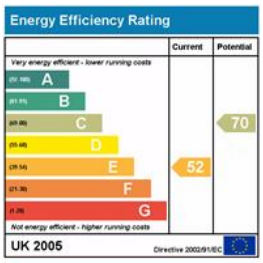
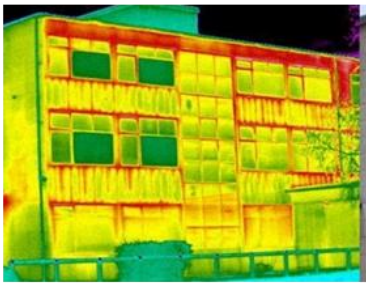
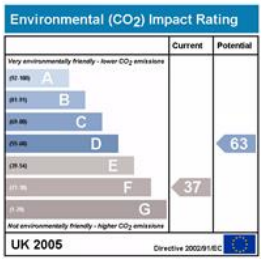
# Modernization of local public services in the Republic of Moldova

## - Intervention area 1: Local services -











# Report on smart power metering system for the Orhei district hospital

**Final report**

**August 2011**

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
cooperare germană DEUTSCHE ZUSAMMENARBEIT
On behalf of BMZ Federal Ministry for Economic Cooperation and Development
Ministerul Dezvoltării Regionale şi Construcţiilor

**Published by:**

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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Bonn and Eschborn, Germany

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**Prepared for:**

Project “Modernization of local public services in the Republic of Moldova”, implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of Federal Ministry for Economic Cooperation and Development (BMZ) and with support of Romanian Government and Swedish International Development Cooperation Agency (Sida)

**Project partners:**

Ministry of Regional Development and Construction of the Republic of Moldova
Ministry of Environment of the Republic of Moldova
Agencies for Regional Development



**Chisinau, August 2011**

## Content



## Annexes

## Acronyms and abbreviations

| | |
|---|---|
| DIN | Deutsche Industries Norm |
| EU | European Union |
| IEC | Standard cable names |
| MRDC | Ministry of Regional Development and Construction |
| PP | Power point |
| RM | Republic of Moldova |
| ПУЭ | Moldavian regulation for electrical installation |

# 1 Introduction

GIZ has initiated the project "Modernization of Local Public Services in the Republic of Moldova" at the beginning of 2010, which is being implemented in collaboration with local, regional and central Government stakeholders. The main partner of GIZ in implementing this project is the Ministry of Regional Development and Construction (MRDC).

The “Orhei District Hospital” received a grant from the German Ministry of Cooperation and Economic Development in order to improve the energy efficiency in the district hospital from Orhei. The feasibility study on the above-mentioned issue done by local experts contains a list of recommendations for improving the energy efficiency in the hospital buildings. One of the most appropriate is considering the installation of a so-called “Smart power metering system”.

This report concerns itself with the scope of works, technical possibilities of implementation and an analysis of perspective contractors.

## 2 Scope of works

The Scope of this project is to install a system for centralized remote data gathering for all the power meters in the “Orhei district hospital”. The hospital has only two meters at the moment installed in the transformer substations 1 and 2. In order to implement an efficient energy management policy the hospital needs to know the energy consumption in each ward. The prospective contractor will install meters in order to have all the wards power consumption metered separately. The prospective contractor will rewire and refurbish the distribution boxes designated in Annex 1 Table 1 with new protection interrupters, replace the distribution boxes where needed. The contractor will also undertake rewiring of the distribution boxes in the cardiology building according to Annex 2 Drawing 1.

# 3 State of the hospital

The Hospital is placed in a series of 18 main buildings and several auxiliary ones. The power network is very old and is poorly suited to modernization without capital repairs. There are two types of wards, situated in separate buildings and situated in a part of a multi-stored building. We separated the wards in “easily metered” meaning that the ward's power system allows the installation of a meter without effort and discomfort to the hospital and “non-easily metered” meaning that in order to install a meter some effort to rewire the power system and/or distribution boxes is required.

After a thorough inspection of the site, three types of works were identified:

- The majority of wards occupy one building and the meter can be conveniently installed in or near the main distribution box:
  - The pharmacy building (5), the administration building (6) and the infectious diseases ward (7) are three separate buildings but are connected from the same distribution box thus the meters can be conveniently placed in it. The box is very old and rusty and replacement is recommended;
  - The laundry unit (11) is easily “metered”;
  - The sterilisation unit (12) needs two meters as it has a disinfection subunit and a sterilisation subunit, the power boxes are separate for each subsection;
  - The kitchen (10), garage (13), fridge and food warehouse (14) are easily “metered”;
  - The doctor control (15), red cross (15), tomography unit (15) are placed in the same building but the power is fed separately to each from an outside distribution box the medical consultation building (16) is fed from the same box, thus the meters can be placed in the common distribution box. The box is temporary and needs “urgent” replacement;
  - The “old” boiler house (22) is easily metered;
  - The morgue (24) is easily metered;
  - The Industrial warehouse(25) is easily metered;
  - The “new” boiler house is easily metered;
  - The shop (26) is easily metered;
  - The power substations that feed the hospital need replacement of the meters. The matter must be coordinated with “Union Fenosa” the net owner;
  - The three external users have direct contract with “Union Fenosa” and the change of their meters must also be coordinated with the net owner.
- Four larger buildings contain more than one section and the meters can't be placed in the main distribution box:
  - The “Gallery” (1). has three floors and each is occupied by a different entity. The first floor is rented by the medical emergency service. The second floor is rented by the Medical insurance company. The third floor is occupied by the hospital accountancy division. The building has two main power shafts that go from the first floor to the third. Each shaft has two cables from two different feeders, one for power supply the other for illumination (lightning). The only

feasible technical solution to meter the floors separately, without remaking the power supply, would be to install 5.00 meters , as the Insurance company uses only half a floor;

- The therapy building (2) has four wards the transfusion ward, the machine treatment ward, the gastroenterology ward and the therapy ward. The transfusion ward has only one distribution box and is easily metered. The machine treatment ward uses half of the first floor and has two distribution boxes. The gastroenterology ward uses half the second floor and has four distribution boxes .The therapy ward uses the second floor, and half of the second floor of the gallery building. The optimal solution would be to install a master meter in the main distribution box and deduce from its numbers the secondary meters in the gastroenterology, machine treatment and the transfusion wards and thus obtain the data for the therapy ward;
- The maternity building (2+3) is L-shaped and houses four wards the laboratory (first floor), the perinatal centre (first floor), the gynaecology ward (third floor) and the maternity ward (all three floors). Each wing of the L-shape has two power shafts in each corner, one for lighting and one for lighting and power. The perinatal centre and the laboratory each need two meters one for lighting and one for power. The gynaecology ward needs four meters 2 for power and two for lighting. The maternity ward can be metered by deducing from the Master meter's numbers the numbers of the secondary meters. The matter is further complicated by the individual heating substation that “belongs” to the hospital and must also be metered. We would recommend to install temporary meters in each ward for a month in order to determine the “weight” of each ward in the total power consumption and establish a mathematical coefficient in order to calculate the power used by each ward from the Master meter's numbers;
- The cardiology, paediatriy, neurology, and otolaryngology ward building (18) has four floors and each ward occupies one floor. Each floor has four power shafts, one for power supply and three for lighting. In order not to install four meters on each floor we recommend redesigning the distribution boxes as they are situated very near and are easily interconnected. In order to do this a main power line cable must be replaced from the first to the fourth floor (approx. 25.00 m);
- The surgery building (21) has 6 wards. Reanimation and ultrasonography have separate distribution boxes that were recently replaced and are easily “metered”. The reception ward has two distribution boxes one for power and one for lighting so two meters are in order. The roentgen ward not easily metered as the power supply for the machinery is separate, but the lighting and 220 V power supply comes from the reception ward, the matters are further complicated by the dentist's room that draws power from both sources. The surgery and traumatology each occupy one floor and have four distribution boxes, two in each wing. So Four meters must be installed for each of them.

- All distribution boxes (main and secondary) are very old and need replacement:
  - The distribution boxes in all buildings are old and outdated. They need replacement and rewiring. Many of the distribution boxes don't have a main switch. The housing is generally rusty or broken. The locks do not function or are not even present so the access to the boxes is not restricted. We recommend that they all be replaced.

# 4 Technical requirements

## 4.1 Meters

The meters used for the transformer stations, polyclinic and the ecology building will have a precision of no less than 0.50 S for the active power and 1.00 S for reactive power will be electronic and will be certified as commercial meters in RM. The meters for every other building will have a precision no less than 1.00 S, will be electronic, and will be certified as commercial meters in RM. Each meter will have the capacity to measure the instant voltage, current, cos φ, frequency, active and reactive power and power factor. Each meter will be equipped with a PLC communication modem in order to communicate with the central server. According to the section 6 of the “Regulation regarding the metering of the electricity for commercial purposes” no.382 dated 02.07.2010 each meter will have a separation interrupter before and after itself and will be installed in a secured box, plastic on the inside of buildings and steel on the outside. The boxes for the transformer stations, the polyclinic, ecology building must be coordinated and approved by “Union Fenosa”. Each meter will be installed in accordance with the «ПУЭ» (Moldavian regulation for electrical installation) respecting all national safety regulations. See drawings 1; 2 from Annex 3.

## 4.2 Distribution boxes

The distribution boxes in the hospital are very old and need replacing. The contractor will choose standard distribution boxes that fit into the places of the old ones and fill them with the needed interrupters. The contractor shall than draw a working scheme of each distribution box and clearly mark each interrupter's connection power and type, a copy of these schemes must be handed to the hospital. The wiring and connections to the distribution boxes must be made in accordance with the «ПУЭ» respecting all national safety regulations. The contractor will coordinate with the hospital a schedule of the distribution boxes change in order to disturb as little as possible the usual routine of the hospital. The distribution boxes inside the buildings can be plastic or steel; the distribution boxes on the outside of the hospital will be made of steel and have secured locks.

The main distribution boxes of the therapy building, paediatriy building, surgery building and maternity building are in good state and only need replacing the interrupters, installing a DIN (Deutsche Industries Norm) rail and painting. All cable installations must be neat and well-arranged for easy service and maintenance and be in accordance with "good workmanship". Obstruction of access ways must be avoided. Cables must fulfil IEC codes (standard cable names) and shall be rated according to the application. Cables must run in parallel with the structural lines of the constructions and shall be supported in their full lengths by proper cable support facilities designed for this purpose e.g. cable trays or cable ladders. All cables shall be fixed by cable elates of an approved type in such a manner that no undue strain is put upon them. Directional changes must be made in accordance with the cable manufacturer’s guidelines. Cables shall be laid in one continuous length. No splicing or joints will be permitted other than in junction boxes. Cable entries to cabinets must be provided with properly designed and sized cable glands to maintain the class of enclosure protection.

All cables must be labelled in both ends. See drawings 3-6 from Annex 3

## 4.3 Smart power metering system

The software will be user friendly and stable. The database will have the possibility to save data for minimum of one year and have the possibility to archive the older data. The contractor shall provide an installation disk and teach the employer’s personnel on how to install and configure the programs. The language of the software will be Romanian or Russian.

The contractor shall undertake all necessary works in order to install and commission the smart power metering system. The contractor shall prove that the communication between the server and each meter is stable and that data isn't lost in the process. The contractor shall also prove that the database is functional and doesn't crash when there is a significant amount of data. The contractor shall teach the Hospital's personnel how to operate and use the software. The contractor shall ensure that the software can type reports and bills in various forms. The data should be collected on a 15 min basis in order to establish peak consumption.

## 4.4 Functional guarantees

The contractor shall provide a warranty period of two years for the meters and “Smart power metering system” and of one year for the works and materials used. During the warranty period the contractor is required to arrive and remedy any problem within 32 hours from the moment of call.

# 5 Prospective contractors

## 5.1 Short characteristic of prospective contractors

For the works described in pp.3 four prospective contractors were identified. All four are a consortium made of two companies, one representative of the manufacturing companies and an installer company. The contractors are listed below:

- AMS Energo is the official dealer for “Landys +Gyr” - an international manufacturer of power, heat and water meters. They offer a complete solution for a “Smart metering system” together with all accessories for communication and central server data gathering software. The meters will be equipped with a PLC modem (a modem that communicates directly through the power lines) and several retransmission stations will be installed. The meters are certified in Moldova. Technical documentation about the meters and system is attached. The installer company has more than three years’ experience in power works, but only one year experience in smart metering systems, as in Moldova the smart metering concept was not in use till two or three years ago.
- Lachi-aparat is the official dealer of the Russian manufacturer “Mercury”. They offer a complete solution for a “Smart metering system” together with all accessories for communication and central server data gathering software. The meters will be equipped with a PLC modem (a modem that communicates directly through the power lines) and several retransmission stations will be installed. The meters are certified in Moldova. Technical documentation about the meters and system is attached. The installer company has more than three years experience in power works, but only two year experience in smart metering systems, as in Moldova the smart metering concept was not in use till two or three years ago.
- Volta is the official dealer for the Ukrainian manufacturer “Nic”. They offer a complete solution for a “Smart metering system” together with all accessories for communication and central server data gathering software. The meters will be equipped with a PLC modem (a modem that communicates directly through the power lines) and several retransmission stations will be installed. The meters are certified in Moldova. Technical documentation about the meters and system is attached. The installer company has more than three years’ experience in power works, but only one year experience in smart metering systems, as in Moldova the smart metering concept was not in use till two or three years ago.
- ADD is a Moldavian manufacturer of meters and “Smart metering systems”. They offer a complete solution for a “Smart metering system” together with all accessories for communication and central server data gathering software. The meters will be equipped with a PLC modem (a modem that communicates directly through the power lines) and several retransmission stations will be installed. The meters are not certified in Moldova, but have conformity certificates in EU, Sweden, Russia and 20 other countries. They also use other companies meters if it is necessary, in case of the Orhei hospital they will install commercial meters for the transformer substations and polyclinic and take them into the overall data gathering system. Technical documentation about the meters and system is attached. They are the only ones that have more than 10 years installation experience for “Smart metering systems”.

## 5.2 Analysis of prospective contractors capabilities

All prospective contractors have presented technical solutions for the “Smart power metering system” that from a quality and reliability point of view are equivalent. The software for remote data gathering and storing and also for work with this data is user friendly but needs some practice in order to get used to it. The requirements for the server are not high; it can be placed on an ordinary computer.

### 5.2.1 Technical support

The technical support offered by “AMS Energo”, “Lachi aparat”and “Volta” is satisfactory but not very flexible as they sell relatively few smart meters on the market.

The technical support offered by “ADD” is of superior quality as they are the designers and manufacturers of their meters and any non-standard problem can be solved quickly and efficiently.

### 5.2.2 Prices

The price offered by “AMS Energo is the highest” and the cost list item is the software. We are concerned by this fact because if any meters break in the future and must be replaced there is a possibility that they will be unable to communicate with the older version of the software. In this case the hospital shall have to renounce using the replaced meters with the system or buy new software which in turn can be just as expensive.

The prices offered by “Lachi aparat” and Volta are approximately equal and much cheaper and the software is free of charge which makes it very attractive.

The prices offered by “ADD” are the cheapest and the software is free of charge which makes it very attractive.

### 5.2.3 Comparative table

The following table contains an evaluation of the four prospective contractors’ capabilities.

**Table 5-1: Evaluation of the four prospective contractors’ capabilities.**

| Parameter | Company Name / Grade | | | |
|---|---|---|---|---|
| | ADD | Volta | Lachi Aparat | AMS Energo |
| Meter Certification | 0 | 10 | 10 | 10 |
| Meter Quality | 9 | 9 | 9 | 9 |
| Software quality | 9 | 8 | 8 | 8 |
| Technical support | 10 | 6 | 6 | 7 |
| Software Individualization | 10 | 0 | 0 | 0 |
| Smart Metering Installation experience | 10 | 5 | 5 | 6 |
| Service and replacement | 9 | 7 | 7 | 8 |
| Price | 10 | 8 | 7 | 3 |
| **Total** | **67** | **53** | **52** | **51** |

There are 8 categories and each is graded from 1 to 10, where 1 is the worst and 10 is the best grade. The meter certification takes into account the Moldavian certificates of the meters. The meter quality takes into account the quality and reliability of the meters. The software quality grades the user friendliness and reliability of the data gathering software. The technical support takes the quality of the contractors’ personnel and the possibility to teach and advise the employer. The software individualization takes

into account the possibility to adjust the software and the system to the users' needs. The installation experience takes into account the number and complexity of systems that the prospective contractors successfully commissioned. The service and replacement takes into account the speed and quality of service. The price rates the prices offered for meters, works, system management, software.

### 5.2.4 Recommendation on possible contractors

As a conclusion, we state that the best technical and economical option would be the company "ADD", although it has the disadvantage that its meters are not certified in Moldova that is arguably not important. Other viable alternative would be "Lachi aparat" or "Volta".

# 6 Conclusion

The “Smart metering system” is essential for establishing an energy efficiency program as it delivers real time data on power consumption, localizes individual consumption patterns (separately for each ward) and can be used to monitor changes in the energy efficiency policy. It is the tool that gathers the initial data in order to establish the strategy for energy efficiency and it is also the tool that monitors and saves the results of every policy change, thus decisions can be made about the effectiveness of the policy in general or of a measure in particular. I strongly recommend its implementation so that the “Orhei district hospital” can start saving energy.

## Annexes

| | |
|---|---|
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| Annex 3 | Drawings of the internal wiring of the distribution boxes and meter boxes |
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| Annex 5 | Cost estimates |
| Annex 6 | Technical information on smart power metering system and its components |

# Annex 1

## Tables with the necessary number of meters, distribution boxes and interrupters

# Annex 1

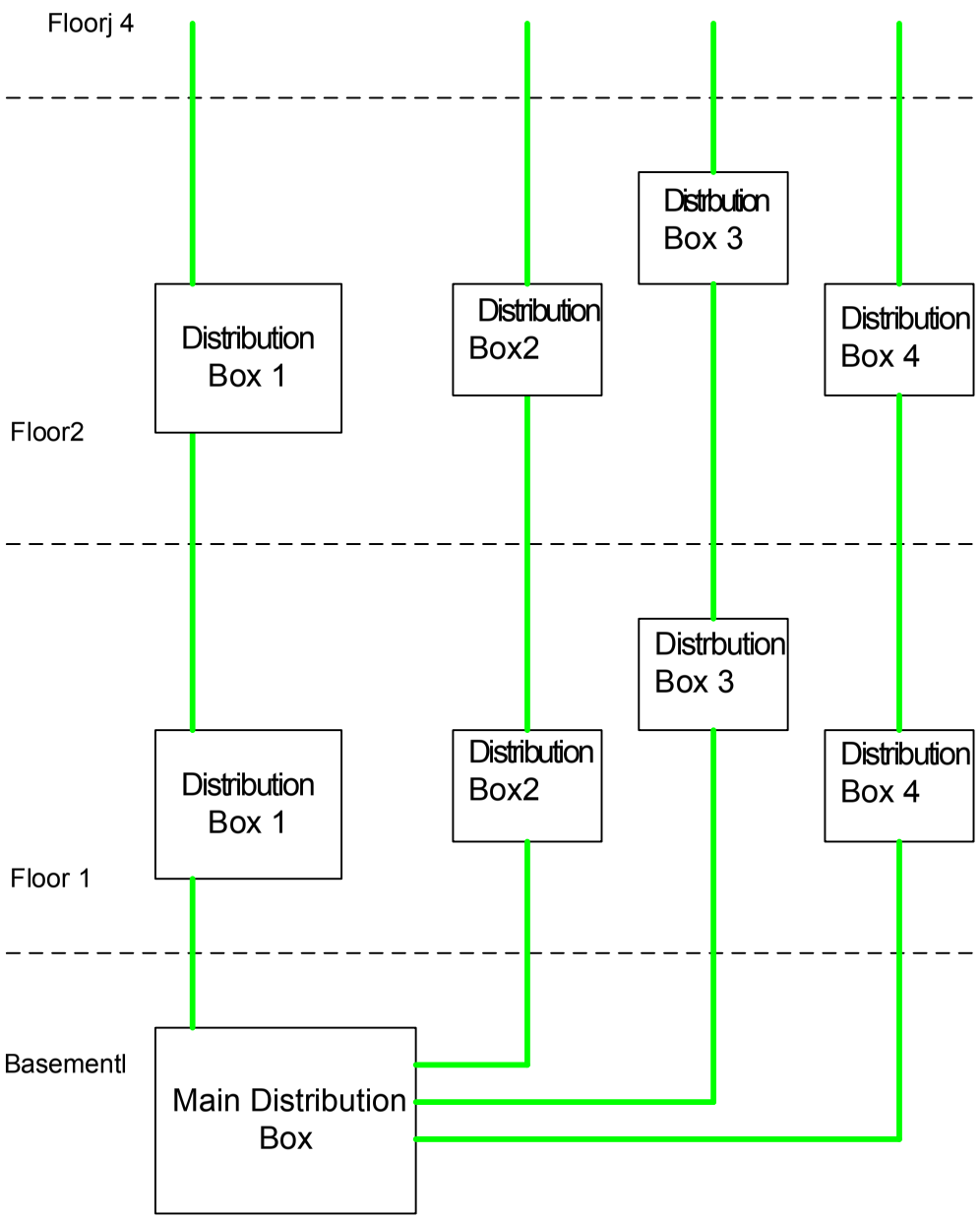
## Number of meters, distribution boxes and interrupters

| N | Nr. Cadastru | Floor | Ward | Dist. Box | | Interrupters | | | | | | Meter with PLC modem | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Power | Lighting | 1phase | | 3phase | | | | Quantity | Power | Current |
| | | | | | | 16A | 25A | 32A | 40A | 50A | 100A | | | |
| 1 | E | 1 | Emergency | 2 | 2 | 12 | | | | 1 | | 4 | A | 100 A |
| | | 2 | Therapy Gallery | 1 | 1 | 24 | | | | 2 | | | | |
| | | 2 | Insurance company | 1 | | 12 | | | | 1 | | 1 | A | 100 A |
| | | 3 | Accountance office | 2 | 2 | 12 | | | | 1 | | 4 | A | 100 A |
| 2 | A | 1 | Transfusion | 2 | | 12 | | | | 1 | | 2 | A | 100 A |
| | | 1 | Machine therapy | 1 | 3 | 24 | | | | 8 | | 3 | A | 100 A |
| | | 2 | Gastroaenterology | 1 | 3 | 24 | | | | 8 | | 4 | A | 100 A |
| | | 2 | Therapy Gallery | 1 | | 12 | | | | 1 | | 1 | A | 100 A |
| 3 | B | 1 | Perinatal Center | 2 | 2 | 12 | 8 | | | | 2 | 4 | A | 100 A |
| | | 1 | Maternity | 3 | 2 | 27 | | | | 5 | | 1 | A | 100 A |
| | | 3 | Gaenicolofy | 2 | 3 | 36 | | 3 | | | | 5 | A | 100 A |
| | | 0 | *Basement* | | | 6 | | | | | | | | |
| | | 0 | *Main Distribution box* | | | | | | | | 8 | | | |
| 4 | | 1 | Laboratory | 1 | 2 | 16 | | | | | 1 | 2 | A | 100 A |
| | | 2 | Maternity | 3 | 2 | 51 | | | | 5 | | | A | 100 A |
| | | 3 | Maternity | 3 | | 42 | | | | 1 | | | A | 100 A |
| 5 | S | | Pharmacy | 1 extern | | 3 | 3 | | | 1 | | 1 | A | 100 A |
| 6 | | | Administration | | | 5 | | 1 | | | 1 | 1 | A | 100 A |
| | | | Housekeeping | | | 5 | 5 | 2 | | | | 1 | A+R | 100 A |
| | | | Well pump nr. 1 | | | 1 | | | | | | 1 | A+R | 100 A |
| 7 | D | | Contagious deseases | | | | | | | | 1 | 1 | | 100 A |
| 10 | M | | Kitchen | 1 extern | | | | | | | 1 | 1 | A+R | 100 A |
| 11 | U | | Wash center | 1 extern | | | | | | | 1 | 1 | A+R | 100 A |
| 12 | F | | Sterilization | 1 extern | | | | | | | 1 | 2 | A+R | 100 A |
| 13 | R | | Garage | 1 extern | | 3 | 2 | | | | 1 | 1 | A | 100 A |
| 14 | LT | | Fridge, Food stufs warehouse | | | 5 | 5 | 1 | | | 1 | 1 | A | 100 A |
| 15 | H | 1 | Doctor control | 1 extern | | 5 | | | | 1 | | 1 | A | 100 A |
| | | 1 | Red Cross | | | 5 | | | | 1 | | 1 | A | 100 A |
| | | 1 | Tomography | | | 5 | 2 | | | | 1 | 1 | A+ R | 100 A |
| 16 | Ă | | Consulting | | | | | | | 1 | | 1 | A | 100 A |
| | | | Well pump nr. 2 | | | 1 | | | | | 1 | 1 | A + R | 100 A |
| 18 | V | 1 | Cardiology | 1 | 3 | 36 | | 4 | 4 | | 1 | 1 | A | 100 A |
| | | 2 | *Paediatry* | 1 | 3 | 36 | | 4 | 4 | | 1 | 1 | A | 100 A |
| | | 3 | *Nourlogy* | 1 | 3 | 36 | | 4 | 4 | | 1 | 1 | A | 100 A |
| | | 4 | *Otorinolaringology* | 1 | 3 | 36 | | 4 | 4 | | 1 | 1 | A | 100 A |
| 21 | T | 1 | Reception | 1 | 1 | 12 | | | | | 1 | 2 | A | 100 A |
| | | 1 | Reanimation | | | | | | | | 1 | 1 | A+R | 100 A |
| | | 1 | Roentgen | | | | | | | | | 1 | A+R | 100 A |
| | | 1 | Ultrasonography | | | | | | | | 1 | 1 | A | 100 A |
| | | 2 | Traumatology | 2 | 2 | 20 | 10 | | | 1 | | 4 | A | 100 A |
| | | 3 | Surgery | 2 | 2 | 20 | 10 | | | 2 | | 4 | A | 100 A |
| | | 0 | Main Distribution box | | | | | | | | 9 | | | |
| 22 | C | | Boiler house | 1 extern | | | | | | | | 2 | A+R | 100 A |
| 24 | X | | Morgue | 1 extern | | | | | | | | 2 | A | 100 A |
| 25 | Î | | Industrial warehouse | 1 extern | | | | | | | | 1 | A | 100 A |
| 26 | P | | Shop | 1 | | | | | | | | 1 | A | 100 A |
| 27 | Z | | Transformer substation 1 | 1 extern | | | | | | | | 1 | A+R | 5A |
| 28 | J | | Transformer substation 2 | 1 extern | | | | | | | | 1 | A+R | 5A |
| 29 | | | Polyclinic | 1 extern | | 5 | 5 | | | | 1 | 1 | A | 100 A |
| 30 | | | Ecology and Social Assistance | 1 extern | | 5 | 5 | | | | 1 | 2 | A | 100 A |

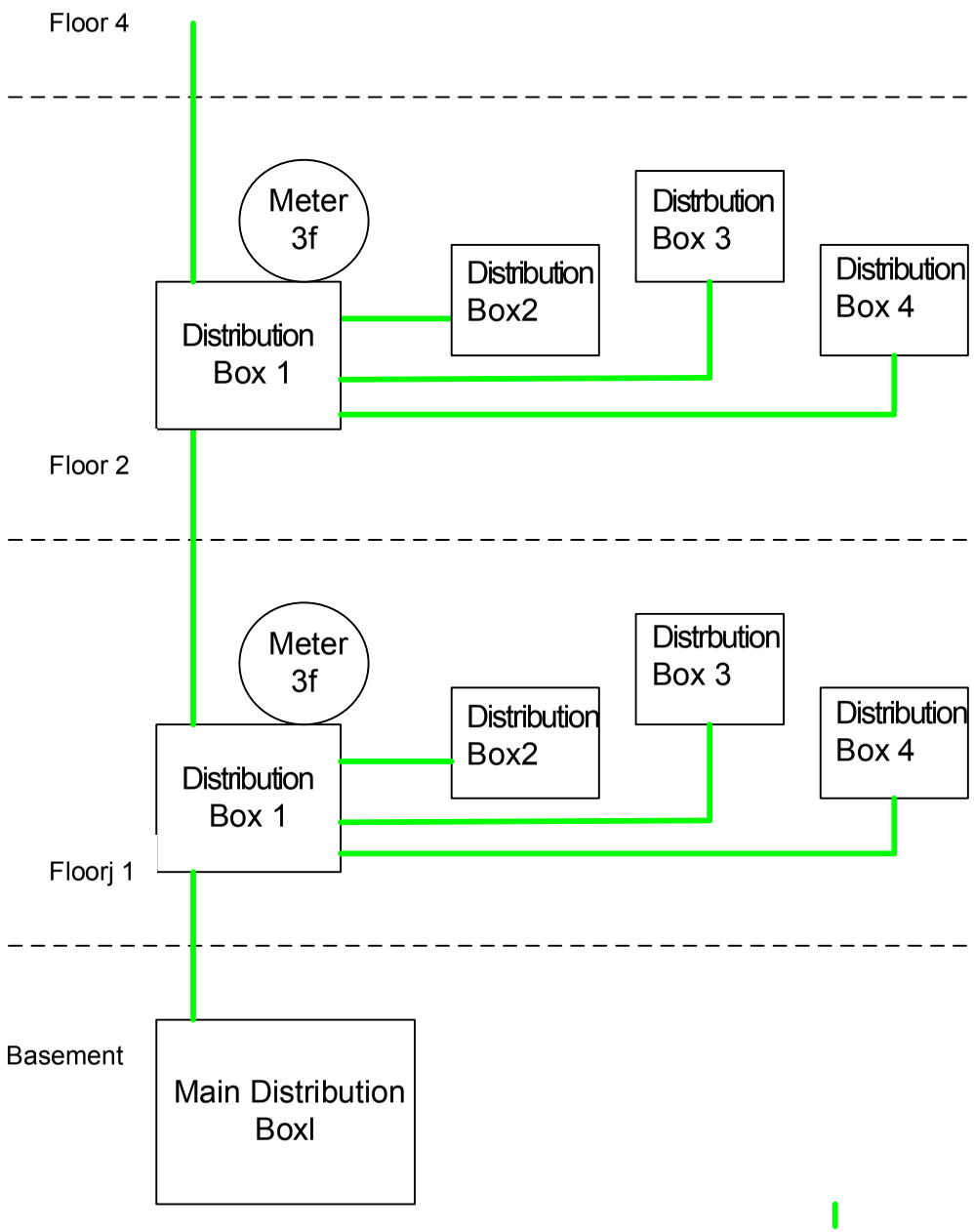
Annex 2

Drawing of the distribution boxes rewiring scheme for the paediatry building

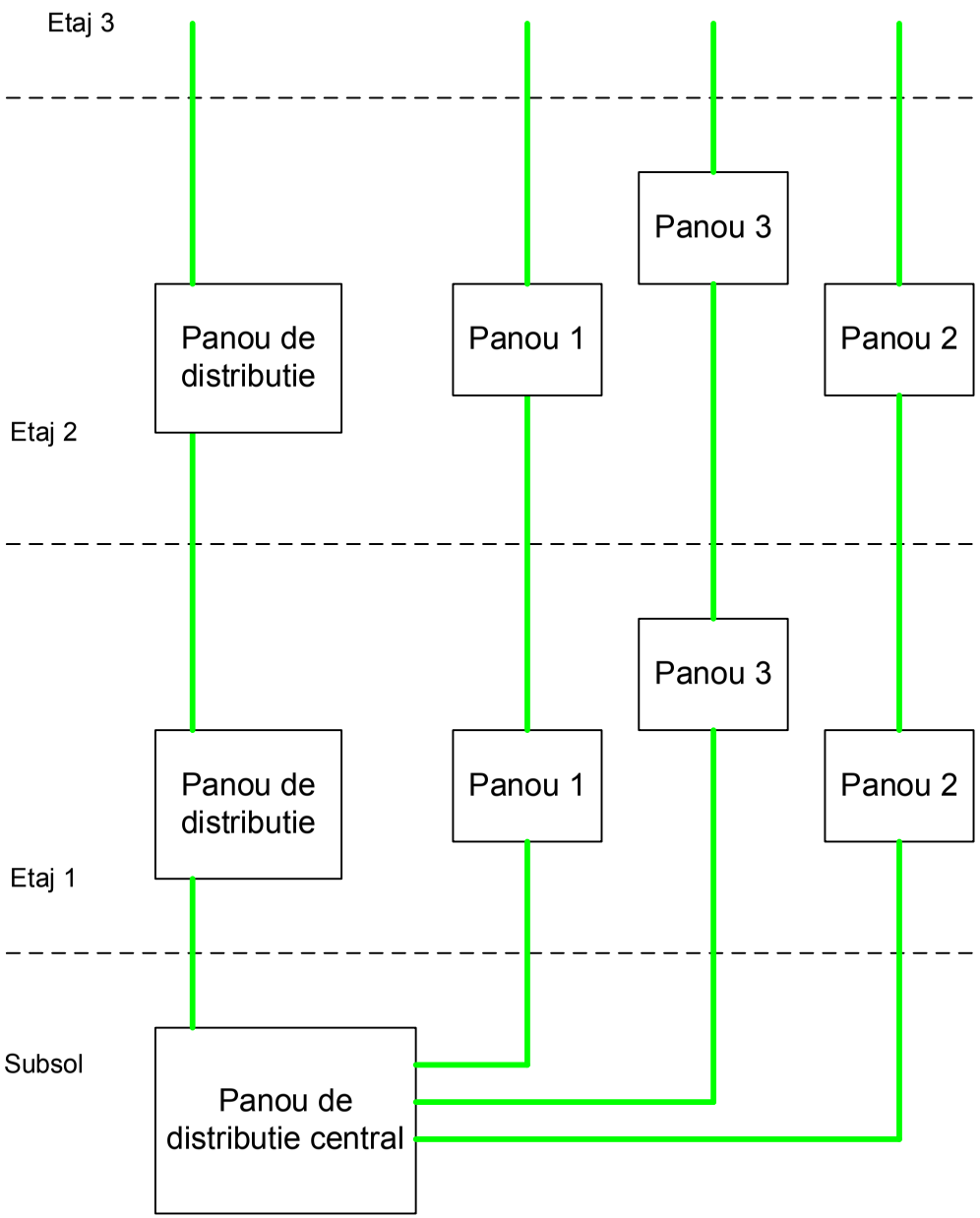
Distribution Boxes Connections in the Paediatry Building



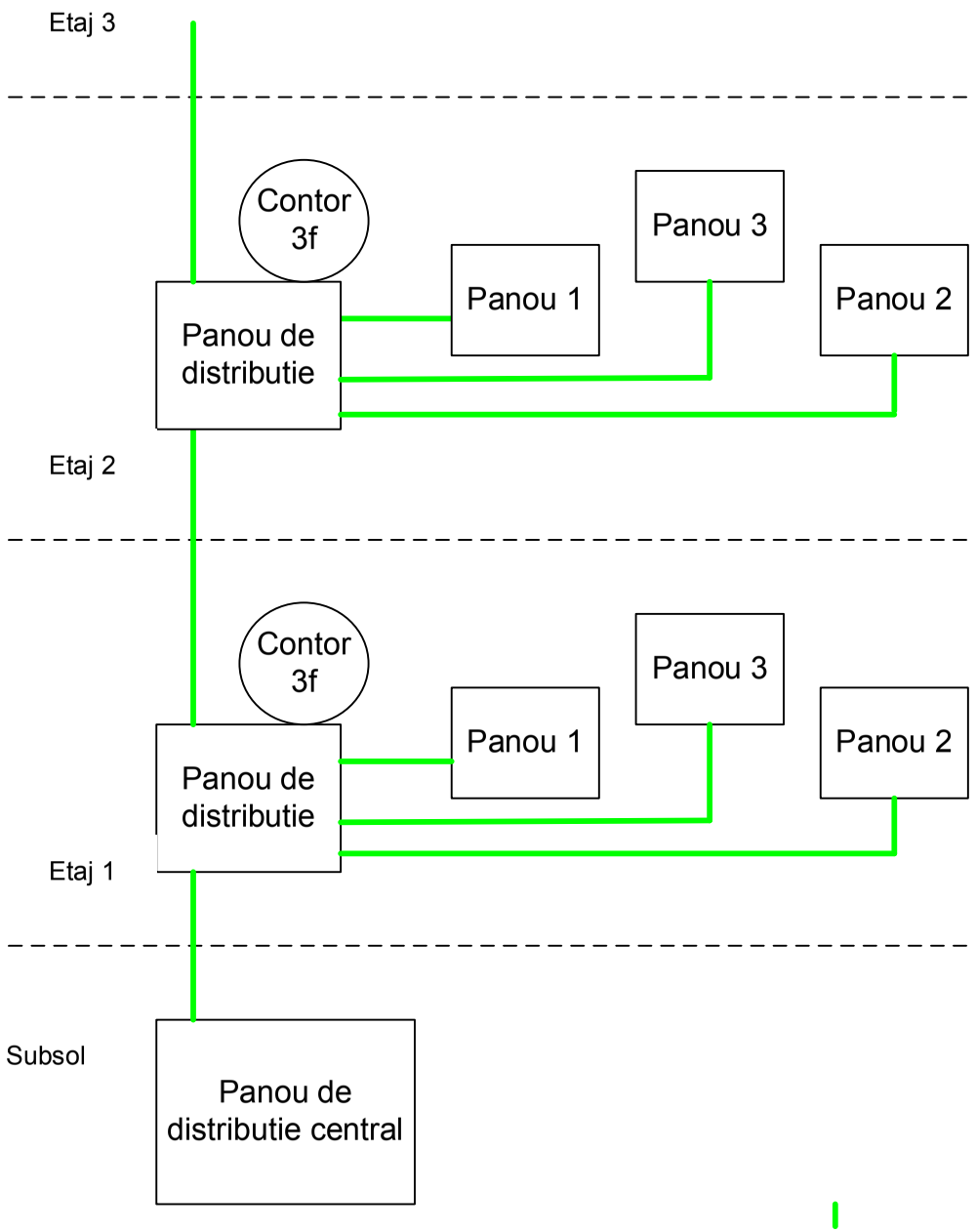

Modernized Connections



Conexiuni actuale

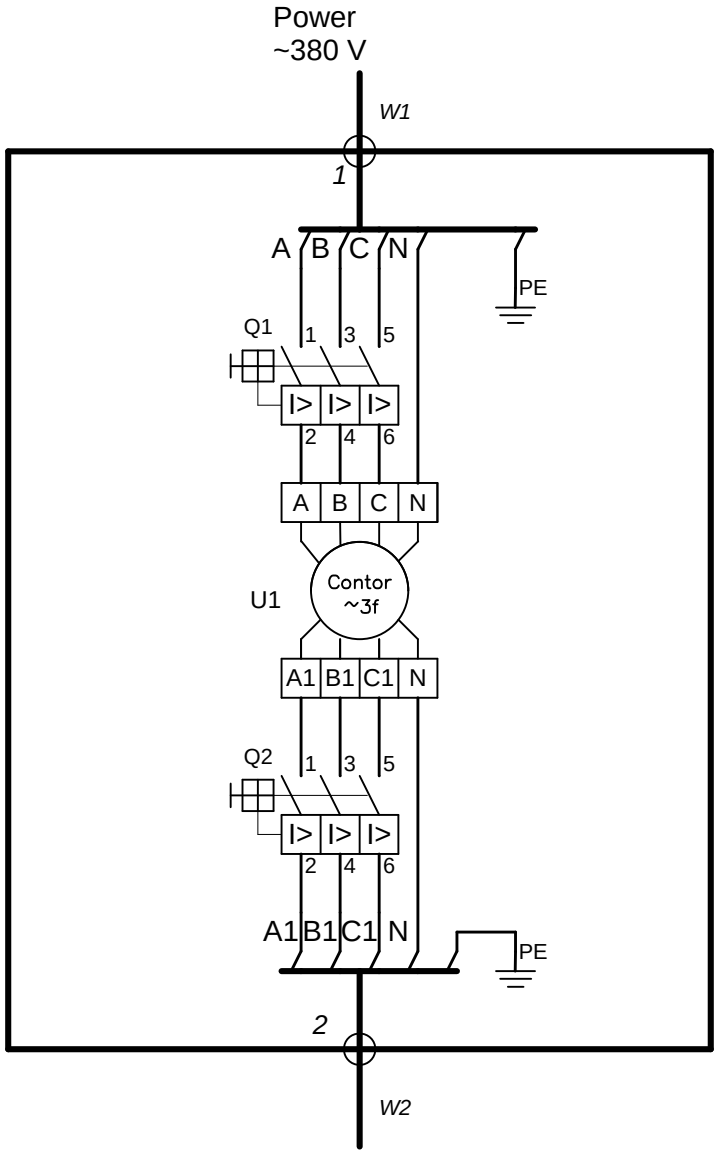



Conexiuni propuse pentru modernizare



Annex 3

Drawings of the internal wiring of the distribution boxes and meter boxes




Q1, Q2 - intrerruptor 100A U1
U1 - meter

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Drawing 1 |
| Mod | Coala | Nr document | Semn | Data | One Meter Box |
| Autor | | {Author} | | | |
| Verificat | | {Checked By} | | | Schema Electrica |
| Control t. | | | | | |
| Coordonat | | {Coordonat1} | | | |
| Coordonat | | | | | |
| Aprobat | | {Approved By} | | | |

| Litera | Masa | Scara |
|---|---|---|
| | | |
| Coala | Coli 1 | |

Aplicare initiala
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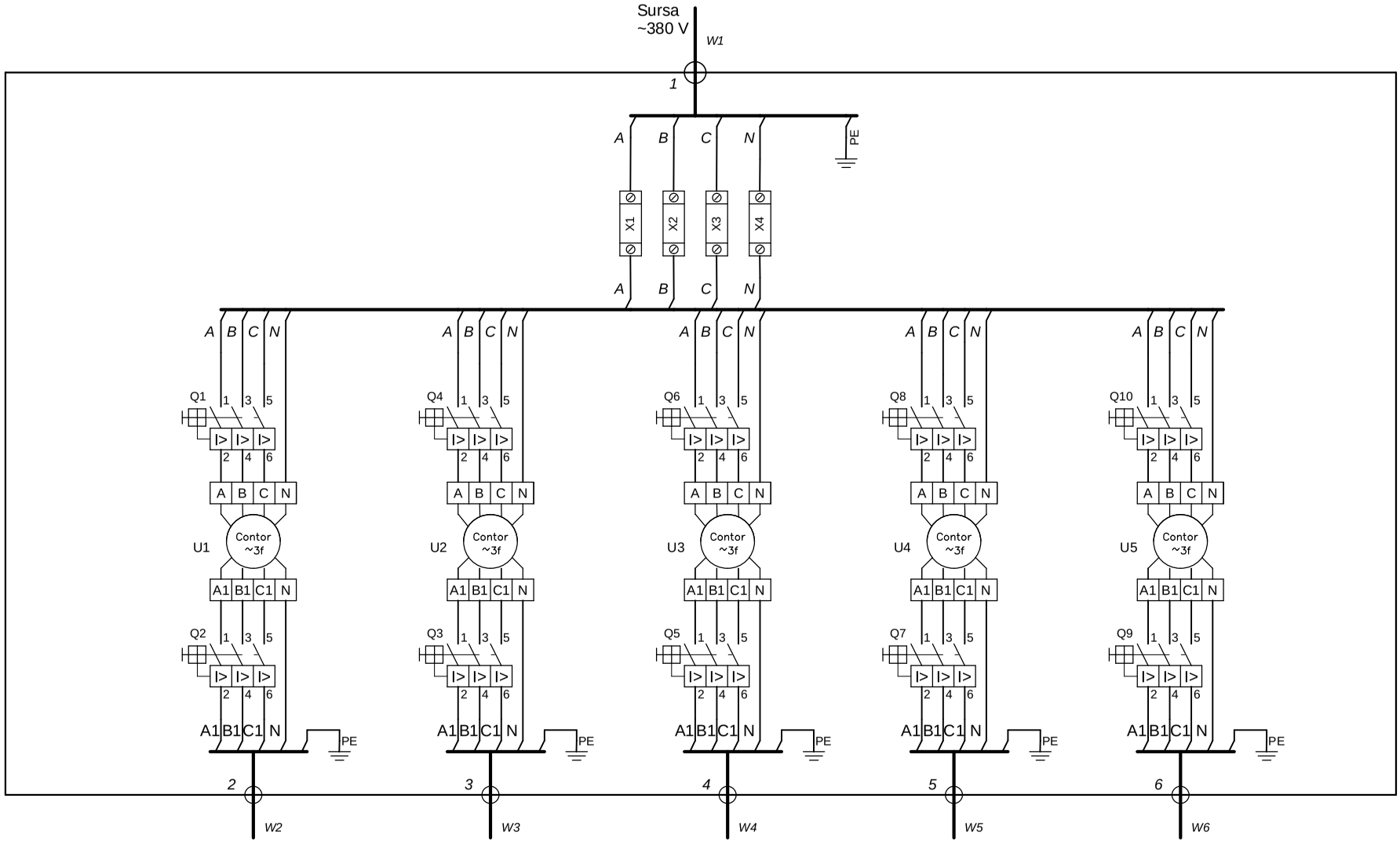
Nr. inv. orig.




Q1.... Q10 - intreruptor automat 100A
U1.... U5 - contor trifazat

| Mod | Coala | Nr document | Semn | Data |
|---|---|---|---|---|
| Autor | | {Author} | | |
| Verificat | | {Checked By} | | |
| Control t. | | | | |
| Coordonat | | {Coordonat1} | | |
| Coordonat | | | | |
| Aprobat | | {Approved By} | | |

{Drawing Number}

Dulap contoare

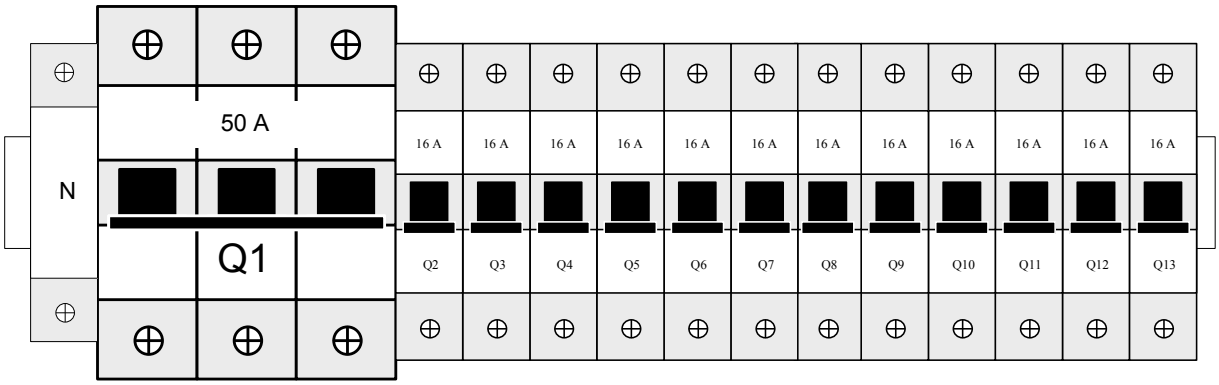
Schema Electrica

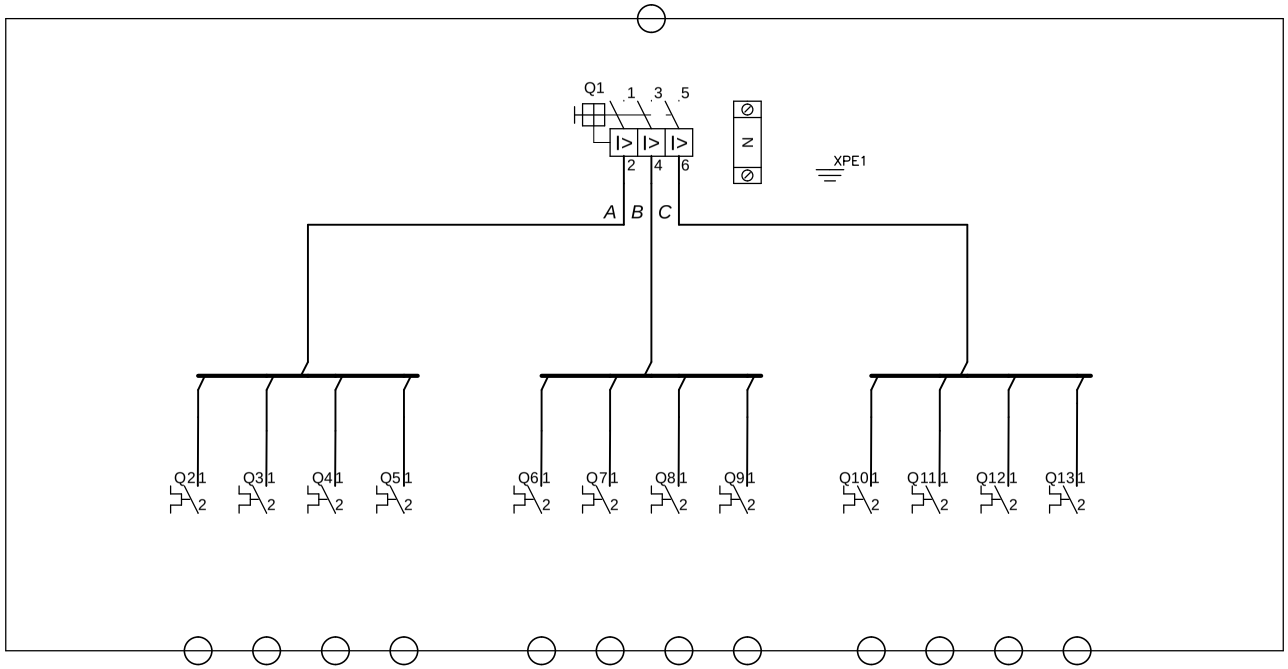
| Litera | Masa | Scara |
|---|---|---|
| | | |

Coala | Coli 1

Aplicare initiala | Nr. de indrumar | Semnatura si data | Nr. inv. dublicat | In loc de Nr. inv. | Semnatura si data | Nr. inv. orig.

Dulap distributie pentru iluminare






Q1 - 50A
Q2....Q13 - 16A

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Mod | Coala | Nr document | Semn | Data | |
| Autor | | {Author} | | | |
| Verificat | | {Checked By} | | | |
| Control t. | | | | | |
| Coordonat | | {Coordonat1} | | | |
| Coordonat | | | | | |
| Aprobat | | {Approved By} | | | |

{Drawing Number}

Dulap distr. iluminat

Schema Electrica

| Litera | Masa | Scara |
|---|---|---|
| | | |
| Coala | Coli 1 | |

Aplicare initiala

Nr. de indrumar

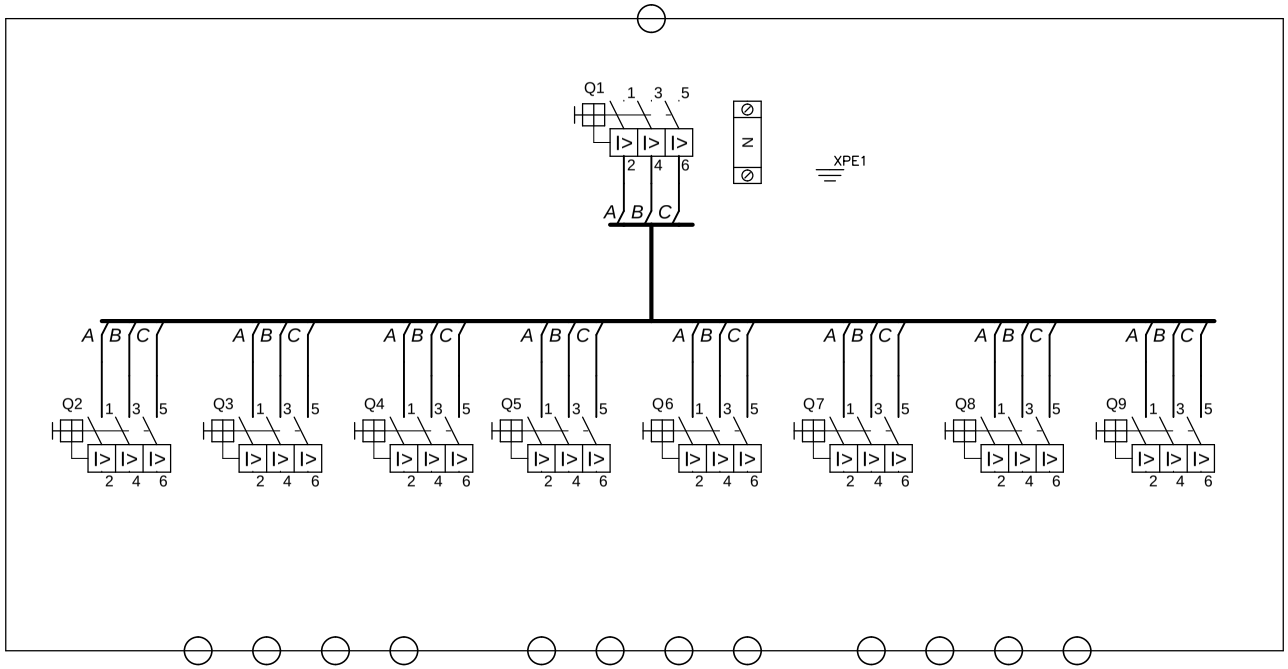
Semnatura si data

Nr. inv. dublicat

In loc de Nr. inv.

Semnatura si data

Nr. inv. orig.




Q1 - 100 A
Q2....Q9 - 32 A

| | | | | |
|---|---|---|---|---|
| Mod | Coala | Nr document | Semn | Data |
| Autor | | {Author} | | |
| Verificat | | {Checked By} | | |
| Control t. | | | | |
| Coordonat | | {Coordonat1} | | |
| Coordonat | | | | |
| Aprobat | | {Approved By} | | |

{Drawing Number}

Dulap putere

Schema Electrica

| Litera | Masa | Scara |
|---|---|---|
| | | |

| Coala | Coli 1 |
|---|---|

Aplicare initiala

Nr. de indrumar

Semnatura si data

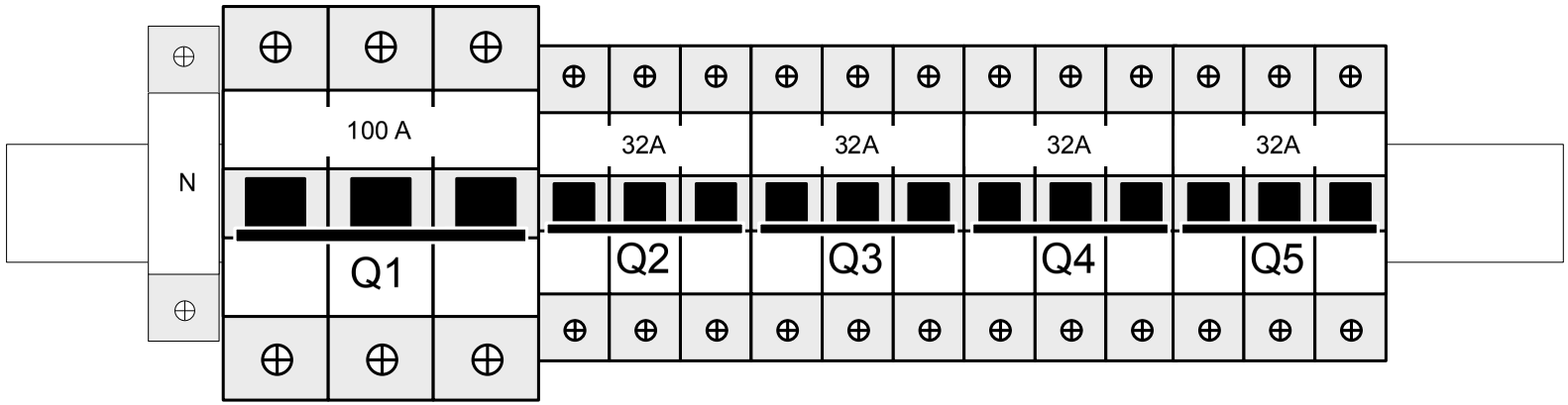
Nr. inv. dublicat

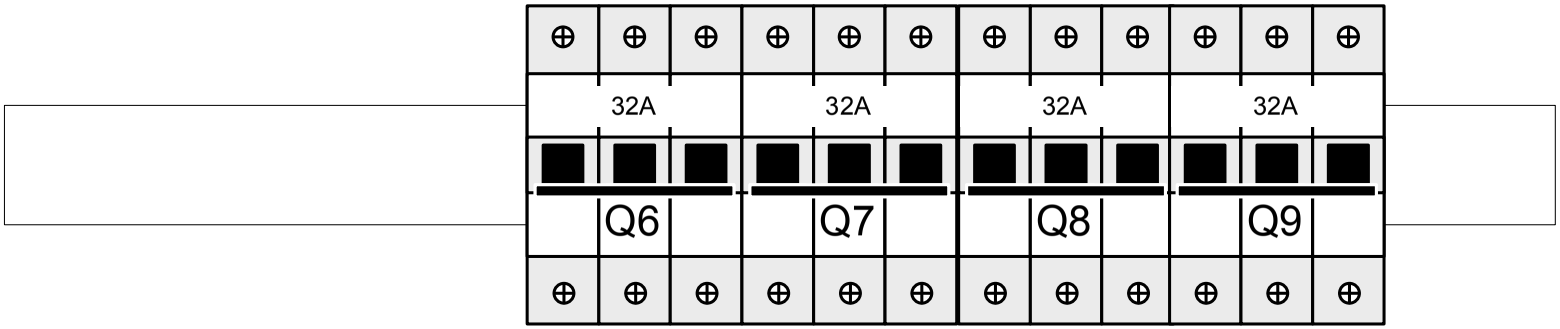
In loc de Nr. inv.

Semnatura si data

Nr. inv. orig.

Dulap putere



Annex 4

Market analysis of potential contractors

# Annex 4

# Offers

| | Unit Price / Euro | | | | | Total Price |
|---|---|---|---|---|---|---|
| **Comapny Name** | **100 A meter** | **5 A meter** | **Comm. Equipment** | **Software** | **System installation** | **Euro** |
| ADD | 79 | 180 | 900 | 0 | 0 | 7027 |
| NIK/ Volta | 132 | 132 | 950 | 0 | 2500 | 13350 |
| Mercury/ Lachi Aparat | 161 | 161 | 870 | 0 | 1800 | 14745 |
| Landis+Gyr / Ams Energo | | | | | | 0 |

# Annex 5

# Cost estimates

Formular Nr.1

(denumirea obiectivului)

# Lista cu cantitatile de lucrari №
## Deviz-oferta №

(denumirea lucrrri)

| № crt. | Simbol norme єi Cod resurse | Denumire lucrrri | U.M. | Cantitate conform datelor din proiect | Preю pe unitate de mrsurr, lei (inclusiv salariu) | Total, lei (col.5 x col.6) |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | **1. Lucrari de electromontaj** | | | | |
| 1 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (16 poz) | buc | 64,00 | 147,46 | 9 437,59 |
| | 1 | Muncitor | h-om | 148,48 | | |
| | c1 | Cutie de distributie ЩРН-Пм-16 | buc | 64,00 | | |
| 2 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (24 poz) | buc | 10,00 | 184,86 | 1 848,62 |
| | 1 | Muncitor | h-om | 23,20 | | |
| | c2 | Cutie de distributie ЩРН-Пм-24 | buc | 10,00 | | |
| 3 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (36poz ) | buc | 4,00 | 223,96 | 895,85 |
| | 1 | Muncitor | h-om | 9,28 | | |
| | c3 | Cutie de distributie ЩРН-Пм-36 | buc | 4,00 | | |
| 4 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (Щит для 3ф счетчика) | buc | 67,00 | 181,36 | 12 151,28 |
| | 1 | Muncitor | h-om | 155,44 | | |
| | c4 | Cutie de evidenta | buc | 67,00 | | |
| 5 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-100) | buc | 9,00 | 3 510,26 | 31 592,36 |
| | 1 | Muncitor | h-om | 20,88 | | |
| | c5 | Cutie de evidenta BZUM-TF-01-100 | buc | 9,00 | | |
| 6 | 08-03-572 -4 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-400) | buc | 2,00 | 6 978,13 | 13 956,26 |
| | 1 | Muncitor | h-om | 6,98 | | |
| | c6 | Cutie de evidenta TF-01-400 | buc | 2,00 | | |
| 7 | 08-03-572 -5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 4 contoare) | buc | 2,00 | 3 375,13 | 6 750,26 |
| | 1 | Muncitor | h-om | 6,98 | | |
| | c7 | Cutie de evidenta pentru 4 contoare | buc | 2,00 | | |
| 8 | 08-03-572 | Bloc de comanda de executare tip | buc | 1,00 | 3 005,13 | 3 005,13 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | -5 | dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 2 contoare) | | | | |
| | 1 | Muncitor | h-om | 3,49 | | |
| | c8 | Cutie de evidenta pentru 2 contoare | buc | 1,00 | | |
| 9 | 08-03-526-1 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 25 A | buc | 722,00 | 80,10 | 57 832,94 |
| | 1 | Muncitor | h-om | 1 126,32 | | |
| | cc10 | Automat monopolar 25A | buc | 68,00 | | |
| | c9 | Automat monopolar 16A | buc | 654,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 14,44 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 28,88 | | |
| 10 | 08-03-526-2 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 100 | buc | 351,00 | 327,31 | 114 887,10 |
| | 1 | Muncitor | h-om | 814,32 | | |
| | cc13 | Automat tripolar 100A | buc | 212,00 | | |
| | cc12 | Automat tripiolar 50A | buc | 91,00 | | |
| | cc11 | Automat tripolar 32A | buc | 48,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 7,02 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 14,04 | | |
| 11 | 08-03-523-3 | Siguranta, instalata pe suport izolator, curent pina la 400 A | buc | 3,00 | 291,09 | 873,27 |
| | 1 | Muncitor | h-om | 5,49 | | |
| | cc14 | Siguranta fuzibila PN-2 400A | buc | 3,00 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 0,18 | | |
| 12 | 08-03-523-4 | Siguranta, instalata pe suport izolator, curent pina la 630 A | buc | 3,00 | 302,76 | 908,29 |
| | 1 | Muncitor | h-om | 6,96 | | |
| | cc15 | Siguranta fuzibila PN-2 630A | buc | 3,00 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 0,18 | | |
| 13 | 08-03-600-2 | Contoare, montate pe suport pregatit, cu trei faze | buc | 88,00 | 20,72 | 1 823,66 |
| | 1 | Muncitor | h-om | 76,56 | | |
| 14 | RpED17A2 | Demontarea cablurilor pentru energie electrica, cu sectiunea 16-35 mmp, montat liber in santuri.Pentru cabluri montate in tuburi de protectie | m | 25,00 | 4,76 | 119,10 |
| | 7137010011520 | Electrician in constructii | h-om | 5,00 | | |
| 15 | 08-02-148-2 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 2 kg | 100 m | 0,25 | 28 266,40 | 7 066,60 |
| | 1 | Muncitor | h-om | 4,58 | | |
| | cc16 | Cablu VVG 5x35 | m | 25,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 0,00 | | |
| 16 | 08-02-148-1 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 1 kg | 100 m | 0,15 | 8 725,40 | 1 308,81 |
| | 1 | Muncitor | h-om | 1,86 | | |
| | cc17 | Cablu VVG 5x10 | m | 15,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 0,00 | | |
| 17 | 08-02-144 | Conectarea firelor conductorilor sau a | 100 buc | 17,75 | 309,66 | 5 496,47 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | -2 | cablurilor la cleme, sectiune pina la: 6 mm2 | | | | |
| | 1 | Muncitor | h-om | 230,75 | | |
| | | | | | | |
| | | Cheltuieli directe | lei | | | 269 953,59 |
| | | Asigurare sociala si medicala | 26,50 % | | | 16 705,94 |
| | | Total | 100,00 + | | | 286 659,53 |
| | | Cheltuieli de transport | 10,00 % | | | 20 583,03 |
| | | Total | 100,00 + | | | 307 242,56 |
| | | Cheltuieli de regie | 76,00 % | | | 47 911,38 |
| | | Total | 100,00 + | | | 355 153,94 |
| | | Beneficiu planificat | 6,00 % | | | 21 309,24 |
| | | **Total Lucrari de electromontaj** | | | | **376 463,18** |
| | | **2. Utilaj electric** | | | | |
| 18 | | Contor trifazat electronic 100A | buc | 86,00 | 1 800,00 | 154 800,00 |
| | cc18 | Contor trifazat electronic 100A | buc | 86,00 | | |
| 19 | | Contor trifazat electronic 5A | buc | 2,00 | 6 200,00 | 12 400,00 |
| | cc19 | Contor trifazat electronic 5A | buc | 2,00 | | |
| | | | | | | |
| | | Cheltuieli directe | lei | | | 167 200,00 |
| | | Cheltuieli de aprovizionare-depozitare | 1,20 % | | | 2 006,40 |
| | | **Total Utilaj electric** | | | | **169 206,40** |

**Total deviz:** **545 668**

L.S.

L.S.

Proiectant

(funcıoia, semnrtura, numele, prenumele)

Ofertant

(funcıoia, semnrtura, numele, prenumele)

APROBAT:

L.S.

Investitor

Formular Nr.1
WinCmeta2000

(denumirea obiectivului)

# Lista cu cantitatile de lucrari
## Deviz-oferta №

(denumirea lucrrri)

| № crt. | Simbol norme, cod resurse | Denumire lucrrri | U.M. | Cantitate | Preю pe unitate de mrsurr, lei (inclusiv salariu) | Total, lei (col.5 x col.6) |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | **Capitolul 1. Lucrari de electromontaj** | | | | |
| 1 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (16 poz.) | buc | 64,00 | | |
| 2 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (24 poz ) | buc | 10,00 | | |
| 3 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (36 poz ) | buc | 4,00 | | |
| 4 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (Щит для 3ф счетчика) | buc | 67,00 | | |
| 5 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-100) | buc | 9,00 | | |
| 6 | 08-03-572-4 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-400) | buc | 2,00 | | |
| 7 | 08-03-572-5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 4 contoare) | buc | 2,00 | | |
| 8 | 08-03-572-5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 2 contoare) | buc | 1,00 | | |
| 9 | 08-03-526-1 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 25 A | buc | 722,00 | | |
| 10 | 08-03-526-2 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 100 | buc | 351,00 | | |
| 11 | 08-03-523-3 | Siguranta, instalata pe suport izolator, curent pina la 400 A | buc | 3,00 | | |
| 12 | 08-03-523-4 | Siguranta, instalata pe suport izolator, curent pina la 630 A | buc | 3,00 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | 08-03-600-2 | Contoare, montate pe suport pregatit, cu trei faze | buc | 88,00 | | |
| 14 | RpED17A2 | Demontarea cablurilor pentru energie electrica, cu sectiunea 16-35 mmp, montat liber in santuri.Pentru cabluri montate in tuburi de protectie | m | 25,00 | | |
| 15 | 08-02-148-2 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 2 kg | 100 m | 0,25 | | |
| 16 | 08-02-148-1 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 1 kg | 100 m | 0,15 | | |
| 17 | 08-02-144-2 | Conectarea firelor conductorilor sau a cablurilor la cleme, sectiune pina la: 6 mm2 | 100 buc | 17,75 | | |
| | | Cheltuieli directe | lei | | | |
| | | Asigurare sociala si medicala | 26,50 % | | | |
| | | Total | 100,00 + | | | |
| | | Cheltuieli de transport | 10,00 % | | | |
| | | Total | 100,00 + | | | |
| | | Cheltuieli de regie | 76,00 % | | | |
| | | Total | 100,00 + | | | |
| | | Beneficiu planificat | 6,00 % | | | |
| | | **Capitolul 2. Utilaj electric** | | | | |
| 18 | | Contor trifazat electronic 100A | buc | 86,00 | | |
| 19 | | Contor trifazat electronic 5A | buc | 2,00 | | |
| | | Cheltuieli directe | lei | | | |
| | | Cheltuieli de aprovizionare-depozitare | 1,20 % | | | |

**Total:**

**Total deviz:**

L.S.

L.S.

Proiectant Ofertant

(funcıoia, semnrtura, numele, prenumele) (fun cıoia, semnrtura, numele, prenumele)

APROBAT:

L.S.

Investitor

(denumirea obiectivului)

# Lista cu cantitatile de lucrari №
## Deviz-oferta №

(denumirea lucrrri)

| № crt. | Simbol norme, cod resurse | Denumire lucrrri | U.M. | Cantitate | Preю pe unitate de mrsurr, lei (inclusiv salariu) | Total, lei (col.5 x col.6) |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | **Capitolul 1. Lucrari de electromontaj** | | | | |
| 1 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (16 poz) | buc | 64,00 | | |
| 2 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (24poz ) | buc | 10,00 | | |
| 3 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (36poz ) | buc | 4,00 | | |
| 4 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (Щит для 3ф счетчика) | buc | 67,00 | | |
| 5 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-100) | buc | 9,00 | | |
| 6 | 08-03-572-4 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-400) | buc | 2,00 | | |
| 7 | 08-03-572-5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 4 contoare) | buc | 2,00 | | |
| 8 | 08-03-572-5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 2 contoare) | buc | 1,00 | | |
| 9 | 08-03-526-1 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 25 A | buc | 722,00 | | |
| 10 | 08-03-526-2 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 100 | buc | 351,00 | | |
| 11 | 08-03-523-3 | Siguranta, instalata pe suport izolator, curent pina la 400 A | buc | 3,00 | | |
| 12 | 08-03-523-4 | Siguranta, instalata pe suport izolator, curent pina la 630 A | buc | 3,00 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | 08-03-600-2 | Contoare, montate pe suport pregatit, cu trei faze | buc | 88,00 | | |
| 14 | RpED17A2 | Demontarea cablurilor pentru energie electrica, cu sectiunea 16-35 mmp, montat liber in santuri.Pentru cabluri montate in tuburi de protectie | m | 25,00 | | |
| 15 | 08-02-148-2 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 2 kg | 100 m | 0,25 | | |
| 16 | 08-02-148-1 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 1 kg | 100 m | 0,15 | | |
| 17 | 08-02-144-2 | Conectarea firelor conductorilor sau a cablurilor la cleme, sectiune pina la: 6 mm2 | 100 buc | 17,75 | | |
| | | Cheltuieli directe | lei | | | |
| | | Asigurare sociala si medicala | 26,50 % | | | |
| | | Total | 100,00 + | | | |
| | | Cheltuieli de transport | 10,00 % | | | |
| | | Total | 100,00 + | | | |
| | | Cheltuieli de regie | 76,00 % | | | |
| | | Total | 100,00 + | | | |
| | | Beneficiu planificat | 6,00 % | | | |
| | | **Capitolul 2. Utilaj electric** | | | | |
| 18 | | Contor trifazat electronic 100A | buc | 86,00 | | |
| 19 | | Contor trifazat electronic 5A | buc | 2,00 | | |
| | | Cheltuieli directe | lei | | | |
| | | Cheltuieli de aprovizionare-depozitare | 1,20 % | | | |

**Total:**

**Total deviz:**

Intocmit _____
(funcıoia, semnrtura)

Verificat _____
(funcıoia, semnrtura)

(denumirea obiectivului)

# DEVIZ LOCAL

**Valoarea de deviz 545 668 lei**

| № crt. | Simbol norme єi Cod resurse | Denumire lucrrri єi cheltuieli | U.M. | Cantitate conform datelor din proiect | Valoarea de deviz, lei | |
|---|---|---|---|---|---|---|
| | | | | | Pe unitate de mrsurr | Total |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | Total borderou de resurse № : | | | | |
| | | **Manopera:** | | | | |
| 1. | 1 | Muncitor | h-om | 2 641,57 | 23,82 | 62 922,19 |
| 2. | 7137010011520 | Electrician in constructii | h-om | 5,00 | 23,82 | 119,10 |
| | | **Total manopera** | | | | **63 041** |
| | | **Materiale:** | | | | |
| 1. | 5009500 | Fise de marcare | 100 buc | 21,46 | 50,00 | 1 073,00 |
| 2. | c1 | Cutie de distributie 16 poz. | buc | 64,00 | 92,20 | 5 900,80 |
| 3. | c2 | Cutie de distributie 24 poz | buc | 10,00 | 129,60 | 1 296,00 |
| 4. | c3 | Cutie de distributie 36 poz | buc | 4,00 | 168,70 | 674,80 |
| 5. | c4 | Cutie de evidenta | buc | 67,00 | 126,10 | 8 448,70 |
| 6. | c5 | Cutie de evidenta BZUM-TF-01-100 | buc | 9,00 | 3 455,00 | 31 095,00 |
| 7. | c6 | Cutie de evidenta TF-01-400 | buc | 2,00 | 6 895,00 | 13 790,00 |
| 8. | c7 | Cutie de evidenta pentru 4 contoare | buc | 2,00 | 3 292,00 | 6 584,00 |
| 9. | c8 | Cutie de evidenta pentru 2 contoare | buc | 1,00 | 2 922,00 | 2 922,00 |
| 10. | c9 | Automat monopolar 16A | buc | 654,00 | 40,00 | 26 160,00 |
| 11. | cc10 | Automat monopolar 25A | buc | 68,00 | 50,00 | 3 400,00 |
| 12. | cc11 | Automat tripolar 32A | buc | 48,00 | 137,00 | 6 576,00 |
| 13. | cc12 | Automat tripiolar 50A | buc | 91,00 | 140,00 | 12 740,00 |
| 14. | cc13 | Automat tripolar 100A | buc | 212,00 | 356,00 | 75 472,00 |
| 15. | cc14 | Siguranta fuzibila PN-2 400A | buc | 3,00 | 246,00 | 738,00 |
| 16. | cc15 | Siguranta fuzibila PN-2 630A | buc | 3,00 | 246,00 | 738,00 |
| 17. | cc16 | Cablu VVG 5x35 | m | 25,00 | 278,30 | 6 957,50 |
| 18. | cc17 | Cablu VVG 5x10 | m | 15,00 | 84,30 | 1 264,50 |
| 19. | cc18 | Contor trifazat electronic 100A | buc | 86,00 | 1 800,00 | 154 800,00 |
| 20. | cc19 | Contor trifazat electronic 5A | buc | 2,00 | 6 200,00 | 12 400,00 |
| | | **Total materiale de construcюii** | | | | **373 031** |
| | | **Utilaje de construcюii:** | | | | |
| 1. | 330206 | Masini de gaurit electrice | h-ut | 43,28 | 25,00 | 1 082,00 |
| | | **Total utilaje de construcюii** | | | | **1 082** |

**Total:**

| | | |
|---|---|---|
| Cheltuieli directe | lei | 545 668 |
| TVA | 0 % | 0 |

**Total deviz: 545 668**

Intocmit _____
(funcıoia, semnrtura)

Verificat _____
(funcıoia, semnrtura)

Investitor
Obiect

# Catalog de preturi unitare pentru obiectul

**(formular desfrєurat)**

| № crt. | Simbol norme єi Cod resurse | Denumire lucrгri, cheltuieli єi resurse | U.M. | Consum de resurse pe unitate de mrsurг | Valoare, lei | |
|---|---|---|---|---|---|---|
| | | | | | Pe unitate de mrsurг | Total |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | **1. Lucrari de electromontaj** | | | | |
| 1 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (16 poz) | buc | | | 147,46 |
| | 1 | Muncitor | h-om | 2,32 | 23,82 | 55,26 |
| | c1 | Cutie de distributie ЩРН-Пм-16 | buc | 1,00 | 92,20 | 92,20 |
| 2 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (24 poz) | buc | | | 184,86 |
| | 1 | Muncitor | h-om | 2,32 | 23,82 | 55,26 |
| | c2 | Cutie de distributie ЩРН-Пм-24 | buc | 1,00 | 129,60 | 129,60 |
| 3 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (36 poz) | buc | | | 223,96 |
| | 1 | Muncitor | h-om | 2,32 | 23,82 | 55,26 |
| | c3 | Cutie de distributie ЩРН-Пм-36 | buc | 1,00 | 168,70 | 168,70 |
| 4 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (Щит для 3ф счетчика) | buc | | | 181,36 |
| | 1 | Muncitor | h-om | 2,32 | 23,82 | 55,26 |
| | c4 | Cutie de evidenta | buc | 1,00 | 126,10 | 126,10 |
| 5 | 08-03-572-3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-100) | buc | | | 3 510,26 |
| | 1 | Muncitor | h-om | 2,32 | 23,82 | 55,26 |
| | c5 | Cutie de evidenta BZUM-TF-01-100 | buc | 1,00 | 3 455,00 | 3 455,00 |
| 6 | 08-03-572-4 | Bloc de comanda de executare tip dulap sau punct de distributie | buc | | | 6 978,13 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (dulap), montat pe perete, (BZUM-TF-01-400) | | | | |
| | 1 | Muncitor | h-om | 3,49 | 23,82 | 83,13 |
| | c6 | Cutie de evidenta TF-01-400 | buc | 1,00 | 6 895,00 | 6 895,00 |
| 7 | 08-03-572-5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 4 contoare) | buc | | | 3 375,13 |
| | 1 | Muncitor | h-om | 3,49 | 23,82 | 83,13 |
| | c7 | Cutie de evidenta pentru 4 contoare | buc | 1,00 | 3 292,00 | 3 292,00 |
| 8 | 08-03-572-5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 2 contoare) | buc | | | 3 005,13 |
| | 1 | Muncitor | h-om | 3,49 | 23,82 | 83,13 |
| | c8 | Cutie de evidenta pentru 2 contoare | buc | 1,00 | 2 922,00 | 2 922,00 |
| 9 | 08-03-526-1 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 25 A | buc | | | 80,10 |
| | 1 | Muncitor | h-om | 1,56 | 23,82 | 37,16 |
| | cc10 | Automat monopolar 25A | buc | | 50,00 | 4,71 |
| | c9 | Automat monopolar 16A | buc | | 40,00 | 36,23 |
| | 5009500 | Fise de marcare | 100 buc | 0,02 | 50,00 | 1,00 |
| | 330206 | Masini de gaurit electrice | h-ut | 0,04 | 25,00 | 1,00 |
| 10 | 08-03-526-2 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 100 | buc | | | 327,31 |
| | 1 | Muncitor | h-om | 2,32 | 23,82 | 55,26 |
| | cc13 | Automat tripolar 100A | buc | | 356,00 | 215,02 |
| | cc12 | Automat tripiolar 50A | buc | | 140,00 | 36,30 |
| | cc11 | Automat tripolar 32A | buc | | 137,00 | 18,74 |
| | 5009500 | Fise de marcare | 100 buc | 0,02 | 50,00 | 1,00 |
| | 330206 | Masini de gaurit electrice | h-ut | 0,04 | 25,00 | 1,00 |
| 11 | 08-03-523-3 | Siguranta, instalata pe suport izolator, curent pina la 400 A | buc | | | 291,09 |
| | 1 | Muncitor | h-om | 1,83 | 23,82 | 43,59 |
| | cc14 | Siguranta fuzibila PN-2 400A | buc | 1,00 | 246,00 | 246,00 |
| | 330206 | Masini de gaurit electrice | h-ut | 0,06 | 25,00 | 1,50 |
| 12 | 08-03-523-4 | Siguranta, instalata pe suport izolator, curent pina la 630 A | buc | | | 302,76 |
| | 1 | Muncitor | h-om | 2,32 | 23,82 | 55,26 |
| | cc15 | Siguranta fuzibila PN-2 630A | buc | 1,00 | 246,00 | 246,00 |
| | 330206 | Masini de gaurit electrice | h-ut | 0,06 | 25,00 | 1,50 |
| 13 | 08-03-600-2 | Contoare, montate pe suport pregatit, cu trei faze | buc | | | 20,72 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | Muncitor | h-om | 0,87 | 23,82 | 20,72 |
| 14 | RpED17 A2 | Demontarea cablurilor pentru energie electrica, cu sectiunea 16-35 mmp, montat liber in santuri.Pentru cabluri montate in tuburi de protectie | m | | | 4,76 |
| | 7137010011520 | Electrician in constructii | h-om | 0,20 | 23,82 | 4,76 |
| 15 | 08-02-14 8-2 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 2 kg | 100 m | | | 28 266,40 |
| | 1 | Muncitor | h-om | 18,30 | 23,82 | 436,40 |
| | cc16 | Cablu VVG 5x35 | m | | 278,30 | 27 830,00 |
| | 5009500 | Fise de marcare | 100 buc | 0,0041 | 50,00 | 0,00 |
| 16 | 08-02-14 8-1 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 1 kg | 100 m | | | 8 725,40 |
| | 1 | Muncitor | h-om | 12,40 | 23,82 | 295,40 |
| | cc17 | Cablu VVG 5x10 | m | | 84,30 | 8 430,00 |
| | 5009500 | Fise de marcare | 100 buc | 0,0041 | 50,00 | 0,00 |
| 17 | 08-02-14 4-2 | Conectarea firelor conductorilor sau a cablurilor la cleme, sectiune pina la: 6 mm2 | 100 buc | | | 309,66 |
| | 1 | Muncitor | h-om | 13,00 | 23,82 | 309,66 |
| | | **2. Utilaj electric** | | | | |
| 18 | | Utilaj | set | | | 167 200,00 |
| | cc18 | Contor trifazat electronic 100A | buc | | 1 800,00 | 154 800,00 |
| | cc19 | Contor trifazat electronic 5A | buc | | 6 200,00 | 12 400,00 |

Intocmit _____
(funcıoia, semnrtura)

Verificat _____
(funcıoia, semnrtura)

(denumirea obiectivului)

# DEVIZ LOCAL

**Valoarea de deviz 545 668 lei**

| № crt. | Simbol norme єi Cod resurse | Lucrrri єi cheltuieli | U.M. | Cantitate conform datelor din proiect | Valoarea de deviz, lei | |
|---|---|---|---|---|---|---|
| | | | | | Pe unitate de mrsurг | Total |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | **1. Lucrari de electromontaj** | | | | |
| 1 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (16poz ) | buc | 64,00 | 147,46 | 9 437,59 |
| | 1 | Muncitor | h-om | 148,48 | | |
| | c1 | Cutie de distributie ЩРН-Пм-16 | buc | 64,00 | | |
| 2 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (24poz ) | buc | 10,00 | 184,86 | 1 848,62 |
| | 1 | Muncitor | h-om | 23,20 | | |
| | c2 | Cutie de distributie ЩРН-Пм-24 | buc | 10,00 | | |
| 3 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (36poz ) | buc | 4,00 | 223,96 | 895,85 |
| | 1 | Muncitor | h-om | 9,28 | | |
| | c3 | Cutie de distributie ЩРН-Пм-36 | buc | 4,00 | | |
| 4 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (Щит для 3ф счетчика) | buc | 67,00 | 181,36 | 12 151,28 |
| | 1 | Muncitor | h-om | 155,44 | | |
| | c4 | Cutie de evidenta | buc | 67,00 | | |
| 5 | 08-03-572 -3 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-100) | buc | 9,00 | 3 510,26 | 31 592,36 |
| | 1 | Muncitor | h-om | 20,88 | | |
| | c5 | Cutie de evidenta BZUM-TF-01-100 | buc | 9,00 | | |
| 6 | 08-03-572 -4 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF-01-400) | buc | 2,00 | 6 978,13 | 13 956,26 |
| | 1 | Muncitor | h-om | 6,98 | | |
| | c6 | Cutie de evidenta TF-01-400 | buc | 2,00 | | |
| 7 | 08-03-572 -5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 4 | buc | 2,00 | 3 375,13 | 6 750,26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | contoare) | | | | |
| | 1 | Muncitor | h-om | 6,98 | | |
| | c7 | Cutie de evidenta pentru 4 contoare | buc | 2,00 | | |
| 8 | 08-03-572-5 | Bloc de comanda de executare tip dulap sau punct de distributie (dulap), montat pe perete, (BZUM-TF pentru 2 contoare) | buc | 1,00 | 3 005,13 | 3 005,13 |
| | 1 | Muncitor | h-om | 3,49 | | |
| | c8 | Cutie de evidenta pentru 2 contoare | buc | 1,00 | | |
| 9 | 08-03-526-1 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 25 A | buc | 722,00 | 80,10 | 57 832,94 |
| | 1 | Muncitor | h-om | 1 126,32 | | |
| | cc10 | Automat monopolar 25A | buc | 68,00 | | |
| | c9 | Automat monopolar 16A | buc | 654,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 14,44 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 28,88 | | |
| 10 | 08-03-526-2 | Automat mono-, bi-, tripolar, montat pe constructii pe perete sau coloana, curent pina la 100 | buc | 351,00 | 327,31 | 114 887,10 |
| | 1 | Muncitor | h-om | 814,32 | | |
| | cc13 | Automat tripolar 100A | buc | 212,00 | | |
| | cc12 | Automat tripiolar 50A | buc | 91,00 | | |
| | cc11 | Automat tripolar 32A | buc | 48,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 7,02 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 14,04 | | |
| 11 | 08-03-523-3 | Siguranta, instalata pe suport izolator, curent pina la 400 A | buc | 3,00 | 291,09 | 873,27 |
| | 1 | Muncitor | h-om | 5,49 | | |
| | cc14 | Siguranta fuzibila PN-2 400A | buc | 3,00 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 0,18 | | |
| 12 | 08-03-523-4 | Siguranta, instalata pe suport izolator, curent pina la 630 A | buc | 3,00 | 302,76 | 908,29 |
| | 1 | Muncitor | h-om | 6,96 | | |
| | cc15 | Siguranta fuzibila PN-2 630A | buc | 3,00 | | |
| | 330206 | Masini de gaurit electrice | h-ut | 0,18 | | |
| 13 | 08-03-600-2 | Contoare, montate pe suport pregatit, cu trei faze | buc | 88,00 | 20,72 | 1 823,66 |
| | 1 | Muncitor | h-om | 76,56 | | |
| 14 | RpED17A2 | Demontarea cablurilor pentru energie electrica, cu sectiunea 16-35 mmp, montat liber in santuri.Pentru cabluri montate in tuburi de protectie | m | 25,00 | 4,76 | 119,10 |
| | 7137010011520 | Electrician in constructii | h-om | 5,00 | | |
| 15 | 08-02-148-2 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 2 kg | 100 m | 0,25 | 28 266,40 | 7 066,60 |
| | 1 | Muncitor | h-om | 4,58 | | |
| | cc16 | Cablu VVG 5x35 | m | 25,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 0,00 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 08-02-148 -1 | Cablu pina la 35 kV in tevi, blocuri si cutii pozate, masa 1 m pina la: 1 kg | 100 m | 0,15 | 8 725,40 | 1 308,81 |
| | 1 | Muncitor | h-om | 1,86 | | |
| | cc17 | Cablu VVG 5x10 | m | 15,00 | | |
| | 5009500 | Fise de marcare | 100 buc | 0,00 | | |
| 17 | 08-02-144 -2 | Conectarea firelor conductorilor sau a cablurilor la cleme, sectiune pina la: 6 mm2 | 100 buc | 17,75 | 309,66 | 5 496,47 |
| | 1 | Muncitor | h-om | 230,75 | | |
| | | | | | | |
| | | Cheltuieli directe | lei | | | 269 953,59 |
| | | Asigurare sociala si medicala | 26,50 % | | | 16 705,94 |
| | | Total | 100,00 + | | | 286 659,53 |
| | | Cheltuieli de transport | 10,00 % | | | 20 583,03 |
| | | Total | 100,00 + | | | 307 242,56 |
| | | Cheltuieli de regie | 76,00 % | | | 47 911,38 |
| | | Total | 100,00 + | | | 355 153,94 |
| | | Beneficiu planificat | 6,00 % | | | 21 309,24 |
| | | **Total Lucrari de electromontaj** | | | | **376 463,18** |
| | | **Incluziv salariu** | | | | **63 041,29** |
| | | **2. Utilag electric** | | | | |
| 18 | | Utilaj | set | 1,00 | 167 200,00 | 167 200,00 |
| | cc18 | Contor trifazat electronic 100A | buc | 86,00 | | |
| | cc19 | Contor trifazat electronic 5A | buc | 2,00 | | |
| | | | | | | |
| | | Cheltuieli directe | lei | | | 167 200,00 |
| | | Cheltuieli de aprovizionare-depozitare | 1,20 % | | | 2 006,40 |
| | | **Total Utilag electric** | | | | **169 206,40** |
| | | **Incluziv salariu** | | | | **0,00** |

| | | |
|---|---|---|
| Cheltuieli directe | lei | 545 668 |
| TVA | 00 % | 0 |

**Total deviz:** **545 668**
**Incluziv salariu** **63 041**

Intocmit _____
(funcıoia, semnrtura)

Verificat _____
(funcıoia, semnrtura)

Annex 6

Technical information on smart power metering system and its components

from proprietary solution to

**open standards and interoperability**

from single application to a

**flexible network platform**

from slow to

**high-speed data exchange**

from basic metering to

**demand-driven rich base functionality**

## from trustworthy

pelican
metering solution

Today, we present three metering solutions and three strategical directions of product development: Pelican, Toucan and Falcon.

All three solutions are built on ADDAX technology and have a common base of functionality, and each one has its particularities making it the best fit for specific environments and requirements.

**Pelican** communicates using ADD GRUP's proprietary data exchange protocol based on FSK modulation. It is slower than the other solutions, but it is trustworthy and offers a lower cost level.

## to rainbow agile

toucan
metering solution

**Toucan** is a more agile solution, based on S-FSK technique. It is interoperable and can be used in multi-vendor platforms.

from fixed functions to

**remote upgradeability**

**and to incredibly powerful and fast**

falcon
metering solution

**Falcon** is the ultimate smart metering solution, based on advanced OFDM techniques. It is extremely fast and reliable, these not being its main advantages.

Falcon provides interoperability, but more, it offers the possibility to remotely upgrade the meter and change its protocol to any, which suits best Utility's interests.

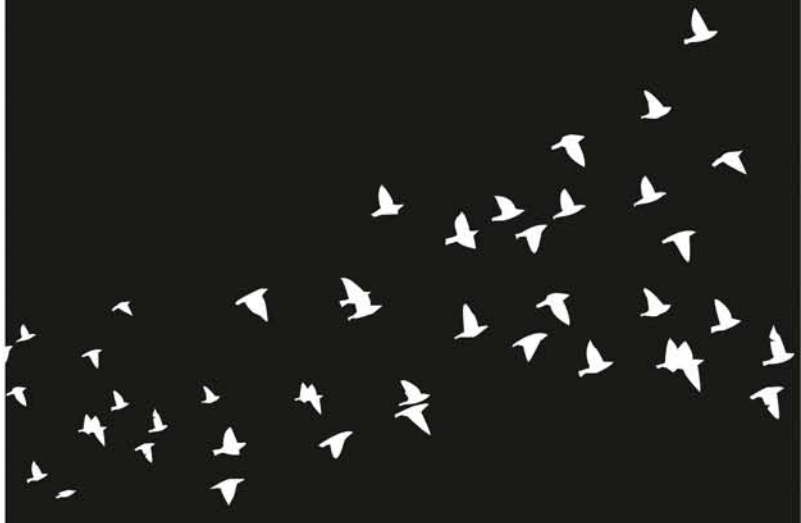
Falcon is open.

# OPEN
for the future

*add new tech to your business!*

4DD GRUP

# OPEN
for the future



2010

Nowadays, the Utilities have expanded beyond their original business environment - they serve different cultures, manage different transmission and distribution networks, abide different legal systems. They dispose of different resources and communication infrastructures. When selecting smart metering solutions, the Utility has to take into account its regional needs and possibilities; there are more factors to compute and the decision is based on more criteria than before.

The offer on the AMI market is broad, ranging from simple meter reading to complex and sophisticated smart grid platforms; and from very narrow solutions to universal ones. But, are separate solutions fitting entirely the needs of expanding Utilities?

What is the most appropriate solution in such circumstances? Should the Utility implement a unique system, which would suit its needs in a zone and underperform or be excessive in others? Should it invest in a dozen of different solutions, each for a separate zone within its business?

Would these solutions be appropriate in a couple of years, taking into account the paces of current technological development? Would they cover the tomorrow's demands and provide the Utility with the proper tools and information in the near future?

**Imagine a unique platform, made of well-placed components, answering the specific needs of a certain zone, interchangeable and free of vendor dependancy.**

**Imagine a system being flexible and future-proof through remote upgrade.**

**Imagine the upgrade of the communication protocol, from the control center, within just one click.**

**Imagine open solutions**

# OPEN

for the future

info@addgrup.com

www.addgrup.com

ADDAX

**ADDAX IMS is a smart-metering platform based on open standards. Our solution is built on a series of hardware and software components, providing rich functionality and a high degree of flexibility. The implementation of open standards made ADDAX IMS interoperable and enabled the integration with tertiary smart-metering solutions.**

## ADDAX METERS

ADDAX meters offer more than simple metering. Our meters integrate a range of features, enabling efficient consumption management, like DSM, Time-of-Use and operation in prepayment (compliant to STS standard).

ADDAX meters

The meters are provided with secure anti-fraud means, blocking or warning about tampering attempts. The latest version brings new features, like remote upgrade, which leads to a higher degree of flexibility and allows matching system's functionality to future requirements. ADDAX meters have built-in PLC modems for upward communications and M-Bus interfaces for integration with HAN devices. The new version of ADDAX IMS has three product lines: Pelican, Toucan and Falcon, with increasing capabilities and data-exchange speeds from one line to another.

**NEW**

CMS base board

three-phase meter

Centralized Metering System is a recent development, bringing a new, modular design and targeting two of the most sensitive issues: cost efficiency and anti-fraud. The benefits and the advantages of the CMS come from the modular approach in the construction of the metering nodes.

## ADDAX ROUTERS

ADDAX router

ADDAX routers are the network elements, responsible for a fast and reliable data-flow within ADDAX AMI solution. Our routers have a modular structure, enabling easy adaptation to any changes in the communication network.

**NEW**

The latest version features a new device, which integrates networking and metering facilities – the meter-router. The MR combines the functionality of a balance meter and router's data-flow management tasks. This combination is designed to minimize the implementation costs and increase the overall economic efficiency of ADDAX IMS.

## ADDAX COUPLING UNITS

ADDAX CU

ADDAX coupling units are essential components of ADDAX.net. The unique design of our coupling units provides efficient bridging between the Low Voltage and Medium Voltage Power Lines.

## ADDAX CUSTOMER INTERFACE UNITS

In the frames of the latest version of ADDAX IMS we offer a diversified range of customer interface units.

ADDAX CIU

Basic displays, designed for viewing the consumption data. Communicate with the meter through LV PLC

Customer Interface Units with keypad (STS compliant). Wired or wireless M-Bus interface with the meters.

**NEW**

we grow

we develop

we contribute

ADD GRUP is a dynamically growing company. We grew from a team of 15 engineers to a company of more than 300 employees and from a product sold locally to a smart-metering platform implemented in more than 20 countries all over the world.

we search

we advance

we encourage

we create value

We have developed ADDAX IMS from a basic metering solution into a smart-metering platform based on open-standards. We value the relationships with our customers, we appreciate the common knowledge and experience we receive and invest this value into our developments.

we support

we learn

We learned to integrate and support tertiary products, in order to create sub-metering solutions and free of vendor-dependency smart-metering systems.
We demonstrated the viability and the feasibility of our solution through more than 1,7 million ADDAX smart meters implemented worldwide.

we open

# OPEN

for the future

info@addgrup.com

www.addgrup.com

# OUR PRESENCE WORLDWIDE


## KEY NUMBERS

AMI projects in more than **twenty** countries

representatives in more than **sixty** countries

more than **1,7 million** ADDAX smart meters implemented

**five** license manufacturers

more than **500 thousand** ADDAX smart meters operating in projects based on MV PLC

# ADDAX METERS

**MEASUREMENTS**
Active and reactive energy
Export and import energy
Power, Max Demand

**METERING DATA**
On-demand meter readings
Periodic meter readings
Timestamp

**FIRMWARE UPGRADE**
Remote or local firmware upgrade

**DATA STORAGE**
Non-volatile memory

**TARIFF MANAGEMENT**
Time-Of-Use metering
SLAB tariff

**PREPAYMENT MODE**
Fully-compliant with Standard Transfer Specification (STS)
Real-time switch between credit and prepayment modes

**LOAD CONTROL**
Built-in relay for remote or preconfigured disconnection/reconnection
DSM functionality through controlling primary and secondary loads (on schedule or by configurable threshold)

**ELECTRICAL ENERGY QUALITY MONITORING**
Average Voltage
Voltage Sags and Swells
Outages

**ANTIFRAUD PROTECTION**
Differential current sensor
Meter case opening sensor
Reverse meter connection sensor
External magnetic field sensor

**METER SELF-CONTROL**
Built-in test for noncurrent and continuous self-control

**POWER LINE COMMUNICATION (PLC)**
Built-in PL-modem (FSK/ S-FSK / OFDM modulation; CENELEC, A Band)
EMC standards compliance

**IN-HOME DISPLAY**
Communication channel: LV PLC, wired or wireless M-Bus
Keypad (STS compliant)

**HOME AREA NETWORK GATEWAY**
M-Bus (wire, wireless)
Collection of metering data from water, gas, heat meters (up to 4 units)



# ADDAX ROUTERS

## STANDARDS

CENELEC A-band LV PLC communications;
Interoperability, compliance to DLMS/COSEM standard protocol stack;

Open communication profiles:
- PL LV S-FSK compliant with **IEC61334-5-1,**
- PL LV OFDM compliant with **PRIME** specification
- PL LV OFDM compliant with **G3** specification

Proprietary communication profile:
- **ADDAX.net**

## COMMUNICATIONS

· Communication downwards - via built-in LV or MV PLC modem
· Communication upwards – via MV PLC, GSM/GPRS, Ethernet , etc.

## DATA COLLECTION

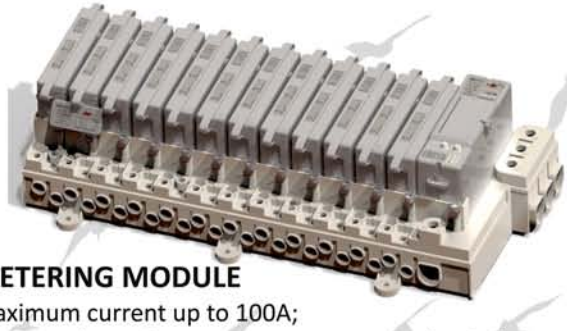
· Collects data by schedule, on request, on event
· Supports address, group and broadcast control commands

## REMOTE MANAGEMENT

· Remote firmware upgrade of end-point devices from the Master Station
· Router's remote firmware upgrade

# ADDAX CENTRALIZED METERING SYSTEM

- Innovative, cost-benefit compact CMS.
- Up to 12 metering modules and a main communication device the base board
- 3-phase meter built from 3 single-phase meters. Different combination of 1-phase and 3-phase meters within the same base board.
- Up to 12 customer interface units support.
- Easy replaceable Plug&Play metering modules. CMS types with 3, 6, or 12 metering modules.
- Multifunctional metering, wide range of controlled parameters.
- Load control. Synchronization of all disconnecting relays for all channels.



## METERING MODULE

Maximum current up to 100A;
Active and reactive power measurements for 3-phase and 1-phase meters;
Export/import power measurements in 4 quadrants;
Power quality parameters
Load profiling from 5' intervals
Time-of-Use metering

## NET NODE COMMUNICATIONS AND INTERFACES

CENELEC A-band LV PLC communications (based on S-FSK, OFDM techniques);
Interoperability, compliance to DLMS/COSEM standard protocol stack;
Support of up to 12 Customer Interface Units via standard wired/wireless M-bus
PLC or GSM/GPRS communication interface to communicate directly with the Master Station (optionally)

## CUSTOMER INTERFACE UNITS

STS compliant keypad;
Data exchange via M-Bus wired/wireless interface or via LV PLC
Possibility to recharge the credit remotely or locally
Safety button to prevent unexpected reconnections;

## ANTI-FRAUD DETECTION

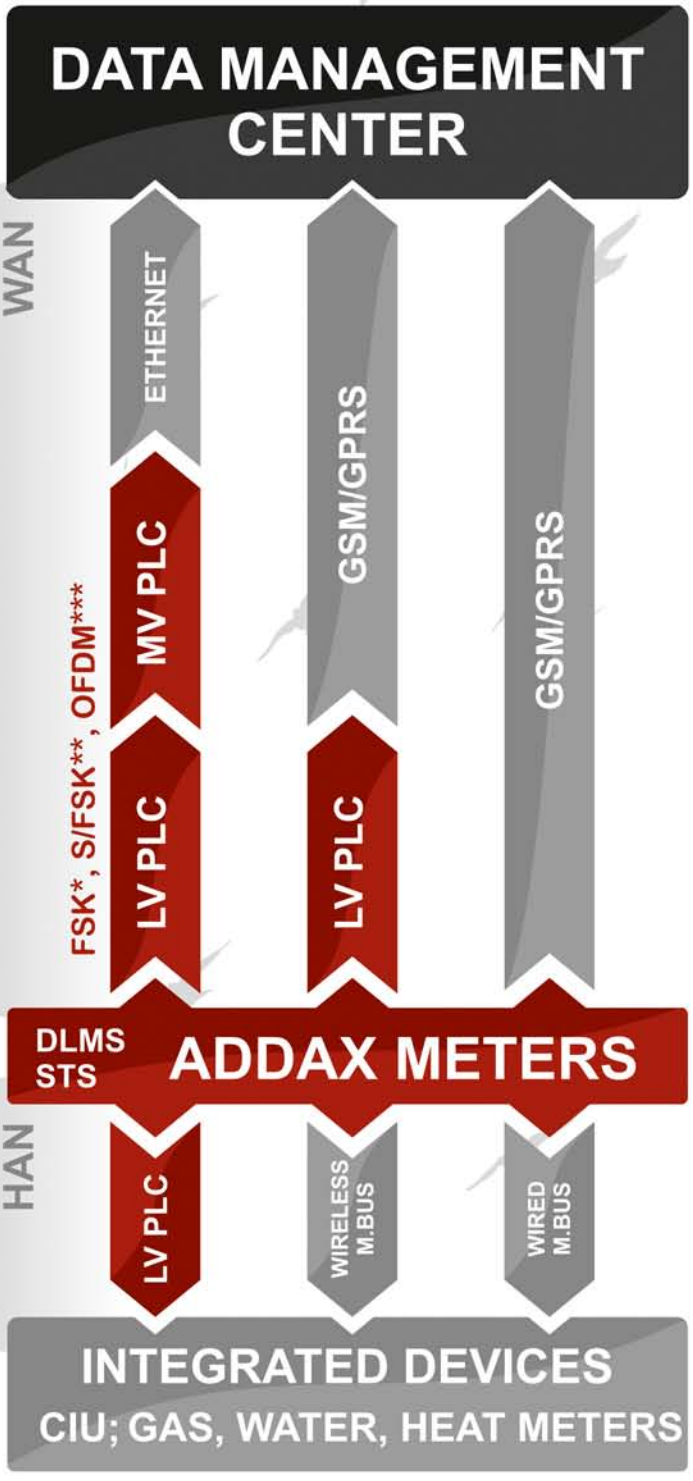
Sensors for CMS protective box unauthorized opening;
Real time alarming to warn the Master station;
Event log with circular memory buffer with storage capacity up to 200 events.

## LOAD CONTROL

Disconnection/reconnection remotely or locally;
DSM functionality through controlling primary and secondary loads (on schedule or by configurable threshold);
Max Demand

# ADDAX IMS

## COMMUNICATION SOLUTIONS

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# solutions

ADDAX TECHNOLOGY

## ADDAX AMI PORTFOLIO

ADDAX AMI PORTFOLIO is a suite of modules (interconnected hardware and software solutions), designed for an efficient management of energy and resources consumption. These modules can be assembled in different ways in order to build the system which would solve specific issues of any Utility:

- electricity metering & load control;
- multiple metering (water/gas/heat);
- street lighting management and control.

Any ADDAX AMI system, regardless its application area (electricity metering /multiple metering/street lighting), has a typical three-level structure:

- Data Management Level
- Communication media
- End-point equipment at consumer's side.

ADDAX AMI is a self-sufficient system – it includes all necessary components to build a complete and efficient AMI solution. ADDAX AMI offers the possibility to integrate products from external suppliers in order to enlarge its functionality.

## *Key Success Factors*

- ADDAX AMI has a strategic orientation on energy efficiency. It supports a wide range of services – Time-Of-Use metering, load profile, load control, demand side management, fraud detection, imbalance control, operation in prepayment and credit modes. These features, altogether, provide a great variety of energy saving solutions.

- ADDAX AMI integrates standard and open solutions in its structure. All the modules within ADDAX AMI Portfolio are compliant with DLMS/COSEM requirements (data model, protocols, interfaces), thus enabling interoperability with standardized products of external manufacturers.

- ADDAX AMI provides reliable and efficient communication solutions. Along with recommended physical environments – Low Voltage and Medium Voltage PLC, which considerably reduce deployment and operation costs, ADDAX AMI can employ media as RF, GSM/GPRS, Ethernet.

- ADDAX AMI offers high-speed data exchange over PLC, using S-FSK and OFDM modulations. The high data rates enable remote firmware upgrade, which allows a continuous development of the system and adaptation to up-to-date requirements.

## *ELECTRICITY METERING AND LOAD CONTROL SOLUTION*

The AMI solution, ADDAX IMS, gives both Utilities and end-consumers many benefits over traditional metering systems providing maximum functionality. ADDAX meters are equipped with a wide range of utilities enabling detailed consumption measurement, efficient load control, anti-fraud protection etc.

### *Detailed Consumption Information*

The AMI solution, ADDAX IMS, provides complete and detailed information on resources consumption which can be used by different participants of the metering infrastructure. The collected data enables utilities to better control customer's power usage, and allows consumers to adjust their usage to reduce costs.

Meter records parameters on consumed electric energy in registers according to DLMS/COSEM requirements:

- Active energy, absolute value
- Active energy in forward direction, import
- Active energy, import, tariff 1…6
- Active energy in reverse direction, export
- Active energy, export, tariff 1… 6
- Instantaneous active power
- Active Max Demand
- Active power for each phase
- Reactive power
- Reactive power for each phase
- Reactive energy in forward direction, import
- Reactive energy in reverse direction, export
- Reactive energy in quadrants

Basic consumption data are registered in the meter profiles with 5, 10, 15, 30, 60 minutes intervals.

Parameters to measure and store are configured remotely from the Data Center.

### *Electricity Quality Control*

Energy Quality monitoring allows optimization of distribution network and technical costs. It provides a complete picture of current energy and resource usage, which can be applied to improve reliability and efficiency, detect energy losses caused by leakages or fraud.

The information provided by ADDAX AMI helps to easily solve consumers' claims regarding energy quality problems.

The following power quality indices are monitored for each phase:

- instantaneous voltage and current;
- 10 minutes average voltage;
- voltage sags and swells;
- outages;
- power factor;
- phase absence etc.

When predefined limits are exceeded (e.g. maximum current, voltage etc.) the system can automatically disconnect a consumer to ensure his safety.

The outage control provides detailed information on power absence, such as the number and total duration of outages, both for short-term and long-term outages. The limit can be configured from 1 to 3 minutes.

The delivery of the alarms on energy quality can be configured remotely from the Data Management Center.

## *Time-of-Use Metering*

**ADDAX meters** provides effective tariff policy based on TOU metering of consumed active and reactive energy in single-phase and three-phase power networks.

The time-of-use tariffs within predefined intervals during the day can be set in the Data Management Center. This feature provides customers with necessary information on their consumption and motivates them to reduce power consumption during peak hours.

ADDAX meters support the following tariff parameters which can be configured remotely from the Center:

- Number of tariff registers - 6
- Number of changeovers - up to 8 changeovers per day with 30 minutes increment.
- Number of seasons per year (max): 4
- Number of special days per year (max) which do not correspond to the day type : 30
- Number of day types per week (max):4

## *Demand Side Management (DSM)*

Demand-side management (DSM) enables automatic limitation of electric energy consumption during peak load hours.

The ADDAX meters are equipped with relays to control consumer's loads: the primary load (using basic relay 80/100 A) and the secondary load (via external contactor by extra relay 5 A).

**Emergency load control** allows quick disconnection of the consumers, thus reducing peak loads promptly.

**Scheduled load control.** A pre-defined schedule is remotely set in the meter and is used to shed load during peak hours with the help of the extra relay (for secondary loads).

**Power consumption limiting** is another efficient method to decrease peak loads. Load control is a built-in feature, present in all ADDAX meters. With this feature enabled, the consumer will be disconnected when power consumption exceeds the predefined maximum value.

## *Efficient Anti-Fraud Protection*

ADDAX meters provide continuous anti-fraud monitoring and control. Timely alarming and data logging provide critical reduction of losses.

**All meters are equipped with built in** anti-fraud sensors which generate alarms**:**

- meter cover opening sensor,
- meter terminal box cover opening sensor,
- magnetic field sensor;
- differential current sensor to measure difference between currents in phase and neutral wires both for single-phase and 3-phase meters.

Differential current presence can be an evidence of possible fraud attempt. Minimum admissible differential current limit is remotely configured from the central software.

**Split Meters.** An efficient mean of anti-fraud protection are the split meters, with separated measuring and displaying parts. The meter is installed in a location, inaccessible for the customer, usually on the poles. The information related to the consumption is presented on a remote user display. Data exchange between meter and the display is performed via PLC or RF.

**Balance metering. Distribution losses control and fraud detection**

The Balance Metering is performed through simultaneous consumption metering both on transformer substation and on consumer side. Comparing the energy supplied and consumed allows detecting the losses in the distribution network.

The Load profiles (with minimum intervals equal to 5 minutes) are also used to detect the imbalance in the distribution network. The Time Synchronization feature ensures accurate reading and load profile synchronization.

## *Prepayment and Credit Modes*

**Each ADDAX meter** supports both credit and prepayment modes. The operation modes can be switched remotely by a command from the Data Management Center. The prepayment mode operates in full compliance with the Standard Transfer Specification (STS) requirements.

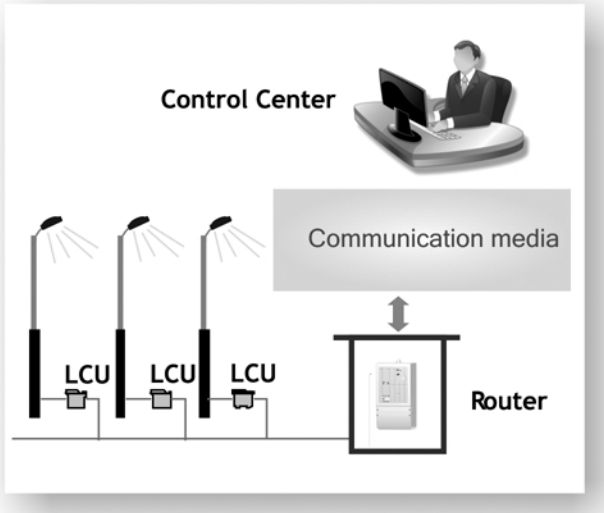
Each ADDAX meter can be equipped with a keypad designed to enter the numeric code which contains the necessary information to recharge the balance (numeric token). A unique feature of ADDAX AMI is the possibility to recharge the balance remotely (token-less prepayment), by a command delivered from the Data Management Center, which simplifies the re-charging procedure.

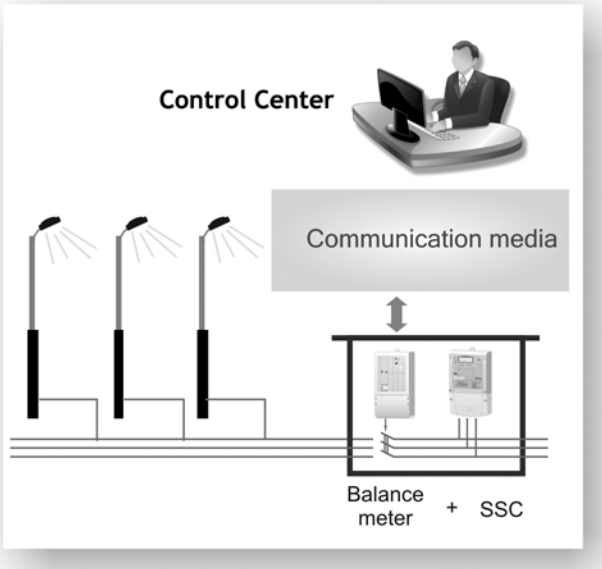
In the prepayment mode, the meter is automatically disconnected as the balance reaches zero. The customers served in Credit mode are disconnected automatically when a certain limit of credit is over-passed or by a command from the Data Management Center. Once the customer enters a recharging token or a relevant command is sent from the Center the meter is ready to be reconnected. All ADDAX meters are equipped with safety buttons, which prevent unexpected reconnection.

## STREET LIGHTING

ADDAX Street Lighting Solution provides flexible and efficient management of the street lighting network. The street lamps can be controlled individually or by groups using centralized monitoring software. ADDAX SL solution leads to essential energy savings and decrease of maintenance costs.
There are three solutions for Street-Lighting management within ADDAX AMI:

- Individual management, using Lighting Control Units (LCU) installed in each lamp. The LCU incorporates a measurement circuit, a control unit and a PLC modem.
- Group management using Supply Station Controller (SSC), which is designed to manage groups of lamps per phase connected to a certain supply station. This solution is efficient when it's necessary to switch on/off all the streetlights connected to a feeder. SSC also monitors the operation of the Supply Station itself.
- Combined solution using both, LCU and SSC in one supply station. This solution provides a higher degree of flexibility and represents a more efficient control and management tool.




## *Lighting control by LCU*

LCU is equipped with relay to switch load on/off, and a metering module to measure consumed energy and register network events.

LCU control mechanisms:

- The LCU can be programmed to control two lamps simultaneously.
- The LCU controls and monitors the streetlights using electronic ballasts: it can be used to switch on/off the lamps and provides stepless dimming. The Electronic ballast control is realized using relays or via 1-10V interface.

## *LCU functionality*

- scheduled or remote connection/disconnection;
- dimming (lightness level). The dimming can be performed based on dawn/dusk time, time schedules or/and a command from the Data Management Center;
- consumption metering (total active energy, hourly active energy consumption, etc);
- energy quality control (outages duration, bad voltage duration, etc);
- lamp estate, providing alarms to Data Management Center when a broken lamp has to be replaced;
- additional data, such as real active life time of lamps since its installation.

## *Street Lighting control by SSC*

SSC is designed for Street lighting group management on each separate phase. SSC is mounted into Supply Station (SS) box and allows direct control and management of the SS.

Functionality:

- The SSC records periodically voltage control points, switches on/off phase relays, controls sensors (such as door opening sensors) installed in the supply station
- The SSC generates messages on every change of its state and transmits this information to the Data Collection Center via PLC or GSM/GPRS channel.
- The SSC supports several modes of data exchange with the supply station - on schedule or on request from the Data Management Center.
- The SSC controls unauthorized access in supply station or in SSC

## MULTIPLE METERING

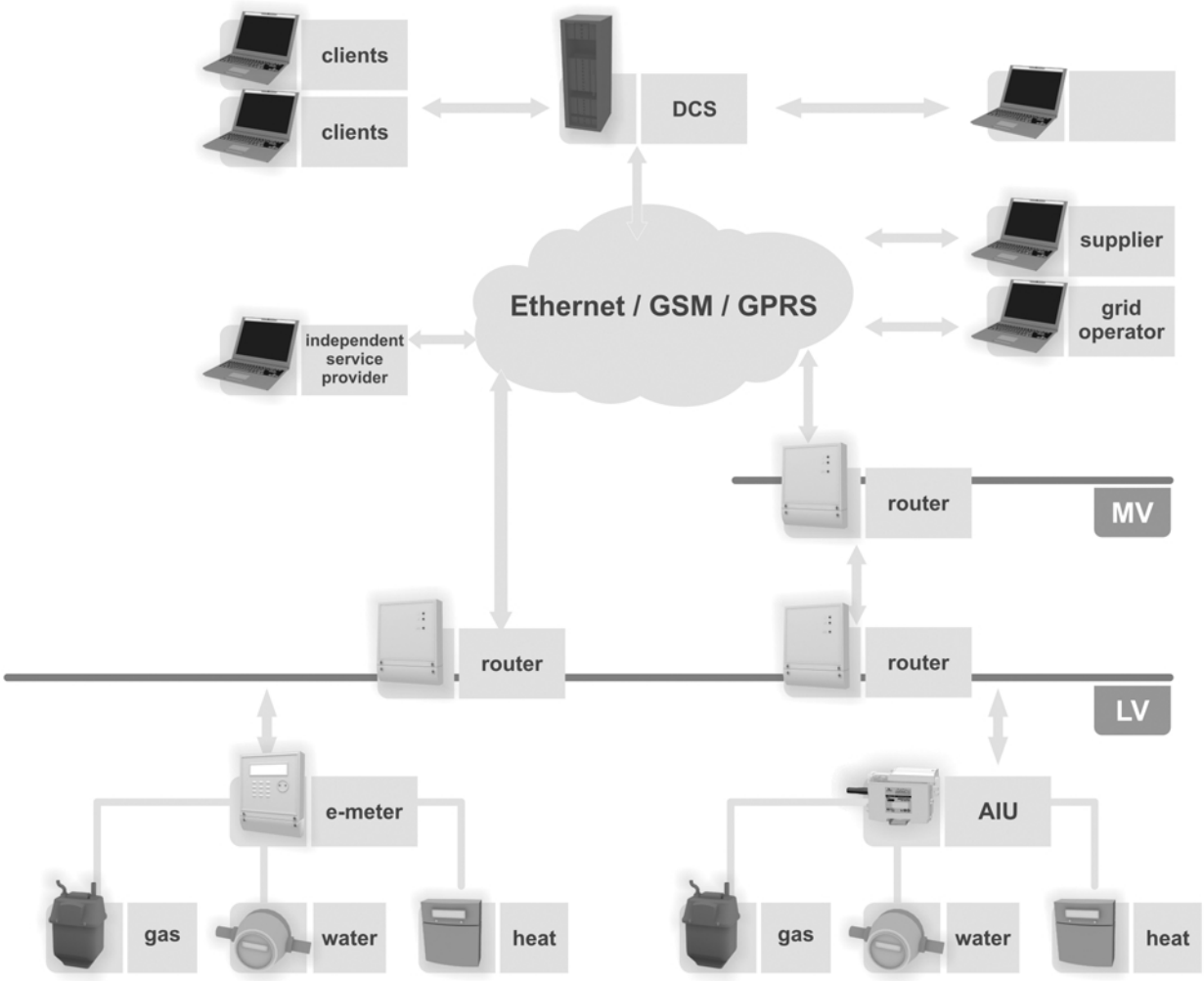
ADDAX Integrated Metering enables the management of several resources (electricity, gas, water and heat) within the frames of a single metering solution. The meters from external suppliers are integrated in ADDAX AMI through their M-Bus interfaces or pulse outputs. All market players (Grid Companies, Suppliers, Service Providers) can access the data related to their resources in the unique Data Management Center.

There are two ways of integration:

1. Through ADDAX electricity meters that can operate as a gateway for Home Appliances Network and distribution network of a higher level. For this purpose, ADDAX meters are equipped with an additional communication module.
2. Using Addax Interface Units (AIU), which integrate meters from external suppliers into the ADDAX network.

Both devices can be remotely configured from the Center to store data from tertiary meters in a non-volatile memory, deliver these readings to the Center based on a schedule or request and monitor the status of the integrated equipment.

The integration of different resources in a unique Data Management Center using a common communication infrastructure leads to a substantial decrease of deployment and operation costs.



## ADDAX AMI COMMUNICATIONS

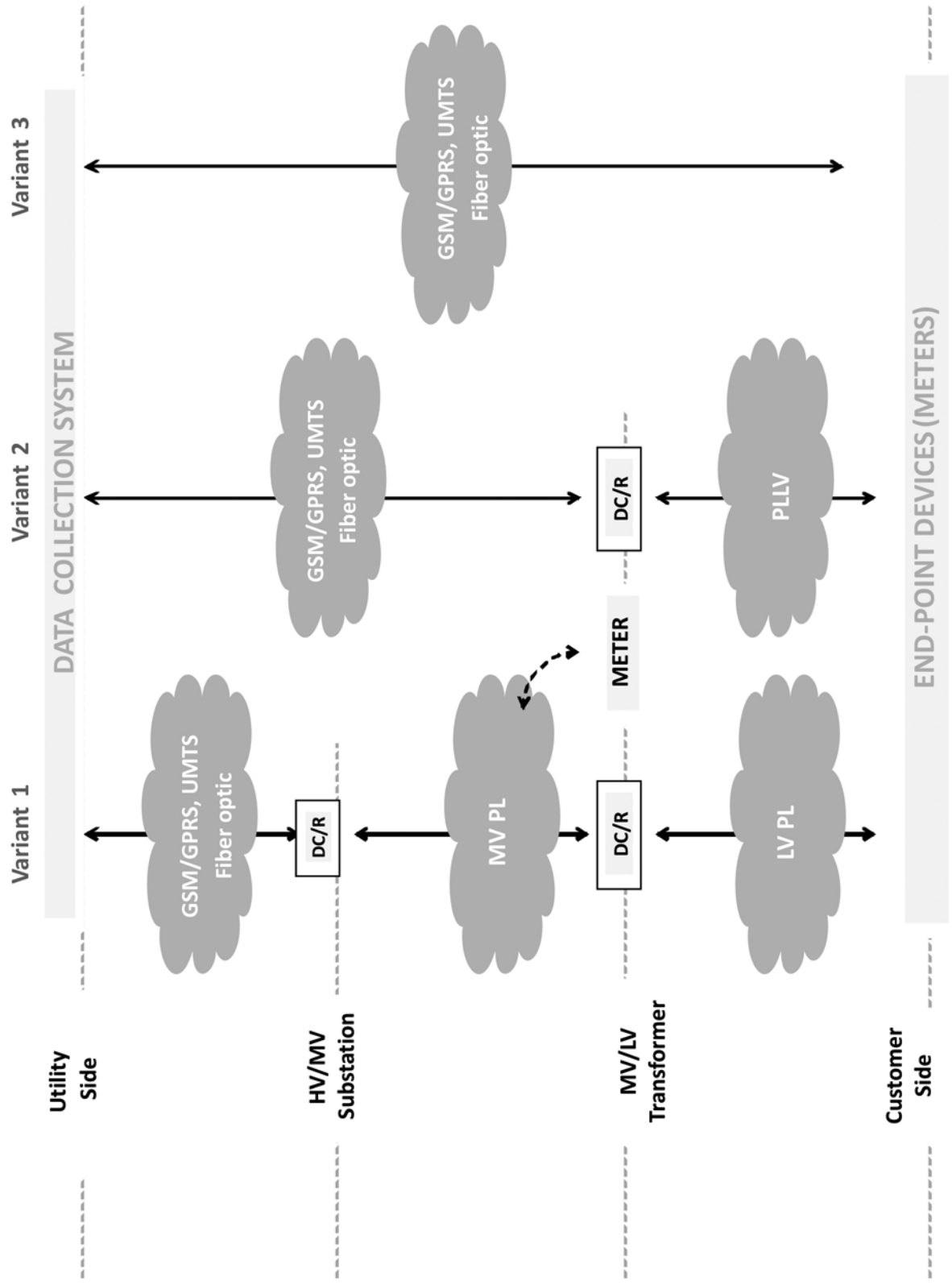
In ADDAX AMI any data exchange between infrastructure components is carried out via special data-transmission wide area network ADDAX.Net.

### *ADDAX.Net brief description*

- ☑ Full 2 – way communications within the entire network.
- ☑ Compliance with DLMS/COSEM; standard (open) data models, communication protocols and interfaces.
- ☑ Compatibility with standard solutions of other producers.
- ☑ Possibility to use heterogeneous segments on the basis of LV PLC, MV PLC, GSM/GPRS, UMTS, fiber optic.
- ☑ Scalability on the level of network segments and/or end-point devices within each segment.
- ☑ Support of several alternative data exchange schemes: “concentrator”, “router” and P2P.
- ☑ Support of data exchange on schedule, on request and on alarm event.
- ☑ Support of address (individual), group and broadcast commands.
- ☑ ADDAX LV PLC features: FSK / S-FSK / OFDM, Plug & Play, AutoDiscovery, Repetition (up to 7 levels).
- ☑ Unique sharing of LV PLC + MV PLC.
- ☑ Special means of network management and monitoring (Network Management System).

### *Communication equipment*

ADDAX.Net is built on the basis of a pivot communication device, which is realised as Data Concentrator (DC), or Router (R) depending on selected configuration. Each DC/R supports up to 1000 end-point devices, which is definitely above the real needs.
Interchangeable communication modules enable the adaptation of the DC/R to any combinations of physical media.


Variant 1
Variant 2
Variant 3
DATA COLLECTION SYSTEM
GSM/GPRS, UMTS
Fiber optic
DC/R
MV PL
METER
LV PL
PLLV
END-POINT DEVICES (METERS)
Utility Side
HV/MV Substation
MV/LV Transformer
Customer Side

## *End-point devices facilities*

- All ADDAX end-point devices are equipped with built-in PLC–modems.
- Each meter of Extra model line may be also equipped with one of the following additional communication modules (modems), if necessary: MV PLC, GSM/GPRS, UMTS. Communication module is installed under the meter's terminal box cover.
- All ADDAX end-point devices are equipped with built-in optical port (IEC 62056-21, mode C,E). This communication channel may be used in emergency cases for data exchange or on-site device configuration.

## *Network Management System (NMS)*

Network Management System (NMS) – is one of the most important components of the metering infrastructure. NMS ensures network monitoring and management, as well as control and displaying of current states of network/devices, detection of changes in the network, statistics forming and analysis, troubleshooting etc.

The NMS allows considerable increase of reliability and effectiveness of network utilization.

## *Data Security*

- Compliance with DLMS/COSEM data security requirements
- Authentication of data exchange participants (AES, GCM, 128 bit key)
- Encryption of transmitted messages (AES, GCM, 128 bit key)
- Control of integrity of the resident firmware of a device
- Password access to device's optical port

## ADDAX SOFTWARE SOLUTION

### *General*

ADDAX Data Management provides means to perform the data collection and processing, parameterization and network management. ADDAX DM solution controls the network operability, and ensures data base management and the centralized authorization for access to the metering equipment. ADDAX DM enables consumption data validation and monitoring on the real time basis.

ADDAX SW Solution provides:

- accurate information to the billing system;
- flexible tariff plans;
- monitoring of energy quality,
- alarms on fraud attempts; remote switching off or load limitation; User friendly interface and Multilanguage support.

### *Basic principles*

- Openness based on standard data model and protocols used
- Modularity which allows seamless integration of other manufactures solutions
- Easy scalable architecture of the Data Collection System.
- Popular platforms (MS Windows, .Net) used

ADDAX DM Solution enables continuous development by keeping the same basic principles through different versions and downwards/upwards compatibility.

### *Key functions*

**Remote reading**

- Actual meter reading
- Energy quality data
- Interval data

**Remote parameterization**

- Remote parameterization of meters and data concentrators, such as tariff structures

**Remote configuring and upgrade**

- Remote firmware upgrade for meters and concentrators/routers

**Measuring data management**

- Data collection on schedule or on-demand
- Data storage

**Remote control**

- Remote meter control (switching on/off)
- Remote control of unauthorized network access and tampering attempts
- DSM
- Scheduling

**Alarms and events**

- Events logging
- Alarming on event

**Communication network and system management**

- Maintains accurate system time in meters and data concentrators/routers
- Implements network state monitoring
- Manages information about the grid topology
- Supports connection scheduling to automate data collection from data concentrators/routers
- Manages and supports network communication channels such as GSM, GPRS, UMTS, PL MV, PL LV (S-FSK, OFDM).

**Security**

- Users hierarchy
- Access rights
- Customer information protection.

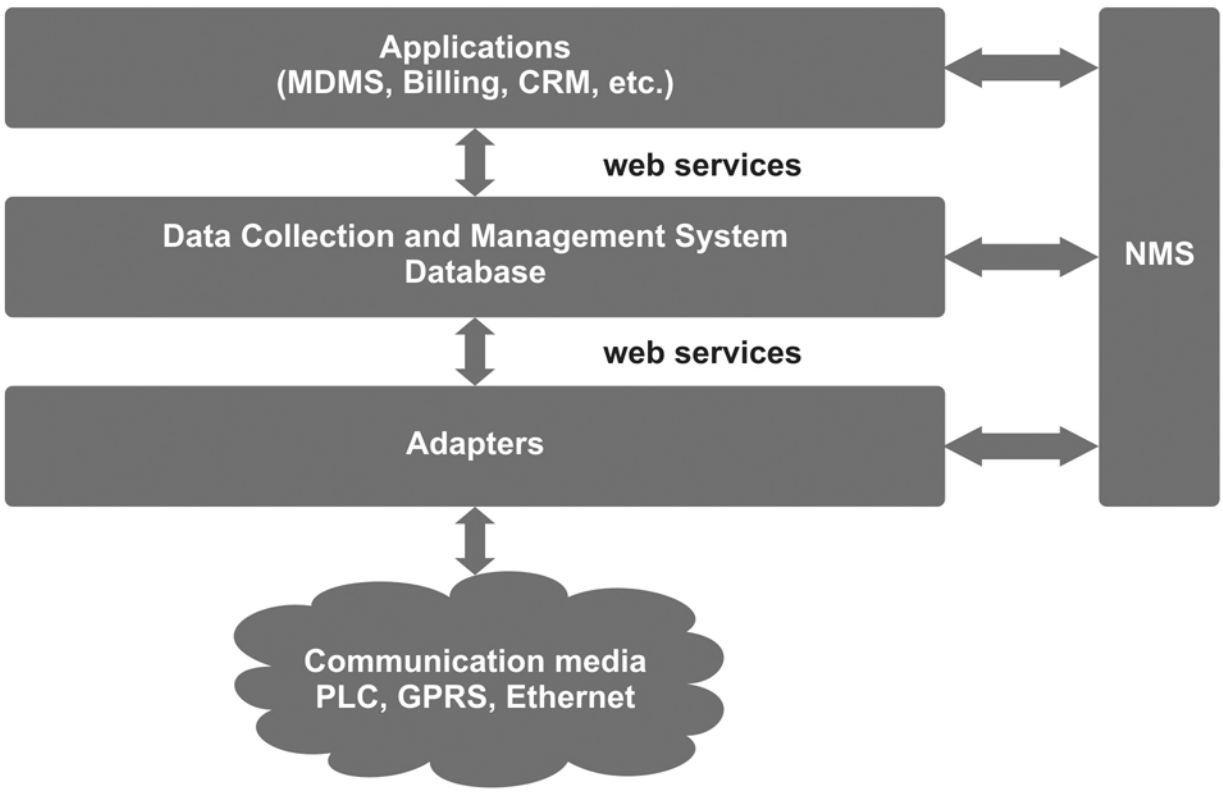
**Reporting** consumer data and network events, such as tamper alarms and outages

## *Architecture*

The main components of the ADDAX DM Solution are:

- **Data collection system**, designed for data exchange between the Center and end-points
- **Database** as a repository for meter readings and calculated data.
- Different applications intended for special purposes (Billing, CRM, Outage Management, etc.)
- **Communication Network Management System** to monitor and administrate the network.

**Various adapters** to communicate with end-point devices according to different protocols (GPRS, Ethernet, PL S-FSK modulation, PL OFDM modulation), ADDAX proprietary).



## *Easy Adaptation*

ADDAX AMI DM solution provides customer with quality service adapted to specified situation, offering metering equipment from versions with limited functionality up to tuned-up multi-functional meters. ADDAX Solution allows effortless scaling from small projects to millions of devices, easy deployment and integration due to automated devices registration, remote parameterization and upgrade.

## *ADDAX AMI Integration*

The AMI system collects detailed data (e.g. meter interval data, meter outage, meter restoration, meter events) that can provide all interested parties with necessary information through a data warehouse (data web-services or file exchange), or via direct access to meters.

**Different Applications**, such as **Meter Data Management System**, **Billing System**, **CRM**, etc) of third party companies can be integrated in ADDAX SW Solution.

**Web services** provide access to software systems using standard protocols and allow requesting collected data, parameterize the devices, subscribe to various events, etc.

## CONTACT DETAILS

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Landis+Gyr

manage energy better

# Automatic Meter Reading System

# edasYs

State-of-the-art technologies for your miniature control centre

# Simply future-assured

edasYs, the automatic meter reading system for small-scale applications, lays the foundations for a new era. With its metering point oriented database like Windows Explorer environment and greatest ease of use, it paves the way to the future. edasYs provides connectivity for a wide range of meters.

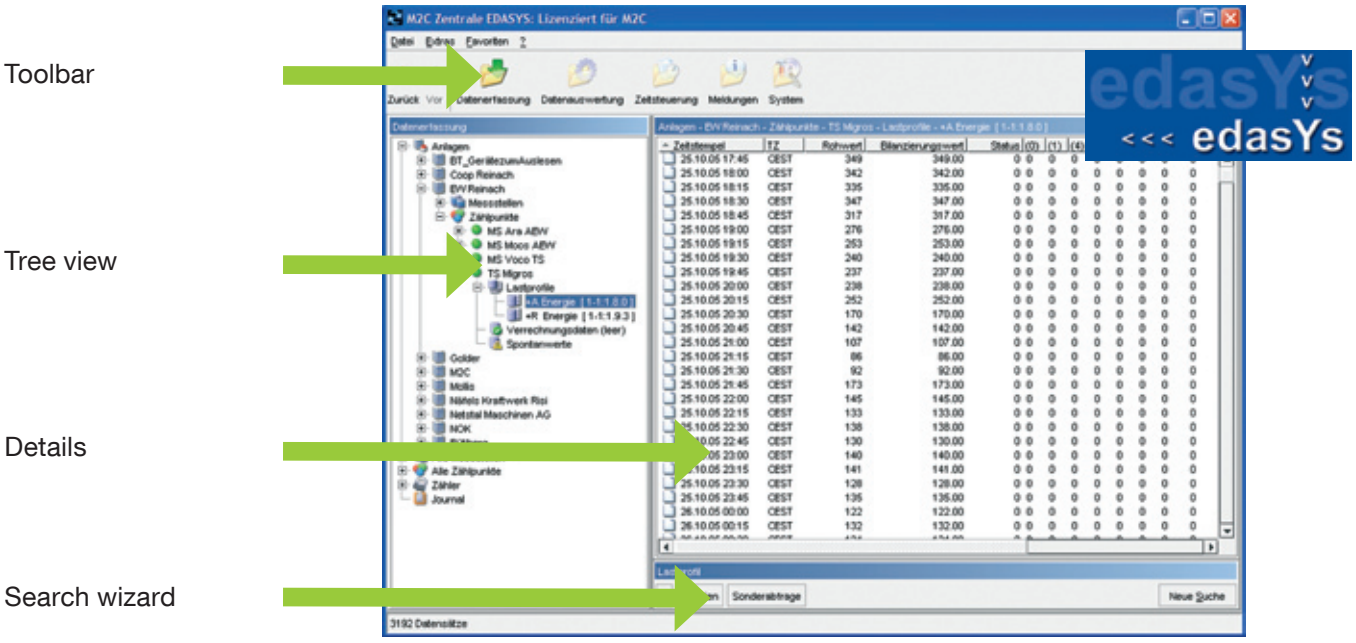
In these fast-moving times, sophisticated administration often comes at a high price. The state-of-the-art technologies from Landis+Gyr minimise administrative effort, helping to reduce such costs. Convenient operation makes the administration of your customer data easy.

The rising demands of the liberalised electricity market make flexible and sometimes complex configurations a necessity. edasYs provides an excellent basis, and its simple and straightforward operation delivers the best possible support for data acquisition, evaluation and circulation. Its sophisticated scheduler sets the pace. edasYs picks up where other AMR systems just seem too massive. This becomes apparent from the moment of installation, which is quick and effortless.

The metering points can be managed on a Windows-based user interface. The operating steps are self-explanatory and quickly become second nature – particularly the process of adding and managing new metering points becomes highly efficient. All information is structured clearly and unambiguously.

The competitive price and balanced functionality suit any budget. Finally a system is available that doesn't make too many demands on your hardware.

# Familiar Windows Explorer environment




Who doesn't know the Windows Explorer data management interface? It was the answer to this question that motivated us to equip edasYs with the same interface.

Navigation using the toolbar and a series of default buttons ensures that you are always in the right menu. The various metering points and all other data are presented in a tree view. The tree view gives you access to the corresponding detailed information. The search wizard and the possibility to define favourites provide additional support.

Define the reading times and intervals to create whatever jobs you want. A wide variety of meter protocols support an efficient automatic meter reading process. Substitute value entry is provided in case of implausible data. Helpful backup features are included to support archival storage.

A data interface is provided for data export. The transfer of accounting data to external billing systems is guaranteed. Additionally, you can import all data lists into Excel spreadsheets for further use.

Flexible reporting structures provide for professional reporting on the acquired data. Create graphs and tables for reports and tariff structures, and distribute them via the internet.

edasYs is an important contribution by Landis+Gyr to help you get ready for tomorrow's demands today. Benefit from our experience with automatic reading systems across the entire spectrum of the electricity market.

## Manage energy better

We deliver peace-of-mind when it comes to managing your energy. Decades of leadership in technology and in-depth knowledge at Landis+Gyr means we are able to offer you an extensive, high quality and proven portfolio.

Obtaining the highest level of energy efficiency has never been easier. We have translated our unique expertise of utility processes into integrated energy management solutions and we can help you streamline your processes, increase customer loyalty and secure revenue.

Let us tailor our innovative solutions to meet your specific needs. Whether electricity, water, heat/cold, gas metering or load management, we provide what you need to ensure that your energy is managed with increased precision and reliability.

With Landis+Gyr as your trusted partner, you can manage energy better.

**Landis+Gyr AG**

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Fax +41 41 935 6601
info@landisgyr.com

www.landisgyr.com/europe

D000012791 en

**Gridstream Solution**
Advanced Metering Management system

Landis+Gyr
manage energy better

# Gridstream AIM

The most comprehensive
energy management system

Gridstream

# Improved energy management with Gridstream

- **We focus on the unique needs of energy utilities**
- **We offer tailored solutions and environmental efficiency**
- **Our technological leadership enables the smart grid**

With 25 years of experience in the Advanced Metering Management (AMM) solutions business, Landis+Gyr is the world's most committed and competent AMM solutions and services provider as well as the recognized global leader in the metering business. Serving the energy industry has always been our core business. During decades of cooperation with energy utilities we have gained a unique understanding of your business requirements. Now we have developed and packaged our advanced energy management products and services under a new solution suite, Gridstream.

## Customised intelligence

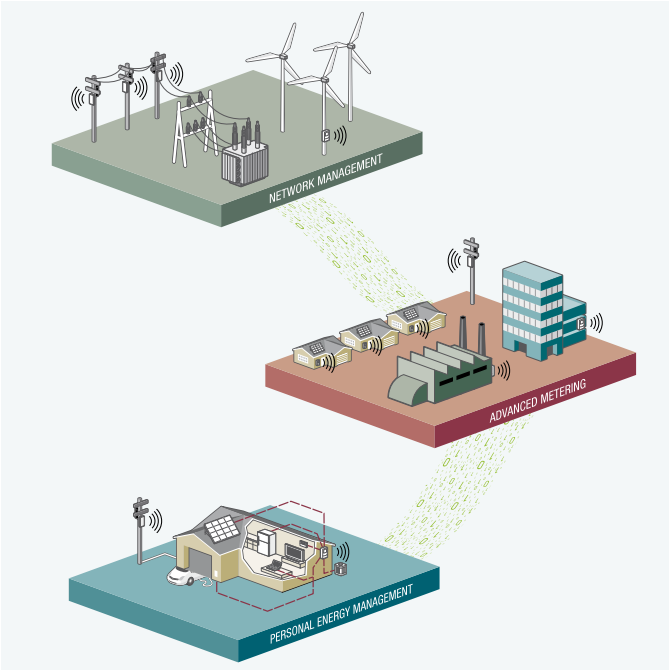
In order to increase profitability and efficiency, you need more than just Automatic Meter Reading (AMR); you need an AMM solution that enables the smart grid. The Gridstream AMM solution is tailored to your unique needs so that you can achieve better results and the best return on your investment. Our strong commitment to AMM benefits your company – we are here to help you manage energy better.

## Your innovative partner

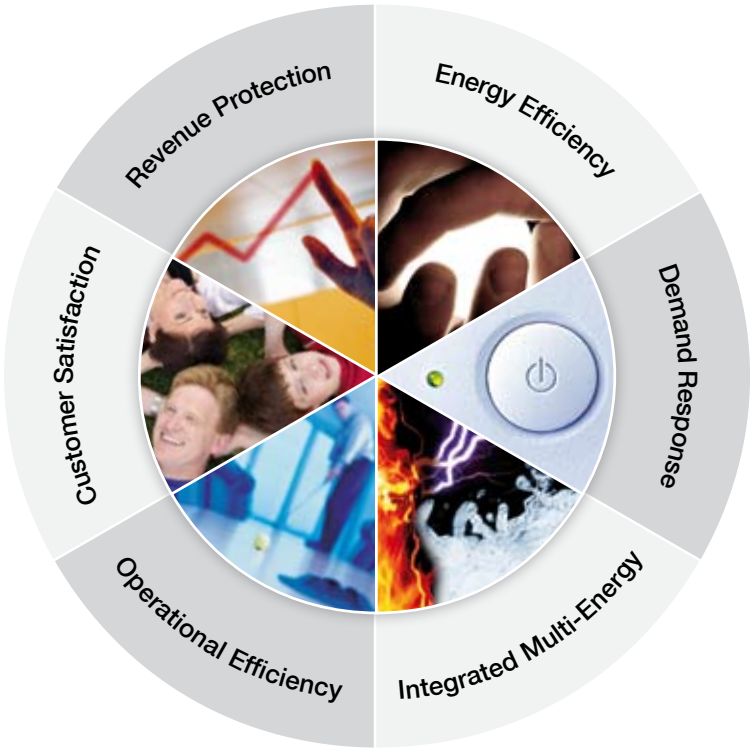
We are committed to developing long-term customer relationships and to providing you with trustworthy solutions that grow with your business and help you to advance at the speed of technology. We want to be the experienced partner that moves the industry towards the smart grid, delivering positive outcomes for you, your customers and the environment.

## Sustainable awareness

We want to support you to manage energy better and realise smart grids. Advanced metering, network management and personal energy management improve efficient use of energy resources and support sustainable development. Our smart metering solutions enable you to provide consumers with fully transparent information regarding their individual energy consumption, which increases their awareness of sustainable behaviour. We at Landis+Gyr are also committed to managing our own energy usage better and demonstrating our green initiative throughout all our operations.



# Six reasons to choose the Gridstream AMM solution:




## Energy efficiency

Give your customers precise information that enables them to use energy in a manner that is more beneficial to the environment. Provide them with advanced personal energy management tools. Improve your network management and help your customers save energy by raising the awareness of their energy usage.

## Demand response

Forecast demand accurately with your new insight into consumer behaviour. Peaks can be leveled out, and consistent supply can be attained.

## Operational efficiency

Save money and give your customers a better service with the increased operational efficiency and process quality that comes with automation.

## Integrated multi-energy

Realise the efficiency benefits of integrating the processes used in operating, monitoring and managing multiple energy forms. Our Gridstream solution works for electricity, heat, gas and water. Efficiency is increased as there is only one system to use, train on and maintain.

## Customer satisfaction

Increase your customers' loyalty to you and create growth opportunities through more precise, consumption-based billing and quality customer service.

## Revenue protection

Reduce your non-technical losses and identify theft with the wide range of advanced tools provided by the Gridstream solution. You can remotely switch power supply on and off, improve debt collection processes and respond quickly to abnormalities which may threaten revenue.

# Advanced technology to meet your needs today and tomorrow

- **A solution customised to your needs**
- **Technology that grows with you**
- **Cost effective design**

Gridstream helps you maximise the effectiveness of your energy management assets through the seamless integration and flow of technology and information. It packages the industry's largest portfolio of energy management tools into an interoperable and secure AMM solution.

At the heart of our Gridstream solution is the advanced software, Gridstream AIM. It enables the expansion of smart metering towards smart grids. Besides advanced multi-energy metering, it provides tools for network management support and personal energy management. Gridstream AIM makes all multi-energy consumption data available in a single AMM system, covering electricity, heat/cold, gas and water.

The system supports network management by improving the awareness and information of the network status and enabling load management by shaping the load curve and preventing overloads. Personal energy management engages your customers by giving them unique insight and control of their household energy consumption. Gridstream AIM is developed in an open architecture for ease of integration with existing utility software and data management systems.

## Value creation process

A truly flexible solution, Gridstream can address all of your energy needs in one complete energy management solution. Or, you may deploy individual products or components and integrate them into your existing infrastructure. Based on our wide range of experience, we have developed a systematic process model where we together define your specific needs and the optimal way for you to implement AMM.

## Four steps to an optimal solution

1. Customer needs analysis
2. Solution design with proven technology
3. Reliable deployment
4. Dependable operation

## Customer needs analysis

When first discussing the deployment of an AMM system a thorough study of a utility's needs must be undertaken. Our in-depth knowledge of utility processes and our strong local experience allow us to see the big picture. Our joint expertise will produce the ideal solution to your specific needs.

## Solution design

After the needs analysis we use the findings to compose the correct solution for you. From providing hardware to operating the entire AMM system, we have the perfect solution to meet your requirements, securing your investment for years to come.

## Reliable deployment

Successful deployment is key for successful AMM operations. We have the tools to carry out the project on time and within budget. Accurate and flawless information flow is vital during deployment. Our vast experience and references show that we have the right tools to ensure a fast deployment while maintaining the highest quality.

## Dependable operation

At Landis+Gyr, we are dedicated to serving your needs during the system operation. Our extensive range of services includes training and system updates. We can ensure a prompt response in your own language thanks to our local presence in your market. Additionally we can partly or fully run your metering operations, according to your needs.

# Gridstream AIM – designed to enhance your processes

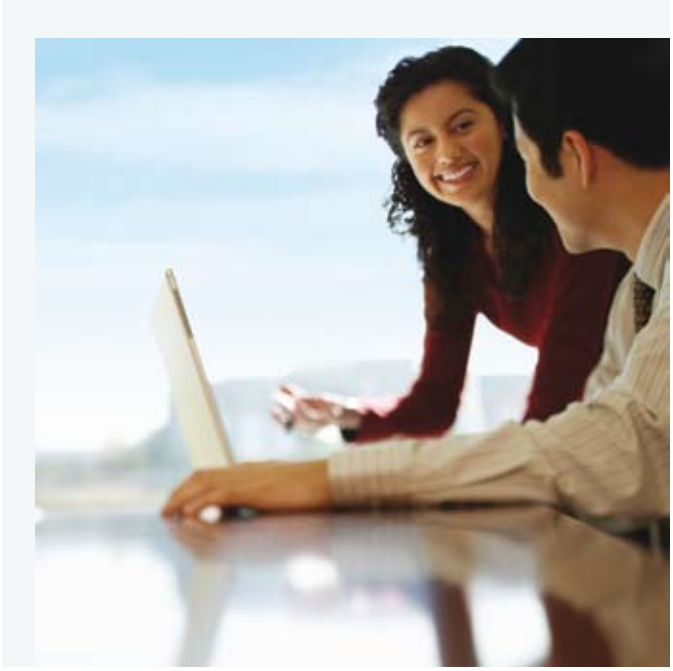
- **Advanced smart grid functionality goes beyond AMM**
- **Automated processes improve efficiency**
- **Interoperable and future proof technology**

Gridstream AIM offers a multi-energy AMM software that is fully integrated and easy to manage. It has been designed to provide you with all the functionalities you need in order to manage your energy better and to enable the smart grid.

The advantages of using an integrated AMM system streamline your processes and make them more efficient. We help you maximise the effectiveness of your energy management assets through the seamless integration and flow of technology and information. Gridstream AIM helps you save on everything from operational costs to workload. By having all your information in one place, your staff will be trained on only one system to manage all of your processes. With numerous automated processes and functions, let Gridstream AIM do the work for you.

Our technologies offer operational advantages to utilities. This translates into value added services for end-consumers. Consumers receive clear and precise bills, prompt customer service and readily available online information. Accurate information empowers the customers to use energy more efficiently.

We build our solutions on openness and flexibility. Gridstream AIM is based on standards that enable interoperability, providing seamless integration and flexibility also for future growth needs.



## Utility processes

Easy access to data enhances many of the utility processes


Customer Service


Billing


Information Management


Balance Settlement


Network Functions

## AMM Software: Gridstream AIM

Gridstream AIM stores and prepares metering information for viewing, reporting or use in other applications.

**An AMM software for efficient data collection, processing and management**

Gridstream AIM

## Data transfer

Data is transferred into the Gridstream AIM-system using cost efficient methods.

GSM/GPRS

Ethernet

PSTN

Low voltage powerline

Medium voltage powerline

## Customers

Our range of products offers metering equipment for all customer segments.


Multi-energy residential metering


Industry and commercial metering


Grid metering

# Gridstream AIM in every step of the metering value chain

- **One system covers all functions and energy forms**
- **Monitoring and management tools for energy companies**
- **Monitoring tools for consumers**

## Reading and Control – real-time energy management

The versatile and flexible reading and control capabilities in Gridstream AIM form the backbone of an efficient metering system. It provides a basis for all other value added services such as billing, balance and customer reporting and network management. Additional benefits include:

- Data retrieval according to schedule or on demand
- Remote data retrieval
- Traceable data flow
- Comprehensive reading management tools
- The possibility to simplify and automate business processes
- Remote management of tariffs, loads, relays and power supply

## Validation – always reliable data

Validation in Gridstream AIM checks the quality, validity and reliability of metering information at an early stage enabling you to react immediately to any abnormalities. This enables you to monitor and react to conditions such as consumption limitations or invalid data. Validation is a flexible platform that is equipped to handle future validation requirements.

## Profile Calculation – flexible profiling

Profile Calculation produces a series of data using different calculation rules based on existing information. Profile Calculation is a highly flexible and efficient tool. It prepares data for balance settlement and load profile follow up. The calculated data can then be used as a basis for tariff planning. The tool can be applied to all energy forms. With profile calculation, you can change the periodicity and convert profile metering to various time profiles or calculate temperature compensated profiles.

## Tariff Calculation - total freedom in tariffing

Tariff Calculation in Gridstream AIM provides you with refined and reliable data for multiple purposes in billing and new tariff planning. It also enables flexible tariffing, even afterwards. Tariff calculation can be used to simulate and accurately forecast the effects of different tariffing types. As the calculation suits multi-energy solutions, there is no need for multiple systems.


## InSight – advanced monitoring tool

InSight is a tool used for proactively monitoring system hardware, applications, services and databases. The metering value chain can be managed with ease due to fast access to current monitoring data. InSight brings all the information within Gridstream AIM together in a visual, easy to use form. It enables you to finetune the general performance level of the system or locate bottlenecks.

InSight uses modern web services and portal based architecture. The portal approach provides a clear and visual interface that can be customised to best suit your needs. Data for monitoring is collected through probes which gather information from different parts of the system. It is then stored in the InSight database and unified. The InSight engine also preprocesses the data for quick viewing and graph display.

## Integration - seamless data flow

Reliable and real time data exchange between different systems is a key factor when aiming for cost efficient data management for the entire metering value chain. This occurs when high quality two-way integration becomes a necessity. Integration application (AIMIA) is a flexible integration tool that offers data exchange services for integration needs. It enables reliable data flow simultaneously between Gridstream AIM and various systems, such as Customer Information System (CIS), Energy Data Management System (EDMS) and Network Information System (NIS). Using this application ensures that data is constantly updated, readily available and stored in only one place.

## Site Manager – automating deployment

Seamless data flow during AMM deployment is crucial for accuracy and data security. The key to a successful AMM deployment is ensuring a smooth roll out phase. Site Manager is a planning and data gathering tool which provides quick and easy handling of installation information. Site Manager includes two user interfaces: one for installation planners and network users and PDA access for service personnel.

## Dashboard – a user-friendly system overview

Dashboard ensures that consumer and sales information is easily available, bringing benefits to customer service and managers alike. Dashboard gives access to a vast amount of metering information stored in the Gridstream AIM database. It is a user-friendly, web-based application that requires no previous knowledge of Gridstream AIM. It offers different views for different user groups, such as customer service personnel or executive managers. Dashboard improves many of the network company's key processes:

- Efficient customer handling
- Efficiency in handling changes of supplier
- Quick responses to billing enquiries
- Easy tracking of power cuts and power quality information
- Efficient debt collection through remote access
- Variety in network company service offering with remote relay options

# Maximise AMM efficiency

- **Hybrid communication solution for lowest lifetime cost**
- **Single system for managing multiple energy forms**
- **Extremely reliable metering equipment for peace of mind**

Gridstream AIM uses the communication technologies that suit you best. Currently data transfer can be carried out using GSM/GPRS, Ethernet, PSTN or PLC. To achieve an optimal, cost efficient solution for a metering segment or geographical location you often need to combine different data transfer methods. When it comes to developing new methods of data transfer, we at Landis+Gyr are at the cutting edge, while at the same time using standardised communications, such as IP protocols to ensure full interoperability.

Gridstream AIM provides significant potential for improving efficiency in multi-energy utilities. Implementation of a single system to read multiple energy forms streamlines processes and reduces operational costs.

## Timeless quality

Our range of products represents the highest quality in AMM. We produce smart multi-energy meters that are not only accurate and functional, but also reliable and extremely durable. These traits ensure an optimal lifecycle cost for all our metering products. Our high quality standards mean that we can offer our customers peace of mind throughout the lifetime of our product.

Landis+Gyr meters are compact, lightweight and easy to install. Their durability and remote data transfer capabilities minimize the need for on-site visits. This makes them convenient and saves time, effort and resources.

# Personal energy management – revolutionising consumer communication

- **Enabling energy monitoring and management at home**
- **Enabling you to promote demand response**
- **Educational and informative for consumers**

## Empowering the consumer

The increasing environmental concerns and growing interest in environmental sustainability have opened consumers' minds to new ideas.

As part of it's Gridstream solution, Landis+Gyr offers applications that enable households to monitor and manage their energy consumption. EcoMeter is an in-home device that shows the real-time information needed for energy consumption management. Consumers could also have software on their PC, showing the personal usage details online. In both applications, actual information regarding the electricity, gas and water consumption as well as current tariff rates and demand are available for the consumer – for the first time. Awareness of consumption rates increases the consumers' incentive to change their consumption patterns and to contribute to environmental sustainability.

## Interactive communication

The applications for personal energy management enable you to set up a direct communication channel with consumers. You can monitor consumer behavior and develop new ways of dealing with peak demand management. Increased energy consciousness among consumers efficiently levels peaks and supports in optimizing the network load. The applications enable you to promote demand response, as you have the ability to encourage consumers to reduce their consumption at critical times or in response to high electricity prices.

Landis+Gyr
manage energy better

## Manage energy better

We deliver peace-of-mind when it comes to managing your energy. Decades of leadership in technology and in-depth knowledge at Landis+Gyr means we are able to offer you an extensive, high quality and proven portfolio.

Obtaining the highest level of energy efficiency has never been easier. We have translated our unique expertise of utility processes into an integrated energy management solution, Gridstream. We can help you streamline your processes, increase customer loyalty and secure revenue. Gridstream packages our AMM offering, meeting your needs today and in the future.

Let us tailor our innovative solutions to meet your specific needs. Whether electricity, water, heat/cold, gas metering or load management, we provide you with the technology you need to ensure that your energy is managed with increased precision and reliability.

With Landis+Gyr as your trusted partner, you can manage energy better

**Landis+Gyr in short**

- 5000 employees worldwide
- Operations on all five continents
- Broadest portfolio of products and services in the industry
- 25 years of smart metering experience
- 1000 AMM systems delivered
- 300 million energy meters produced
- Largest relevant engineering capacity in the industry
- 60 years of direct load management experience
- 15 million load management receivers produced
- ISO certified for quality and environmental processes
- World leader in integrated energy management solutions
- Committed to improved energy efficiency and environmental conservation
- Solid and established partner network

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