FURUNO

CHART RADAR

Models:

FAR-3000 series

with an optional pedestal

www.furuno.com

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

Newly developed antennas with enhanced high durability and reliability

for X-band

for S-band

- **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**

NEW Solid State transceiver available (for S-band)

- **Less noise and much clearer targets**

  FURUNO's Solid State Radar technology generates clearer echo images, which allows users to obtain clearer picture of what are around their vessel, including weak targets from small craft.

Solid State

The newly developed Power Amplifier generates properly modulated radio frequency to the targets around the vessels. Also, the receiver catches the weak signals, which are processed inside the Power Amplifier module to reduce the clutters.

Power Amplifier Module
of the Solid State transceiver

- **Fan-less antenna design requires less maintenance**
- **Lower maintenance hours and costs compared to Magnetron radar**

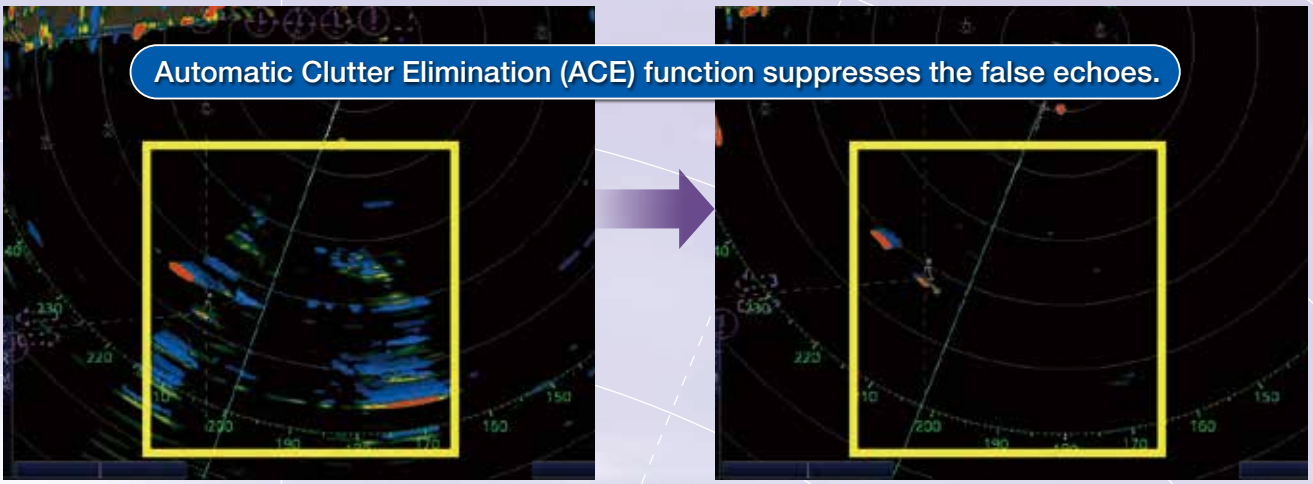
  No need to replace the Magnetron

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.

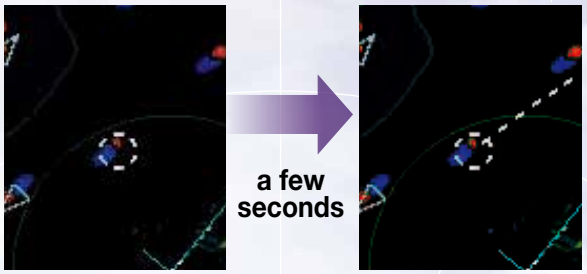


Automatic Clutter Elimination (ACE)
OFF

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

▶ Advanced Interference Reduction (IR) function

Target Echo does not become smaller even with IR on

▶ 26" Wide LCD monitor compatibility

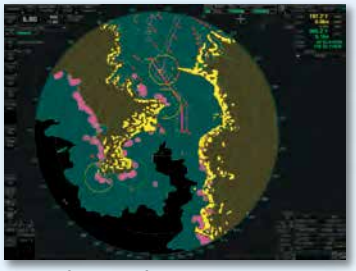
▶ Complies with the following regulations:

- IEC62388 Ed. 2.0
- IEC61174 Ed. 3.0
- IEC62288
- IEC61162-1 Ed. 4.0
- IEC61162-2

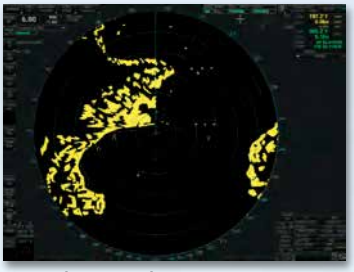
Multifunction display (MFD) capability*

FURUNO offers 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 update



Radar (Chart ON)



Radar (Chart OFF)

ECDIS

Conning Information Display

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.

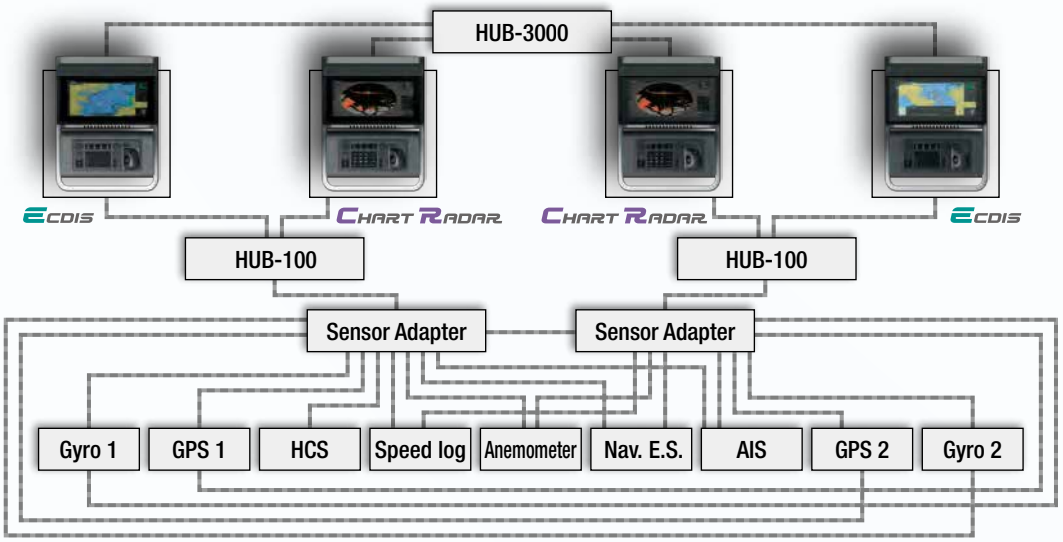
Navigation sensors can be directly interfaced with the processor's 8 serial I/O ports.
Sensor adapters are required under the following conditions:

- 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 switching hub HUB-100 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 scales (NM)	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6
Ring intervals (NM)	0.025	0.05	0.1	0.25	0.25	0.25	0.5	0.5	1	1
Number of Rings	5	5	5	3	4	6	4	6	4	6

Range scales (NM)	8	12	16	24	32	48	72	96	120
Ring intervals (NM)	2	2	4	4	8	8	12	16	20
Number of Rings	4	6	4	6	4	6	6	6	6

1, 2, 4, 8, 16, 32, 72, 120 NM cannot be selected on IMO radar.

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					Solid State
Frequency	RTR-105	RTR-106	RTR-108	RTR-107	RTR-109	RTR-111
	X band: 9410±30 MHz			S band: 3050±30 MHz		①P0N: 3043.75 MHz/Q0N: 3063.75±5 MHz ②P0N: 3053.75 MHz/Q0N: 3073.75±5 MHz
Output Power	12 kW	25 kW		30 kW		250 W

Pulselength, Pulse Repetition Rate (PRR) and Range scale

Magnetron

Pulselength (μs)	0.07	0.15	0.3	0.5	0.7	1.2
PRR (Hz)	3000*	3000*	1500	1200	1000	600**
Range scale (NM)	0.125/0.25/ 0.5/0.75/1/ 1.5/2	0.5/0.75/ 1/1.5/2/3/4	0.75/1/1.5/ 2/3/4/6/ 8/12	1.5/2/3/ 4/6/8/12/ 16/24	3/4/6/8/ 12/16/24	6/8/12/16/ 24/32/48/ 96/120

Solid State

Pulselength (μs)		0.07	0.18	0.3	0.5	0.7	1.2
	Q0N	5.0	7.5	12.5	17.5	18.3	18.3
PRR (Hz)		2400***	2000****	1500	1060	1000	600 (96 NM) 450 (120 NM)
Range scale (NM)		0.125/0.25/ 0.5/0.75/1/ 1.5/2	0.5/0.75/ 1/1.5/2/3/4	0.75/1/1.5/ 2/3/4/6/8	3/4/6/8/ 12/16/24	3/4/6/8/ 12/16/24	6/8/12/16/ 24/32/48/ 96/120

* 2200 Hz on TT range = 32 NM
** 500 Hz on 96/120 NM range
*** 1800 Hz on TT range = 32 NM
**** 1500 Hz on TT range = 32 NM

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 mathmatical filter to generate highly accurate position and speed
Navigation Planning	Planning by rhumb line, great circle
Route Monitoring	Off-track display, waypoint arrival alarm, shallow depth alarm
User Chart	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
Display Type	19" color LCD	23.1" color LCD
Resolution	SXGA (1280×1024 pixels)	UXGA (1600×1200 pixels)

INTERFACE

Processor Unit

DVI	2 ports, DVI-D (Video signal from DVI-1 and DVI-2 is identical) 1 port, DVI-I Ver. 1.1 (RGB for VDR)
LAN	2 ports, Ethernet 1000 Base-T (for Interswitch and Sensor Adapter) 1 port, 100 Base-TX (for Radar sensor)
USB	4 ports, USB 2.0 type-A
COM	2 ports, RS232C/RS-485 (for brilliance control)
Serial I/O	8 ports IEC61162-1/2 (2 ports), IEC61162-1 (6 ports)
Sentences	
Input	ABK, ACK, ACM, ALR, CUR, DBT, DPT, DTM, GGA, GLL, GNS, HBT, HDT, MTW, MWV, RMC, THS, VBW, VDM, VDO, VDR, VHW, VTG, ZDA
Output	ABM, ACK, ALC, ALF, ALR, ARC, BBM, EVE, HBT, OSD, RSD, TLB, TTD, TTM, VSD
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 IEC 61162-1/2 (4 ports), IEC 61162-1 (4 ports)
Analog Input	3 ports/per unit, -10 to +10 V/0 to 10 V, 4 to 20 mA selectable
Digital Input	8 ports/per unit, normal close or open, selectable
Digital Output	8 ports/per unit, normal close or open, selectable

POWER SUPPLY

Monitor unit	
MU-231	100-230 VAC; 1.0-0.6 A, 1 phase, 50/60Hz
MU-190	100-230 VAC; 0.7-0.4 A, 1 phase, 50/60Hz
Processor unit	100/230 VAC, 1 phase, 50/60 Hz

Power Supply Unit

	Input Voltage	Input Current
PSU-014	100-230 VAC 1 phase 50/60 Hz	3.7 A
PSU-015		6.4 A
PSU-016		2.8 A
PSU-018		5.6 A

ENVIRONMENTAL CONDITIONS

Unit	Ambient Temperature	Relative Humidity	Degree of protection	Vibration
Antenna Unit	-25°C to +55°C (storage +70°C)	93 % or less at 40°C	IP56	IEC 60945 Ed. 4
Power Supply Unit	-15°C to +55°C		IP20	
Processor Unit			IP20	
Control Unit			IP22	
Sensor Adapter			IP22	
Monitor Unit			IP22	

EQUIPMENT LIST

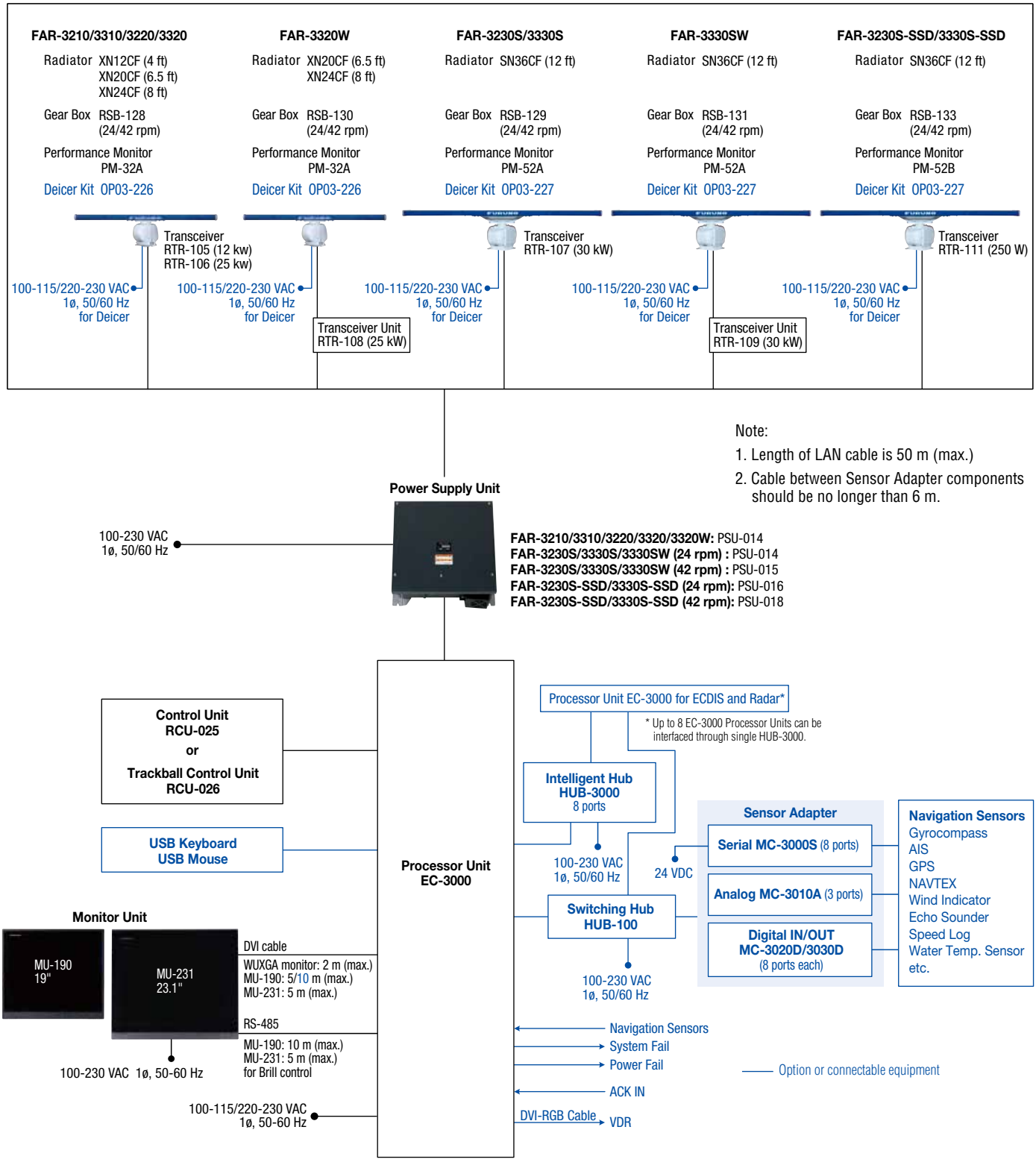
Standard

Display Unit	MU-190/231	1 unit
Processor Unit	EC-3000	1 unit
Control Unit		1 unit
Radar Control Unit	RCU-025	1 unit (specify when ordering)
Trackball Control Unit	RCU-026	
Antenna Radiator	XN12CF/XN20CF/XN24CF/ SN36CF	1 unit
Transceiver	RTR-105/106/107/108/109/111	1 unit
Gear Box	RSB-128/129/130/131/133	1 unit
Performance Monitor	PM-32A/52A/52B	1 unit
Power Supply Unit	PSU-014/015/016/018	1 unit
Cable between Power Supply Unit and Antenna Unit		1 pc
LAN Cable between Processor Unit and Power Supply Unit		1 pc
Standard Spare Parts and Installation Materials		1 set

Option

Sensor Adapter	MC-3000S/3010A/ 3020D/3030D
Sub Display Radar Cable	RW-00136
Deicer	OP03-226/227
Junction Box (for foremast mounting)	RJB-001
Composite Cable between Junction Box and Antenna/ Power Supply Unit (for foremast mounting)	RW-9600
LAN Signal Converter (for foremast mounting)	OP03-223
Switching Hub for sensor network	HUB-100
Intelligent Hub for interswitch network	HUB-3000

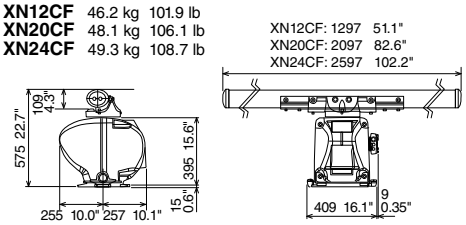
INTERCONNECTION DIAGRAM



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	RSB-128	4 ft (XN12CF) 6.5 ft (XN20CF) 8 ft (XN24CF)	24/42 rpm	PSU-014		19.0" SXGA (MU-190)
FAR-3310								23.1" UXGA (MU-231)
FAR-3220	X band 25 kW	RTR-106						19.0" SXGA (MU-190)
FAR-3320								23.1" UXGA (MU-231)
FAR-3320W		RTR-108	RSB-130	6.5 ft (XN20CF) 8 ft (XN24CF)				23.1" UXGA (MU-231)
FAR-3230S	S band 30 kW	RTR-107	RSB-129	12 ft (SN36CF)		PSU-014	PSU-015	19.0" SXGA (MU-190)
FAR-3230S-SSD	S band 250 W	RTR-111	RSB-133			PSU-016	PSU-018	19.0" SXGA (MU-190)
FAR-3330S	S band 30 kW	RTR-107	RSB-129			PSU-014	PSU-015	23.1" UXGA (MU-231)
FAR-3330SW	S band 30 kW	RTR-109	RSB-131			PSU-014	PSU-015	23.1" UXGA (MU-231)
FAR-3330S-SSD	S band 250 W	RTR-111	RSB-133			PSU-016	PSU-018	23.1" UXGA (MU-231)

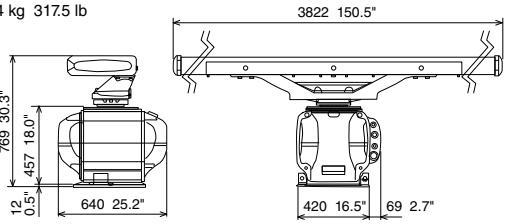
Antenna Unit for FAR-3210/3310/3220/3320/3320W

Radiator XN12CF 46.2 kg 101.9 lb
XN20CF 48.1 kg 106.1 lb
XN24CF 49.3 kg 108.7 lb



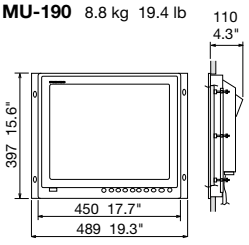
Antenna Unit for FAR-3230S/3330S/3330SW/3230S-SSD/3330S-SSD

Radiator SN36CF 144 kg 317.5 lb

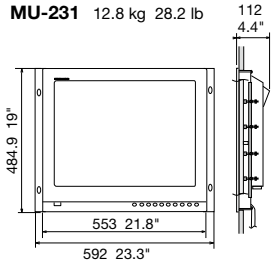


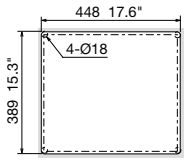
Monitor Unit

MU-190 8.8 kg 19.4 lb

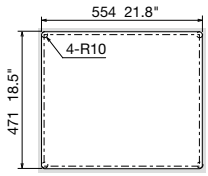


MU-231 12.8 kg 28.2 lb





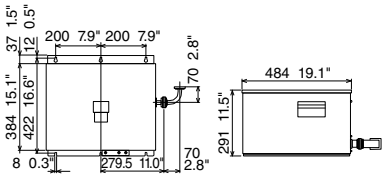
Cutout for flush mount



Cutout for flush mount

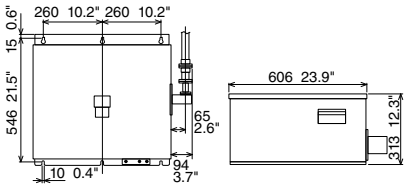
Transceiver Unit for FAR-3320W

RTR-108 17 kg 37.5 lb



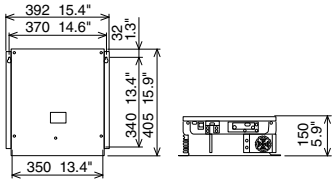
Transceiver Unit for FAR-3330SW

RTR-109 22 kg 48.5 lb

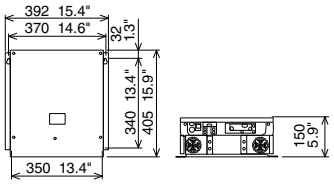


Power Supply Unit

PSU-014/016 8.5 kg 18.7 lb

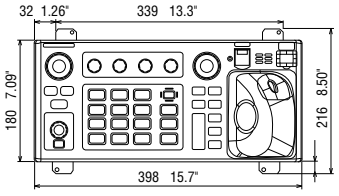


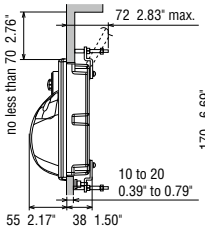
PSU-015/018 10 kg 22.0 lb

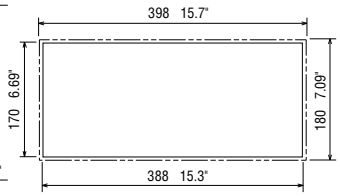


Control Unit

RCU-025 3.1 kg 6.84 lb



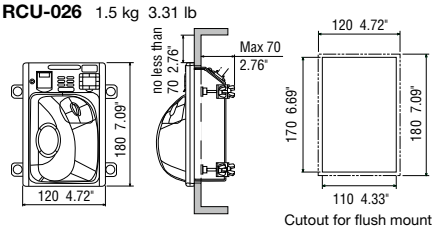




Cutout for flush mount

Trackball Control Unit

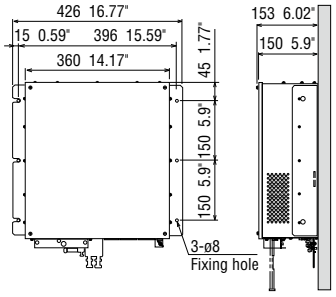
RCU-026 1.5 kg 3.31 lb



Cutout for flush mount

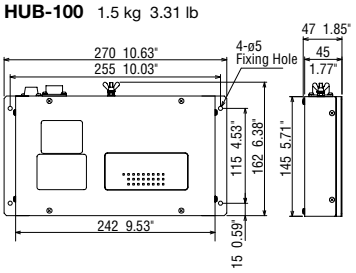
Processor Unit

EC-3000
14 kg 30.9 lb



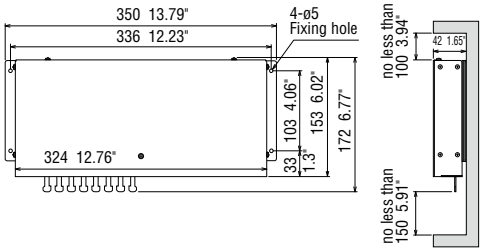
Switching Hub

HUB-100 1.5 kg 3.31 lb



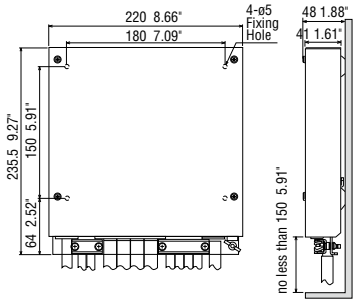
Intelligent Hub

HUB-3000
1.5 kg 3.31 lb

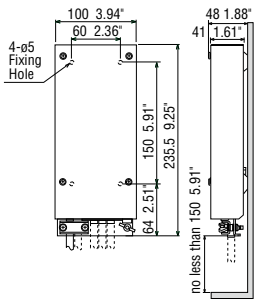


Sensor Adapter

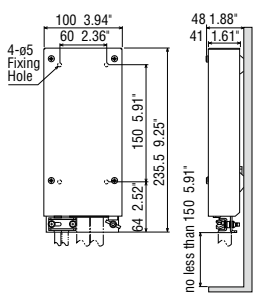
Serial : MC-3000S 1.5 kg 3.3 lb



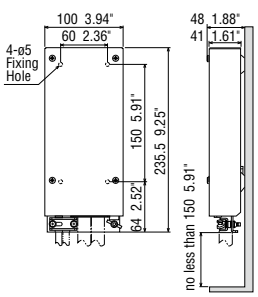
Analog : MC-3010A 0.8 kg 1.8 lb



Digital In : MC-3020D 0.8 kg 1.76 lb



Digital Out : MC-3030D 0.8 kg 1.76 lb



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