



Synchronous Machines are used as Generators in power plants because of their characteristic relation of speed with frequency. The study of power generators is the part of most of the curriculum.

**TYPE 20 113** "Synchronous Machine Training System" is an exclusive product designed to demonstrate the fundamental concepts of parallel operation of Three Phase Synchronous Generators.

This product is equipped with measurement system for AC Parameters and DC Parameters. It has inbuilt phase Sequence Indicator. Due to use of LCD / LED display it is possible to observe multiple parameters simultaneously. The RISC micro controller based design provides better resolution and sensitivity as compared to analog meters. The panel is also equipped with advanced Digital Synchroscope as well as Conventional Lamps (Dark Lamp Method) to perform the synchronization of two generators.

Students can learn the basics as well as advanced experiments and safety conditions with precautions that are encountered while generating power with multiple generators.

Various terminals including three phase starter terminals are provided on front panel to provide flexibility and ease of connections while performing experiments. Students can perform experiments like Synchronization of parallel generators using advanced and conventional methods, behavior of generator, load sharing, power transfer parameters, analysis of voltage regulation of generator, V curve and inverse V curve in Three Phase Synchronous Generators with a vast flexibility.

**OBJECT:**

- 01 Synchronization of two Three Phase Alternators by
  - 1.1 Synchroscope method
  - 1.2 Three dark lamp method
  - 1.3 Two bright one dark lamp method
- 02 Regulation of Three Phase Alternator by
  - 2.1 Open Circuit test
  - 2.2 Short Circuit test
- 03 Study & Analysis of V-Curve & Inverse V-Curve of Synchronous Motor

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We are committed to the continuous development of our products, and therefore reserve the right to amend specifications without prior notice

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## FEATURES

- 01 Two Identical Motor Generator Set
- 02 Electrical Loading Arrangement
- 03 Inbuilt Phase Sequence Indicator
- 04 Equipped with Digital Synchroscope.
- 05 Two Inbuilt Digital Multifunction Meter for AC Voltage, Current, frequency, Power (Kw), KVA, KVAh, Energy (Kwh), KVAh, KVAh & Power factor.
- 06 Two digital voltmeter Range 300V DC
- 07 Four Digital current Meter Range 0-5Amp.
- 08 Lamps are provided on front panel for synchronisation
- 09 Designed considering all the safety standards
- 10 Provided with shaft protection cover
- 11 Equipped with supply indication lamps
- 12 Heavy Duty Base/Channel
- 13 Machine with Class "B" Insulation
- 14 Diagrammatic representation for the ease of connections.

Phase Sequence Indicator is unique of its kind. It measures the phase sequence of both the generators individually.

DC measurement block uses high resolution ADC for voltage measurement and DC current measurement. This unit provides accurate voltage & current display with higher resolution.

Two multifunction meter to Display Current, Voltage, Frequency, Power & Power Factor. It measures parameters from both the generators individually.



**Digital Three Phase Synchroscope**

## TECHNICAL SPECIFICATIONS

### 01 DC Power Supply Dual Required

- Input mains : 230V AC  $\pm 10\%$ , 50Hz  
 Fixed DC output : 200V  
 Variable DC output : 0-200V

### 02 AC Measurement Unit

- Voltage : 60 - 310V  
 Current : 250mA - 5Amp  
 Frequency : 45Hz - 55Hz.  
 Power Factor : 0.5Lag - UPf

### 03 DC Measurement Unit

- Two Digital Voltmeter: 0 - 300V  
 Four Digital Ammeter: 0 - 5Amp

### 04 Phase Sequence Indicator : For both generators

### 05 Machines Specification

Both the M-G Sets are Flexibly Coupled and Mounted on a "C" channel Base

### 06 Two DC Machine.

- Type : Shunt  
 Voltage Rating : 200V  
 Rating : 1 HP  
 Speed : 1500 RPM (no load)  
 Insulation : Class "B"

### 07 Two Three Phase Synchronous Machine

- Type : Salient Pole  
 Rating : 500VA  
 Voltage rating : 415VAC  
 Speed : 1500 RPM (no load)  
 Excitation Voltage : 220V  
 Insulation : Class "B"

### 08 Dimensions(panel) : L800xH600xD350 mm

### 09 Weight (panel) : 22kg (approx.)

### 09 Dimensions(MG Set) : W 250 x D 900 x H 400mm

### 10 Weight (MG 2 Set) : 110kg (approx.)

## LIST OF ACCESSORIES:

- 01 Shrouded patch cord 4mm length 50/100Cm  
 Red /Black.....92  
 02 Digital Tachometer .....01

## OTHER APPARATUS REQUIRED (NOT INCLUDED):

- 01 DC Power Supply OMEGA TYPE 20 201 ----- 02  
 02 Rheostat 220 ohms, 2.8Amp.----- 04  
 03 3 Phase Resistive Load OMEGA TYPE 20 202--- 01

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