iPERL

Appendix 1
SensusREAD

Content

## 1. Connection of SIRT device to a hand-held device

The following procedure describes how to connect the hand-held terminal with the SIRT device. In this case, the Psion Workabout Pro G3 terminal is used with Windows CE 5 operating system. With a terminal that includes a different version or type of operating system, the process may vary.

To connect the hand-held terminal with the SIRT device proceed as follows:

1. Switch the SIRT device on by briefly pressing the green button. All 3 LEDs light up for a moment and the diode "On" remains lit.


2. Click in the bottom left corner on the symbol of the Start menu, then select "*Settings*" and click on the option "*Control Panel*".
3. In the next window displayed select the option "*Power*" from the menu
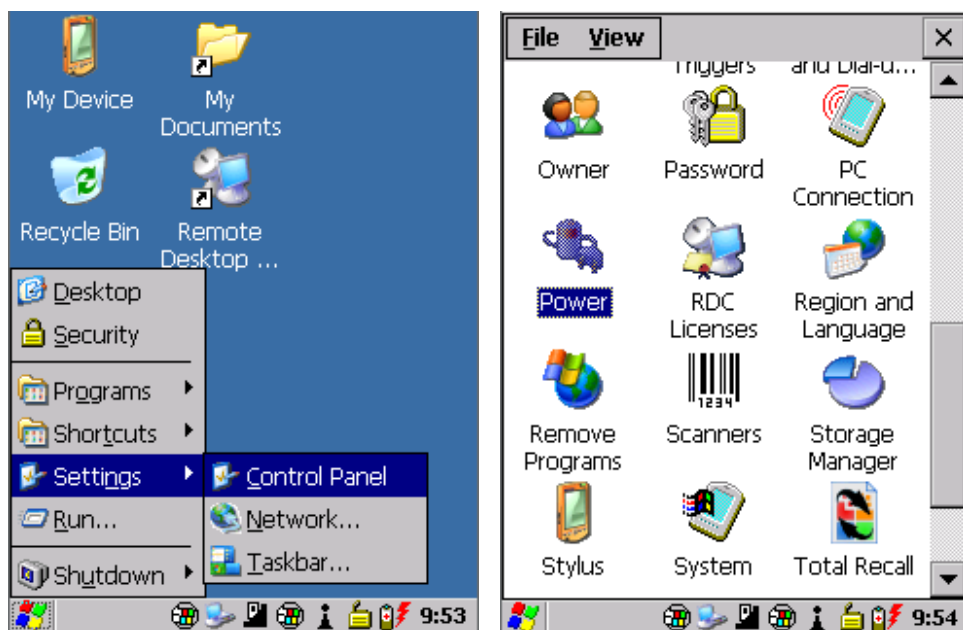
4. In the window "*Power Properties*" check under the tab "*Built-in Devices*" if the Bluetooth interface on the terminal is on. The option "*Enable Bluetooth*" must be selected. Click in the upper right corner on "*OK*".

5. From the options menu in the section "*Control Panel*" select "*Bluetooth*".

6. In the window "*Bluetooth*" displayed afterwards click on the tab "*Device*" and then in the lower left corner on the option "*Scan*".

7. After a while one or more devices are displayed in the empty window. Click on the device with the name beginning with "*SIRT*" and from the menu select the option "*Pair*".
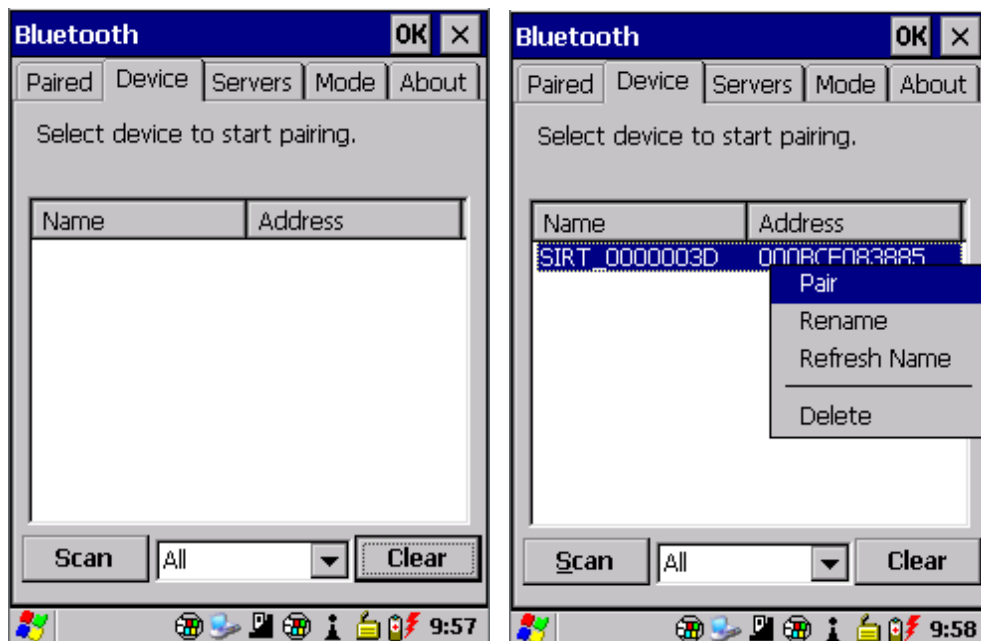
8. In the next step, insert the code for Bluetooth pairing in the empty field. This code is listed on the label located on the top of the SIRT device. It is the code found near the letters "*BT-PW*". In this case the code is 1209, as can be seen in the picture below.
   After entering the relevant code click on "*Next* ".
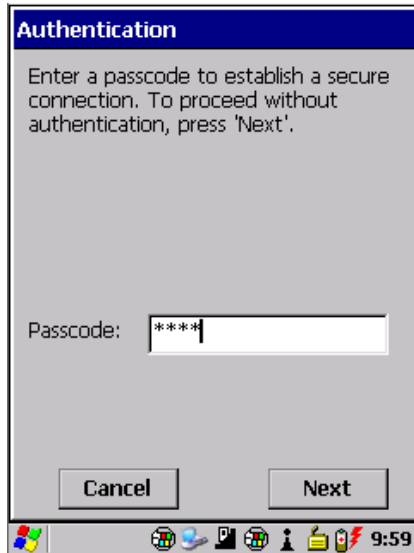
9. In the next window select "*Serial Port*".

10. In the window "*Serial Profile*" set "*Mode*" as "*Serial*", "*Encryption*" as "*Disable*" and in the menu "*Port*" select the COM port with any number that is not assigned to any other device. Click on the option "*Next*".
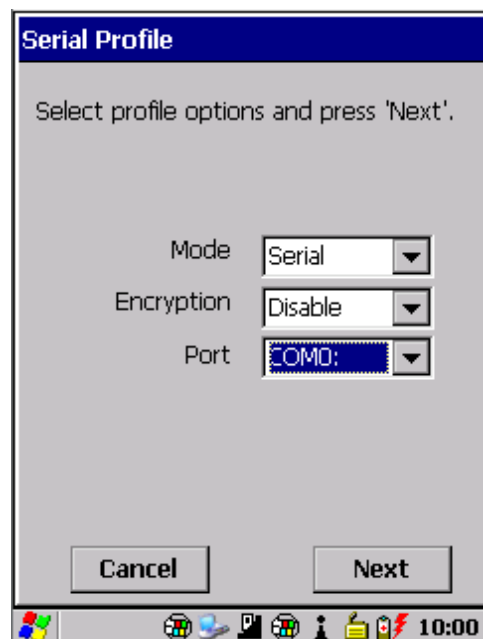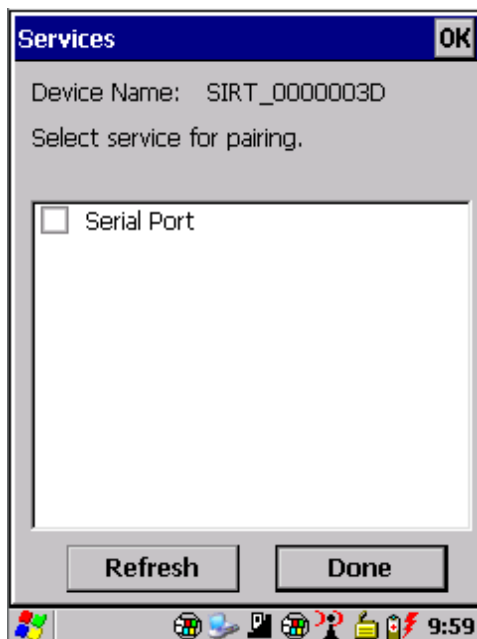
11. In the window "*Services*" the selected setting is displayed together with the assigned number of the COM port. Finish the selection by "*Done*".

12. In this moment the Bluetooth connection between the terminal and the SIRT device is completed. Click on the tab "*Paired*" placed in the upper bar and the pairing of SIRT and COM port is displayed.
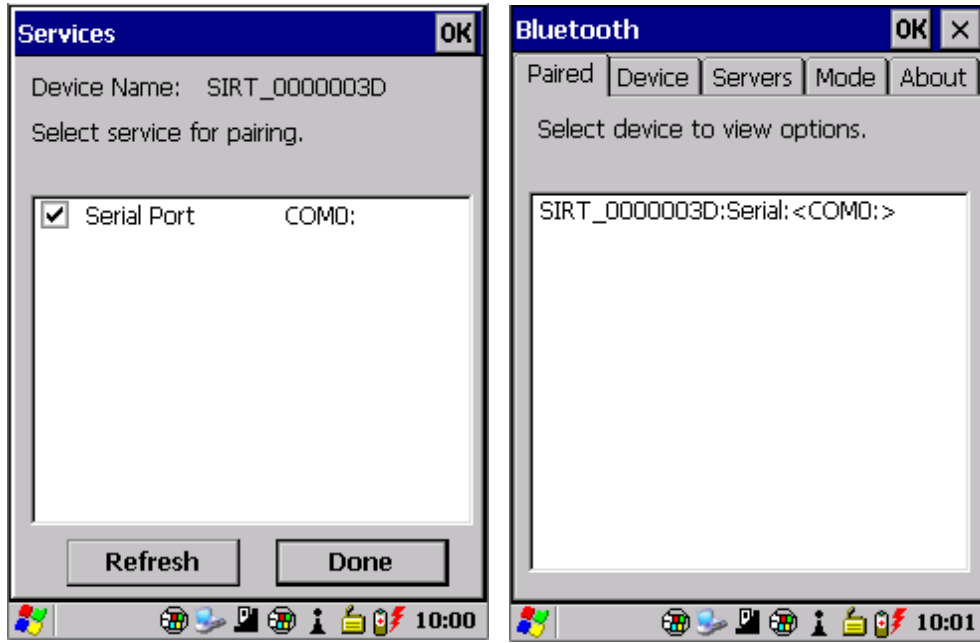
2. Installation of SensusREAD software

2.1. Installation of SensusREAD software on PC

The readout and configuration of the iPERL meter is made by means of the SensusREAD software and its 60-day trial version is available through the following link: http://sensus.com/web/de/products/water/software-downloads (for the purchase of a license for unlimited use of the software contact the company Sensus).

To install the SensusREAD programme on PC follow this procedure:

1. Find the SensusREAD programme on the web site in a list of the software and in the column "*Download*" click on the blue link to download .

Software Downloads

Systems		
Title	**Meter System(s)**	**Download**
SensusREAD	• SIRT • Sensus((S))cout / Radio Module	Version 11026 >> (48,596.9k)

2. Before you install the programme, it is necessary to be sure about the rights of the administrator in the operating system.
3. Run the downloaded installation file.
4. Choose language in which the setup programme will be displayed.
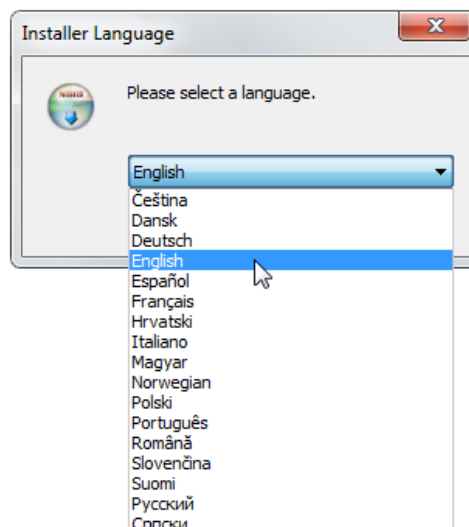
5. Follow the instructions of the setup programme.

### 2.2. Installation of the SensusREAD software on the portable (hand-held) terminal

1. Run the SensusREAD software on the PC using the desktop shortcut. The desktop shortcut is shown in the picture below.

SensusREAD

2. Check the connection between the terminal and PC. In the programme SensusREAD in the lower right corner a green icon appears with the words "Handheld connected".

Handheld connected. Psion_WAP_G4
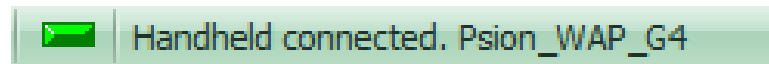
3. When the SensusREAD programme is running click on the toolbar (located in the upper left part) to select "*Install* ".

4. After a while the newly opened window in the PC application *automatically* disappears and then the desktop shortcut of SensusREAD appears on the screen of the terminal, whereby the programme is started.
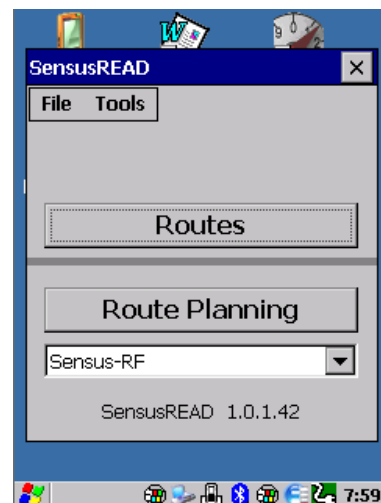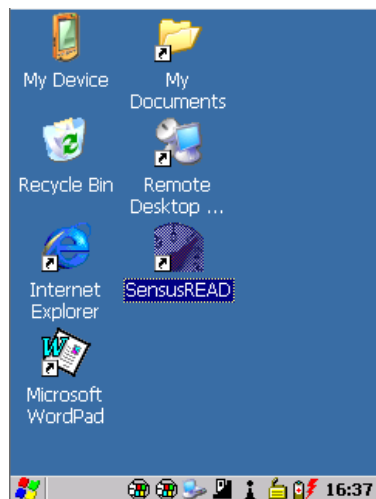
3. Readout of basic data

3.1. Programme start

1. To work with the installed programme click on the item "*Emulate"* (in the left upper bar).
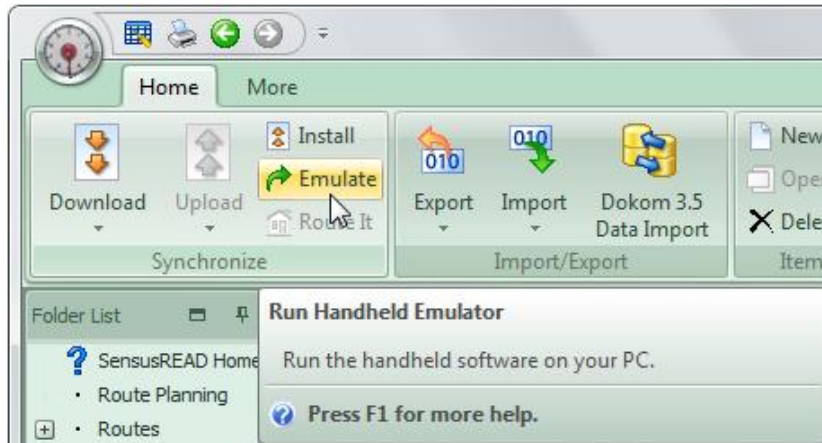
2. In the new window "*Login*" the programme requires to enter the ID of the person performing the readout (freely selectable), choose Expert access level and confirm these login data by pressing " *OK* ".
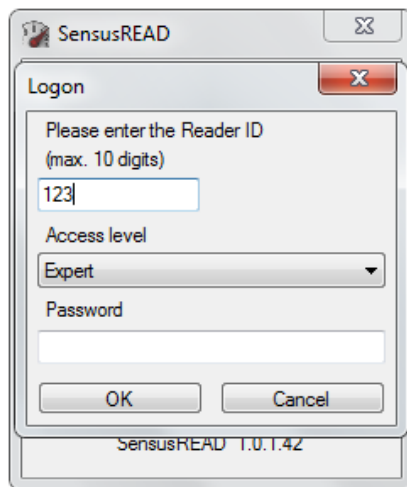
3. Click on the drop-down list of channels located at the bottom of the window and choose the "*Sensus-RF* " channel. Then click on the option "*Route Planning*".
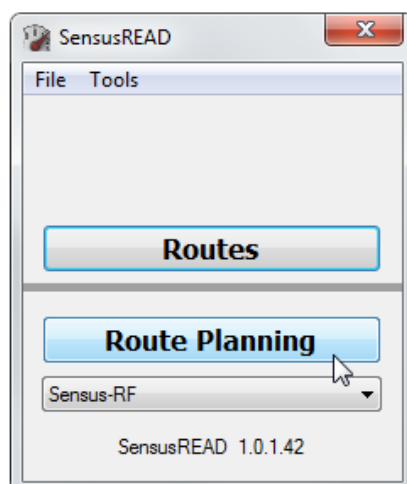
> **Note:**
> The mentioned procedures are displayed on the terminal emulator in PC application, the procedure for SensusREAD installed on the portable terminal is identical. The following steps displayed in the terminal emulator are also identical and equally valid for portable terminal with the SensusREAD programme installed :

4. The new window displays the course of connecting of the SIRT device which is necessary for the communication with devices using radio technology Sensus-RF (e.g. iPERL).

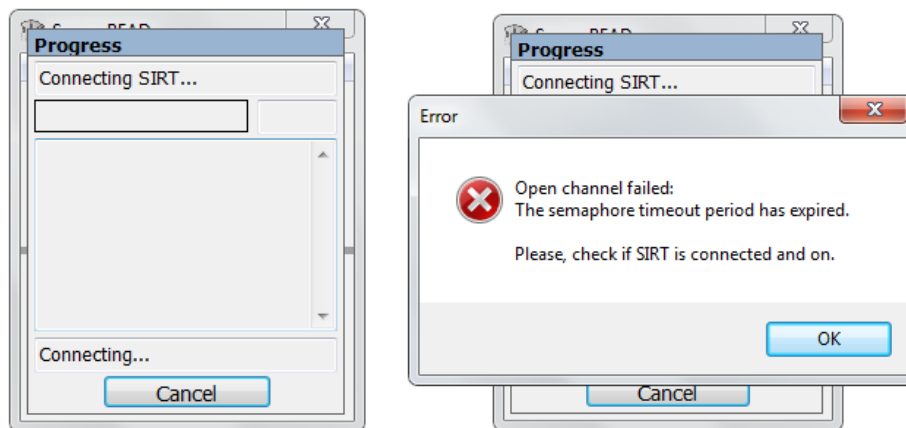5. If the SIRT device is switched off, it is not within the range of the Bluetooth connection, or the COM port is not correctly configured, the programme will report errors when opening a channel - see in the right lower part of the picture below.

6. If the software does not detect SIRT, a window with options for the connection of the SIRT device to a COM port of the PC is displayed. It is also possible to switch between Bluetooth and USB, depending on how SIRT is connected to the PC.

   If the SIRT device uses an additional external antenna, it is necessary to check the option "*External antenna used*". Other settings leave in the default presets.

   After selecting the interface and COM port click on "*Test* ".

7. If the settings are correct a window with an information about the connected SIRT device appears. Click on "*OK* ".
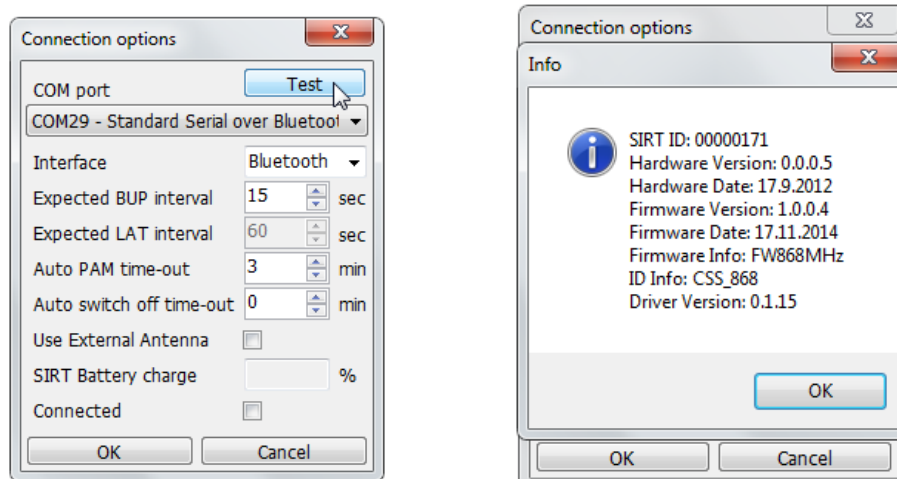
8. If the SIRT device is successfully detected, in addition to other data also the remaining capacity of the battery in the SIRT device is displayed in the window "*Connection options*". Continue by clicking on "*OK* ".
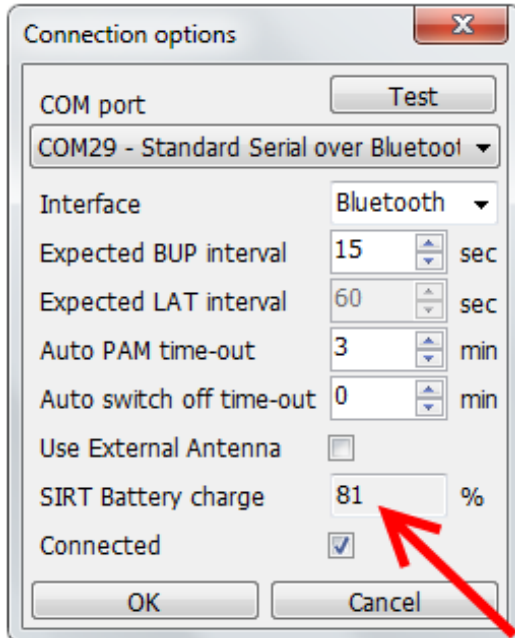
3.2. Readout of end point

1. After a successful connection of the portable terminal with the SIRT device a window for the route planning is opened. The picture below shows an open window containing a list of meters. If the route planning is opened for the first time, the content of this window is empty.
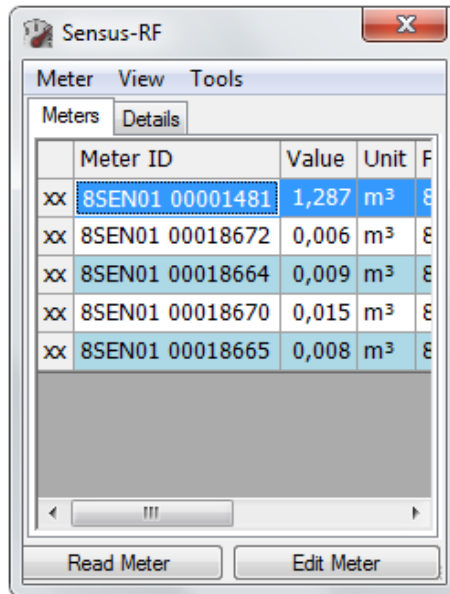
2. In the top left corner click on "Meter ", then on the option "*Read* ".
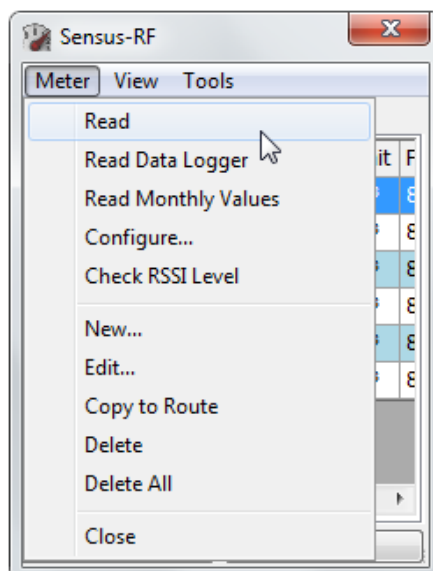
> **Note:**
>
> **The Route Planning** is performed in cases when new meters are installed in the system, when the meters or communication devices are replaced or the SensusREAD software is used for the first time. The route planning is used to define measuring points and their order as they are going to be identified during the route.
>
> **Route** is the list of measuring points in a defined order following each other on a particular route on which the person performing the route must read out the measuring points .

3. In a new window under the tab "*Reading*" enter the radio address of iPERL into the field *"Meter Address"*. The radio address can be found on the side of the meter as shown in the pictures in the note below, or it can be derived from the serial number located on the meter in the top left part above the display.

If the iPERL or iPERLs that will be read out have other than the default encryption key (**a unique key can be requested when ordering**), it is necessary to enter this encryption key in the field "Radio e*ncryption key* ".
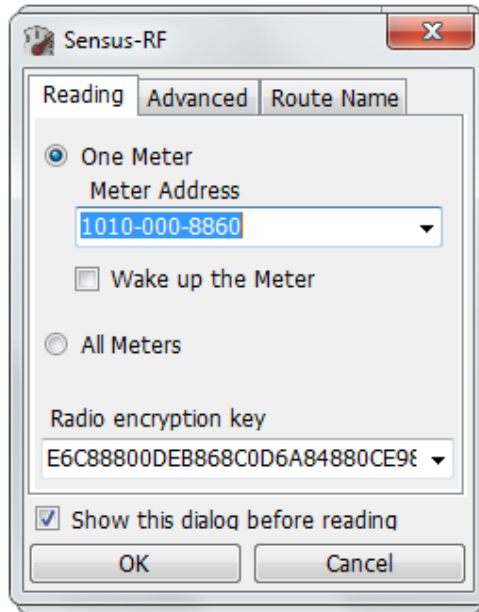
4. When the option *"Read monthly volumes*" is checked under the tab titled "*Advanced*" not only the current reading of the meter will be read out, but also the readings of volume stored in the monthly register as of the set day of the month (as a default the first day of the month). Start the meter reading by clicking on "*OK*".
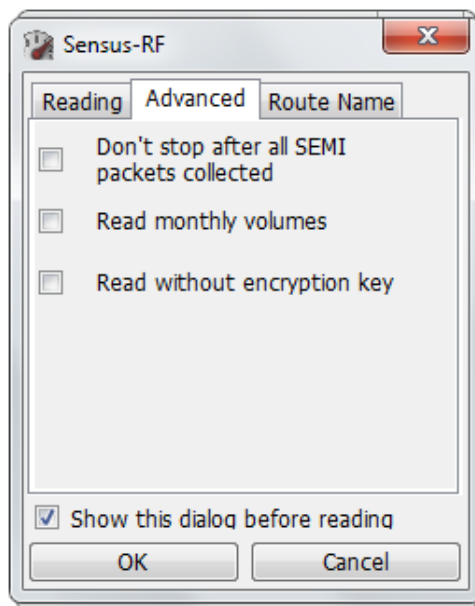
Note:

The serial number 8SEN01 00018677 can be entered as the radio address 1010-001-8677. The SensusREAD programme accepts several formats of this address:

- 1010-001-8677 (format as it is shown on the meter)
- 10100018677 (address format without dashes)
- 010-001-8677 (address format without number 1 at the beginning)
- 0100018677 (address format without number 1 at the beginning and without dashes)
- 05F629F5 (hexadecimal address format without number 1 at the beginning and without dashes)

5. The window opened afterwards shows the progress of incoming BUP packets normally sent by iPERL every 15 seconds. If immediately after the readout iPERL is not configured, it is not required to "*Read monthly volumes*", and it is not necessary to obtain extended data in the SEMI packet, immediately after the message "BUP recv" is displayed, by clicking on "*Cancel*" you can cancel the receiving of other BUP packets. This prevents the programme to wait for the LAT (Listen after talk) window to request extended data from the meter in the form of a SEMI packet or to request monthly volumes from the "monthly" data logger in the form of a LOG packet.
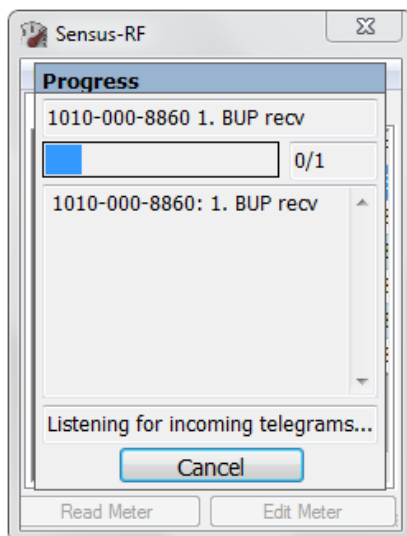
6. After the readout is completed a window "Add" appears with the information: Meter ID, Fabrication number, Type, Register reading and physical unit. In the field "*Comment*" you can enter any comment.
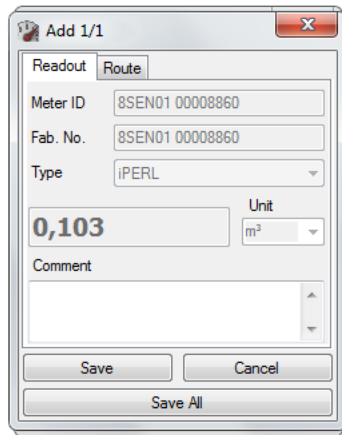
7. By clicking on the tab "*Route*" you can fill in the route name, the position of the meter in the sequence of the route, reading point and reading point sequence. Enter the Site ID into the bottom field (**The Site ID must be unique for each meter!**). All the data in the tab Route can be filled in, or added or changed any time by clicking on the button "*Edit Meter*" located in the bottom right corner of the route planning window. In the event that it is not necessary to fill in these data immediately after the readout, after the reading click on the button "*Save*" and do not fill in the tab "*Route*".
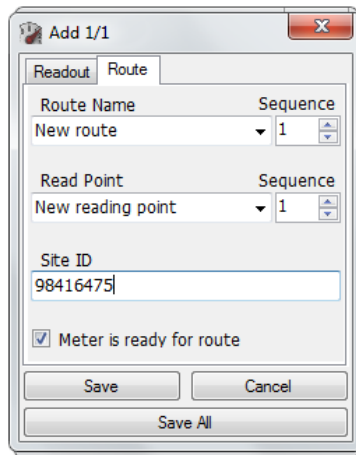
8. After saving the meter appears in the list of meters for the route planning.
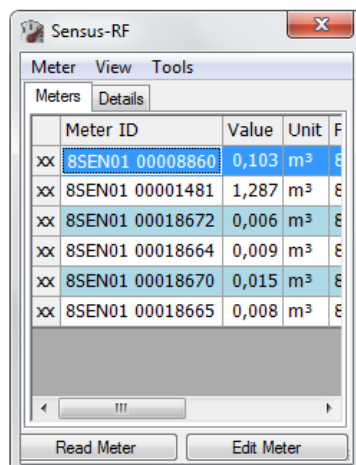
3.3. Readout of all meters within coverage radius

1. In the case of a requirement to read out all the Sensus-RF meters in the proximity, choose the option "*All Meters*" in the readout window. If a different encryption key is used than the standard one, paste it in the box "Radio e*ncryption key*".

2. Under the tab "*Advanced*" by selecting the option "*Don't stop after all SEMI packets collected"*, it is set that even after the SEMI packets have 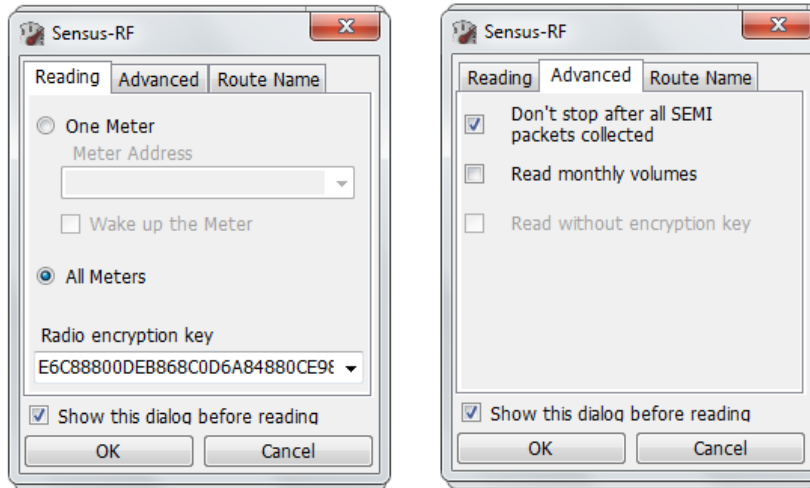been received from all detected meters in the proximity, the software would still try to capture other BUP and SEMI packets.

3. In the window shown below all captured BUP packets can be seen – see the picture below. In the upper part on the right two numbers are visible. The first number, in this case 9, means that SEMI packet with extended information has been already received from 9 meters. The second number indicates the quantity of meters from which the BUP packet has been received, in this case 27. By clicking on the button "*Cancel*" during receiving SEMI packets, their reception will be interrupted. However, we recommend not to interrupt the process of receiving the SEMI packets immediately, in order to avoid that the SensusREAD programme fails to read out any of the meters (a standard interval of the BUP packets transmission with iPERL is 15 seconds). When SensusREAD receives the SEMI packet from all detected iPERLs in the range (in this case there would be 27/27 in the upper-right corner) it terminates the readout automatically, but only in the case that in the tab "*Advanced*" the option "*Don't stop after all SEMI packets collected"* was not marked. In the case you have made the described choice it is necessary to exit the readout manually by selecting "*Cancel*".
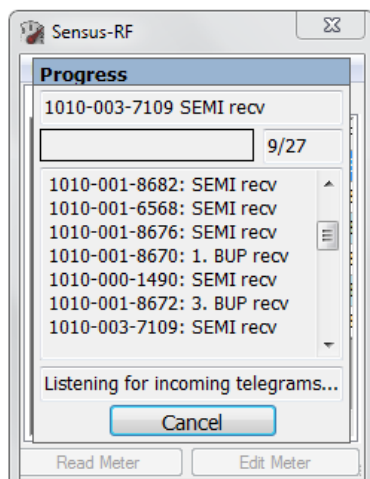
4. After all Sensus-RF devices (e.g. iPERLs) in the range have been read out, the programme identifies new meters (the ones that have not been yet included in the list of meters) and invalid meters. New meters can be marked and then by clicking on "*OK*" added to the list of meters.
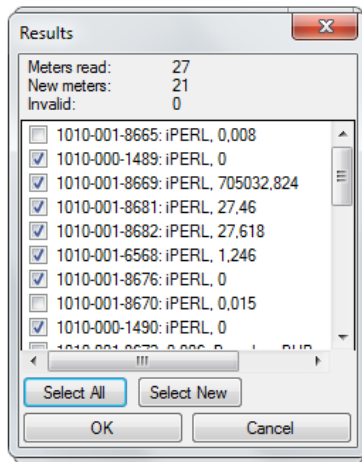
5. In the next window, you can add each meter to the route separately (the number of the added meters is displayed in the entry "*Add 1/21")* by selecting the option "*Save"* or by "*Save* all" to add all the new identified meters.
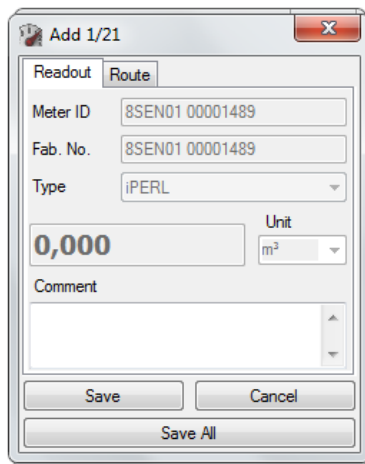
6. In the picture below you can see the meters added to the already existing list of meters in the window for the route planning.

MD 5010 SK
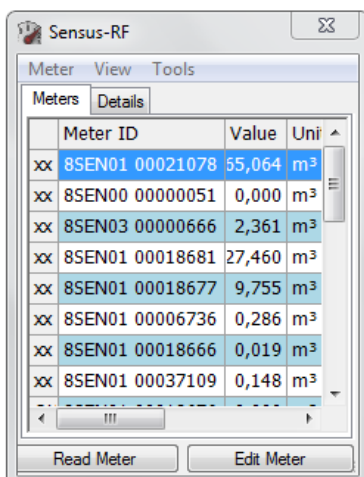
3.4. Testing of signal level

The function of testing the signal level can be used before installing the iPERL meters in order to determine in what distance the meter can be actually read out in the given installation conditions.

1. In order to determine the signal level, in the window for the route planning click on the menu "*Tools*" and choose the option "*Connection Options*".

2. In the displayed window "*Connection options*" by clicking on the button "*Test*" verify the functionality of the connection between the portable terminal and SIRT. If the SIRT device uses an external antenna make sure that the option "*Use External Antenna*" (highlighted by the red arrow in the picture) is selected.
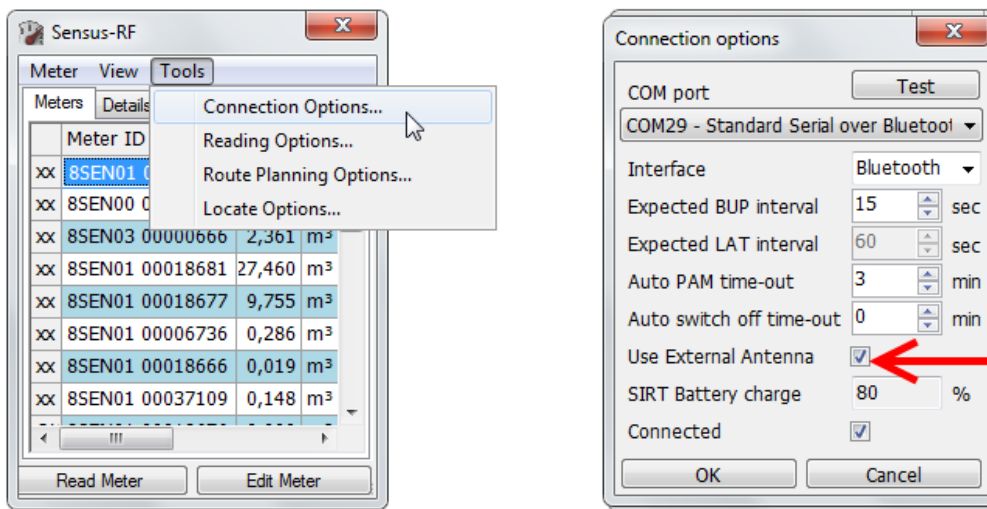
3. In the window for the route planning left-click on the meter the signal level of which is to be measured.
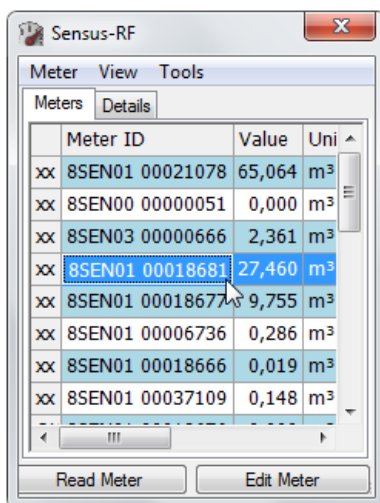
4. To test the signal level, it is necessary to make sure that the SIRT device is in the correct (vertical) position and directed to the measuring point. By the option "*Meter*" and then "*Check RSSI Level*" the testing of the signal is selected .
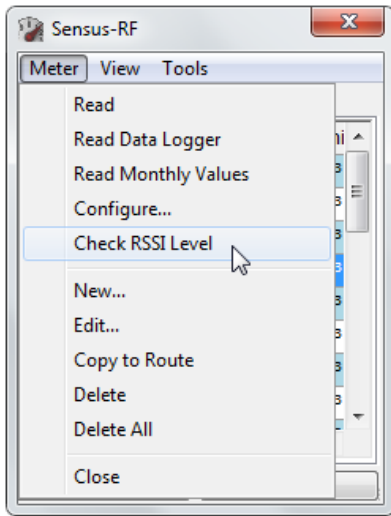
5. In the window opened afterwards the signal level between the SIRT device and iPERL meter is displayed. Every 15 seconds, when iPERL transmits, a new point appears in the diagram with a percentage value of the signal level. The small box in the lower middle part of the window shows the average signal level of the measured values.
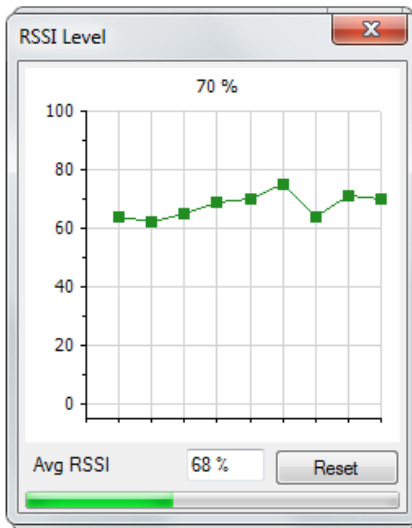
4. Configuration

4.1. Setting of programme display

1. In the window for the route planning by selecting the option "*View*" you can set the display of four tabs: "*Details, Readout, Events, Log*". These will then appear in the window for the route planning as new tabs containing additional information about the read out meters. The content and description of these tabs is described in steps 6 to 9 below.

2. If under the tab "*View*" the option "*Columns*" is selected, in the following window the data which should be displayed in the columns of the measuring points in the window for the route planning can be selected.
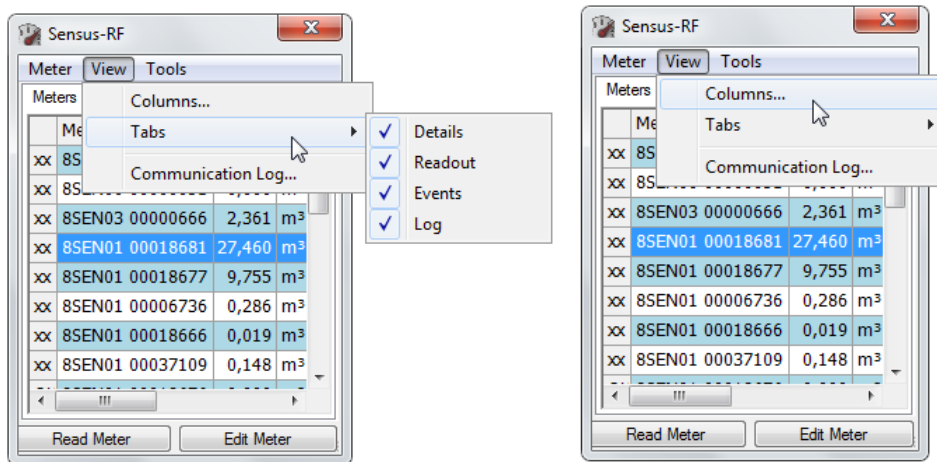
3. As it can be seen in the picture below on the left, by default, the following data are displayed in the columns: Meter ID, Date, Value and Unit.
To these standard data it is possible to choose others from the menu - e.g. as seen in the picture on the right the option to display: Site, Route, Sequence, Point, Type.
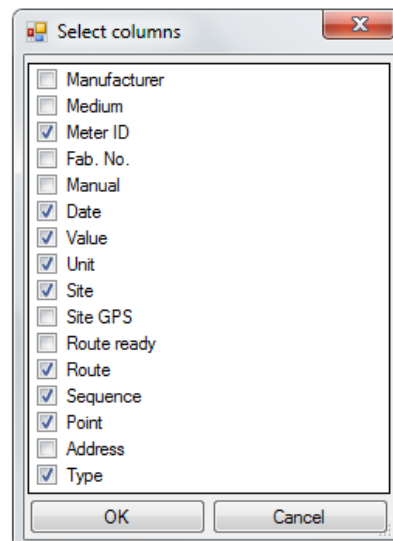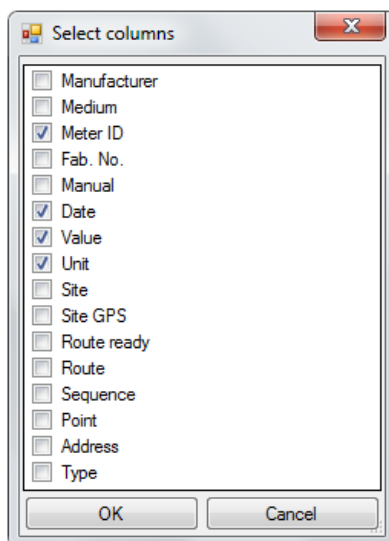
4. The window size is adapted to the display of the portable terminal. However in the terminal emulator on a PC it is possible to adjust its size as follows: move the cursor to the edge of the window, where it changes into a double-headed arrow, hold the left mouse button pressed and by moving the arrow towards the outside of the window, the window expands.
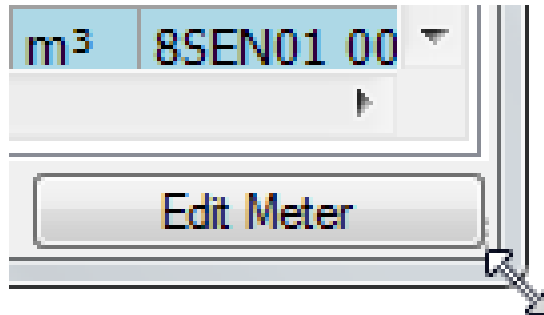
In the picture below you can see an enlarged window of the route planning with the standard display settings.
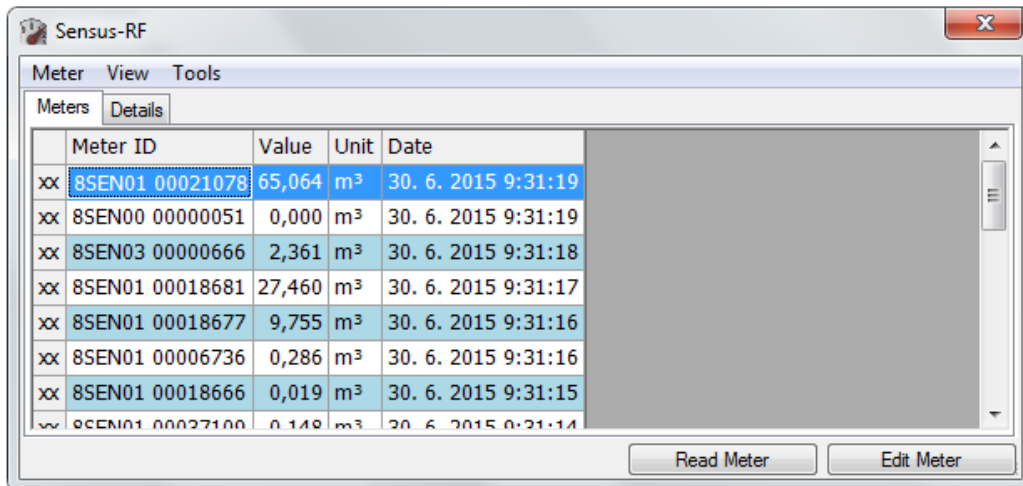
The following picture shows the same window for the route planning but with added tabs and columns according to the steps 1 to 3 listed above.
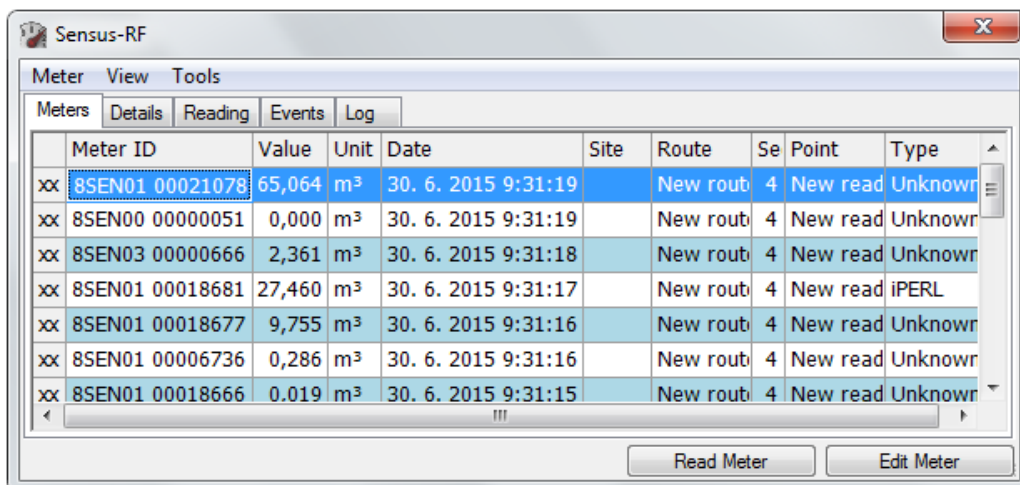
5. The width of each column can be changed by holding the pressed left mouse button on the edge of the desired column in the row that contains the header (column titles) and then moving the cursor to the left or right.
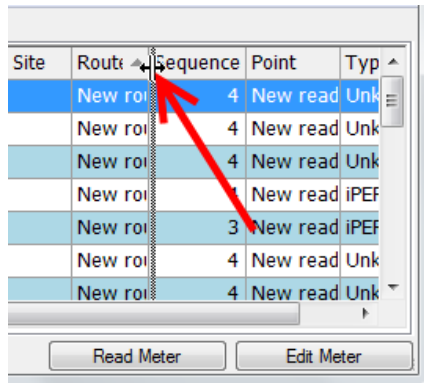
6. Under the tab "*Details*" extended information about the meter indicated in the tab "*Meters*" is displayed.
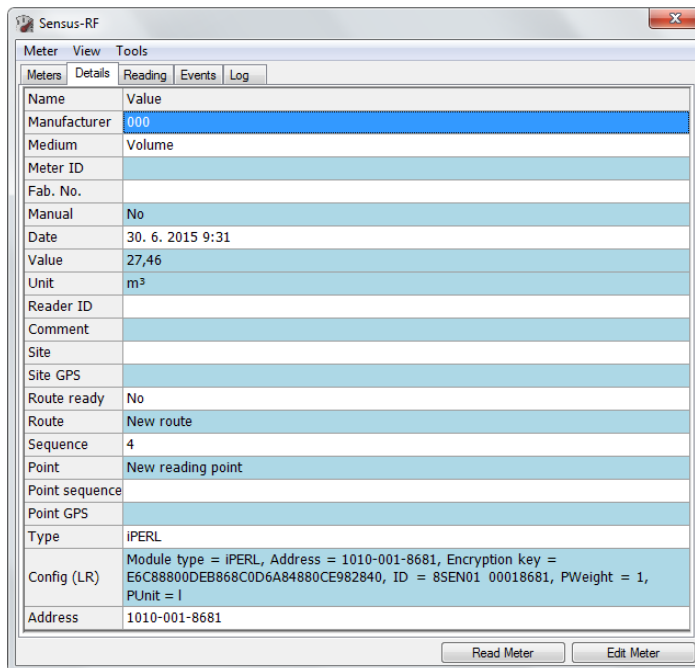
7. Data obtained from the meter readout are displayed under the tab "*Reading*". In the picture below during the readout besides the BUP packet also the SEMI and LOG packets have been received from the meter so also the items "*Backward Volume*" and "*Stored value*s" are included. "*Stored value*s" display the records of the volume register, stored in the "monthly" data logger (these data were selected by the option "*Read monthly volumes*" in the tab "*Advanced*").
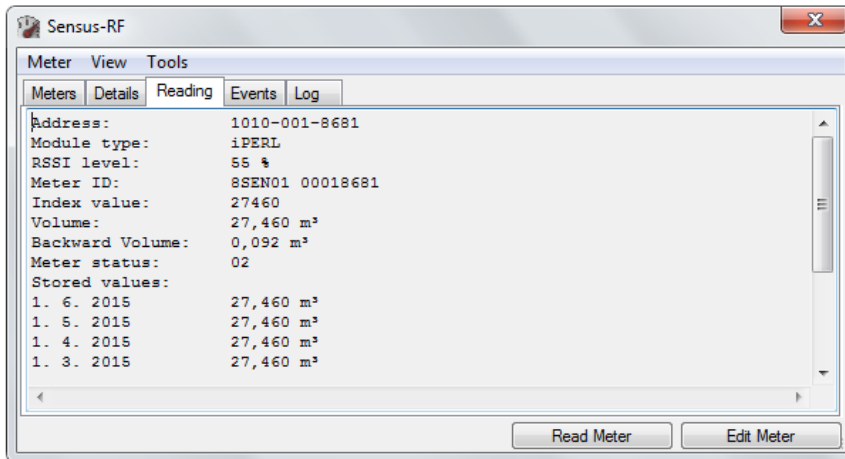
In the event that, after the BUP packet has been received, the option "*Cancel*" was selected, the data of the readout would be as follows:
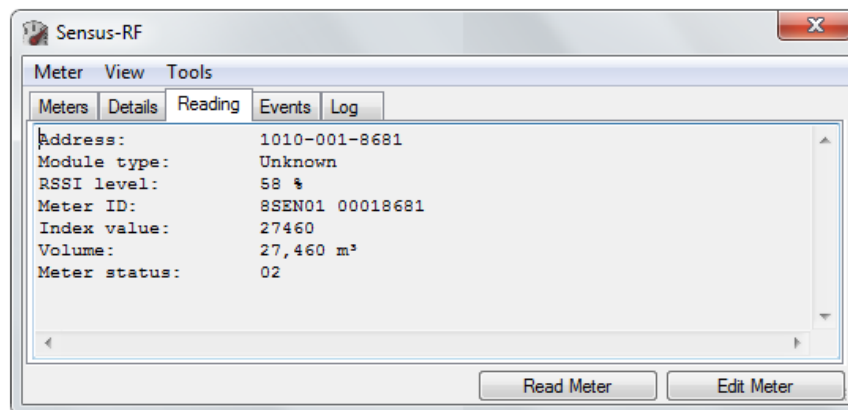
8. In the tab "*Events*" the information on the events (alarms), which took place during the operation is available. If in addition to the BUP packet also the SEMI packet was received from the meter also a more detailed information is available on the events (alarms), such as the date and time of the first occurrence and the last end of the event. In the case of a reverse flow also the volume flowed back would be displayed.
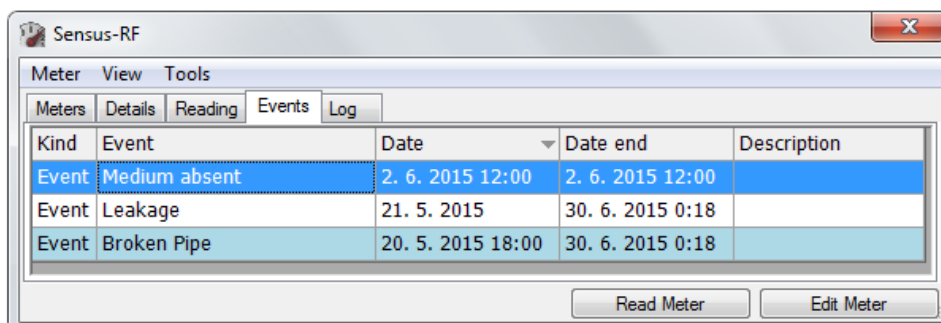
The BUP packet contains only information on the existence of an event/events. In the picture below you can see that in this case the programme SensusREAD adds to the events also an information that the SEMI packet was not received and thus the readout was created only on the basis of information from the BUP telegram. More detailed information about the events are also not available, since BUP packet does not contain such data.
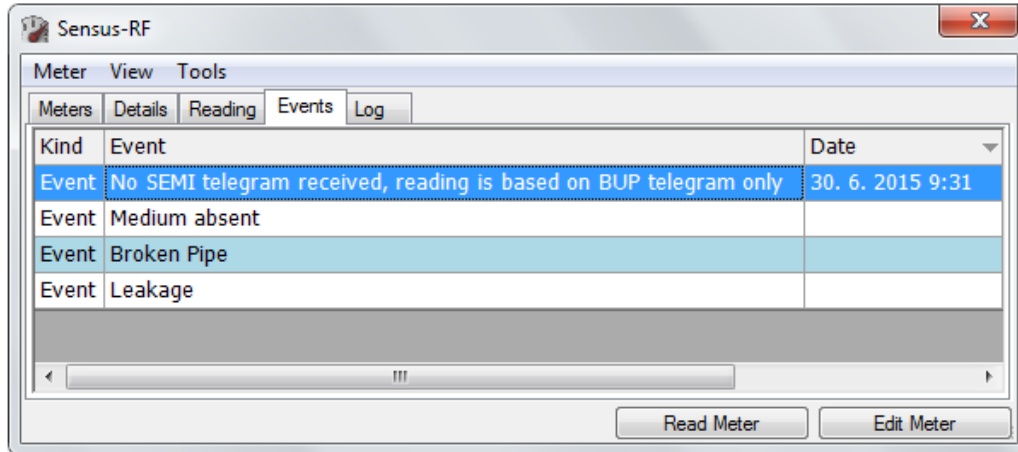
9. Under the tab "*Record*" a detailed listing of the entire communication between the SIRT device and iPERL, together with the content of the sent packets in a hexadecimal format is available. Understanding the content of this window requires a technically advanced user and comprehensive knowledge of the Sensus-RF communication protocol this manual does not address.
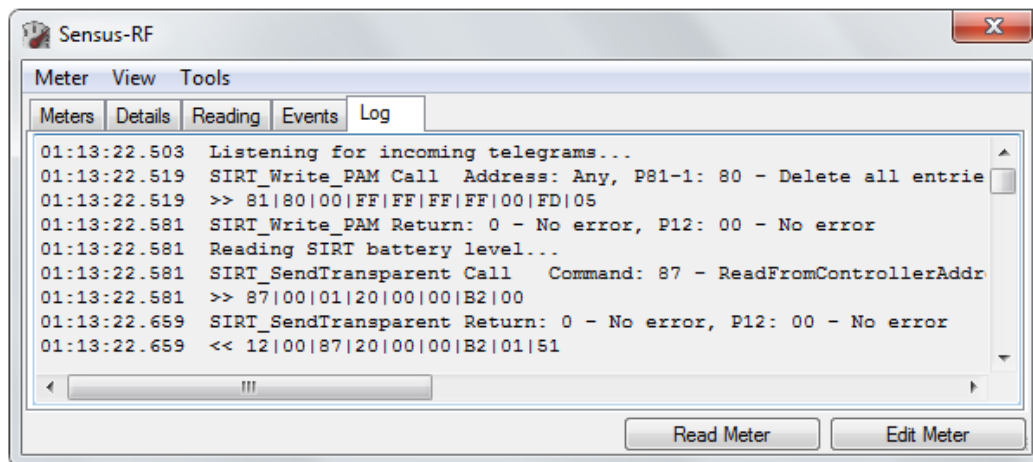
4.2. Basic configuration of the meter

1. If iPERL is in the list of meters its setting can be changed. By marking iPERL in the list of meters and by clicking with the left mouse button on the "Meter" option and selecting the option "Configure" the download of the current configuration of the particular meter starts.
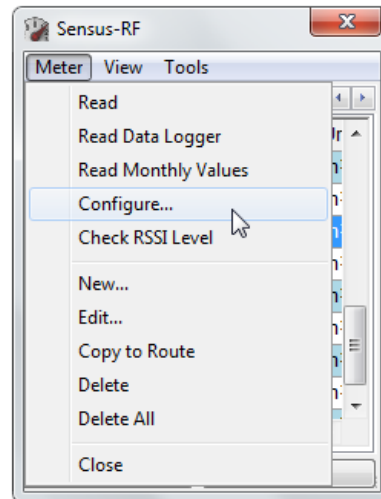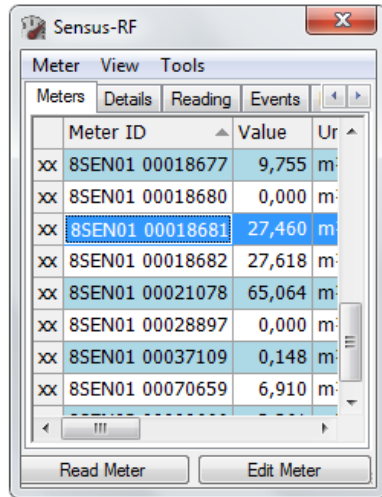
2. In the next window, you can see the progress of the current meter configuration downloading, this process should take no more than 1 minute.
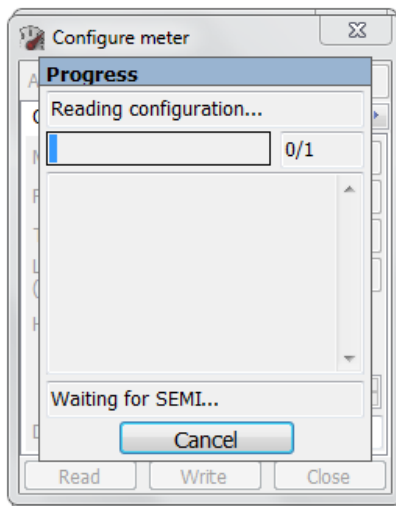
3. In the window of the meter configuration under the tab "*General*" the following items are displayed:

    -   **Meter ID:** As a default the ID of the meter is its fabrication number (8SEN01 00018677). When you change the ID of the meter, make sure that it is unique and not identical with any other meter. Maximum 9 characters can be entered in the box for the meter ID.
    -   **T-interval** and **LAT frequency:** These items are constant and inform about the frequency of BUP packets transmission by iPERL (every 15 seconds) and of the LAT window frequency when iPERL listens in the radio band (after every fourth BUP packet).
    -   **Hydraulic test mode:** By means of this option iPERL can be switched to the test mode. The test mode is used only for the need to test the meter for meeting metrological parameters and for the purposes of subsequent verification.
    -   **Date/time:** This field displays the date and time configured on the meter, by default it contains the UTC time, it can be changed.

    In the event of any allowed change in the configuration of iPERL, always click on the middle bottom part of the window on the button "*Write*".
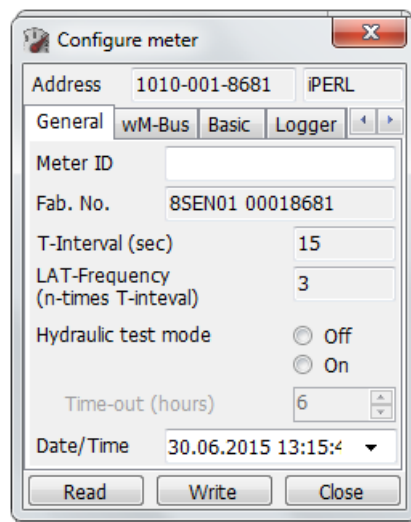
4. After clicking on the button "*Write*" the programme always asks you whether you want to change the configuration of the given meter. By selecting "*Yes*" you confirm the choice of a new configuration and its registration may take up to 1 minute, depending on how far is the LAT window interval, during which iPERL may receive PAM, i.e. the packet with instructions.

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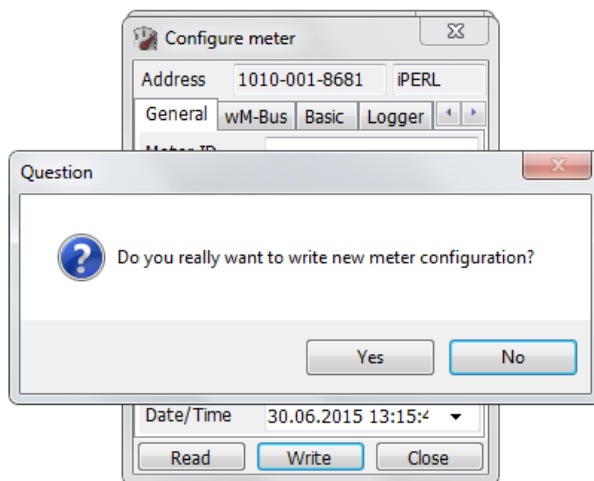
5. The "wM-Bus" tab is for setting the communication by means of the Wireless M-Bus Protocol which is an open communication standard OMS. wMBus is by default active after the installation of iPERL and awakening of the radio communication and the data in this protocol are sent in 60-minute intervals. In this tab the wMBus protocol can be turned off or switched into an installation mode. The default mode is "T Mode OMS", which means that the protocol communicates according to OMS specification of T1 mode. By selecting "*T Mode not ecnrypted*" the communication will not be encrypted.
Packets in the Wireless M-Bus Protocol are sent every 60 minutes by default. This time can be adjusted in 15-minute intervals ranging from 15 to 240 minutes

6. In the tab "*Basic*" the type of the meter read out is displayed, in this case "*Water meter*", *the value* and *the unit* with which the meter works, *meter index* (the volume flowed through) in m^3 and *the current flow* recorded at the moment of the reading. By selecting the option "*Deactivate Transmitter*", it's possible to turn off the radio messages sent by the iPERL.
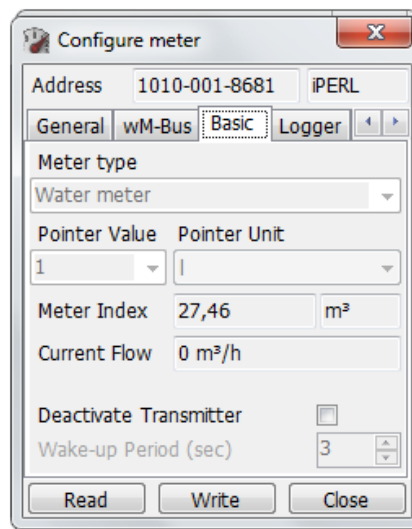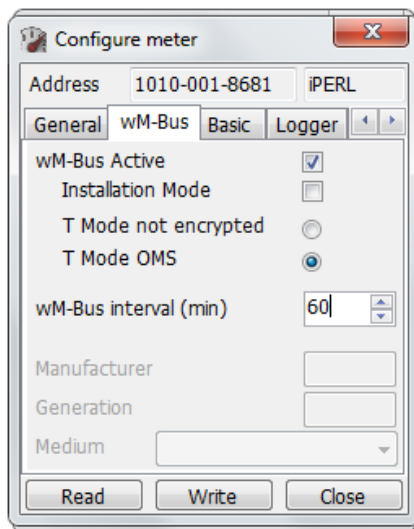
4.3. Configuration of Data loggers

iPERL has two data loggers, each of which has its own reserved memory, in which the pre-set parameters in various time intervals are stored. These data loggers are divided into:
- **"Minute" data logger**
- **"Monthly" data logger (FDR – Fixed Date Reading)**

After the data logger is full it automatically overwrites the oldest stored value (the so-called scrolling). Packets containing data from data loggers are called "LOG".

Data which may be stored in both data loggers

a) **Alarm State*** - informs about the kind of the alarm event recorded by iPERL.

b) **Counter***- status of the volume flowed through displayed on the display of the meter

c) **Backward volume** - status of the volume flowed through measured in the reverse direction of flow

d) **Maximum flow rate** – the value of the maximum flow rate recorded during the set time interval for saving

e) **Time of the Maximum flow rate:**
   1. Minute data logger: The number of 1-second intervals when the maximum flow rate occurred during the set time interval for saving
   2. Monthly data logger: Date and time when the maximum flow rate occurred during the set time interval for saving

f) **Current flow rate** – the value of the average flow rate recorded during the set time interval for saving

g) **Broken pipe flow rate** – The value of the flow rate recorded by iPERL on the occurrence of a ruptured pipe alarm event

h) **Time of broken pipe flow rate** – The date and time when this event occurred during the set time interval for storing

i) **Minimum flow rate** – The value of the minimum flow rate recorded during the set time interval for saving

j) **Time of the minimum flow rate:**
   1. Minute data logger: The number of 1-second intervals when the minimum flow rate occurred during the set time interval for saving
   2. Monthly data logger: Date and time when the minimum flow rate occurred during the set time interval for saving

k) **Forward counter** - Reading of the volume flowed through measured in the forward direction of flow

l) **Date/Time of saving** -The date and time when the given data was stored in the data logger

   *-These values are always stored and the setting of their storage cannot be changed

1. The **Minute "Data logger"** saves data by default - every 60 minutes.
   The reading of the meter register (counter) and state of alarms (events) completed by the date and time of saving is always saved in the data logger. Saving of these data in a data logger cannot be turned off.
   By default iPERL saves also the values of the maximum and minimum flow rates. When the interval for saving is every 60 minutes it has the capacity of data storing for the last 179 days.
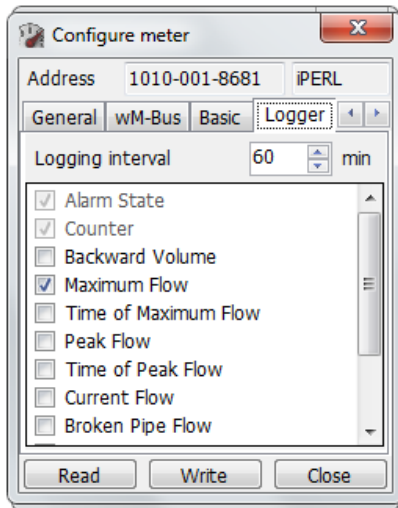
2. More detailed information can be stored in the minute data logger. To store also other than the default values it is necessary to mark them in the configuration of the particular meter – see the picture below:
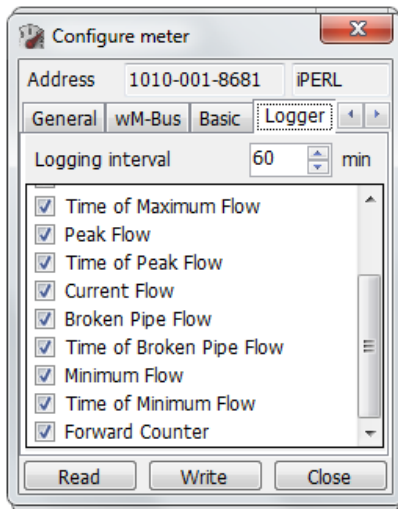
The data storage interval can be set for the following values shown in the table:

Time interval of saving [min.]				
1	2	3	5	6
10	15	30	60	120
180	300	360	720	1440 (1 day)

The longer interval is set, the longer will be the data stored in the memory until they are overwritten by new ones. When setting the saving of all the information available in an interval once every 1 minute iPERL can store data for the last 26 hours. Such a short interval may be appropriate in various specific cases when it is necessary to create a very detailed statistics during a short period of time.

In the table below you can see some examples of the number of savings in the minute data logger with specific intervals for saving and selected values as well as the period for which they are stored. The meanings of the individual stored values indicated by small letters are identified more specifically in the list "Data that can be stored in both data loggers", mentioned at the beginning of this chapter.

Stored values	Saving interval	Number of savings	Data for the period
a), b), l), - 3 basic	1 min.	6041	4.1 days
a), b), l), - 3 basic	60 min.	6041	251.7 days
a), b), l), - 3 basic	1440 min. (1 day)	6041	16.5 years
a), b), d), e), l)	60 min.	3776	157.3 days
a), b), d), e), l)	1440 min. (1 day)	3776	10.3 years
a), b), d), e), i), j), l)	60 min.	2746	114.4 days
a), b), d), e), i), j), l)	1440 min. (1 day)	2746	7.5 years
a), b), c), d), e), f), i), j), l)	60 min.	2157	89.8 days
a), b), c), d), e), f), i), j), l)	1440 min. (1 day)	2157	5.9 years
All	1 min.	1589	26.4 hours
All	60 min.	1589	66.2 days
All	1440 min. (1 day)	1589	4.3 years

3. **Monthly data logger (FDR)** can be found under the "*Fixed Date Reading*" tab.
   Fixed Date Reading is the readout set for a specific day of the month. The readout day can be selected in the range from the 1st to 28th. On this day, the pre-selected data are stored in the memory allocated for the "monthly" data logger (FDR). In the standard setting all the options except "*Forward counter*" are chosen to be stored in the memory.

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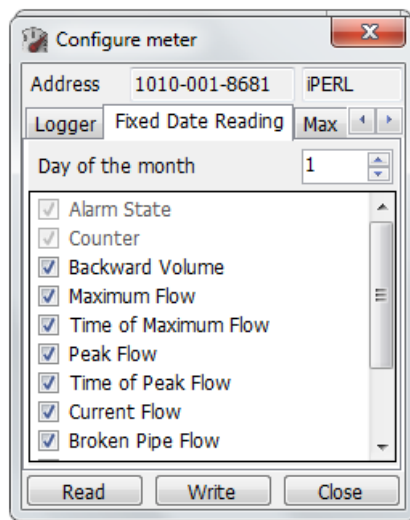
In the table below you can see some examples of how many savings can be stored in the monthly data logger with selected values as well as the number of months for which they are stored. The meanings of the individual stored values indicated by small letters are identified more specifically in the list "Data that can be stored in both data loggers", mentioned at the beginning of this chapter.

Stored values	Number of	Data for the period
a), b), l), - 3 basic	102	102 months
a), b), d), e), l)	64	64 months
a), b), d), e), i), j), l)	46	46 months
a), b), c), d), e), f), i), j), l)	36	36 months
All	26	26 months

!Warning:

The options "**Peak flow**" and "**Time of peak flow**" **are not supported**, therefore do not use those options in the data loggers. When even one of these options is selected when reading the data from data loggers, the SensusREAD programme can display the window with an error message and the readout will not be completed correctly, it will be necessary to repeat it.

!Warning:

Before making any changes to the data logger configuration it is necessary to make sure that all previously stored data are read out, or are no longer needed, since after making any changes in the configuration of any data logger the data already stored before the implementation of the changes will not be available. Data storage starts again.

4. Under the tab "*Max* " the date, time and the value of the maximum flow rate ever recorded by iPERL is displayed. By selecting the option "*Reset* " this data can be reset.
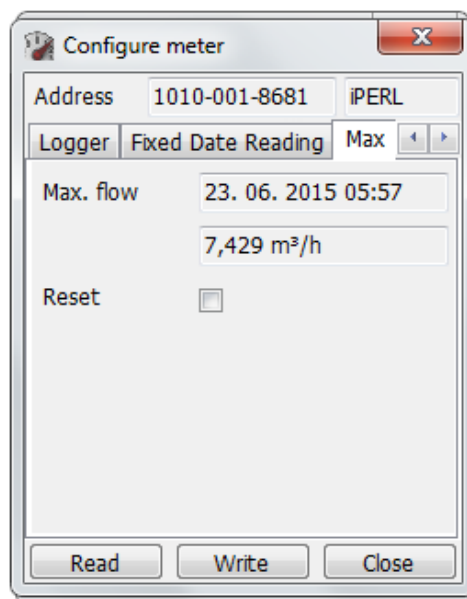
5. By clicking on the tab "*Events*" the next menu of a lower level with sub-tabs is displayed.
In the first one of these - "*Auto reset* " you can set the time interval defining the time after which the alarm status and information about events (alarms) in the fields "*Started*" and "*Stopped* " are reset. After resetting iPERL will not send the information about the alarm events in the BUP packet. If an event occurs again later, iPERL will include it in the BUP packet again and will be sending it up to the next automatic reset of alarms. By default this function is activated with the length of the interval 29 days. The configuration can be changed only by whole days within the range from 1 to 90 days. You can deactivate the automatic alarms reset state by deselecting " Enabled ".
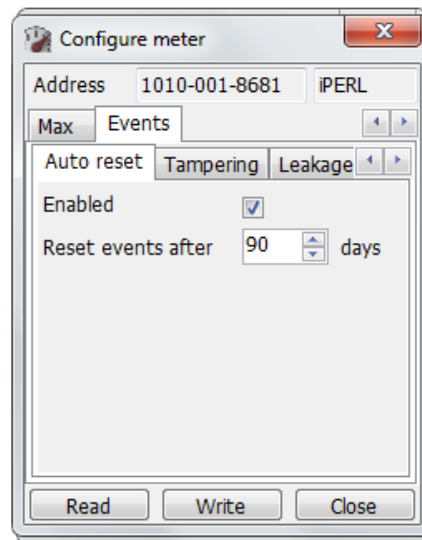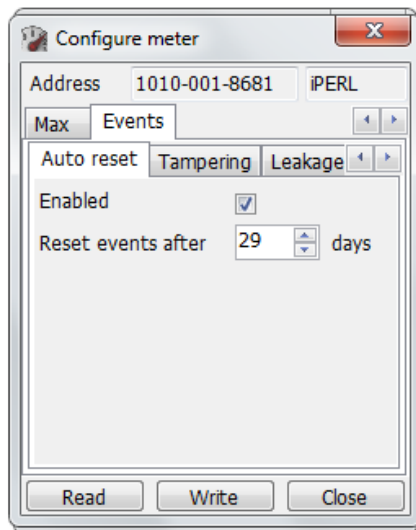
6. In the tab "*Tampering*" it is possible to disable or enable the detection of attempted tampering by a magnet near the iPERL meter. By default the detection of this event is enabled, as well as the detection of all other events. If iPERL comes into contact with a magnet the field "*Detected*" would display the date and time of the first time such tampering occurred. The field "*End* " shows the date and time when the last tampering ended. By selecting "*Reset*" the data in the fields "*Detected*" and "*Stopped*" are reset. By this the alarm event is deleted, i.e. iPERL is not going to send an information about this event in the next BUP packets until a new event.
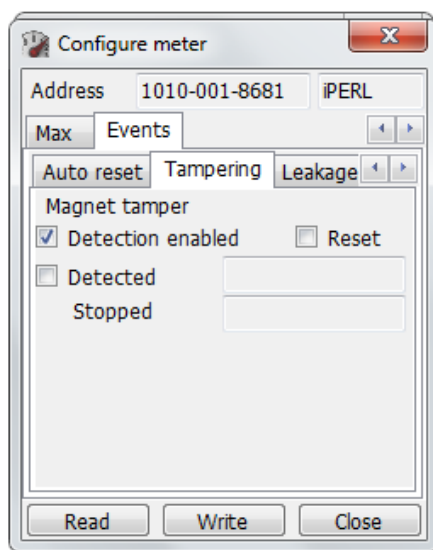
7. The tab "*Leakage*" allows you to set the conditions for evaluation of the situation as an alarm event due to leakage occurrence. By default, this event is set with a limit of 25 l/h during the 6 hour period of detection. This means that if iPERL detects a flow rate higher than the established limit of 25 litres per hour, and at the same time this flow rate does not fall below the threshold of 25 litres for longer than 6 hours, this condition will be evaluated as an alarm event due to the occurrence of leakage.
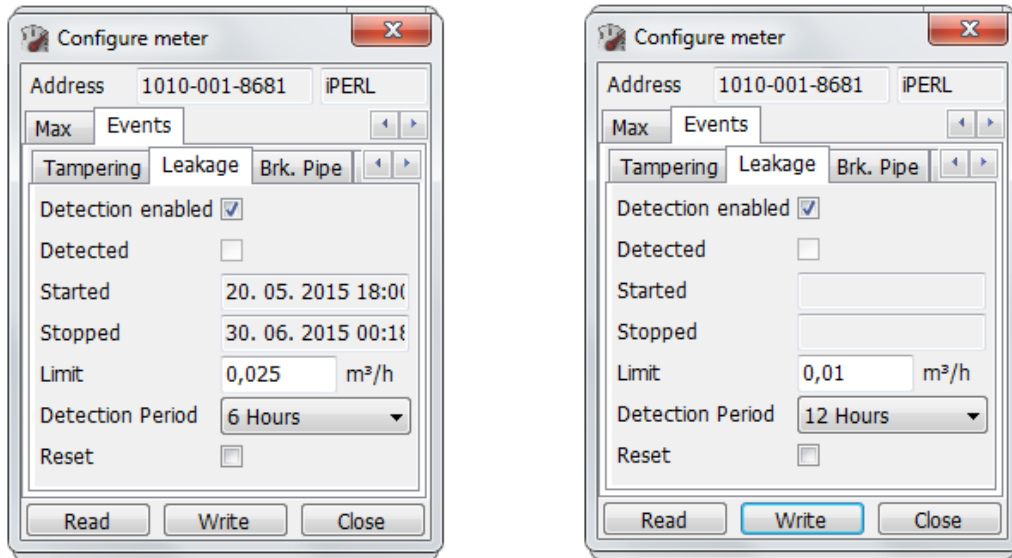
For an alarm event of the type "*Leakage*" a limit of the flow rate and period of detection can be set at the values listed in the following tables:

Configurable values of flow rate for the event "*Leakage*" [l/h]							
1.25	2.5	3.75	5	6.25	7.5	8.75	10
12.5	25	37.5	50	62.5	75	87.5	100
125	250	375	500	625	750	875	1000
1250	2500	3750	5000	6250	7500	8750	10000

Configurable values for the period of detection for "*Leakage*" [h]			
1	2	6	12
24 (1 day)	72 (3 days)	168 (7 days)	336 (14 days)

The required value can be directly entered in the field "*Limit*" in the SensusREAD programme. In the event that a different value is entered than one of the above values, it will be automatically changed into the nearest lower value shown in the table, e.g. a leakage limit set to 60 l/h will be automatically changed to the nearest lower configurable value, i.e. 50 l/h.

The date and time of the first occurrence of this event can be seen in the field "*Started*", while the field "Stopped" displays the date and time of the end of the last recorded event of this type. By selecting "*Reset*", or changing the configuration of this event the data in the fields "*Started*" and "Stopped" are reset and at the same time, this event is deleted and iPERL stops sending the information about this alarm in the BUP packet (until the occurrence of the next event of this type) .

8. In the tab "*Brk. Pipe*" you can configure the flow rate limit and detection period in the same way as with leakage. For iPERL with diameters DN15 with a nominal flow rate Q3 = 2.5 m^3/h the set default flow rate limit is 2.5 m^3/h with a detection period of 4 hours. If in this case the flow rate was higher than 2.5 m^3/h and this condition continuously lasted more than 4 hours, iPERL would assess this situation as an alarm event "*Broken pipe*".

With iPERLs with DN20 to DN40 diameters as a default the limit is set to 3.75 m3/h with the same detection period.
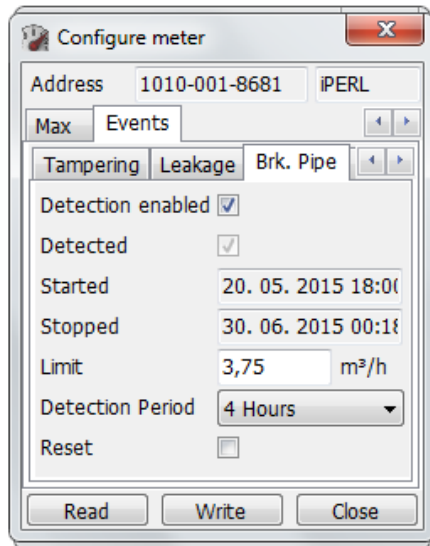

For an alarm event of the type "*Broken pipe*" a limit of the flow rate and period of detection can be set at the values listed in the following tables:

Configurable values of flow rate for "*Broken pipe*" [m^3/h]				
1.25	2.5	3.75	5	6.25
7.5	8.75	10	12.5	25

Configurable values for the period of detection for the "*Broken pipe*" [min]			
15	30	45	60
120	180	240	300

The date and time of the first occurrence of this event can be seen in the field "*Started*", while the field "*Stopped*" displays the date and time of the end of the last recorded event of this type. By selecting "*Reset*", or changing the configuration of this event the data in the fields "*Started*" and "*Stopped"* are reset and at the same time, this event is deleted and iPERL stops sending the information about this alarm in the BUP packet (until the occurrence of the next event of this type).

9. The event "*Medium Absent*" occurs in the case if iPERL detects that the hydraulic part of the meter is not internally filled with water. The date and time of the first occurrence of this event can be seen in the field "*Started*", while the field "*Stopped*" displays the date and time of the end of the last event of this type. By selecting "*Reset*", the data in the fields "*Started*" and "*Stopped*" are reset and at the same time, this event is deleted and iPERL stops sending the information about this alarm in the BUP packet (until the occurrence of the next event of this type).
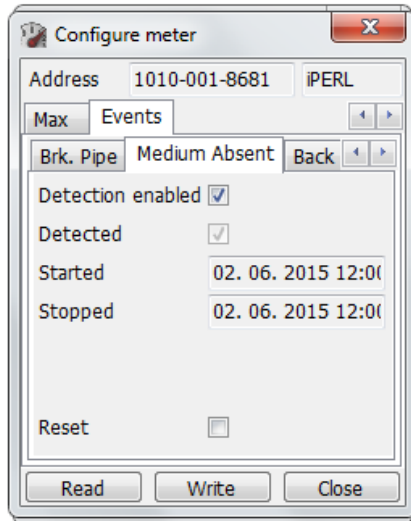
10. The alarm message "*Back flow*" appears in the event that the medium flows through the meter in the opposite direction than the fixed forward flow direction, which is shown during the whole operation of iPERL by an arrow on the display. If iPERL detects flow in the opposite direction, it evaluates it as an alarm event and records the volume flowed through in the register for the reverse volume.

The date and time of the first occurrence of this event can be seen in the field "*Started*", while the field "*Stopped*" displays the date and time of the end of the last recorded event of this type. The field "*Backward volume*" shows the total volume flowed through in the reverse direction. By selecting "*Reset*", the data in the fields "*Started*" and "*Stopped*" are reset and at the same time, this event is deleted and iPERL stops sending the information about this alarm in the BUP packet (until the occurrence of the next event of this type).
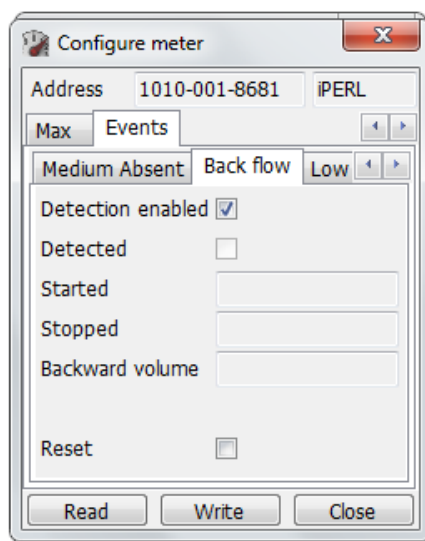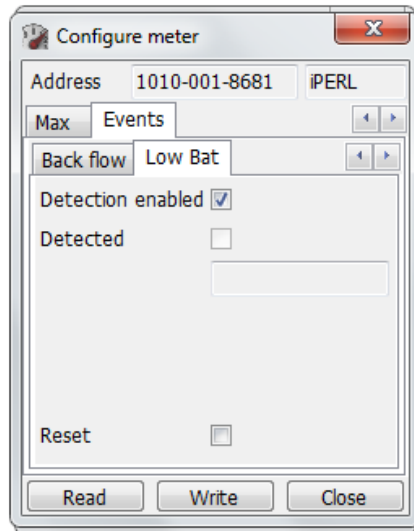

11. The last tab of possible alarm events "*Low bat*" is an alarm message on discharged battery. This

message is shown by iPERL 1 year before the actual discharge of the battery. At this moment iPERL switches to the low consumption mode.

> **Note:**
>
> **On occurrence of any event, a flag symbol indicating the occurrence of an alarm event appears in the upper right corner of the iPERL meter display. The flag symbol remains displayed for the duration of the event. If the event stops, the flag symbol disappears, but the information about the fact that this event occurred will continue to be sent in BUP packets.**

By default, detection of all events is activated in iPERL by the manufacturer. This setting can be individually changed for each event by deselecting the option "*Detection enabled*".

Each event can be individually reset by selecting the option "*Reset"* in the appropriate tab.
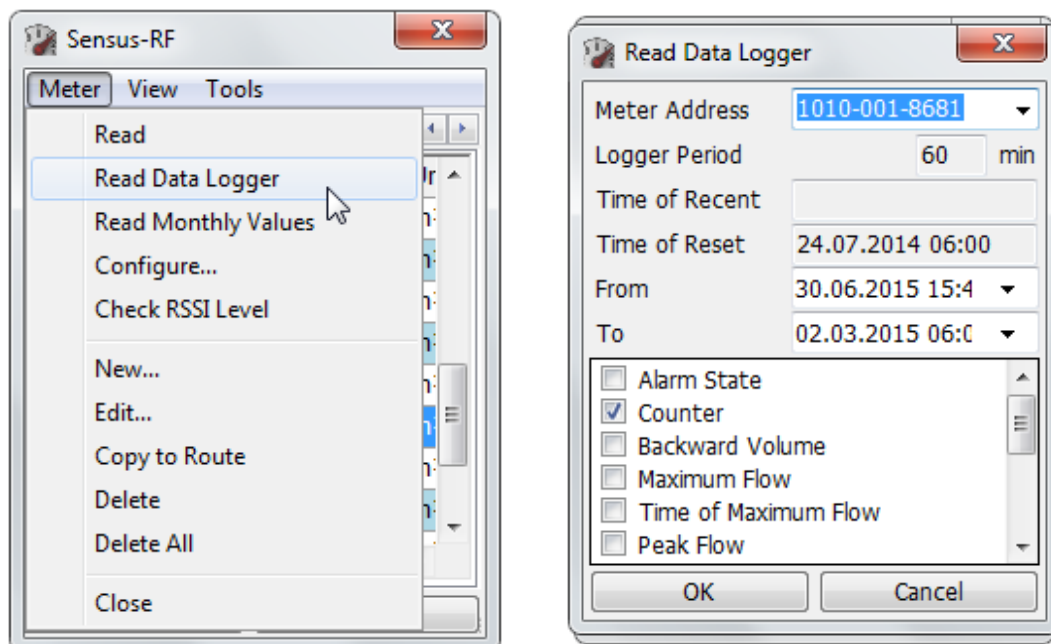
In case of a configuration, reset of an event or any other authorized change it is always necessary to use the button "*Write*", otherwise the changes will not have any effect.

5. Reading of data from data loggers

5.1. Readout of the "minute" data logger

1. In the window for the route planning in the menu "*Meter*" select the option "*Read Data Logger*".

2. The upper field in the new window shows the radio address of the iPERL, which was marked in the list of meters (before the option "*Read Data Logger*" has been selected). If you want to read out a different meter, simply overwrite the address. The fields located below the address of the module have the following meanings:

   - **Logger Period**: It displays the interval in which data are stored in the data logger, by default the period is 60 minutes.
   - **Time of Recent**: Contains the date and time of the last readout of the data logger.
   - **Timer Reset:** Displays the date and time of the change of the stored data selection setting.
   - **From**: In this field you can set the date and time from which the data are to be read from the data logger. By default, the current date and time are set.
   - **To**: In this field you can set the date and time in the past until when the readout is to be done. By default, the same date and time is set in this field as the date and time in the field "*Time of Recent*", to perform the readout of the data logger from the present moment up to the last readout performed.

   By default, only the *counter* readout is pre-set for the meter, but in case the minute data logger has been set up to store also additional data, and they are to be read, it is necessary to mark them (see picture below) and confirm the selection by clicking on "*OK".*


3. In the next window, you can see the progress of the data logger readout. Each item marked for the readout is displayed separately in its line. In this example 11 data were selected for the

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readout, of which 6 have been already read. The message shown next to the radio address "Logger recv" means that the SIRT is receiving LOG packets containing data logger data transmitted by the iPERL.
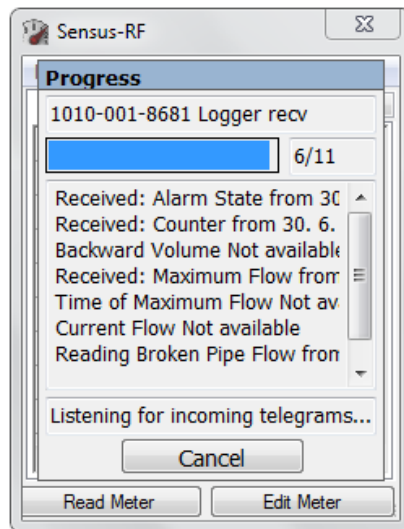
4. After all the items have been read SensusREAD shows a message which data and in what time scope have been read. By clicking on the "OK" button the window closes. This particular meter have default settings, so most of the data are "*Not available*" since they were not configured to be stored in the data logger memory.
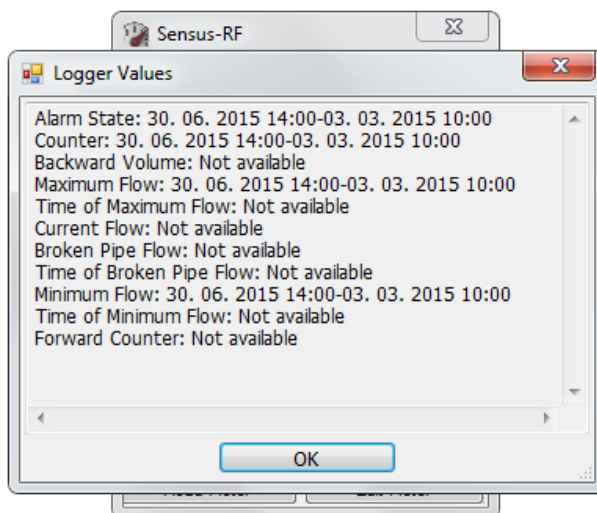
!Warning:

The options "**Peak flow**" and "**Time of peak flow**" **are not supported**, therefore do not use those options in the data loggers. When even one of these options is selected when reading the data from data loggers, the SensusREAD programme can display the window with an error message and the readout will not be completed correctly, it will be necessary to repeat it.

5.2. Readout of the "monthly" data logger (FDR)

1. In the window for the route planning in the menu "*Meter*" select the option "*Read monthly values*".

   The upper field in the new window shows the address of the iPERL, which was marked in the list of meters (before the option "*Read Monthly Values*" has been selected). If you want to read out a different meter, simply overwrite the address. The fields located below the address of the module have the following meanings:

   - **Day of the Month:** Shows the day of the month in which the data storage has been configured. In the picture below it is "1", which means that the selected data in the configuration are saved in the monthly data logger always on the first day in the month.
   - **Time of Recent**: Contains the date and time of the last readout of the data logger.
   - **Time of Reset:** It displays the date and time when the setting of the day in the month was changed or when the selection of the stored data was changed.
   - **From**: In this field you can set the date from which the data are to be read from the data logger. By default, the current date is set.
   - **To**: In this field you can set the date in the past until which the data are to be read from the data logger. By default, the date in this field is the same as the date in the field "*Time of Recent*", so that the readout is made from the present moment up to the last readout performed.

   By default, only the *counter* reading is pre-set for the meter, but in case the monthly data logger has been set up to store also additional data, and they are to be read, it is necessary to mark them (see picture below) and confirm the selection by clicking on "*OK".*
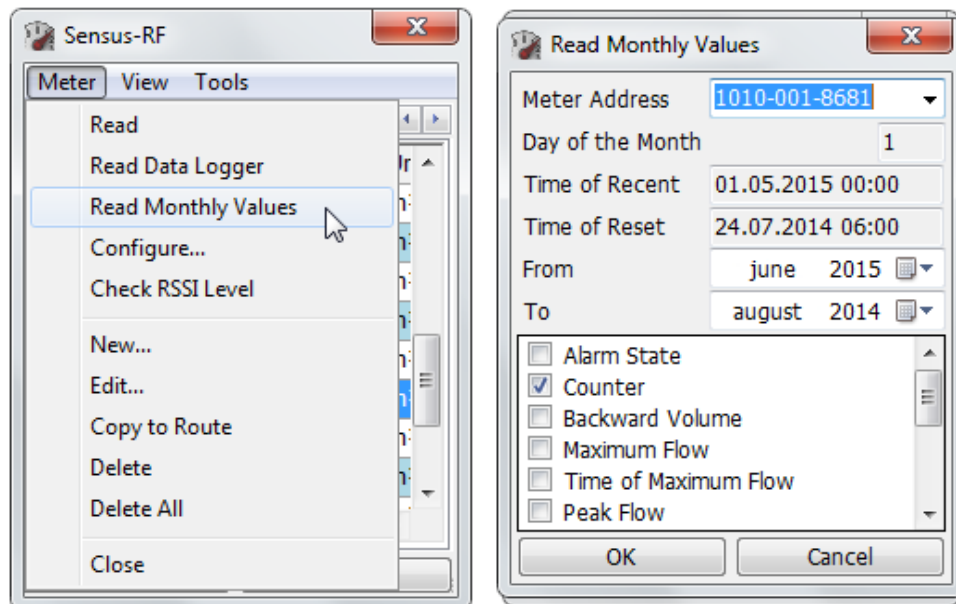

2. In the next window, you can see the progress of the data logger read out. Each item marked for the readout is displayed separately in its line. In this example 11 data were selected for the

readout, of which 9 have been already read.
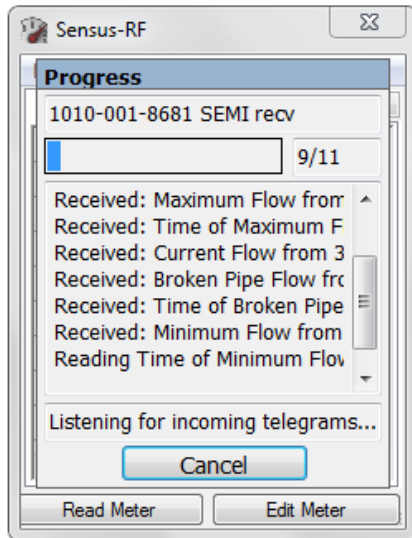
3. After all the items have been read SensusREAD shows a message which data and in what time scope have been read. In the case below you can see that the time range is from 01.06.2015 - 01.08.2014. In the report you can also see that the last entry *"Forward Counter"* is not available. The reason is that by default all items except for the *forward counter* are stored in the "monthly" data logger. By clicking on the "OK" button the window closes.
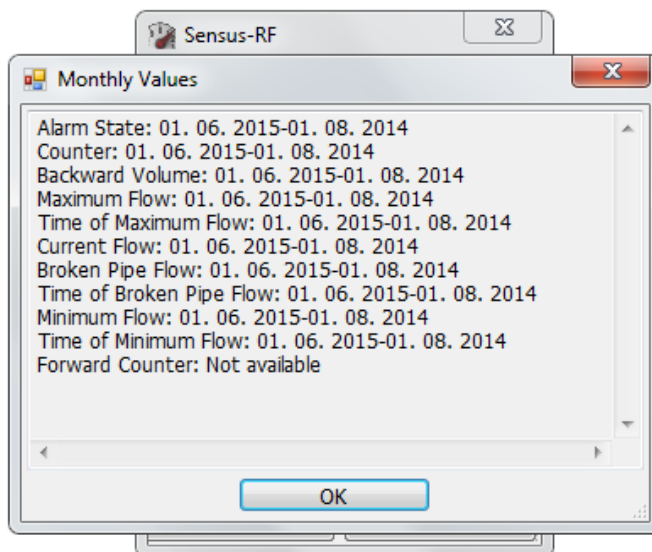

!Warning:

The options "**Peak flow**" and "**Time of peak flow**" **are not supported**, therefore do not use those options in the data loggers. When even one of these options is selected when reading the data from data loggers, the SensusREAD programme can display the window with an error message and the readout will not be completed correctly, it will be necessary to repeat it.

5.3. Download of stored data from data loggers

1. In the main window of the SensusREAD, programme click in the left upper corner on the button "*Download*". If SensusREAD is installed on a mobile terminal as e.g. Psion Workabout Pro and the data are to be downloaded from it, select the option "*Download from the Handheld*". If a terminal emulator is used (which is displayed in this manual), click on the "*Download from the Handheld Emulator*".
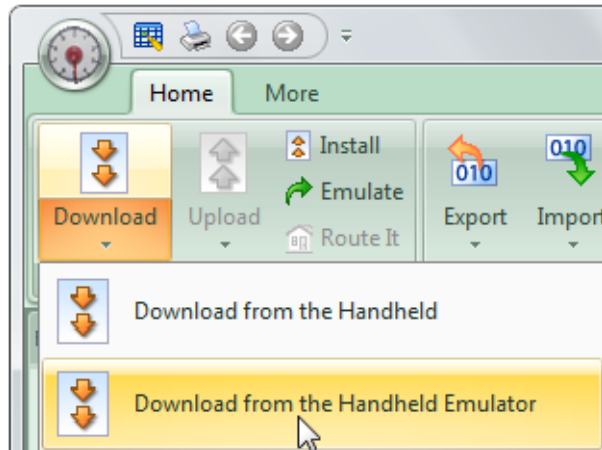

2. In the next open window it is possible to switch between the following tabs: *Routes, Route Planning, Logger Values, Monthly Values*.
    In the case where the data are to be downloaded from the data loggers of iPERL, it is necessary to work with the tabs L*ogger Values*" and "*Monthly Values*."
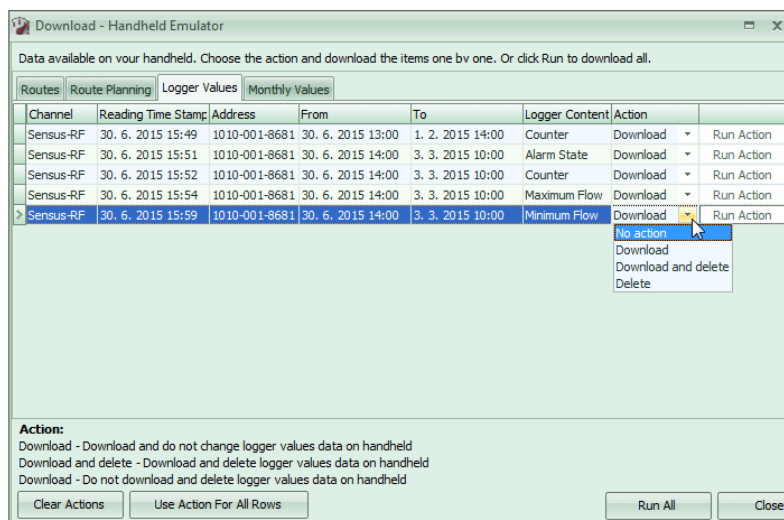

In these tabs you can see the channel used (*Sensus-RF*), time when the readout of the "minute" and "monthly" data loggers was performed, radio address of the meter from which the readout was made, time range, and the type of read data. The column "*Action*" allows to set the procedure for the software for each read parameter individually. When selecting "*Download*", the data of the selected parameter are only downloaded to the application SensusREAD on the PC. When selecting "*Download and delete*", the data are downloaded into a PC application and immediately are deleted from the terminal/terminal emulator. The selection of "*Delete*" deletes the data from the terminal/ emulator without downloading them

and storing in the PC. The actions can be used individually for each line using the buttons "*Run*

Action", or all the set actions may be started at the same time by clicking "*Run All*" located at the bottom right part of the window.
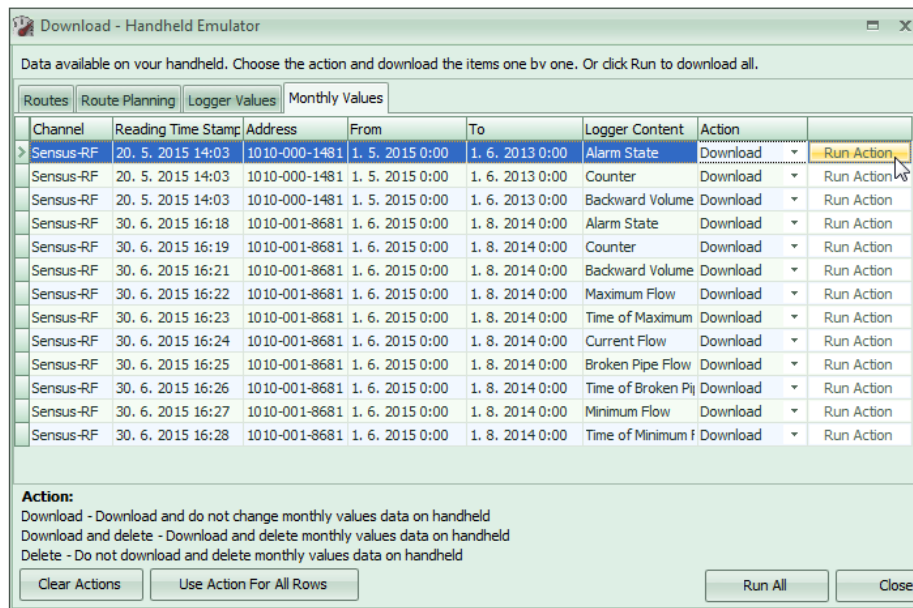

3. In the new window that pops up when you run the action, or after the start of all actions, you can see the report on the progress. If the software detects that the data readout from the data logger have already been downloaded to the PC before, the messages on the progress of the data download includes the note: "*Stored values set already exists, skipped*", and due to it SensusREAD will not unnecessarily save duplicate values. Simply close this window, or copy the message.
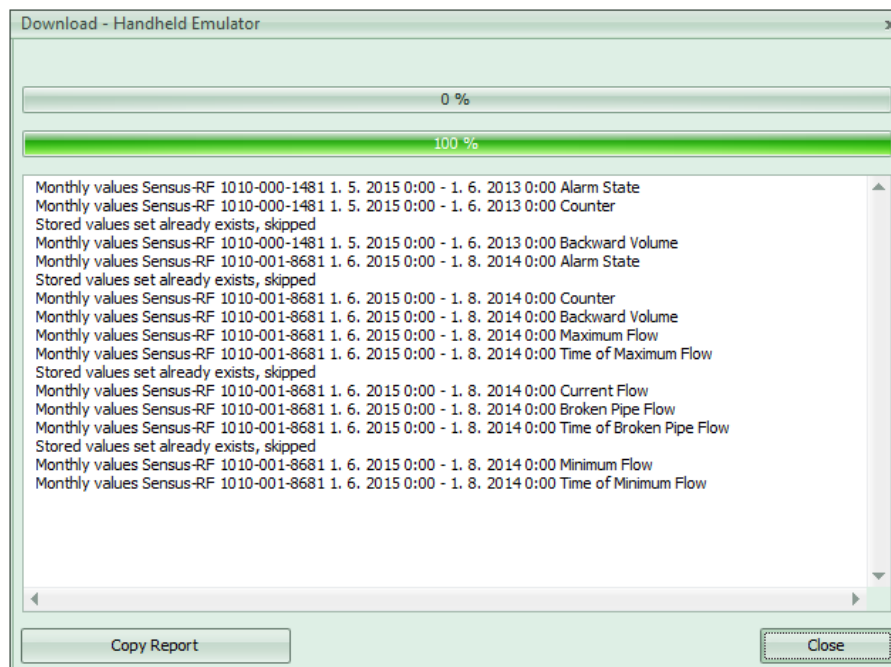

4. Once the data from the data loggers are downloaded, you can work with them. In the left part of the main programme window by clicking in the section "*Folder List*" on the option "*Logger*

Values" or "*Monthly Values*" all the data downloaded from the particular data logger are displayed.
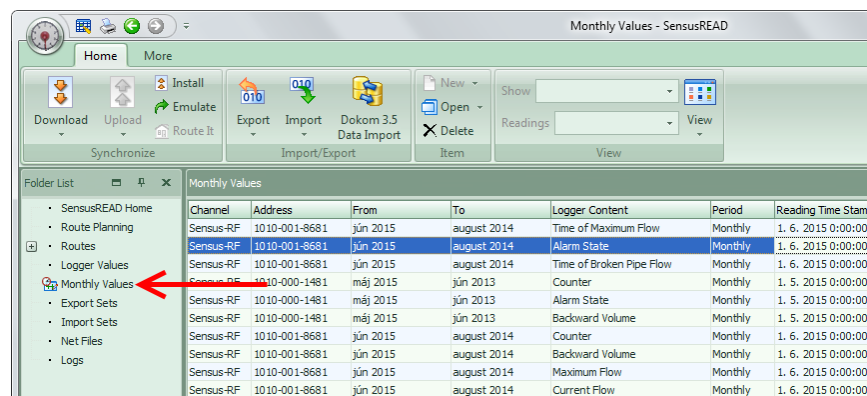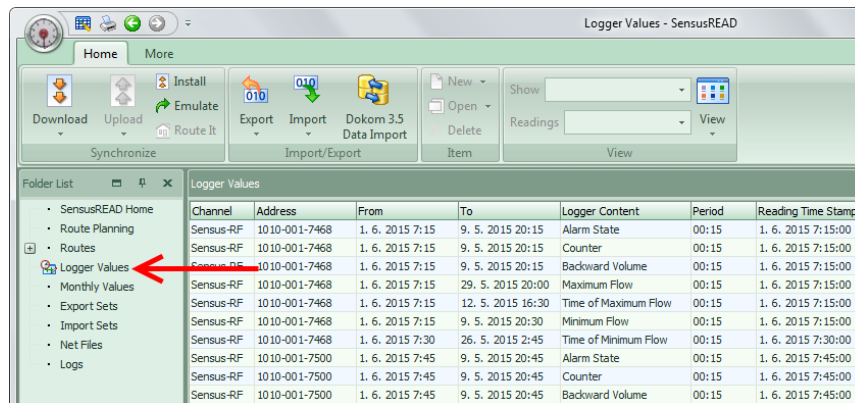
5. By double clicking on any row a new window with the details of the records for the given parameter is displayed, for example, the "*Alarm State*" window will be displayed with the data of the alarm events that were in this example stored in the "monthly" data logger. The toolbar at the top of the window shows 3 options: *Table*, *Chart* and *Export*. The *Table* shows the current window with the data as you can see in the picture below. The tool "*Chart*" is used to draw a chart from the recorded values of the given parameter (some parameters such as "*Alarm State*" do not support the chart function).
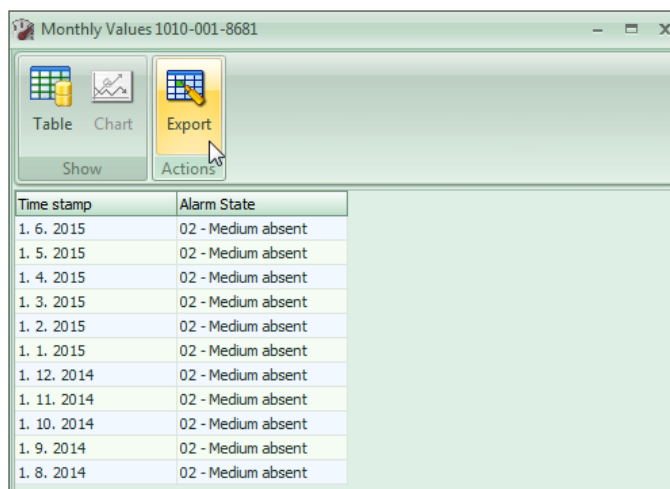
6. By clicking on the tool "*Export*" a new window is shown, in which you can set the format and the

used divider for the export of the data of the given parameter. It is also possible to select an export of only the lines marked in the previous window or all the lines. By clicking on the button "*Export*" you will be given the possibility to select the name of the file and the destination where you wish to save the file. Then you can work with the exported data according to your needs.

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