

RADIO LORAWAN™ MODULO RADIO COMPATTO LoRaWAN™ 868 MHz

Compact radio module with built-in bidirectional inductive sensor, designed for meters with Modularis Register. It allows long-range remote reading via radio through the LoRa WAN™ protocol of consumption data, ensuring ease and efficiency.

1. Assembly instructions

1.1 Remove the dummy cover

The Modularis system shaft is factory-fitted with a blind cap. Remove the cap with a small screwdriver by levering it out through the cable entry provided. The blind cap is no longer required

If necessary, clean the inside of the open counter with water without the addition of solvents. Pay special attention to the spot above the silver semicircle.

1.3 Insert the module and screw it on

For assembly, the radio add-on module has to be inserted into the opening of the counter and fixed with the enclosed screw (2.2x25mm). Please make sure that the screw is not overtightened.)

1.4 Stick the Security mark

The security mark supplied (adhesive seal) is used to indicate unauthorized access. Attach the security tag so that the screw head is completely covered.

Before commissioning (installation and activation), the devices should be made known to the LoRa server. To do this, the DEVEUI, APPEUI and DEVKEY details must be made known to the server. To simplify the process, you will receive an "electronic delivery note", a csv file with all the numbers of the devices delivered.

2 Activation of the radio

The radio add-on module is delivered ready for operation, e.g. the flow rate measurement is already active. The radio is deactivated for the transport. The factory-set connection is OTAA (over the air activation). There are 4 options to activate the radio and start the connection process:

- via activation head, purchase via Innotas. Please Note: This only works with a deactivated PIN!
- with an IrDa optical head and the free Software LST (LoRa Setup Tool) from Innotas
- with an IrDa opto head and the free Android APP to activate LoRa products. Note: This only works with a deactivated PIN!
- via a predefined water flow rate, usually around 120 liters

After activation, a red LED flashes briefly every 10 seconds until the join procedure is complete. After a successful activation, the device sends several hours every 2 minutes,

3 ADR setting

The setting ADR (Automatic Data Rating) means that the data rate or the spreading factor of the radio transmission are dynamically and automatically controlled. The LoRa device sends a radio protocol message with an acknowledgment request to the server. If the acknowledgment is not received, the device will firstly repeat the protocol transmission and then increases the spreading factor. If the server receives the protocol message properly and with good quality, it sends the device a command to reduce the spreading factor. Large spreading factors lengthen the protocol message and thereby the probability of a collision with another device's radio protocol message, and more energy is consumed.



3.1 Link check setting

The device checks cyclically whether there is still a connection to the server.

Join procedure

In the connection setting OTAA (factory setting), the device requests a connection to the LoRaWAN network with its device ID of DEVEUI and the application ID of APPEUI from the network. The protocol is encrypted with the DEVKEY. The server responds to the device if it recognizes it.

Next the server negotiates new private keys with the device. These private keys are the NetSKey and the AppSKey. From this point on, communication is privately encrypted

3.2 Behavior in the event of a connection failure

After activation, the device tries to JOIN with the LoRaWAN network. If this fails, it will be repeated after a while with a higher spreading factor. If there is no connection, the radio will go into idle mode for 24 hours. Then the join sequence will be repeated. If there is another unsuccessful attempt, the device will pause again for 24 hours etc. If the device is already integrated in the net, but the server does not answer the acknowledgment requests, because for example, the telegrams do not arrive at the server, the acknowledgment does not arrive at the device or the server is switched off, then the device first increases the spreading factor. Once it increases to the maximum SF12 (spreading factor) and a few unsuccessful repetitions, the device falls back into the join sequence and tries to establish a new connection to the LoRa network every 24 hours up from now.

4 Configuration of the radio add-on module

4.1 Parameterization via IrDa opto head

The water meter attachment can be parameterized using a standard IrDa optical head. Once connection with the LST software (LoRa-Setup-Tool) the following parameters can be changed:

- Date and Time
- Meter reading
- target date (monthly, yearly)
- month of the yearly reading
- Device PIN
- LoRa settings:
 - Connection type OTAA / ABP
 - APPEUI, DEVKEY, NETID, NetSKEY, AppSKEY
 - ADR, link check

4.2 Factory configuration

The radio add-on modules are delivered configured according to customer specifications. To do this, the customer fills out an order form. The following settings can be specified:

- Time zone
- Connection setting OTAA
- target date (monthly, yearly)
- month of the yearly reading
- APPEUI DEVKEY
- Parameters for activation flow, standstill limit, return flow limit and leak detection
Device PIN "0000" (deactivated) or customer-specific

5 Monitoring functions

The radio add-on module monitors the most important basic functions and settings during operation in order to ensure proper operation and to notify possible errors in good time.

5.1 Sabotage detection

The sabotage detection is used to register attempts at manipulation with magnets. An error bit is set and transmitted via LoRa and can also be read out via the interface. The module continues to work independently. A detected sabotage error can be reset via the interface.

5.2 Battery monitoring

The battery of the radio add-on module has a service life of 12 years for cold water / 10 years for hot water in normal operation and a battery capacity margin. A "Batt low" error is set after 12 years of operation since production or the battery voltage falls below the minimum battery limit during radio operation. From this point on, the water meter attachment still has a battery capacity margin that can vary between weeks and months depending on the battery load (due to radio frequency, low or high ambient temperature, etc.). The Battery low error bit is transmitted via LoRa and can be read out via the interface. The battery low error bit can be only locally reset via the optical interface. The battery monitoring is activated at the factory.

5.3 RESET monitoring

The radio add-on module registers a restart of the software in the event of an error. The error is communicated via radio and the interface

Storage monitoring

The radio add-on module monitors the validity and consistency of the set parameters. If it detects an error, a check sum error will be set. The error is communicated via radio and the interface.

5.4 Standstill detection

If a preset number of days without flow is exceeded, an error bit is set. The error is communicated via radio and the interface.

5.5 Backflow detection

If a preset number of liters of reverse flow is exceeded, an error bit is set. The error is communicated via radio and the interface.

Backflow (also below the backflow limit) is recognized and measured so that the mechanical and electronic meter reading always match.

5.6 Leak detection

Flows above an adjustable minimum flow (start-up flow) are recorded over time. If this flow exceeds an adjustable number of hours, an error bit is set.

The error is communicated via radio and the interface.

5.7 RF error

This is an internal diagnostic function.

The controller monitors the correct function of the radio chip. If malfunctions are found, an error bit is set which can be read out via the optical interface.

6 Technical specifications

Measuring principle	inductive
resolution	1 liter
operating temperature	0 ° C to +60 ° C
Storage temperature	-25 ° C to +60 ° C
service interface	optical
Tamper detection	mechanically via seal / magnetic
Power supply	3 V DC lithium battery
Factory default:	Storage Mode (radio non active)
Operating time:	12/10 Years (cold/warm)
Battery storage	Last 18 monthly values
Radio interface	LoraWan TM 868 870 MHz frequency band
LoRa Specification	V 1.0.2
Radiated Power:	Approx 6 dBm
Nr. of telegrams per day	<= 12 / standard modules; <= 1 / high-power
Data security	Radio 2-way AES 128, Optical interface with PIN
Self Monitoring	Sabotage, leakage, backflow, stand still, operating time, reset, data
Certification mark	CE according to directive 2014/53/EU (RED)

7. Warning and safety information

The module is intended exclusively for recording and transmitting consumption values. The specified environmental conditions must be observed. The product must be installed in accordance with the installation guidelines by trained specialists and experts.

The module contains a battery and must be disposed of properly.



EC DECLARATION

Wir bestätigen als Hersteller in alleiniger Verantwortung, dass das Produkt, auf das sich diese Erklärung bezieht, konform ist mit den Anforderungen der Richtlinie(n) und Norm(en)

As the manufacturer, we confirm under our sole responsibility that the product to which this declaration relates conforms to the requirements of the directive(s) and standard(s)

RED Direktive 2014/53/EU

Weiter entspricht das Produkt folgenden Normen:
Futhermore the Product complies with the following standards

EN 301 489-1 V1.9.2; EN301 489-3 V2.1.1
EN 300 220-2 V3.1.1
EN 61326-1: 2013

Zittau, 18.10.2017

A handwritten signature in blue ink, appearing to read 'H. Töpfer'.

H. Töpfer Geschäftsführer/manager