WIND BLOWER & WIND TURBINE

MAIN RACK/ CONTROL UNIT

SALIENT FEATURES

- Table top wind tunnel with side/ top covers having transparent viewing window & protection cage to facilitate identification of components of windmill.
- 3 phase motor with axial fan blades as blower to simulate variable wind.
- VFD to control speed of motor/ blower with continuously variable speed to set wind speed.
- Renewable energy basics, energy conservation, charge controller, storage system & invertor etc.
- Converting kinetic wind energy into electrical energy in laboratory using BLDC generator.
- 500mm cuboid using aluminium profile, 2 such racks connected each other to form wind tunnel containing wind blower and wind turbine.
- Pitching and yawing provision provided. Wind turbine mounted on Pillar with bearing to facilitate yawing.
- Optional PC interface.

TECHNICAL SPECIFICATIONS

A) Wind turbine & Wind blower

Consist of table top wind tunnel made of two numbers of 30x30mm aluminium profile cuboid (500mm) rack with perforated aluminium protection cage and holding wind blower & wind turbine

Wind turbine - 1 No.

- O/P wattage- 100W
- O/P voltage- 75V
- O/P current- 2A
- Blade dia. 550mm x 6 nos.
- Nut and screw arrangement for pitching
- Mounted on rotating table to facilitate yawning, tail length= 250mm

Wind blower - 1 No.

- 3 phase 4 pole induction motor with 19ϕ shaft
- Rated star 415VAC & Delta 230VAC, 1HP, 50Hz, 1450 RPM
- Blade dia. 550mm x 6 nos.

Wind blower panel (RE1) - 1 No.

- Motor input terminals terminated on shrouded sockets

Wind generator panel (RE2) - 1 No.

- Generator output terminals terminated on shrouded sockets
- Diode bridge (1000V/35A)- 2 Nos.
- Digital anemometer- 1 No.
- Anemometer to measure air flow with digital display (0.5", 4 digit LCD)
- Measurement units- Air velocity: m/s, km/h, ft/min, knots
- Measurement units- Air flow: CMM (m^3/min), CFM (ft^3/min)
- Dimension/Wt.- 156x67x28mm/ 260g

B) Main rack/ Control unit

Consists of table top aluminium profile (45x45) strudy modular flat demo panel rack (4x3 matrix) system, holding various panels as below

Single phase supply panel (EMT16A) - 1 No.

- Single phase MCBs of 10A
- Lamp load

IGBT controlled AC drive panel (EMT33) - 1 No.

- Input voltage: 230VAC, 50Hz
- Output voltage: 3 phase 200 to 230VAC
- Range (frequency control): 0.1Hz to 100Hz (50Hz factory set)
- Control mode: Sine wave PWM
- Capacity: 2HP with reverse and forward direction

DC Application panel (ST3)- 1 no

- 12V LED lamp/ LED strip and fan.

Charge controller Panel (ST4) - 1 No.

- Rated voltage- 24Vdc, Max current- 6A
- Max generator voltage-25V
- Min generator voltage-20V
- Battery Capacity- 7Ah
- Battery rated voltage- 12V
- Battery type- Lead acid

Stand- alone Inverter panel (ST5) - 1 No.

- I/P DC voltage-10-15Vdc, O/P AC voltage- 230Vac
- O/P power rating- 210VA/ 500VA

DC voltmeter & DC ammeter panel (EMT68) - 2 Nos.

- DC voltmeter (0-50V)
- DC ammeter (0-5A) with polarity protection diode.

AC voltmeter & AC ammeter panel (EMT6)- 1 No.

- Voltmeter: 300V, Ammeter: 0.5A

Note: Specifications are subject to change.

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◆ **Lamp load panel (EMT7) - 1 No.**

- 230V/15/40/60/100W x 3 bulbs with individual ON/OFF using 6A toggle switches.

◆ **AC voltmeter panel (EMT2) - 1 No.**

- Voltage range : 300V OR 500VAC.
- 1 pole 4 way switch to select line voltage for three phase

◆ **Rheostat for generator loading (600E/1A)- 1 No.**

List of experiments

- To study characteristics of wind velocity and generator power.
- To analyze effect of pitching (blade angles) on performance of wind turbine.
- To study yawing due to change in direction of wind.
- To perform experiment to study working of inverter and calculate its efficiency.
- To study VI characteristics of wind turbine.
- To study working of MPPT charge controller.
- To study working of DC application (load).
- To perform experiment to study & plot IV/PV characteristics of wind generator on PC screen using VWB V11.x software using MPPT controller & graph window (Optional)
- To perform experiment to study MPPT charge controller (Optional)
- To identify cut in velocity of wind turbine.

C) Optional PC interface - WET needs following additional panels & S/W: EMT8, ST8, CIP-II panels

◆ **Instrumentation power supply cum multichannel DPM panel (EMT8)- 1 No.**

- DC Multi Output power supply.
- Provides 1 Ph. AC supply through 3 MCB's, 4A each to power up other panels in the rack.
- Multi channel DPM for temperature display.
- 20 pin FRC power bus to supply power to neighboring
- Green shrouded socket provided to extend earth

◆ **MPPT charge controller Panel (ST8)- 1 no**

- 2 IGBT modules, 1st for charging control & 2nd for load ON/OFF
- 5 nos of analog outputs AI (0-2.5V) for RE voltage, RE current, Battery voltage, Irradiance measurement & Load/ battery voltage
- 2 nos of DAC inputs for PWM control and load ON/OFF
- Built in battery- 12V/7Ah, Type: Lead acid

◆ **Computer interface Panel (CIP-II)- 1 no**

- Connects to PC (Win7/8/10) USB port through USB IO module & type A to mini B cable
- 8 ADC channels I/P: 0 to 2.5V FS with 1 no. input simulation pot. 2 DAC channels O/P 0-2.5V FS
- V to I function block: I/P 0 to 2.5V and O/P 0-20 or 4-20mA (100 ohm load) switch settable.
- I to V function block: I/P 4 to 20mA and O/P 0-2.5V
- USB converter to interface 25 pin D connector on CIP panel to USB enclosed in 25 pin D shell using type A to mini B type cable

◆ **Software on CD**

- Virtual Workbench (VWB) software package is a USB based software working on windows .net platform coupled with USB IO module useful as general purpose S/W utility which supports different control strategies like , MPPT controller etc.

◆ **Mechanical Dimensions (mm)/ Net Wt./Gross Wt. (Kg)**

Wind blower & Wind turbine: 500(W) x 1000(L) x 500(H)/ 35Kg/ 45Kg, **Main rack:** 545(H) x 960(W) x 300(D)/ 30Kg/ 40Kg

Note: Specifications are subject to change.

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