



MEASURING SOLUTIONS



## AT-WMBUS-16-2 MODULES

FOR WIRELESS M-BUS COMMUNICATIONS

The RF modules type AT-WMBUS-16-2, type AT-WMBUS-16-2a with increased battery capacity and type AT-WMBUS-16-2-1 with extended RF antenna circuit are intended for wireless transmission of metering data over the Wireless M-Bus communication protocol. The data can be received from the modules with RF receivers which support Wireless M-Bus mode T1 or T2. The device can be configured in mode T2 only.

The optical scanning of the counter reflective indicator eliminates the drawbacks of weed-relay pulsers, while assuring reliable and accurate reading.

### APPLICATION

The FR modules are intended for installation on the JS-02 Smart+ and JS-02 SmartC+ single-flow water meters from Apator Powogaz S.A. The RF modules can work with a wide range of devices in remote reading and data transmission systems.



## DATA READING AND WRITING

The device enables reading and writing the following data over RF communication:

- Water meter S/N
- Current date
- Device operating days
- AES key
- Device operation/transmission times
- Transmission frame contents configuration
- Monthly volume write day
- Current volume
- Volume history
- Current flow rate
- Event details and threshold values
- Event auto-delete configuration

It is also possible to delete event information and historical volume values, as well as to switch the RF module into the storage mode (the possible events are defined at the Events point).

## TRANSMISSION ENCRYPTION (AES KEY)

To assure confidentiality of the metering data, the RF transmitted consumption data is secured with the AES-128 + CBC encryption algorithm (which guarantees variation of the transmitted data when no volume changes occur). The received data can be decrypted if the encryption key is known. The key is a string of 16 numbers (0 to 255). The encryption key also required for reading and writing of the configuration data. A new encryption key can be set if the current key of the RF module is known.

## VOLUME HISTORY

The RF module collects and saves historical volume data for the last 16 months. The volume write day can be configured (day 1 to 28 or the last day of the month). The data frame may contain historical data from 1 to 16 months back. The service mode allows accessing the whole historical content (irrespective of the months configured to be transmitted in an RF frame).

## EVENTS

Each transmitted RF frame reads event flags. The event details are transmitted periodically; each subsequent RF frame contains the details of a single event, and successive RF frames read the data of successive events. The data of an event is not transmitted when there has been no event or there has been no event since it was last deleted, or when the event flag is not set in the Frame (Event) Contents.

The details of an event may include the first instance date, the last instance date, the number of instances, the duration in full 10 second periods, and the event value (e.g. the backflow volume value).

The following events have been defined:

- Magnetic Field: an external magnetic field was detected.
- Strong Light (Threshold: illumination): all optical detectors detected a strong light source.
- Disconnected: the RF module was detached from its water meter.
- No Flow (Thresholds: Maximum daily volume, Maximum total volume over a pre-set number of days, Number of days): A zero flow condition is detected when the total volume over a pre-set number of days is below the Threshold, or when the Maximum daily volume is not exceeded on any of the pre-set days.
- Minimum flow rate (Thresholds: Flow rate, Minimum volume): This event is detected when the device records the Minimum volume (or a higher volume) at a flow that is below the Threshold.
- Maximum flow rate (Thresholds: Flow rate, Successive instances of flow over the Threshold): This event is detected when a flow above the Threshold is recorded over the successive 10-second periods, and the number of those instances is at least the one defined for the Threshold.
- Backflow (Threshold: Backflow volume): This is a backflow with a volume that exceeds the Threshold.



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AT-WMBUS-16-2-1

- Water leak (Thresholds: Water meter start flow, Leak time (multiple of 10 minutes)): This event occurs when a continuous flow is detected with a value above the Threshold for a preset duration.
- CPU reset: 1. RESET, 2. PORF, 3. IWDGF, 4. ILLOPF, 5. Code.
- Indicator error (Software error): There are 3 events related to the status of the optical detectors (Excessive flow that obstructs detection (indicator skips); RF module installed on the water meter; Simultaneous light reflection from 3 optical detectors).
- The Threshold is related to the voltage value measured each hour before the WMBUS frame is transmitted. The 2nd voltage is measured after each WMBUS frame transmitted, and thus it will be lower than the 1st voltage.
- Battery operating time exceeded (Threshold: Min. count of operating days): This event occurs when the number of the RF module operating days exceeds the Threshold.
- Battery power exceeded (battery dead) (Threshold: Counted power): The event occurs when the calculated battery power consumption exceeds the Threshold.
- Access error (Threshold: Number of failed attempts to communicate with the RF module): This event occurs when the number of failed communication attempts exceeds the defined Threshold.
- Instruction executed: Denotes that at least one of the possible events has been written (writing of: water meter data, event deletion, RF data write).

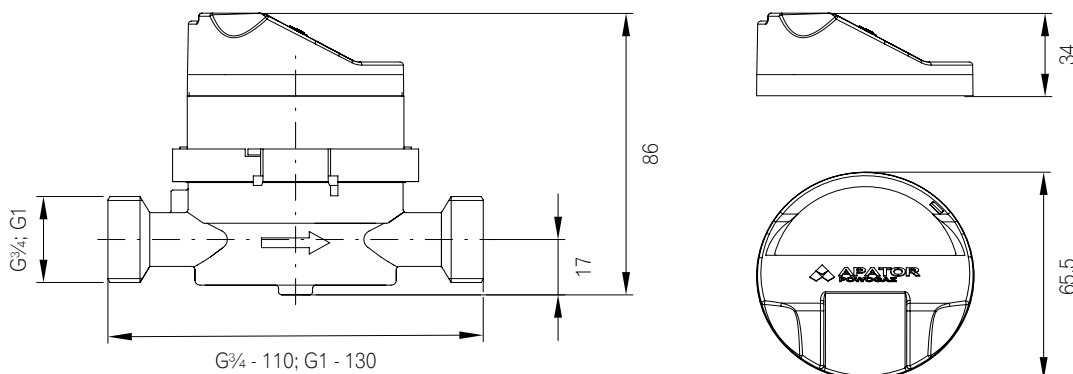
Table 1. TECHNICAL SPECIFICATIONS

RF module	AT-WMBUS-16-2 AT-WMBUS-16-2-1	AT-WMBUS-16-2a
Installation method	Directly on the water meter	
Water meter pulse counting method	Reflective transoptor	
Power supply	Lithium battery, 3.6 V; 1/2 x AA	Lithium battery, 3.6 V; AA
Battery life	10 years max. *	
Weight	0.033 kg	
Operating temperature	+5°C to +35°C / (0°C to +55°C)**	
Protection rating	IP 65 (IP 68 available on order***)	
Dimensions	h = 34 [mm], s = 65.5 [mm]	
<b>RF parameters:</b>		
Baud rate	100 kcps	
Transmission type	unidirectional (data), bidirectional (config)	
Protocol	Wireless M-Bus	
Frequency	868.95 MHz	
Transmitter power output	10 mW / 50 Ω	
Transmitter power output level stability	+1 dB/ -3 dB	
Receiver sensitivity	-102 dBm	
Outdoor range	350 m	

\*) Configuration-dependent

\*\*) Customizable on customer's order

\*\*\*) Not available with AT-WMBUS-16-2-1



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