

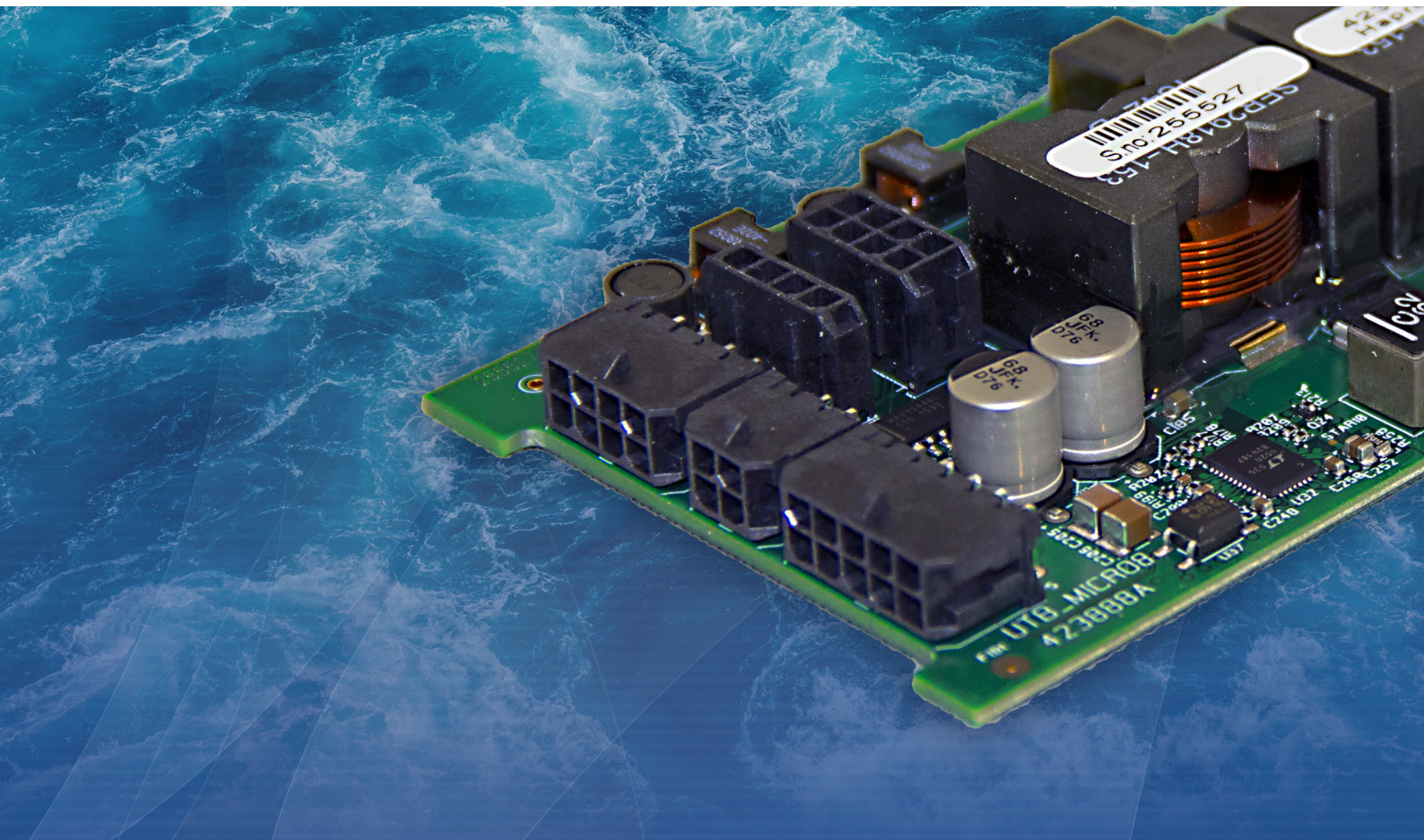


KONGBERG

Instruction Manual

cNODE

Modem Embed





KONGSBERG

cNODE Modem Embed Instruction Manual

453694/C

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Document information

- **Product:** Kongsberg cNODE Modem Embed
- **Document:** Instruction Manual
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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.

Kongsberg Discovery disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Disclaimer

Kongsberg Discovery 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 Discovery's support organisation. You can also contact us at the following email address: support.hpr@kd.kongsberg.com. If you need information about our other products, visit <https://www.kongsberg.com/discovery/>.

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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/discovery/>

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Kongsberg cNODE Modem Embed

Topics

[System description, page 7](#)

[Scope of supply, page 7](#)

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System description

cNODE Modem Embed is designed for point-to-point data transfer between two cNODEs or to a surface vessel equipped with any HiPAP or μ PAP systems.

The cNODE Modem Embed provides flexibility to integrate transponder electronics into a custom pressure housing. This reduces the size, weight and the need for subsea interface cabling.

The data telemetry operates on CYMBAL digital protocol, Kongsbergs field proven robust propriety link. Data rates of up to 6 kb/s are available. One cNODE Modem can address several other cNODE Modems during operation using the Kongsberg Link User Protocol. The modem is easy to configure using the TTC Light software.

Scope of supply

The main units are supplied as standard.

- Printed Circuit Board (PCB)
- Transducer
- Transformer
- Cable kit (Optional)
- Quick Reference Guide

General supply conditions

General supply conditions apply to this cNODE Modem Embed 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 Discovery so that Kongsberg Discovery 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.

Support information

Should you need technical support for your cNODE Modem Embed system you must contact a Kongsberg Discovery 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.

Company name	Kongsberg Discovery AS
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Telephone 24hr Support	+47 33 03 24 07
Website	https://www.kongsberg.com/discovery/
Support website	Product support A to Z
E-mail address	support.hpr@kd.kongsberg.com

Kongsberg Discovery support is also available in the KM-Support App. Our support application is available for free in the App Store and Google Play. Search for KM-Support. The use of our support application is free of charge. Your mobile phone provider may charge you the cost of the communication.

Installing the cNODE Modem Embed cables

Topics

[Electrostatic discharge \(ESD\), page 10](#)

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Electrostatic discharge (ESD)

Electrostatic discharge (ESD) is the sudden flow of electricity between two electrically charged objects. Such flow can be caused by contact, an electrical short, or dielectric breakdown. Electrostatic discharge (ESD) can cause serious damage to printed circuit boards and electronic modules.

Beware of Electrostatic Discharge (ESD)!

Note

When you handle electronic circuit boards and modules, you must beware of the dangers of electrostatic discharge (ESD), both to yourself and to the equipment. In order to ensure safe transport and storage, circuit boards and other electronic units will always be wrapped in a clear plastic protective bag, and the bag will be sealed.

For correct and safe handling of printed circuit boards and electronic modules, you need a suitable working area. The working area must be covered by an approved conductive service mat that has a resistance of between 50 k Ω and 2 M Ω , and is connected directly to a reliable earth point via its earthing cord. You - and all other service personnel involved - must wear a wristband in direct contact with the skin. The wristband must be electrically connected to the service mat.

Precautions to prevent Electrostatic Discharge (ESD)

Sensitive printed circuit boards and electronic modules must always be transported and stored in protective antistatic packing bags. It is also important that they are not transported or stored close to strong electrostatic, electromagnetic or radioactive fields. If it is necessary to open and touch the printed circuit board or module inside the protective bag, the following precautions must be taken.

- 1 For correct and safe handling of printed circuit boards and electronic modules, you need a suitable working area. The working area must be covered by an approved conductive service mat that has a resistance of between 50 k Ω and 2 M Ω , and is connected directly to a reliable earth point via its earthing cord.
- 2 You - and all other service personnel involved - must wear a wristband in direct contact with the skin. The wristband must be electrically connected to the service mat.
- 3 Printed circuit boards and electronic modules must be placed on the conductive service mat during installation and maintenance operations.
- 4 If, for any reason, it is necessary to move the circuit board from the conductive service mat, it must be placed in an approved antistatic transportation container (for example a static shielding bag) before transportation.
- 5 During installation and servicing, all electrical equipment (for example soldering irons and test equipment) must be earthed.

Installing the cNODE Modem Embed cables

Cables can be supplied with an optional cable kit.

Prerequisites

The following specific items are required for this task:

- 1 x Molex 4-pin receptacle 43025-0400
- 2 x Molex 8-pin receptacle 43025-0800
- 1 x Molex 10-pin receptacle 43025-1000
- 30 x Molex Female crimp terminal 43030-0008

If you have a cable kit, the wires are already connected to the connectors.

Procedure

- 1 Connect the transducer cable.
 - [Installing the transducer cables TD80V, page 12](#)
 - [Installing the transducer cables TD180, page 13](#)
 - [Installing the transducer cables TD40V Mini, page 14](#)
 - [Transducer connector pinout J1, page 16](#)
- 2 Prepare 8 wires with the appropriate length for the modem interface.
- 3 Install a crimp terminal in one end of each cable.
- 4 Install the crimp terminals in a Molex 8-pin receptacle according to the cable drawing.
 - [Modem top section interface connector pinout J3, page 17](#)

This is now connector J3.
- 5 Connect J3 to P3 on the top of the PCB.
- 6 Prepare 2 red and 2 black wires with the appropriate length for the power.
- 7 Install a crimp terminal in one end of each cable.
- 8 Install the crimp terminals in a Molex 4-pin receptacle according to the cable drawing.
 - [Power connector J4, page 18](#)

This is now connector J4.
- 9 Connect J4 to P4 in the front on the PCB.
- 10 Prepare 3 wires with the appropriate length for the service interface.
- 11 Install a crimp terminal in one end of each cable.

- 12 Install the crimp terminals in a Molex 8-pin receptacle according to the cable drawing.

[Service connector J5, page 19](#)

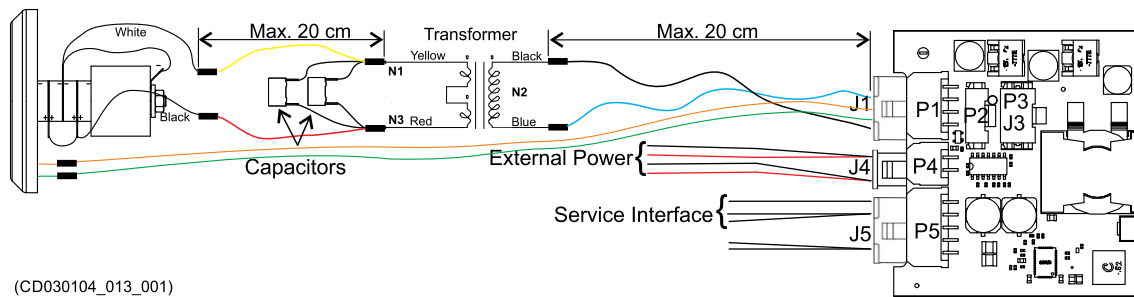
This is now connector J5.

- 13 Connect J5 to P5 in the front on the PCB.

Installing the transducer cables TD80V

Cables can be supplied with an optional cable kit.

Prerequisites



(CD030104_013_001)

[Transducer connector pinout J1, page 16](#)

The following specific items are required for this task:

- 1 x Molex 8-pin receptacle 43025-0800
- 7 x Molex Female crimp terminal 43030-0008

Procedure

- 1 Use one yellow wire (0.5 mm²) and connect the white wire from the transducer with both capacitors and the yellow wire from the transformer.
- 2 Use one red wire (0.5 mm²) and connect the black wire from the transducer with both capacitors and the red wire from the transformer.
- 3 Use two black wires (0.5 mm²) and connect both to the black wire from the transformer.
- 4 Use two blue wires (0.5 mm²) and connect both to the blue wire from the transformer.
- 5 Use two green wires (0.24 mm²) and connect both to the green wire from the transducer.
- 6 Use one orange wire (0.24 mm²) and connect to the orange wire from the transducer.
- 7 Add crimp terminals to the end of the wires.
- 8 Install the crimp terminals in a Molex 8-pin receptacle according to the cable drawing.

- a Connect the green wires to pin 1 and 5 on the receptacle.
- b Connect the black wires to pin 3 and 7 on the receptacle.
- c Connect the blue wires to pin 4 and 8 on the receptacle.
- d Connect the orange wire to pin 6 on the receptacle.

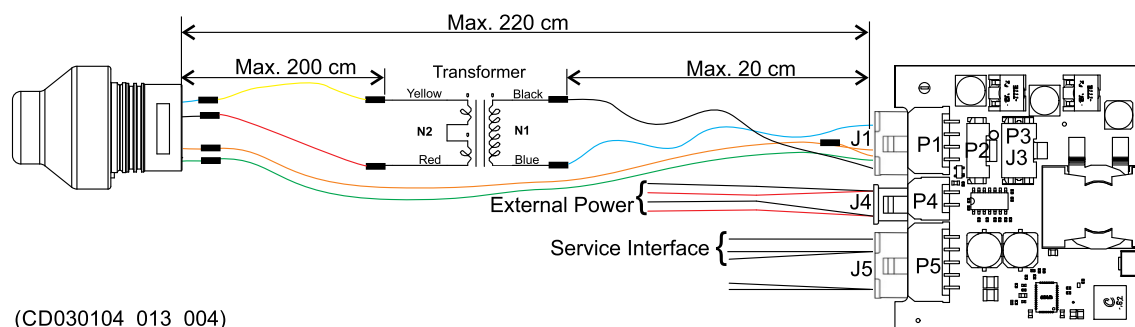
This is now receptacle J1.

- 9 Connect receptacle J1 to connector P1 on the front of the PCB.

Installing the transducer cables TD180

Cables can be supplied with an optional cable kit.

Prerequisites



Transducer connector pinout J1, page 16

The following specific items are required for this task:

- 1 x Molex 8-pin receptacle 43025-0800
- 7 x Molex Female crimp terminal 43030-0008

Procedure

- 1 Use one yellow wire (0.5 mm²) and connect the white wire from the transducer with the yellow wire from the transformer.
- 2 Use one red wire (0.5 mm²) and connect the black wire from the transducer with the red wire from the transformer.
- 3 Use two black wires (0.5 mm²) and connect both to the black wire from the transformer.
- 4 Use two blue wires (0.5 mm²) and connect both to the blue wire from the transformer.
- 5 Use two green wires (0.24 mm²) and connect both to the green wire from the transducer.
- 6 Use one orange wire (0.24 mm²) and connect to the orange wire from the transducer.

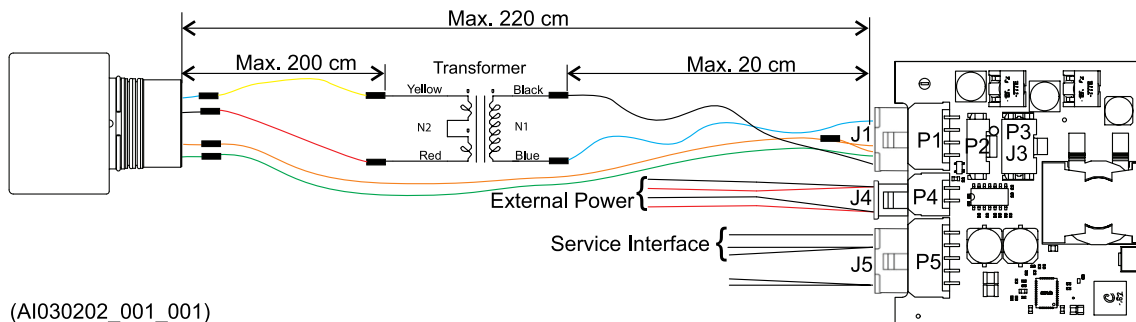
- 7 Add crimp terminals to the end of the wires.
- 8 Install the crimp terminals in a Molex 8-pin receptacle according to the cable drawing.
 - a Connect the green wires to pin 1 and 5 on the receptacle.
 - b Connect the black wires to pin 3 and 7 on the receptacle.
 - c Connect the blue wires to pin 4 and 8 on the receptacle.
 - d Connect the orange wire to pin 6 on the receptacle.

This is now receptacle J1.
- 9 Connect receptacle J1 to connector P1 on the front of the PCB.

Installing the transducer cables TD40V Mini

Cables can be supplied with an optional cable kit.

Prerequisites



[Transducer connector pinout J1, page 16](#)

The following specific items are required for this task:

- 1 x Molex 8-pin receptacle 43025-0800
- 7 x Molex Female crimp terminal 43030-0008

Procedure

- 1 Use one yellow wire (0.5 mm²) and connect the white wire from the transducer with the yellow wire from the transformer.
- 2 Use one red wire (0.5 mm²) and connect the black wire from the transducer with the red wire from the transformer.
- 3 Use two black wires (0.5 mm²) and connect both to the black wire from the transformer.
- 4 Use two blue wires (0.5 mm²) and connect both to the blue wire from the transformer.

- 5 Use two green wires (0.24 mm²) and connect both to the green wire from the transducer.
- 6 Use one orange wire (0.24 mm²) and connect to the orange wire from the transducer.
- 7 Add crimp terminals to the end of the wires.
- 8 Install the crimp terminals in a Molex 8-pin receptacle according to the cable drawing.
 - a Connect the green wires to pin 1 and 5 on the receptacle.
 - b Connect the black wires to pin 3 and 7 on the receptacle.
 - c Connect the blue wires to pin 4 and 8 on the receptacle.
 - d Connect the orange wire to pin 6 on the receptacle.This is now receptacle J1.
- 9 Connect receptacle J1 to connector P1 on the front of the PCB.

Connectors

Topics

[Transducer connector pinout J1, page 16](#)

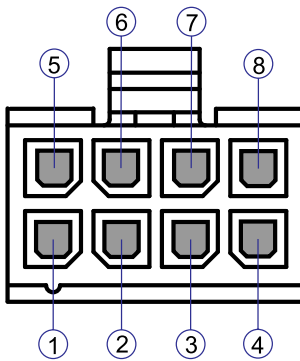
[Modem top section interface connector pinout J3, page 17](#)

[Power connector J4, page 18](#)

[Service connector J5, page 19](#)

Transducer connector pinout J1

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



Pin number	Colour	Signal	Minimum requirements
1	Green	ID data	0.24 mm ²
2		Screen	
3	Black	TD +	0.5 mm ²
4	Blue	TD –	0.5 mm ²
5	Green	ID data	0.24 mm ²
6	Orange	Ground	0.24 mm ²
7	Black	TD +	0.5 mm ²
8	Blue	TD –	0.5 mm ²

Related topics

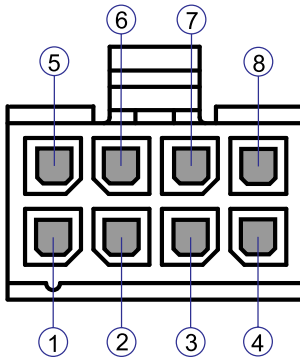
[Installing the transducer cables TD80V, page 12](#)

[Installing the transducer cables TD180, page 13](#)

[Installing the transducer cables TD40V Mini, page 14](#)

Modem top section interface connector pinout J3

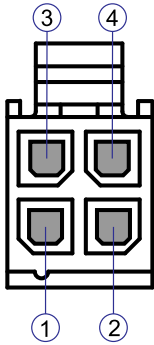
This is the pin configuration for a female plug, as seen towards the plug (face view).



Pin number	Signal	Minimum requirements
1	RS-232 Tx	0.5 mm ²
2	RS-232 Rx	0.5 mm ²
3	Ground	0.5 mm ²
4	RS-422 Tx +	0.5 mm ²
5	RS-422 Tx -	0.5 mm ²
6	RS-422 Rx +	0.5 mm ²
7	RS-422 Rx -	0.5 mm ²
8	Ground	0.5 mm ²

Power connector J4

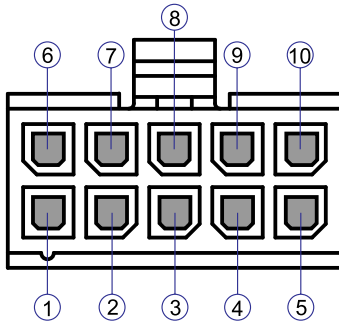
This is the pin configuration for a female plug, as seen towards the plug (face view).



Pin number	Colour	Signal	Minimum requirements
1	Red	External power (24 VDC)	0.5 mm ²
2	Red	External power (24 VDC)	0.5 mm ²
3	Black	Ground	0.5 mm ²
4	Black	Ground	0.5 mm ²

Service connector J5

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



Pin number	Signal	Minimum requirements
1	Not connected	
2	Not connected	
3	Not connected	
4	Ground	0.5 mm ²
5	Not connected	
6	Not connected	
7	Not connected	
8	Not connected	
9	RS-232 Tx	0.5 mm ²
10	RS-232 Rx	0.5 mm ²

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 a number of factors, and some of these factors are beyond the control of the user.

Vessel system

The directivity and coverage area of the vessel's system will vary depending on the system's components and their specifications. Some systems have high directivity and omnidirectional coverage, while others have reduced coverage and less directivity. The transponder should always be within the coverage cone of the vessel system.

Transducer type

Several types of transducers can be used with the transponders to meet operational requirements. An omnidirectional transducer, such as the TD180, covers a large area but has less acoustic power than a focused transducer, such as the TD30V. A focused signal will give a smaller 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's system and for the transponder.

Acoustic noise

Acoustic noise is present on all vessels. Under certain conditions, the noise level may be excessive. A vessel's propellers and thrusters generate noise during manoeuvring, and in certain cases, on-board machinery and pumps may also generate noise when in use. Heavy propeller/thruster use and waves can create air bubbles that can get in front of the vessel's transducer and block the acoustic signal.

Sound velocity and ray bending

Changes in water temperature affect the speed of sound through the water column, and changes in the salinity of the ocean can bend the acoustic signal, making it impossible for the signal to reach the vessel.

Operating procedures

The transponder is operated from the HiPAP operator station APOS.

- See APOS online help for more information.

Spare parts

Topics

[TD80V Spare part, page 24](#)

[TD180 Spare part, page 24](#)

[TD40V Spare part, page 24](#)

[Printed Circuit Board \(PCB\) Spare part, page 24](#)

[Capacitor Spare part, page 25](#)

[Transformer TD80V Spare part, page 25](#)

[Transformer TD180/TD40V Spare part, page 25](#)

[Cable kit Spare part, page 25](#)

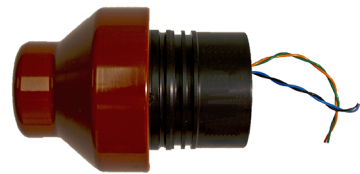
TD80V Spare part

- **Part name:** TD80V
- **Part number:** 350501



TD180 Spare part

- **Part name:** TD180
- **Part number:** 417492



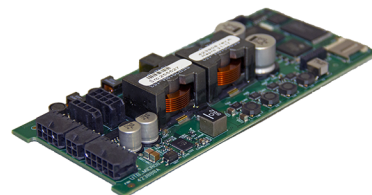
TD40V Spare part

- **Part name:** TD40V
- **Part number:** 332186



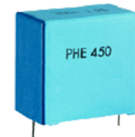
Printed Circuit Board (PCB) Spare part

- **Part name:** cNODE Modem Embed Printed Circuit Board (PCB)
- **Part number:** 423774



Capacitor Spare part

- **Part name:** cNODE Modem Embed Capacitor
- **Part number:** 212-076626



Transformer TD80V Spare part

- **Part name:** Transformer TD80V
- **Part number:** 402399

Transformer TD180/TD40V Spare part

- **Part name:** Transformer TD180
- **Part number:** 412432

Cable kit Spare part

The cable kit contains the following items

- Receptacle J1 with 150 mm wires.
- Receptacle J3 with 150 mm wires.
- Receptacle J4 with 150 mm wires.
- Receptacle J5 with 150 mm wires.
- **Part name:** cNODE Modem Embed Cable kit
- **Part number:** 431008

Technical specifications

Topics

[Performance specifications, page 27](#)

[Weight and outline dimensions, page 28](#)

[Power requirements, page 29](#)

[Environmental requirements, page 29](#)

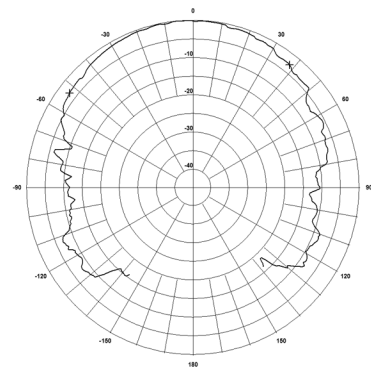
Performance specifications

The performance specifications are listed below.

- **Operating frequency:** 21 - 31 kHz
- **Responder trigger signal:** 5 - 25 V positive logic pulse (2 - 6 ms)
- **Depth rating:** 3000 m
- **Internal tilt sensor:** $\pm 90^\circ$

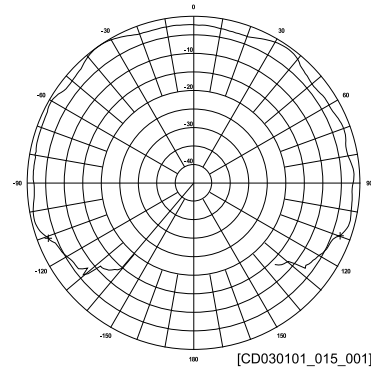
TD80V

- **Transducer beam:** 80° Vertical
- **Receiver sensitivity:** 85 dB
- **Source level:**
 - Maximum: 188 dB
 - High: 182 dB
 - Low: 176 dB
 - Minimum: 171 dB



TD180

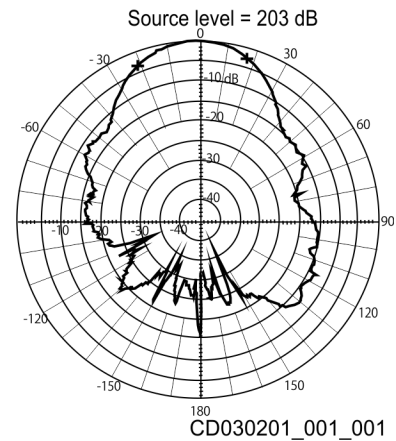
- **Transducer beam:** 180°
- **Receiver sensitivity:** 100 dB
- **Source level:**
 - Maximum: 190 dB
 - High: 184 dB
 - Low: 178 dB
 - Minimum: 173 dB



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TD40V Mini

- **Transducer beam:** 40° Vertical
- **Receiver sensitivity:** 90 dB
- **Source level:**
 - Maximum: 203 dB
 - High: 197 dB
 - Low: 191 dB
 - Minimum: 183 dB



Weight and outline dimensions

The weight and outline dimensions are listed below.

Printed Circuit Board (PCB)

- technical specifications
 - Outline dimensions:**
 - **Height:** 142 mm
 - **Width:** 63 mm
 - **Depth:** 22 mm

TD80V

- **Outline dimensions:**
 - **Height:** 57.7 mm
 - **Diameter:** 68 mm

TD180

- **Outline dimensions:**
 - **Height:** 70.5 mm
 - **Diameter:** 88 mm

TD40V Mini

- **Outline dimensions:**
 - **Height:** 71 mm
 - **Diameter:** 100 mm

Capacitor

- **Outline dimensions:**
 - **Height:** 18 mm
 - **Width:** 5 mm
 - **Depth:** 10.5 mm

Transformer

- **Outline dimensions:**
 - **Height:** 32 mm
 - **Diameter:** 42 mm

Power requirements

The power requirements are listed below.

- **Voltage requirement:** 22.5–29.5 VDC
- **Nominal voltage:** 24 VDC
- **Transmit power:** 250 W
- **Standby power:** < 100 mW

Environmental requirements

The environmental requirements are listed below.

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

Drawing file

Topics

[TD80V Outline dimensions, page 31](#)

[TD180 Outline dimensions, page 32](#)

[TD40V Outline dimensions, page 33](#)

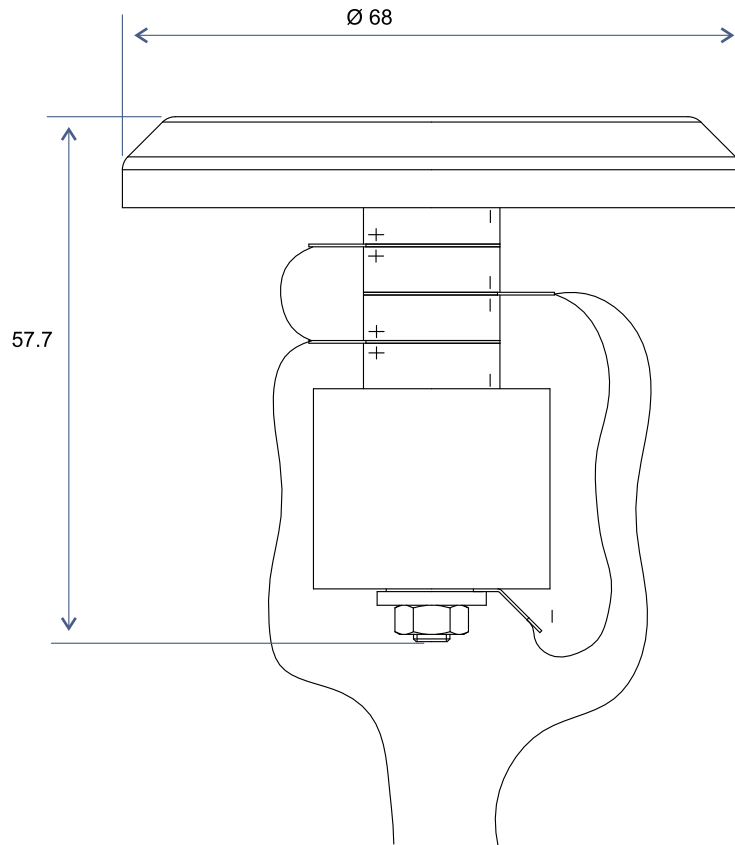
[PCB Outline dimensions, page 34](#)

[cNODE Modem Embed TD80V Low wiring diagram, page 35](#)

[cNODE Modem Embed TD180 wiring diagram, page 36](#)

[cNODE Modem Embed TD40V Mini wiring diagram, page 37](#)

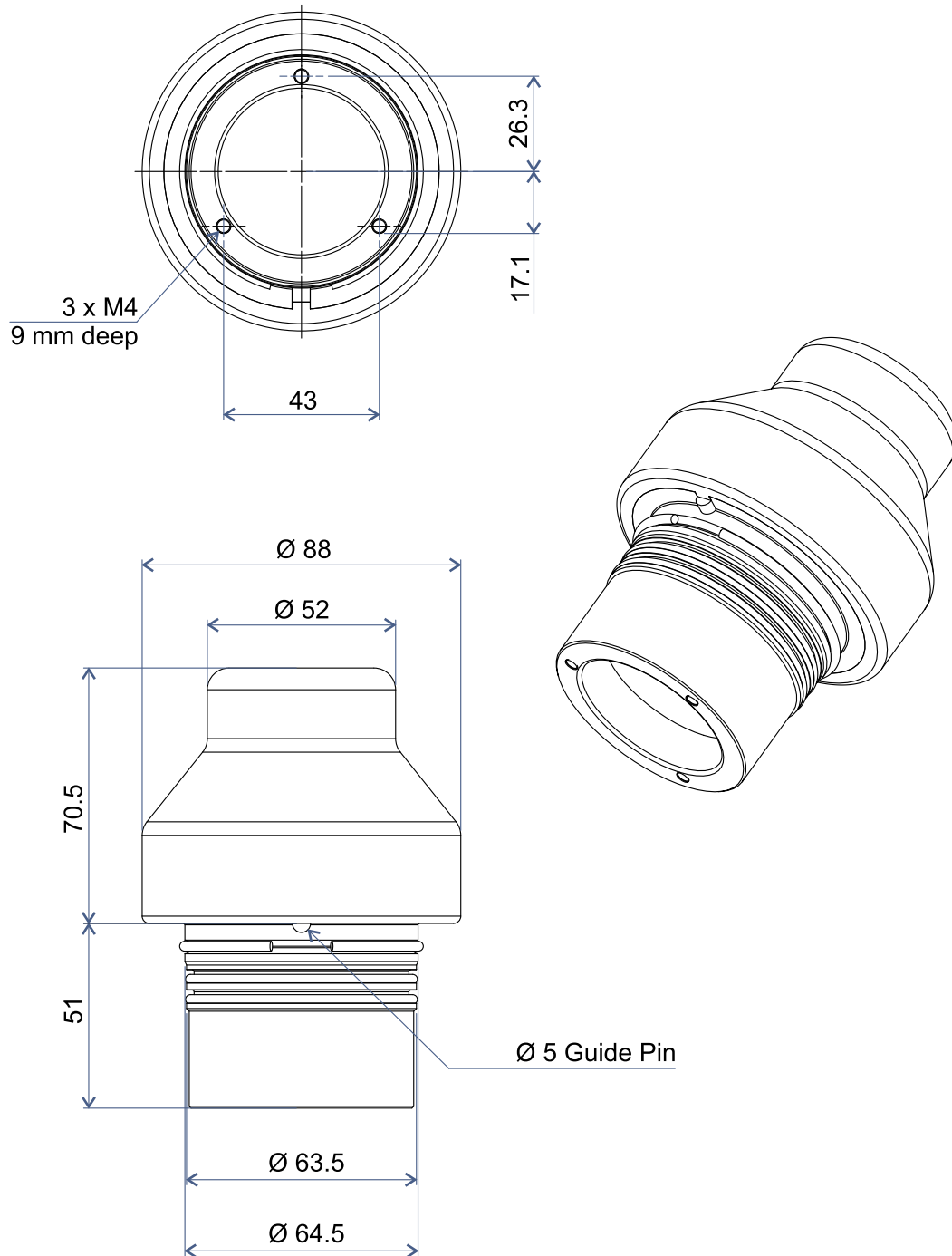
TD80V Outline dimensions



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

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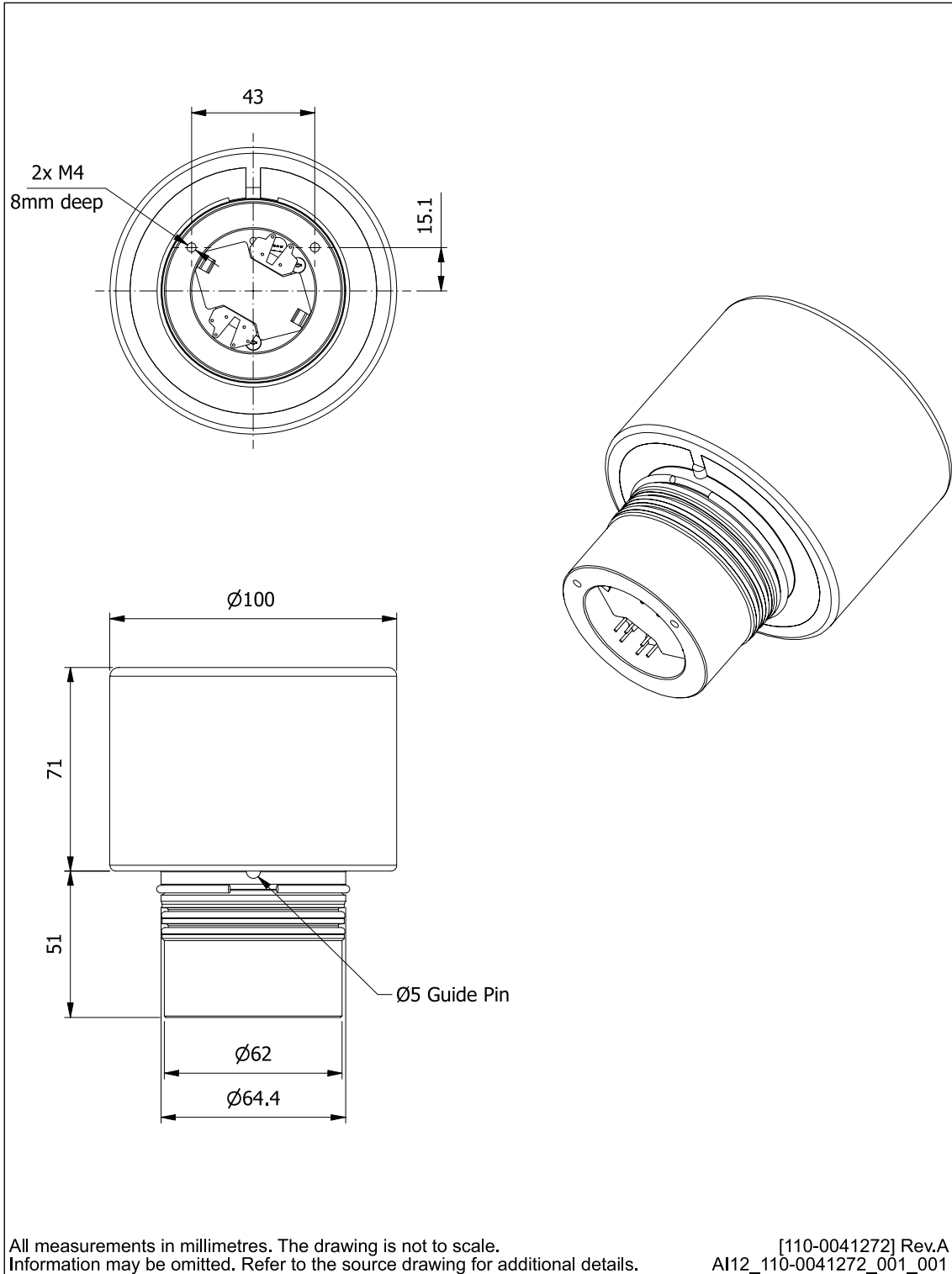
TD180 Outline dimensions



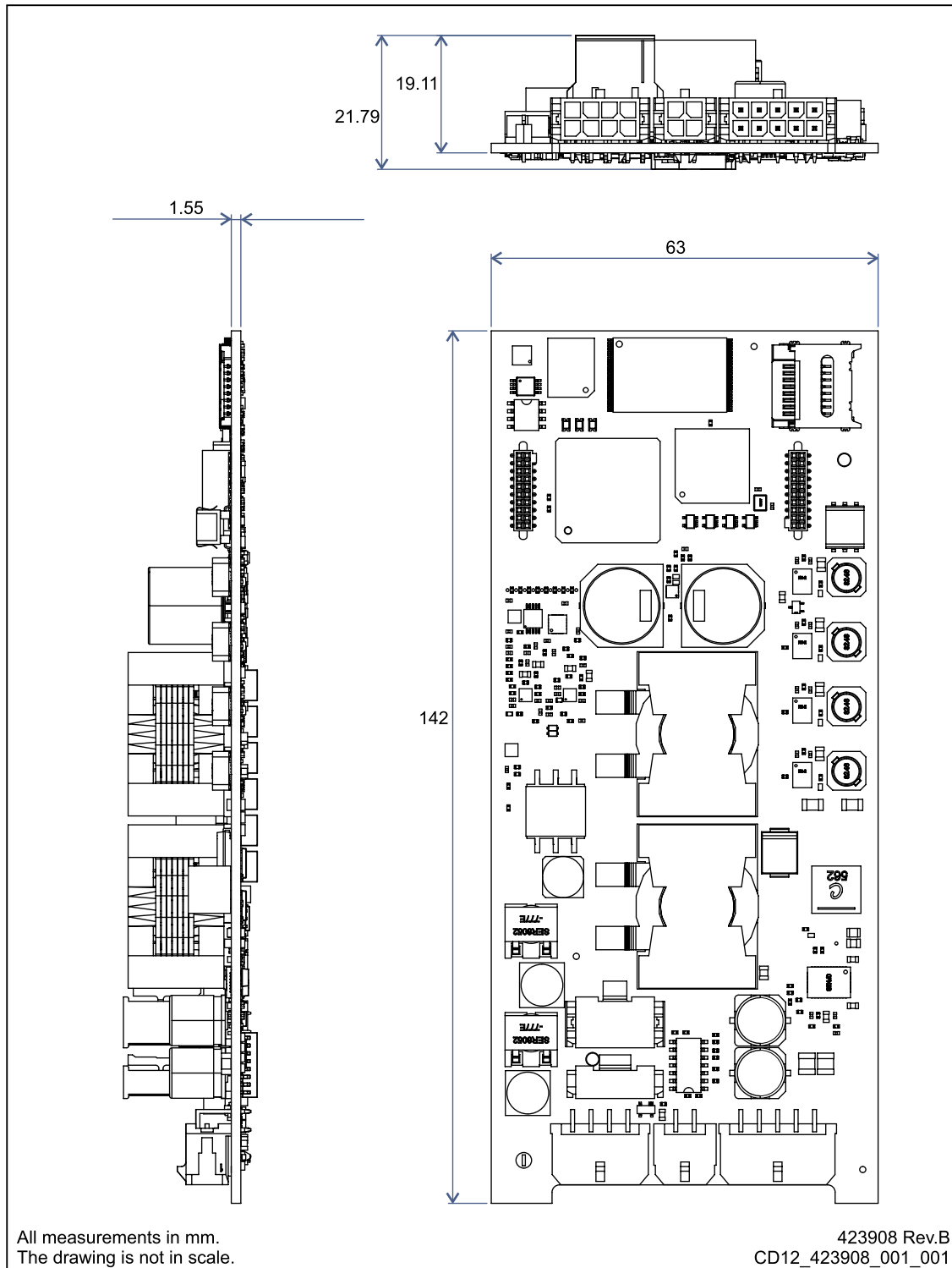
All measurements in mm.
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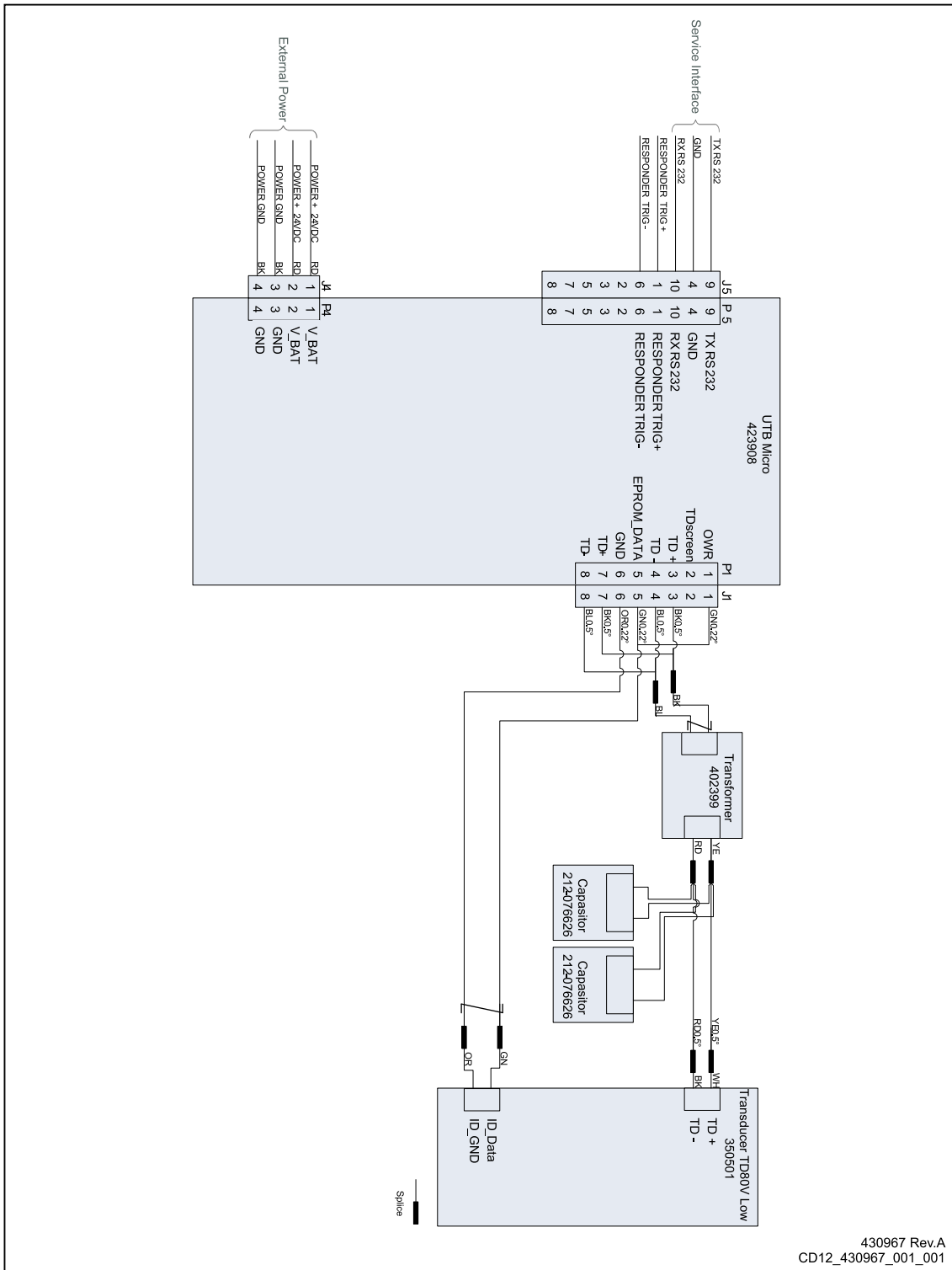
TD40V Outline dimensions



PCB Outline dimensions

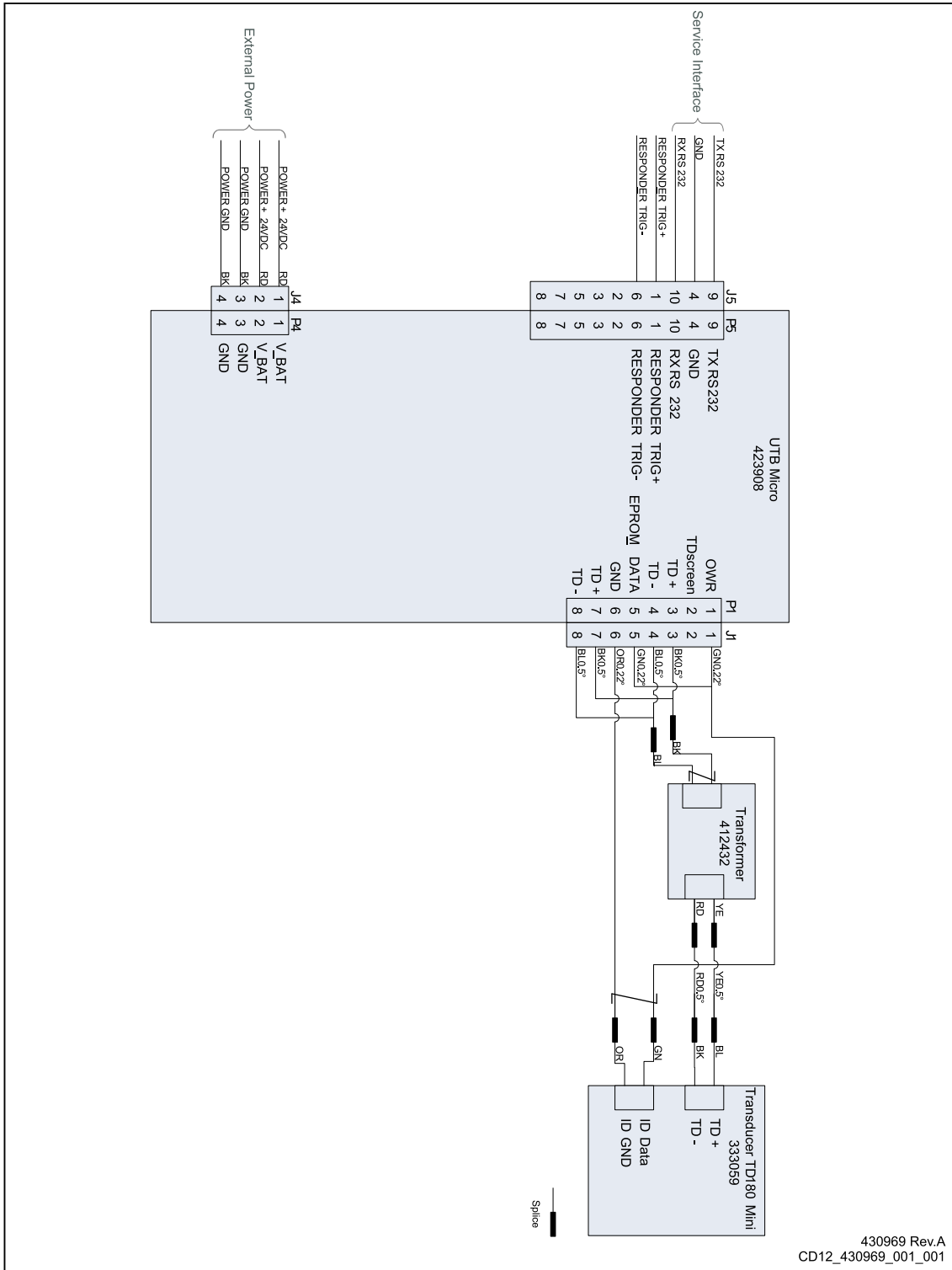


cNODE Modem Embed TD80V Low wiring diagram

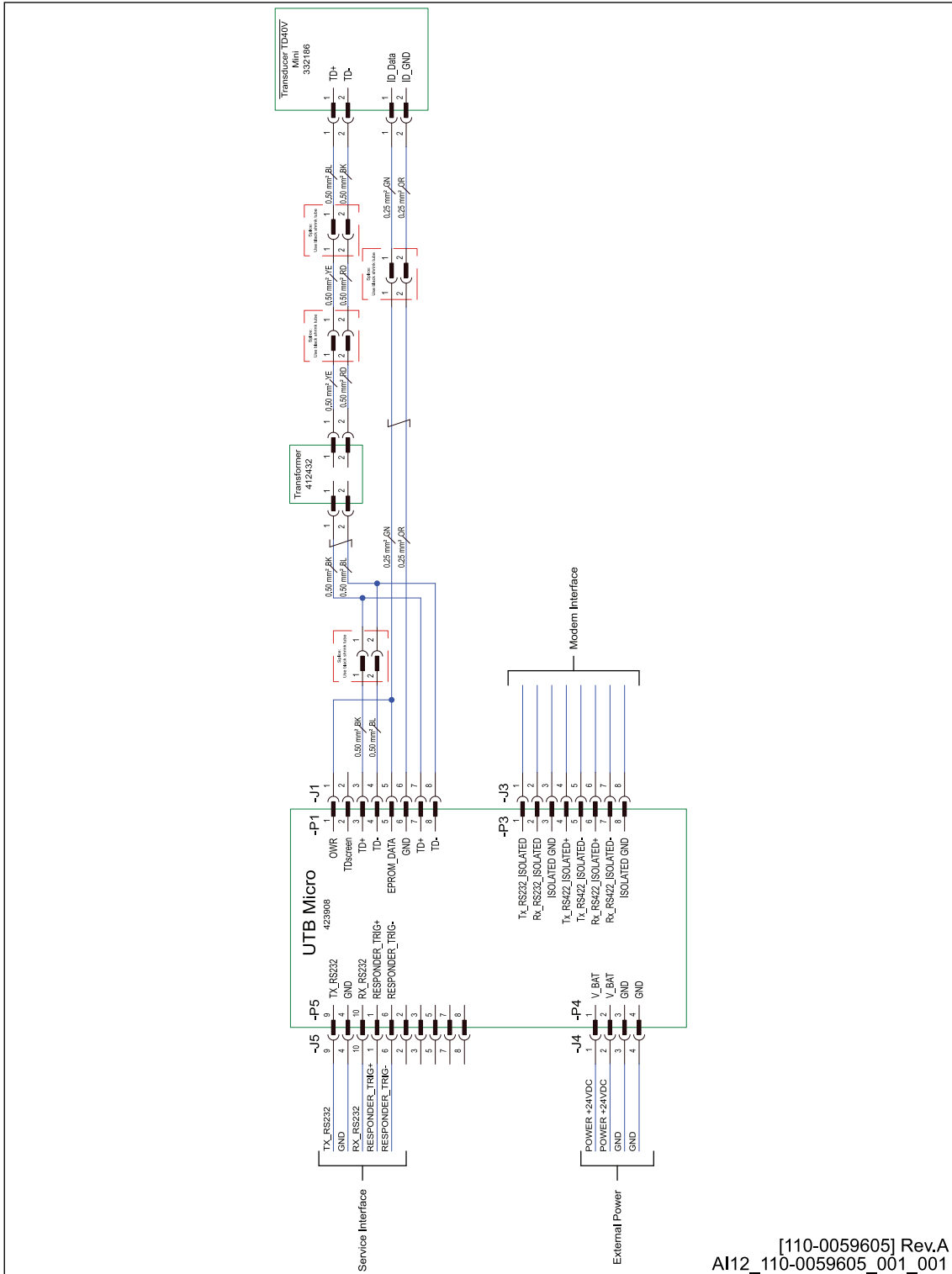


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cNODE Modem Embed TD180 wiring diagram



cNODE Modem Embed TD40V Mini wiring diagram



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