

# The 3-rd generation AMR system for water and heat

Kishinev - March 2009

## Comparison of AMR systems

**Systems of the first generation** are presented by tens manufacturers, have rather low cost, high speed of expansion. Lacks - manual data gathering, the maximal approach to object for data collection. In high-rise buildings – access to a building is required for collect data on floors.

**Systems of the second generation** are presented by leading manufacturers of meters Actaris, Elster, Sensus ... and provide automatic data gathering on a server of system. Lacks – necessity for the intermediate routers established on each ladder platform and demanding an external feed from a network of an alternating current. It raises cost of the equipment, complicates expansion of system (need connect to the network of an alternating current), demands security from vandalism. Such systems are inefficient for buildings with low density of points of measurement.

**Systems of the third generation.** Speed of expansion, low cost, absence of design jobs, absence of intermediate routers, installation of a measurement point in some minutes, suitability as for buildings with low density (countryside) –collect of data to the manual terminal, and for buildings with high density – multi-storey houses. Scalability – in process of increase in quantity of the established points they can be united in a network, and presence of clock - allows to have data on consumption with time intervals – hour and daily.

## The equipment of AMR system



### The radiomodule D100-F

- Remote collection of data from meters by radio
- Opportunity of connection to any meters with a pulse output
- Simplicity of installation
- Up to three pulse inputs and three inputs of temperature,
- Support of meters Maddalena, B-Meters, Sensus...
  - The control of presence of an external magnetic field
  - The control of breakage of the gauge
  - The control of short circuit of the gauge



### Router J100-U

- Number of registration points – up to 250.
- Type of a feed – the concentrator/modem 6V/600mA, DC
- Power consumption no more 3W
- A reserve feed – lithium-ion accumulator
- Range of communication (50 – 400m - depends on conditions)
- Type of interface RF/USB
- Type of the supported modem - GSM/GPRS



### The manual terminal C100-U

- Collect data from radiomodules.
- Type of a feed – the lithium-ion accumulator
- External power unit – 6V/40mA, DC,
- Power consumption no more 0,25W
- Type of the interface RF/USB
- Collect data for separate consumers (cottages)

## Primary converters



### The primary converter of the flow

- The meter with pulse output “Maddalena”
- Temperature of the water – up to 90°C
- Class of accuracy – B
- Pulse output 10 l/pulse
- Installation on the direct or return pipeline

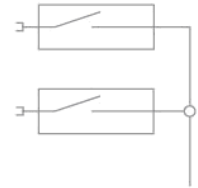


### The primary converter of the flow

- The meter with pulse output “B-Meters”
- Temperature of the water – up to 90°C
- Class of accuracy – B
- Pulse output 10 l/pulse
- Installation on the direct or return pipeline



Circuit with anti-fraude device



### The temperature sensor DTI2B, (A)

- Installation in a tee DN15
- Working temperatures of the gauge 3°C – 100°C
- Accuracy of measurement of a difference of temperatures: type B - 0,12°C, type A - 0,06°C,
- Time of reaction in water no more 12s at 0,4 m/s
- Class protection of the case IP67



### The temperature sensor DTI3B, (A) for surface mount

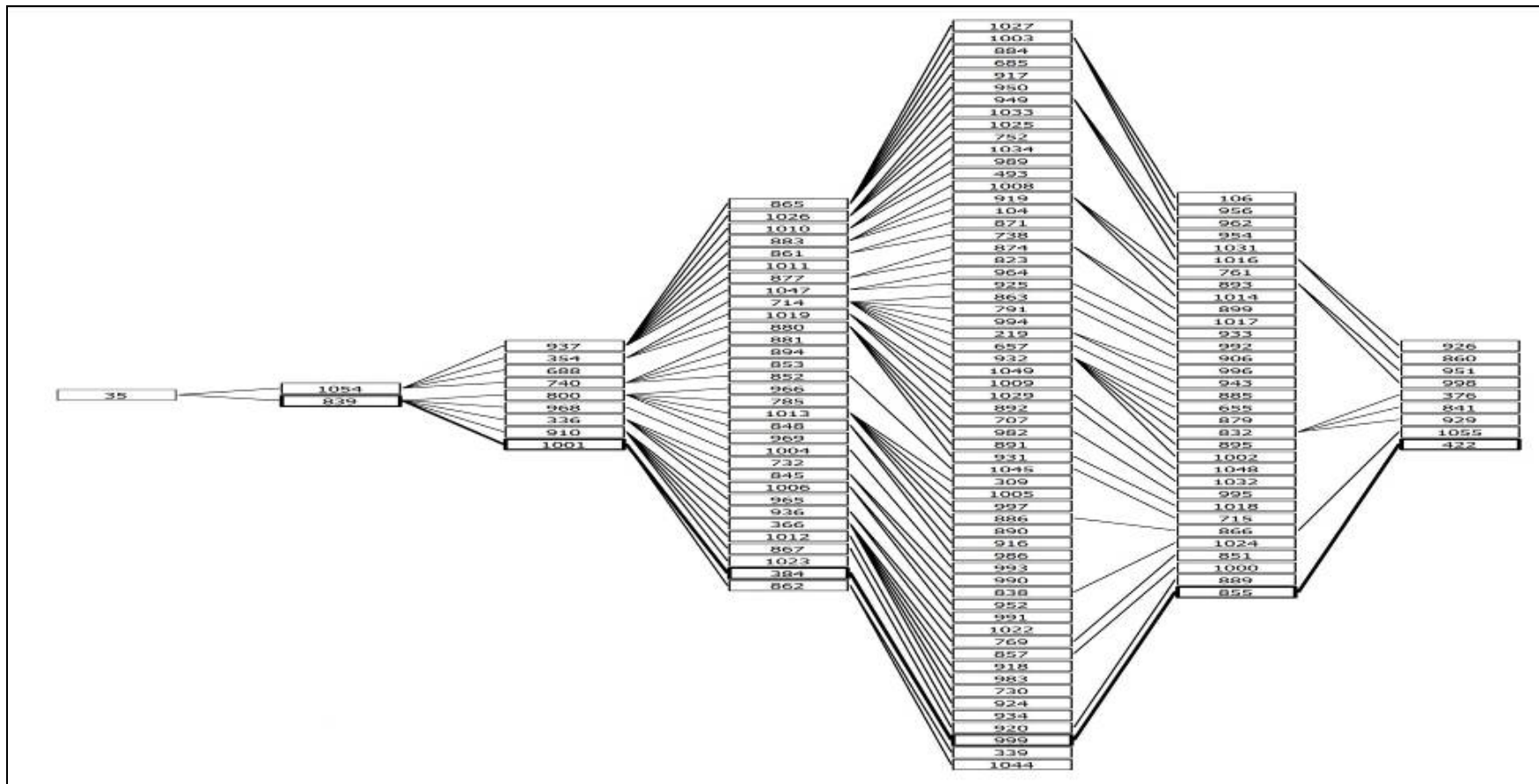
- Installation in heat-insulating bandage
- Working temperatures of the gauge 3°C – 100°C
- Accuracy of measurement of a difference of temperatures: type B - 0,12°C, type A - 0,06°C,
- Time of reaction for water no more 12s at 0,4 m/s
- Class protection of the case IP67



## Account of consumption in an apartment house

The account of consumption for the room meter is carried out by means of the radiomodule equipped by the pulse gauge.

For communication inside of the house the local radio network is used. Radiomodule can communicate directly with the concentrator, and also to pass data the friend through the friend. The Data network is construction automatically. As an example the network on street Peter Zadnipru 14/6 is resulted.



# Calculation of thermal energy

The valid value of measured thermal energy is equaled:

$$E = \int_{\tau_2}^{\tau_1} G_m \times \Delta h \times d\tau ; \text{ GJ} \quad (1)$$

where:  $G_m$  - the mass charge of the heat-carrier , t/h;

$\Delta h$  - difference between specific values enthalpy the heat-carrier, GJ/t;

$\tau_1, \tau_2$  - time of measurement, hour.

The valid value can be expressed also as:

$$E = \int_{\tau_2}^{\tau_1} G_o \times K \times (t_1 - t_2) d\tau ; \text{ GJ} \quad (2)$$

where:  $G_o$  - the volumetric charge of the heat-carrier, m<sup>3</sup>/h;

$K$  - thermal factor, GJ/m<sup>3</sup>\*°C;

$t_1$ - temperature of the heat-carrier in the submitting pipeline, °C;

$t_2$ - temperature of the heat-carrier in the return pipeline, °C;

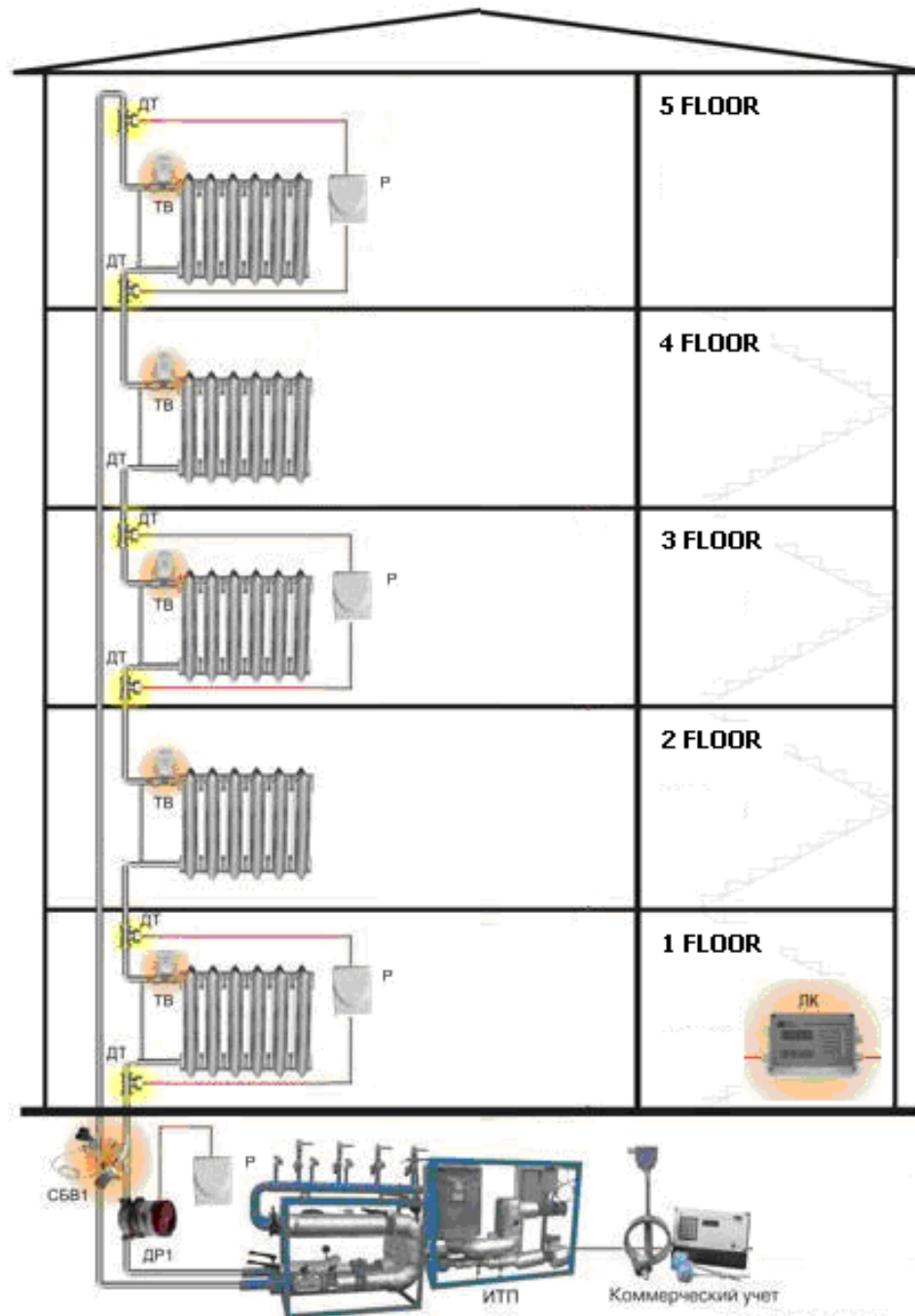
$\tau_1, \tau_2$  - time of measurement, hours.

The heat allocator for horizontal system of distributing directly calculates consumed thermal energy.

Calculation of thermal energy for vertical system of distributing is carried out on a server, on the basis of structures of the mass charge on a strut and on the basis of structures of temperatures of each consumer.

Calculations for consumed heat and hot water between the proprietor of the house and power supply organization are made on the basis of indications common house meters. Housing meters are technical in relation to the common house meters.

**Design procedure.** As the sum of indications of the heat allocators will be on 15 – 25 % less than indications common house meter, the difference is distributed is proportional to consumed heat. The difference appears because heat exchanger has no 100 % of efficiency, plus of loss of heat on delivery up to a corresponding strut (apartment) plus heating of places of the general using: entrances and common premises.



The room account of heat on the basis of heat allocators D100FC for system of heating with one-trumpet vertical distributing

Symbols:

СБВ1 - Balancing gate of the stack;

ДР1 - Flowmeter of the stack;

P - Heat allocator D100FC;

ДТ - Gauges of temperature;

ТВ - Thermostatic gate;

ЛК - Concentrator;

ИТП - Individual heat station.



## **Advantages of use of AMR system:**

- Definition of leakage on the basis of the analysis hourly data;
- Definition of meter point with low consumption – a greater mistake of the measure;
- Low peak consumption – attempt of theft is possible;
- Control of an external magnetic field - it is possible fail of the measure;
- Control of balance over the house and serviceability common meter;
- Remote disconnect - at installation of the operated valve.

## **Opportunities of connection to one radiomodule:**

- Up to three devices of cold/hot water meters (3 subscribers);
- Cold, hot water and heat metering (1 subscriber horizontal distributing);
- Heat metering – up to 2 subscribers (horizontal distributing);
- Heat metering – vertical one-trumpet distributing (the charge and 2 temperatures).

## **Additional features**

- Indications from meters of water collect by radio that does not demand any wires, and also additional design jobs;
- It is easily mounted on the meters which are already being operation, not breaking thus metrological seal;
- The system is suitable for installation, both in apartment houses, and in areas of private building;
- The system raises a degree of quality and comforts of rendered services.

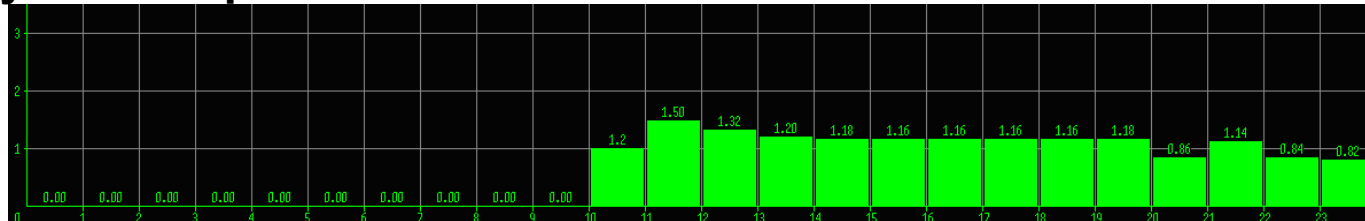


# Opportunities of the software

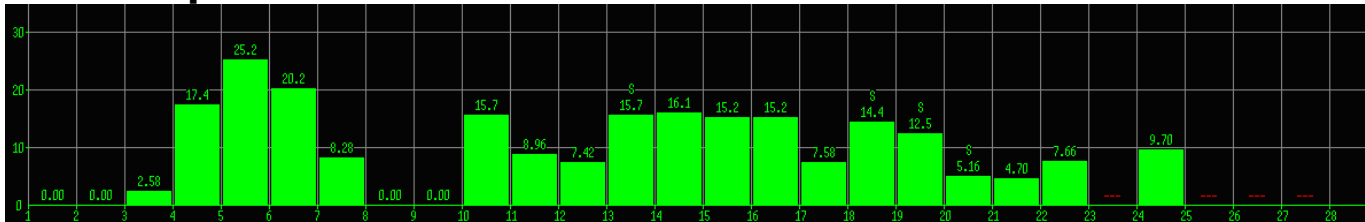
## Numerical data on the set object for the chosen date

ID	Версия/тип	Events	Реле	M/S	Slot	Квартал	№ Счётчика	NLC	Начальные	Делитель	Импульсы	Показания	Дата	Время
424	GAS v68	S	N/A	N/A	1	0	0	0	1133	100	334732	4480	2.2.9	....
129	GAS v68	S	N/A	N/A	2	0	0	0	100	0	0	0	2.2.9	....
392	GAS v68	S	N/A	N/A	3	0	0	0	100	11	0	0	2.2.9	....
432	GAS v68	S	N/A	N/A	4	0	0	0	784	100	202983	2813	2.2.9	....
691	GAS v68	S	N/A	N/A	5	0	0	0	267	100	54643	813	2.2.9	....
427	GAS v68	S	N/A	N/A	6	0	0	0	683	100	134843	2031	2.2.9	....

## Hourly consumption of the chosen subscriber for the chosen date



## Daily consumption of the chosen subscriber for the chosen month



## Example of formation of the report on the set object for the chosen date

Apartment	ID	Meter	Coefficient	Start	Sum m3	Date
1	992	71150	/100	0	711	24.2.2009
2	863	47136	/100	0	471	24.2.2009
3	1030	13140	/100	0	131	24.2.2009
4	739	1	/100	0	0	24.2.2009

## **Results of operation of AMR system**

**Cost of the equipment, in comparison with 2008, is lowered twice.**

**The program of the top level allowing to organize any number of workplaces with access on the Internet to the information on consumption of water, heat and gas.**

**The program allows to look through structures of consumption as hour/day and day/month, and also to generate reports on the set object for the chosen date.**

**The analysis of hourly data of consumption allows to reveal apartments with leakage and also small peak consumption.**

**The certificate is received, assembly of radiomodules and manufacture of magnetic gauges is carried out in firm LOCUS. There is no danger of the termination of support of system in case of leaving one of firms from the market.**

**Introduction of system reduces quantity of complaints of the consumers connected with an incorrect extract of bills. There are no the problems of data acquisition connected with necessity to find tenants at home.**

**For convenience of payment of bills there is an opportunity of an extract of bills for any date of month, and not just on the first day of month.**

## **Directions of the further development of the project**

**Management of consumption. Cost of installation of the cutting valve makes 15-25 USD.**



**The control of pressure. Installation of radiomodules with the gauge of pressure in final points of a network of water supply of multi-storey houses.**

**Installation of the radiomodule in cottages. There is an opportunity to collect data on the manual terminal on a radio channel too. Installation of system in areas with problem data gathering, in places, where a greater difference between the released volume of water and heat and acting payments, for localization places of not authorized consumption.**

**Revealing of meters working outside a working range (the control of the minimal and maximal consumption).**

**Construction hour structures of consumption on the set object (site) of a network – an estimation of throughput of a waterpipe for connection of additional consumers.**

## **The controller of Individual heat station (IHS)**

### **Billing information (the hour information):**

- Thermal energy ;
- Energy of cooling (for systems of the centralized cooling).

### **Information of the control of a status of thermal networks (hour data):**

- Energy input/energy output - distribution of energy in a network;
- Register of weights V1/V2 (presence V2 - definition of leakage inside of object);
- Charge VA, VB (hot water/additional charging);
- Input/output temperature T1, T2 ;
- Difference of temperatures T1-T2 ;
- Temperature T3 – hot water.

### **The control of the equipment and failure (on event and hour data):**

- External gauges (type dry contact – normally closed);
  - pressure decline in a secondary contour;
  - output of temperature for admissible limits;
  - gauge of flooding (option);
  - access to a premise (option);
  - absence power of a network feed (engines/pumps),
- Status Kamstrup heat meter (a code/flags/time of operation);
- Status of the controller HIS.

SISTEMUL NAȚIONAL DE ASIGURARE A CONFORMITĂȚII PRODUSELOR  
AL REPUBLICII MOLDOVA

## CERTIFICAT DE CONFORMITATE



Nr. de înregistrare **SNACP MD CP24 11 A2522-07**

Data emiterii: 15 octombrie 2007 Valabil pînă: 15 octombrie 2010

ORGANISMUL DE CERTIFICARE **SNACP MD 81 CP24**

Organismul de certificare a produselor din Telecomunicații, Informatică și Poștă (OC TIP)  
MD-2021, mun. Chișinău, str. Drumul Viilor, 28/2; tel. 373 22 735394, fax 373 22 73 39 41

PRIN PREZENTUL DOCUMENT SE CONFIRMĂ FAPTUL, CĂ PRODUSELE IDENTIFICATE ASTFEL:  
DENUMIREA / DESCRIȚIA:

**Module radio tip 100 modele D100-FC și J100-UC cu adaptor de alimentare  
"JODEN" model JOD-4101-05**

Codul NM MD  
**8525**

SÎNT CONFORME CU CERINȚELE OBLIGATORII STABILITE ÎN :

SM GOST R 50842-2005, SM SR EN 60335-2-29:2006 (cap.: 6-8, 16; 20; 22-29), ERC/REC 70-03  
(Anexa 1, banda "f")

PRODUCĂTOR

Firma "LOCUS" SRL,  
MD-2071, mun. Chișinău, șos. Balcani 8, of. 60

Codul țării  
MD

SOLICITANT

**Societatea Comercială "DJV-COM" SRL ,  
MD-2068, mun. Chișinău, str. Costin Miron 7, ap. 604**

Codul CUIO  
**1006600062650**

CERTIFICATUL ESTE ELIBERAT ÎN BAZA

1. Actului nr. 95 EPA din 29.08.2007 privind evaluarea sistemului de producere a "Modulelor radio tip 100 modele D100-FC și J100-UC" cu adaptor de alimentare "JODEN" model JOD-4101-05

2. Rapoartelor de Încercări nr. 913 din 28.09.2007, Laboratorul de încercări LÎ CEM,  
Autorizație de desemnare nr. SNACP MD 82 0079 și nr. 65/08 din 29.08.2007, Laboratorul de încercări  
a produselor industriale (LÎPI), certificat de acreditare nr. SA MD CAECP LĂ 01 002

INFORMAȚIE SUPPLEMENTARĂ:

Echipamentul certificat poate fi:

-comercializat numai fiind marcat cu marca de conformitate a OC TIP și însoțit de prezentul certificat sau copia  
lui autenticată de OC TIP.

- utilizat numai în banda de frecvențe de emisie autorizate de Î.S. "Inspectoratul de Stat al Comunicațiilor".  
Evaluarea periodică a produselor certificate se va efectua de OC TIP o dată pe an.

Seria B Nr. **014905**



Conducătorul organismului  
de certificare

Expert

Alic Gobjila

Petru Chiriliuc

**În atenția antreprenorilor și organelor de control!  
Copiile certificatelor de conformitate se legalizează în modul stabilit de  
Organismul Național de Asigurare a Conformității Produselor**

# Thank Your!

## Contact Us

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