



**Radio telemetric modem**

**WS868-PLE-EX**

**USER MANUAL**

*(Revision 1, 23.7.2018)*

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## 1. Introduction

This document describes radio telemetric modem WS868-PLE-EX, that can be used for reading of data from Elster „BK“ series gas-meters. The data are transferred via Sigfox radio network in 868 MHz frequency band. The document describes setting (configuration) possibilities, as well as recommendations for installation and operation.

The device is intrinsically safe and can be installed in the potentially explosive atmospheres.



- II** - explosive atmospheres other than coal-mining with presence of methane
- 3** - zone 2
- G** - gaseous explosive atmosphere
- ic** - degree of intrinsically safety according to the ČSN EN 60079-11 standard, article 5.4
- IIA** - group of devices for explosive gaseous atmosphere with propane typical gas, according to the ČSN EN 60079-0 ed.3 standard, article 4.2
- T4** - temperature conditions, maximum surface temperature of the modem details is 135°C, according to the ČSN EN 60079-0 ed.3 standard, article 5.3.2.2
- Gc** - gaseous explosive atmosphere in zone 2

## 2. Usage

The WS868-PLE2-EX modem is intended for remote reading of data from BK series gas-meters produced by Elster. The device can be installed to gas-meters of BK4-1,6 - BK4-100 type with Z6 type of counter.

## 3. Description

The device electronic is enclosed in translucent plastic casing that enables optical configuration with using of infrared IRDA configuration converter. The device casing is designed for mounting directly to the gas-meter counter slot reserved for remote reading modules. Its position is fixed by sealing screw or wire same way as any other remote reading module (e.g. IN-Z60).

Standard (recommended) type of antenna is SMA stick antenna with 90° degrees mounting angle against the axe of antenna connector. In case of weak radio signal it is possible to connect remote with antenna cable and place the antenna to the near area with satisfactory radio signal.

External view of the modem is depicted in the figure 1. View of modem installed onto BK-G4 gas-meter can be seen in the figure 2. In the figure 3 there are displayed types of antenna that can be used with the modem.

Lid of the casing (upper part) is attached to the base (lower part) by two screws. As the screws are accessible from the bottom side, it is not possible to open the lid when the device is installed on the gas-meter.

The modem is equipped with infrared configuration interface. In the left side of the lid there is crater-like circular hollow that helps for easy positioning and magnetic fixing of USB-IRDA configuration converter. The converter is depicted in the figure 4. During normal operation the modem is not a source of any IR radiation. The communication between converter and modem in IR specter is under way only during the configuration, when the modem responds to converter's commands. IRDA optical configuration can be used even in the explosive environment, but on condition that the configuration device (computer, converter..) with Zone 2 certification is used.

The modem casing has IP40 degree of protection and the device is not suitable for using in exteriors without additional protection. The device is power supplied by internal battery with up to 7 years lifetime for frequency of 4 - 6 broadcastings per day. Battery lifetime can be negatively influenced by shorter broadcasting period, or by storing and operation in sites with the temperatures exceeding the recommended range (for more information see paragraph 6 of this manual).

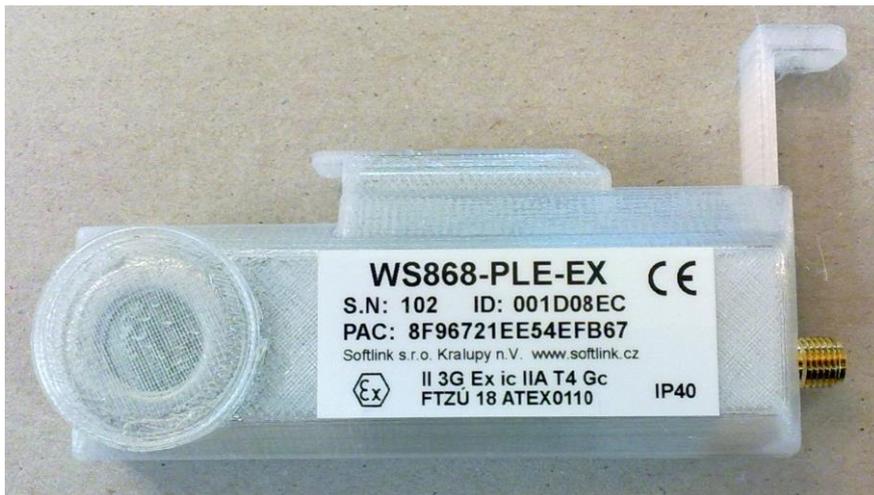


Figure 1: WS868-PLE2-EX modem external view

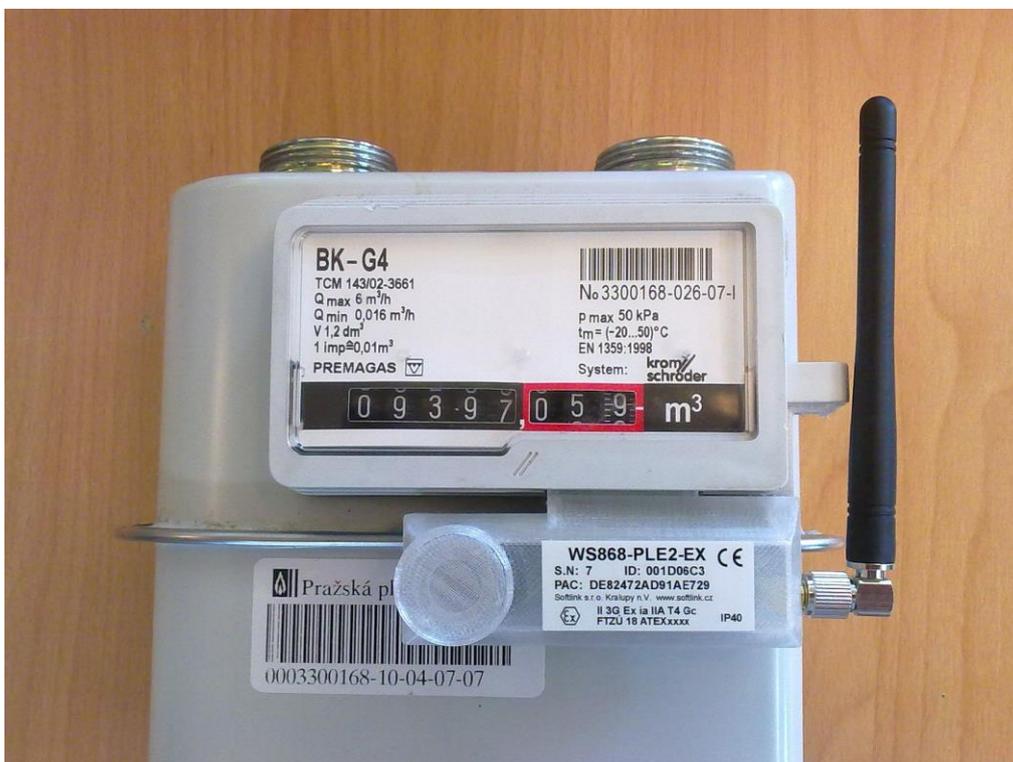


Figure 2: View of WS868-PLE-EX modem mounted to BK-G4 gas-meter

The WS868-PLE-EX modems are enclosed in plastic casings externally equipped only with antenna connector of SMA type and circular hollow for positioning and fixing of USB-IRDA configuration converter. The casing consists of two parts:

- back cover with printed circuit board and antenna connector
- front lid with translucent circular hollow for IR configuration
- the lid can be dismantled by unscrewing of two screws from the bottom side
- the modem is permanently switched on and its broadcasting period is preset to 24 hours (once per day). The period can be changed before/during installation by using of IRDA converter
- principal antenna solution is using of stick antenna with 90° flexure angle, supplied type: GSM-ANT-2 (Producer SR PASSIVES, Supplier: TME Ostrava). Any similar type of stick antenna for 868 MHz frequency band with 90° flexure angle can be used (e.g. GSM-ANT-402 of same producer) as well as the remote antenna with coaxial cable. Antenna solution should be selected according to the installation site conditions and strength of radio signal in the installation place. Basic types of antenna are depicted in the figure 3.



Figure 3: Basic suitable types of antenna

## 4. Technical parameters

### 4.1. Radio interface parameters

- frequency band: 868 MHz
- carrier frequency: 868.130 MHz
- transmitting power: 15 mW (12dBm)
- antenna connector: SMA-F
- antenna: external
- fixed transmitting power (cannot be changed)
- in compliance with ČSN ETSI EN 300 220-2, ČSN ETSI EN 300 220-1
- in compliance with ČSN ETSI EN 301 489-3, ČSN ETSI EN 301 489-1

### 4.2. Configuration interface IRDA parameters

- transmission speed: 115,2kb/s
- type of operation: asynchronous
- transmission parameters: 8 data bits, 1 stop bit, none parity
- optical interface band: 870 nm
- infrared radiation intensity: typically 40 mW/Sr, maximum 93 mW/Sr
- radiating angle: typically +/- 18°, maximum +/- 30°





Figure 5: USB-IRDA configuration converter

Configuration via USB-IRDA infrared converter can be performed from any computer with MS Windows or Linux OS with using of pre-installed „WACO OptoConf" software application.

### 5.1. Connecting of USB-IRDA optical converter to computer

- connect the USB-IRDA converter to the USB port of computer
- launch the "WACO OptoConf" program
- during the first using of the program an operating system may go through the driver installation
- converter with correctly installed driver will appear as „USB Serial Device (COMx)" in the "Ports (COM and LPT)" section of the "Device Manager" window
- by using of "Walk device" button all modem parameters are scanned and displayed
- by using of "Read device" button the configuration table can be displayed. Non-configurable parameters are displayed as inactive (gray). Configurable parameters appear as active (with white background of the field).

### 5.2. General rules for configuration via IRDA interface

- insert IRDA converter into the computer USB port. Correct function of the converter is signaled by flashing of green LED
- launch "WACO OptoConf" program and select the name of relevant serial port ("COM XY") in the "Com/port" menu;
- place the modem to the direction of infrared beam approximately 20 – 30 cm from the tip of converter. Modem lid with translucent window in circular hollow should be facing the converter. If a converter type with magnetic fixing is used, attach it to the circular hollow on the modem.
- by clicking to „Read device" button open the configuration table. There are 4 possible types of editable fields:
  - text field for insertion of text information (e.g. „Info text" parameter)
  - numeral fields, where numeral values can be changed (e.g. „value" parameter)
  - selection fields, where one of preset options can be selected (e.g. „Power" parameter)
  - hexadecimal fields, where numbers in hexadecimal form are entered (e.g. „VIFE")

Text fields can be changed by correcting, erasing, or rewriting of the text inside the field. Numeric fields can be changed by rewriting number inside the field or by its increasing/decreasing with using of arrows. Selection fields can be changed by choosing required option from the list-box. Hexadecimal fields (marked as „hex") can be changed by clicking on the character and rewriting its value to another hexadecimal character (0 to F).

Current status of module configuration parameters can be requested anytime by clicking to „Read" button. If reading of the parameters fails, error "Error: Read timeout" will appear.

Ongoing communication with the modem is signaled by flashing of LED on the configured device.

## 6. Installation and operation

This section of the document describes basic recommendations for transportation, storing, installation and operation of the WS868-PLE-EX modems.



**SAFETY WARNING! Mechanical installation, dismantling and configuration can be performed only by person with appropriate qualification and properly trained for these activities. The activities and manipulations with the modem, that are performed in the explosive environment, must be restricted to the necessary minimum.**

### 6.1. Condition of modems on delivery

Modems are delivered in standard cardboard boxes. The modules are delivered with battery switched on and preset broadcasting interval of 24 hours (1 transmission per day)-

### 6.2. Modem installation

The WS868-PLE-EX radio modems are enclosed in plastic casings equipped by antenna connector accessible from outside. When mounting to the gas-meter, follow these instructions:

- preliminary preparation must be performed outside the explosive area. Connect antenna to the connector and provide necessary setting with using of IRDA converter
- only absolutely necessary manipulations with the modem can be performed inside the potentially explosive area: mounting to gas-meter, mechanical fastening and sealing.
- the antenna should be installed regarding the space around the gas-meter. Radio reach can be optimized by position of antenna (changing of rake angle)
- when using remote antenna on coaxial cable, place the antenna as far from metal objects as possible
- fastening and sealing of the modem should be performed through the gas-meter sealing protrusion

**Recommended final check after installation are as follows:**

- check of pulse counter initial value
- check of broadcasting interval

### 6.3. Modem dismantling and replacement

- check the antifraud seal before dismantling
- remove seal and fastening element
- cautiously pull the module out of gas-meter slot
- unscrew antenna cable (if remote antenna used)



**Any other manipulation with the device (e.g. opening of the casing, dismantling of any electronic elements) must be performed outside the area with potential explosion risk!**



**Any manipulation with internal battery is forbidden during modem deinstallation!**

Install a new modem with the same configuration as the dismantled one. Set gas-meter counter current status to the new modem as "initial value" parameter. Write down the new module ID, gas-meter counter status and seal number and fill in the prescribed service documentation. If possible, arrange making of all appropriate changes in the database of the remote reading system immediately. Apply instructions for mounting and final check as described above (see paragraph 6.2.).

### 6.4. Battery replacement



Battery replacement can be performed only in the workshop with appropriate facilities. Battery replacement can be performed only by person with necessary qualification and at the same time trained for this job. The workplace must follow clear rules for storing and manipulation with batteries so as to prevent mistaking of new and exhausted batteries and shortcircuiting of terminals of new as well as dismantled batteries.

Optimal storage conditions for batteries are in dry storages with temperature of (+15 ÷ +30) °C and relative humidity up to 30%. Rules for battery disposal and recycling can be found in the paragraph 6.8. „Environmental protection and recycling“.



The battery must be replaced only for the same type from the same producer. The battery exact specification (Type//Producer) is embodied in the modem certification for using in explosive environment. It is necessary to use only **3,6V / 3,6Ah** batteries with **LS17500 CNA** type label produced by **SAFT** (HQ Paris, France).

## 6.5. Modem storage

The modems should be stored in dry rooms or halls, in the temperature interval of (0 ÷ 50)°C. Optimal storage temperature is (+15 ÷ +30) °C that is the most convenient for modem batteries. The battery self-discharging current increases with rising of temperature.

The modules are delivered in operating status. To prevent the unwanted discharging of internal battery it is recommended to keep the long transmitting period configured until the module's installation.

## 6.6. General operation risks

The WS868-PLE-EX radio modem is an electronic device power-supplied by internal batterie that register rotation of gas-meter into the internal counter. During its operation be aware mainly of the following risks:

### 6.6.1. Risk of mechanical and electric damage



The device is enclosed in plastic box that (with exception of antenna connector) protects from the direct contact with its electrical components. During normal operation there is no reason to open the modem casing. All the electronic components are accessible after removing of modem front lid. The modem is power supplied by safe voltage of 3,6V and no special safety precautions are needed.

Cleaning of the device casing can pe performed only by natural materials without synthetic additives so as to prevent against accumulation of surface ESD charge on the casing surface. Discharging of the surface charge in unfavorable conditions could cause damage of the device

Avoid the mechanical damage from strong pressure or shocks. Falling to hard surface could cause damage of the casing or tearing of battery terminal.

### 6.6.2. Risk of premature battery discharge

The device is equipped with the long duration battery. Battery lifetime can be influenced by these factors:



- storage and operation temperature – in high temperatures the spontaneous discharging current increases, in low temperature the battery capacity reduces. Optimal storage and operation temperature is in (0 ÷ 30)°C range. Exceeding of storage temperature could cause reduction of battery lifetime.



- frequency of modem activation - setting of broadcasting period. Setting of short broadcasting period could cause preliminary battery discharging. Recommended broadcasting period is at least 6 hours, setting of shorter periods could cause reduction of battery lifetime.

## 6.7. Troubleshooting

If during installation or operation of the modem some anomaly, malfunctions or other troubles are recognized, possible cause of the failure can be discovered by following steps:

### 6.7.1. Difference of remote reading

Current status of gas-meter mechanical counter is different than value of remote reading. It could be caused by one of following reasons:

- reading modem is not correctly mounted to gas-meter slot
- counter was not cleared (set to zero) during installation
- counter initial status was incorrectly entered to the remote reading system database
- counter transfer coefficient was incorrectly entered to the remote reading system database
- the modem is defective

### 6.7.2. Troubles with radio connection

When there are some troubles with module radio-reach, check following possible reasons:

- antenna installation, especially tightness of antenna connector
- antenna positioning, especially proximity of metallic objects around antenna
- change antenna for better type or move antenna to the area with better conditions for radio signal

### 6.7.3. Other possible troubles

The modem does not work independently, but in co-operation with other elements of remote reading system. For proper working of the system it is necessary to set correctly all the system elements, so as the modem messages could get to the destination (target server, application, database). Inspection of correct setting of remote reading system database and all communication elements should be the first task in case of any troubles with delivery of messages with remote readings.

## 6.8. Environmental protection and recycling



- the device does not contain any components that could be replaced on the installation site
- only discharged battery can be replaced in the device. This job could be performed only in properly equipped workshop with proper management of manipulation with batteries
- discharged batteries cannot be disposed as common household waste. It must be disposed separately in collection yards or by companies authorized for battery recycling
- destroyed, defective or discarded devices cannot be disposed as common household waste. It must be disposed separately in collection yards or by companies authorized for recycling of electronics
- Information about the nearest collection yard can be provided by the relevant local (municipal) authority.

## 7. Warranty

The WS868-PLE-EX modem warranty period is 24 months from the delivery date. Warranty cannot be applied in case of any damages caused by improper storage, installation or operation as well as in case of unwarranted interference in the device.

**Warranty and after-warranty service are provided by:**

SOFTLINK, s.r.o., Tomkova 409, 278 01 Kralupy nad Vltavou, Czech Republic, phone +420 315 707 111

## 8. Additional information

Each modem is labeled by unique production label. Its appearance is depicted in the figure 6. Variable entries are "S.N." (serial number), "ID" (network ID) and "PAC" (service contractor registration). These three entries are unique. Invariable and obligatory part of the production label is device classification for using in environment with potential explosion risk, reference to testing laboratory and number of relevant testing protocol (see figure 6).



Figure 6: Modem production label

This manual is focused on description, parameters and configuration options of WS868-PLE-EX modem. More information about the system for wireless data collection in 868 MHz frequency band (including examples of modem applications and description of all manufacturer products) can be found in the producer WEB site. If interested in any information related to modem application or remote reading solutions, feel free to contact manufacturer:

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Phone: +420 315 707 111, e-mail: [sales@softlink.cz](mailto:sales@softlink.cz), WEB: [www.softlink.cz](http://www.softlink.cz)