

# FOUR QUADRANT CHOPPER TRAINER (Model : XPO-4Q)



## SALIENT FEATURES

- ◆ Facilitates easy & safe wiring by students due to 4mm sturdy shrouded banana patch cords and shrouded socket arrangement to try out different topologies for high voltage circuits.
- ◆ Each panel has ABS molded plastic sturdy enclosure, and colorful screw less overlays showing circuit diagram & its connection tag numbers for easy understanding, connections & servicing by swapping at site.
- ◆ Study of different types of choppers i.e. Type-A, Type-B, Type-C, Type-D and Type-E (first quadrant to fourth quadrant).
- ◆ Set of Instructor Guide & Student Workbook.
- ◆ Inbuilt IC based PWM control with variable duty cycle & variable frequency (1-20KHz).
- ◆ 4 independent IGBTs with built in driver & 2KV isolation provided for TTL level driver. Thus easy for site servicing, Optionally 2 hall current sensors one for load & one for source supplied.

## TECHNICAL SPECIFICATIONS

A] Aluminum profile modular flat demo panel rack (4X2) system, carrying various high voltage components housed in plastic enclosures (panel) to minimise shock possibility.

- ◆ **Instrumentation Power supply cum Multichannel DPM panel (EMT 8)** (6 Shrouded Banana)
  - DC Multi Output power supply.
  - Supplies DC power to neighboring signal conditioning circuit panels like EMT9, CIP1, CIP2, MIT12, CE7 etc. through 20 pin FRC cable.
  - Provides 1 Ph. AC supply through 3 MCB's, 4A each to power up other panels in the rack.
  - Optionally Multichannel 4 position DPM for Speed, Torque etc.
  - Green SBS5 socket is provided for extend earth.
- ◆ **4 IGBT/MOSFET power & sensing panel (PE7)** (37 Shrouded Banana)
  - 1200V/40A IGBT with isolated (LV) TTL compatible isolated driver circuit & individual heat sink 4 nos.
  - DC current measurement using 0.5E/5W series resistor default or optionally hall sensors (Max I/P up to 10A, 50/60Hz), isolation up to 2KV, O/P=0-3V for controller feedback.
  - DC voltage measurement using DC meter panel.
  - IC3525 based PWM control with variable duty cycle (5%-90%) & variable frequency (1-20KHz)
- ◆ **Diode Bridge & LC filter panel (PE8B)**
  - Power supplies isolated 2 nos. 24V@3A & 12V@750mA with loading resistors provided to prevent voltage built up.
  - 2.5mH@5A inductor as load supplied.
  - RC components : Capacitors : 0.1uF/63V, 25uF/63V. Resistors : 0.5E/5W - 2 Nos, 5E/5W. Diode bridge : 1000V/35A.
- ◆ **DC Voltmeter & Ammeter panel (EMT6D)** (8 Shrouded Banana)
  - Voltmeter (300V-0-300V) & Ammeter (2A-0-2A)
- ◆ **DC Voltmeter & Ammeter panel (EMT6E)** (8 Shrouded Banana)
  - Voltmeter (30V-0-30V) & Ammeter (2A-0-2A)
- ◆ **PMDC Motor Specifications:**
  - 200V/200W/2000RPM Chassis mounted table top with optionally spring balance loading arrangement [10kg] 10V/1000RPM. **Weight : 12 Kg.**
- ◆ **Variable AC & DC Supply Panel (EMT23)** (8 Shrouded Banana)
  - Variable O/P : AC 0-270V/3A
  - Variable O/P : DC 0-250V/3A
- ◆ **Resistive Load (EMT14B)**
  - DC Resistors : 750E/600E/300E/212E/162E/125E/112E/100E/

400W/8 taps +OFF+separate 60E tap for DC series Gen.

## List of Experiment :

1. Study of first quadrant chopper or Type-A chopper.
2. Study of second quadrant chopper or Type-B chopper.
3. Study of two quadrant type-A chopper or Type-C chopper.
4. Study of two quadrant type-B chopper or Type-D chopper.
5. Study of fourth quadrant chopper or Type-E chopper.
6. Four quadrant 200V/200W PMDC motor chopper drive.
7. Resonant converter

## Accessories (optional) -

- 1) Single IGBT module mounted on 140x40mm heat sink.
- 2) Single phase rectifier pack mounted on heat sink.

- ◆ **Mechanical Dimension(mm):** 960(L) x 545(H) x 300(W)

## IGBT/MOSFET Module (MOQ=Multiple of 15)



## Technical Specifications-

- 1) **IGBT/MOSFET** module mounted on 140x40mm finned heat sink with drain & source outputs brought out on 2 solder pads connected to 100mm x 1.5 Sq.mm flying leads terminated on screw less press fit HV WAGO connectors. Forced air cooling (CFM=85) needed else derate by approximately (~50)%.
- 2) **Power device :** IGBT (Package-TO 247)1200V/40A with built in short circuit sustainability upto 4 μsec. OR optionally MOSFET 800V/17A (or your choice).
- 3) **Protection:** i) Over temperature using NTC @ 85°C ii) Over current using ferrite CT (1:100) iii) Transient high voltage Snubber using RC with 800V clamping voltage transient suppressor.
- 4) **Drive supply :** External 12V/100mA supply needed through 4-pin relimate connector while built in transformer (2KV) isolated DC-DC converter inside.
- 5) **Drive input :** Opto isolated O/C TTL @10mA, Max switching frequency DC to 25 KHz, propagation delay opto isolated trip feedback signal provided using 5-pin relimate connector.
- 6) **Indication :** Power ON green LED & red trip LED provided on module.