По вопросам продаж и поддержки обращайтесь:

Архангельск +7 (8182) 45-71-35
Астрахань +7 (8512) 99-46-80
Барнаул +7 (3852) 37-96-76
Белгород +7 (4722) 20-58-80
Брянск +7 (4832) 32-17-25
Владивосток +7 (4232) 49-26-85
Волгоград +7 (8442) 45-94-42
Екатеринбург +7 (343) 302-14-75
Ижевск +7 (3412) 20-90-75
Казань +7 (843) 207-19-05
Калуга +7 (4842) 33-35-03
Кемерово +7 (3842) 21-56-70
Киров +7 (8332) 20-58-70
Краснодар +7 (861) 238-86-59
Красноярск +7 (391) 989-82-67
Курск +7 (4712) 23-80-45
Липецк +7 (4742) 20-01-75
Магнитогорск +7 (3519) 51-02-81
Москва +7 (499) 404-24-72
Мурманск +7 (8152) 65-52-70
Наб.Челны +7 (8552) 91-01-32
Ниж.Новгород +7 (831) 200-34-65
Новосибирск +7 (383) 235-95-48
Омск +7 (381) 299-16-70
Орел +7 (4862) 22-23-86
Оренбург +7 (3532) 48-64-35
Пенза +7 (8412) 23-52-98
Пермь +7 (342) 233-81-65
Ростов-на-Дону +7 (863) 309-14-65
Рязань +7 (4912) 77-61-95
Самара +7 (846) 219-28-25
Санкт-Петербург +7 (812) 660-57-09
Саратов +7 (845) 239-86-35
Сочи +7 (862) 279-22-65
Ставрополь +7 (8652) 57-76-63
Сургут +7 (3462) 77-96-35
Тверь +7 (4822) 39-50-56
Томск +7 (3822) 48-95-05
Тула +7 (4872) 44-05-30
Тюмень +7 (3452) 56-94-75
Ульяновск +7 (8422) 42-51-95
Уфа +7 (347) 258-82-65
Хабаровск +7 (421) 292-95-69
Челябинск +7 (351) 277-89-65
Ярославль +7 (4852) 67-02-35

сайт: teplovodomer.pro-solution.ru | эл. почта: tvp@pro-solution.ru
телефон: 8 800 511 88 70

FROM METERING TO DATA MANAGEMENT

WATER MEASUREMENT

WIRELESS WATER METERS READING SYSTEM

GRUPA APATOR

WATER
MEASUREMENT

from METERING
to data management

Vision
Apator Group - Central-East European leader in systems and measuring equipment as well as switchgear equipment.

Mission
Our challenge is to create the innovative technologies effectively, managing all kinds of energy. Safety of our clients and protection of the environment is determinant of our operation.

Strategic goal
Developing the Polish technological group based on the strong Apator brand and aimed to increase sale on the foreign markets.

Apator Powogaz

- **EXISTING FROM:**
  1925; since 2008 has been a part of the Apator Group.
- **OBJECTS OF THE COMPANY'S ENTERPRISE:**
  One of the largest manufacturers of water meters in Poland and Europe. The company offers wide range of water meter, flow meters, heat meters, volume parts to heat meters and system solutions.
- **CERTIFICATES:**
  ISO 9001:2009, ISO14001:2005, PN-N 18001:2004
- **AWARDS:**
  Przedsiębiorstwo Fair Play [Fair Play Enterprise], Polska Nagroda Jakości (Polish Award for Quality Management), Solidna Firma [Solid Company], Panteon Polskiej Ekologii(Polish Ecology Hall of Fame), Innowacja Roku 2007 [Innovation of the year 2007], Mister Eksportu [Mister of Export]
- **DID YOU KNOW THAT:**
  Water was Leonardo da Vinci's object of interest. The Italian scientist made hundreds of drafts and experiments concerning the water flow. He made plans of drains and constructed a device to measure water in drains

Thanks to usage of modern Wireless M-Bus (WMBUS) technology, the AMR radio system, manufactured by Apator Powogaz, guaranties the new quality of the remote reading of indicators. This device makes possible integration of appliances of other producers in one uniformed reading system. This system allows water meters to be read in case of difficult access and guaranties vast freedom of choosing time and range of data readings. The system provides simultaneously correctness and time saving of readings. The terminal configures the radio module.

The low power consumption characterizes the remote reading equipped with the standard configured radio module.

It ensures, as well, years of maintenance-free work of the radio module and raises the comfort of the inhabitants since their presence is not necessary while doing readings. The implementation of the AMR radio system during the exploitation of the water meters, as well in the collector as stationary option does not cause violation of the legal seals of the water meters.

SYSTEM ADVANTAGES

Open – usage of the communication protocol working on the basis of the PN-En 13757-4 Wireless M-Bus norm (WMBUS) is an open protocol, so there is possibility to cooperate with the equipment of other manufacturers.

Modular – allows to easy expansion of the system during exploitation of the water meters according to necessities and abilities of the system's administrator, as well in the walk-by, drive-by system as in the stationary system.

Bidirectional – gives the possibility of receiving data from the radio module (ID number, starting volume, impulse constant, frequency of radio transmissions etc.) for configuration, as well as transmitting present or historical data.

Reliable due to:

- usage of the optical flow reading that is fully resistant to external magnetic fields ,
- alarms' indication - the module take-off, flow reverse and magnet usage,
- Elimination of the possibility of human factor mistakes.

Economical – reading of indicators is done without the necessity of entering the premises, any time and in short period of time. All data can be converted into csv files quickly what allows to gain reduction in costs of taking readings and creating databases.

Accuracy – read-out of all the water meters in the building within one day (at one time) can contribute that the discrepancies between readings from the apartment's water meters and the main meter should be lower.

Time saving – reading from the appliances installed in hard to reach places.

USAGE

Collector way for gathering data is about having the PDA computer equipped with the radio modem. The collector goes from house to house (from meter to meter). The readings last for a few second and do not require presence of the owner of the house or the flat because it is done outside the apartments (closed apartment is not a problem). This way of gathering data is a practical application e.g. in condominiums in which difficulties to access to the water meters or problems with the balance of the water usage appear.

The stationary way of gathering data is when the radio signals of the water meters modules are intercepted by adequately placed re-transmitters from which are send to the concentrator.

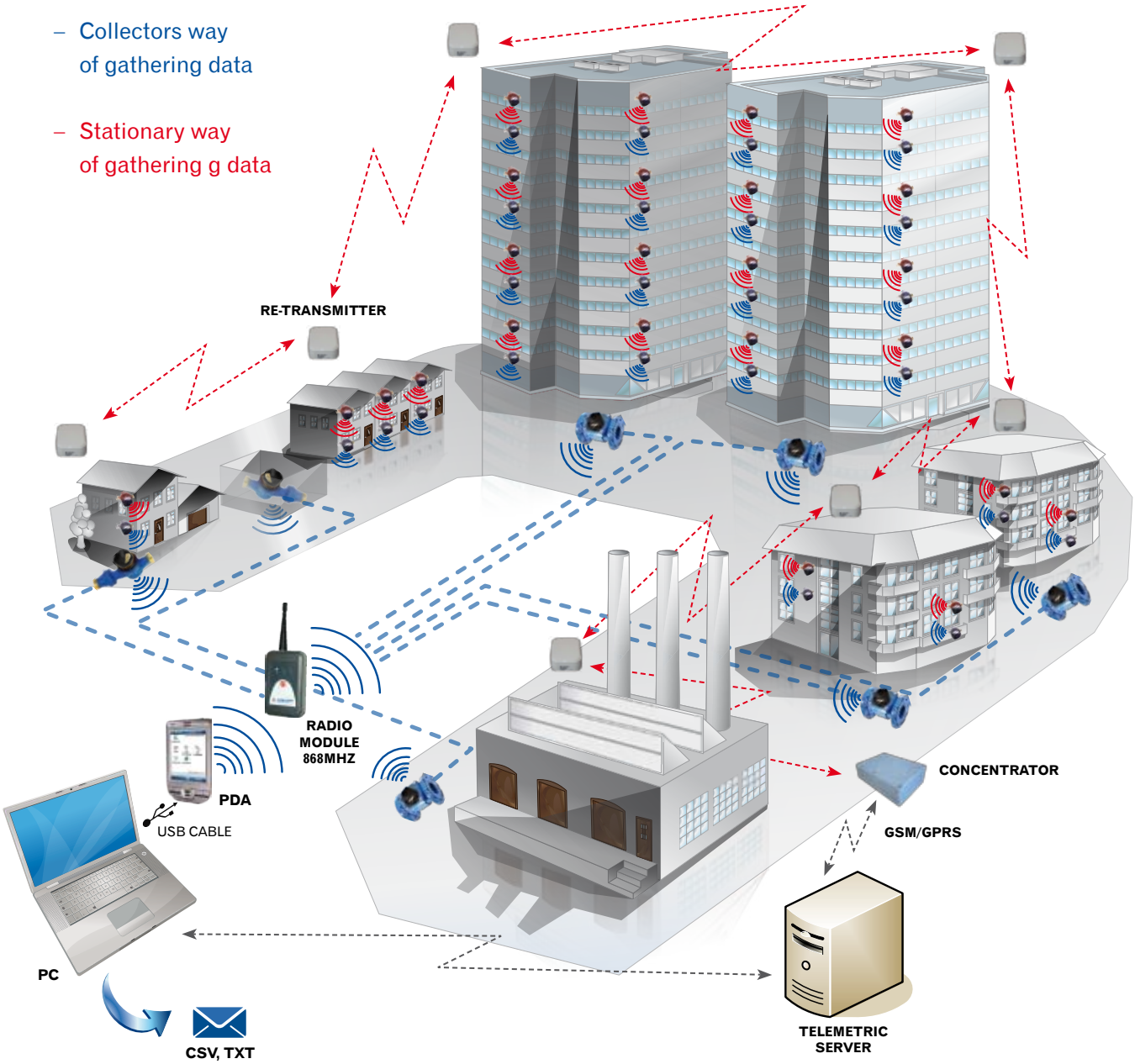
They are equipped with communication modems: GSM/GPR S, Ethernet or radio ones, which directly transfer data to the server.

This way of collecting data has its usage when:

- Installations characterized of the scattered measuring points e.g. distant buildings, housing estates, districts, residential districts where the collector would have to waste a lot of time walking around the measurement points.
- Upgrading the collector's network in full or partially stationary.

The additional advantage of using this system, aside from vast space criteria, is possibility of constant system's monitoring (24h per day), record of the water usage (and other parameters) by the particular users, in the headquarters of the administrator.

WORKING SCHEMATICS OF THE AMR RADIO SYSTEM



ELEMENTS OF THE AMR RADIO SYSTEM

The presented AMR system functions on the basis of the Apator Powogaz product's offer, of which the following water meters consist: apartment type JS, JM, WS and WM, housing type JS, WS WM: and industrial type MWN, MP and JS class C.

THE FOLLOWING APPLIANCES REALIZE REMOTE DATA READING:

- In the collector's version- radio modules, terminal, radio module Bluetooth/WMBUS and software. The Inkasent software is available on PC and PDA.
- In the stationary version- radio modules, re-transmitters, concentrators with communication modems and WMBUS Reader software available on PC.

EXAMPLE OF RADIO MODULE USAGE

Apartment water meter
JS Smart+ type

Industrial water meter
WMN type

ELEMENTS OF THE COLLECTOR'S DATA READINGS

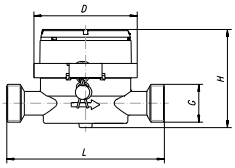
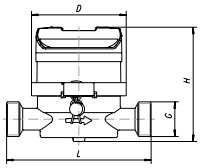
SMART TOP RADIO MODULE

Smart Top radio module is build on the basis of the newest microprocessor system and is used to the wireless data transmission of the measuring Smart water meters, at distance up to 300m in the open space. The network works on the radio band of 868MHz and the installed battery can last up to 12 years of constant work. In the appliance was implemented a communication protocol WMBUS compatible with the PN-EN 13757 norm in the range of the wireless water meters readings, allowing for two-way data transmission.

THE MODULE HAS:

- The system of optical sensors allowing identification of the current water flow and by taking into consideration the backward flow it gives complete conformity with the indication of the counter.
- The reading of data is fully resistant to any external magnetic field interference
- Possibility of manual reading using a PDA terminal or using stationary system with automatic reading
- Possibility of signalling of the following alarms:
  - Module take-off alarm: signalling disjoining of the module and the water meter- the following data are registered: date and time of disconnection as well as total time of disconnection,
  - Backward flow alarm- detection of the backward flow. The following data are registered: sum of the water volume flown backward with data and time of the first alarm,
  - Magnet usage alarm- signalling magnet usage to the water meter. Date and time of the first alarm and the summary time of the magnet influence are registered.
- Possibility to transmit the following data:
  - Maximum flow signalisation – detection of the maximum flow (over the amount defined by the user). Date and time of the first incident are registered.
  - Leak signalisation – leak detection, which is defined as constant, continuous flow, in time defined by the user (e.g. 120 min). Date and time of the first incident are registered.
  - In AT-WMBUS-08 also the full leak time is registered
  - State skipping signalisation - the state of the reflective shield with the excessive flow in the water meter has been skipped,
  - Battery running-down signalisation - signalises a run-down battery on the module
  - Signalization of a high level of light- detection of a high light level on the optical elements (tamper attempt)
  - Minimal flow signalisation (AT-WMBUS-08)- detection of the flow below defined amount. Date and time of the first incident are registered.

Table 1. TECHNICAL SPECIFICATION

Type of the module	AT-WMBUS-01 or 07 module	AT-WMBUS-04 module	AT-WMBUS-08 module
Application	Direct installation on the counting mechanism on the following water meters: - Apartments (DN 15-20mm) JS-01 and 02 type - Housing (DN 25÷40mm) JS type - Industrial (DN 40÷500mm) MWN; MP; JS class. C; MK; MWN/JS type	External radio module installed close to the water meter, assigned to cooperation with the water meters equipped with the pulse transmitters (NK and NO) e.g. WS; WM	Installed directly on the counting mechanism on the apartment water meter (for hot and cold water)- JS-02 type (Smart+)
Physical characteristics	h = 44; ø = 65.5 [mm]	90 x 74.5 x 41.4 [mm]	h = 26.5; ø = 65.5 [mm]
Protection rating	IP 65	IP 65	IP 68
Weight	0,06[kg]	0,18[kg]	0,033[kg]
Increase of height of the water meter after installing the H module	35,8[mm]	N/A	18,5[mm]
Example:			
Height of the water meter with the module	JS-02  H=105mm	- H = the catalogue height of the water meter with the transmitter NK or NO	JS-02 Smart+  H=87mm

RADIO COMMUNICATION

The way of counting impulses	reflective Transoptor
Transmission speed	100 k bit/s
Data protocol format	Wireless M-Bus
Programmed logger	Configuration of the initial state and the ID of the water meter and frequency of transmitting
Data storage	Actual consumption rate, of the last 12 months of merit
Tryb pracy T1 / T2	**Tryb pracy T1 / T2**
Frequency range	868,95 MHz
Adjacent-channel interval	50 kHz
Instability of the frequency	< ±2.5 kHz
Transmission mode	half-duplex
T1 transmitter	
Power output	10 mW / 50 Ω
Stability of the output power level	+1 dB / -3 dB
Adjacent-channel power	according to ET S 300 220-1
Radiation interference	according to ET S 300 220-3
T2 receiver	
Sensitivity	-105 dBm (BER < 10 E-3)
Dampen of the interference adjacent-channel	> -12 dB
Selectivity	> 45 dB
Dampen of the radio inter-modulated noises	> 45 dB

SMART TERMINAL

PDA – a pocket PC HP iPAQ 114, light with a big 3,5-inches colourful touch screen, equipped with rechargeable batteries and Bluetooth interface. Thanks to the "Inkasent"-software and cooperation with Bluetooth/WMBUS communication module, Smart Terminal enables the remote configuration of the RF-front ends and measuring readings. The read data are collected on the SD memory card, thanks to that there are no limits of radio device number. Additionally available are following accessories: reserve battery, loader with input to the car lighter, reserve scriber.

Table 2. TECHNICAL DATA OF SMART TERMINAL

Installed operating system	Windows Mobile® 6 Classic
Type of the processor	Marvell PXA310624 MHz
Standard memory	64 MB memory SDRAM for application start, 256 MB memory flash ROM
External ports	1 connector mini-USB for synchronization and loading
Slots	Nest for memory card SD with large capacity
Sound card	built-in microphone, receiver, speaker and 1 stereo earphones nest 3,5 mm (4-joint)
Wireless technologies	built-in interface WLAN 802, 11b/g, Bluetooth® 2.0 and EDR
Product weight	114,6 g
Dimensions	68,9 x 13,6 x 116,7 mm
Battery	exchangeable Lithium battery with 1200 mAh capacity (exchangeable by the user)
Temperature range during the exploitation	0 ÷ 45 °C
Cover	as an option: a vandal-proof cover available

BLUETOOTH / WMBUS COMMUNICATION MODULE

Portable device intermediating between RF-front end and reading terminal PDA for WMBUS system. This device listens for incoming radio frames WMBUS in the T1 mode and configurable radio frames, then it sends them via Bluetooth interface to the portable reading terminal PDA.

Table 3. TECHNICAL DATA OF THE COMMUNICATION MODULE

Dimensions	105 x 65 x 19 mm
Range of operating temperature	0 ÷ 60 °C
Range of storage temperature	-20 ÷ 70 °C
Power	Li-Ion-Batterie CGA 103450 1950 mAh
Working time	> 24 h
Technical data of the radio receiver	
Working frequency	868 MHz
Receiver sensitiveness	> -90 dBm
Standard	EN 13757-4 (WMBus)
Type of the received frames	T1, T2 and CZEKAM
Technical data of the Bluetooth interface	
Version	Bluetooth Standard Ver. 2.0 - EDR conformity
Frequency band	2.402 ÷ 2.480 GHz
Transmitter power	max 4 dBm
Receiver sensitiveness	Typ -83 dBm
Extent	till 10 m

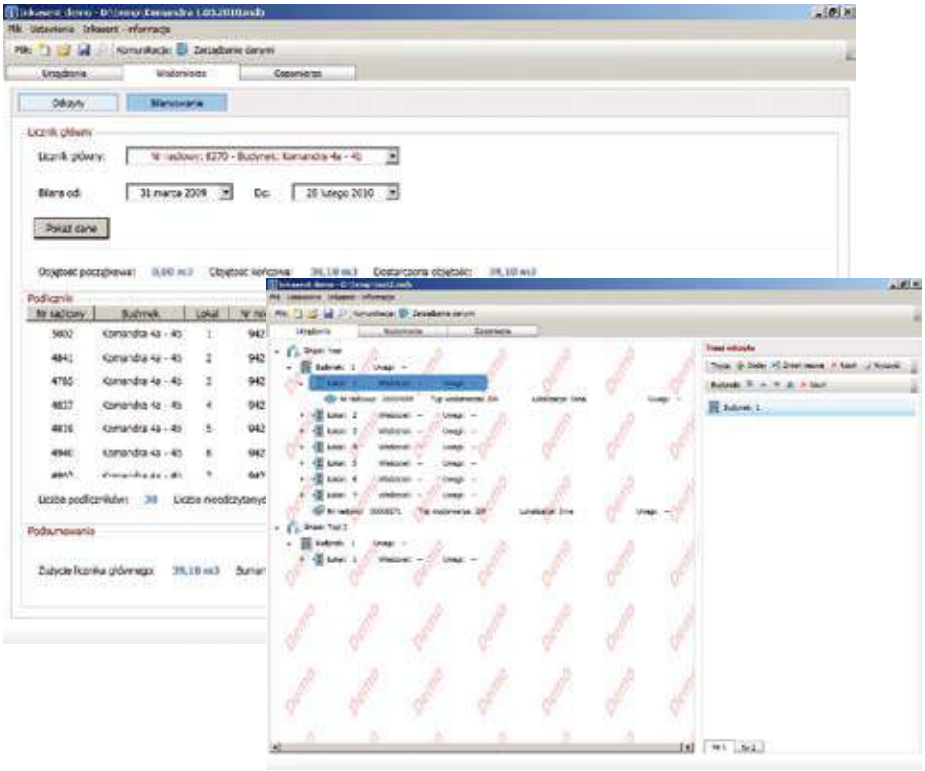
SOFTWARE “INKASENT”

The „Inkasent“ software can be installed on every stationary or portable computer of PC-type working in the Windows system: XP, Vista, 7 and it fully integrates with the functional calculation software. It enables comfortable data reading and their management out of any administrational desktop.

SELECTED SOFTWARE POSSIBILITIES:

- construction of water meter database with collector routes,
- construction of user profile enabling programming of the system functionality according to system administrator expectations,
- introduction of any comments to the given water meter,
- time calculator allowing estimating years, how long the battery – with given parameters – will work,
- construction of reports regarding balancing of water consumption,
- data export in form of commonly used format: *txt lub *csv.

PC/PDA SOFTWARE



ELEMENTS OF THE STATIONARY DATA READING

SMART TOP RADIO MODULE (like in the collector data reading- page 6)

RE-TRANSMITTER

Re-transmitter of the radio signal is an appliance put between radio modules and the concentrator, for broadening the wireless network range. Increase the max allowed distance between those appliances. The re-transmitter works on the basis of renewed broadcast of the received WMBUS border from the measuring appliances from different media, e.g. apartment water meter module AT-WMBUS-01 type. Application of the re-transmitter allows for greater range of data reading.

RE-TRANSMITTER FUNCTIONS:

- Supplied from the230V power network
- Works autonomously - activation consist in switching on the power supply unit only
- Possibility to extend the transmission route (max 8 re-transmitters)
- Integration of the aerial inside the appliance housing.

Table 4. TECHNICAL SPECIFICATION OF THE RE-TRANSMITTER

Power supply	
Power supply	From the 230V network, galvanic insulation with a help of the transformer
Power consumption	<1W
RF interface- parameters according to EN 13757-4	
Device works:	T1 mode with the 868.95MHz frequency
Power transmitting	To 25mW (according to the ISM limitations)
T1 transmit range	Open area up to 500m In buildings it depends on the construction and localization
Sensitivity of the receiver	Better than - 100dBm
Mechanical specification	
Dimensions	70 x 66 x 44 mm
Protection rating	IP68
Installation	On wall
Mass	0.19kg
Surrounding environment specification	
Work temperature	0 °C to 55 °C
Purpose	To work in closed rooms

CONCENTRATOR

Concentrator is used to gather data transmitted from the radio modules of measuring devices or re-transmitters and transferring them for further analysis throughout the GSM/GPRS network, Internet or radio modem to telemetric server for further analyses. Cooperation of the concentrator with the re-transmitter contributes to make the network with more appliances for reading. The concentrator is usually placed in the place with a large concentration of radio modules installed.

CONCENTRATOR FUNCTIONS

- Receiving and saving of the radio frames in WMBUS standard from the specific devices (max 1900 devices)
- Receiving of the retransmitted radio frames
- Connecting at a very particular time (every hour, every day or every month) with FTP server defined by user, by the GPRS protocol and saving data to file
- Configuration of the concentrator by file saved on the FTP server
- Servicing and configuration by the RS-485 or RS-232 interface
- Antenna integrated inside the concentrator's casing

Table 5. TECHNICAL SPECIFICATIONS OF THE CONCENTRATOR

Power supply	
Power supply	Power supply 230V, galvanic isolation by transformer or 5÷9 V DC (1A) charger
Power consumption	< 1 VA while receiving data < 20 VA while working in the GSM network
Communication	
Data storage memory	Max 1900 radio addresses
RF antenna	Built inside the device's housing
GSM antenna	Built inside the device's housing
RF interface- parameters according to EN 13757-4	
GSM module	Four-way 850/900/1800/1900 MHz Class 4 (2W) 850/900 MHz Class 1 (1W) 1800/1900 MHz Sensitivity- 107 dBm 850/900 MHz Sensitivity- 106 dBm 1800/1900 MHz
GPRS data transfer	"download"- depends on the size of configuration file "upload"- 258B x amount of the radio addresses
Receiver sensitivity	More than - 100dBm
Mechanical specification	
Dimensions	180 x 126 x 55 mm (typ A) 165 x 126 x 80 mm(typ B)
Protection rating	IP 68
Installation	On wall (A type) On the pole with diameter up to 50mm (B type)
Weight	< 0,5 kg
Environment specification	
Work temperature	0°C do 55°C

TYP A

TYP B

WMBUSREADER SOFTWARE FOR PC

WMSBUS Reader software can be installed on the PC computers with Windows software (XP, Vista, 7). Thanks to applied applications it allows to analyze and visualize readings and managing them from any administration desktop.

THE SOFTWARE ALLOWS TO:

- Communicate with the database- reading of information gathered during the radio transmission from all buildings (stairways, apartments and devices), all concentrators etc.
- Configure of the concentrator.
- Making reports concerning balancing of water consumption.
- Making visualizations and diagnosing of system work.

APATOR POWOGAZ

По вопросам продаж и поддержки обращайтесь:

Архангельск +7 (8182) 45-71-35
Астрахань +7 (8512) 99-46-80
Барнаул +7 (3852) 37-96-76
Белгород +7 (4722) 20-58-80
Брянск +7 (4832) 32-17-25
Владивосток +7 (4232) 49-26-85
Волгоград +7 (8442) 45-94-42
Екатеринбург +7 (343) 302-14-75
Ижевск +7 (3412) 20-90-75
Казань +7 (843) 207-19-05
Калуга +7 (4842) 33-35-03
Кемерово +7 (3842) 21-56-70
Киров +7 (8332) 20-58-70
Краснодар +7 (861) 238-86-59
Красноярск +7 (391) 989-82-67
Курск +7 (4712) 23-80-45
Липецк +7 (4742) 20-01-75
Магнитогорск +7 (3519) 51-02-81
Москва +7 (499) 404-24-72
Мурманск +7 (8152) 65-52-70
Наб.Челны +7 (8552) 91-01-32
Ниж.Новгород +7 (831) 200-34-65
Новосибирск +7 (383) 235-95-48
Омск +7 (381) 299-16-70
Орел +7 (4862) 22-23-86
Оренбург +7 (3532) 48-64-35
Пенза +7 (8412) 23-52-98
Пермь +7 (342) 233-81-65
Ростов-на-Дону +7 (863) 309-14-65
Рязань +7 (4912) 77-61-95
Самара +7 (846) 219-28-25
Санкт-Петербург +7 (812) 660-57-09
Саратов +7 (845) 239-86-35
Сочи +7 (862) 279-22-65
Ставрополь +7 (8652) 57-76-63
Сургут +7 (3462) 77-96-35
Тверь +7 (4822) 39-50-56
Томск +7 (3822) 48-95-05
Тула +7 (4872) 44-05-30
Тюмень +7 (3452) 56-94-75
Ульяновск +7 (8422) 42-51-95
Уфа +7 (347) 258-82-65
Хабаровск +7 (421) 292-95-69
Челябинск +7 (351) 277-89-65
Ярославль +7 (4852) 67-02-35

сайт: teplovodomer.pro-solution.ru | эл. почта: tvp@pro-solution.ru
телефон: 8 800 511 88 70

SWITCHGEAR
SURGE ARRESTERS
MINING EQUIPMENT
AUTOMATION
ELECTRICITY MEASUREMENT
WATER MEASUREMENT
HEAT MEASUREMENT
GAS MEASUREMENT
SENSORS
IT SYSTEMS
METERING SOLUTIONS

EN