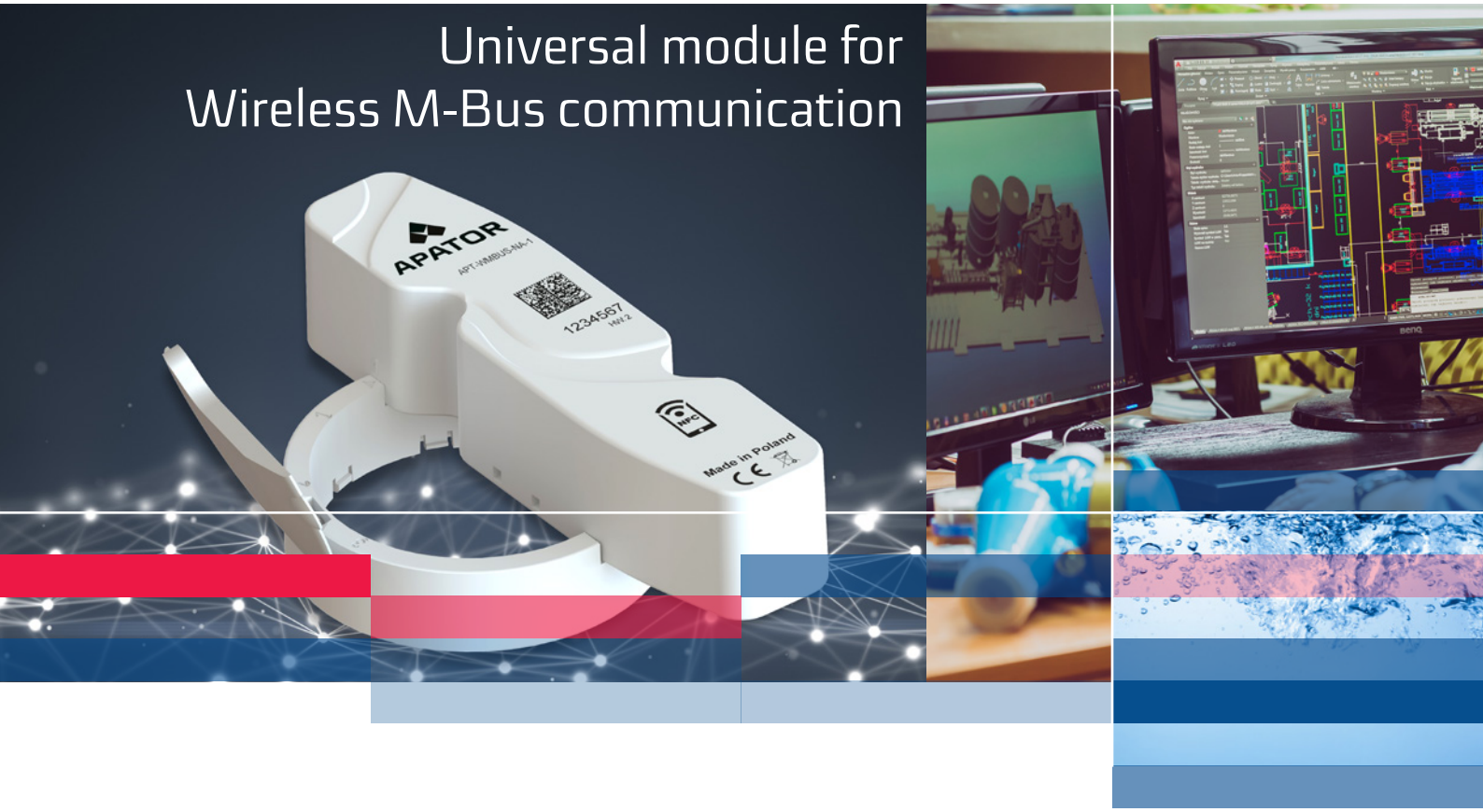
APATOR

APT-WMBUS-NA-1

Universal module for Wireless M-Bus communication



The APT-WMBUS-NA-1 universal RF module is a separable module consisting of a spacer ring, radio module, and cap. The spacer ring is used to fit the RF module to water meters manufactured by Apator Powogaz S.A., in the required installation position. The module is designed to transfer measurement data in the ISM 868 MHz band in accordance with the Wireless M-Bus protocol.

The APT-WMBUS-NA-1 RF module scans the dedicated counter indicator of the water meter, using an induction system that detects and recognises its direction of rotation. This solution enables remote transmission of the actual indication of the water meter counter.

The option to establish individual flow profiles for dedicated water meter applications enables the comprehensive analysis and diagnostics of their operation; for example, based on alarms and historical records in the device memory.

APPLICATION

The universal RF module enables one type of RF module and spacer ring to function with different types of water meters by Apator Powogaz S.A. The installation position of the ring and module installation depends on the water meter type (position of the indicator). The cap is used for wireless measurement data transfer in walk-by and drive-by mobile systems. The module is fitted with an inductive scanning mechanism, which scans the counter indicator. The mechanism is useful in extreme locations and conditions (damp water meter wells which are at risk of flooding)

KEY FEATURES

- The module is compatible with a wide range of home and industrial water meters by Apator Powogaz S.A.
- Direct installation onto water meter counters without interference with the security features
- Option to install the module with the water meter in operation
- Module fitting for the counter in a position enabling visual reading of the indications from the water meter counter
- The module is mounted onto the movable assembly of the water meter counter (rotation up to 358°), which facilitates its installation and counter reading under difficult operating conditions (see the Instruction Manual)
- High resistance to external magnetic fields
- Recognition of flow direction
- Signalling of a series of alarm events, e.g. removal, leakage, external magnetic field etc.
- Battery life of up to two approval periods, depending on the temperature profile of water meter operation (for details, see the Instruction Manual)
- IP68 protection rating

COMMUNICATION

DATA RF READING, CONFIGURATION AND WRITING

APT-WMBUS-NA-1 is equipped with a universal RF module for reading water meter indications in remote meter reading systems.

Ad-hoc transmission (T1)

APT-WMBUS-NA-1 under the standard configuration sends messages at a fixed transmission interval of 10 s (05:00 to 21:00 hours) and 60 s (21:00 to 05:00 hours). The data included in the basic simplex transmission frame (T1) are:

- current device date and time,
- current water meter indication,
- one historical indication per set period with an indication of date and time
- event occurrence information (saved and current flags).

Reading on request (T2)

The device can also read other data in the reading on request mode (T2), including:

- serial number of the water meter,
- history of last 12 indications of the water meter (in accordance with the indication saving schedule configuration),
- event details (see the Instruction Manual),
- total reverse volume (saved since the last reset),
- instantaneous flow,
- battery voltage,
- battery charge level,
- device temperature,
- current configuration.

Device configuration

In the reading on request mode (T2), remote device configuration is possible with respect to the following parameters:

- device date and time update,
- serial number of the water meter,
- indicator rotation weight [l/rotation],
- current water meter indication (as of the installation),
- indication saving period (year, month or week) and, in addition, depending on the option selected:
  - Indication saving month
  - Indication saving day of the month,
  - Indication saving day of the week,
  - Indication saving hour,
- automatic event details clearing period,
- event thresholds - alarm configuration.

Clearing parameters

The T2 mode also enables current operation in the following scope:

- clearing event details,
- clearing reverse volume,
- clearing water meter indication history.

NFC - DATA READING

APT-WMBUS-NA-1 is equipped with the NFC (Near Field Communication) standard. With a dedicated app installed on a mobile device with an NFC module, you can switch the device from storage mode to operation mode, read the current and historical meter data and event details.

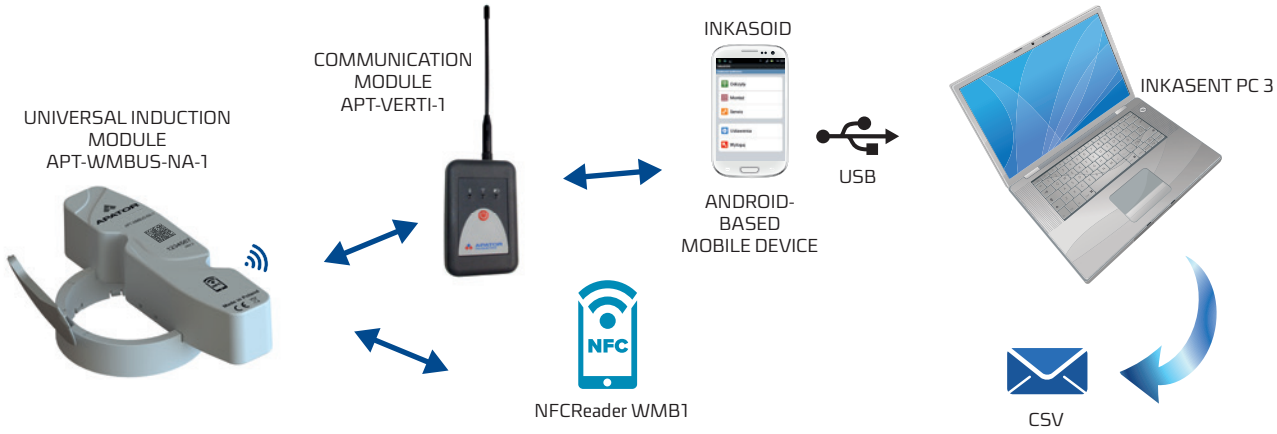


Fig. 1. Telemetric system wiring diagram

DATA SECURITY

Data is sent from and to the module via the ISM 868 MHz interface, encrypted using the AES-128 standard in the CBC mode, where every device can have its own unique encryption key assigned.

INDICATION SAVING SCHEDULE

The module logs up to 12 historical indications of the water meter in its memory, according to the user configuration. Saving can be performed according to the following schemes:

- once per year (selected month, day of the month and time),
- once per month (selected day of the month and time),
- once per week (selected day of the week and time).

EVENTS

The APT-WMBUS-NA-1 module in the basic frame sends information on the occurrence of the given event in the present or in the past. In additional transmission, on request, reading event details is also possible. The scope of information that can be sent is: date and time of first occurrence, date and time of last occurrence, number of occurrences and event-specific parameters, such as: duration, and volume or volumetric flow rate (see Table 1. Possible event information).

LIST OF EVENTS:

- Minimum flow (flow rate below a specified volumetric flow rate, lasting longer than the time specified by the user)
- Maximum flow (flow rate above a specified volumetric flow rate, lasting longer than the time specified by the user)
- Backflow (reverse flow, logged above the volume specified by the user),
- Measurement unchanged (no flow or minute – specified by the user for changes in water meter indication, logged within a specified time)
- Magnetic field detection (external magnetic field detection)
- Device disconnected (module removed from the water meter)
- Low battery voltage (logged voltage drop to below a threshold specified by the manufacturer – for details see the Instruction Manual)
- Acceptable device operation temperature range exceeded (logged temperature outside the range of <-15°C-60°C>, in which acceptable module operation is guaranteed)
- Device access error (event generated after 30 failed attempts to communicate with the module)
- Excess of volumetric water flow rate, at which operation of the RF module is still guaranteed. (for details see the Instruction Manual)

Table 1. Possible event information

Event	Flags		Event details					
	Current	Stored	Date and time of first occurrence	Start date and time of last occurrence	End date and time of last occurrence	Event duration	Event occurrence count	Other details
Maximum flow	+	+	+	+	+	+	+	Peak flow value
Minimum flow	+	+	+	+	+	+	+	volume
Leakage	+	+	+	+	+	+	+	volume
Backflow	+	+	+	+	+	-	+	volume
No change in measurement	+	+	+	+	+	+	+	-
Magnetic field detection	+	+	+	+	+	+	+	-
Device disconnected	+	+	+	+	+	+	+	-
Low battery voltage	+	+	+	+	-	+	-	-
Battery usage threshold exceeded	+	+	+	-	-	+	-	-
Temperature exceeded	+	+	+	+	+	+	+	-
Access error	-	+	+	+	-	-	+	-
Processor reset	-	+	+	+	-	-	+	-
Tip error	+	+	+	+	-	-	+	-
Maximum rotary speed exceeded	+	+	+	+	+	+	+	-

EVENT DETECTION OFF

The event detection off function is available for flow rate-related events:
- minimum flow,
- maximum flow,
- leakage,
- backflow,
- measurement unchanged,

and for battery consumption-related events (battery usage threshold exceeded).

AUTOMATIC EVENT CLEARING

It is possible to enable the automatic periodical data clearing option for selected events, of which the occurrence has no permanent impact on proper operation of the module. This is an alternative to manual clearing

COMPLIANCE WITH STANDARDS AND REGULATIONS

RADIO DIRECTIVE RED 2014/53/EU

Directive of the European Parliament and Council 2014/53/EU 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

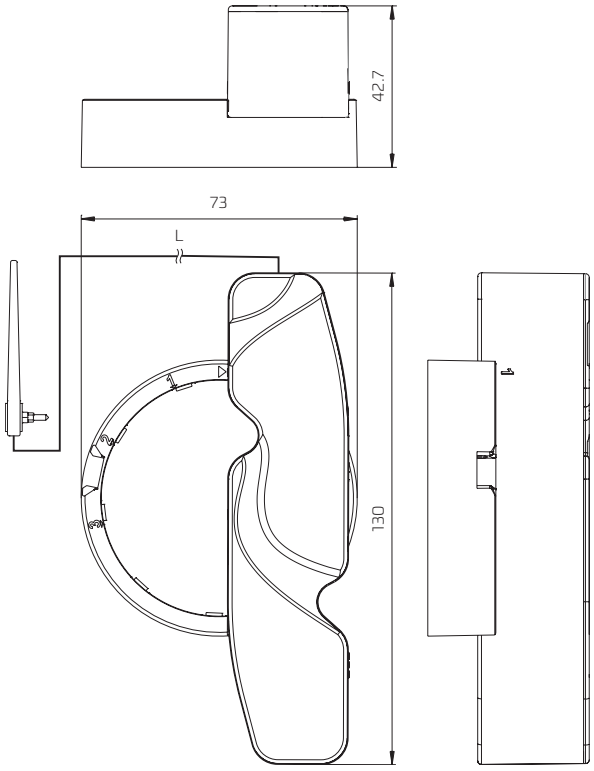
SPECIFICATION

Table 2. Specification

RF module	APT-WMBUS-NA-1	APT-WMBUS-NA-1 M
Antenna	internal - standard structure	external antenna track, L = 3 m
Installation method	Using the spacer ring, on the water meter	
Pulse counting method	Inductive resonance module	
Power supply	3.6 V A lithium battery	
Battery life	12 years of operation + 1 years in 'storage' mode for the following temperature profile: 10% of operation time at 10°C, 80% of operation time at 20°C and 10% of operation time at 30°C	
	6 years of operation + 1 years in 'storage' mode for the following temperature profile: 100% of operation time at 60°C (for use with water meters of temperature classes T90 and T130)	
Proper operation temperature	-15°C TO 60°C	
Ingress protection rating	IP 68	
Transmission type	Simplex (T1) – use data (current indication and one historical – last saved), event flags	
	Duplex (T2) – use data (current indication and 12 historical indications), diagnostics data, event details, remote parameter change option	
Transmission intervals	10 s from 05:00-21:00 hours	
	60 s from 21:00-05:00 hours	
Protocol	Wireless M-Bus*	
Transmission frequency	868.95 MHz	
Transmitter power output	20 mW / 50 Ω	
Power output level stability	+1 dB / –2 dB	
Receiver sensitivity	-100 dBm	
Outdoor range	up to 800 m (depending on ambient conditions)	
Weight	0.106 kg	

* protocol using manufacturer-specific CI field values (application layer as per PN-EN13757).

DIMENSIONS



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