



# Electrical Machine WorkBench

## Nvis 7089SF

New



**Nvis 7089SF Electrical Machine Workbench** offers an excellent platform for teaching of electrical machines over a unique modular designed control unit. It provides flexibility for the students to carry out experiments over AC and DC machines using a large selection of Industry standard inbuilt components. There is an additional facility to make wireless connection on workstation with computer and to monitor real time electrical parameters using computer interfacing software. Users can also observe a real time graph between any of the AC and DC electrical parameters on computer.

Nvis WorkBench comprises of separate AC and DC measuring sections equipped with all the necessary instruments such as digital meters, facility to connect AC and DC supplies along with protection devices such as fuses, MCB's, indicators, etc. There are multiple buses provided on the WorkBench to make external connections while performing AC and DC machines experiments.

The design of the control unit ensures to get the highest quality practical experience to users. All the necessary protective measures are taken to avoid any fault or danger.



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### Features

- Equipped with measurement facilities for experimentation on AC machines, DC machines and transformers.
- Separate AC and DC measuring sections.
- Rust free powder coating paint on external of WorkBench.
- Standard BS-10 terminals, and patch cords for safety.
- Terminals are provided to obtain three phase fixed as well as variable AC and DC supplies with suitable protection.
- High quality digital tachometer for RPM measurement which is also interfaced with DAQ (Data Acquisition System).
- Motors provided with standard mechanical loading arrangement facility.
- Motors with aluminum cast brake-drum/pulley with heat suppression facility.
- Machines with class F insulation.
- Flexible shaft coupling arrangement (Lovejoy) for motor generator (MG) sets.
- Machines are provided with heavy duty base/channel with suitable interconnection.
- Machines are provided with suitable protections such as MCB's, fuses. Motor generator (MG) sets provided with coupling protective cover.
- Generator with electrical loading arrangement facility.
- Designed considering all safety measures.

### Scope of Learning

- Single phase capacitor start induction motor.
- Study of running and reversing phenomenon in a single phase capacitor start induction motor.
- Study of single phase capacitor start induction motor.
- Study of no load test of single phase capacitor start induction motor.
- Study of block rotor test of single phase capacitor start induction motor.
- Study of slip test of single phase capacitor start induction motor.
- Study of load test of single phase capacitor start induction motor.

### Three Phase Squirrel Cage Induction Motor

- Study of running and reversing phenomenon in a three phase squirrel cage induction motor.
- Study of no load test in a three phase squirrel cage induction motor.
- Study of block rotor test in a three phase squirrel cage induction motor.
- Study of slip test in a three phase squirrel cage induction motor.
- Study of load test in a three phase squirrel cage induction motor.

### DC Shunt Wound Motor

- Study of separately excited DC shunt wound motor.
- Study of self excited DC shunt wound motor.
- Study of running and reversing phenomenon of dc shunt wound motor.
- Study of speed control of self excited DC shunt wound motor by flux field current control method.
- Study of speed control of self excited DC shunt wound motor by armature control method.
- Study of load characteristics of separately excited DC shunt wound motor.



### Universal Motor

- To study speed control of universal motor in DC mode.
- To study speed control of universal motor in AC mode.

### PMDC Motor

- To study PMDC motor and operation through lead acid battery.

### Three Phase Synchronous Motor

- To study operational working of three phase synchronous motor at no load.
- To study V and Inverse V curve of three phase synchronous motor at no load.

### Single Phase Transformer:

- Study of single-phase isolation transformer.
- Study of single-phase step up transformer.
- Study of single-phase step down transformer.
- Study of subtractive polarity of single phase transformer.
- Study of additive polarity of single-phase transformer.
- Study of open circuit test of single-phase transformer.
- Study of short circuit test of single-phase transformer.

### Three Phase Transformer

- Study of open circuit test of three-phase transformer.
- Study of short circuit test of three-phase transformer.

## Technical Specifications

### Electrical Measuring Instruments

#### AC Ammeter (4 nos.)

Type	:	Digital
Range	:	10A

#### AC Voltmeter (4 nos.)

Type	:	Digital
Range	:	450Vrms

#### DC Ammeter (4 nos.)

Type	:	Digital
Range	:	20A

#### DC Voltmeter (4 nos.)

Type	:	Digital
Range	:	300V

#### Single Phase Wattmeter (2 nos.)

Type	:	Digital
Range	:	4kW

#### DC Supply (for excitation purpose only)

Voltage	:	300V $\pm$ 10%
Current	:	2Amp



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### DC Power Supply

DC output voltage (fixed)	:	220V $\pm$ 10%, 2A
DC output voltage (variable)	:	220V $\pm$ 10%, 12A

### Protective devices

Three Phase MCB (TPN)	:	2 nos.
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### Electrical Data Acquisition System with USB peripheral

Communication frequency	:	2.4GHz
RF Power	:	1mWatt
Range	:	10Mtr.

### Measurement ranges

AC voltage range	:	25-450Vrms
AC current range	:	0.20-10Amp
DC voltage range	:	25-300Vrms
DC current range	:	0.20-15Amp
Frequency	:	45-55Hz
Active power	:	50-3000Watts
Reactive power	:	50-3000Watts
Apparent power	:	50-3000Watts
Power factor	:	0.2 to 0.99
Electrical speed	:	Up to 2500 RPM
Torque	:	0 - 25 N-m
Auxiliary Supply	:	230V AC $\pm$ 10%

### Machine Specification

#### DC Shunt machine

Power rating	:	1HP
Voltage rating	:	220V DC $\pm$ 5%
Rated speed	:	1500RPM $\pm$ 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring balance	:	2 nos. (tubular type)
Brake drum/pulley	:	Aluminum cast with heat suppression facility
Machine base	:	C channel
Protection	:	Fuses (mounted on terminal box of the machines)

#### Three Phase Squirrel Cage Induction Motor

Power rating	:	1HP
Voltage rating	:	415V AC $\pm$ 5%
Rated speed	:	1440RPM $\pm$ 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring balance	:	2 nos. (tubular type)
Brake drum/pulley	:	Aluminum cast with heat suppression facility
Machine base	:	C channel
Protection	:	Fuses (mounted on terminal box of the machines)



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## Single Phase Capacitor Start Induction Motor

Power rating	:	1HP
Voltage rating	:	220V AC $\pm$ 5%
Rated speed	:	1440RPM $\pm$ 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring balance	:	2 nos. (tubular type)
Brake drum/pulley	:	Aluminum cast with heat suppression facility
Machine base	:	C channel
Protection	:	Fuses (mounted on terminal box of the machines)

## Single Phase Transformer

Mains supply	:	Single phase, 230V AC $\pm$ 10%
Rating	:	1kVA
Primary voltage	:	0-125V, 0-125V
Secondary voltage	:	0-125V, 0-125V
Rated current	:	5A

## Three Phase Transformer

Mains supply	:	415V $\pm$ 10%, 50Hz
Type	:	Three phase
Power rating	:	1kVA
Primary voltage	:	415V
Secondary voltage	:	230V
Rated current	:	2A
<b>PMDC motor</b>	:	100W, 24VDC

## Universal motor

Power rating	:	1HP
Voltage rating at AC mode	:	220V AC $\pm$ 10%, 50Hz
Voltage rating at DC mode	:	220VDC $\pm$ 10%

## Three phase synchronous machine

Both the machines are flexibly coupled and mounted on a single C channel base

## Three phase synchronous machine

Power rating	:	3 HP
Voltage rating	:	415V AC $\pm$ 10%, 50Hz
Configuration	:	Delta connected
Rated speed	:	1500RPM $\pm$ 5%
Insulation	:	Class B
Excitation voltage	:	180VDC $\pm$ 10%



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### DC machine (act as Generator)

Type	:	Shunt
Power rating	:	2HP
Rated speed	:	1500RPM $\pm$ 7.5%
Insulation	:	Class F
Loading arrangement	:	Electrical
Type of coupling	:	Flexible Lovejoy coupling
Machine base	:	C channel
Protection	:	Fuses (mounted on terminal box of the machines)

### Single and Three phase resistive load

Single phase supply	:	230V $\pm$ 10%, 50Hz
Three phase supply	:	415V $\pm$ 10%, 50Hz (star configured)
Resistive load	:	2.5A AC/phase
Load steps	:	0.5A x 5 steps
Toggle switches	:	15nos.

### Single and Three phase inductive load

Single phase supply	:	230V $\pm$ 10%, 50Hz
Three phase supply	:	415V $\pm$ 10%, 50Hz (star configured)
Inductive load	:	1.5A AC/phase
Load steps	:	0.5A x 3 steps
Toggle switches	:	9 nos.

### Single and Three phase capacitive load

Single phase supply	:	230V $\pm$ 10%, 50Hz
Three phase supply	:	415V $\pm$ 10%, 50Hz (star configured)
Capacitive load	:	2.5A AC/phase
Load steps	:	0.5A x 5 steps
Toggle switches	:	15nos.

**Single phase variac** : 10A, 0 - 415V AC  $\pm$  10%, 50Hz

**Three phase variac** : 10A, 0 - 230V AC  $\pm$  10%, 50Hz

**Rheostat** : 2.8A, 220 $\Omega$

**Lead acid battery** : 7.5AH

**Battery charger** : 24V, 2.5A

**Storage shelves** : 4ft x 2ft x 5ft (2nos.)

**Interconnections** : 4mm BS-10 safety terminals