Electro Sistem
Baia Mare

UNIT SUBSTATIONS

IN CONCRETE OR METAL HOUSING, PACKAGED OR WALK-IN TYPES

ELECTRO SISTEM S.R.L. Baia Mare

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Our substations unit are assembled in specialized factories and are delivered by "key" to our customers.

The unit substations include:

- Housing: foundation (trafo tub, cable canals, pressure relief system), walls, doors, roof;
- Medium voltage switchgear;
- Transformer, in a separate compartment;
- Low voltage distribution.

Applications:

- Public power supply both in urban and rural areas,
- Industrial energy distribution and services,
- Construction site power supply.

Types of substations:

Model	Type	Rated voltage kV	Maximum transformer capacity kVA	M.V. switchgear
Packaged substations				
Concrete	**BK**	12/24	2000	SF_6 or air insulated
Sheet steel, insulated	**SIK**	12/24	4000	SF_6 or air insulated
Walk-in type substations				
Concrete	**BK...I**	12/24	2000	SF_6 or air insulated
Sheet steel, insulated	**SIK...I**	12/24	4000	SF_6 or air insulated

Standards and regulations: IEC 1330/95, Product standard SP 552/2001, VDE 0670 (cap. 611, ed. 8/93), IEC 76/1993, IEC 439-1/91, SR ISO 9001/2000, etc.

General features:

Operator safety:

- Overall safety IP 43 (transformer compartment) and IP 54 (M.V. and L.V. compartments)
- Blast proof doors
- Internal arc fault proofing by pressure relief and cooling of arching gases

Long life:

- User of high availability equipment
- Housing made of time resistant materials: concrete, aluminum, hot-galvanized steel, etc.
- Modern technologies

Environmental friendliness:

- User of biodegradable and recyclable materials;
- Transformer oil sump in highly compacted oil-proof and water proof specially coated;
- Reducing the electromagnetic fields and the transformer's noise.

Easy placing and mounting:

- The substation is delivered fully tested and equipped, ready for connection, only cable insertions and connections being needed on site;
- It must be placed in a pit with strong floor bearing, floor unevenness must be compensated with a leveled gravel and sand bed;

Minimum surface on the soil: from 2.77m^2 (BK – SIK 001) up

Low maintenance

For substation manufacturing, ELECTRO SISTEM S.R.L. uses a wide range of electric equipment. Therefore it is possible to achieve a large variety of configurations and to accomplish all technical requirements.

Medium voltage switchgear

- Compact medium voltage panels with SF_6 insulation (RMU);
- Extensible modular medium voltage panels with SF_6 insulation;
- Extensible modular medium voltage panels with air insulated busbars;
- Protection and signaling relays.

Measuring transformers

- Voltage measuring transformers;
- Current measuring transformers;

Power distribution transformers

- Oil immersed, hermetically sealed transformers;
- Dry, cast resin transformers.

Cables and cable connectors (accessories)

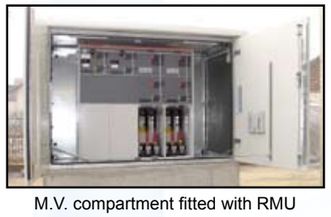
- M.V. cables;
- L.V. cables;
- Insulated T-shaped, straight and elbow plug-in terminations;
- Non-insulated terminations;
- L.V. cable terminations and clamps.

Low voltage distribution

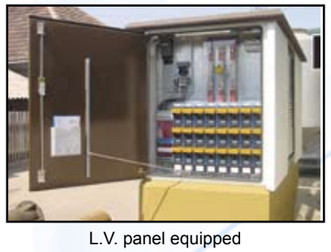
- Fixed and withdrawable automated circuit breakers;
- Switch disconnectors. Load break switches;
- Switch fuses, fuse switch disconnectors;
- Contacts and relays;
- Mini circuit breakers;
- Power capacitors;
- Copper busbars and insulators.

Foundation and metallic frame

The transformer and L.V. compartments



M.V. compartment fitted with RMU



L.V. panel equipped

Substation enclosure

- **Foundation**
  The foundation is made of reinforced concrete type B35, which is oil and water-proof. It is divided and it also contains the transformer compartment. The M.V. cable inlets are also mounted in the foundation, they insuring both the inner and outer tightness of the substation. The outlet for L.V. cables consists of a gap in the foundation. The earth-bar is also integrated in the foundation and it has two plugs for external soil earthing lead.
- **Housing construction**
  There is a metallic frame system mounted on the foundation, which is made of hot-galvanized steel and supports the walls, the doors and the roof. The walls are made of reinforced concrete panels and they attach to the frame by screws. There are several designs available for the walls: washed concrete, brick wall, washable painting. The roof consists of a reinforced concrete plate, 85 mm thick and it is coated in a water-proof washable painting. The roof is detachable allowing transformer mounting. The rooms of the substation are separated by galvanized steel sheets.
- **The doors**
  L.V. and M.V. compartment doors are 28 mm thick and they are made of two aluminum sheets with thermal insulation between them. The door fittings are made of neoprene seals. The doors of the M.V. and L.V. compartments are fitted with three hinges each, which are not reachable from the outside. Each door has a central lock for profile barrels, a three point bar fastening system and an automatic stop.
- **Ventilation**
  Doors to the transformer compartment are fitted with special aluminum to assure proper ventilation. The window blinds geometry together with stainless steel meshes located behind, insure a safety class of IP 43. The transformer compartment's doors are operated only from the M.V. compartment. Up to 250 kVA, the temperature class is 10K, and from 400 kVA above, the temperature class is 20K.

Equipment assembly

- **Medium voltage switchgear**
  They are mounted in the M.V. compartment, above the foundation level, on a metallic frame. The base of the M.V. compartment is sealed around the cubicle with galvanized steel sheets. Thus, in case of a short-circuit, hot gases are lead below, under the cubicles, towards the transformer compartment through a pressure relief system mounted between the two compartments. Cable connection to the M.V. panels is made with proper plug-in terminations. M.V. panels can be operated only from outside the substation.
- **Transformer**
  The transformer is fitted without wheels, inside the foundation, on rubber. M.V. cable connection to the transformer is made with non-insulated terminations (in the case of transformers with high isolators) or with elbow plug-in termination (in case of transformers with junction terminals). L.V. cable connection is made with special clamps or cable terminations.
- **Low voltage distribution**
  L.V. distribution panel has an open structure, all the necessary devices being mounted on a galvanized steel sheet, which separates the L.V. compartment from the transformer's compartment. The power circuit consists of copper busbars, fastened on the support insulators. Vertical fuse disconnectors are fitted on the horizontal busbar system. The neutral bar in located on the lower side of the panel. The L.V. devices are chosen according to the wiring diagram requested by the beneficiary.

Electro Sistem Baia Mare

BK Packaged unit substation

Substation variants

Type	Maximum transformer capacity kVA	M.V. switchgear (maximum no)	Energy measurement on M.V.	Volume L*l*h mm	Weight without the transformer kg
BK 001	250	1		1690x1645x2005	3100
BK 002	800	5	•	2790x1943x2305	7300
BK 003	630	3	•	3020x1280x2255	6400
BK 004	400	3	•	2070x1730x2005	5100
BK 005	800	3	•	2353x1943x2305	6500
BK 006	1600	5	•	3590x1943x2305	8200

Non-standardized substations can be executed at the client's request, according to the configuration and the necessary equipment. For example BK 35-23, 2x800kVA; BK 49-23, 2x1000kVA, etc. In these cases the digits represent the length and the width of the substation in dm.

Concrete packaged substation BK 003 installed and operational

Metallic frame

The transformer compartment

M.V. switchgear

L.V. distribution panel

Substation enclosure

- **Foundation**

  The foundation is made of reinforced concrete type B35, which is oil and water-proof. It is divided and it also contains the transformer compartment. The M.V. cable inlets are also mounted in the foundation, they insuring both the inner and outer tightness of the substation. The outlet for L.V. cables consists of a gap in the foundation. The earth-bar is also integrated in the foundation and it has two plugs for external soil earthing lead.

- **Housing construction**

  There is a metallic frame system mounted on the foundation, which is made of hot-galvanized steel and supports the walls, the doors and the roof. The walls are made of thermally insulating metallic panels 60 mm thick. The panels are made of two metallic galvanized and painted steel sheets with thermal insulation between them. They are fitted in the metallic frame with screws. The walls are painted according to the beneficiary's request. The roof consists of two aluminum plates with thermal insulation between them. The roof is detachable allowing transformer mounting. The rooms of the substation are separated by galvanized steel sheets.

- **The doors**

  L.V. and M.V. compartment doors are 28 mm thick and they are made of two aluminum sheets with thermal insulation between them. The door fittings are made of neoprene seals. The doors of the M.V. and L.V. compartments are fitted with three hinges each, which are not reachable from the outside. Each door has a central lock for profile barrels, a three point bar fastening system and an automatic stop.

- **Ventilation**

  Doors to the transformer compartment are fitted with special aluminum to assure proper ventilation. The window blinds geometry together with stainless steel meshes located behind, insure a safety class of IP 43. The transformer compartment's doors are operated only from the M.V. compartment. Up to 250 kVA, the temperature class is 10K, and from 400 kVA above, the temperature class is 20K.

Equipment assembly

- **Medium voltage switchgear**

  They are mounted in the M.V. compartment, above the foundation level, on a metallic frame. The base of the M.V. compartment is sealed around the cubicle with galvanized steel sheets. Thus, in case of a short-circuit, hot gases are lead below, under the cubicles, towards the transformer compartment through a pressure relief system mounted between the two compartments. Cable connection to the transformer panel is made with proper plug-in terminations. M.V. panels can be operated only from outside the substation.

- **Transformer**

  The transformer is fitted without wheels, inside the foundation, on rubber. M.V. cable connection to the transformer is made with non-insulated terminations (in the case of transformers with high insulators) or with elbow plug-in termination (in case of transformers with junction terminals). L.V. cable connection is made with special clamps or cable terminations.

- **Low voltage distribution**

  L.V. distribution panel has an open structure, all the necessary devices being mounted on a galvanized steel sheet, which separates the L.V. compartment from the transformer's compartment. The power circuit consists of copper busbars, fastened on the support insulators. Vertical fuse disconnectors are fitted on the horizontal busbar system. The neutral bar in located on the lower side of the panel. The L.V. devices are chosen according to the wiring diagram requested by the beneficiary.

Electro Sistem Baia Mare

Sheet steel packaged substation SIK with concrete foundation

Substation variants

Type	Maximum transformer capacity kVA	M.V. switchgear (maximum no)	Energy measurement on M.V.	Volume L*l*h mm	Weight without the transformer kg
SIK 001	250	1		1690x1645x2005	2400
SIK 002	800	5	•	2790x1943x2305	5400
SIK 003	630	3	•	3020x1280x2255	4600
SIK 004	400	3	•	2070x1730x2005	3800
SIK 005	800	3	•	2353x1943x2305	5100
SIK 006	1600	5	•	3590x1943x2305	6700

Non-standardized substations can be executed at the client's request, according to the configuration and the necessary equipment. For example SIK 35-23, 2x800kVA; SIK 52-23, 2x2000kVA, etc. In these cases the digits represent the length and the width of the substation in dm.

SIK 35-23 Metal insulated packaged unit substation mounted and operational

Concrete walk-in unit substation

M.V. switchgear

L.V. distribution panel fitted fuse switches

Substation enclosure

- **Foundation**

  The foundation is made of reinforced concrete type B35, which is oil and water-proof. It is divided and it also contains the transformer compartment. The M.V. cable inlets are also mounted in the foundation, they insuring both the inner and outer tightness of the substation. The outlet for L.V. cables consists of a gap in the foundation. The earth-bar is also integrated in the foundation and it has two plugs for external soil earthing lead.

- **Housing construction**

  There is a metallic frame system mounted on the foundation, which is made of hot-galvanized steel, which also contains the frame for floor as well as the support rails for the transformer. The walls are made of reinforced concrete panels and they are attach to one another by metal links or by monolithic links. There are several designs available for the walls: washed concrete, brick wall, washable painting. The roof consists of a reinforced concrete plate, 85 mm thick and it is coated in a water-proof washable painting. The substation unit is divided into two compartments separated by a galvanized steel sheet. M.V. and L.V. compartment has a metal sheet covered with an electro-insulate rubber.

- **The doors**

  L.V. and M.V. compartment doors as well as the doors of the transformer compartment are 28 mm thick and they are made of two aluminum sheets with thermal insulation between them. The door fittings are made of neoprene seals. The doors of the M.V. and L.V. compartments are fitted with three hinges each, which are not reachable from the outside. Each door has a central lock for profile barrels, a three point bar fastening system and automatic stop.

- **Ventilation**

  Doors and walls to the transformer compartment are fitted with special aluminum to insure proper ventilation. The window blinds geometry together with stainless steel meshes located behind, insure a safety class of IP 43. Up to 250 kVA, the temperature class is 10K, and from 400 kVA above, the temperature class is 20K.

Equipment assembly

- **Medium voltage switchgear**

  They are mounted in the common M.V. and L.V. compartment, on the foundation level. Under the cubicles there is a tub that allows the introduction of M.V. cables, and in case of a short-circuit, hot gases are lead below, under the cubicles, towards the transformer compartment through a pressure relief system mounted between the two compartments. Cable connection to the M.V. panels is made with proper plug-in terminations. M.V. panels can be operated only from the space between the M.V. and L.V. compartments.

- **Transformer**

  The transformer is fitted with wheels on two support rails, above the transformer. Therefore it can be either inserted or taken out through the access door. M.V. cable connection to the transformer is made with non-insulated terminations (in the case of transformers with high isolators) or with elbow plug-in termination (in case of transformers with junction terminals). L.V. cable connection is made with special clamps or cable terminations.

- **Low voltage distribution**

  L.V. distribution panel has a closed structure, bearing all the necessary cut-outs to handle the break switches and the disconnectors and with eyeholes for the electric meters. The power circuit consists of copper busbars, fastened on the support insulators. Vertical fuse switches are fitted on the horizontal busbar system. L.V. cables are inserted in the L.V. panel equipped lower part of the panel through the foundation. The L.V. devices are chosen according to the wiring diagram requested by the beneficiary.

Electro Sistem Baia Mare

Concrete walk-in unit substation BK…I

Substation variants

Type	Maximum transformer capacity kVA	M.V. switchgear (maximum no)	Energy measurement on M.V.	Volume L*l*h mm	Weight without the transformer kg
BK 003 I	630	3	●	3080x2320x2905	10700
BK 002 I	630	5	●	4080x2320x2905	12500
BK 006 I	1600	3	●	3480x2320x2905	11300
BK 50-23 I	1600	5	●	5280x2320x2005	17200

Non-standardized substations can be executed at the client's request, according to the configuration and the necessary equipment. For example BK 33-20 I. In these case the digits represent the length and the width of the substation in dm.

Concrete walk-in unit substation BK003I

Metal insulated walk-in unit substation

The transformer fitted with wheels

L.V. distribution panel closed design

Substation enclosure

- **Foundation**
  The foundation is made of reinforced concrete type B35, which is oil and water-proof. It is divided and it also contains the transformer compartment. The M.V. cable inlets are also mounted in the foundation, they insuring both the inner and outer tightness of the substation. The outlet for L.V. cables consists of a gap in the foundation. The earth-bar is also integrated in the foundation and it has two plugs for external soil earthing lead.
- **Housing**
  There is a metallic frame system mounted on the foundation, which is made of hot-galvanized steel and supports the walls, the doors and the roof. The lower frame also contains the floor support as well as the support rails for the transformer. The walls are made of thermally insulating metallic panels 60 mm thick. The panels are made of two metallic galvanized and painted steel sheets with thermal insulation between them. They are fitted in the metallic frame with screws. The walls are painted according to the beneficiary's request. The roof consists of two aluminum plates with thermal insulation between them. The roof is detachable allowing transformer mounting. The rooms of the substation are separated by a galvanized steel sheet. The M.V. and L.V. has a metal sheet covered with electro-insulated rubber.
- **The doors**
  L.V. and M.V. compartment doors as well as the doors of the transformer compartment are 28 mm thick and they are made of two aluminum sheets with thermal insulation between them. The door fittings are made of neoprene seals. The doors of the M.V. and L.V. compartments are fitted with three hinges each, which are not reachable from the outside. Each door has a central lock for profile barrels, a three point bar fastening system and an automatic stop.
- **Ventilation**
  Doors and walls to the transformer compartment are fitted with special aluminum to assure proper ventilation. The window blinds geometry together with stainless steel meshes located behind, insure a safety class of IP 43. Up to 250 kVA, the temperature class is 10K, and from 400 kVA above, the temperature class is 20K.

Equipment assembly

- **Medium voltage cubicles**
  They are mounted in the common M.V. and L.V. compartment, on the foundation level. Under the cubicles there is a tub that allows the introduction of M.V. cables, and in case of a short-circuit, hot gases are lead below, under the cubicles, towards the transformer compartment through a pressure relief system mounted between the two compartments. Cable connection to the M.V. panels is made with proper plug-in terminations. M.V. panels can be operated only from the space between the M.V. and L.V. compartments.
- **Transformer**
  The transformer is fitted with wheels on two support rails, above the transformer. Therefore it can be either inserted or taken out through the access door. M.V. cable connection to the transformer is made with non-insulated terminations (in the case of transformers with high isolators) or with elbow plug-in termination (in case of transformers with junction terminals). L.V. cable connection is made with special clamps or cable terminations.
- **Low voltage distribution**
  L.V. distribution panel has a closed design, bearing all the necessary cut-outs to handle the break switches and the disconnectors and with eyeholes for the electric meters. The power circuit consists of copper busbars, fastened on the support insulators. Vertical fuse disconnectors are fitted on the horizontal busbar system. L.V. cables are inserted in the L.V. panel equipped lower part of the panel through the foundation. The L.V. devices are chosen according to the wiring diagram requested by the beneficiary.

Electro Sistem Baia Mare

Metal insulated walk-in unit substation SIK65-25 I

Substation variants

Type	Maximum transformer capacity kVA	M.V. switchgear (maximum no)	Energy measurement on M.V.	Volume L*l*h mm	Weight without the transformer kg
SIK 003 I	630	3	●	3080x2320x2905	7800
SIK 002 I	630	5	●	4080x2320x2905	10100
SIK 006 I	1600	3	●	3480x2320x2905	10500
SIK 50-23 I	1600	5	●	5280x2320x2005	14900

Non-standardized substations can be executed at the client's request, according to the configuration and the necessary equipment. For example SIK 65-25 I. In these case the digits represent the length and the width of the substation in dm.

Metal insulated walk-in unit substation SIK 70-24 I

Electro Sistem
Baia Mare

UNIT SUBSTATIONS

CERTIFICAT

SOCIETATEA ROMÂNĂ PENTRU ASIGURAREA CALITĂȚII
ROMANIAN SOCIETY FOR QUALITY ASSURANCE

certifică organizația
certifies the company

S.C. ELECTRO SISTEM S.A.
Str. 8 Martie, Baia Mare, jud. Maramureș

pentru următoarele activități
for the following field of activities

Proiectare, execuție și montaj instalații electrice de joasă și medie tensiune, producție tablouri electrice, import de echipamente electrice de joasă și medie tensiune

Design, execution and mounting of underrunning and mean voltage electric wirings, production of electric panels, import of underrunning and mean voltage electric equipment

că are implementat și menține un
sistem de management al calității
which has implemented and maintains a
quality management system

conform condițiilor din standardul
which fulfils the requirements of the standard

ISO 9001 : 2000

Acest certificat este valabil până la 10 ianuarie 2006
This certificate is valid until
Nr. Certificat (Certificate Registration No): 150 / 1
București : 10 ianuarie 2003

PREȘEDINTE
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ACREDITAT NR. 004-C

INSTITUTUL NAȚIONAL DE CERCETARE-DEZVOLTARE ȘI ÎNCERCĂRI PENTRU ELECTROTEHNICĂ

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BULETIN DE ÎNCERCĂRI
Nr.38786 / 06.04.2001

1. Produsul încercat: Post de transformare compact în anvelopă de beton sau metalică tip BK și SIK, echipat cu trafo de distribuție 630kVA, 20(10)/0,4kV; unitate de MT în SF6 tip RMU și tablou de JT
2. Încercări: I - Încercarea de înaltă tensiune la unda impuls 1,2 / 50μs a circuitelor principale de joasă tensiune (JT)
II - Încercarea la tensiunea de înaltă tensiune la 50Hz, 1 min a circuitelor principale de joasă tensiune (JT)
III - Încercarea la tensiunea de înaltă tensiune la 50Hz, 1 min a circuitelor principale de medie tensiune (MT)
IV - Încercarea de înaltă tensiune la unda impuls 1,2 / 50μs a circuitelor principale de medie tensiune (MT)
3. Comanda încercări: 19309/04.04.2001
4. Client: S.C. ELECTROSISTEM S.A. Baia Mare
5. Producător: Peters & Thieding Romania SA
6. Adresa client: Str. 8Martie nr.4, Baia Mare, jud.Maramureș
7. Rezultatul: CORESPUNDE
8. Responsabil încercare: ing. Bădea I.

Responsabil LIT:
Ing. Ungureanu A.

9. Buletinul conține 28 pagini.
10.Buletinul este editat în 4 ex.; 1 ex. la LIT și 3 ex. la client.

AVERTISMENTE:
a. Rezultatul încercărilor se referă numai la produsul supus încercării, menționat la punctul 1.
b. Reproducerea integrală a prezentului buletin de încercări este interzisă.
c. Reproducerea parțială a prezentului buletin este permisă numai cu aprobarea scrisă a LIT și RENAR.
d. Toate semnăturile din prezentul buletin sunt în original.

IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and
SRAC
hereby certify that the organization

S.C. ELECTRO SISTEM S.A.
Str. 8 Martie, Baia Mare, jud. Maramureș

for the following field of activities

Design, execution and mounting of underrunning and mean voltage electric wirings, production of electric panels, import of underrunning and mean voltage electric equipment

has implemented and maintains a

Quality Management System

which fulfils the requirements of the following standard

ISO 9001:2000

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