

**FURUNO**

# **RADAR**

Model: FAR-23x8 series

*Keep Steady At Sea*

*with the safe, reliable and user-friendly next generation Radar*



# Keep Steady At Sea

*with the safe, reliable and user-friendly next generation Radar*



## **RADAR**

### **FAR-23x8 series**

*for Category 1 of ship/craft, with 27" wide or 23" LCD*

<b>FAR-2318</b>	<b>X-band, 12 kW, TR up</b>
<b>FAR-2328</b>	<b>X-band, 25 kW, TR up</b>
<b>FAR-2328W</b>	<b>X-band, 25 kW, TR down</b>
<b>FAR-2328-NXT</b>	<b>X-band, 600 W, TR up, Solid State</b>
<b>FAR-2338S</b>	<b>S-band, 30 kW, TR up</b>
<b>FAR-2338SW</b>	<b>S-band, 30 kW, TR down</b>
<b>FAR-2338S-NXT</b>	<b>S-band, 250 W, TR up, Solid State</b>

Complies with the following regulations:

IEC 62388 Ed.2.0	IEC 61162-1 Ed.5.0
IEC 62288 Ed.2.0	IEC 60945 Ed.4.0
IEC 61162-2	IEC 61162-450

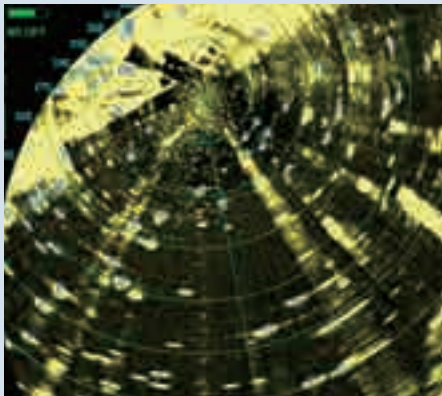


## Advanced technologies for navigation safety

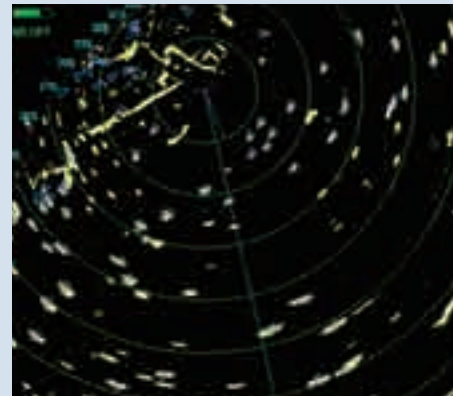
The Furuno FAR-23x8 series is a brand-new Radar series characterized by its state-of-the-art antenna design and innovative signal processing technologies. Furuno's latest, advanced technologies and intuitive design will increase situational awareness, facilitating unparalleled navigational safety.

### ► Automatic Clutter Elimination (ACE) for unprecedented echo clarity

Quickly adjusts the Radar image with a single button press. When the ACE function is activated, the system automatically optimizes clutter reduction filters and gain control according to the sea and weather conditions.



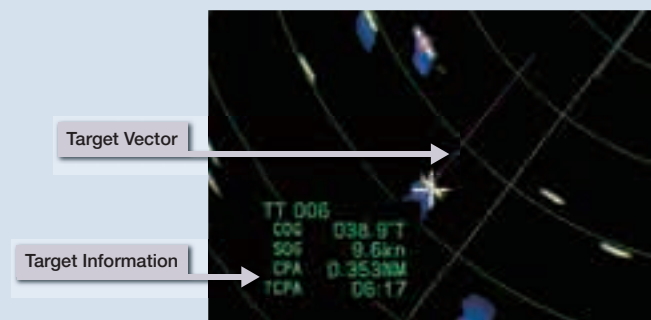
ACE OFF



ACE ON

### ► Fast Target Tracking™ function provides early-stage collision avoidance

With Fast Target Tracking™, the FAR-23x8 series provides accurate tracking information; speed and course vectors are displayed in mere seconds allowing operators to take action and avoid incidents at a very early stage.



## 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.

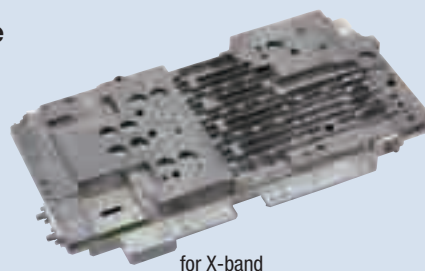
### ► Clear images

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)

Power Amplifier Module of the Solid State transceiver



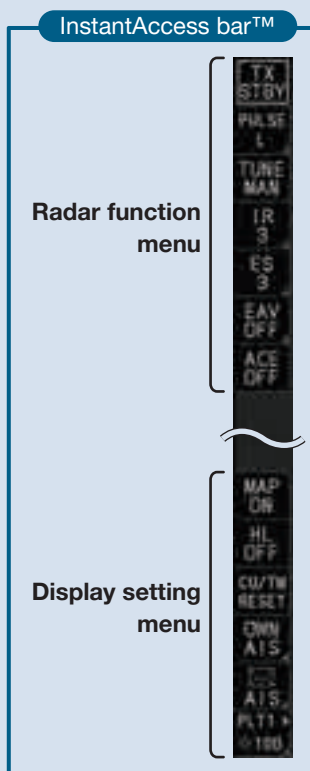
for X-band



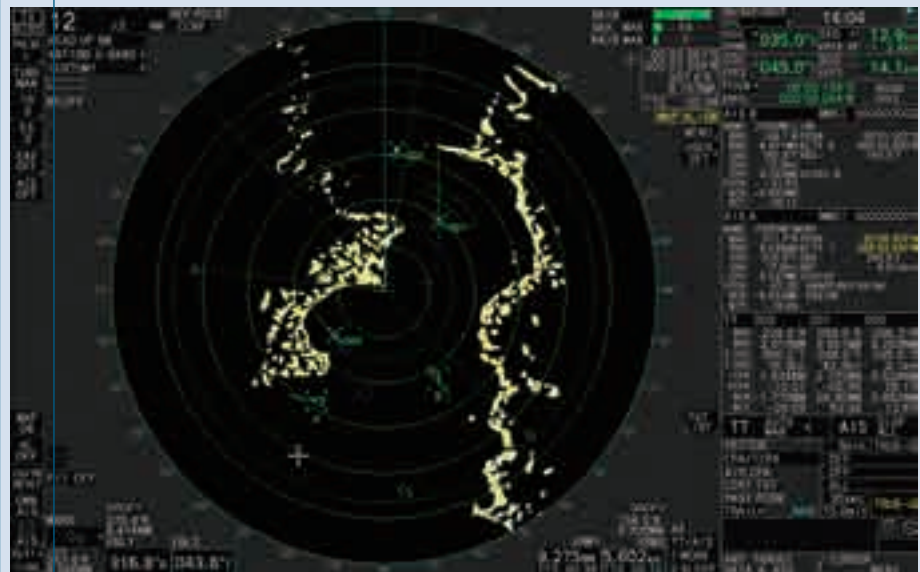
for S-band



## Exceptionally intuitive user interface



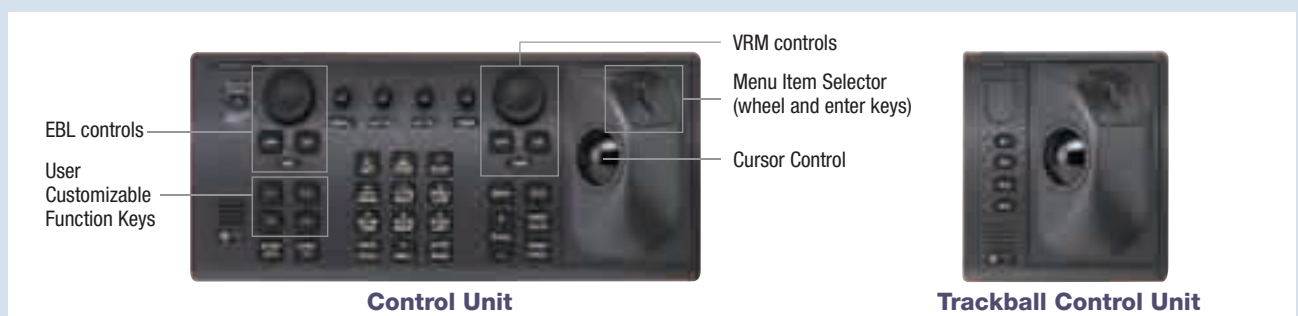
► **InstantAccess bar™** for quick access to your frequently used functions  
 InstantAccess bar™ contains shortcut menus for frequently used functions and actions, allowing for quick access to essential tasks.



Screen image: Wide monitor MU-270W

### ► Well-designed controllers for stress-free operation

Comfortable usability is very important on long voyages. With that in mind, these control units are designed based on ergonomics to comfortably accommodate the operator's hand. All operations can be controlled with the trackball.





## Refined antenna with excellent reliability and easy maintenance



The FAR-23x8 series is designed to provide clearer and more accurate Radar images of the surroundings, while increasing reliability and decreasing overall cost of ownership with easy maintenance.

Signals are safely transported through the Ethernet network between the antenna and below deck processing unit, allowing for higher reliability. High quality images are obtained by the signal processor inside the antenna unit, directly converting analog to digital signals before sending them to the main processor unit.

The new antenna's refined shape significantly reduces aerodynamic drag and lightens the burden on the gear box. The gear box itself has also been redesigned. Decreased aerodynamic drag and a DC brushless motor result in a very durable gear box that can be used for a prolonged period of time.

Installation and maintenance are now easier than ever. All components of the gear box are integrated into one block that can easily be removed from the gear box when maintenance is required. The cable to the gear box can be connected from the side of the gear box.

# Easy installation for new building as well as retrofits, with high flexibility

▶ **27" wide monitor (model: MU-270W) selectable.**

With the expanded wide monitor, 9 TT data boxes will be displayed on the screen. The color contrast of the display is excellent so that Radar echo can be grasped at a glance.

▶ **Existing monitor, control unit and cables can be used in retrofitting\*.**

\*Only when retrofitting in lieu of FAR-2xx7 series

▶ **Optional LAN Signal Converter enables Ethernet communication. Extension of the cable between antenna unit and processor unit utilizing existing cables when retrofitting is possible.**

▶ **Ethernet connectivity with onboard system**

Ethernet expands the radar's capability with connection between either existing or newly installed systems, such as ECDIS and VDR.

▶ **With the optional Ethernet HUB, Inter-switch can be utilized.**

▶ **DVI-I cable is connectible to VDR in retrofitting.**

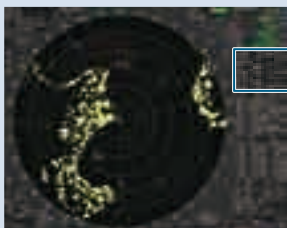
**How to connect VDR with FAR-23x8 series**

<b>VR-7000/7000S</b>	Directly connect VDR with LAN or convert the RGB signal from a DVI-I port using video LAN converter, and input to the VDR.
<b>VR-3000/3000S</b>	Directly input the RGB signal from a DVI-I port to the VDR.
<b>Other manufacturer's VDR</b>	Please check with the VDR manufacturer to connect appropriately.

# 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

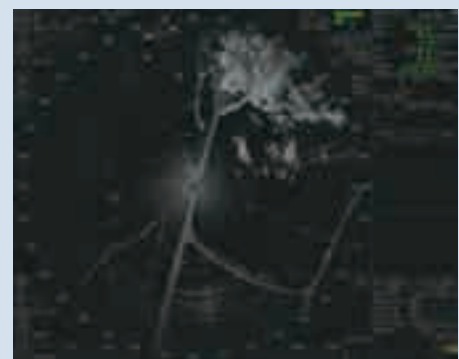


SIG WAVE	ΔWIND 045.0°
HEIGHT 1.0m	5.0m/s
Δ1st WAVE	
HEIGHT 2.0m	
DIR 225.0°	
PERIOD 2.0s	
Δ2nd WAVE	
HEIGHT 3.0m	
DIR 315.0°	
PERIOD 3.0s	THEORETICAL

\*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

**Product Name** MARINE RADAR

**Antenna Radiator**

**1. Type** Slotted waveguide array

**2. Beam width and sidelobe attenuation**

Radiator type	X-Band			S-Band
	XN12CF	XN20CF	XN24CF	SN36CF
Length	4 ft	6.5 ft	8 ft	12 ft
Horizontal beam width	1.9°	1.23°	0.95°	1.8°
Vertical beam width	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

**3. Polarization** Horizontal

**4. Rotation** 24 rpm or 42 rpm (for high speed craft)

\*XN24CF not available in 42 rpm

**5. Wind load** 100 kn relative

**6. De-icer (option)** On: when temperature goes down to 0°C

Off: when temperature goes up to +5°C

**Transceiver**

**1. TX Frequency and modulation**

X-band (Magnetron)	9410 MHz ±30 MHz, P0N
S-band (Magnetron)	3050 MHz ±30 MHz, P0N
X-band (Solid state)	CH1 P0N: 9403.75 MHz/Q0N: 9423.75 ±5MHz or CH2 P0N: 9413.75 MHz/Q0N: 9433.75 ±5MHz
S-band (Solid state)	CH1 P0N: 3043.75 MHz/ Q0N: 3063.75 MHz ±5 MHz or CH2 P0N: 3053.75 MHz/ Q0N: 3073.75 MHz ±5 MHz

**2. Output power**

FAR-2318	12 kW
FAR-2328/2328W	25 kW
FAR-2328-NXT	600 W
FAR-2338S/2338SW	30 kW
FAR-2338S-NXT	250 W

**3. Range scale, Pulse Repetition Rate and Pulselength**

Magnetron radar: FAR-2318/2328/2328W/2338S/2338SW

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-2328-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-2338S-NXT

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**

**1. Minimum range** 22 m

**2. Range discrimination** 26 m

**3. Range accuracy**

1% of the maximum range of the scale in use or 10 m, whichever is the greater

**4. Bearing discrimination**

2.1° (XN12CF), 1.5° (XN20CF), 1.2° (XN24CF), 2.0° (SN36CF)

**5. Bearing accuracy** ±1°

**6. Range scale and Range ring interval (RI)**

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

**7. Warm-up time** 3 min. approx. (solid state radar excluded)

**8. Presentation mode**

Head-up, STAB head-up, Course-up, North-up (RM/TM), Stern-up

**9. Marks**

Cursor, Range ring, Heading mark, North mark, Bearing mark, Target trail, VRM, EBL, Acquisition zone

**10. Target tracking (TT)**

Auto or manual acquisition 100 targets in 24/32 NM (range selected from setting menu)

Tracking 5/10 pts on all targets

Vector time Off, 30 s, 1-60 min

**11. AIS**

Display capacity 350 targets

Tracking 5/10 pts on activated targets

Vector time Off, 30 s, 1-60 min

**12. Radar map** 20,000 points

**13. Acquisition zone** 2 zones

**14. Interswitch function** Selectable from menu

**Display Unit**

**1. Screen type**

MU-231 23.1-inch color LCD, 1600 x 1200 (UXGA)

MU-270W 27-inch color LCD, 1920 x 1200 (WUXGA)

**2. Brightness**

MU-231/270W 400 cd/m<sup>2</sup> typical

**3. Visible distance**

MU-231 1.2 m nominal

MU-270W 1.02 m nominal

**4. Radar effective diameter**

MU-231 331 mm

MU-270W 349 mm

**Interface**

**1. Number of port (processor unit)**

Serial 7 ports (IEC61162-1/2: 2 ports, IEC61162-1: 4 ports, AD-10: 1 port)

Alarm output 6 ports: contact signal, load current 250 mA (Normal close/ open: 4, System fail: 1, Power fail: 1)

DVI output 2 ports: DVI-D, DVI-I or RGB picture data (VDR)

LAN 2 ports: Ethernet 100Base-TX

RS-232C 1 port: brilliance control

Sub display (for ECDIS) 2 ports: HD, BP, Trigger and Video signal

**2. Data sentences (IEC61162-1/2, IEC61162-450)**

Input ABK, ACK, ACN, ALR, BWC, BWR, CUR, DBK\*, DBS\*, DBT, DDC, DPT, DTM, GGA, GLL, GNS, HBT, HDT\*, MTW, MWV, OSD, RAQ, RMB, RMC, ROT, RTE, THS, VBW, VDM, VDO, VDR, VHW, VSD, VTG, VWR\*, VWT\*, WPL, ZDA

Output ABM, ACK, AIQ, ALC, ALF, ALR, ARC, BBM, DDC, EVE, HBT, OSD, RSD, TLB, TLL, TTD, TTM, VSD

\*1: for retrofit.

**3. Ethernet interface for IEC61162-450**

Port (LAN2) 100Base-TX, IPv4, 8P8C connector

IEC61162-450 transmission group

Input MISC, TGTD, SATD, NAVD, TIME, PROP

Output Arbitrary (default: TGTD)

Multicast address 239.192.0.1 to 239.192.0.16

Destination port 60001 to 60016

Re-transmittable binary image transfer

Multicast address 239.192.0.26 to 239.192.0.30

Destination port 60026 to 60030

Other network function excepted IEC61162-450

SNMP, HTTP, Syslog, Furuno Management Protocol (FMP)

**4. Output port on antenna unit**

Sub display (for radar) 1 port: HD, BP, Trigger and Video signal

**Power Supply**

**1. Processor unit (w/antenna and transceiver unit)**

FAR-2318 100-230 VAC: 2.1-1.0(2.9-1.3)A, 1 phase, 50-60 Hz

FAR-2328/2328W 100-230 VAC: 2.3-1.1(3.2-1.4)A, 1 phase, 50-60 Hz

FAR-2328-NXT 100-230 VAC: 2.1-1.0(2.9-1.3)A, 1 Phase, 50-60 Hz

FAR-2338S/2338SW 100-230 VAC: 3.2-1.5(5.6-2.5)A, 1 phase, 50-60 Hz

FAR-2338S-NXT 100-230 VAC: 2.6-1.2(5.1-2.2)A, 1 phase, 50-60 Hz ( ): 42 rpm

**2. Display Unit**

MU-231 100-230 VAC: 1.0-0.6 A, 1 phase, 50-60 Hz

MU-270W 100-230 VAC: 0.7-0.4 A, 1 phase, 50-60 Hz

**3. HUB (option)**

100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz

**4. De-icer (option)**

100-115/220-230 VAC: 2.6/1.3 A, 1 phase, 50-60 Hz

**Environmental Conditions**

**1. Ambient temperature**

Antenna unit -25°C to +55°C (storage: -25°C to +70°C)

Indoor units -15°C to +55°C (storage: -20°C to +70°C)

**2. Relative humidity**

95% or less at +40°C

**3. Degree of protection**

Antenna unit IP56

Processor/ monitor unit IP22

Control unit IP20

HUB IP20 (HUB-100), IP22 (HUB-3000)

**4. Vibration**

IEC 60945 Ed.4

**Equipment List**

**Standard**

1. Display Unit MU-231/MU-270W

2. Processor Unit RPU-025

3. Control Unit RCU-014

Trackball Control Unit (Specify when ordering) RCU-015

4. Antenna Radiator XN12CF/XN20CF/XN24CF/SN36CF

5. Transceiver RTR-105/106/107/108/109/111

6. Gear Box RSB-128/129/130/131/133

7. DVI cable (5 m) DVI-D/D S-LINK 5M

8. Standard Spare Parts and Installation Materials

9. Performance Monitor PM-32A/52A/52B

**Option**

1. Remote Control Unit RCU-016

2. Junction Box RJB-001

3. AD Converter AD-100-E

4. Switching HUB HUB-100

5. Intelligent HUB HUB-3000

6. De-icer OP03-226/227/231/232

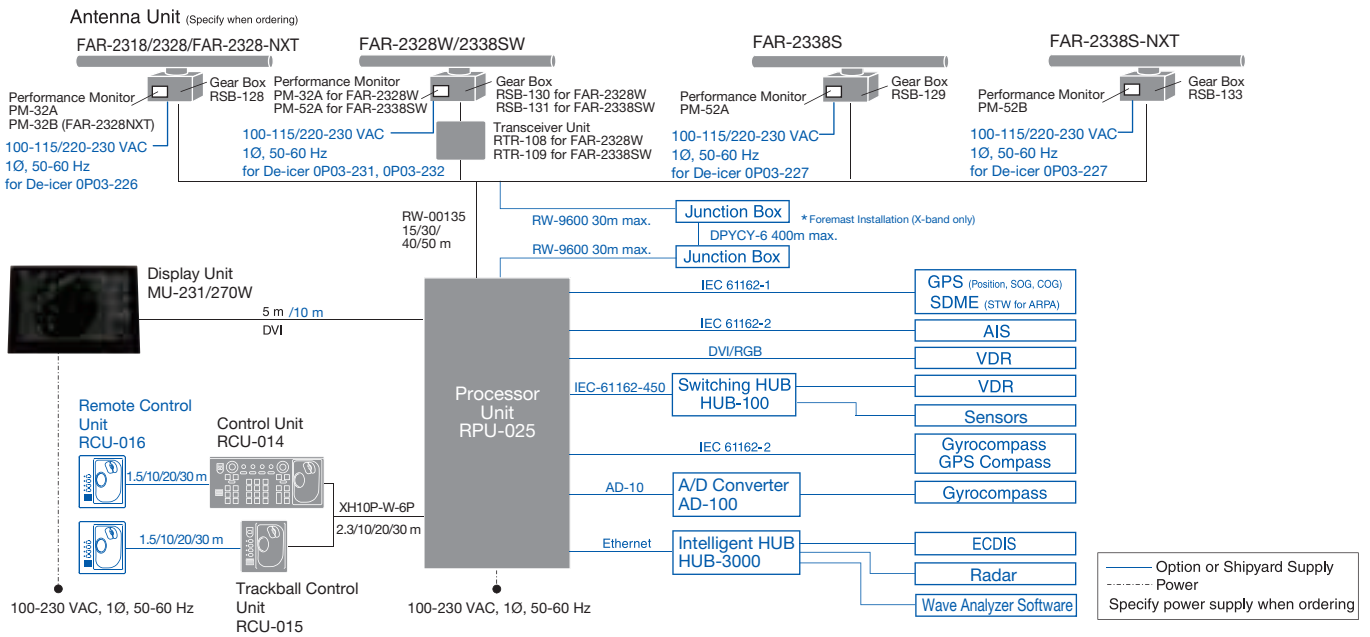
7. LAN Signal Converter

X-band (magnetron) OP03-247-3, X-band (NXT) OP03-247-4,

S-band (magnetron) OP03-247-2, S-band (NXT) OP03-247-1

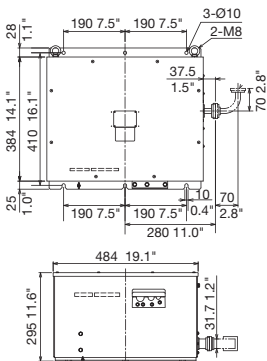
8. Wave Analyzer Software WV-100/WV-100ST

# INTERCONNECTION DIAGRAM



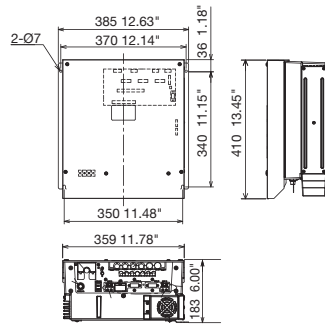
## Transceiver Unit for FAR-2328W

**RTR-108** 17.0 kg 37.5 lb



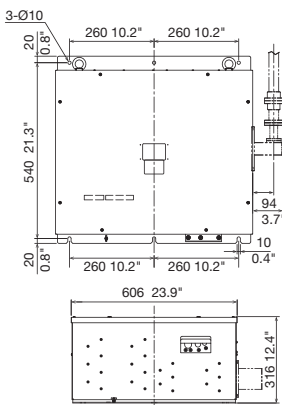
## Processor Unit RPU-025

X-band/ S-band 24rpm w/ Fan 9.6 kg 21 lb  
S-band 42rpm w/ 2 Fan 11.5 kg 25 lb



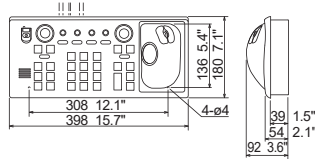
## Transceiver Unit for FAR-2338W

**RTR-109** 24.0 kg 55.1 lb



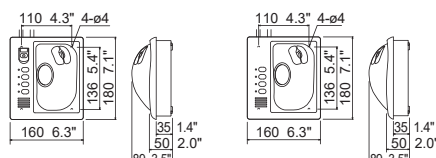
## Control Unit RCU-014

2.5 kg 5.5 lb



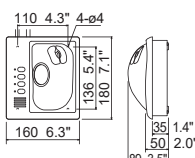
## Trackball Control Unit RCU-015

2.4 kg 5.3 lb



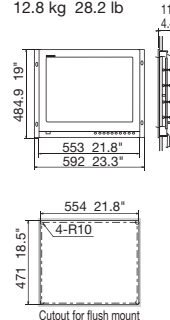
## Remote Control Unit RCU-016

2.4 kg 5.3 lb

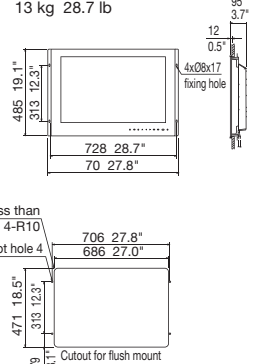


## Display Unit

**MU-231** 12.8 kg 28.2 lb



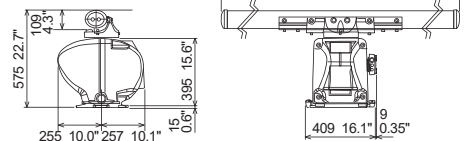
**MU-270W** 13 kg 28.7 lb



## Antenna Unit for FAR-2318/2328/2328W/2328-NXT

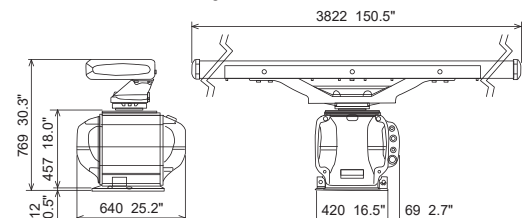
**Radiator** XN12CF 46.2 kg 101.9 lb  
XN20CF 48.1 kg 106.1 lb  
XN24CF 49.3 kg 108.7 lb

XN12CF: 1297 51.1"  
XN20CF: 2097 82.6"  
XN24CF: 2597 102.2"



## Antenna Unit for FAR-2338S/2338SW/2338S-NXT

**Radiator SN36CF** 144 kg 317.5 lb



Beware of similar products

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