

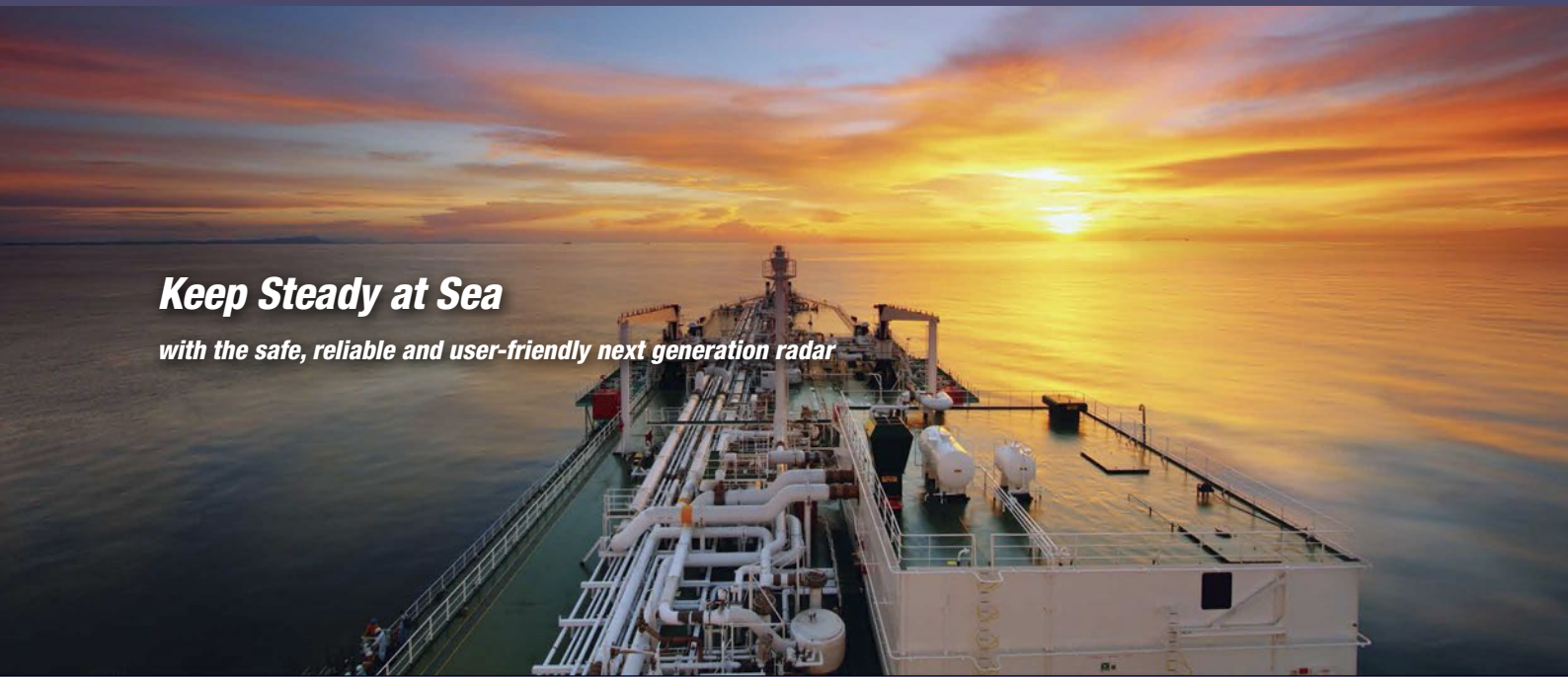
**FURUNO**

# **RADAR**

Model: FAR-22x8 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-22x8 series**

*for Category 2 of ship/craft, with 19" LCD*

**FAR-2218/FAR-2218-BB**

X-band, 12 kW, TR up

**FAR-2228/FAR-2228-BB**

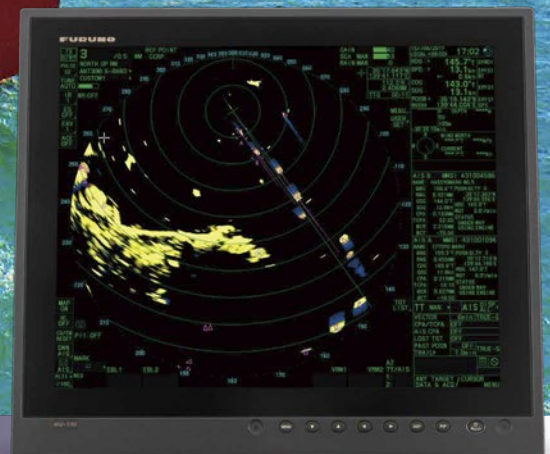
X-band, 25 kW, TR up

**FAR-2238S/FAR-2238S-BB**

S-band, 30 kW, TR up,

**FAR-2238S-NXT/FAR-2238S-NXT-BB**

S-band, 250 W, TR up, Solid State



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

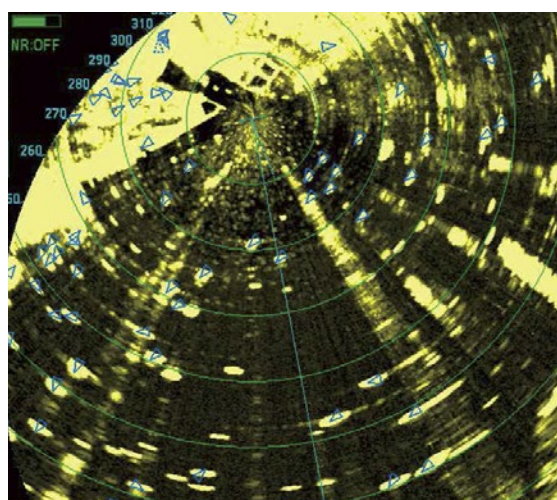
IEC 61162-450

# Advanced technologies for safe navigation

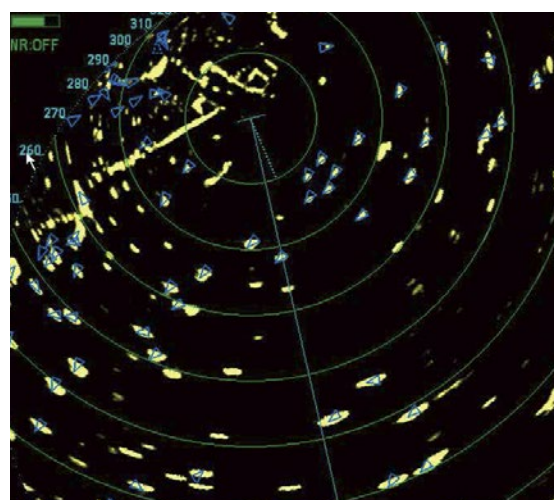
*The FURUNO FAR-22x8 series is a brand-new radar series characterized by its state-of-the-art antenna design and innovative signal processing techniques. FURUNO latest and finest technologies and intuitive design will increase situational awareness and enable safer than ever navigation.*

## ► 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 adjusts clutter reduction filters and gain control according to the sea and weather conditions.



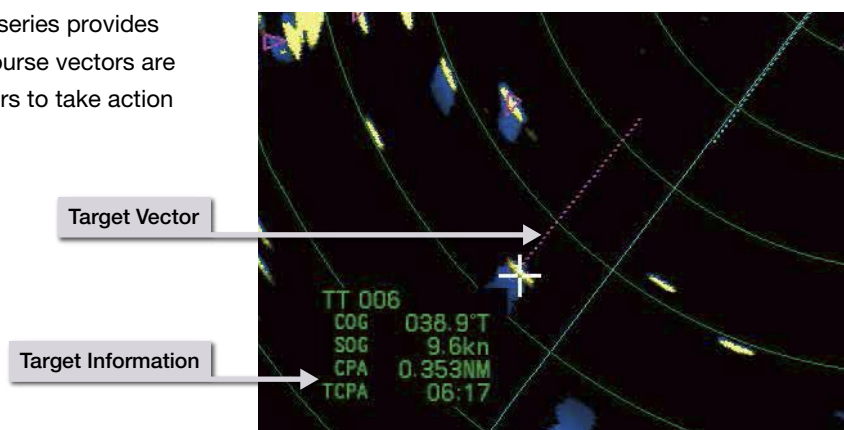
ACE OFF



ACE ON

## ► Fast Target Tracking™ function to prevent collision at an early stage

With Fast Target Tracking™, the FAR-22x8 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.



Read the QR cord to see detail explanations of above functions. ►►►





## User interface designed for the ultimate intuitive operation

InstantAccess bar™

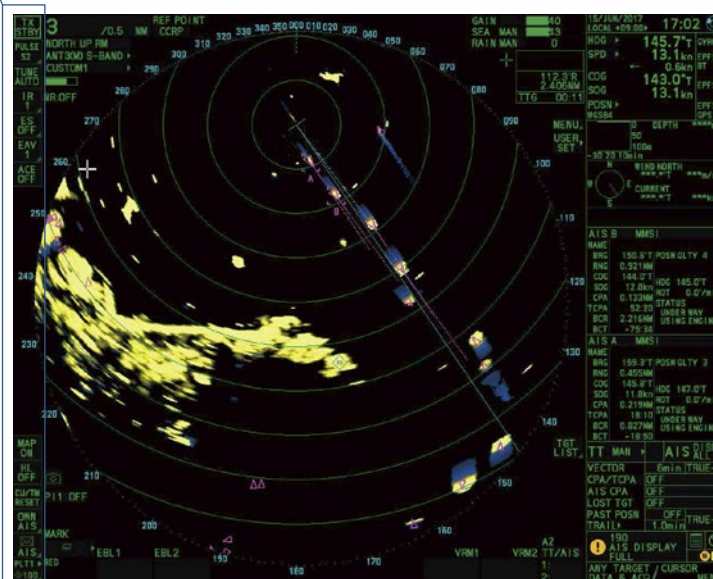
► InstantAccess bar™ gives immediate access to the functions you need.

InstantAccess bar™ contains shortcut menus of tasks (functions/actions) which operators frequently use, so users can quickly access necessary tasks.

Radar function menu

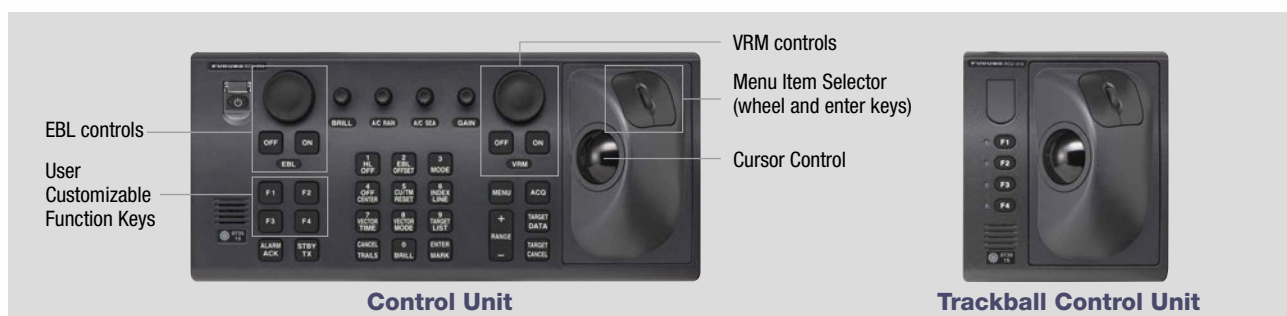


Display setting menu



► 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 fit the operator's hand. All operations can be controlled with the trackball.



EBL controls  
User Customizable Function Keys

VRM controls  
Menu Item Selector (wheel and enter keys)  
Cursor Control

Control Unit

Trackball Control Unit



## Refined antenna with high signal accuracy and excellent reliability



The FAR-22x8 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.

High image quality is achieved by the signal processor inside the antenna unit directly converting analog to digital signals before sending them to the main processor unit. Signals are safely transported through the Ethernet network between the antenna and below deck processing unit.

The new antenna shape suppresses aerodynamic drag and lightens the burden on the gear box.

The gear box itself has also been redesigned. Decreased aerodynamic drag and DC brushless motor result in a very durable gear box that can be used for 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.

# Solid State Radar model - NXT - specialized in target detection and maintainability (S-band only)

FURUNO Solid State Radars emphasize quality and reliability, while also meeting the rigorous demands of the marine environment.



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 craft.

## ► Reduced maintenance and running costs

Fan-less Solid State antenna dramatically reduces maintenance costs for the magnetron and CPU fan.

## ► Solid State Radar keeps almost same power ability as conventional magnetron radar.

# Easy installation for new building as well as retrofits, with expanded capabilities

## ► 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. Also extension of the cable between antenna unit and processor unit utilizing existing cables when retrofitting is possible.

## ► Ethernet connectivity enables interface and information exchange.

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

## ► With the optional Ethernet HUB, Inter-switch can be utilized only with LAN cable.

## ► DVI-I cable is connectible to VDR in retrofitting.

### How to connect VDR with FAR-22x8 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.

**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)
- 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
- 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-2218/2218-BB 12 kW
- FAR-2228/2228-BB 25 kW
- FAR-2238S/2238S-BB 30 kW
- FAR-2238S-NXT/2238S-NXT-BB 250 W (equivalent to magnetron radar 30 kW)

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

Magnetron radar: FAR-2218/2218-BB/2228/2228-BB/2238S/2238S-BB

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-2238S-NXT/2238S-NXT-BB

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 menu for maintenance)  
Auto tracking on all acquired targets,  
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**

- MU-190**
- 1. Screen type 19-inch color LCD, 1280 x 1024 (SXGA)
  - 2. Brightness 450 cd/m<sup>2</sup> typical
  - 3. Visible distance 1.02 m nominal
  - 4. Radar effective diameter 282 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**

- FAR-2218 100-230 VAC: 2.2-1.1 A, 1 phase, 50-60 Hz
- FAR-2228 100-230 VAC: 2.6-1.3 A, 1 phase, 50-60 Hz
- FAR-2238S 100-230 VAC: 3.9-1.7 A, 1 phase, 50-60 Hz
- FAR-2238S-NXT 100-230 VAC: 3.0-1.5 A, 1 phase, 50-60 Hz

**2. Display Unit**

- MU-190 100-230 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**

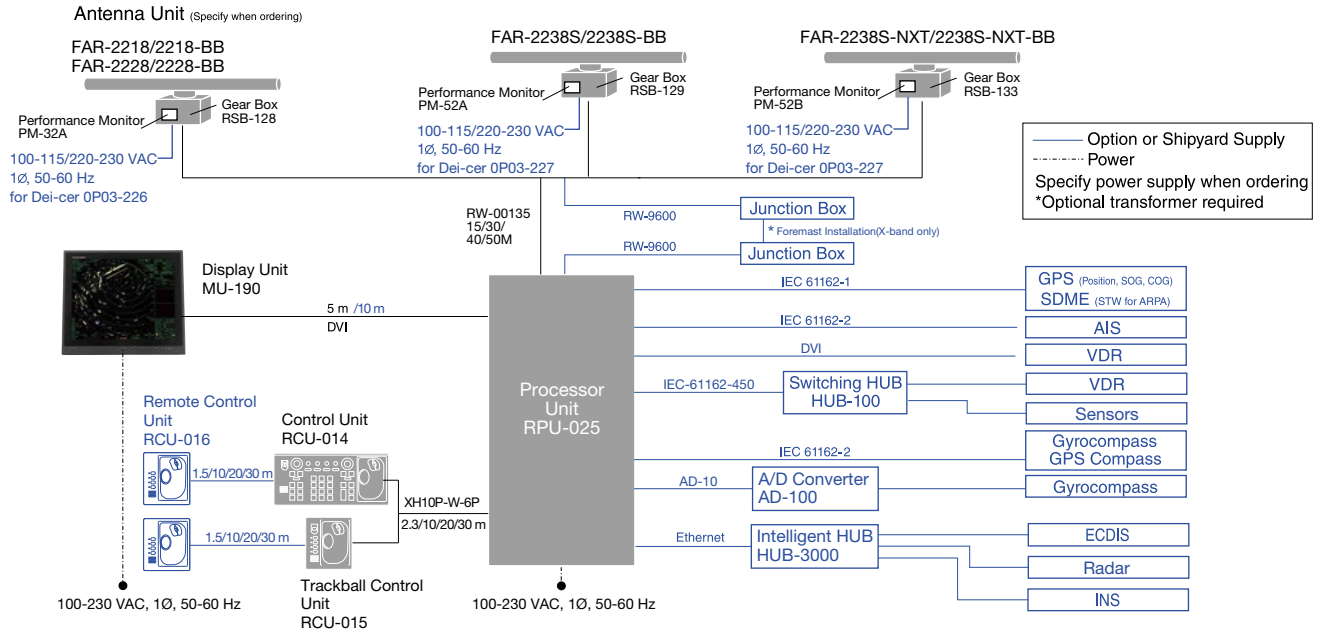
**Standard**

- 1. Display Unit MU-190
- 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-105/106/107/111
- 6. Gear Box RSB-128/129/133
- 7. DVI cable (5 m) DVI-D/D S-LINK 5M, not supplied with BB model
- 8. Standard Spare Parts and Installation Materials
- 9. Performance Monitor PM-32A/52A/52B

**Option**

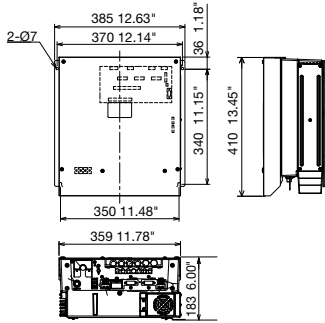
- 1. Remote Control Unit RCU-016
- 2. Junction Box RJB-001
- 3. AD Converter AD-100-E
- 4. Switching HUB HUB-100
- 5. Intelligent HUB HUB-3000
- 6. De-icer OP03-226/227/231/232
- 7. LAN Signal Converter X-band OP03-247-3, S-band (magnetron) OP03-247-2, S-band (NXT) OP03-247-1

# INTERCONNECTION DIAGRAM



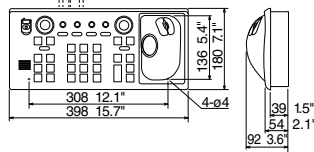
## Processor Unit RPU-025

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



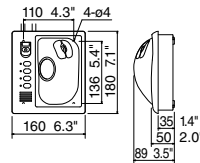
## Control Unit RCU-014

2.5 kg 5.5 lb



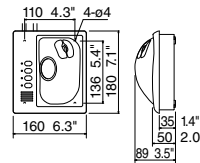
## Trackball Control Unit RCU-015

2.4 kg 5.3 lb



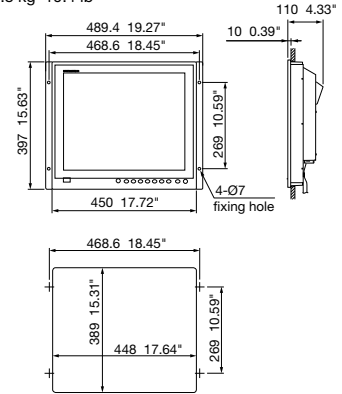
## Remote Control Unit RCU-016

2.4 kg 5.3 lb



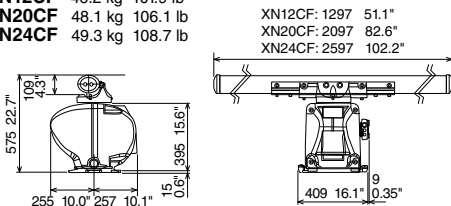
## Display Unit MU-190

8.8 kg 19.4 lb



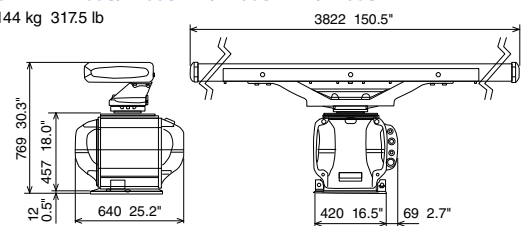
## Antenna Unit for FAR-2218/2218-BB/2228/2228-BB

**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-2238S/2238S-BB/2238S-NXT/2238S-NXT-BB

**Radiator SN36CF** 144 kg 317.5 lb



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