

Neles™ LoRa Communication Module

For Neles™ ND6000™, ND7000™,
ND9000™ and NDX™ HART variants

Installation, maintenance and
operating instructions



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At Valmet Flow Control, cybersecurity is considered from the very beginning of the product design process, ensuring a high level of product security. In addition, we regularly assess and scan our products for security vulnerabilities. Any identified vulnerabilities that affect product security, together with the corresponding mitigation measures and corrective actions, are published on our website:
<https://www.valmet.com/company/innovation/advisories/>

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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the device.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

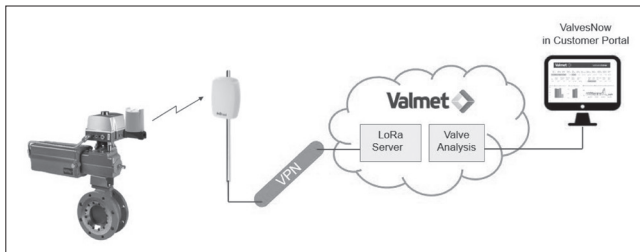
Addresses and phone numbers are printed on the back cover.

1. GENERAL

Neles™ LoRa Communication Module (LCM) is a retrofittable wireless add-on device for Neles™ valve controllers ND9000™, ND7000™, ND6000™ and NDX™. LoRa communication module is intended especially for control systems lacking HART communication capability. It enables communication by sending diagnostic data to Valmet AWS cloud for centralized valve fleet monitoring. The analysis results of monitoring are shared with end users via dashboard within the Valmet Customer Portal.

LoRa communication means a long-range, low-power, low-speed telecommunication protocol. The modem features a LoRa radio with an integrated antenna. The LoRa radio operates on international, license-free bands 863-870 MHz (EU) and 915-928 MHz (Brazil).

Communication between Neles valve controller and LoRa module is according to HART standards where LoRa module is acting as a secondary HART master. The actual LoRa communication between LoRa module and Valmet AWS cloud is according to LoRa protocol utilizing a private LoRa network established by Valmet at the production site.



Communication is only one way from LoRa module via LoRa gateway to LoRa server. There is only cyclic data reading from valve controllers, no writing / configuration access. Cyclic data reading is typically 9-12 data messages per module per day including about a hundred diagnostic values. The rather small amount of data can provide a sufficient picture of the valve performance since edge computing is utilized in valve controllers and only precalculated summary values and alarm messages are sent over LoRa.

LoRa Communication Module is the easiest way for giant leap to valve digitalization offered as part of ValvesNow valve fleet monitoring agreement. The analysis pinpoints devices needing attention, optimizing maintenance by prioritizing valve issues. The actions on right devices ensure entire plant performance.

Key features:

- Enables device communication for plants with automation systems lacking it
- Easiest and most cost-efficient communication for valves
- Retrofittable, by nature, to existing installations
- Plug and play mounting into valve controller's cable entry
- No battery, energized by 4-20 mA control loop
- Supports Industry standard HART protocol
- Reliable, long-range wireless LoRa technology
- Typically, 3-4 gateways able to cover production areas (several hundreds of meters)

2. TECHNICAL DESCRIPTION

Neles™ LoRa Communication Module contains a microcontroller, HART modem, LoRa radio and antenna. The LoRa antenna is integrated on the printed circuit board under the cover and features a nearly omni-directional radiation pattern. The module supports European and Brazilian LoRa frequencies.

The LoRa module is fitted into the cable entry of the positioner. Electrically wise, the module is connected to the 4-20 mA control loop in series with the positioner allowing the original mA control signal path to the positioner. The control loop powers both the positioner and the LoRa module.

For commissioning and maintaining purposes, the module has a USB-C interface under its cover (USB 2.0 Full-Speed). LoRa Communication Module communicates with the positioner using HART protocol. Outward communication is according to LoRaWAN protocol. The module is preconfigured to communicate with Valmet LoRa server.

2.1 Technical specifications

System port

Connector type	Screw terminal
Cable cross section	2.5 mm² max.
Connector pinout	IN+ (250 R) (Optional 250R resistor to increase impedance on HART frequencies for legacy systems without HART support)
	IN+ (4-20 mA loop positive)
	IN- (4-20 mA loop return)

Positioner port

Connector type	2.5 mm² max.
Cable cross section	OUT- (4-20 mA loop return from positioner)
Connector pinout	OUT+ (4-20 mA loop positive to positioner)
	CHGND (optional connection to chassis ground, not connected)

Position transmitter (PT) loop input from positioner

Connector type	Screw terminal
Cable cross section	2.5 mm² max.
Connector pinout	PT+ (PT loop positive from positioner)
	PT- (PT loop return to positioner)

Position transmitter (PT) loop output to system

Connector type	
Cable cross section	2.5 mm² max.
Connector pinout	PT- (PT loop return to system)
	PT+ (PT loop positive to system)

Current loop characteristics

Supply power	Loop powered, 4–20 mA
Minimum loop current	3.6 mA
Maximum loop current	120mA
Maximum DC voltage	+28 VDC
Maximum negative polarity	-28 VDC
Maximum voltage drop	1.5 VDC @ 20 mA (corresponding 75 ohm)
HART input DC leakage	<10 uA

LoRa radio

Frequency plan (EU868)	863-870 MHz
Frequency plan (AU915 Brazil)	915-928 MHz
Antenna gain:	1 dBi
Maximum transmit power:	EU868 +15 dBm AU915 +22 dBm

USB port

USB-C 2.0 Full-Speed

Mechanical

Size	140 mm x 125 mm x 87 mm
Weight	0.65 kg / 1.4 lbs
Material	Aluminium housing with polycarbonate cover
Protection class	IP66
Attachment to positioner	External thread M20 x 1.5 ND6000, ND7000, ND9000 External thread 1/2 NPT (NDX) Internal thread M20 x 1.5
Field wiring cable entry thread	Internal thread M20 x 1.5 (remote installation only)

Environmental specifications

Operating temperature	-40 ... +75 degrees C
Vibration	Tested according to ANSI / ISA-75.13.01-2013: 2g 5-150 Hz, 1g 150-300 Hz, 0.5g 300-2000 Hz

3. STANDARDS AND APPROVALS

Health and safety

EN 62368-1:2014 and EN IEC 62368-1:2020 / 2024

EMC

EN 61326-1:2021
EN 61000-6-4:2019
EN 61000-6-2:2019
CISPR 11 / EN 55011 11:2019
EN 61000-4-2:2025
EN 61000-4-3:2020
EN 61000-4-4:2012
EN 61000-4-5:2017
EN 61000-4-6:2023
EN 61000-4-8:2010

Radio

ETSI EN 300 220-2 V3.3.1 (2025-03)

Cybersecurity

EN 18031-1:2024

4. SAFETY PRECAUTIONS

NOTE

In heavy vibration it is recommended to select installation with remote cabling (< 30meters).

WARNING

For Flameproof/Explosion Proof positioner types ND92, ND93, ND72 and NDX____2, the LoRa Communication Module must be installed remotely. This is a safety requirement due to the risk of elevated housing pressure (10 bar).

NOTE

If remotely mounted, the cable between positioner and LoRa module shall be less than 30 meters.

CAUTION

Do not exceed the permitted values! Exceeding the permitted values marked on LoRa Communication module may cause damage to the equipment.

CAUTION

LoRa Communication Module is secondary HART master. No other secondary masters are allowed.

CAUTION

Device is used with 4-20 mA current loop source with current limited below 120 mA and voltage limited below 28 VDC. Do not connect to constant voltage supply.

NOTE

Quite thick and heavy cabling may be used in the field installations. That might cause bending force to the case and should be minimized during the installation.

NOTE

Avoid earthing a welding machine in close proximity. Damage to the equipment may result.

CAUTION

During maintenance or commissioning when the device cover is open, ensure that water does not go inside the enclosure.

WARNING

Do not operate the device with cover removed!
Environmental influence (water, dust etc.)

CAUTION

Automation systems I/O cards might have an option to connect extra resistor (e.g. 250 ohm) to the control loop. If the option is in use, it needs to be disabled with LoRa Communication Module, since the module is adding the needed extra load to the loop.

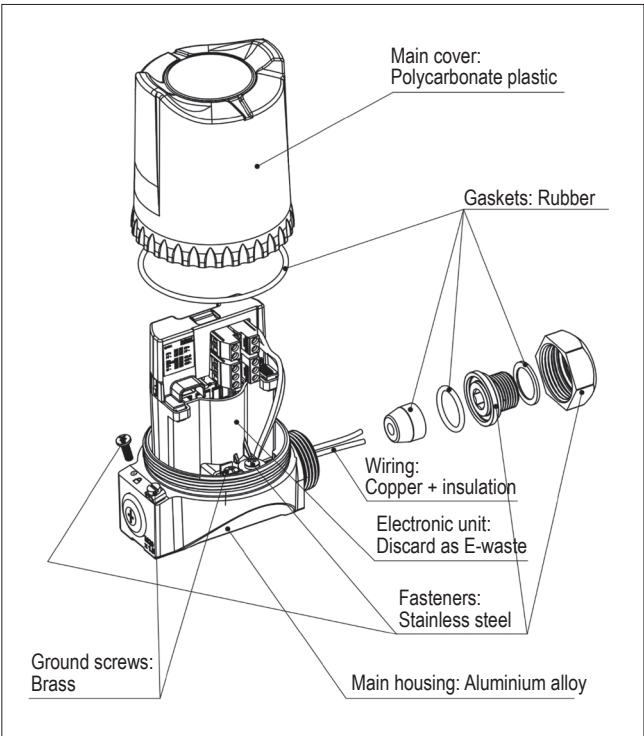
5. TRANSPORTATION, RECEPTION AND STORAGE

Neles LoRa module is a sophisticated instrument, handle it with care.

- Check the device for any damage that may have occurred during transportation.
- Store the uninstalled device preferably indoors, keep it away from rain and dust.
- Do not unpack the device until installing it.
- Do not drop or knock the device.
- Follow instructions elsewhere in this manual.

6. RECYCLING AND DISPOSAL

Most parts can be recycled if sorted according to material. Most parts have material marking. In addition, separate recycling and disposal instructions are available from the manufacturer. Devices may also be returned to the manufacturer for recycling and disposal. There will be a charge for this.



7. INSTALLATION

7.1 Pre-charging with USB-C

To speed up the commissioning, the super capacitor of the device can be charged using the USB connector. For example, a power bank or laptop can be used as power source.

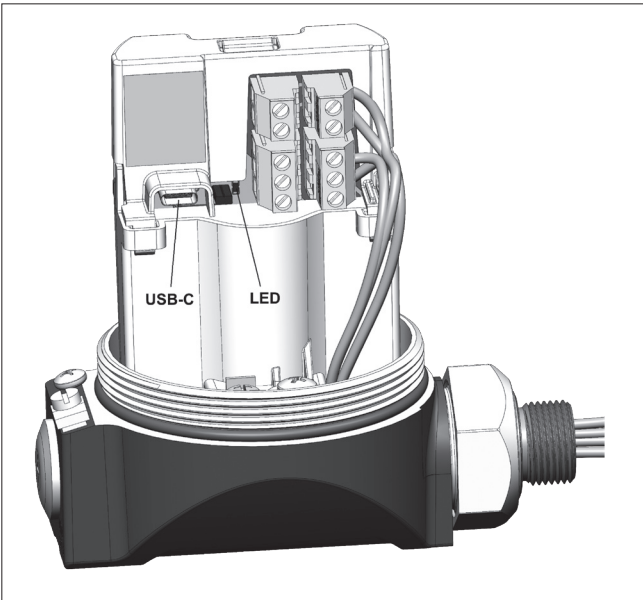
A led next to the USB port starts to blink once per second when the super capacitor is charged enough for the device to operate. When the led is constantly on, the super capacitor is fully charged.

Charging the super capacitor using external USB power source takes about 1-3 minutes. When fully charged, there is about 1 hour time to do the installation so that the device starts to operate directly after the installation without delay for the super capacitor to be charged.

It is also possible to install the device without pre-charging the super capacitor. In this case it takes a while after the device has been powered on before the first LoRa message can be sent, and the device can be commissioned in the cloud.

Energy storage, charging

Charging time from loop without pre-charging	2:30 hours (4 mA loop current, at minimum 3.6 mA) 15 min (20 mA loop current)
Charging time from USB-C	3 min (standard charging) 1 min (fast charging)
Commissioning time	1 hour (time for which the supercapacitor can hold its charge during field installation)



NOTE

High-quality USB-cable suitable for charging shall be used.
Recommended maximum length: 2 m.
Recommended minimum thickness of power-wires: AWG24.

7.2 Mounting

WARNING

For Flameproof/Explosion Proof positioner types ND92, ND93, ND72 and NDX_512, the LoRa Communication Module must be installed remotely. This is a safety requirement due to the risk of elevated housing pressure (10 bar).

NOTE

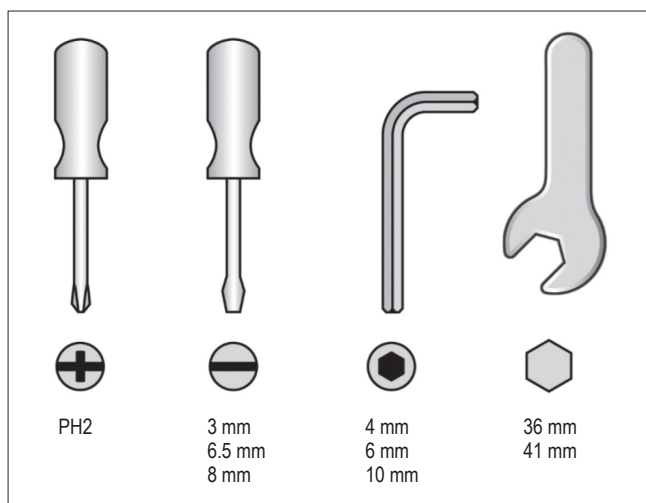
In heavy vibration, the installation with remote cabling (< 30meters) is recommended.

NOTE

If remotely mounted, the cable between positioner and LoRa Communication module shall be less than 30 meters.

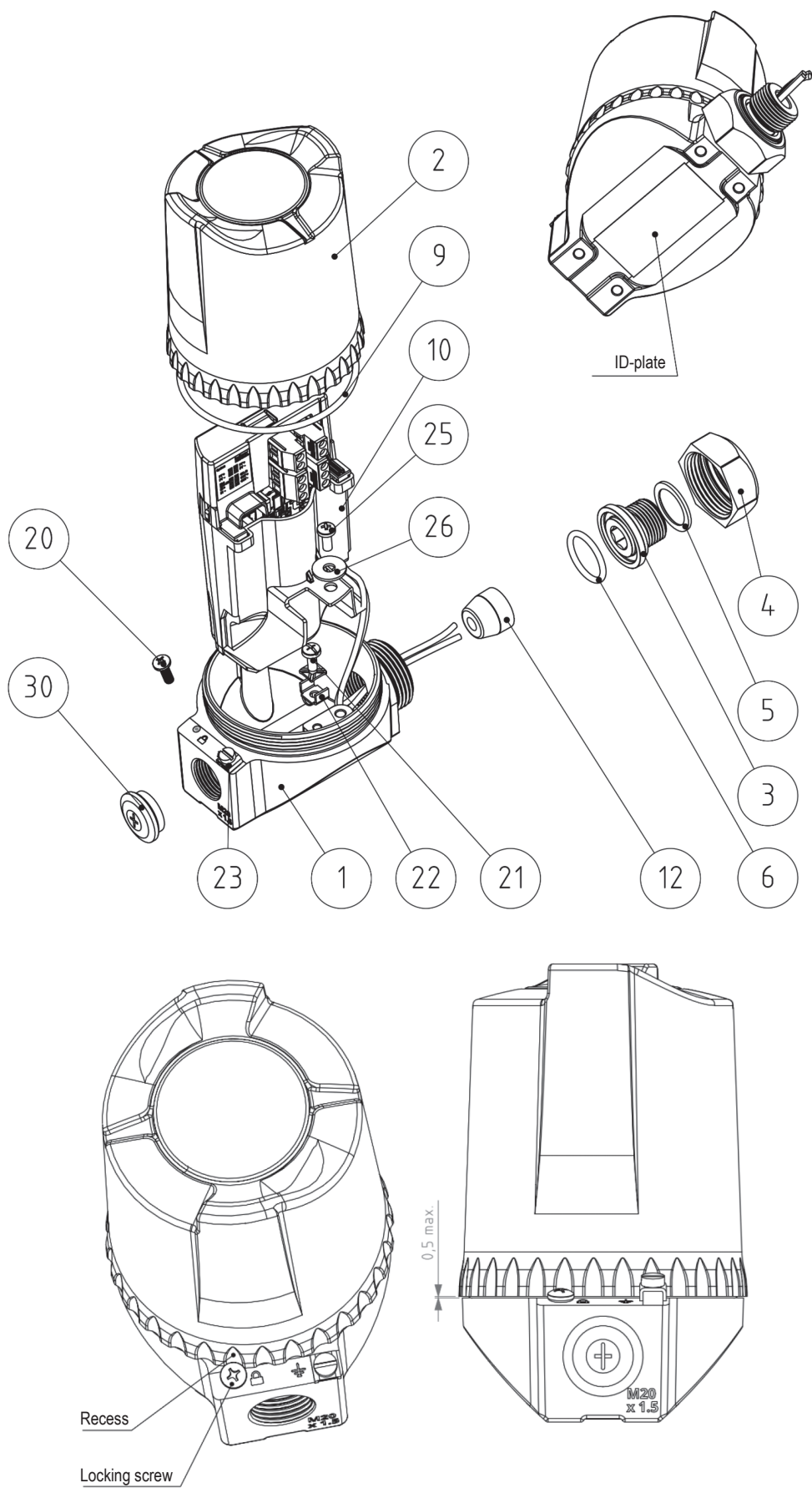
Tools

Screw	Primary tool	Alternative tool
LoRa cover locking	Screwdriver (+) Ph2	
LoRa external grounding	Screwdriver flat (-) 6.5 mm	
LoRa field cable plug	Screwdriver (+) Ph2	Screwdriver flat (-) 8 mm
LoRa electronics fixing	Screwdriver (+) Ph2	
LoRa internal grounding	Screwdriver (+) Ph2	
Nipple to valve controller	Allen key (hex key) 10 mm	
Fixing nut to valve controller	Open-end wrench 36 mm, width < 17 mm	
LoRa housing	Open-end wrench 41 mm	Adjustable wrench, jaw opening > 40 mm
Wiring terminal (all versions)	Screwdriver flat (-) 3 mm	
ND61/71/91 Cover screw	Screwdriver (+) Ph2	Screwdriver flat (-) 8 mm
NDX_2 Cover screw	Allen key (hex key) 6 mm	
ND72/92/93 Cover screw	Allen key (hex key) 4 mm	
Cable gland	Depends on installation	

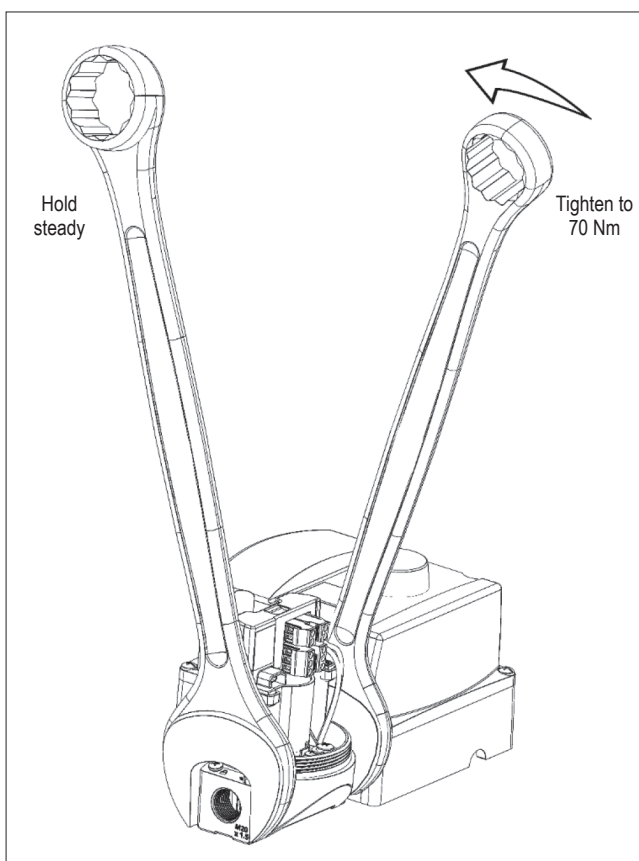
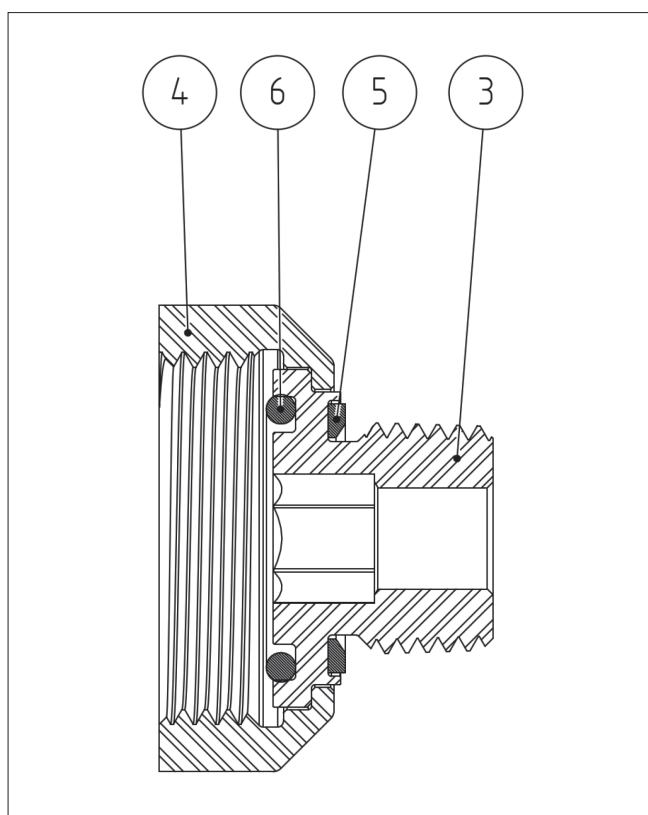


Step by step instructions:

1. Isolate power. Disconnect the field cable from the valve controller in accordance with the manufacturer's manual.
2. Insert the connection nipple (3) together with nut (4) and seal (5) into the cable inlet of the valve controller. Ensure that the 36 mm nut (4) and seal (5) is correctly positioned.
3. Tighten the nipple (3) to the valve controller to a torque of 90 Nm. Exercise caution to avoid damaging the valve controller brackets. While a calibrated torque wrench is not mandatory, the connection must be sufficiently secure to prevent any movement of the LoRa assembly during operation and subsequent tightening of the 36 mm nut (4).
4. Ensure the grommet (12) is properly seated within the housing.
5. If the positioner transmitter function is not required, remove the corresponding wires.
6. Move the LoRa unit close to the valve controller.
7. Insert the wiring through the nipple (3) into the valve controller.
8. Verify the correct installation of the O-ring (6). Rotate the LoRa unit to the desired orientation and hand-tighten the nut (4).
9. Tighten the nut (4) to 70 Nm using a 36 mm open-end wrench. To prevent damage or structural stress, provide counter-rotation support at the opposite end of the LoRa housing using a 41 mm or adjustable wrench.
10. Confirm that the LoRa unit is securely fixed and immobile. Should the assembly exhibit any movement, the installation must be repeated starting from Step 3.
11. Complete the electrical connections as specified in the "Electrical connections" section of this manual and valve controller manual. Install and tighten the cable gland as per the manufacturer's instructions.
12. Secure and support the field cable to prevent excessive force on the LoRa module cable gland.
13. Install the LoRa module main cover: Firmly hand tighten the cover to secure O-ring compression.
 - a. Align one of the cover recesses with the locking screw
 - b. Do not use tools or excessive force.
 - c. **Note:** The gap between cover and housing may vary between 0 and 0.5 mm.
 - d. Tighten the locking screw (20).
14. Install the main cover of the valve controller, see valve controller manual.



	Description
1	Housing
2	Cover
3	Connection nipple
4	Special nut
5	Seal (nipple - valve controller)
6	O-ring (nipple - LoRa)
9	O-ring (cover)
10	Electronics module
12	Grommet
20	Cover locking screw
21	Ground screw, internal
22	U-washer
23	Ground screw, external
25	Screw (electronics fixing)
26	Washer
30	Blanket plug



7.3 Remote mounting

Step by step instructions:

1. Isolate power. Disconnect the field cable from the valve controller in accordance with the manufacturer's manual.
2. Attach the LoRa unit on the bracket using the 4 x M5 at the bottom. Use threadlocker such as Loctite 243.
3. Remove the preinstalled wires from the LoRa unit.
4. Install cable glands on the LoRa unit and the valve controller and route cable between the devices.
5. Route the field cable to the LoRa unit.
6. Complete the electrical connections as specified in the "Electrical connections" section of this manual and valve controller manual. Tighten the cable glands as per the manufacturer's instructions.
7. Install the LoRa module main cover: Firmly hand tighten the cover to secure O-ring compression.
 - a. Align one of the cover recesses with the locking screw
 - b. Do not use tools or excessive force.
 - c. **Note:** The gap between cover and housing may vary between 0 and 0.5 mm.
 - d. Tighten the locking screw (20).
8. Install the main cover of the valve controller, see valve controller manual.

7.4 Electrical connections

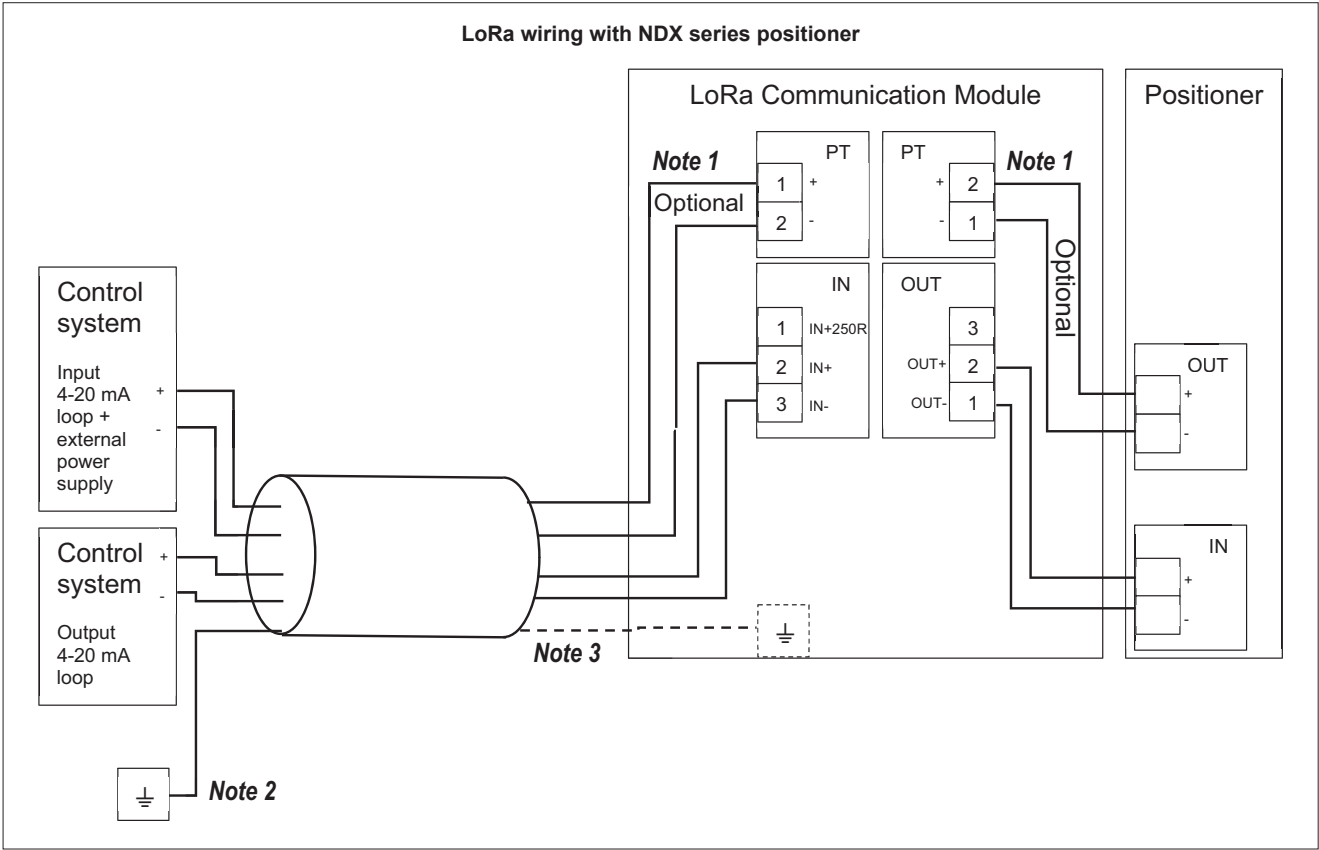
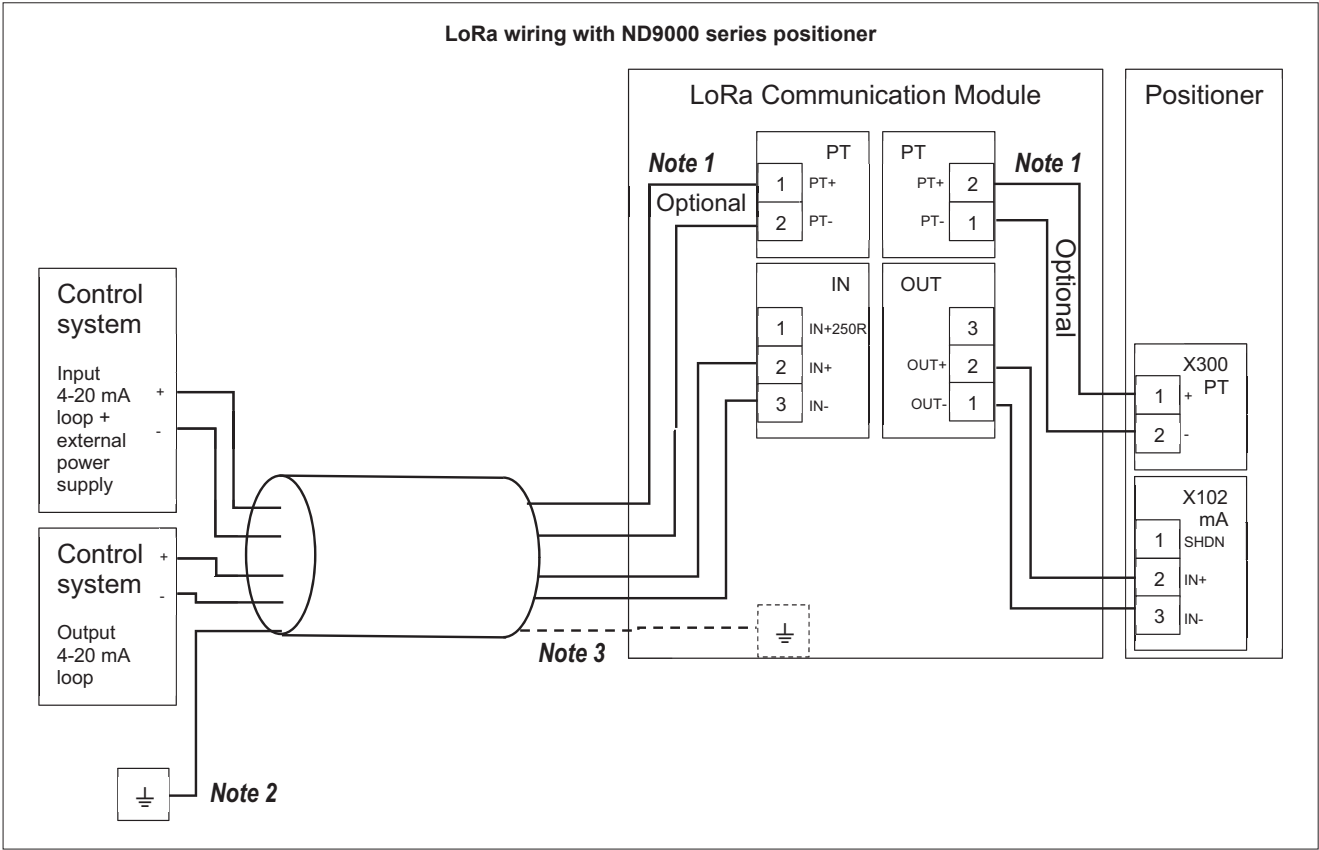
Connectors

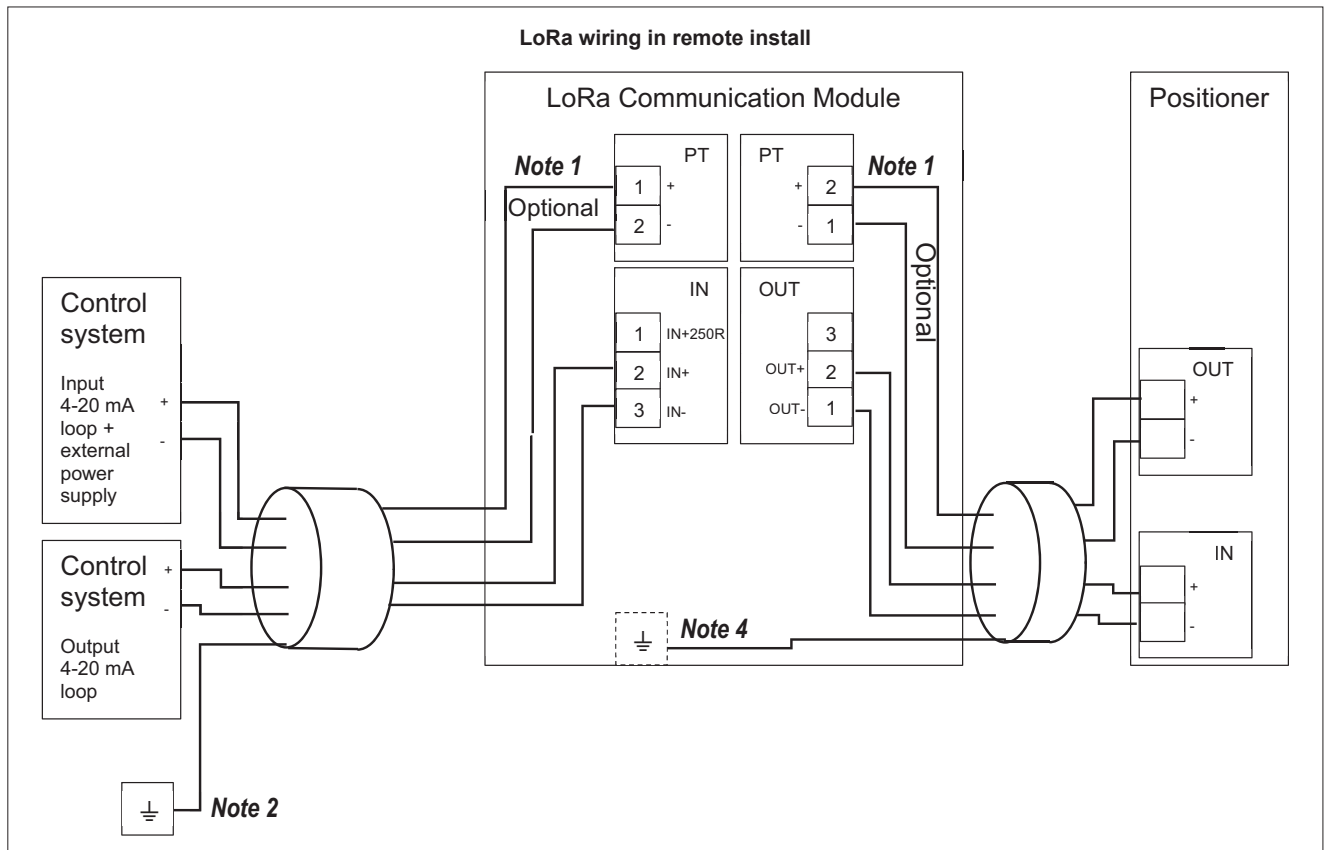
Note

Tightening torque 0.5 ... 0.6 Nm.

System		Positioner / Field device	
PT +			PT +
PT -			PT -
IN + (250 Ω)			CH_G
IN +			OUT +
IN -			OUT -

Wiring diagram





Note 1

If Position transmitter output is not used, position transmitter (PT) wires should be removed.

Note 2

By default, the screen of the cable is connected to earth at the barrier / system / supply side.

Note 3

Alternatively cable screen can be connected to earthing terminal inside LoRa Communication Module enclosure (dash line). If the screen is connected to earth at both ends of the cable, the potential equalization of the system shall conform to requirements of IEC 60079-14 .

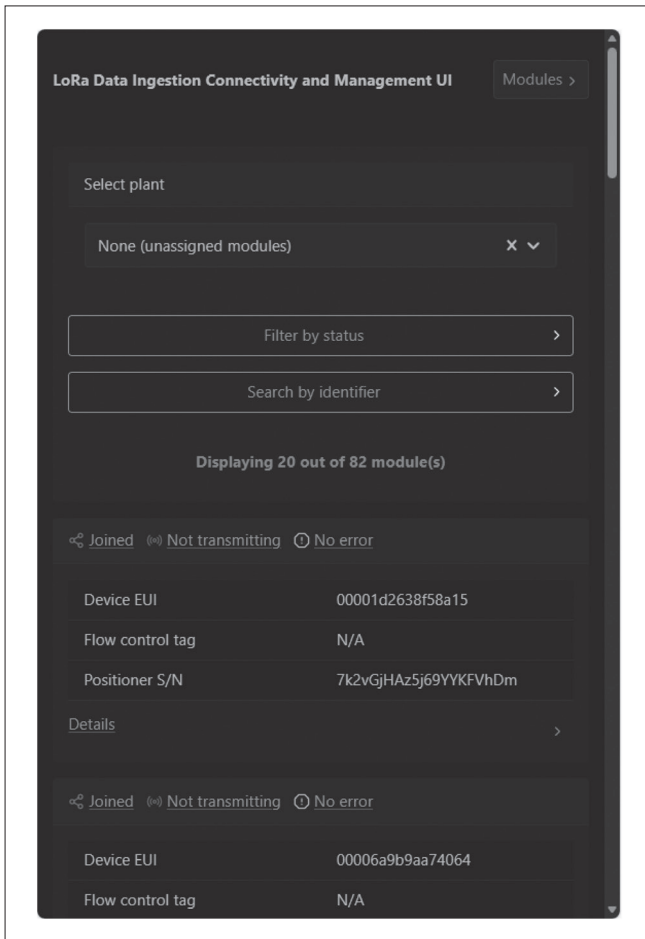
Note 4

In remote installation cable screen between Lora communication module and positioner needs to be connected to earth.

8. COMMISSIONING AND OPERATION

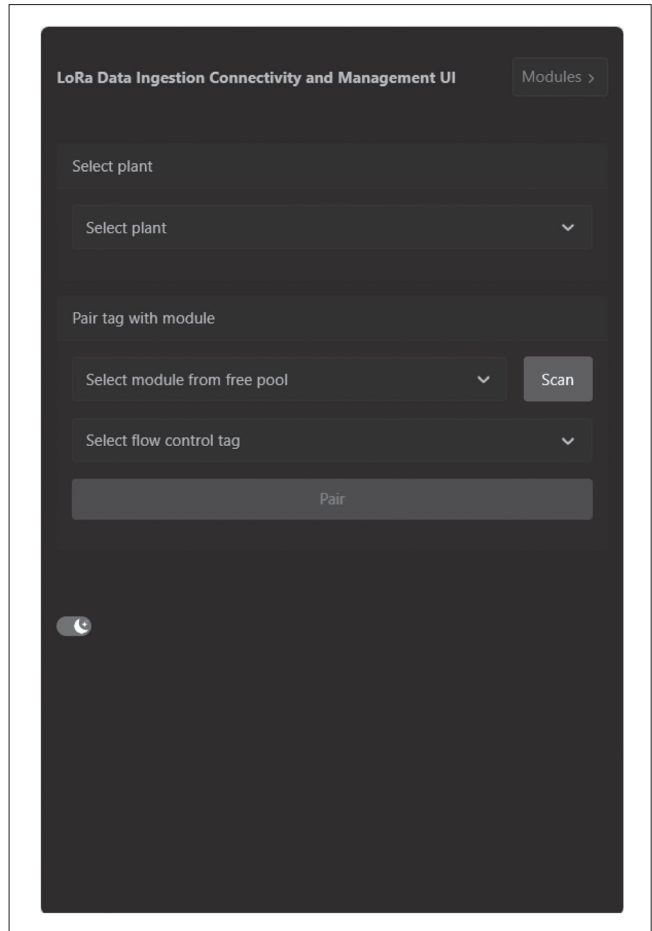
8.1 Device Management application

Device Management application is a web-based application for commissioning and operation monitoring of the LoRa Communication Modules. The application can be accessed via URL <https://lora.on.valmetsystem.com> using a mobile phone or a computer. The user must have access rights to use the application.



8.2 Commissioning

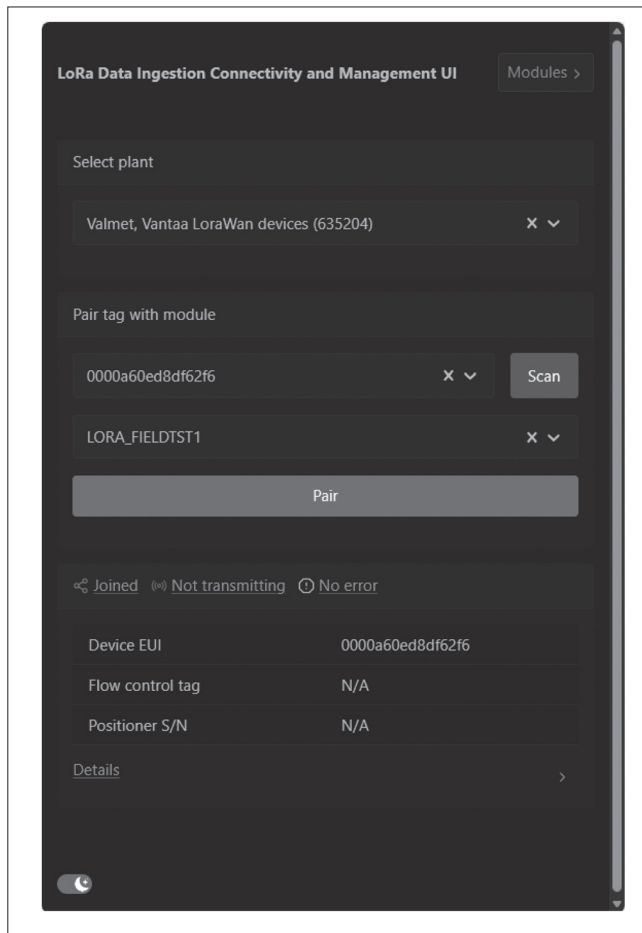
In commissioning, the LoRa Communication Module is paired with the valve position (tag) to make the data visible for the correct valve. Commissioning view can be opened in the Device Management application by selecting command Modules > Commission from the top right corner of the application.



Commissioning can also be started by scanning the QR code in the device. This will open the Device Management application in Commission view with the Device EUI of the device pre-selected. QR code can be found from a sticker on top of the inside cover of the device.

Commissioning of the LoRa Communication Module consists of the following steps:

1. Select plant from a pre-defined list.
2. Select LoRa module from the free pool.
Modules are listed with the Device EUI of the LoRa device. The Device EUI can be found from the QR code sticker on top of the inside cover of the device.
3. Select flow control tag from the pre-defined list.
4. Press Pair button to start the pairing.
5. The status of the pairing is displayed in the bottom of the screen. The status "Pairing completed" is displayed when the pairing has succeeded.

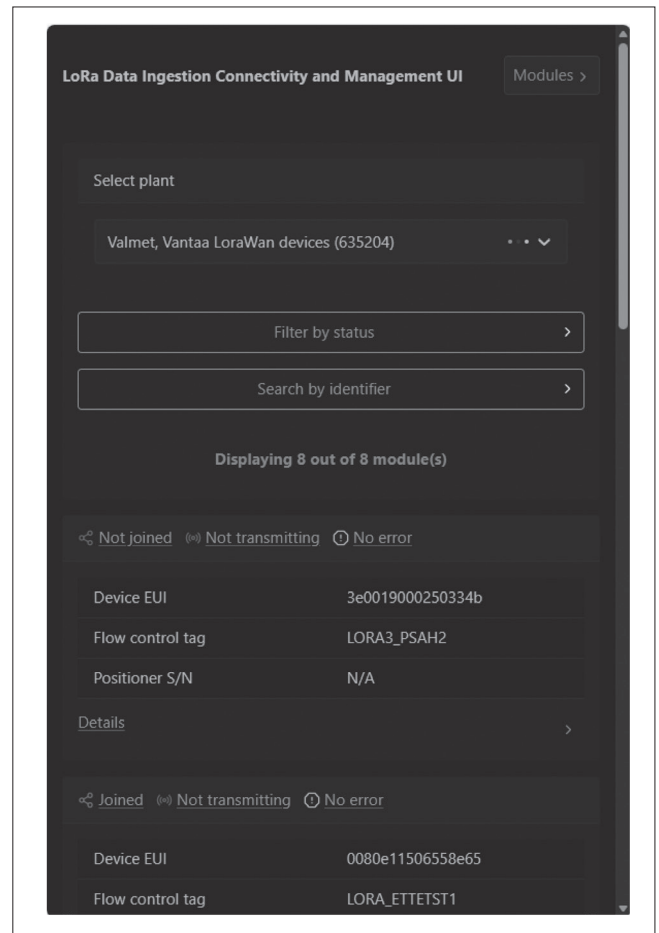


Note! If your plant, LoRa module or flow control tag are not listed in the application, please contact the system administrator.

8.3 Operation check

The List view of the Device Management application can be used to check the communication status of a LoRa Communication Module. To list the LoRa Communication Modules in a plant, select the plant from the drop-down list.

By default, the list shows status flags of the operation and the identification information of the LoRa Communication Module, valve and the positioner. Pressing the Details link opens more information of the LoRa Communication Module.



Information shown for each device is explained in below lists.

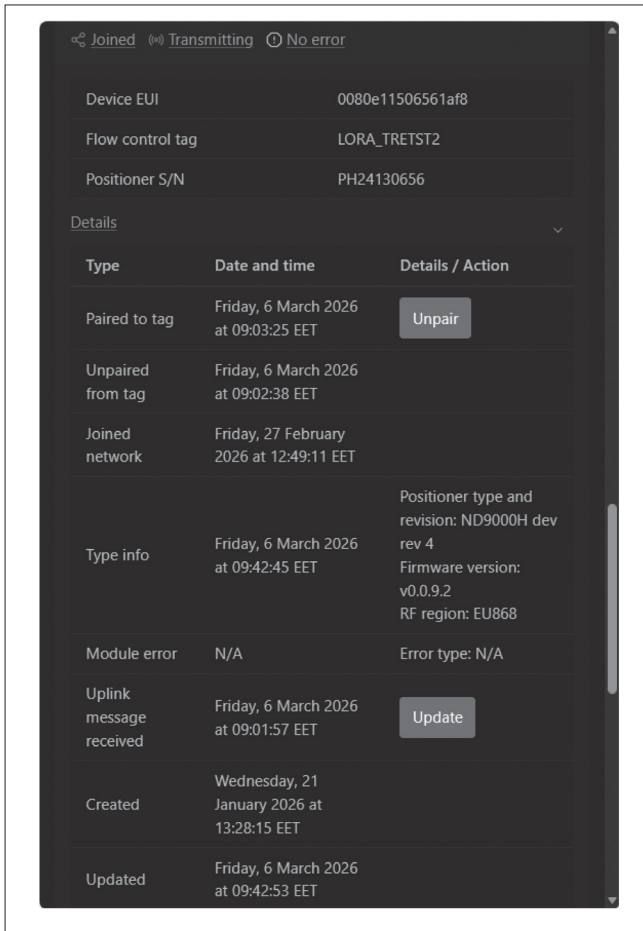
Status flags:

- **Joined / Not joined:** Shows if the LoRa device has successfully joined the LoRaWan network. Join message is the first one the device sends when turned on.
- **Transmitting / Not transmitting:** Shows if the device is transmitting data normally. Status changes to Not transmitting if there have been no messages received during the latest 8 hours.
- **No error / Error:** Shows status of the connection to a positioner. Status is "no error" if the LoRa device has successfully connected to a supported positioner model and revision. Possible errors are:
 - Positioner not detected. There is no HART device connected to the LoRa device.
 - Positioner not supported. There is a HART device found but it is not of a supported device model.

Identification information:

- **Device EUI:** ID of the LoRa Communication Module used in the LoRaWan communication
- **Flow control tag:** The ID (tag name) of the valve in the customer plant
- **Positioner S/N:** The serial number of the positioner. This is read from the positioner when LoRa device is powered on.

Details view shows more details of for example the device and latest message times.

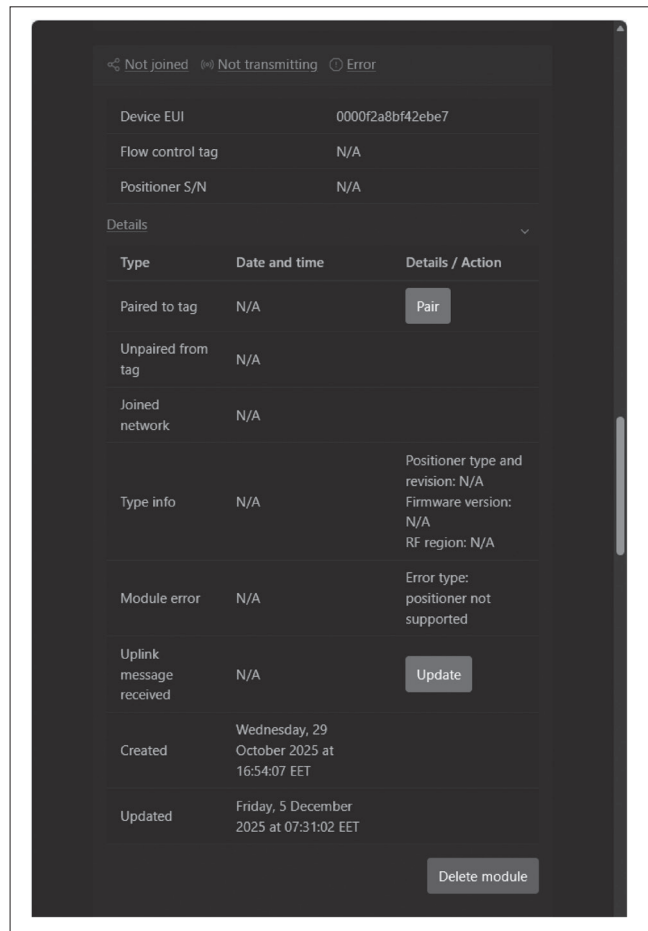


9.3 Decommissioning LoRa Communication Module

When a LoRa Communication Module is removed from the operation, it needs to be deleted using the Device Management application. This removes the module from the system permanently so that it cannot be added back anymore.

Before deleting the module, it needs to be unpaired from a positioner. Only unpaired modules can be removed. Unpairing is done by pressing the Unpair button in the List view of the Device Management application.

Deleting a module is done in the List view. All the unpaired modules can be listed by selecting "None (unassigned modules)" as a plant. Finding the correct module from List view is done using the Device EUI. It can be found from the QR code sticker on top of the inside cover of the device. Pressing the Details link opens more information of the module and shows also the Delete module button. Pressing the Delete module button asks a confirmation from the user and after that removes the module from the system.



9. MAINTENANCE

9.1 Replacing LoRa Communication Module

In case the LoRa Communication Module needs to be changed to new one, the pairing of the existing LoRa Communication Module needs to be removed first. This is done by pressing the Unpair button in the List view of the Device Management application. After unpairing, the new LoRa Communication Module can be paired as described in the chapter Commissioning.

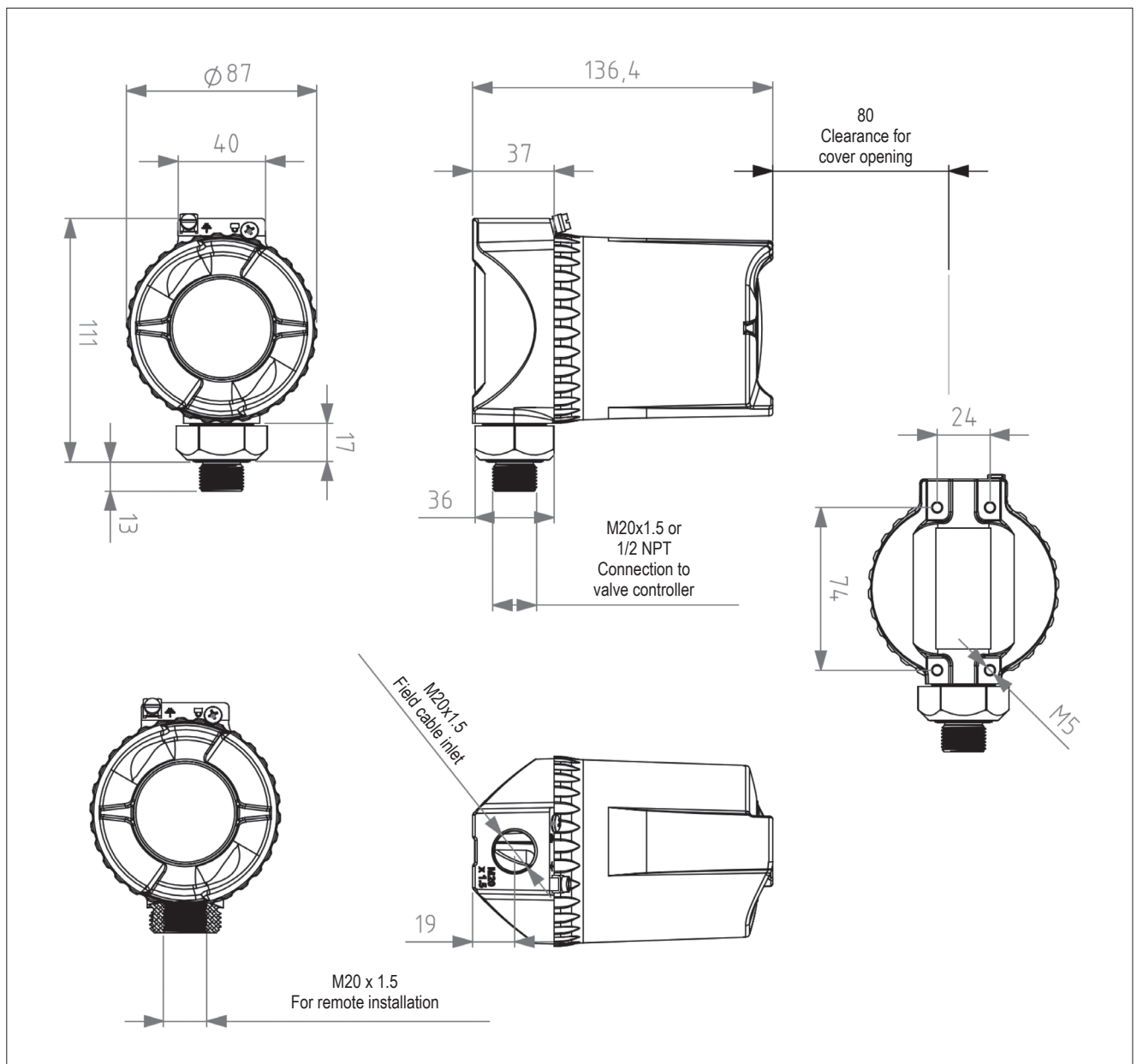
9.2 Replacing the positioner

The positioner where the LoRa Communication Module is connected can be changed without any additional commissioning actions. When the LoRa Communication Module is connected to a new positioner, it reads the information from the positioner and updates the information to the Device Management application. The serial number of the new positioner can be seen in the List view.

NOTE

In case of LoRa Communication Module failure, contact your local Valmet Service. No spare parts available; device will be replaced.

10. DIMENSIONS



11. TYPE CODE STRUCTURE

LoRa Communication Module variants are available for EU and Brazil region.

The difference is the used frequency band, which is not user configurable.

Europe 863-870 MHz EU868 frequency plan

Brazil 915-928 MHz AU915 frequency plan

Neles™ LoRa Communication Module is offered only as part of ValvesNow valve fleet monitoring agreement.

1.	2.	3.	4.	5.	6.	7.
LCM	01	A	1	N	01	N

LCM01A1N01N

1.	Product group
LCM	LoRa Communication Module

2.	Region
01	Europe EU868 (863-870 MHz)
02	Brazil AU915 (915-928 MHz)

3.	Antenna Frequency Range
A	Frequency area 863 - 928 MHz

4.	Enclosure
1	Aluminium housing with polycarbonate cover

5.	Approvals for hazardous areas
N	No approvals
X	ATEX & IECEx certifications (pending) Ex ia, ib, ic, ec
Z	Inmetro (Brazil) certifications (pending) Ex ia, ib, ic, ec

6.	Wire assembly
01	Four-wire with grommet

7.	Brand
N	Neles

Accessories	
Fastening thread	
L01	M20 (Suitable for ND9000, ND7000, ND6000)
L02	NPT (Suitable for NDX)

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