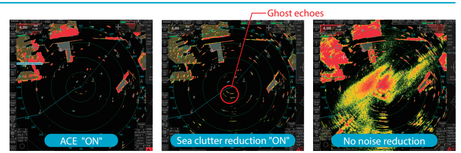
X/S-BAND BlackBox RADAR

Model FAR-23x8-BB series

▶ Automatic Clutter Elimination (ACE)

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



Compared to the other two images on the right, the ACE function allows near-total suppression of noise and other unwanted echoes, while reinforcing those of targets and landmasses. In addition to this smart suppression capability, and unlike the sea clutter reduction, ACE also recognizes ghost and other false echoes, allowing them to be eliminated.

Sea clutter reduction provides a very sharp image. Nevertheless, this noise suppression considerably reduces the intensity of other important target and landmass echoes as well. Sea clutter reduction also does not allow the total suppression of unwanted false echoes.

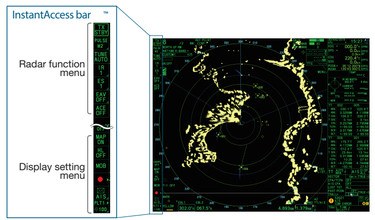
When no noise reduction, all echoes, including echoes of waves or rain, are strongly reflected on the screen. The echoes of the other ships are mixed with this noise.

▶ Fast Target Tracking™

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.

▶ InstantAccess Bar™ Provides immediate access to the functions you need

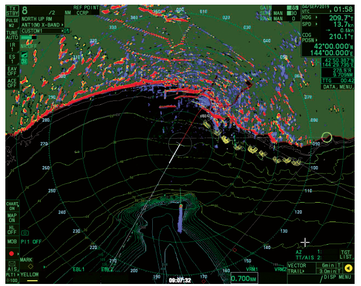
InstantAccess Bar™ contains shortcuts to menus for tasks (functions/actions) that are most frequently used by operators, providing quick access to the most critical functions.



▶ Chart Overlay

Plotter-related functions, such as ship's path (own ship and others), destination settings, route registration, waypoints are all integrated.

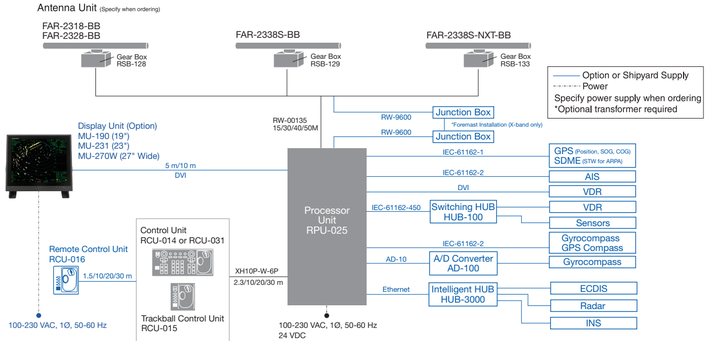
It is possible to superimpose Radar and Plotter information on the same image to have an even more precise image containing all the most useful information.



X/S-BAND BlackBox RADAR

Model FAR-23x8-BB series

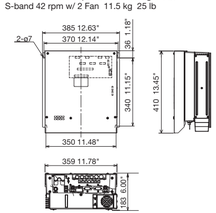
INTERCONNECTION DIAGRAM



Processor Unit

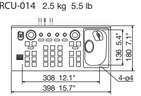
RPU-025

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

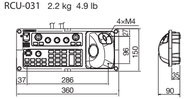


Control Unit

RCU-014 2.5 kg 5.5 lb

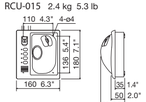


RCU-031 2.2 kg 4.9 lb



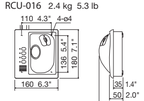
Trackball Control Unit

RCU-015 2.4 kg 5.3 lb



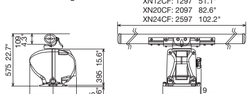
Remote Control Unit

RCU-016 2.4 kg 5.3 lb



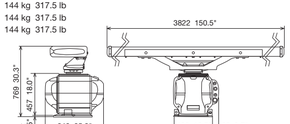
Antenna Unit for 2318-BB/2228-BB

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-2338S-BB/2338S-NXT-BB

Radiator	SN24CF	144 kg	317.5 lb
	SN30CF	144 kg	317.5 lb
	SN36CF	144 kg	317.5 lb



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Catalogue No. CA000001372
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FURUNO

X/S-BAND RADAR

Model FAR-23x8-BB series

TARGET ANALYZER | AUTO | Target Tracking | AIS

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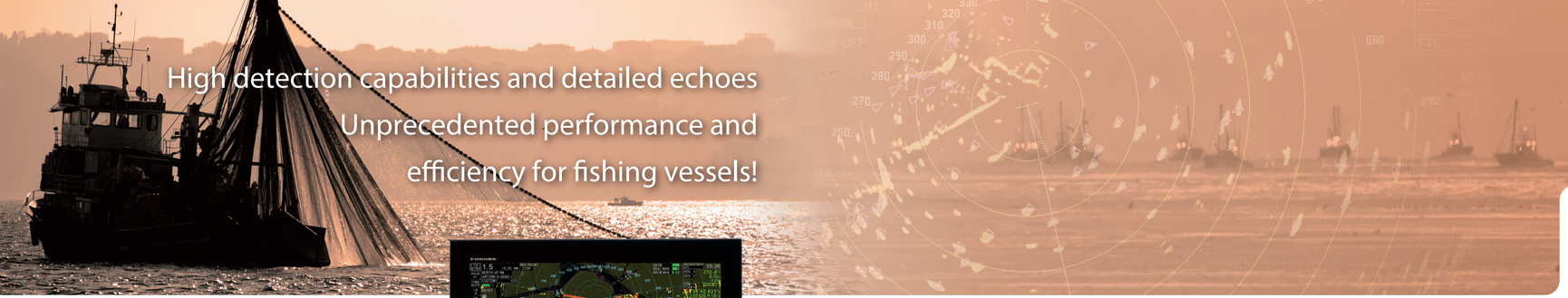


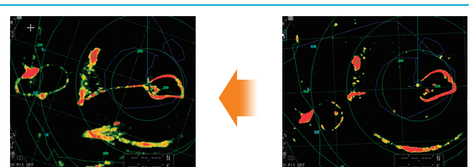
High detection capabilities and detailed echoes
Unprecedented performance and efficiency for fishing vessels!

X/S-BAND BlackBox RADAR
Model **FAR-23x8-BB series**

FAR-2318-BB	X-band, 12 kW, TR up
FAR-2328-BB	X-band, 25 kW, TR up
FAR-2338S-BB	S-band, 30 kW, TR up,
FAR-2338S-NXT-BB	S-band, 250 W, TR up, Solid State

▶ Enhanced dynamic range for a more complete EAV (Echo Average) Function!

The EAV determination technology has been taken to the extreme by integrating wide-range dynamic image correlation techniques.
Despite being a digital Radar, all echoes, from the weakest to the strongest, are displayed with richer shades.

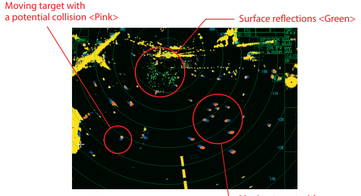


Echo Average function with wide dynamic range

The addition of signal transformation technology, offering a wider dynamic range, provides a more stable image of a net and its floating line while suppressing noise and other unwanted echoes.

▶ Target Analyzer™

Furuno's unique Target Analyzer™ function helps to find targets in high noise areas (rain/snow), or where there is interference from sea clutter.



*available to change the set color

▶ The power to judge the situation at a glance with customizable TT and AIS displays

When these are previously set, AIS symbols can be displayed with different colors for each MMSI. It is also possible to change the name of the acquired targets and change their color or symbol.

*In the case of TT, it is possible to easily change the display by creating specific presets.

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

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. Moreover, a 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 according to low output power.

Power Amplifier Module of the Solid State transceiver

▶ Well-designed controllers for stress-free operation

These control units are designed based on ergonomics. The RCU-031 Control Unit, specially designed for fisheries, incorporates all the main Chart Plotter functions and allows you to perform a variety of operations.

Control Unit RCU-014

Trackball Control Unit RCU-015

Control Unit RCU-031

▶ Refined antenna with high signal accuracy and excellent reliability

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.

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.

X/S-BAND BlackBox RADAR
Model **FAR-23x8-BB series**

Specifications

Antenna Radiator

1. Type — Slotted waveguide array
2. Beam width and sidelobe attenuation

Radiator type	X-Band			S-Band		
	XN12CF	XN20CF	XN24CF*	SN24CF	SN30CF	SN36CF
Length	4 ft	6.5 ft	8 ft	8 ft	10 ft	12 ft
Horizontal beam width	1.9°	1.23°	0.95°	2.6°	2.3°	1.8°
Vertical beam width	20°			25°		
Sidelobe within ±10°	-24 dB	-28 dB	-28 dB	–		-24 dB
Sidelobe outside ±10°	-30 dB	-32 dB	-32 dB			-30 dB
Sidelobe within ±20°	–			-23 dB	-24 dB	–
Sidelobe outside ±20°				-27 dB	-30 dB	

*: 24 rpm only.

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-2318-BB 12 kW
   FAR-2328-BB 25 kW
   FAR-2338S-BB 30 kW
   FAR-2338S-NXT-BB 250 W (equivalent to magnetron radar 30 kW)
3. Range scale, Pulse Repetition Rate and Pulselength
   Magnetron radar: FAR-2318-BB/2328-BB/2338S-BB

PRR (Hz approx.)	Range scale (NM)														
	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96
3000*	S1																
3000*	S2																
1500	M1																
1200	M2																
1000	M3																
600**	L																

*: 2200 Hz with TT range on 32 NM, **: 500 Hz on 96 NM range.

   Solid state radar: FAR-2338S-NXT-BB

PRR (Hz approx.)	Range scale (NM)														
	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	32	48	96
2400*	S1																
2400*	S2																
1500	M1																
1060	M2																
1000	M3																
600	L																

*: 1800 Hz (S1) and 1500 Hz (S2) with TT range on 32 NM.

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
   X-band: 2.1° (XN12CF),1.5° (XN20CF), 1.2° (XN24CF),
   S-band: 2.8° (SN24CF), 2.5° (SN30CF), 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	1.5	2	3	4	6	8	12	16	24	32	48	96
RI (NM)*	0.025	0.05	0.1	0.25	0.25	0.25	0.5	0.5	1	1	2	2	4	4	8	8	16

*: changeable from menu

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, 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 activated 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

Plotter Functions

1. Projection — Mercator
2. Useable area — 85° latitude or below
3. Effective projection area
   0.025 to 120 NM (for STBY), follows the radar range scale while transmitting
4. Memory capacity
   Own ship's track 30,000 pts (3,000 pts indicated)
   Other ship's track TT: 100,000 pts, AIS: 10,000 pts, consort ship: 10,000 pts, GPS buoy: 10,000 pts
   Mark/line 30,000 pts
   Waypoint 3,500 pts
   Route 200 routes with 100 waypoint each
5. External memory Waypoint: 100 pts, 1 route
6. Electronic chart Mapmedia
7. Own ship's tracking 7 colors

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 (for VDR) (RGB resolution 1280x1024 (SXGA), 60.0Hz or 1440x900 (WXGA+), 59.9Hz)
   LAN 2 ports: Ethernet 100Base-TX
   USB 2 ports: USB flash memory and mouse/keypad
   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, HDG, HDM, HDT*, MTW, MWV, OSD, RAQ, RMB, RMC, ROT, RTE, THS, TLL, TTM, 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
   *: for retrofit.
3. Ethernet interface for IEC61162-450
   Port (LAN2) 100Base-TX, IPv4, 8P8C connector
   Data sentences Same as 6.2 sentences
   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/plotter) 1 port: HD, BP, Trigger and Video signal

Power Supply

1. Processor unit (w/ antenna unit)
   FAR-2318-BB 100-230 VAC: 2.2-1.1 (2.8-1.4) A, 1 phase, 50-60 Hz or 24 VDC: 6.4 A (9.9 A)
   FAR-2328-BB 100-230 VAC: 2.6-1.3 (3.9-1.7) A, 1 phase, 50-60 Hz or 24 VDC: 10.2 A (13.7 A)
   FAR-2338S-BB 100-230 VAC: 3.9-1.7 (6.6-2.8) A, 1 phase, 50-60 Hz
   FAR-2338S-NXT-BB 100-230 VAC: 3.0-1.5 (5.8-2.6) A, 1 phase, 50-60 Hz ( ): 42 rpm
2. HUB (option) 100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz
3. 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 93% or less at +40°C
3. Degree of protection
   Antenna unit IP56
   Processor unit IP22
   Control unit IP20 (RCU-014/015/016), IP22 (RCU-031)
   HUB IP20 (HUB-100), IP22 (HUB-3000)
4. Vibration IEC 60945 Ed.4