HI-TECH ELASTOMERS LTD.

AIDS TO NAVIGATION

Where
Innovation
is Tradition

SOLAR MARINE LANTERNS

The Hi-Tech range of Solar LED Marine Lanterns are designed to be maintenance-free and have a service life of up to 12 years. Each product incorporates the latest in LED, solar, battery, electronics and moulding technology, and is designed to meet IALA recommendations for aids to navigation.

Through a combination of solar module sizes, battery capacities and light output customers are able to select the most appropriate and economical light for their requirement

APPLICATIONS

- Sea Channel
- River Channel
- Lake
- Building
- Bridge
- Tower
- Chimney
- Mariculture Area
- Communication Tower
- Traffic Barrier
- Tower Crane
- Buoy

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We supply the full range of LED Standalone lanterns, which can achieve nominal ranges from 3 to 20 nautical miles (T=0.74).

Our range of Standalone Lanterns are manufactured from the highest quality components, such as fiberglass polyamide, marine aluminium or stainless steel. They are fitted with optical elements manufactured from UV-stabilised methacrylate and protected by impact-resistant acrylic lens covers. Patented optical systems provide maximum luminous efficiency, with a wide divergence between 2° to 30°. High-quality, user-friendly control systems ensure these lanterns have a long service life.

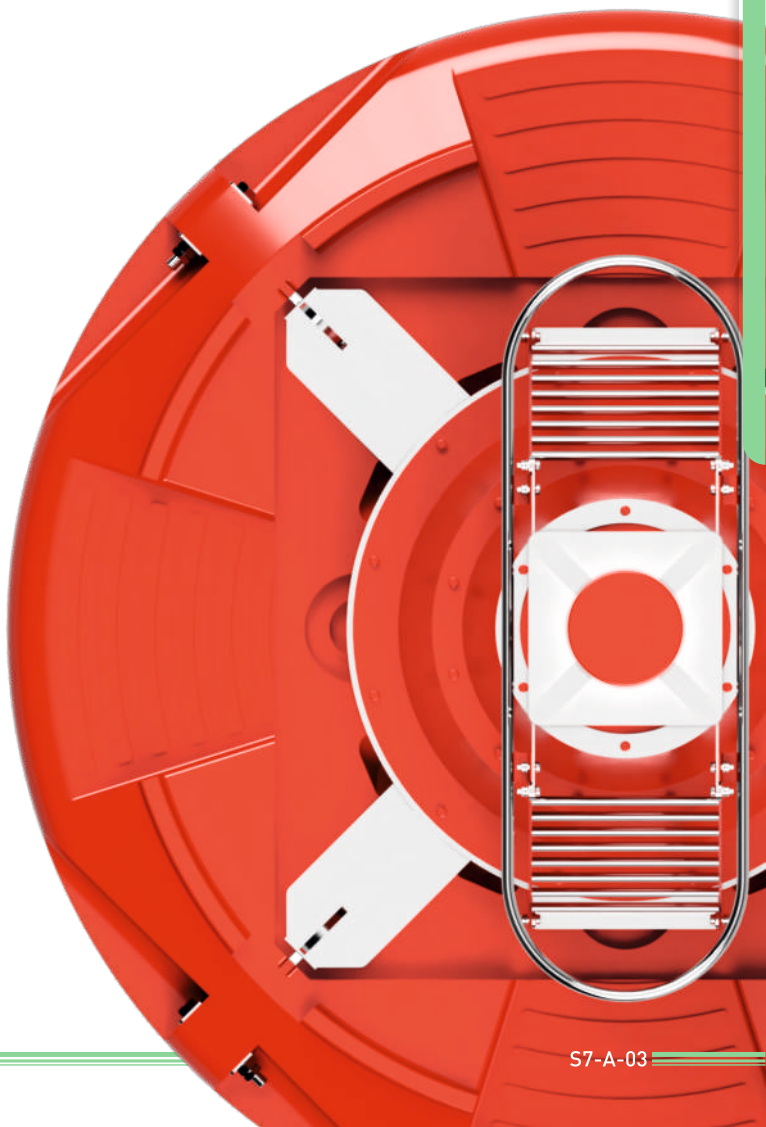
Lanterns are suitable for all beaconing applications, whether on or off shore, in sheltered locations such as ports, harbours and channels or on remote, isolated and exposed AtoN sites. Selection of the most appropriate lantern is dependent on many considerations and we can assist with advice where needed.

All of our Standalone Lanterns can be fitted with AIS AtoN, GPS synchonisation, Bluetooth and a range of remote monitoring and control options, depending on your requirements. Power supply design is critical for reliability of Standalone Lanterns and we can assist with the design process to ensure you have a high level of redundancy and autonomy on your Aton site.

All lanterns come with a 2-year guarantee, but have significantly longer life spans, up to 15 years can be expected.

FUNCTION & FEATURES

- Advanced optical condensing lens design, luminous angle in line with the IALA standard.
- LED light Source, more than 100000 hours of service life.
- Customized with AIS controller to achieve real-time monitoring function.
- Can be customized GPS synchronization.
- 350 light characteristics, user can adjust according to require.
- Low voltage design,high safety in maintenance and use.
- Provide shock resistance, lightning-proof, sunlight resistance, rain and snow.
- No radio frequency (RF), no electromagnetic interference.
- With lightning protection function.
- PC cover is adopted, which has the characteristics of high transparency and chemical resistance, and it will not change color and crack in bad environment.



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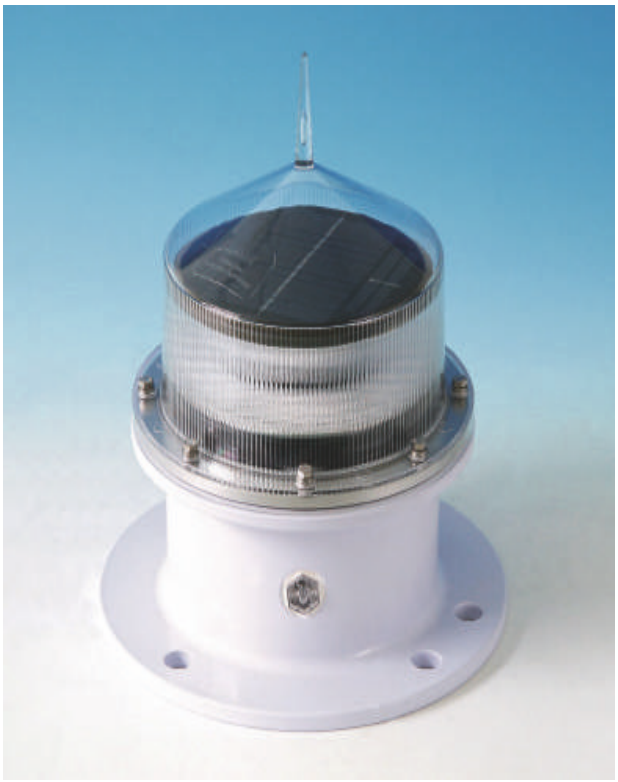
SOLAR MARINE LANTERNS

HSML-2



The Hi-Tech HSML-2 1–2NM+ compact LED light is exceptional value and incorporates some of the most advanced technology available. In the tradition of Hi-Tech lanterns, the HSML-15 is designed to be maintenance-free and have a service life of over 5 years.

The HSML-15 can be installed in minutes and requires no operator intervention. The HSML-15 has a rotary switch to allow users to change the flash character of the light without the need for special tools or programmers.

During daylight hours the solar module will charge the battery, and the lantern will automatically begin operation at dusk – once the ambient light threshold drops sufficiently.

ADVANTAGES

- User-adjustable flash characters
- User-replaceable battery in sealed battery compartment
- NiMH battery for long service life & wide temperature range
- Completely sealed & self-contained using advanced UV-sealing
- Installs in minutes & operates maintenance-free for up to five years

SPECIFICATIONS

Light source	Supper bright LED
Vertical divergence	≥7.5° (I50%)
Sun switch	250±50 lx
Flash rhythm	256 rhythms site selectable
Idling current	≤4mA
Solar panel	2W
Maintenance-free battery	8Ah
Autonomy (50% flash, 12hr/day)	• 3nm:≥12 day;
	• 2nm:≥24 day;
	• 1nm:≥72 day.
Temperature	-35°C~+55°C
Protection	Ip68
Dimension	Φ240×285mm
Installation	3 and 4-Φ17 on 200mm bolt circle
Weight	1.6kg
Optional:	GPS synchronized flash

INTENSITY AND RANGE

Red

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	25cd	3.6nm	17.86cd	3.2nm
2nm	12cd	2.7nm	8.57cd	2.4nm
1nm	4cd	1.8nm	1.29cd	1.1nm

Green

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	30cd	3.8nm	21.43cd	3.2nm
2nm	16cd	3.1nm	11.43cd	2.4nm
1nm	5cd	2.0nm	3.57cd	1.1nm

Yellow

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	24cd	3.6nm	17.14cd	3.2nm
2nm	16cd	3.1nm	11.43cd	2.6nm
1nm	4cd	1.8nm	2.86cd	1.5nm

White

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	28cd	3.7nm	20cd	3.3nm
2nm	15cd	3.0nm	10.71cd	2.6nm
1nm	5cd	2.0nm	3.57cd	1.7nm

• Specifications subject to change or variation without notice
* Subject to standard terms and conditions

† Intensity setting subject to solar availability
^ Refer to the Hi-Tech website under the warranty section

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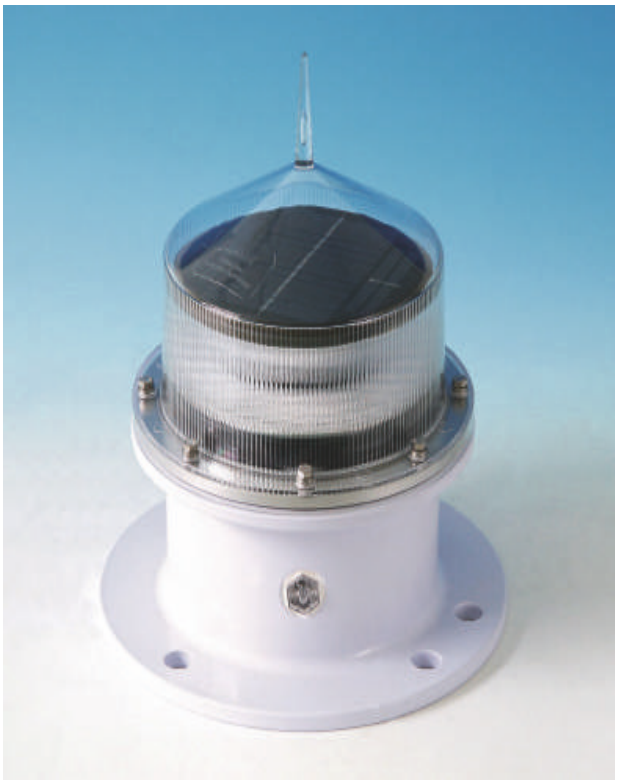
SOLAR MARINE LANTERNS

HSML-3



The HSML-3 is a robust, completely self-contained 2–3NM+ Solar LED Lantern specifically designed to withstand the tough marine environment, providing years of reliable, low-maintenance service. The 3 & 4 hole bolt pattern base fits directly onto existing 200mm bolt pattern industry standard mounts for ease of installation.

The base and top of the HSML-3 are made from cast aluminium, subject to 7-stage powder-coating in high visibility IALA colours for daytime recognition, with UV-stabilised rubber corners and gaskets providing a superior IP68 waterproof rating – the best in the industry.

ADVANTAGES

- IR programmable
- Fitted with on-board GPS as standard for synchronised flashing
- Simplicity of design ensures ease of maintenance in the field
- Heavy-duty aluminium construction
- All components areuser-replaceable in the unlikely event of damage
- 200mm bolt pattern for immediate installation on existing structures
- User-replaceable battery

SPECIFICATIONS

Light source	Supper bright LED
Vertical divergence	≥7.5° (I50%)
Sun switch	250±50 lx
Flash rhythm	256 rhythms site selectable
Idling current	≤4mA
Solar panel	2W
Maintenance-free battery	8Ah
Autonomy (50% flash, 12hr/day)	• 3nm:≥12 day;
	• 2nm:≥24 day;
	• 1nm:≥72 day.
Temperature	-35°C~+55°C
Protection	Ip68
Dimension	Φ240×285mm
Installation	3 and 4-Φ17 on 200mm bolt circle
Weight	1.6kg
Optional:	GPS synchronized flash

INTENSITY AND RANGE

Red

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	25cd	3.6nm	17.86cd	3.2nm
2nm	12cd	2.7nm	8.57cd	2.4nm
1nm	4cd	1.8nm	1.29cd	1.1nm

Green

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	30cd	3.8nm	21.43cd	3.2nm
2nm	16cd	3.1nm	11.43cd	2.4nm
1nm	5cd	2.0nm	3.57cd	1.1nm

Yellow

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	24cd	3.6nm	17.14cd	3.2nm
2nm	16cd	3.1nm	11.43cd	2.6nm
1nm	4cd	1.8nm	2.86cd	1.5nm

White

Range selection	Max. intensity	Range (T=0.74)	0.5s intensity	Range (T=0.74)
3nm	28cd	3.7nm	20cd	3.3nm
2nm	15cd	3.0nm	10.71cd	2.6nm
1nm	5cd	2.0nm	3.57cd	1.7nm

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SOLAR MARINE LANTERNS
HSML-5

The HSML-C420 is a robust, completely self-contained 3–5NM+ Solar LED Marine Lantern which incorporates a 36 LED light source for even greater light intensity.

The 3 & 4 hole bolt pattern base fits directly onto existing 200mm bolt pattern industry standard mounts for ease of installation.

The chassis of the HSML-C420 is made from cast aluminium, subject to 7-stage powder-coating in high visibility IALA colours for daytime recognition, with UV-stabilised rubber corners and gaskets providing a superior IP68 waterproof rating – the best in the industry.

ADVANTAGES

- Simplicity of design ensures ease of maintenance in the field
- Heavy-duty aluminium construction
- All components are user-replaceable in the unlikely event of damage
- 200mm bolt pattern for immediate installation on existing structures
- User-replaceable battery
- Vertical light emissions to maintain visibility when passing adjacent to light

SPECIFICATIONS	
Light source	Supper bright LED
Input voltage	DC6.4V
Vertical divergence	7.5° (I50%)
Sun switch	250±50 lx
Flash rhythm	256 rhythms site selectable
Idling current	≤4mA
Solar panel	9V, 16W
Maintenance-free battery	6.4V, 60Ah (or as required)
Battery	average 5 years
Autonomy (50% flash, 12hr/day)	• 5nm≥16 days;
	• 4nm≥24 days;
	• 3nm≥30 days.
Temperature	-35°C~+55°C
Protection	IP68
Installation	4-Φ17 on 200mm bolt circle
Weight	7.5kg (base on battery of 60AH)

Optional: GPS /Baidou synchroflashing and remote control by GSM/GPRS

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HSML-12

The HSML-12 is a completely self-contained 5–12NM Solar LED Marine Lantern designed for a range of low-maintenance applications.

The light boasts a large internal battery compartment, a HSML-12 Series LED light-head and 4 premium-grade 10 watt solar modules mounted to collect sunlight at all angles.

The HSML-12 is moulded from UV-stabilised, virgin polyethylene, providing enormous impact and weather resistance, in addition to high visibility IALA colours.

The user-friendly, 2-piece design allows the lantern to be opened for convenient battery inspection or replacement whilst the base remains fixed to the supporting structure

ADVANTAGES

- Up to 12NM visible range
- Multiple lens divergences for fixed or floating applications
- Complete unit - ready for immediate installation
- Impact & weather resistant polyethylene
- PC or IR Programmer for setup, diagnostic & testing

SPECIFICATIONS

Light source	Supper bright LED
Input voltage	DC24V (20~28V)
Vertical divergence	≥3° (I50%)
Sun switch	300±50 lx
Flash rhythm	256 rhythms site selectable
Idling current	≤5mA
Temperature	-35°C~+55°C
Protection	IP67
Dimension	Φ240x285mm
Installation	3 and 4-Φ13 on 200mm bolt circle
Weight	2kg (include 5m cable)

Please indicate when purchase, if needs GPS or remote control.

INTENSITY AND RANGE

White

Range selection	Power	intensity		intensity	
		Steady lighting	Range T=0.74	0.5s flash	Range T=0.74
10nm	25W	2000cd	10.8nm	1500cd	10.2nm
11nm	45W	3200cd	11.8nm	2500cd	11.2nm
12nm	56W	4000cd	12.2nm	3500cd	12nm

• Specifications subject to change or variation without notice
* Subject to standard terms and conditions
† Intensity setting subject to solar availability
^ Refer to the Hi-Tech website under the warranty section

GLASS REINFORCED PLASTIC (GRP) BEACON TOWERS

Hi-Tech GRP towers are engineered to integrate flashing and rotating beacons c/w their solar power supply system, in order to operate as medium - and long range Lighthouses.

These towers are manufactured from GRP (glass-reinforced polyester). Colour is pigmented in the raw material, thus the tower colour remains unaltered. Its watertightness, batteries, control units and other items can be housed inside the tower, in order to be protected from the weather.

ADVANTAGES

- Focal heights from 3.5 to 11 metres.
- Easy assembly, due to its modular architecture.
- Fast erection without crane.
- Spacious top platform to hold solar modules and batteries.
- Tower accessories and bolting made from stainless steel.
- Wind-speed resistance higher than 180 kph.
- Inner access ladder.
- GRP plates with rings for easy lifting.
- Access door with safety lock.
- Provided with templates for accurate anchor bolt positioning.

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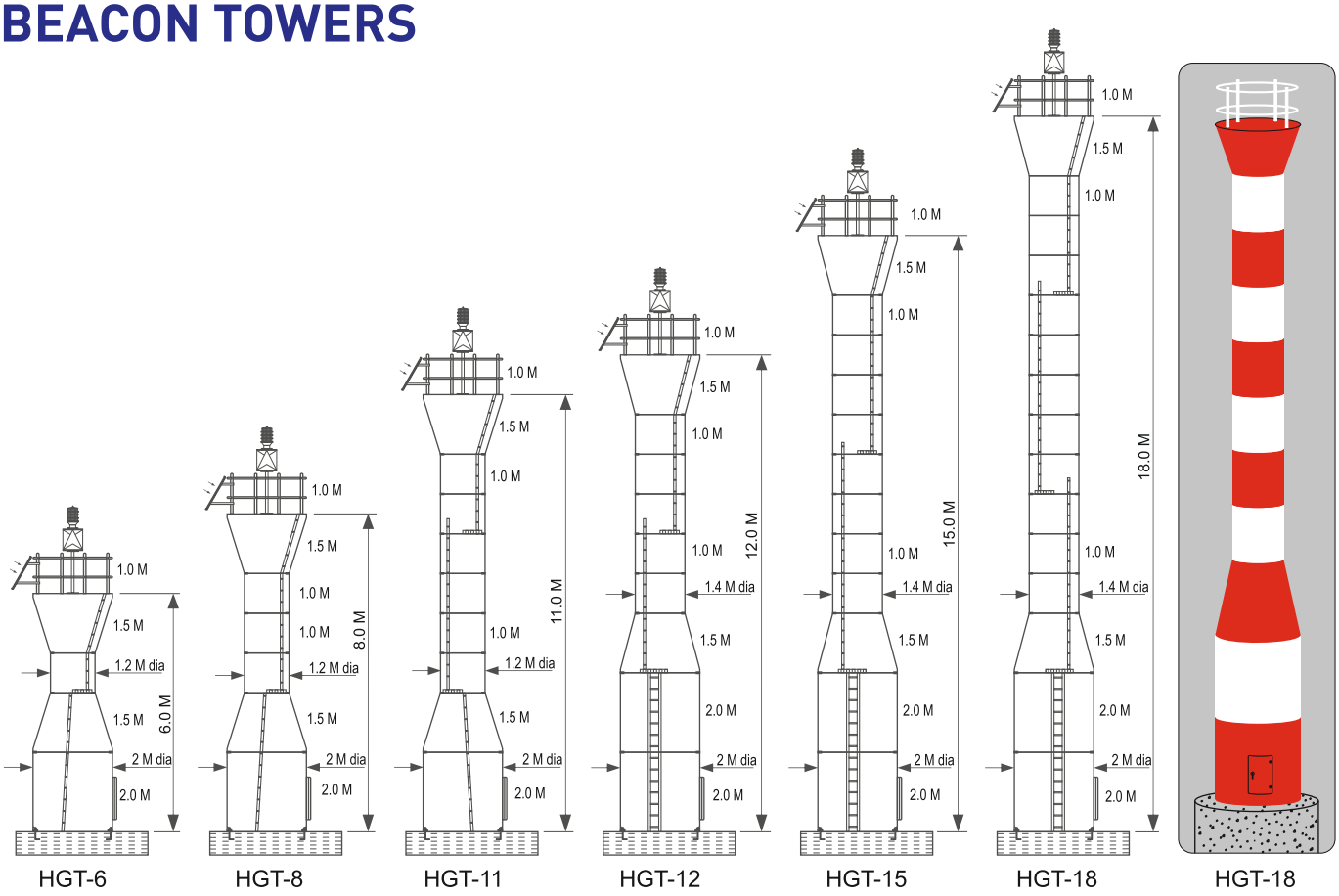
GLASS REINFORCED PLASTIC (GRP) BEACON TOWERS



- Application : Fixed or Flashing shore Beacons with Radar Reflector (optional).
- Daymark : Acts as an excellent daymark.
- Colour (As per IALA) : Permanently self-coloured UV stabilized isophthalic gel coat.
- Servicing : Virtually no servicing required during its life span.
- Installation : Modular design, makes it easy for transportation and assembly at site.
- Access to the Tower Top : Base module is provided with a lockable door and an internal Al. ladder.
- Safety Railing : Top platform is fitted with 1.0M high (SS 316) safety railing.
- Design data : Designed to withstand wind force up to 56M/sec (200 KMPH)

SPECIFICATION	6M + 1M + ... 11 M			12M + 1M + ... 18 M		
MODEL	HGT-6	HGT-8	HGT-11	HGT-12	HGT-15	HGT-18
MATERIAL	GRP	GRP	GRP	GRP	GRP	GRP
TOWER HEIGHT	6.0M	8.0M	11.0M	12.0M	15.0M	18.0M
EACH MODULE DIAMETER	As shown in the above drawings.					
EACH MODULE HEIGHT	As shown in the above drawings.					
BODY COLOUR	Alternate Red and White Modules as per IALA. or as per order					
TOTAL GRP BODYWEIGHT	800 kg	970 kg	1225 kg	1655 kg	1970 kg	2285 kg

FIXING : Prepare R.C.C. foundation with 24 Nos. steel Anchor bolt embeded in the concrete, equi-spaced at 1850mm PCD

PORT ENTRY & RANGE LIGHTS (HPEL)

The Hi-Tech range of LED Port Entry, Range and Leading Lights are typically installed to indicate a clear line of passage. Mariners use these aids to easily distinguish shipping channel entrances, safe passage through hazardous waters, and shoulder leads to assist with large vessel docking.

Lanterns are available in a range of LED colours to ensure clear distinction against confusing background lighting, as well as GPS and hard-wire flash synchronisation, GSM monitoring and control capabilities.

FEATURES

- High Precision, Long Range LED Optics
- Robust, with Ultra-Low Power Consumption
- AIS & GSM Ready
- GPS Synchronisation
- Convenient PC Programming via USB
- Multiple configurations & maintenance-free

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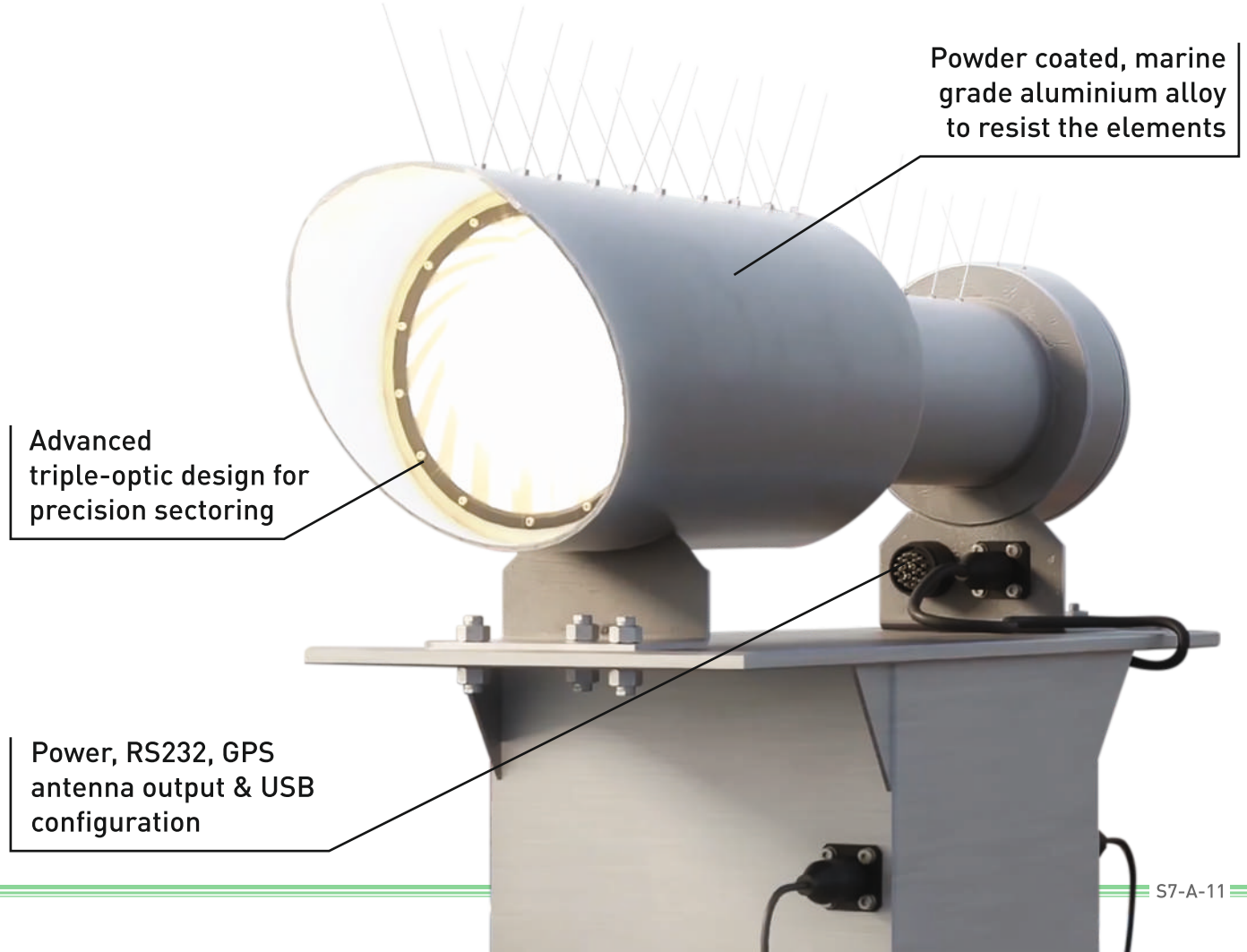
PORT ENTRY & RANGE LIGHTS

ADVANTAGES

- Low power consumption – typically uses 30 watts to achieve intensities that previously required 250 watts, making solar power possible
- LEDs can be configured for automatic night dimming, eliminating the need for moving filters• LEDs can be individually flashed, reducing the need to employ moving oscillating boundaries
- AIS & GSM ready – comes ready for interfacing with AIS or GSM monitoring facilities
- At only 30 watts, the HPEL can be run on a 12-24 volt DC supply without the need for large cables
- Ultra compact design - removing the need for split assemblies and realignment on difficult access sites
- GPS options enables reliable synchronisation with multiple units and other AtoNs
- Independent verification of conformity to IALA colour chromaticity co-ordinates and angles of uncertainties
- Lightweight for ease of installation
- Optional solar powered configurations available

THE HI-TECH PORT ENTRY LIGHT (HPEL) IS A LOW-POWERED, HIGH-INTENSITY PRECISION SECTOR LIGHT, SUITABLE FOR DAY OR NIGHT-TIME USE.



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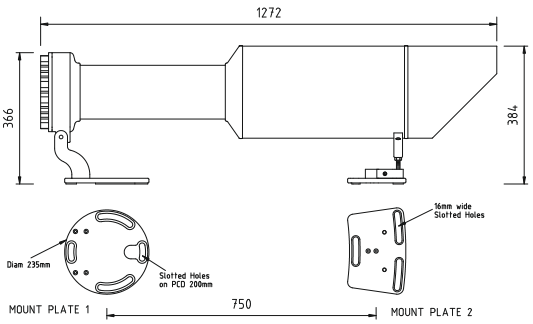
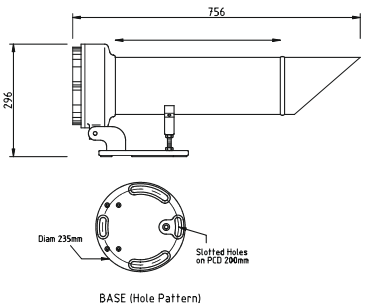
PORT ENTRY & RANGE LIGHTS

SPECIFICATIONS	5° Model HPEL-05	10° Model HPEL-10
Light Characteristics		
Light Source	LED	LED
Available Colours	Red, Green, White	Red, Green, White
Typical Maximum Peak Intensity (cd)	Red - 380,000	Red - 95,000
	Green - 345,000	Green - 85,000
	White - 505,000	White § - 120,000
Visible Range (NM)	AT @ 0.74: White sector, nighttime: up to 23.5	AT @ 0.74: White sector, nighttime: up to 20
	AT @ 0.85: White sector, nighttime: up to 37.5	AT @ 0.85: White sector, nighttime: up to 31.3
Vertical Divergence (degrees)	@ 50% peak intensity: 0.85	@ 50% peak intensity: 1.7
Beam Width Overall (degrees)	5	10
Minimum Sector (degrees)	0.5	1
Available Flash Characteristics	User adjustable	User adjustable
Intensity Adjustments	Fully adjustable	Fully adjustable
LED Life Expectancy (hours)	>50,000	>50,000
Electrical Characteristics		
Power (watts)	30 watts peak x character ratio	30 watts peak x character ratio
Voltage Range (VDC)	Dec-24	Dec-24
Nominal Voltage (VDC)	12.5	12.5
Temperature Range	-40 to 80°C	-40 to 80°C
Physical Characteristics		
Body Material	Marine grade aluminium alloy & carbon fibre, enamel baking	Marine grade aluminium alloy, subject to enamel baking
Lens Material	Anti-reflection coated glass	Anti-reflection coated glass
Mounting	4 x 12mm slotted holes equally spaced on 200mm PCD with additional front	4 x 12mm slotted holes equally spaced on 200mm PCD
	mounting plate consisting of 16mm slotted holes	
Length (mm/inches)	1272 / 50	756 / 29¾
Mass (kg/lbs)	20 / 44	12 / 26½
Product Life Expectancy	Up to 12 years ^	Up to 12 years ^
Environmental Factors		
Driving Rain	MIL-STD-810F Method 506.4	MIL-STD-810F Method 506.4
Low Temperature	MIL-STD-810G Method 502.5	MIL-STD-810G Method 502.5
High Temperature	MIL-STD-810G Method 501.5	MIL-STD-810G Method 501.5
Humidity	MIL-STD-810F Method 507.4	MIL-STD-810F Method 507.4
Salt Fog	MIL-STD-810F Method 509.4	MIL-STD-810F Method 509.4
Shock	IEC 60068-2-29 Test Eb	IEC 60068-2-29 Test Eb
Vibration	ASTM D4169-05 cl.12.3	ASTM D4169-05 cl.12.3
Certifications		
CE	EN61000-6-1: 2007. EN61000-6-3: 2007.	EN61000-6-1: 2007. EN61000-6-3: 2007.
IALA	Signal colours compliant to IALA E-200-1	Signal colours compliant to IALA E-200-1
Waterproof	IP67. AS 60529-2004 (IEC 60529:2001)	IP67. AS 60529-2004 (IEC 60529:2001)
Options Available		
	• AIS Type 1 or Type 3	• AIS Type 1 or Type 3
	• GSM Remote Monitoring & Control Capabilities	• GSM Remote Monitoring & Control Capabilities
	• GPS Synchronisation	• GPS Synchronisation
	• Variety of solar/battery configurations	• Variety of solar/battery configurations

5° Model HPEL-05



10° Model HPEL-10



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PORT ENTRY & RANGE LIGHTS

EXAMPLES OF PEL BEAM CONFIGURATIONS

- Synchronised LEDs are programmable in both intensity and character
- Length of beam indicates intensity
- Illustration shows HPEL-10 with 10 x 1º sectors
- The HPEL-05 variant produces 10 x 0.5º sectors

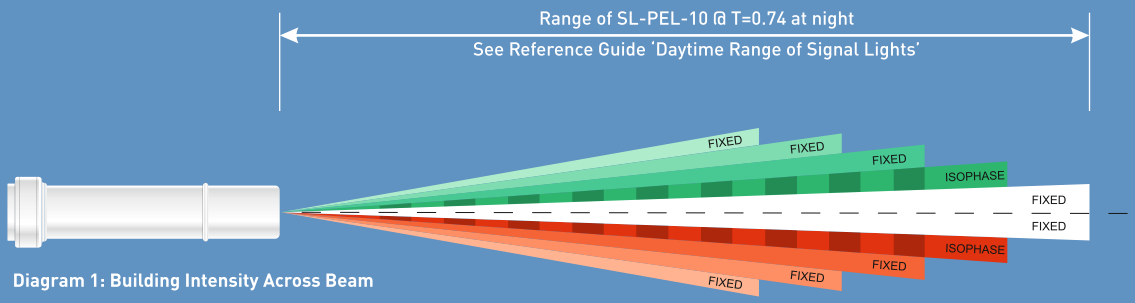

Diagram 1: Building Intensity Across Beam

> HPEL-10
> Boundary intensity reduction
> Automatic night dimming via PE cell (no moving lters)
> Flashing red & green boundary with no moving parts

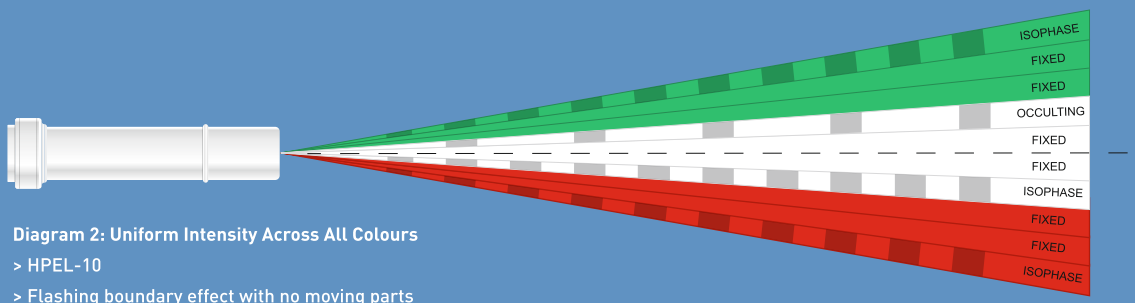

Diagram 2: Uniform Intensity Across All Colours

> HPEL-10
> Flashing boundary effect with no moving parts
> Full intensity across all sectors
> Automatic night dimming via PE cell (no moving filters)

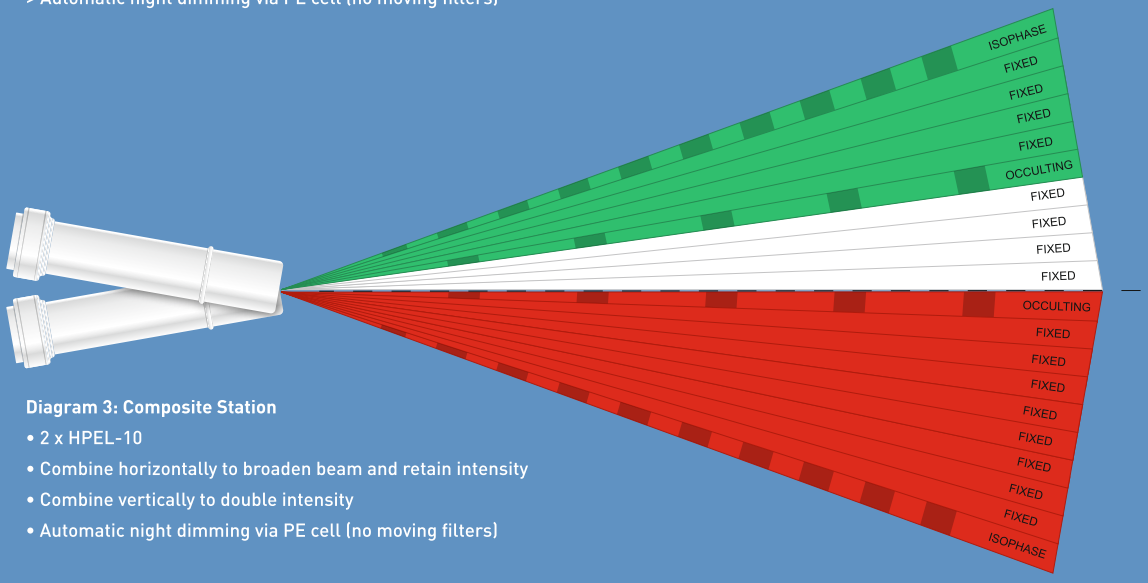

Diagram 3: Composite Station

- 2 x HPEL-10
- Combine horizontally to broaden beam and retain intensity
- Combine vertically to double intensity
- Automatic night dimming via PE cell (no moving filters)

RACON RADAR

Racon is a radar transponder which emits a characteristic signal when triggered by a ships radar.

The signal may be emitted on the same frequency as that of the triggering radar, in which case it is automatically superimposed on the ship's radar display. The maximum range of a radar is limited to range of sight.

Bacons operate on 2 frequencies, X band or X+.5 band.

ADVANTAGES

- Response on X and S bands.
- Advanced Side-Lobe Suppression system (SLS) to better discriminate the genuine pulses to be responded.
- The length of the Morse code response matches the display range setting by programming the duration of the answer according to the pulse length before installation.
- Transmitter power: 1 W in both bands.
- Configurable receiver sensitivity.
- RS-232 communication serial port.
- Configuration via PC or Android APP (tablet and mobile).
- Protection against reverse polarity and transient overvoltages.
- Wide power supply range.
- Low power consumption.
- Light weight.
- Maintenance free

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RECON RADAR

Frequency-agile Radar Beacon

The HRR is a latest-generation (frequency-agile) Radar Beacon, which works in the marine X and S radar bands, providing an important information to mariners under whatever meteorological conditions.

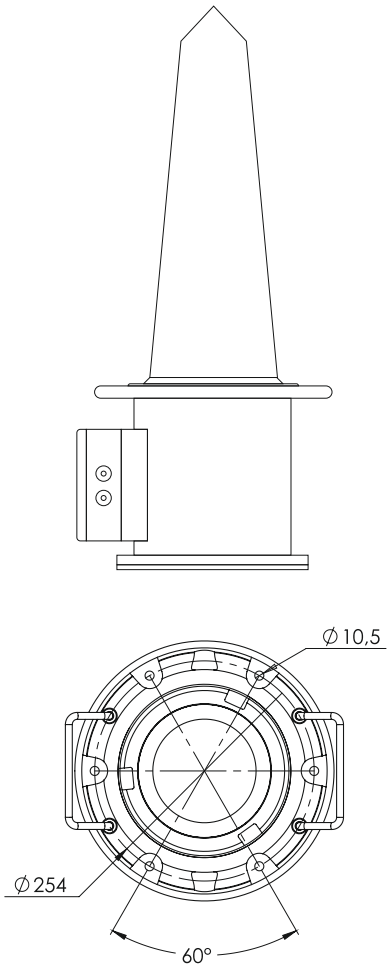
Advanced Electronic Technology

The HRR incorporates advanced electronic technology components from radar systems, applied to navigation aids, such as programmable logic and flexible circuit antenna arrays.

Programmed Morse Code

The Racon actively answers all active radars in the vicinity with a user programmed Morse code which identifies its location by appearing on the radar display.

Designed according to IALA Recommendations and IMO Standards



Installation axis (Standard)

SPECIFICATIONS	
Response encoding	A-2, 0-9, SW-SE-NE-NW Morse codes, according IMO A530
Output power	Typical 1W (X and S bands)
Response delay	<700 ns (X and S bands)
Speed response (each band)	10 KHz (X and S bands)
Azimuth response	360º
Communications and programming	RS-232 serial port 3 nos. status logic outputs 1 no. control logic input
Programmable activity	0 to 60 seconds
Programmable idle mode	0 to 60 seconds
Side-Lobe Suppression (SLS)	Advanced
Temperature range	From -40º to +70ºC
Materials	Aluminium and polyamide
Watertightness degree	IP 68
Weight	14 kg
Fixings	6 nos. Ø10 drill holes each 60° in a 254 mm diameter
FREQUENCY RANGE	
X band	9,300 - 9,500 MHz
S band	2,900 - 3,100 Mhz
RECEPTOR SENSITIVITY (ADJUSTABLE)	
X band	-50 dBm
S band	-50 dBm
ANTENNA	
Broadcasting uniformity	X Band: -4 dBi 2 dB Horizontal over 360º (horizontal) S Band: -2 dBi 0.5 dB Horizontal
Vertical divergence	X Band: 26º S Band: 34º
POLARISATION	
X band	Horizontal
S band	Horizontal and vertical
POWER SUPPLY RANGE	
Range	From 9 to 36 V d.c
POWER CONSUMPTION	
Average nominal	120 mA @ 12 V (1,44 W)
Maximum (X+S)	1.400 mA @ 12 V (16,8 W)
Idle	<0,1 W
OPTIONS	
Adaptation base, diameter 200 mm	
Lifting and carrying handles	
Interface module for telecontrol	
OPTIONS	
Programming cable	
Power cable	
User manual	

*Specifications subject to change without previous notice.

ROTATING BEACON

Rotating beacons are designed to provide a long range signaling capability with limited power sources in remote locations.

The beacon uses high intensity LED with a revolving core to provide flashes of light as set intervals. Required flash codes can be designed according to the project requirement.

The range of rotating beacons is unto 25, nautical miles.

ADVANTAGES

- State-of-the-art LED technology.
- Highest-efficiency luminous system. Up to 24 nm (T=0.74), 39 nm (T=0.85).
- Average operation lifetime over 25 years.
- No lampchanger needed.
- Redundant rotating system made up of double electronic, gearless and brushless rotating motor.
- High reliability and availability.
- Rotating speed adjustable in situ from 1 to 6 rpm.
- External control unit based on microprocessor, with automatic or manual operation.
- Status and alarms available for remote monitoring, by opto-iso lated signals and RS-232 serial port.
- Short-circuit, reverse-polarity, over-temperature and transient over-voltage protections.
- Easy access in case of maintenance or spare replacement.

AIDS TO NAVIGATION
ROTATING BEACON

State-of-the-art LED Technology

The HRB is a long-range rotating beacon, fitted with state-of-the-art LEDs, able to obtain a luminous range of up to 24 nautical miles.

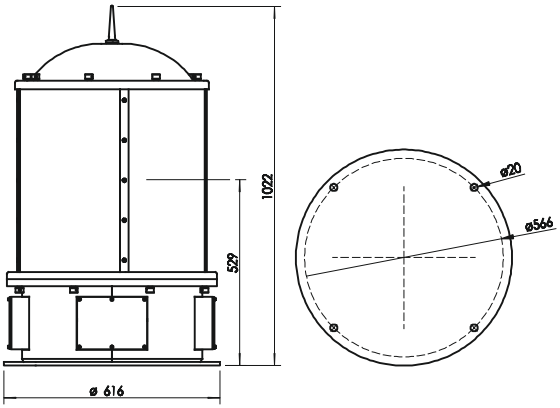
Great Reliability and Availability

This equipment includes a redundant rotating system, our HRB 160 gearless and brushless double electronic rotating motor, one working as standby of the main one. This feature lends it a great reliability and availability.

Long Service Life

High-quality & resistant manufacturing materials, such as glass and marine aluminium, complete a watertight beacon easy to install and with minimum maintenance. All this provides an estimated lifespan of more than 25 years under the harshest marine conditions.

This beacon strictly meets IALA Recommendations.



Optical system	
Light source and Lens	High-intensity LEDs and Fresnel lens with dioptric and catadioptric prisms
Luminous range	Up to 24 nm (T=0.74), 39 nm (T=0.85)
Power consumption	Up to 72 W
LED average life	More than 100,000 hours
MRM 160 double rotating motor	
Type	Double, electronic, gearless and brushless
Regulation	Precise balance with minimum friction
Rotating speed	Adjustable in situ, from 1 to 6 rpm
Speed setting accuracy	1.3 %
Motor control	Double electronic circuit
Accessibility	4 nos. lateral accesses
MMC 160 external control unit	
Functions	> Rotation control (automatic switch-over to standby motor in case of main drive failure)
	> LED light source control
	> Photocell control
	> Remote monitoring signals
Operating modes	Automatic (by photocell), Manual (for maintenance) or Remote (for remote monitoring).
Voltage supply	12 or 24 V d.c.
Remote monitoring	> Status and alarms ready for remote control and monitoring, by opto-isolated signals.
	> RS-232 or RS-485 serial port
Options	
Other colours available	
A.C. power supply	
Remote monitoring modules	
Other specifications available under request	
Other lighting systems available	
Version with LED light source and Fresnel lens as an option	
Version with xenon lamp and Fresnel lens as an option	
Version with halide lamp and Fresnel lens as an option	
Sectorised version available	

MBR600R

No. of levels	Stationary Intensity I_o (Cd)	Effective intensity I_e (Cd)								
		Rotating speed (rpm)								
		0.5	1	1.5	2	2.5	3	4	5	6
1	257,544	205,181	172,081	150,805	134,928	115,380	112,537	97,132	85,655	76,720
2	515,088	410,362	344,162	301,610	269,856	230,760	225,074	194,264	171,310	153,440
3	772,632	615,543	516,243	452,415	404,784	346,140	337,611	291,396	256,965	230,160
4	1,030,176	820,724	688,324	603,220	539,712	461,520	450,148	388,528	342,620	306,880
5	1,287,720	1,025,905	860,405	754,025	674,640	576,900	562,685	485,660	428,275	383,600
6	1,545,264	1,231,086	1,032,486	904,830	809,568	692,280	675,222	582,792	513,930	460,320
7	1,802,808	1,436,267	1,204,567	1,055,635	944,496	807,660	787,759	679,924	599,585	537,040
8	2,060,352	1,641,448	1,376,648	1,206,440	1,079,424	923,040	900,296	777,056	685,240	613,760

*Specifications subject to change without previous notice.

AIS MONITORING

Hi-Tech range of Remote Monitoring and Control Systems provide users such as major Port Authorities and Coast Guards with the ability to effectively and efficiently monitor and control their AtoN installations from real-time data.

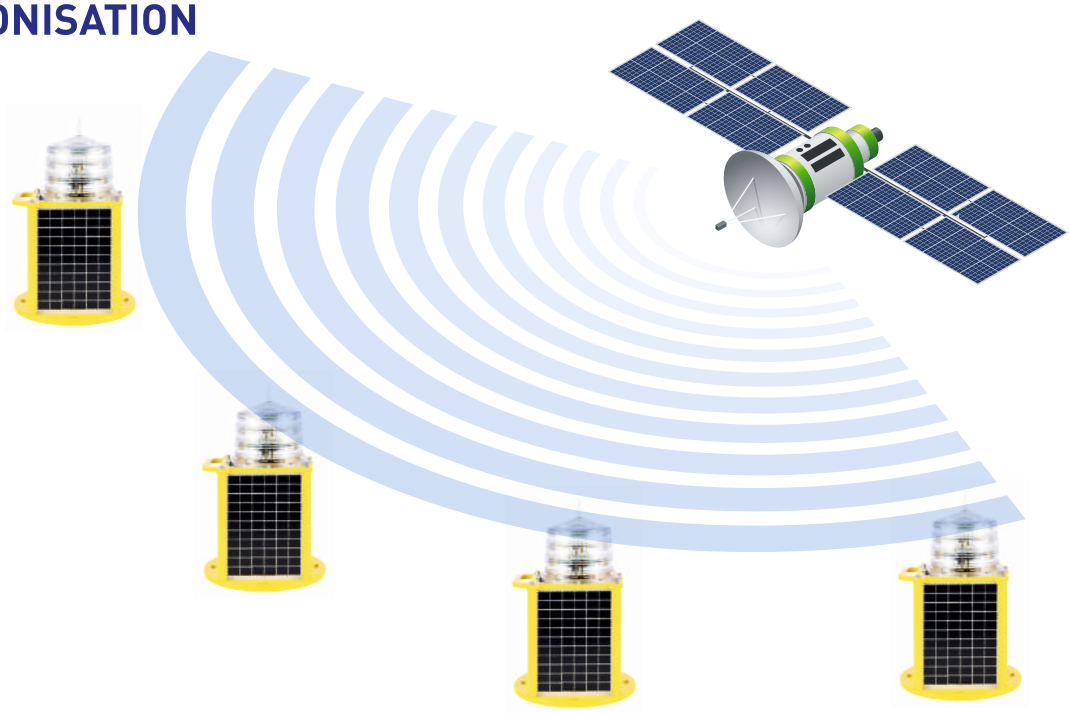
GPS platforms enable lights to flash in synchronisation, while GSM and Radio Control allows the user to remotely modify the settings of their navaid installations, such as flash setting, light colour and operational ON/OFF status.

Mariners and Ship Pilots benefit from the substantial increase in safety provided through the use of such reliable, state-of-the-art systems compatible with a range of Hi-Tech lanterns.

AIDS TO NAVIGATION

REMOTE MONITORING SOFTWARE

GPS SYNCHRONISATION



For flash synchronisation of lanterns installed over longer ranges, Hi-Tech has developed an advanced GPS system. Lanterns are fitted with an internally integrated GPS module which also enables the lights to maintain their high IP67/68 waterproof rating.

Hi-Tech's GPS system provides users with the ability to mark a channel, port or river with independently operating lanterns that all flash in synchronisation. This presents a clear outline of the channel each time the lanterns flash and is particularly effective in overcoming background lighting, as opposed to indiscriminate flashing lights which may render the judgement of distance and navaid location difficult.

The Global Positioning System (GPS) receiver is housed within the Hi-Tech lantern and no additional power supplies, aerials or control systems are required. This lantern option is microprocessor-based and has been designed to provide maximum reliability and performance of the lantern over a wide range of environmental conditions.

Using overhead satellites, multiple GPS lanterns set to the same flash pattern will synchronise anywhere in the world.

How does it work?

Synchronisation is achieved using an internal algorithm base on the highly accurate time base and time data received from the satellites. At power-up the microprocessor checks that the internal GPS module is programmed correctly and is able to provide valid time base and time data.

The light then checks for day/night. If it is night the internal microprocessor will use the GPS data to maintain flash synchronisation.

Hi-Tech Technology

The inbuilt GPS receiver and advanced software of the Hi-Tech synchronised lanterns allow channel marking, battery status, flash code changing and accurate location of lanterns.

The Hi-Tech Advantage

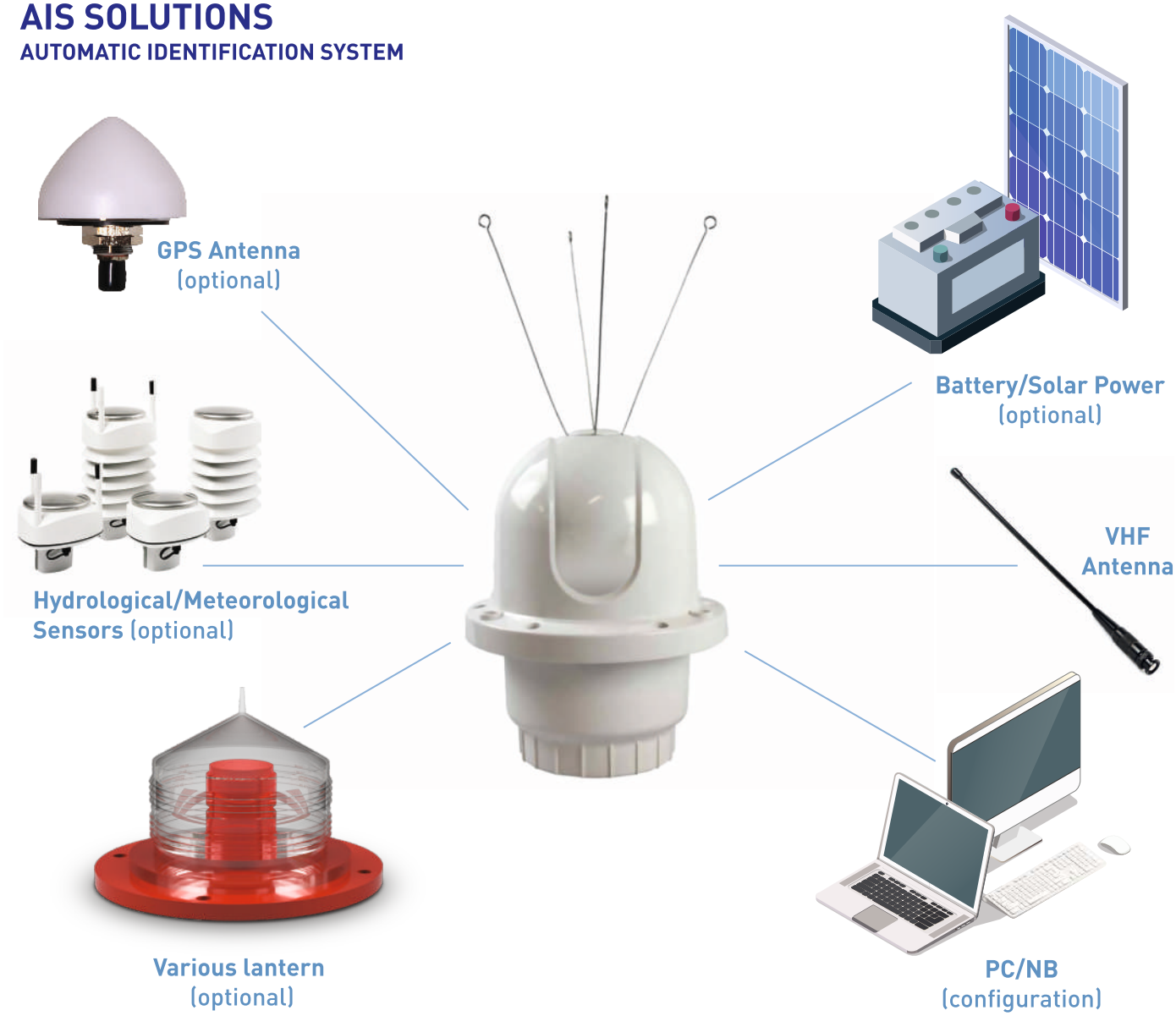
- Long range flash synchronisation via GPS satellites
- No limitation on distance or objects between lanterns
- Each lantern operates independently (no operator intervention required)
- Clear identification of AtoNs against confusing background lighting
- Ease of installation
- Internal GPS module with no external components required, maintaining IP68 waterproof rating of lantern
- Lanterns set to the same flash pattern will come into synchronisation

AIDS TO NAVIGATION

REMOTE MONITORING SOFTWARE

AIS SOLUTIONS

AUTOMATIC IDENTIFICATION SYSTEM



Hi-Tech's AIS solutions are available in regional Mobile Bands, enabling Port Authorities and other users to remotely monitor the real-time status of their AtoN installations.

In addition, the AIS enabled AtoN broadcasts AIS Messages received by the designated base station, allowing the operator to monitor the AtoN for solar and battery voltage, flash code setting and light status. Meteorological and hydrological data.

Low Power Consumption

Hi-Tech's AIS solutions have an incredibly low power consumption of less than 0.5 Ah/day making them suitable for a large range of solar installations. The compact AIS AtoN Transponder is available installed within Hi-Tech's range of self-contained lantern assemblies - providing installation flexibility and operational reliability for a range of environmental conditions and demanding duty cycles.

Benefits to AtoN Authority or Port Authorities

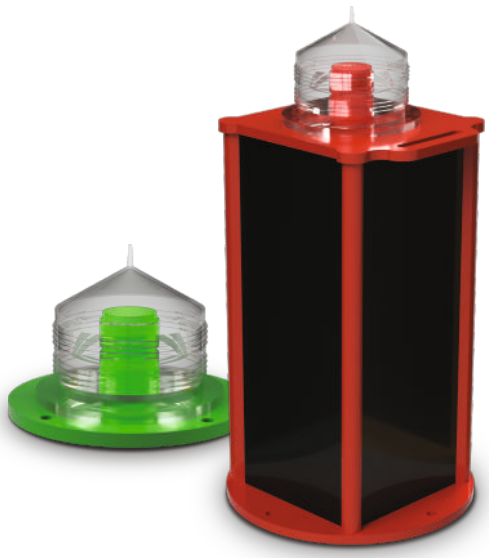
- Complete AIS solutions display accurate positioning & operational information about the AtoN
- Low power consumption, making the units ideal for solar & AtoN installations
- Accurate & real-time information
- Supports synthetic & virtual transmissions
- Monitor the status of an AtoN
- Track AtoNs that are off position
- Assist in the identification of ships involved in collisions with AtoN through provision of exact AtoN position data
- Gather real-time (or near real-time) information on the 'state of health' of an AtoN
- Remotely control changes in AtoN parameters (if so equipped)

AIDS TO NAVIGATION

REMOTE MONITORING SOFTWARE

GSM SOLUTIONS

MONITORING & CONTROL SYSTEM



Hi-Tech's cost effective GSM Monitoring & Control System provides an array of options for your lantern including remote control over flash code and intensity settings, and other features for GSM-enabled lanterns.

Data is able to be communicated from the lantern including lantern statistics, battery condition and GPS positioning via your cell-phone, email address or Hi-Tech's secure web portal.

Maintenance personnel are able to send an SMS message to the designated Hi-Tech GSM lantern cell-phone number and then receive an automatic SMS reply detailing the various pre-set operational conditions. In addition, various alarm conditions can also be activated such as tracking a drifting buoy via GPS that has moved outside a designated area (if mooring is broken etc) or alerting to a potential power disruption.

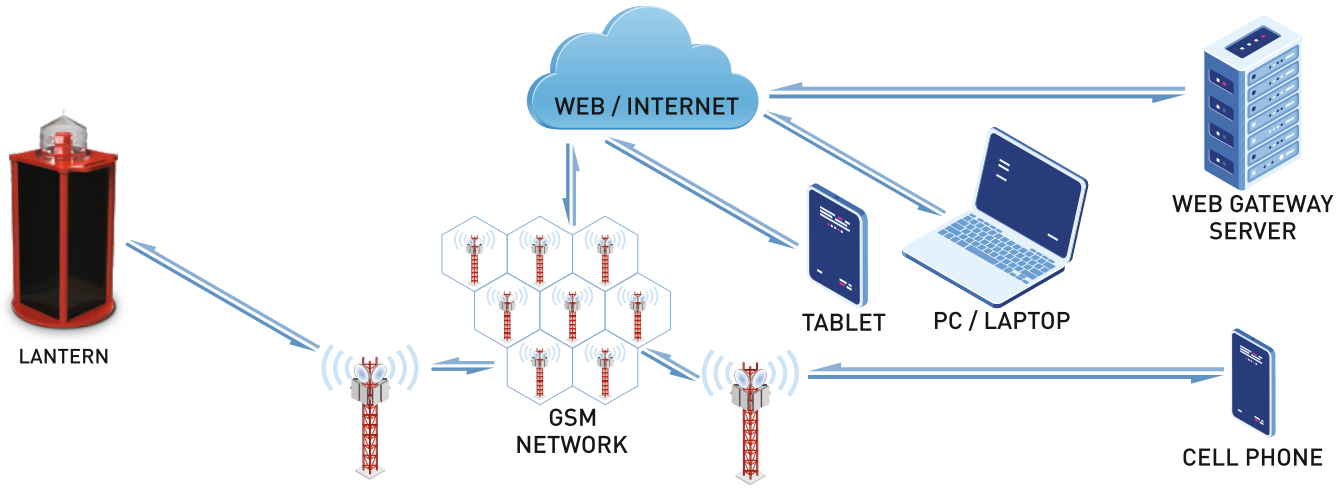
Hi-Tech's innovative GSM Monitoring & Control System may also be setup to regularly report lantern conditions to a secure user-login portal area of the Hi-Tech website. This provides details of the GSM lantern's operational status in an easy-to-read PC interface, such as historical graphed data, GPS positioning viewed via internet mapping systems and day-to-day operational information about each individual lantern over the period of its service life. Users can also have alarms and reports sent to designated email addresses.

Each lantern is fitted with its own SIM card which provides a designated cell-phone contact number for each individual lantern. Any network operator can be used providing they have GSM coverage.

Services to AIS equipped vessels

- Monitor lantern status using any cell-phone
- Reports pre-programmed alarm conditions to designated cell-phone numbers and email addresses
- Remote control of lantern settings
- Lantern responds only to authorised users
- Internally integrated system available with a range of Hi-Tech lanterns to maintain IP68 waterproof rating
- Trend analysis of historical data enables proactive maintenance scheduling
- Low cost monitoring

Interaction of GSM enabled lantern with GSM network, web gateway & user devices



HI-TECH MARINE BUOYS

Hitech elastomers is a pioneer in design and manufacturing of buoys. We have a wide range of buoys for applications like channel marking, mooring, oceonographic data monitoring, fishing, special purpose, etc.

Buoys can be made from different materials like steel, polyethylene, foam etc depending on the project requirements.

ADVANTAGES & FEATURES

- Channel marking solution
- mooring of ships
- pickup buoys
- offshore markings
- emergency marking Wreckage

HI-TECH MARINE BUOYS

Here at Hi-Tech we have been manufacturing buoys for over 25 years. Our experience covers many different designs of buoy, buoy materials and buoy applications. Depending upon the customers application we have experience in many forms of buoys

- Aids to Navigation (AtoN) Buoys
- Spar Buoys
- Mooring Buoys
- Anchor Pendant Buoys
- Marker Buoys
- Utility Buoys
- Hose Pick-up & End Marker Buoys
- Offshore Application Buoys, Pipe Laying for example
- Semi-submersible Buoys for Drilling Works on Rigs

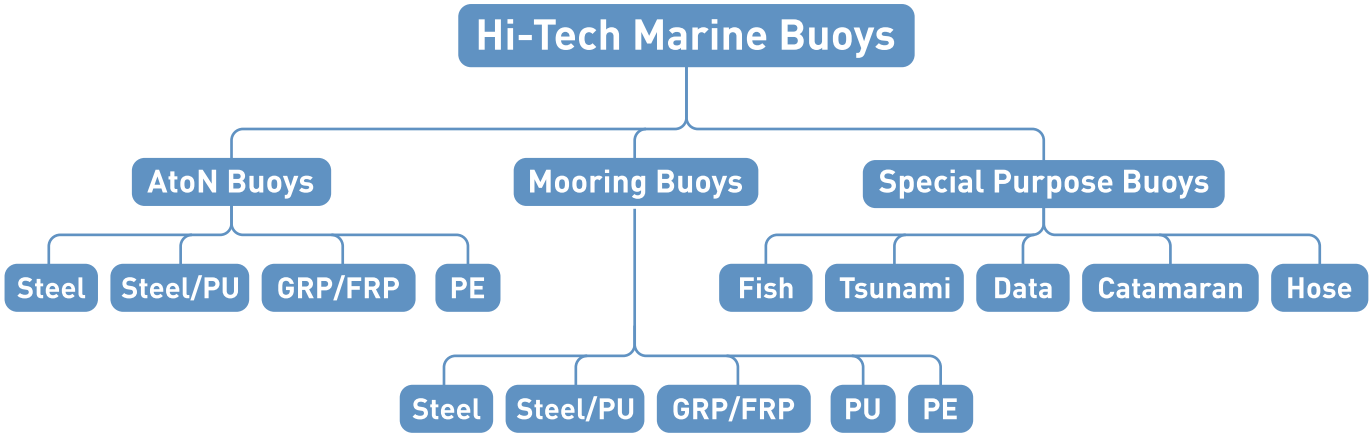
Not only does Hi-Tech have a vast experience of buoy designs we are also able to supply buoys in a wide range of materials, such as:

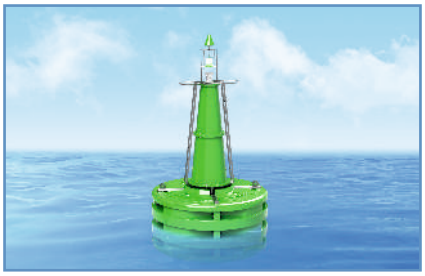
- Mild steel or stainless steel
- Polyethylene and foam filled
- GRP/FRP
- Cross linked Polyethylene foam with Polyurea coat

Steel

Polyethylene

Hitech being an IALA member and 2 decades of rich experience allows us to design , certify, manufacture and install almost all types and sizes of buoys used in todays maritime world. Being an OEM hitech has the flexibility and skill to modify and suit any specific project requirements.





Channel Marker

Mooring Buoy

Special Purpose Buoys

HI-TECH MARINE BUOYS

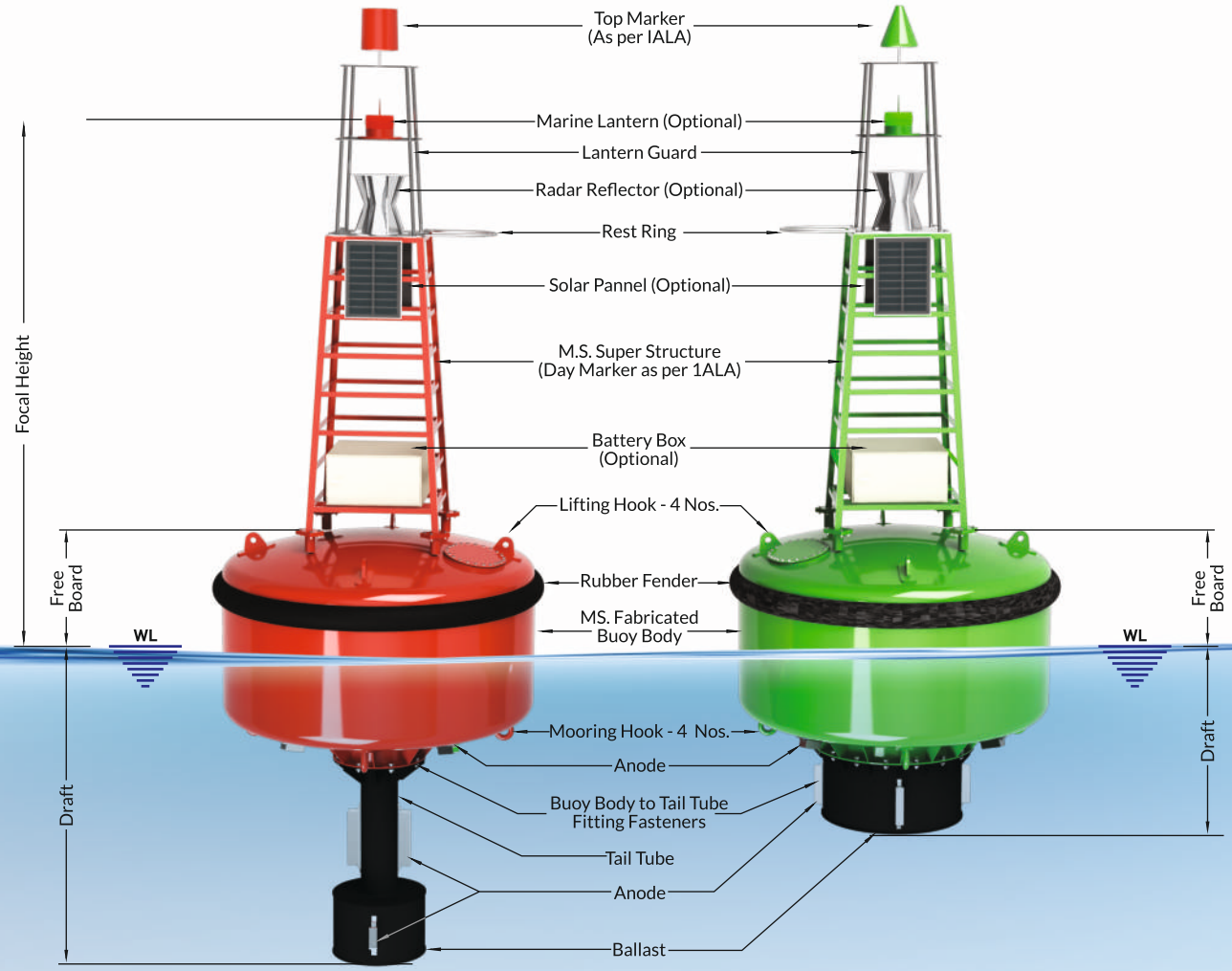
STEEL BUOYS

STEEL BUOYS HSB

All Hi-Tech steel buoys are manufactured in our world class, steel fabrication facilities to allow complete control over design and manufacture. Not only does that provide complete control but allows us to easily modify proven designs to meet any customer requirement.

All steel buoys are rigrously tested according to our ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 certification and welding is conducted by approved welders. This also includes a pressure test of the buoy hull to ensure complete reliability. All steel buoys are based on our standard design and customised to meet customer requirements. Hi-Tech steel buoys are available in many options such as a Polyethylene Superstructure to aid visual aspect and maintenance. A host of additional items can be mounted on the buoy including monitoring sensors and AIS.

- Available from 700 to 4000 mm dia.
- Available with both tail tube (for more stability) & without tail tubedesigns. Tail tube design is used when extended focal heights are required or when there is need for additional stability
- Optional items, as listed below, can be attached to these buoys:
  - > Day marks and top mark
  - > Radar reflector
  - > Regular lanterns and self-contained lanterns
  - > Solar panels and battery boxes
  - > Numerous monitoring and data systems
  - > A range of antenas for data collection or remote monitoring



HI-TECH MARINE BUOYS

STEEL BUOYS

STEEL BUOYS HSB

Hi-Tech has developed a unique buoy. A conventional Steel buoy construction which is then coated with Polyurethane (PU), designed as an improvement over conventional buoys made out of mild steel. Hi-Tech SPU buoys can be designed for AtoN Buoys and also to act as Mooring Buoys.

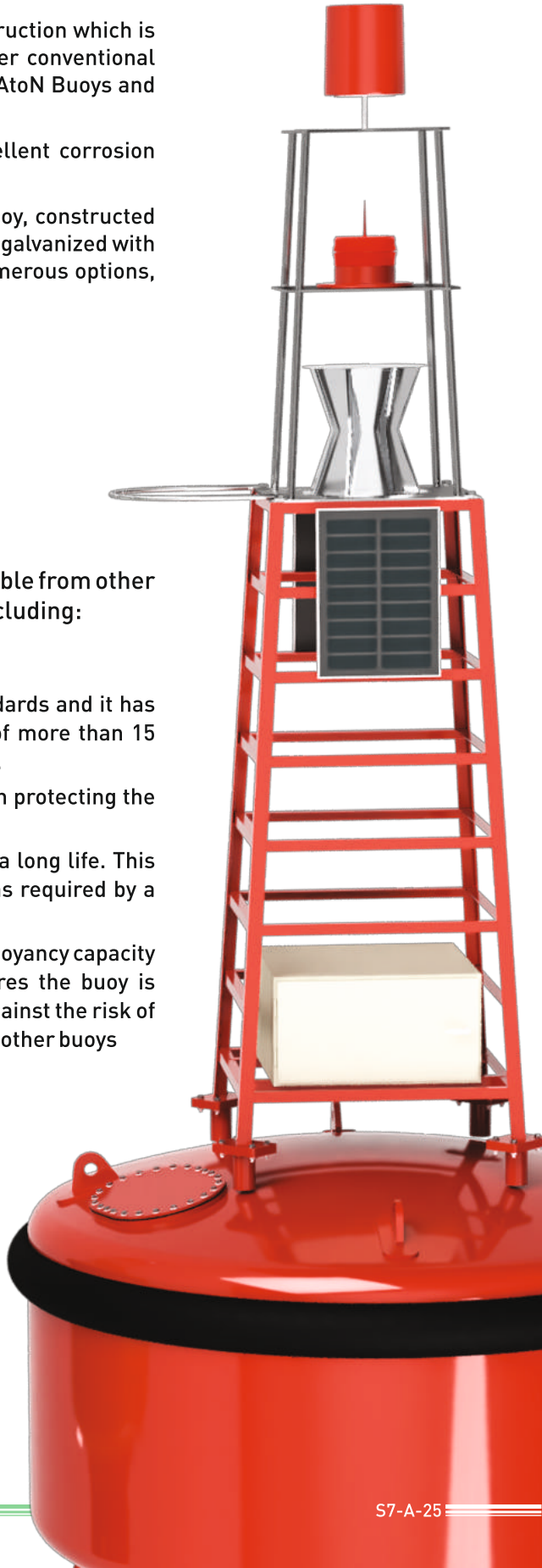
The main steel body is coated with 4mm of PU which provides excellent corrosion resistance, never requires painting and assists in absorbing shocks.

For all AtoN buoys a super structure will be provided on top of the buoy, constructed from mild steel and painted with high corrosion resistant paint or spray galvanized with a minimum 120 microns. The super structure can be equiped with numerous options, such as:

- Day marks and top mark
- Radar reflector
- Regular lanterns and self-contained lanterns
- Solar panels and battery boxes
- A range of antenas for data collection or remote monitoring

Hi-Tech prides itself with its unique SPU design which is not available from other AtoN manufacturers and includes a host of additional features, including:

- Available from 700mm to 4000mm Diameter.
- The PU materials used for the buoys conform to International standards and it has proven excellent ageing resistance in sea water and working life of more than 15 years tested throughout the world. Actual expectancy is over 20 years.
- Due to energy absorption capacity and flex resistance it will assist in protecting the surfaces of a vessel coming in contact with it.
- There is no corrosion in sea water due to the PU coating providing a long life. This reduces maintenance costs as the buoy does not require painting as required by a conventional steel buoy.
- As an option the steel hull can be filled with PU foam providing total buoyancy capacity to support the weight of the buoy and mooring loads. This ensures the buoy is UNSINKABLE WITH INTACT BUOYANCY. This safe guards the buoy against the risk of leaking OR rupture of buoyancy chambers as can happen with steel or other buoys



STEEL NAVIGATIONAL BUOY SIZE RANGE			
700	1000	1250	1500
1750	2000	2500	3200
3000	3500	4000	

Other size available on request

- Dimensional data may change as per requirement of design which is customised thus this data is for reference only. For final drawing and calculation please contact Hi-Tech Office.

HI-TECH MARINE BUOYS

PE BUOY

ROTATIONALLY MOULDED POLYETHYLENE BUOYS (HPEB)

Hi-Tech's rotationally moulded polyethylene (PE) buoys are widely accepted as the future of buoys and meets Hi-Tech's goal in developing high performance, low maintenance marine aids to navigation. Virgin UV stabilised polyethylene material is rotationally moulded to form a seamless hull section providing a strong structure to withstand higher impacts. Greater thickness is achieved at high stress areas using the latest moulding techniques and mould design engineering. The buoy hull is filled with a closed cell, low density, Polyethylene foam that keeps the buoy afloat in case of damage or puncture.

A variety of buoy superstructures are available and all rotationally moulded with the same colour material and designed for strength and high visibility.

The options for in built graphics, sign boards or to mount special equipment are also available upon special request. Hi-Tech also provides a complete solution for design and configuration of the buoy and specific mooring solutions

- Available up-to 3500mm diameter. Custom size & different models of PE buoys are also available.
- PE buoys are light in weight and yet designed to be unsinkable.
- Low maintenance and easy to handle.
- Puncture resistant and can withstand harsh marine environments and weather conditions.
- Made from virgin polyethylene to ensure superior quality and enhancing its durability.
- Optional items of navigational aids as listed below can be attached to these buoys:
  - > Day marks and top mark
  - > Radar reflector
  - > Regular lanterns and self-contained lanterns
  - > Solar panels and battery boxes
  - > A range of antenas for data collection or remote monitoring

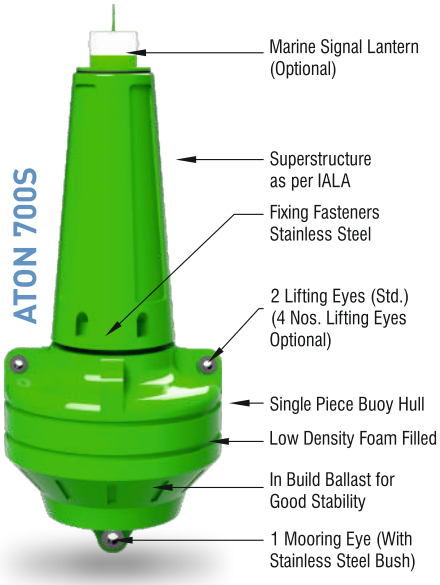
PRODUCT RANGE

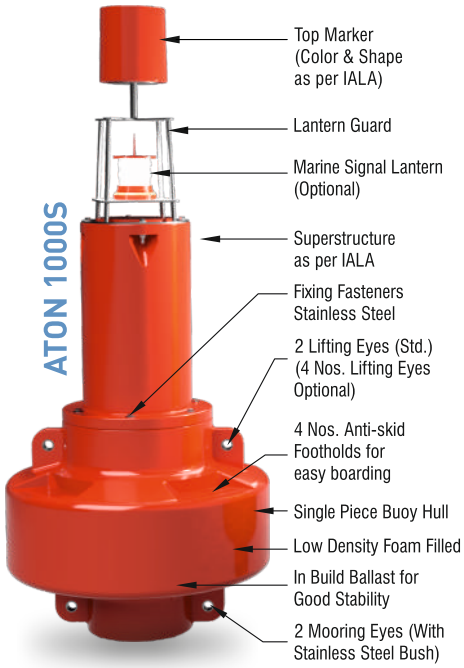
ATON S SERIES	
ATON 700S	ATON 1000S
ATON 1250S	ATON 1500S
ATON 1750S	ATON 2200S
ATON 2600S	
ATON E SERIES	
ATON 1250E	ATON 1750E
ATON D SERIES	
ATON 1500D	
ATON Q SERIES	
ATON 2000Q	ATON 2500Q
ATON 3000Q	

HI-TECH MARINE BUOYS

PE BUOY

ATON S SERIES





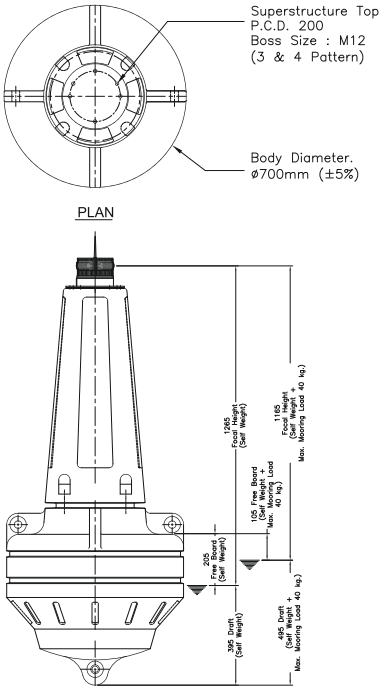
ATON 700S

ATON 700S is single piece, rotationally moulded seamless hull construction and engineered to make them most suitable for coastal, back-waters, harbours, Inland waterways. The dual configuration of mooring eye allows the use of one pendant chain to increase stability even in flowing waters. The light weight and robust construction is easy to deploy and multiple lifting eyes makes it easier to handle and move.

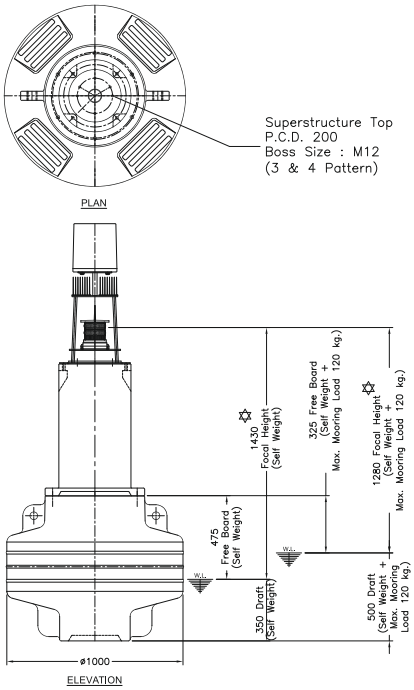
ATON 1000S

ATON 1000S is single piece, rotationally moulded seamless hull construction and engineered to make them most suitable for coastal, back-waters, harbours, Inland waterways. The dual configuration of mooring eye allows the use of one pendant chain to increase stability even in flowing waters. The light weight and robust construction is easy to deploy and multiple lifting eyes makes it easier to handle and move.

ATON 700S



ATON 1000S



* Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

	ATON 700S	ATON 1000S
MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	
DIAMETERS	700mm ±5%	1000mm ±5%
WEIGHT IN AIR	70 kg.	135 kg.
LIFTING HOLE	2 Nos.	2 Nos.
MOORING HOOK	1 No.	2 Nos.
RESERVE BUOYANCY	93 kg. (Without Mooring Load)	265 kg. (Without Mooring Load)
MAXIMUM MOORING LOAD	40 kg.	120 kg.
SUBMERGENCE	3.9 kg/cm	8.04 kg/cm
FREEBOARD	205mm WITHOUT MOORING 105mm WITH MOORING [40 kg]	475mm WITHOUT MOORING 325mm WITH MOORING [120 kg]
DRAFT	395mm WITHOUT MOORING 495mm WITH MOORING [40 kg]	350mm WITHOUT MOORING 500mm WITH MOORING [120 kg]
FOCAL HEIGHT	1265mm WITHOUT MOORING 1165mm WITH MOORING [40 kg] • Extension spacer available for higher focal height.	1430mm WITHOUT MOORING 1280mm WITH MOORING [120 kg] • Extension spacer available for higher focal height.
CERTIFICATIONS	ISO 9001:2015	ISO 9001:2015
OPTIONS AVAILABLE	• MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD	• TOP MARK AS PER IALA • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD

- Specifications are for general guidance only and subject to change without notice.
- Dimensional data may change as per requirement of design which is customised thus this data is for reference only. For final drawing and calculation please contact Hi-Tech Office.

Environment Friendly & Recyclable

HI-TECH MARINE BUOYS

PE BUOY

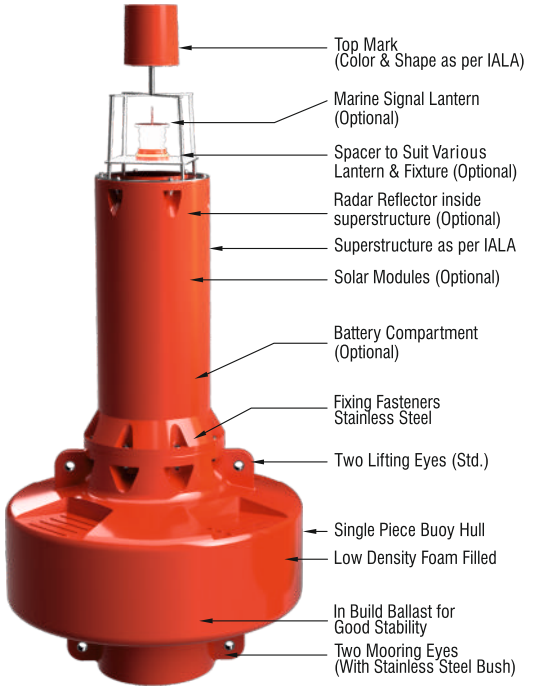
ATON S SERIES

ATON 1250S

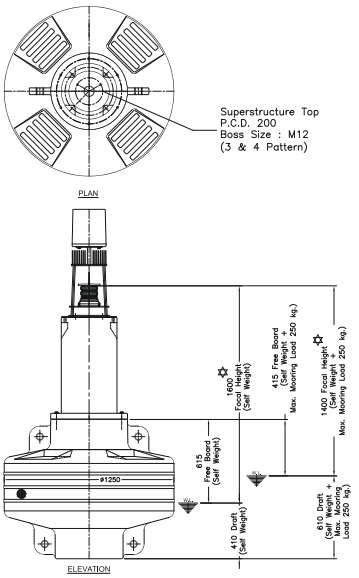
ATON 1250S is single piece, rotationally moulded, seamless hull, construction and engineered to make them most suitable for harbours and inland waterways. Polyethylene provides a lightweight construction which is robust and durable. Its weight, combined with two (2) or optional four (4) lifting eyes, makes it very easy to deploy from small vessels. ATON 1250S is ideal for use on navigation channels and inland waterways, it can also accommodate signboards and other optional items.

ATON 1500S

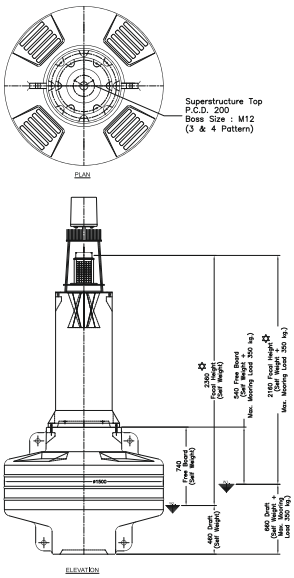
ATON 1500S is single piece, rotationally moulded seamless hull construction and engineered to make them most suitable for coastal, back-waters, harbours, Inland waterways. The dual configuration of mooring eyes allows the use of one or two pendant chains to increase stability even in flowing waters. The light weight and robust construction is easy to deploy and multiple lifting eyes makes it easier to handle and move.



ATON 1250S



ATON 1500S



* Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

	ATON 1250S	ATON 1500S
MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	
DIAMETERS	1250mm ±5%	1500mm ±5%
WEIGHT IN AIR	225 kg	325 kg
LIFTING HOLE	2 Nos.	2 Nos
MOORING HOOK	2 Nos.	2 Nos
RESERVE BUOYANCY	510 kg	950 kg
MAXIMUM MOORING LOAD	250 kg	350 kg
SUBMERGENCE	12.57 kg/cm	18.1 kg/cm
FREEBOARD	340mm WITHOUT MOORING 140mm WITH MOORING [250 kg]	740mm WITHOUT MOORING 540mm WITH MOORING [280 kg]
DRAFT	410mm WITHOUT MOORING 610mm WITH MOORING [250 kg]	460mm WITHOUT MOORING 660mm WITH MOORING [280 kg]
FOCAL HEIGHT	1600mm WITHOUT MOORING 1400mm WITH MOORING [250 kg] • Extension spacer available for higher focal height.	2360mm WITHOUT MOORING 2160mm WITH MOORING [280 kg]
CERTIFICATIONS	ISO 9001:2014	ISO 9001:2014
OPTIONS AVAILABLE	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD

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Environment Friendly
& Recyclable

HI-TECH MARINE BUOYS

PE BUOY

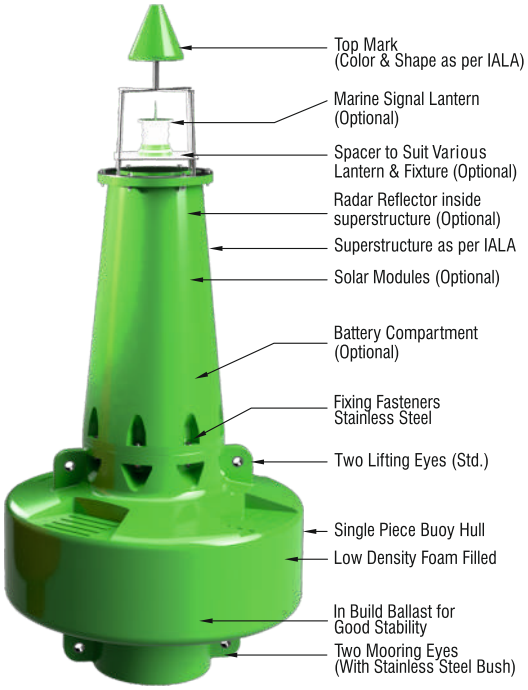
ATON S SERIES

ATON 1750S

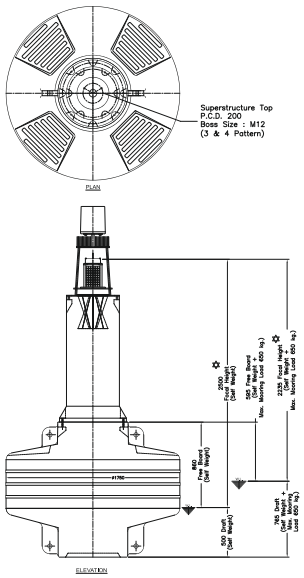
ATON 1750S is single piece, rotationally moulded seamless hull construction and engineered to make them most suitable for coastal, back-waters, harbours, Inland waterways. The dual configuration of mooring eye allows the use of one pendant chain to increase stability even in flowing waters. The light weight and robust construction is easy to deploy and multiple lifting eyes makes it easier to handle and move.

ATON 2200S

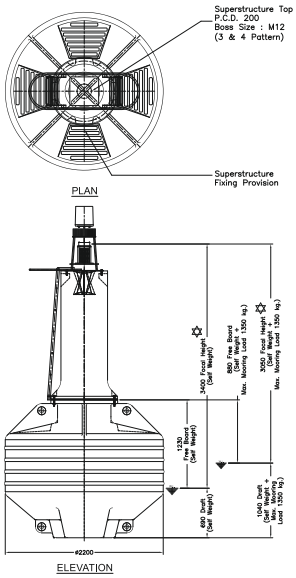
ATON 2200S is single piece, rotationally moulded seamless hull construction and engineered to make them most suitable for coastal, back-waters, harbours, Inland waterways. The dual configuration of mooring eye allows the use of one pendant chain to increase stability even in flowing waters. The light weight and robust construction is easy to deploy and multiple lifting eyes makes it easier to handle and move.



ATON 1750S



ATON 2200S



* Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

	ATON 1750S	ATON 2200S
MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	
DIAMETERS	1750mm ±5%	2200mm ±5%
WEIGHT IN AIR	460 kg	1550 kg
LIFTING HOLE	2 Nos.	2 Nos.
MOORING HOOK	2 Nos.	2 Nos.
RESERVE BUOYANCY	1500 kg	3350 kg
MAXIMUM MOORING LOAD	650 kg	1350 kg
SUBMERGENCE	24.64 kg/cm	38.94 kg/cm
FREEBOARD	860mm WITHOUT MOORING 595mm WITH MOORING [650 kg]	1230mm WITHOUT MOORING 880mm WITH MOORING [1350 kg]
DRAFT	500mm WITHOUT MOORING 765mm WITH MOORING [650 kg]	690mm WITHOUT MOORING 1040mm WITH MOORING [1350 kg]
FOCAL HEIGHT	2500mm WITHOUT MOORING 2235mm WITH MOORING [650 kg]	3400mm WITHOUT MOORING 2050mm WITH MOORING [1350 kg]
CERTIFICATIONS	ISO 9001:2014	ISO 9001:2014
OPTIONS AVAILABLE	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD

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Environment Friendly
& Recyclable

HI-TECH MARINE BUOYS

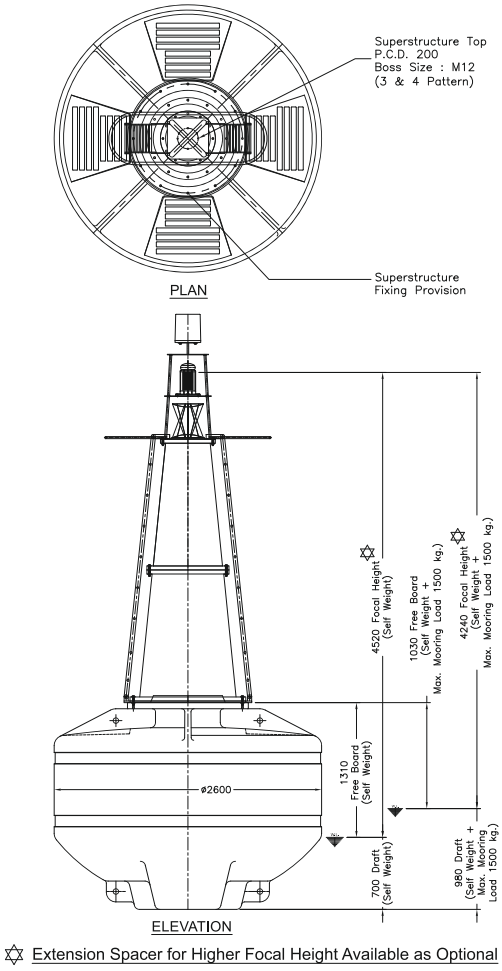
PE BUOY

ATON S SERIES

ATON 2600S

ATON 2600S is single piece, rotationally moulded seamless hull construction and engineered to make them most suitable for coastal, back-waters, harbours, Inland waterways. The dual configuration of mooring eye allows the use of one pendant chain to increase stability even in flowing waters. The light weight and robust construction is easy to deploy and multiple lifting eyes makes it easier to handle and move.

ATON 2600S



✡ Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	FREEBOARD	1310mm WITHOUT MOORING 1030mm WITH MOORING [1500 kg]
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	DRAFT	700mm WITHOUT MOORING 980mm WITH MOORING [1500kg]
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	FOCAL HEIGHT	4520mm WITHOUT MOORING 4240mm WITH MOORING [1500 kg]
HULL DIAMETER	2600mm ±5%	CERTIFICATIONS	ISO 9001:2015
WEIGHT IN AIR	2000 kg	OPTIONS AVAILABLE	• TOP MARK AS PER IALA
LIFTING HOLE	2 Nos.		• RADAR REFLECTOR
MOORING HOOK	2 Nos.		• MARINE LANTERN
RESERVE BUOYANCY	5600 kg (Without Mooring Load)		• MONITORING/CONTROL SYSTEM
MAXIMUM MOORING LOAD	1500 kg		• MARKING/SIGN BOARD
SUBMERGENCE	54.39 kg/cm		• LANTERN GUARD

Environment Friendly & Recyclable

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HI-TECH MARINE BUOYS

PE BUOY

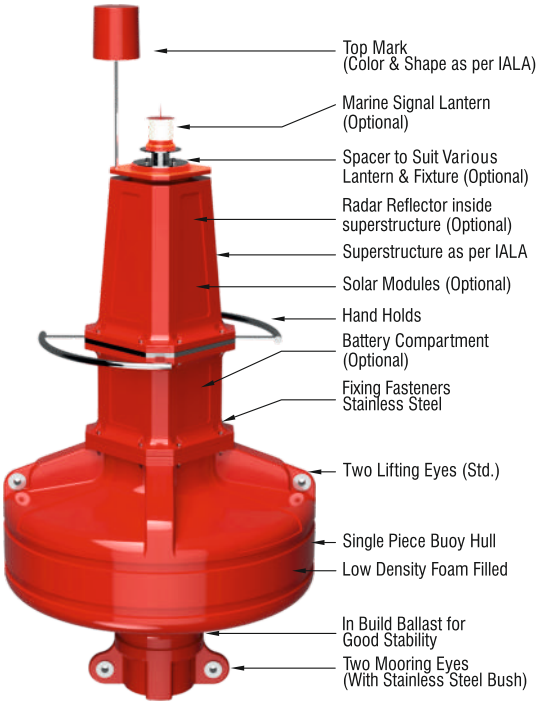
ATON E SERIES

ATON 1250E

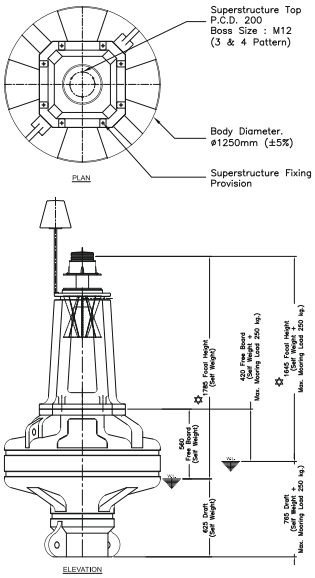
ATON 1250E is single piece, rotationally moulded, seamless hull, construction and engineered to make them most suitable for harbours and inland waterways. Polyethylene provides a lightweight construction which is robust and durable. Its weight, combined with two (2) or optional four (4) lifting eyes, makes it very easy to deploy from small vessels. ATON 1250E is ideal for use on navigation channels and inland waterways, it can also accommodate signboards and other optional items.

ATON 1750E

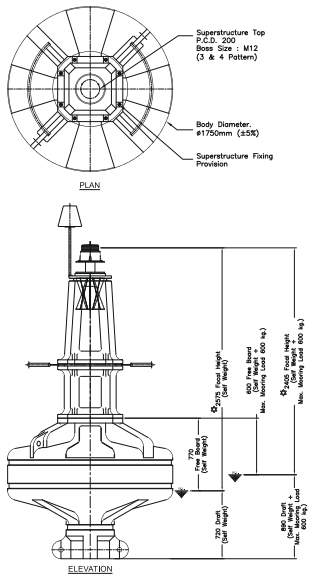
ATON 1750E is one of our most popular buoy models which is used for a variety of locations and applications. From a standard ATON to a data buoy which can house various weather and sea monitoring sensors. ATON 1750E is most suitable for open sea, navigation channels, harbours and inland waterways. Polyethylene provides a lightweight construction which is robust and durable. Its weight, combined with two (2) lifting eyes, makes it very easy to deploy.



ATON 1250E



ATON 1750E



* Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

	ATON 1250E	ATON 1750E
MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	
DIAMETERS	1250mm ±5%	1750mm ±5%
WEIGHT IN AIR	284 kg	440 kg
LIFTING HOLE	2 Nos.	2 Nos.
MOORING HOOK	2 Nos.	2 Nos.
RESERVE BUOYANCY	330 kg	880 kg
MAXIMUM MOORING LOAD	250 kg	600 kg
SUBMERGENCE	12.57 kg/cm	24.7 kg/cm
FREEBOARD	560mm WITHOUT MOORING 420mm WITH MOORING [250 kg]	770mm WITHOUT MOORING 600mm WITH MOORING [600 kg]
DRAFT	625mm WITHOUT MOORING 765mm WITH MOORING [250 kg]	720mm WITHOUT MOORING 890mm WITH MOORING [600 kg]
FOCAL HEIGHT	1785mm WITHOUT MOORING 1645mm WITH MOORING [250 kg]	2575mm WITHOUT MOORING 2405mm WITH MOORING [600 kg]
CERTIFICATIONS	ISO 9001:2014	ISO 9001:2015
OPTIONS AVAILABLE	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD

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Environment Friendly
& Recyclable

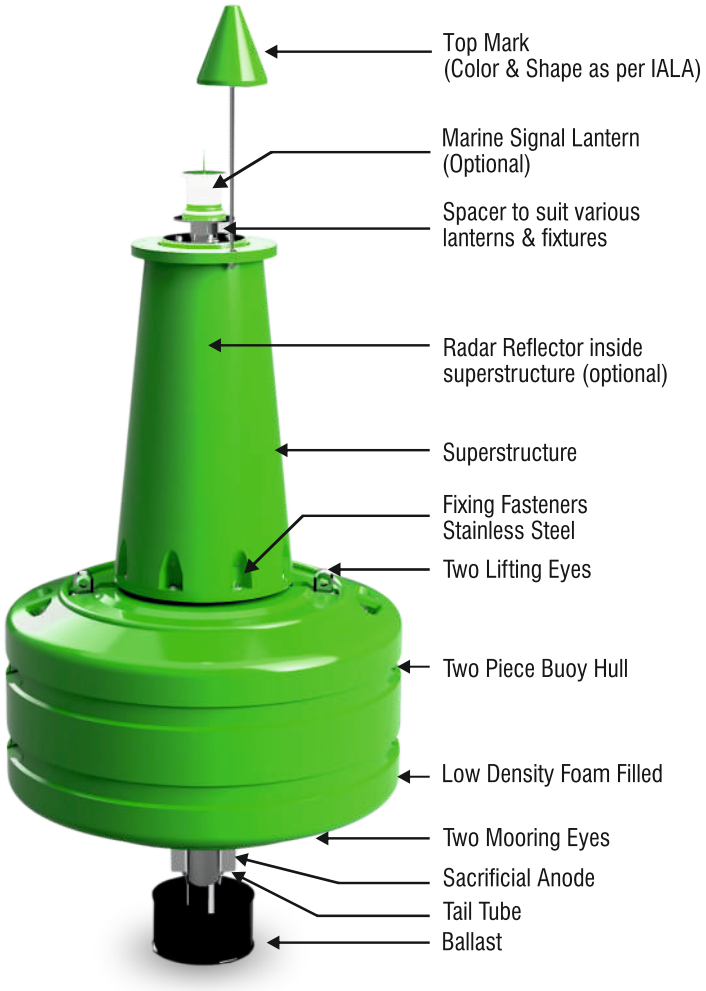
HI-TECH MARINE BUOYS

PE BUOY

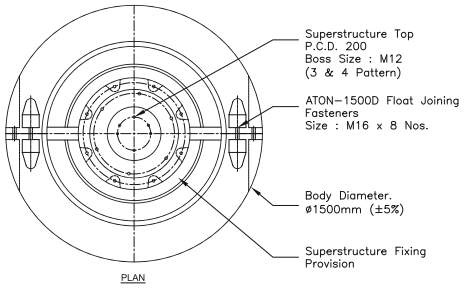
ATON D SERIES

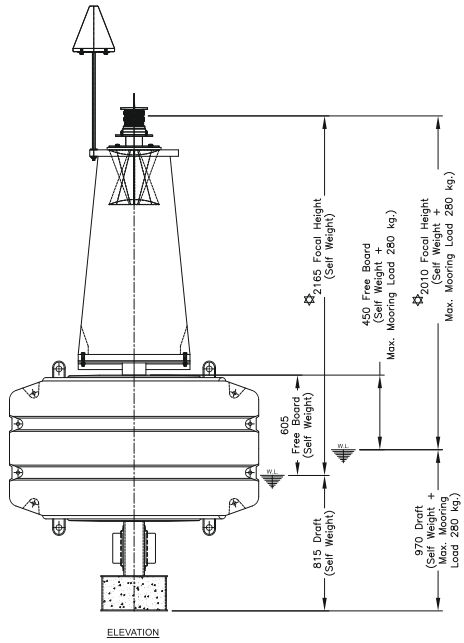
ATON 1500D

A unique heavy-duty design and robust construction makes ATON 1500D most suitable for applications where water depths are less, and sea conditions rough with high swell and high impact wave zones. The modular engineering of ATON 1500D provides flexibility for providing higher focal plane options with improved stability making it suitable for extreme environmental conditions.



ATON 1500D





✡ Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	FREEBOARD	600mm WITHOUT MOORING 400mm WITH MOORING [350 kg]
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	DRAFT	820mm WITHOUT MOORING 1020mm WITH MOORING [350 kg]
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	FOCAL HEIGHT	2300mm WITHOUT MOORING 2100mm WITH MOORING [350 kg]
HULL DIAMETER	1500mm ±5%	CERTIFICATIONS	ISO 9001:2014
WEIGHT IN AIR	410 kg	OPTIONS AVAILABLE	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD
LIFTING EYE	2 Nos.		
MOORING EYE	2 Nos.		
RESERVE BUOYANCY	940 kg		
MAXIMUM MOORING LOAD	350 kg		
SUBMERGENCE	18.1 kg/cm		

Environment Friendly & Recyclable

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HI-TECH MARINE BUOYS

PE BUOY

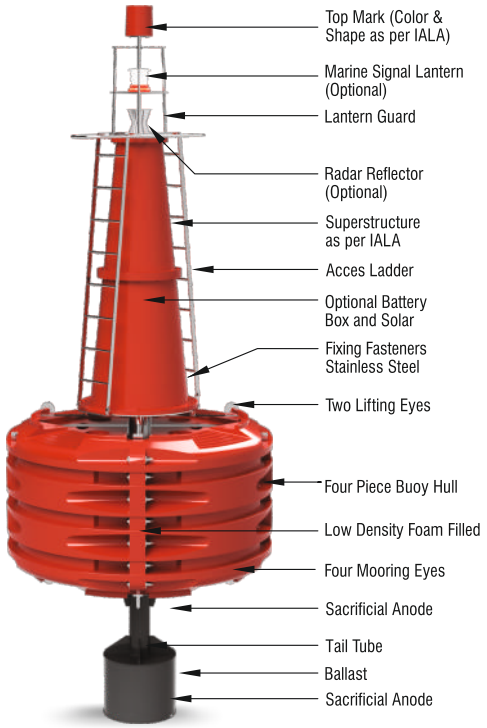
ATON Q SERIES

ATON 2000Q

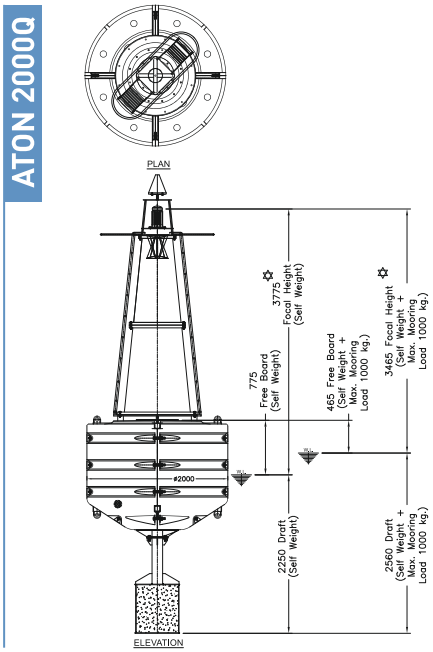
ATON 2000Q is specifically designed for harsh, open sea conditions. Four rotationally moulded hull sections are supported by a strong steel frame combined with a moulded superstructure. ATON 2000Q is ideal for use as a safe-water buoy and is also capable of carrying weather and sea monitoring equipment together with AIS.

ATON 2500Q

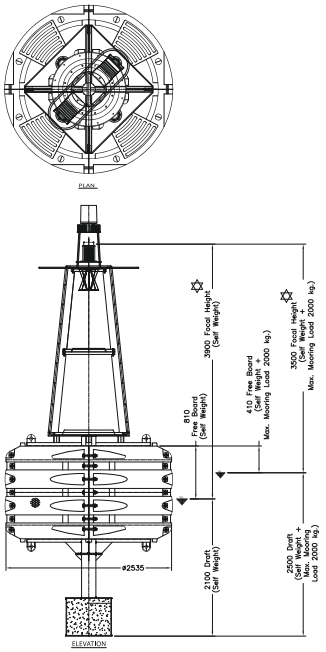
ATON 2500Q is specifically designed for harsh, open sea conditions. Four rotationally moulded hull sections are supported by a strong steel frame combined with a moulded superstructure. ATON 2500Q is ideal for use as a safe-water buoy and is also capable of carrying weather and sea monitoring equipment together with AIS.



ATON 2000Q



ATON 2500Q



* Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

	ATON 2000Q	ATON 2500Q
MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	
DIAMETERS	2150mm ±5%	2500mm ±5%
WEIGHT IN AIR	1850 kg	2530 kg
LIFTING HOLE	4 Nos.	4 Nos.
MOORING HOOK	4 Nos.	4 Nos.
RESERVE BUOYANCY	2000 kg	2200 kg
MAXIMUM MOORING LOAD	1000 kg	2000 kg
SUBMERGENCE	32.18 kg/cm	50.28 kg/cm
FREEBOARD	775mm WITHOUT MOORING 465mm WITH MOORING [2000 kg]	810mm WITHOUT MOORING 410mm WITH MOORING [2000 kg]
DRAFT	2250mm WITHOUT MOORING 2560mm WITH MOORING [2000 kg]	2100mm WITHOUT MOORING 2500mm WITH MOORING [2000 kg]
FOCAL HEIGHT	3775mm WITHOUT MOORING 3465mm WITH MOORING [2000 kg]	3900mm WITHOUT MOORING 3500mm WITH MOORING [2000 kg]
CERTIFICATIONS	ISO 9001:2014	ISO 9001:2014
OPTIONS AVAILABLE	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD	• TOP MARK AS PER IALA • RADAR REFLECTOR • MARINE LANTERN • MONITORING/CONTROL SYSTEM • MARKING/SIGN BOARD • LANTERN GUARD

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Environment Friendly & Recyclable

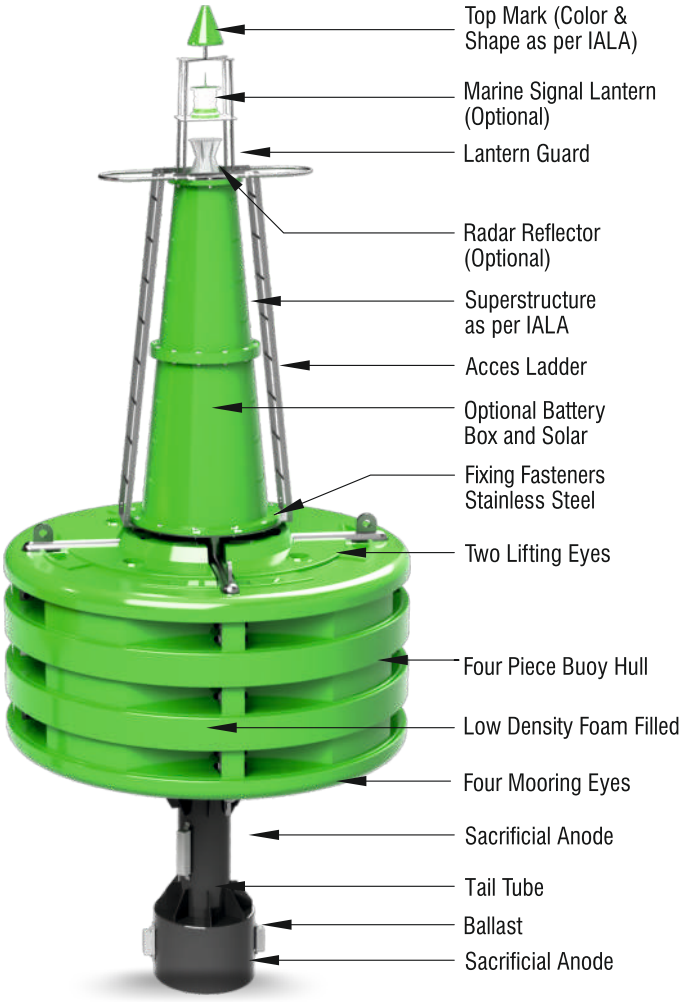
HI-TECH MARINE BUOYS

PE BUOY

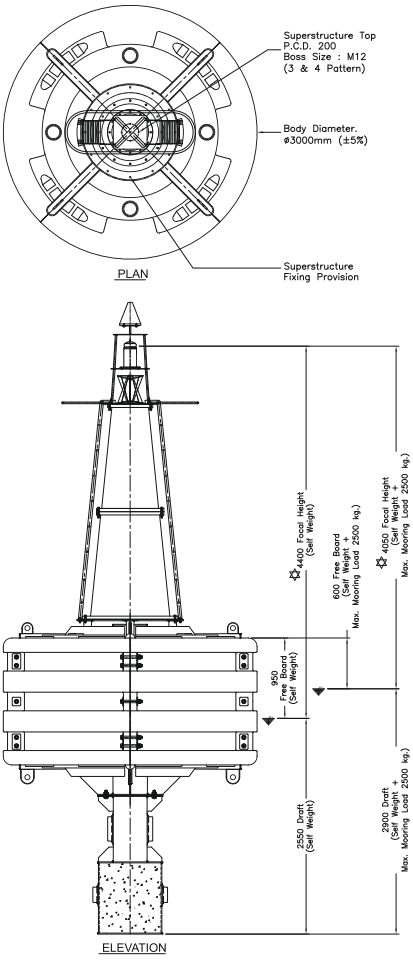
ATON Q SERIES

ATON 3000Q

ATON 3000Q is specifically designed for harsh, open sea conditions. Four rotationally moulded hull sections are supported by a strong steel frame combined with a moulded superstructure. ATON 3000Q is ideal for use as a safe-water buoy and is also capable of carrying weather and sea monitoring equipment together with AIS.



ATON 3000Q



✡ Extension Spacer for Higher Focal Height Available as Optional

SPECIFICATIONS

MATERIAL	ROTATIONALLY MOULDED UV-STABILISED VIRGIN POLYETHELENE	FREEBOARD	950mm WITHOUT MOORING 600mm WITH MOORING [2500 kg]
COLOUR	RED, GREEN, WHITE, YELLOW, COMBINATIONS AS PER IALA & REQUIREMENTS.	DRAFT	2550mm WITHOUT MOORING 2900mm WITH MOORING [2500 kg]
FILLING	CLOSED CELL LOW DENSITY POLYURETHENE FOAM	FOCAL HEIGHT	4400mm WITHOUT MOORING 4050mm WITH MOORING [2500 kg]
HULL DIAMETER	3000mm ±5%	CERTIFICATIONS	ISO 9001:2014
WEIGHT IN AIR	3800 kg	OPTIONS AVAILABLE	• TOP MARK AS PER IALA
LIFTING EYE	4 Nos.		• RADAR REFLECTOR
MOORING EYE	4 Nos.		• MARINE LANTERN
RESERVE BUOYANCY	2700 kg		• MONITORING/CONTROL SYSTEM
MAXIMUM MOORING LOAD	2500 kg		• MARKING/SIGN BOARD
SUBMERGENCE	72.41 kg/cm		• LANTERN GUARD

Environment Friendly & Recyclable

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HI-TECH MARINE BUOYS

FIBRE REINFORCED POLYMER BUOYS (FRP)
GLASS REINFORCED POLYMER BUOYS (GRP)

Hi-Tech Elastomers offers Glass Reinforced Polymer (GRP) / Fibre Reinforced Polymer (FRP) Buoys which are available in many colours. These buoys are manufactured from corrosion resistant material and do not require frequent maintenance. FRP/GRP Buoys can be designed for AtoN use and also to act as Mooring Buoys.

FEATURES

- Available up-to 3000mm diameter.
- Custom size & type of FRP/GRP buoys are also available on request.
- These buoys are unsinkable yet light in weight.
- Manufactured of fibre/glass reinforced polymer; they are anti-corrosive.
- Available in many in-built colors which eradicates the need for external painting and related maintenance & other optional navigational aids can be attached on top, similar to other types of buoys.
- These buoys have long service life and long interval between servicing.

AVAILABLE SIZE (mm)		
700	1000	1250
1500	1750	2000
2500	3200	3000
3500	4000	

Other size available on request

HI-TECH MARINE BUOYS

FOAM-FILLED MARINE BUOYS

Hitech foam-filled Buoys are constructed to withstand the toughest marine applications and environments. High resilience polyethylene closed cell foam is heat bonded together to form a foam core which is then cut to the desired shape and finally coated with nylon fabric-reinforced polyurea. Polyurea coating is abrasion-resistant and Uv stabilized. Also, the coating and foam are designed to withstand small collisions due to its impact-taking ability. These buoys can be supplied with ballast, superstructure, lantern, AIS, and custom moorings.

APPLICATIONS :

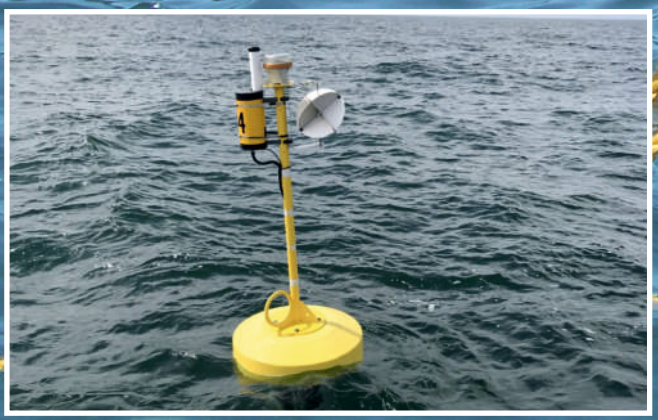
- Waterways
- Narrow channels
- Lock ways and gates
- Naval applications
- Backwater channels
- Channels operating cruise and sensitive vessels

FEATURES :

- Unsinkable structure as closed cell foam does not allow water ingression
- Can absorb small collisions
- Polyurea coating is nonmarking and UV stabilized hence no painting is necessary throughout its life cycle
- Excellent buoyancy
- High-strength steel inner core increases stability and durability

AVAILABLE SIZE (mm)									
700	1000	1250	1500	1750	2000	2500	3000	3200	3500

Other size available on request



HI-TECH MOORING BUOY

A buoy marking the location of a mooring & is usually attached to an anchor is known as Mooring Buoy.

Mooring buoys are designed to allow vessels to moor on them and numerous buoys can be used to moor one vessel.

Hi-Tech offers many types and configurations of mooring buoys to meet specific and unique requirements.

Mooring buoys can be made of steel/rubber/FRP/ GRP/Polyethylene/Polyurethane material.

Hi-Tech offers a fully customised service and is able to design a mooring buoy and system to meet your exact requirements.

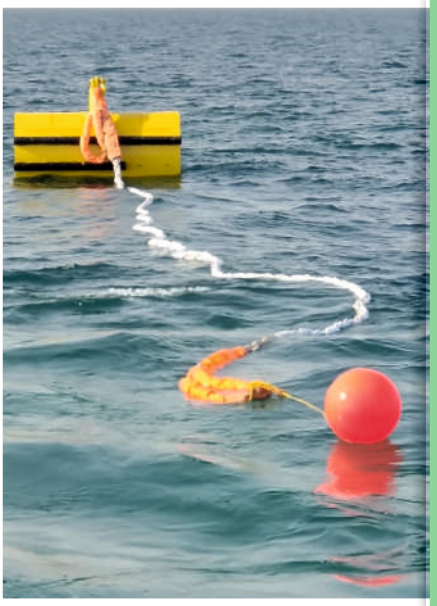
CYLINDRICAL MOORING BUOYS

PE MOORING BUOYS

QRMH MOORING BUOYS
Mooring Buoys with
Quick Reales Mooring Hook

HI-TECH ELASTOMERS LTD.
WHERE INNOVATION IS A TRADITION

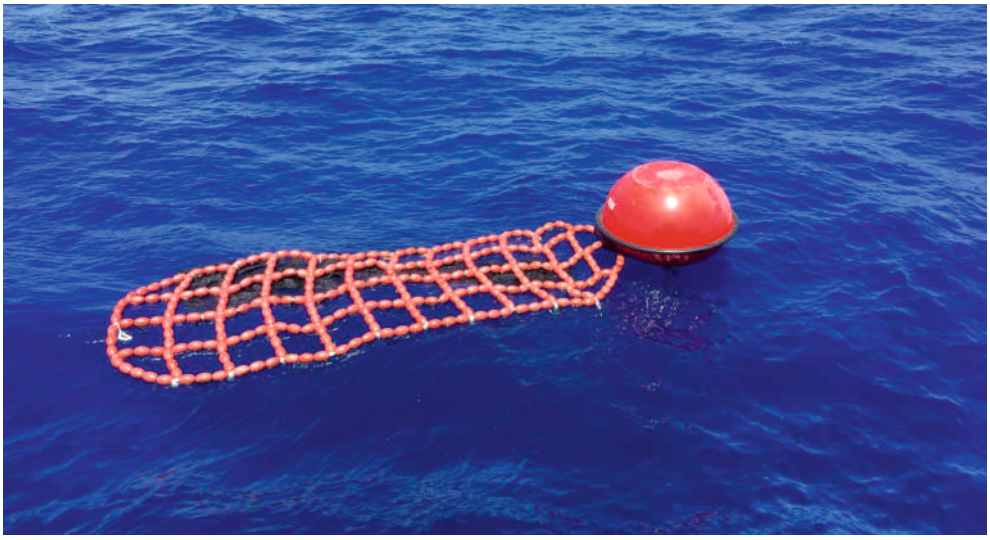
PRODUCT INSTALLATION PICTURES



HI-TECH MOORING BUOY

SPECIAL PURPOSE BUOYS

Here at Hi-Tech we are experienced in providing a host of special purpose buoys. Many such buoys can be modified from a standard product or special buoys can be designed. Examples of these products include:



FISH BUOY:

Commonly known as a FAD (fish aggregating device) which attracts fish by numerous reasons depending upon fish species. Fish are fascinated with floating objects. They aggregate in considerable numbers around objects such as drifting flotsam, rafts, jellyfish and floating seaweed. The objects appear to provide a "visual stimulus in an optical void" and offer some protection for juvenile fish from predators. The gathering of juvenile fish, in turn, attracts larger predator fish.

DATA BUOY:

Data buoys are fitted with sensors to measure air pressure, air temperature, wind speed and direction, wave height and direction, current speed and direction, sea surface temperature and salinity. Besides, the data buoys are fitted with global positioning system, satellite transceiver, navigation light and radar reflector. Some buoys are equipped with a wide range of water quality sensors The data collected from the data buoys are transmitted to the shore station having two-way communication facilities.

TSUNAMI BUOY:

These are anchored buoys that can detect sudden changes in undersea water pressure are used as part of tsunami warning systems in the Pacific Tsunami Warning Centre and Indian Oceans.

CATAMARAN BUOY:

A catamaran buoy is geometry-stabilized, that is, it derives its stability from its wide beam, rather than having a ballasted keel like a mono-hull. Often used in very rough sea areas or where the buoy is required to carry a large pay load (Data buoy for example).

HOSE SUPPORT BUOY (FLOATS):

These floats are used to support hoses such as dredging or oil hoses in the vicinity of oil terminals.

MOORING SYSTEMS & ACCESSORIES

Hi-Tech can supply a range of mooring systems and accessories to compliment the extensive range of marine aids to navigation.

HITECH can design and supply mooring accessories in accordance to IALA guidelines. Different mooring types are available depending on the mooring load conditions, water depth, current and mooring specifications.

MOORING OPTIONS

- single, 2, 4, 6 point mooring options
- steel chain mooring options
- various sinker weights and materials like cast steel, fabricated or rcc
- various types of anchors

AIDS TO NAVIGATION

COMPLETE MOORING SOLUTIONS

CHAIN, HARDWARE & SINKERS

Hi-Tech can provide turn-key mooring solutions for the range of buoy products, enabling complete systems to be containerised and delivered to customer sites around the world.

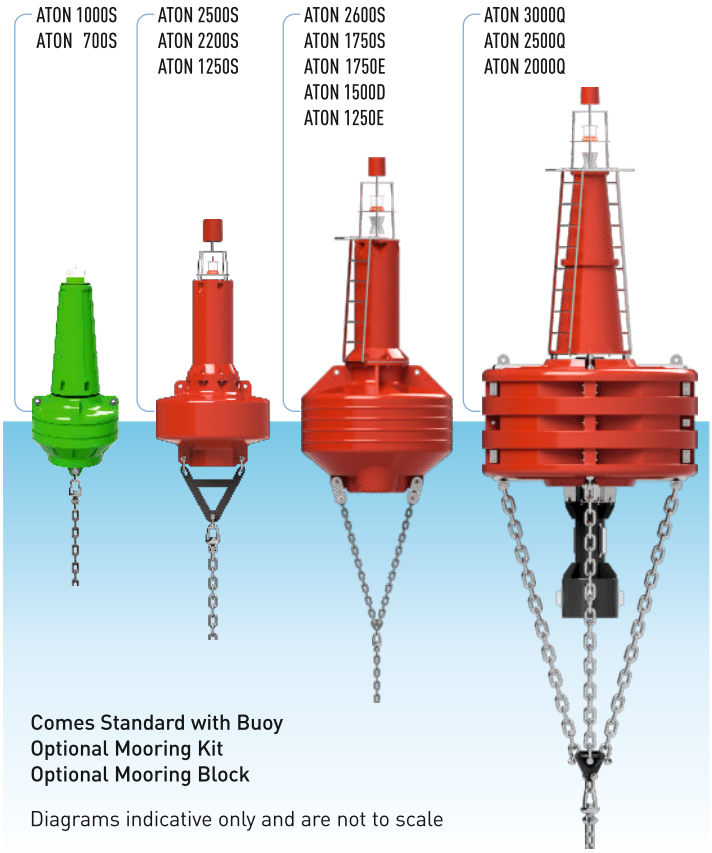
CONVENIENT TURNKEY SOLUTION

The delivery of a complete turnkey system provides customers with a single-source supply, and a convenient solution to their floating navigation aid requirements.

TAILORED TO SUIT SPECIFIC REQUIREMENTS

Mooring systems are designed to specifically suit Hi-Tech buoys and their unique environments, taking into consideration buoy type, water depth, current speed, and other operational parameters.

The complete systems include chain, mooring sinkers and associated hardware in various grades and sizes.



Comes Standard with Buoy
Optional Mooring Kit
Optional Mooring Block

Diagrams indicative only and are not to scale

The Hi-Tech Advantage

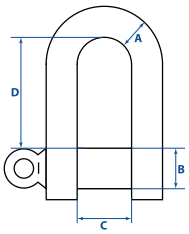
- Convenient, complete mooring solution to suit every Hi-Tech buoy type
- Range of sizes, grades, and configurations
- Includes chain, hardware and mooring sinkers
- Can be shipped with buoys to provide turnkey solution

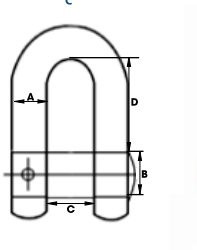
AIDS TO NAVIGATION
MOORING HARDWARE
CHAIN, HARDWARE & SINKERS

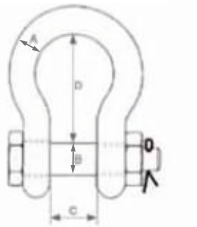
In addition to offering complete mooring solutions to complement each Hi-Tech buoy product, Hi-Tech also offers a range of mooring hardware such as chain, shackles and swivels for individual purchase as required.

The Hi-Tech Advantage

- Galvanised or black finish
- Range of grades
- Sizes from 10mm to 42mm
- Standard chain shot lengths
- Range of shackle types
- Range of swivel types





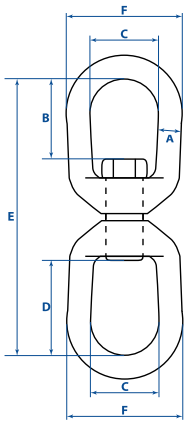


CHAIN

ORDER CODE	DESCRIPTION	WEIGHT PER LENGTH
CHAIN, GRADE L, GALVANISED		
SL-CHAIN-10-L-ST-GAL	Chain, 10mm, Grade L, Galvanised, 5 Mtr length	11 kg
CHAIN, GRADE U2, BLACK		
SL-CHAIN-16-U2-SL-BLK	Chain, 16mm, Grade U2, Black, c/w swivel, 27.5mtr length	150 kg
SL-CHAIN-20-U2-SL-BLK	Chain, 20.5mm, Grade U2, Black, c/w swivel 27.5mtr length	285 kg
SL-CHAIN-26-U2-SL-BLK	Chain, 26mm, Grade U2, Black, c/w swivel 27.5mtr length	431 kg
SL-CHAIN-32-U2-SL-BLK	Chain, 32mm, Grade U2, Black c/w swivel 27.5mtr length	635 kg
SL-CHAIN-38-U2-SL-BLK	Chain, 38mm, Grade U2, Black c/w Swivel, 27.5mtr length	888 kg
SL-CHAIN-42-U2-SL-BLK	Chain, 42mm, Grade U2, Black, c/w swivel, 27.5mtr length	1084 kg
CHAIN, GRADE U3, BLACK		
SL-CHAIN-26-U3-SL-BLK	Chain, 26mm, Grade U3, Black, c/w swivel 27.5mtr length	TBA

SHACKLE DIMENSIONS

ORDER CODE	DESCRIPTION	A	B	C	D
SHACKLE, DEE, GRADE M, GALVANISED					
SL-SHACKLE-13-M-D-GAL	Shackle, 13mm, Grade M, D, Galvanised	13	16	28	54
SL-SHACKLE-16-M-D-GAL	Shackle, 16mm Grade M, D, Galvanised	16	20	31	61
SL-SHACKLE-22-M-D-GAL	Shackle, 22mm, Garde M, D, Galvanised	22	25	44	83
SL-SHACKLE-25-M-D-GAL	Shackle, 25mm, Grade M, D, Galvanised	25	32	55	104
SL-SHACKLE-25-S-D-GAL	Shackle, 25mm, Grade S, D, Galvanised	25	29	43	81
SL-SHACKLE-32-M-D-GAL	Shackle, 32mm, Grade M, D, Galvanised	32	35	60	114
SL-SHACKLE-32-S-D-GAL	Shackle, 32mm, Grade S, D, Galvanised	32	35	52	100
SHACKLE, JOINING, GRADE U2, BLACK					
SL-SHACKLE-16-U2-J-BLK	Shackle, 16mm, Grade U2, Joining, Black	20	27	24	53
SL-SHACKLE-20-U2-J-BLK	Shackle, 20mm, Grade U2, Joining, Black	27	39	27	65
SL-SHACKLE-26-U2-J-BLK	Shackle, 26mm, Grade U2, Joining, Black	33	41	36	88
SL-SHACKLE-32-U2-J-BLK	Shackle, 32mm, Grade U2, Joining, Black	44	51	45	109
SL-SHACKLE-38-U2-J-BLK	Shackle, 38mm, Grade U2, Joining, Black	49	60	53	129
SL-SHACKLE-42-U2-J-BLK	Shackle, 42mm, Grade U2, Joining, Black	57	70	58	140
SHACKLE, LOCKING, BOW SAFETY, GALVANISED					
SL-SHACKLE-32-12-BLGAL	Shackle, 32mm, 12T, Bow, Galvanised	32	35	51	115
SL-SHACKLE-38-17-BLGAL	Shackle, 38mm, 17T, Bow, Galvanised	38	42	60	146



SWIVEL DIMENSIONS

ORDER CODE	DESCRIPTION	A	B	C	D	C	D
SWIVEL, EYE & EYE, GRADE M, GALVANISED							
SL-SWIVEL-10-M-EE-GAL	Swivel, 10mm, Grade M, Eye & Eye, Galvanised	10	26	25	35	110	52
SL-SWIVEL-13-M-EE-GAL	Swivel, 13mm, Grade M, Eye & Eye, Galvanised	13	34	30	46	63	63
SL-SWIVEL-16-M-EE-GAL	Swivel, 16mm, Grade M, Eye & Eye, Galvanised	16	40	44	60	138	76
SWIVEL, EYE & EYE, GRADE M, GALVANISED							
SL-SWIVEL-16-U2-EE-BLK	Swivel, 16mm, Grade U2, Eye & Eye, Black	16	48	22	48	289	64
SL-SWIVEL-26-U2-EE-BLK	Swivel, 26mm, Grade U2, Eye & Eye, Black	26	80	38	80	470	105
SL-SWIVEL-32-U2-EE-BLK	Swivel, 32mm, Grade U2, Eye & Eye, Black	32	105	53	105	590	135
SL-SWIVEL-42-U2-EE-BLK	Swivel, 42mm, Grade U2, Eye & Eye, Black	42	135	66	138	777	170

Note: All measurements are in mm.
All dimensions are approximate
- Specifications subject to change or variation without notice
- * Subject to standard terms and conditions

AIDS TO NAVIGATION

MOORING SINKERS

CAST IRON OR CONCRETE

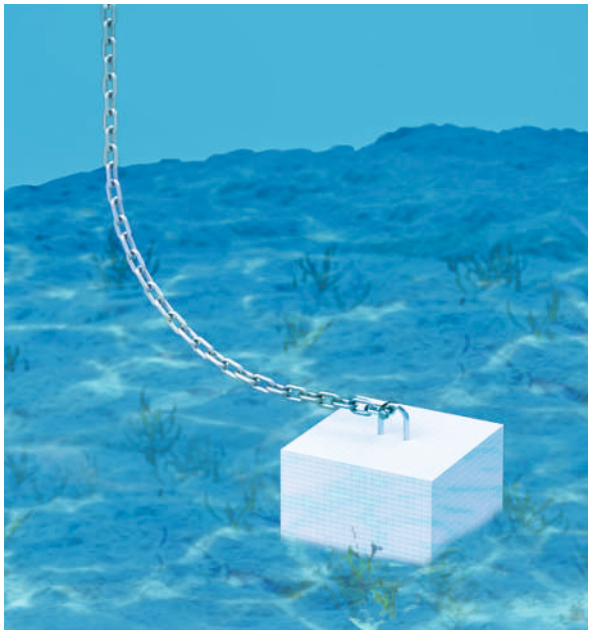
Hi-Tech has a selection of concrete and cast iron mooring sinkers available in various weights and sizes.

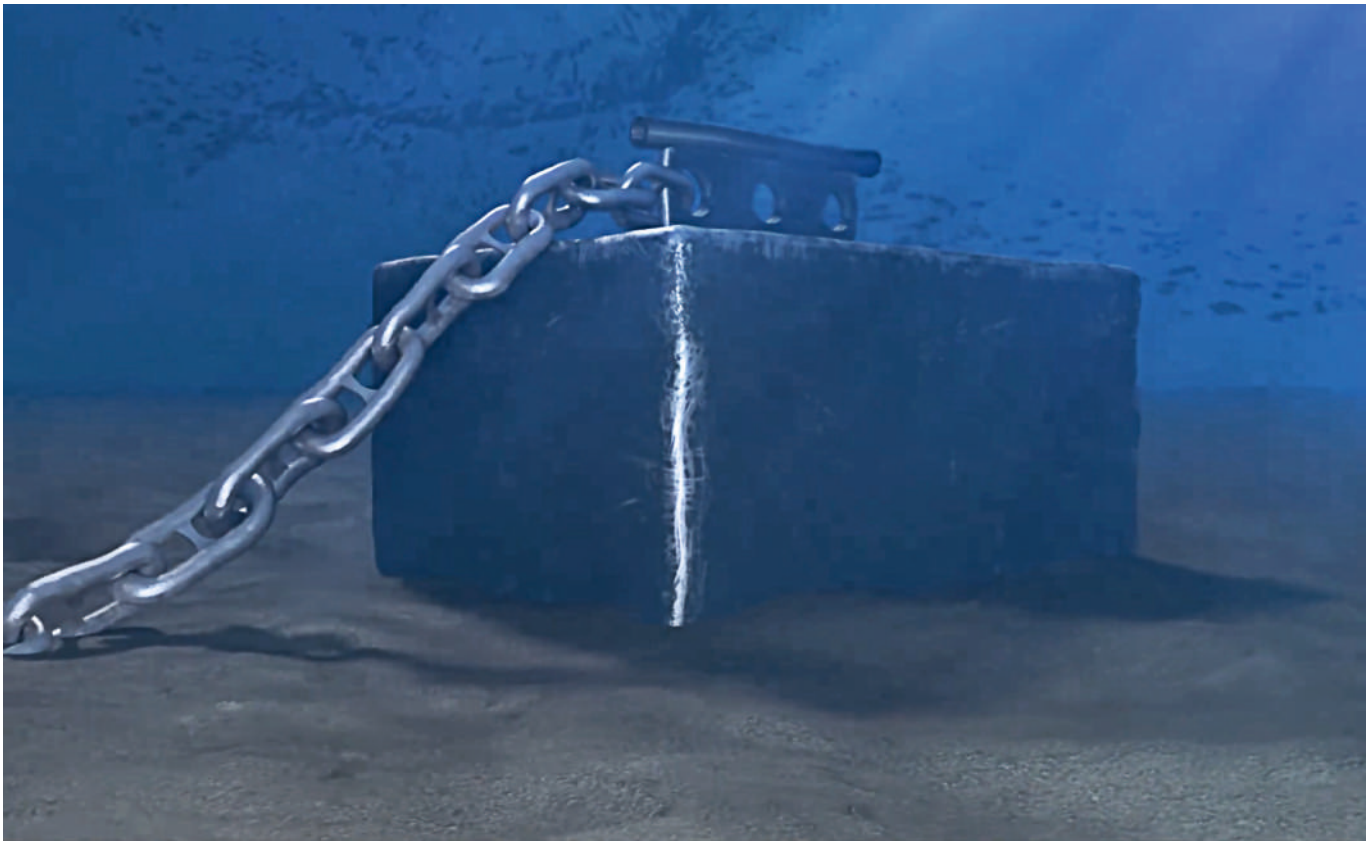
The Hi-Tech Advantage

- Range of mooring sinkers in various weights & sizes
- Available in concrete or cast iron

MOORING SINKERS (HMS)

ORDER CODE	DESCRIPTION	SIZE (LxWxH)(mm)
MOORING SINKERS, CONCRETE		
HMS-R-115	Mooring Sinker Concrete 115KG	550x550x160
HMS-R-180	Mooring Sinker Concrete 180KG	550x550x250
HMS-R-400	Mooring Sinker Concrete 400KG	900x900x250
HMS-R-1000	Mooring Sinker Concrete 1000KG	1220x1220x320
HMS-R-1800	Mooring Sinker Concrete 1800KG	1500x1500x370
HMS-R-3000	Mooring Sinker Concrete 3000KG	1700x1700x600
HMS-R-3600	Mooring Sinker Concrete 3600KG	1800x1800x505
MOORING SINKERS, CONCRETE		
HMS-S-100	Mooring Sinker Cast Iron 100KG	550x330x90
HMS-S-250	Mooring Sinker Cast Iron 250KG	640x425x160
HMS-S-350	Mooring Sinker Cast Iron 350KG	730x500x170
HMS-S-500	Mooring Sinker Cast Iron 500KG	840x600x165
HMS-S-1000	Mooring Sinker Cast Iron 1000KG	1100x860x170
HMS-S-2000	Mooring Sinker Cast Iron 2000KG	1400x1000x240
HMS-S-2500	Mooring Sinker Cast Iron 2500KG	1400x1000x300
HMS-S-3000	Mooring Sinker Cast Iron 3000KG	1500x1200x300
HMS-S-3500	Mooring Sinker Cast Iron 3500KG	1500x1200x350
HMS-S-5000	Mooring Sinker Cast Iron 5000KG	1800x1400x330





IALA MARITIME BUOYAGE SYSTEM

Who is IALA?

Established in 1957, IALA (International Association of Marine Aids and Lighthouse Authorities) is a non-profit international technical association. IALA provides nautical expertise and advice. IALA encourages its members to work together to harmonise aids to navigation worldwide and to ensure the movements of vessels are safe, expeditious and cost effective whilst simultaneously protecting the environment.

One of the ways IALA achieves this is by establishing technical committees which bring together experts from more than 80 countries around the world. The work of these committees is to develop recommendations on technologies and practices which are available in publications such as IALA Recommendations and Guidelines. Hi-Tech is proud to be an IALA member which ensures our products are compliant.

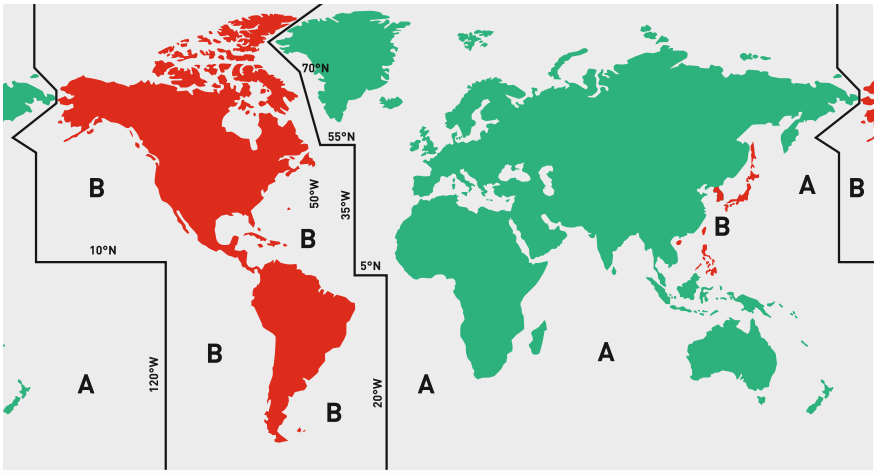
IALA is chiefly known for its buoyage system. As early as 1976, there were more than 30 dissimilar buoyage systems in use throughout the world. To avoid confusion and help create safe navigation to mariners of different regions IALA have created a worldwide buoyage system.

Region A & Region B

To minimise the number of changes to existing systems and to meet conflicting requirements IALA decided to create a system divided into two regions. The region followed is dependent on geographical location:

Region A: Europe, Australia, New Zealand, Africa, the Gulf and some Asian countries

Region B: North, Central & South America, Japan, North & South Korea and the Philippines



Types of Navigation Marks

The different types of marks used in the pilotage of vessels at sea are easily distinguished by their shape, colour, topmark by day and the colour and rhythm of the light by night. The five types of marks are:

Lateral Marks: indicate the edge of a channel

Cardinal Marks: indicate the position of a hazard and the direction of safe water

Isolated Danger Marks: indicate a hazard to shipping

Safe Water Marks: indicate the end of a channel and deep, safe water is ahead

Special Marks: indicate an area or feature such as speed restrictions or mooring area

Lateral Marks are the only marks that differ by region, the other four marks are common to both Region A and Region B.

IALA MARITIME BUOYAGE SYSTEM

Lateral Marks

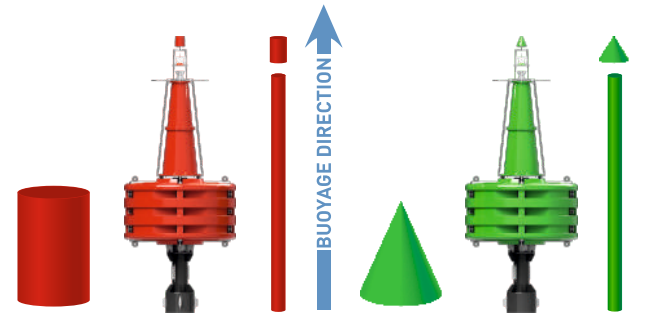
Lateral marks define a channel and indicate the port and starboard sides of the navigation route to be followed into a waterway such as a harbour, river or estuary from seaward. The vessel should keep port marks to its left and keep starboard marks to its right.

If lateral marks are unable to be represented by a can or cone shaped buoy they should carry the appropriate topmark.

At the point where a channel divides, a modified lateral mark is used to indicate a 'preferred' channel (often a deep channel suitable for heavy commercial vessels) on one side and a secondary channel on the other. A preferred channel is indicated by red and green horizontal bands on the lateral marker. If a vessel wants to use the 'preferred' channel they observe the top colour of the mark while a vessel wishing to use the secondary channel observes the bottom colour. See 'Preferred Channel to Starboard/Port' in Table 1.1 and Table 1.2

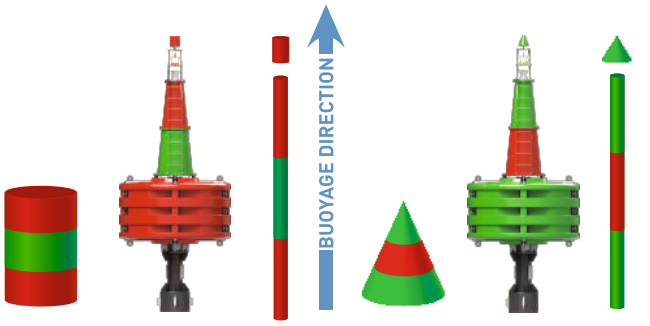
Table 1.1 LATERAL MARKS: REGION A

	Preferred Channel to Starboard	Preferred Channel to Port
Colour	Red	Green
Buoy Shape	Cylindrical (can), pillar or spar	Conical, pillar or spar
Topmark (if any)	Single red cylinder (can)	Single green cone, point upwards
Light Colour (when fitted)	Red	Green
Light Rhythm (when fitted)	Any apart from composite group flashing (2 + 1)	Any apart from composite group flashing (2 + 1)



Preferred Channel to Starboard | Preferred Channel to Port

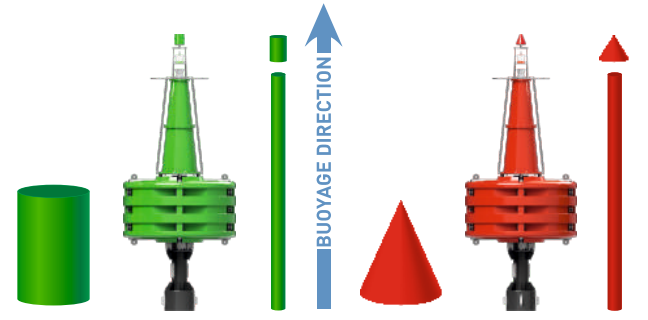
	Preferred Channel to Starboard	Preferred Channel to Port
Colour	Red with one broad green horizontal band	Green with one broad red horizontal band
Buoy Shape	Cylindrical (can), pillar or spar	Conical, pillar or spar
Topmark (if any)	Single red cylinder (can)	Single green cone, point upward
Light Colour (when fitted)	Red	Green
Light Rhythm (when fitted)	Composite group flashing (2 + 1)	Composite group flashing (2 + 1)



Preferred Channel to Starboard | Preferred Channel to Port

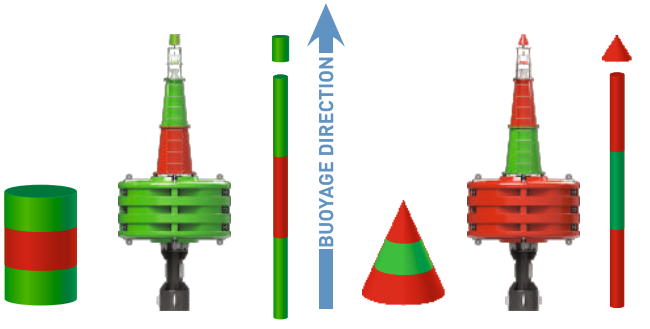
Table 1.2 LATERAL MARKS: REGION B

	Port Hand Marks	Starboard Hand Marks
Colour	Green	Red
Buoy Shape	Cylindrical (can), pillar or spar	Conical, pillar or spar
Topmark (if any)	Single green cylinder (can)	Single red cone, point upwards
Light Colour (when fitted)	Green	Red
Light Rhythm (when fitted)	Any apart from composite group flashing (2 + 1)	Any apart from composite group flashing (2 + 1)



Preferred Channel to Port | Preferred Channel to Starboard

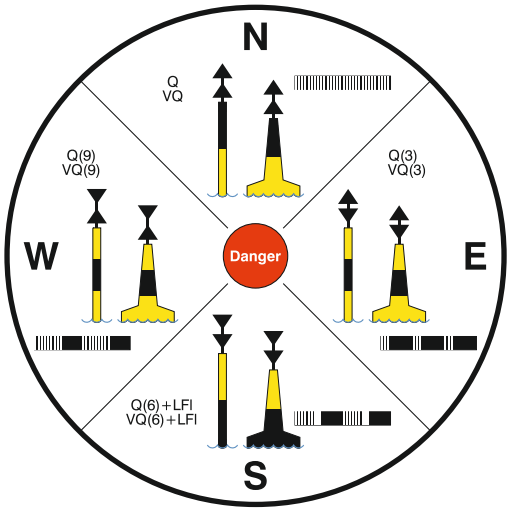
	Preferred Channel to Starboard	Preferred Channel to Port
Colour	Green with one broad red horizontal band	Red with one broad green horizontal band
Buoy Shape	Cylindrical (can), pillar or spar	Conical, pillar or spar
Topmark (if any)	Single green cylinder (can)	Single red cone, point upward
Light Colour (when fitted)	Green	Red
Light Rhythm (when fitted)	Composite group flashing (2 + 1)	Composite group flashing (2 + 1)



Preferred Channel to Starboard | Preferred Channel to Port

IALA MARITIME BUOYAGE SYSTEM

Cardinal Marks



A cardinal mark is used to signify a danger and show where the safest water can be found. Cardinal marks indicate the direction of safety as a compass direction relative to the mark. A cardinal mark is named after the quadrant in which it is placed. Due to the unique way cardinal marks use the points of a compass to signal safety it makes them meaningful regardless of the direction of the approaching vessel.

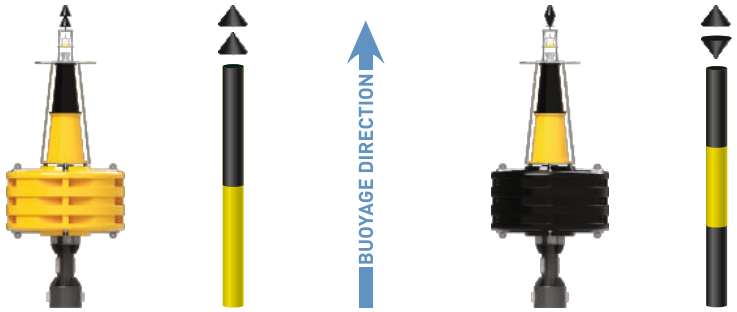
Cardinal marks have distinctive black and yellow markings and topmarks.

Cardinal marks can be used to show the following:

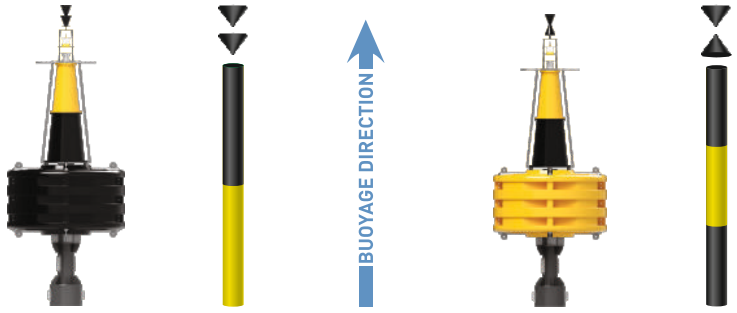
- The deepest water on an area on the named side of the mark
- The safe side on which to pass a danger
- Draw attention to a feature in a channel such as a bend, junction or end of a shoal

Table 2.1 CARDINAL MARKS: REGION A & REGION B

	North Cardinal Mark	East Cardinal Mark
Colour	Black above yellow	Black with a single broad horizontal yellow band
Buoy Shape	Pillar or spar	Pillar or spar
Topmark	2 black cones, one above the other, pointing upward	2 black cones, one above the other, base to base
Light Colour (when fitted)	White	White
Light Rhythm (when fitted)	VQ or Q	VQ(3) every 5 seconds or Q(3) every 10 seconds



	North Cardinal Mark	East Cardinal Mark
Colour	Black above yellow	Black with a single broad horizontal yellow band
Buoy Shape	Pillar or spar	Pillar or spar
Topmark	2 black cones, one above the other, pointing upward	2 black cones, one above the other, base to base
Light Colour (when fitted)	White	White
Light Rhythm (when fitted)	VQ or Q	VQ(3) every 5 seconds or Q(3) every 10 seconds



Q & VQ LIGHT RHYTHMS

Q and VQ refer to the rhythm of a flashing light. Q is a quick flashing light and VQ is the symbol for a very quick flashing light.
Q = Flash frequency is at least 50 or 60 flashes per minute (1.2 or 1 flashes per second)
VQ = Flash frequency is at least 100 or 120 flashes per minute (0.6 or 0.5 flashes per second)

IALA MARITIME BUOYAGE SYSTEM

Isolated Danger Marks

An isolated danger mark is used to indicate a hazard to shipping such as a submerged rock or wreck which has navigable water all around it. It is erected or moored above the hazard.

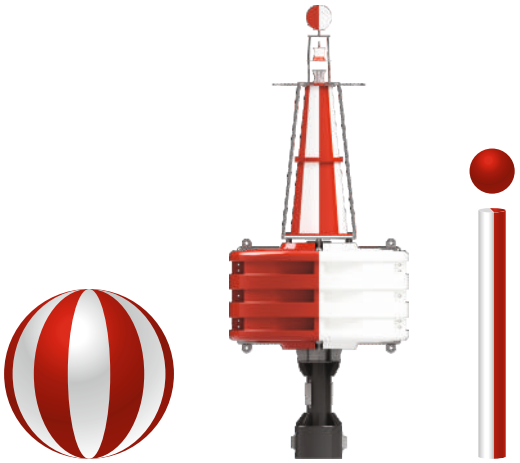
The double sphere topmark is an important feature and needs to be visible by day. The topmarks should be as large as possible with the spheres clearly separated.

Table 3.1 ISOLATED DANGER MARKS: REGION A & REGION B

	Isolated Danger Mark
Colour	Black with one or more broad horizontal red bands
Buoy Shape	Optional, but not conflicting with lateral marks; pillar or spar preferred
Topmark	2 black spheres, one above the other
Light Colour (when fitted)	White
Light Rhythm (when fitted)	Group flashing (2)

SAFE WATER MARKS

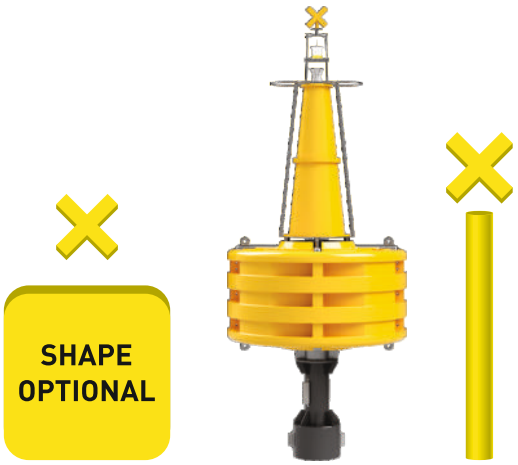
Safe water marks indicate there is navigable water all around the mark including the end of a channel or mid channel, however, this mark does not mark a danger. They are the only mark to have vertical stripes.



	Safe Water Marks
Colour	Red and white vertical stripes
Buoy Shape	Spherical; pillar or spar with spherical topmark
Topmark	Single red sphere
Light Colour (when fitted)	White
Light Rhythm (when fitted)	Isophase, occulting, one long flash every 10 seconds or Morse "A"

SPECIAL MARKS

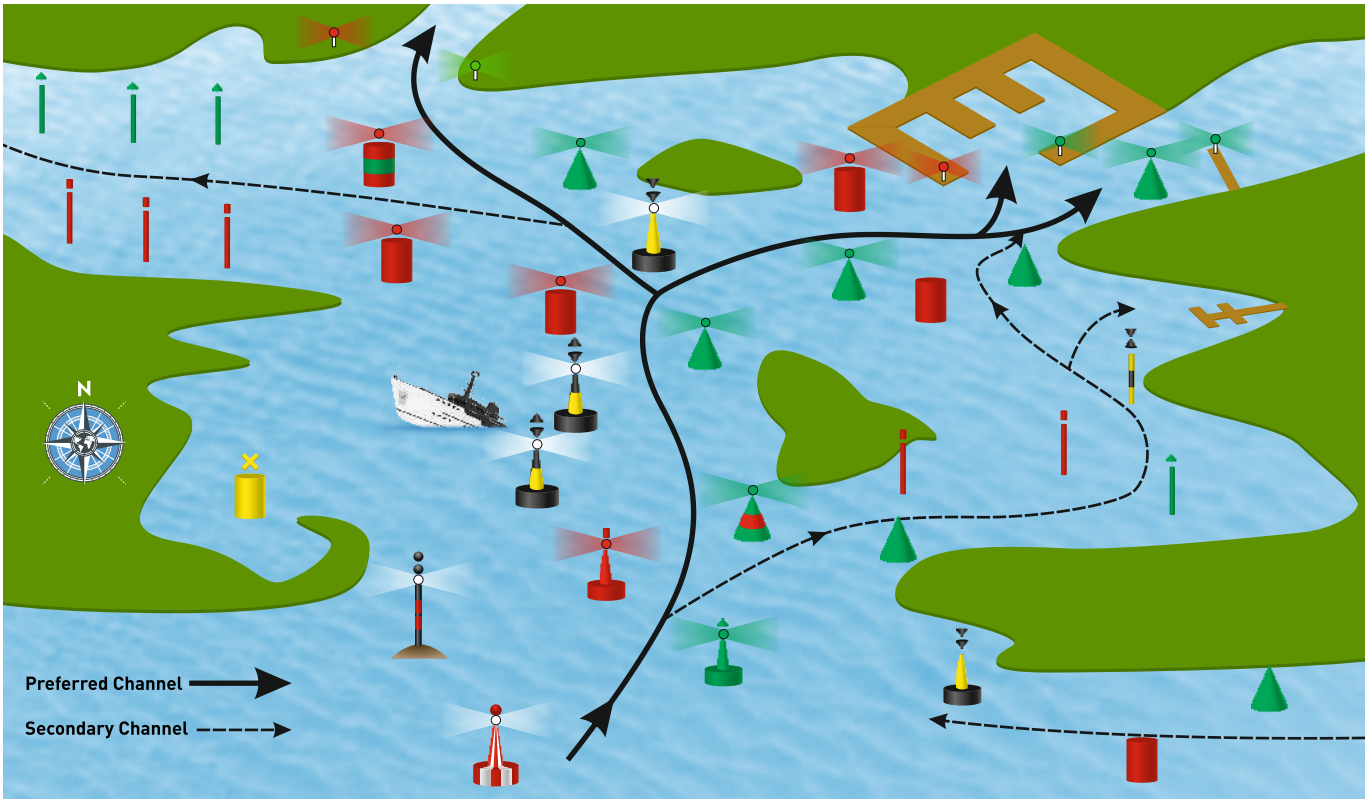
Special marks do not usually assist navigation but are used to indicate a feature such as recreation zones, speed limits, mooring areas or cable and pipe lines including outfall sewerage pipes.



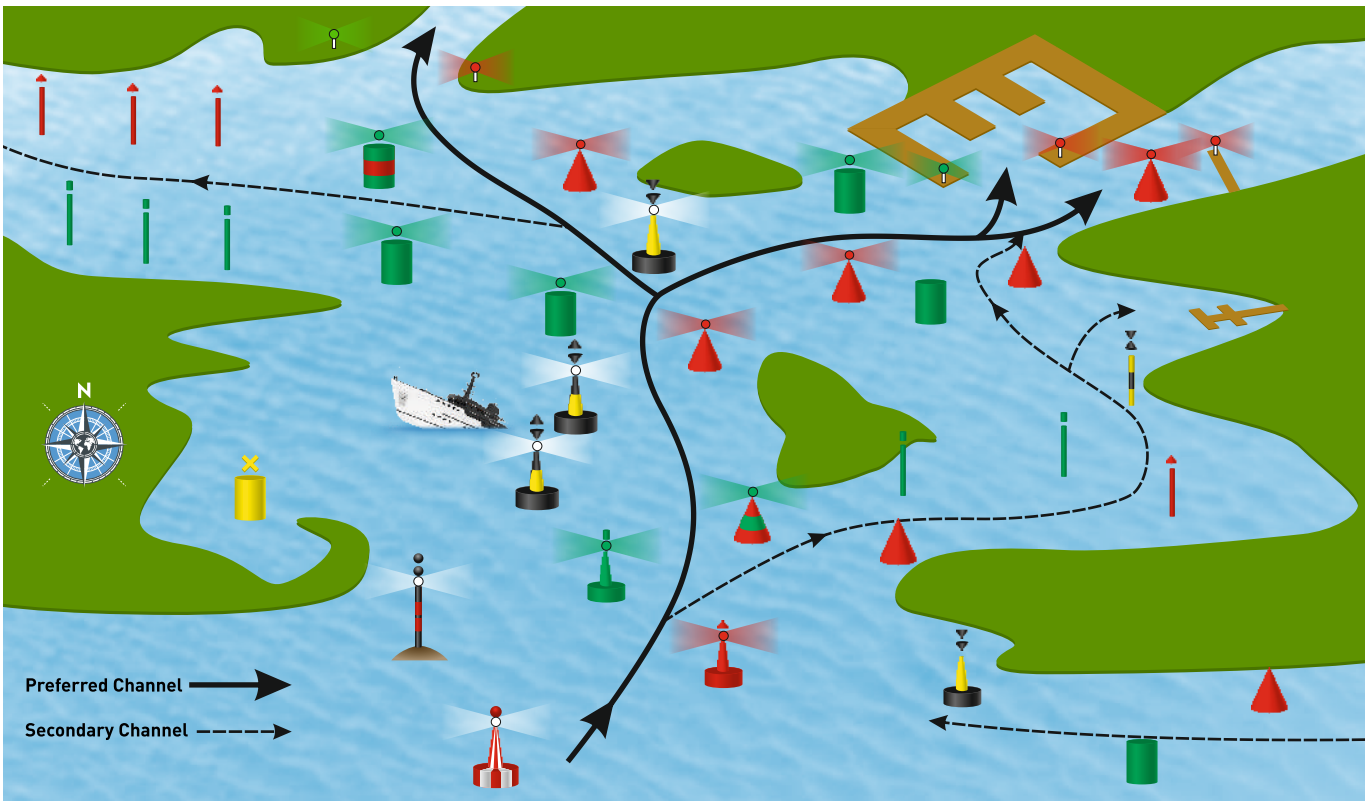
	Special Marks
Colour	Yellow
Buoy Shape	Optional but not conflicting with navigational marks
Topmark	Single yellow 'X' shape (St Andrew's Cross)
Light Colour (when fitted)	Yellow
Light Rhythm (when fitted)	Any other than those described in cardinal, isolated danger and safe water marks

IALA MARITIME BUOYAGE SYSTEM

IALA Buoyage System Example, Region A



IALA Buoyage System Example, Region B



The information contained in this publication is advisory only. Please contact your local authority for rules and regulations particular to your region.
For further information about IALA and the IALA Maritime Buoyage System please visit www.iala-aism.org
References:
IALA Maritime Buoyage System, IALA Publications, viewed 3 May 2010, http://www.iala-aism.org

HI-TECH ELASTOMERS LTD.
WHERE INNOVATION IS A TRADITION

PRODUCT INSTALLATION PICTURES

Specifications are for general guidance
Only and subject to change without notice.

HI-TECH ELASTOMERS LTD.

WHERE INNOVATION IS A TRADITION

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