



FURUNO®

21" Multi-color High-performance X-BAND RADAR

Models **FR-2115/2125/2155**

- Daylight-bright rasterscan 21-inch multi-color, high-resolution display
- New microprocessing technology with high-speed, high-density gate array and software expertise
- New cast aluminum scanner gearbox and new series of streamlined antennas
- Easy operation by a combination of discrete keys, rotary controls, and menu operation, all logically arranged and configured
- Electronic Plotting Aid (EPA) fitted as standard, Automatic Radar Plotting Aid (ARPA) option exceeding IMO and IEC standards
- Reliable CPA and TCPA warning in any plotting mode, accurate target data
- Optional 42 rpm scanner for high speed vessels
- Meeting the new IMO and IEC requirements including:
 - Radar Mapping capability to produce nav lines, aids to navigation, approximated coastlines and other features necessary for safe navigation
 - Sea and ground stabilization
 - True and relative vectors to determine future movement of other ships
 - True and relative target trails
 - Heading marker on the bearing scale, etc.



The future today with FURUNO's electronics technology.

FURUNO ELECTRIC CO., LTD.

9-52 Ashihara-cho, Nishinomiya City, Japan Telephone: +81 (0)798 65-2111
Telefax: +81 (0)798 65-4200, 66-4622, 66-4623

Catalogue No. R-164c

TRADE MARK REGISTERED
MARCA REGISTRADA

New Powerful Signal Processing and Radar Mapping



Photo:
6.5 ft antenna unit

FR-2105 series X-band radars

FR-2115: X-band, 12 kW, TR up

FR-2125: X-band, 25 kW, TR up

FR-2155: X-band, 50 kW, TR up

The new rugged cast aluminum antenna gearbox is based on many years of design experience. The new streamlined stylish radiators come in various sizes and are available in 24 rpm standard or 42 rpm optional (only for FR-2115/2125 with XN12AF or XN20AF).



Complies with the following Regulations and Standards:

- IEC 60936-1 Shipborne radar
- IEC 60936-2 HSC radar
- IEC 60872-1 ARPA (with optional ARP-26)
- IEC 60872-3 EPA
- IEC 60945 General requirements
- IMO MSC.64(67) Annex 4
- IMO A.823 (19)

The FR-2115/2125/2155 are designed for a wide range of users such as coasters, fishing boats, mega yachts, cargo and passenger ships, also high-speed craft or anyone requiring a high-resolution, high-refresh rate display in multi-color rasterscan.

The equipment is available in a variety of configurations: 12, 25 or 50 kW output, short or long antenna radiator, 24 or 42 rpm scanner, with standard electronic plotting facility and optional Automatic Radar Plotting Aid (ARPA). These plotting aids are essential in shipborne radar to reduce the workload of ship personnel and to improve the standard of collision avoidance.

The display unit employs a 21" high-resolution multi-color monitor which provides an effective diameter of 275 mm. Radar echoes are presented in a selected color with a day or night background color for easy observation under all lighting conditions. Different colors are assigned for marks, symbols and texts for

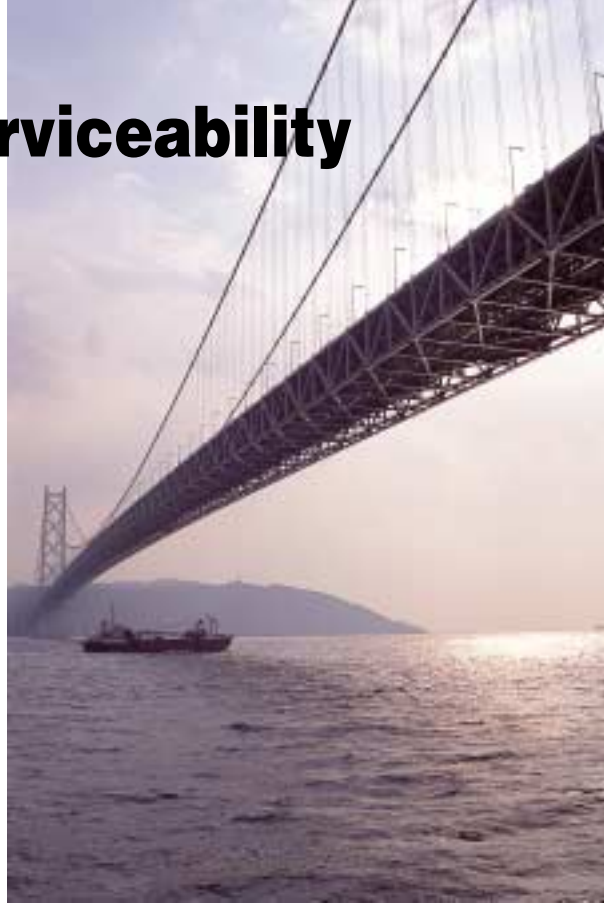
user-friendly operation. The control head has logically arranged controls in a combination of push keys, rotary controls and a well-organized menu

structure, and can be separated from the display unit via a flexible cable. The display pedestal contains all major modules and may be separated from the monitor part.

Operational features include all functions required by the IMO and IEC, such as, Head-up/Course-up/North-up orientation, parallel index lines, True Motion, sensor status message for compass, SDME, GPS and other electronic position-fixing systems, wind parameters, depth sounder data, etc. interfaced in IEC 61162.

Other features include two VRMs, range marker on the EBL, two EBLs with capability of offcentering and instant flipback, custom macro keys, multiple pulselengths, storage of operator-created maps, optional chart cards and the RP-26 Video Plotter module.

Reliability and Advanced Serviceability



Enhanced Serviceability

"Pull and lift" concept allows the service technician to easily see all surfaces of the display unit and the inside of the display base.

Radar Plotting Facilities

Target detection is enhanced by sophisticated signal processing techniques such as 16-level quantization, echo stretch, echo average, noise reducer, radar interference rejector.

The new IEC 60936 defines 3 types of radar plotting facilities: Electronic Plotting Aid (**EPA**), Automatic Tracking Aid (**ATA**), and Automatic Radar Plotting Aid (**ARPA**). All these Plotting Aids generate CPA and TCPA and collision alerts, complying with all IMO and IEC standards. The FR-2115/2125/2155 provide EPA and ARPA.

EPA (standard):

Electronic plotting of 10 targets in different symbols or colors

ARPA (Optional ARP-26 required):

Automatically tracks 30 targets which have been acquired manually or automatically, trial maneuverable, complying with A.823 (19).

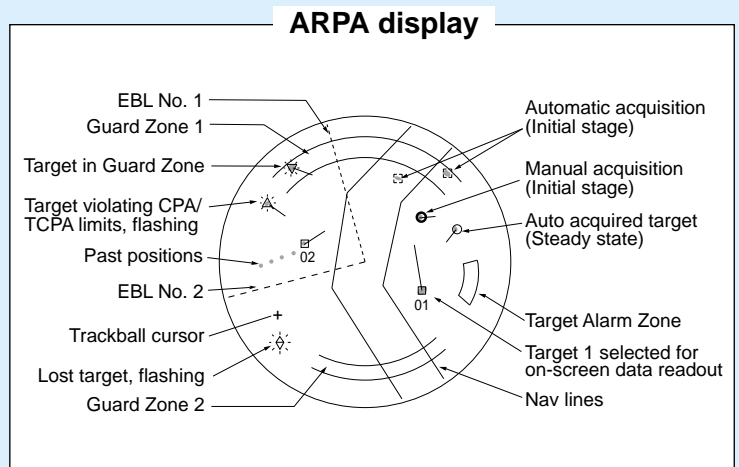
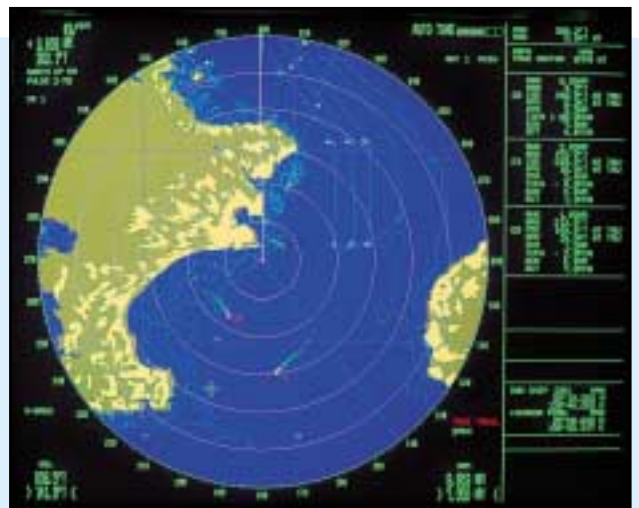


Chart Display

Video Plotter RP-26 (optional)

The RP-26 offers the capability of superimposing the digitized chart over the real-time radar display. The chart may be instantly removed by a simple action (The radar display has the priority over the chart.) Photo by a simulator. Radar image in yellow tones, charts in blue with light brown in fill to show up the radar images day and night.

- Map Area:** 0.125 to 96 nm
- Latitude Limits:** Between 85°N and 85°S
- Plot Interval:** 10, 30 s, 1, 5, 10, 30 or 60 min
- Built-in Memory:** 6,000 points for ships track and marks, 98 waypoints, 25 routes
- Tracking Speed:** 120 knots max.



SPECIFICATIONS OF FR-2115/2125/2155

ANTENNA RADIATOR

- Type** Slotted waveguide array
- Beamwidth**

| | FR-2115/2125 radiator | | | FR-2155 radiator | |
|---------------|-----------------------|--------|--------|------------------|-------|
| | XN12AF | XN20AF | XN24AF | XN4A | XN5A |
| Radiator type | XN12AF | XN20AF | XN24AF | XN4A | XN5A |
| Length | 4 ft | 6.5 ft | 8 ft | 8 ft | 10 ft |
| Beamwidth (H) | 1.8° | 1.23° | 0.95° | 0.95° | 0.75° |
| Beamwidth (V) | 25° | 20° | 20° | 20° | 20° |

- Rotation** 24 rpm or 42 rpm (option to FR-2115/2125 with XN12AF or XN20AF)

RF TRANSCEIVER

- Frequency**
X-band 9410 MHz ± 30 MHz
9415 MHz ± 30 MHz (50 kW)
- Output power** FR-2115: 12 kW, FR-2125: 25 kW, FR-2155: 50 kW
- Pulselengths and PRR**

| Range scales | P/L (µs) | PRR (Hz) |
|--------------|--------------------------------------|-----------------------|
| 0.125, 0.25 | 0.07 (0.08) | 3000 (2200) |
| 0.5 | 0.07/0.15 (0.08) | 3000 (2200) |
| 0.75, 1.5 | 2 from 0.07/0.15/0.3 (0.08/0.3) | 3000/1500 (2200/1100) |
| 3 | 2 from 0.15/0.3/0.5/0.7 (0.3/0.6) | 3000/1500 (2200/1100) |
| 6 | 2 from 0.3/0.5/0.7/1.2 (0.3/0.6/1.2) | 1500/1000 (1100/600) |
| 12, 24 | 2 from 0.5/0.7/1.2 (0.6/1.2) | 1000/600 (600) |
| 48, 96 | 1.2 | 600 (500) |

(): FR-2155

- IF** 60 MHz, Logarithmic. BW 28/3 MHz
- Noise figure** 6 dB

DISPLAY

- Picture tube** 21" high-resolution color CRT (1280x1024 pixels), Raster scan non-interlace
Effective display diameter 275 mm
IMO type Yellow or green echoes in 16 levels
Regular type Yellow or green echoes in 16 levels or 3 colors depending on echo strengths

- Minimum range and discrimination** Meets 35 m HSC requirements

3. Range scales

| Range (nm) | 0.125 | 0.25 | 0.5 | 0.75 | 1.5 | 3 | 6 | 12 | 24 | 48 | 96 |
|------------|-------|------|-----|------|------|-----|---|----|----|----|----|
| Rings (nm) | 0.025 | 0.05 | 0.1 | 0.25 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 |

4. Accuracy

- Range: 1% of range in use or 15 m, whichever is greater
Bearing: Better than 1°

- Presentation** Head-up, Head-up TB, North-up, True Motion
Sea or ground stabilization

6. Plotting facilities

- EPA 10 targets in different symbols (standard)
ARPA Automatic Radar Plotting Aid for 30 targets automatically or manually acquired, 2 guard zones 0.7-32 mi. complies with A.823(19).

7. Radar map

Nav lines, coastlines, buoys, etc. produced by operator as required by IMO and IEC standards. 50 points x 10 areas stored in PROM.

INTERFACE

- Analog RGB video, H/V sync
Digital in IEC 61162-1
Input: \$- GGA, \$- GLL, \$- RMA, \$- RMB, \$- RMC, \$- BWR, \$- BWC, \$- WPL, \$- RTE, \$- DPT, \$- DBT, \$- DBS, \$- VDR, \$- MWV, \$- VBW, \$- VHW, \$- VWT, \$- VWR, \$- ZDA, \$- MTW*, \$- VTG* * not in IMO type
Output: \$RAOSD, \$RARSD, \$RATTM

- POWER SUPPLY** (Specify when ordering)
115/230 VAC, 360 VA (FR-2115), 410 VA (FR-2125)
490 VA (FR-2155)

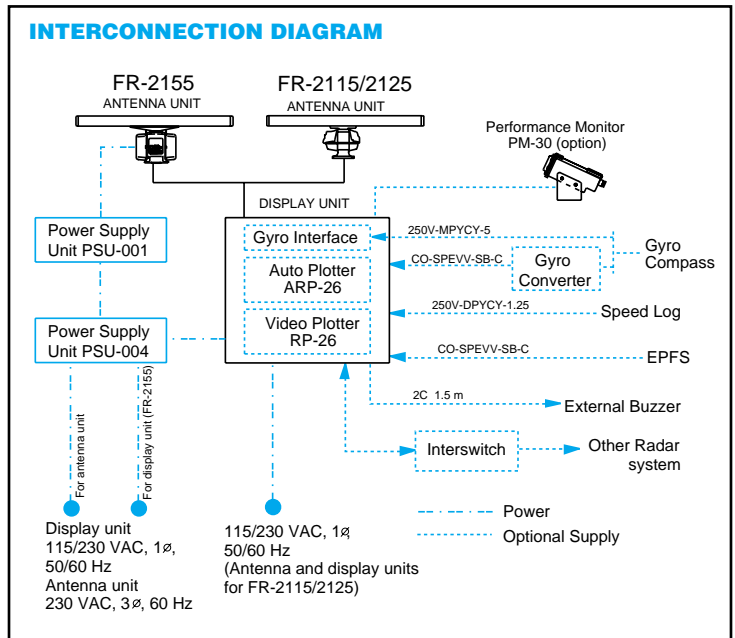
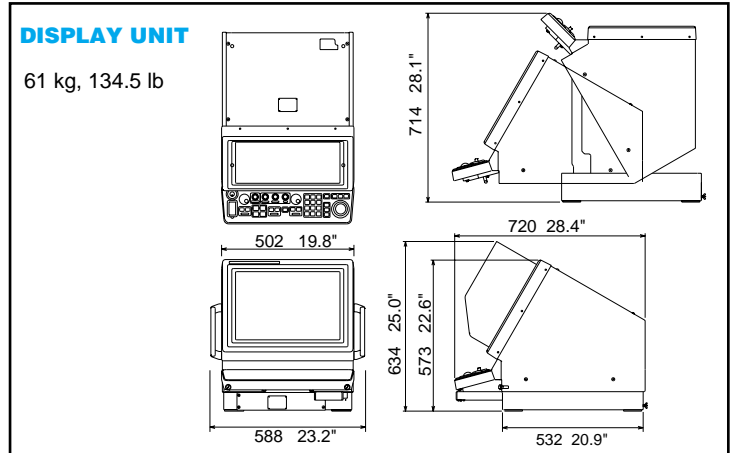
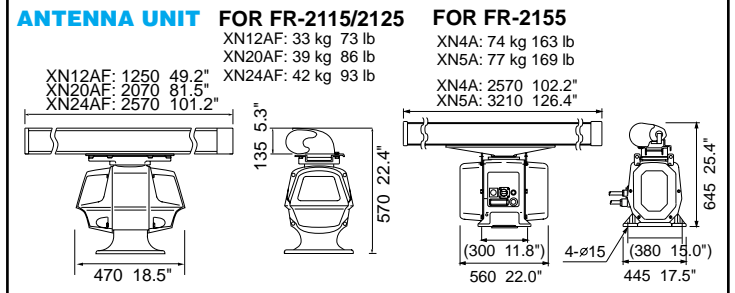
EQUIPMENT LIST

Standard

- | | |
|---|---------|
| 1. Display Unit with Hand Grip | 1 unit |
| 2. Antenna Unit | 1 unit |
| 3. Power Supply Unit for FR-2155 | 2 units |
| 4. Installation Materials and spare parts | 1 set |

Option

- Performance monitor PM-30 (Relay Board Kit OP03-150 required)
- Auto Plotter ARP-26 for ARPA
- Video Plotter RP-26
- Chart ROM card for RP-26
- RAM card for RP-26
- 42 rpm scanner motor for FR-2115/2125
- Interswitch box RJ-7/8
- Gyro Interface GC-8
- Display Pedestal
- Stepdown Transformer for 380/440 VAC



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

FURUNO U.S.A., INC.
Camas, Washington, U.S.A.
Phone: +1 360-834-9300 Telefax: +1 360-834-9400

FURUNO (UK) LIMITED
Denmead, Hampshire, U.K.
Phone: +44 2392-230303 Telefax: +44 2392-230101

FURUNO FRANCE S.A.
Bordeaux-Mérignac, France
Phone: +33 5 56 13 48 00 Telefax: +33 5 56 13 48 01

FURUNO ESPAÑA S.A.
Madrid, Spain
Phone: +34 91-725-90-88 Telefax: +34 91-725-98-97

FURUNO DANMARK AS
Hvidovre, Denmark
Phone: +45 36 77 45 00 Telefax: +45 36 77 45 01

FURUNO NORGE A/S
Ålesund, Norway
Phone: +47 70 102950 Telefax: +47 70 127021

FURUNO SVERIGE AB
Västra Frölunda, Sweden
Phone: +46 31-7098940 Telefax: +46 31-497093

FURUNO SUOMI OY
Helsinki, Finland
Phone: +358 9 341 7570 Telefax: +358 9 3417 5716

01015TPrinted in Japan

