

Version: 1.4



VEP8

Emergency Position Indicating Radio Beacon User Guide

**No.36 RESEARCH INSTITUTE
OF CHINA ELECTRONICS TECHNOLOGY GROUP CORPORATION**

■ Before you begin

Dear customer:

Thank you for purchasing the VEP8 Emergency Position Indicating Radio Beacon. This guide provides you with detailed installation, operation and specification information for using the VEP8. Read it carefully for safe and proper use before you begin. And keep the guide for future consultation.

■ Notice

This guide is the property of JEC. It contains necessary information for the customer and it subjects to change without notice. Jec is not liable for the failure of the product resulting from misuse, abuse, accident, incorrect environments or wear from ordinary use.

■ Product Warranty

JEC warrants to you, the end-customer, that the specifications and performance of the product meet the technical standard as set forth in this guide and that this product will be free from defects in material and workmanship.

■ Repair Service

Failure of the product resulting from proper use and maintenance will be repaired free of charge within a year starting from the date of purchase. Within the country, the cost of shipping the product to JEC will be borne by the customer and the cost for returning it will be on JEC. However, for a foreign customer, all will be borne by him including cost of shipping to and from the foreign country, custom duties, and other fees and charges.

■ Limited Warranty

This warranty is limited to the VEP8 Emergency Position Indicating Radio Beacon. JEC will not repair it free of charge if failure of the product is caused by negligence, modification without authorization, use in incorrect environments and force majeure. A list of estimated cost for repairing will be submitted to the owner before repairing.

Except for the above warranty statement, JEC disclaims all other warranties, express or implied, including any implied warranty of merchantability and the rationality and fitness for some special applications, whether in the contract, civil negligence or any other. JEC is not liable for any special, incidental or indirect damage.

△Attention△

The VEP8 emergency position indicating radio beacon is used for maritime emergency. It works effectively in emergence but it is not recommended for use in the air or on land though it can be transported by air or land. It is an emergency device that is used only under very serious and emergency conditions. False alarms set intentionally or unintentionally will lead to severe punishment (in loss in life and money).

Safety Cautions

In the use and maintenance of the product, attention must be called to the following safety points. The protection functions provided with this product will be weakened if the following and other points put forth in this guide are not followed. JEC will not be responsible for the damage caused this way.

Points for attention:

- The VEP8 emergency position indicating radio beacon is an emergency device that is used only under very serious and emergency conditions. False alarms will result in loss in life and money;
- Read carefully the guide before installation, test and use of the VEP8;
- Do not open the sealed case. Unauthorized persons are not allowed to maintain and adjust the VEP8;
- Make sure that the VEP8 you use is registered with the local authority (with code of country);
- The VEP8 does not include customer serviceable parts. Return it to your local support representative for change of batteries and other service;
- The VEP8 will be transmitting RF signals once it is turned on but the radiation will not be harmful to human beings;
- Bumping into hard or sharp objects may result fire or unrecoverable damage.

Check on Opening the Packing Case

Follow the procedures below when you have received the product:

- ◆ Check for any damage caused by transportation

Contact JEC or your authorized support representative immediately if the packing is seriously damaged.

Important: Do not return the product before you have positive reply from JEC or the representative.

- ◆ Check against the list

Make sure that you have received everything listed below:

Table 1 Itemized list of the VEP8

Description	Remarks
Beacon	Complete with the lanyard and positioning pin
Release device	Complete with 4 bolts for installation
Hydrostatic release unit (HRU)	Complete with 4 bolts for installation and authorization certificate
User guide	Including details on installation, operation, and maintenance
Product quality certificate	Test report for delivery
Warranty card	Warranty information

Contact JEC or your authorized support representative for discrepancy and damage.

- ◆ Visual and performance check of the beacon

Contact JEC or your authorized support representative if the case of the beacon is broken or the performance is off standard.

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Emergency Position Indicating Radio Beacon

User Guide

1 General

Cospas/Sarsat system is a satellite system that provides alarming and location data to assist searching and rescuing actions. It detects 406MHz signal from position indicating radio beacons through air- or ground-based equipment to identify the coordinates of position of accident. The accident location and other relevant information are forwarded to associated domestic searching and rescuing organizations by Cospas/Sarsat mission control center. It aims at assisting every organization with such responsibility around the world to carry on its searching and rescuing actions, no matter at sea, in the air, or on land.

The VEP8 Satellite Emergency Position-Indicating Radio Beacon (VEP8-EPIRB) is used in the global maritime distress and safety system (GMDSS) of Cospas/Sarsat system. Fig 1 shows us how a global maritime accident alarming system functions based on independent identification and emergent accident signals.

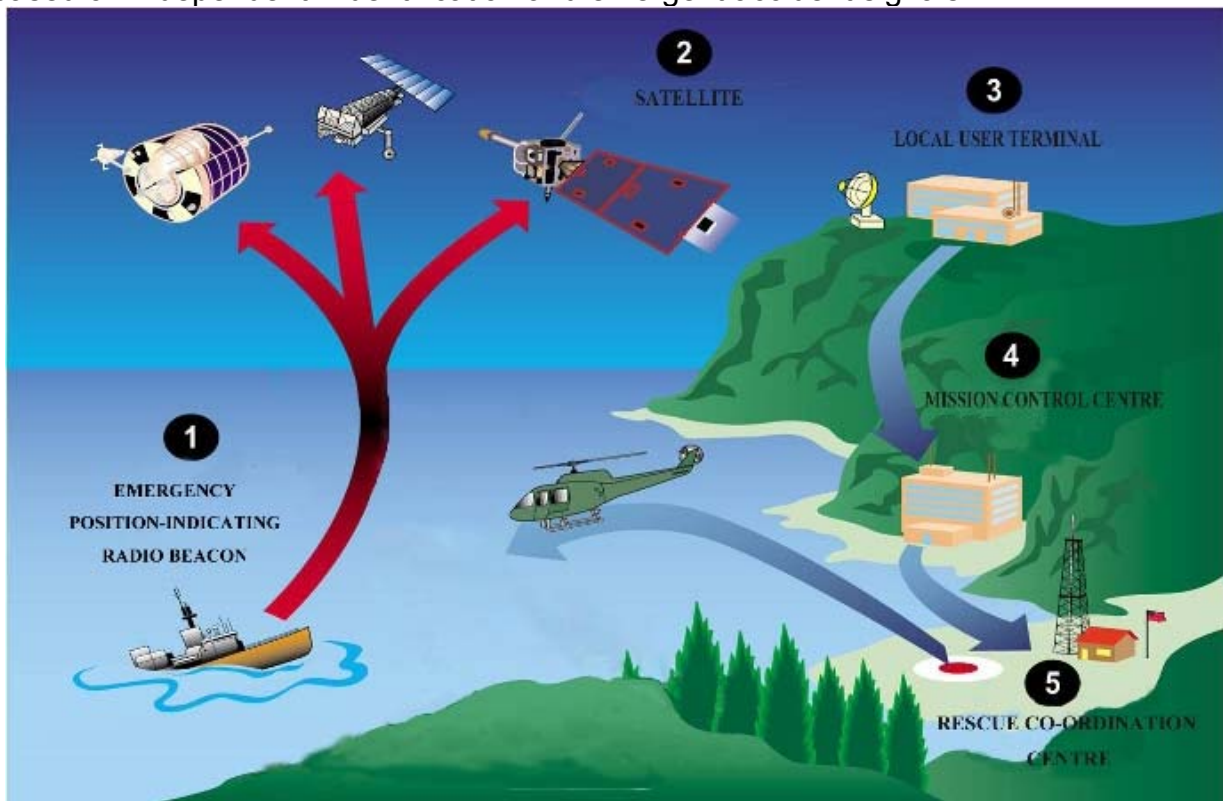


Figure 1 A global maritime accident alarming system

Composition of the Cospas/Sarsat system:

- a) 6 LEOSAR satellites;
- b) Local User Terminals (LUTs);
- c) Mission Control Center/Rescue Coordination Center (MCC/RCC);
- d) Satellite Emergency Position Indicating Radio Beacons (EPIRBs).



Figure 2 Cospas/Sarsat system

EPIRB signal processing procedures:

- a) Turning on of EPIRB;
- b) EPIRB transmits a 0.52s-length signal that carries ship identification code or serial number, with the interval of about 50s;
- c) The satellite receives signal from the EPIRB, and retransmits the signal to usable LUT within its visual angle;
- d) LUT processes the received signal to get the positional information of EPIRB, and send it to MCC;
- e) The information is also provided to the air unit of the Search and Air Rescue (SAR) organization through 121.5MHz homing signals.

2 Product Description

The VEP8, self-floating Satellite Emergency Position Indicating Radio Beacon (VEP8-EPIRB), transmits 406MHz emergency signal and 121.5MHz homing signal, which meet relevant regulations of IMO/IEC and Cospas/Sarsat. It is a necessary equipment in emergency search and rescue.

When the ship sinks down, the VEP8 will automatically release from the release device, and transmits 406MHz SOS signals. The signal will be received by Cospas/Sarsat system satellite and forwarded to coast terminals. LUT will get the location of the position indicating beacon through decoding and analyzing, and send the data to RCC, for carrying out emergency rescue.

The VEP8 sends emergency signal to rescue systems all around the world through satellite. The signal can be received in any place and be quickly identified and located, with the precision within 2nm.

The VEP8 meets the requirements of Cospas/Sarsat EPIRBs, and has the following two transmitters:

- a) frequency of 406MHz: locate and identify signals through Cospas/Sarsat satellite;
- b) aviation distress frequency of 121.5MHz: assist in searching and rescuing through automatically guiding program.

The VEP8 can be used in ships of any size, and possesses the following advantages:

- a) Simple installation and storage (optimal design);
- b) Simple and safe operation;
- c) Able to realize manual transmitting through simple operation;
- d) Simple process under emergency (ergonomics design);
- e) Possesses multilevel switch protection system that prevents mis-operation. (water-activating switch, magnet switch);
- f) Automatic releasing mechanism, able to be released under the depth between 2~4m, and ascend to the water surface;
- g) Bright orange body case, water-tight>1bar;
- h) Manual switching on for self-test;
- i) Battery life: 5 years, able to continuously operate for more than 48 hours.

3 Product Specifications

Operating temperature range:	-20°C ~ +55°C
Storage temperature range:	-40°C ~ +65°C
Battery:	Li/SOCI2, period of validity: 5 years
Operating time:	48h@ -20°C, 80h@+20°C
Body case:	ABS plastic
Waterproof capability:	1bar
Dimensions:	Φ140/ H231.5mm (antenna not excluded)
Weight:	< 1.7kg
Strobe light:	24 times per minute (>1cd)

406MHz satellite signal transmitting:

Transmitting frequency:	406.040MHz ± 1kHz
Frequency stability	
- Short-term:	< 2 × 10 ⁻⁹ /100ms
- Medium term:	average gradient: ±1 × 10 ⁻⁹ /min
	Residual frequency change: ≤3 × 10 ⁻⁹
Output power:	5W (37dBm) ± 2dB
Phase modulation:	1.1rad ± 0.1rad
Repetition period:	47.5s ~ 52.5s
Transmission time:	520ms ± 1% or 440ms ± 1%
Data encoding:	Bi phase L

121.5MHz homing transmitting:

Transmitting frequency:	121.5MHz ± 3kHz
Output power:	> 50mW (+17dBm)
Modulation type:	A3X
Modulation duty cycle:	33% ~ 43%
Transmission duty cycle:	97%(continuously transmitting)

Global positioning system

Receiver type:	50 Channels, GPS L1 frequency, C/A Code
Position accuracy:	<100m (Horizontal, Autonomous)
Cold start:	32s (Autonomous)
Receive antenna:	Ceramic patch

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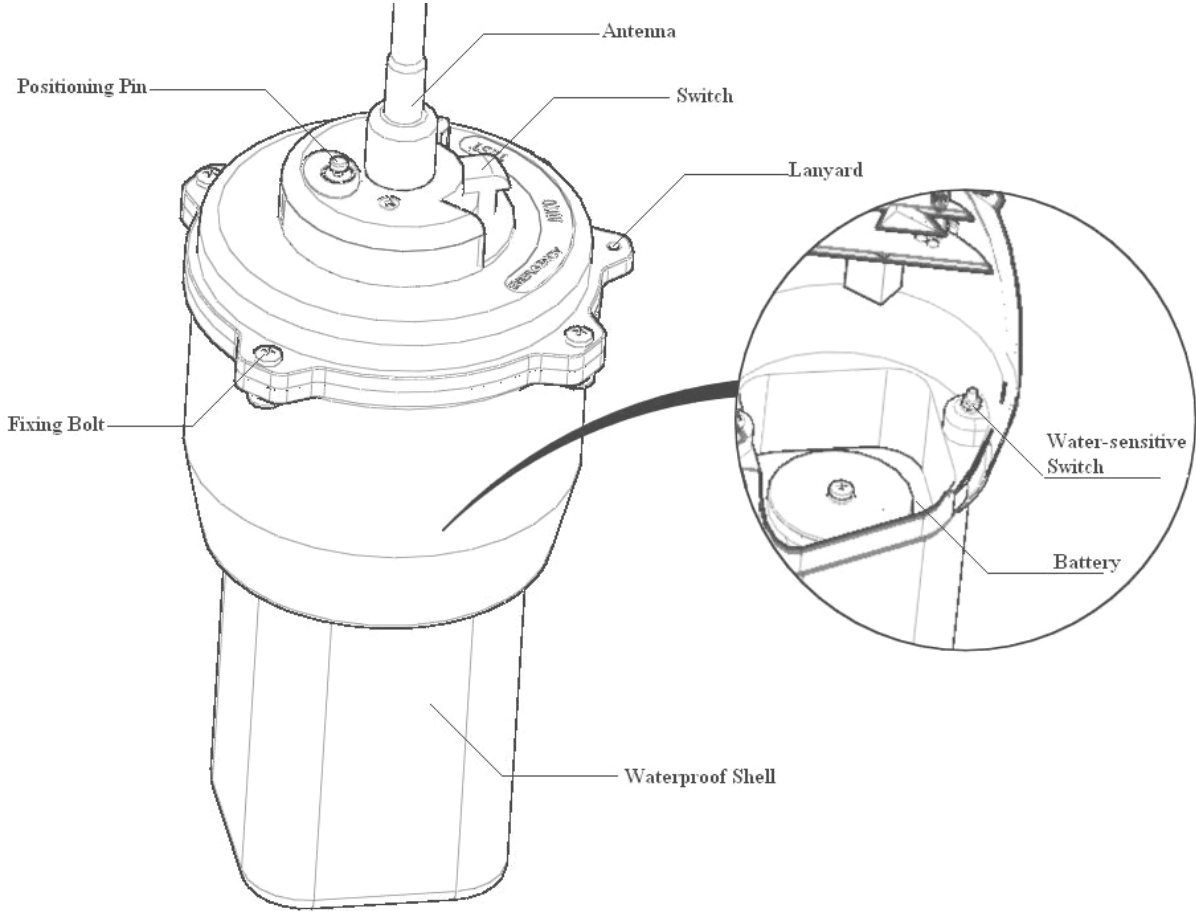
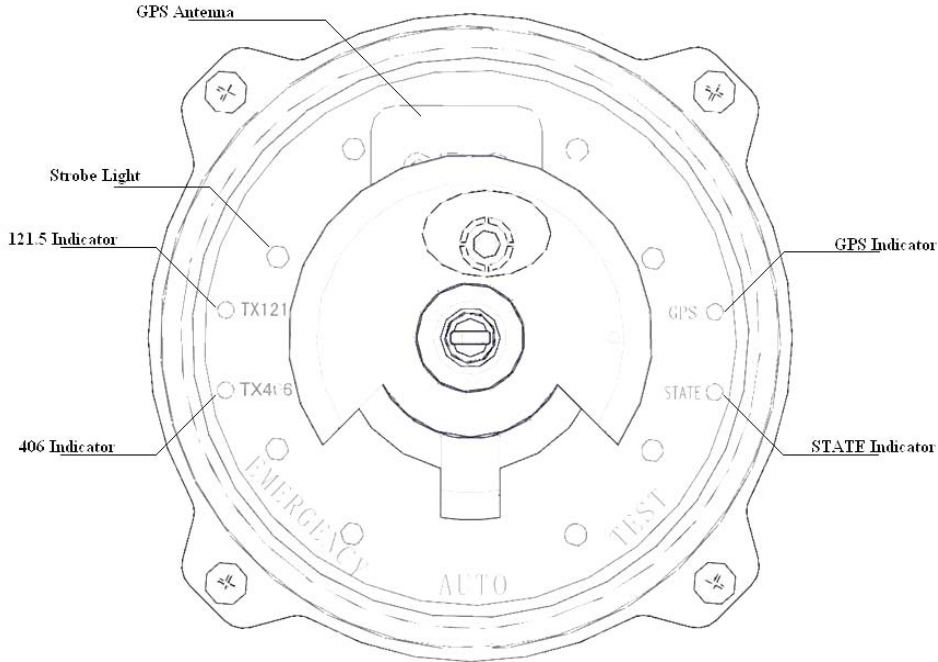


Figure 3 Mechanical structure of the VEP8



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Figure 4 Top view of the VEP8

4 Operation

4.1 Site selection

Generally speaking, the VEP8 is floating on the sea. However, for the best performance of the VEP8, the following can be followed in case of other situations.

On board: place the VEP8 in a wide-field and uncovered place, keep the VEP8 vertical (if possible, hold up in hand); and then turn on the VEP8.



Do not place the VEP8 beside big structural parts, lay the VEP8 on its side, or lay the VEP8 in a covered place.

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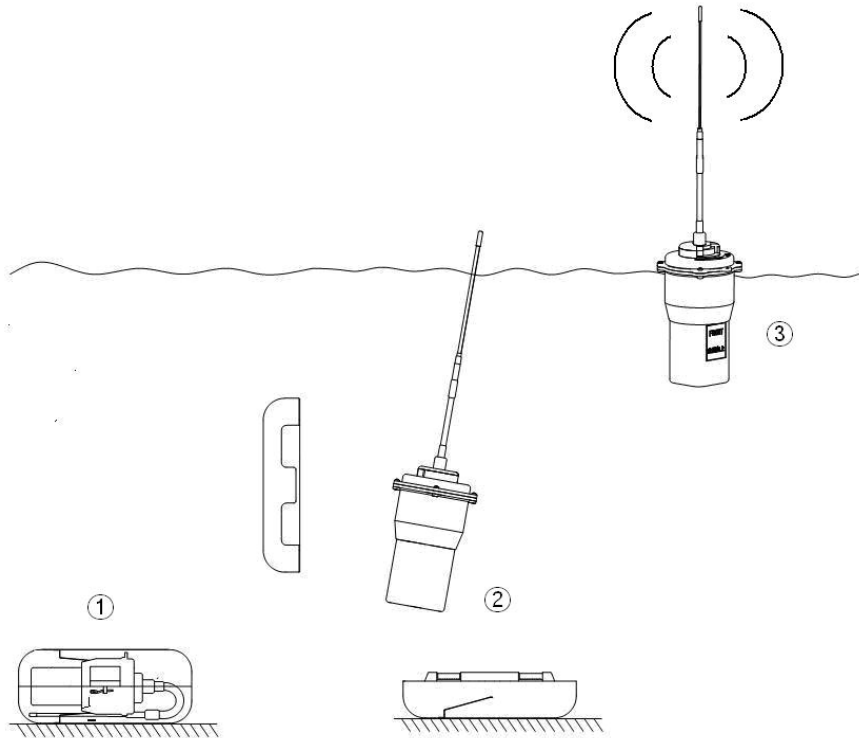
On life boat: raise up the VEP8 as high as possible.

Note: gaze at flashlight for a long time may cause discomfort.

Note: lay the VEP8 in water may obtain better transmission result.

4.2 Automatic operation mode

The VEP8 is of self-floating type. Once the boat is sinking in shipwreck, the VEP8 sinks with the boat, and will be released from the release device and comes up to the water surface before it reaches 4 meters in depth in the sea. Once the water-sensitive switch of the VEP8 is turned on by water, the indicator of the VEP8 starts to blink and automatically send out SOS signals.



In order to be rescued in a the shortest possible time, the personnel on the life boat can take out the VEP8 from the release device, tie the VEP8 to the life boat with the rope, and throw the VEP8 into the sea. Once the water-sensitive switch of the VEP8 is turned on by water, the indicator of the VEP8 starts to blink and it starts to work. The operating mode is shown in Figure 5.

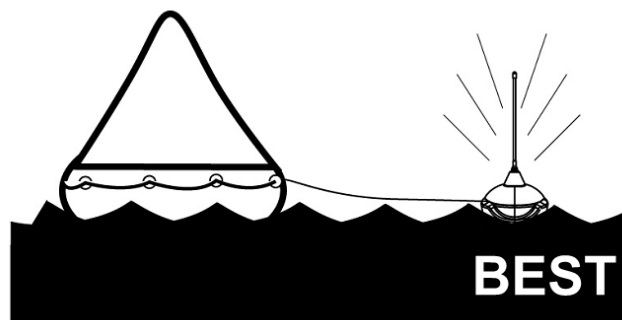


Figure 5 The best application on life boat

In circumstances of emergency operation mode, the status of indicator refer to Table 2.

Table 2 Emergency operation mode

EPIRB STATE	LED TX121	LED TX406	LED GPS	LED STATE	Strobe Light
Normal operation status	Transmitting: Flash	Transmitting: Flash	OFF	OFF	Night:Flash Day:OFF
GPS fixing	X	X	Flash	OFF	As above
Fixing successful	X	X	ON	OFF	As above
Position update successful	X	X	ON→OFF	OFF	As above
406MHz output power low	X	ON	X	X	As above
121.5MHz output power low	ON	X	X	X	As above
PLL operation fault	X	X	X	Flash 4 times	As above
Low voltage of battery	X	X	X	Flash 5 times	As above
Temperature sensor fault	X	X	X	Flash 6 times	As above
Main board communication fault	X	X	X	Flash 8 times	As above

Note:

" X " represents the status of indicator determined by the correspondent operation mode, including illumine, extinguish or flash.

ON = illumine, OFF = extinguish.

4.3 Manual operation mode

Sometimes, the boat is in danger but not sinking, manual operation can be selected to send SOS signals.

First, remove safety pin under HRU, open the release device, and take out the VEP8, carry it to a wide-field place; And then rip off the label of positioning pin, right shift the switch 5mm, and pull out the positioning pin, then the switch will be automatically bounced to the “EMERGENCY” position. The STATE indicator light of the VEP8 blinks; it means the VEP8 starts to work. The specific procedures can be referred to in Fig 6.

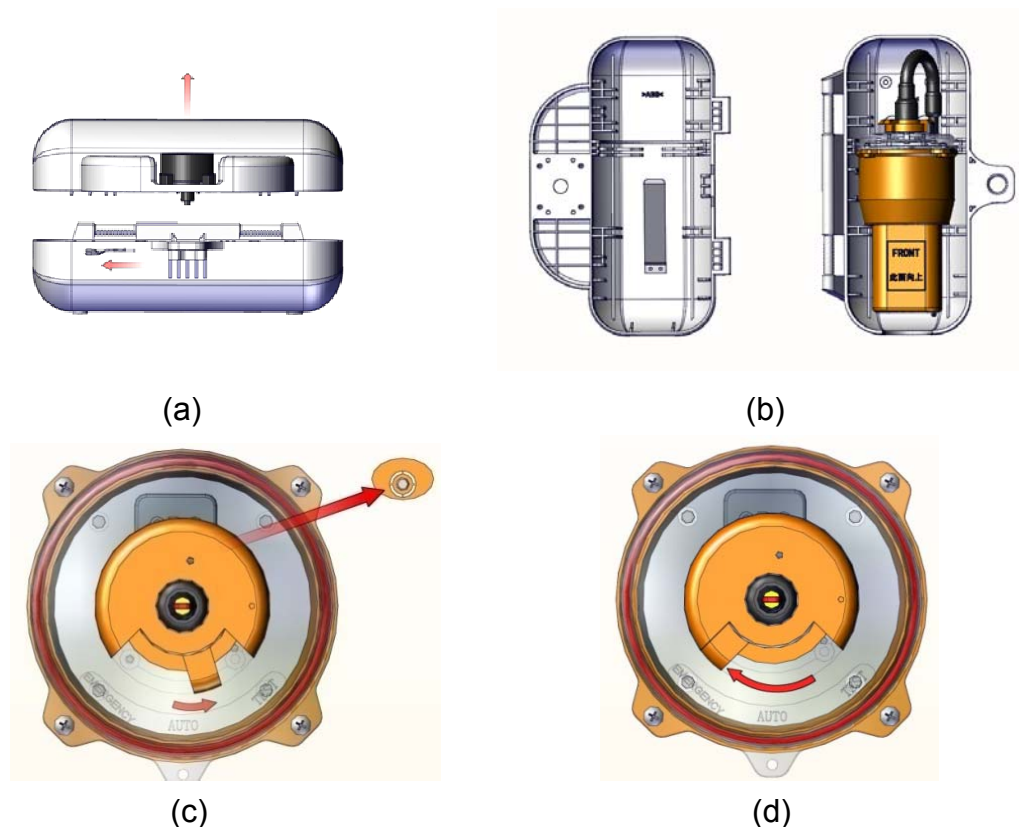


Figure 6 Illustration of manual operating method

Note: the GPS receiver in the VEP8 needs a wide-field vision to ensure that its position signal can be received by enough number of satellites. If there are not enough satellites, the VEP8 will continuously transmit 406MHz distress signals for Cospas/Sarsat satellite to fix the location coordinates by Doppler technology.

4.4 Self-test mode

Notice:

Overuse selftest function can lead to untimely battery discharge.

As 121.5 MHz signal is transmitted during self-test, this test may only be executed during the first five (5) minutes period of any hour.

- a) Take out the VEP8 from the release device;
- b) Carry the VEP8 to a open place;
- c) Push the switch to “TEST” position and hold it, refer to Fig 7;
- d) The STATE Indicator starts to blink and then stays on constantly after 10s. If strobe light blinks once, it means self-test is normal;
- e) If STATE flash after 10s, it means self-test is abnormal, and the associated fault indicator lights up;
- f) When testing, signal of 406MHz only transmits once, signal of 121.5MHz transmits 1s;
- g) After finishing self-test, let off of the switch, and it will automatically set to “AUTO” to turn off the VEP8.



Figure 7 Indicator Beacon Selftest (TEST)

In circumstances of self-test mode, the status of indicator refer to Table 3.

Table 3 Self-test mode

EPIRB STATE	LED TX121	LED TX406	LED GPS	LED STATE	Strobe Light
Self-test normal	OFF	OFF	OFF	ON	Flash once
406MHz output power low	X	ON	OFF	X	OFF
121.5MHz output power low	ON	X	OFF	X	OFF
Protocol input failure	X	X	OFF	Flash 2 times	OFF
GPS communication fault	X	X	OFF	Flash 3 times	OFF
PLL operation fault	X	X	OFF	Flash 4 times	OFF
Low voltage of battery	X	X	OFF	Flash 5 times	OFF
Temperature sensor fault	X	X	OFF	Flash 6 times	OFF
EPIRB S/N coding failure	X	X	OFF	Flash 7 times	OFF
Main board communication fault	X	X	OFF	Flash 8 times	OFF
Times of self-test exceed limit	X	X	OFF	Flash 9 times	OFF

Note: "X" represents the status of indicator determined by the correspondent operation mode, including illumine, extinguish or flash.

ON = illumine, OFF = extinguish.

4.5 Stop transmission

In auto transmission mode, take the VEP8 out from the sea and dry it, and the drying of water-sensitive switch turns the VEP8 off.

In manual transmission mode, push the switch from "EMERGENCY" to "AUTO" position and replace the positioning pin. Then the indicator will stop blinking and the VEP8 is off.

4.6 Guard against false alarm

Generally, water-sensitive switches are common in modern position indicating beacons. It is not rare that seawater turns on the switch in severe sea condition or rainstorm.

Normally, it is because the beacon is improper placed in release device. To avoid this, a magnet is incorporated in the release device of beacon to hold it in closed state. If the beacon is not installed correctly on support and the release device is not properly closed, the magnet will not work, thus seawater or rainwater may gets in and starts the water sensitive switch.

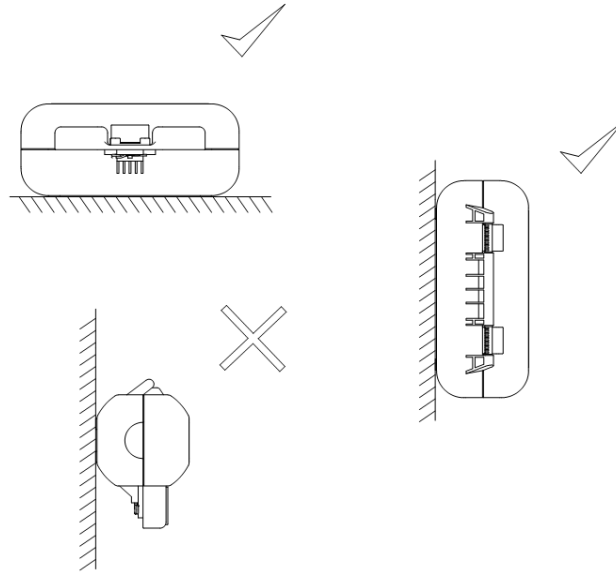
Though the above measures may reduce the chances of mis-starting, the simplest precaution is to ensure the VEP8 is laid properly.

If false alarm is activated, please carry out the following procedures:

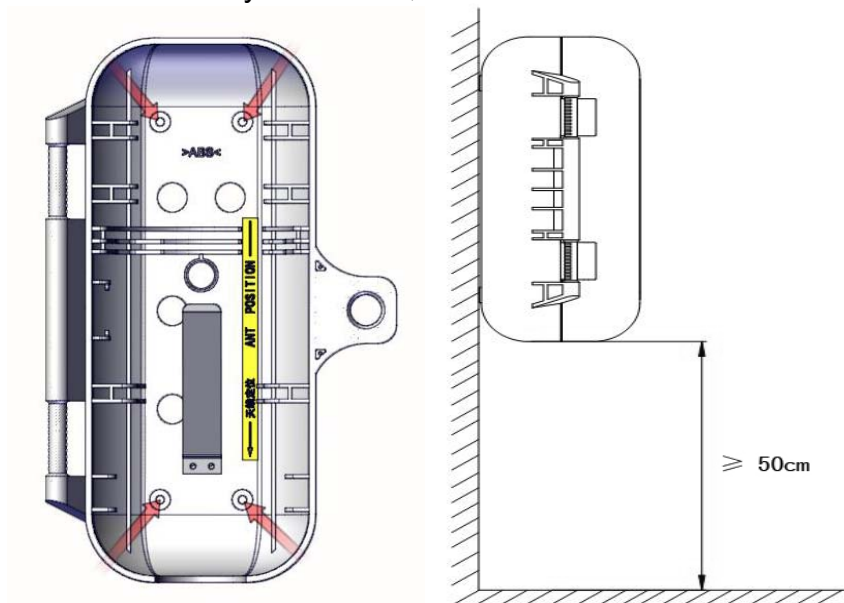
- a) Inform nearest rescue organizations, as soon as possible, to stop all the rescue service;
- b) Turn off the VEP8 as per the procedures above (Para. 4.5 Stop transmission);
- c) In case the VEP8 can't be turned off, break or bend the antenna and put VEP8 into a sealed metal container for more than 4 days until it the battery is exhausted. Consult the local representative;
- d) Removing the battery or other methods are not recommended as it may cause electric shock. JEC is not liable for it and it is not covered by the warranty.

5 Installation

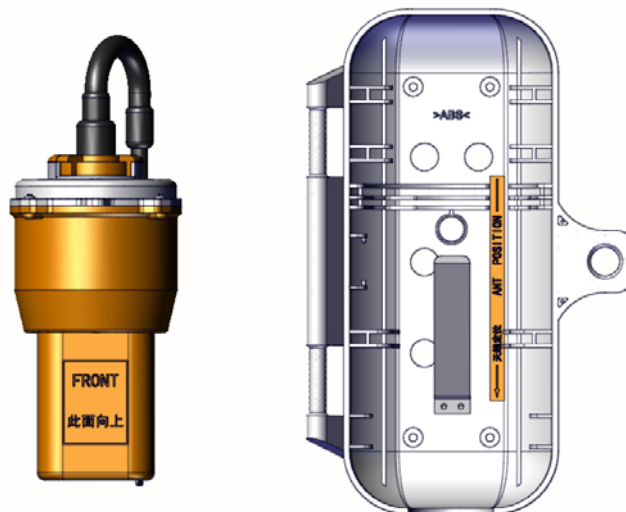
Normally, the VEP8 is installed on the two sides of the control bridge or on top of the control bridge. The installation place should be accessible for easy maintenance and manual start. In the vicinity, there should be no obstacles and it should be away from exhaust gas, chemical pollution, mechanical shock and ocean wave shock.



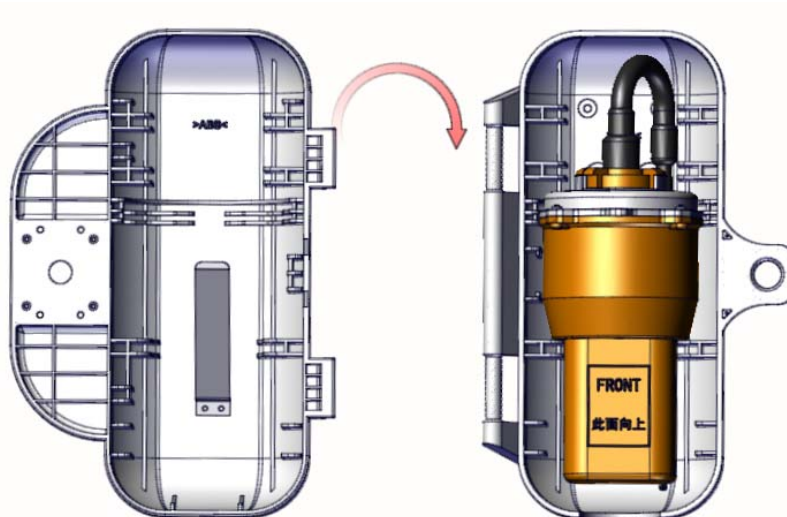
- a) Open the release device, fix bottom part of release device, using the 4 bolts, to the ship in an open place to ensure that the beacon can come up to the water surface without any obstruction in emergency (keep away from obstruction such as the mast, antenna or covering). The bottom of release device should be at least 50cm away from deck;



- b) Put the beacon into the bottom part of the release device with the antenna bent gently at the bottom of it. The antenna should be placed into the antenna hole, and the front label of beacon should be visible. Make sure the beacon is laid correctly and fixed in its position so that it will not vibrate and disengage from the magnetic switch;



- c) Press the beacon with hand to make sure that the spring in the bottom part of the release device works and check the safety pin and then close it with the top part.



When installing, remember to mark the expiring date on the yellow label of HRU (mark with a knife or marker) and fill the side label on the VEP8 with the date. The HRU expiring period is two years from the installation date.

6 Product Maintenance

6.1 Monthly check

User should check the VEP8 on schedule every month:

- a) Check whether the exterior is damaged and whether water has got in;
- b) Check whether the VEP8 is placed correctly on the support and make sure it does not vibrate;
- c) Check whether the battery and the HRU are in the valid period. The battery is valid for 5 years and the HRU is valid for 2 years.

6.2 Check every 6 months

Check the HRU is in the valid period.

Check whether the VEP8 can be removed from and placed into release device easily.

Carry out self test. Put the VEP8 back into release device after self test.

Warning:

To avoid transmitting 121.5MHz false alarm, this test may only be executed during the first five (5) minutes period of any hour.

If STATE indicator is flash after 10s, it means the beacon is abnormal and the corresponding fault indicator will be on. In this case, please contact the manufacturer or authorized support representative.

6.3 Check every year

The annual inspection of the VEP8 should be carried out by related government organization.

6.4 Check every two years

The extensive check includes change of the waterproof and seal by authorized service agent.

HRU is valid for 2 years.

6.5 Check every five years

Shop maintenance of all the VEP8 satellite emergency position indicating beacons should be carried out by related department in required time as per the manual and the interval should not exceed 5 years. They must be tested by related organization as per CIRCULAR/MSC/Circ.1039. Battery pack is valid for 5 years.

7 Installation of Hydrostatic Release Unit

7.1 Specifications

Release depth:	≤ 4m
Operation environment:	-30°C~65°C
Effective period for storage:	One year from the production date
Effective period for usage:	2 years

7.2 Installation requirements

Make sure that the product is in the effective period for storage before installation, and then install it as per steps below.

- a) Put the HRU in its position in the release device, and fix it with the 4 bolts;
- b) Insert the safety pin into the lock hole at the bottom part of the HRU and lock it;

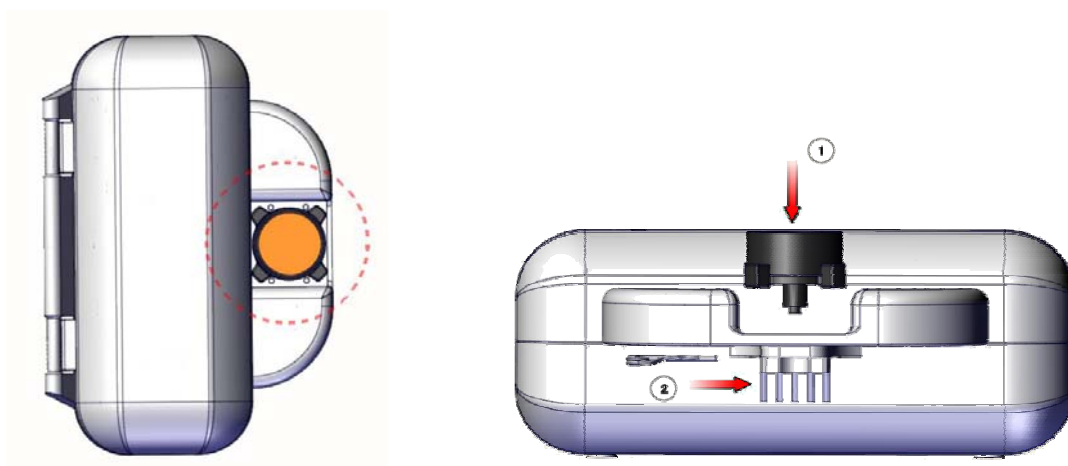


Figure 8 Installation of Hydrostatic Release Unit

7.3 Expiring date mark

Expiring date of the product should be made on the HRU unit after installation. The effective period for the usage of the HRU is 2 years from the installation date. Cut the date from the label of the HRU. E.g. expiring date is AUG 2012, see Figure 9 .



Figure 9 Hydrostatic Release Unit (HRU)

8 Method for Replacing the Battery

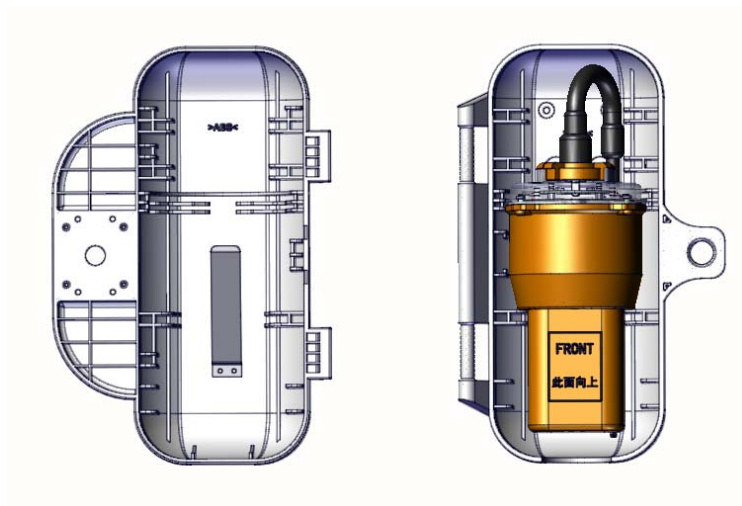
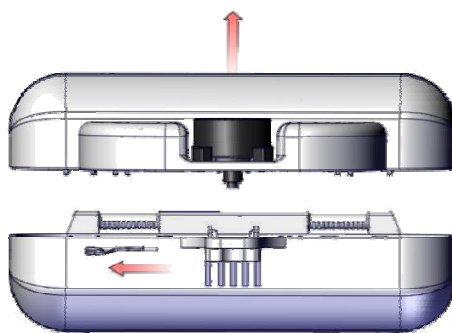
Warning:

The battery should be replaced by an authorized professional agency.

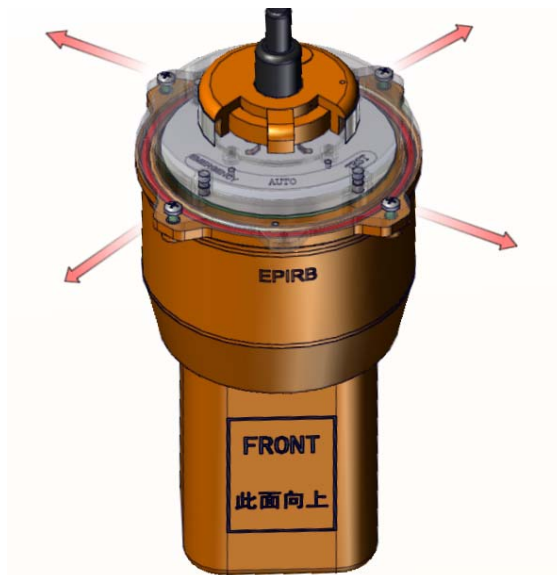
Do not open the VEP8 without permission.

Do not charge the battery or short circuit it.

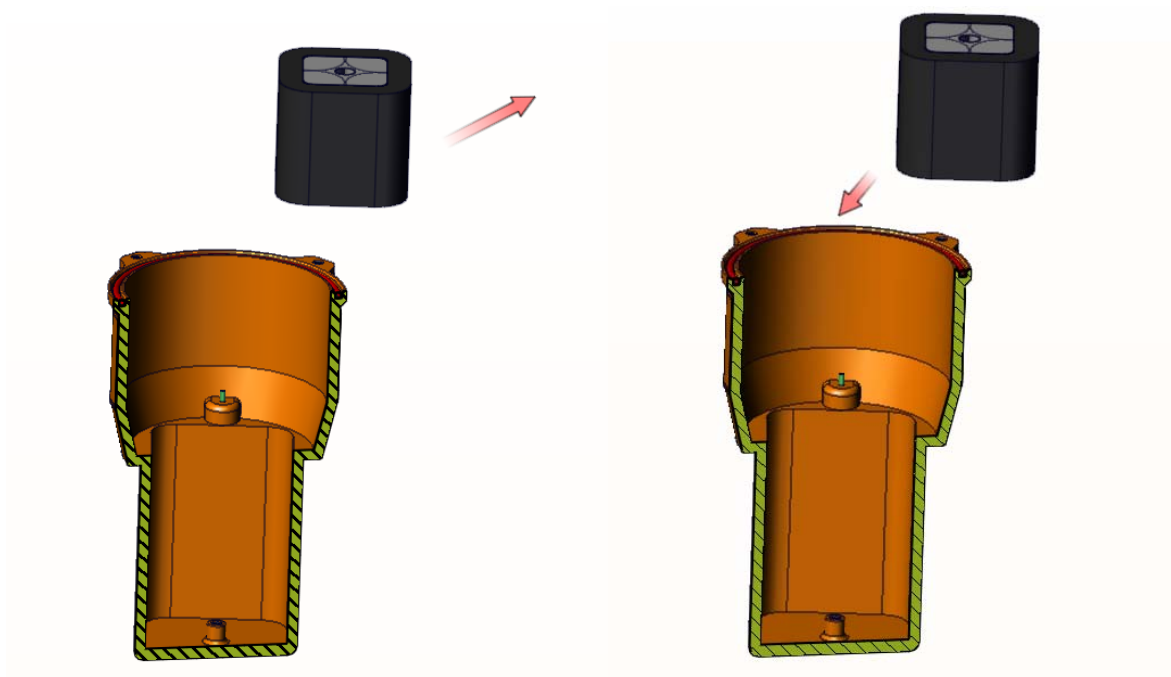
- a) Gently pull out the pin from the bottom part of the HRU. Open the releasing device and take out the beacon;



- b) Remove the fixing bolts at the four corners of the beacon, and open the top cover. Disconnect the power cable and the water-sensitive switch cable. Handle with care and not to break the cables;

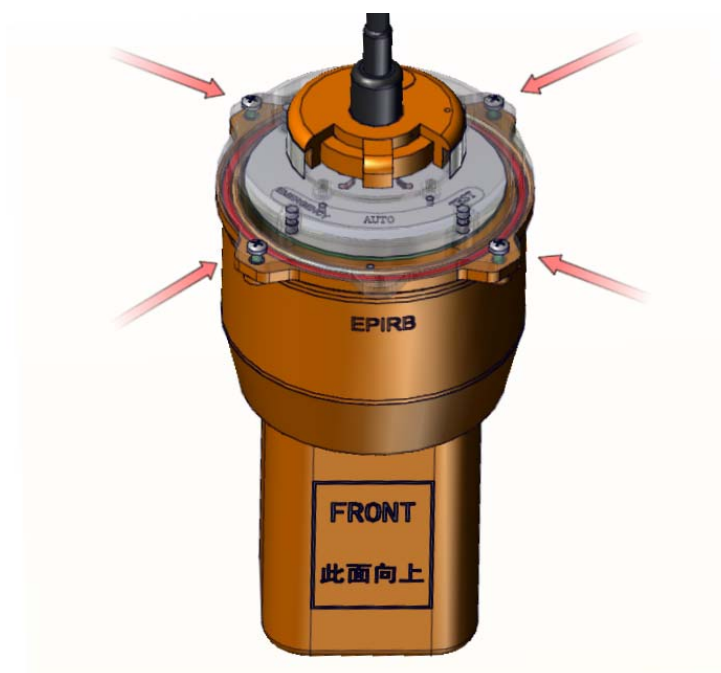


- c) Remove the fixing bolt of the battery, take out the used battery from the case and replace with a new one, fasten the bolt (torque of 0.5Nm). Pay attention to the polarization of the battery;



- d) Connect the power cable, replace the top cover and tighten the fixing bolts at the four corners;

Improper fastening may cause partial cracks of the beacon. A proper way of fastening shall: fasten four bolts all together but don't fasten very tight, when feeling it is going to be tight, fasten the bolt slowly by order of diagonal, about 270° at a time until it is completely fastened (torque of 0.5Nm).



- e) Push the switch to “TEST” position and the power supply is ok if STATE indicator blinks;



- f) On completion, put the beacon back to the releasing device.

9 Cancel Distress Call

If a VEP8 is activated by mistake, let VEP8 work on and try every way to inform SAR that the alarm is false.

The VEP8 can activate an alarm in Cospas/Sarsat worldwide and immediately generates a plan for the high-cost rescue action. During false alarm, do not turn off the VEP8 until SAR is informed about it and identify which alarm is false.

If false alarm appear in EPIRB, please report to RCC immediately and request cancellation with content as follows:

TOP URGENT

TO: RCC

FM: MASTER OF M/V (SHIP NAME/SES ID)

DT: DATE /TIME

SUBJ: CANCELLED A FALSE DISTRESS ALERT

MY SHIP S-EPIRB GENERATED A FALSE DISTRESS ALERT IN POSN LAT....
LON.... ATUTC, PLEASE CANCELLED, NOW MY SHIP CONDITION IS GOOD.
THANK YOU.

Or maritime search and rescue center in your region.

Beijing RCC:

TEL: +86+10-65292221, 65291720

FAX: +86+10-65292245

Fax: 222258 CMSAR CN

10 Registration

The encoding program in the beacon and the imprint on the registration card must not be modified during the service period. Updating of registration details in the SAR is very important. After purchasing the VEP8 EPIRB, the buyer should fill in the registration card and post it for registration.

Some administrations now allow direct registration using the Cospas-Sarsat website online IBIRD registration database.

Further information can be found online here: www.cospas-sarsat.org.

Protocol code update is executed by manufacturer or manufacturer authorized service station.

11 Transportation

This product contains small lithium metal batteries. Due to these batteries, the product may be classified as hazardous cargo. Always check with the carrier for any additional restrictions that could apply.

12 Size

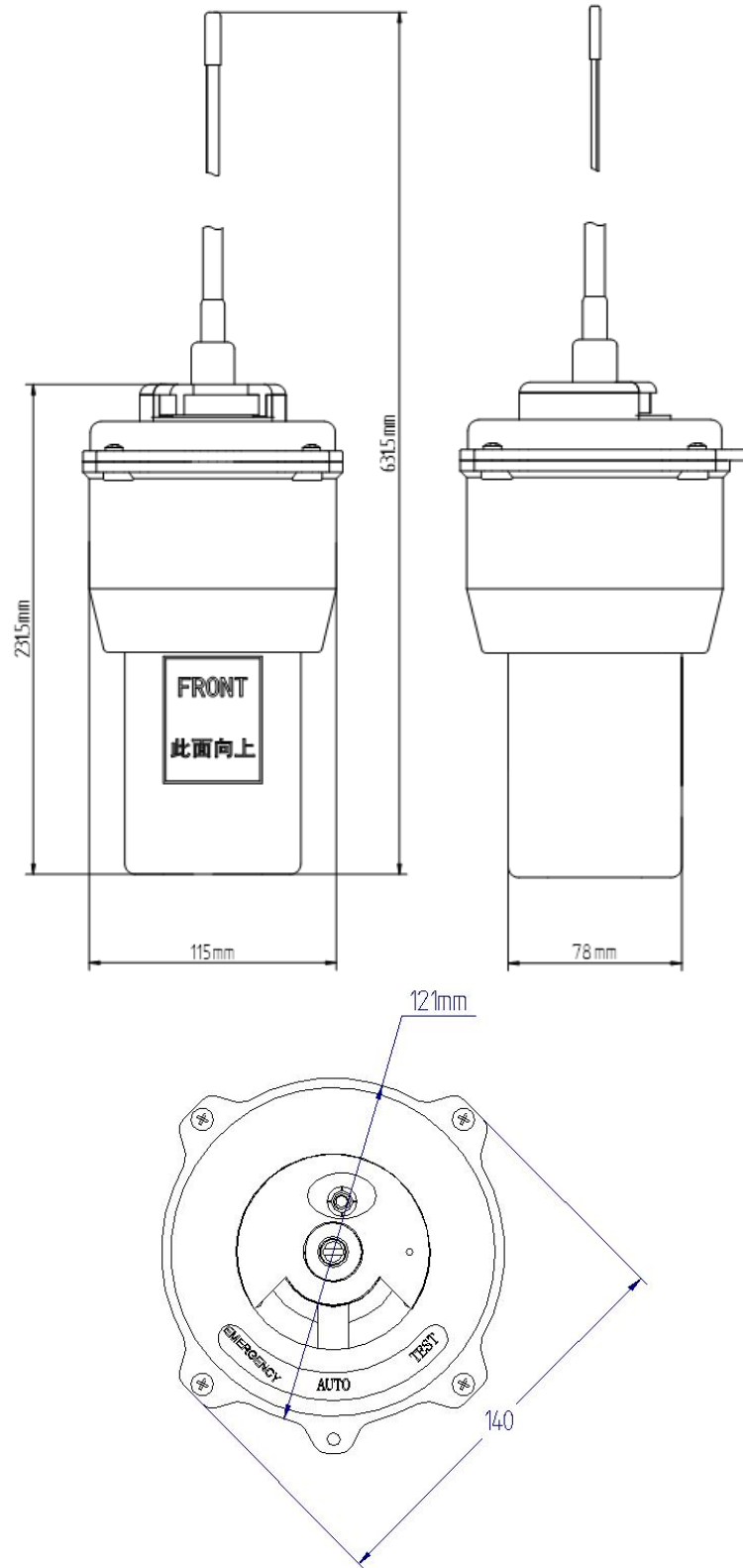


Figure 10 Size of the beacon

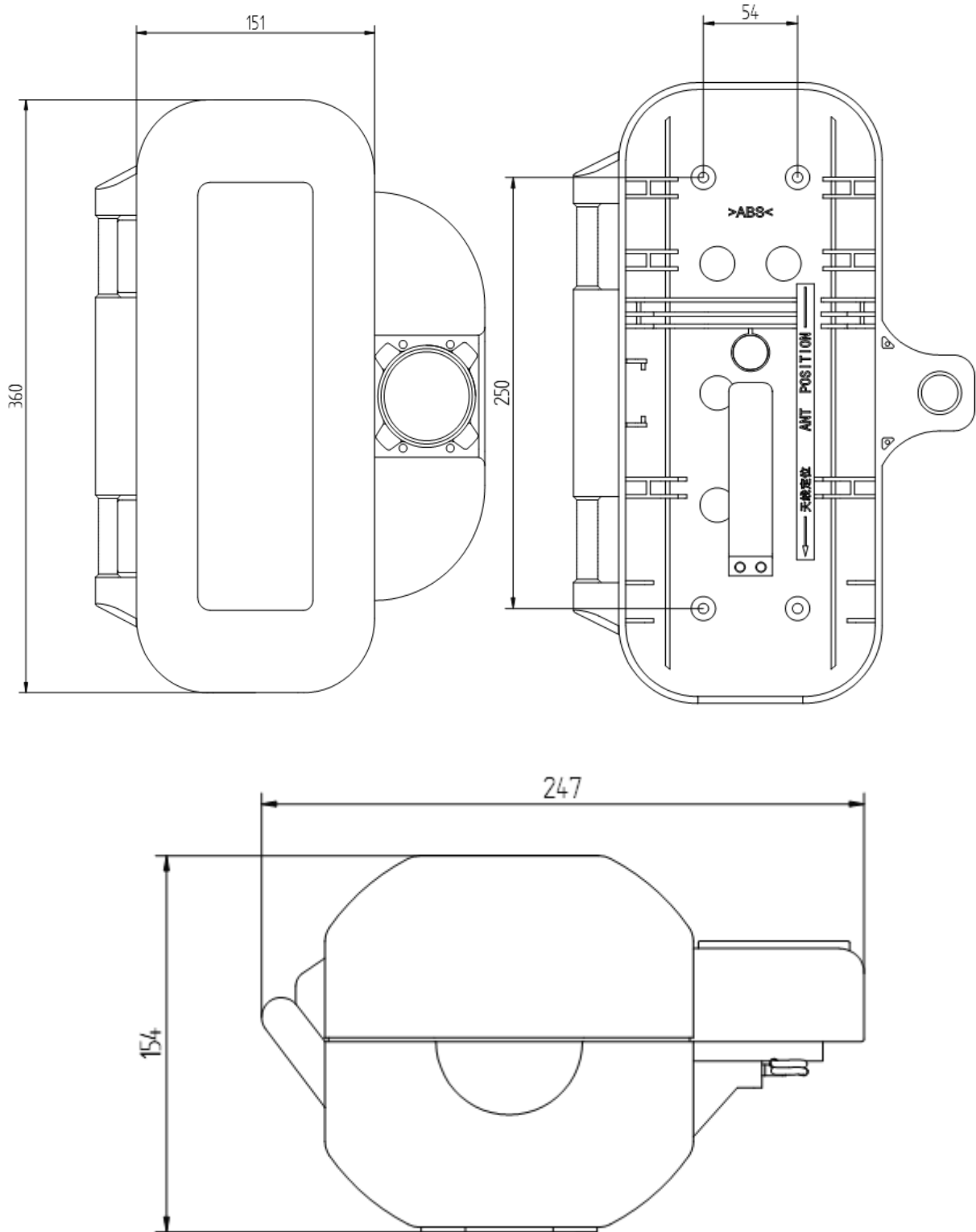


Figure 11 Size of the releasing device

13 Appendix

How to use the user guide and the registration card

- a) This guide describes all correct operations of EPIRB;
- b) This guide must be kept on board and shown to the Maritime Authority if required;
- c) When the beacon is regularly inspected by the service agency authorized by the manufacturer, the guide should be signed;
- d) Each time after regular or irregular inspection of the beacon, the guide should be signed by the Maritime Authority;
- e) If the name of the vessel is changed or the EPIRB is reallocated, please inform the registered service agent and authorized representative of the manufacturer in order to keep the warranty.

Warning

Activation of a VEP8 will cause transition on international distress frequency. Transmitting false alarm intentionally is against the law and will be punished.

Inspection record before shipping

Result	Inspection items		
	Battery	Installation date:	Replacement date:
	Hydrostatic release unit	Installation date:	Replacement date:
	Exterior view inspection of the releasing device		
	Waterproof capability		
	121.5MHz transmission		
	406MHz transmission		

Date of inspection: _____

Agency of inspection: _____

Record of regular inspection

Result	Inspection items		
	Battery	Installation date:	Replacement date:
	Hydrostatic release unit	Installation date:	Replacement date:
	Exterior view inspection of the releasing device		
	Waterproof capability		
	121.5MHz transmission		
	406MHz transmission		

Date of inspection: _____

Agency of inspection: _____

Record of shifting of ownership of the beacon

Vessel name	
ID	
Port of installation	
Date of installation	
Date of registration	

Date of inspection: _____

Agency of inspection: _____