



KONGSBERG

***cNODE MiniS 1.11-50V Ti
Transponder
Instruction Manual***

436538/B

September 2022 © Kongsberg Maritime AS

Document information

- **Product:** Kongsberg cNODE MiniS 1.11-50V Ti
- **Document:** Instruction Manual
- **Document part number:** 436538
- **Revision:** B
- **Date of issue:** 1 September 2022

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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. You must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

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

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. If you need information about our other products, visit <https://www.kongsberg.com/maritime>.

Table of contents

ABOUT THIS MANUAL	5
CNODE MINIS 1.11-50V TI	6
System description.....	7
Naming description.....	7
System units.....	8
MiniS 1.11-50V Ti.....	8
Battery charger	8
TTC 10 (Transponder Test and Configuration unit).....	8
Support information.....	9
GENERAL ACOUSTIC CONSIDERATIONS	10
GETTING STARTED	12
Turning on the transponder.....	13
Connecting the transponder to external power and responder signals.....	13
Changing between responder and transponder mode	14
Turning on the TTC	15
Acoustic test.....	15
Pre-deployment checks	16
Deployment.....	16
Recovering the transponder	17
Cymbal protocol	17
CABLE LAYOUT AND INTERCONNECTIONS	18
Interconnections.....	19
Interconnections for on-deck charging	19
Interconnections without external power supply	20
Interconnections with external power supply	20
Configuration or power connector pinout.....	21
OPERATING PROCEDURES	22
MAINTENANCE	23
Charging the battery (on-deck)	24
Lubricating SubConn® connectors.....	25
Battery charger status and troubleshooting.....	25
SPARE PARTS	27
cNODE MiniS 1.11-50V Ti spare part	28
Battery charger spare part	28
Adapter cable spare part.....	28
ON/OFF plug spare part.....	28

Interface cable spare part	29
TTC 10 spare part	29
Test and configuration cable (TTC to MiniS) spare part	29
Test and configuration cable (PC to MiniS) spare part	29
DRAWING FILE	30
cNODE MiniS 1.11-50V Ti dimensions	31
TECHNICAL SPECIFICATIONS	32
Performance specifications	33
Weights and outline dimensions	34
Power requirements	34
Environmental requirements	34
BATTERY SAFETY	35
SECTION 1: Identification	36
SECTION 2: Hazards identification	36
SECTION 3: Composition	37
SECTION 4: First aid measures	37
SECTION 5: Firefighting measures	38
SECTION 6: Accidental release measures	38
SECTION 7: Handling and storage	39
SECTION 8: Exposure control and personal protection	39
SECTION 9: Physical and chemical properties	39
SECTION 10: Stability and reactivity	40
SECTION 11: Toxicological information	40
SECTION 12: Ecological information	40
SECTION 13: Disposal considerations	40
SECTION 14: Transport information	41
SECTION 15: Regulatory information	42
SECTION 16: Other information	42

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 1.11-50V Ti

Topics

[System description, page 7](#)

[Naming description, page 7](#)

[System units, page 8](#)

[Support information, page 9](#)

System description

cNODE MiniS 1.11-50V Ti is a family of transponders for underwater positioning and data links, and operates with HiPAP and cPAP transceivers. cNODE MiniS 1.11-50V Ti is designed to be a very versatile system with many interchangeable parts.

cNODE MiniS 1.11-50V Ti is a family of transponders for underwater positioning and data links, and operates with HiPAP and cPAP transceivers. They have responder and transponder functionality, SSBL and LBL positioning, and telemetry capabilities.

cNODE MiniS 1.11-50V Ti is compatible with both Cymbal protocol for positioning and data link and FSK channels and telemetry.

The transponders are rated to 11000 m with a housing made of titanium. They have an internal tilt sensor $\pm 90^\circ$, an external on/off function and a pressure relief valve for safety purposes.

cNODE MiniS 1.11-50V Ti 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. TTC10 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

MiniS 1.11-50V Ti

Model number

First digit = Frequency band	Second digit = Depth rating
1 = 12 kHz	11 = 11000 m

Transducer beamwidth

50V = 50° vertical beam width

Transponder identification

The transponders have labels that identifies

- the transponder name
- serial number
- default channels

System units

MiniS 1.11-50V Ti

The transponder have a depth rating of 11000 metres, and the housing is a titanium tube.

The transducer has a 50° vertical beam. 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.

In addition the battery charger for the deep water MiniS 1.11–50V Ti has an adapter from the transducer connector to the charger.

TTC 10 (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 low 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 1.11-50V Ti 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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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 a TD180, covers a large area, but has less acoustic power compared to a focused transducer, such as TD50V. A focused signal gives less footprint/coverage. The vessel should always be within the signal footprint of the transponder.

Tx Power

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

Acoustic noise

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

Sound velocity and ray bending

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

Getting started

Topics

[Turning on the transponder, page 13](#)

[Connecting the transponder to external power and responder signals, page 13](#)

[Changing between responder and transponder mode, page 14](#)

[Turning on the TTC, page 15](#)

[Acoustic test, page 15](#)

[Pre-deployment checks, page 16](#)

[Deployment, page 16](#)

[Recovering the transponder, page 17](#)

[Cymbal protocol, page 17](#)

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 SubConn® connectors, page 25](#)
- 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

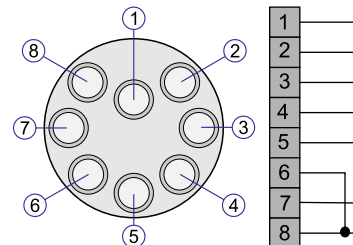
It is recommended to test the transponder with the Test and Configuration unit (TTC) to make sure it is working properly before operation.

Connecting the transponder to external power and responder signals

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.

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 1.11-50V Ti 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 1.11-50V Ti 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 If the unit has been altered from the factory pre-sets, check that the unit is configured according to your requirements.
- 2 Make sure the battery is fully charged.
- 3 Push the pressure relief valve in.
- 4 Switch the transponder ON by inserting the on/off plug.
- 5 Perform an acoustic test using a Transponder Test and Configuration (TTC) unit:
 - a Interrogate the transponder.
 - b Read battery status and confirm that it will last for the upcoming operation.
 - c Read the power setting and confirm it is correct for the upcoming operation.

Result

The transponder is then 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.

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 then 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.

The wide band carrier frequency of 12.8 kHz has 56 unique codes; L01 to L56.

Cable layout and interconnections

Topics

[Interconnections, page 19](#)

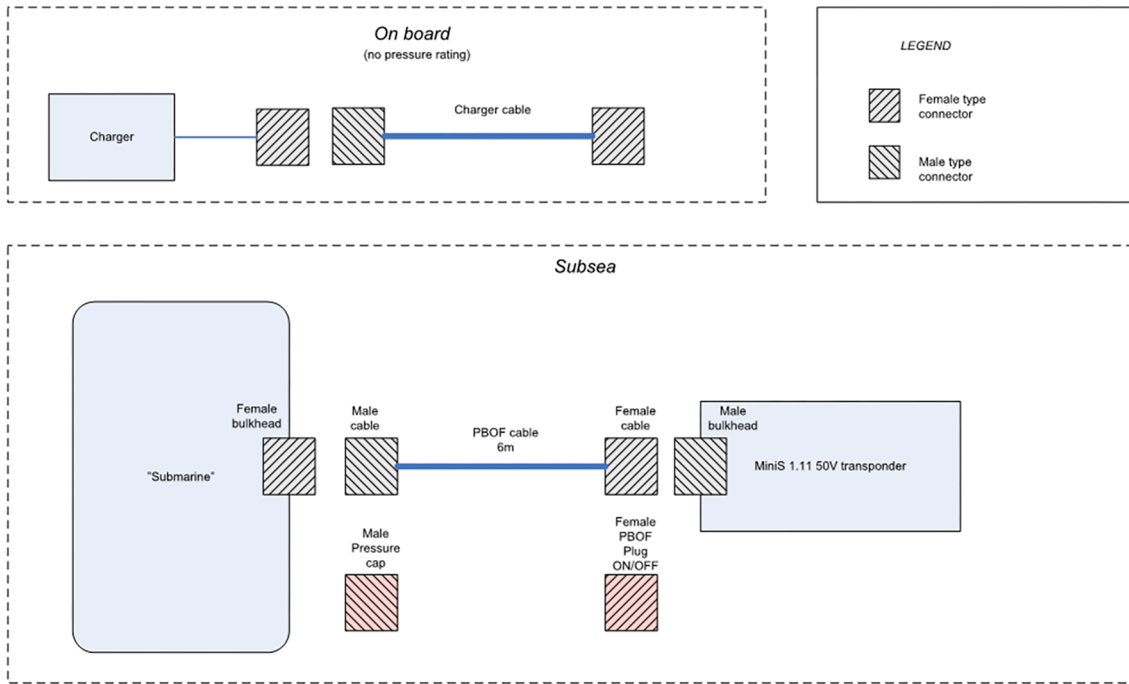
[Interconnections for on-deck charging, page 19](#)

[Interconnections without external power supply, page 20](#)

[Interconnections with external power supply, page 20](#)

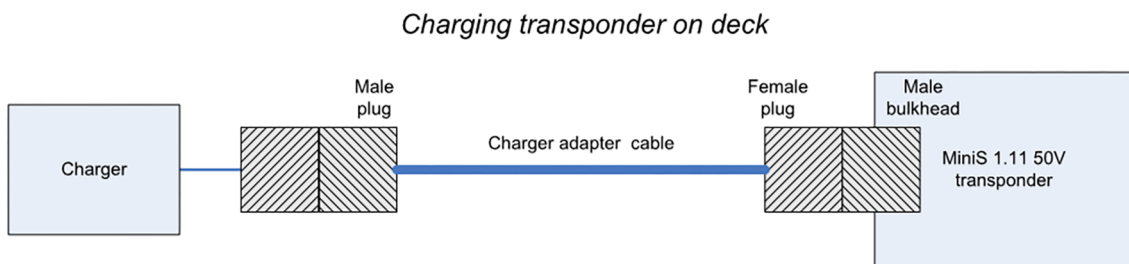
[Configuration or power connector pinout, page 21](#)

Interconnections



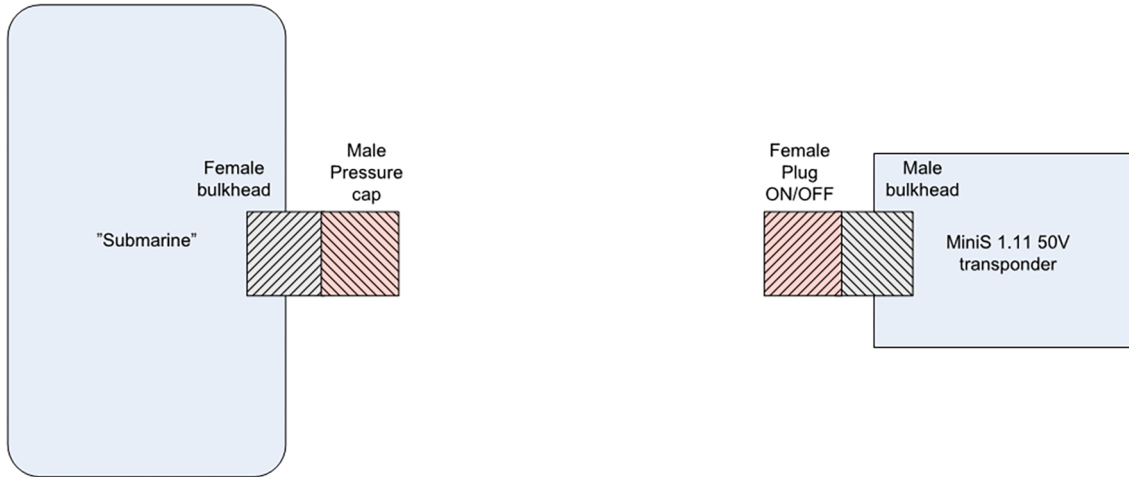
Interconnections for on-deck charging

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



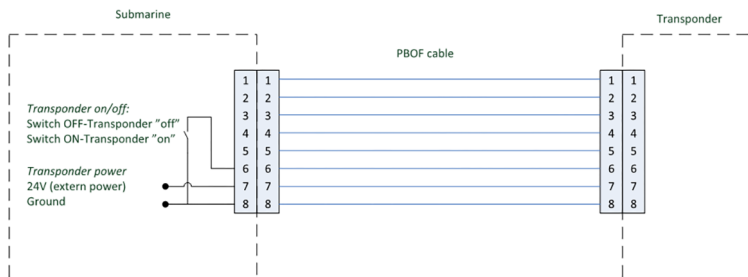
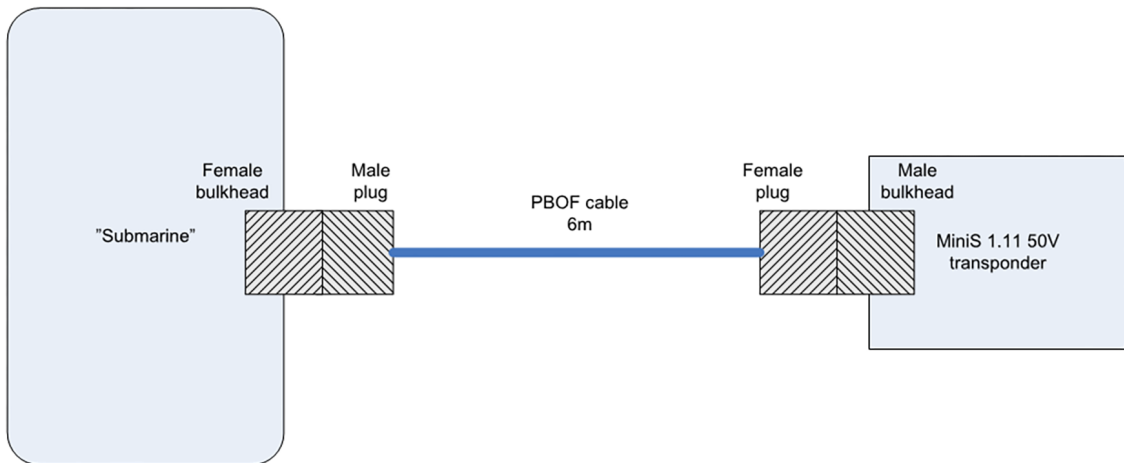
Interconnections without external power supply

Transponder without external power supply



Interconnections with external power supply

Transponder with external power supply



Configuration or power connector pinout

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

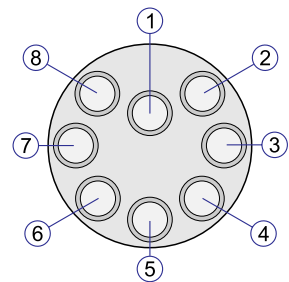
This is the pin configuration for a male connector, as seen towards the connector (face view).

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

Operating procedures

The transponder is operated from the HiPAP operator station APOS.

- Refer to APOS online help for descriptions.

Maintenance

Topics

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

[Lubricating SubConn® connectors, page 25](#)

[Battery charger status and troubleshooting, page 25](#)

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.

Prerequisites

Caution

Equalize the temperature of the cNODE MiniS 1.11-50V Ti 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.

Context

Always connect the cNODE battery charger to the cNODE MiniS 1.11-50V Ti before connecting the cNODE battery charger to the mains (110 or 220 VAC).

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.

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

Procedure

- 1 Switch off 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 charger cable for cNODE MiniS 1.11–50V Ti to the transponder and the charger.
- 4 Connect the charger to mains (110 or 220 VAC).
- 5 Remove the power cord after charging, before removing the connector from the cNODE MiniS 1.11-50V Ti.

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 then ready for use.

Lubricating SubConn® connectors

Underwater connectors must be kept clean and lubricated and should be inspected regularly for damages and corrosion.

Context

SubConn® connectors should not be exposed to extended periods of heat or direct sunlight. If a connector becomes very dry, it should be soaked in fresh water before use.

Procedure

- 1 Remove the ON/OFF plug.
- 2 Grease the connector with Molykote 44 Medium or equivalent grease.
A layer of grease corresponding to minimum 1/10 of the socket depth should be applied to the female connector.
- 3 Check that the inner edge of all sockets is completely covered, and a thin transparent layer of grease is visible on the face of the connector.
- 4 Fully mate the male and female connector in order to secure optimal distribution of grease on pins and in sockets.
- 5 Open and check for grease on every male pin, to confirm that enough grease is applied.
Add more if necessary.
- 6 Connect and tighten the locking sleeve.

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"> • The charger is not connected to the transponder • Failure in charger/transponder connection • Charger might be faulty 	<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>

LED indicator	What it means	How to fix this
Steady red	<ul style="list-style-type: none"> • The battery temperature might be outside the charging specification • Possible battery failure 	<ul style="list-style-type: none"> • Let the unit warm up or cool down to an ambient temperature of 10 °C to 40 °C before charging. • Disconnect all cables and wait 1 minute before reconnecting the cables and connect power supply to mains (110 or 220 Vac). <p>If the LED indicator is still flashing red:</p> <p>Possible battery failure Contact your local Kongsberg Maritime office.</p>
No light	<p>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 1.11-50V Ti and then to the mains (110 or 220 VAC).</p>	<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 1.11-50V Ti might be faulty. Contact your local Kongsberg Maritime office.</p>

Spare parts

Topics

[cNODE MiniS 1.11-50V Ti spare part, page 28](#)

[Battery charger spare part, page 28](#)

[Adapter cable spare part, page 28](#)

[ON/OFF plug spare part, page 28](#)

[Interface cable spare part, page 29](#)

[TTC 10 spare part, page 29](#)

[Test and configuration cable \(TTC to MiniS\) spare part, page 29](#)

[Test and configuration cable \(PC to MiniS\) spare part, page 29](#)

cNODE MiniS 1.11-50V Ti spare part

- **Part name:** MiniS 1.11-50V Ti
- **Part number:** 436500



Battery charger spare part

- **Part name:** cNODE MiniS 1.11-50V Ti battery charger
- **Part number:** 404199



Adapter cable spare part

- **Part name:** Adapter cable cNODE MiniS 1.11-50V Ti
- **Part number:** 424209



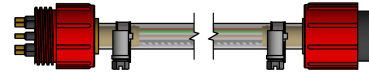
ON/OFF plug spare part

- **Part name:** ON/OFF plug for MiniS 1.11
- **Part number:** 424208



Interface cable spare part

- **Part name:** Interface cable with locking sleeve
- **Part number:** 424207



TTC 10 spare part

- **Part name:** TTC 10 (Transponder Test and Configuration unit)
- **Part number:** 463018



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

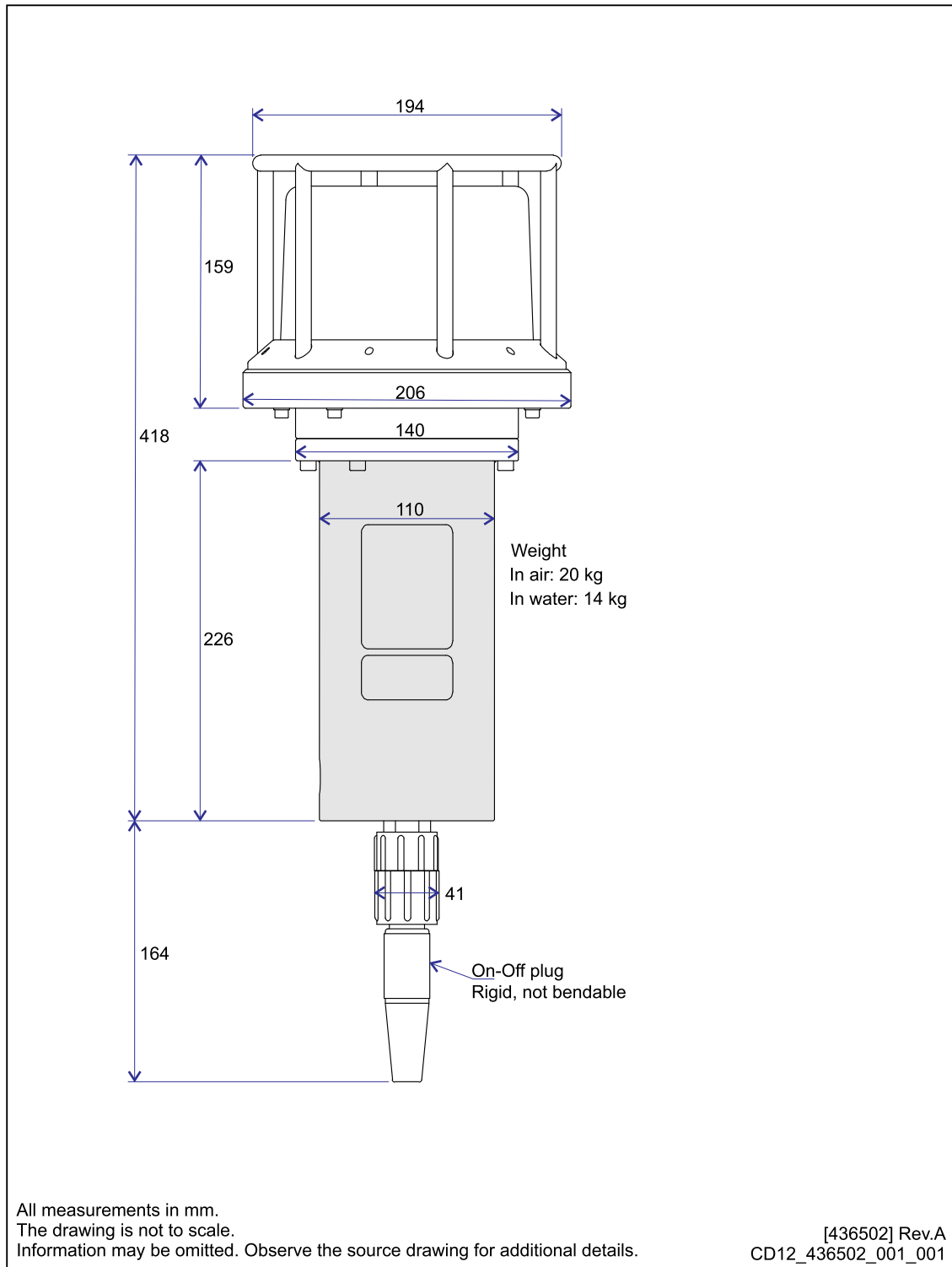
- **Part name:** Test and configuration cable (PC to MiniS) spare part
- **Part number:** 407648

Drawing file

Topics

[cNODE MiniS 1.11-50V Ti dimensions, page 31](#)

cNODE MiniS 1.11-50V Ti dimensions



Technical specifications

Topics

[Performance specifications, page 33](#)

[Weights and outline dimensions, page 34](#)

[Power requirements, page 34](#)

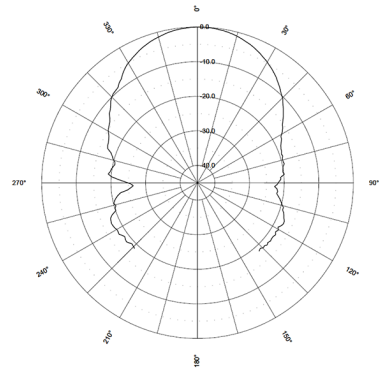
[Environmental requirements, page 34](#)

Performance specifications

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

MiniS 1.11-50V Ti

- **Depth rating:** 11500 m
- **Operating range:** 13000 m
- **Operating frequency:** 12 kHz
- **Responder trigger signal:** 5 - 25 V positive logic pulse (2 - 6 ms)
- **External connector:** BH8MTI
- **Interface cable:** PBOF8FSS - PBOF8MSS, 6 m
- **Operating battery lifetime:**
 - **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
 - **Battery capacity with external power:** 85 to 90 %
- **Transducer beam:** 50° Vertical
- **Trigger level:** 85 dB
- **Source level:** 200 dB
- **Internal tilt sensor:** $\pm 90^\circ$



Weights and outline dimensions

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

Model	Height	Diameter	Weight in air	Weight in water
MiniS 1.11-50V Ti	418 mm	194 mm	20 kg	14 kg

Model	Depth	Width	Height	Weight
Battery charger	80.7 mm	157.7 mm	47.3 mm	0.6 kg

Power requirements

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

Battery

- **Battery type:** Li-Ion (LiFePO₄)
- **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.

MiniS 1.11-50V Ti

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

Battery safety

Topics

- SECTION 1: Identification, page 36
- SECTION 2: Hazards identification, page 36
- SECTION 3: Composition, page 37
- SECTION 4: First aid measures, page 37
- SECTION 5: Firefighting measures, page 38
- SECTION 6: Accidental release measures, page 38
- SECTION 7: Handling and storage, page 39
- SECTION 8: Exposure control and personal protection, page 39
- SECTION 9: Physical and chemical properties, page 39
- SECTION 10: Stability and reactivity, page 40
- SECTION 11: Toxicological information, page 40
- SECTION 12: Ecological information, page 40
- SECTION 13: Disposal considerations, page 40
- SECTION 14: Transport information, page 41
- SECTION 15: Regulatory information, page 42
- SECTION 16: Other information, page 42

SECTION 1: Identification

The specification describes the technical parameters for the battery.

The cNODE MiniS 1.11-50V Ti 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
- **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 provided with any hazards identification. It is not classified as dangerous or hazardous with normal use.

The battery must not be opened or burned. 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.

SECTION 3: Composition

The battery is solid with a hard surface.

The lithium metal cells have the following chemical formula:

Li-Ion (LiFePO₄)

- **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, CO₂, 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 PF₆) 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

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 affects 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

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

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

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 1.11-50V Ti 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 1.11-50V Ti transponder is transported as a closed and sealed unit, and must not be opened by unauthorized personnel.

The cNODE MiniS 1.11-50V Ti 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 1.11-50V Ti 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

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>

Index

404199		
battery charger	28	
424207		
interface cable	29	
424208		
on/off plug	28	
424209		
adapter	28	
A		
about		
acoustic considerations	10	
acoustic range	10	
document downloads	5	
online information	5	
registered trademarks	5	
target audience	5	
this publication	5	
transducer type	10	
vessel system	10	
accidental release measures		
battery safety	38	
acoustic considerations		
about	10	
acoustic range		
about	10	
Acoustic test	15	
adapter		
424209	28	
spare part	28	
adapter cable		
spare part	28	
B		
battery charger		
404199	28	
description	8	
maintenance	25	
spare part	28	
troubleshooting	25	
battery safety		
accidental release measures	38	
ecological information	40	
exposure controls	39	
fire fighting measures	38	
handling and storage	39	
personal protection	39	
batterybattery safety		
hazards identification	36	
C		
charging the battery	24	
connecting the pigtail to the external power		
supply	13	
connecting the responder signals	13	
connector		
pin out	21	
signal pin number	21	
D		
deployment		
description	16	
description		
battery charger	8	
deployment	16	
naming	7	
recovery checks	17	
system	7	
dimensions		
technical specifications	34	
E		
ecological information		
battery safety	40	
exposure controls		
battery safety	39	
F		
fire fighting measures		
battery safety	38	
H		
handling		
battery safety	39	
hazards identification		
battery battery safety	36	
help		
support	9	
technical support	9	
how to		
change to responder mode	14	
charge the battery	24	
connect the pigtail to the external power		
supply	13	
lubricating underwater connector	25	
perform pre-deployment checks	16	
Turning on the cNODE MiniS 1.11- 50V Ti system	13	
I		
information		
support	9	
technical support	9	
interface		
specifications	17	
interface cable		
424207	29	
spare part	29	
introduction		
TTC	8	

L

lubricating
 underwater connector 25

M

maintenance
 battery charger 25

N

naming
 description 7

O

offices
 support 9
 technical support 9

on/off plug
 424208 28
 spare part 28

online information
 website 5

order number
 adapter 28
 battery charger 28
 interface cable 29
 on/off plug 28

outline dimensions
 technical specifications 34

overview
 TTC 8

P

part number
 adapter 28
 battery charger 28
 interface cable 29
 on/off plug 28

performance
 specifications 33

peripheral systems
 interface specifications 17

personal protection
 battery safety 39

pin out
 connector 21

power
 requirements 34

pre-deployment checks 16

procedure
 changing to responder mode 14
 charging the battery 24
 connecting the pigtail to the external power
 supply 13
 lubricating underwater connector 25
 Turning on the cNODE MiniS 1.11-
 50V Ti system 13
 what to do before deployment 16

purpose
 this publication 5
 TTC 8

R

recovery
 description 17

registered trademarks 5

requirements
 power 34

responder
 connecting the pigtail to the external power
 supply 13

responder mode 14

S

sensors
 interface specifications 17

size
 technical specifications 34

spare part
 adapter 28
 battery charger 28
 interface cable 29
 on/off plug 28

specifications
 interface capabilities 17
 outline dimensions 34
 performance 33
 weight 34

storage
 battery safety 39

support
 information 9
 offices 9

Support information 9

system
 description 7

T

target audience
 this publication 5

technical requirements
 power 34

technical specifications
 interface specifications 17
 outline dimensions 34
 performance 33
 weight 34

technical support
 information 9
 offices 9

this publication
 about 5
 purpose 5

this user manual
 about 5
 purpose 5

transducer type
 about 10

transponder test and configuration unit
 introduction 8

troubleshooting
 battery charger 25

TTC
 introduction 8

overview	8
purpose	8
Turning on the cNODE MiniS 1.11-50V Ti system.....	13

U

underwater connector lubricating.....	25
--	----

V

vessel system about.....	10
-----------------------------	----

W

website document downloads	5
weight technical specifications.....	34

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