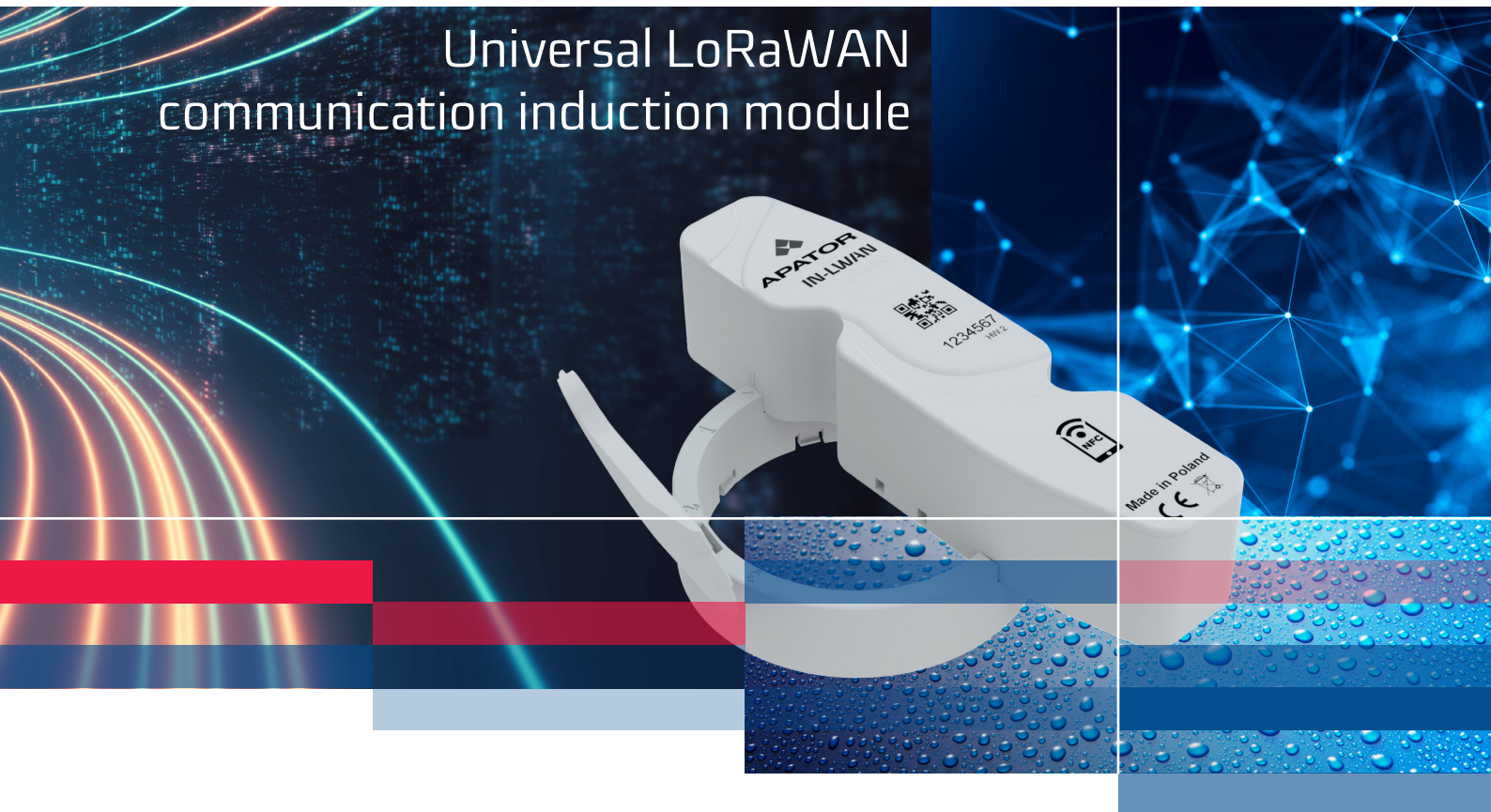


IN-LWAN

Universal LoRaWAN communication induction module



The IN-LWAN universal radio module is a detachable assembly consisting of an intermediate ring (or none), a radio module and a cover. The intermediate ring is used to mount the radio module on IP65-rated water meters manufactured by Apator Powogaz S.A. in the required installation position. The module is designed for wireless transmission of measurement data in the ISM 868 MHz band in accordance with the LoRaWAN protocol.

The IN-LWAN radio module scans the dedicated water meter counter hand using an inductive system that detects and recognises the directions of its rotation. This solution enables the remote transmission of the actual water meter counter reading to the LoRaWAN Gateway, which then forwards it to the server collecting measurement data. In the event of a loss of connection, the IN-LWAN module can switch to a fallback mode using wMBUS communication, also on the 868 MHz frequency, where data will be transmitted at 10-second intervals. The ability to set individual flow profiles for specific water meter applications enables comprehensive analysis and diagnostics of their operation, thanks in part to transmitted alarms and historical records stored in the device's memory.

Application

The universal radio adapter allows the use of a single type of radio module: with an intermediate ring (for IP65-rated water meters) and without an intermediate ring (for IP68-rated water meters), for use with various types of water meters with a counter suitable for optical reading (Ti). Depending on the type of water meter (the position of the dedicated pointer), the mounting position of the ring and adapter differs. The cap is used for wireless transmission of measurement data in stationary systems. The mechanism for inductive scanning of the counter pointer works perfectly in particularly challenging installation conditions (e.g. in damp water meter chambers at risk of flooding).

Key features

- Direct installation on water meter counters (with TI indicator) – without affecting the meter's legal metrological characteristics or operation
- The cover is mounted on the counter in a position that allows for visual reading of the water meter counter
- The cover is mounted on the water meter's rotating counter assembly (rotation up to 358°), which facilitates installation and reading of the counter in difficult operating conditions (see User Manual for details)
- High resistance to external magnetic fields
- Flow direction detection
- Signalling of a range of alarm events, including disassembly, leakage, external magnetic fields and others
- Battery life of up to two verification periods, depending on the water meter's operating temperature profile (for details, see the User Manual)
- IP68 protection rating
- Operating conditions: -15°C to 60°C
- Battery lifetime up to 12 years, depending on the configuration

COMMUNICATION

Radio readout, configuration, and data collection

The IN-LWAN device is equipped with a universal radio module that reads water meter readings within the SPIDAP remote reading system. Cyclical transmission (spontaneous transmission only in the event of an alarm). In its standard configuration, the IN-LWAN device sends messages at a fixed transmission interval and in the event of an alarm.

The data transmitted includes:

- the device's current date and time,
- the current water meter reading,
- hourly consumption profile,
- information on events (stored and current flags).

The device can be configured via the NFC interface to set the following parameters:

- update the device's date and time,
- water meter serial number,
- volume per pointer revolution,
- current water meter reading (as at the time of installation).

NFC - readout

The IN-LWAN device is equipped with the NFC (Near Field Communication) short-range communication standard. Using a dedicated app installed on a mobile device equipped with an NFC module, you can switch the device from storage mode to operational mode, read current and historical measurement data, and view details of events..

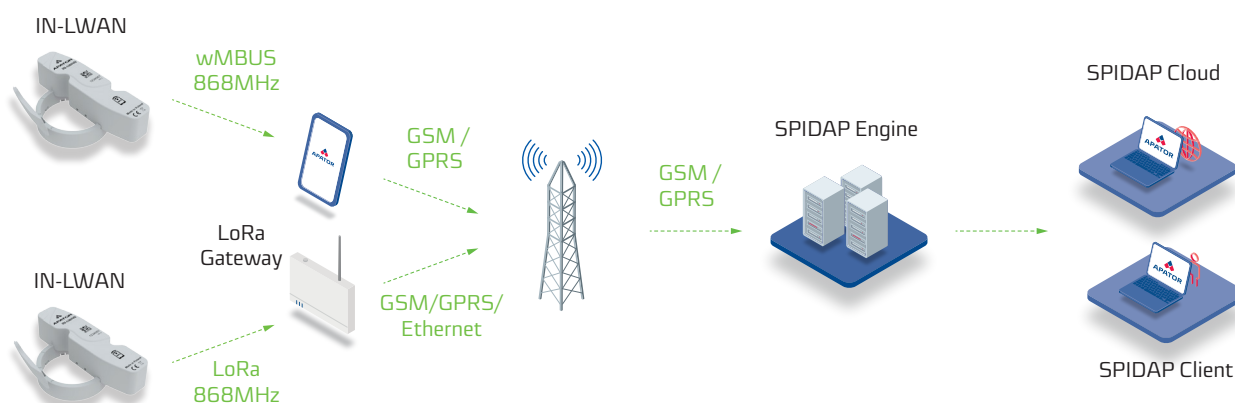


Fig. 1. Connection schematic of the telemetry system

Data security

Data sent to and from the module via the 868 MHz ISM interface is encrypted using the AES-128 standard in CBC mode, with each device able to be assigned a unique encryption key.

Schedule for recording readings

The module stores 14 hours of historical water meter readings in its memory.

Events

The IN-LWAN module, in the basic frame, transmits information regarding the occurrence of a given event, whether currently or in the past. In terms of details, the date and time of the first occurrence, the date and time of the last occurrence, the number of occurrences, as well as event-specific parameters such as duration, volume or volumetric flow rate may be transmitted (see Table 1. Possible event information).

List of events

- Minimum flow – detection of a volumetric water flow rate through the water meter that remains below a specified threshold for longer than the predefined time period.
- Maximum flow – detection of a volumetric water flow rate through the water meter that exceeds a specified threshold for longer than the predefined time period.
- Backflow – detection of backflow exceeding a specified backflow volume threshold.
- Leak – detection of continuous water flow through the water meter lasting longer than a set time.
- No change in measurement – detection of a complete lack of flow, or very slight increases in volume, lasting longer than a set time.
- Magnetic field detection – detection of a strong external magnetic field.
- Device disconnection – detection of the removal of the module installed on the water meter.
- Battery consumption threshold exceeded – detection of the battery charge level falling below a user-defined value.
- Extreme temperature – detection of the device temperature falling below -15°C or rising above 60°C.
- Device access error – detection of more than 30 failed attempts to communicate with the module installed on the water meter via the radio interface, caused by errors such as an incorrect encryption key, incorrect addressing, or a malformed message.
- Reading error – detection of damage to the measuring module.

Tabela 1. Possible event information

Event	Flags		Event details					
	Current	saved	Date and time of the first occurrence	Date and time of the last occurrence	Date and time of the end of the last occurrence	Duration of the event	Number of occurrences	other details
Minimum flow	+	+	+	+	+	+	+	volume
Maximum flow	+	+	+	+	+	+	+	peak flow rate
Leakage	+	+	+	+	+	+	+	volume
Backflow	+	+	+	+	+	-	+	volume
No change in measurement	+	+	+	+	+	+	+	-
Magnetic field detection	+	+	+	+	+	+	+	-
Device disconnection	+	+	+	+	+	+	+	-
Battery consumption threshold exceeded	+	+	+	-	-	+	-	-
Exceeding the device's operating temperature range	+	+	+	+	+	+	+	-
Device access error	-	+	+	+	-	-	+	-
Reading error	+	+	+	+	-	-	+	-

COMPLIANCE WITH STANDARDS AND REGULATIONS

Radio Equipment Directive (RED) 2014/53/EU

Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

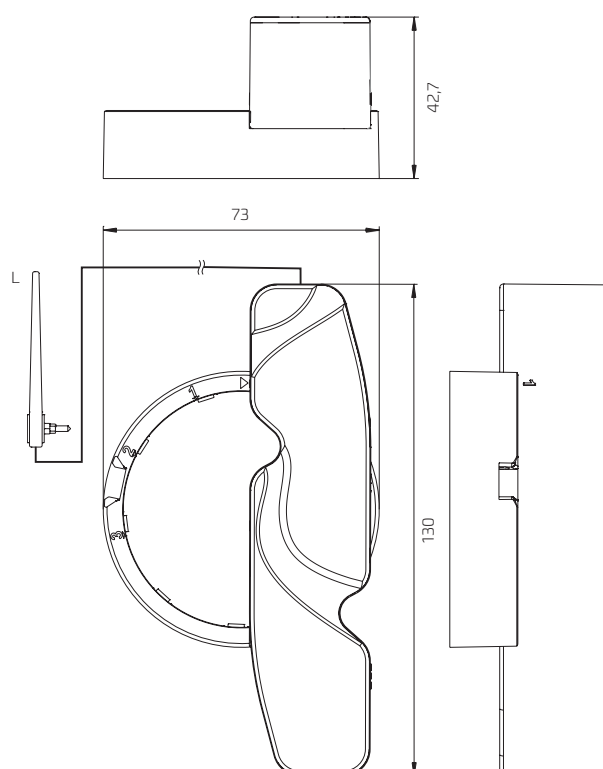
TECHNICAL SPECIFICATIONS

Tabela 2. Technical data

Module	IN-LWAN	IN-LWAN ANT3
Antenna	Internal - standard version	External, Antenna lenght = 3 m
Installation options	Using an intrmediate ring for water meters with an IP65 rating and without an intermediate ring for water meters with an IP68 rating.	
Method of pulse counting	Inductive resonance module	
Power supply	3.0 V lithium battery	
Battery lifetime	Up to 12 years of operation + 1 year of storage for the following temperature profile: 10% of operating time at 10°C, 80% of operating time at 20°C and 10% of operating time at 30°C	
Operating temperature	-15°C ÷ 60°C	
IP rating	IP68	
Types of transmission	LoRaWAN frames with acknowledgement – communication with the LoRa gateway (network connection, connection quality diagnosis) LoRaWAN frames without acknowledgement – regular read transmissions WMBus frames – communication in fallback mode	
Transmission interval	LoRaWAN every 7H wMBUS every 10s	
Protocol	LoRaWAN Standard 1.0.4	
Transmission frequency	868,95 MHz	

Module	IN-LWAN	IN-LWAN ANT3
Transmitter output power	25 mW / 50 Ω	
Stability of the output power level	+1 dB / -2 dB	
Receiver sensitivity	-130 dBm	
Range	Up to 2,000 m in urban areas Up to 5,000 m in rural areas	
Weight	0,138 kg	

DIMENSIONS



The data presented in the data sheet was correct on the date of publication.
The manufacturer reserves the right to modify and improve its products without notice.
This publication is intended for information purposes only and shall not be construed as a commercial offer under the Polish Civil Code.



Apator Powogaz S.A.

Jaryszki 1c, 62-023 Żerniki, Poland

Office: sekretariat.powogaz@apator.com, tel. +48 61 84 18 101

Sales / Customer Service: tel.: +48 61 84 18 149

Customer Service Centre Support: handel.powogaz@apator.com

Export: export.powogaz@apator.com

Technical Support: support.powogaz@apator.com, tel. +48 61 8418 131, 134, 294

Warranty Claims: reklamacje.powogaz@apator.com