Electrical WorkStation

Nvis 7089AD

All AC & DC Machines are optional

Nvis 7089AD Electrical Workstation offers an excellent approach to the teaching of Electrical Machines principles by introducing 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.

Electrical Machines is one of the most important area of study as it helps users to understand the operational characteristics and working of AC and DC Machines. Nvis 7089AD enables user to put their theory knowledge into practice with ease. 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.

Workstation 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, Supply Indicators, etc. There are multiple buses provided on the Workstation 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 user. All the necessary protective measures are taken to avoid fault or danger.

Note: All AC & DC Machines along with supporting accessories are available optionally

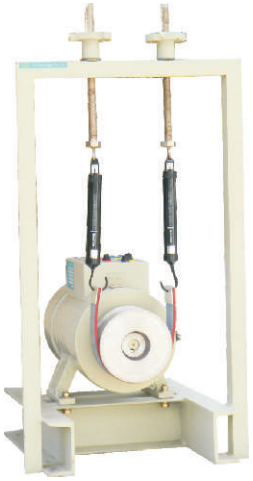
Electrical WorkStation

Nvis 7089AD

Features

- Compatible for Machines upto 2HP
- Equipped with Measurement Facilities for Experimentation on AC Machines, DC Machines and Transformers
- Separate AC and DC Measuring Sections
- Diagrammatic representation of AC and DC Machines for better understanding
- Rust Free Powder Coating Paint
- Standard BS-10 terminals, patch cords for safety purpose
- Terminals 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" casted Brake-Drum/Pulley with heat suppression facility
- Machines with Class "B" Insulation
- Flexible shaft coupling arrangement (Lovejoy) for Motor Generator (MG) Sets
- Machines provided with Heavy Duty Base/Channel with suitable interconnection
- Machines provided with suitable protections such as MCB's, Fuses, Motor Generator (MG) Sets provided with coupling protective cover
- Generator with Electrical Loading Arrangement Facility
- Durable good quality spring balance
- Designed by considering all the safety measures

Note: All AC & DC Machines along with supporting accessories are available optionally



Motor with Mechanical loading arrangement

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 ± 10%
Current	:	2Amp

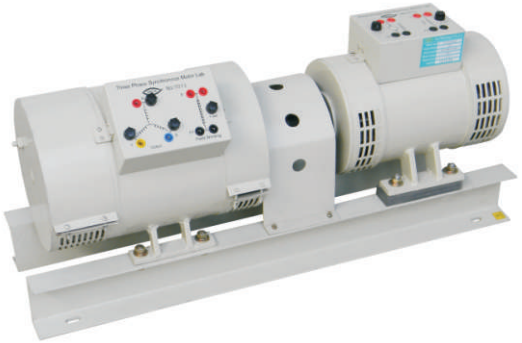
DC Power Supply

DC Output Voltage (Fixed) : 220V ± 10%, 2A

DC Output Voltage (Variable) : 220V ± 10%, 15A

Protective Devices

Three Phase MCB (TPN)	:	2 Nos.
Interconnections	:	4mm BS-10 Safety Terminals



Generator with Electrical loading arrangement

Electrical WorkStation

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Experiments with Nvis 7089AD

DC Machines (optional)

DC Shunt Wound Motor

- Study of Operational Working and Principle of DC Shunt Motor
- Study of running and reversing phenomenon of DC Shunt Motor
- Study of No Load Characteristic of DC Shunt Motor
- Study of Load Characteristic of DC Shunt Motor
- Study of speed control of DC Shunt Motor using armature voltage control and flux field control method
- Study and Determine the losses of DC Machine and correspondingly calculate the efficiency of DC Machine by Swinburn's Test Method

DC Series Wound Motor

- Study of Operational Working and Principle of DC Series Motor
- Study of running and reversing phenomenon of DC Series Motor
- Study of Load Characteristic of DC Series Motor
- Study of speed control of DC Series Motor using armature voltage control and flux field control methods

DC Compound Wound Motor

- Study of Operational Working and Principle of DC Compound Motor
- Study of running and reversing phenomenon of DC Compound Motor
- Study of Load Characteristic of DC Cumulative-Compound Wound Motor
- Study of Load Characteristic of DC Differential-Compound Wound Motor

DC Shunt Wound Generator

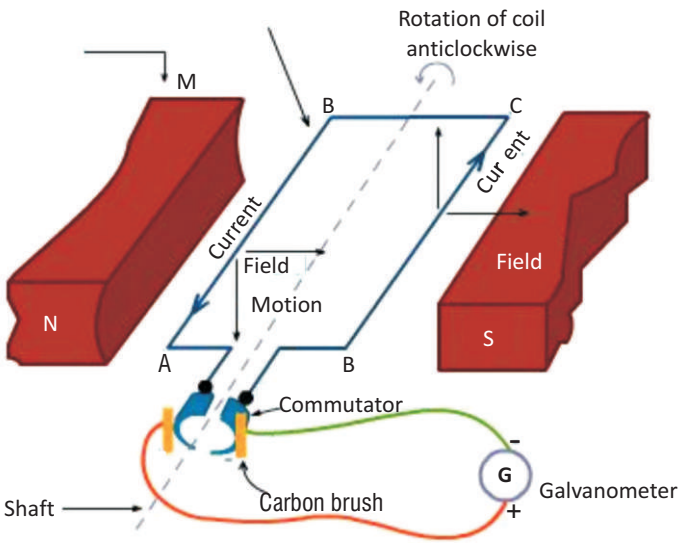
- Study of Operational Working and Principle of DC Shunt Generator
- Study and measurement of Open Circuit Characteristic of DC Shunt Generator
- Study and measurement of External Characteristic of DC Shunt Generator
- Study and measurement of Internal Characteristic of DC Shunt Generator

DC Series Wound Generator

- Study of Operational Working and Principle of DC Series Wound Generator
- Study and measurement of Open Circuit Characteristic of DC Series Generator
- Study and measurement of Load Characteristic of DC Series Generator
- Study and verify the Field Test of DC Series Machine and correspondingly determine the efficiency of DC Series Motor and Generator at any desire load

DC Compound Wound Generator

- Study of Operational Working and Principle of DC Compound Wound Generator
- Study and verify the Load Characteristics of Long Shunt Cumulatively Compound Generator
- Study and verify the Load Characteristics of Short Shunt Cumulatively Compound Generator
- Study and verify the Load Characteristics of Long Shunt Differentially Compound Generator
- Study and verify the Load Characteristics of Short Shunt Differentially Compound Generator



Working Principle of DC Generator

Electrical WorkStation

Nvis 7089AD

AC Machines (optional)

Single Phase Capacitor Start Induction Motor

- Study of Operational Working and Principle of Single Phase Induction Motor
- Study of Running and Reversing of Single Phase Induction Motor
- Study of the No-Load Test in a Single Phase Induction Motor
- Study of the Blocked Rotor Test in a Single Phase Induction Motor
- Study of Load Test in a Single Phase Induction Motor

Three-phase Squirrel Cage Induction Motor

- Study of Operational Working and Principle of Three Phase Squirrel Cage Induction Motor
- Study of Running and Reversing of Three Phase Induction Motor
- Study of No Load Test performed in a Three Phase Induction Motor
- Study of Block Rotor Test performed in a Three Phase Induction Motor
- Measurement of Slip in a Three Phase Induction Motor
- Study of Speed-Torque characteristics in a Three Phase Induction Motor

Three Phase Salient Pole Synchronous Motor

- Study of Operational Working and Principle of Three Phase Synchronous Motor
- Study of V curve of Three Phase Synchronous Motor
- Study of Inverse V curve of the Three Phase Synchronous Motor

Three Phase Salient Pole Synchronous Generator

- Study of Operational Working Principle of Three Phase Synchronous Generator
- Study and Measurement of Positive Sequence Impedance of Three Phase Synchronous Generator
- Study and Measurement of Negative Sequence Impedance of Three Phase Synchronous Generator
- Study and Measurement of Zero Sequence Impedance of Three Phase Synchronous Generator
- Study of short circuit characteristics (SCC) of three Phase Synchronous Generator
- Study of open circuit characteristics (OCC) of three Phase Synchronous Generator
- Study and measure of voltage regulation of Three Phase Synchronous Generator using EMF Method

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

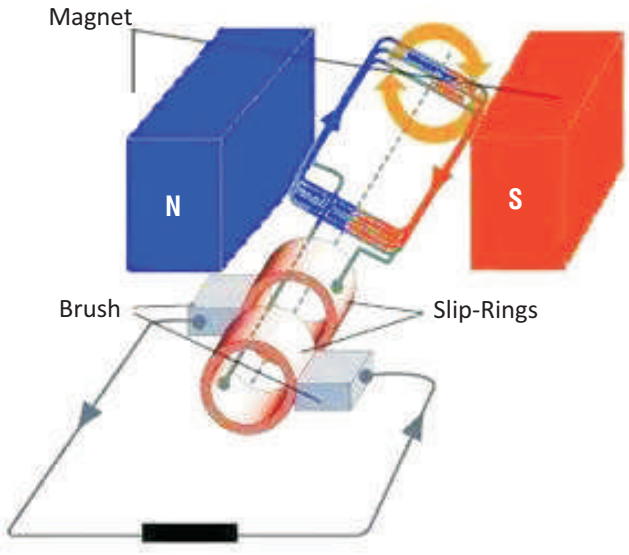
  To determine the Efficiency and Voltage Regulation of a Single-Phase Transformer by direct loading at different loading condition.

Three Phase Transformer:

- Study of Open Circuit test of Three-Phase Transformer
- Study of Short Circuit Test of Three-Phase Transformer
- Study of Three Phase Configurations in Three Phase Transformer

**More than 70 Experiments can be performed in Nvis 7089AD

**Also suitable for performing experiments on basic Electrical Measurements



Working Principle of AC Generator

Electrical WorkStation

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Technical Specifications of Optional Machines

DC Motors (optional)

- **Machine Specification**

Model No.	:	Nvis SHM05, Nvis SHM10 & Nvis SHM20
Type	:	Shunt
Power Rating	:	Available with 1/2HP, 1HP& 2HP
Voltage Rating	:	220V DC ± 5%
Rated Speed	:	1500RPM ± 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring Balance	:	2Nos.(Tubular Type)
Brake Drum/Pulley	:	Aluminum casted with heat suppression facility
Machine Base	:	"C" Channel
Protection	:	Fuses (mounted at the terminal box of the Machines)

DC Motors with standard Mechanical loading arrangement

- **Machine Specification**

Model No.	:	Nvis SM10 & Nvis SM20
Type	:	Series
Power Rating	:	Available with 1HP&2HP
Voltage Rating	:	220V DC ± 5%
Rated Speed	:	1500RPM ± 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring Balance	:	2Nos. (Tubular Type)
Brake Drum/Pulley	:	Aluminum casted with heat suppression facility
Machine Base	:	"C" Channel
Protection	:	Fuses (mounted at the terminal box of the Machines)

- **Machine Specification**

Model No.	:	Nvis CM10 & Nvis CM20
Type	:	Compound
Power Rating	:	Available with 1HP & 2HP
Voltage Rating	:	220V DC ± 5%
Rated Speed	:	1500RPM ± 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring Balance	:	2Nos.(Tubular Type)
Brake Drum/Pulley	:	Aluminum casted with heat suppression facility
Machine Base	:	"C" Channel
Protection	:	Fuses (mounted at the terminal box of the Machines)

Selection Guide

Machine Ratings	Shunt Motor	Series Motor	Compound Motor
0.5 HP	Nvis SHM05	--	--
1 HP	Nvis SHM10	Nvis SM10	Nvis CM10
2 HP	Nvis SHM20	--	Nvis CM20

Electrical WorkStation

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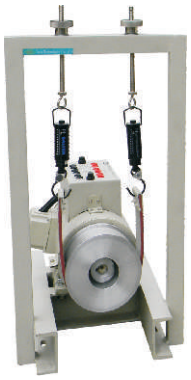
AC Motors (optional)

- **Machine Specification**

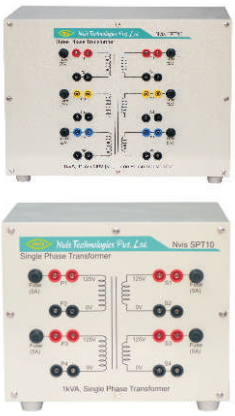
Model No.	:	Nvis SPM10
Type	:	Single phase Capacitor Start Induction Motor
Power Rating	:	Available with 1HP
Voltage Rating	:	230V AC ± 5%, 50Hz
Rated Speed	:	1440RPM ± 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring Balance	:	2 Nos. (Tubular Type)
Brake Drum/Pulley	:	Aluminum casted with heat suppression facility
Machine Base	:	"C" Channel
Protection	:	Fuses (mounted at the terminal box of the Machines)

- **Machine Specification**

Model No.	:	Nvis SQM10 & Nvis SQM20
Type	:	Three Phase Squirrel Cage Induction Motor
Power Rating	:	Available with 1HP & 2HP
Voltage Rating	:	415V AC ± 5%, 50Hz
Rated Speed	:	1440RPM ± 7.5%
Insulation	:	Class 'B'
Loading arrangement	:	Mechanical
Spring Balance	:	2 Nos. (Tubular Type)
Brake Drum/Pulley	:	Aluminum casted with heat suppression Facility
Machine Base	:	"C" Channel
Protection	:	Fuses (mounted at the terminal box of the Machines)



AC Motors with standard Mechanical loading arrangement



Transformer modules

Single Phase Transformer (optional)

Transformer Specifications

Mains Supply	:	Single Phase, 230V AC ±10%, 50Hz
Rating	:	1kVA
Primary Voltage	:	0-125V, 0-125V
Secondary Voltage	:	0-125V, 0-125V
Rated Current	:	5A

Three Phase Transformer (optional)

Transformer Specifications

Mains Supply	:	415V ±10%, 50Hz
Type	:	Three Phase
Power Rating	:	1kVA
Primary Voltage	:	415V
Secondary Voltage	:	230V
Rated Current	:	4A

Selection Guide

Machine Ratings	Single Phase Capacitor Start Induction Motor	Three Phase Squirrel Cage Induction Motor
1 HP	Nvis SPM10	Nvis SQM10
2 HP	-----	Nvis SQM20

Selection Guide

Transformer Ratings	Single Phase Transformer	Three Phase Transformer
1 KVA	Nvis SPT10	Nvis TPT10

Electrical WorkStation

Nvis 7089AD

DC Generators (optional)

- **Machine Specification**

Model No. : Nvis SHG05,Nvis SHG10 & Nvis SHG20

Both the Machines are flexibly coupled and Mounted on a Single 'C' Channel Base DC Machine (acts as prime mover)

Type : Shunt
Voltage Rating : 220V DC ± 5%
Rated Speed : 1500RPM ± 7.5%
Insulation : Class 'B'

- **DC Machine (acts as generator)**

Type : Shunt
Power Rating : Available with 0.5HP, 1HP & 2HP
Rated Speed : 1500RPM ± 7.5%
Insulation : Class 'B'
Shaft extension : Single Sided
Loading Arrangement : Electrical
Type of Coupling : Flexible "Lovejoy" Coupling
Machine Base : "C" Channel
Protection : Fuses (mounted at the terminal box of the Machines)

- **Machine Specification**

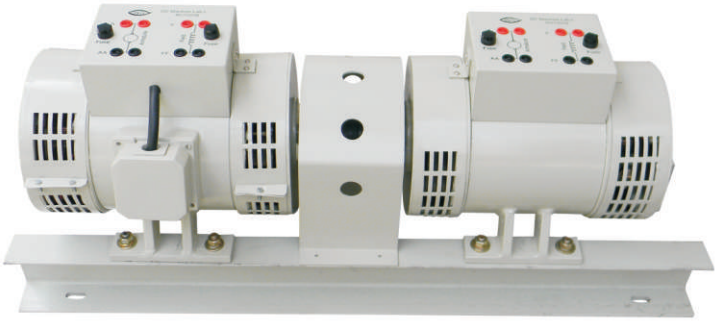
Model No. : Nvis SG10 & Nvis SG20

Both the Machines are flexibly coupled and Mounted on a Single 'C' Channel Base DC Machine (acts as prime mover)

Type : Shunt
Voltage Rating : 220V DC ± 5%
Rated Speed : 1500RPM ± 7.5%
Insulation : Class 'B'

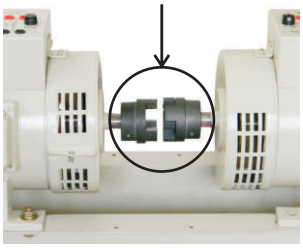
- **DC Machine (acts as generator)**

Type : Series
Power Rating : Available with 1HP & 2HP
Rated Speed : 1500RPM ± 7.5%
Insulation : Class 'B'
Shaft extension : Single Sided
Loading Arrangement : Electrical
Type of Coupling : Flexible "Lovejoy" Coupling
Machine Base : "C" Channel
Protection : Fuses(mounted at the terminal box of the Machines)



DC Motors -Generator Set Coupled with Flexible Lovejoy Coupling

Lovejoy Coupling



- **Machine Specification**

Model No. : Nvis CG10 & Nvis CG20

Both the Machines are flexibly coupled and Mounted on a Single 'C' Channel Base

DC Machine (acts as prime mover)

Type : Compound
Voltage Rating : 220V DC ± 5%
Rated Speed : 1500RPM ± 7.5%
Insulation : Class 'B'

DC Machine (acts as generator)

Type : Compound
Power Rating : Available with 1HP & 2HP
Rated Speed : 1500RPM ± 7.5%
Insulation : Class 'B'
Shaft extension : Single Sided
Loading Arrangement : Electrical
Type of Coupling : Flexible "Lovejoy" Coupling
Machine Base : "C" Channel
Protection : Fuses (mounted at the terminal box of the Machines)

Selection Guide

Machine Ratings	Shunt Generator	Series Generator	Compound Generator
0.5 HP	Nvis SHG05	--	--
1 HP	Nvis SHG10	Nvis SG10	Nvis CG10
2 HP	Nvis SHG20	Nvis SG20	Nvis CG20

Electrical WorkStation

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AC Generators (optional)

- **Machine Specification**

Model No. : Nvis TPM30

Both the Machines are flexibly coupled and Mounted on a Single 'C' Channel Base

Three Phase Synchronous Machine

Type : Salient Type

Power Rating : 3 HP

Voltage Rating : 415V AC ± 10%, 50Hz

Configuration : “Delta” Connected

Rated Speed : 1500RPM ± 5%

Insulation : Class 'B’

Excitation Voltage : 180Vdc ± 10%

DC Machine (acts as generator)

Type : Shunt

Power Rating : 2HP

Rated Speed : 1500RPM ± 7.5%

Insulation : Class 'B’

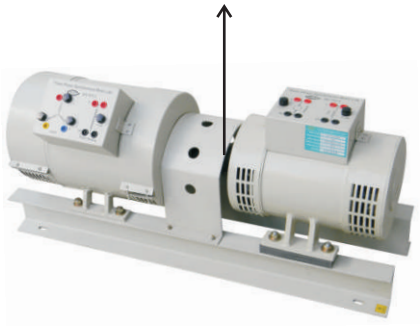
Loading Arrangement : Electrical

Type of Coupling : Flexible “Lovejoy” Coupling

Machine Base : “C” Channel

Protection : Fuses (mounted at the terminal box of the Machines)

Protective Coupler Cover



AC Motors -Generator Set Coupled with Flexible Lovejoy Coupling

- **Machine Specification**

Model No. : Nvis TP30

Both the Machines are flexibly coupled and Mounted on a Single 'C' Channel Base

DC Machine

Type : Shunt

Power Rating : 2HP

Voltage Rating : 220V DC ± 5%

Rated Speed : 1500RPM ± 5%

Insulation : Class 'B’

Three Phase Synchronous Machine

Type : Salient Type

Configuration : "Star" Connected

Power Rating : 3HP

Voltage Rating : 415V AC ± 5%, 50Hz

Rated Speed : 1500RPM ± 7.5%

Insulation : Class 'B’

Excitation Voltage : 180Vdc ± 10%

Loading Arrangement : Electrical

Type of Coupling : Flexible “Lovejoy” Coupling

Machine Base : “C” Channel

Protection : Fuses (mounted at the terminal box of the Machines)

Selection Guide

Machine Ratings	Three Phase Synchronous Motor	Three Phase Synchronous Machine
3 HP	Nvis TPM30	Nvis TP30

** We also offer customized Solutions for different Motor and Motor-Generator Set.

Electrical WorkStation

Nvis 7089AD

Other Supporting Optional Items

- **Single and Three Phase Resistive Load**

  Single Phase Operation

  Voltage : 240V AC ±10%, 50Hz

  Current : 15A

  Power : 3.5kW

  Loading steps : 15

  Three Phase Star Operation

  Voltage : 415V AC ±10%, 50Hz

  Current : 5A (per Phase)

  Power : 3.5kW

  Loading steps : 5 (per Phase)

  Three Phase Delta Operation

  Voltage : 415V AC ±10%, 50Hz

  Current : 15A (per Phase)

  Power : 10.5kW

  Loading steps : 5 (per Phase)

  Switching Technique : Star/Delta Switch, 415V, 25A

  Mains MCB : 16A (TPN)

- **Three Phase Inductive Load**

  Three Phase Star Operation

  Voltage : 415V AC ±10%, 50Hz

  Current : 10A (per Phase)

- **Single and Three Phase Capacitive Load**

  Single Phase Operation

  Voltage : 230V AC ±10%, 50Hz

  Current : 14A (Approx.)

  Loading steps : 30

  Three Phase Star Operation

  Voltage : 415V AC ±10%, 50Hz

  Current : 4.6A (per Phase)

  Loading steps : 10 (per Phase)

  Three Phase Delta Operation

  Voltage : 415V AC ±10%, 50Hz

  Current : 13A (per Phase)

  Loading steps : 10 (per Phase)

  Switching Technique : Star/Delta Switch, 415V, 25A

  Mains MCB : 16A (TPN) 10A (One Pole) 30 Nos.

Single and Three Phase Resistive Load

Three Phase Inductive Load

Single and Three Phase Capacitive Load

Electrical WorkStation

Nvis 7089AD

- **Thyristorized DC Regulated Power Supply**

Input Mains	:	415VAC ± 10%, 50Hz
Rated Output Voltage	:	220VDC (Fixed) ± 5%,
Rated Output Current	:	50ADC
Regulation	:	Less than 3% at full load condition.

Measuring Instruments

AC Voltmeter	:	1 No. (with voltage selector switch)
DC Ammeter	:	1 No.
DC Voltmeter	:	1 No.

Protection with its indicators

Overload Protection

Short Circuit Protection

Phase Sequence Indicator

Thyristorized DC Regulated Power Supply

- **Single Phase Variac**

Type	:	Close Type
Operating Rating	:	230V AC ±10%, 50Hz
Output Voltage	:	0 - 270V AC ±10%, 50Hz
Current	:	10A (Also available in different Current Ratings)

- **Three Phase Variac**

Type	:	Close Type
Operating Rating	:	415V AC ±10%, 50Hz
Output Voltage	:	0 - 470V AC ±10%, 50Hz
Current	:	10A (Also available in different Current Ratings)

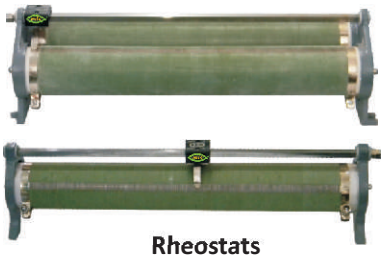
Three Phase Variac

Single Phase Variac

- **Rheostats**
- **AC Starters**
- **DC Starters**

DC Starters

AC Starters



Rheostats

Electrical WorkStation

Nvis 7089AD

Nvis Electrical Data Acquisition System is a versatile solution that allows high quality measurements for all Electrical Parameters and is suited for all types of Engineering Laboratories. Electrical Data Acquisition System provides wireless measurements of Single and Three Phase AC as well as DC Parameters measurements with high accuracy.

Nvis Electrical Data Acquisition System includes three inputs each for Voltage and Current, two inputs each for DC Voltage and DC Current to measure an entire Three Phase Parameters and DC Parameters such as AC and DC Voltage, AC and DC Current, Active Power, Reactive Power, Apparent Power, Power Factor, Frequency, etc. along with Over Load Protection Indicators and buzzer at the same time. All these parameters will be displayed on the PC Software screen provided with the product.

Nvis Electrical Data Acquisition System is compatible for three phase/three wire and three phase/four wire configurations. User can also plot a real time graph between any of these parameters on computer through the facility of wireless connectivity.

Features

- **Electrical Data Acquisition System is compatible for Motors upto 2HP**
- **Real Time monitoring of electrical parameters using computer Interface Software**
- **Curve can be plotted between any of the two electrical parameters along with its calculation done on computer**
- **Facility to store plotting curve reading for further reference**
- **Microcontroller based accurate and reliable design**
- **Singe Phase Parameters Measurement**

  - 3 AC Voltage Inputs

  - 3 AC Current Inputs

  Corresponding Active Power, Reactive Power, Apparent Power, Frequency, Power Factor and Angle

  - 2 DC voltage Inputs

  - 2 DC current Inputs

- **Three Phase Parameters Measurement**

  - Line to Neutral Voltage

  - Line to Line Voltage

  - Line Current

  - Active Power

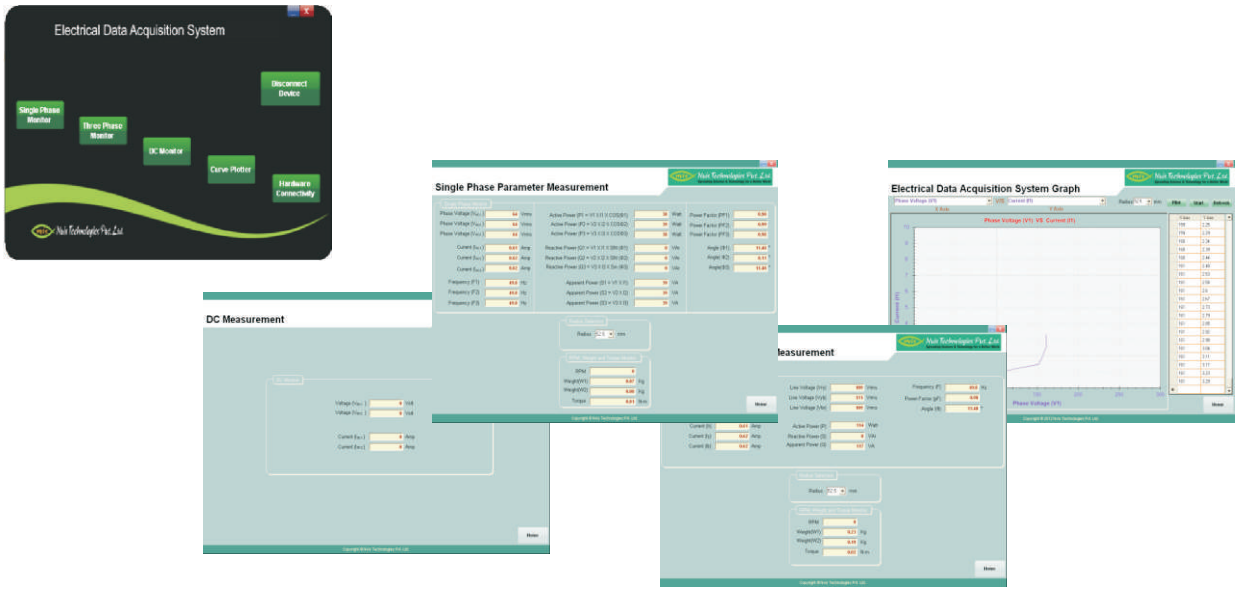
  - Reactive Power

  - Apparent Power

  - Frequency

  - Power Factor

- **CT is used as Current Transducer**
- **Fully isolated measurement**



Real Time monitoring of electrical parameters using computer interface software

Electrical WorkStation

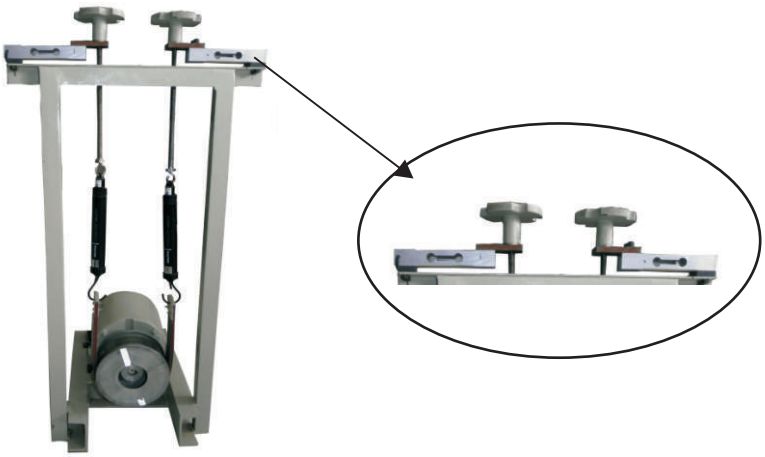
Nvis 7089AD

Technical Specifications

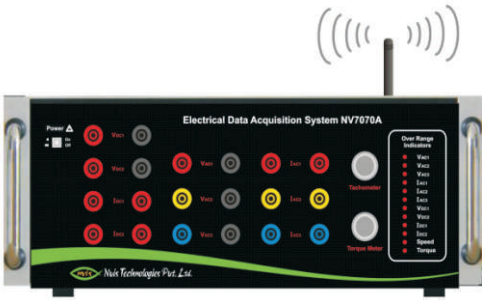
Communication Frequency	:	2.4GHz
RF Power	:	1mWatt
Range	:	10Mtr.

Measurement Ranges

AC Voltage Range	:	25-450Vrms, accuracy ±5%
AC Current Range	:	0.20-10Amp, accuracy ±5%
DC Voltage Range	:	25-300Vrms, accuracy ±5%
DC Current Range	:	0.20-15Amp, accuracy ±5%
Frequency	:	45-55Hz, accuracy ±3%
Active Power	:	50-3000Watts, accuracy ±5%
Reactive Power	:	50-3000Watts, accuracy ±5%
Apparent Power	:	50-3000Watts, accuracy ±5%
Power Factor	:	0.30 to 0.99 both Lead and Lag, accuracy ±3º Electrical
Speed	:	Up to 2500 RPM, accuracy ±5%
Torque	:	0 - 25 N-m, accuracy ±5%
Auxiliary Supply	:	230V AC± 10%, 50Hz



Torque Measurement Unit



Wireless connectivity with computer

Speed Measurement Device

Subject to change - Version 2.0

Designed & Manufactured in India by

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