

Generation Trainer with Protection Relays (Model:XPO-PET/Gen)



Table Top Control Panel Rack & under table prime mover alternator set

Salient Features

- VFD drive is used to control brushless prime mover's speed in manual
- Multi function meters read the input voltage & frequency of generator output along with **power analyser** data. (optional)
- The Generator/ alternator coupled with prime mover have brought out six terminals from three phase 3 windings (RYBs). The every alternate terminal of RYB is shorted and connected together to form Star connection (Neutral) at the output of generator.
- The relay panel carries shrouded sockets to connect Generator Protection relay mounted below. The CT panel and PT panel provide necessary interface between real world & relay.
- Emergency stop mushroom switch is provided with security key lock on the profile rack.
- Facilitates easy and safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords and shrouded socket arrangements for high voltage circuits
- Each panel has ABS molded plastic sturdy enclosure, and colorful screwless overlays showing circuits diagrams & its connection tag numbers for easy understanding and connection
- Set of Instructor Guide & Student Workbook.

Technical Specifications

XPO- PET/Gen trainer can work in standalone mode with simulated grid sources consists of following panels:

■ Input 3 phase DOL Starter panel (EMT1) X 1 Nos

- 4 pole MCB of 415 V/20A.
- DOL 16A Contactor with 24DCV / 11VA COIL
- Bimetallic thermal O/L relay with range 9A - 15A
- RYB inputs indicators.
- 9 pin D (M) connector
- Manual start / stop with local trip contact
- Power ON LED indicator

■ DC Volt meter & DC ammeter Panel (EMT6B) X 1 Nos.

- DC voltmeter 0-300VDC
- DC ammeter 0-5A
- 4A circuit breaker.

■ Instrumentation power supply cum multichannel DPM panel (EMT 8) X 1 No.

- Power supply +12V, -12V, 500 mA, +5V/300mA
- Unregulated 17VDC /750 mA
- line synchronizing signal.
- Multi channel DPM for digital display of torque & speed.

■ Variable AC and DC supply panel (EMT 23) X 1 No.

- Input 0-230VAC, 50Hz
- Variable O/P: AC 0-270V/3A
- Variable O/P: DC 0-250V/3A.

■ IGBT Controlled VVVF Drive panel (EMT 33A) X 1 No.

- Input voltage: 3 phase, 415VAC. 50Hz
- Output voltage: 3 phase 415VAC
- Range (Frequency Control) : 0.1 Hz to 100 (400)Hz
- Control Mode :Sine Wave PWM
- Capacity : 10 HP
- With Reverse And Forward Direction
- 3 phase EMI Inductor.
- Mod bus RS485 interface. (optional)

■ 3 Phase Bidirectional Power cum Energy meter panel (EMT 34) X 4 Nos.

- Bidirectional Multifunction
- 3 phase 3/4 wire, 415VAC, CT Input 5A
- LCD/LED display, Aux. supply 230V, 45-65Hz,5W
- Measure V. I., Hz, Pf, KVA, KW, KWH

■ **SCR Actuator (variable DC) cum sensor signal conditioning panel (EMT 9) X 1 No.**

- Full bridge SCR based 0V-195V / 3 Amp cosine firing with linear characteristics.
- Supports signal conditioning circuit for speed, torque in kg to give output 0-2.5Vdc (FS).
- External control signal (0 - 2.5VDC) to set O/P volt (0-100VDC) to control excitation.

■ **Generator Protection Relay panel (EMT 47B) X 1 No.**

- Protections: Differential, Over current, Under/Over voltage, Under/Over frequency, Reverse power, Earth fault.
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■ **CT panel (EMT48) X 1 No.**

- Consist of 5/5 Amp. CT 6 Nos.
- Primary side of CTs are brought on 3 x 2 x 2 SBS-5 sockets.
- Secondary side of CTs are Star connected in group of 3 & brought out on 4 x 2 SBS-5 sockets

■ **415/110VAC, 50VA PT panel (EMT 54) X 1 No.**

- Consisting of potential transformer,
- Input 415VAC, star connected, Output 110VAC, star connected, 50VA.

■ **Accessories:**

- a) Tables for Generation Setup (Optional): 1 no. consist of Pi type frame.
 - i) **Frame:** 16 gage MS square tube (Heavy duty) Colour : Brown / Off white powder coating, optionally with sturdy aluminum profile frame or optionally 45mm x 45mm aluminum profile.
 - ii) **Table top material/colour:** The nova pan or Rubber wood with white/Silver gray with smooth finish veneer finish table top (18mm thick optionally 40mm) with removable slot cover (900X500mm).
 - iii) Provision to insert MS Sturdy mesh cover on front side to protect students from rotating machines below.
 - iv) **Dimension:** Table: 1450 mm (L) X 750 mm (W) X 760 mm (H).
 - v) **Caster wheels:** Four sturdy castor wheels with locking mechanism are provided so that table can be positioned conveniently.

■ **List of experiments:**

- i) Study of V curve & inverted V curve.
- ii) Study of Generator performance chart.
- iii) Study of generator protection for differential, over current, over/under voltage, over/under frequency, reverse power and earth faults using generator protection relay.

Table top panels:

■ **Generator transformer Panel (EMT54B) X 1 No.**

- 3 phase power transformer with connection group YY11,
- Input 415VAC, Output 415VAC, 5KVA,
- Secondary winding with tapping at $\pm 2.5\%$ and $\pm 5\%$.

■ **3 phase Squirrel cage Induction Motor Panel (EMT65) X 1 No.**

- Voltage: 3 phase Delta connected, 415 VAC, 50Hz,
- Capacity/RPM /Terminals: 10HP/4 Pole m/c / 1500RPM/ 6 terminals.
- Rotor Construction: Diecast Squirrel cage rotor.
- Stator construction: 3x2 terminals,
- Frame/ Mounting Shaft dia : 132 Frame, Chasis mounted 38mm dia. with easily swappable gear coupling.

■ **3 phase Salient pole Alternator Panel (EMT65) X 1 No.**

- Voltage : 3 phase, star connected, 415VAC, 50Hz
- Capacity/RPM /Terminals : 3KVA/4 Pole m/c / 1500RPM
- Rotor Construction: Rotor excited 180Vdc/2.65A, two terminals brought out on 2 slip rings mounted on shaft.
- Stator construction: Six terminals brought out for star connection.
- Frame/ Mounting Shaft dia : 132 Frame, Chasis mounted 28mm dia. With easily swappable gear coupling

■ **Mechanical Dimension (mm) / Wt. (kg):**

- Rack: 1170(L) x 300(W) x 990(H) / Net Wt.: 65, Gross Wt.:73.
- Coupled machine: 1250(L) x 450(W) x 500(H) / Net Wt.: 80
- Gen X'mer: 770(L) x 275(W) x 435(H) / Net Wt.: 53

