

INSTRUCTION MANUAL



KONGSBERG

cNODE Mini LF 7000 m





KONGSBERG

cNODE Mini
Low Frequency, 7000 m
Instruction Manual

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About this manual

Observe this general information about the cNODE Mini 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 Mini.

Target audience

The manual is intended for all users of cNODE Mini.

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cNODE Mini

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System description

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

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.

A transponder is normally a self-contained unit, receiving power from an internal rechargeable battery pack. The transponder can also be powered from an external power supply.

The transponder unit is designed with a modular construction such that the transponder electronics, battery pack and options (where applicable) can be replaced individually.

The transponder may be secured to a subsea structure using mounting brackets.

Note _____

Always make sure the vent screw is closed before deployment.

Naming description

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

Model name

Mini

Model number

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

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

Example of transponder name

The transponder name Mini 17-180-St indicates that this transponder unit is operating in the 12 kHz, rated to 7000 metres depth, with a 180° transducer beam width and a basic end cap. The standard transponder tube material is stainless steel.

Transponder identification

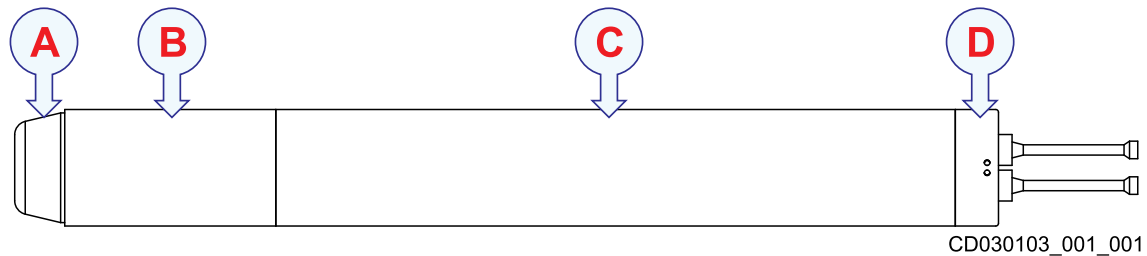
The transponders have labels that identifies:

- the transponder name
- serial number
- default channels

System diagram

The system diagram identifies the main components of the cNODE Mini.

cNODE Mini



- A** Transducer
- B** Top section module
- C** Tube
- D** End cap module

System units

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

TD180LF

The transducer has a 180° omnidirectional beamwidth, and is available in stainless steel.



Split transponder for remote transducer (S)

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



Transducer cable 6 m

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



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.



Tube

The tube contains the battery and the electronics for the Mini transponder. Available in aluminium and stainless steel.



End cap

The end cap has a vent screw, safety valve with on/off switch and two external connectors and is available in aluminium and stainless steel.



Battery

The battery is a rechargeable nickel-metal hybrid battery.



Battery charger

Charging the battery has some risks, read the procedure first.



Power supply

Use the AC to DC converter for continuous charging of the cNODE Mini from an AC source.



TTC (Transponder Test and Configuration unit)

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.



Scope of supply

The following items are provided when you order a transponder.

- Transponder
- Instruction manual

General supply conditions

The following general supply conditions apply to this Kongsberg cNODE Mini 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 Mini 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 Mini 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

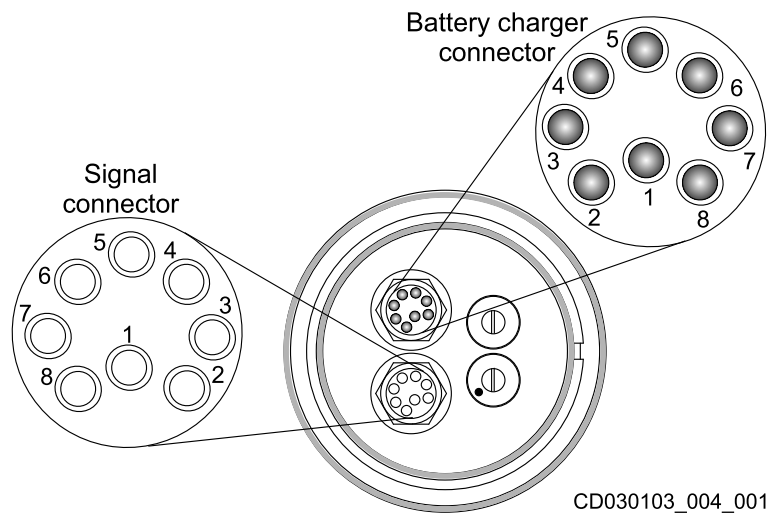
Cable layout and interconnections

Topics

[End cap connectors, page 14](#)

[Power converter connectors, page 15](#)

End cap connectors



The end cap has two connectors:

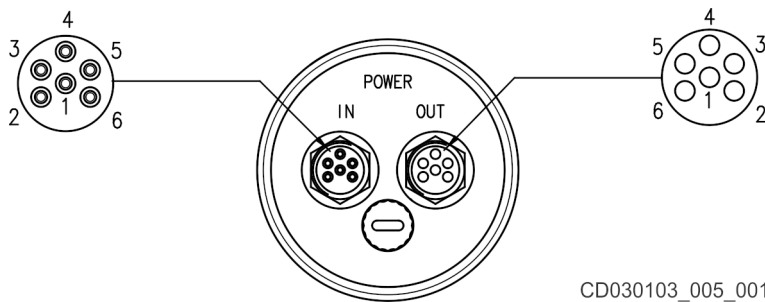
- External signal connector; 8 pin male subconn MCBH8M for serial line, external power supply and responder signal
- External charge connector; 8 pin female subconn MCBH8F for charging the battery

Signal connector pin out

Pin no.	Signal
1	TP TX
2	GND
3	TP RX
4	Responder +
5	Responder —
6	GND
7	Ext. power +15 VDC (use in parallel with 8)
8	Ext. power +15 VDC (use in parallel with 7)

Battery charger connector pin out

Pin no.	Signal
1	Charger A
2	Charger B
3	Charger C
4	NTC A
5	NTC B
6	NTC C
7	GND
8	GND

Power converter connectors

The end cap has two connectors:

- Power in connector; 6 pin male subconn MCBH6MAS
- Power out connector; 6 pin female subconn MCBH6FAS

Power in connector pin out

Pin no.	Signal
1	Responder +
2	115/230 VAC (L)
3	115/230 VAC (L)
4	Responder –
5	115/230 VAC (N)
6	115/230 VAC (N)

Power out connector pin out

Pin no.	Signal
1	Responder +
2	15 VDC
3	15 VDC
4	Responder –
5	GND
6	GND

Operational procedures

Topics

[Charging the transponder, page 18](#)

[Powering up the transponder, page 19](#)

[Powering down the transponder, page 20](#)

[Responder function, page 20](#)

[Setting up the internal tilt sensor, page 21](#)

[Configuring the transponder, page 21](#)

Charging the transponder

The battery is charged inside the cNODE Mini. This is connected with some risk, please read the information below and follow the charge procedure carefully.

Prerequisites

Caution

When you are charging the battery ensure good ventilation and stable temperature. Do not cover the transponder. No open fire, sparks or smoking in the area.

NiMH batteries can generate some hydrogen and oxygen gas, the amount depending on certain conditions. Most often this generation occurs during charging.

Procedure

- 1 Switch off the transponder.
- 2 Climatize the transponder.
The battery must have a temperature between 5 °C and 40 °C. Recommended charging temperature is 25 °C.
- 3 Unscrew the vent screw until you feel some resistance (a nylon washer is forced against a metal surface). The O-ring is now visible.
Hold the transponder in an upright position while you do this, so that any water droplets caught around the vent screw comes out, rather than going inside the cNODE Mini.
- 4 Connect the charger plug to the connector on the transponder marked CHARGE.
- 5 Connect Power supply to mains (110 or 220 VAC).
- 6 Switch on the charger.
The charger measures the battery status; all LEDs emit constant yellow light. If the temperature is out of range, the LEDs will flash orange/green.
Fast charge starts and the LEDs emit constant orange light.
When the battery is fully charged the LEDs will be green with a yellow flash every minute.
- 7 Switch off the charger.
- 8 Disconnect the charger plug from the transponder.
- 9 Close the vent screw.
Tighten the vent screw by hand only, until you feel a rather sudden resistance. (an internal axial O-ring hits a metal surface, compresses 0.3 mm, before 2 metal surfaces meet). The main flat circular surface of the end cap should now align with the edge of a semicircular groove that runs all around the vent screw. This is to visually confirm that the vent screw has been properly tightened.

Result

When the battery is fully charged the charger will start trickle charging the battery. It is not recommended to trickle charge the battery for a long time. It is better to fast charge, and then top up the battery just before operation.

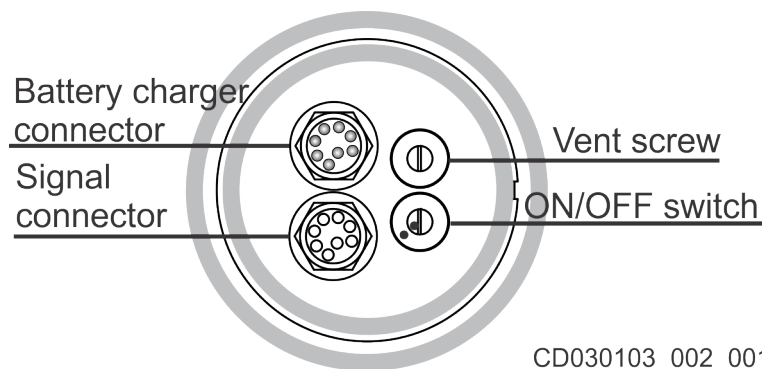
Further requirements**Caution**

When the charging is done, always make sure the vent screw is closed.

Deploying the transponder with the vent screw open will ruin the transponder.

Powering up the transponder

Before deploying the transponder you must connect the battery to the internal circuitry.

Procedure

- 1 See the alignment markers on the ON/OFF switch.
- 2 Align the markers using a suitable screwdriver.

Result

The unit transmits bursts when switched on.

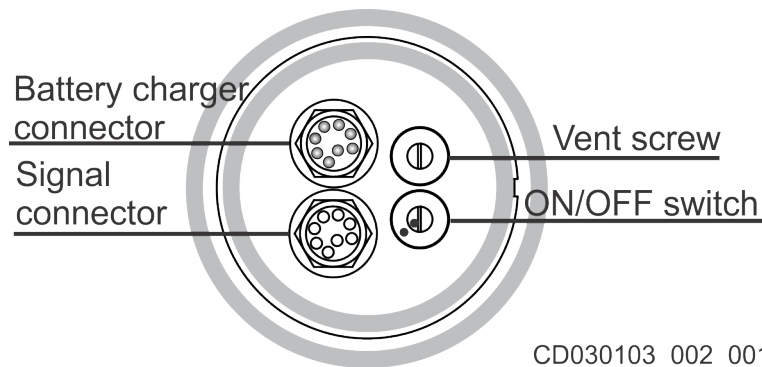
Each time the transponder is switched on, it resets to the two default channels.

Note

Always make sure the vent screw is closed before deployment.

Powering down the transponder

Procedure



- Use a suitable screwdriver to move the two marker dots away from each other.

Result

The transponder is off in all three other positions.

Note

Always keep the transponder switched off when not in use.

Always make sure the vent screw is closed before deployment.

Responder function

Procedure

- cNODE will automatically change to responder mode if a responder trigger signal is present. cNODE will change back to transponder mode if no new trigger signal is received within the next 30 seconds.

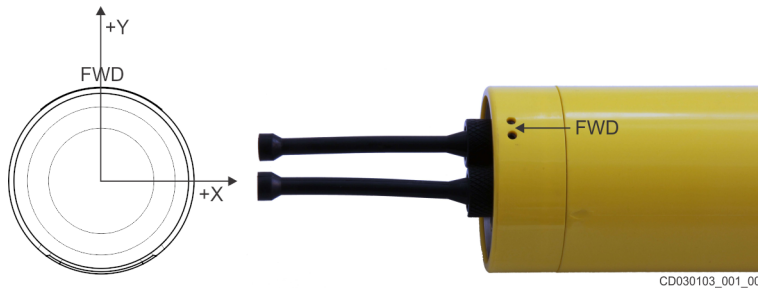
Result

See APOS online help for setting up a responder.

Setting up the internal tilt sensor

The transponder needs to face the right way to show the correct values.

Procedure



- Top view of the transponder to the left in this figure - showing the FWD direction. FWD is marked with the two holes in the bottom end cap module.

Configuring the transponder

The transponder channel and mode can be changed.

Prerequisites

The transponder is configured by Kongsberg Maritime. The channel and mode (FSK or cymbal) may be changed if required. The procedure to change configurations depends on the HiPAP/HPR system in use.

Procedure

- Change the channel and mode either by acoustic telemetry from a HiPAP system or via serial line from a Transponder Test and Configuration unit.

See APOS online help or the instruction manual for the TTC.

Maintenance

Topics

[Charging the transponder, page 23](#)

[Cleaning the transponder, page 24](#)

[Inserting an O-ring, page 24](#)

[Opening the transponder, page 25](#)

[Changing the transducer, page 25](#)

[Lubricating the subsea connector, page 26](#)

Charging the transponder

The battery is charged inside the cNODE Mini. This is connected with some risk, please read the information below and follow the charge procedure carefully.

Prerequisites

Caution

When you are charging the battery ensure good ventilation and stable temperature. Do not cover the transponder. No open fire, sparks or smoking in the area.

NiMH batteries can generate some hydrogen and oxygen gas, the amount depending on certain conditions. Most often this generation occurs during charging.

Procedure

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- 2 Climatize the transponder.
The battery must have a temperature between 5 °C and 40 °C. Recommended charging temperature is 25 °C.
- 3 Unscrew the vent screw until you feel some resistance (a nylon washer is forced against a metal surface). The O-ring is now visible.
Hold the transponder in an upright position while you do this, so that any water droplets caught around the vent screw comes out, rather than going inside the cNODE Mini.
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Fast charge starts and the LEDs emit constant orange light.
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- 9 Close the vent screw.
Tighten the vent screw by hand only, until you feel a rather sudden resistance. (an internal axial O-ring hits a metal surface, compresses 0.3 mm, before 2 metal surfaces meet). The main flat circular surface of the end cap should now align with the edge of a semicircular groove that runs all around the vent screw. This is to visually confirm that the vent screw has been properly tightened.

Result

When the battery is fully charged the charger will start trickle charging the battery. It is not recommended to trickle charge the battery for a long time. It is better to fast charge, and then top up the battery just before operation.

Further requirements

Caution

When the charging is done, always make sure the vent screw is closed.

Deploying the transponder with the vent screw open will ruin the transponder.

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.

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.

Opening the transponder

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

Prerequisites

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

Procedure

- 1 Pull out the lock cord between the tube and the end cap.
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 end cap.
There is a 5 mm orientation peg at either end of the tube. When pulling apart, make sure to keep this orientation until all parts are completely free from each other. Forceful twisting of the parts relative to each other while the internal parts are still mated, will damage the unit.
- 3 Pull out the lock cord between the transducer and the tube.
- 4 Remove the transducer carefully, the chassis and the battery is fastened to the transducer.
- 5 Replace the O-rings that are damaged or used for more than a year.
- 6 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.

Result

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

Changing the transducer

The transducer is a sealed unit and does not open. If the transducer is damaged, replace the whole unit.

Prerequisites

The transponder needs to be clean and open to change the transducer.

Procedure

- 1 Remove the battery carefully.
- 2 Unscrew the chassis from the transducer.
- 3 Make sure the new transducer is of the same type as the old.
- 4 Fasten the transducer to the chassis and fit the battery.

Further requirements

Assemble the transponder.

Lubricating the subsea connector

The subsea connector must be kept clean from grit and dirt.

Prerequisites

Caution

Do not use silicone based sprays like 5–55, WD-40 or similar. These products will degrade the rubber fused around the metal pins.

Procedure

- 1 Remove the dummy plug or the external cable from the connector.
- 2 Apply Molykote 44M silicone based grease.
Half a match head dose per contact is enough.

Spare parts

Topics

[cNODE Mini maintenance kit spare part, page 28](#)

[TD180 St spare part, page 28](#)

[Split transponder \(S\) for remote transducer spare part, page 28](#)

[Transducer cable 6 m spare part, page 28](#)

[TDR180 LF spare part, page 29](#)

[TDR50V LF spare part, page 29](#)

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[Battery charger spare part, page 30](#)

[Power supply St spare part, page 30](#)

[Transponder Test and Configuration unit \(TTC10\) spare part, page 30](#)

cNODE Mini maintenance kit spare part

- **Part name:** cNODE Mini maintenance kit
- **Part number:** 351794

The kit consists of:

- 2 locking cords
- 4 O-rings 58 mm
- 2 locking sleeves MCDLSF
- 1 female dummy plug
- 1 male dummy plug
- 1 O-ring 12 mm
- 1 O-ring 10 mm

TD180 St spare part

- **Part name:** TD180 St Mini Steel
- **Part number:** 320885



Split transponder (S) for remote transducer spare part

- **Part name:** Split transponder (S) for remote transducer Stainless steel
- **Part number:** 330071



Transducer cable 6 m spare part

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



TDR180 LF spare part

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



TDR50V LF spare part

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



Tube spare part

- **Part name:** cNODE Tube stainless steel
- **Part number:** 381343



End cap steel spare part

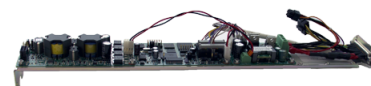
- **Part name:** cNODE Mini end cap steel
- **Part number:** 349131



Chassis with PCB spare part

Chassis with circuit board for low frequency transponders.

- **Part name:** cNODE Mini chassis LF
- **Part number:** 354758



Battery spare part

- **Part name:** Battery
- **Part number:** 290–220687



Battery charger spare part

- **Part name:** Battery charger cNODE Mini
- **Part number:** 290-220687



Power supply St spare part

- **Part name:** cNODE Power supply Steel
- **Part number:** 367386



Transponder Test and Configuration unit (TTC10) spare part

Transponder test and configuration unit for low frequency transponders.

- **Part name:** TTC 10
- **Part number:** 364845



Technical specifications

Topics

[Performance specification, page 32](#)

[Weight and outline dimensions, page 33](#)

[Power specifications, page 34](#)

[Environmental specifications, page 35](#)

Performance specification

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

cNODE Mini 17 series

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

Internal tilt

- **Max. detectable angles:** $\pm 90^\circ$
- **Accuracy:** $\pm 2^\circ$

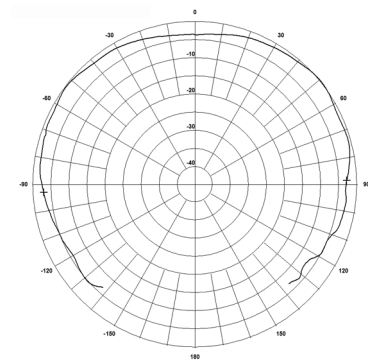
Responder trigger signal

Responder trigger connection via the external signal connector.

- **Logic pulse:** Positive
- **Amplitude:** 5 to 25 V
- **Duration:** 2 to 6 ms

TD180 LF

- **Beam pattern:**
- **Transducer beam:** 180° vertical
- **Frequency band:** Low frequency
- **Receiver sensitivity:** 100 dB
- **Maximum source levels:**
 - Max 188 dB
 - High 182 dB
 - Low 176 dB
 - Min 168 dB



Battery charger

- **Charge method:** Constant current, charging the three battery strings individually
- **Detection method for fully charged battery:** Temperature rise, maximum temperature and maximum time (165 min.)
- **Charging time:** 2 hours 45 minutes for an empty battery

Weight and outline dimensions

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

cNODE Mini 17–180–St

Transponder	Weight in air	Weight in water	Height	Diameter
cNODE Mini 17–180–St	15.5 kg	11.5 kg	661 mm	85 mm

TD180LF

- **Height:** 70.5 mm
- **Diameter:** Ø88 mm

Tube

- **Height:** 495 mm
- **Diameter:** Ø85 mm

Basic end cap

- **Height:** 31.5 mm
- **Diameter:** Ø85 mm

Floating collar

- **Height:** 845 mm
- **Width:** 290 mm

Power supply

- **Height:** 309.2 mm
- **Diameter:** Ø85 mm

Battery charger

Weight	Height	Width	Depth
2.9 kg	83 mm	256 mm	355 mm

Power specifications

These power characteristics summarize the power specifications for the cNODE Mini.

cNODE Mini battery lifetime

- Quiescent: 60 days

Mini 17–180 series – Cymbal

Update rate	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
TX power level						
Minimum	5.7	6.0	6.1	6.2	6.2	6.3
Low	4.2	5.1	5.4	5.6	5.8	6.1
High	2.1	3.2	3.8	4.2	4.5	5.3
Maximum	0.5	1.1	1.5	1.9	2.2	3.3

Mini 17–180 series – FSK

Update rate	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
TX power level						
Minimum	10.1	10.4	10.5	10.6	10.6	10.7
Low	8.5	9.5	9.9	10.1	10.2	10.5
High	5.3	7.1	8.0	8.5	8.9	9.7
Maximum	1.8	3.1	4.1	4.8	5.4	7.3

Mini 17–S with TDR50V – Cymbal

Update rate	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
TX power level						
Minimum	5.7	6.0	6.1	6.2	6.2	6.3
Low	3.5	4.5	5.0	5.3	5.5	5.9
High	1.2	2.1	2.8	3.3	3.6	4.6
Maximum	0.3	0.6	0.9	1.2	1.5	2.4

Mini 17–S with TDR50V – FSK

Update rate	1 seconds [days]	2 seconds [days]	3 seconds [days]	4 seconds [days]	5 seconds [days]	10 seconds [days]
TX power level						
Minimum	10.1	10.4	10.5	10.6	10.6	10.7
Low	7.5	8.8	9.4	9.7	9.9	10.3
High	3.6	5.4	6.5	7.2	7.8	9.0
Maximum	1.1	2.0	2.8	3.4	3.9	5.8

Battery charger

- **Voltage requirement:** 110 or 220 V

Environmental specifications

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

All cNODE Mini transponders

- **Operational temperature:** –5 to +55°C
- **Storage temperature:** –40 to +70°C

Battery

- **Operational temperature:** –5 to +55°C
- **Storage temperature:** –20 to +30°C
- **Storage humidity:** <50% relative

Battery charger

- **Operational temperature:** 5 to 40°C for fast charging
- **Storage temperature:** –40 to +70°C
- **Relative humidity:** 10 to 90% relative non-condensing
- **Ingress protection:** IP30

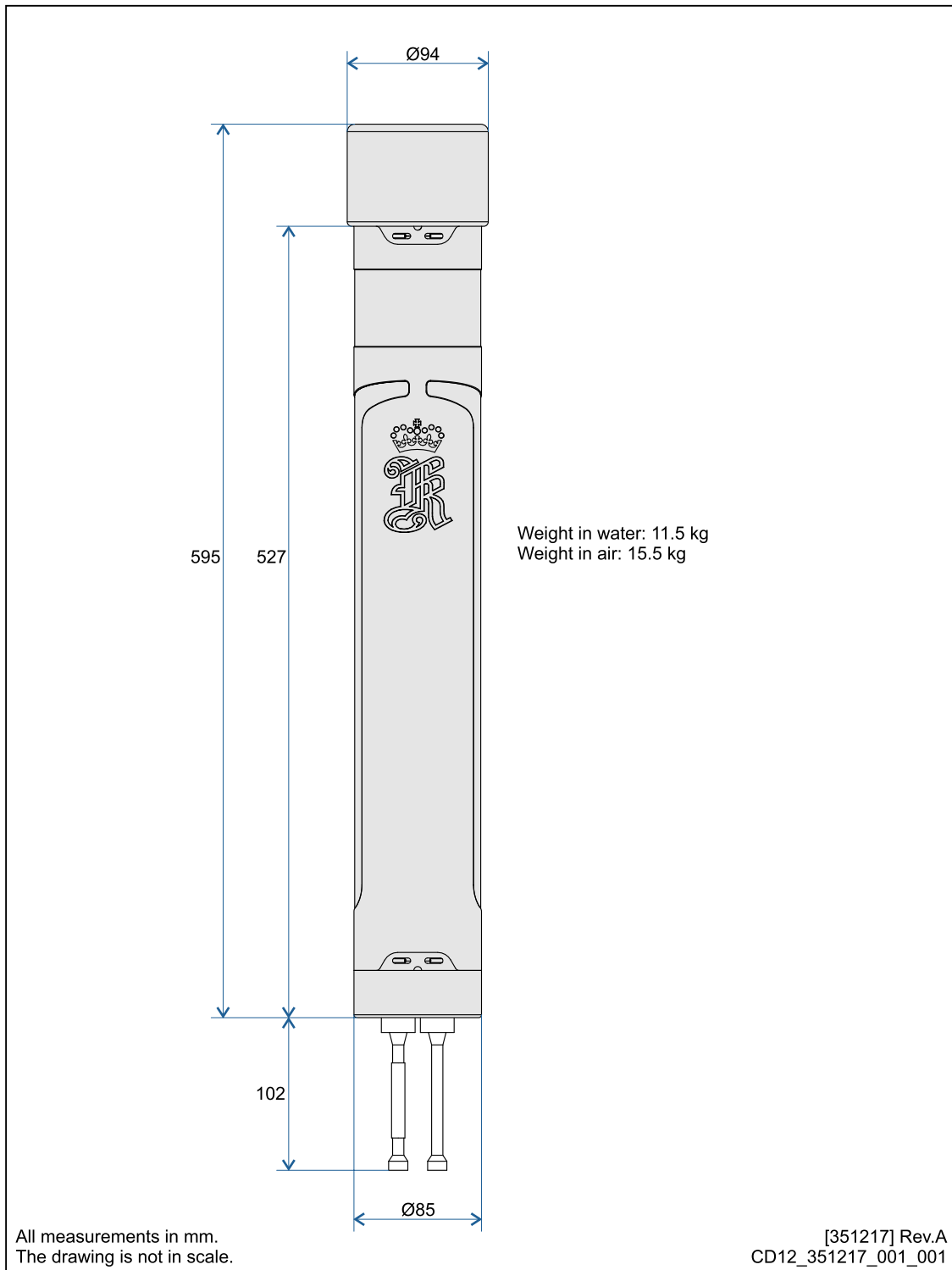
Drawing file

Topics

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cNODE Mini 17-180-St outline dimensions

Drawing 351217



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