



KONGSBERG

***cNODE MiniS***  
***Transponder***  
***Instruction Manual***

397152/E

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## Document information

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## Support information

If you require maintenance or repair, contact Kongsberg Maritime's support organisation. You can also contact us using the following address: [km.support.hpr@kongsberg.com](mailto:km.support.hpr@kongsberg.com). If you need information about our other products, visit <https://www.kongsberg.com/maritime>.

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# About this manual

This manual includes all necessary documentation to safely install, operate and maintain the system.

## **Target audience**

This manual is intended for all users of the system.

## **Online information**

All end-user documentation can be downloaded from our website.

<https://www.kongsberg.com/maritime/>

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# cNODE MiniS

## Topics

[System description, page 9](#)

[Naming description, page 9](#)

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## System description

cNODE MiniS is a family of transponders for underwater positioning and data links, and operates with HiPAP and cPAP transceivers.

The cNODE MiniS transponders are ideal for positioning ROVs. They have responder and transponder functionality, SSBL and LBL positioning, and telemetry capabilities.



cNODE MiniS is compatible with both Cymbal protocol for positioning and data link and FSK channels and telemetry.

The transponders are rated up to 7000 metres depending on the housing. They have an internal tilt sensor  $\pm 90^\circ$ , an external on/off function and a pressure relief valve for safety purposes. Several models are available with dedicated pressure sensors.

cNODE MiniS is powered from an internal rechargeable Li-Ion battery, and can be powered from ROVs 24 V during operation. An on-deck battery charger is available.

Update the configuration and the software via an external connector. TTC30 can be used for test and configuration.

## Naming description

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

### **Model name**

cNODE MiniS

### **Model number**

First digit = Frequency band

- 3 = 30 kHz

Second digit = Depth rating

- 1 = 1000 m
- 4 = 4000 m
- 7 = 7000 m

### **Optional transponder modules**

**PS:** Pressure sensor

**S:** Split version for remote transducers

### Transducer beamwidth

180 = 180° beam width

40V = 40° vertical beam width

### Transponder identification

The transponders have labels that identifies

- the transponder name
- serial number
- default channels

## System units

### Transponders

The transponders have a depth rating of 7000 metres, and the housing is either an anodised aluminium tube or a titanium tube which is polyurethane coated to protect against corrosion and abrasion.

There are several models available with different beam widths. Some models have a pressure sensor. All transponders have an internal tilt sensor  $\pm 90^\circ$  and a rechargeable Li-Ion battery. The transponder can be charged from an on deck battery charger or from a ROV's 24 V during operation.



### Battery charger

Charging a battery is a process with an inherent risk so check applicable procedure(s) prior to charging in order to first assess the level of the inherent risk; and then, if necessary, apply suitable controls to mitigate the inherent risk before charging.

The battery charger charges the internal battery in approximately 1 hour. The LED charge status indicator shows when charging is complete.



## Remote transducers

You need a transponder with a dedicated end cap for the remote transducers.

There are several different remote transducers available for various applications.



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



## TTC 30 (Transponder Test and Configuration unit)

The transponder test and configuration unit is designed for on deck testing and configuration of the transponders.

The TTC can test all Kongsberg Transponder high frequency channels, Cymbal and FSK. It can also test telemetry Transponders with internal and external sensors.



## Support information

Should you need technical support for your cNODE MiniS system you must contact a Kongsberg Maritime office. A list of all our offices is available on our website. You can also contact our main support office in Norway.

Manuals and technical information can be downloaded from our support website.

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<b>Support website</b>	<a href="#">Product support A to Z</a>
<b>Email address</b>	<a href="mailto:km.support.hpr@kongsberg.com">km.support.hpr@kongsberg.com</a>

# General acoustic considerations

Take this information into consideration when deploying the transponders.

## Acoustic range

The term *depth rating* should not be confused with the term *acoustic range*. The acoustic range is dependent on many factors, and some of the factors are outside the 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 with the transponders depending on operational needs. An omnidirectional transducer, such as TD180, covers a large area, but has less acoustic power compared to a focused transducer, such as TD30V. 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. A vessel's propellers and thrusters produce acoustic noise during manoeuvring, and in certain instances onboard machinery and pumps may also produce acoustic noise when in use. Heavy propeller/thruster use as well as waves can generate air bubbles, which can get in front of the vessel's transducer and block the acoustic signal.

### **Sound velocity and ray bending**

Variations in water temperature affects the velocity of sound through the water column, and variations in the ocean's salinity level can bend the acoustic signal making it impossible for the signal to reach the vessel.

# Getting started

## Topics

[Charging the battery \(on-deck\), page 15](#)

[Turning on the transponder, page 16](#)

[Connecting the transponder to external power and responder signals, page 17](#)

[Changing between responder and transponder mode, page 18](#)

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[Deployment, page 20](#)

[Recovering the transponder, page 20](#)

[Cymbal protocol, page 21](#)

## Charging the battery (on-deck)

Charging a battery is a process with an inherent risk so check applicable procedure(s) prior to charging in order to first assess the level of the inherent risk; and then, if necessary, apply suitable controls to mitigate the inherent risk before charging. Follow the charging procedure carefully.

### Context

The battery must be fully charged before long term storage and it is recommended to recharge the battery every 6 months to make sure the battery does not discharge completely over time. A completely discharged battery will not charge, as all lithium ion batteries.

To comply with regulations for air transportation, the battery must have 30 % or less remaining capacity.

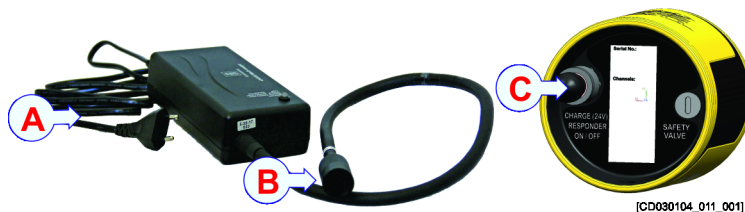
The battery charger will only start to charge if the battery capacity is lower than 96 %.

### Caution

*Equalize the temperature of the cNODE MiniS to between 10 °C and 40 °C before charging it.*

*For on-deck charging, use the cNODE battery charger only.*

*Never charge the battery unattended.*



### Procedure

- 1 Disconnect the on/off plug from the cNODE transponder.
- 2 Let the unit warm up or cool down to an ambient temperature of 10 °C to 40 °C before charging.
- 3 Connect the battery charger plug (B) to the connector on the cNODE MiniS marked CHARGE (C).
- 4 Connect the battery charger to mains (110 or 220 VAC).
- 5 Remove the power cord after charging, before removing the connector from the cNODE MiniS.

### Result

The LED indicator on the charger flashes green when charging. It normally takes about 30 seconds before the charging starts and the LED indicator starts flashing green after

connecting the cNODE battery charger to the mains. The battery will be charged within 1 hour. The LED indicator will stay green when fully charged.

The transponder is ready for use.

## Turning on the transponder

The transponder is designed for operation in water only. The transponder may be operated in air for test purposes over a short period of time.

### Prerequisites

The transponder must be charged before use.



### Procedure

- 1 Grease the connector with Molykote 44 Medium or equivalent grease.  
[Lubricating SEACON connectors, page 27](#)
- 2 Connect the on/off plug to the end cap connector.
- 3 Tighten the locking sleeve to the end cap connector.

### Result

A buzz can be heard within 25 seconds as a confirmation that the transponder is activated.

### Further requirements

It is recommended to test the transponder with the Test and Configuration unit (TTC) to make sure it is working properly before operation.



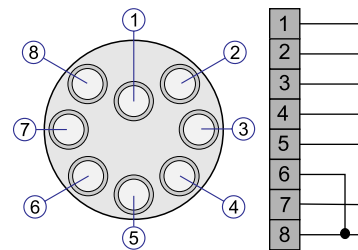
## Connecting the transponder to external power and responder signals

The transponder can also be used as a responder unit.

### Prerequisites

The transponder must be charged before use. This is the pin configuration for a male connector, as seen towards the connector (face view).

- 1
- 2
- 3
- 4 Responder trigger +
- 5 Responder trigger -
- 6 On/Off
- 7 External power (24 VDC)
- 8 Ground



### Procedure

- 1 Use the cable with part number 402462 from Kongsberg.
- 2 Connect wire 6 and 8 in the pigtail (the ON/OFF function).  
When 6-8 are linked, the transponder is ON.  
With no connection between 6-8, the transponder is OFF.
- 3 Make sure that the external power supply 24 VDC is between 20 and 28 VDC.
- 4 Check the responder trigger signal.
- 5 Switch ON the unit by inserting the external power/responder cable.

### Further requirements

It is recommended to test the transponder with the Test and Configuration unit (TTC) to make sure it is working properly before operation.

## Changing between responder and transponder mode

The transponder can also be used as a responder unit.

### Prerequisites

The transponder must be charged before use.

By default when the cNODE MiniS is turned on it is in transponder mode.

The signal input for the responder function must be between 2 and 6 ms with a positive pulse of 5 to 24 V.

### Procedure

- 1 When responder trigger signals are received, the mode is automatically changed to responder.
- 2 Once the responder trigger signals stop, it will take 1 minute before the cNODE MiniS changes automatically back to transponder mode.

## Turning on the TTC

Use the Transponder Test and Configuration unit to check that the transponder is ready for use.

### Procedure

- 1 Open the suitcase.
- 2 Turn on the main power switch to start the program.

This takes approximately 1.5 minutes.



## Acoustic test

Test the transponder acoustics to make sure it is functioning..

### Procedure

- 1 Set **TTC Power** by using the left/right arrows to select the power level and tap **Set** to confirm your selection.
- 2 Connect the test transducer cable to the upper right connector.

- 3 Place the test transducer face to face with the transponder transducer.
- 4 Select the **Acoustic test** tab.
- 5 Type in the serial number, if necessary.
- 6 Type in the transponder channel number, if necessary.
- 7 Tap **Interrogate**.
- 8 A green indicator will flash on the display if there is acoustic contact with the transponder.
- 9 Tap **Interrogate** again to stop the acoustic test.

## Pre-deployment checks

Before deploying the transponder, it is important to do the following checks to make sure the operation goes smoothly.

### Context

It is recommended to test the transponder with the Test and Configuration unit (TTC) to make sure it is working properly before operation.

### Procedure

- 1 Make sure the locking cord is in place.



- 2 If the unit has been altered from the factory pre-sets, check that the unit is configured according to your requirements.
- 3 Make sure the battery is fully charged.
- 4 Push the pressure relief valve in to confirm that it is flush with the end cap.
- 5 Switch the transponder ON by inserting the on/off plug.
- 6 Perform an acoustic test using a Transponder Test and Configuration (TTC) unit:  
[Acoustic test, page 18](#)
  - 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.

## Result

The transponder is ready for use.

# Deployment

The transponder is designed for operation in water only. The transponder may be operated in air for test purposes over a short period of time.

## Prerequisites

The transponder must be charged before use. It is recommended to test the transponder with the Test and Configuration unit (TTC) to make sure it is working properly before operation.

## Description

When you fit the transponder onto a vehicle/structure, the unit must be positioned with the transducer upright and there must be a clear line of sight between the transducer on the transponder and the vessel's transducer. Use a hose clamp with rubber protection to secure the transponder.

## Internal tilt sensor

The transponder has an internal tilt sensor, where forward is towards the embossed logo, and upwards is toward the transducer.

# Recovering the transponder

It is important to perform these recovery checks after every operation.

## Procedure

- 1 Wash the unit thoroughly in warm fresh water to dissolve any salt deposits and clean off any sand or silt.
- 2 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, such as crevices between mating parts.  
Leave the unit to soak for 24 hours, or as long as practical conditions allow.
- 3 Dry off the unit and make sure that there is no water around the on/off plug or the external connector.
- 4 Turn the unit off by removing the on/off plug or disconnecting the external cable.

5 Recharge the unit.

### Result

The transponder is ready for use.

## Cymbal protocol

Cymbal is the acoustic protocol used both for positioning of subsea transponders in SSBL/LBL mod and data communication to and from transponders. It uses Direct Sequence Spread Spectrum (DSSS) signals.

There are 10 wide band carrier frequencies with 56 unique codes. The bandwidth of each band is 4 kHz. There are 560 unique channels in total.

Channel names	Centre frequency
M8xx	24.0 kHz
M6xx	24.4 kHz
M4xx	24.8 kHz
M2xx	25.2 kHz
Mxx	25.6 kHz
M1xx	26.0 kHz
M3xx	26.4 kHz
M5xx	26.8 kHz
M7xx	27.2 kHz
M9xx	27.6 kHz

# Operating procedures

The transponder is operated from the HiPAP operator station APOS.

- Refer to APOS online help for descriptions.

# Maintenance

## Topics

[Safety features, page 24](#)

[Charging the battery \(on-deck\), page 24](#)

[Replacing the connector, page 26](#)

[Lubricating SEACON connectors, page 27](#)

[Battery charger status and troubleshooting, page 29](#)

## Safety features

The transponder has a safety valve for releasing pressure that might build up inside.

### **Pressure relief valve**

The transponder is fitted with a pressure relief valve at the bottom of the unit. The relief valve prevents overpressure. This valve will release the pressure if it exceeds approximately 1.0 bar.

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.

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.

### **Handling a transponder with an open relief valve or heated body**

If the transponder body is hot when recovered, place the transponder fully submerged in a bucket of water for 24 hours or deploy into the sea permanently. If this method is impossible, the transponder can be cooled with lots of cold water using a fire hose.

If the transponder pressure relief valve emits gas or liquids when recovered, place the transponder fully submerged in a bucket of water for 24 hours or deploy into the sea permanently. If this method is impossible, the transponder can be cooled with lots of cold water using a fire hose.

## Charging the battery (on-deck)

Charging a battery is a process with an inherent risk so check applicable procedure(s) prior to charging in order to first assess the level of the inherent risk; and then, if necessary, apply suitable controls to mitigate the inherent risk before charging. Follow the charging procedure carefully.

### **Context**

The battery must be fully charged before long term storage and it is recommended to recharge the battery every 6 months to make sure the battery does not discharge completely over time. A completely discharged battery will not charge, as all lithium ion batteries.

To comply with regulations for air transportation, the battery must have 30 % or less remaining capacity.

The battery charger will only start to charge if the battery capacity is lower than 96 %.



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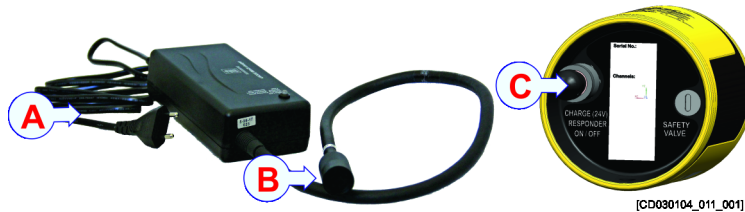
**Caution**

Equalize the temperature of the cNODE MiniS to between 10 °C and 40 °C before charging it.

For on-deck charging, use the cNODE battery charger only.

Never charge the battery unattended.

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**Procedure**

- 1 Disconnect the on/off plug from the cNODE transponder.
- 2 Let the unit warm up or cool down to an ambient temperature of 10 °C to 40 °C before charging.
- 3 Connect the battery charger plug (B) to the connector on the cNODE MiniS marked CHARGE (C).
- 4 Connect the battery charger to mains (110 or 220 VAC).
- 5 Remove the power cord after charging, before removing the connector from the cNODE MiniS.

**Result**

The LED indicator on the charger flashes green when charging. It normally takes about 30 seconds before the charging starts and the LED indicator starts flashing green after connecting the cNODE battery charger to the mains. The battery will be charged within 1 hour. The LED indicator will stay green when fully charged.

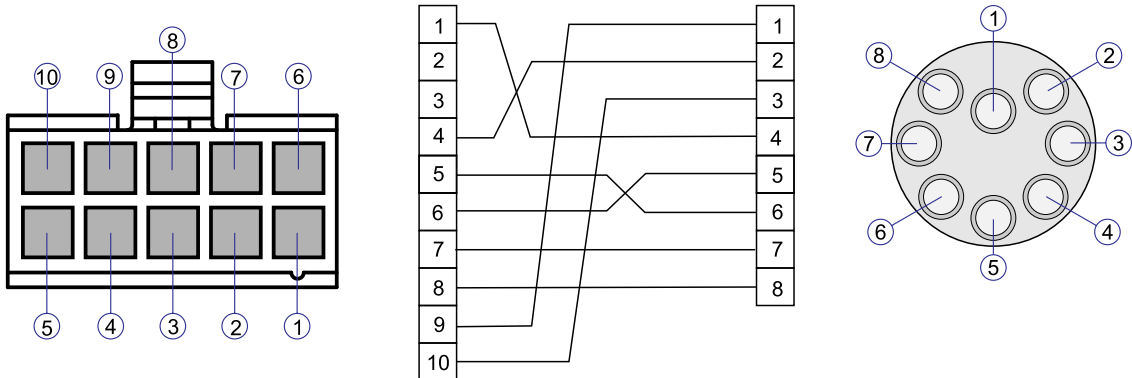
The transponder is ready for use.

## Replacing the connector

The connector kit consists of a connector, a receptacle, crimp terminals and a cable sleeve.

### Context

Cable specifications



This is the Molex plug seen from the back where the crimp terminals are installed and a face view of the connector.

### Procedure

- 1 Remove the transducer.
- 2 Disconnect the transducer cable(s).
- 3 Disconnect the connector plug from the PCB.
- 4 Remove the battery and the PCB.
- 5 Cut the Molex plug.



- 6 Use a wrench to remove the connector.  
Use a wrench with a slim 20 mm socket. The outer diameter of the socket should be 24 mm or less to avoid damaging the transponder housing.



- 7 Clean the threads in the transponder housing.
- 8 Feed the wires on the new connector through the connector hole.
- 9 Use Loctite 243 on the threads and apply activator.



- 10 Insert the connector.
- 11 Tighten the connector to 10 Nm.
- 12 Install the crimp terminals in the receptacle according to the cable drawing.
- 13 Put the battery and the PCB back in the tube.
- 14 Check and replace any damaged O-rings on the transducer before replacing it.
- 15 Connect the new connector and the transducer to the PCB.
- 16 Install the transducer.

## Lubricating SEACON connectors

SEACON connectors require very little maintenance. They are designed to be used in harsh environments and thus limited amounts of dirt and grit do not affect their performance.

### Context

It is recommended that, upon disconnecting or retrieving the system, the connectors be cleaned, to storage (if possible, remate with dummy plugs). Prior to deployment the following maintenance procedure is recommended:

### Procedure

- 1 Demate the connector set.

- 2 Flush connector interface with fresh water (deionized water if available), remove all dirt, grit and grease.
- 3 Inspect for damage in sealing areas, excessive corrosion, debonding of the cable and connector interface and cuts in the cable jacket.
- 4 Apply thin film of dielectric compound (DC) grease, silicon based, to sealing areas of male connector and across the face of the female connector. If the bulkhead connector (BC) is removed from its housing then replace facial o-ring and make sure that o-rings are lubricated and in good condition. The use of some oil-based propellants in spray cans can cause conductivity problems in neoprene.
- 5 Mate the connector halves, wipe away any excess grease off the interface line of the mated set.

## Battery charger status and troubleshooting

The battery charger has a LED indicator for easier troubleshooting.

LED indicator	What it means	How to fix this
Flashing green	The battery is charging	
Steady green	The battery is fully charged	
Flashing red	<ul style="list-style-type: none"> <li>The charger is not connected to the transponder</li> <li>Failure in charger/transponder connection</li> <li>Charger might be faulty</li> </ul>	<p>Disconnect all cables and wait 1 minute before reconnecting the cables and connect power supply to mains (110 or 220 Vac).</p> <p>If the LED indicator is still flashing red:</p> <p>Charger might be faulty Contact your local Kongsberg Maritime office.</p>
Steady red	<ul style="list-style-type: none"> <li>The battery temperature might be outside the charging specification</li> <li>Possible battery failure</li> </ul>	<ul style="list-style-type: none"> <li>Let the unit warm up or cool down to an ambient temperature of 10 °C to 40 °C before charging.</li> <li>Disconnect all cables and wait 1 minute before reconnecting the cables and connect power supply to mains (110 or 220 Vac).</li> </ul> <p>If the LED indicator is still flashing red:</p> <p>Possible battery failure Contact your local Kongsberg Maritime office.</p>
No light	It normally takes about 30 seconds before the battery starts charging and the LED indicator starts flashing green after connecting the cNODE battery charger to the cNODE MiniS and then to the mains (110 or 220 VAC).	<p>Disconnect all cables and wait 1 minute before reconnecting the cables and connect power supply to mains (110 or 220 Vac).</p> <p>The charger or cNODE MiniS might be faulty. Contact your local Kongsberg Maritime office.</p>

# Spare parts

## Topics

[Ordering spare parts, page 31](#)

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## Ordering spare parts

To make the order process as short and efficient as possible, you must provide accurate information about the product, the part you need, and yourself.

The following information must be provided with your order:

- Part name and/or description
- Our part number
- Number of items required
- Your shipment address
- Preferred shipment method
- Required date of delivery from us

For certain spare parts (typically complete units, printed circuit boards and software) the vessel name is also useful, as this allows us to update our vessel database.

### cNODE MiniS 34-180 spare part

- **Part name:** MiniS 34-180
- **Part number:** 396588



### cNODE MiniS 34-180 PS spare part

- **Part name:** MiniS 34-180 PS
- **Part number:** 443399



### cNODE MiniS 31-180 PS spare part

- **Part name:** MiniS 31-180 PS
- **Part number:** 443380



## cNODE MiniS 34-40V spare part

- **Part name:** MiniS 34-40V
- **Part number:** 396590



## cNODE MiniS 37-40V Ti spare part

- **Part name:** MiniS 37-40V Ti
- **Part number:** 438678



## cNODE MiniS 34-40V PS spare part

- **Part name:** MiniS 34-40V PS
- **Part number:** 443303



## cNODE MiniS 31-40V PS spare part

- **Part name:** MiniS 31-40V PS
- **Part number:** 443391



## cNODE MiniS 34-S spare part

- **Part name:** MiniS 34-S
- **Part number:** 414030





## TDR180 spare part

### Aluminium

- **Part name:** cNODE MiniS TDR180
- **Part number:** 349742

### Stainless steel

- **Part name:** cNODE MiniS TDR180-St
- **Part number:** 375361



## TDR40V spare part

### Aluminium

- **Part name:** cNODE MiniS TDR40V
- **Part number:** 349743

### Stainless steel

- **Part name:** cNODE MiniS TDR40V-St
- **Part number:** 375360



## TDR30H spare part

### Aluminium

- **Part name:** cNODE MiniS TDR30H
- **Part number:** 345773

### Stainless steel

- **Part name:** cNODE MiniS TDR30H-St
- **Part number:** 375359



## Transducer cable spare part

- **Part name:** cNODE MiniS transducer cable
- **Part number:** 345772



## Battery charger spare part

- **Part name:** cNODE MiniS battery charger
- **Part number:** 404199



## ON/OFF plug spare part

- **Part name:** ON/OFF plug with locking sleeve
- **Part number:** 401633



## Configuration or power cable spare part

- **Part name:** Pigtail cable with locking sleeve
- **Part number:** 408094



## Floating collar spare part

- **Part name:** Floating collar
- **Part number:** 442750



## Transducer guard spare part

- **Part name:** Transducer guard
- **Part number:** 439442



## TTC 30 spare part

- **Part name:** TTC 30 (Transponder Test and Configuration unit)
- **Part name:** 345775



## Test and configuration cable (TTC to MiniS) spare part

- **Part name:** Test and configuration cable (TTC to MiniS) spare part
- **Part number:** 407647

## Test and configuration cable (PC to MiniS) spare part

- **Part name:** Test and configuration cable (PC to MiniS) spare part
- **Part number:** 407648

# Drawing file

## Topics

[cNODE MiniS 3x-180 dimensions, page 37](#)

[cNODE MiniS 3x-40V dimensions, page 38](#)

[cNODE MiniS 34-S dimensions, page 39](#)

[Configuration or power connector pinout, page 40](#)

[Transducer guard dimensions, page 41](#)

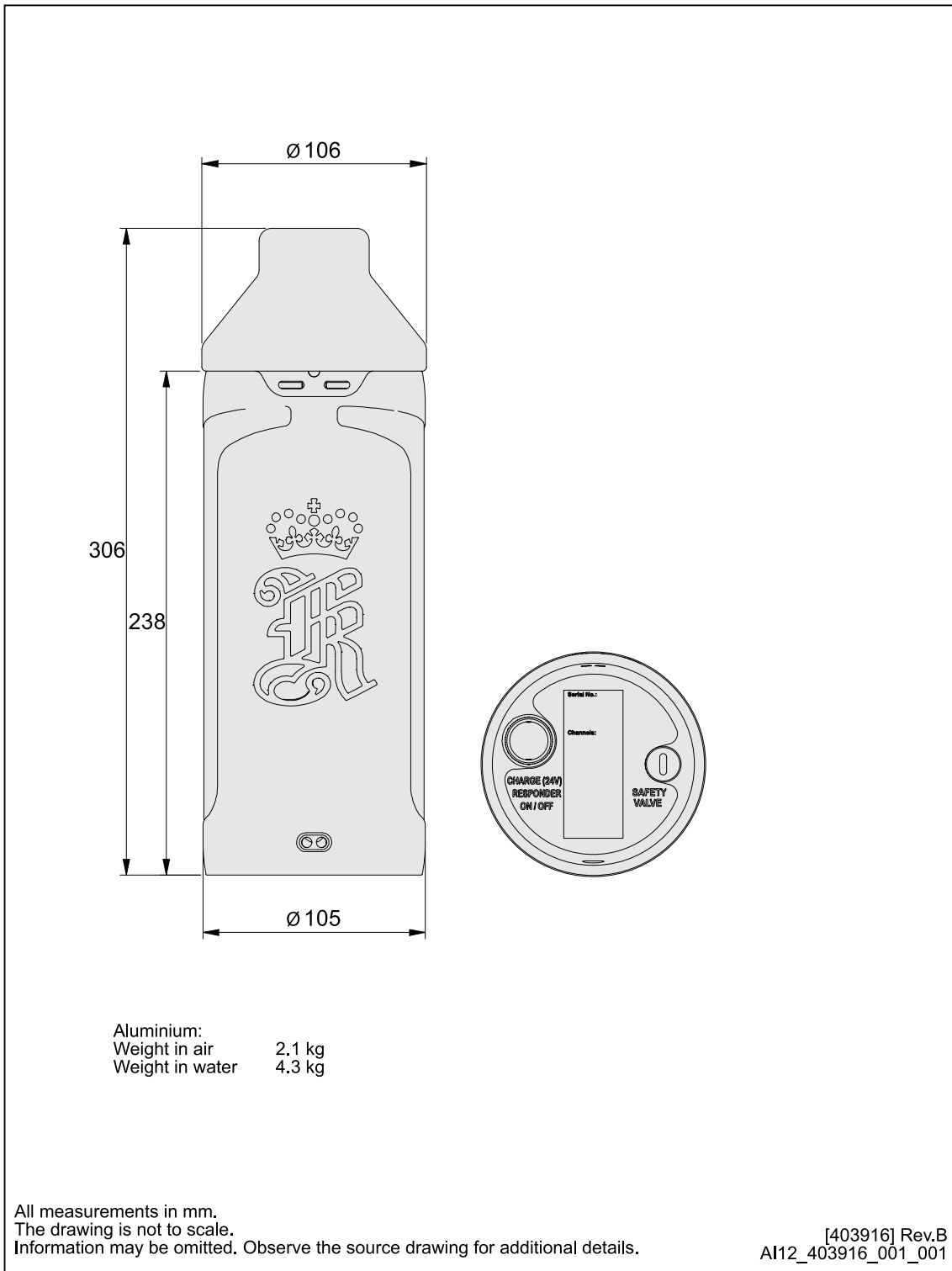
[Floating collar dimensions, page 42](#)

[TDR180 dimensions, page 43](#)

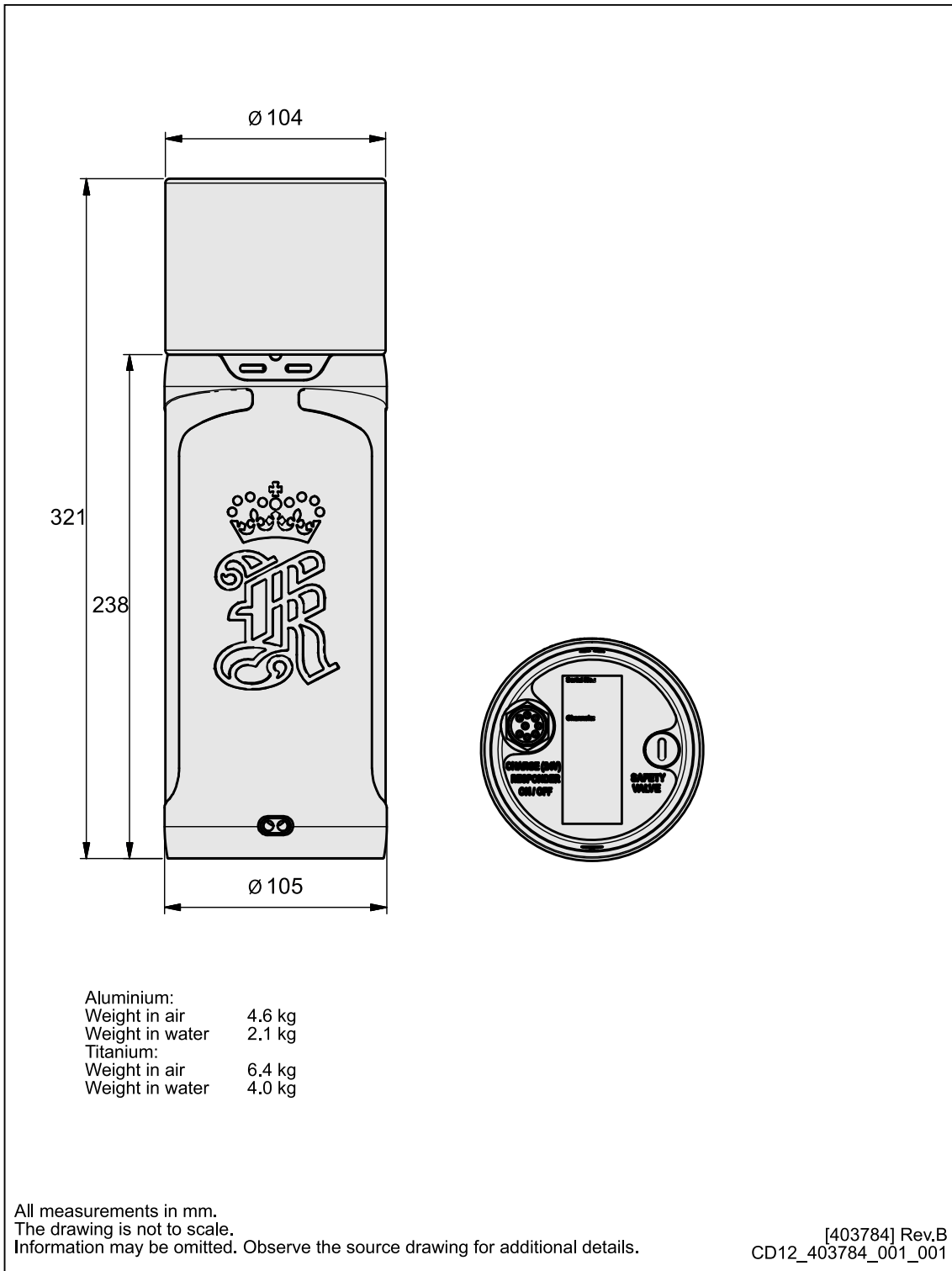
[TDR40V dimensions, page 44](#)

[TDR30H dimensions, page 45](#)

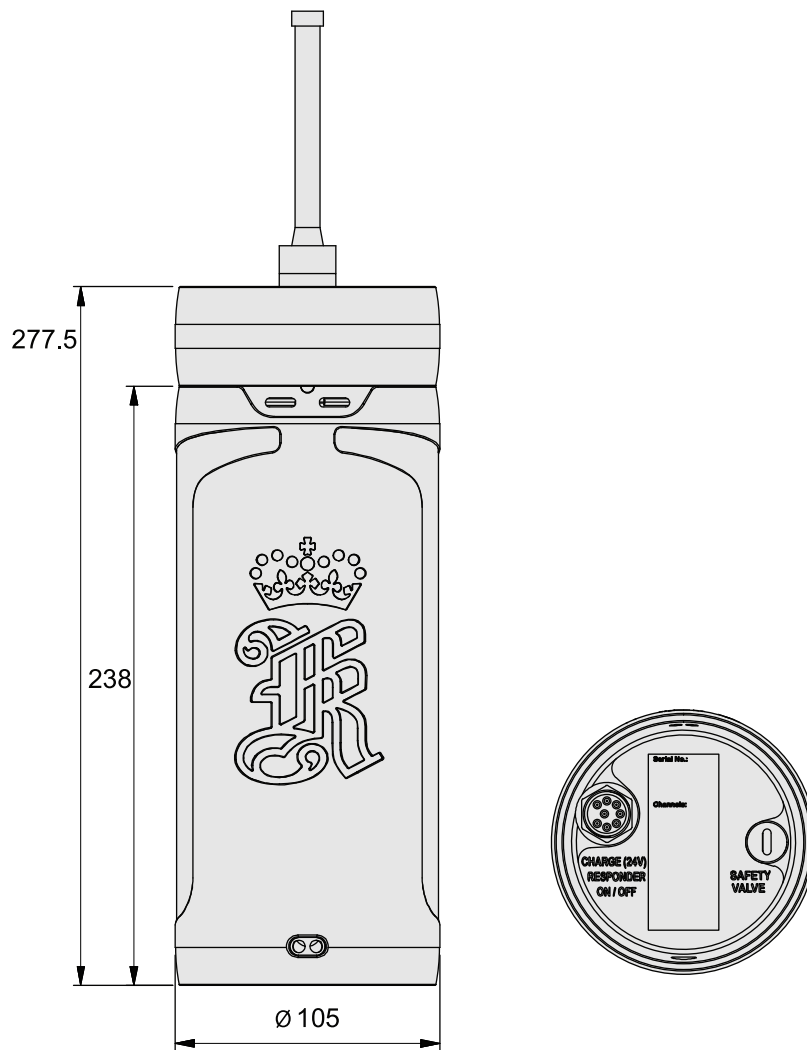
## cNODE MiniS 3x-180 dimensions



## cNODE MiniS 3x-40V dimensions



## cNODE MiniS 34-S dimensions



Aluminium:  
 Weight in air 2.1 kg  
 Weight in water 4.3 kg

All measurements in mm.  
 The drawing is not to scale.  
 Information may be omitted. Observe the source drawing for additional details.

[441986] Rev.A  
 AI12\_441986\_001\_001

## Configuration or power connector pinout

The external connector is for configuration, responder function, on/off function and charging.

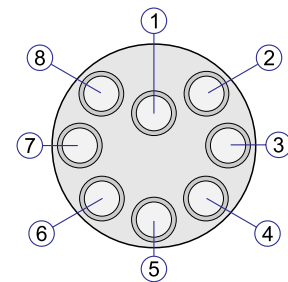
This is the pin configuration for a male connector, as seen towards the connector (face view).

Pin 1, 2 and 3 is for configuration.

Pin 4 and 5 is for responder function.

Pin 6 and 8 is for on/off function.

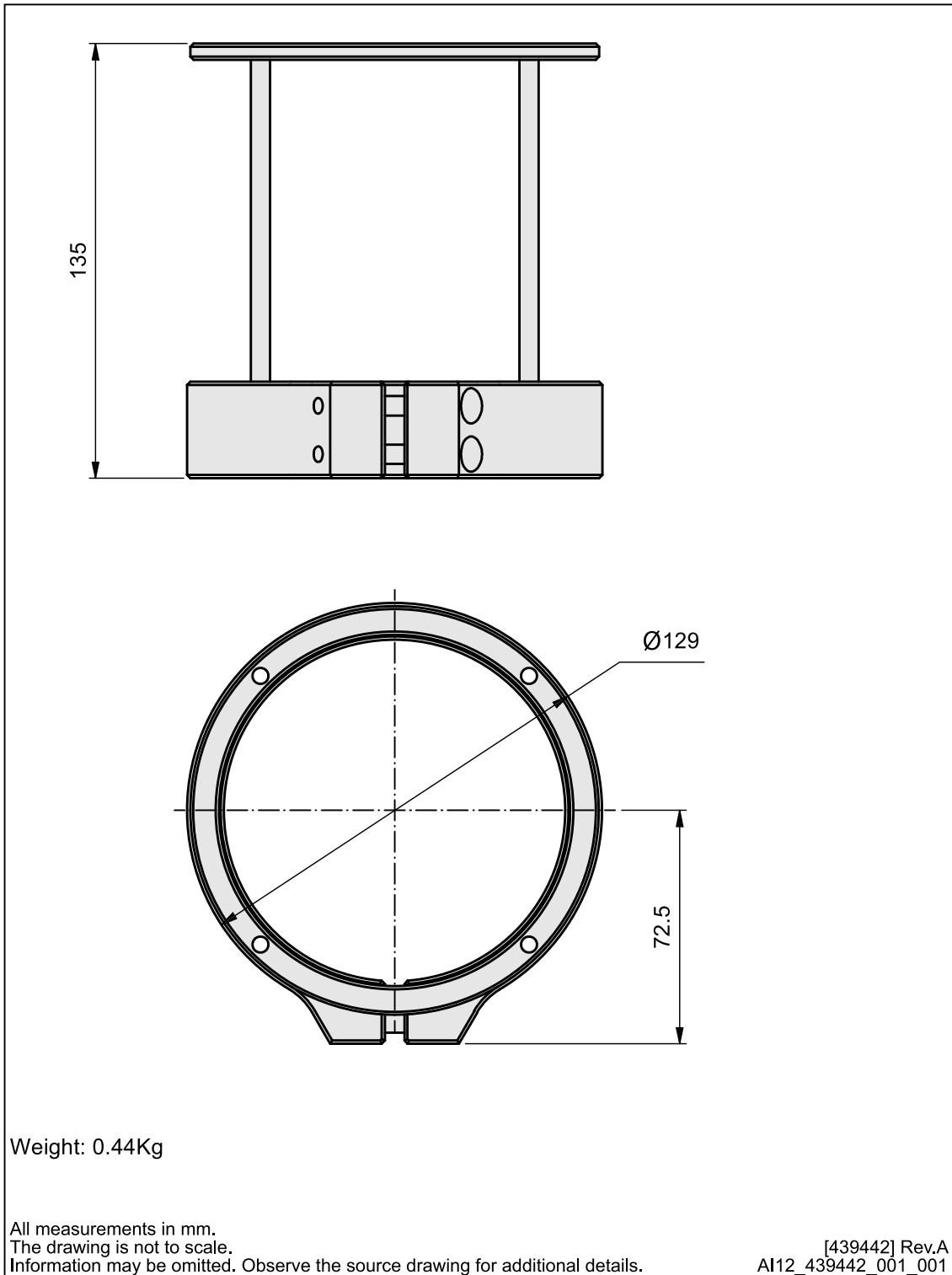
Pin 7 and 8 is for external power.



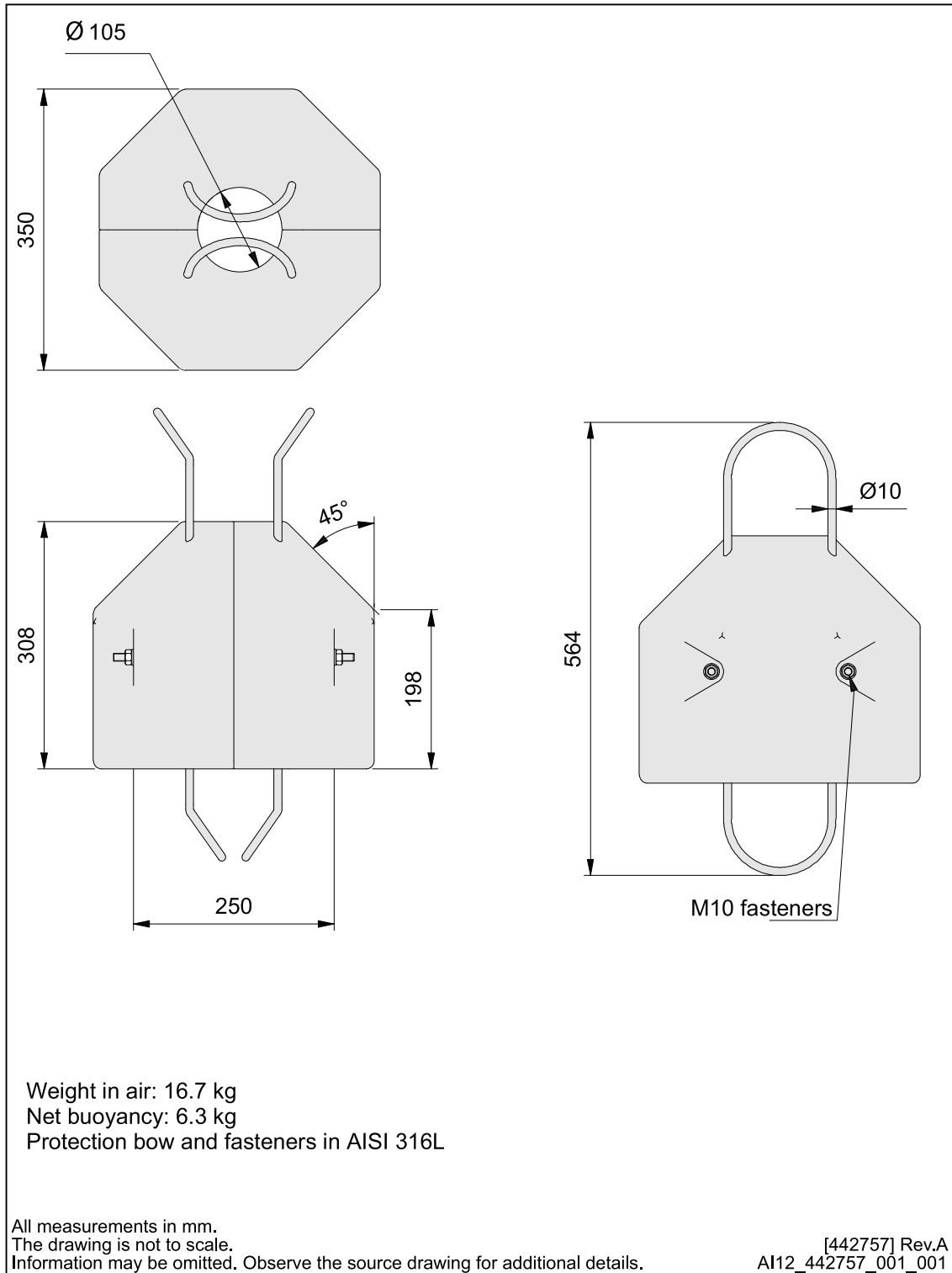
Pin number	Signal
1	
2	
3	
4	Responder trigger +
5	Responder trigger -
6	On/Off
7	External power (24 VDC)
8	Ground



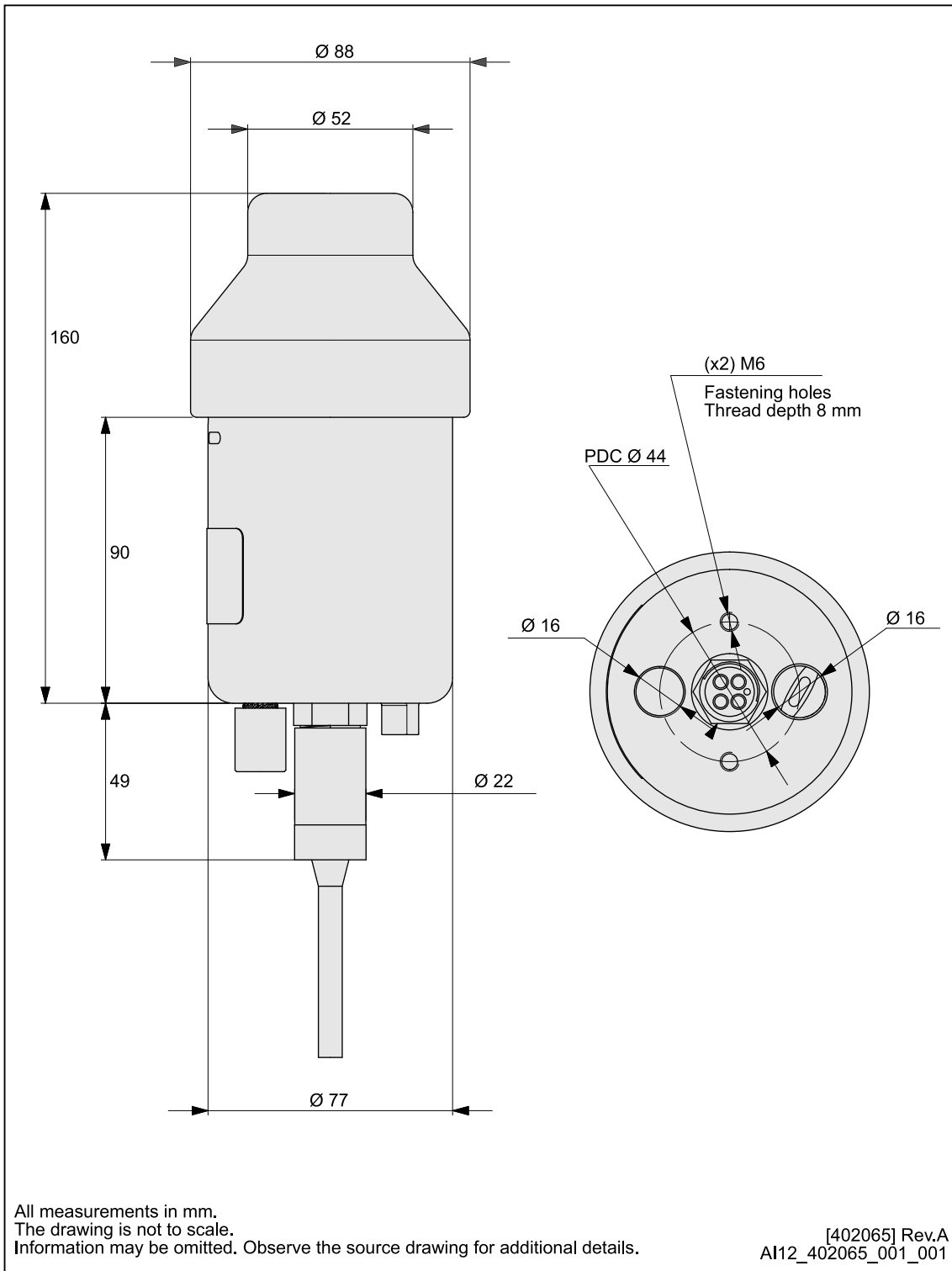
## Transducer guard dimensions



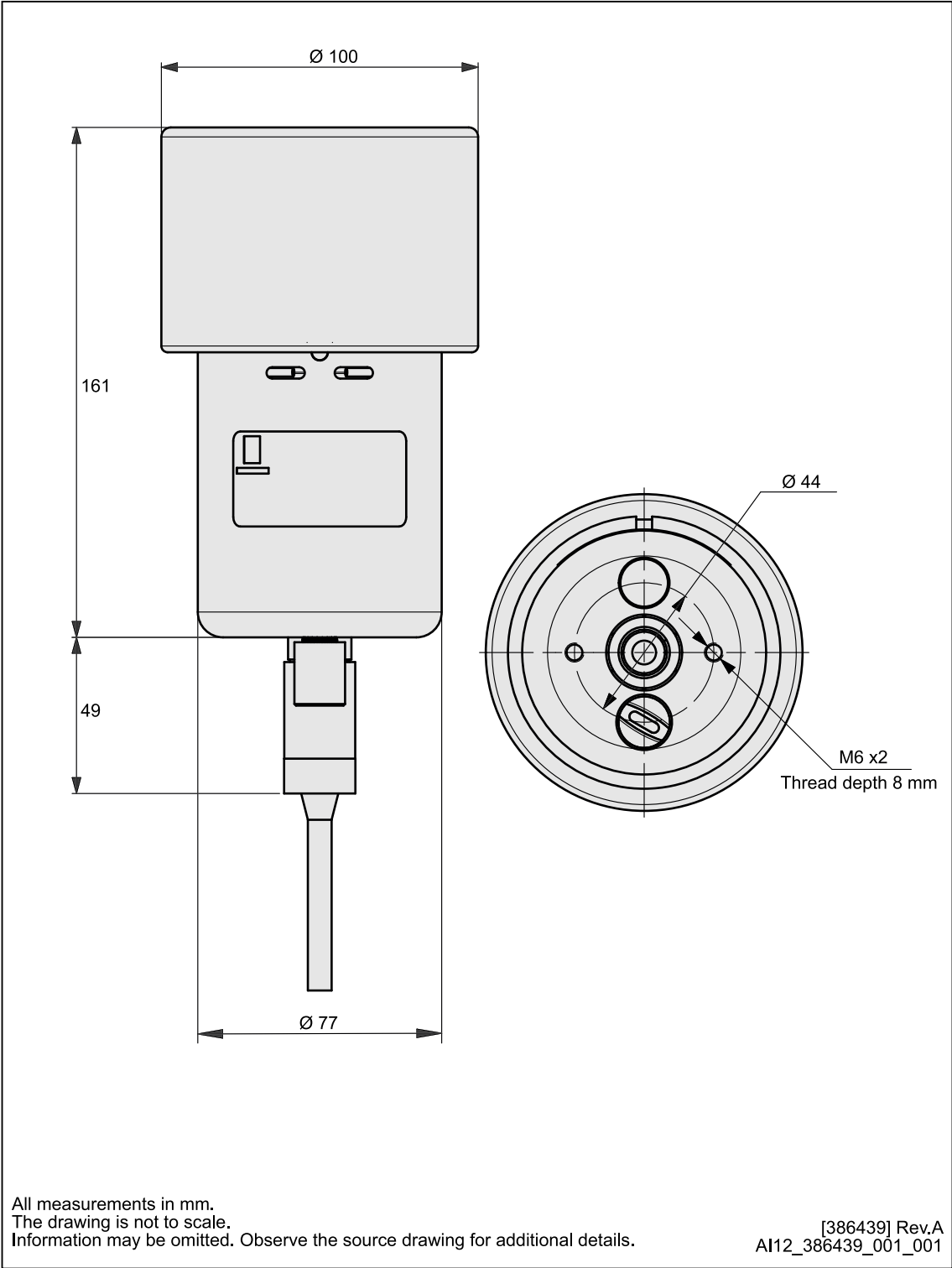
## Floating collar dimensions



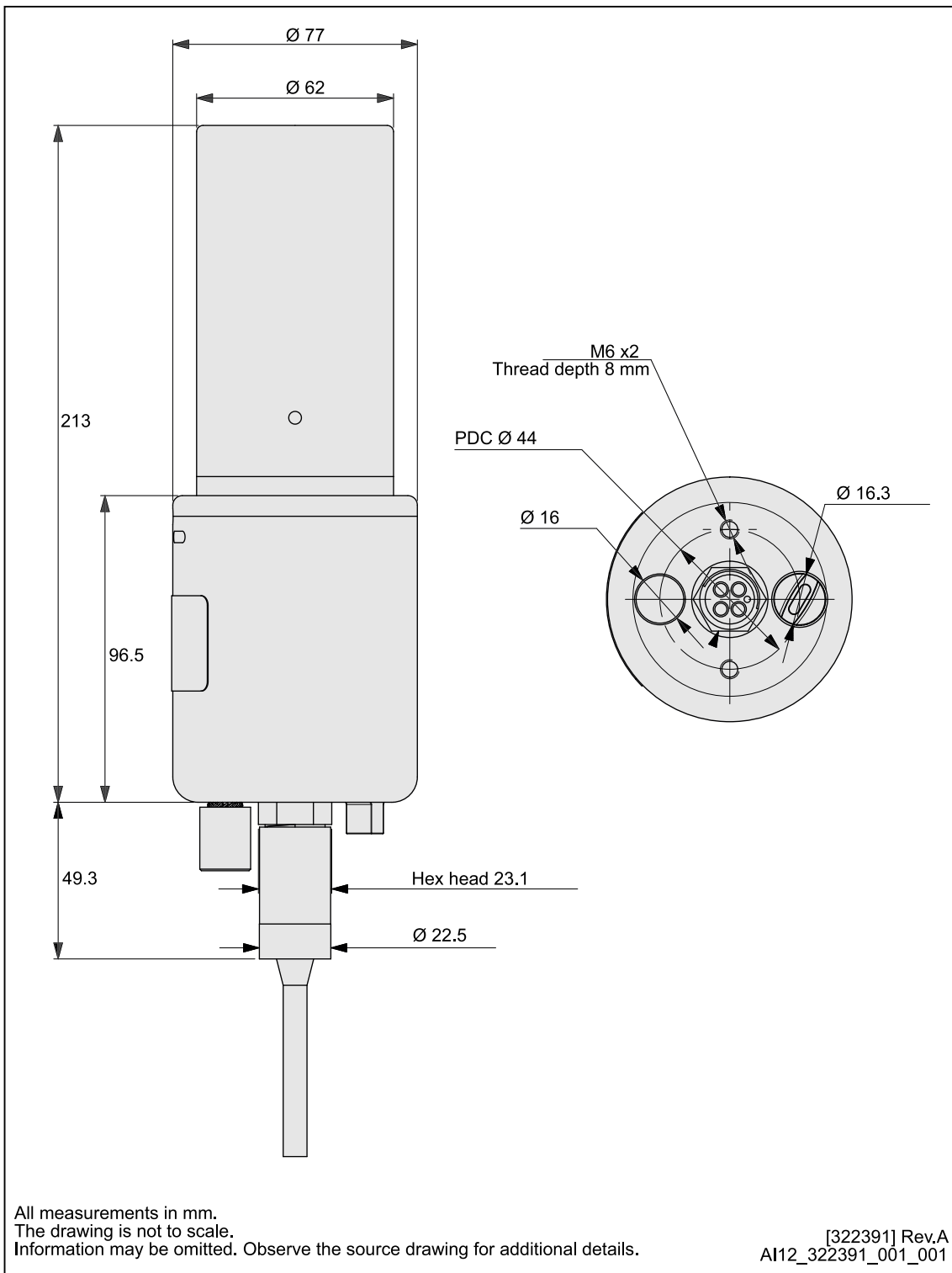
# TDR180 dimensions



# TDR40V dimensions



# TDR30H dimensions



# Technical specifications

## Topics

[Performance specifications, page 47](#)

[Weights and outline dimensions, page 49](#)

[Power requirements, page 50](#)

[Environmental requirements, page 50](#)

## Performance specifications

These performance specifications summarize the main functional and operational characteristics of the system.

- **Operating frequency:** 21 – 31 kHz
- **Responder trigger signal:** 5 - 25 V positive logic pulse (2 - 6 ms)
- **External connector:** Seacon MCBH8MDO
- **Pigtail cable:** Seacon MCIL8F, 0.60 m
- **Internal tilt sensor:**  $\pm 90^\circ$
- **Pressure sensor accuracy (for models with pressure sensor):** 0.05% of full scale
- **Estimated operating battery lifetime at 20° C ambient temperature:**
  - **Quiescent battery lifetime:** 30 days
  - **Cymbal (Low power, 1 second update rate):** > 2.5 days\*
  - **Cymbal (Low power, 3 second update rate-power saver mode):** > 7 days\*
  - **FSK (High power, 3 second update rate):** > 4.5 days

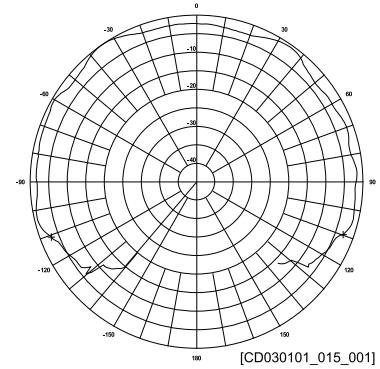
\* For transponders with pressure sensor, the estimated battery lifetime is reduced to 35 % when the sensor is active.

Model	Depth rating	Range capability**
MiniS 34-S	4000 m	Depending on the type of remote transducer model in use.
MiniS 37-40V Ti	7000 m	5000 m
MiniS 34-180	4000 m	3000 m
MiniS 34-40V, MiniS 34-40V PS	4000 m	5000 m
MiniS 34-180 PS	4000 m	3000 m
MiniS 31-180 PS	100 m, transponder depth rating limited by the rating of the pressure sensor model.	3000 m
MiniS 31-40V PS	1000 m, transponder depth rating limited by the rating of the pressure sensor model.	5000 m

\*\* Range capability is dependent on acoustic conditions and the type of acoustic system in use, and indicates the "up to" achievable range.

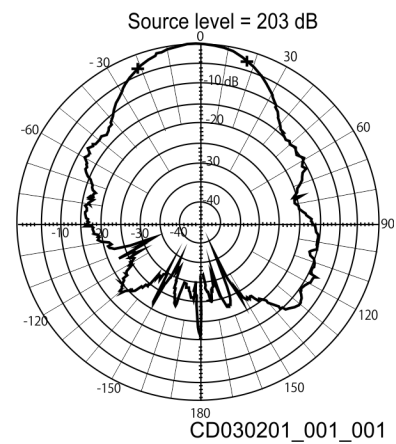
**Common for all 180° transducers**

- **Transducer beam:** 180°
- **Trigger level:** 188 dB
- **Source level:** < 85 dB



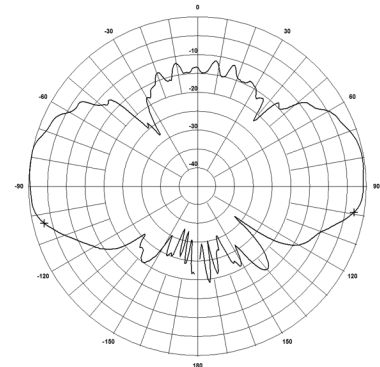
**Common for all 40° transducers**

- **Transducer beam:** 40° Vertical
- **Trigger level:** 203 dB
- **Source level:** < 80 dB



**TDR30H**

- **Transducer beam:** 30° Horizontal
- **Trigger level:** < 80 dB
- **Source level:** 194 dB





## Weights and outline dimensions

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

<b>Model</b>	<b>Height</b>	<b>Diameter</b>	<b>Weight in air</b>	<b>Weight in water</b>
MiniS 34-180, MiniS 34-180 PS, MiniS 31-180 PS	305.5 mm	105 mm	4.3 kg	2.1 kg
MiniS 34-40V, MiniS 34-40V PS, MiniS 31-40V PS	321 mm	105 mm	4.6 kg	2.2 kg
MiniS 37-40V Ti	321 mm	105 mm	6.4 kg	4.0 kg
MiniS 34-S	321 mm	105 mm	4.3 kg	2.1 kg
TDR180	160 mm	88 mm	1.7 kg	1.0 kg
TDR40V	161 mm	100 mm	2.3 kg	1.3 kg
TDR30H	213 mm	77 mm	1.7 kg	0.9 kg

<b>Model</b>	<b>Depth</b>	<b>Width</b>	<b>Height</b>	<b>Weight</b>
Battery charger	80.7 mm	157.7 mm	47.3 mm	0.6 kg
Floating collar	350 mm	350 mm	564 mm	16.7 kg
Transducer guard	129 mm	137 mm	135 mm	0.44 kg

## Power requirements

These power characteristics summarize the supply power requirements for the system.

### Battery

- **Battery type:** Li-Ion (LiFePO<sub>4</sub>)
- **Nominal capacity:** 58 Wh

### Battery charger

- **Input voltage:** 115/230 VAC 50–60 Hz maximum 1.4 A
- **Output voltage:** 24 VDC, 4 A

### External power

- **Input voltage:** 24 VDC (20-28 VDC), 1 A/24 W

## Environmental requirements

These environmental specifications summarize the temperature and humidity specifications for the system.

- **Operating temperature:** -5 to 55 °C
- **Storage temperature:** -30 to 70 °C
- **Vibration range:** 2 - 100 Hz
- **Excitation level:** 2-13.2 Hz ± 1.4 mm, 13.2-100 Hz 1 g

# Battery safety

## Topics

- SECTION 1: Identification, page 52
- SECTION 2: Hazards identification, page 52
- SECTION 3: Composition, page 53
- SECTION 4: First aid measures, page 53
- SECTION 5: Firefighting measures, page 54
- SECTION 6: Accidental release measures, page 54
- SECTION 7: Handling and storage, page 55
- SECTION 8: Exposure control and personal protection, page 55
- SECTION 9: Physical and chemical properties, page 56
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- SECTION 11: Toxicological information, page 56
- SECTION 12: Ecological information, page 56
- SECTION 13: Disposal considerations, page 57
- SECTION 14: Transport information, page 57
- SECTION 15: Regulatory information, page 58
- SECTION 16: Other information, page 58

## SECTION 1: Identification

The specification describes the technical parameters for the battery.

The cNODE MiniS contains a custom made 58 Wh Li-Ion battery.

- **Product name:** cNODE MiniS Battery
- **Part number:** 396782
- **Manufacturer:** Kongsberg Maritime AS
- **Address:** Strandpromenaden 50, 3190 Horten, Norway
- **Telephone:** +47 33 03 24 07 (24 h)
- **Email address:** [km.support.hpr@kongsberg.com](mailto:km.support.hpr@kongsberg.com)
- **Website :** <https://www.kongsberg.com/maritime>

### Note

---

*The battery is a solid and sealed unit. The battery cannot be opened to reveal the individual cells.*

*For additional information about the cells inside the sealed battery pack, see the safety data sheet provided by the cell manufacturer. <https://lithiumwerks.com/>*

---

## SECTION 2: Hazards identification

The battery is not labelled with a hazmat label. It is not classified as dangerous or hazardous when undamaged and used as intended, and as such it is exempted from GHS (Globally Harmonized System of Classification and Labelling of Chemicals) classification and labelling.

Do not open, disassemble, crush or burn the battery. The battery contains dangerous ingredients. Exposure to the ingredients contained within the battery cells could be harmful. The battery cells include a barrier, preventing exposure to the user and environment. The battery cells are not classified as hazardous according to Regulation (EC) No. 1272/2008.

The chemicals in the battery cells are contained in a sealed enclosure. Risk of exposure occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, exposure to the electrolyte solution contained within can occur by inhalation, ingestion, eye contact and skin contact. The electrolyte solution can be corrosive and may cause irritation and burns.

### Other hazards

- **Overcharge:** If the cells that form the battery block are overcharged, the results may be a thermal runaway.

- **External fire:** Internal pressure and thermal runaway may be the consequences if the cells inside the battery are exposed to temperatures above 85 °C.
- **Internal short circuit:** Internal short circuit in a cell. Destruction of the separator can cause a short circuit between the anode and cathode. Thermal runaway and fire is possible.
- **Water ingress:** Internal pressure, thermal runaway and chemical reactions may be the consequence.

The transponder is fitted with a pressure relief valve at the bottom of the unit. The relief valve prevents overpressure. Noxious gases and ingredients 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.

## SECTION 3: Composition

The battery is solid with a hard surface.

The lithium metal cells have the following chemical formula:

Li-Ion (LiFePO<sub>4</sub>)

- **Negative electrode:** Lithium
- **Positive electrode:** Carbon
- **Nominal capacity:** 58 Wh
- **Lithium weight:** 5.3 g

Note

---

*For additional information about the cells inside the sealed battery pack, see the safety data sheet provided by the cell manufacturer.*

---

- **Manufacturer:** Lithium Werks
- **Cell type:** APR18650
- **Manufacturer's website:** <https://lithiumwerks.com>

## SECTION 4: First aid measures

The battery will release toxic fumes if burned or exposed to fire.

If subjected to gas from a burning battery, remove the source of contamination or move yourself and any victims to fresh air. Seek medical advice.

- **Inhalation:** The chemicals are lung irritant. Avoid inhaling any vented gases. Remove the victim and yourself from exposure. Rest and keep warm. If breathing is difficult, seek emergency medical attention.

- **Skin contact:** The chemicals are skin irritant. Rinse immediately with a lot of water and soap for at least 15 minutes. Wipe immediately away excess material with waterless hand cleaner. Remove contaminated clothing and wash it thoroughly before reuse.
- **Eye contact:** The chemicals are eye irritant. Flush immediately with a lot of clear tepid water for at least 15 minutes.
- **Ingestion:** Exposure to the chemicals may cause tissue damage to throat and gastro/respiratory tract if swallowed. If ingested, rinse mouth and surrounding area with tepid water. Dilute by drinking plenty of water. Seek medical advice.

## SECTION 5: Firefighting measures

The transponder is designed to withstand damage to the internal battery pack. Non-flammable material is used. In case of fire, move the battery away from the fire area if you can do it without compromising your own safety. Extreme mechanical abuse to the battery may result in a ruptured seal and exposure.

The individual cells in the battery pack contain a flammable liquid electrolyte that may vent, ignite and produce sparks when subjected to high temperatures (> 150 °C/302 °F), when damaged or abused. A burning battery can ignite other batteries in close proximity.

Suitable extinguishing media are dry chemical, CO<sub>2</sub>, water spray or regular foam. Cool down the battery/transponder with copious amounts of cold water.

The interaction with water or water vapour and exposed lithium hexafluorophosphate (Li PF<sub>6</sub>) may result in the generation of hydrogen and hydrogen fluoride (HF) gas. Contact with battery electrolyte may be irritating to skin, eyes and mucous membranes. Fire will produce irritating, corrosive and/or toxic gases. Fumes may cause dizziness or suffocation. Don a self-contained breathing apparatus (SCBA).

### Note

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

---

## SECTION 6: Accidental release measures

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

As an immediate precautionary measure, isolate the spill or leak area at least 25 metres (75 feet) in all directions. Keep unauthorized personnel away. Stay upwind, and keep out of low areas. Ventilate closed areas before entering. Wear adequate personal protective equipment.

Prevent material from contaminating soil and from entering sewers or waterways. Stop the leak if safe to do so. Contain the spilled liquid with dry sand or earth. Clean up the spills immediately.

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 it according to relevant regulations. Scrub the area with detergent and water; collect all contaminated water for proper disposal.

## SECTION 7: Handling and storage

Do not open, disassemble, crush or burn the battery.

- 1 Do not expose the battery to water, sea water or other high-conductivity liquids.
- 2 Avoid mechanical or electrical abuse.
- 3 Do not expose the battery to temperatures outside the range of -30 °C to +70 °C.
- 4 Store in a dry location.

To minimize any adverse effects on the battery performance it is recommended that it is kept at room temperature (25 °C ± 5 °C). A storage temperature outside the recommended temperature range may foreshorten the service life.

To avoid complete discharge of the battery during long term storage, the battery should be fully charged and recharged every 6 months. A completely discharged battery will not charge, as all lithium ion batteries.

## SECTION 8: Exposure control and personal protection

Airborne exposures to hazardous substances are not expected when the battery is undamaged and used as intended. Personal protective equipment (PPE) is not required when the battery is undamaged and used as intended. Don personal protective equipment if the battery is damaged and you are at risk for exposure to the chemicals inside.

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

- **Fire or explosion:** Don a self-contained breathing apparatus (SCBA).
- **Exposure to noxious gas:** Chemical-resistant gloves and safety glasses.

## SECTION 9: Physical and chemical properties

The battery is solid with a hard surface. There is no risk for exposure to the chemicals inside an undamaged battery during normal operation and transportation.

The battery is a solid and sealed unit. The battery cannot be opened to reveal the individual cells.

For additional information about the cells inside the sealed battery pack, see the safety data sheet provided by the cell manufacturer.

### Cell manufacturer

- **Manufacturer:** Lithium Werks
- **Manufacturer's website:** <https://lithiumwerks.com/>

## SECTION 10: Stability and reactivity

The battery is stable. No specific handling requirements apply.

Avoid exposing the battery to fire or temperatures above 80 °C. Do not disassemble, crush, short or install the battery with incorrect polarity. Avoid mechanical or electrical abuse. Do not immerse in seawater or other high conductivity liquids.

The battery will release toxic fumes if burned or exposed to fire. Breaching of the individual cell enclosure may lead to generation of hazardous fumes which again may include extremely hazardous hydrofluoric acid (HF).

## SECTION 11: 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. If this occurs, irritation to the skin, eyes and respiratory tract may occur.

## SECTION 12: Ecological information

The battery will not have an environmental impact provided it's disposed of in accordance with applicable laws, regulations and guidelines.



## SECTION 13: Disposal considerations

Adhere to applicable laws, regulations and guidelines when disposing of the batteries.

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

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

### Note

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

---

## SECTION 14: Transport information

Transportation of the cNODE MiniS must take place with adherence to applicable laws, regulations and guidelines; including those who address the transportation of dangerous goods in all modes of transport. To comply with regulations for air transportation, the battery must have 30 % or less remaining capacity.

The battery is certified according to UN 38.3.

- **Shipment of transponder**

Each cNODE MiniS transponder is transported as a closed and sealed unit, and must not be opened by unauthorized personnel.

The cNODE MiniS transponder must be shipped in accordance with the prevailing national regulations; **UN 3481 PI 967 Section II**, *Miscellaneous (Lithium Ion batteries included in equipment)*.

- **Shipment of separate battery**

If the battery is shipped separately, the prevailing national regulations that apply are: **UN 3480 PI 965 Section IB**, *Miscellaneous (Lithium Ion battery)*.

For all shipments – cNODE MiniS and separate batteries –, use lithium battery handling label as specified in the additional requirement of Section II of packing instructions 965, 966 and 967.

Transport identification codes:

- **Aircraft:** IATA DGR
- **Sea transport:** IMDG
- **Railway:** RID
- **Road transport:** ADR

Note

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*Damaged transponders that are returned to the manufacturer for repair must be transported without batteries. Damaged or spent batteries that have been recalled by the manufacturer for safety reasons must not be transported by air.*

---

## SECTION 15: Regulatory information

Not applicable.

## SECTION 16: Other information

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

- Lithium Werks: <https://lithiumwerks.com>

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