

THE SECURING OF LOW VOLTAGE ELECTRICAL NETWORKS FROM AREAS WITH MAJOR RISK BY ILLEGAL CONSUMPTION

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REZUMAT. Autorii propun analizei doua solutii pentru securizarea retelelor de distributie de joasa tensiune, cel mai grav afectate de consumurile frauduloase.

Cuvinte cheie: cutie de distributie si masurare.

ABSTRACT. THE AUTHORS PROPOSE TWO SOLUTIONS FOR SECURING ANALYSIS OF LOW-VOLTAGE DISTRIBUTION, THE MOST SEVERELY AFFECTED BY FRAUDULENT CONSUMPTION.

Keywords: box for distribution and measurement

1. INTRODUCTION

In this writing, the authors have watch to grow the degree of security installation of low voltage switchboards (0,4 kV), proposing two solutions:

- **(Solution 1)** switching to 1 kV and the choice of equipment, instruments, materials and the means of securing;
- **(Solution 2)** The use of voltage level 0.4 kV and the choice of equipment, instruments, materials and the means of securing.

2. SOLUTION 1: MOVE TO 1KV INSTALLATION OF 0.4 KV DISTRIBUTION

It mounts in place of it, power 20/0.4 kV transformer substation 20/1 kV power with the same Sn [kVAr] connection Dd0 group.

It mounts in place of the existing distribution box (DB) of 0.4 kV a new distribution box (DB) of 1 kV secured mechanically with yale type device that will not contain the windows for reading the meter or for remove the general fuses . The box will be sealable.

It mounts a new general measurement group: it mounts 3 indoor voltage transformers with $n_{tt} = 1/\sqrt{3}/0,057$ kV and precision accuracy class = 0.5, side clips provided with cover sealable;

On the 1kV side the three voltage transformers shall be protected with fuses. In the new distribution box (DB) it will be mount three current transformers for measuring, indoor type , with Isecondary rated = 5 A. The primary rated value of the current will according the maximum current absorbed properly in normal operation conditions by the connect consumers for the departures. The accuracy class for current trabsformers must be 0.5. The cover fot the secondary connectors will be sealable.

In the new distribution box (DB) will mount an electronic meter with two measure senses, 3x5(6)A; 3x 57,7/100 V, accuracy class: 0,5 with memory for record 4 loads curves (A+,A-,R+,R-) and an interface RS232 for communications to long distance (+ GPRS modem), customizable professional in systems SMART/AMR (property of E.ON MOLDOVA Distributie S.A.);

In the sealable compartment or in the measurement box will mount current clips (with clips for schort circuit) and voltage clips. All these clips must be cover with a transparent cap .The voltage clips will have folding fusses (In = 2 A).One of the voltage clips will be intended for earthing circuit.

If is necessary, the network's conductors at 0,4 kV will be replaced with new twisted-pair conductors for 1 kV with an according the section for the energy's transit.

If the network at 0,4 kV have selectivity boxes will be mount new selectivity boxes for 1kV [2].

On the 1kV network's poles, it mounts (according with Fig. 1 and Fig. 2):

- boxed processor with fuses at 1 kV chosen for protect the power transformer (1/0,4 kV) on the 1 kV side;
- a power transformer (with S_n according to the consumption), 1/0,4 kV, with Dy5 group of connection, with a sealable box at 0,4 kV for secondary connections [4];
- a support console for the power transformer 1/0,4 kV;
- one three phase circuit protected against the external factors (and against unauthorized interventions) between the power transformer and the box for distribution and measurement.
- a box for distribution and measurement (not from metallic material) that will be mount to the minimum height = 4m on the opposite side regarding the power transformer. For new works and for modernizations will be group as many consumers on the box for distribution and measurement without exceeding the maximum number: 8 [5].
- the cables come in, coming out on the bottom side of the box for distribution and measurement.
- the box for distribution and measurement will have one single door (with the possibility of tilting and block to 90 ° and to 180 °).

From the the box for distribution and protection will leave by air directly to the clients or through an intermediate pole for dedicated branch pipe (used only for 0.4 kV). The box for distribution and measurement will be chosen according of the optimal solution with up to 8 departures (8 meters for active energy + 8 switches).

The box for distribution and measurement will be secured with yale-type device and will not contain windows for read the meters and for act the switches. The box must be sealable.

The departures from this box will be in accordance with STANDARD E.ON MOLDOVA Distributie S.A. for modernizations and new works.

The Earth outlet $R_p \leq 4 \Omega$ at each pole. The tank's power transformer 1/0,4 kV, the boxed processor and the box for distribution and measurement will be related to the plug earth $\leq 4 \Omega$. If it is necessary to replace some poles, they will mount the centrifugal type.

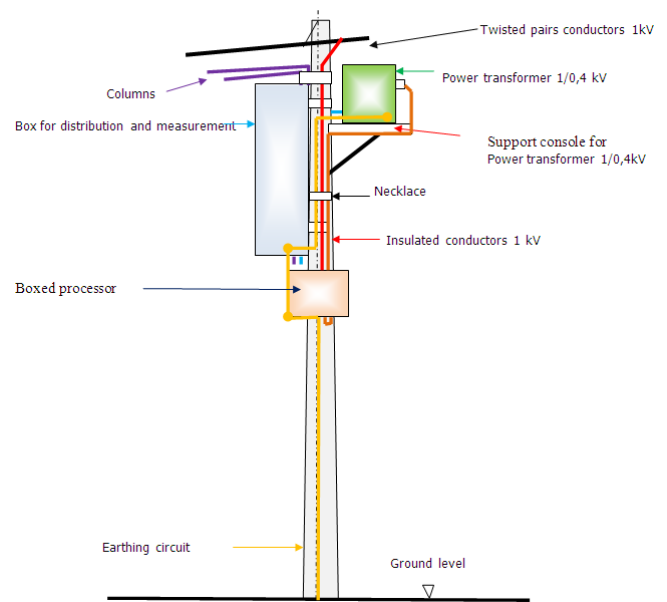


Fig. 1

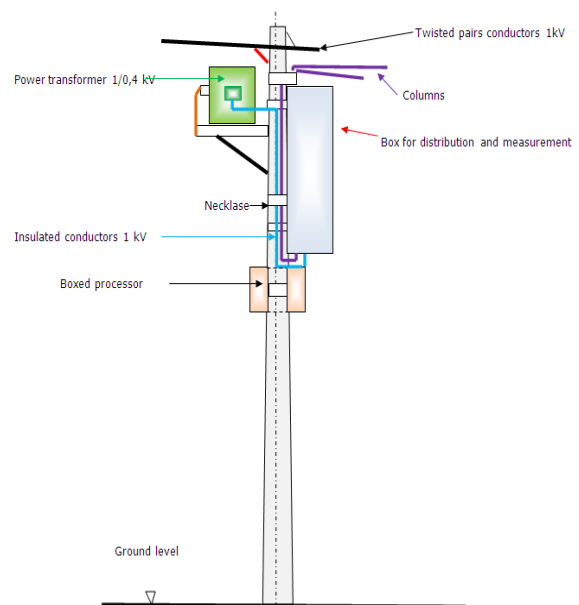


Fig. 2

Depending on the existence/advising of a lighting circuit, the meter for measuring electricity (for public lighting consumption metering) will mount in the boundary of the first pole in the box for distribution and measurement, in the vicinity of the station. The order of public lighting will be installed under the measurement box.

3. (SOLUTION 2) THE USE OF VOLTAGE LEVEL 0.4 KV

It will mount an electronic meter with two measure senses, 3x5(6)A; 3x 57,7/100 V, accuracy class: 0,5 with memory for record 4 loads curves (A+,A-,R+,R-) and an interface RS232 for communications to long distance (+ GPRS modem), customizable professional in systems SMART/AMR (property of E.ON MOLDOVA Distributie S.A.);

In the substation, in the place of the distribution box (DB) at 0,4 kV it will mount a new distribution box (DB) at 0,4 kV mechanical safety device with yale type and will not include windows for read the meters and for replace the general , with the same number of departures.

It mounts (if necessary/if not already fitted) twisted-pair conductors of 0.4 kV.

In the sealable compartment or in the measurement box will mount current clips (with clips for schort circuit) and voltage clips. All these clips must be cover with a transparent cap .The voltage clips will have folding fuses (In = 2 A).One of the voltage clips will be intended for earthing circuit.

On the 0,4 kV network's poles, it mounts (Fig. 3):

- one three phase circuit protected against the external factors (and against unauthorized interventions) between the network and the box for distribution and measurement.

- a box for distribution and measurement (not from metallic material) that will be mount to the minimum height = 4m on the opposite side regarding the power transformer. For new works and for modernizations will be group as many consumers on the box for distribution and measurement without exceeding the maximum number: 8.

- the cables come in, coming out on the bottom side of the box for distribution and measurement.

- the box for distribution and measurement will have one single door (with the possibility of tilting and block to 90 ° and to 180 °).

From the the box for distribution and protection will leave by air directly to the clients or through an intermediate pole for dedicated branch pipe (used only

for 0.4 kV). The box for distribution and measurement will be chosen according of the optimal solution with up to 8 departures (8 meters for active energy + 8 switches).

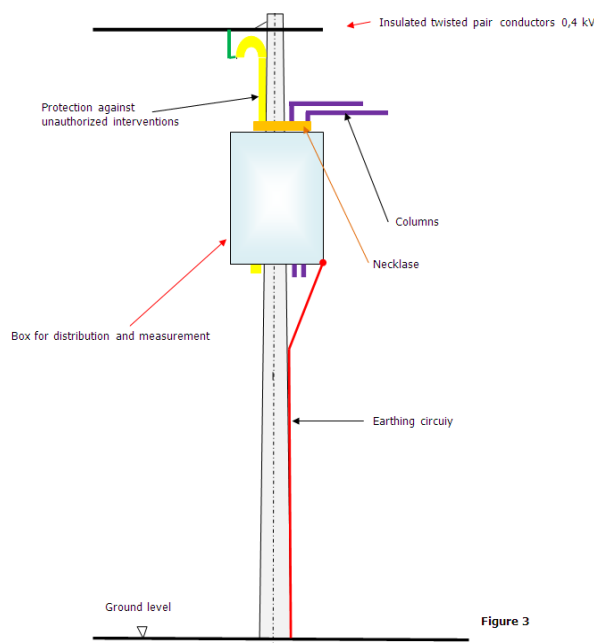


Fig. 3

The box for distribution and measurement will be secured with yale-type device and will not contain windows for read the meters and for act the switches. The box must be sealable.

The departures from this box will be in accordance with STANDARD E.ON MOLDOVA Distributie S.A. for modernizations and new works.

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