INFRA-RED READING UNIT

IRU 10.00

Installation and service manual

Firmware version: 9.0

CONTENT

1. INTRODUCTION

Reading unit IRU 10.00 is used for data reading from heat cost allocators E-ITN series 10.7, 20, 30 and radio modules for water meters E-RM 30 (further "read device") via infra-red interface. In addition, basic operations of radio modules E-RM 30 can be done with reading unit (switching between operation modes, display informations about set parameters and module function).

Read data are transmitted to PC via serial interface RS-232 for further processing. Function IRU in decoding software EITN-10 is used for data transfer from IRU 10.00 to PC. Unit can read data from any read device but only data from unit for whose customer data are available are transferred to PC. See Installation and service manual for decoding software EITN-10 for more information.

reading head

LC display

IRU 10.00

Infra-red reading unit

button

RS-232 interface
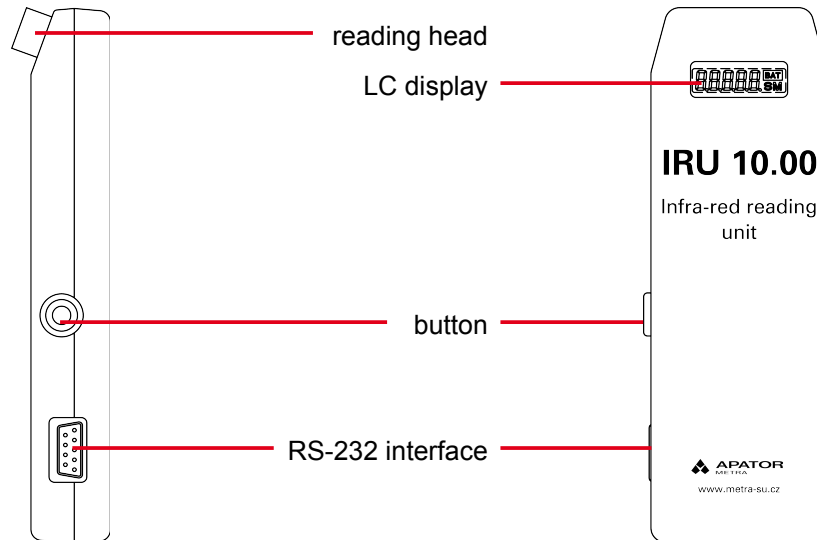
Illustration 1: IRU 10.00

1.1. LC DISPLAY

Basic information necessary for unit operation can be displayed on LCD. LCD can display five alphanumeric characters. These values are highlighted by underline and overline, e.g. $\overline{\underline{325}}$ in following text.

Meaning of some values may be different if the additional symbol "SM" at the right bottom corner is displayed. These values are mentioned with "SM" symbol in text, e.g. $\overline{\underline{385\ SM}}$.

The last symbol on the display indicate end of the battery life.

Illustration 2: LCD

To save the battery, after longer period of inactivity (approx. 1 min.), energy-saving mode is activated and display is switched off (chapter 4.4. Sleeping mode). Unit can be activated by pushing the button. (Illustration 1: IRU 10.00).

When pushing the button briefly, notice $\overline{\underline{----}}$ on the display will appear. If the button is not pushed in 1 minute, the display will switch off.

The data displayed on the LCD may vary depending on the firmware version. For more information, see below.

2. READING UNIT DESCRIPTION

Unit IRU 10.00 capacity is 500 or 1000 records with control of the last 10 saved record against multiple reading. Before new read data are saved, read device serial number is compared with serial numbers of previous 10 read devices and if record with same serial number is found, data are not saved. Restriction against multiple reading saves memory capacity of the unit.

One record represents one read device (heat cost allocator / radio module for water meter). Record includes not only data used for billing, but also important additional data about working conditions. Additional data can for example point out (or help to prove) some less frequent manipulations, etc. Structures of records are described for individual types of read devices in Installation and service manual for decoding software EITN-10.

Data from IRU 10.00 are transferred to PC via serial bus (RS-232). For connection not-crossed serial cable (RS-232) with connectors D-SUB9 Female/D-SUB9 is used. If serial port is not available on your PC (e.g. mostly laptops), it is necessary to use converter between serial port and USB.

2.1. READING

Reading head must fit with infra-red diode correctly to avoid any interferences caused by ambient lighting. The front surface of the reading head has to be in contact with plastic cover and infra-red diode must be hidden inside (refer to Illustration 3: Data reading from E-ITN 30 with IRU 10.00, analogously for E-RM 30).

Make the reading process as follows:

1. If there is no information displayed on LCD, press the button to switch reading unit from sleeping mode to working mode (more in chapter 1.1. LC display). Empty capacity is now displayed (i.e. number of devices that can be read without need of data transfer to PC) – e.g. $\overline{493}$.

2. Put reading head to infra-red diode and press the button shortly. Notice $\overline{\overline{IP}}$ indicating ongoing communication is displayed. Hold reading unit in the same position till the end of the reading.

3. Successful reading is indicated with one beep. Information about performed reading and remaining capacity of the reading unit is displayed on LCD, e.g. $\overline{o.\ 492}$ (free capacity is now one record less then before reading). In case of repeated reading (see above), record will be not saved and capacity will be not changed (in our case $\overline{o.\ 493}$).

4. Unsuccessful reading is indicated with four beeps. Information about unsuccessful reading and remaining capacity, e.g $\overline{E.\ 492}$ is displayed on LCD (free capacity is the same like before reading).
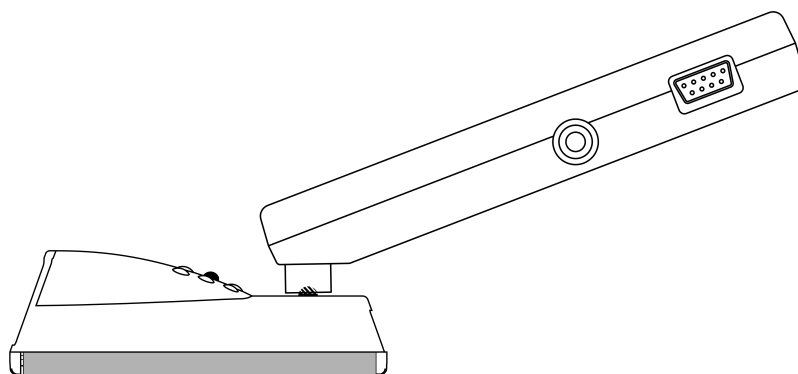
Illustration 3: Data reading from E-ITN 30 with IRU 10.00

2.2. DATA SEGMENTS

For maximal data security in IRU 10.00 there is no way how to physically delete this data. Every IRU 10.00 has unique serial number and data are managed in two data segments. ***Actual data segment*** contains records of read devices before transfer to PC (or after data transfer before reading from the next read device). The last successfully transferred (successful transfer means successful communication between PC and IRU 10.00 also in case if data are not transferred due missing customer data) actual data segment becomes ***last data segment*** when new record is made (that new record becomes now new actual data

segment with size of one record). In case of full capacity of IRU 10.00 in actual data segment is not possible to continue in reading without data transfer from this segment to PC. Unit protects automatically non-transferred data against overwriting by next records. The way how data segments work is described in Illustration 4: Schema of data segments in IRU 10.00.

New IRU 10.00
- free capacity 500 records
- no data segment

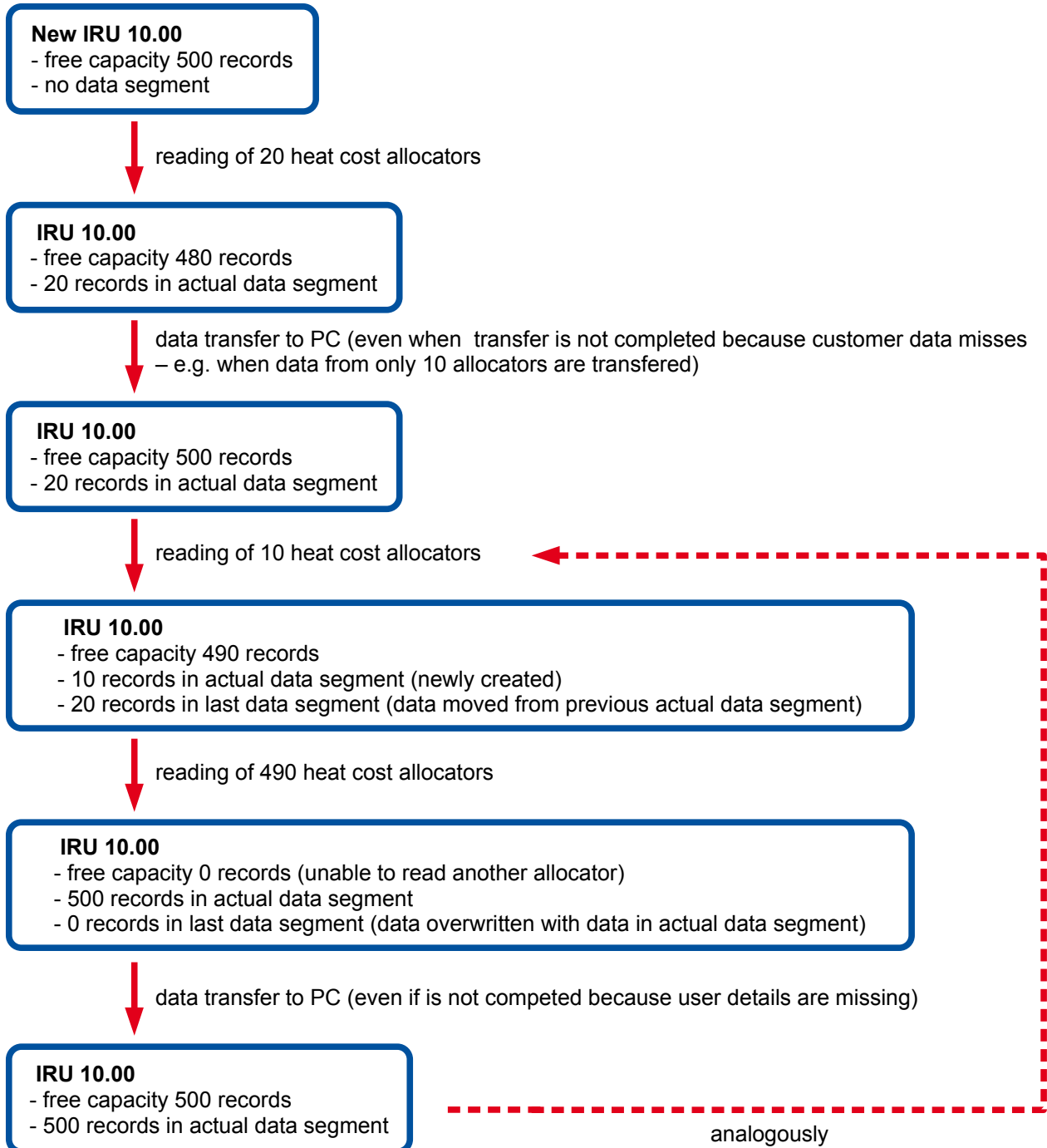↓ reading of 20 heat cost allocators

IRU 10.00
- free capacity 480 records
- 20 records in actual data segment

↓ data transfer to PC (even when transfer is not completed because customer data misses – e.g. when data from only 10 allocators are transfered)

IRU 10.00
- free capacity 500 records
- 20 records in actual data segment

↓ reading of 10 heat cost allocators

IRU 10.00
- free capacity 490 records
- 10 records in actual data segment (newly created)
- 20 records in last data segment (data moved from previous actual data segment)

↓ reading of 490 heat cost allocators

IRU 10.00
- free capacity 0 records (unable to read another allocator)
- 500 records in actual data segment
- 0 records in last data segment (data overwritten with data in actual data segment)

↓ data transfer to PC (even if is not competed because user details are missing)

IRU 10.00
- free capacity 500 records
- 500 records in actual data segment

analogously

Illustration 4: Schema of data segments in IRU 10.00

Warning!

Data from read devices for which customer data are not available at the time of transfer to PC are not transferred and saved. To read these records it is necessary to upload customer data and repeat the transfer. Reading of another devices to IRU 10.00 without transfer of these records can cause their loss!

The manufacturer assumes no liability for any loss of data. The user of EITN-10 is solely responsible for securing of data.

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3. TECHNICAL SPECIFICATIONS

Power supply	2 x 1,5 V (AAA)
	2 x 1,2 V (AAA) Ni-Cd / Ni-Mh
	If 1,2 V batteries are used, low battery warning is displayed.
Communication interface	RS-232
Capacity	500 / 1000 records

Illustration 5: IRU 10.00 identification label

3.1. DESCRIPTION

Reading unit consists of a two part plastic cover, where electronic parts including batteries are located. Cover parts are connected with screw. When screw is released the upper side of the cover can be removed to replace the batteries.

Reading head with transmitting (and also receiving) infra-red diode and LCD is located at the top of the unit.Button for unit operation and serial port for connection of the unit with a PC are on the left side.

3.2. WORK WITH READING UNIT

- Make battery test before planned reading. Rechargeable Ni-Cd or Ni-Mh batteries suffer from self-discharge effect and should be cared throughout the year.

- Load reading unit with batteries of the same capacity and charge level.

- If reading unit will be not in use for longer period (more than two months), remove the batteries from unit.

- Do not leave reading unit connected with PC. Connected unit increases consumption of electrical energy from batteries.

4. OPERATION MODES

4.1. OPERATION MODES

Reading unit can be in four operation modes:

- sleeping mode
- working mode
- mode of data transfer
- error mode

4.2. SUBMENU NAVIGATION

The reading unit contains a simple submenus (depending on current operation mode) that allow to obtain additional information or perform other activities.

To switch between individual items of menu or submenu, push the button briefly. To enter the submenu, choose relevant item and hold the button (approximately 2 seconds) until notice --A-- appears on LCD. When you release the button, designation of the 1st submenu item appears. The next menu sequence can be reached by pushing the button again. If the button is not pushed for 12 seconds, the LCD returns to the main menu.

Activation process of item is the same as entering the submenu. Find the relevant item and hold the button (for approximately two seconds) till notice --A-- on the LCD appears.

Movement in options is the same – briefly press the button. Selected option confirmation as well – by long (approx. 2 s) press of the button till notice --A-- appears on LCD.

4.3. COMMUNICATION BETWEEN IRU 10.00 AND READ DEVICE

The way how to attach reading unit to read device (heat cost allocator or radio module for water meter) is described in chapter 2.1. Reading.

Ongoing communication between IRU 10.00 and read device is indicated on LCD with notice IP. It is important to hold reading unit still in the same position to avoid any infra-red communication interferences during this time.

Successful communication is indicated with one beep and o. ??? is displayed on LCD where symbols ??? are replaced with designation of current operation.

Unsuccessful communication is signalized with four beeps and on LCD is displayed E. ??? is displayed on LCD where symbols ??? are replaced with designation of current operation.

Further action can be performed immediately even if o. ??? or E. ??? is displayed – IRU 10.00 is still in menu/submenu item indicated on LCD.

4.4. SLEEPING MODE

Unit consumption is reduced to a minimum since no values are displayed on LCD. Sleeping mode is automatically used after 1 minute of inactivity.

4.5. WORKING MODE

Working mode is activated after battery replacement or from sleeping mode by pressing of the button.Number of records that can be saved to unit is displayed on LCD.

When pushing the button briefly, notice ---- appears on the display. If the button is not pushed for 1 minute, the display will switch off.

4.5.1. Menu structure

Reading unit displays only free capacity (number of records that can be saved without data transfer to PC). If there is no information displayed briefly press the button.

Table 1: Structure of menu in working mode

Empty capacity (e.g. 493)	493

The way how to perform reading is described in chapter 2.1. Reading.

4.5.2. Sub-menu structure in working mode

Enter submenu from the main menu. When the display is switched on and free capacity is displayed (e.g. 493) press and hold the button, till notice --A-- is displayed. After button release, 1st submenu item PAr is displayed (submenu for displaying of informations about radio module E-RM 30).

Table 2: Structure of submenu in working mode

Submenu for displaying of informations about radio module E-RM 30	PAr
Switching of E-RM 30 to working mode	Pro
Switching of E-RM 30 to automatic activation mode	rAA
Switching of E-RM 30 to sleeping mode	uPr
Displaying of the last 4 digits of serial number of read devices	cP
Switching to higher menu level	-n-

Navigation in submenu is described in chapter 4.2. Submenu navigation.

4.5.3. Structure of submenu "PAr"

As radio module E-RM 30 is not equipped with LCD, basic information about active working mode, start of the billing period and electronic seal status can be obtained with infra-red reading unit IRU 10.00.

IRU 10.00 displays data related to last read device – if is the last read device is heat cost allocator, the notice --- is displayed and after 12 seconds reading unit switches back to main menu. So it is necessary to read module E-RM 30 first (see chapter 2.1. Reading) and than display basic informations about module status.

To enter submenu "Par", choose option "PAr" and hold the button (approximately 2 seconds) until notice --A-- appears on LCD. To switch between individual items of menu, push the button briefly. Press the button for 2 seconds to get to the higher level of menu.

If there is no action for 12 seconds, the LCD returns to the main menu.

Table 3: Structure of submenu "PAr"

Operation mode of E-RM 30	sleeping mode	uPr
	mode of automatic activation	rAA
	working mode	Pro
	error mode	Err
Date of E-RM 30 billing period beginning	day, month... year billing period	25.04.
	day... month billing period	du 28.
Status of E-RM 30 electronic seal	electronic seal broken	EP-Er
	electronic seal intact	EP-o

4.5.3.1. Operation mode of E-RM 30

E-RM 30 can be in four operation modes. For more information see Installation and service manual for radio module E-RM 30.

4.5.3.2. Date of E-RM 30 billing period

Billing period can be displayed in two formats depending on E-RM 30 version (year or month). For more informations see Installation and service manual for radio module E-RM 30.

4.5.3.3. Status of E-RM 30 electronic seal

The electronic seal is used for detection if radio module was removed from the water meter. For more informations see Installation and service manual for radio module E-RM 30.

4.5.4. Item "Pro"

This item is used to switch radio module E-RM 30 to working mode. Radio module must be attached to water meter (reflective disc must be detected) – for more information see Installation and service manual for radio module E-RM 30.

1. When notice "Pro" appears, hold the button till notice --A-- is displayed and indicates submenu activation.

2. Readiness of IRU 10.00 is indicated with notice -PrE-. Attach reading head to cover of infra-red diode of radio module E-RM 30 and press the button briefly. Ongoing communication is indicated with notice IP on the display.

3. Successful mode change is indicated with one beep and notice o. Pro is displayed.

4. Unsuccessful mode change is indicated with four beeps and notice E. Pro is displayed.

If there is no action for 12 seconds, the reading unit returns to the main menu.

4.5.5. Item "rAA"

This item is used to switch radio module E-RM 30 to mode of automatic activation. Radio module must not be attached to water meter and sensors have to be covered with delivered black cover. If radio module was attached to water meter during mode change then it would not be activated even after 5 litres flow – for more information see Installation and service manual for radio module E-RM 30.

1. When notice "rAA" appears, hold the button till notice --A-- is displayed and indicates submenu activation.

2. Readiness of IRU 10.00 is indicated with notice -PrE-. Attach reading head to cover of infra-red diode of radio module E-RM 30 and press the button briefly. Ongoing communication is indicated with notice IP on the display.

3. Successful mode change is indicated with one beep and notice o. rAA is displayed.

4. Unsuccessful mode change is indicated with four beeps and notice E. rAA is displayed.

If there is no action for 12 seconds, the reading unit returns to the main menu.

4.5.6. Item "uPr"

This item is used to switch radio module E-RM 30 to sleeping mode from automatic activation mode or working mode (when changing from working mode, electronic seal must be broken). Radio module must not be attached to water meter and sensors have to be covered with delivered black cover. See more in Installation and service manual for radio module E-RM 30.

1. When notice "uPr" appear, hold the button till notice --A-- is displayed and indicates submenu activation.

2. Readiness of IRU 10.00 is indicated with notice -PrE-. Attach reading head to cover of infra-red diode of radio module E-RM 30 and press the button briefly. Ongoing communication is indicated with notice IP on the display.

3. Successful mode change is indicated with one beep and notice o. uPr is displayed.

4. Unsuccessful mode change is indicated with four beeps and notice E. uPr is displayed.

If there is no action for 12 seconds, the reading unit returns to the main menu.

4.5.7. Structure of submenu „nAP"

For radio modul E-RM 30 with yearly billing period, the parametre is the date of the billing period beginning, for module with monthly billing, the parametre is the day of the billing period beginning.

Directions:

1) For yearly billing period

We switch to the „nAP" submenu by a long press of the button switch. The 1. item appears on the display – date of the yearly billing period beginning. To change a date, switch to 2. item "Edi" by a short press of the button and then switch to edit mode by a long press of the button. In the edit mode, the month value flashes as a first and this can be changed by short presses of the button. Then switch to setting of the day by a long prss of the button and in the same way adjust the value. The new value can be saved by a long press of the button which will also quit the edit mode. The 1. item is displayed on the LCD with the new saved date.

2) For monthly billing period

We switch to the „nAP" submenu by a long press of the button switch. To change a date of the billing period beginning, we switch to item 4 „Edi" by short presses of the button switch and then switch to edit mode by a long press of the button. By short presses of the button adjust the value of the day and save by a long press of the button (this also quits the edit mode).

Table 4: Structure of the "nAP" submenu

Beginning of the yearly billing period saved in the IRU 10.00 unit	12.08.
Submenu for editing the parameter of the yearly billing period beginning	Edi
Beginning of the monthly billing period saved in the IRU 10.00 unit	du 12
Submenu for editing the parameter of the day of the monthly billing period beginning	Edi
Switching to upper menu „nAP"	-n-

The change of the billing period beginning on radio modules E-RM 30 can be done as follows:

a)   module E-RM must be in the sleeping mode

b)   do the reading of the data from the radio module E-RM 30 using IRU 10.00

c)   switch the IRU 10.00 unit to menu „nAP" and chose item dd.mm. (12.08) to change a date of yearly billing period beginning or item du dd. (du 12) to change a day of the monthly billing period beginning.

By long press of the button switch to item „Pre". The unit is now ready to transfer the data into the module. Attach the rading head of the unit to the visor on the cover of the radio module and start the IR communication by a short press of the button (if the button is not pressed within the time interval of 12 s, the unit switches to displaying the information about the free capacity for the readings and the steps above must be repeated).

Sucesfull setting of the parametre is indicated on the display with notice „o. nAP" and with short audio signal, unsuccesful setting is indicated by a notice „E. nAP" and 4 short audio signals.

4.5.8. Structure of submenu "cP"

Reading unit IRU 10.00 allows to display 10 serial numbers of read devices (last four digits).

To enter submenu "cP", choose item uPr and hold the button till notice --A-- is displayed and indicates submenu activation. To switch between individual serial numbers, push the button briefly. The list is ended with notice End SM. Press the button for 2 seconds to get to the higher level of menu.

If there is no action for 12 seconds, the reading unit returns to the main menu.

Table 5: Structure of submenu "cP"

Serial number of last read device (e.g. "0845 sm")	0845 SM
Serial number before last read device	0862 SM
...	
Serial number of 9th last read device	0842 SM
Serial number of 10th last read device	0863 SM
End of the list of saved serial numbers	End SM

4.5.9. Structure of submenu „roP"

Serves to reseting of the current or all registers of the flow (supported only by radio modules E-RM 30.3**)

Method:

By a long press of the button, switch to submenu „roP". Use short presses of the button to select the desired item of the submenu („uPn" or „cAn"). Switch to item „PrE"by a long press of the button. The unit is now ready to communicate with the radio module. Attach the rading head of the unit to the visor on the cover of the radio module and start the IR communication by a short press of the button (if the button is not pressed within the time interval of 12 s, the unit switches to displaying the information about the free capacity for the readings and the steps above must be repeated).

Sucessful reset of the registers is indicated by notice „o. uPn" or „o. cAn" and with short audio signal. Unsuccesfull reset is indicated by notice „E. uPn" or „E. cAn" and with a sequence of 4 short audio signal.

Submenu „roP" can be exited by selecting „-n-" and long press of o button, or after 12 s if the button is not pressed.

Table 6: Submenu structure "roP"

Reset of all flow registers	uPn
Reset of the current flow registers	cAn

4.6. MODE OF DATA TRANSFER

Mode of data transfer is intended for transfer of read data to PC using decoding software EITN-10 for further processing. The   mode of data transfer is activated automatically when unit is connected to PC via serial interface. Notice Con is displayed on LCD. If reading unit is in error status automatic activation of mode of data transfer does not happened.

The way how to transfer and decoding data is described in Installation and service manual for decoding software EITN-10.

After data transfer reading unit is ready again with full capacity for further use. For more informations see chapter 2.2. Data segments.

When serial cable is disconnected unit switch to the last mode before cable connection.

4.7. ERROR MODE

Unit is switched to error mode if unable to save data without error. In this case it is necessary to send the unit to manufacturer for repair.

5. ELECTRONIC SEAL REACTIVATION

5.1. E-ITN 30

The electronic seal is used for detection if allocator was removed from back plate – for more informations see Installation and service manual for electronic heat cost allocator E-ITN 30. If you need to re-fit allocator (e.g. replace old radiator with new radiator), it is necessary to reactivate the seal.

1. Insert new latch into allocator (Illustration 6: Electronic seal assembly). If use the old one, please check its condition, especially electro-conductive rubber.
2. Secure the latch with mechanical seal.
3. Read allocator with IRU 10 unit (Illustration 3: Data reading from E-ITN 30 with IRU 10.00). Allocator now displays the menu items.
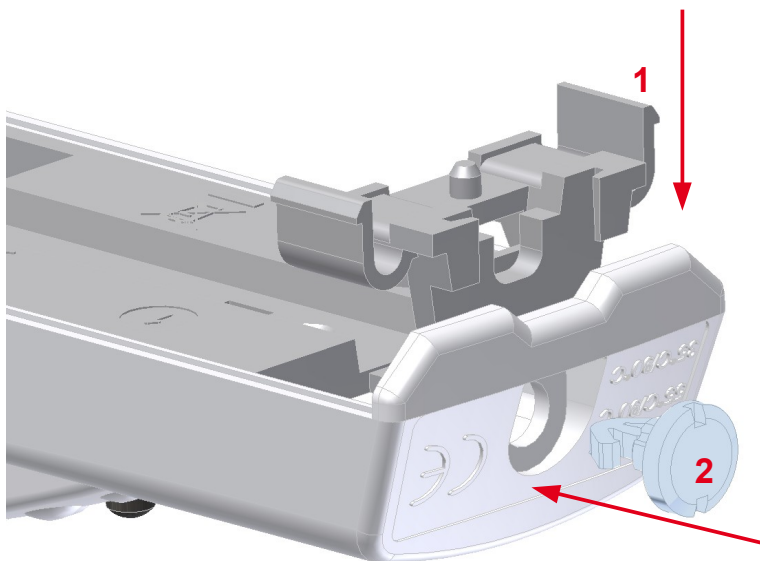4. Install allocator to the radiator.

Illustration 6: Electronic seal assembly

5.2. E-RM 30

The electronic seal is used for detection if radio module E-RM 30 was removed from the water meter – for more informations see Installation and service manual for radio module E-RM 30. If you need to re-fit radio module, it is necessary to reactivate the seal.

1. Remove radio module (in working mode with broken electronic seal) from the water meter and cover optical sensors with black cover used during module transportation.

2. Switch radio module to sleeping mode described in chapter 4.5.6. Item "uPr".

3. Switch module to mode of automatic activation (chapter 4.5.5. Item "rAA") or working mode (chapter 4.5.4. Item "Pro").

4. If using mode of automatic activation, install radio module on water meter and let flow at least 5 litres of water.

6. OTHER INFORMATIONS

6.1. TRANSPORTATION

Reading unit IRU 10.00 can be transported under following conditions:

- unit can be transported by all usual covered means of transport
- unit must be in original package
- originally packed unit must be stored and secured to avoid mechanical damages during transportation
- devices can not be transported together with aggressive substances
- temperature during transportation from -10 °C to +50 °C
- relative humidity from 45 % to 75 %

6.2. STORAGE

Infra-red reading unit IRU 10.00 is an electrical device and can be stored under these conditions:

- storage temperature from +10 °C to +30 °C
- relative humidity from 45 % to 75 %
- devices must be stored in clean covered areas without aggressive substances and stored properly to avoid mechanical damage

6.3. APPLICATION OR DISPOSAL

"This device is subject to a waste management in accordance with local legislation."

6.4. DEFECTS AND THEIR ELIMINATION

Any IRU 10.00 defect should be repaired by manufacturer only.

6.5. WARRANTY

If device is handled according to manufacturer instructions mentioned in Installation and service manual, manufacturer provide warranty under the valid legislation unless agreed differently.

The warranty is void if device was used contrary to Installation and service manual or damaged:

- during transport or storage by customer or reseller
- when mounted or dismantled to the customer device
- because of improper handling or installation into other device than agreed in manual
- if the product was exposed to different environment than agreed in manual
- if mechanically or in other way damaged by user