



# MARINE ELECTRONICS PRODUCTS





# Lines of Marine Electronics Products

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GEM ELETTRONICA is engaged in the design, development and production of high performance and high quality marine navigation equipment and systems. Product line include Radar, PC radar, River radar, ECDIS, gyrocompass, and integrated bridge solutions. These products are available stand-alone or for bridge integration. Based on innovative technology, the electronic equipment of GEM ELETTRONICA are designed to improve safety and efficiency of sea and river navigation.



## SUPERNET 10 / 12 / RADARBOX

Ideal navigation class for the tourist and commercial sector



4 - 6 - 7.5 feet Open array

Ø 46 - 62 radome



10" touch screen



12"



RadarBox



Multi-display and multi-scanner configuration

To dynamically configure any ship radar system with several displays and scanner units. Each scanner can be controlled in real time by the operator from any of the display unit (master configuration), while the other displays can independently show either the same (repeater mode) or any other different picture.



On-demand display assignment

Each display in the network can be independently and autonomously assigned by the operator to show the radar image, the video plotter or an overlay of combined radar-plotter image without interrupting navigation surveillance.



OEM Applications

GEM ELETTRONICA software drivers allow scanner unit to be connected directly to standard PC using the RJ45 Ethernet port without any PC add-on hardware or external interfaces boxes. Drivers are available for Microsoft Windows.

# Solid State Radar

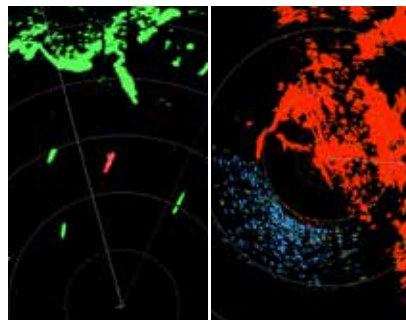


10 / 12 / 13.3" / 15" Touch screen



Doppler echo-filtering  
Technology

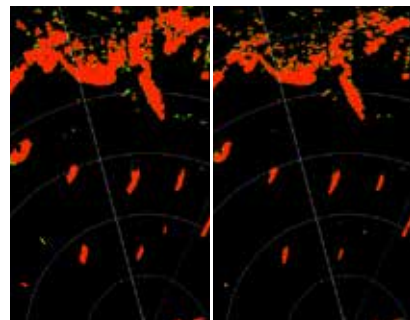
Thanks to the Doppler technology these radars are able to clearly identify moving targets. The e-Target Viewer give us the possibility to distinguish fixed target or moving targets away from our vessel from the moving targets toward our vessel.



E-Target Viewer  
and Rain Mode

*E-Target Viewer:*  
Identify moving targets in red color and fixed or moving away from our vessel targets in green color.

*Rain Mode:*  
By selecting Rain mode "ON" the rain echo will be shown on the screen in blue color.



e-Dar  
Processing

Special processing has been studied in order to significantly improve the Digital Azimuth Resolution. The e-DAR gives an image clear and detailed with less clutter than a traditional radar.



# LEONARDO SSR

Leonardo SSR is a marine navigation CHART RADAR of modern design based on Solid State Power Amplifier (SSPA) and Digital Technology. The radar provides high performance with a high level of targets detection and tracking, with a high resolution and discrimination capacity, using a compact and very light antenna.

X-Band

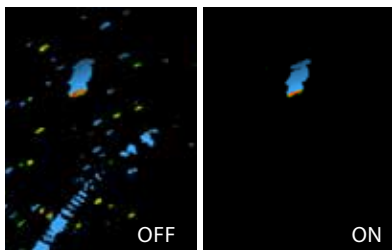


S-Band



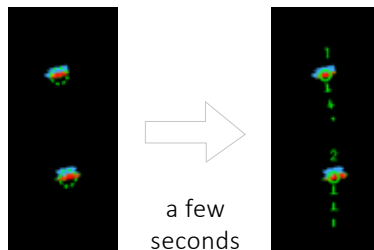
Transmission is available immediately after power up.

- **Solid State Amplifier (SSPA) designed in house;**
- Radar features are fully configurable and reprogrammable by software (Software Defined Radar);
- Automatic detection of small and large naval targets;
- Performance of detection and tracking fully complies with the IMO Performance Standards MSC.192(79) and IEC 62388;
- Extensive multifunctional capacity of the display with: ARPA (250 targets), electronic charts (optional) and data overlay support; fusion and information;
- Digital video output in proprietary or Asterix CAT 240 (optional);
- Innovative Human Machine Interface (HMI) with modern user-friendly windows based operation;
- Compact, silent, light weight and low power consumption;
- Antenna rotation speed: 22 rpm (standard version), 40 rpm (HSC version with 6' or 7,5 antenna);
- Embedded performance monitor;
- High reliability with extensive automatic BITE;
- De-icing optional provision;
- Antenna lengths: 6', 7.5', 9' (X-Band) and 12' (S-Band);
- Up-mast or down-mast transceiver configuration;
- Simple installation and maintenance procedures;
- Brushless motor (maintenance free)



### Adaptive clutter rejection

Adaptive clutter rejection algorithms perform better radar image adjustment and improved false echoes suppression.



### Advanced target tracking

Advanced Target Tracking performs faster acquisition and stable tracking even for highly manoeuvring targets in dense traffic waters.



### Multifunctional capacity

Extensive multifunctional capacity of the display with electronic charts and data overlay support: AIS targets fusion and information. Embedded display ensure maximum flexibility in bridge design and in general for customer requirements best satisfaction.

# River radar



Type Approved  
n. e-01-020  
n. R-4-020



By means of its experience and capacity our company has developed an unrivalled, high resolution and high discrimination radar delivering a complete and safe day/night river and narrow waterways navigation. With its exclusive processing technology and a new man-display graphics interface, this equipment meets full standards of Rhine river radar specification, and assures target detection, particularly in very close range and congested areas. Easy to install, the River radar is designed, manufactured and tested against high performance, reliability and quality requirements.



## Mini Conning

One of the many advantages of the screen 22" is the mini-conning display. Possibility of having more space for menu, including Compass, GPS, AIS, Depth.



## IVP - Intelligent Video Processing

Clear display through the application of intelligent filters. The processor implements the techniques of digital filtering of the signal making the image clearer and without false echoes (autoSTC - integration Scan to Scan - False Alarm Reduction, etc ...)



## Ship & Barge Editor

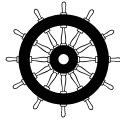
Ability to graphically change the profile of the boat on the radar display by entering the size and the placement of the barges transported.

ECDIS



# ECDIS

The ECDIS ECD-350 and ECD-360 are both type approved by DNV, having been tested according to the latest specifications of IMO, IHO and IEC; they have been adopted by the Italian Navy as well as other Navies in the world, professional vessel companies etc.



ECD-350

- 
- Panel computer 19" with touch screen
  - Keyboard TST-902
- 



ECD-360

- 
- Monitor 24" 16:9 MLD-2400
  - Elaboration Unit MCU-3102B
  - Keyboard TST-902
-

GYROCOMPASS

# AHRS Attitude and Heading Reference System

A Gyro compass is a form of gyroscope, used widely on ships employing an electrically powered, fast-spinning gyroscope wheel and frictional forces among other factors utilizing the basic physical laws, influences of gravity and the Earth's rotation to find the true north.



FOG-50

FOG-100

FOG-200/INS



Ideal for:

Cargoes	Oil Tankers	Hydrographic Survey
Cruise Ships	Super Yachts	High precision applications
Leisure Vellels	Commercial Vessels	Underwater navigation
Ferry Boats	Stabilization Systems	Precise reference for Stabilization

## Attitude sensors stabilization

Ship stabilizers are fins or rotors mounted beneath the waterline and emerging laterally from the hull to reduce a ship's roll due to wind or waves.



### ROT-100

Rate of turn sensor

ROT-100 provides instantaneous, accurate and stable data on the ship's turning rate and it is one of the most important equipment in maritime navigation guidance and steering.



### RRS-011

Roll and Pitch reference system

RRS provides responsive and reliable rotation rate and acceleration information. RRS-011 merges accurate data measured by its solid state IMU (Inertial Measurement Unit) with GEM ELETRONICA extended and proprietary sensor fusion algorithm.



### THD-100D

MEMS-GPS based inertial navigation system

THD-100D is the GEM ELETRONICA dual GPS and MEMS based INS\GNSS integrated system specifically developed for maritime navigation. THD-100D combines the potential of a GNSS satellite compass with the continuity, robustness, and frequency update that only a 9DOF IMU based navigation system can provide. With multiple sensor integrated in the unit and the possibility to be integrated with an external speed log.



Ideal for:

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Yachts and leisure boats

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Unmanned surface platform

---

Stabilization Systems

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Commercial vessels

---

Service/work boats

---

Rescue/littoral patrol ships

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Small vessels

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## HIGH POWER ILLUMINATOR

### Search system

HPI-100 is a system that performs surveillance, high power illuminator and long distance target illumination and detection using embedded sensors:

- UV Light used for Search & Rescue and Oil Spill operations;
- White Light used for long distance research and lighting;
- Color daylight surveillance Camera; it is a camera capable of providing full HD video.



#### Search and Rescue and Oil Spill Detector



This activity is supported by a long distance lighting system and availability of HD video camera.

#### Off-Shore Oil Industry



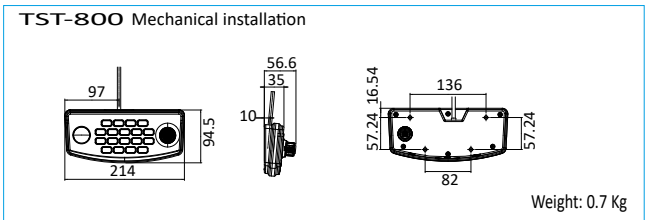
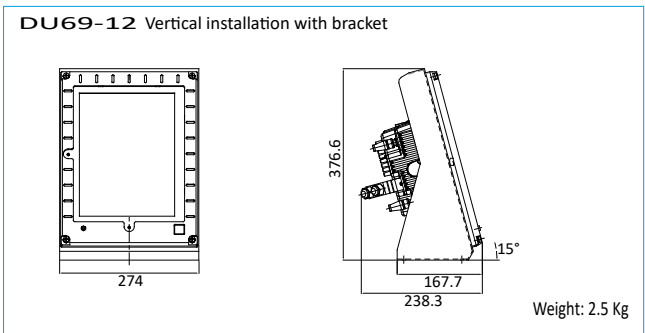
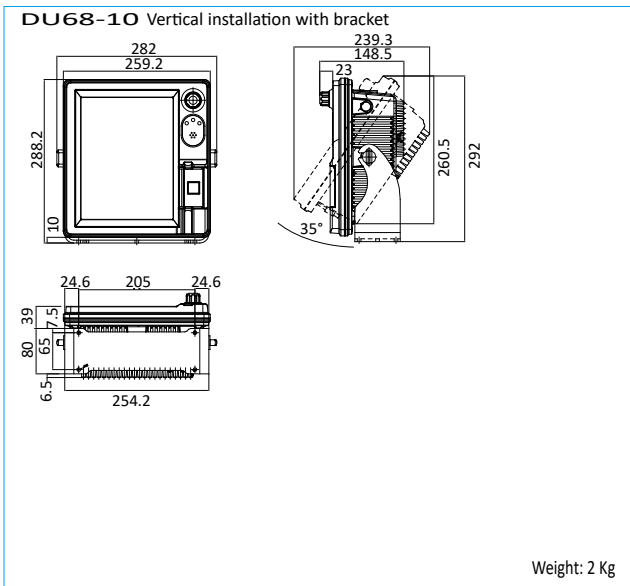
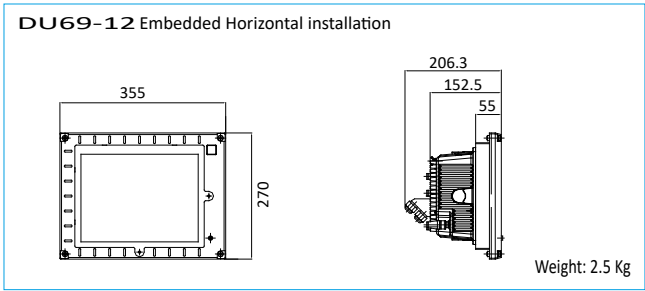
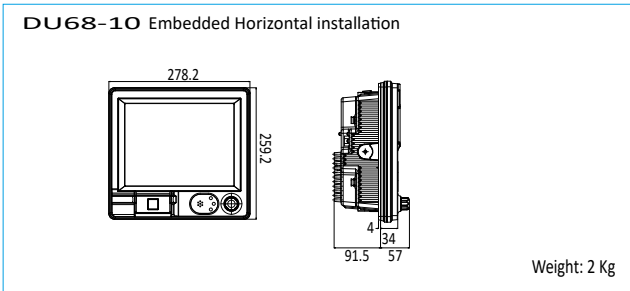
# Technical Specification



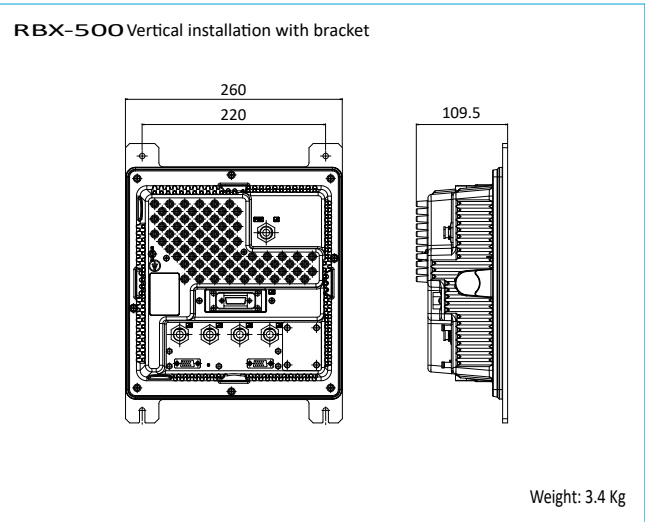
SUPERNET 10 / 12 / RADARBOX

10" DISPLAY	
Data Display Capabilities	Chartplotter, Radar
Display (LCD) size	10.4" Touch Screen
Display colors	256
Display resolution	640 x 480 pixels (VGA)
Display type	Transflective color TFT LCD
Interfaces	3 NMEA 0183, 1 auxiliary Ethernet LAN
SpeakVoice	for warning, alarm and instructions
Mounting Methods	See Outline drawing
MiniARPA	capability of manual/automatic acquisition and automatic tracking of 12 targets
AIS	50 targets, AIS ATon targets, (sensor required)

12" DISPLAY	
Data Display Capabilities	Chartplotter, Radar
Display (LCD) size	12" LCD
Display colors	256
Display resolution	800 x 600 pixels, 16 level
Display type	Super TFT, LCD
Interfaces	3 NMEA 0183, 1 auxiliary Ethernet LAN
Keyboard	Remote keyboard with 1.5 mt cable
Mounting Methods	See Outline drawing
MiniARPA	Capability of manual/automatic acquisition and automatic tracking of 12 targets
AIS	50 targets, AIS ATon targets, (sensor required)



RADARBOX	
Data Display Capabilities	Chartplotter, Radar
RadarBox	Links to different unit
Interfaces	3 NMEA 0183, 1 auxiliary Ethernet LAN
Keyboard	Remote keyboard with 1.5 mt cable
Mounting Methods	See Outline drawing
MiniARPA	capability of manual/automatic acquisition and automatic tracking of 12 targets
AIS	50 targets, AIS ATon targets, (sensor required)



# SUPERNET 10 / 12 / RADARBOX

ANTENNA	Radome 46	Radome 62	4 ft Array	6 ft Array	7.5 ft Array
Length	1.4 feet	1.8 feet	4 feet	6 feet	7.5 feet
Type	Microstrip Array		Slotted waveguide		
Frequency band	9410 ± 50 MHz.				
Polarization	Horizontal				
Horizontal beamwidth	5.2° ± 0.2°	3.8° ± 0.2°	1.8° ± 0.1°	1.2° ± 0.1°	1.05° ± 0.1°
Vertical beamwidth	25° ± 2°	25° ± 2°	22° ± 2°	22° ± 2°	22° ± 2°
Sidelobes within ± 10°	-19 dB	-19 dB	-26 dB	-26 dB	-26 dB
Sidelobes outside ± 10°	-21dB	-21dB	-30 dB	-30 dB	-30 dB
Gain	≥ 19 dBi	≥ 21 dBi	≥ 27dBi	≥ 29 dBi	≥ 30 dBi

TRANSCIVER UNIT	Radome		Scanner		
Peak power (nominal):	4 kW		12 kW	25 kW	
Range scale:	36 nm	48 nm	64 nm	72 nm	96 nm
Radiation frequency:	9410 ± 30 MHz.				
Pulse Width:	50 nS	50 nS	50 nS	50 nS	80 nS
	80 nS	80 nS	200 nS	200 nS	200 nS
	300 nS	300 nS	400 nS	400 nS	400 nS
	800 nS	800 nS	800 nS	800 nS	800 nS
	(± 20nsec; for PW > 300nsec ± 10% tolerance)				
Pulse Repetition Frequency:	2600 Hz	2600 Hz	3200 Hz	3200 Hz	2000 Hz
	2100 Hz	2100 Hz	1600 Hz	1600 Hz	1000 Hz
	1200 Hz	1200 Hz	800 Hz	800 Hz	750 Hz
	600 Hz	600 Hz	500 Hz	500 Hz	500 Hz
	(with ± 5% tolerance – stagger function included)				
Transmitter type:	Magnetron				
Modulator:	fully solid state				
Receiver type:	logarithmic, fully solid state				
Dynamic range:	100 dB				
Intermediate Frequency (I.F.):	60 MHz ± 2 MHz				
I.F. bandwidth:	20 MHz with short and medium pulses 4 MHz with long and extralong pulses (with ± 10% tolerance)				
Minimum Detection Range	< 15 m from the antenna location				
Noise Figure:	Nominal 3.5 dB				
Antenna rotation speed:	Radome: 24/30 (> 1.5 nm) rpm - Open array: 22 ± 2 rpm - River: 36 rpm				

ENVIRONMENTAL AND SUPPLY	
Temperature (IEC 60945)	- 15°C to 55°C (display) - 25°C to 55°C (External Unit)
Enclosure	Waterproofing IPX5
Power Voltage	12 to 24 Vdc Radome - 24 Vdc Open antenna
Power consumption	< 70 W

**OPTIONS**

HUB LINK SUPERNET 310  
HUB LINK SUPERNET 620

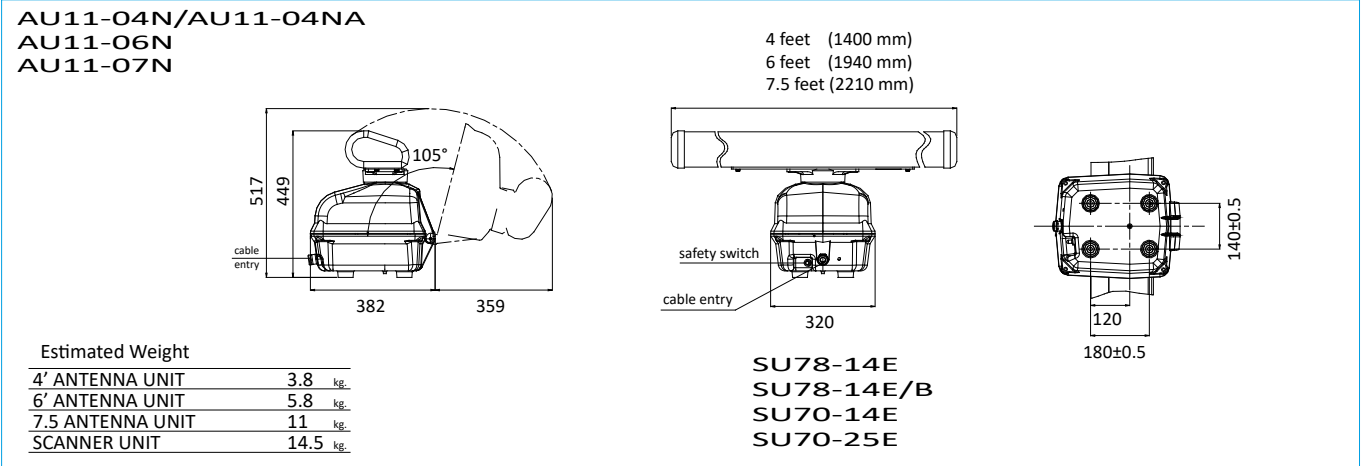
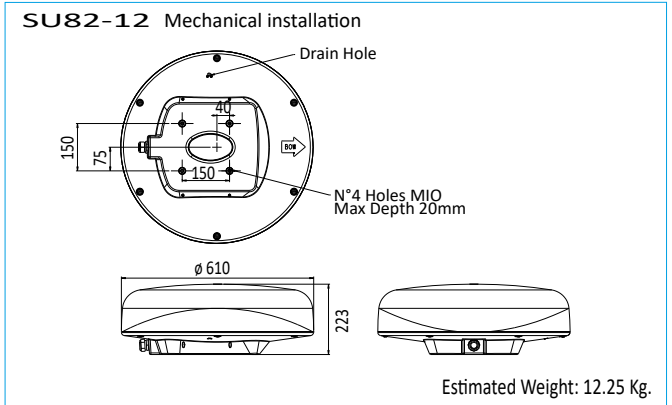
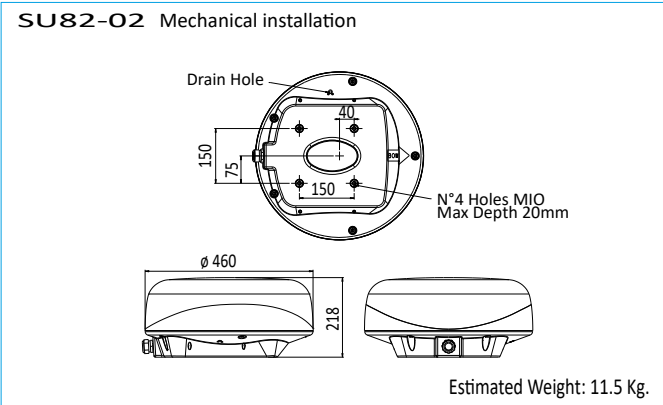
Power supply cable  
Connection cable between HUB (RJ45) and SUPERNET display, 1 mt / 5 mt / 20 mt / 30 mt  
LAN connection Display-Display SUPERNET J6-J6, 5 mt / 10 mt / 20 mt / 30 mt  
ETHERNET cable for connection between HUB and PC  
Power supply cable DISPLAY and RADAR BOX complete with fuse  
Fuse for new generation GEM cable 5 mt  
Cable for interface with autopilot, fluxgate compass, GPS, AIS, external alarm, J3, J4, J5 connectors, 5 m / 10 m  
Connection cable J5 with ECHO BOX, 5 mt / 10 mt  
DATA CONCENTRATOR  
Connections with EM cable for J3, J4 or J5 (same part number)

AC/DC CONVERTER  
For radome type SP 100-12 Input 88-264 Vac 50 Hz, output 12 Vdc ± 2%  
For open antenna type SP 320-24 Input 88-264 Vac 50 Hz, output 24 Vdc ± 2% 13 A

CONNECTION CABLES AND ACCESSORIES FOR SUPERNET AND RADAR BOX SYSTEMS  
Connection cable between Radome and SUPERNET Display Unit, 15 mt length  
Connection cable between Radome and HUB, 15 mt length  
Keyboard with cable, 1.5 mt / 5 mt / 10 mt  
Connection cable between Scanner and SUPERNET Display Unit, 15 mt length  
Connection cable between Radome antenna and HUB, 15 mt length  
C-MAP External C-Card reader  
Cartography C MAP-MAX LOCAL  
WIDE  
MEGA WIDE

**INSTALLATION KIT**

Installation GEM cable 10 mt.  
Kit of ancillaries, installation and operator manual





ANTENNA UNIT

		X-BAND			S-BAND
Lenght	6 feet	7.5 feet	9 feet	12 feet	
Type	Slotted waveguide array				
Frequency band	X band, $\lambda = 3.2$ cm, frequency range 9300-9500MHz			2900±3100 MHz	
Polarization	Horizontal				
VSWR	≤ 1.2:1				
Horizontal beamwidth to -3dB	≤ 1.25°	≤ 1.05°	≤ 0.85°	1.9° ± 0.1°	
Vertical beamwidth to -3dB	~ 23°			25° ± 10%	
Sidelobes within 10°	≤ - 27 dB			≤ 26 dB	
Sidelobes outside 10°	≤ - 30 dB			≤ 30 dB	
Gain	≥ 29 dBi	≥ 30 dBi	≥ 31 dBi	≥ 27 dBi	
Bearing discrimination with e-DAR* processing optional					

TRANSCEIVER UNIT PERFORMANCE

Solid State Power Amplifier (SSPA) / Coherent two-channel receiver Superheterodyne / Digital configuration with functions defined by the software (Software Defined Radar) / Pulse compression techniques

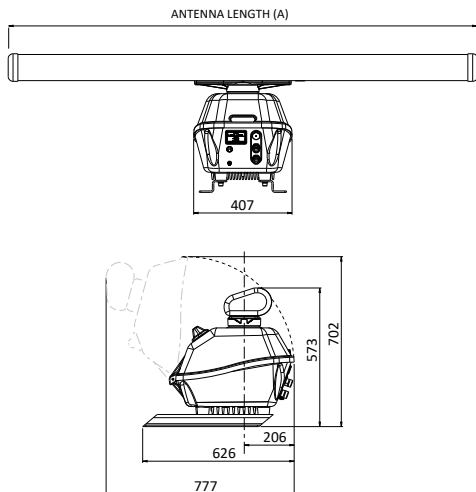
SCANNER UNIT

		X-BAND			S-BAND
Transmission output	100 watt	200 watt	400 watt	400 watt	
Transmission frequency					
Pulse Repetition rate (PRR)	from 500 to 2000 Hz				
Pulse Width	from 0.05 $\mu$ s up to 93 $\mu$ s				
Sector blanking	Available				
Receiver	Coherent, 16 bits sampling				
Dynamic range	≥ 120 dB				
Built-In Test Equipment (BITE)	Fully integrated in all modules, covering also PRF parts.				
Interface	Gbit Ethernet. Asterix CAT 240 (optional)				

RANGE SCALE

Range (NM)	0.0625	0.125	0.25	0.5	0.75	1.5	3	6	12	24	48	96
RI (NM)	0.03125	0.0625	0.125	0.125	0.125	0.25	0.5	1	2	4	8	16
Number of rings	2		4		6							

X-BAND OUTLINE



Antenna length (A)	6ft	7ft	9ft
	1940	2285	2795

Dimensions in mm

ROTATION UNIT PERFORMANCE

Rotation speed	20 or 40 rpm (for HSC requirement)
Wind load	Operational: 100 knots Survival: 120 knots
Performance monitor	Option

ENVIRONMENTAL CONDITIONS

Models SSR are designed to operate in a reliable and continuous mode, with full operative performances, in the environmental conditions specified in the following table:

Antenna Group	Operating Temperature From -25° C to 55° C (storage from -28° C to +70° C) with optional anti-icing device (de-icer)
Protection grade	IP66
Relative humidity	Up to 95% at +40°C
Vibrations	In accordance with IEC-60945
Shocks	In accordance with IEC -62388 (17.3.2)

POWER SUPPLY

Antenna Supply Unit (powering Antenna Group and Transceiver)	single phase 88 - 264 VAC, 47-63 Hz, 800 W max
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COLORS

White RAL9003 (Standard)
Navy Gray FED-STD 595 - 26373 (on request)

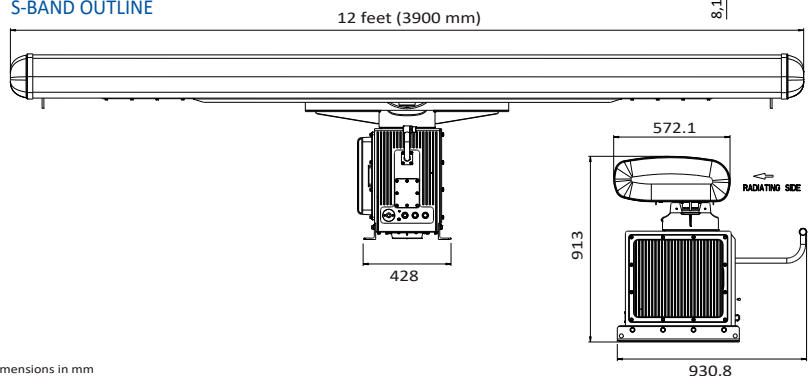
WEIGHTS

- Scanner Unit	X-BAND: 35 Kg.	S-BAND: 111 Kg.
- 6' Antenna:	5.8 Kg.	
- 7.5' Antenna:	9 Kg.	
- 9' Antenna:	11 Kg.	
- 12' Antenna		77 Kg.

PANEL PC

Size	23.6" wide screen
Aspect ratio	16:9
Active area	521.0 x 293.0 mm
Native resolution	1920 x 1080 (full HD)
View angle	89° (L/R/T/B) typical
Glass	Anti reflection coated front glass
Qualified	IEC 60945, approved for ECDIS/RADAR use

S-BAND OUTLINE



# RIVER

SPECIFICATIONS	LD-2204R RK/7		LD-2204R RK/9	
	ARRAY UNIT	AU11-07NF	AU11-09NF	
Type:	7.5" (2300 mm)	9" (2795 mm)		
	slotted waveguide array			
Polarization:	Horizontal			
Horizontal beamwidth (-3 dB):	1.05° ± 0.1°	0.85° ± 0.1°		
Vertical beamwidth (-3dB):	23° ± 3°			
Sidelobe level within 10° from main lobe:	< -26dB			
Sidelobe level outside 10° from main lobe:	< -32dB			
Gain:	30dB ± 1dB	31dB ± 1dB		
Rotation speed:	30 r.p.m. nominal			
Resistance to the wind:	Up to 100 km/h			

PROCESSOR UNIT	
AIS function	Yes, 200 targets (sensor required)
Range scales	0.15, 0.3, 0.5, 0.8, 1.2, 1.6, 2, 4, 8, 16, 32, 64 km
Range resolution	less than 15m
Minimum detectable range	less than 15m
Range accuracy	± 1.5% or ± 5m
Bearing resolution	± 1° max.
VRM	2 pieces
EBL	2 pieces
Cursor range, bearing and lat/long	
Tune	manual / Auto
STC	manual / Auto
FTC	manual
Bearing	scale 360° at 1° interval
Heading marker	Yes
Stern marker	Yes (for ferry boats)
Parallel line	2 pieces, with readout
Off centre	2 steps: 20% or 33% in addition to the 66% permanent fixed extension of the radar picture in the forward direction.
Mini conning display	with navigation Information on the bottom of the radar screen
Sector Blanking	Yes
Intelligent Filter	Yes
Display Control	Fully controllable by trackball or touchpad on the keyboard
Trails length	2 different intervals (ETSI EN302-194) OR 10 (No ETSI EN302-194)
Expansion	Yes
Display colour echo	256 levels, 4 colors palette
Display colour background	4 colors inside / 4 color outside
Display colours trail	4 colors
Own mark	Yes
Ship and Barge Editor	
Extensive customization of the user interface colors	
Time Local or UTC	
Distance counter	From GPS (ground distance)
Screenshot Internal memory or USB Pen Drive	
INPUT SIGNALS	
GPS	NMEA
2nd GPS	NMEA
Rate of turn	Analog (20mV/deg isolated) or NMEA
Rudder feedback	Analog (20mV/deg isolated) or NMEA
Automatic pilot	Analog (20mV/deg isolated) or NMEA
Depth	NMEA
Wind	NMEA
Course and heading	NMEA
AIS RX	NMEA V3 X
Output signals	
2nd monitor	DVI
Analog Raw video	Video, Trigger, Bearing Signal (optional)
Digital Raw Video	Ethernet interface (optional)
POWER	
Supply Input	24 Vdc -10% +30%
Power Consumption	< 400W

• Open array

• Keyboard

• Processor Unit

Weight :

7.5' Antenna + Scanner Unit:	35 Kg
9' Antenna + Scanner Unit:	37 Kg
Keyboard:	0.7 Kg
Processor Unit:	7 Kg

ECD-350

Display

Aspect Ratio	5:4
Contrast Ratio	2000:1
Max. No. of Colors	16.7M (8-bit/color)
Panel Size	19-inch viewable image
Panel Type	MVA
Pixels	1280 x 1024
Response Time	20 ms (gray to gray)
Viewing Angles	178°/178°
Light Intensity (Brightness)	MD-219X/219Z: 300 cd/m2 MD-219Z-HB: 1000 cd/m2

Computer Interface

Serial Ports	RS-232 ports x 1 (DB9 male) RS-232/422/485 ports x 1, software-selectable (terminal block)
Video Input	DVI-D x 1, 29-pin DVI-D connectors (female) VGA x 1, 15-pin D-sub connector (female)
Touch Function	
Touch Type	MD-219Z/MD-219Z-HB: Capacitive Touch (PCAP) MD-219X: None
Touch Support Points	MD-219Z/219Z-HB: 4 points

Serial Interface

Baudrate	50 bps to 115.2 kbps
Data Bits	5, 6, 7, 8
Flow Control	RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485, RTS Toggle (RS-232 only)
Parity	None, Even, Odd, Space, Mark
Stop Bits	1, 1.5, 2

Serial Signals

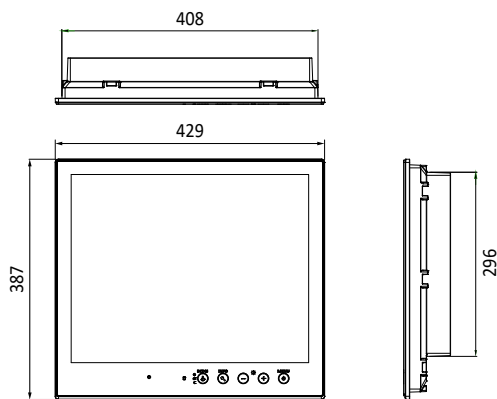
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w	Data+, Data-, GND
RS-485-4w	Tx+, Tx-, Rx+, Rx-, GND

Power Parameters

Input Voltage	100 to 240 VAC, 24 VDC (18 to 30 V)
Power Consumption	40 W (max.)

Environmental Limits

Operating Temperature	-15 to 55°C (5 to 131°F)
Storage Temperature (package included)	-20 to 60°C (-4 to 140°F)
Ambient Relative Humidity	5 to 95% (non-condensing)



Panel computer 19" touch screen

Weight: 7.8 Kg.

ECD-360

DISPLAY 24 inch

Screen type	High-Resolution 24" LCD based on Si-TFT technology
Screen dimensions	Diagonal 24.0 inches equivalent to 25" standard CRT
Pixel pitch	0.28 mm
Viewing angle	+/- 89° (horizontal) typical +/- 89° (horizontal) typical
Contrast ratio	3000
Pixel resolution	1920x1080 pixels
Video levels	16.7 M

COMPUTER

CPU	Intel® Celeron® Processor 1047UE (2M Cache, 1.40 GHz)
System Memory Pre-installed	4 GB DDR3/DDR3L
System Memory Slot	SODIMM DDR3/DDR3L slot x 1
Pre-installed OS	Windows 10 Pro 64-bit
Storage	Slot MPC-2150Z-T-W7E: 64 GB 2.5-in SSD pre-installed

COMPUTER INTERFACE

Ethernet Ports	Auto-sensing 10/100/1000 Mbps ports (RJ45 connector) x 2
Serial Ports	RS-232/422/485 ports x 2, software selectable (DB9 male)
USB 2.0	USB 2.0 hosts x 4, type-A connectors
PS/2	Keyboard PS/2 x 1, Mouse PS/2 x 1
Video Output	DVI-D x 1, 29-pin DVI-D connectors (female) VGA x 1, 15-pin D-sub connector (female)

SERIAL INTERFACE

Baudrate	50 bps to 115.2 kbps
Data Bits	5, 6, 7, 8
Flow Control	RTS/CTS, XON/XOFF, ADDC®
Parity	None, Even, Odd, Space, Mark
Stop Bits	1, 1.5, 2

SERIAL SIGNALS

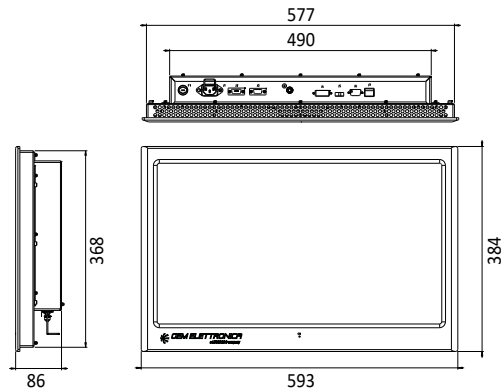
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w	Data+, Data-, GND
RS-485-4w	Tx+, Tx-, Rx+, Rx-, GND

POWER PARAMETERS

Input Voltage	9 to 36 VDC
Power Consumption	70 W (max.)

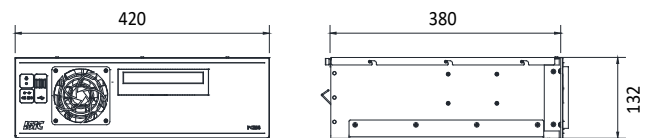
ENVIRONMENTAL LIMITS

Operating Temperature	-40 to 70°C (-40 to 158°F)
Storage Temperature	-40 to 70°C (-40 to 158°F)
Ambient	Relative Humidity 5 to 95% (non-condensing)



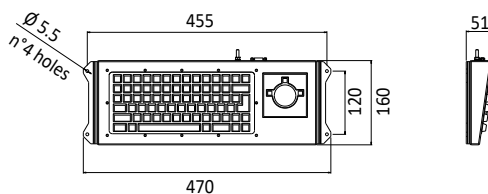
MLD-2400

Weight: 10 Kg.



MCU-3102B

Weight: 11 Kg.



TST-902

Weight: 1.4 Kg.

# GYROCOMPASS

## MAIN UNIT

PERFORMANCES	FOG-50	FOG-100	FOG-200
Heading accuracy	≤ 0.4° Sec (Lat) RMS *	≤ 0.2° Sec (Lat) RMS *	≤ 0.1° Sec (Lat) RMS *
Roll / Pitch accuracy	≤ 0.1° RMS	≤ 0.05° RMS	≤ 0.018° RMS
Heave		5 cm or 5% whichever is greater	
Roll / Pitch range		± 60°	
Settling time		≤ 10 min (static) ≤ 30 min (full accuracy, all conditions)	
INS option performances			≤ 3 m CEP (GPS signal available) ≤ 1 NM/12h CEP (with LOG aiding) ≤ 2 NM/12h CEP (full inertial)
Position accuracy INS			< 0.1 m/s (GPS) < 0.5 m/s (with SpeedLog)
Velocity accuracy INS			

Certified according to IMO A.424 (XI), A.821 (19), A.526 (13), ISO 8728 (1997), ISO 16328 (2001), ISO 20672 (2001), IEC 60945 (2008), IEC 62288 (2008), IEC 61162 series.

\* Secant (Latitude) = 1/cosine (Latitude)

## ENVIRONMENTAL CONDITIONS

Operating temperature	0 °C to + 55 °C
Storage temperature	-40°C ÷ 80°C
Damp heat	up to 95% at 40° C
Vibrations	Fully compliant with IEC-60945 (sweep 2 Hz - 13.2 Hz at ± 1 mm, 13.2 Hz - 100 Hz at 7 m/s <sup>2</sup> and for 2 h on each resonance, otherwise 2 h at 30 Hz in all three axes)
Waterproof	in accordance with IP66 standard
Electromagnetic interference	Fully compliant with IEC-60945
MTBF	≥ 100,000 hours

## SIGNAL OUTPUTS

Number of outputs	7 serial lines
Data output AHRS	HDG, HDT, XDR, ROT, HEAVE
Data output INS (option)	VTG, VNE, VHD, GGA, GLL, RMC, HDG, HDT, XDR, ROT, HEAVE
Output protocols (user defined)	IEC-61162, Binary
Baud rate (user defined)	from 4800 bps, up to 460800 bps
Output rate (user defined)	from 0.25 Hz up to 10 Hz

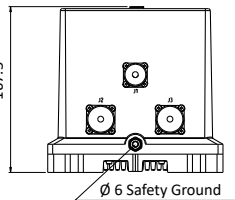
## SIGNAL INPUTS

Number of inputs	3 serial lines
Input protocols	IEC-61162
Baud rate (user defined)	up to 460800 bps
Input rate (user defined)	up to 10 Hz

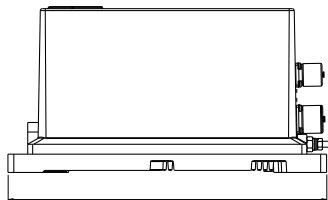
## POWER SUPPLY FIBER-OPTIC GYROCOMPASS

Supply	24 Vdc -10% +30%
Power consumption	Typical 12 W (24 V, 0.5 A)
Protection	Against over-voltage, low voltage and inversion of polarity

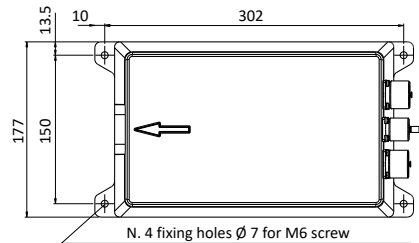
FOG-50



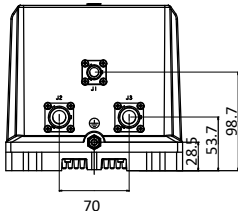
Weight: 6.8 Kg.



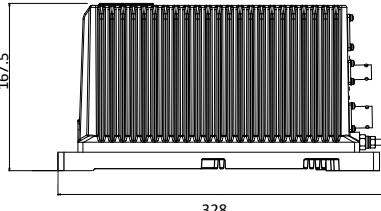
322



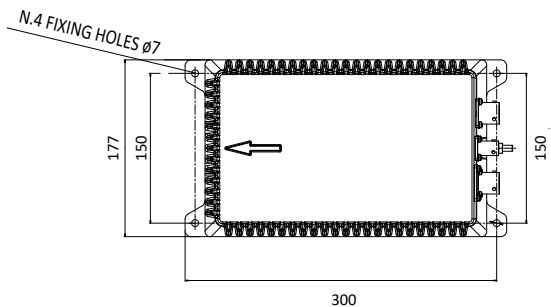
FOG-100 and FOG-200



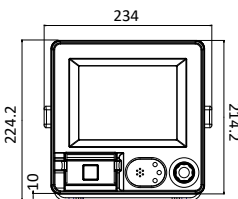
Weight: 6.8 Kg.



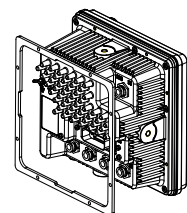
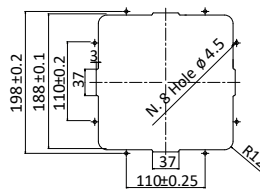
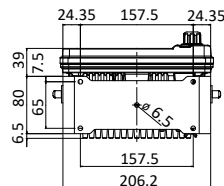
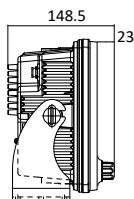
328



7" DISPLAY UNIT



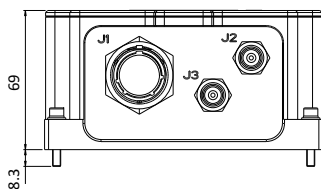
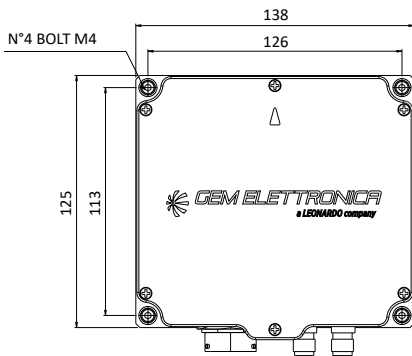
Weight: 1.2 Kg



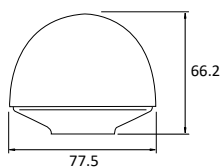
## STABILIZATION SENSORS

### THD-100D

<b>PERFORMANCES</b> (1 $\sigma$ )	With GPS	No GPS (5 min outage)
Heading static accuracy	< 0.75°	< 1.5° for 5 min outage
Heading dynamic accuracy	< 1°	< 1.5° for 5 min outage
Pitch & Roll static accuracy	< 0.2°	< 0.5°
Pitch & Roll dynamic accuracy	< 0.4°	< 1.0°
Position accuracy (CEP)	< 2.5 m	150 m (with SpeedLog)
	< 2 m (SBAS)	
Velocity accuracy	< 0.1 m/s	< 0.5 m/s (with SpeedLog)
<b>FEATURES</b>		
Time to first positioning fix	25 s (Cold start), 1 s (hot start)	
Time to first heading fix	30 s (Coarse magnetic alignment), 240 s (Fine alignment) from GPS fix	
Dynamic Range	Acceleration: $\pm 10$ g, Rotation rate: $\pm 300^\circ/\text{sec}$	
I/O Ports	2 serial ports RS422 available at DB9 connector (4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800 baud selectable) - 2 input TNC for GPS antennas	
Power supply	9-36 Vdc	
NMEA output sentences	Heading: \$HDG, \$HDT, \$HDM; Roll & Pitch: \$XDR; Speed: \$VTG, \$VNE, \$VHD; Position: \$GGA, \$GLL, \$RMC. Programmable on two serial ports as output sentences	
Update rate	Up to 100 Hz (Attitude), 10 Hz (Position)	
NMEA Input sentences	Compatible LOG: \$VBW, \$VHW	
Operative temperature	-10° C $\div$ 55° C	
EMI and RFI immunity	CE certified	



Estimated Weight: 1.35 Kg



antenna GPS Weight: 200 grams

### RRS-011

#### ATTITUDE

Static Accuracy [RMS]	0.4°
Dynamic Accuracy [RMS]	1°
Roll Range	$\pm 180^\circ$
Pitch Range	$\pm 90^\circ$
Resolution	0.001°

#### YAW

Range	$\pm 180^\circ$
Drift max	0.05°/sec 1 $\sigma$
Resolution	0.001°

#### ANGULAR RATE

Range Roll/Pitch/Yaw	$\pm 300^\circ/\text{sec}$
Resolution	0.008°/sec
Bandwidth	40 Hz

#### LINEAR ACCELERATION

Range X/Y/Z	$\pm 10$ m/ sec2
Resolution	0.00036 m/ sec2
Bandwidth	40 Hz

#### START-UP TIME

Start-up Time Valid data	5 sec
Fully stabilized data	30 sec

#### OTHER

Update Rate	100 Hz
Operating Temperatures	-0/+50° C
Storing Temperatures	-40/+70° C
Input Power Supply	12 to 32 VDC

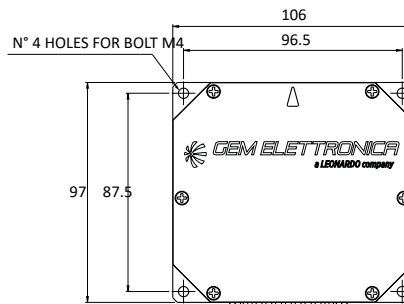
### ROT-100

#### PERFORMANCES

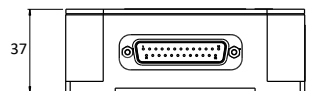
DESCRIPTION	SPECIFICATION
Sensor output	Rate of Turn, NMEA-0183 sentence ROT (\$**ROT)
Sensor accuracy	1 deg/min, 1 $\sigma$
Resolution	0.01 deg/min
Output frequency	20 to 100 Hz
Serial port baud rate	4800 baud, no parity, 1 stop bit, no handshaking
Time to valid data	Time to first valid data (10 deg/min), 5 sec
Time to stable valid data	(1 deg/min), 60 sec
Dynamic range	$\pm 300$ deg/sec
Output interface	DB25 form factor, hosting 2 serial RS422 ports and power input
Output protocol	Serial NMEA-0183 ROT sentence
Power supply	9-36 V
Power consumption	< 2 W
Operative temperature	-10° C $\div$ 55° C

#### ENVIRONMENTAL FEATURES

TYPE	REQUIREMENTS
Operative temperature	-15° C $\div$ +55° C, according to IEC 60945 §8.2 and §8.4 Ref.[2]
Storing temperature	-20° C $\div$ +70° C
Humidity	93% @ 40° C, according to IEC 60945 §8.3 Ref.[2]
Vibrations	2 Hz $\div$ 13.2 Hz @ $\pm 1$ mm; 13.2 Hz $\div$ 100 Hz @ 0.7g; according to IEC 60945 §8.7 Ref.[2]/ IEC 60068-2-6 Ref.[3]
Radiated emissions	in accordance with IEC 60945
IP protection	According to IP65
Shock	Semisinusoidal 10 g x 11 ms, according to IEC 60068-2-27 Ref.[3]



Weight: 0,4 Kg



**SEARCH LIGHT BODY**

Housing Dimension	1116 x 685 x 880 mm (WxDxH)
Clearance	Horizontal Ø 1270 mm, vertical Ø 783 mm
Weight searchlight turret	90 kg
Housing material LED-modules	Seawater resistant aluminium
Housing material searchlight body	Acid proof stainless steel 1.4401 in critical structural parts.
Coating	Powder coat grey
Rubber dampers	4 pcs, 32 x 33 mm, for vibrations and shock
Electrical motors	2 for movements, 5000 hours
Horizontal rotation	Unlimited movement
Vertical movement	Unlimited movement
Protection class	IP66
Speed both axis	Stepless, max 20°/s
Operation temperature	-25°C to +55°C
Relative humidity	100 %
Enclosure protection grade	IP66

**LIGHT PAYLOAD**

UV	UV light technology	HMI Metal halide lamp, single-ended
	Power	400W
	Average life	1000h
	Light beam angle	Fixed spot beam 4 degrees
WHITE	White light technology	HMI Metal halide lamp, single-ended
	Average life	1000 h
	Power	575 W
	Light beam angle	Fixed spot beam 3 degrees

**CAMERA PAYLOAD**

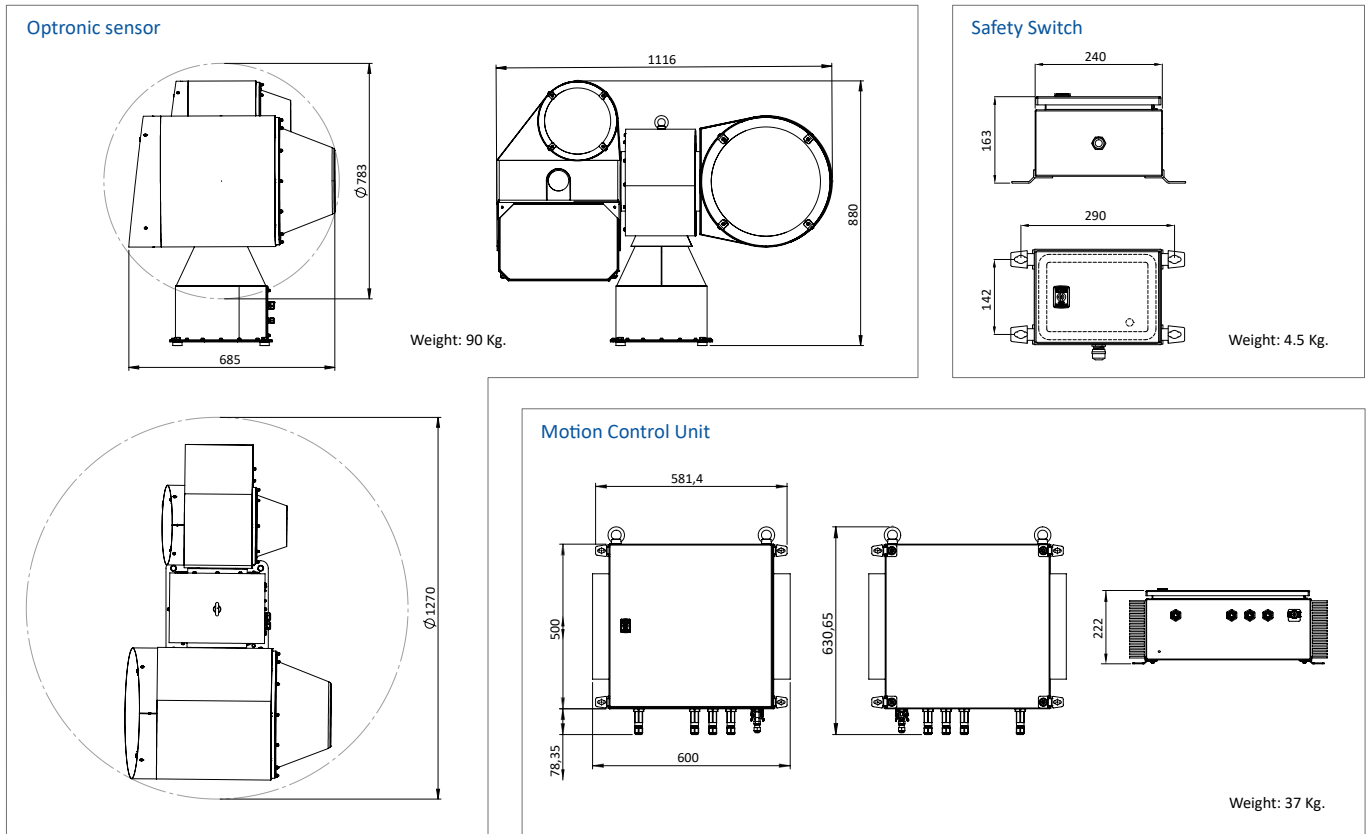
Type	Sony FCB-EV7500
Image sensor	1/2.8 type Exmor CMOS
Picture quality	Full HD 1080p (1920x1080)
Zoom	30x opt., 12x digital (360x with optical zoom)
Lens value	30x opt. zoom; f=4.3mm (wide) to 129.0mm (tele); F1.6 to F4.7
Digital video output	HD-SDI 292M

**ELECTRONIC BOX**

Measurements	600 x 210 x 625 mm (WxDxH)
Weight	28 kg
Material	Acid proof stainless steel 1.4401
Coating	FED-STD 595 n° 26307
Protection class	IP44
Supply voltage	115VAC 60Hz
Power consumption	2000W (max load)
Operating temperature	-15°C to +55°C

**SAFETY SWITCH**

Dimensions	240 x 150 x 180 mm (WxDxH) Wallmount excluded
Housing material	Acid proof stainless steel 1.4401
Weight	4,5 kg
Protection class	IP66
Operating Temperature	-25°C to +55°C







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