

ROTATING MACHINES FOR 3 HP, 2.2 kW

DESCRIPTION



The CL-300 is a 3-HP rotating motor/generator package, including control equipment and measuring instruments. It has been carefully designed for use in electrical engineering laboratories. The 3-HP machines provide the benefits of working with commonly used industrial machines. Besides learning the behaviour of different types of machines, the student will become familiar with measuring instruments frequently encountered in industry. The measuring and control instruments and load housings are in modular form in half or full size cabinets. This feature makes them very flexible during use and saves considerable time when experiments are set up. The electrical machines are mounted individually on carts. A connecting box, marked with the corresponding electrical symbol and fitted with multiple terminals, completes the assembly.

The units can be easily moved and stored. Couplings are quickly and easily made. The handbook provided contains full details of the experiments to be performed. Consulab offers a variety of optional measuring and control equipment which completes the basic CL-300 package. The training equipment is available in two different versions: Consulab or Unitec. In the Consulab version, the machines are mostly mounted on mobile carts and the starting, control and measuring units are individually assembled in stackable half or full size cabinets. In the Unitec version, the machines are mounted in mobile consoles equipped with starters, control and measuring equipment. The two versions differ in their mechanical specifications (coupling, height of transmission shaft, etc.).

The CL-300 handbook contains the following experiments:

DC Machines

- Measuring the winding resistances of a DC machine;
- No load saturation curve;
- Characteristics of shunt generator on load;
- Characteristics of a separately excited shunt generator on load;
- Efficiency of a shunt generator;
- Shunt motor on load;
- Stray power losses in DC machines;
- Efficiency of a series motor;
- Characteristics of a compound generator on load;
- Efficiency of a compound generator;
- Compound motor on load;
- Shunt generators in parallel;
- Compound generators in parallel; and,
- Kapp opposition test.

Squirrel Cage Induction Motors

- Characteristics of squirrel cage motor;
- Circle diagram for a squirrel cage motor;
- Squirrel cage motor as a generator;
- Squirrel cage motor as a phase converter;
- Dynamic braking of a squirrel cage motor;



CL-300 - CONSULAB VERSION



CL-300 - UNITEC VERSION

Wound Rotor Induction Motors

- Characteristics of a wound rotor motor
- Circle diagram of a wound rotor motor
- Dynamic braking of wound rotor motor
- Wound rotor motor used as a generator
- Cascading wound rotor motors
- Using a wound rotor motor as a frequency changer

Synchronous Machines

- Saturation curve of a synchronous alternator
- Alternator winding connections
- Synchronizing alternator with power system
- Alternator efficiency by measuring
- Synchronizing two alternators
- Alternator regulation
- Characteristics of a synchronous motor
- Offset angle of synchronous motor poles
- Synchronous motor V curve
- Power factor correction using a synchronous motor
- Efficiency of an alternator under loads

The basic CL-300 package contains the following equipment:

DESCRIPTION	QTY	60 HZ	50 HZ
Three phase AC variable power supply	1	CL-141-00	CL-141-50
Rectifier unit	1	CL-146-00	CL-146-50
AC circuit breaker, 15 A	1	CL-121-00	CL-121-50
Synchronizing unit	1	CL-122-00	CL-122-50
DC circuit breaker, 30 A	1	CL-123	
Manual DC starter, 3 points	1	CL-131-00	CL-131-50
AC magnetic starter	1	CL-133-00	CL-133-50
Knife switch, TPDT	1	CL-616-00	CL-616-50
Over speed cut-out	1	CL-1030-00	CL-1030-50
Synchronous machine	1	CL-201-00	CL-201-50
Wound rotor induction machine	1	CL-202-00	CL-202-50
Squirrel cage induction machine	1	CL-203-00	CL-203-50
DC machine	1	CL-204	

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DESCRIPTION	QTY	60 HZ	50 HZ
Variable resistive loads	3	CL-301-00	CL-301-50
Eddy current brake	1	CL-207-00	CL-207-50
Endless worm gear drive	1	CL-1031	
AC measuring instruments	1	CL-402-00	CL-402-50
DC measuring instruments	1	CL-407-00	
Three phase wattmeter, 5 kW	1	CL-411-00	CL-411-50
Power factor meter	1	CL-414-00	CL-414-50
Frequency meter	1	CL-415-00	CL-415-50
Tachogenerator	1	CL-1004-00	CL-1004-50
Set of connecting wires with banana plugs	1	CL-1002	
Rubber coupling	1	CL-1008	
Experiment handbook	1	CL-300-95	CL-300-50-95
Answer book	1	CL-300-96	CL-300-50-96

OPTIONAL EQUIPMENT COMPATIBLE WITH CL-300

DESCRIPTION	ENSEMBLE 60 HZ	ENSEMBLE 50 HZ
Control and Operation Equipment		
Control buttons	CL-101-00	CL 101-50
Control buttons and indicator lights	CL-102-00	CL-102-50
Three pole contactor	CL-103-00	CL-103-50
Five pole contactor	CL-105-00	CL-105-50
Time delay relay	CL-107-00	CL-107-50
Starter resistors	CL-108-00	CL-108-50
Starter autotransformer	CL-110-00	CL-110-50
Variable frequency speed control	CL-150-3	
Reverse power relay	CL-1032-00	CL-1032-50
Voltage regulator	CL-1033-00	CL-1033-50
Electrical Machines		
Electrodynamometer	CL-205-00	CL-205-50
Squirrel cage motor with 36 windings	CL-206-00	CL-206-50

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Capacitor start motor	CL-206-1-00	CL-206-1-50
Electrical and Mechanical Loads		
Variable inductive loads	CL-302-00	CL-302-50
Variable capacitive loads	CL-303-00	CL-303-50
De Prony brake	CL-208	
Adjustable flywheel	CL- 209	
Transformers		
Single phase transformer	CL-304-00	CL-304-50
Measuring Instruments		
Virtual instrumentation lab	CMC	
AC voltmeters	CL-408-00	CL-408-50
Single phase wattmeter, 2 kW	CL-410-00	CL-410-50
Power indicator	CL-1034-00	CL-1034-50

SPÉCIFICATIONS

DESCRIPTION	CL-300-00	CL-300-50
Nominal Voltage:	120/208V AC	220/380V AC
Frequency:	60 Hz	50 Hz
Item Number:	50107	50428
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).	