

**Sciencetech 2700 High Voltage Power Electronics Lab** is a compact, ready to use experiment workbench. In this particular workbench there are various applications and experiments of Power Diode and SCR on the workbench with different load configuration.

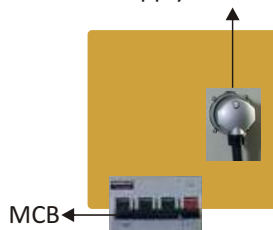
Sciencetech 2700 High Voltage Power Electronics Lab covers the principles and operation of Single Phase and Three Phase Thyristor control circuits.

Sciencetech 2700 High Voltage Power Electronics Lab has economically designed in vertical position and with sufficient space for working, this workbench is available with table and without table .



Three Phase Supply socket to supply instruments

Locking mechanism



<b>WorkStation Configuration Details</b>	
<b>Measuring Instruments</b>	Digital Storage Oscilloscope (DSO) PowerScope AC Voltmeter AC Ammeter DC Voltmeter DC Ammeter
<b>Power Electronics Module</b>	PM01 Diode Assembly PM02 SCR Assembly PM03 IGBT Assembly
<b>Gate Firing Circuits</b>	PE21 Ramp Comparator Firing Circuit PE22 Three Phase Firing Circuit PE24A Cycloconverter Firing Circuit PE27 Microcontroller Based Firing Circuit PM18 Single Phase and Three Phase Inverter firing circuit for IGBT module
<b>Optional Modules</b>	
Gate Firing Circuits (Optional)  <b>Power Electronics Module            (Optional)</b>	PE25 Ramp & Pedestal Firing Circuit PE26 Cosine Firing Circuit  PM04 Three Phase Diode Bridge Rectifier PM05 Three Phase Semiconverter PM06 Three Phase SCR Bridge Rectifier PM07 Three Phase Half Wave AC Voltage Controller PM08 Three Phase Full Wave AC Voltage Controller PM09 AC Voltage Control By TRIAC PM10 Single Phase Half and Full Wave AC Voltage Controller PM11 Single Phase Half Wave Converter Drive PM12 Single Phase Semiconverter Drive PM13 Single Phase Full Wave Converter Drive PM14 Three Phase Half Wave Converter Drive PM15 Single Phase Bridge Inverter PM16 Three Phase Firing Circuit for Three Phase AC voltage Controller without neutral configuration PM17 Cycloconverter Firing Circuit with variable frequency

## Features

- **On Board (Mains) AC Power Supplies-**
  - Single Phase Power Supply
  - Three Phase Power Supply
- **On Board Step down AC Power Supplies-**
  - Single Phase Power Supply
  - Three Phase Power Supply
- **MCB Protected Single and Three Phase AC Supply**
- **Three Phase indicator (R-Y-B) at front panel**
- **On Board Oscilloscope with Power Scope**
- **On Board DC/AC Voltmeter and DC/AC Ammeter**
- **On Board Firing Circuits-**
  - Single Phase Firing Circuit
  - Three Phase Firing Circuit
  - Cycloconverter Firing Circuit
- **Test point are provided to observe waveforms at different blocks in Firing Circuit**
- **On Board Power Devices Assembly-**
  - Diode Assembly
  - SCR Assembly
  - IGBT Assembly
- **Internal RC snubber circuit in Power Circuit Module**
- **2 mm and 4 mm Socket provided to make different connections**
- **Easily replaceable Firing Circuit and Power Circuit Module**
- **Four 200 W Bulb as Lamp Load**
- **Universal Motor 1/8 HP as Motor Load**
- **Short Circuit Protection**
- **Easy to operate and understand**
- **Exhaust fan at back panel for cooling**

## Scope of Learning

### Study of Single Phase Uncontrolled Rectifier (Diode Rectifier)

- Half-Wave Rectifier on R Load, RL Load and Freewheeling Diode
- Full-Wave Mid-point Rectifier on R Load, RL Load and Freewheeling Diode
- Full-Wave Bridge Rectifier on R Load, RL Load and Freewheeling Diode

### Study of Single Phase Controlled Rectifier

- Ramp and Comparator Firing Circuit
- Half-Wave Rectifier on R Load, RL Load and Freewheeling Diode
- Full-Wave Mid-point Rectifier on R Load, RL Load and Freewheeling Diode
- Full-Wave Bridge Rectifier on R Load, RL Load and Freewheeling Diode
  - Full Converter
  - Semiconverter
    - ♦ Symmetrical Semiconverter (Common Cathode & Common Anode type)
    - ♦ Asymmetrical Semiconverter (Half Controlled & Full Controlled type)

### Study of Single Phase AC Voltage Controller

- Study of Cycloconverter Firing Circuit
- AC voltage on off control on R Load, RL Load and Freewheeling Diode
- Half Wave AC voltage controller on R Load, RL Load and Freewheeling Diode
- Full Wave AC voltage controller on R Load, RL Load and Freewheeling Diode
- Cycloconverter on R Load, RL Load and Freewheeling Diode

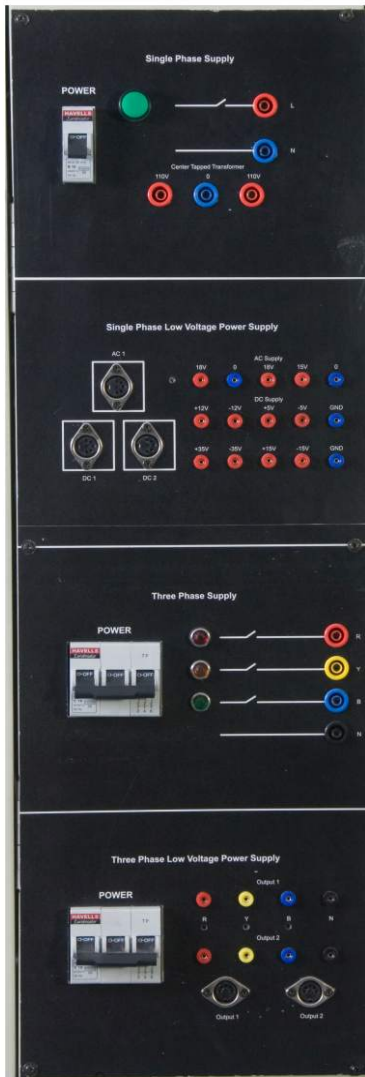
### Study of Three Phase Uncontrolled Rectifier (Diode Rectifier)

- Half-Wave Rectifier on R Load, RL Load and Freewheeling Diode
  - Common Cathode Configuration
  - Common Anode Configuration
- Full-Wave Bridge Rectifier on R Load, RL Load and Freewheeling Diode

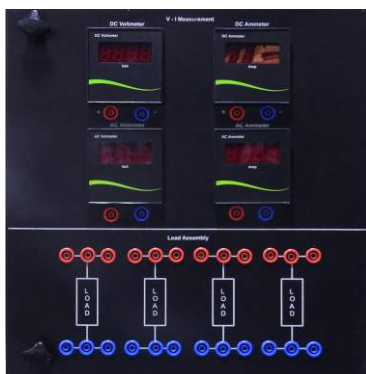
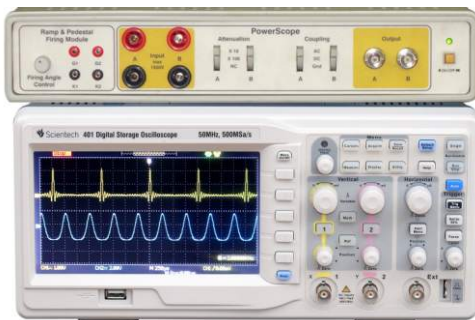
### Study of Three Phase Controlled Rectifier

- Three Phase Firing Circuit
- Half Wave Controlled Rectifier common cathode configuration on R Load, RL Load and Freewheeling Diode
- Semiconverter on R Load, RL Load and Freewheeling Diode
- Half Wave AC Voltage Controller on R Load, RL Load and Freewheeling Diode
- Full Wave AC Voltage Controller on R Load, RL Load and Freewheeling Diode

### Supply Section



### Measurement Section



### Technical Specifications

MCB (Power Switch)	: Single Phase 10A
MCB (Power Switch)	: Three Phase 10A
Single Phase AC Power Supply	: 230V, $\pm 10\%$ , 50Hz
	: 115V - 0 - 115V $\pm 10\%$ , 2A
Single Phase Low Voltage AC Power Supply:	: 18V - 0 - 18V, 15V-0
Low Voltage DC Power Supply	: +30V, -30V 250mA
	: +15V, -15V 250mA
	: +12V, -12V 500mA
	: +5V, -5V 500mA
Three Phase AC Power Supply	: 230V Phase voltage $\pm 10\%$ 50Hz
	: 440 Line voltage $\pm 10\%$ 50Hz
Three Phase Low Voltage	: 15V Each Phase $\pm 10\%$ , 50Hz
	: Power Supply
Interconnections	: 2mm & 4mm Safety Socket
Diode Assembly	: Diode 6A10 1000V/6A
SCR Assembly	: TYN 616 600V/16A
IGBT Assembly	: IGBT G4BC20S 600V/10A
<b>Gate Firing Circuits</b>	
Single Phase Firing Circuit	: Ramp Comparator Firing Circuit (Firing Angle Control 30-180°)
Three Phase Firing Circuit	: Three Phase Firing Circuit (Firing Angle Control 30-150°)
Cycloconverter Firing Circuit	: Cycloconverter Firing Circuit (Firing Angle Control 30-180°)
Single Phase and Three Phase Inverter firing circuit	: Firing Pulse - 50Hz Square Wave with 10Vpp

### Measuring Instruments

#### Digital Storage Oscilloscope

Bandwidth	: 50MHz
Realtime Sample Rate	: 500MSa/s (Single Channel)
Equivalent Sample Rate	: 50GSa/s
Number of Channels	: 2 CH +1 Ext
Memory Depth	: 32 Kpts (Single Channel)
Acquisition Modes	: Normal/Average/Peak Detect
Average	: Selectable from 4 to 256
Vertical Sensitivity	: 2mV/div - 10V/div
Vertical Resolution	: 8bits
Input Impedance	: 1 M $\Omega$ $\pm 2\%$    17 pF $\pm 3$ pF
Input Coupling	: DC, AC and GND
Maximum Input Voltage	: $\pm 400$ Vpp

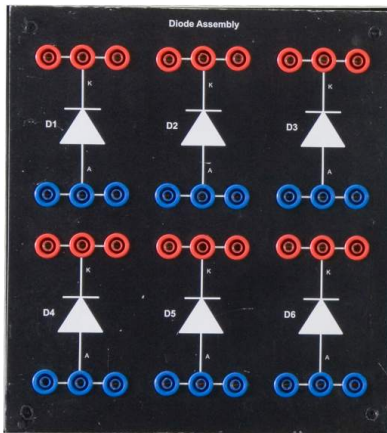
#### Power Scope:

Digital AC Voltmeter	: 1500V Isolated measurement
Digital AC Voltmeter	: 0-500V AC Voltage Measurement
Digital AC Ammeter	: 0-25A AC Current Measurement
Digital DC Voltmeter	: 0-650V DC Voltage Measurement
Digital DC Ammeter	: 0-25A DC Current Measurement
Load Assembly	: R Load- Lamp Load (200W)-4nos.
	: L Load -Inductive Load
	: 300-350-400mH, 1.5A



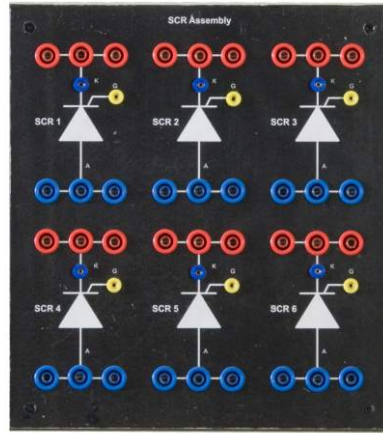
### Power Circuit Module

#### PM01 Diode Assembly



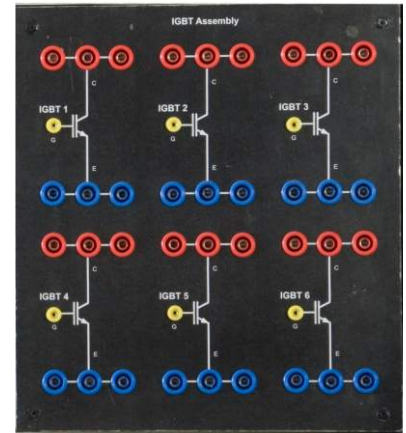
Diode : 6A10  
 Voltage : 1000 V  
 Current : 6 A  
 Safety Terminal : 4 mm socket

#### PM02 SCR Assembly



SCR : TYN 616  
 Voltage : 600 V  
 Current : 16 A  
 Safety Terminal : 4 mm socket  
 Snubber : RC Snubber Protected

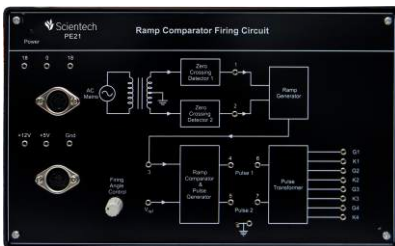
#### PM03 IGBT Assembly



IGBT : G4BC20S  
 Voltage : 600 V  
 Current : 10 A  
 Safety Terminal : 4 mm socket  
 Snubber : RC Snubber Protected

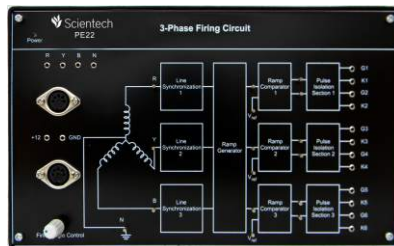
### Firing Circuit Module

#### PE21 Ramp Comparator Firing Circuit



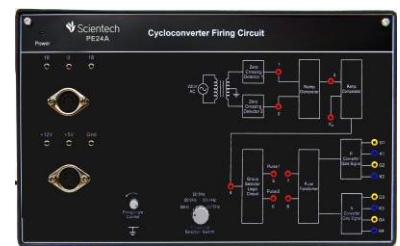
Power Supply : 15 V - 0 (AC Supply)  
 +12V & Gnd (DC Supply)  
 Firing Angle : 30 -180° variable  
 Terminal Socket: 2 mm.

#### PE22 Three Phase Firing Circuit



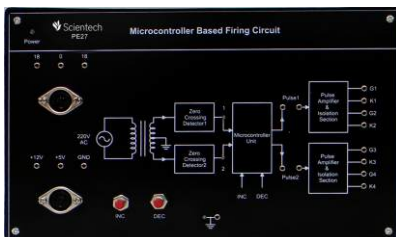
Power Supply : R, Y, B & N output1  
 Three Phase Low Voltage  
 Power supply  
 +12V & Gnd (DC Supply)  
 Firing Angle : 30 -150° variable  
 Terminal Socket: 2 mm.

#### PE24A Cycloconverter Firing Circuit



Power Supply : 18 V - 0 - 18 V  
 (AC Supply)  
 +12 V, +5 V & Gnd  
 (DC Supply)  
 Firing Angle : 30 -180° variable  
 Terminal Socket : 2 mm.

#### PE27 Microcontroller Based Firing Circuit



Power Supply : 18 V - 0 - 18 V (AC Supply)  
 +12 V, +5 V & Gnd (DC Supply)  
 Terminal Socket : 2mm

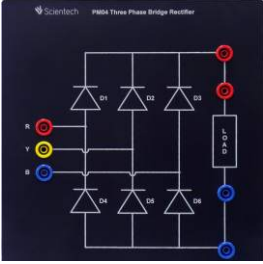
#### PM18 Single Phase and Three Phase Inverter Firing Circuit



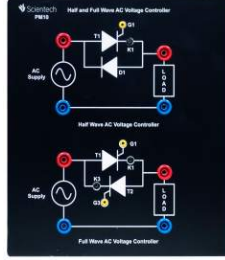
Mains Supply : 230 V ± 10%, 50 Hz  
 Firing Pulse ( $V_{GE}$ ) : 50Hz Square Wave with 10Vpp  
 Fuse : 1A  
 Test points : 24 numbers

### Optional Firing Circuit

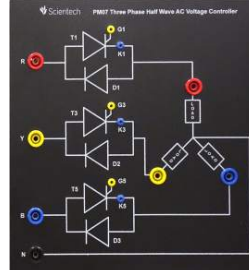
PM04 Three Phase Diode Bridge Rectifier



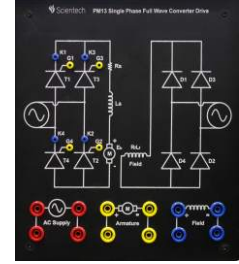
PM10 Single Phase Half and Full Wave AC Voltage Controller



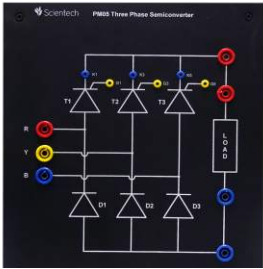
PM07 Three Phase Half Wave AC Voltage Controller



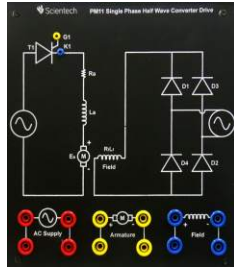
PM13 Single Phase Full Wave Converter Drive



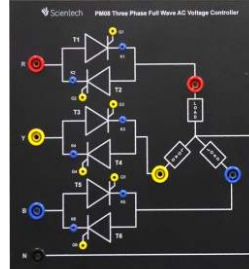
PM05 Three Phase Semiconverter



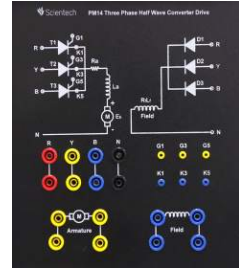
PM11 Single Phase Half Wave Converter Drive



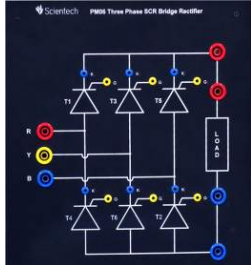
PM08 Three Phase Full Wave AC Voltage Controller



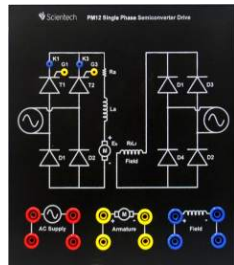
PM14 Three Phase Half Wave Converter Drive



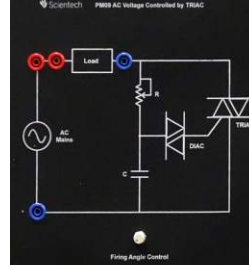
PM06 Three Phase SCR Bridge Rectifier



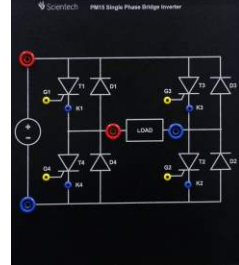
PM12 Single Phase Semiconverter Drive



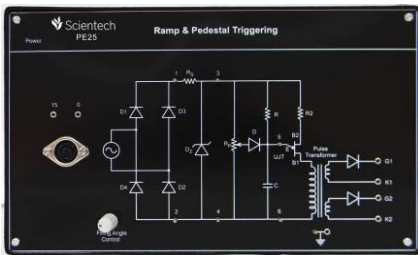
PM09 AC Voltage Control By TRIAC



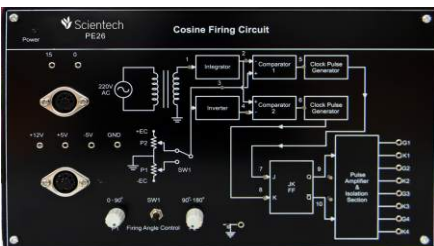
PM15 Single Phase Bridge Inverter



PE25 Ramp & Pedestal Triggering



PE26 Cosine Firing Circuit



PM16 Three Phase Firing Circuit for Three Phase AC voltage Controller without neutral configuration

