



TECHNICAL REQUIREMENTS

ELECTRICAL

Document No. OL-TR-ER-000

LOW VOLTAGE PANELS

Document No. OL-TR-ER-003

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1. SCOPE

The present document is intended to define the technical requirements of the low voltage (LV) panels.

2. REFERENCES

The latest editions of the following publications are to be used with this Technical Requirements as applicable:

Skirstyklų ir pastočių elektros įrenginių įrengimo taisyklės, patvirtintos energetikos ministro 2011 m. gruodžio 15 d. įsakymu Nr. 1-303 (Žin., 2011, Nr. 165-7886).

LST EN 60439-1:2006 *Žemosios įtampos perjungimo ir valdymo įrenginių sąrankos. 1 dalis. Patikrinto ir iš dalies patikrinto tipo sąrankos (IEC 60439-1:1999). Low-voltage switchgear and controlgear assemblies. Part 1: Type-tested and partially type-tested assemblies (IEC 60439-1:1999)*

LST EN 60947-1:2007 *Žemosios įtampos perjungimo ir valdymo įrenginiai. 1 dalis. Bendrosios taisyklės (IEC 60947-1:2007) Low-voltage switchgear and controlgear - Part 1: General rules (IEC 60947-1:2007)*

LST EN 60947-2:2006 *Žemosios įtampos perjungimo ir valdymo įrenginiai. 2 dalis. Jungtuvai (IEC 60947-2:2006) Low-voltage switchgear and controlgear -- Part 2: Circuit-breakers (IEC 60947-2:2006)*

LST EN 60947-3:2009 *Žemosios įtampos perjungimo ir valdymo įrenginiai. 3 dalis. Perjungikliai, skyrikliai, atjungiantieji skyrikliai ir saugikliniai įtaisai (IEC 60947-3:2008) Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units (IEC 60947-3:2008)*

OL-TR-GR-000 *General Requirements*

OL-TR-ER-000 *Electrical. General*

3. TERMS AND DEFINITIONS

LV: Low voltage, the voltage from 50V till 1000V AC and from 75V till 1500V DC.

MV: Medium voltage, the voltage from 1000V till 35kV AC.

4. GENERAL

4.1 LV panels shall be designed according to the requirements of local rules and standards see references in point No.2.

4.2 For data for the selection of panels units see Table 1.

Table 1. Data for the Selection of Switchgear Units

Item	Value
Voltage	230/400 V
Network neutral	TN-C-S
Nominal frequency	50 ± 0,2 Hz
Peak short-circuit current I_{peak}	25 kA *
Short circuit current ($I_{k(3)}$), duration	15 kA; 3 s *
Protection degree	IP44
Environment temperature range for installation in rooms with temperature control	0 ÷ +50 °C
Environment temperature range for installation in rooms without temperature control	-30 ÷ +50 °C
Environment temperature range for installation in field	-40 ÷ +40°C
Bus system	L1, L2, L3, PEN or N, PE

* - value of short circuits should be defined according short circuit values.

- 4.3** LV panels shall have incoming circuit breakers or switch disconnecter.
- 4.4** LV panels is metal-enclosed and designed to be operated indoors and the plastic type enclosures for outdoor installations are preferred.
- 4.5** Inside construction is 3b or covering of live parts shall be used of.
- 4.6** Outdor panels must to have roofs against a rainfall
- 4.7** Terminal blocks for feeder cables shall be used for <63A feeders size.
- 4.8** Main bus bars shall be copper. Marking of busbars shall be fixed in visible places and will be L1 (yellow), L2 (green), L3 (red), PEN (yellow/green) or N (blue), PE (yellow/green). Color type marking of busbars shall be used also. For main technical values of bus bars, which should be specify exactly on design stage see Table 2.

Table 2. Main Technical Values for Bus Bars

Item	Value
Nominal current	< 630 A
Nominal insulation voltage	1000 V, 50 Hz
Peak withstand voltage	$U_{imp} \geq 8$ kA
Electrodynamics withstand current	≥ 25 kA
Thermal withstand current	≥ 15 kA, 3 s

- 4.9** For field installed panels bottom cables entry shall be used only.
- 4.10** Doors of panels shall have double bit locks with fixed keys/handles.
- 4.11** On the doors of cells shall be mounted only control and signaling circuits
- 4.12** Doors of cells shall be secure fixed on hinges and accidental move out should be eliminated.

- 4.13** On the doors of cell shall be mounted holder for 50 sheets of paper.
- 4.14** Incoming Power cables terminals should be IP20 and marked L1, L2, L3, PEN or N,PE.
- 4.15** Circuit breakers and switches shall have possibility for lock out and tag (LoTo system ready).
- 4.16** Labels on panels outside should be in Lithuanian and approved by OL. The size of characters in labels of feeders names and numbering of cells shall be approved by OL.
- 4.17** The number of cell shall be from left to right and down.
- 4.18** The measurement devices shall be installed on incoming of LV panels $\geq 120A$. They will provide the possibility to measure the following electrical values:
a) Phase current;
b) Phase and linear voltage;
- 4.19** Circuit breakers will be used for the protection of secondary (control) circuits (instead of fuses).
- 4.20** If automatic change over (AMP) is required, AMP system shall be based on figure 1. provided scheme.
- 4.21** Panels shall be designed with self-ventilation against condensation and dustproof.
- 4.22** Panels outside must to have space heater controlled by thermostat.
- 4.23 Installation**
- 4.23.1** Flexible one-piece wire will be used for the installation from one terminal box to other terminal box without butt-joints and is terminated using pressed lugs. Insulation level 450/750V.
- 4.23.2** Tags that contain the address of wire end and connection point address will mark each end of wire.
- 4.23.3** All secondary circuit terminals will be numbered and selected to fit the cross-section of the conductor being connected in order to have possibility to connect two wires to each terminal. The standard jumpers (not wire) of connecting wire from one terminal to the other terminal shall be selected according to the introduced terminal type
- 4.23.4** With LV panel distributor shall add portable earthing devices, electrical protective equipment (face covers, protective clothes, insulating gloves, shoes and etc.) , electrical safety and warning signs which are necessary by local requirements to operate switchgear.
- 4.23.5** LV panel incomings shall have place to connect portable earthing devices.
- 4.23.6** Between relays and contactors use ventilation spacers.

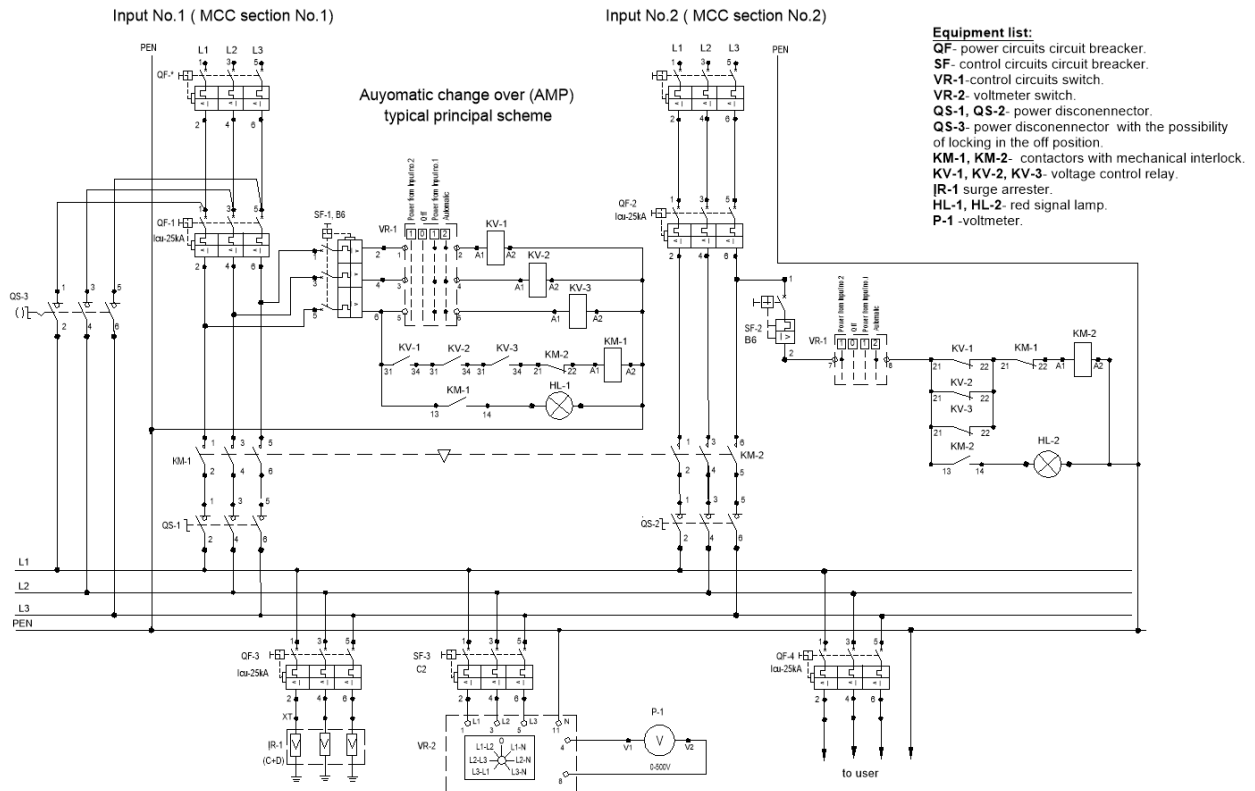


Figure 1. Automatic change over (AMP) typical principal scheme