GEM elettronica

LPI-2000/N

Low Probability of Intercept

NAVAL RADAR

DIGITAL VIDEO (LAN)

Main Features

- X-Band Solid State Transmitter
- Pulse compression and coherent processing
- Software Defined Radar
- Pulsed doppler processing
- Low voltage operation
- Peak power selection capability
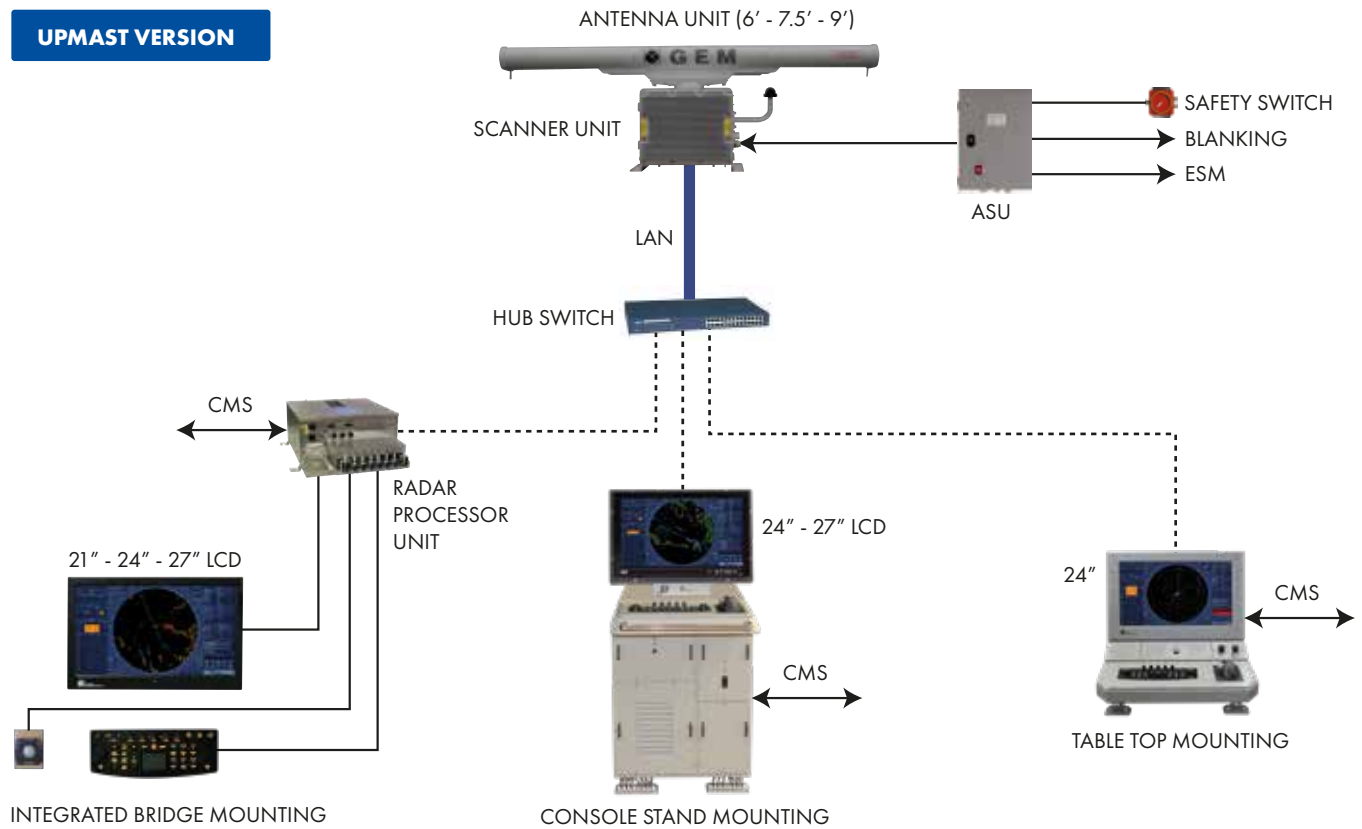- Fully compatible with existing GEM antennas

Performances

- Operation at extremely low power levels while maintaining high performances in target discrimination also at long range and in presence of adverse sea clutter/rain conditions;

- Rejection of interferences from other radar emissions through suitable filters;

- Enhanced Signal/Noise ratio through intensive use of Doppler filters and most sophisticated correlation techniques;

- Real-time emission control;

- Helicopter approach and decking operation mode;

- Greatly reduced maintenance and increased reliability with respect to a traditional magnetron radar system.
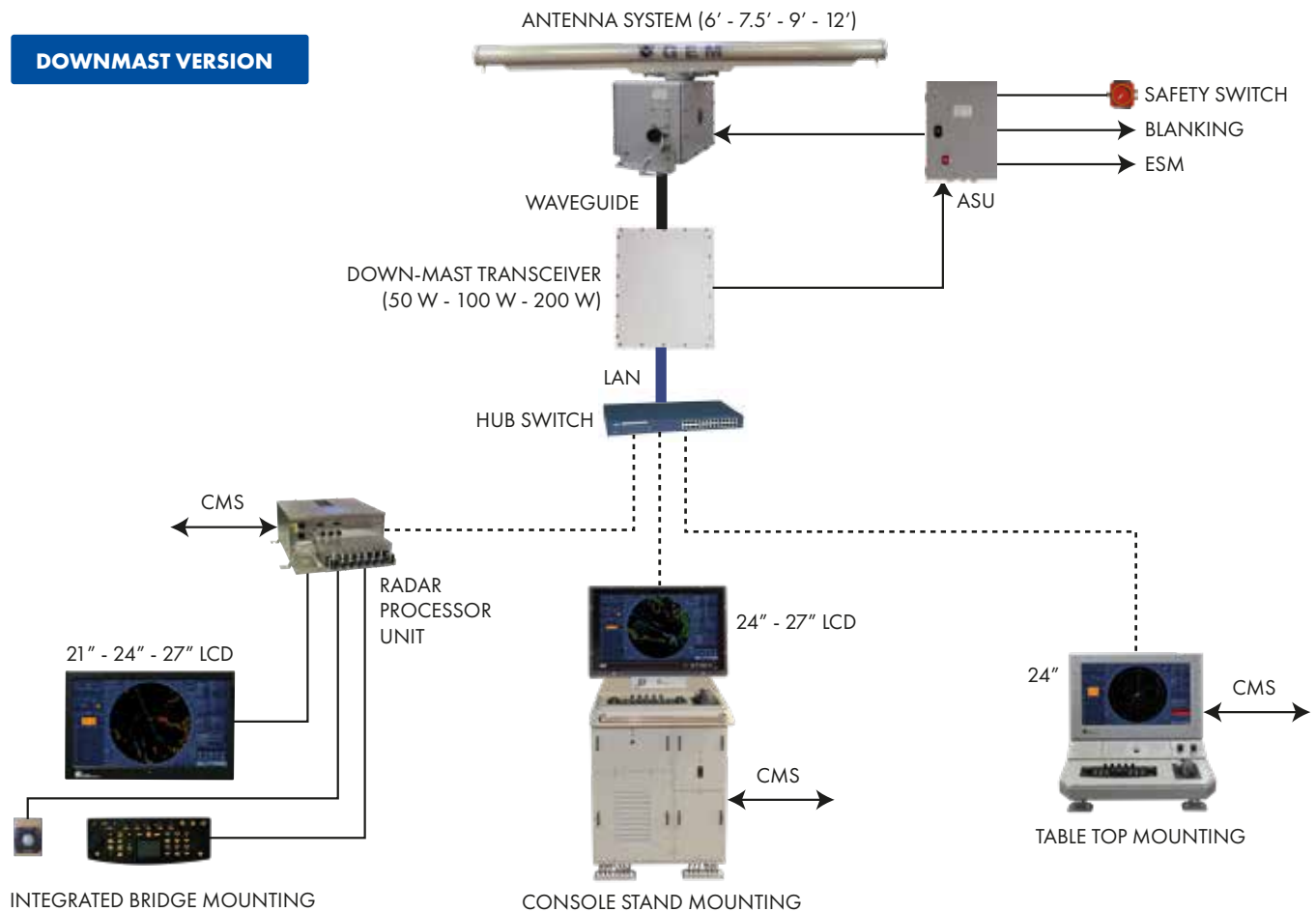
LPI-2000/N BLOCK DIAGRAM

UPMAST VERSION

ANTENNA UNIT (6' - 7.5' - 9')

SAFETY SWITCH

BLANKING

ESM

SCANNER UNIT

ASU

LAN

HUB SWITCH

CMS

RADAR PROCESSOR UNIT

21" - 24" - 27" LCD

24" - 27" LCD

24"

CMS

CMS

INTEGRATED BRIDGE MOUNTING

CONSOLE STAND MOUNTING

TABLE TOP MOUNTING

DOWNMAST VERSION

ANTENNA SYSTEM (6' - 7.5' - 9' - 12')

SAFETY SWITCH

BLANKING

ESM

WAVEGUIDE

ASU

DOWN-MAST TRANSCEIVER
(50 W - 100 W - 200 W)

LAN

HUB SWITCH

CMS

RADAR PROCESSOR UNIT

21" - 24" - 27" LCD

24" - 27" LCD

24"

CMS

CMS

INTEGRATED BRIDGE MOUNTING

CONSOLE STAND MOUNTING

TABLE TOP MOUNTING

Antenna arrays:

- length: 6' , 7.5' , 9' - 12' (downmast version only)
- type: slotted waveguide array
  - frequency: between 9300 and 9500 MHz
    - polarization: horizontal or circular
      - horizontal beamwidth at −3 dB: 1.2 (6'), 1.05° (7.5'), 0.85° (9'), 0.65° (12') (tolerance: ± 0.1°)
        - vertical beamwidth at −3dB: 25° (6', 7.5' and 9'), 22° (12') (tolerance: ± 10%)
      - side lobes within 10°: < -27dB (6' and 7.5'), < -26dB (9' and 12')
      - side lobes outside 10°: < −30dB
    - gain: 29dBi (6'), 30dBi (7.5'), 31dBi (9'), 32dBi (12') (tolerance: ± 0.5 dB)

Antenna turning unit:

- rotation speed: 22 r.p.m. (IMO mode), 11 r.p.m. (SEARCH mode)
- tolerable relative wind speed: 100 knots (operative) – 120 knots (non operative)
- azimuth position: incremental encoder, 4096 pulses per revolution

Transmitter unit:

- fully solid state transceiver (no magnetron) with 50/100/200 W peak power (nominal)
- power attenuation level ≥ 20 dB selectable by user on a sector basis to operate in LPI mode
- up-mast transceivers integrated in the antenna unit or down-mast transceivers for easy maintenance operations
- 33 selectable frequencies from 9300 to 9500 MHz
- PRF from 500 to 5000 Hz
- PW from 0.05 to 93 μs; several types of pulses are combined in the same pulse repetition interval
- TX mode with non-linear frequency modulation
- direct digital wave shape generation
- high resolution and range/bearing accuracy on all ranges with medium-size antenna
- wide choice of antenna arrays from 6' up to 12'
- performance monitor

Receiver unit:

- low noise, fully solid state linear coherent radar receiver with high sensitivity for weak radar signals, to give better performances
- FFT-based Doppler filter for SNR and SCR improvement
- adoption of the most advanced pulse compression techniques for pulse compression and coherent processing;
- noise figure: <3 dB (LNFE)
- Intermediate Frequency: 75 MHz
- receiver bandwidth: up to 20 MHz
- pulse compression rates up to 930:1 depending on mode
- manual or automatic (A-STC) gain control
- dynamic range: >107 dB (after pulse compression gain)
- MDS equivalent after pulse compression: < -122 dBm (after pulse compressione gain)
- side lobe suppression: down to -55 dB (depending on mode of operation)
- minimum range: ≤ 35 m
- range discrimination: ≤30m

Interfaces and other features:

- standard digital LAN interface for unlimited data output
- ease of integration within a radar network
- small size and weight, for installation on any roof or mast
- beacon and SART detection
- up to 10 blanking sectors, user selectable

Automatic STC
Non-Isotropic Clutter
Distribution due to strong
wind in coastal area
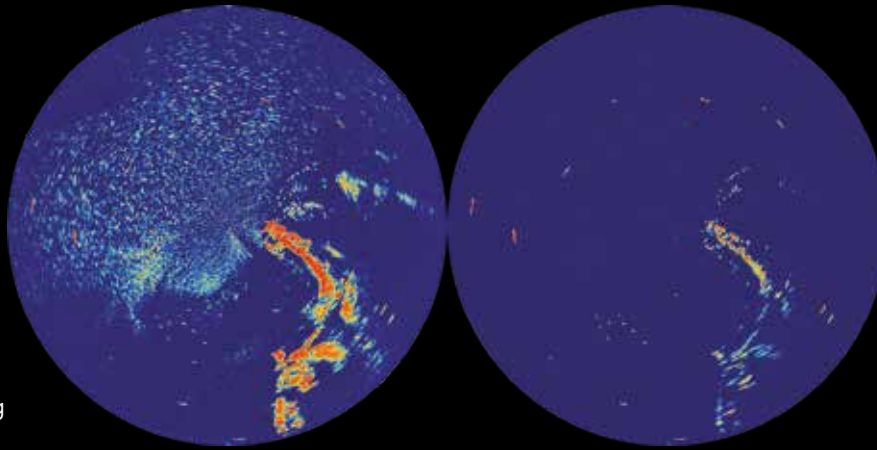
It automatically generates a clutter suppression curve from the raw radar video.

This dynamic curve adapts very rapidly to any sea clutter variation due to different environmental conditions.

Automatic STC guarantees a remarkable advance compared to the traditional isotropic STC curve and it is very recommended when operating in higher sea states and in open waters.

CFAR
Three small fishing boats
masked by dense rain clutter
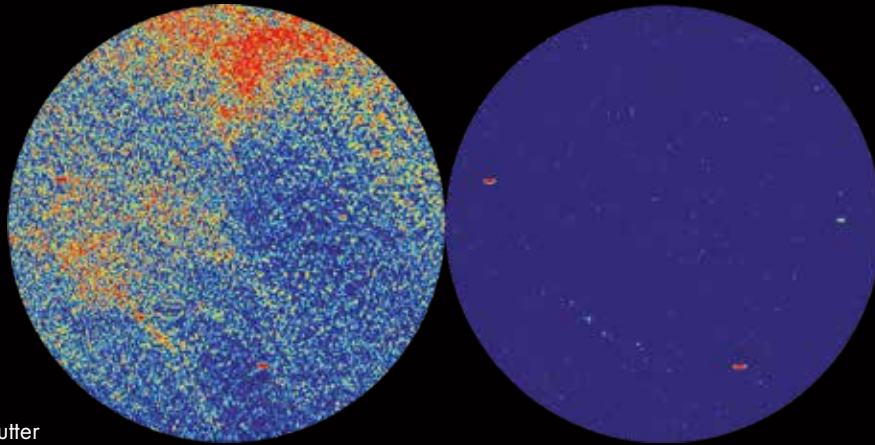
CFAR is a range adaptive filter based on statistical measures to suppress unwanted echoes (like snow, rain and sea clutter) against small targets.

It generates a dynamic threshold from two observation windows around the radar cell under test. Target censoring techniques are used to minimize target losses.

Scan to Scan Correlation
Small RIB approaching
in Sea State Level 4 at about 1,5 NM
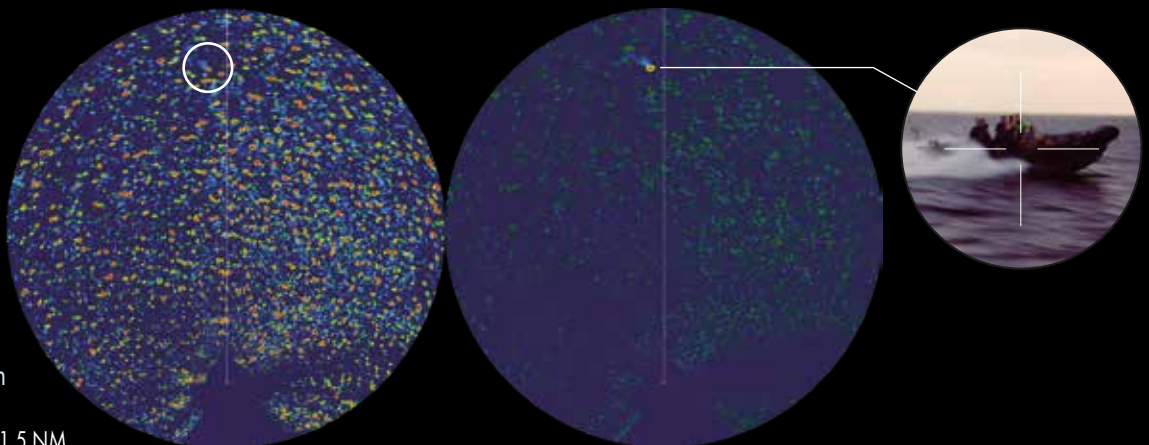
It exploits target correlation proprieties to enhance sub-clutter visibility.

This improved scan to scan correlation technique is used for a superior discrimination of fluctuating medium speed targets on high sea clutter condition.

The filter compares the current radar cell under test with the history of activity in that range cell to stabilize and enhance real targets against randomic echoes such as sea clutter.

A memory up to 64 consecutive scans is kept by the filter. Filter loss could be observable only for very fast targets.

Display type:

- colour flat screen LED LCD monitor up to 27" (320 mm PPI size) and relevant keyboard
- very wide selection of radar controls (e.g. range scale, PRF, PW, interference rejection), video controls (STC, FTC, gain) and tools (EBL, VRM...)
- screen resolution up to 1920 x 1080 pixels with 256 video levels

Processing and presentation:

- ease of usage through a user-friendly interface with keyboard and graphic presentation based on pop-up/pull-down menus allowing to open/close windows for data and functions management through a trackball-controlled cursor
- all installation parameters (such as alignment data, operation commands pre-set) can be stored in memory using the keyboard
- range scales: from 0.0625 to 96 n.m. (130 n.m. with off-center)
- two VRM, two EBL and an electronic marker with off-centre capability
- image freeze: stops the current image for a more accurate control
- echo stretch, allowing the enhancement of small radar returns
- plot function of all echoes preceding positions with automatic decay, user programmable
- PPI off-centre: off-centre representation of radar image in all directions
- signal processing functions: FTC, STC, interference rejection, CFAR, pulse-to-pulse correlation, scan-to-scan correlation, echo stretcher
- additional software module available for management of GEM elettronica proprietary Ship Identification System
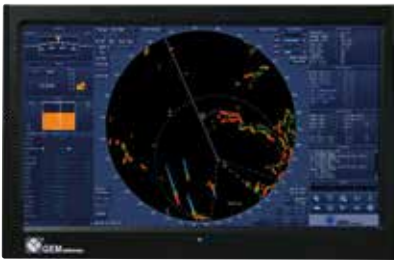
• display with optional touch screen

ARPA functionality:

- acquisition and tracking on targets, manual or automatic
- guard zones, in order to generate automatic alarms once a target enter or exit such zones
- tracking inhibition areas, In order to disable target initialisation and tracking
- clutter maps, to adaptively modify plot extraction thresholds in presence of areas with different sea and noise levels

• innovative keyboard with touchpad for cursor control

System interfaces:

- all the on-board navigation sensors, such as GPS, compass or gyrocompass, LOG, plotter, etc.
- other devices, such as AIS, TLC, etc.
- direction finder, with on-screen display of the EM source bearing
- high-speed Ethernet connection for data sharing

System management and maintenence:

- ease of fault detection, due to comprehensive BITE system covering the whole system: Tx power levels, VSWR, receiver sensitivity
- very high reliability and reduced maintenance
- ease of access for maintenance, due to easy access to all replaceable parts
- very low power consumption, mostly due to the use of LED LCD display
- reduced size and weight, for easy installation in small spaces
- rugged construction in order to be used in harsh environment and in unmanned sites
- advanced, latest generation product compliant with the relevant international standards
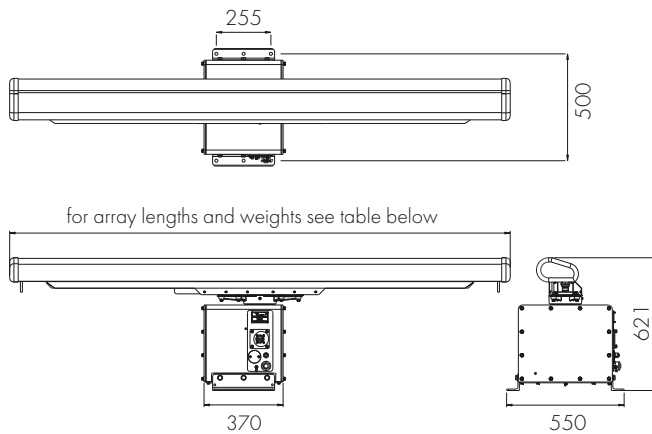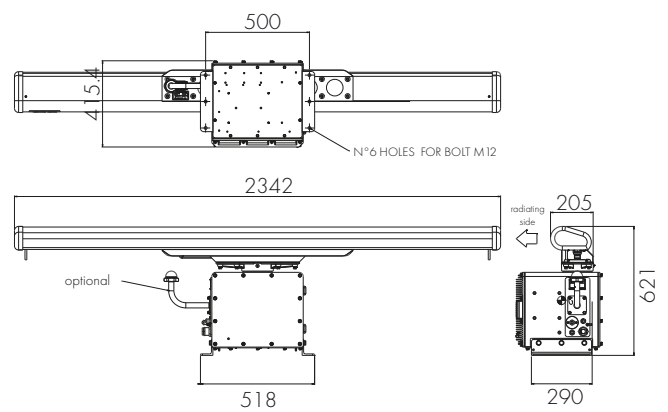
Outdoor equipment
dimensions in mm

DOWNMAST

255

500

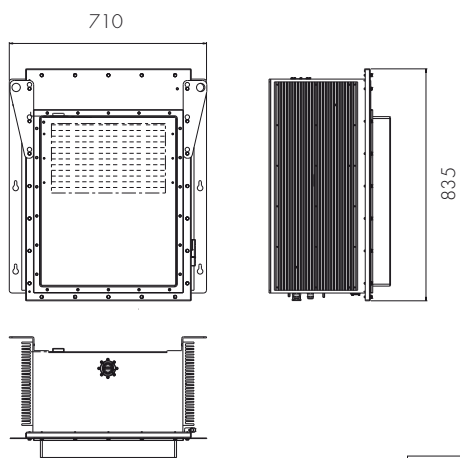for array lengths and weights see table below

621

370

550

UPMAST

500

415,4

N°6 HOLES FOR BOLT M12

2342

optional

radiating side

205

621

518

290

Model	array size	length	weight
AU11-06NE	6 feet	1980 mm	6 Kg
AU11-07NE	7.5 feet	2315 mm	14 Kg
AU11-09NE	9 feet	2790 mm	22 Kg
AU11-12	12 feet	3830 mm	24 Kg

Antenna System Weight: 50 Kg (w/o array)

Scanner Unit Weight: 170 Kg (w/o array)

Down-mast transceiver

710

835
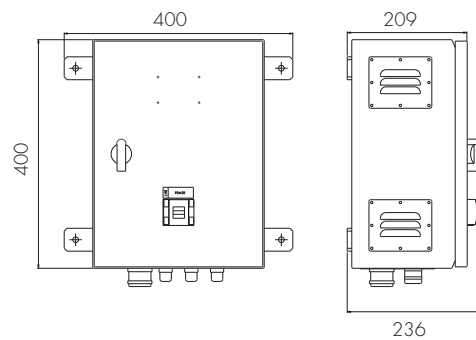
Weight 70 Kg

Radar Processing Unit
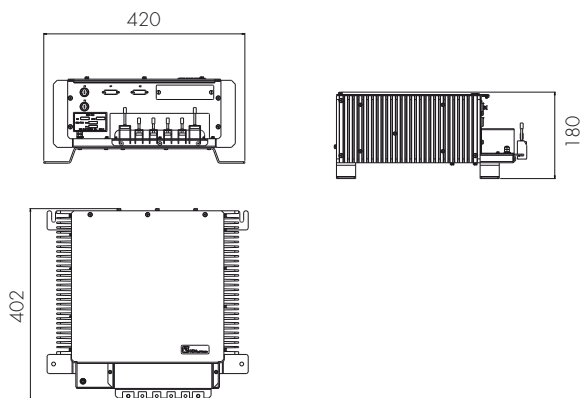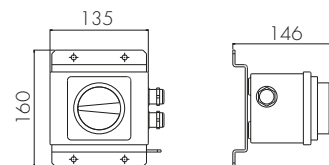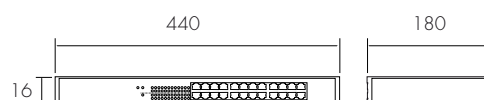
420

180

402

Weight 10 Kg

Antenna Supply Unit

400

209

400

236

Weight 19 Kg

Safety Switch

135

146

160

Weight 1.5 Kg

HUB

440

180

16

Weight 0.4Kg

Console stand mounting

950

625

1347

Weight 110 Kg

Console table top mounting

655

596

673
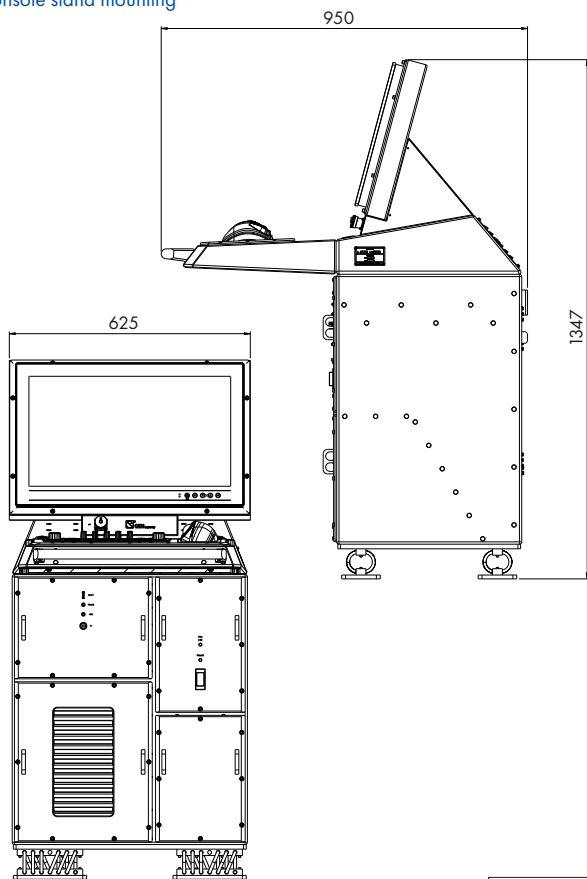
Weight 32 Kg

21" LED LCD display

518

490

439

519

321

394
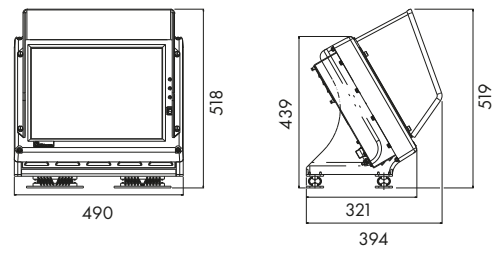
Weight 12 Kg

24" LED LCD display

593

384

427

65

66

6.5

36

387

457
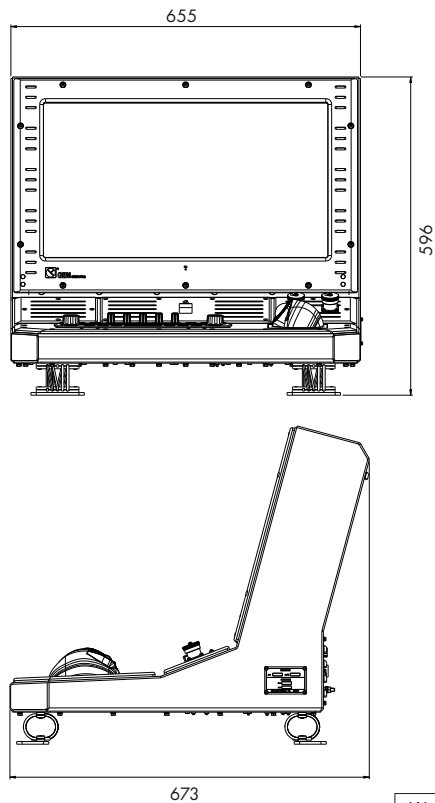
Weight 12 Kg

27" LED LCD display

365

530

632

710

250
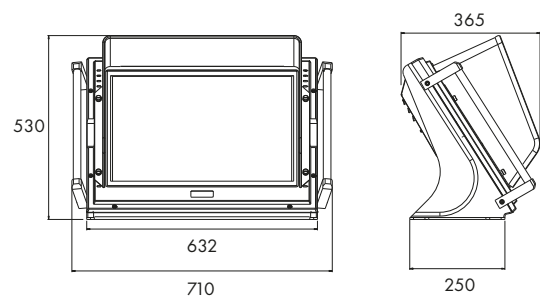
Weight 19 Kg

Keyboard

340

62

34

120
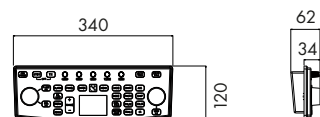
Weight 2 Kg

Pointing device
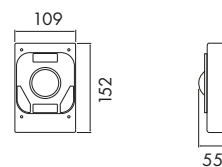
109

152

55

Weight 0.5 Kg

GEM elettronica

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Member of CISQ Federation

RINA

CERTIFIED MANAGEMENT SYSTEM
ISO 9001 - ISO 14001

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