FURUNO

RADAR

Model: FAR-23x8 series

Keep Steady At Sea

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

www.furuno.com

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RADAR

FAR-23x8 series

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

FAR-2018-MK-2	**X-band, 12 kW, TR up**
FAR-2028-MK-2	**X-band, 25 kW, TR up**
FAR-2328-NXT	**X-band, 600 W, TR up, Solid State**
FAR-2338S	**S-band, 30 kW, TR up**
FAR-2338S-NXT	**S-band, 250 W, TR up, Solid State**

Complies with the following regulations:

IEC 60945 Ed.4.0	IEC 62288 Ed.3.0
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 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

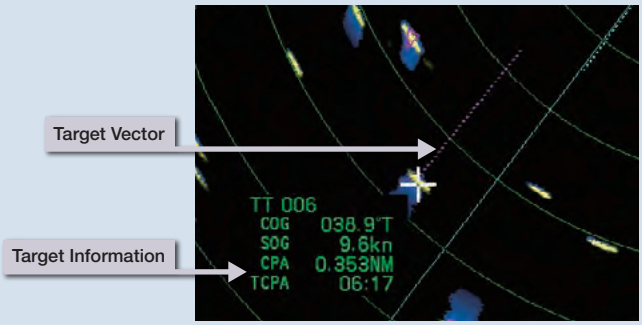
Quickly adjusts the Radar image with a single button press. When the ACE function is activated, the system automatically optimizes clutter reduction filters and gain control according to the sea and weather conditions.

ACE OFF

ACE ON

Fast Target Tracking™ function provides early-stage collision avoidance

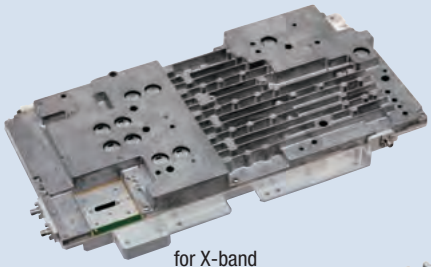
With Fast Target Tracking™, the FAR-23x8 series provides accurate tracking information; speed and course vectors are displayed in mere seconds allowing operators to take action and avoid incidents at a very early stage.



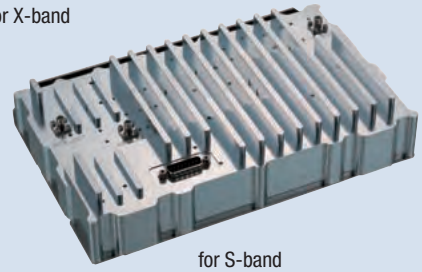
Solid State Radar model - NXT - specializes in target detection and maintainability

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

Power Amplifier Module of the Solid State transceiver



for X-band



for S-band

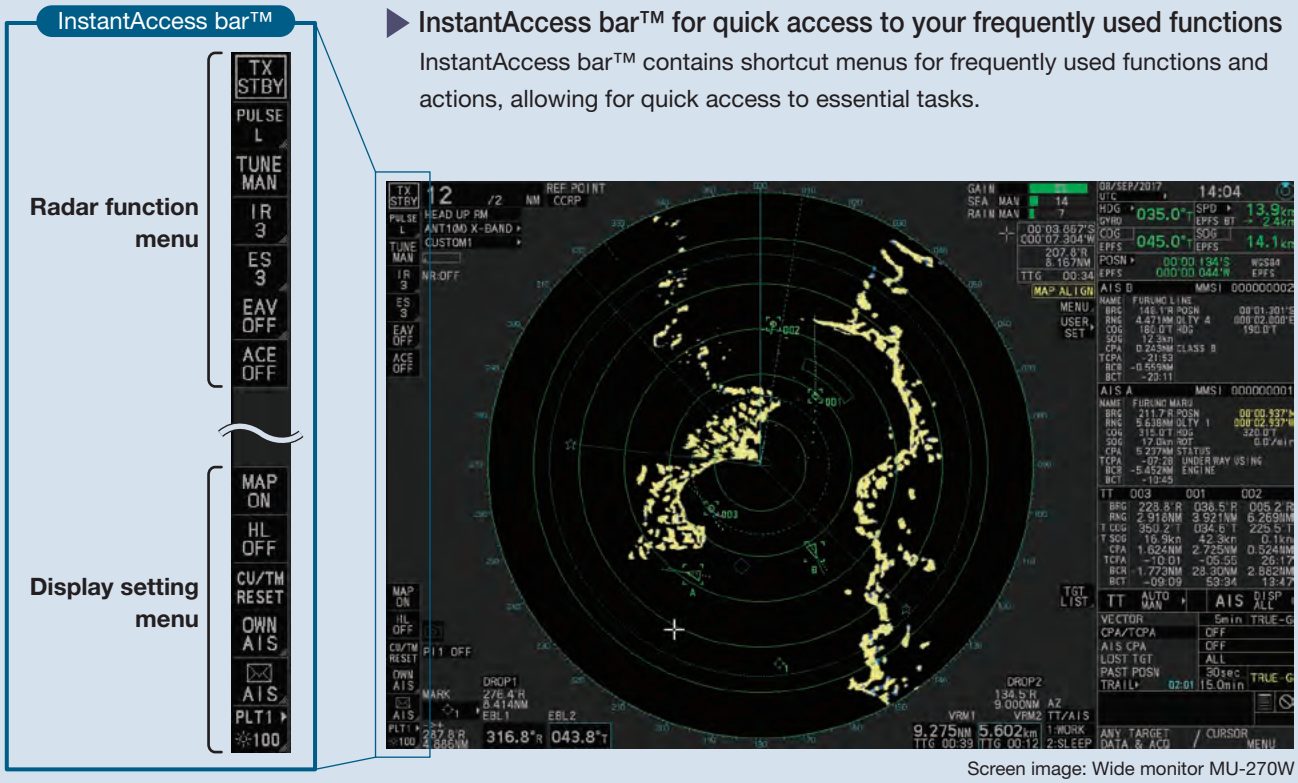
Clear images

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)

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.

Control Unit

Trackball Control Unit

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 though 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.

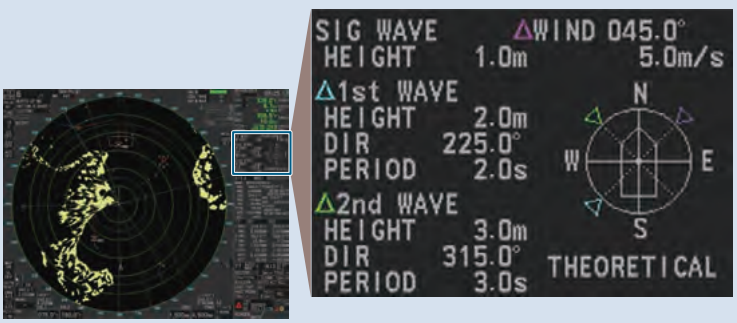
How to connect VDR with FAR-23x8 series

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

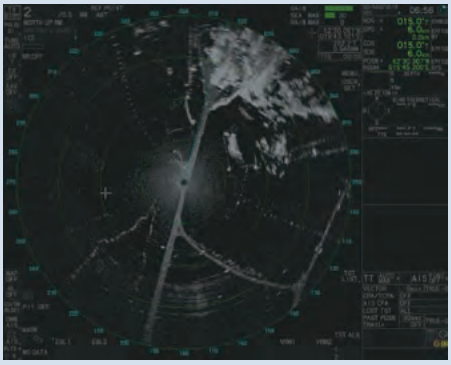
- Allows real-time monitoring and analysis of wave echoes
- Ensures safety at sea even at night



*More details on the Wave Analyzer brochure

▶ Ice Mode ** (X-band magnetron only)

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



**Please contact your local distributor for more details

PRODUCT NAME

Navigation Radar

ANTENNA

Type: Slotted waveguide array

Beam width and sidelobe attenuation

Radiator Type	X-band						S-band
	XN12CF	XN20CF	XN24CF	XN12AF	XN20AF	XN24AF	SN36CF
Length (cm / ft)	130 / 4	210 / 6.5	260 / 8	126 / 4	204 / 6.3	255 / 7.8	382 / 12
Horizontal beam width	1.9°	1.23°	0.95°	1.9°	1.23°	0.95°	1.8°
Vertical beam width	20°			20°			25°
Sidelobe(±10°)	-24 dB	-28 dB	-28 dB	-24 dB	-28 dB	-28 dB	-24 dB
Sidelobe(±10°)	-30 dB	-32 dB	-32 dB	-30 dB	-32 dB	-32 dB	-30 dB

Polarization	Horizontal
Rotation	24 rpm or 42 rmp (for high speed craft)
Wind load	100 kn
De-ier (option)	On : When temperature goes down to 0°C Off : When temperature goes up to + 5 °C

TRANSCEIVER

● 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 MHz±5 MHz CH2 P0N: 9413.75 MHz/Q0N: 9433.75 MHz±5 MHz
S-band (Solid State)	CH1 P0N: 3043.75 MHz/Q0N: 3063.75 MHz±5 MHz CH2 P0N: 3053.75 MHz/Q0N: 3073.75 MHz±5 MHz

● Output power

FAR-2018-MK-2	12 kW
FAR-2028-MK-2	25 kW
FAR-2328-NXT	600 W
FAR-2338S	30 kW
FAR-2338S-NXT	250 W

● Range scale, Pulse Repetition Rate and Pulselength

Magnetron Radar : FAR-2018-MK-2/2028-MK-2/2338S

PRR (Hz)	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)	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)	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

Minimum range	22m
Range discrimination	26m
Range accuracy	1% of the maximum range of the scale in use or 10m
Bearing discrimination	XN12CF 2.1° XN12AF 2.1° XN20CF 1.5° XN20AF 1.5° XN24CF 1.2° XN24AF 1.2° SN36CF 2.0°
Bearing accuracy	±1°

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

Warm-up time	3 min. approx.	
Display mode	Head-up, STAB head-up, Course-up, North-up (RM/TM), Stern-up	
Display mark	Cursor, Range ring, Heading mark, North mark, Bearing Mark, VRM, EBL, Acquisition zone	
Target Tracking (TT)	Max target acquisition	100 in 24/32 NM (Auto or Manual)
	Tracking	5/10 pts on all activated targets
	Vector time	Off / 30 s / 1-60 min
AIS	Display capacity	350 targets,
	Tracking	5/10 pts on all activated targets
	Vector time	Off / 30 s / 1-60 min
Radar map	20000 pts	
Acquisition zone	2 zones	
Interswitch function	Selectable from menu	

DISPLAY UNIT

Screen type	MU-270W
Resolution	27-inch color LCD, 1920 x 1200 (WUXGA)
Brightness	400 cd/m² typical
Visible distance	1.02 m nominal
Effective diameter	349 mm

INTERFACE

● 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/Power fail : 1)
DVI output	2 Ports: DVI-D, DVI-I or RGB picture data for 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

● Data sentences (IEC61162-1/2)

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

● Ethernet interface (IEC61162-450)

Port (LAN)	100Base-TX、IPv4、8P8C connector
IEC61162-450 Transmission group	
↳Input	MISC, TGTD, SATD, NAVD, TIME, PROP, CAM1, CAM2, NETA
↳Output	ALC, ALF, ALR, HBT sentence: TGTD, BAM1, BAM2 (default: TGTD)
↳Multicast address	239.192.0.1 ~ 239.192.0.18、239.192.0.56
↳Destination port	60001 ~ 60018、60056
Re-transmittable binary image transfer	
↳Multicast address	239.192.0.26 ~ 239.192.0.30
↳Destination port	60026 ~ 60030
Other network function excepted IEC61162-450	
	SNMP, HTTP, Syslog, Furuno Management Protocol (FMP)

● Output port (Antenna)	Sub display (Radar): 1 port: HD, BP, Trigger and Video signal

POWER SUPPLY

● Processor Unit (Antenna and Transceiver)

FAR-2018-MK-2	100-230 VAC: 2.1-1.0 (2.8-1.2)A, 1 phase, 50-60 Hz
FAR-2028-MK-2	100-230 VAC: 2.2-1.0 (2.8-1.3)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	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
● Display Unit	MU-270W : 100-230 VAC : 0.6-0.4A, 1 phase, 50-60 Hz
● HUB	100-230 VAC: 0.1 A, 1 phase, 50-60 Hz
● Deicer (option)	100-115/220-230 VAC: 2.6-1.3 A, 1 phase, 50-60 Hz

ENVIRONMENTAL CONDITIONS

● Ambient temperature	Antenna unit	-25°C~ +55°C(storage : -25°C~ +70°C)
	Indoor units	-15°C~ +55°C(storage : -20°C~ +70°C)
● Relative humidity	93% or less at +40°C	
● Degree of protection	Antenna unit	IP56
	Processor/Monitor unit	IP22
	Transceiver/Control unit	IP20
	HUB	IP22 (HUB-3000)
● Vibration	IEC60945 Ed.4	

CONFIGURATION

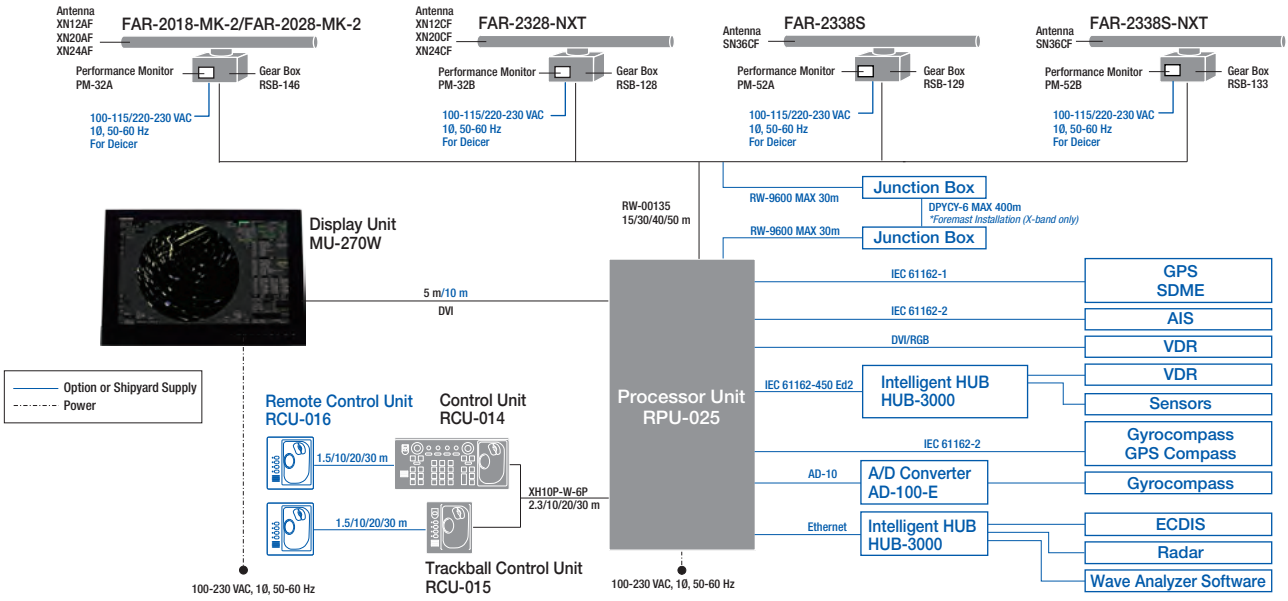
Standard

Processor unit	RPU-025
Control unit	RCU-014
Trackball control unit	RCU-015
Antenna unit	XN12CF/XN20CF/XN24CF/XN12AF/XN20AF/XN24AF/SN36CF
Display unit	MU-270W
Transceiver unit	RTR-107/108/109/111/123/131/132
Gear box	RSB-128/129/133/146
Performance monitor	PM-32A/32B/52A/52B
DVI cable (5m)	DVI-D/D S-LINK 5M
Standard Spare Parts and Installation Materials	

Option

Remote control unit	RCU-016
Junction box	RJB-001
A/D Converter	AD-100-E
Intelligent HUB	HUB-3000
Deicer	OP03-226/227/231/232/274
LAN signal converter	X band (Magnetron) : OP03-247-5
	X band (Solid-state) : OP03-247-4
	S band (Magnetron) : OP03-247-2
	S band (Solid-state) : OP03-247-1
Wave Analyzer Software	WV-100/WV-100ST

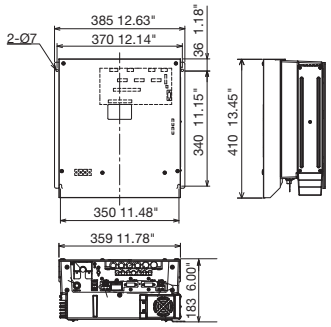
INTERCONNECTION DIAGRAM



Processor Unit

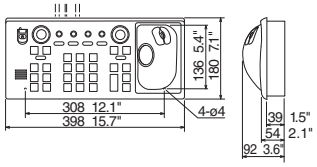
RPU-025

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



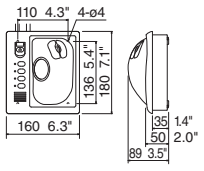
Control Unit

RCU-014 2.5 kg 5.5 lb



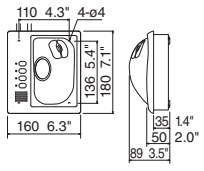
Trackball Control Unit

RCU-015 2.4 kg 5.3 lb



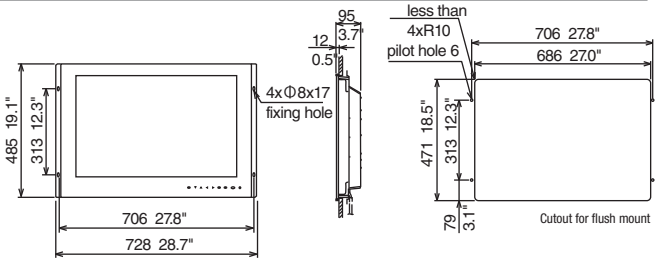
Remote Control Unit

RCU-016 2.4 kg 5.3 lb



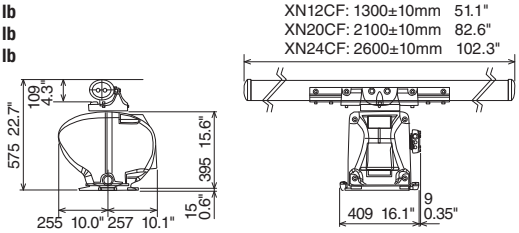
Display Unit

MU-270W
Flush Mount
13 kg 28.7 lb



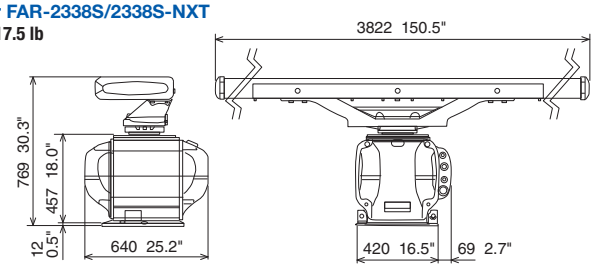
Antenna Unit for FAR-2328-NXT

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



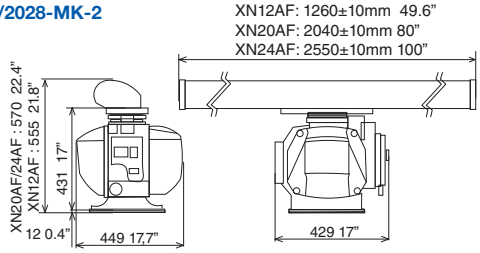
Antenna Unit for FAR-2338S/2338S-NXT

SN36CF 144 kg 317.5 lb



Antenna Unit for FAR-2018/2028-MK-2

XN12AF 39 kg 86 lb
XN20AF 44 kg 97 lb
XN24AF 46 kg 101 lb



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