move SOLUTIONS

Communication Node

Instruction Manual

Quick installation guide and system operation

Important safety, compliance and warranty information

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Communication Node

Instruction Manual - English

This document applies to:

SCN-xxx-LR-2, version 3.0

All product codes:
SCN-MA0-LR-2
SCN-MVV-LR-2
SCN-V05-LR-2
SCN-V12-LR-2
SCN-VBW-LR-2
SCN-PT1-LR-2
SCN-NTC-LR-2
SCN-POT-LR-2

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NOTICE OF PUBLICATION

The information contained in this manual may be subject to change without notification. For further instructions, more detailed information, product specifications and to download up-to-date manuals, visit our website at www.movesolutions.it

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Warnings

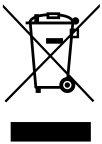
1

For the correct and safe operation of the product, it is recommended to read and follow the instructions in this manual.

Great attention should be paid to the following warnings. Move Solutions shall not be held responsible for inconveniences, damage or malfunctions due to lack of compliance to the prescriptions and suggested use in this manual.

- The declared IP rating is to be intended with both the cable gland tightened around a cable and the lid of the product correctly screwed in place. Do not expose the product to humidity or dust in any other condition.
- Before use, make sure that the product conforms to the description in this manual and that no damage is present.
- Do not use batteries other than those specified by Move Solutions without express approval from a Move Solutions representative.
- Before any operation on the product, disconnect the batteries.
- The product is not intended for use in applications where safety is extremely critical, such as medical-related applications or life-security systems.
- On top of the prescriptions in this manual, the user should operate in compliance with local standards for security and health, and according to the best engineering practices for a safe installation.
- The product must be kept clear of children, animals, and any unauthorized personnel.
- Do not disassemble the product except when explicitly instructed in this manual, as this could cause malfunctions and damage the product.
- Do not attempt to repair or modify the product.
- If the product releases smoke or heat during operation, immediately disconnect the batteries.
- Do not expose the product to high temperatures outside the specified range or heat sources.
- Do not expose the product to liquids of any kind and do not operate on it with wet hands. The product can only be exposed to water when the conditions to guarantee the IP rating are satisfied.

- Do not operate on the product in extreme weather conditions that may damage the device or the user, such as thunderstorms or snowstorms.
- Do not disperse the product or part of it in the environment.
- Correct functioning of the product in environments with high radio activity is not guaranteed.
- The product is compliant to all regulations concerning the fair use of ISM radio bands. However, given the free nature of these bands, occasional conflict with nearby devices operating on the same bands cannot be fully prevented.



This product contains electronic components and batteries that must be disposed of separately from common household waste, according to local regulations. To ensure correct disposal of the product at the end of its lifecycle, please refer to your local authority. Failure to comply to the regulations could lead to penalties.

NOTE

- In case of deterioration or loss of this manual, a compliant copy may be requested by the customer from the manufacturer. For increased security, we suggest that you keep a copy of this manual in a place where it cannot be damaged or lost.

FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ISED Compliance

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, e (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with Industry Canada radiation exposure limits set forth for an uncontrolled environment.

Cet équipement est conforme à l'exposition aux rayonnements Industry Canada limites établies pour un environnement non contrôlé.

Symbols and provisions used in the documentation

The following symbols and conventions are used throughout the documentation. Please follow all warnings and instructions marked on the product.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

IMPORTANT

IMPORTANT indicates a potentially hazardous situation which, if not avoided, can result in property damage or loss of product functionality.

NOTE

NOTE specifies the operating environment, installation conditions, or special conditions of use.

Bold

Bold text highlights an important point or keywords for understanding the context.

Italic

Italic text is used to indicate references to external elements, such as options in the myMove IoT Platform, or internal references to other chapters of this manual.

Fire Danger icons warn of the possibility of fire.

Electrical Danger icons warn of the risk of electric shock.

Prohibition icons indicate actions that must not be performed.

General description

2

The Communication Node is an outdoor wireless data logger that enables geotechnical probes for LoRaWAN wireless communication. Each node supports one geotechnical probe, and most models can also accomodate the probe's built-in NTC thermistor when present. The Communication Node can be remotely configured through *MyMove - IoT Platform*, where it is also possible to visualize the data, convert it and analyze it.

This communication device can read and digitize geotechnical sensors in static regime such as: strain gauges, temperature sensors, load cells, crack meters, humidity sensors, piezometers, anemometers, inclinometers, rain gauges and radar-based probes among others. These sensors can be purchased through Move Solutions™ or other channels.

The Communication Node is thus suitable for use in geo-environmental, hydrogeological, geotechnical, and structural monitoring.

The Communication Node comes in eight different types, corresponding to different types of analog probes. This is because different kinds of analog probes use different ways to electrically communicate their measure to a datalogger.

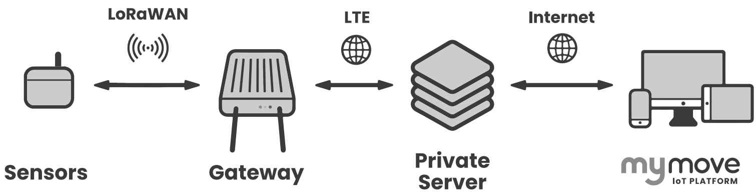
The available types are:

Product Code	Interface
SCN-MA0-LR-2	Communication Node — 4-20mA
SCN-MVV-LR-2	Communication Node — mV / V
SCN-V05-LR-2	Communication Node — Voltage Output (5 V)
SCN-V12-LR-2	Communication Node — Voltage Output (12 V)
SCN-VBW-LR-2	Communication Node — Vibrating Wire
SCN-PT1-LR-2	Communication Node — Pt100 / Pt1000
SCN-NTC-LR-2	Communication Node — NTC
SCN-POT-LR-2	Communication Node — Potentiometer

IMPORTANT

- Each node is compatible with only one type of probe, so make sure you have chosen the right type when ordering.

The Communication Node is part of the Move Solutions range of LoRaWAN products for monitoring purposes; as such, the node needs a LoRaWAN gateway (such as the Move Solutions Gateway Pro) to connect to the *MyMove - IoT Platform*. After correctly connecting to the platform, the settings and data can be personalized to fit the user's needs.



The data is sampled by the Communication Node in two possible modes:

- **Programmed sampling**, where the node acquires the data from the probe at fixed intervals configurable through the platform.
- **Triggered sampling**, where on top of the Programmed sampling a threshold can be selected on the internal accelerometer of the node to acquire data from the probe immediately after an extraordinary event has happened.

The data is thus sent to the platform in raw format, which is the electrical measure from the sensor, along with a few other data to help the user understand how the probe is performing. The raw data can then be converted to the output format desired by the user through a set of formulas.

Technical Data

3

Operation		
Working modes	Programmed	
	Programmed + Acceleration-triggered[1]	
Cadence for scheduled acquisitions	• 2 minutes • 10 minutes • 20 minutes • 30 minutes • 1 hour • 2 hours • 6 hourse • 12 hours	
Absolute synchronization [2]	± 1 second	
Integrated accelerometer	Full-scale range	± 2 g
	Resolution	1 mg
	Bandwidth	0.7 – 25 Hz

[1] If more modes are enabled at the same time, their performance may be reduced. To reach the best performances foreach mode, please avoid using combined mode.

[2] Under good LoRaWAN radio coverage.

General data	
Wireless connection technology	Sub-GHz LoRaWAN protocol[1] (Gateway required)
Supported LoRaWAN regions	EU868, US915, AU915
Wireless coverage [2]	1 km line of sight from the nearest Gateway
Connections	Move Solutions 8-pole connector. For compatible accessories visit Move Solutions' website or contact support.
IP rating [3]	IP67

General data	
Power supply	2x 19Ah 3.6V replaceable lithium battery (D-type $LiSOCl_2$ with JST EHR-2 connector, suggested EVE ER34615 EHR2)
Operating temperature range	From -40 °C to +85 °C
Dimensions [4]	130.0 x 171.2 x 62.0 mm
Weight [4]	0.6 kg
Case material	Polycarbonate
Installation options	Wall, floor, or ceiling mount. Two-points attachment using screw anchors (Ø6mm max). One set included in the package. Pole or wall mounting using special plates and screw.
Cable gland accepted cable diameter	3 to 8 mm
Screw terminals accepted cable	30 to 14 AWG
Software version	v3

[1] The sensor's LoRaWAN connection operates on a best-effort basis, which means that while most data packets aredelivered, there is a slight possibility of occasional packet loss.

[2] Under good LoRaWAN radio coverage.

[3] Only when the connector is protected by the connected external cables and/or accessories, and an appropriate cable is correctly installed in the probe gland.

[4] Refers to the sensor unit itself. External accessories are not considered since they are optional and/or can be replaced with alternative parts to fit specific applications.

3.1 Technical data specific for each type of Communication Node

Analog specifications for SCN-MA0-LR-2 — 4 – 20 mA	
Interface type 4 – 20 mA (2 or 3 wires)	4 – 20 mA (2 or 3 wires)
Probe supply voltage	12.3 VDC
Probe supply max suggested current	30 mA
Accuracy[1,2]	± 0.1% of reading
Measuring span	0-24 mA
Shunt resistance	10 Ω
Auxiliary NTC channel	Yes

Analog specifications for SCN-MVV-LR-2 — mV / V	
Interface type	mV / V
Probe supply voltage	5 VDC
Probe supply max suggested current	50 mA
Accuracy[1,2]	± 0.2% of reading or 0.002 mV / V
Measuring span	± 8 mV/V
Input resistance (nominal)	2 GΩ
Auxiliary NTC channel	Yes

Analog specifications for SCN-V05-LR-2 — 5V	
Interface type	Voltage Output
Probe supply voltage	5 VDC
Probe supply max suggested current	50 mA
Accuracy[1,2]	± 0.2 % of reading
Measuring span	0 – 5 V
Input resistance (nominal)	> 20 GΩ
Auxiliary NTC channel	Yes

Analog specifications for SCN-V12-LR-2 — 12V	
Interface type	Voltage Output
Probe supply voltage	12.3 VDC
Probe supply max suggested current	30 mA
Accuracy[1,2]	± 0.2 % of reading
Measuring span	0 – 12 V
Input resistance (nominal)	> 20 GΩ
Auxiliary NTC channel	Yes

Analog specifications for SCN-VBW-LR-2 — Vibrating Wire	
Interface type	Vibrating Wire
Measuring span	400 – 10000 Hz
Auxiliary NTC channel	Yes

Analog specifications for SCN-PT1-LR-2 — Pt100 / Pt1000	
Interface type	Pt100 / Pt1000 (4 wires)
Accuracy[1,2]	± 0.03% of reading
Measuring span	15 - 1500 Ω
Auxiliary NTC channel	No

Analog specifications for SCN-NTC-LR-2 — NTC	
Interface type	NTC
Accuracy[1,2]	± 0.1% of reading
Measuring span	10Ω - 1 MΩ
Auxiliary NTC channel	No

Analog specifications for SCN-POT-LR-2 — Potentiometer	
Interface type	Potentiometer
Probe supply voltage	2.7 VDC
Probe supply max suggested current	50 mA
Accuracy[1,2]	± 0.02 % of reading
Measuring span	0 – 100 %
Input resistance (nominal)	2 MΩ
Auxiliary NTC channel	Yes

[1] Referred to absolute readings.

[2] Measurement conditions: room temperature 20 °C, 45 %rh.

3.2 Battery life estimation

WITHOUT ACCELEROMETER TRIGGER

Interface	Conditions	Read duration	Read cadence	Estimated battery life[1]
4-20 mA, 2 wires	The node is reading half of its full scale (12 mA)	5 seconds	10 minutes	2 years
4-20 mA, 3 wires	Probe supply current of 30 mA	5 seconds	30 minutes	2.4 years
mV / V	Probe load resistance = 350 Ω	5 seconds	10 minutes	3.4 years
Voltage (5V)	Probe supply current of 50 mA	8 seconds	20 minutes	2.5 years
Voltage (12V)	Probe supply current of 30 mA	8 seconds	30 minutes	2.1 years
Vibrating Wire	—	2 seconds	10 minutes	4.1 years
Pt100 / Pt1000	—	5 seconds	10 minutes	5.2 years
NTC	—	5 seconds	10 minutes	5.2 years
Potentiometer	Resistance of potentiometer = 1kΩ	5 seconds	10 minutes	5.2 years

WITH ACCELEROMETER TRIGGER

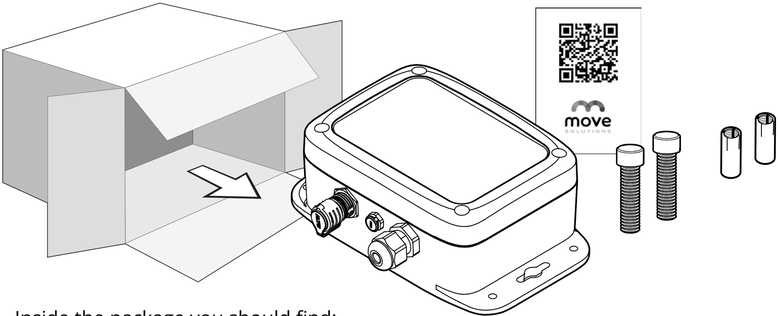
Interface	Conditions	Read duration	Read cadence	Estimated battery life[1]
4-20 mA, 2 wires	The node is reading half of its full scale (12 mA)	5 seconds	20 events/day	1.6 years
4-20 mA, 3 wires	Probe supply current of 30 mA	5 seconds	20 events/day	2.5 years
mV / V	Probe load resistance = 350 Ω	5 seconds	100 events/day	2.1 years
Voltage (5V)	Probe supply current of 50 mA	8 seconds	20 events/day	2.3 years
Voltage (12V)	Probe supply current of 30 mA	8 seconds	20 events/day	2.0 years
Vibrating Wire	—	2 seconds	100 events/day	2.2 years
Pt100 / Pt1000	—	5 seconds	100 events/day	2.5 years
NTC	—	5 seconds	100 events/day	2.5 years
Potentiometer	Resistance of potentiometer = 1kΩ	5 seconds	100 events/day	2.5 years

[1] The estimation refers to a sensor in a typical working environment with average quality of the radio connection between the sensor and the gateway. Actual battery life may be worse in case the product is used under extreme conditions, suchas prolonged working in high or low temperatures, bad quality of radio connection between the sensor and the gateway, etc..

What’s in the box

4

The Communication Node is shipped in a cardboard box. The label on the box specifies the EUI and SN of the product. The EUI is very important as it used to identify the product inside the *MyMove - IoT Platform*.



Inside the package you should find:

Number of pieces	Components
1 pc.	Communication Node of the type that you ordered (see following chapters for further explanation)
2 pcs.	Anchors (M6x25mm, fixing hole 8mm)
2 pcs.	Socket cap screws (M6x30mm)
1 pc.	Move Solutions flyer with a QR code linking to the most up-to-date documentation

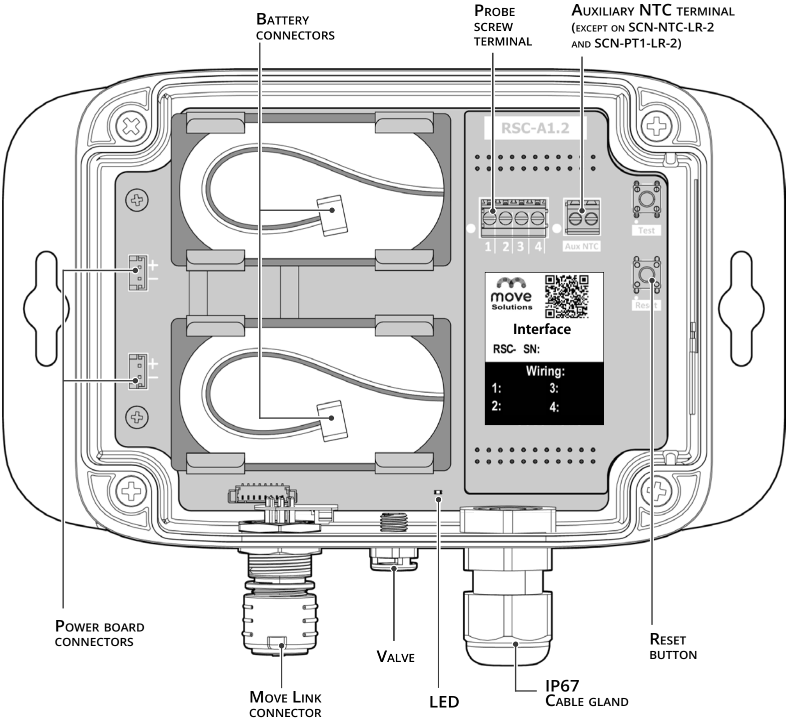
Carefully examine what’s inside the package and check that everything is present and in excellent condition.

CAUTION

- **DO NOT** use the Communication Node if any of the components looks broken or tampered with.

A label identical to the one on the packaging is affixed on the side of the Communication Node. On the back of the Communication Node another label specifies the product code and type of the Communication Node. Refer to the following chapters for more information on Communication Node types.

Opening the lid of the Communication Node you'll see:



IMPORTANT

- **DO NOT** open the Communication Node in a dusty and/or humid environment. The IP rating of the node is guaranteed only after the lid is screwed on and a cable is tightly secured in the cable gland.

5

Quick guide to installation

BEFORE THE INSTALLATION

1. Check that you have the correct type of node for the probe you intend to install.

2. Check that you have the right tools for the operation.

INSTALLATION

3. Correctly and securely install the Communication Node on site, following the instructions in chapter *Installation on site*.

4. If you don't plan on installing the probe inside the node immediately, remember to keep the node closed, put a piece of electrical cable through the cable gland and tighten it to prevent humidity, dirt, and water from entering the product.

5. With the batteries disconnected, insert the cable of the probe through the cable gland.

6. If necessary, strip the cable to reveal the wires. Insert and tighten the wires in the screw terminal according to the instructions in the following chapters. For the screw terminal of the node, use a 2.5 mm flat-head screwdriver.

7. Connect the batteries by inserting the cables in the connectors on the board.

8. The green LED lights up for about 2 seconds for confirmation.

9. Tighten the cable gland and close the lid.

10. If the gateway is already running, you can start checking your data on the *MyMove - IoT Platform* within a few minutes. Otherwise, a maximum time of 30 minutes after the installation of the gateway is required before the node can be viewed on the platform.

Wiring a probe

6

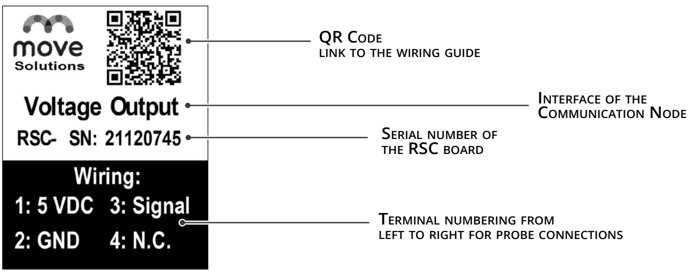
CAUTION

- When connecting a probe to the node, disconnect the batteries.
- Before connecting a probe, verify that it is compatible with the type of node you are planning to connect it to. This means checking that the type of node is suitable to read the output of the probe, and that the voltage supplied by the node is in the range of acceptable supply voltages for the probe.

Each probe connection cable will have a variable number of wires with different colors inside. The intended use and the consequent identification of a cable is managed through a color coding; thus each conductor is distinguished by a sheath of a different color. To understand the color convention used by a probe to distinguish the wires, refer to the product datasheet, the user manual or the calibration certificate of the probe or contact the supplier company directly.

A label indicating the wiring for each specific type of the Communication Node is present inside the node.

Here you'll find an example for the wiring label of a Voltage Output (5V) Communication Node:



CAUTION

- Before reconnecting the batteries after wiring the probe, check the wiring to avoid damaging the node, the batteries, or the probe due to incorrect wiring.

6.1 Wiring instructions Communication Node — 4 – 20 mA

The Communication Node supports 4-20 mA probes with 2 or 3 wires. Other types might be possible to read with an external power supply.

CAUTION

- The naming conventions and color code of wires is not standard and can vary significantly from probe to probe and manufacturer to manufacturer. Only act based on certain information. Refer to the manufacturer of your probe for specific information.

4-20 mA — 2 WIRES

The wires in 2-wire 4-20 mA probes are usually:

- A power wire (often called 'VCC', 'Power', 'E+'), usually red
- A signal wire (often called 'Signal', 'E-'), usually black

The wires should be connected as follows:

Position in the terminal	4-20 mA | 2 wires Probe connectors
1	VCC (Power)
2	—
3	—
4	Signal

4-20 mA — 3 WIRES

The wires in 3-wire 4-20 mA probes are usually:

- A power wire (often called ‘VCC’, ‘Power’, ‘E+’), usually red
- A ground wire (often called ‘GND’, ‘E-‘, ‘0V’), usually black
- A signal wire (often called ‘Signal’, ‘S’, ‘S+’), other colors, often white or green

The wires should be connected as follows:

Position in the terminal	4-20 mA — 3 wires Probe connectors
1	VCC (Power)
2	GND (Ground)
3	—
4	Signal

CAUTION

- The signal and ground contact on the Communication Node are electrically referred to the same ground node. If your probe has separate Power Ground and Signal Ground wires, check with the manufactured if they can be shorted, in which case you can connect them together on position 2 of the screw terminal.

6.2 Wiring instructions Communication Node — mV / V

mV / V probes usually come with 4 wires, sometimes 6.

CAUTION

- Resistor bridges are akin to mV/V probes, so they should be electrically compatible with the node. Data interpretation, however, might require further calculations on behalf of the user.

CAUTION

- The naming conventions and color code of wires is not standard and can vary significantly from probe to probe and manufacturer to manufacturer. Only act based on certain information. Refer to the manufacturer of your probe for specific information.

The wires in 4-wire mV / V probes are usually:

- A power wire (often called ‘VCC’, ‘Power’, ‘E+’), usually red
- A ground wire (often called ‘GND, ‘Ground‘, ‘E-‘), usually black
- A positive signal wire (often called ‘S+’)
- A negative signal wire (often called ‘S−‘)

The wires should be connected as follows:

Position in the terminal	mV / V Probe connectors
1	VCC (Power)
2	Signal +
3	Signal –
4	GND (Ground)

mV / V probes with 6 wires have 2 extra wires to read back the power supply voltage. This is not supported on the Communication Node. In this case it is sufficient to leave the two extra wires unconnected and proceed as described above.

CAUTION

- When leaving the extra wires unconnected, remember to wrap them separately in insulating tape to avoid short circuits.

6.3 Wiring instructions Communication Node — Voltage Output (5V)

This node supports probes that can work with a power supply of 5 VDC, and output a signal between 0 and 5 Volts, referred to the same ground as the power supply. These probes usually have 3 wires, sometimes 4.

CAUTION

- The naming conventions and color code of wires is not standard and can vary significantly from probe to probe and manufacturer to manufacturer. Only act based on certain information. Refer to the manufacturer of your probe for specific information.

The wires in 3-wire voltage output probes are usually:

- A power wire (often called 'VCC', 'Power', 'E+'), usually red
- A ground wire (often called 'GND', 'E−', '0V'), usually black
- A signal wire (often called 'Signal', 'S', 'S+'), other colors, often white or green

The wires should be connected as follows:

Position in the terminal	Voltage Output (5V) Probe connectors
1	VCC (Power)
2	GND (Ground)
3	Signal
4	—

NOTE

- The signal and ground contact on the Communication Node are electrically referred to the same ground node. If your probe has separate Power Ground and Signal Ground wires, check with the manufactured if they can be shorted, in which case you can connect them together on position 2 of the screw terminal.

6.4 Wiring instructions Communication Node — Voltage Output (12V)

This node supports probes that can work with a power supply of 12.3 VDC, and output a signal between 0 and 12 Volts, referred to the same ground as the power supply. These probes usually have 3 wires, sometimes 4.

CAUTION

- The naming conventions and color code of wires is not standard and can vary significantly from probe to probe and manufacturer to manufacturer. Only act based on certain information. Refer to the manufacturer of your probe for specific information.

The wires in 3-wire voltage output probes are usually:

- A power wire (often called 'VCC', 'Power', 'E+'), usually red
- A ground wire (often called 'GND', 'E−', '0V'), usually black
- A signal wire (often called 'Signal', 'S', 'S+'), other colors, often white or green

The wires should be connected as follows:

Position in the terminal	Voltage Output (12V) Probe connectors
1	VCC (Power)
2	GND (Ground)
3	Signal
4	—

NOTE

- The signal and ground contact on the Communication Node are electrically referred to the same ground node. If your probe has separate Power Ground and Signal Ground wires, check with the manufactured if they can be shorted, in which case you can connect them together on position 2 of the screw terminal.

6.5 Wiring instructions Communication Node — Vibrating Wire

Vibrating wire probes consist of a winding (or coil) which allows to excite a metal string and to read its vibration frequency, which varies according to the geotechni-calquantities of interest.

CAUTION

- The naming conventions and color code of wires is not standard and can vary significantly from probe to probe and manufacturer to manufactu-rer. Only act based on certain information. Refer to the manufacturer of your probe for specific information.

The 4 wires in vibrating wire probes are usually:

- A first coil wire (often called 'Coil', 'Coil +'), usually red
- A second coil wire (often called 'Coil', 'Coil −'), usually black
- A first NTC wire (often called 'NTC', 'NTC +'), usually white
- A second NTC wire (often called 'NTC', 'NTC −'), usually green

The coil wires can be swapped without consequences. The NTC wires are optional and not always present, and if present they can be swapped without consequences.

The wires should be connected as follows:

Position in the terminal	Vibrating Wire Probe connectors
1	Coil +
2	NTC + (optional)
3	NTC − (optional)
4	Coil −

6.6 Wiring instructions Communication Node — Pt100 / Pt1000

The Pt100 and Pt1000 probes consist of a platinum resistance whose value depends on the temperature. By measuring the resistance of the sensor, it is therefore possible to trace its temperature.

These types of probes typically have 4 wires. These wires are combined in pairs marked with the same color, usually white and red.

If the wires have more than two colors, it is necessary to refer to the probe documentation to identify the matching pairs.

CAUTION

- The naming conventions and color code of wires is not standard and can vary significantly from probe to probe and manufacturer to manufacturer. Only act based on certain information. Refer to the manufacturer of your probe for specific information.

Here we will call “Signal + ” the first pair of wires, and “Signal - “ the other pair.

The wires should be connected as follows:

Position in the terminal	Pt100 / Pt1000 Probe connectors
1	Signal +
2	Signal +
3	Signal −
4	Signal −

6.7 Wiring instructions Communication Node — NTC

These types of probes typically have 2 wires. These wires can be swapped without consequences.

Here we will call “NTC + ” the first wire, and “Signal - “ the other. The wires should be connected as follows:

Position in the terminal	Vibrating Wire Probe connectors
1	—
2	NTC +
3	NTC −
4	—

6.8 Wiring instructions Communication Node — Potentiometer

These probes typically accept any supply voltage and give a voltage output between 0 and the supplied voltage. These probes usually have 3 wires.

CAUTION

- The naming conventions and color code of wires is not standard and can vary significantly from probe to probe and manufacturer to manufacturer. Only act based on certain information. Refer to the manufacturer of your probe for specific information.

The wires in 3-wire voltage output probes are usually:

- A power wire (often called 'VCC', 'Power', 'E+'), usually red
- A ground wire (often called 'GND', 'E−', '0V'), usually black
- A signal wire (often called 'Signal', 'S', 'S+'), other colors, often white or green

The wires should be connected as follows:

Position in the terminal	Potentiometer Probe connectors
1	VCC (Power)
2	Signal
3	—
4	GND (Ground)

Acquired Data

7

The Communication Node is most of the time in an idle state to save energy. This means that the probe is turned off every time the node has stopped reading the data.

Whenever an event happens, an acquisition starts.

The Communication Node has basically two functional modes:

- **Programmed Acquisition**
- **Triggered Acquisition**

In **Programmed Acquisition**, the Communication Node starts acquiring data once every given period, which can be set by the user through *MyMove - IoT Platform*. The Programmed acquisitions are aligned to 00:00 UTC. This means that if the acquisition cadence is set to 2 minutes, the acquisitions will start at 00:00, 00:02, 00:04, 00:06 UTC and so on. To give another example, if the acquisition cadence is set to 6 hours, the acquisitions will start at 00:00, 06:00, 12:00, 18:00 UTC.

In **Triggered Acquisition**, the Programmed acquisitions are still happening, but on top of that the user can activate the internal accelerometer of the Communication Node and set a threshold on its measure.

By doing so, the Communication Node starts monitoring the data from the accelerometer (refer to the chapter about technical data for more in-depth information of this accelerometer). If the given threshold is surpassed on any of the three axes, an acquisition starts. This acquisition works identically to a Programmed acquisition.

IMPORTANT

- Activating the accelerometer, even if the threshold is never exceeded, has a significant impact on battery life as it greatly raises the consumption of the node in idle state.

7.1 Procedure of acquisition for 4-20 mA, mV/V, Voltage (5V), Voltage (12V), Potentiometer, Pt100/Pt1000 and NTC Communication Nodes

At the beginning of an acquisition, whether it is a planned acquisition or due to exceeding the threshold of the integrated accelerometer, the probe is powered on and the node enters the warmup phase.

During the warmup phase the node does nothing and waits for a predetermined time, which can be managed via the *MyMove - IoT Platform*, to give time to the probe to turn on and make sure that the data that is read is valid. For simpler probes a warmup of 1 second may be sufficient, while for more complex probes - especially 4-20 mA 3-wire, Voltage Output (5V) and Voltage Output (12V) - the warmup time can vary greatly.

Once the warmup time has passed, the node begins to acquire a sample roughly every 0.45 seconds. Once 3 consecutive samples have been acquired that differ from each other by less than 0.1%, the node considers the data sufficiently stable, calculates the average of these 3 samples and sends it to the platform.

NOTE

- If the signal is outside the expected range of the product the acquisition might take longer as the node repeats the process multiple times.

If stability is not reached within 20 samples (approximately 9 seconds) the last detected data is still sent.

7.2 Procedure of acquisition for the Vibrating Wire Communication Node

For vibrating wire probes, there is no need for warmup. Instead, vibrating wire probes are read by exciting the coil with a signal around the resonant frequency of the probe and reading back the electromagnetic “echo” generated by the probe on the coil.

To do so, the node starts its first acquisition by sweeping all the frequencies between the minimum and the maximum frequencies set by the user on the platform. In doing so, the node tries to identify the current frequency of the probe. This operation may take some time, and thus some power.

After that, the node will use this information to reduce the time and power required for the next acquisitions.

Sometimes the vibrating conditions of the probe may prevent the node from latching to the correct frequency. In that case it's important to check the minimum and maximum frequencies and the advanced options on the platform. A reading of 100'000 Hz means that the node couldn't correctly identify the frequency of the probe.

7.3 Additional Data

Along with the probe reading, some other data is sent: the total acquisition time (warmup time + actual sampling duration), a timestamp of the acquisition of the last sample -which is the time shown in the graphs on the platform-, resistance of the auxiliary NTC measured at the end of the acquisition and the average current consumed by the entire node during the acquisition time.

For triggered sampling, additional information about the event is sent: based on a window of 960 milliseconds around the surpassing of the threshold, the peak acceleration and the RMS value are calculated for each axis. Subsequently, the highest peak among the three axes and the highest RMS among the three axes are sent.

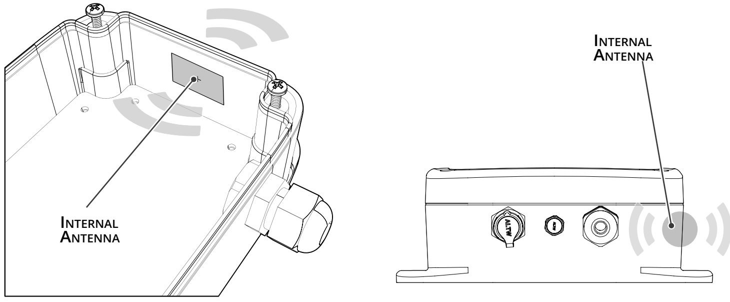
All this information is available on the platform to allow the user to better understand the consumption and operating condition of the node, as well as helping to diagnose possible faults.

Installation on site

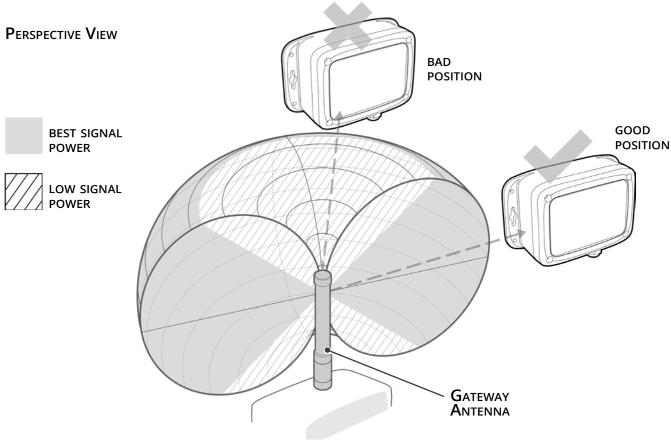
8

When installing the Communication Node, it is important to follow some basic prescriptions to ensure the correct operation of the product.

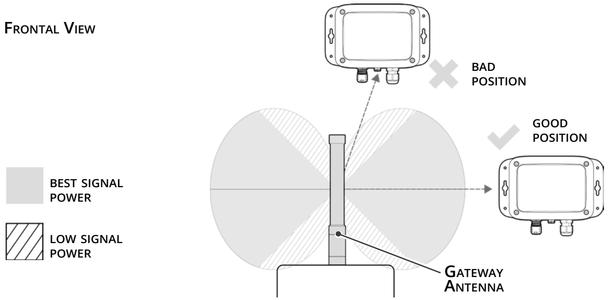
First, locate the antenna on the inside of the node. The antenna is on the shorter side of the node, on the inner side of the wall were the label is affixed.



For optimal radio performance, the antenna should be oriented the same way as the gateway antenna, and the gateway should be on the side of the node.



Avoid, if possible, to locate the gateway vertically above or under the node. If this cannot be avoided, it is best to keep the two antennas perpendicular to one another.



Keep the node and the gateway in line of sight as much as possible, as obstacles along the path of the signal could have a negative impact on the radio link.

Additional information on optimal positioning can be found on the gateway manual. Pay attention to the length of the probe's cable and the desired location of the probe before installing the node.

Try to keep the node, particularly the side on which the antenna resides, as far as possible from metallic materials that could alter the radiative performance of the antenna. Similarly, keep as clear as possible of high voltage power cables, radio and tv antennas and any other source of unwanted electromagnetic disturbance.

The Communication Node can be installed considerably away from the probe, but if you plan to use the triggered acquisition mode you should make sure that the Communication Node is located where it can detect significative events. For example, a node installed on a pole will probably detect accelerations that have no relevance to the probe.

Use the hardware supplied with the Communication Node to fix it to the wall, floor, or ceiling.

CAUTION

- Remember to install the Communication Node away from busy areas where it could be damaged by or cause damage to animals or people. For example, don't install the Communication Node on the floor unless it's in a completely secluded area.

MyMove IoT Platform 9

6.1 General settings

To access *MyMove - IoT Platform*, connect to the URL that you have been supplied with by Move Solutions and log in with your credentials.

Through *MyMove - IoT Platform* you'll be able to:

- check the data of the last 24 hours and the current state of all your devices
- explore all the data that has been gathered by your sensors since day one
- set alarms and email notifications for each sensor
- manage settings for each sensor
- ...and more!

NOTES

- The *MyMove - IoT Platform* is frequently updated with new features, fixes, and reviews. Refer to its documentation for more detailed information.
- Settings that alter the Communication Node behavior (settings that don't concern email alarms and sensor naming) can require up to 1 hour to be synchronized with the sensor.

9.1 General settings

NOTE

- All the settings that alter the Communication Node's behavior, which is to say all settings that don't concern data conversion, email alarms, and probe naming can require up to 30 minutes, sometimes 1 hour to become effective.

To access the settings of your Communication Node, go to ***Settings*** in the side navigation menu. Select ***Analog Node*** in the side bar, and the specific EUI of the node you wish to configure.

All types of Communication Node have a few common settings:

- **Probe name** allows you to specify a name that is shown near the graph. You can use this to track the position or function of the probe connected.
- **Data mode** allows you to choose between raw data and converted data:
  - **Raw data** shows you the electrical measurement from the probe (for example mA for 4-20 mA probes, Ohms for NTC and Pt100/Pt1000, Hz for Vibrating Wire and so on),
  - **Converted data** allows you to apply a variety of formulas (custom conversion) or choose a probe that has previously been validated by Move Solutions and apply a pre-configured conversion.
- **Warmup** allows you to select the amount of time that the node must wait between turning on the probe and starting to acquire. A few practical considerations on how to choose warmup time are given in the Annexes of this manual.

NOTE

- Warmup control is not available in the Vibrating Wire Communication Node

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- **Unit of measurement** allows you to specify the output unit of your converted data. This means that all conversion parameters that you insert should refer to the same unit of measurement. For example, if your unit of measurement is millimeters don't enter the conversion parameters in meters.
- **NTC** allows you to enable the auxiliary NTC probe (where supported), and in converted data mode you can also specify the A, B and C parameters of the Steinhart-Hart equation to convert the resistance value of the NTC into Celsius

degrees. These values are usually found on the user manual, calibration report or datasheet of the probe.

$$T = \frac{1}{A + B\ln(R) + C[\ln(R)]^3}$$

In the **Operations** tab of the **Device Settings** menu of the node, you will be able to:

- Choose the cadence of the Programmed sampling
- Activate the accelerometer for Threshold sampling and set a threshold in mg.

Finally in the **Alarms** tab allows you to set a lower and upper threshold and receive email notifications when one of the thresholds is surpassed by the sensor.

9.2 Specific settings for 4-20 mA Communication Node

To setup the conversion of a 4-20 mA probe, the platform asks for 4 parameters, which are the minimum and maximum values in mA, and the relative conversion of each of the values. By doing so, the platform constructs a straight line between the two points to obtain a conversion rule.

The formula is:

$$Omeas = \frac{Rmeas - Rmin}{Rmax - Rmin} \times (Omax - Omin) + Omin$$

Where $Omeas$ is the converted data, $Rmeas$ is the raw measurement, $Rmin$ and $Rmax$ are the minimum and maximum value in mA, and $Omax$ and $Omin$ are their respective conversion.

NOTE

- This conversion keeps working even for $Rmeas$ higher than $Rmax$ or lower than $Rmin$.

For example, a typical 4-20 mA, 200 mm extensometer would probably have $Rmin$ = 4 mA, $Rmax$ = 20 mA, $Omin$ = 0 mm, $Omax$ = 200 mm.

9.3 Specific settings for mV / V Communication Node

To setup the conversion of a mV/V probe, the platform offers the choice of two formulas. These formulas yield the same results, but have two different ways of inserting the parameters, depending on how the manufacturer has supplied them.

GAIN FORMULA

The gain formula only asks for one parameter, which is usually referred to as 'gain' or 'sensitivity'. This means: "how many mV/Vs correspond to 1 unit of measurement of the probe?".

Simply put, a load cell that ouputs 1.4 mV/V with 1 kN of load on it has a gain or sensitivity of 1.4 mV/V/kN. This is the parameter that needs to be input on the platform.

Note that the easiest way to recognize this parameter is its unit of measurement, which is mV/V divided by the unit of measurement of the probe. A few examples might be mV/V/kN, mV/V/mm, mV/V/ue, and so on.

The applied formula is simply:

$$Omeas = Rmeas \times Gain$$

Where $Omeas$ is the output measurement, $Rmeas$ is the raw measurement and Gain is the parameter input by the user.

FULLSCALE FORMULA

Sometimes the conversion parameters are given differently by the manufacturer, in which case this formula can be used.

In this case, the formula asks for the maximum raw value in mV/V and the maximum converted value corresponding to it.

These two parameters can usually be recognized as the first one has a unit of measurement of mV/V, while the other is the full scale measure of the probe in its own unit of measurement.

The applied formula is simply:

$$Omeas = Rmeas \times \frac{Omax}{Rmax}$$

Where $Omeas$ is the output measurement, $Rmeas$ is the raw measurement, $Omax$ is the full scale measure of the probe and $Rmax$ is the maximum raw value in mV/V.

For example, a 2 mV/V, 2000 kN load cell has a maximum raw value of 2mV/V and a maximum output value of 2000 kN.

NOTE

- This conversion keeps working even for $Rmeas$ higher than $Rmax$.

9.4 Specific settings for Voltage Output (5V) and Voltage Output (12V) Communication Node

To setup the conversion of a Voltage Output probe, the platform asks for 4 parameters, which are the minimum and maximum values in V, and the relative conversion of each of the values. By doing so, the platform constructs a straight line between the two points to obtain a conversion rule.

The formula is:

$$Omeas = \frac{Rmeas - Rmin}{Rmax - Rmin} \times (Omax - Omin) + Omin$$

Where $Omeas$ is the output measurement, $Rmeas$ is the raw measturement, $Rmin$ and $Rmax$ are the minimum and maximum value in mA, and $Omax$ and $Omin$ are their respective conversion.

NOTE

- This conversion keeps working even for $Rmeas$ higher than $Rmax$ or lower than $Rmin$

For example, a Voltage Output wind speed meter with a fullscale measure of 50 m/s and 0-4 V output will have $Rmin$ = 0V, $Rmax$ = 4V, $Omin$ = 0 m/s, $Omax$ = 50 m/s.

9.5 Specific settings for Vibrating Wire Communication Node

First, for optimal operation of the node, it is suggested to set the probe frequency range in the Probe configuration tab. The minimum and maximum frequency of the probe should be available on its instruction manual, calibration report or datasheet. When in doubt, try setting the minimum frequency as half the expected frequency, and the maximum frequency as slightly less than double the expected frequency.

Furthermore, if the readings seem unstable, the advanced options can be used to optimize the node's reading procedure. It's difficult to characterize the different profiles in the advanced options, so it's suggested to simply try them in order and experiment to find the optimal solution for the probe.

The conversion of the Vibrating Wire can be done through 3 different formulas.

LINEAR DIGIT

Linear digits don't have a direct translation in terms of geotechnical measurements, but are an industry standard in visualization of data from vibrating wire probes. A great amount of handheld data acquisition units show the readings directly in linear digits instead of Hz, so this formula can be useful when comparing the data from other readout units.

The formula is simply:

$$LD = \frac{Fmeas^2}{1000}$$

Where LD is the output measurement in linear digit and $Fmeas$ is the raw frequency measurement.

LINEAR FORMULA

The simplest way to convert the frequency from the vibrating wire probe to a geotechnical unit of measurement is applying a conversion factor to the corresponding linear digit. The linear formula requires the user to insert the conversion factor (referred to as “gain” or “gauge factor”) for this reason. The conversion factor can usually be found on the calibration report, the datasheet, or the user manual of the probe.

The formula is thus:

$$Omeas = G \times \frac{Fmeas^2}{1000}$$

Where $Omeas$ is the output measurement in the desired unit of measurement, G is the conversion factor and $Fmeas$ is the raw frequency measurement.

QUADRATIC FORMULA

A more accurate way to convert the frequency measurement is to apply a polynomial formula to the linear digit representation. In this case, a second degree polynomial is used.

The formula is thus:

$$Omeas = A \times \left(\frac{Fmeas^2}{1000}\right)^2 + B \times \frac{Fmeas^2}{1000} + C$$

Where $Omeas$ is the output measurement in the desired unit of measurement, A, B and C are the coefficients of the polynomial and $Fmeas$ is the raw frequency measurement.

NOTE:

- A, B and C are arbitrary names.
- Where a more complex formula is supplied by the manufacturer, be careful to only use the coefficients up to second degree.

TEMPERATURE COMPENSATION

Vibrating wire probes often include an NTC thermistor to measure the probe's temperature as this information can be used to compensate thermal effects on the measure.

In the Probe configuration tab, after configuring the auxiliary NTC and its conversion formula it's possible to activate the temperature compensation function. The user only needs to input the temperature compensation parameter to apply. The compensation formula is simply:

$$Omeas,\ comp = Omeas - Kt \times T$$

Where $Omeas,comp$ is the measure after compensation, $Omeas$ is the measure before compensation as output by the linear or polynomial formulas, Kt is the temperature compensation parameter and T is the temperature measured by the auxiliary NTC.

9.6 Specific settings Pt100 / Pt1000 Communication Node

To convert the Pt100/Pt1000 it's first necessary to select the Probe type at the bottom of the probe configuration tab. It's also necessary to insert a gain factor which corresponds to the temperature coefficient of the probe.

Basic values are:

- $2.5974\ °C/\Omega$ for Pt100
- $0.25974\ °C/\Omega$ for Pt1000

But the user is free to choose a custom value.

The resulting formulae are:

- $Omeas = (Rmeas - 100) \times G$
- $Omeas = (Rmeas - 1000) \times G$

Where $Omeas$ is the output measure, $Rmeas$ is the raw measure and G is the gain inserted by the user.

9.7 Specific settings NTC Communication Node

NTC probes readings in Ohms are usually converted to Celsius degrees through the Steinhart-Hart equation. The equation requires the user to enter three parameters, usually called A, B, C.

The equation is as follows:

$$T = \frac{1}{A + B \times \ln R + C \times (\ln R)^3}$$

These parameters should be available on the calibration report, datasheet or user manual of the probe.

9.8 Specific settings for Potentiometer Communication Node

To setup the conversion of a Potentiometer probe, the platform asks for 2 parameters, which are the minimum value and the maximum value that can be measured by the probe. By doing so, the platform constructs a straight line between the two points to obtain a conversion rule. Put simply, the two values asked are those corresponding to 0% and 100% of the probe's range.

The formula is:

$$Omeas = \frac{Rmeas}{100} \times (Omax - Omin) + Omin$$

Where $Omeas$ is the output measurement, $Rmeas$ is the raw measurement, and $Omax$ and $Omin$ are the parameters input by the user.

For example, a potentiometric crackmeter with a fullscale measure of 100 mm will have $Omin$ = 0 mm, $Omax$ = 100 mm.

Maintenance 10

10.1 Changing the batteries

Depending on the power consumption of the probe and a few other factors, a battery change may be necessary every few months to every few years.

In this event, only use the prescribed batteries.

For information on how to provision said batteries, please contact a Move Solutions representative.

If the prescribed batteries are unavailable, or provisioning is not possible, consult a Move Solutions representative to find a viable alternative.

Move Solutions is not responsible for malfunctions and damage caused by batteries supplied by other companies and/or use of batteries different from the specified part number.

To change the batteries:

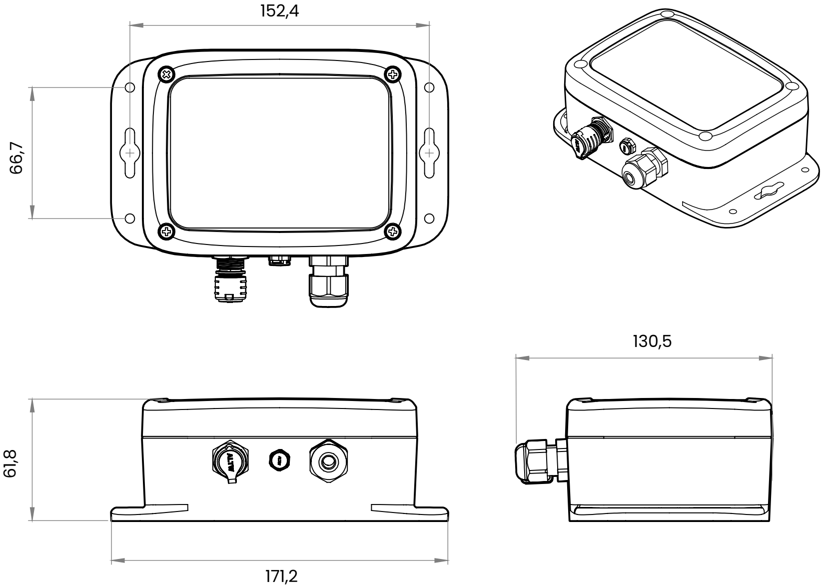
1. Arrange the necessary tools to work safely where the node is installed.
2. Make sure to work with dry hands and in a dry environment. It's advised not to change the batteries in humid, rainy, foggy, or snowy weather.
3. Open the lid.
4. Disconnect the batteries.
5. Insert the new batteries.
6. Connect the new batteries. The green LED should flash for 2 seconds to signify correct restart of the node.
7. Properly close the lid tightening the screws.

Overall dmensions 11

Please note that the drawings provided in this manual are not drawn to scale.

The purpose of these illustrations is to assist you in understanding the various components and their relative positions. Therefore, it is essential to rely on the numerical measurements provided alongside the drawings for accurate dimensions.

The following measurements are expressed in millimeters (**mm**).



Annex A
About Warmup

A

Warmup is the time required for the probe to correctly turn on and respond with a valid data. The nature of the data can vary greatly depending on the technology employed on the probe: simple analog probes such as thermistors, potentiometers and such usually have a very fast warmup that is almost impossible to notice.

Other sensors, while still being analog, might require a little more time to respond. Their response could be shaped in two ways:

1. Purely analog probes usually have a gradual response: in that case, the node is able to sense that the reading is changing, and thus waits for the probe's output to stabilize.
2. On the other hand, probes that have some kind of converter or processing inside them might have a step-like response, where the output is stable on a not valid value for a few seconds and then steps up to the correct value as soon as the processing is done. This is a situation where the node cannot automatically configure itself, so the user has to specify a longer warmup time to get a valid output.

For energy saving purposes it's always best to start with minimum warmup of 1 second and let the Communication Node read the first data available. If the data is correct, then no further operation is needed, and the node is going to use the minimum amount of energy needed for the acquisition.

If the data obtained this way seems off, it might be worth trying to set a longer warmup and see if anything changes. You could also try and see if any "warmup time" or "response time" is cited on the datasheet or user manual of the probe.

Of course, the invalid data could be due other factors as well. To better understand what is happening it's advised to do this operation looking at the raw data, to avoid being deceived by an incorrect conversion formula.

Annex B
Optimizing battery life

B

The life of the Communication Node's batteries depends heavily on the needs of the probe connected to it. The main consumption factors for the node are:

1. The number of acquisitions over a given time
2. The duration of the acquisitions
3. The average current consumption of the probe
4. Whether the accelerometer is active or not

The average probe consumption and the duration of the acquisitions are parameters that depend on the operation of the probe, so they do not offer many opportunities for optimization. The only choice you can make in this regard is to be careful not to select an unnecessarily high warmup time to keep the acquisition time as low as possible.

A cause of long acquisition times might be a high variability of the data: if the data is too noisy, the node will struggle to find steady data and will thus prolong the acquisition.

As for the frequency of acquisitions, it is obviously possible to decrease the cadence (for example from 10 minutes to 30 minutes) for programmed acquisitions and raise the accelerometer threshold to reduce the number of acquisitions triggered. However, it is important to keep in mind that activating the accelerometer, even without being triggered, significantly impacts node consumption by reducing its duration.

Information on the current consumption and acquisition time of the probe can be accessed from the Events section of the platform, in the **Diagnostic** tab.

Annex C
Zeroing

C

One useful feature on the *MyMove - IoT Platform* is the zeroing function, located in the Acquisition parameters tab, in the ***Settings*** menu.

By clicking on the ***Zero the measure*** button, the last measure from the probe is saved and used as a tare for future (and past) measurements. In simpler terms, the data visualized on the platform for the probe is going to be the difference between the current measure and the measure at the time when the button was pushed.

Zeroing is useful when the user wants to see the variation of the data instead of the absolute value. For example, when installing a crackmeter or a strain gauge, it's nearly impossible to install it perfectly in the center, which means that different probes of the same type on the same structure might have significant offsets between one another. Zeroing the measure in these cases simplifies comparison between probes on a structure.

If a conversion formula is selected, the zeroing is applied after converting the data.

The resulting formula would thus be:

$$Omeas = Mnow - Mzero$$

Where $Omeas$ is the output measurement as seen on the graphs, $Mnow$ is the current measurement after conversion and $Mzero$ is the measurement at the time of zeroing, converted with the same formula.

In vibrating wire probes, sometimes the manufacturer might give the conversion formula as:

$$G \times \left(\frac{Fmeas^2}{1000} - \frac{Finstallation^2}{1000} \right) - Kc \times (Tmeas - Tinstallation)$$

Where $Fmeas$ and $Tmeas$ are the current frequency and temperature measurements, while $Finstallation$ a $Tinstallation$ are the frequency and temperature measurements when the probe was first installed. This case is covered automatically by zeroing, too, by pressing the ***Zero the measure*** button after correctly installing the probe. Of course the same goes without temperature compensation.

NOTE

- To view the non-zeroed data, you don't need to erase the zeroing. There is a switch next to the graphs that allows you to view the non-zeroed data temporarily.

D

Annex D
Troubleshooting

Here we seek to give a few pointers to the most common misfunctions and suggested countermeasures.

WARNING

- Remember to always disconnect the batteries before physically operating on the node.

THE COMMUNICATION NODE IS OFFLINE

First of all, check whether the gateway is online. If the gateway is offline, refer to its manual or to the customer service to solve the problem.

If the gateway is online, wait a few hours: the Communication Node might be functioning correctly but the data may not arrive due to high traffic on the radio channel. This might be the case in installations with a high density of LoRaWAN devices.

Try pushing the Reset button on the node. If the LEDs don't turn on, there's likely an issue with the batteries.

If the problem persists, and the wiring of the probe has not been checked before, check the wiring as it might be causing issues to the node. Also, try disconnecting the probe and see if the Communication Node goes back online. In that case, this might be an issue with the probe, or with the node's batteries.

If all these tests fail, refer to the customer support for assistance.

PROBE DATA IN CONVERTED MODE IS SIGNIFICANTLY DIFFERENT THAN EXPECTED

Try switching to raw data visualization. If the raw data is still different than expected try the other troubleshooting tips based on raw data. If the raw data is as expected, there's likely a problem with the conversion formula. Check whether you are using the correct formula and the right parameters.

PROBE DATA IS LOWER THAN EXPECTED

There may be a problem with warmup, try a longer warmup time. Check the raw data as well to make sure it's not a conversion problem.

4-20 mA: READING IN RAW MODE IS CLOSE TO 0 mA

Check the wiring. Either the probe is not receiving power, or the signal wire is not correctly wired. If the probe has multiple ground wires, make sure they are all connected, but first confirm with the manufacturer that they can be shorted together.

mV/V: READING IN RAW MODE IS CLOSE TO 0 MV / V

This may be a correct measure if the probe is very close to its halfway point. If it's not, check the wiring. It's likely that the power or ground wires are not correctly connected, or the two signal wires are touching.

mV/V: READING IN RAW MODE IS OVER 10 MV / V

If this is not an expected value, probably one or both of the signal wires are disconnected.

Pt100/Pt1000 AND NTC: VALUE IN RAW DATA IS CLOSE TO 0 Ohm

Check the wiring. It's likely two wires are touching each other or have been swapped.

Pt100/Pt1000: VALUE IN RAW DATA IS STUCK AT 1500 Ohm

Check the wiring. It's likely that some of the wires are not connected correctly.

VOLTAGE OUTPUT (5V) AND VOLTAGE OUTPUT (12V): READING IN RAW MODE IS CLOSE TO 0V

Check the wiring. Either the probe is not receiving power, or the signal wire is not correctly wired. If the probe has multiple ground wires, make sure they are all connected, but first confirm with the manufacturer that they can be shorted together.

VOLTAGE OUTPUT (5V): READING IN RAW MODE IS CLOSE TO 5V

Check the wiring. The signal wire might be touching the power wire.

VOLTAGE OUTPUT (12V): READING IN RAW MODE IS CLOSE TO 12V

Check the wiring. The signal wire might be touching the power wire.

POTENTIOMETER: READING IN RAW MODE IS CLOSE TO 0%

Check the wiring. The signal wire might be touching the ground wire.

POTENTIOMETER: READING IN RAW MODE IS CLOSE TO 100%

Check the wiring. The signal wire might be touching the power wire.

VIBRATING WIRE: READING IN RAW MODE IS STUCK AT 100'000 Hz

The probe is giving a very weak response. Check the wiring: the coil wires might be connected incorrectly. If this doesn't work, try tuning the minimum and maximum frequency around the expected frequency of the probe. If this doesn't work either, try changing the stimulus profile in the advanced options.

This problem could also be due to incorrect installation of the probe: check with the manufacturer to get information on how to best install the probe and obtain maximum vibration, and if possible, double check the reading with a different readout unit.

VIBRATING WIRE: READING IN RAW MODE IS BELOW 10'000 Hz, BUT CONSIDERABLY HIGHER THAN EXPECTED

Vibrating wire probes don't have one single vibration frequency, but they usually have harmonic vibrations at higher frequencies. Try lowering the maximum frequency in the probe configurations.

ACQUISITION TIME IS LONG FOR VIBRATING WIRES

The probe's response is very weak, try tuning the minimum and maximum frequency and the stimulus profile as instructed above (Vibrating Wire: reading in raw mode is stuck at 100'000 Hz). In this case as well there is a chance the problem resides in the probes installation.

ACQUISITION TIME IS LONG FOR OTHER TYPES OF PROBES

If the signal is stable, acquisition time should be around 2 seconds plus the warmup time. A longer acquisition time means that either the signal is very noisy or unstable, or the measurement is out of the typical range for the probe type (e.g. 2 mA for a 4-20 mA Communication Node).

MOVE SOLUTIONS CUSTOMER ASSISTANCE SERVICE
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