.
- [CONNING for RADAR]*: The **conning mode** provides a comprehensive navigation data display. * Optional specification.

1.7.1 How to select a display mode

Click the Display mode button to select desired mode.

- [RADAR]: Radar or chart radar mode (see subsection 1.8.2)
- [CHART for RADAR]: Chart for radar mode
- [Back-up ECDIS]: Back-up ECDIS mode (replaces [CHART for RADAR])
- [CONNING for RADAR]: Conning mode (see section 24.1)



1.7.2 Limitations when using the chart radar mode

The presentation mode for the chart radar mode can be course-up RM, north-up RM, or north-up TM. The presentation mode is automatically switched to north-up RM if the mode is head-up at the time the chart radar mode is selected.

1.7.3 Limitations when using Back-up ECDIS mode

When Back-up ECDIS mode is enabled, the following changes are also applied.

- The [CHART for RADAR] button changes to read "Back-up ECDIS".
- Own Ship look-ahead Area is always active and cannot be turned off.
- The talker for some sentences (route/alerts) changes from "RA" to "EI".

1.8 Display Screens

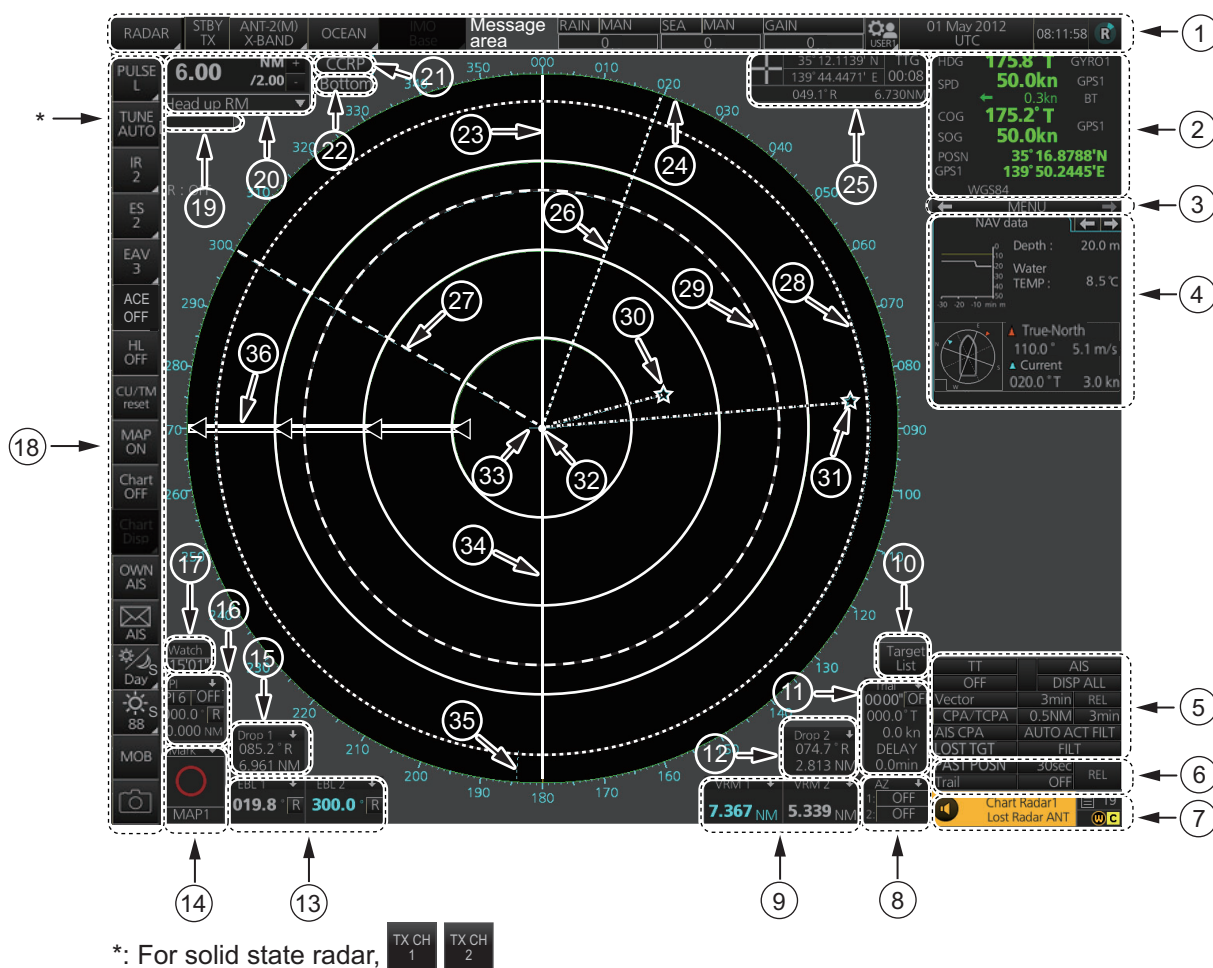
All display screens have operational buttons, boxes and indications, and display markers. Click a button or indication to execute the related operation. Context-sensitive menus are available with several boxes and objects. Right-click the appropriate box or object to show the related context-sensitive menu.

Monitor viewing distance

The optimal viewing distance for the FURUNO-supplied monitors is 1020 mm.

1.8.1 Radar display

The illustration below shows the markers, data, etc. as they appear on the FURUNO 19-inch monitor unit. The layout for the 23-inch and 27-inch monitor unit is partially different - the  button appears on the bottom of the InstantAccess bar™.



No.	Name	Description
1	Status bar	- Selects an antenna. - Selects the mode. - Adjusts the radar picture. - Displays radar operational messages.

1. OPERATIONAL OVERVIEW

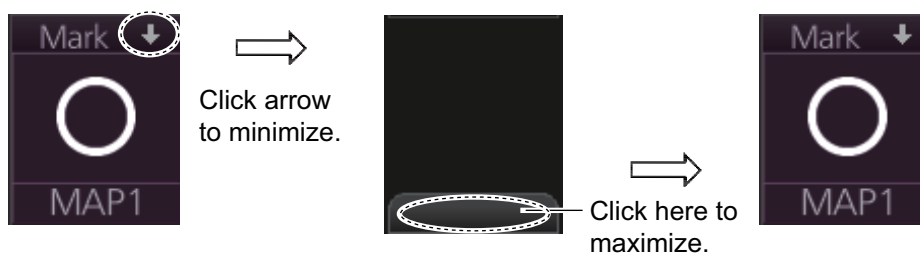
No.	Name	Description
2	Sensor information, datum box	Shows your ship's heading, heading source, ship's speed, water tracking speed, speed source, course over ground, speed over ground, course and speed source, ship's position, position source, chart datum. Note: Position source shall meet the requirements of IMO MSC.112(73).
3	Menu	Drop-down menu with various radar and chart functions.
4	Information box	Provides various navigation data and route information.
5	TT/AIS setting box	Sets the parameters for TT and AIS objects.
6	Trail box	Sets the parameters for the target trails.
7	Alert box	Shows alert messages by alert name and alert source. - Unacknowledged or regenerated alerts flash in red (alarm) or yellow-orange (warning). - Acknowledged alerts are shown in normal video.
8	Acquisition zone box	Sets an acquisition zone for TT, AIS.
9	VRM boxes	Shows the range and TTG to the VRM1, VRM2.
10	Target list button	Displays the TT and AIS object list.
11	Trial maneuver box	Sets the parameters for the trial maneuver.
12	Drop mark 2 box	Shows the bearing and range to the drop mark 2.
13	EBL boxes	Shows the bearing to the EBL1, EBL2.
14	Mark box	Selects the mark to inscribe on the radar display.
15	Drop mark1 box	Shows the bearing and range to the drop mark 1.
16	PI line box	- Adjusts the direction and width of the parallel index lines. - Activates or deactivates the parallel index lines.
17	Watch box	Counts down the time remaining until the buzzer sounds to alert the operator to view the radar picture. The watch alert function is available only for B-type.
18	InstantAccess bar™	Quick access to often-used radar, chart radar and chart functions. For radar and chart radar functions, see section 1.10. For chart functions, see subsection 6.1.3.
19	Tuning bar	Shows tuning status. (No function with solid state radar.)
20	Range/Presentation mode box	- Selects the radar range. - Selects the presentation mode.
21	REF point box	Selects the reference point (antenna or CCRP) for measurements (range, bearing, etc.) and markers (position, etc.)
22	Stabilization mode box	Selects the stabilization mode (Bottom or Water). The stabilization mode is synchronized with all FMD-3xxx and FAR-3xxx units on the same network.
23	Heading line	Indicates ship's heading.
24	Bearing scale	The bearing scale provides an estimate of the bearing to a target.
25	Cursor position box	This box shows - Latitude and longitude of the cursor position. - Range and bearing to the cursor position. - TTG to the cursor position.
26	EBL1	Measures the bearing to a target.
27	EBL2	
28	VRM1	Measures the range to a target.
29	VRM2	
30	Drop mark 1	Finds the range and bearing to drop mark position.
31	Drop mark 2	
32	Antenna marker	A cross marks antenna position.

No.	Name	Description
33	Own ship marker	An inverted "T" marks your ship's position.
34	Stern marker	Marks location of stern.
35	North marker	Marks North.
36	Range rings	Provide an estimate of the range to a target.

1

How to minimize, maximize the boxes at the bottom of the screen

The boxes at the bottom of the screen that contain an arrow can be minimized. Click the arrow to minimize the box. To restore maximum size, click the minimized box.

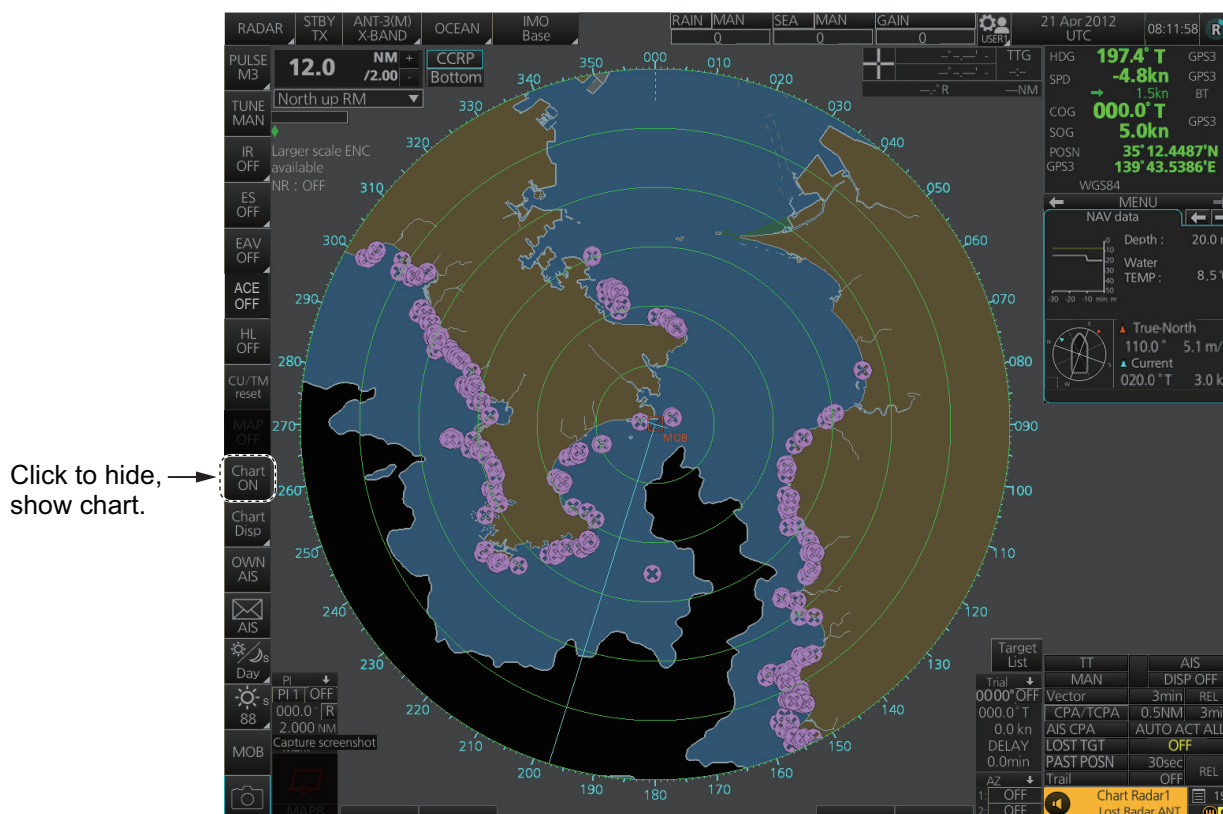


Example: Mark box

Note: The respective VRM or EBL is erased from the screen when the corresponding VRM or EBL box is minimized.

1.8.2 Chart radar display

The chart radar display overlays an electronic chart on the radar picture. To switch between the radar and chart radar displays, click the [Chart ON/OFF] button on the InstantAccess bar™.

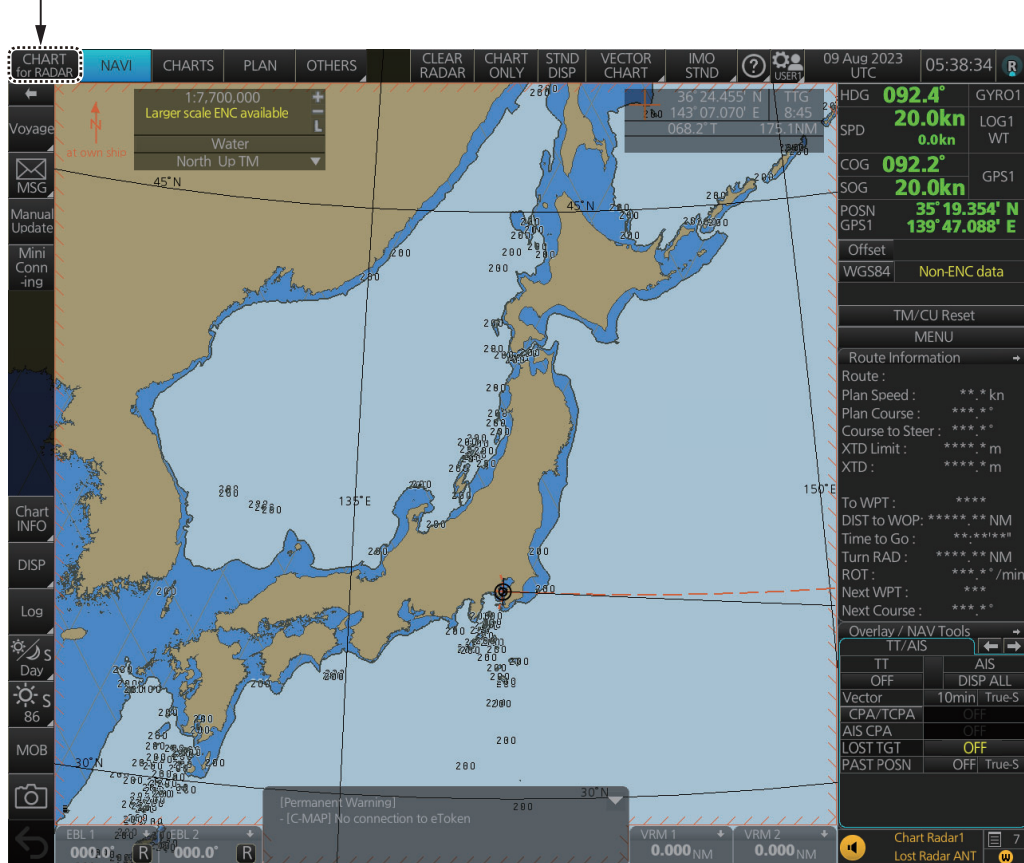


1. OPERATIONAL OVERVIEW

1.8.3 Chart display

The chart display shows only the electronic chart. Click the Display mode button to select [CHART for RADAR] to activate this display. See chapter 6 or a description of the chart display.

Select [CHART for RADAR].



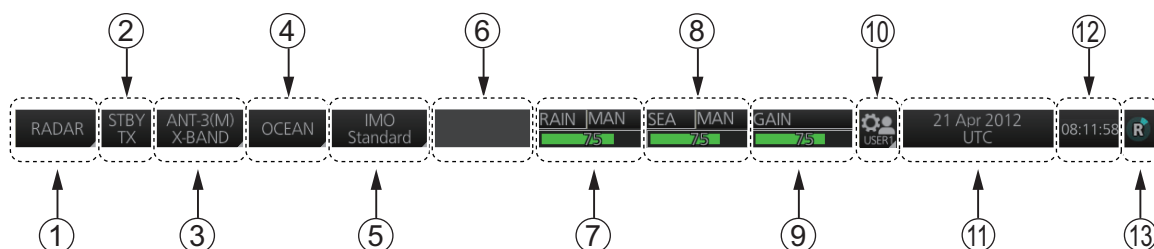
1.9 Status Bar

The Status bar is displayed at the top of screen in all modes. This bar provides, in the radar and chart radar modes, buttons for selection of the mode, antenna and chart database, and adjustment of the radar picture.

For a description of the Status bar used in the chart for radar mode, see subsection 6.1.2. For a description of the Status bar used in the conning mode, see section 24.1.

1

1.9.1 Status bar for radar, chart radar mode

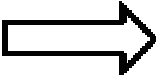


No.	Button name	Description
1	Display Mode	Selects the display mode: [RADAR], [CHART for RADAR], [CONNING for RADAR]*. * Optional specification.
2	STBY TX	Toggles the radar between stand-by and transmit.
3	Antenna	Selects an antenna.
4	Customize Echo	Presets the radar controls for specific navigation purpose; for example, congested waters.
5	Chart database	Selects the chart database (IMO Base, IMO Primary, IMO Standard, IMO All or PERSONAL).
6	Message area	Displays the message or icon.
7	RAIN*	Reduces rain clutter.
8	SEA*	Reduces sea clutter.
9	GAIN	Adjusts the gain of the radar receiver.
10	Settings 	Manages user profiles; opens the Settings menu.
11	Date	- Displays the date. - Selects the time to use, local or UTC. - Sets the time difference between local and UTC (to use local time).
12	Time	Displays the time, local or UTC.
13	Working Indicator 	- Rotates clockwise if the system is working properly. If it is not spinning the system is not working. Shortly after the working indicator stops spinning the buzzer sounds and the status LED turns red. Reset the power to restore normal operation. - If the primary display mode is specified during installation, the first letter of the primary mode name appears at the center of the working indicator as follows: C: Conning, E: ECDIS, R: Radar. The letter can be clicked to return to the primary display mode.

*: The indication is grayed out when the Automatic Clutter Elimination (ACE) function is [ON].

1.9.2 How to operate the buttons, slider bars on the Status bar

The Status bar has three types of controls: toggle button, drop-down list button and slider bar. You operate the buttons and bars with the trackball module.

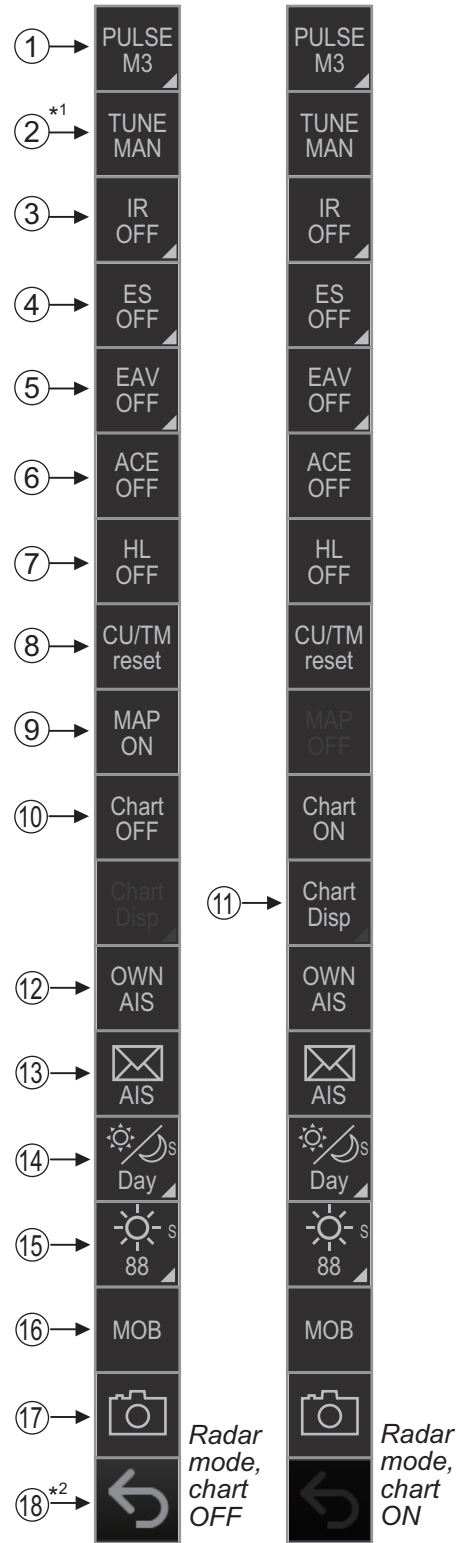
Control type	Example of control
Toggle button	
A toggle button alternately selects one of two functions assigned to the button. For example, the [STBY TX] button toggles the radar between stand-by and TX. The background color of the [STBY TX] button momentarily changes to light-blue when switching from standby to TX.	
Drop-down list button	
A drop-down list button provides a list from which to select an option related to the label on the button. A drop-down list button is identified by a triangle on the button's bottom-right corner. The [Chart database] button, shown in the right figure, is an example of a drop-down list button.	  Click button to show drop-down list. 
Slider bar	
The slider bars provide for adjustment of the radar picture. [RAIN], [SEA] and [GAIN] are slider bar buttons. To adjust the bar coarsely, put the cursor at any location within the slider bar area then push the left button. For fine adjustment, put the cursor at the end of the slider bar and roll the trackball while holding down the left button. Release the button to finish.	

1.10 InstantAccess Bar™

The InstantAccess bar™ runs vertically along the left edge of the screen and is displayed always. This bar provides, in the radar and chart radar modes, buttons for adjustment of the radar picture and chart, AIS operations, display brilliance control, MOB, screenshot, etc.

For a description of the InstantAccess bar™ used in the chart mode, see subsection 6.1.3.

- *1: For solid state radar, [TX CH] icon is displayed instead of [TUNE].
- *2: This button is not displayed on the FURUNO 19-inch monitor unit.



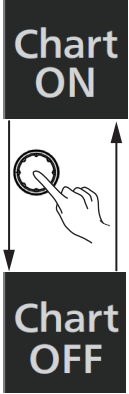
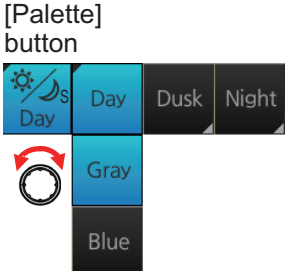
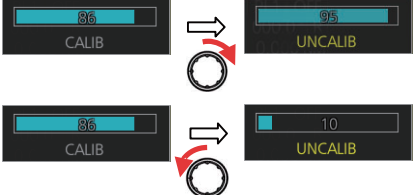
1. OPERATIONAL OVERVIEW

No.	Button name	Description
1	PULSE	Selects the radar pulse length.
2	TUNE (Magnetron radar)	Selects the radar receiver tuning method, automatic or manual, and manually tunes the radar receiver.
	TX CH (solid state radar)	Selects the transmit frequency from [TX CH 1] or [TX CH 2]. If your radar is receiving interference from another radar operating at the same frequency, use the [TX CH] button to change the TX frequency.
3	IR	Activates or deactivates the interference rejector.
4	ES	Activates or deactivates the echo stretch.
5	EAV	Activates or deactivates the echo averaging when Automatic Clutter Elimination (ACE) function is off.
6	ACE	Activates or deactivates the Automatic Clutter Elimination (ACE) function. Automatic Clutter Elimination (ACE) automatically sets the gain, rain and sea clutter controls according to the sea and rain clutter states.
7	HL OFF	Temporarily erases everything but radar echoes.
8	CU/TM reset	• 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.
9	MAP ON/OFF	Shows or hides the radar map marks on the radar display, in the radar mode.
10	CHART ON/OFF	Shows or hides the electronic chart.
11	Chart Disp	Shows or hides various chart objects. Shown in the chart radar mode. See subsection 2.43.2.
12	OWN AIS	Shows the [VOYAGE DATA] menu, to set your ship's AIS data.
13	 AIS message	Displays screen for "received AIS messages". When an unread AIS message exists, the [AIS message] button is displayed in yellow and changed as shown in the figure to the right. 
14	 OR  Palette	Selects a color palette, day, dusk or night. The S or L at the right edge of the label indicates how the color palette selection is shared, among the units of the system (S) or locally (L). The default setting is "S". See section 22.7.
15	 OR  BRILL	• Adjusts the brilliance of the monitor. • Adjusts the backlighting for the control unit. (CHART for RADAR mode) The S or L at the right edge of the label indicates how the brilliance/backlighting selection is shared, among the units of the system (S) or locally (L). The default setting is "S". See section 22.7.
16	MOB	Enters a MOB mark at the current position.
17	 Capture	Takes a screenshot.
18	 UNDO	Restores previous condition in radar map.

1.10.1 How to operate the buttons, slider bars on the InstantAccess bar™

The InstantAccess bar™ has three types of controls: toggle button, drop-down list button and slider bar. (The MOB and Capture buttons are special buttons.) You operate the buttons and bars with the trackball module or the InstantAccess knob. This section shows you how to use the InstantAccess knob.

1

Toggle button	Drop-down list button	Slider bar
	A drop-down list button provides a list from which to select an option related to the label on the button. A drop-down list button is identified by a triangle on the button's bottom-right corner. [Palette] button  <i>Palette list</i>	

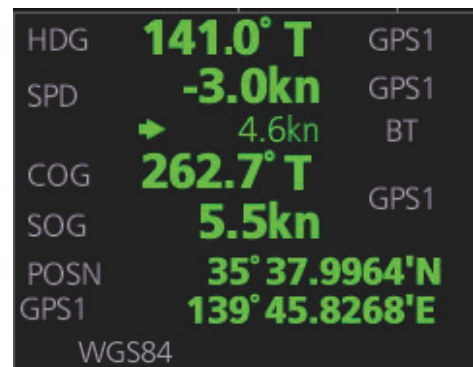
1. Push the **InstantAccess** knob to enable its use with the InstantAccess bar™.
2. Rotate the **InstantAccess** knob to select a button. The background color of the button selected is light-blue.
3. Do one of the following depending on button type.
 - 1) **Toggle button**: Push the knob to select setting.
 - 2) **Drop-down list button** or **slider bar**: Push the knob then rotate the knob to select an item or adjust the slider bar. Push the knob to confirm your selection.

Note: You can use the **ESC** key to go back one step in the current operating sequence.

1.11 Sensor Information, Datum Box

Sensor information, datum box displays the sensor data and the name of the datum in use. If the selected sensor's signal is interrupted or lost, the system automatically switches to a usable sensor. The sensor indications and names are colored according to sensor state. See the table below.

- **HDG**: Heading and its source.
- **SPD**: Longitudinal speed and its source. The direction of transverse speed is indicated with arrows, ➡, Starboard, ⬅, Port.
- **COG**: Course over ground and its source.
- **SOG**: Speed over ground and its source.
- **POSN**: Latitude and longitude position of own ship and its source.
- **Datum**: Chart datum (WGS84, WGS72, etc.) in use. No datum appears when there is no datum sentence.



Note: The position source shall meet the requirements of IMO MSC.112(73).

Color of nav data indications and sensor name

The color of the nav data indications and sensor names changes according to the state of the sensor data. The table shown below provides basic indication and color meanings. For detailed information, see Appendix 3. When no sensor data is received, the sensor source indication is blank and the related indication shows asterisks.

Sensor info box	Color of nav data indication	Color of sensor name	State
	Green	White	Sensor is normal.
	Yellow	White	Position correction applied.
	Red	White	Data is invalid.
	Green, data shown with asterisks (**.*)	No display	Data is not valid or not being received.
	Yellow	White, Yellow (DR)	Data is input manually (DR).

1.12 Menu Overview

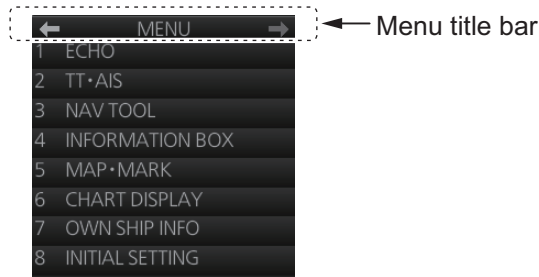
The menu consists of eight main menus and several sub menus. You can operate the menu with the Radar Control Unit or trackball module. The system closes open menus whenever there is no menu operation for 30 seconds.

1.12.1 Basic menu operation

1. Open the main menu.

Control Unit: Press the **MENU** key.

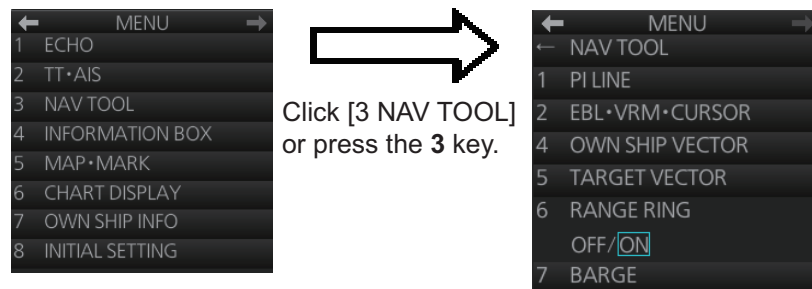
Trackball module: Click the menu title bar at the right side of the display.



2. Select a menu.

Control Unit: Press the corresponding numeric key. For example, press the **3** key to show the [NAV TOOL] menu.

Trackball module: Click the menu desired. The current selection is highlighted in blue.



3. Select a menu item.

Control Unit: Press the corresponding numeric key.

Trackball module: Click the menu item desired. The current selection is highlighted in blue.

4. Select a menu option.

Control Unit: Press the corresponding numeric key. The current selection is highlighted in orange.

Trackball module: Spin the scrollwheel. The current selection is highlighted in orange.

5. Confirm your selection.

Control Unit: Press the **ENTER** key.

Trackball module: Push the left button.

Note: Hereafter, "select" in a menu operating procedure means to press the applicable numeric key on the Control Unit or push the left button on the trackball module.

Keys, buttons to use in menus

Control Unit

1. OPERATIONAL OVERVIEW

MENU key: Open main menu, or close menu.

CANCEL key: Go back one layer in menu, or close menu when main menu is displayed.

←key: Return to main menu, in no. 2 layer or higher.

Trackball module

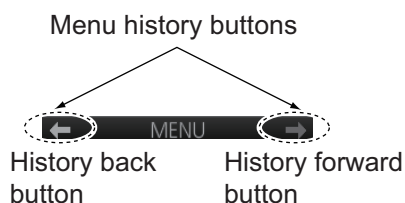
Right button: Go back one layer, or close menu when main menu is displayed.

Left button: (1) Click menu title bar to go back one layer, or close menu when main menu is displayed, (2) Click the left arrow on the menu title bar to return to the main menu, in no.2 layer or higher.

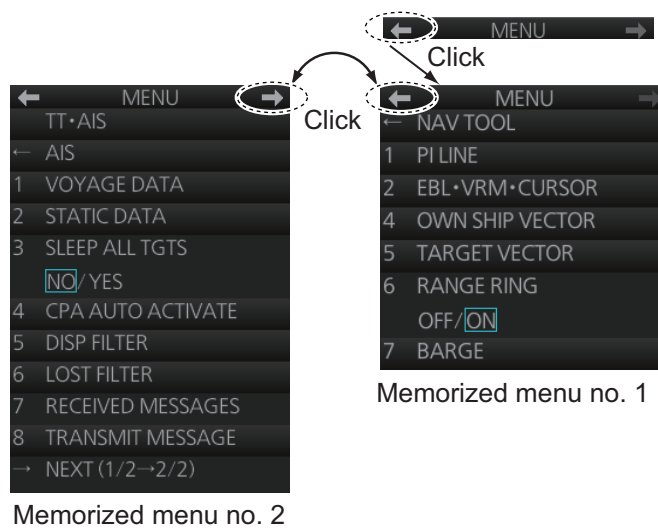
1.12.2 Menu history feature

This chart radar remembers the 10 last-used menus to help you go to recently used menus quickly. The memorized menus are cleared when the power is turned off. Installation- and service-related menus and menus where no operation occurred are not memorized. Menus accessed multiple times are counted as one menu.

Click the memory history buttons on the menu title bar to navigate through the last-used menus.



For example, the last two used menus are [NAV TOOL] and [AIS].



1.12.3 **How to enter numeric data**

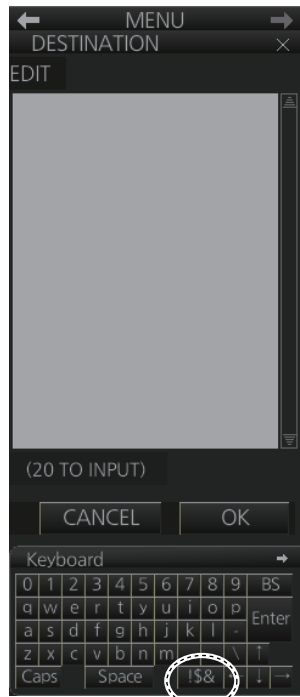
Select the numeric data, then do one of the following:

Control Unit: Use the ten keys to enter data.

Trackball module: Spin the scrollwheel to set data then push the left button.

1.12.4 **How to enter alphanumeric character data**

Some operations display a software keyboard to enter alphanumeric character data.



Click to switch between letters and symbols.

To enter characters, click applicable characters on the software keyboard. You can switch between letter input and symbol input by clicking the key circled in the illustration above.