# Instruction Manual

KONGSBERG

## cNODE® Maxi 34-180-Si3

Transponder with compass


cNODE

KONGSBERG

# Kongsberg cNODE transponder

## Instruction Manual

This manual provides you with the information required to install, operate and maintain this cNODE Maxi 34–180–Si3 with a compass unit.

390909/B

390909/B

# Table of contents

# About this manual

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

## Purpose

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

## Target audience

The instruction manual is intended for all users of Kongsberg cNODE.

## Registered trademarks

Observe the registered trademarks that apply.

Windows®, Windows XP®, and Windows® 7 are either registered trademarks, or trademarks of Microsoft Corporation in the United States and/or other countries.

cNODE® is a registered trademark of Kongsberg Maritime AS in Norway and other countries.

# cNODE

Study this chapter to familiarize yourself with the Kongsberg cNODE transponder.

**Topics**

# System description

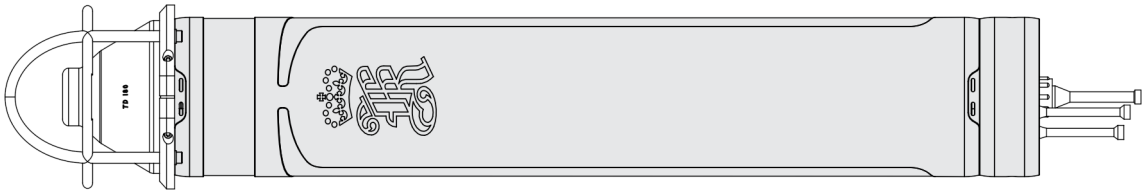
cNODE is a family of transponders for underwater positioning and data links. cNODE is designed to be a very versatile system with many interchangeable units.

### cNODE 34–180–Si3 with compass unit and external batteries

The cNODE transponder is rated to 4000 m with a housing made of aluminium. The transducer has a 180° beam width and the Si3 end cap is interfaced with the external subsea batteries and the compass unit via interface cables. The operator sends a command from the Acoustic Position Operator Station (APOS) to the transponder. The compass unit has no on/off switch and will turn itself on when the transponder sends a command to awake the compass unit. The transponder will then interrogate the compass unit to get information and send it back to APOS and the operator.

# System diagram

### cNODE Maxi 34–180–Si3



# Scope of supply

The following items are provided when you order a transponder.

- Transponder
- Battery
- Instruction manual

The following items are also provided when you order a compass unit.

- Compass unit
- External battery
- Cable to external battery
- Cable to compass unit

# 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 should ensure that the delivery is complete and inspect each shipping container for evidence of physical damage. If this 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 should 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

The shipyard performing the installation and/or equipment dealer becomes fully responsible for the equipment upon receipt unless otherwise stated in the contract.

The duration of responsibility includes:

- The period of time the equipment is stored locally before installation
- During the entire installation process
- While commissioning the equipment
- The period of time between commissioning and the final acceptance of the equipment by the end user (normally the owner of the vessel which the equipment has been installed to)

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

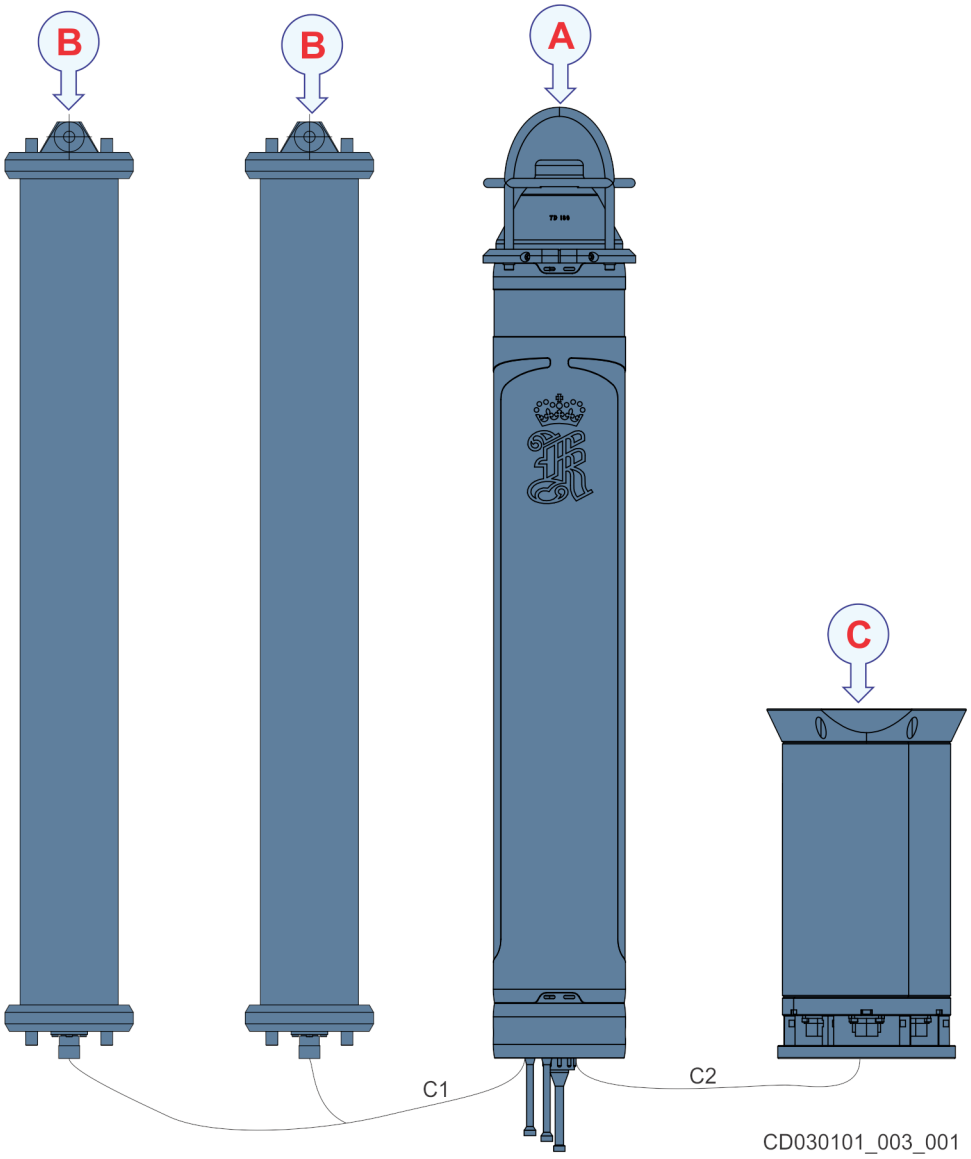
# Cable layout and interconnections

Cabling principles, cable plans and drawings, as well as relevant procedures, are provided.

**Topics**

# Cable plan

The cable plan shows the system setup and its connections.




A cNODE transponder

B External battery

C Compass

# Cable list

A set of cables is required to connect the cNODE system units to each other, to the relevant power source(s), and to peripheral devices.

C1 Split power cable

This cable has Subcon 6-pin male connectors at the external battery side and a Gisma 4-pin female connector at the transponder side.

C2 Compass cable

This cable has a 26-pin Subcon mini-con connector at the compass side and a female Subcon 16-pin connector at the transponder side.

# Cable procedures

Dedicated procedures are provided to explain how to connect the various cables comprising the cNODE system.

All cables are provided by Kongsberg Maritime. In order to ease access for maintenance purposes, and to allow for vibration, make sure that some slack is provided for each cable.

The cabling can be done with the transponders on and the batteries inserted.

## Connecting the cable from the transponder to the external batteries

### Procedure

1 Connect the 6–pin connector to the connector marked Ext.BATTERY on the transponder.

2 Connect the Gisma connectors to each external battery.

## Connecting the cable from the transponder to the compass

### Procedure

1 Connect the 26 pin connector to the connector marked PORT A&B on the compass unit.

2 Connect the 16 pin connector to the connector marked SENSOR on the transponder end cap.

3 Tighten the locking sleeve by using your hands.

# Getting started

This will leave you up and running with your cNODE transponder.

**Topics**

# Power on/off procedures

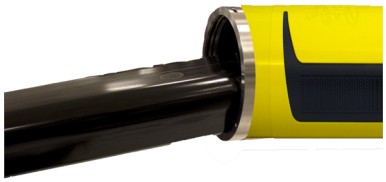
Starting up for the first time and powering down the system is found here.

## Powering up the transponder

### Procedure

1 Insert the battery.

Inserting the battery at an angle makes this easier.



2 Place the bag of silica-gel desiccant on the top of the battery.

3 Switch the on/off switch inside of the top end cap to on.


4 Insert the top end cap, observing the alignment marks.

5 Insert the lock cord.

## Powering down the transponder

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

### Procedure

1 Open the top end cap.

2 Switch the connector inside the top end cap to OFF.

3 Remove the battery from the transponder.

***WARNING***

***The battery must be removed from the transponder when stored for a longer period.***

# Pre-deployment checks

This will prepare the transponder for installation and operation.

### Procedure

1 Ensure the battery is installed and the on/off switch is switched on.

2 Check that the battery contains enough power for the operation.

3 Perform a functional test to ensure it will operate correctly once it has been positioned.

4 Ensure the transponder replies to the correct interrogation frequency by using a Transponder Test and Configuration unit.

# 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**

# 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

### Prerequisites

The transponder must be cleaned and dried before opening, so no dirt or water seeps into the transponder.

***WARNING***

***Never stand in front of or at the back of the transponder when opening it.***

### Procedure

1 Pull out the lock cord between the tube and either the top end cap, the transducer or the top section module.

   If the lock cord is hard to remove, try carefully opening the vent screw. Pressure may have built up inside the transponder.

2 Remove the top section.

3 Inspect all O-rings for damage.

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

5 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.

   The EMI shield must not be lubricated.

### Result

Follow the procedure for opening the transponder in reverse order to close it.

# Changing the battery

### Prerequisites

The transponder must be opened to change the battery

Note

*Read the Lithium batteries safety procedure before handling batteries.*

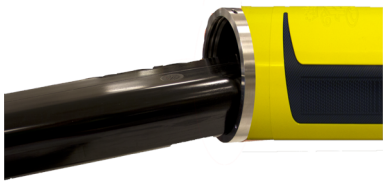
*Do not connect the + and — electrodes on the batteries with metal or wire.*

### Procedure

1 Take out the used battery.

2 Insert the new battery.

Inserting the battery at an angle makes this easier.



3 Place a new bag of silica-gel desiccant on the top of the battery.

### Result

Follow the procedure for opening the transponder in reverse order to close it.

# Illustrated spare parts catalogue

All spare parts for the cNODE transponder are listed here.

## cNODE spare parts

All spare parts for the cNODE are listed here.

### cNODE Maxi maintenance kit

- Part name: cNODE Maxi maintenance kit
- Part number: 345595

This kit contains:

- 3 retainer cords
- 6 O-rings, 107 x 5 mm
- 1 EMI shield
- 3 Zink anodes 207–5000
- 3 Serrated lock washers
- 1 Vent screw
- 3 O-rings, 10 x 2 mm
- 3 O-rings, 12 x 2 mm
- 1 UV plug, dummy
- 1 Locking sleeve
- 1 O-ring, 112 x 4 mm
- 1 Transport plug

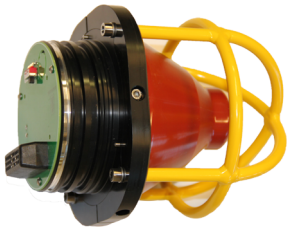
### Battery

- Part name: cNODE Maxi battery
- Part number: 319554

### O-ring

- Part name: O-ring for cNODE Maxi (107 x 5 mm)
- Part number: 317051

### Transducer



- Part name: TD180
- Part number: 319750

### End cap

- Part name: Bottom end cap Si3
- Part number: 388730

### External battery

- Part name: Subsea battery unit
- Part number: 107–217844

### Compass

- Part name: Gyrocompass Octans 3000
- Part number: 383547

### Split power cable

- Part name: Split power cable cNODE
- Part number: 389326

### Compass cable

- Part name: Cable Gyrocompass Octans 3000 to transponder
- Part number: 388853

### Instruction manual

- Part name: cNODE instruction manual
- Part number: 390909

### Accessories

- Transponder rack — Part number 320808
- Transport plug — Part number 346211
- TTC 30, Transponder Test and Configuration unit — Part number 345775
- Installation adapter for cNODE Maxi Buoyancy Collar without Release mechanism (stainless steel models with basic end cap) — Part number 372953
- Installation adapter for cNODE Maxi Buoyancy Collar without Release mechanism (aluminium models with basic end cap) — Part number 369045
- Installation adapter for cNODE Maxi Buoyancy Collar without Release mechanism (aluminium models with older basic end cap without threaded holes) — Part number 374243

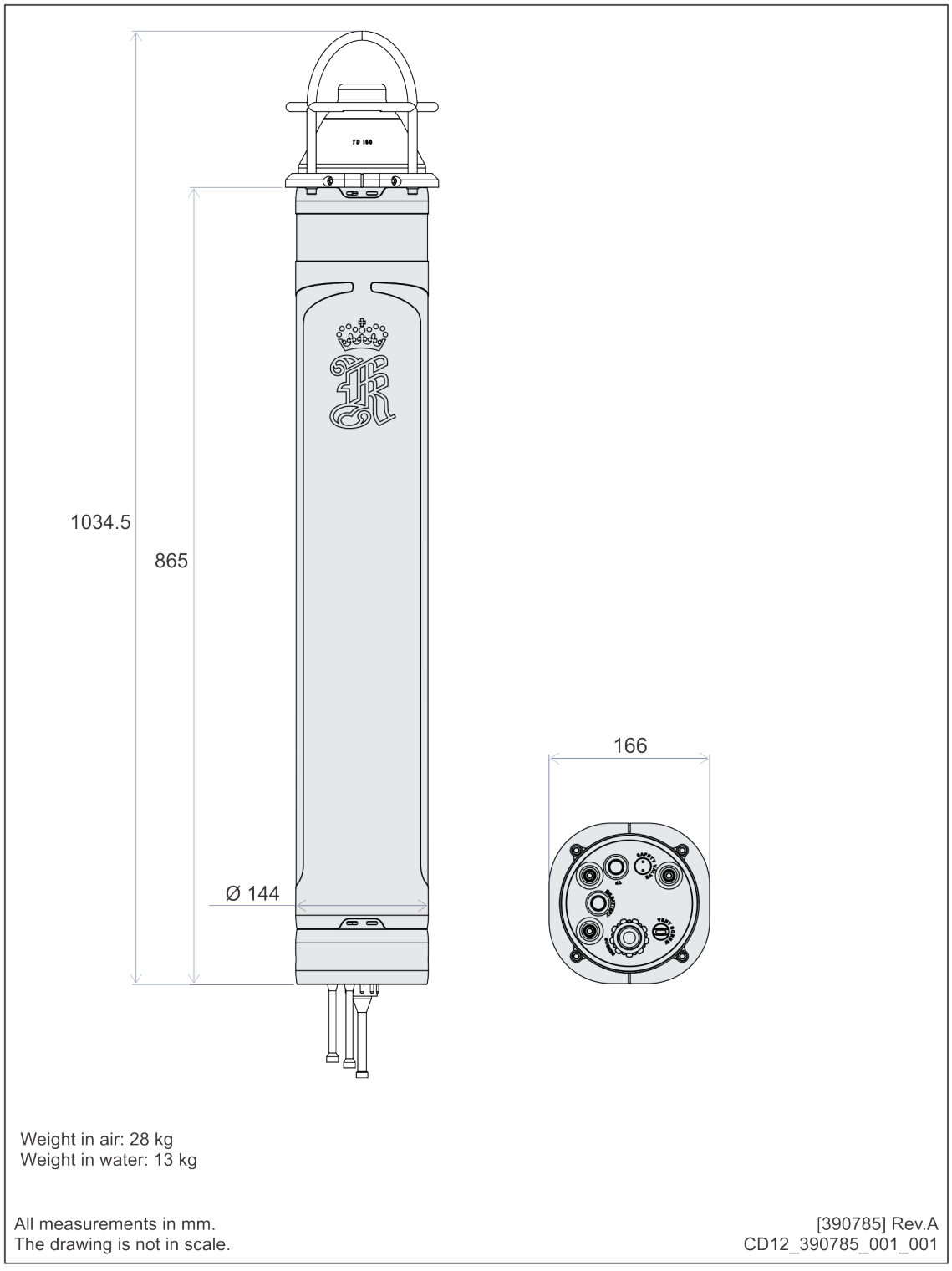
# Drawing file

This chapter lists all the drawings needed for installation and maintenance.

**Topics**

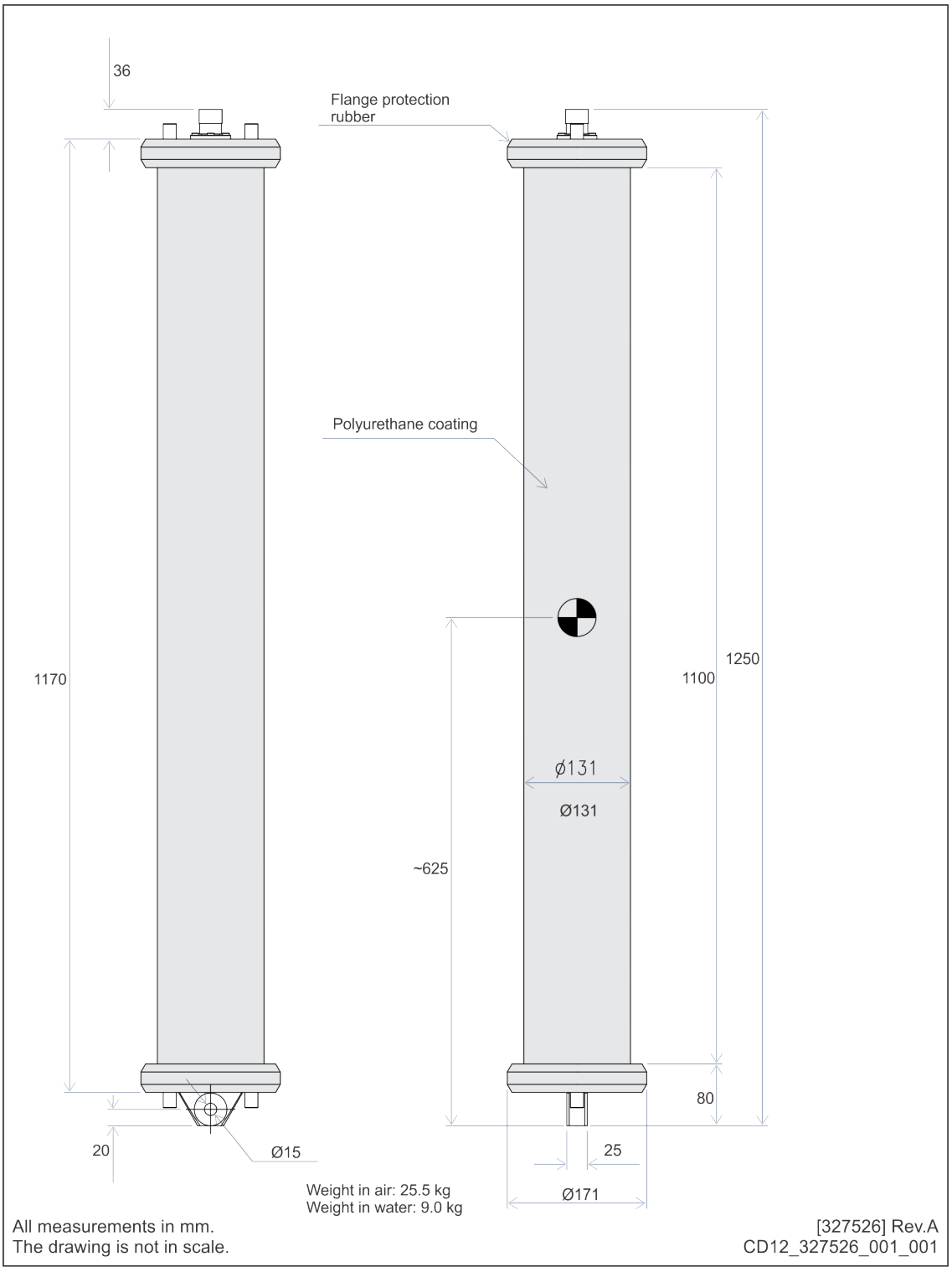
# cNODE Maxi 34-180-Si3 Outline dimensions

Drawing 390785



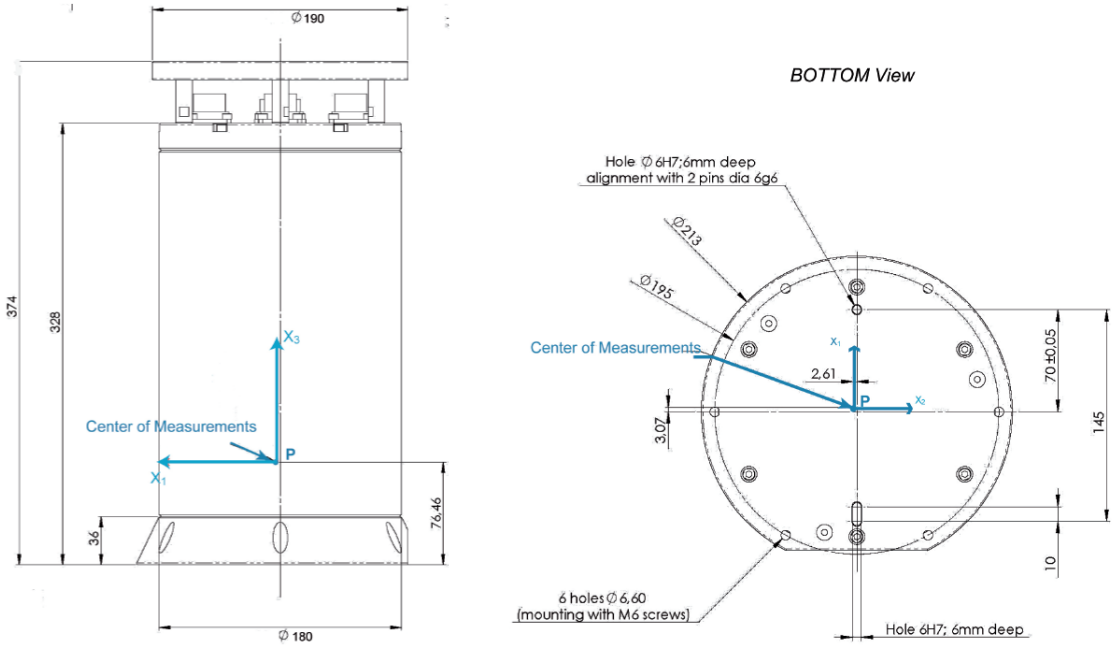
# External battery Outline dimensions

Drawing 327526



# cNODE Compass Outline dimensions

Drawing from Octans.



# Technical specifications

The technical specifications summarize the main functional and operational characteristics of the cNODE system, as well as information related to power requirements, physical properties and environmental conditions.

Note

*We are continuously working to improve the quality and performance of our products. Technical specifications may therefore be changed without prior notice.*

**Topics**

# Performance specifications

The performance specifications provides the necessary information for the installation and operation of thecNODEtransponders.

### cNODE Maxi 34–180–Si3

- Operation depth: 4000 m
- Operating frequency: 21 kHz to 31 kHz
- Communication principle: Phase Shift Keying (Cymbal) and Frequency Shift Keying (FSK)
- Transducer beam width: approximately 180° at –3 dB
- Source level: 198 dB
- Receiver sensitivity: 85 dB

### Compass unit, Octans 3000

- Operation depth: 3000 m
- Communication: RS422/RS232
- Operation data
  - Heading: 0 to 360 degree
  - Roll: –180 to 180 degree
  - Pitch: –90 to 90 degree

# Weight and outline dimensions

The weights and outline dimension characteristics summarize the physical properties of the cNODE system.

### cNODE Maxi 34–180–Si3

- Diameter: Ø 166mm
- Height: 1034.5 mm
- Weight in air: 28 kg
- Weight in water: 13 kg

### External battery

- Diameter: Ø 171 mm
- Height: 1250 mm
- Weight in air: 25.5 kg

- Weight in water: 9 kg

### Compass unit, Octans 3000

- Diameter: Ø 213 mm
- Height: 375 mm
- Weight in air: 15 kg
- Weight in water: 6.2 kg

## 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

### External battery

- Battery type: Non-rechargeable Lithium metal, ($Li/SOC_2$)
- Battery output: 24 VDC
- Total battery energy content: 168 Ah
- Cells per battery: 98

### Compass unit, Octans 3000

- Operating voltage: 24 VDC
- Power consumption: <20 W

## Environmental specifications

The environmental specifications summarize the temperature requirements for the cNODE transponders.

- Operation temperature: – 5 to +55°C
- Storage temperature: – 30 to +70°C

# Index

# Safety Data Sheet

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# *Safety information for transponder and transponder battery*

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

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***Warning*** ***This document must be read before handling transponders with lithium battery and separate transponder lithium batteries.***

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# *Safety information for transponder and transponder battery*

This document includes transponder safety information for the Kongsberg Maritime transponders with lithium battery, and separate Kongsberg Maritime transponder lithium batteries. It also includes emergency procedures.

***Warning*** ***This document must be read before handling transponders with lithium battery and separate transponder lithium batteries.***

# About this document

| Rev | Date | Written by | Checked by | Approved by |
|---|---|---|---|---|
| F | 23 April 2014 | AJ | HAA | SER |
| | Added a new ex battery. | | | |

## Copyright



## Disclaimer

*Kongsberg Maritime endeavours to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omission.*

## Warning

***The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment. Kongsberg Maritime disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.***

## Support

All Kongsberg Maritime products:
Phone 24 hour: +47 33 03 24 07
E mail: km.support.hpr@kongsberg.com
Web: http://www.km.kongsberg.com/support_hpr

# Table of contents

# 1 IDENTIFICATION OF THE PRODUCTS AND COMPANY

## 1.1 Product name

All Kongsberg Maritime transponders with a lithium battery, and separate Kongsberg Maritime transponder lithium batteries.

## 1.2 Range of products

| PART NUMBER | BATTERY TYPE |
|---|---|
| 290-089501 | L10/36 (15/20) |
| 290-101665 | L10/36 (18/30) |
| 290-103053 | L10/36 (15/40) |
| 290-089505 | L10/36 (36/60) |
| 290-102726 | L10/40 (3/11) |
| 290-210845 | L10/40 (3/11) |
| 290-089010 | L10/21 (6/12) |
| 290-082380 | L10/21 (6/48) |
| 290-089592 | L10/50 (12/42) |
| 290-222071 | L10/50 (27/28) |
| 290-083530 | L50/10/24 (70/12/7) |
| 290-219492 | L24 (98) |
| 290-062447 | L50 (35) |
| 290-080718 | L80 (56) |
| 325902 | L14.4 (48) |
| 319554 | L14.4 (48), cNODE Maxi |
| 355324 | L14.4 (48), cNODE Maxi Exd |
| 347563 | L14.4 (24), cNODE Midi |

## 1.3 Company address

Kongsberg Maritime AS

P.O.Box 111

N-3190 Horten

Norway

## 1.4 Emergency contact

Duty phone 24 hour: +47 33 03 24 07

# 2 COMPOSITION AND INFORMATION ON INGREDIENTS

## 2.1 Battery chemistry

A transponder lithium battery consists of **Lithium Metal** cells with chemistry:

**Lithium Thionyl Chloride - $Li/SOCl_2$**

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

## 2.2 Battery weight and lithium content

| Part number | Battery type | Battery weight (kg) | Lithium content (g) |
|---|---|---|---|
| 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 (70/12/7) | 10 | 438 |
| 290-219492 | L24 (98) | 11 | 490 |
| 290-062447 | L50 (35) | 4.3 | 175 |
| 290-080718 | L80 (56) | 6.8 | 280 |
| 325902 | L14.4 (48) | 5.9 | 183 |
| 319554 | L14.4 (48), cNODE Maxi | 5.9 | 183 |
| 355324 | L14.4 (48), cNODE Maxi Exd | 5.9 | 183 |
| 347563 | L14.4 (24), cNODE Midi | 3.0 | 92 |

## 2.3 Battery cell manufacturers/types

A transponder lithium battery consists of cells from one or two of the following manufacturers and types:

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

## 2.4 Battery design

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

There are transponder batteries with different number of cells, voltages and capacity.

All transponder batteries include protection against short-circuits (re-settable fuses) and reverse current (diodes).

# 3 HAZARDS IDENTIFICATION

Short-circuits, overheating, mechanical damage and exposure to water can start chemical reactions and high currents inside the transponder 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.

During operation, the battery is placed inside the transponder. Water ingression into the transponder can cause dangerous situations.

## 3.1 Danger of explosions

- If the cells that form the battery exceed the critical temperature of 180° C, they may explode.
- **External fire** - The temperature can reach the critical point of 180° C.
- **Water ingression** - The battery temperature will increase, caused by the high internal currents. The temperature can reach the critical point of 180° C.
- **Water ingression** - Electrolysis gives hydrogen. Together with oxygen, hydrogen can create oxyhydrogen gas inside the transponder (depends on the concentration). This gas is very inflammable/explosive.
- **Water ingression** - Chemical reactions in the battery will cause a pressure build-up inside the transponder. The transponder can explode if the inside pressure is high enough.
- If the transponder explodes, either the transducer or the bottom end cap will blow out, or the transponder becomes fragmented. This can cause serious damages on personnel and/or equipment.
- Some transponders have a relief valve that will prevent over-pressure. Noxious gases will then leak out of the transponder until the chemical reactions have stopped.

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Note *The relief valve can be plugged, caused by products from the chemical reactions during an emergency as described above.*

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## 3.2 Noxious gases

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

# 4 FIRST-AID MEASURES

All personnel that have been exposed to the noxious gases should immediately be seen by a doctor.

| | |
|---|---|
| **Inhalation:** | Remove from exposure, rest and keep warm. |
| **Skin contact:** | Wash off skin thoroughly with water. Remove contaminated clothing and wash it before reuse. |
| **Eye contact:** | Irrigate thoroughly with water for at least 15 minutes. |
| **Ingestion:** | Wash out mouth thoroughly with water and give plenty of water to drink. |

# 5 FIRE-FIGHTING MEASURES

- **Cool down the battery with copious amounts of cold water.**
  - Transponder with lithium battery:
    * Immerse the transponder in the sea for 24 hours or permanent.
    * If this method is impossible, the transponder can be cooled down by use of a fire hose.
  - Separate transponder lithium battery:
    * Immerse the battery in the sea for 24 hours or permanent.
    * If this method is impossible, the battery can be cooled down by use of a fire hose.

Cooling down the battery 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 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%).

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

# 6 ACCIDENTAL RELEASE MEASURES

Refer to Chapter 7, ***Handling and Storage***.

# 7 HANDLING AND STORAGE

All personnel that handle transponders must know the transponder's status:

**'Functioning' - 'Failing' - 'Unknown'**

A Transponder with unknown status **must be handled** as a transponder that is failing.

## 7.1 Recovering a "*functioning*" transponder

- All transponders recovered from the sea, should be placed in a safe place out on deck and controlled for minimum 2 hours:
  - Look for outer damages that could involve a water leakage.
  - The transponder housing temperature must be checked to verify a possible temperature increase in the lithium battery.
- If everything is OK refer to Kongsberg Maritime transponder instruction manuals for normal procedures.

## 7.2 Recovering a *"failing"* transponder

- Handle as possible water ingression.
- Evacuate all unnecessary people.
- Recover the transponder with great precaution. Use a crane.
- No people should be near the transponder when it is lifted up on deck.
- Place the transponder in a safe place out on deck, shielded from people and vital equipment.
- Fasten the transponder in a crane, ready to lower it into the sea again.
- Control the transponder for minimum 2 hours:
  - Look for outer damages that could involve a water leakage.
  - The transponder housing temperature must be checked to verify a possible temperature increase in the lithium battery.

**Failing and normal temperature:**

- Take out the battery - see ***Opening a transponder with defect/possible defect battery***.

**Failing and increasing temperature:**

- See ***Handling a heated or self-heated transponder***.

## 7.3 Handling a heated or self-heated transponder

- Evacuate all unnecessary people.
- Fasten the transponder to a rope and immerse it in the sea for 24 hours or permanent.
  - If this method is impossible, the transponder can be cooled down with copious amount of cold water. Use a fire hose.
- Recover the transponder and control the temperature.
- Repeat this until the temperature is low and stable.
- The transponder can now be opened - see ***Opening a transponder with defect/possible defect battery***.

## 7.4 Handling a transponder if relief valve opens

- Evacuate all unnecessary people.
- Use necessary protection equipment.
- Fasten the transponder to a rope and immerse it in the sea for 24 hours or permanent.
  - If this method is impossible, the transponder can be cooled down with copious amount of cold water.
  - Use a fire hose.
- Repeat this until no gases come out the check valve and the temperature is low and stable.
- The transponder can now be opened - see ***Opening a transponder with defect/possible defect battery***.
- Wash out chemical reaction products with water.

## 7.5 Opening a transponder with defect/possible defect battery

- The transponder is reported failing. There could have been water ingression in the transponder.
- Open the transponder in a safe place out on deck, shielded from people and vital equipment.
- Use necessary protection equipment.

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

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- If there has been water ingression, and the battery is still warm:
  - Disconnect the battery from the transponder electronics, and then - see ***Handling heated or warm separate battery.***
- Wash out chemical reaction products with water.

## 7.6 Opening a *"functioning"* transponder

- The transponder is reported functioning.
- Open the transponder in a safe place out on deck, shielded from people and vital equipment.

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

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## 7.7 Handling heated or warm separate battery

- Evacuate all unnecessary people.
- Fasten the battery to a rope and immerse it in the sea for 24 hours or permanent.
  - If this method is impossible, the battery can be cooled down with copious amount of cold water.
  - Use a fire hose.
- Wash out chemical reaction products with water.

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

- Remove transponders with lithium battery and separate transponder lithium batteries in case of an external fire if possible
- Cool down transponders and separate transponder batteries with copious amounts of cold water - **s**ee Chapter 5, ***Fire-fighting measures*** on page 10.

## 7.9 Storage

*Caution* *A transponder that is failing must be stored in a safe place out on deck, shielded from people and vital equipment.*

A transponder that is functioning, and separate batteries can be stored indoors. The battery must be removed from the transponder when stored indoors.

- Storage temperature:
  - Recommended storage temperature lies between 0º C and +25º C (max +50º C, min -55º C).
- Storage relative air humidity:
  - Recommended relative air humidity is 40 to 70%.
- A transponder/separate battery must not be stored directly in the sunlight.
- A battery must not be exposed to water.
- Storeroom:
  - A solid room with study racks for transponders/separate batteries.
  - A room where no people are staying, or no vital equipment is placed.
  - Good ventilation.
  - Clearly identified.
  - Easy to remove transponders and batteries in case of an external fire.

*Caution* *The storeroom must have a sprinkler system or a fire station, with fire hose (water), must be placed outside the storeroom.*

# 8 EXPOSURE CONTROLS AND PERSONALS PROTECTION

**Fire/explosion:**

- Use self-contained breathing apparatus.

**Relief valve opens and noxious gasses come out:**

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

**Opening transponder with defect/possible defect battery:**

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

**Opening a functioning transponder:**

- Use protective goggles.

# 9 PHYSICAL AND CHEMICAL PROPERTIES

Not applicable unless individual components exposed.

# 10 STABILITY AND REACTIVITY

The products are stable under normal conditions - see Chapter 3, ***Hazards identifications*** on page 8.

# 11 TOXICLOGICAL INFORMATION

**Signs and symptoms:**

- None, unless battery ruptures. In the event of exposure to internal contents, corrosive fumes with pungent odour will be very irritating to skin, eyes and mucous membranes. Over-exposure can cause symptoms of non-fibrotic lung injury and membrane irritation.

| | |
|---|---|
| **Inhalation:** | Lung irritant. |
| **Skin contact:** | Skin irritant. |
| **Eye contact:** | Eye irritant. |
| **Ingestion:** | Tissue damage to throat and gastro/respiratory tract if swallowed. |
| **Medical conditions:** | Eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur. |

# 12 ECOLOGICAL INFORMATION

None known if used/disposed of correctly.

# 13 DISPOSAL CONSIDERATIONS

- 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.

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

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# 14 TRANSPORT INFORMATION

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

**Transponder with lithium battery:**

UN no. 3091, Class 9 Miscellaneous
(Lithium batteries contained in equipment).

**Separate transponder lithium battery:**

UN no. 3090, Class 9 Miscellaneous (Lithium batteries)

**Transport:**

| | |
|---|---|
| Aircraft: | IATA DGR |
| Sea Transport: | IMDG Code |
| Railway: | RID |
| Road transport: | ADR |

- Aircraft - Only new separate transponder lithium batteries can be transported by air.
- Aircraft - Transport of all transponders with new lithium battery and new separate transponder lithium batteries by air is only permitted on board cargo aircraft. The goods must be clearly labelled:
  **CARGO AIRCRAFT ONLY**

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*Caution* *Transponder with lithium battery - During transport the lithium battery must always be disconnected from the electronics.*

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- Original transponder/battery cages must be used.

# 15 REGULATORY INFORMATION

Not applicable.

# 16 OTHER INFORMATION

The battery cell manufacturers' safety data sheets are available on the following internet addresses:

- Saft:  Saft: www.saftbatteries.com
- Tadiran / Sonnenschein: www.tadiranbatteries.de