SPECIFICATIONS OF MARINE RADAR/ARPA
FAR-32x0/33x0 SERIES

1 ANTENNA RADIATOR

1.1 Type: Slotted waveguide array

1.2 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	

1.3 Polarization: Horizontal

1.4 Rotation: 24 rpm or 42 rpm (for high speed craft)

1.5 Wind load: 100 kn relative

2 TRANSCEIVER

2.1 TX Frequency and modulation

X-band (Magnetron): 9410 MHz ±30 MHz, P0N

X-band (Solid state): CH1: 9403.75 MHz (P0N)/ 9423.75 MHz ±5 MHz (Q0N) or
CH2: 941.75 MHz (P0N)/ 9433.75 MHz ±5 MHz (Q0N)

S-band (Magnetron): 3050 MHz ±30 MHz, P0N

S-band (Solid state): CH1: 3043.75 MHz (P0N)/ 3063.75 MHz ±5 MHz (Q0N) or
CH2: 3053.75 MHz (P0N)/ 3073.75 MHz ±5 MHz (Q0N)

2.2 Output power

FAR-3210/3310 12 kW

FAR-3220/3320/3320W 25 kW

FAR-3220-NXT/3320-NXT 600 W

FAR-3230S/3330S/3330SW 30 kW

FAR-3230S-SSD/3330S-SSD 250 W

2.3 Pulse Repetition Rate, Range scale and Pulselength,
X/S-band Magnetron radar

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	72	96
3000*	S1																	
3000*			S2															
1500				M1														
1200						M2												
1000								M3										
600**										L								

1/2/4/8/16/32/72 NM ranges: non-IMO radar only

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

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X-band Solid state radar

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	72	96
1500	S1																	
1500			S2															
1200				M1														
1000						M2												
1000								M3										
600										L								

1/2/4/8/16/32/72 NM ranges: non-IMO radar only

S-band Solid state radar

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	72	96
2400*	S1																	
2000*			S2															
1500				M1														
1060						M2												
1000								M3										
600										L								

1/2/4/8/16/32/72 NM ranges: non-IMO radar only

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

3 PROCESSOR UNIT

3.1	Minimum range	22 m
3.2	Range discrimination	26 m
3.3	Range accuracy	1% of the maximum range of the scale in use or 10 m, whichever is the greater
3.4	Bearing discrimination	
	X-band:	2.1° (XN12CF), 1.5° (XN20CF), 1.2° (XN24CF)
	S-band:	2.8° (SN24CF), 2.5° (SN30CF), 2.0° (SN36CF)
3.5	Bearing accuracy	±1°
3.6	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	72	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	12	16
Number of rings	5	5	5	3	4	6	4	6	4	6	4	6	4	6	4	6	6	6

3.7	Warm-up time	3 min. approx. (solid state radar excluded)
3.8	Orientation mode	Head-up RM, STAB head-up RM, Course-up RM, North-up RM North-up TM, Stern-up RM
3.9	Stabilization mode	Ground or sea stabilization
3.10	Target tracking (TT)	Auto or manual acquisition: 200 targets in 32 NM Auto tracking on all acquired targets, Past position: 5/10 pts on all activated targets Vector time: Off, 30 s, 1-60 min
3.11	AIS	Capacity: 2000 targets, Past position: 5/10 pts on all activated targets Vector time: Off, 30 s, 1-60 min
3.12	Radar map	10 maps, 4,000 pts per map
3.13	Acquisition zone	2 zones

4 MONITOR UNIT

4.1	Screen type	
	MU-190	19-inch color LCD, 1280 x 1024 (SXGA)
	MU-231	23.1-inch color LCD, 1600 x 1200 (UXGA)
	MU-270W	27-inch color LCD, 1920 x 1200 (WUXGA)
4.2	Brightness	
	MU-190	450 cd/m^2 typical
	MU-231/270W	400 cd/m^2 typical
4.3	Visible distance	
	MU-190/270W	1.02 m nominal
	MU-231	1.2 m nominal
4.4	Video interface	DVI-D: DVI-standard, VESA-DDC2B
4.5	Brilliance control	RS-485, serial data control (DDC sentence)

5 INTERFACE

5.1	Processor unit (EC-3000)	
	Number of port	
	Serial	7 ports (IEC61162-1/2: 4 ports, IEC61162-1: 3 ports)
	Alarm output	6 ports: contact signal, load current 250mA Normal close: 2, Normal open: 2, System fail: 1 (n/c), Power fail: 1 (n/c)
	DVI output	3 ports: DVI-D (2), DVI-I or RGB picture data (1 port for VDR)
	USB	4 ports (3 ports for control units)
	LAN	2 ports: Ethernet 1000Base-T for local communication
	Digital input	1 port: contact signal, 100 ohm max. or 24VDC input
	Data sentences (IEC61162-1/2)	
	Input	ABK, ACK, ACN (ACM), ALR, CUR, DBT, DPT, DTM, GGA, GLL, GNS, HBT, HDT, MTW, MWV, NRX, NSR, RMC, RRT, THS, VBW, VDM, VDO, VDR, VHW, VSD, VTG, ZDA
	Output	ABM, ACK, ALC, ALF, ALR, ARC, BBM, EVE, HBT, OSD, RRT, RSD, TLB, TTD, TTM, VSD
5.2	Sensor adapter (option)	
	MC-3000S (serial)	8 ports: I/O, IEC61162-1/2: 4 ports, IEC61162-1: 4 ports
	MC-3010A (analog)	3 ports: Input, -10 to +10 V, 0 to 10 V or 4 to 20 mA
	MC-3020D (digital-in)	8 ports: relay contact, logics set from program
	MC-3030D (digital-out)	8 ports: relay contact, normal open and normal close available
5.3	Ethernet interface for IEC61162-450 (EC-3000)	
	Port (LAN2)	1000Base-T, IPv4, 8P8C connector
	Data sentences	Same as 5.1 sentences
	IEC61162-450 transmission group	
	Input	MISC, TGTD, SATD, NAVD, VDRD, RCOM, TIME, PROP, USR1 to USR8
	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	
		HTTP: *.*.*.*: 80, XML-RPC: *.*.*.*: 6403
		Syslog: 239.192.0.254: 514
5.4	Ethernet interface for IEC61162-450 (MC-3000S)	
	Port	100Base-TX, IPv4, 8P8C connector
	Maximum data rate	800 sps
	Data sentences	Output: XDR
	IEC61162-450 transmission group	
	Input	MISC, TGTD, SATD, NAVD, VDRD, RCOM, TIME, PROP, USR1 to USR8
	Output	Arbitrary (default: MISC)
	Multicast address	239.192.0.1 to 239.192.0.16
	Destination port	60001 to 60016
	Other network function excepted IEC61162-450	
		HTTP: *.*.*.*: 80, XML-RPC: *.*.*.*: 6403
		Syslog: 239.192.0.254: 514

6 POWER SUPPLY

6.1	Power supply unit (w/ antenna and transceiver unit)	
	FAR-3210/3310 (X-band, 12 kW)	
	PSU-014 (24rpm)	100-230 VAC: 1.8-0.9 A, 1 phase, 50-60 Hz
	PSU-014 (42rpm)	100-230 VAC: 2.5-1.2 A, 1 phase, 50-60 Hz
	FAR-3220/3320/3320W (X-band, 25 kW)	
	PSU-014 (24rpm)	100-230 VAC: 2.0-1.0 A, 1 phase, 50-60 Hz
	PSU-014 (42rpm)	100-230 VAC: 2.8-1.3 A, 1 phase, 50-60 Hz
	FAR-3220-NXT/3320-NXT (X-band, SSD)	
	PSU-014 (24rpm)	100-230 VAC: 1.8-0.9 A, 1 phase, 50-60 Hz
	PSU-014 (42rpm)	100-230 VAC: 2.5-1.2 A, 1 phase, 50-60 Hz
	FAR-3230S/3330S/3330SW (S-band, magnetron)	
	PSU-014 (24rpm)	100-230 VAC: 2.8-1.3 A, 1 phase, 50-60 Hz
	PSU-015 (42rpm)	100-230 VAC: 5.1-2.3 A, 1 phase, 50-60 Hz
	FAR-3230S-SSD/3330S-SSD (S-band, SSD)	
	PSU-016 (24rpm)	100-230 VAC: 2.3-1.1 A, 1 phase, 50-60 Hz
	PSU-018 (42rpm)	100-230 VAC: 4.7-2.1 A, 1 phase, 50-60 Hz
6.2	Processor unit (EC-3000)	100-115/220-230 VAC: 1.5/0.7 A, 1 phase, 50-60 Hz
6.3	Monitor unit	
	MU-190	100-230 VAC: 0.7-0.4 A, 1 phase, 50-60 Hz
	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
6.4	Sensor adapter (option)	24 VDC: 1.4 A (for 11 units), input to MC-3000S, the sources of other sensor adapters are fed from MC-3000S
6.5	Switching HUB (option)	
	HUB-3000	100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz
	HUB-100	100-230 VAC: 0.1 A max. 1 phase, 50/60 Hz
6.6	Transformer (option)	440 VAC: 1 phase, 50/60 Hz
6.7	De-icer (option)	100-115/220-230 VAC: 2.6/1.3 A, 1 phase, 50-60 Hz

7 ENVIRONMENTAL CONDITIONS

7.1	Ambient temperature	
	Antenna unit	-25°C to +55°C (storage: -25°C to +70°C)
	Indoor units	-15°C to +55°C
7.2	Relative humidity	95% or less at +40°C
7.3	Degree of protection	
	Antenna unit	IP56
	Processor unit	IP20 (IP22: option)
	Sensor adapter	IP20 (IP22: option)
	Transceiver unit	IP20
	HUB	HUB-100: IP20, HUB-3000: IP22
	Control/ monitor/ power supply unit	IP22
7.4	Vibration	IEC 60945 Ed.4

8 UNIT COLOR

8.1	Antenna unit	N9.5
8.2	Power supply unit	N2.5
8.3	Processor unit	N2.5
8.4	Control/ monitor unit	N2.5
8.5	Transceiver unit	N2.5
8.6	HUB	HUB-100: N3.0, HUB-3000: N2.5
8.7	Radar console	2.5GY5/1.5 (standard), 7.5BG7/2, 2.5G7/2, N7.5

9 PERFORMANCE MONITOR

9.1	PM-32 (X-band, MAG)	
	Frequency range	9380 to 9440 MHz
	Input power	+18 dBm to +30 dBm
	Output power	-21 dBm (1st pulse max. output), -41 dBm (1st pulse min. output)
	Step level	8 to 12 dB (1st pulse to last pulse)
9.2	PM-32B (X-band, SSD)	
	Frequency range	9423.75 ±1.6 MHz
	Input power	+6 dBm to +25 dBm
	Output power	-35 dBm (1st pulse max. output), -66 dBm (1st pulse min. output)
	Step level	8 to 12 dB (1st pulse to last pulse)
9.3	PM-52A (S-band, MAG)	
	Frequency range	3040 to 3080 MHz
	Input power	+25 dBm to +40 dBm
	Output power	-38 dBm (1st pulse max. output), -58 dBm (1st pulse min. output)
	Step level	8 to 12 dB (1st pulse to last pulse)
9.4	PM-52B (S-band, SSD)	
	Frequency range	3063.75 ±2 MHz
	Input power	+5 dBm to +25 dBm
	Output power	-52 dBm (1st pulse max. output), -72 dBm (1st pulse min. output)
	Step level	8 to 12 dB (1st pulse to last pulse)