



CL-318



CL-325



CL-325



CL-320

DESCRIPTION

The CL-1450 simulators clearly demonstrate the most important features and specifications of transmission lines used in electrical energy. Energy losses in the form of heat and voltage variations along the line, as a function of length, are closely studied. The CL-1450 contains all the equipment and theoretical references required to analyse networks transmitting electrical energy.

The equipment includes power supplies, mechanical and electrical loads, AC/DC measuring instruments and other accessories usually provided with the CL-100 1/3 HP Rotating Machines required for the experiments. Consulab modular units are portable and can be easily moved from place to place. They may be stacked vertically to minimize the working space and the storage. Experiments are carried out on any flat surface or in a Consulab mobile console if used. The front panel of every simulator is transparent, and symbols and specifications are silk-screened on the reverse. Terminals are 4mm color-coded safety sockets to facilitate interconnections with flying leads ended with 4mm piggy back plugs.

The CL-1450 training kit deals specifically with electrical energy distribution and transportation. Through simple vector diagram construction, the student avoids the use of advanced mathematics when analyzing the observed results. Major problems addressed in detail in this course include real and reactive energy losses, voltage increase, output voltage variations according to load and type (resistive, capacitive and inductive), output voltage variations depending on the source and methods of controlling the voltage (capacitors, synchronous machine), phase angle differences between the beginning and end of a line, connecting two lines in parallel, and a comparison with direct current transmission.

SPÉCIFICATIONS

| DESCRIPTION | CL-1450-00 | CL-1450-50 |
|-----------------|--|-------------------|
| Supply voltage: | 120/208V AC, 3 PH | 220/380V AC, 3 PH |
| Frequency: | 60 Hz | 50 Hz |
| Total weight: | 260 kg (570 lbs) + 132 kg (290 lbs) (options) | |
| Volume: | 0.28 m ³ (10 ft ³) + 0.12 m ³ (4.3 ft ³) (options) | |
| Product number: | 50308 | 50617 |

Consulab Éducattech, Inc.

5100, rue des Tournelles, Suite 500

Québec, QC Canada G2J 1E4

Phone: 418-688-9067/ 800-567-0791 Fax: 418-688-9526

Email: info@consulab.com Internet : <http://www.consulab.com>

© 2008 Consulab Éducattech, Inc.

Rev. 2008/05

BASIC EQUIPMENT FOR THE CL-1450

Each CL-1450 contains the following components:

| DESCRIPTION | QTY | CL-1450-00 (60 Hz) | CL-1450-50 (50 Hz) |
|---|-----|--------------------|--------------------|
| Variable AC/DC power supply (*) | 1 | CL-143-00 | CL-143-50 |
| DC rectifier (*) | 1 | CL-148-00 | CL-148-50 |
| Magnetic shoe brake | 1 | CL-233 | |
| Inertia wheel | 1 | CL-234 | |
| Centrifugal switch | 1 | CL-238 | |
| Torque angle indicator | 1 | CL-239 | |
| Mounting base for CL 233/234/238/239 | | CL-240 | |
| Synchronous machine (*) | 1 | CL-211-00 | CL-211-50 |
| DC machine (*) | 1 | CL-214-00 | CL-214-50 |
| Variable resistive load bank (*) | 1 | CL-311-00 | CL-311-50 |
| Variable inductive load bank (*) | 1 | CL-312-00 | CL-312-50 |
| Variable capacitive load bank (*) | 1 | CL-313-00 | CL-313-50 |
| Three phase transformer | 1 | CL-318-00 | CL-318-50 |
| Three phase voltage/phase angle correcting unit | 1 | CL-320-00 | CL-320-50 |
| Three phase network unit | 2 | CL-325-00 | CL-325-50 |
| Three phase wattmeter/varmeter | 2 | CL-418-00 | CL-418-50 |
| Phase meter | 1 | CL-419-00 | CL-419-50 |
| DC measurement unit (*) | 1 | CL-420-00 | CL-420-50 |
| Analog AC ammeters (*) | 1 | CL-421-00 | CL-421-50 |
| Analog AC voltmeters (*) | 1 | CL-422-00 | CL-422-50 |
| Stroboscope | 1 | CL-1022-00 | CL-1022-50 |
| Automatic voltage regulator for alternators | 1 | CL-1033-00 | CL-1033-50 |
| Set of piggy back connector cables (41) (*) | 1 | CL-1012 | |
| Rubber coupling (*) | 1 | CL-1007 | |
| Two-machine coupling base (*) | 1 | CL-1010-00 | |
| Student's manual | 1 | CL-1450-95-00 | CL-1450-95-50 |
| Teacher's manual | 1 | CL-1450-96-00 | CL-1450-96-50 |
| (*) Items included either in the CL-100-00 or CL 100-50. All items without (*) are available as CL-1450 add-on equipment. | | | |

Consulab Éducatel, Inc.

5100, rue des Tournelles, Suite 500

Québec, QC Canada G2J 1E4

Phone: 418-688-9067/ 800-567-0791 Fax: 418-688-9526

Email: info@consulab.com Internet : http://www.consulab.com

© 2008 Consulab Éducatel, Inc.

Rev. 2008/05

OPTIONAL EQUIPMENT COMPATIBLE WITH THE CL-1450

| DESCRIPTION | QTY | CL-1450-00 (60 Hz) | CL-1450-50 (50 Hz) |
|---|-----|--------------------|--------------------|
| Armature speed control | 1 | CL-155 | |
| Three phase power supply | 1 | CL-149-00 | CL-149-50 |
| Wound rotor asynchronous machine (*) | 1 | CL-212-00 | CL-212-50 |
| Squirrel cage asynchronous machine (*) | 1 | CL-213-00 | CL-213-50 |
| (*) Items included either in the CL-100-00 or CL 100-50. All items without (*) are available as CL-1450 add-on equipment. | | | |

| HOUSING COATING SPECIFICATIONS | |
|---|---|
| Type | |
| Blue thermalkyd thermosetting enamel | |
| Features | |
| Thermalkyd enamel, when baked completely, produces a strong, resistant finish. The following physical tests, to say flexibility, impact resistance, abrasive resistance, adherence and hardness, are extremely satisfying when applied to properly prepared metal. Thermalkyd enamel has a good resistance to water, detergents, gasoline, salt, humidity and sunlight. | |
| Properties | |
| Resistance to water: | Intact after 18 hours. |
| Resistance to gasoline: | Intact after 4 hours. |
| Resistance to salt: | Less than 0.15 cm (1/16 in) deterioration by corrosion and no cracking after 150 hours. |
| Resistance to humidity: | No cracking and no color change after 500 hours. |
| Flexibility: | No cracking on a 0.30 cm (1/8 in) conical mandrel. |
| Adherence: | Crosshatch test; adherence is same. |
| Impact: | 31 cm/kg (30 in/lbs) no cracking on direct or indirect impact. |
| Hardness: | HB-F pencil. |
| Metal temperature: | 10 minutes at 150 °C (300 °F). |

LIST OF EXPERIMENTS

1. Vector representation of measured voltage in power supply;
2. Demonstration of voltage loss measured in transmission lines and load;
3. Measuring real and reactive power loss along the transmission line;
4. Demonstration of voltage increase along the transmission line;
5. Voltage variation at the transmission line output according to resistive, inductive and/or capacitive load;
6. Voltage variation at the transmission line output according to inductive and/or capacitive source;
7. Voltage variation at the transmission line output according to current intensity applied to a synchronous motor field.
8. Voltage regulation at the transmission line output;
9. Phase angle differences between measured input and output voltages;
10. Transmission lines operated at nominal or reduced voltage;
11. Two lines connected in parallel; and,
12. Regulation of two transmission lines carrying AC or DC current.

Consulab Éducattech, Inc.
5100, rue des Tournelles, Suite 500
Québec, QC Canada G2J 1E4
Phone: 418-688-9067/ 800-567-0791 Fax: 418-688-9526
Email: info@consulab.com Internet : http://www.consulab.com