Instruction Manual

KONGSBERG

cNODE®

Maxi and Midi transponders

Low frequency, 7000 metres

KONGSBERG

cNODE

Maxi and Midi, Low Frequency, 7000 m

Instruction Manual

410608/A

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Important

Battery safety

WARNING

The transponders are equipped with lithium batteries which can potentially be dangerous.

It is important to read and understand the battery safety instructions before operating a transponder.

About this manual

Observe this general information about the cNODE Instruction Manual; its purpose and target audience.

Purpose of manual

The purpose of this instruction manual is to provide the descriptions and procedures required to install, operate and maintain the cNODE.

Target audience

The manual is intended for all users of cNODE.

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Kongsberg cNODE

Topics

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System description

The transponders are operated from Acoustic Position Operator Station (APOS) with an acoustic telemetry link for command and data transfer. The transponders are compatible with both HiPAP Cymbal acoustic protocol for positioning and data link, and HPR 400 channels and telemetry. Perform SSBL positioning with a total of 52 HiPAP Cymbal channels and 56 HPR 400 channels, LBL positioning and acoustic link for command and data transfer. The transponders have both transponder and responder functions.

The transponders are rated to up to 7000 m with a housing made of stainless steel. The transponders are designed with a modular construction which means that the transducer, transponder electronics, battery pack and optional add-on's can be replaced individually to suit the operation.

The transponder may be secured to a subsea structure using mounting brackets, or fitted with an anchor weight and floating collar for operation on the open seabed.

Naming description

The transponder name consists of the model name, the model number, the transducer beam width and any options included.

Model name

Maxi or Midi

Model number

The two digit number in the transponder name describes the frequency band and the depth rating.

Example:

First number =Frequency band	Second number = Depth rating
1 = 12 kHz	7 = 7000 meters

Transducer beam width

- 180 = 180° beam width
- 50V = 50° vertical beam width

Optional transponder modules

R: Release mechanism

S: Split transponder for remote transducer

St: Stainless steel

Example of transponder name

The transponder name Maxi 17-50V-R-St indicates that this transponder unit is operating in the 12 kHz, rated to 7000 metres depth, with a 50° transducer beam width and a release unit. The standard transponder tube material is stainless steel.

Transponder identification

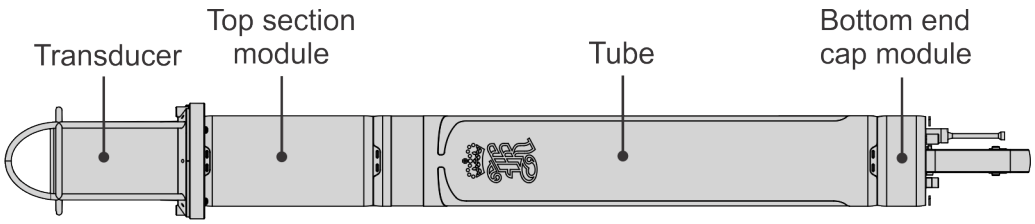
The transponders have labels that identifies:

- the transponder name
- serial number
- default channels

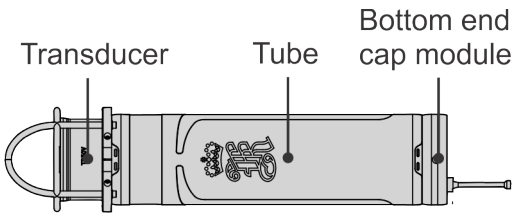
System diagram

The system diagram identifies the main components of the cNODE.

cNODE Maxi



cNODE Midi



Scope of supply

The following items are provided when you order a transponder.

- Transponder
- Battery
- Instruction manual

General acoustic considerations

Acoustic range

The depth rating should not be confused with acoustic range. The acoustic range is dependent on many factors, and some of the factors are outside control of the user.

Vessel system

The directivity and coverage area for the vessel system is different, depending on which system you are using. Some systems have high directivity and omnidirectional coverage, while other systems has reduced coverage and less directivity. The transponder should always be within the coverage cone of the vessel system.

Transducer type

There are different types of transducers used on the transponders. An omnidirectional transducer (such as a TD180) covers a large area, but has less acoustic power compared to a focused transducer (e.g. TD50V). However, a focused signal gives less footprint/coverage. The vessel should always be within the signal footprint of the transponder.

TX power

The ability to detect signals depends on the signal strength. The transmission power can be adjusted, both for the vessel system and for the transponder.

Acoustic noise

Acoustic noise is present at all vessels. At given conditions, the noise level can be excessive. Acoustic noise is caused by main propellers and thrusters, and in some instances also from machinery/pumps on board. Heavy propeller/thruster use or also waves can also generate air bubbles, which can get in front of the vessel transducer and block the acoustic signal.

Sound velocity and ray bending

Changes in sound velocity through the water column caused by changes in the water temperature and/or salinity can bend the acoustic signal and make it impossible to reach the vessel.

General supply conditions

The following general supply conditions apply to this Kongsberg cNODE delivery.

Receipt, unpacking and storage

Upon accepting shipment of the equipment, the shipyard and/or the dealer must ensure that the delivery is complete and inspect each shipping container for evidence of physical damage.

If the inspection reveals any indication of crushing, dropping, immersion in water or any other form of damage, the recipient should request that a representative from the company used to transport the equipment be present during unpacking.

All equipment must be inspected for physical damage, i.e. broken controls and indicators, dents, scratches etc. during unpacking. If any damage to the equipment is discovered, the recipient must notify both the transportation company and Kongsberg Maritime so that Kongsberg Maritime can arrange for replacement or repair of the damaged equipment.

Once unpacked, the equipment must be stored in a controlled environment with an atmosphere free of corrosive agents, excessive humidity or temperature extremes.

The equipment must be covered to protect it from dust and other forms of contamination when stored.

Equipment responsibility

Unless otherwise stated in the contract, the shipyard doing the installation and/or equipment dealer becomes fully responsible for the equipment upon receipt.

The duration of responsibility cover:

- The period of time the equipment is stored locally before installation
- The entire installation process
- Commissioning
- The period of time between commissioning and the final acceptance of the equipment by the end user or owner

Unless other arrangements have been made in the contract, the Kongsberg cNODE guarantee period (as specified in the contract) begins when the acceptance documents have been signed.

Support information

If you need support for your Kongsberg cNODE you must contact Kongsberg Maritime AS.

- **Company name**: Kongsberg Maritime AS
- **Address**: Strandpromenaden 50, 3190 Horten, Norway
- **Telephone, 24h support**: +47 33 03 24 07
- **Telefax**: +47 33 04 76 19
- **Website**: http://www.km.kongsberg.com
- **Support website**: http://www.km.kongsberg.com/support_hpr
- **E-mail address**: km.support.hpr@kongsberg.com

Main system units

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Transponder features

Stainless steel modules

The cNODE transponder comprises a modular set of electronic units. The low frequency modules are all made of Super Duplex stainless steel.

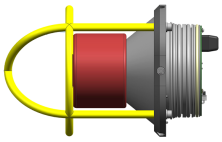
Internal tilt

All cNODE transponders have an 90° internal tilt sensor that allows you to detect orientation.

Transducers

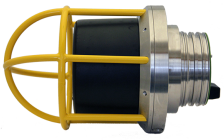
TD180LF

The transducer has a 180° omnidirectional beam width.



TD50VLF

The transducer has a 50° vertical beam width.



Remote transducers

TDR180 LF St

The remote transducer has a 180° omnidirectional beam width and is made of Super Duplex stainless steel.

TDR50V LF St

The remote transducer has a 50° vertical beam width and is made of Super Duplex stainless steel.

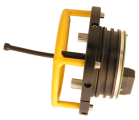
Transducer cable 6 m

The transducer cable has two Subconn connectors; MCIL4F and MCIL4M. The cable connects all the remote transducers to the transponder.

Top section modules

Split transponder for remote transducer (S)

This top end cap has a standard external connector for remote transducers.



Tubes

Maxi tube

The tube contains the battery and the electronics for the Maxi transponder.

Midi tube

The tube contains the battery and the electronics for the Midi transponder.

End caps

Basic end cap

The basic end cap has a vent screw, safety valve and a standard external connector.

Release mechanism (R)

The release module has a vent screw, safety valve and a standard external connector and it has an acoustic release mechanism.

Chassis

Maxi chassis

The chassis holds the electronics for the Maxi transponder.

Midi chassis

The chassis holds the electronics for the Midi transponder.

Batteries

Maxi battery

The battery is a non-rechargeable lithium battery.

Midi battery

The battery is a non-rechargeable lithium battery.

Accessories

Floating collar for Maxi stainless steel transponders, 7000 m

This floating collar is made for the Maxi stainless steel transponders for operation down to 7000 metres.

Installation kit for end cap

This kit is used on transponders without a release mechanism to fit the floating collar.

Transport plug

All transponders must have the battery replaced by a transport plug before transportation or storage.

Transponder test and configuration unit (TTC 10)

The TTC 10 unit is for on deck testing and configuration of low frequency transponders. It can test all KONGSBERG transponder channels, Cymbal and HPR 400. It can also test telemetry transponders with internal and external sensors.

Funnel collar

The upper and lower funnel collars are used on the transponder when the transponder is placed in a funnel on the seabed.

Cable layout and interconnections

Topics

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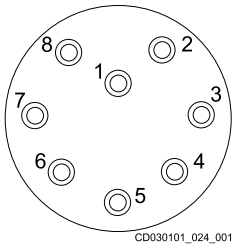
Cable procedures, page 22

External signal connector pin out

This connector is a standard connector and is found on all end cap modules.

Face view (male):



Pin number 1–3 is for transponder configuration and software download.

Pin numbers 4 and 5 are for the responder function. The signal input for the responder function must be a minimum of 1 ms. Signal level: 5–24 V positive pulse.

Pin number	Signal
1	Transponder TX (RS-232)
2	GND
3	Transponder RX (RS-232)
4	Responder +
5	Responder -
6	On
7	NC.
8	NC.

Cable procedures

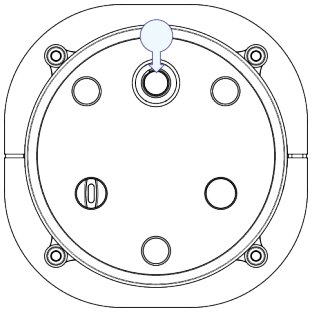
Connecting a cable to use the responder function

All Maxi and Midi transponders have an external signal connector.

Procedure

1 Remove the dummy plug.

2 Connect the cable to the 8 pin female connector on the end cap.



Result

The transponder is now ready for operation. The transponder will automatically change to responder mode when the responder trigger signal is present. It will change back to transponder mode if no new trigger signal is received within the next 30 seconds.

Getting started

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Powering up the transponder

This will leave you with the transponder on and ready for pre-deployment checks.

Context

Each transponder is delivered with a separate battery. The battery must therefore be mounted and connected before transponder deployment.

Powering down the transponder

This will leave you with the transponder powered down and not using up the battery.

Prerequisites

WARNING

The battery must be removed from the transponder when stored for a longer period (months).

Procedure

1 Open the top end cap.

2 Remove the battery from the transponder.

Pre-deployment checks

This will prepare the transponder for installation and operation.

Procedure

1 Record the transponder serial number and channel.

2 Make sure that the vent screw is closed.

3 Push the pressure relief valve in to confirm that it is flush with the end cap.

4 Perform an acoustic test using a Transponder Test and Configuration (TTC) unit:

   a Interrogate the transponder.

   b Read battery status and confirm that it will last for the upcoming operation.

   c Read the power setting and confirm it is correct for the upcoming operation.

Powering up the TTC

Procedure

1 Place the unit in a suitable location.

2 Open the case by pressing the handle knobs and pulling the handles up.

3 Turn on the main power switch to load the transponder tester software (this takes approximately 1.5 minutes).

Result

The system is now ready for operation.

Configuring the transponder

This will leave your transponder with a new configuration.

Prerequisites

The transponder must be connected to the Transponder Test and Configuration unit via a TTC Test and configuration cable.

Procedure

1 Tap **Transponder Configuration**.

2 Make changes to the configuration in the relevant fields.

3 Tap **DOWNLOAD A NEW CONFIGURATION** to update the transponder.

Result

If the configuration is successful you will receive a message; Downloaded new configuration succeeded and reset performed sucessfully.

If the configuration is not successful you will receive a warning message; Download config failed. Check all cables and try again.

Further requirements

See the Instruction manual for the Transducer Test and Configuration unit, document number 350839, for more information.

Acoustic test

Perform the acoustic test to make sure the transponder is functioning.

Prerequisites

Pre-deployment checks have been done.

Context

To set **TTC POWER** use left/right arrows to choose power level and tap **SET** to confirm your selection.

Procedure

1 Connect the test transducer cable to the upper right connector.

2 Place the Test transducer face to face with the transponder.

3 Communication between the TTC and the transponder may easily be tested by selecting the **ACOUSTIC TEST** tab.

4 Enter serial number.

5 Enter the transponder channel number.

6 Tap **INTERROGATE**.

7 A green indicator will blink on the display if there is acoustic contact with the transponder.

8 Tap **INTERROGATE** again to stop the **ACOUSTIC TEST**.

Fitting the floating collar

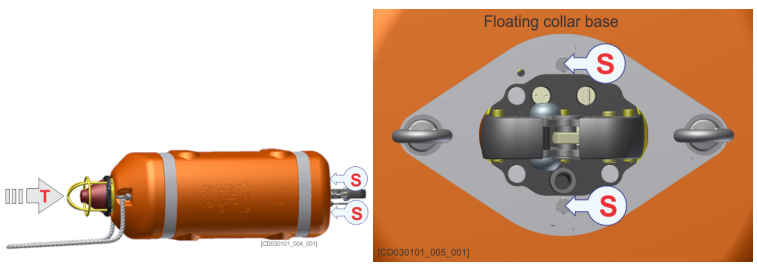
Prerequisites

The transponder must have a release unit or an adapter for a basic end cap to have the floating collar fitted.

Procedure

1 Remove the two securing screws on the release unit.

2 Insert the transponder **T** in the floating collar.



3 Fasten the two securing screws **S** on either side of the release unit.

4 Make sure the floating collar is fastened securely.

Result

The transponder is ready for deployment once the floating collar is fitted.

Deploying a transponder with a floating collar

Prerequisites

The floating collar must be fitted before deploying the transponder.

Inspect the rope on the floating collar to make sure it is still intact.

The transponder must be turned on before deployment.

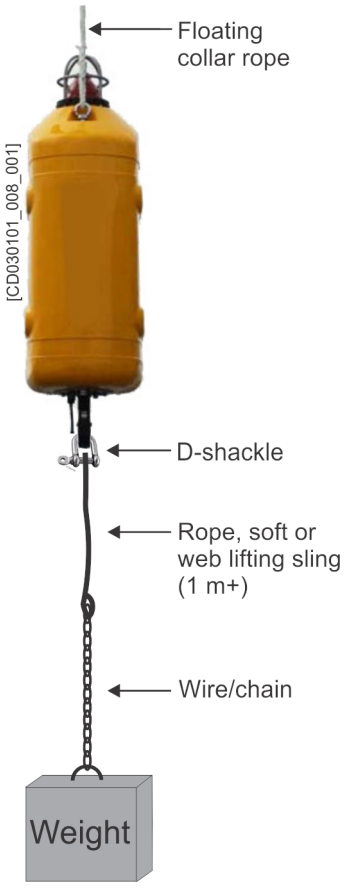
Context

Note

Do not lift the transponder by the transponder cage.

The transponder must be positioned with the transducer upright.

Ensure a clear line of sight between the transponder's transducer and the ship's transducer.



Procedure

1 Connect the lifting device to the rope on the floating collar.

2 Lift the transponder with caution to avoid slamming into other solid objects.

3 Release the transponder into the water.

Note

The minimum length of the sling between the transponder and the weight should be 2 m to avoid the transponder from hitting the weight when it lands on the seabed.

Result

Once the transponder is deployed it is ready for operation. The operation is performed from the Acoustic Positioning Operator Station (APOS). For more information regarding the operation see APOS online help.

Manually releasing the release unit

Context

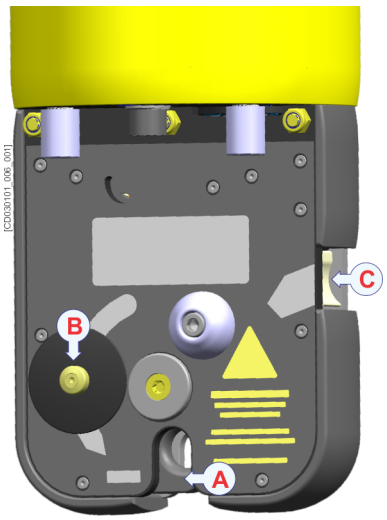
The release unit can be released manually or acoustically.

Procedure

1 Push in the release button **C** on the side of the release unit.

2 A sudden muted click and thud can be heard and felt.

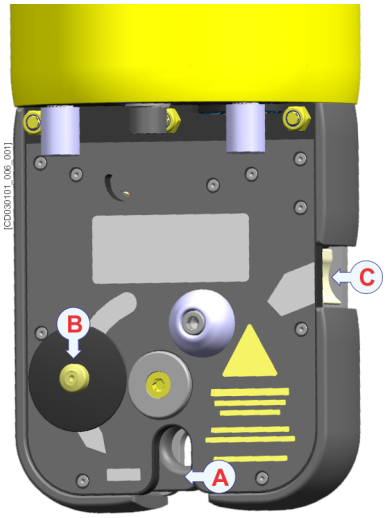
3 The release unit is now fully opened **A**.



Closing the release unit

Prerequisites

The transponder release unit might need to be opened/released before the release unit can be closed. This can be done manually or acoustically.



Procedure

1 Place a release link in the release hook **A**.

2 Pull the reset knob **B** down until a firm click is heard and felt.

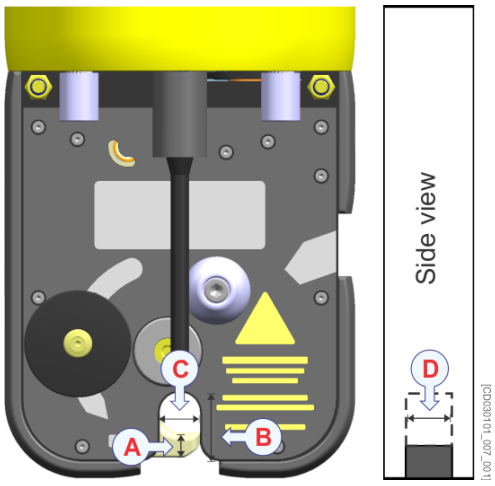
Result

The release unit should now be in a fully closed position. This is how the anchor weight can be attached to the transponder before operation.

Adding weight to the release unit

Steel shackle

Use a D-type stainless steel shackle to connect the rope, soft or web lifting sling to the release mechanism.



Note

Using rope, soft or web lifting sling directly to the release mechanism might jam the release hook, and the transponder could fail to release/open.

Maximum material thickness used in the D-type shackle is Ø15 mm.

Always use a ty-rap or locking wire to secure the pin at the shackle.

Release mechanism	A (mm)	B (mm)	C (mm)	D (mm)
cNODE Maxi	10	17	16	10
cNODE Midi	10	17	16	10

Avoiding corrosion

To avoid corrosion it is recommended to use a minimum of 2 m of rope, soft or web lifting sling between the D-type shackle attached to the release unit and the clump weight.

Another option is to use a minimum of 1 m of rope, soft or web lifting sling between the D-type shackle attached to the release unit and a minimum of 1 m of wire or chain attached to the clump weight.

Default transmitting power

- Cymbal: Low
- HPR 400: High

Extending the battery lifetime

You can either reduce the TX power level of the transponder or increase the update rate (interrogation) to extend the battery lifetime.

Emergency procedures

Follow these procedures for transponders with lithium batteries with unknown or failing status. Always read these procedures before handling any lithium batteries.

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Handling a heated or self-heated transponder, page 34

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Handling heated or warm batteries, page 35

Handling transponders and separate transponder batteries in case of an external fire, page 36

Safety features

These safety features are included on the release unit and the bottom end cap.

Pressure relief valve

The pressure relief valve prevents internal pressure to build up. This valve will release the pressure if it exceeds approximately 1.5 bar/g.

Resetting the valve can in certain cases be obstructed due to production of acids and salts leaking from a damaged battery. In such cases the battery and circuits may have been damaged. Please contact Kongsberg Maritime for assistance.

The relief valve will normally pop out gently releasing the pressure. The valve is reset by firmly pushing the valve back in and is levelled with the surrounding surface.

Vent screw

The vent screw is normally not operated and is for safety purposes only. It allows the operator to release any excess pressure that may have built up inside the transponder. Make sure to dry off any water around the screw before opening it. The screw is normally opened and closed by hand.

Recovering a failing transponder

Always read the emergency procedures before handling lithium batteries.

Prerequisites

Handle a failing transponder as a possible water ingression.

Procedure

1 Evacuate all unnecessary people.

2 Recover the transponder with great caution using a crane. No people should be near the transponder when it is lifted up on deck.

3 Place the transponder in a safe place out on deck, shielded from people and vital equipment.

4 Fasten the transponder in a crane, ready to lower it into the sea again.

5 Control the transponder for minimum two hours. Check for damages that could involve a water leakage and check the housing temperature for a possible temperature increase in the lithium battery.

6 For batteries with normal temperature: Take out the battery, see the emergency procedure for opening a transponder with a possible defect battery.

7 For batteries with increasing temperature: See the emergency procedure for handling a heated or self-heated transponder.

Opening a transponder with defect/possibly defect battery

Always read the emergency procedures before handling lithium batteries.

Procedure

1 Open the transponder in a safe place out on deck, shielded from people and vital equipment.

2 Use a full face mask with minimum BE-filter and protective equipment of rubber or plastic.

WARNING

Do not stand in front of the transducer or the bottom end cap when opening the transponder.

3 If there has been water ingression and the battery is still warm, disconnect the battery from the transponder electronics and study the procedure for handling a heated or warm separate battery.

4 Wash out the residues from the chemical reaction with water.

Handling a heated or self-heated transponder

Always read the emergency procedures before handling lithium batteries.

Procedure

1 Evacuate all unnecessary people.

2 Fasten the transponder to a rope and immerse in the sea for 24 hours or permanent. If this method is impossible, the transponder can be cooled with copious amounts of cold water using a fire hose.

3 Recover the transponder and control the temperature.

4 Repeat this until the temperature is low and stable.

5 Take out the battery, see the emergency procedure for opening a transponder with a possible defect battery.

Handling a transponder with an open relief valve

Always read the emergency procedures before handling lithium batteries.

Procedure

1 Evacuate all unnecessary people.

2 Use a full face mask with minimum BE-filter and protective equipment of rubber or plastic.

3 Fasten the transponder to a rope and immerse in the sea for 24 hours or permanent. If this method is impossible, the transponder can be cooled with copious amounts of cold water using a fire hose.

4 Repeat this until no gases come out the relief valve and the temperature is low and stable.

5 Take out the battery, see the emergency procedure for opening a transponder with a possible defect battery.

6 Wash out the chemical reaction products with water.

Handling heated or warm batteries

Always read the emergency procedures before handling lithium batteries.

Procedure

1 Evacuate all unnecessary people.

2 Fasten the battery to a rope and immerse it in the sea for 24 hours or permanent. If this is not possible, the battery can be cooled down with copious amounts of cold water using a fire hose.

3 Wash out the residues from the chemical reaction with water.

Handling transponders and separate transponder batteries in case of an external fire

Always read the emergency procedures before handling lithium batteries.

Procedure

1 Remove transponders with lithium batteries and separate transponder lithium batteries in case of an external fire if possible.

2 Cool down transponders and separate transponder batteries with copious amounts of cold water.

3 Cooling down the batteries with copious amount of cold water is the only way to reduce/stop the internal chemical reactions, or to limit the fire/explosions to as few battery cells as possible. The chemical reactions/fire will continue without additional supply of oxygen, so extinguishers like Lith-X will not work properly.

Operational procedures

Once deployed the transponder is ready for operation.

The transponder is operated from the HiPAP operator station APOS.

- Refer to APOS online help for descriptions.

Maintenance

All maintenance procedures you can do on the cNODE are listed here.

Topics

Recovering a transponder, page 39
Cleaning the transponder, page 39
Opening the transponder, page 40
Inserting an O-ring, page 40
Changing the battery, page 41
Replacing corroded anodes, page 41
Resetting the pressure relief valve, page 41
Closing the release unit, page 42
Manually releasing the release unit, page 42
Safety features, page 43

Recovering a transponder

Always read the emergency procedures before handling lithium batteries.

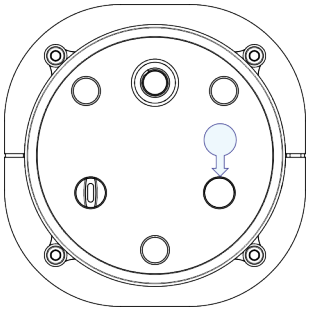
Procedure

1 Send an acoustic command to the transponder to release from the anchor weight for transponders with a release and a floating collar.

2 Grab hold of the rope attached to the floating collar and pull the transponder towards you.

3 Avoid slamming the transponder against solid objects as it is lifted out of the water.

4 Check the pressure relief valve to see if any chemical reaction has increased the pressure in the transponder to set it off.



5 Wash the unit thoroughly in warm fresh water to dissolve any salt deposits and clean off any sand or silt.

6 As an extra precaution it is recommended that the unit is left to soak in fresh water to allow salt to dissolve and diffuse from hard to reach areas.

7 Transponders containing lithium batteries should be placed on a safe place out on deck and controlled for minimum two hours. Check for damages that could involve a water leakage and check the housing temperature for a possible temperature increase in the lithium battery. For batteries with possible damages, go to the emergency procedures chapter.

8 Turn the transponder off and store the batteries outside the housing if the transponder is not used for some time.

Result

The transponder should be free of any salt water and/or sand before placed in storage.

Cleaning the transponder

The transponder must be cleaned after use.

Procedure

1 Remove any growth and dirt with a stiff brush or a wooden or plastic scraper. Be careful not to damage the transducer.

2 Clean the unit thoroughly with lots of fresh water.

3 Dry off, so no water can come inside when opening.

Opening the transponder

In order to replace the transponder battery - and to access the electronic module for maintenance - the unit must be opened.

Prerequisites

The transponder must be cleaned and dried before opening, so that no dirt or water seeps into the unit when it is opened.

Procedure

1 Inspect all O-rings for damage.

2 Replace the O-rings that are damaged or used for more than a year.

3 Make sure the mating surfaces and the O-rings are completely clean and wipe a thin film of silicone grease over the rings and mating surfaces.

Inserting an O-ring

The O-rings must be inspected for damage as often as possible.

Procedure

Note

Make sure to keep the O-rings and mating surfaces free of dust and debris.

Do not use a screwdriver or similar when removing the O-ring, use an O-ring tool.

1 Open the transponder.

2 Remove the existing O-ring.

3 Clean the surface and cover it with a thin film of silicone grease.

Use lint-free objects when cleaning the surfaces.

4 Insert the new O-ring.

5 Close the transponder.

Changing the battery

The cNODE battery is non-rechargeable and needs to be replaced when empty.

Prerequisites

The transponder must be opened to change the battery

Note

Read the Lithium batteries safety procedure before handling batteries.

Do not connect the + and — electrodes on the batteries with metal or wire.

Result

A buzz can be heard as confirmation when the transponder has made a self check after power up (normally 5–6 seconds after assembly).

Replacing corroded anodes

Procedure

1 Unscrew the corroded anodes using pliers.

Make sure the centre stud bolt comes out.

2 Replace the anode and serrated washer for better contact.

Resetting the pressure relief valve

The Pressure relief valve can be found on the transponder bottom end cap.

Procedure

1 Clean the unit thoroughly with lots of fresh water.

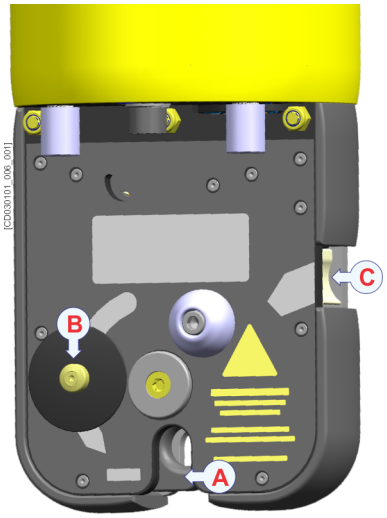
2 Push the valve back in until it sits flush with the surrounding surface.

3 Contact Kongsberg Maritime for assistance if the valve will not reset properly.

Closing the release unit

Prerequisites

The transponder release unit might need to be opened/released before the release unit can be closed. This can be done manually or acoustically.



Procedure

1 Place a release link in the release hook **A**.

2 Pull the reset knob **B** down until a firm click is heard and felt.

Result

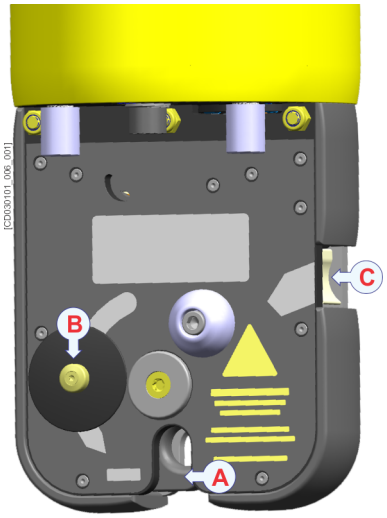
The release unit should now be in a fully closed position. This is how the anchor weight can be attached to the transponder before operation.

Manually releasing the release unit

Context

The release unit can be released manually or acoustically.

Procedure



1 Push in the release button **C** on the side of the release unit.

2 A sudden muted click and thud can be heard and felt.

3 The release unit is now fully opened **A**.

Safety features

These safety features are included on the release unit and the bottom end cap.

Pressure relief valve

The pressure relief valve prevents internal pressure to build up. This valve will release the pressure if it exceeds approximately 1.5 bar/g.

Resetting the valve can in certain cases be obstructed due to production of acids and salts leaking from a damaged battery. In such cases the battery and circuits may have been damaged. Please contact Kongsberg Maritime for assistance.

The relief valve will normally pop out gently releasing the pressure. The valve is reset by firmly pushing the valve back in and is levelled with the surrounding surface.

Vent screw

The vent screw is normally not operated and is for safety purposes only. It allows the operator to release any excess pressure that may have built up inside the transponder. Make sure to dry off any water around the screw before opening it. The screw is normally opened and closed by hand.

Illustrated spare parts catalogue

Topics

Maintenance kit, page 45
Transducer TD180LF spare part, page 45
Transducer TD50VLF spare part, page 45
TDR180 LF spare part, page 45
TDR50V LF spare part, page 46
Transducer cable 6 m spare part, page 46
Split transponder for remote transducer spare part, page 46
Maxi tube spare part, page 46
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Maxi battery spare part, page 47
Midi battery spare part, page 47
Maxi chassis with PCB spare part, page 47
Midi chassis with PCB spare part, page 47
Floating collar spare part, page 48
Transponder transport plug spare part, page 48

Maintenance kit

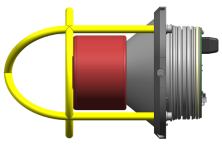
- **Part name:** cNODE Maxi and Midi maintenance kit, Steel
- **Part number:** 366981

This kit contains:

- 3 retainer cords
- 1 EMI shield
- 6 O-rings, 107 x 5
- 1 O-rings, 10 x 2 mm
- 1 O-rings, 12 x 2 mm
- 1 UV plug, dummy
- 1 Locking sleeve
- 1 Transport plug
- 2 Serrated lock washers
- 2 Screws, M8 x 20

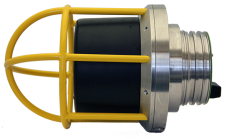
Transducer TD180LF spare part

- **Part name**: Transducer TD180LF
- **Part number**: 375311



Transducer TD50VLF spare part

- **Part name**: Transducer TD50VLF
- **Part number**: 356979



TDR180 LF spare part

- **Part name**: TDR180 LF St
- **Part number**: 394785

TDR50V LF spare part

- **Part name**: TDR50V LF
- **Part number**: 330015

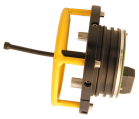
Transducer cable 6 m spare part

- **Part name**: Transducer cable, 6 m
- **Part number**: 345772

Split transponder for remote transducer spare part

Stainless steel

- **Part name**: Split transponder for remote transducer
- **Part number**: 322375



Maxi tube spare part

Stainless steel

- **Part name**: cNODE Maxi tube
- **Part number**: 322316

Midi tube spare part

Stainless steel

- **Part name**: cNODE Midi tube
- **Part number**: 363963

End cap spare part

Stainless steel

- **Part name**: End cap
- **Part number**: 330805

Release mechanism spare part

Part name: Release mechanism

Part number: 356511

Maxi battery spare part

- **Part name:** Battery cNODE Maxi
- **Part number:** 319554

Midi battery spare part

- **Part name**: Battery cNODE Midi
- **Part number**: 347563

Maxi chassis with PCB spare part

- **Part name**: cNODE Maxi chassis with PCB
- **Part number**: 330762

Midi chassis with PCB spare part

- **Part name**: cNODE Midi chassis with PCB
- **Part number**: 354043

Floating collar spare part

Part name: Floating collar, 7000 m, Stainless steel

Part number: 331150

Transponder transport plug spare part

- **Part name**: Transport plug
- **Part number**: 346211

Drawing file

Topics

cNODE Maxi 17-180-St Outline dimensions, page 50

cNODE Maxi 17-180-R-St Outline dimensions, page 51

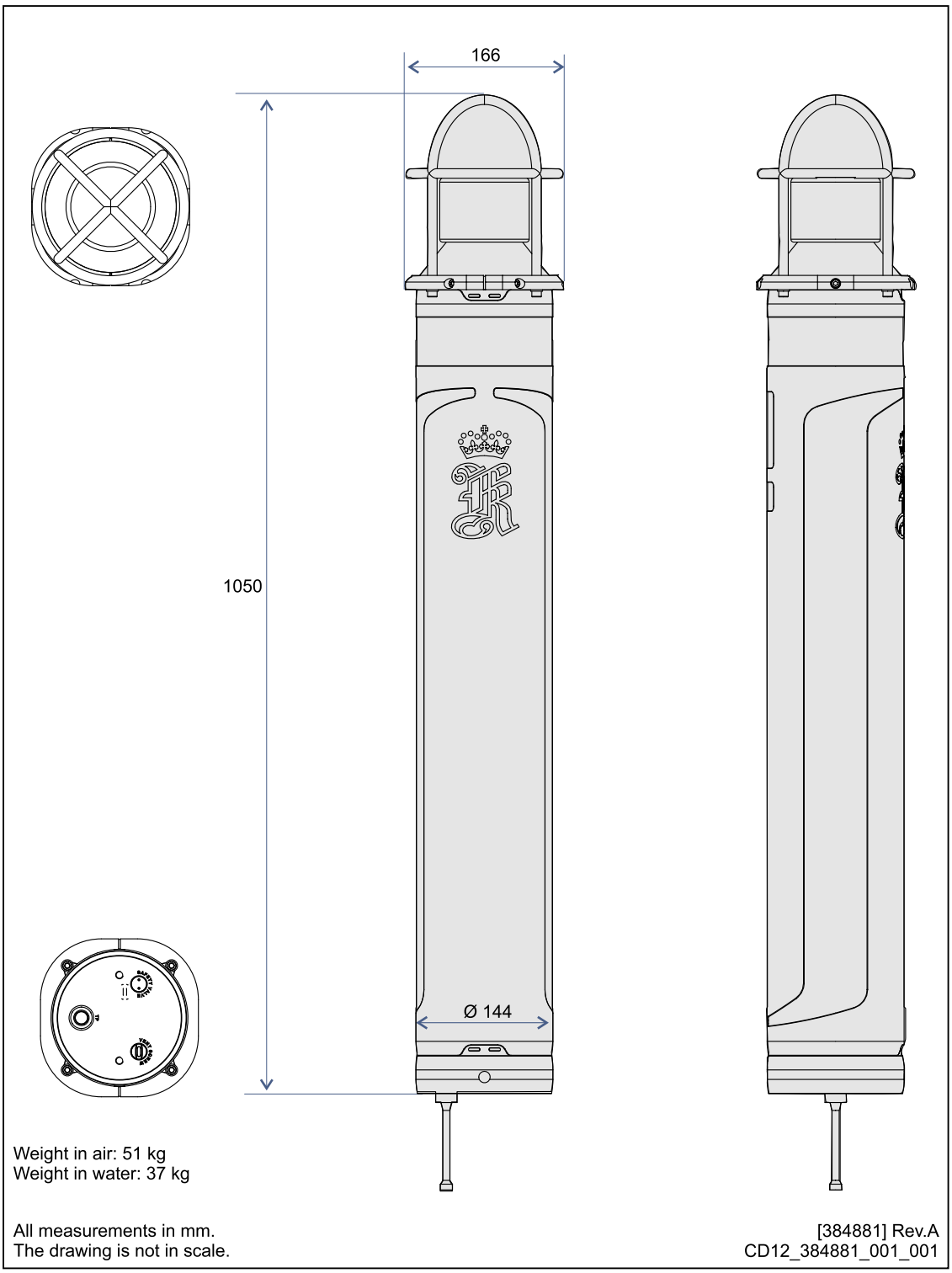
cNODE Maxi 17-50V-St Outline dimensions, page 52

cNODE Maxi 17-50V-R-St Outline dimensions, page 53

Floating collar Outline dimensions, page 54

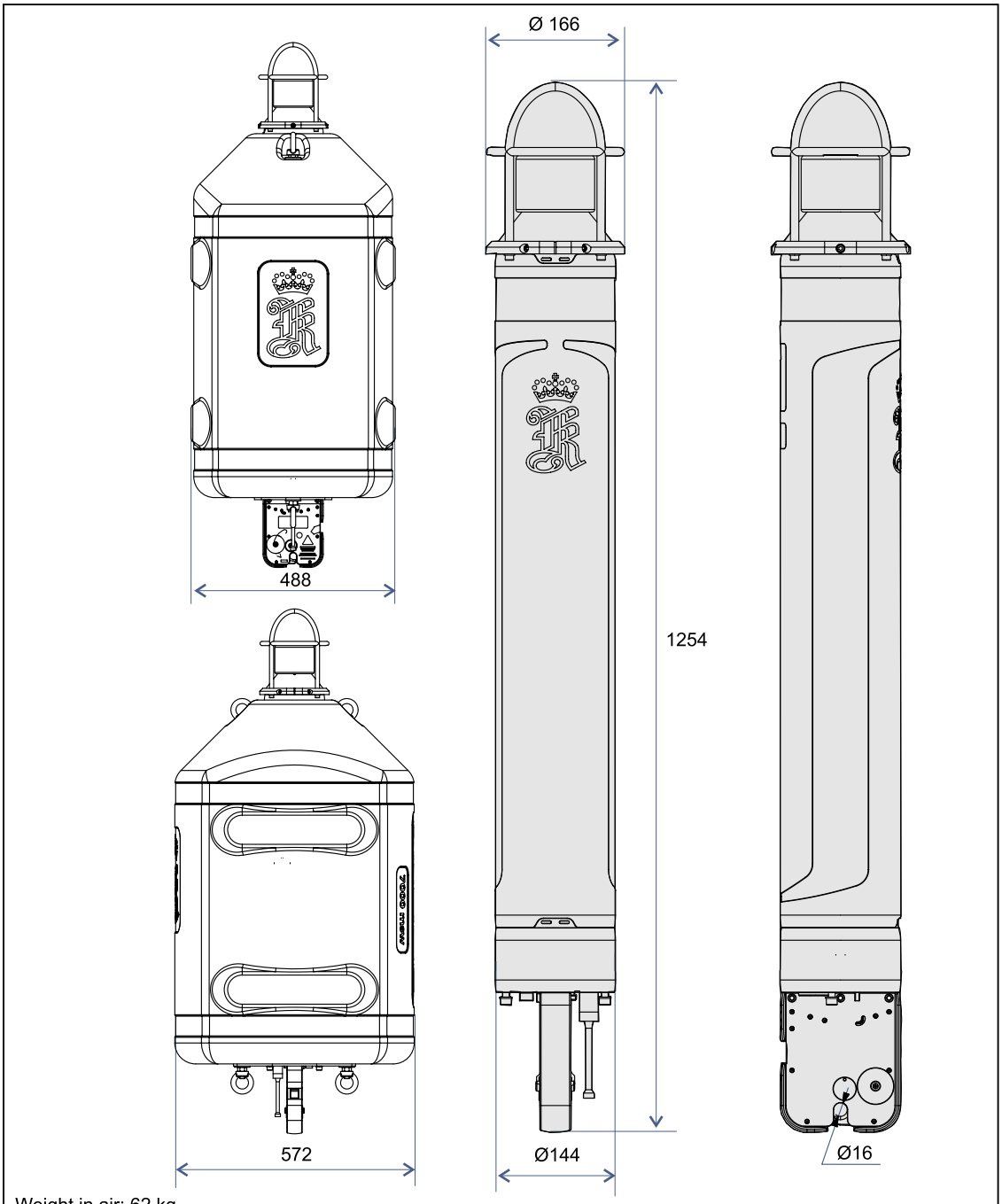
cNODE Maxi 17-180-St Outline dimensions

Drawing 384881



cNODE Maxi 17-180-R-St Outline dimensions

Drawing 384917



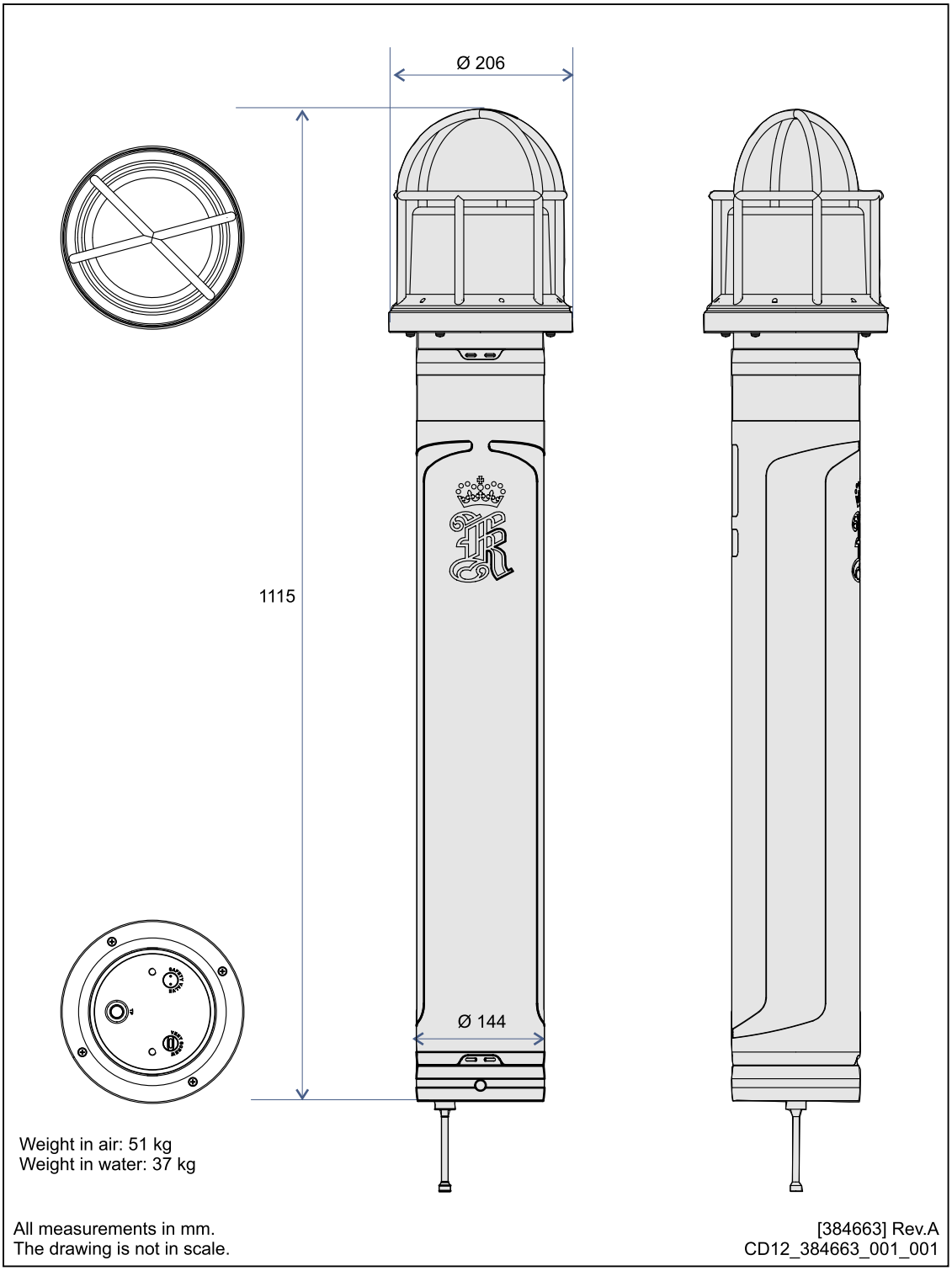
Weight in air: 62 kg
Weight in air with floating collar: 160 kg
Weight in water with floating collar: -23 kg

All measurements in mm.
The drawing is not in scale.

[3784917] Rev.A
CD12_384917_001_001

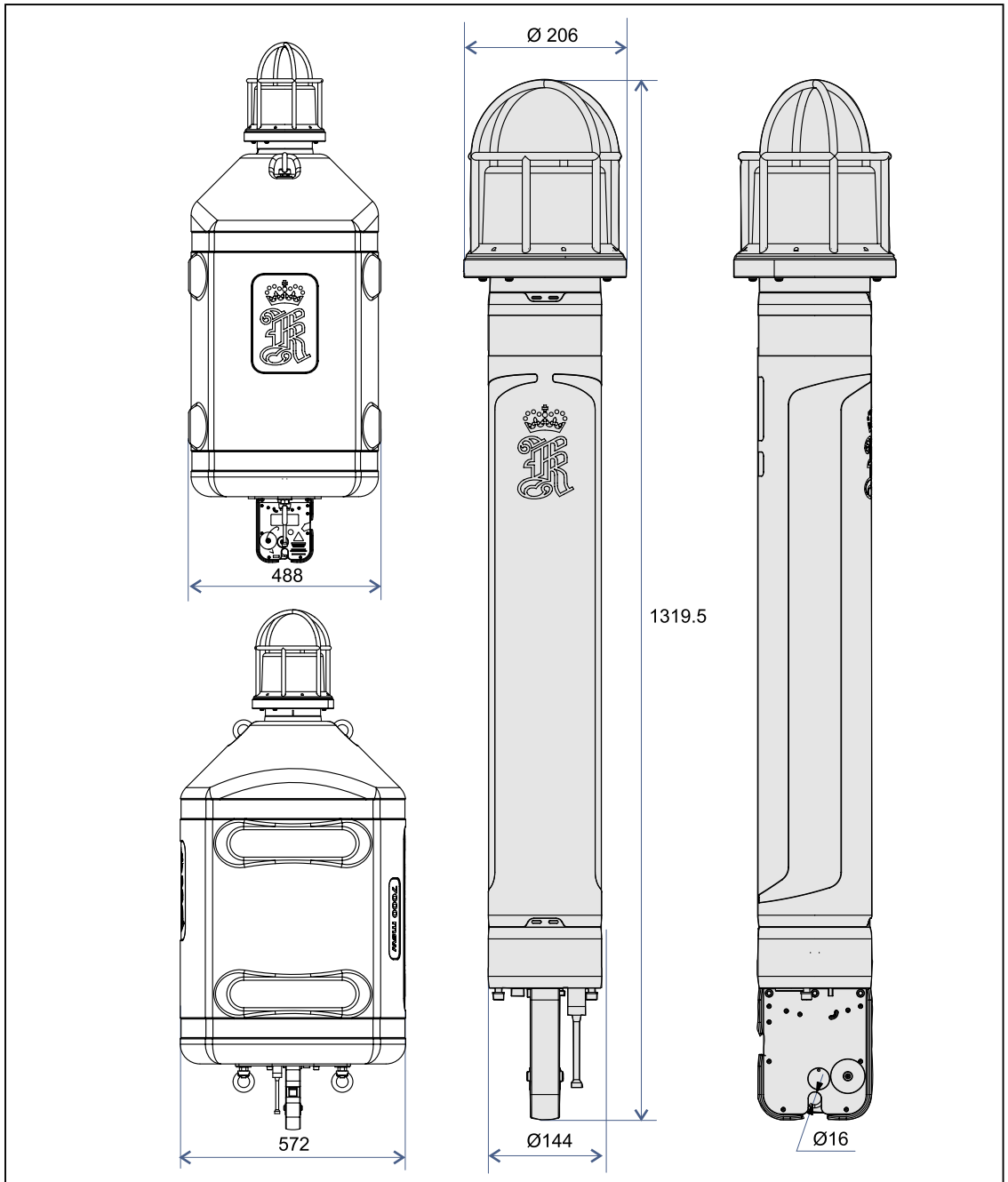
cNODE Maxi 17-50V-St Outline dimensions

Drawing 384663



cNODE Maxi 17-50V-R-St Outline dimensions

Drawing 374775



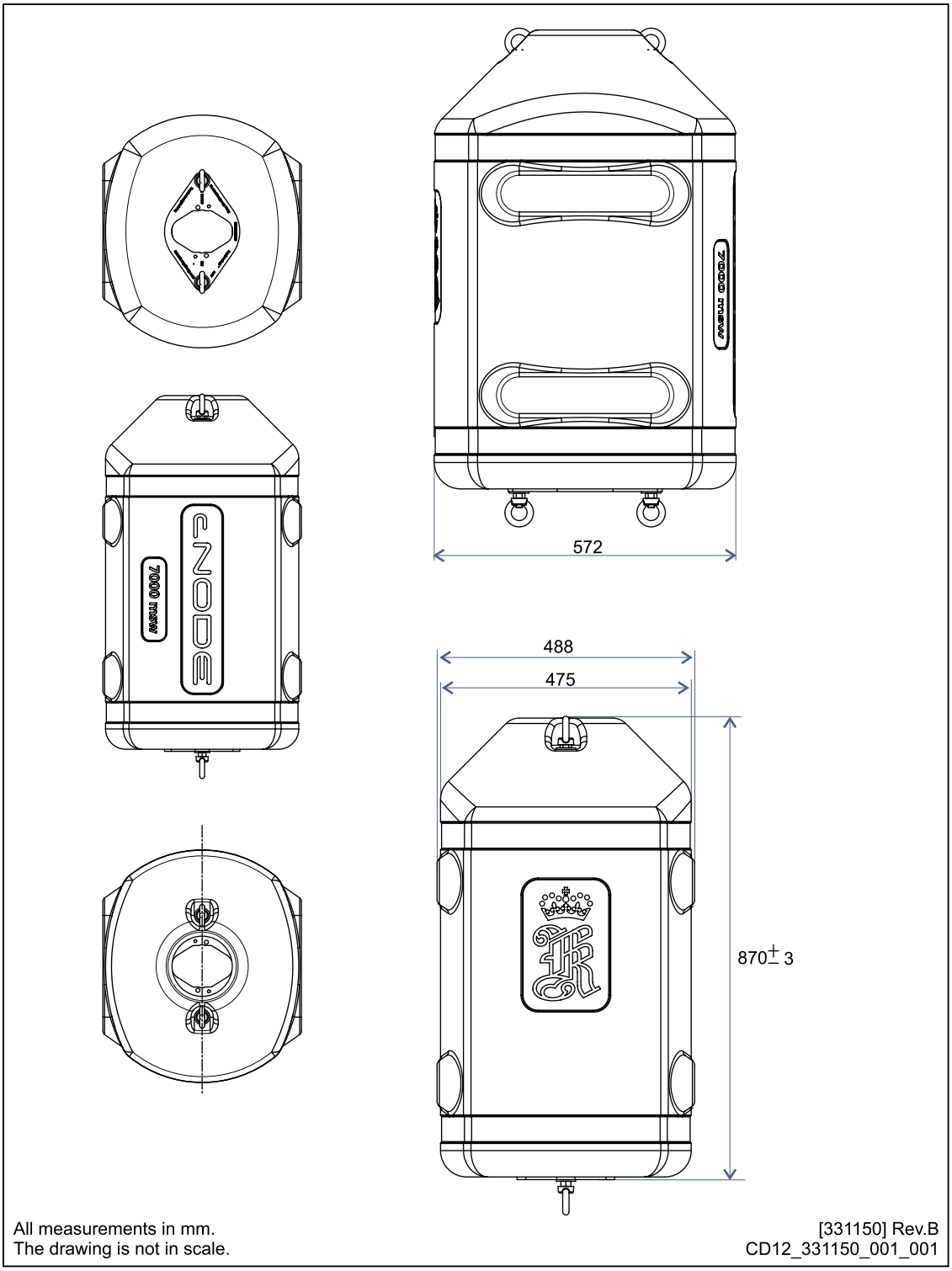
Weight in air: 62 kg
Weight in air with floating collar: 160 kg
Weight in water with floating collar: -23 kg

All measurements in mm.
The drawing is not in scale.

[374775] Rev.A
CD12_374775_001_001

Floating collar Outline dimensions

Drawing 331150



All measurements in mm.
The drawing is not in scale.

[331150] Rev.B
CD12_331150_001_001

Technical specifications

Topics

Environmental requirements, page 56

Performance specifications, page 56

Power specifications, page 57

Weight and outline dimensions, page 60

Environmental requirements

These environmental specifications summarize the temperature and humidity requirements for the cNODE.

- **Operational temperature**: -5 to +55°C
- **Storage temperature**: -30 to +70°C

Performance specifications

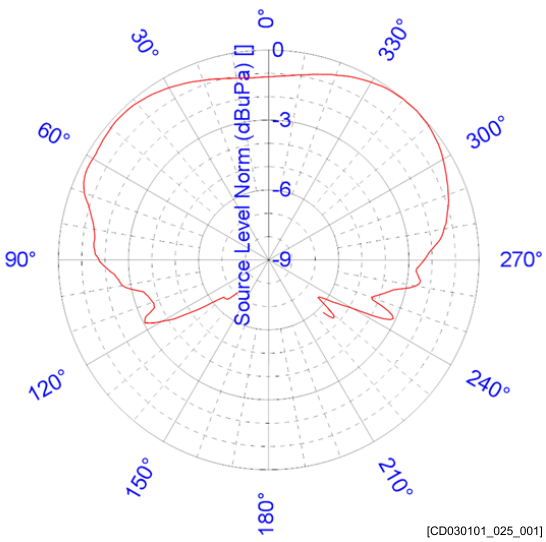
Common specifications for all cNODE transponders

- **Operation depth**: Maximum 7000 m
- **Frequency band**: Low frequency (LF)

Internal tilt

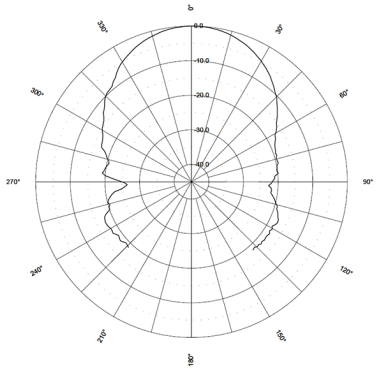
- **Max. detectable angles**: ±90°
- **Accuracy**: ±2°

TD180 LF



- **Transducer beam**: 180°
- **Source level**: 190 dB
- **Trigger level**: 95 dB

TD50V LF



- **Transducer beam**: 50° vertical
- **Source level**: 200 dB
- **Trigger level**: 85 dB

Release unit (R)

- **Safe working load (SWL)**: 500 kg
- **Anchor weight**: Minimum 60 kg
- **External signal connector**: 8-pin female Subconn MCBH8F

Floating collar

- **Depth rating**: 7000 m

Power specifications

cNODE Maxi battery

- **Battery type**: Non-rechargeable Lithium metal, (Li/SOC_2)
- **Operating voltage**: 10 to 14.4 VDC
- **Battery output**: 14.4 VDC
- **Total battery energy content**: 128 Ah
- **Cells per battery**: 48

cNODE Maxi battery lifetime

Note

The lifetime ranges should be treated as approximations only. Calculations made should allow for standard deviation in battery manufacture.

- **Battery lifetime quiescent mode**: 913 days

Maxi 17-180 series — Cymbal:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	95	101	102	103	104	105
Low	71	85	91	95	97	101
High	36	54	65	72	77	89
Maximum	10	18	25	32	37	55

Maxi 17-180 series — FSK:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	167	172	174	175	175	176
Low	141	157	163	167	169	173
High	88	118	133	142	148	161
Maximum	30	51	67	80	90	119

Maxi 17-50V series — Cymbal:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	95	101	102	103	104	105
Low	59	76	84	89	92	99
High	23	38	48	56	62	78
Maximum	6	11	16	21	25	40

Maxi 17-50V series — FSK:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	167	172	174	175	175	176

Low	125	147	156	161	164	170
High	61	91	109	121	129	149
Maximum	18	34	46	57	66	96

cNODE Midi battery

- **Battery type**: Non-rechargeable Lithium metal, (Li/SOC_2)
- **Operating voltage**: 10 to 14.4 VDC
- **Battery output**: 14.4 VDC
- **Total battery energy content**: 64 Ah
- **Cells per battery**: 24

cNODE Midi battery lifetime

Note

The lifetime ranges should be treated as approximations only. Calculations made should allow for standard deviation in battery manufacture.

Battery lifetime quiescent mode: 456.5 days

Midi 17-180 series — Cymbal:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	47.5	50.5	51	51.5	52	52.5
Low	35.5	42.5	45.5	47.5	48.5	50.5
High	18	27	32.5	36	38.5	44.5
Maximum	5	9	12.5	16	18.5	27.5

Midi 17-180 series — FSK:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	83.5	86	87	87.5	87.5	88
Low	70.5	78.5	81.5	83.5	84.5	86.5
High	44	59	66.5	71	74	80.5
Maximum	15	25.5	33.5	40	45	59.5

Midi 17-50V series — Cymbal:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	47.5	50.5	51	51.5	52	52.5
Low	29.5	38	42	44.5	46	49.5
High	11.5	19	24	28	31	39
Maximum	3	5.5	8	10.5	12.5	20

Midi 17-50V series — FSK:

Update rate / **TX power level**	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
Minimum	83.5	86	87	87.5	87.5	88
Low	62.5	73.5	78	80.5	82	85
High	30.5	45.5	54.5	60.5	64.5	74.5
Maximum	9	17	23	28.5	33	48

Weight and outline dimensions

TD180 LF

- **Height**: 169.5 mm
- **Diameter**: Ø 166 mm
- **Weight in air**: 8.2 kg

TD50V LF

- **Height**: 380 mm
- **Diameter**: Ø 206 mm
- **Weight in air**: 23.5 kg
- **Weight in water**: 18.5 kg

TDR180 LF St

- **Height**: 207.3 mm
- **Diameter**: Ø 94 mm

- **Weight in air**: 4 kg

TDR50VLF

- **Height**: 380 mm
- **Diameter**: Ø 206 mm
- **Weight in air**: 23.5 kg
- **Weight in water**: 18.5 kg

Split transponder for remote transducer (S)

- **Height**: 62 mm
- **Diameter**: Ø 166 mm

Maxi tube

- **Height**: 805 mm
- **Diameter**: Ø 144 mm
- **Weight in air**: 29.5 kg

Midi tube

- **Height**: 495 mm
- **Diameter**: Ø 144 mm
- **Weight in air**: 18 kg

Basic end cap

- **Height**: 40 mm
- **Diameter**: Ø 144 mm
- **Weight in air**: 5 kg

Release mechanism

- **Height**: 243 mm
- **Diameter**: Ø 144 mm
- **Weight in air**: 11.3 kg

Maxi battery

- **Length**: 704 mm
- **Weight**: 6.5 kg

Midi battery

- **Length**: 325.5 mm

- **Weight**: 3.5 kg

Maxi chassis with PCB

- **Length**: 710 mm

Midi chassis with PCB

- **Length**: 400 mm

Maxi floating collar 7000 m stainless steel transponders

- **Height**: 945 mm
- **Width**: 572 mm
- **Depth**: 488 mm
- **Weight in air**: 98 kg

Battery safety data

This document includes transponder safety information for all the Kongsberg Maritime transponders with lithium batteries and separate lithium batteries.

Topics

Identification, page 64

Hazards identification, page 64

Composition, page 65

First aid measures, page 66

Fire fighting measures, page 67

Accidental release measures, page 67

Handling and storage, page 68

Exposure control and personal protection, page 69

Physical and chemical properties, page 69

Stability and reactivity, page 69

Toxicological information, page 70

Ecological information, page 70

Disposal considerations, page 71

Transport information, page 71

Regulatory information, page 72

Other information, page 72

Identification

The battery packs for Kongsberg Maritime's subsea transponders are manufactured according to high standards and strict specifications to offer best possible performance and maximum operational safety.

Subsea transponders are used to provide communication between the various modules that comprise an underwater positioning and navigation system and for underwater data links.

Many transponders are equipped with a lithium battery pack.

- **Manufacturer**: Kongsberg Maritime AS
- **Address**: Strandpromenaden 50, 3191 Horten, Norway
- **Telephone**: +47 33 03 24 07 (24 hrs)
- **Website**: http://www.km.kongsberg.com
- **E-mail**: km.support.hpr@kongsberg.com

Hazards identification

The battery pack for the transponder is a solid, manufactured article. Exposure to hazardous ingredients is not expected with normal use. The battery pack is not provided with any hazards identification.

In normal use, the battery pack is placed inside the sealed transponder.

Water ingression into the transponder can cause dangerous situations.

Short-circuits, overheating, mechanical damage and exposure to water can start chemical reactions and high currents inside thetransponder lithium battery. This can generate noxious gases and/or danger of explosions. The chemical reactions will continue without additional supply of oxygen, as the battery cells contain the necessary ingredients for maintaining the chemical reactions.

- If the cells that are used in the battery pack exceed the critical temperature of 180°C, they may explode.
- In the event of external fire, the temperature inside the transponder can easily reach the critical limit of 180°C.
- In the event of water ingression:
  - The battery temperature will increase. This is caused by the high internal currents. The temperature can easily reach the critical limit of 180°C.
  - An electrolytic process will produce hydrogen. Together with oxygen, hydrogen can create oxyhydrogen gas inside the transponder. This gas is explosive.
  - Chemical reactions in the battery pack will cause increased pressure inside the transponder. The transponder can explode if this pressure is high enough.

- In the event of an explosion, one or both end caps will blow out. The transponder will become fragmented. This can cause serious damage to personnel and/or equipment.
- Some transponders have a relief valve to prevent overpressure. Noxious gases will then leak out of the transponder until the chemical reactions have stopped.

  Products generated by the chemical reactions during an emergency may however clog this pressure release valve.

Composition

The lithium battery used in the transponder consists of *Lithium Metal* cells.

A transponder lithium battery pack consists of several individual cells that are electrical connected, both in series and parallel.

The various transponder battery packs have different number of cells, output voltages and power capacity. All transponder batteries include protection against short circuits (circuit breakers) and reverse current (diodes).

The cells used within the battery pack are manufactured by one of the following companies:

- Tadiran TL-2300
- Sonnenschein SL-780
- Saft LS 33600
- Saft LSH 20
- Sonnenschein SL-760

The lithium metal cells have the following chemical formula:

Lithium Thionyl Chloride - $Li/SOCl_2$

- **Negative electrode**: Lithium metal (Li)
- **Positive electrode**: Carbon
- **Electrolyte**: Solution of lithium tetrachloroaluminate ($LiAlCl_4$) in thionyl chloride

cNODE and WBAT batteries			
Part	**Battery**	**Weight-(kg)**	**Lithium(g)**
319554	L14.4 (48) Maxi	5.9	183
347563	L14.4 (24) Midi	3.0	92

Exd batteries			
Part	**Battery**	**Weight-(kg)**	**Lithium(g)**
355324	L14.4 (48) Maxi Exd	5.9	183

Other lithium batteries			
Part	**Battery**	**Weight-(kg)**	**Lithium(g)**
325902	L14.4 (48)	5.9	183
290-089501	L10/36 (15/20)	4.3	175
290-101665	L10/36 (18/30)	5.6	240
290-103053	L10/36 (15/40)	6.6	235
290-089505	L10/36 (36/60)	11.7	480
290-102726	L10/40 (3/11)	1.7	70
290-210845	L10/40 (3/11)	1.7	70
290-089010	L10/21 (6/12)	2.2	90
290-082380	L10/21 (6/48)	6.7	270
290-089592	L10/50 (12/42)	6.5	228
290-222071	L10/50 (27/28)	6.6	247
290-083530	L50/10/24	10	438
290-219492	L24 (98)	11	490
290-062447	L50	4.3	175
290-080718	L80	6.8	280

In case of hazardous events, the noxious gases are:

- Thionyl chloride ($SOCl_2$)
- Sulphur dioxide (SO_2)
- Hydrogen sulphide (H_2S)
- Hydrogen chloride (HCl)
- Chlorine (Cl_2)

First aid measures

All personnel that have been exposed to noxious gases must immediately seek medical help.

The battery will release toxic fumes if burned or exposed to fire. If subjected to gas from a burning sensor or battery, remove source of contamination or move victim to fresh air. Obtain medical advice.

- **Inhalation**: The chemicals are lung irritant. Remove yourself from exposure, rest, and keep warm.
- **Skin contact**: The chemicals are skin irritant. Wash off skin thoroughly with water. Remove contaminated clothing and wash it before reuse.

- **Eye contact**: The chemicals are eye irritant. Irrigate thoroughly with water for at least 15 minutes.
- **Ingestion:**: Exposure to the chemicals may cause tissue damage to throat and gastro/respiratory tract if swallowed. Wash out mouth thoroughly with water and give plenty of water to drink. Seek medical advice.

Fire fighting measures

The transponder in which the battery pack is used is designed to withstand damage to the internal battery. Nonflammable materials are used. In case of fire, move the transponder away from the fire if you can do it without risk.

Extreme mechanical abuse to the transponder may result in ruptured seal, and expose the battery.

1 If possible, move the battery and/or the transponder away from the fire.

2 Cool it down using copious amounts of cold water.

   a Immerse the battery and/or the transponder in the sea for minimum 24 hours.

   b If this method is impossible, it can be cooled down with a fire hose.

Cooling down the battery with copious amount of cold water is the only way to reduce or stop the internal chemical reactions, or to limit the fire/explosions to as few battery cells as possible. The chemical reactions/fire will continue without additional supply of oxygen, so extinguisher like Lith-X will not work properly.

Applying water directly onto a battery may develop hydrogen gas, due to the possible electrolysis if the battery terminals are exposed to water. Mixed with air, this gas is very inflammable/explosive. However, if the water cooling takes place out on deck or in a storeroom with good ventilation, there will never be enough hydrogen gas to exceed the lower explosive limit of hydrogen in air (about 4%).

Note

In case of an external fire, always remove transponder units and lithium batteries.

Accidental release measures

During normal operation, accidental release measures are not applicable. Extreme mechanical abuse to the transponder in which the battery is used may however result in ruptured seal and exposure.

1 As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions.

2 Keep unauthorized personnel away.

3 Stay upwind, and keep out of low areas.

4 Ventilate closed areas before entering.

5 Wear adequate personal protective equipment.

6 Prevent material from contaminating soil and from entering sewers or waterways.

7 Stop the leak if safe to do so.

8 Contain the spilled liquid with dry sand or earth, and clean up spills immediately.

9 Absorb spilled material with an inert absorbent (dry sand or earth).

Scoop contaminated absorbent into an acceptable waste container.

Collect all contaminated absorbent and dispose of according to relevant regulations.

10 Scrub the area with detergent and water; collect all contaminated wash water for proper disposal.

Handling and storage

Correct storage and handling is required to avoid damage and reduce the battery lifetime.

1 Do not open, dissemble, crush or burn the battery.

2 Do not expose the battery to water, sea water or other high conductivity liquids.

3 Avoid mechanical or electrical abuse.

4 Do not expose the battery to temperatures outside the range of -40°C to 80°C.

5 Store the battery in a dry location.

Recommended relative air humidity is 40 to 70%.

To minimize any adverse affects on battery performance it is recommended that it is kept at room temperature (25°C +/- 5°C). Elevated temperatures can result in shortened life.

6 Do not store the battery in direct sunlight.

7 Keep the battery out of reach of children.

A suitable storage room is properly ventilated, it has sturdy racks with dedicated cradles for the batteries, and it must allow for easy removal of batteries in case of fire. The room must be designated and clearly identified as a storage area, and entrance should be restricted. The room must not be used as a general rest or work area.

Note

The storage room must have a sprinkler system or a fire station. A suitable fire hose (with water) must be placed outside or in the proximity of the room.

Exposure control and personal protection

Airborne exposures to hazardous substances are not expected when the battery is used for its intended purpose. No protection (respirator, skin and/or eye) are then required. If the battery is damaged, and you are exposed to the chemicals inside it, proper personal protection is required.

In the event of fire or physical damage to the battery, observe the mandatory rules for personal protection.

- **Fire or explosion**: Use self-contained breathing apparatus.
- **Exposure to noxious gas**: Use a full face mask with minimum BE-filter, and protective equipment of rubber or plastic.

Physical and chemical properties

The battery is solid with a firm and hard appearance. No chemicals are exposed during normal use and transportation.

The cNODE battery pack is provided as a solid and sealed unit. The battery pack can not be opened to reveal the individual cells.

Stability and reactivity

During normal operational conditions, the battery is stable. No specific handling requirements apply.

In normal use, the battery pack is placed inside the sealed transponder.

Water ingression into the transponder can cause dangerous situations.

Short-circuits, overheating, mechanical damage and exposure to water can start chemical reactions and high currents inside thetransponder lithium battery. This can generate noxious gases and/or danger of explosions. The chemical reactions will continue without additional supply of oxygen, as the battery cells contain the necessary ingredients for maintaining the chemical reactions.

1 Do not open, dissemble, crush or burn the battery.

2 Do not expose the battery to water, sea water or other high conductivity liquids.

3 Avoid mechanical or electrical abuse.

4 Do not expose the battery to temperatures outside the range of -40°C to 80°C.

5 Store the battery in a dry location.

Recommended relative air humidity is 40 to 70%.

To minimize any adverse affects on battery performance it is recommended that it is kept at room temperature (25°C +/- 5°C). Elevated temperatures can result in shortened life.

6 Do not store the battery in direct sunlight.

7 Keep the battery out of reach of children.

Toxicological information

Acute oral, dermal and inhalation toxicity data are not available for this battery. Risk of irritation occurs only if the battery is abused to the point of breaking the container and opening it to reveal the individual cells.

In the event of exposure to internal contents, corrosive fumes with pungent odor will be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.

- **Inhalation**: The chemicals are lung irritant. Remove yourself from exposure, rest, and keep warm.
- **Skin contact**: The chemicals are skin irritant. Wash off skin thoroughly with water. Remove contaminated clothing and wash it before reuse.
- **Eye contact**: The chemicals are eye irritant. Irrigate thoroughly with water for at least 15 minutes.
- **Ingestion:**: Exposure to the chemicals may cause tissue damage to throat and gastro/respiratory tract if swallowed. Wash out mouth thoroughly with water and give plenty of water to drink. Seek medical advice.

Note

Eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

Ecological information

The battery is not biodegradable.

Provided that the battery pack is disposed of according to local regulations and/or law, it will not have any environmental impact.

Disposal considerations

The battery pack must be disposed of in accordance with local, state and federal laws and regulations for batteries.

A lithium thionyl chloride battery does not contain any heavy metals, and is therefore not regarded as special waste (contains only biodegradable parts).

A used transponder lithium battery often contains a significant amount of residual energy. It is the danger of explosion that presents a problem when disposing a battery. Used batteries must therefore be handled with the same care as new ones.

Note

For safe disposal, contact the nearest local company that has been approved to collect and dispose of lithium batteries.

Transport information

All transponders with a lithium battery and separate transponder lithium batteries must be shipped in accordance with the prevailing national regulations.

Observe the following regulations:

- **Lithium battery**: UN no. 3090, Class 9 Miscellaneous (Lithium batteries)
- **Transport**:
  - **Aircraft**: IATA DGR
  - **Sea**: IMDG Code
  - **Railway**: RID
  - **Road**: ADR

Original shipping boxes must be used for all transport.

Only new separate transponder lithium batteries can be transported by air.

Air transport of all transponders with new lithium battery, and new separate transponder lithium batteries, is only permitted on board cargo aircraft. The goods must be clearly labelled: CARGO AIRCRAFT ONLY.

Note

During transport a lithium battery must always be disconnected from the electronics.

Regulatory information

Not applicable.

Other information

The battery manufacturers' safety data sheets are available on their websites.

- Saft: http://www.saftbatteries.com/
- Tadrian/Sonnenschein: http://www.tadiranbatteries.de/

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