

# POWER TRANSMISSION LINES

## Mod. SEL-1/EV

# POWER TRANSFORMER

## Mod. P-14A/EV

### INTRODUCTION

The equipment reproduces two high voltage transmission lines with the possibility of varying the parameters. It enables to learn and test the characteristics and management of high voltage distribution networks, with small scale components. The electric various devices installed, partially connected with one another and with safety terminals, are set at work with extremely simple and quick operations and they enable to modify parameters and circuits at operator's discretion. The power transmission with insulated lines (IT system) is completed with a three-phase transformer with different possible connections with the primary and secondary circuits.



### POWER TRANSMISSION LINES MOD. SEL-1/EV

The fore panel is made of aluminium alloy. Two models of high voltage power transmission lines are represented with the international electric symbols. Proper educational terminals and jumpers with a high degree of protection against accidental contacts allow to use the lines separately or in series/parallel connection. Electric parameters (resistance, inductance and capacitance) may be changed by means of lever selectors according to the different sections and length of line. The presence of voltage is signalled by pilot lamps while protection against overloads relies on quick fuses.

### TRAINING PROGRAM:

Training refers to the study of power transmission in medium-voltage high-voltage networks and to the study of three-phase transformers.

#### Main subjects dealt with:

- Models of power transmission lines with concentrated parameters
- Voltage drop and losses in power transmission lines
- Types of line (copper, aluminium)
- Parallel of power transmission lines
- Ideal transformer, real transformer
- No load, load and short-circuit tests of transformers, efficiency of a three-phase transformer
- Star, delta, zigzag connections and time index of three-phase transformers
- Protection devices of transformers

**TECHNICAL CHARACTERISTICS:****SIMULATOR OF POWER TRANSMISSION LINES  
Mod. SEL-1/EV**

Framework is made of chemically treated sheet steel, painted with many epoxy coats; the base is provided with rubber feet and it may be positioned on any working top. Lines are protected against overload and short circuit by quick blow fuses.

**Main installed components:****Line 1**

Modifiable parameter: Section (capacity in A)

Model of line used: PI

Simulated Un: 120 kV, operating Un 400V

Simulated Pn: 10 -15 - 20 MVA

Operating In: 1 A

Equivalent distributed R: 18 - 25 - 35  $\Omega$

Distributed inductance and capacitance

equivalent to: 72 mH, 0.2  $\mu$ F

Breakers of line start and end

**Line 2**

Modifiable parameter: length (km)

Model of line used: PI

Simulated Un: 120 kV, operating Un 400V

Simulated Pn: 20 MVA

Operating In: 1 A

Equivalent distributed R: 8.9 - 18 - 35  $\Omega$

Distributed inductance equivalent to: 144 - 72 - 36 mH

Distributed capacitance equivalent to 0.1 - 0.2 - 0.4  $\mu$ F

Breakers of line start and end

**Possibility of using lines separately or in series/parallel connection.**

**Dimensions:** 840 x 450 x 680 mm

**Net weight:** 35 kg

**TECHNICAL CHARACTERISTICS:****THREE-PHASE POWER TRANSFORMER  
Mod. P-14A/EV**

It is used as a step-up transformer at the output of the power plant, the output is connected with medium- high voltage transmission lines.

Power: 1500 VA

Primary voltage: 230/400 delta/star 50-60 Hz

Secondary voltage: 230/400 V with voltage variation  $\pm 5$  %, + 10 %, + 15 %; phase variation between Primary and Secondary +/- 5 - 10 - 20 electrical degrees with zig-zag connection.

Protection: IP 22

Embedded thermal protector

Safety terminals with section 4 mm

**Dimensions:** 360 x 200 x 300 mm

**Net weight:** 19 kg

**REQUIRED****UTILITIES (PROVIDED BY THE CUSTOMER)**

- Power supply: 400 Vac 50 Hz three-phase - 1500 VA (Other voltage and frequency on request)

**SUPPLIED WITH****OPERATIONAL HANDBOOK WITH EXERCISES****ACCESSORIES:**

- 1 set of cables - jumpers with safety plugs of 4 mm

**OPTIONAL**

**RESISTIVE LOAD MOD. RL-2A/EV**

**INDUCTIVE LOAD MOD. IL-2/EV**

**CAPACITY LOAD MOD. CL-2/EV**

**SINGLE-PHASE - 3-PHASE R-L-C LOAD MOD. RLC-2K/EV**

