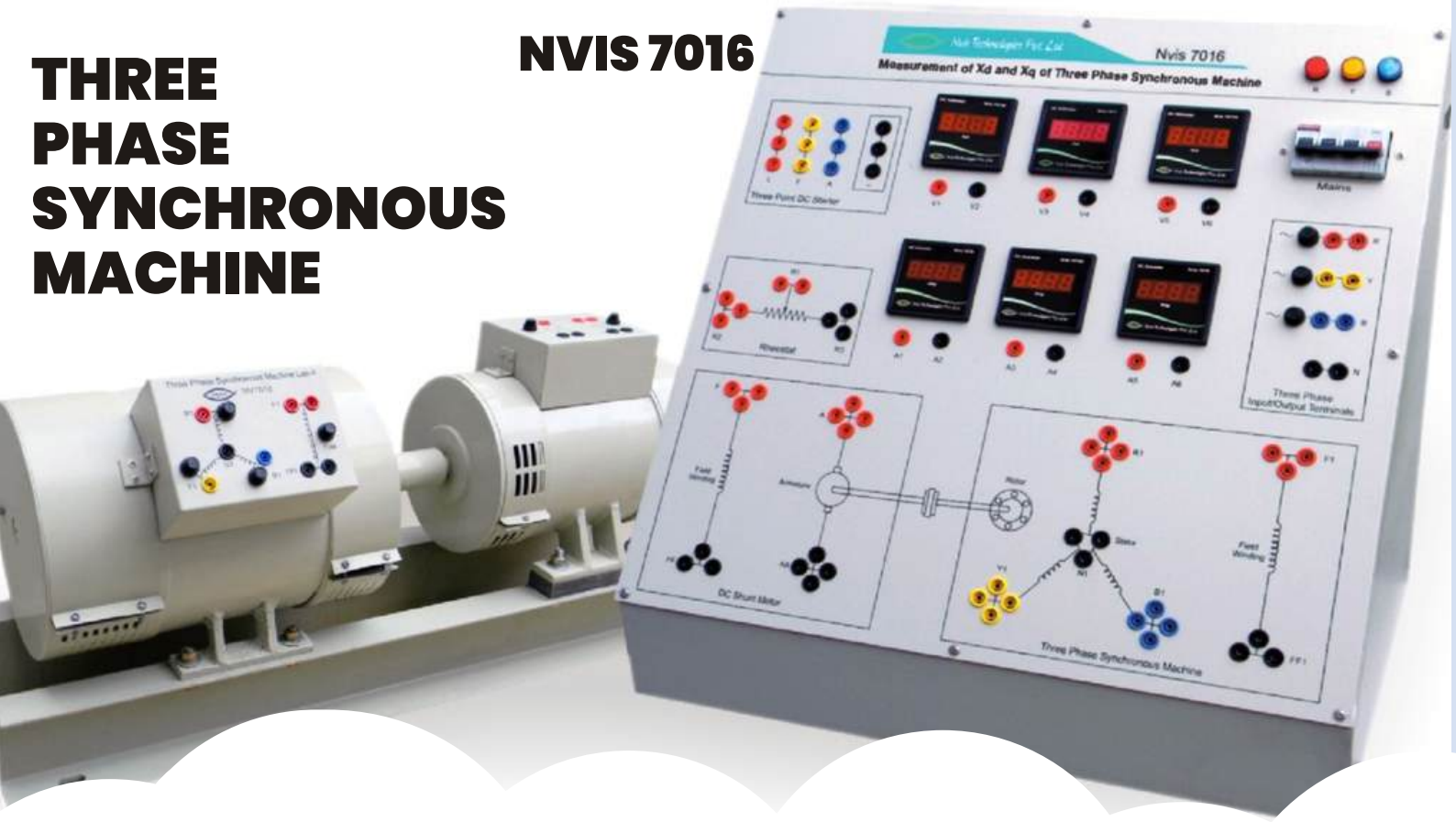
THREE PHASE SYNCHRONOUS MACHINE

NVIS 7016



Measurement of Xd and Xq of Three Phase Synchronous Machine is designed to demonstrate the operating principle and functioning of Three Phase Synchronous Generator. It helps students to analyse and calculate the significant parameters such as positive, negative and zero sequence impedance, direct and Quadrature axis reactance etc. to correctly construct Three Phase Synchronous Generator.

FEATURES

- ELECTRICAL LOADING ARRANGEMENT
- FLEXIBLE SHAFT COUPLING ARRANGEMENT
- PROVIDED WITH DIGITAL TACHOMETER
- MACHINE WITH CLASS “B” INSULATION
- HEAVY DUTY BASE/CHANNEL
- EQUIPPED WITH SUPPLY INDICATION LAMPS
- TERMINALS PROVIDED TO USE THE OPTIONAL EXTERNALLY
- EQUIPPED WITH SUPPLY INDICATION LAMPS
- DESIGNED BY CONSIDERING ALL THE SAFETY STANDARDS
- DIAGRAMMATIC REPRESENTATION FOR THE EASE OF CONNECTIONS
- EXCLUSIVE AND COMPACT DESIGN
- ONLINE PRODUCT TUTORIAL

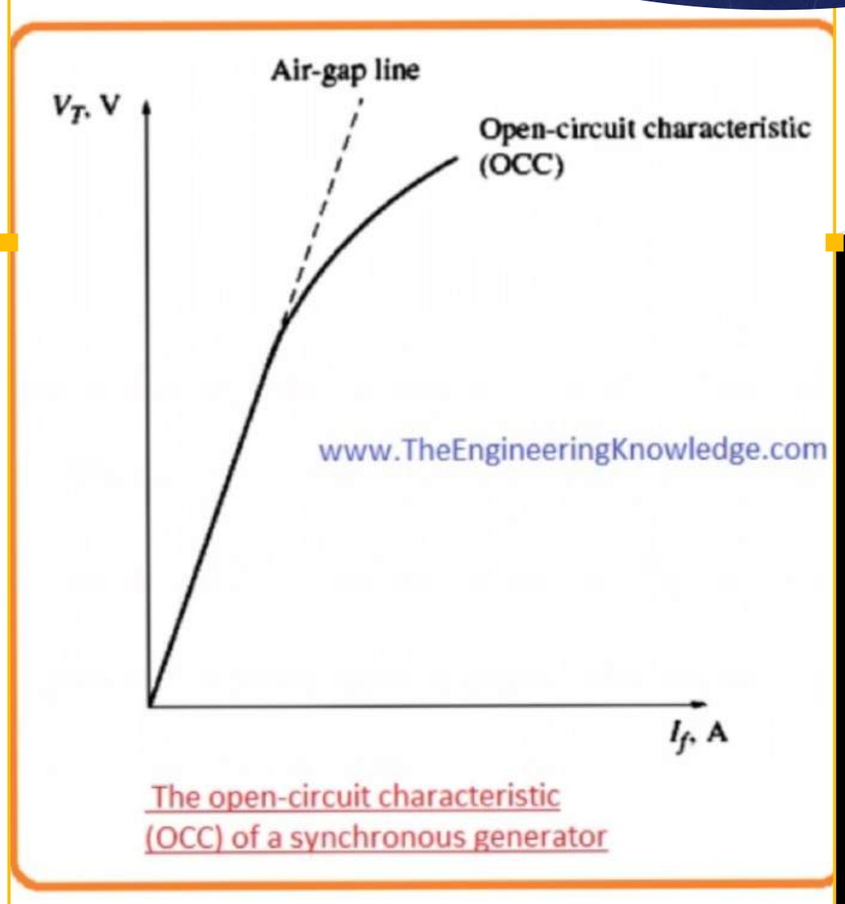
TECHNICAL SPECIFICATIONS

Mains Supply : Three Phase, 415V±10 %, 50Hz
Machines Specification (2 nos.)
Both the Machines are flexibly coupled and mounted on “C” channel base
DC Machine
Type : Shunt
Rating : 2HP
Voltage Rating : 220V ±10 %
Speed : 1500 RPM ±5 %
Insulation : Class “B”
Three Phase Synchronous Machine
Type : Star Connected
Voltage Rating : 415V
Rating : 3HP
Speed : 1500 RPM
Excitation Voltage : 120V ±10 %
Insulation : Class “B”
Digital Meters used
DC Voltmeter : 300V
DC Ammeter : 10A
AC Voltmeter : 450V (2 nos)
AC Ammeter : 5A & 10A (1 each)
MCB (TPN) : 10A

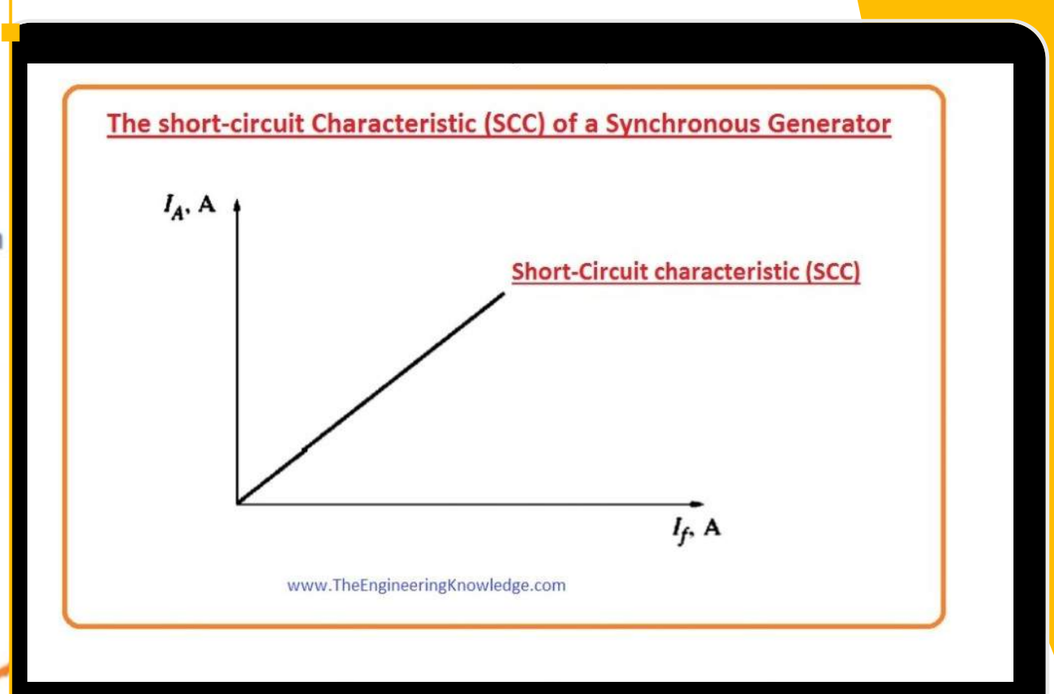
TO STUDY OPEN CIRCUIT AND SHORT CIRCUIT TEST OF THREE PHASE SYNCHRONOUS GENERATOR

ANSHUMAN XPO/EMT

An open circuit test on a synchronous generator measures the synchronous impedance and magnetization characteristics of the generator. To accomplish this test the generator should move at its rated speed, no-load should be at its terminals, and the value of the field winding current should be 0.



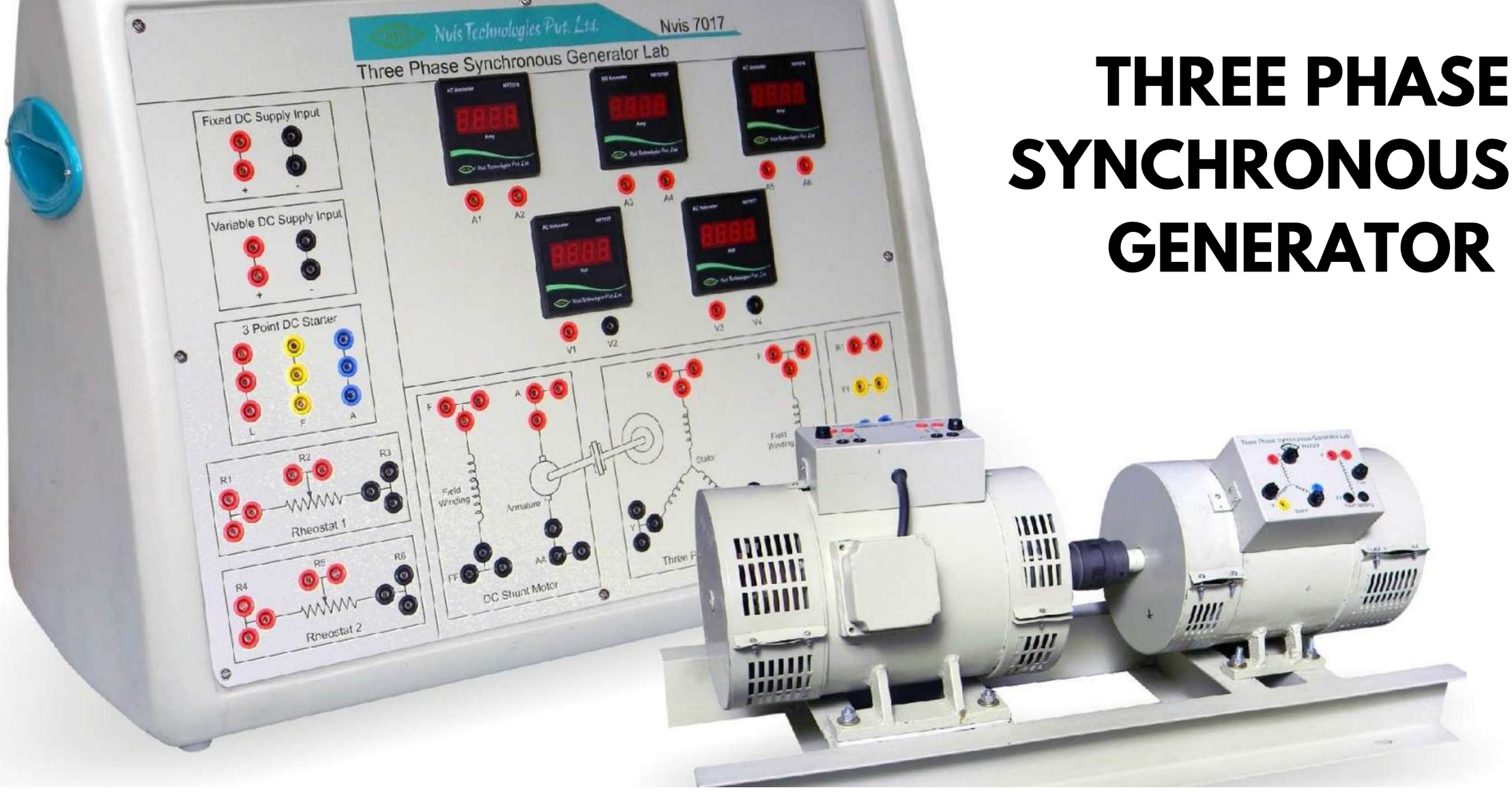
The open-circuit characteristic (OCC) of a synchronous generator



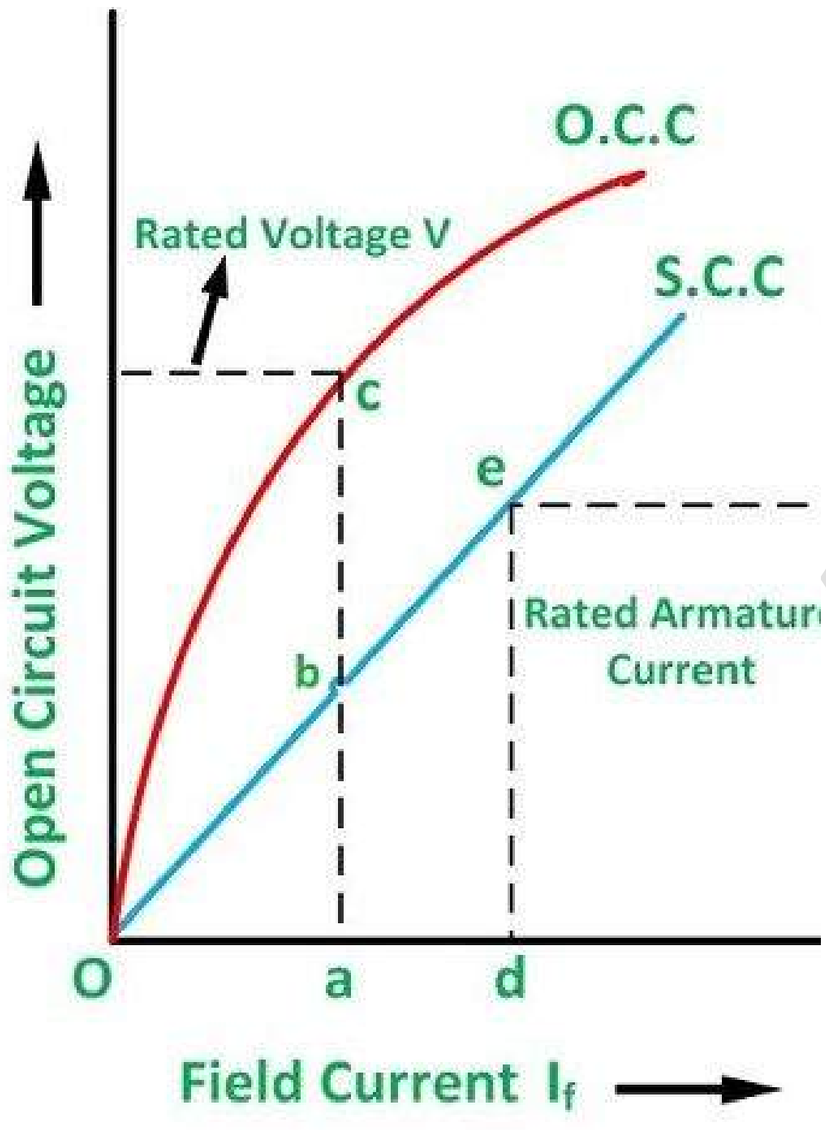
The short-circuit test provides information about the current capabilities of a synchronous generator. It is performed by driving the generator at its rated speed when the terminals of the armature winding are shorted. An ammeter is placed in series with one of the three shorted lines.

- *OC test is used to find core or no load features and SC test is used to measure copper or full load parameters. OC test is done at rated voltage and frequency and SC uses just five to ten percent rated voltage.*
- *Short circuit tests give details about the current features of synchronous generators. it is done with operating a generator at a rated speed when terminals of armature winding are short-circuited. Ammer is configured in a series combination of shorted lines.*

THREE PHASE SYNCHRONOUS GENERATOR



Three Phase Synchronous Generator training kit is designed to provide comprehensive learning about fundamental concepts and operating principles of Three Phase Synchronous Generator. The product provides hands-on experiments like Open Circuit Characteristic and short circuit characteristics of Synchronous Generator and study of the relation between field current and armature voltage.



TECHNICAL SPECIFICATIONS

Machines Specification (2 nos.)
Both the Machines are Flexibly Coupled and Mounted on a M.S. channel Base
DC Machine (acts as Prime Mover)
Type : Shunt
Rating : 2HP
Voltage Rating : 220V ±10%
Speed : 1500 RPM
Insulation : Class 'B'
Three Phase Synchronous Motor (acts as Generator)
Type : Salient Pole
Rating : 3HP
Voltage rating : 415V ±10%
Speed : 1500 RPM
Insulation : Class 'B'
Excitation Voltage : 120V
Digital Meters Used
DC Voltmeter : 300V
DC Ammeter : 10A, 5A
AC Ammeter : 10A
AC Voltmeter : 450V
Optional
DC Power Supply "Nvis 725", Rheostat 2.8A, 220W

Features

- Electrical loading arrangement
- Flexible shaft coupling arrangement
- Control board consist of high grade FRP material to provide utmost safety to the users
- Provided with Digital Tachometer
- Machine with Class "B" Insulation
- Heavy Duty Base/Channel
- Equipped with supply indication lamps
- Terminals provided to use the optional externally
- Equipped with supply indication lamps
- Designed by considering all the safety standards
- Diagrammatic representation for the ease of connections

SPEED CONTROL OF DC SHUNT MOTOR

Speed control

- ***Armature resistance control***

This method uses a variable resistor series with the armature to control th voltage drop across the armature. Increasing the external resistance reduces the voltage across the armature and the current from the armature winding, which decreases t speed.

- ***Armature voltage control***

This method, also known as the Ward Leonard Method, varies the voltage applied to the motor's armature winding to control the speed.

- ***Reversal in the applied voltage***

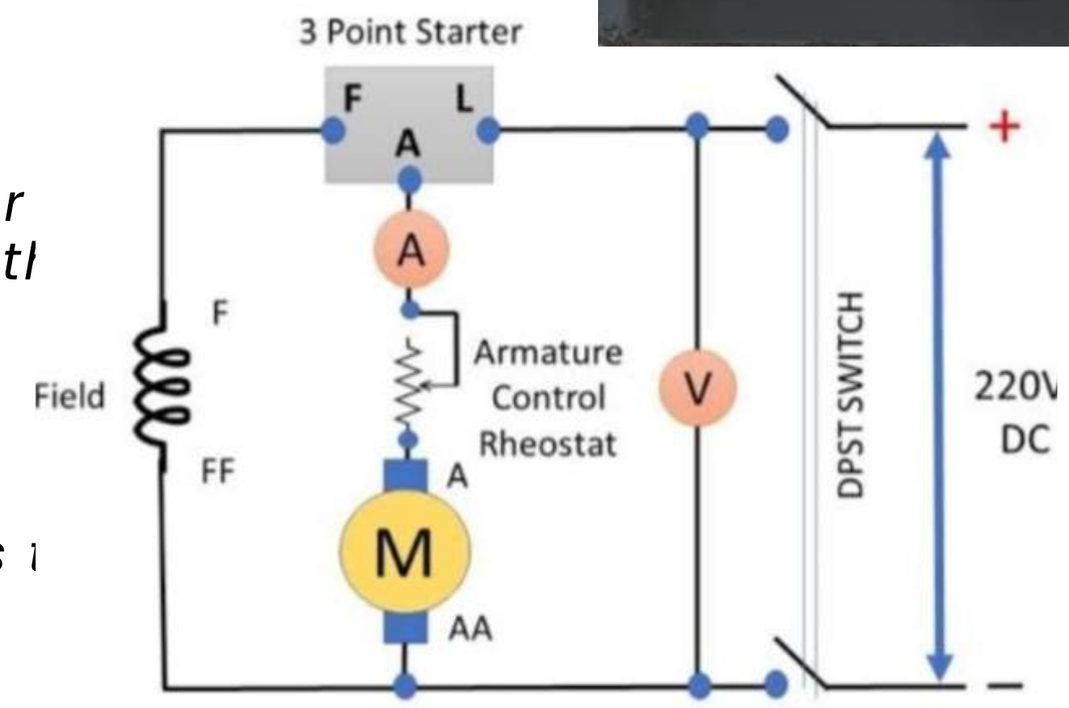
Reversing the applied voltage changes the direction of the motor.

- ***Torque-speed characteristic***

The torque increases with the increase of load current, which causes the armature current to increase and the speed to slightly fall.

- ***Constant speed***

The shunt DC motor is a constant speed motor, meaning its RPM changes very little from no load to full load.



Characteristics

1.Speed regulation: DC shunt motors have better speed regulation than other types of DC motors.
2.Speed-armature current characteristics: The speed of a DC shunt motor decreases slightly as the armature current increases.
3.Torque-speed characteristics: The torque of a DC shunt motor increases as the load current increases.
4.Efficiency: The shunt motor is efficient because the field current is relatively small.
5.Ease of implementation: The shunt motor is simple to implement.
6.Speed range: The shunt motor provides a wide range of speed control.
7.Field weakening: Weakening the field flux beyond a certain point can lead to instability.

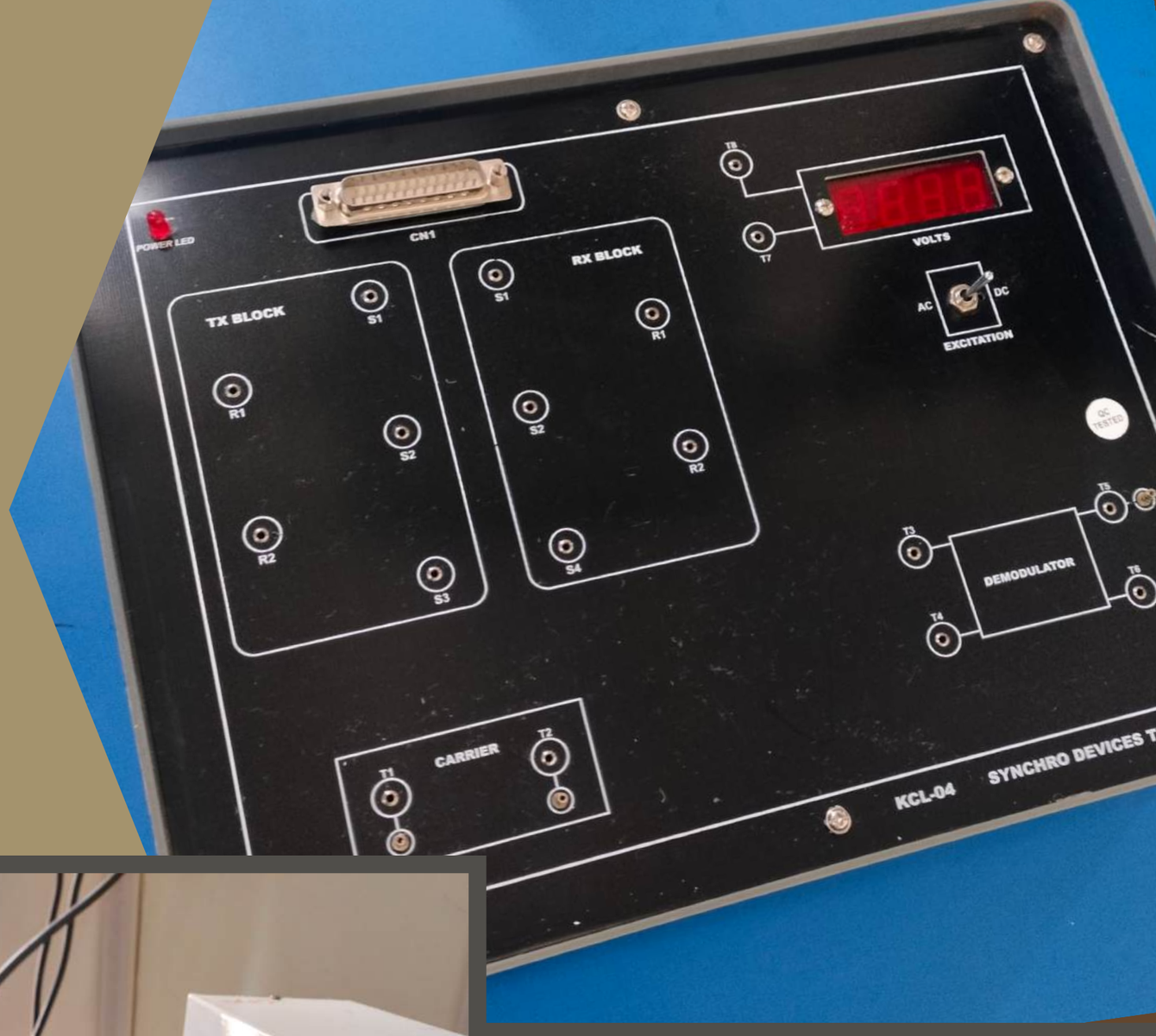
SYNCHRO DEVICE

TRAINER

TRANSMITTER

And

RECEIVER KIT



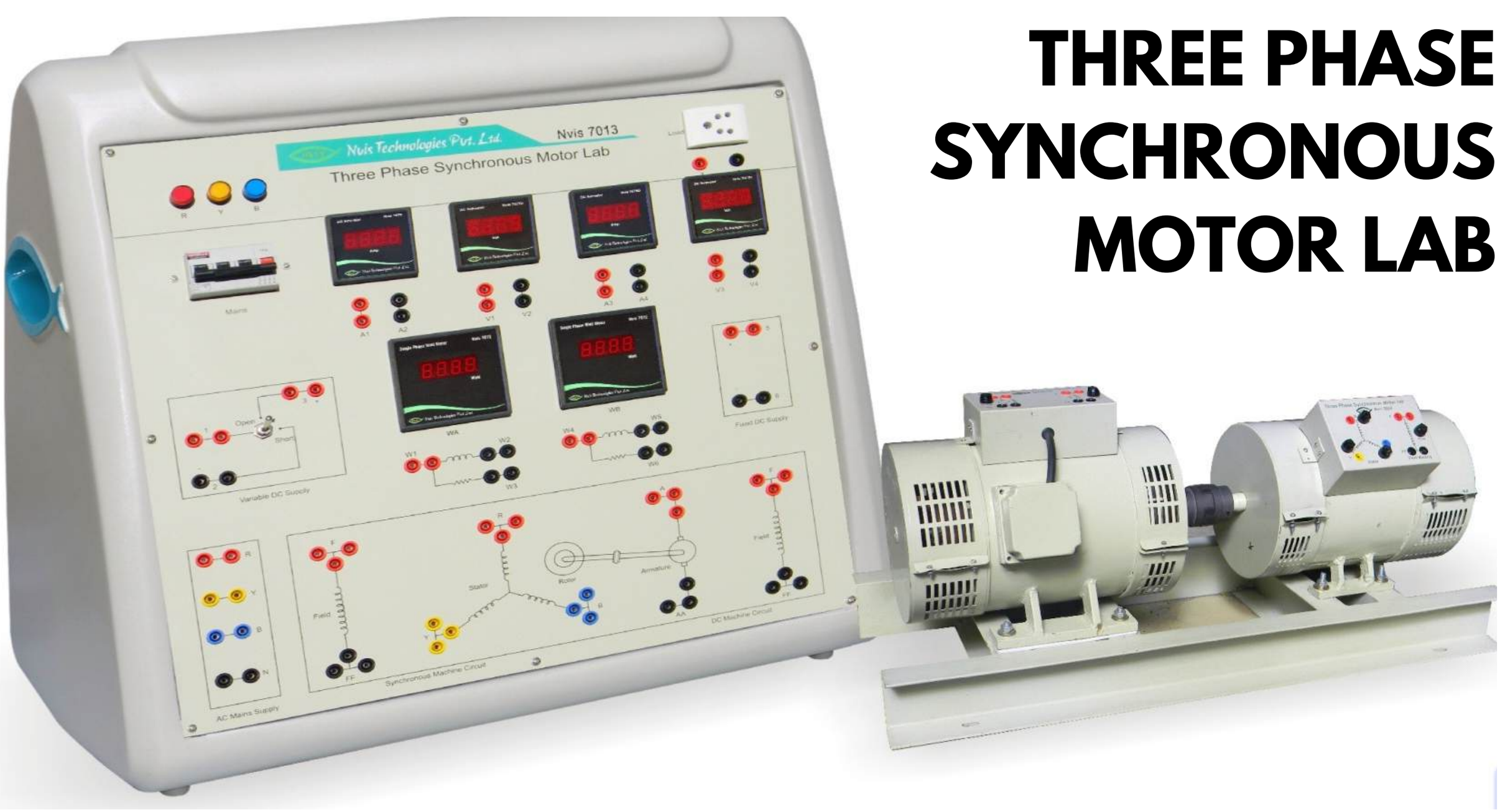
EXPERIMENTAL USE

- Basic characteristics study - stator voltages as a function of the rotor angle using the built-in ac voltmeter.
- Operation and error study of the transmitter-receiver pair as a simple open loop position control at a very low torque.
- Plotting the error voltage output as a
function of the transmitter rotor angle with the receiver rotor locked.
- Use of balanced demodulator to develop dc error signal with appropriate polarity compare it with the ac error.

FEATURES

- **KCL-04 Synchro transmitter-receiver pair with calibrated dials enclosed In see through metal cabinet**
- **Locking system for receiver rotor, Receiver use as control transformer**
- **Built-in balanced demodulator circuit, Panel meter forAC/DC Voltages**

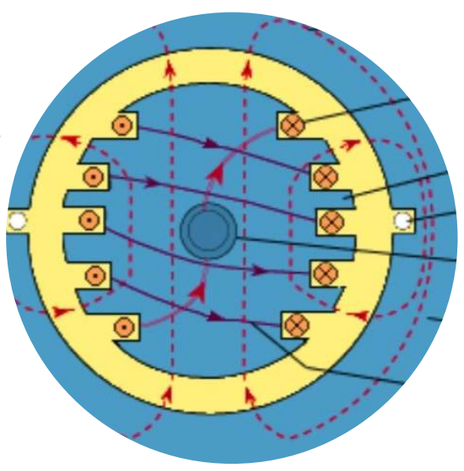
THREE PHASE SYNCHRONOUS MOTOR LAB



Nvis 7013 Three Phase Synchronous Motor Lab is an adaptable Training System for the Electrical Laboratories. The product helps in getting fully acquainted with the basic concepts, functioning and operating principle of a Three Phase Synchronous Motor. The product includes experiment such as V and inverse V curve of synchronous motor. For engineering students it is important to know how the variation of field current can affect the power factor of the Synchronous Motor and hence improve the system's performance.

Features

- **Flexible Shaft Coupling Arrangement**
- **Control board consist of high grade FRP material to provide utmost safety to the users**
- **Equipped with supply indication lamps**
- **Provided with Digital Tachometer**
- **Machine with Class “B” Insulation**
- **Heavy Duty Base/Channel**
- **Designed by considering all the safety standards**
- **Diagrammatic representation for the ease of connections**
- **Exclusive and Attractive Design**
- **Online Product Tutorial**



Technical Specifications

Mains Supply : Three Phase, 415V±10%, 50Hz
Machines Specification (2 nos.)
Both the Machines are flexibly coupled and mounted on a M.S. channel base
Three Phase Synchronous Motor
Type : Salient Pole
Rating : 3 HP
Voltage rating : 415V ±10%
Speed : 1500 RPM
Insulation : Class ‘B’
Excitation Voltage : 120V±10%
DC Machine (Acts as Generator)
Type : Shunt
Rating : 2 HP
Speed : 1500 RPM ±5%
Insulation : Class 'B'
Digital Meters Used
AC Ammeter : 10A
DC Ammeter : 10A
AC Voltmeter : 450V
DC Voltmeter : 300V
Wattmeter : 1500W (2nos.)
MCB (TPN) : 10A
Optional
Three Phase Variac 10A, DC Power Supply
“Nvis 725/Nvis 725A” Resistive Load “Nvis 7067”

Electrical Engineering Laboratories

TRANSFORMER OIL TESTING SYSTEM

Nvis 7080 Transformer Oil Testing System is used for testing the dielectric strength of insulation oil used in Transformers. Testing is performed to determine the reliability of the oil filled in Transformer. Transformer oil is used in all types of High Voltage Transformers & circuit breakers. This system includes motorized unit for smooth variation of high voltage. Kilovoltmeter is provided for monitoring high voltage. This product also incorporates automatic tripping mechanism for protection against overload.

The equipment consists of two High Voltage Coils having starting winding at earth potential. The High Voltage Transformer is designed for testing Duty only.

FEATURES

- Fully motorized high voltage control
- Break down voltage protection
- Over current protection
- Mains & H.T. ON & OFF Switches
- Incorporates automatic tripping mechanism
- Mains and H.T. ON indications
- Test cup with gap electrode arrangement
- Equipped with Kilo Voltmeter
- Designed by considering all the safety standards
- Learning material CD

TECHNICAL SPECIFICATIONS

Mains Supply : 230V AC ±10%, 50Hz

Single Phase Variac : 230V/ 0-270V

High Voltage Source : 80kV, 20mA

HV Control Motor

Type : Servo

RPM : 500 (No Load)

Voltmeter : 0 to 100kV

Dimensions (mm) : W 600 x D 350 x H 450

Weight : 58kg (approximate)