

SETTING PROGRAM FOR PULSE COUNTER wMBHL

USER MANUAL

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Used terms and technical descriptions

Terms and abbreviations

wM-bus - wireless m-bus protocol, EN 13757-4

AES-128 - symmetrical encryption algorithm

dBm - measurement unit for radio signal quality and strength (dB/mW)

Descriptions



- Attention, important notice



- Hint

I. General description

Device wMBHL is a pulse counter with wireless m-bus interface, mode T1. Pulse counter is powered by internal battery, which means it is autonomous device and is suitable for mounting at different locations.

wMBHL has two independent pulse channels. To each of them user can connect external device, which has some of the following pulse output definition:

- 'dry' contact (in most of the cases reed switch)
- Open collector output

For each input user can set separately following parameters:

- Pulse constant - 1/10/100 or 1000
- Initial value - integer number, which is multiple to pulse constant

As overall parameters to each pulse counter wMBHL user can set/define:

- Power of the transmission (which is related to battery life)
- Enable or disable AES-128 encryption Mode 5, set encryption key
- Transmission interval
- Telegram type - user can select from several types of telegrams, all of them are OMS compatible. But the idea is to make easier implementation of wMBHL in existing wireless networks, where already other meters/counters are installed

Battery of this counter is non-rechargeable lithium and is calculated to ensure minimum 10 years work at maximum transmission power and transmission every minute. Transmission is one-way, mode T1 and is compatible with OMS standard.

All of the above parameters are settable through optical infrared port of wMBHL. To do so user must have optical head of some kind, with RS-232 interface or USB. Our software can work for now only on RS-232 so if the optical device is pure USB, then USB-to-RS-232 converter should be used. This optical device should also work in infrared spectrum. Using our software and optical 'head' all settings can be made fast and easy.

We can provide our optical head, if needed.

When shipped, pulse counters wMBHL are not enabled. This means that they do not count and do not transmit over the air. This is made in order to preserve battery life and to allow different ways of delivery. When the user have to install wMBHL, he should do the following:

- enable wMBHL - put pulse counter in normal working mode
- set/change pulse constants on each pulse input - by default pulse constants are 1 for both inputs
- set initial values - if necessary
- enable AES-128 encryption - if necessary
- change encryption key - if necessary. By default encryption key is 00000000000000000000000000000000.

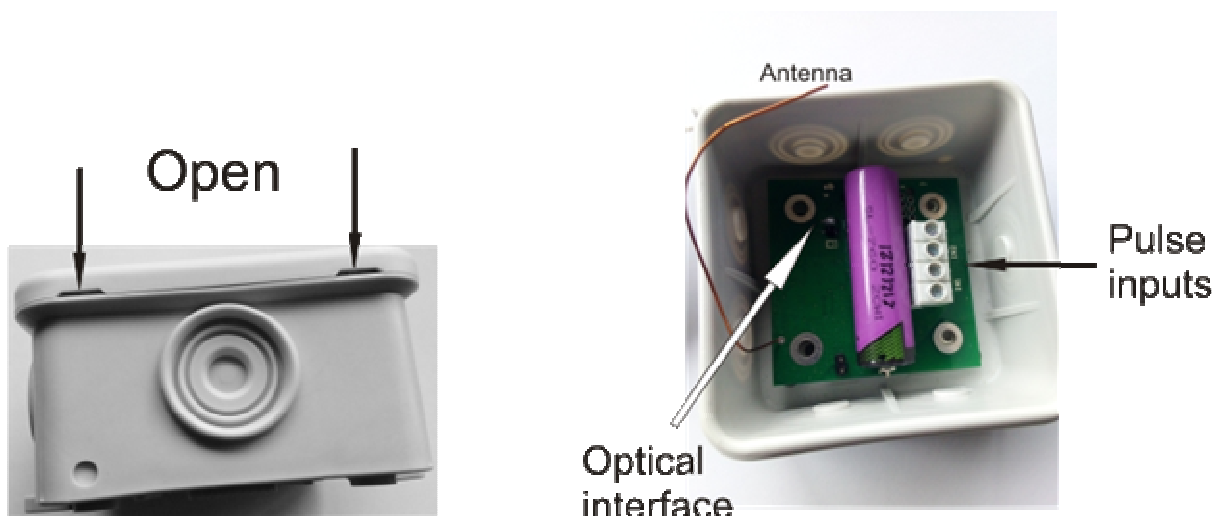
Table.1. Technical specifications of wMBHL-2

Nº	Specification	Value
1.	RF band	868.95 MHz
2.	Wireless m-bus modes	T1
3.	Interface	Optical, infrared spectrum
4.	Serial port settings, bps	4800 bps, Even
5.	Power supply	3.6 Vdc battery
6.	Battery type	3.6Vdc, Lithium, non-rechargeable
7.	Pulse inputs	2
8.	Max frequency of the pulse inputs	10 Hz
9.	Encryption	AES-128, Mode 5
10.	Work temperature, °C	-10 °C ÷ +50 °C
11.	Dimensions, LxWxH, mm	74x74x30
12.	Protection class, IP	IP54
13.	Own weight, g	80 g

II. Setting program for wireless m-bus counter wMBHL

1. Positioning of the optical head

In order to set the counter, user should set correct optical head above the infrared port of the counter. To do that one should first open the counter and then position optical head above the infrared port. In the future we will try to ease this step. See pictures below:



Step 1. Open the enclosure -->

Step 2. Position head above "Optical interface"

2. General view of the setting software

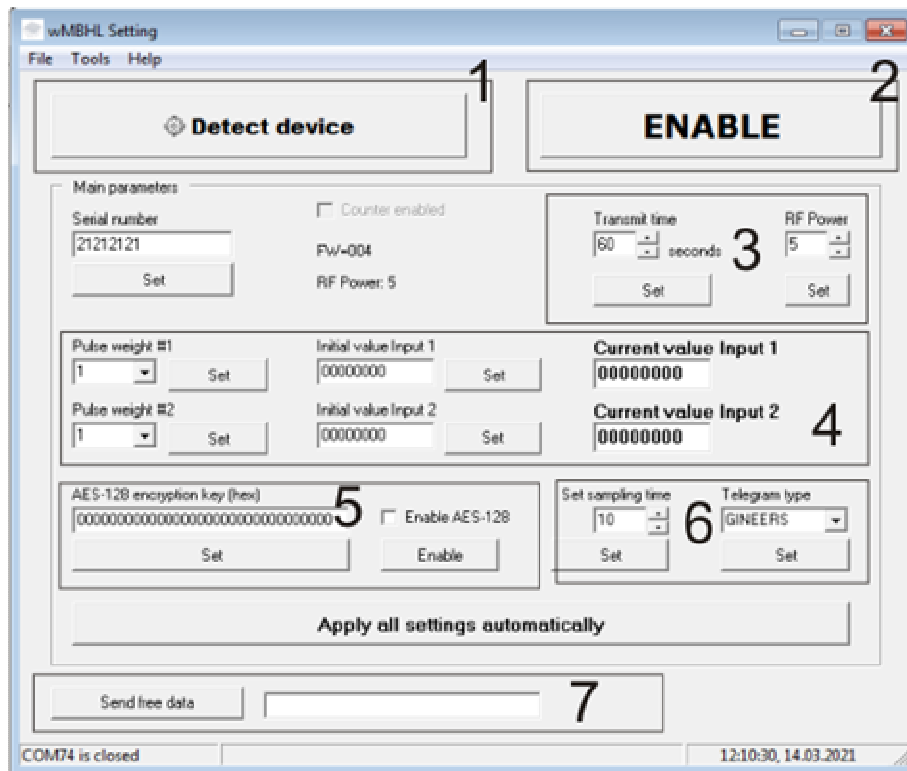


Fig. 1. General view of the software

On the above picture are shown all settings that can be made:

- 1 - detect specific pulse counter wMBHL
- 2 - enable pulse counter wMBHL
- 3 - data transmission settings
- 4 - pulse inputs settings
- 5 - encryption settings
- 6 - additional settings for data transmission and pulse counting
- 7 - sending free command through serial interface

Detect specific pulse counter wMBHL



Pressing this button will tell program to read all memory data from the counter and fill appropriate fields. Before the device is detected user **CAN NOT** make/change any other setting.

Enable pulse counter wMBHL



If user can not detect the device - then either counter is not activated or optical head is not positioned well. Pressing button "ENABLE" is the first thing to do, when a new counter has to be set. Next is pressing button "DETECT DEVICE".

Data transmission settings

Transmit time <input type="text" value="60"/> seconds <input type="button" value="Set"/>	RF Power <input type="text" value="5"/> <input type="button" value="Set"/>
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Here user can set signal strength for transmission (by default is set maximum - 5), and transmission interval. Transmission strength is set in steps from 1 to 5 and transmission interval can be set from 30 to 180 seconds in 10 second step.

Pulse inputs settings

Pulse weight #1 <input type="text" value="1"/> <input type="button" value="Set"/>	Initial value Input 1 <input type="text" value="00000000"/> <input type="button" value="Set"/>	Current value Input 1 <input type="text" value="00000000"/>
Pulse weight #2 <input type="text" value="1"/> <input type="button" value="Set"/>	Initial value Input 2 <input type="text" value="00000000"/> <input type="button" value="Set"/>	Current value Input 2 <input type="text" value="00000000"/>

For each pulse input user can set independently the following:

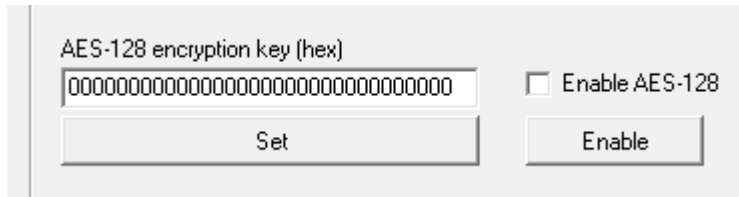
- pulse constant - "Pulse weight". Value, by 10 - 1/10/100 or 1000. For each input the constant is set by pressing corresponding button "Set";
- initial value, from which pulse counting will start - "Initial value Input 1/2". For each pulse input is set by pressing corresponding button "Set";

Separate from that, software reads and shows total value for each pulse input (i.e. - value to be sent through wireless m-bus). This value is a sum between pulses counted, multiplied by pulse constant and initial value.



Setting new initial value zeroes Total value automatically!

Encryption settings



Encryption of the telegram can be turned On or Off - checkbox *"Enable AES-128"*. To turn it on checkbox should be checked and the button *"Enable"* is pressed. To turn it Off - checkbox should be cleared and again button *"Enable"* should be pressed.

When encryption is turned On wMBHL uses by default AES-128 key 00000000000000000000000000000000. If the user wants to change the key - he should enter 16-byte key in the field *"AES-128 encryption key (hex)"* and then presses button *"Set"* below it. The key is entered in hexadecimal value, which means that allowed symbols for entering are number 0-9 and capital letters A-F. The key should be exactly 32 symbols and no spaces between each byte. Invalid keys are not stored and user can see a message in the status bar of the program.

All settings success or failure can be seen in status bar, also a log file is saved on each operation.

Additional settings for data transmission and pulse counting

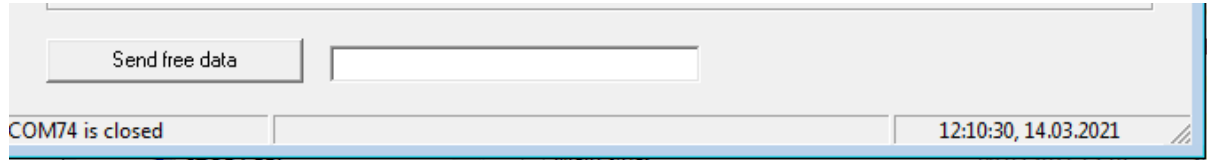


There are several types/templates of wireless m-bus telegram, which can be selected for transmission. This is made in terms of compatibility of wMBHL with already build wireless networks. Also very often is easier to adapt the device to existing system/software instead of changing upper level of a network. In this moment user can select standard telegram GINEERS(by default) or telegram, same as telegram of Maddalena watermeters/counters.

wMBHL is designed in general case for connecting watermeters in wireless m-bus systems. This means that usually input pulses are not too fast - usually between 100ms-1000ms. But we can sample faster, if needed. For this setting user can change sampling time - *"Set sampling time"*. For details what the sampling values mean - ask Gineers.

Sending free command through serial interface

Since we can provide setting commands to our partners – we have provided also a way user to send free command through serial interface/optic head.



To do so user can enter a command in the field and then press button "Send free data". All commands for setting/reading the counter are ASCII-based, so no special skills are required to send a command through computer serial RS-232 interface, to which optical device is connected.

Status Bar

In status bar user can see:

- serial COM port status – is it opened or closed, what are the communication settings, when COM is opened (speed and parity);
- current date and time;
- messages about success or failure when setting/programming the device

3. Menu Settings

To set common options in this program use should select menu *Tools->"Settings"*:

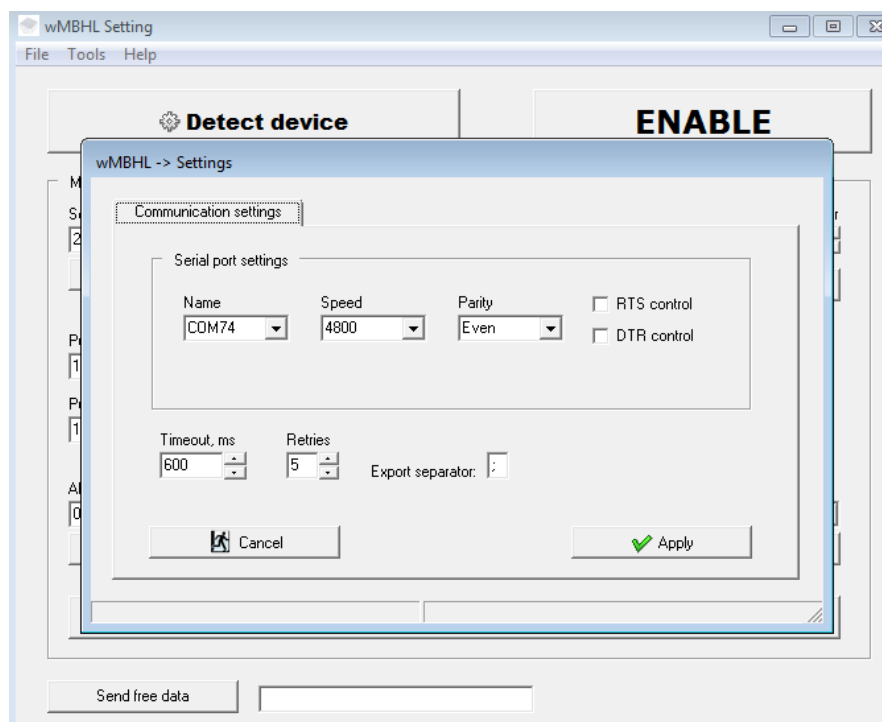


Fig. 2. Menu Settings

Here user can do the following:

- Select serial COM port, communication speed and parity. wMBHL works ALWAYS on 4800bps and parity Even. COM port number varies from a PC to PC and can be checked in OS Device Manager for exact computer/laptop
- Timeout to wait counter response, when some parameter is saved or data is read. By default this is 600ms, but can be faster
- how many times software to retry to send again commands, if previous attempt to write/read was unsuccessful
- Symbol for separation when data export is made – program can generate csv files and they need correct column separate symbol in order to be opened directly with MSEXcel.

All settings are saved with pressing button "*Apply*".

4. Menu "Help"

Here two options can be made:

About – opens a window, which shows current version of this program and contact details for support

User Manual – opens this User Manual, if a pdf reader is installed on the system

III. Safety and troubleshoot

In normal conditions work with wMBHL is not considered dangerous and it covers European regulations for safety. Device is powered from non-rechargeable lithium battery, with voltage 3.6Vdc and very small consumption (~10uAh). So it does not need special LVD certificates.

Though, when working with this kind of pulse counters, You should consider the following:

- Installing FTDI drivers (for optical setting head) should be made by people who knows what is serial port RS-232, USB and RS-232-to-USB converters;
- Battery should not be recharged in any way;
- This counter has protection class IP54, which means that water protection is on medium level. This **DOES NOT** mean that wMBHL can work under water or in heavy duty conditions, Gineers does not give any warranty in this case;
- After its lifetime this counter should not be disposed in regular garbage and is threaded according country regulations.

IV. Contacts

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This device and programming software are entirely developed by "**Gineers**" Ltd.
Changes in both hardware and software are possible, if reasonable.

For questions how to use this counter and programming software please write to
support@gineers.com