

# Applied Power Electronics Trainer (XPO – APPE)



## Salient Features

- Each of following independent Applied PE trainer may need a few set of associated panels (4 nos. typically) which are mounted in a light weight sturdy aluminum flat demo panel system.
- Facilitates easy and safe wiring by students due to 4mm sturdy shrouded banana patch cords and shrouded socket arrangement for high voltage circuits.
- Each panel has ABS molded plastic sturdy enclosure, and colorful screwless overlays showing circuit diagram & its connection tag numbers for easy understanding and connections.
- Set of Instructor Guide & Student Workbook.



## Mechanical specifications:

- ? **Aluminum rack:** of 1\* 4 matrix used as flat panel demo panel system to house 4 panels needed for the trainer ordered.
- ? **Dimensions :**500(H)\*910(L)\*300(D)mm

## 1] 3 Phase HV Thyristor control Trainer

### Electrical Specifications

- Sturdy stud type 6 SCRs (anode to body type) with PIV rating 1000V/25Amp and 6 diodes with PIV ratings of 1000V/16A, however actual use is limited to 300W for equipment safety.
- 6 Nos. of Snubbers for protection of thyristors consisting of capacitor 0.1uF/1000V and 0.1E/5W ceramic resistors.
- The Power Module with 36 shrouded bananas to construct 3 phase HV circuit configurations.
- Cosine firing scheme to facilitate linear control between firing angle & DC load voltage, also gives better harmonic ripple control.

### Panels needed

- Input 3 phase DOL/MCB Starter panel (EMT1)
- Integrated 3 phase AC measurement panel (EMT20).
- 3 phase SCR firing/Synchronizing Panel(PE4A)+ 6 SCR/Diode Power Module(PE4B)
- Lamp load panel (EMT7) 100W x 3nos.
- EMT6B : Voltmeter(600V), Ammeter(5A)
- Inductive Load panel (EMT15A) (Optional).
- Optionally 3? step down (430/110Vac) Isolation Transformer or 3? dimmer of 500VA may be ordered from safety point of view.
- Optional 3 phase induction motor (F.H.P.).

### Experiments covered

- ? Study of 3 phase SCR cosine firing circuits
- ? 3 Phase half bridge uncontrolled
- ? Full bridge uncontrolled
- ? Half bridge controlled
- ? Full bridge controlled
- ? Single phase cycloconverter (25Hz / 12.5Hz).
- ? 3 phase AC power control for resistive lamp load / 3? Induction motor (Optional).

## 2] Single phase dual converter trainer

### Electrical specifications

- 2 No. CTs (1A/ 30mA)to detect current zero condition in each converter bridge
- 2 No. current limiting chokes with rating 750mH/1A
- 15W/60W lamp loads / DC motor 200Vdc/200W with1500rpm.
- 4 SCR based full bridge output 0V-195V / 3 Amp, cosine firing with linear characteristics

### Panels Needed

- Instrumentation power supply panel (EMT8).
- 2 Nos. of SCR actuator panels as Forward & Reverse controlled converter (EMT9 \* 2 nos.)
- Single phase dual converter controller panel (PE5).
- 1phase MCB isolator panel (EMT16).

### Experiments covered

- ? Study of Dual converter topology & control strategy.
- ? Study of Dual converter operation : Resistive load / motor load.

### 3] Motor speed control trainer

Motor	DC Full wave converter	AC Controller
<b>Method</b>	PMDC 200V/200W motor Optional: i) 160W/180V shunt motor <b>OR</b> ii) 300W/180V DC motor with series shunt & compound winding	Fractional HP Universal AC/DC motor 230V AC / 1/12HP
<b>Mechanical</b>	Chasis mounted table top with brake pulley and spring balance (5kg).	
<b>Speed feed back</b>	Electronic : Tacho 0.5V/1000RPM, Optionally 10V/1000RPM electrical tacho only if PMDC motor ordered.	Electronic tacho 0.5V/1000RPM
<b>Panels</b>	? EMT8 : Instrumentation power supply. ? EMT9 : Variable thyristor controlled power for Armature supply, One more EMT9 needed only if DC shunt motor ordered as field supply. ? EMT6B : Voltmeter (300V), Ammeter (6A), Optional additional DC voltmeter with FF relay if DC shunt motor ordered.	? EMT8 : Instrumentation power supply. ? EMT9 : Variable thyristor controlled power for Armature supply. ? EMT6 : Voltmeter (300V), Ammeter (1A).
<b>Experiments</b>	? Open loop torque speed characteristics. ? Closed loop speed control using Armature voltage / speed feed back using P/PI mode	? Open loop torque speed characteristics. ? Closed loop speed control using speed feed back with <b>AC controller</b> using P/PI mode.

### 4] UPS Trainer (OFF line)

#### Electrical Specification

- ✍ Input Range is 170 – 270V A.C. / 50Hz.
- ✍ Output ( Input present) 195 – 250V sine.
- ✍ Output ( Input unhealthy/ absent) 230 +/- 5% Quasi-sine.
- ✍ Capacity 200W lamp load on AVR.
- ✍ Battery 12V / 7Ah, 'Panasonic' (maintenance free lead acid).
- ✍ Backup of 5 mins on 200W lamp load or 20 min. on one PC with colour monitor (14").
- ✍ Test points provided are 17

#### Panels needed

- ✍ Input / Output Module / UP1.
- ✍ Battery / Transformer Module / UP2.
- ✍ AVR / Charger Module / UP3.
- ✍ Inverter Module / UP4.

#### Experiments covered:

- ? Study of charger
- ? Study of Inverter
- ? Study of UPS

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