

FURUNO

CHART RADAR



Models:

FAR-3000 series

FURUNO FAR-3000 Chart Radar offers the radar and navigation safety by greatly enhanced technology

Newly developed antennas with enhanced high durability and reliability

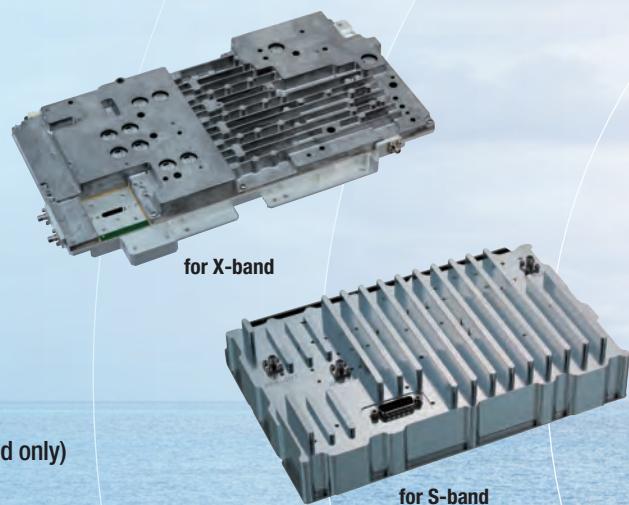


- ▶ Newly designed antenna scanners to suppress the aerodynamic drag and prevent a spike in temperature
- ▶ Less maintenance required through use of the DC brushless motor
- ▶ Ethernet network link between antenna unit and below deck processor unit
 - The analog signals are converted into the digital signals within the antenna unit and sent to the below deck processor unit via Ethernet network. This network technology eliminates loss of signal gain between antenna unit and processor unit that may be seen in conventional Radar system.
- ▶ Optional LAN Signal Converter enables users to extend the cable between antenna unit and processor unit or to utilize the existing cables when retrofitting

Solid State Radar model - NXT - specializes in target detection and maintainability

Compared to the traditional Magnetron Radar, the Solid State Radar NXT Series provide highly reliable target detection while requiring low power.

Power Amplifier Module of the Solid State transceiver



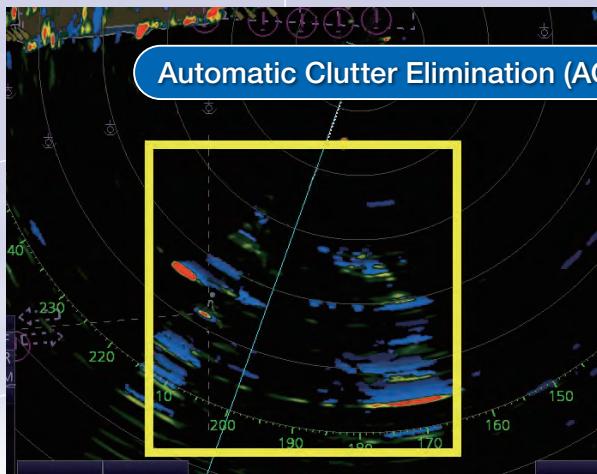
- ▶ Clear images
 - Furuno Solid State Radar technology generates clear echo images, which allows users to obtain a clear picture of the area around their vessel, including weaker echoes from small crafts.
- ▶ Reducing the time and cost for maintenance
 - No need to replace the magnetron
 - Removal of the consumable parts thanks to a fan-less antenna (S-band only)

reliable situation awareness target detection

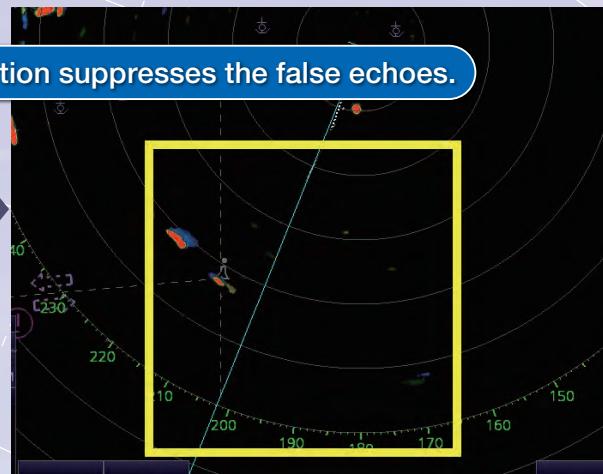
► Automatic Clutter Elimination (ACE) function provides clear echoes

Users can quickly adjust the radar image with a single action. When Automatic Clutter Elimination (ACE) function is activated, the system automatically adjusts the clutter reduction filter and gain control according to the sea and weather conditions selected (Calm/Rough Sea/Hard Rain).

Our advanced echo averaging architecture is also incorporated into Automatic Clutter Elimination (ACE) function. Users can avoid complicated adjustment processes, resulting in clear echo images.



Automatic Clutter Elimination (ACE)
OFF



Automatic Clutter Elimination (ACE)
ON

► Improved Target Tracking (TT) function

- Target acquisition takes only a few seconds



- Acquired target does not jump to adjacent target
- Reliable and stable tracking of high-speed and rapidly maneuvering vessels

► High performance Radar with Cat.1 and Cat.2 support

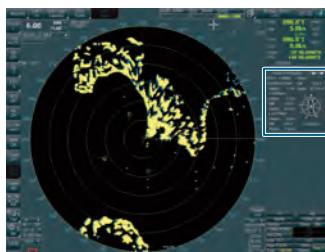
► Complies with the following regulations:

- | | |
|-------------------------|---------------------|
| • IEC 60945 Ed. 4.0 | • IEC 62288 Ed. 2.0 |
| • IEC 61162-1 Ed. 5.0 | • IEC 62388 Ed. 2.0 |
| • IEC 61162-2 Ed. 1.0 | • IEC 62923-1 |
| • IEC 61162-450 Ed. 2.0 | • IEC 62923-2 |
| • IEC 61174 Ed. 4.0 | |

Advanced technologies for safer and optimal navigation in all kinds of situations (option)

Wave Analyzer Software *

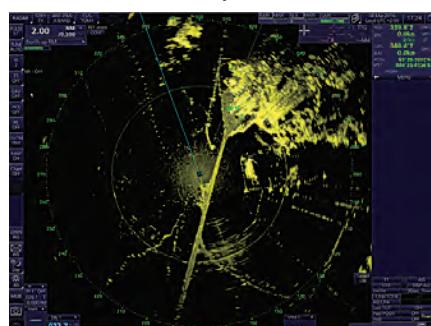
- Allows real-time monitoring and analysis of wave echoes
- Ensures safety at sea even at night



*More details on the Wave Analyzer brochure

Ice Mode ** (X-band magnetron only)

- Find the best route through ice
- Observe ice conditions by Radar

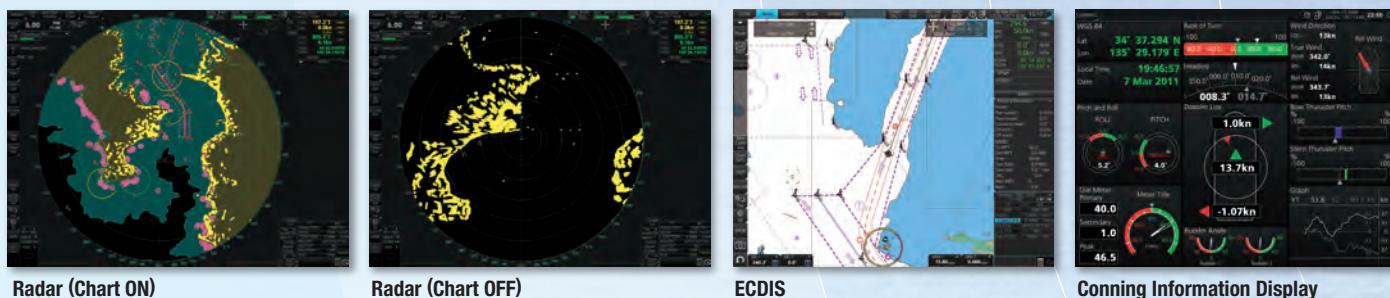


**Please contact your local distributor for more details

Multi Function Display (MFD) capability*

Furuno proposes workstations that combine flexibility and redundancy. Users may easily select ECDIS, Chart Radar, Conning display or Alert Management System at any multi-function display. Navigators will enjoy reduced workload and significant freedom to move about the bridge. All necessary information is available on a variety of displays and at locations that may be altered as required.

*MFD capability is to be implemented as software upgrade



Sensor Adapter

► Common sensor adaptor makes installation and maintenance easy

The Sensor Adapter acts as a central medium to gather all of the sensor data and collectively feed it to all FAR-3000 Chart Radar and FMD-3200/3300 ECDIS in the network. Since the sensor adapter can be extended to interface with all the sensors within the network, individual cable connections in the sensor-to-Chart Radar/ECDIS interface can be greatly reduced.



Navigation sensors can be directly interfaced with the processor's 8 serial I/O ports.

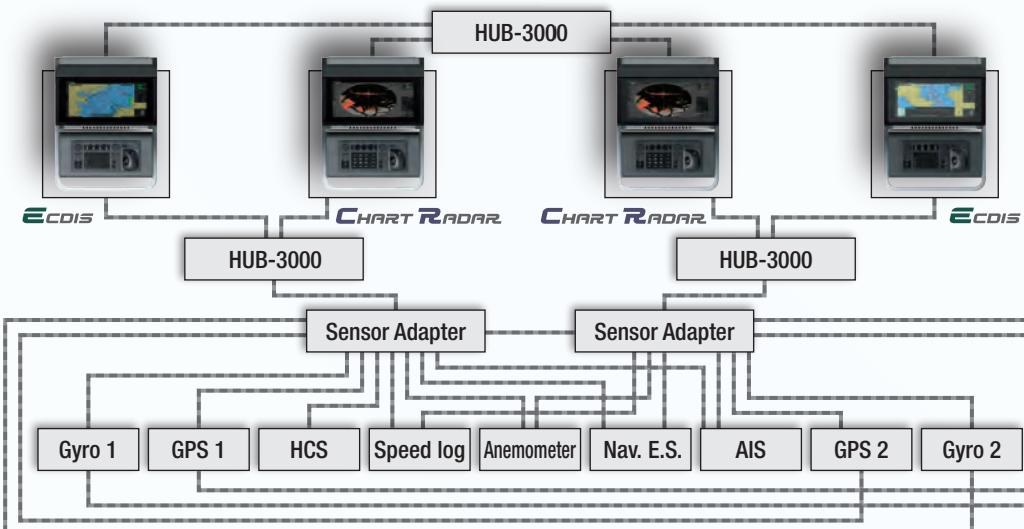
Sensor adapters are required under the following conditions:

- The sensor data is to be shared amongst multiple networked Chart Radar and ECDIS systems,
- The number of sensors interfaced is more than the number of the ports the processor has (8 serial I/O ports, 1 digital IN and 6 digital OUT), and/or
- The networked sensors include analog sensors.

In order to integrate onboard sensors into the navigation network, the sensor adapter may be interfaced with the Intelligent Hub HUB-3000 from which distribution of the sensor data throughout the network is possible. Alternatively, multiple sensor adapters may be interfaced via Ethernet to integrate onboard sensors for use in the shipboard network.

System diagram for the new Chart Radar

Model: FAR-3000



FURUNO's new user interface delivers straightforward operation



Unique & smart operation tool – “Status bar” and “InstantAccess bar™”

The user interface of the Radar utilizes carefully organized operational tools: the Status bar and the InstantAccess bar™. These operational tools deliver straightforward, task-based operation by which the operator can quickly perform tasks without having to navigate an intricate menu tree.

Status bar

Status bar contains information about the operating status, i.e., MFD operating mode, main tasks assigned to each MFD operating mode.

InstantAccess bar™

InstantAccess bar™ contains all the tasks (functions or actions) corresponding to the operation mode currently selected so that quick access to necessary functions/actions can be made.



Stress-free operation with the well-designed control unit

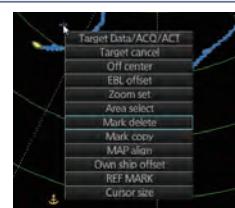


Intuitive operation

All operations can be controlled with the trackball.

Contextual menu

The context menu contains all the available actions related to the selected icon or area, it provides quick access to tasks.



SPECIFICATIONS

PRODUCT NAME

MARINE RADAR

GENERAL

Range Scales and Ring Intervals

Range (NM)	0.125	0.25	0.5	0.75	1.5	3	6	12	24	48	96
RI (NM)	0.025	0.05	0.1	0.25	0.25	0.5	1	2	4	8	16
Number of rings	5	5	5	3	6	6	6	6	6	6	6

ANTENNA UNIT

Radiator Type Slotted waveguide array

Beamwidth and Sidelobe

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

TRANSCEIVER UNIT

Transceiver Unit	Magnetron						
Frequency	RTR-105	RTR-106	RTR-108	RTR-107	RTR-109		
	X band: 9410±30 MHz			S band: 3050±30 MHz			
Output Power	12 kW	25 kW		30 kW			
Transceiver Unit	Solid State						
Frequency	RTR-123 (X band)		RTR-111 (S band)				
	①PON: 9403.75 MHz/QON: 9423.75 ±5MHz		①PON: 3043.75 MHz/QON: 3063.75±5 MHz				
	②PON: 9413.75 MHz/QON: 9433.75 ±5MHz		②PON: 3053.75 MHz/QON: 3073.75±5 MHz				
Output Power	600 W		250 W				

Range scale, Pulse Repetition Rate and Pulselength

Magnetron radar: FAR-3210/3310/3220/3320/3320W

FAR-3230S/3330S/3330SW

PRR (Hz approx.)	Range scale (NM)											
	0.125	0.25	0.5	0.75	1.5	3	6	12	24	48	96	
3000		S1										
3000			S2									
1500				M1								
1200					M2							
1000						M3						
600*							L					

*: 500 Hz on 96 NM range.

Solid state radar: FAR-3220-NXT/3230-NXT

PRR (Hz approx.)	Range scale (NM)											
	0.125	0.25	0.5	0.75	1.5	3	6	12	24	48	96	
1500		S1										
1500			S2									
1200				M1								
1000					M2							
1000						M3						
600							L					

Solid state radar: FAR-3230S-SSD/3330S-SSD

PRR (Hz approx.)	Range scale (NM)											
	0.125	0.25	0.5	0.75	1.5	3	6	12	24	48	96	
2400		S1										
2000			S2									
1500				M1								
1060					M2							
1000						M3						
600							L					

PROCESSOR UNIT

Chart Materials IMO/IHO S57 edition-3 ENC vectorized material (IHO S-63 ENC data protection scheme), C-MAP and CM-93/3 vectorized materials

Data Presentation Own Ship Own ship's mark and numeral position in lat/lon, speed and course

Target Data(TT: ARPA, AIS) Range, bearing, speed, course, CPA/TCPA, BCR/BCT Target information from AIS (waypoint, ship's hull and status)

Position Calculation Navigation by result from external position sensor Dead reckoning with gyro and log data from gyro, log, and position sensors to be fed to mathematical filter to generate highly accurate position and speed

Navigation Planning Planning by rhumb line, great circle Off-track display, waypoint arrival alarm, shallow depth alarm User Chart creation and display Notes Data Create and display notes data MOB (Man Overboard) Position, and other data at time of man overboard are recorded MOB mark is displayed on the screen

DISPLAY UNIT

Display Unit	MU-190	MU-231	MU-270W
Display Type	19" color LCD	23.1" color LCD	27" color wide LCD
Resolution	SXGA (1280x1024 pixels)	UXGA (1600x1200 pixels)	WUXGA (1920x1200 pixels)

INTERFACE

Processor Unit

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

Sensor Adapter

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

POWER SUPPLY

Monitor unit	MU-270W	100-230 VAC; 0.7-0.4 A, 1 phase, 50/60 Hz
MU-231	100-230 VAC; 1.0-0.6 A, 1 phase, 50/60 Hz	
MU-190	100-230 VAC; 0.7-0.4 A, 1 phase, 50/60 Hz	
Processor unit	100/230 VAC, 1 phase, 50/60 Hz	
Power Supply Unit	FAR-3210/3310 FAR-3220/3320/3220W FAR-3220-NXT/3320-NXT FAR-3230S/3330S/3330SW FAR-3230S-SSD/3330S-SSD	100-230 VAC; 1.8-0.9 (2.5-1.2) A, 1Φ, 50/60 Hz 100-230 VAC; 2.0-1.0 (2.8-1.3) A, 1Φ, 50/60 Hz 100-230 VAC; 1.8-0.9 (2.5-1.2) A, 1Φ, 50/60 Hz 100-230 VAC; 2.8-1.3 (5.1-2.3) A, 1Φ, 50/60 Hz 100-230 VAC; 2.3-1.1 (4.7-2.1) A, 1Φ, 50/60 Hz
	() : 42 rpm	

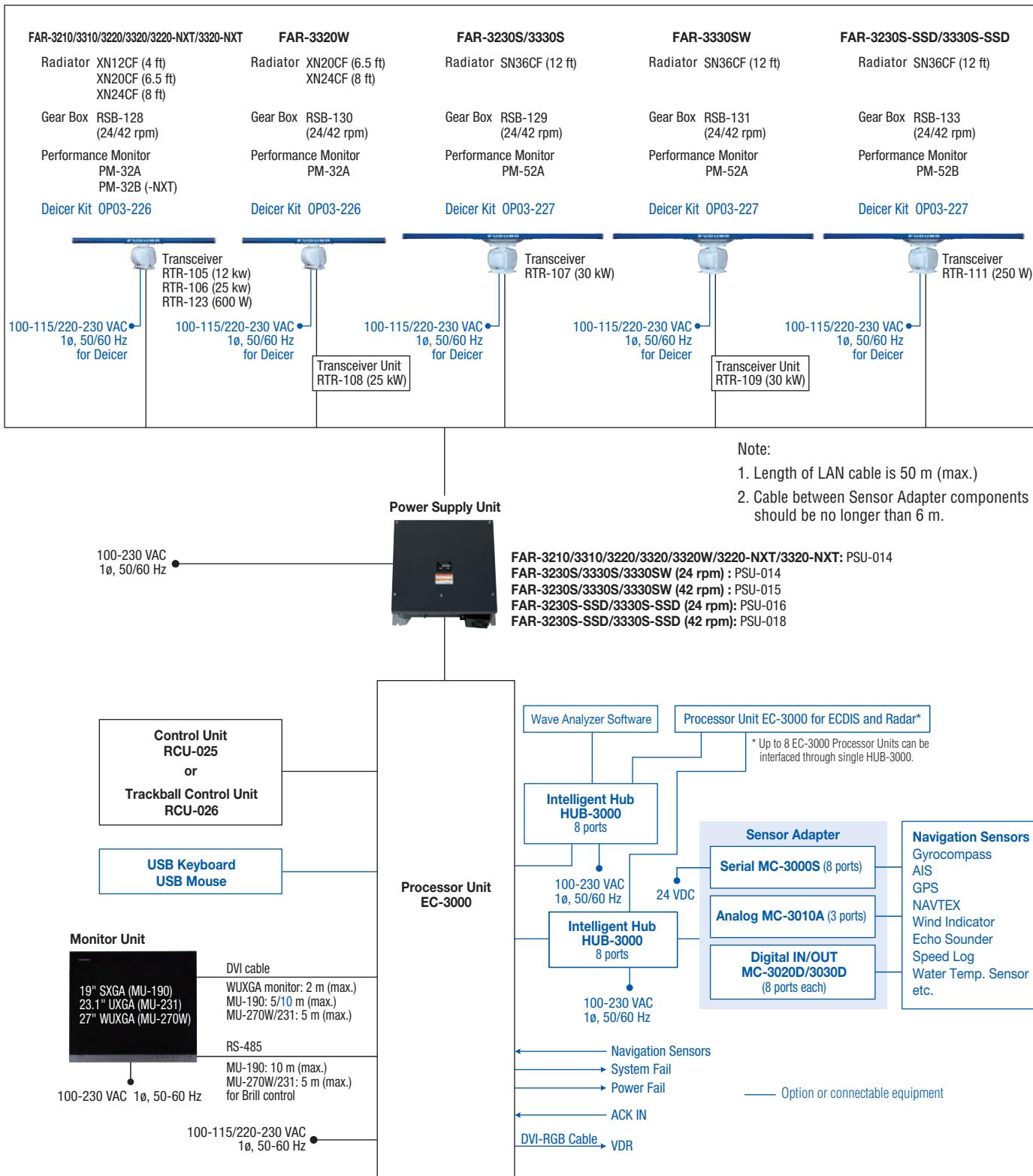
ENVIRONMENTAL CONDITIONS

Unit	Ambient Temperature	Relative Humidity	Degree of protection	Vibration
Antenna Unit	-25°C to +55°C (storage +70°C)		IP56	
Power Supply Unit		95% or more at 40°C		
Processor Unit			IP20	
Control Unit	-15°C to +55°C		IP20	
Sensor Adapter			IP22	
Monitor Unit			IP22	

EQUIPMENT LIST

Standard	
Display Unit	MU-190/231/270W
Processor Unit	EC-3000
Control Unit	
Radar Control Unit	RCU-025
Trackball Control Unit	RCU-026
Antenna Radiator	XN12CF/XN20CF/XN24CF/ SN36CF
Transceiver	RTR-105/106/107/108/109/111/123
Gear Box	RSB-128/129/130/131/133
Performance Monitor	PM-32A/32B/52A/52B
Power Supply Unit	PSU-014/015/016/018
Cable between Power Supply Unit and Antenna Unit	
LAN Cable between Processor Unit and Power Supply Unit	
Standard Spare Parts and Installation Materials	1 pc
Option	
Sensor Adapter	MC-3000S/3010A/ 3020D/3030D
Sub Display Radar Cable	RW-00136
Deicer	OP03-226/227/231/232
Junction Box (for foremast mounting)	RJB-001
Composite Cable between Junction Box and Antenna/Power Supply Unit (for foremast mounting)	RW-9600
Power Supply Unit (for foremast mounting)	
LAN Signal Converter (for foremast mounting)	OP03-223
Intelligent Hub	HUB-3000
Wave Analyzer Software	WV-100/WV-100ST

INTERCONNECTION DIAGRAM



Model	Output Power	Transceiver Unit	Gear Box	Radiator Length	Rotation	Power Supply Unit		Display Unit
						24 rpm	42 rpm	
FAR-3210	X band 12 kW	RTR-105		4 ft (XN12CF)				19.0" SXGA (MU-190)
FAR-3310			RSB-128	6.5 ft (XN20CF)	24/42* rpm	PSU-014		27" WUXGA (MU-270W) or 23.1" UXGA (MU-231)
FAR-3220		RTR-106		8 ft (XN24CF)				19.0" SXGA (MU-190)
FAR-3320			RSB-130	6.5 ft (XN20CF)				27" WUXGA (MU-270W) or 23.1" UXGA (MU-231)
FAR-3320W		RTR-108		8 ft (XN24CF)				27" WUXGA (MU-270W) or 23.1" UXGA (MU-231)
FAR-3220-NXT	X band 600 W	RTR-123	RSB-128	4 ft (XN12CF)	12 ft (SN36CF)	PSU-014 / PSU-015		19.0" SXGA (MU-190)
FAR-3320-NXT				6.5 ft (XN20CF)				27" WUXGA (MU-270W) or 23.1" UXGA (MU-231)
FAR-3230S		RTR-107	RSB-129	8 ft (XN24CF)				19.0" SXGA (MU-190)
FAR-3330S								27" WUXGA (MU-270W) or 23.1" UXGA (MU-231)
FAR-3330SW		RTR-109	RSB-131			PSU-016 / PSU-018		19.0" SXGA (MU-190)
FAR-3230S-SSD								27" WUXGA (MU-270W) or 23.1" UXGA (MU-231)
FAR-3330S-SSD	S band 250 W	RTR-111	RSB-133					* Except for XN24CF

