

Features

- The trainer is designed to teach the fundamental of 8 bit industrial microprocessor. Compact model-only on a single high quality double side board-to make the trainer easy to carry.
- No external software needed to use this trainer, simply type the user program sequence to the trainer on built in keypad.
- Easy to check and change the contents of the registers on microprocessor.
- User's program can run in step by step mode or continuous running.
- User's program can be written in assembly language or BASIC.
- All input output lines and microprocessor buses are available for off-board expansion.
- Provide audio tape interface to record user's program on a cassette and can be reloaded to the trainer in a simple way.
- Wide breadboard area is provided to build an external circuit.
- Complete with comprehensive experiment manual and user's manual book to guide student step by step in conducting experiments.

Microprocessor Trainer

PT 980401



Covered Topics

- DE04001E Introduction to Microprocessor Trainer
- DE04002E Data Transfer Experiment
- DE04003E Basic Application of Arithmetic And Logic Operation
- DE04004E Subtract and Adder Instruction
- DE04005E Loop Program and Branch Instruction
- DE04006E Subroutine and Stack
- DE04007E Rotate, Shift, Instruction and Multiple Routine
- DE04008E Divide Instruction
- DE04009E Binary to BCD Conversion Program
- DE04010E BCD to Binary Conversion Program
- DE04011E Square Program
- DE04012E Game
- DE04013E Stop Watch
- DE04014E Clock
- DE04015E Telephone Tone
- DE04016E Microcomputer Organ
- DE04017E Music Box

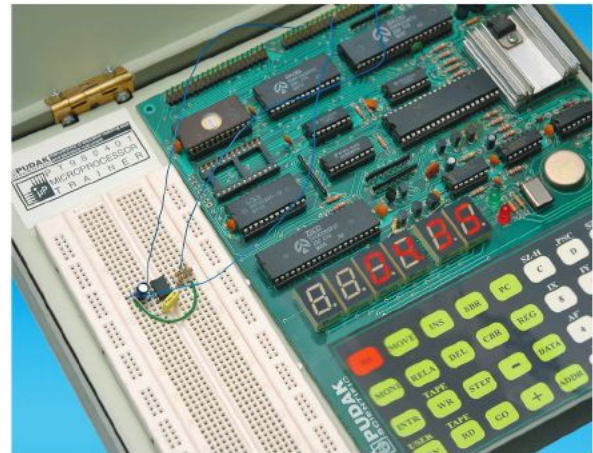
Specification

- | | |
|-----------------------------|--|
| • Processor | : Zilog Z-80 |
| • ROM | : 4KB |
| • RAM | : 2KB, expanded to 4KB |
| • Programmable input output | : Z80 PIO 16 bit I/O lines |
| • Controller Timer Counter | : Z80 CTC 4 independent timer counter |
| • Seven Segment | : 6 Digit for data and address display |
| • Speaker | |
| - Impedance | : 8Ω |
| - Power | : 0.5W |
| - Audio drive included | |
| • Keypad | : 36 keys for data and function entry |
| • Keypad Template | : BASIC and Assembler |
| • Breadboard | |
| • Audio Tape Interface | |

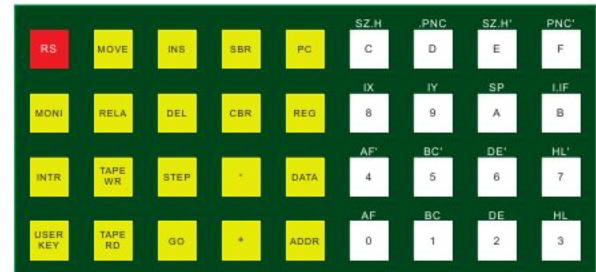
Training Panel System

PT980401 Microprocessor Trainer consists of

Cat. No.	Description	Qty.
PT980401	Microprocessor Trainer Board	1 pc
PEL 223 01	Assembler Keypad Template	1 pc
PEL 223 02	BASIC Keypad Template	1 pc
D04S-01E	Experiment Manual Book	1 pc
D04M-01E	User's Manual Book	1 pc
D04M-02E	Monitor Source Program Listing Book	1 pc



Realtime Clock Using IC 555



Assembler Keypad Template
PEL 223 01



BASIC Keypad Template
PEL 223 02

Features

- The Microcontroller trainer is designed to teach the fundamental knowledge of hardware and software of a microcontroller.
- The trainer can be used to demonstrate various device interfacing with microcontroller.
- Provide test point for investigate write or read timing sequence of microcontroller when accessing to another unit. Investigating can be done by using logic probe or logic analyzer.
- Each peripheral unit equipped with selectable DIP-switch for easy to change address of peripheral unit.
- Modules are equipped with over voltage and over current protector to protect module from damage possibility.
- The system consist of modular block to enable the student to learn the microcontroller in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Covered Topics

- DE05001E Introduction to 8031 Central Processing Unit
- DE05002E Interfacing with Digital to Analog Converter
- DE05003E Interfacing with Analog to Digital Converter
- DE05004E Interfacing with Programmable Digital Peripheral Interface
- DE05005E Interfacing with Programmable Serial Communication Interface
- DE05006E Seven Segment
- DE05007E LED Matrix
- DE05008E Stepper Motor
- DE05009E Traffic Light

Microcontroller Trainer

PT 981702



Specification

- **8031 Central Processing Unit [PTE-026-01]**
 - Based on 8031 microcontroller
 - Clock system: 11.0592MHz or manual clock by pushbutton
 - Program files download via PC USB port (PC not included)
 - EPROM program storage replaced by 8Kbytes RAM
 - External memory: 8Kbyte
 - 2 × 13 bus connectors to connect with other devices
 - RS232 converter
- **Parallel Input/Output [PTE-026-02]**
 - Programmable input output: 3 × 8 bit
 - 2 × 13 bus connector to connect with other devices
 - Device addressing : selectable by DIP-switch
 - Provide test point
- **Serial Input/Output [PTE-026-03]**
 - Programmable serial input output
 - Device addressing : selectable by DIP-switch
 - Provide test point
 - Provide RS 232
 - 2 × 13 bus connectors to connect with other devices
- **Analog to Digital Converter [PTE-026-04]**
 - Resolution : 8 bit
 - Conversion time : 100 microseconds
 - Voltage input : -10V – +10V
 - Provide test point
 - Device addressing : selectable by DIP-switch
 - 2 × 13 bus connectors to connect with other devices
- **Digital to Analog Converter [PTE-026-05]**
 - Resolution : 8 bit
 - Output voltage : -10V – +10V
 - Provide test point
 - Device addressing : selectable by DIP-switch
 - Provide 2 × 13 bus connectors to connect with other devices
- **LED Matrix [PTE-026-06]**
 - Input voltage : +5V
 - Large 5 × 7 LED matrix
 - Connected by 4mm connector
 - Drive by transistor

Continue >>

Training Panel System

>> Specification Continued

- **Seven Segment [PTE-026-07]**
 - Common voltage : +15V
 - Large seven segment (two colors)
 - Type : common anode
 - Drive by transistor

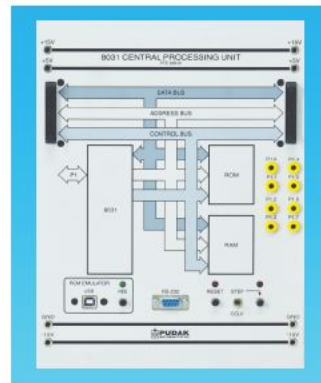
- **Loud Speaker [PTE-026-08]**
 - Impedance : 8Ω
 - Power : 1W
 - Power amplifier : 1W

- **Power Supply [PTE-026-09]**
 - Input voltage : 220V – 240V, 50Hz
 - Output voltage : +15V, 1.5A
+5V, 1.5A
-15V, 0.5A

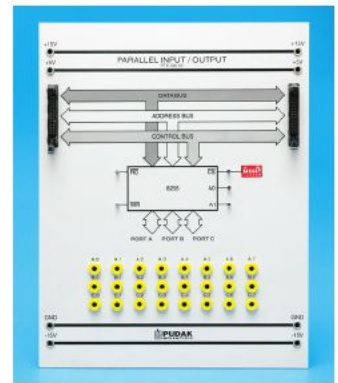
- **Traffic Light Model [PTE-MP1-01]**
 - Traffic light model to simulate junction of main road and a branch/minor road traffic light system

- **Stepping Motor [PTE-MP1-02]**
 - Unipolar motor stepper
 - Built in motor stepper controller:
 - Full and half step
 - CW and CCW direction
 - Controlled by built in controller or external logic control
 - Active coil of stepper motor indicated by LED

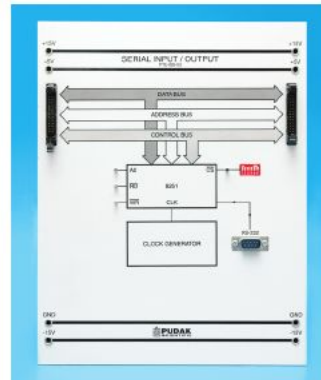
PT981702 Microcontroller Trainer consists of		
Cat. No.	Description	Qty.
PTE-026-01	8031 Central Processing Unit	1 pc
PTE-026-02	Parallel Input/Output	1 pc
PTE-026-03	Serial Input/Output	1 pc
PTE-026-04	Analog to Digital Converter	1 pc
PTE-026-05	Digital to Analog Converter	1 pc
PTE-026-06	LED Matrix	1 pc
PTE-026-07	Seven Segment	1 pc
PTE-026-08	Loud Speaker	1 pc
PTE-026-09	Power Supply	1 pc
PTE-MP1-01	Traffic Light Model	1 pc
PTE-MP1-02	Stepping Motor	1 pc
GSE 230 15	Standard Serial Cable	1 pc
GSE 230 11	Expansion Connecting Lead, 2 × 13 pin	4 pcs
FLS 20.02/097	Connecting Cross	50 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	50 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	10 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	10 pcs
GSC 700 01	CD PT981702 Microcontroller Trainer	1 pc
D05S-01E	Experiment Manual Book	1 pc
GSN 245	TPS Frame 1200mm	1 set



8031 Central Processing Unit
PTE-026-01



Parallel Input / Output
PTE-026-02



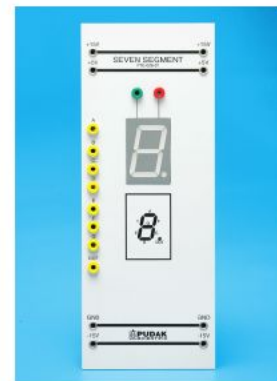
Serial Input / Output
PTE-026-03



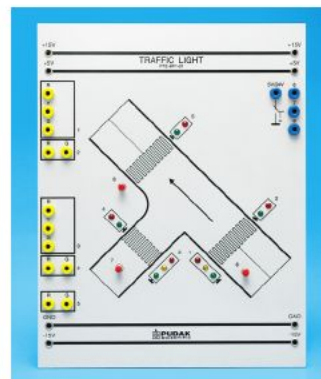
A/D Converter
PTE-026-04



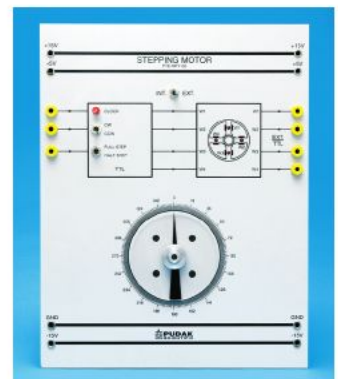
LED Matrix
PTE-026-06



Seven Segment
PTE-026-07



Traffic Light
PTE-MP1-01



Stepping Motor
PTE-MP1-02

Specifications and illustrations are subject to change without prior notice

Features

- The trainer is designed to teach the fundamental concept of servo system.
- The trainer will bring fast and easy for the student to understand the servo characteristic, drive technique and control.
- The student will also learn both of analog and digital PID control systems.
- Featuring speed or position data sample recording with adjustable sampling time on digital PID unit, make the student can plot and analyze servo control process using this sampled data.
- The system consist of modular block to enable the student to learn the servo system in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Covered Topics

- DE02001E Concept of a PWM Generator and it's Generation
- DE02002E Encoder as a Feedback
- DE02003E Identification of a Plant Characteristic
- DE02004E Open Loop Speed Controller
- DE02005E Closed Loop Speed Controller
- DE02006E Digital Control For Servo Motor Speed (Closed Loop)
- DE02007E Digital Control For Servo Motor Position (Closed Loop)

Servo Trainer

PT 93221



Specification

- **Analog PID Unit [PTE-014-01]**
 - Input voltage : -10V – +10V
 - Output voltage : -10V – +10V
 - Proportional rate : 0 – 10
 - Correction time : 0 – 100 ms
 - Rate time : 0 – 100 ms
- **PWM Generator [PTE-014-02]**
 - Input voltage : -10V – +10V
 - Output voltage : 0V – +10V
 - Frequency : 30KHz
 - Duty cycle : 0% – 100%
- **Motor Drive [PTE-014-03]**
 - H-bridge transistor
 - Opto isolated input
 - Input voltage : +10V
 - Output voltage : 0V – +10V
- **Motor Assembly [PTE-014-04]**
 - DC servo motor
 - Input voltage : +12V
 - Power : 26W
 - Gear head : 14:1
 - Optical encoder output : +5V dual channel square waves phase shift
 - Pulse output : 2484 pulse/ rotation
 - DC load motor
- **Encoder Conditioner [PTE-014-05]**
 - Input : 2 channels +5V square wave
 - Output : - 2 channel digital : +5V square waves
 - 1 channel speed : 0V – +10V
 - 1 channel velocity : -10V – +10V
 - 1x and 2x digital square wave output multiplier
- **Digital Control Unit [PTE-014-06]**
 - Based on microcontroller, able to control speed or position
 - Display : 2 x 16 character Liquid crystal display
 - Kp : 0 – 99
 - Tn : 0 – 99
 - Tv : 0 – 99

Continue >>

Training Panel System

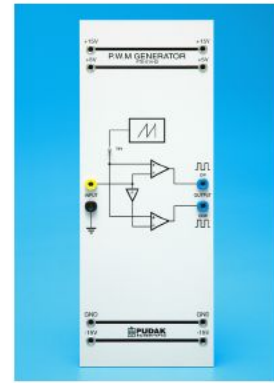
>> Specification Continued

- Sampling rate : 2ms – 10ms
- Able to record the data of speed or position
- Keypad function and data entry
- Input feedback : 2 digital square wave
- Output voltage : -10V – +10V

- **Analog Summing Block [PTE-014-07]**
 - Input voltage : -10V – +10V
 - Input feedback : -10V – +10V
 - Output voltage : -10V – +10V
- **Loading Control [PTE-014-08]**
 - Able to control DC motor as a load on Motor Assembly unit
 - Direction : CW or CCW
 - Torque : 0 – 750mNm
- **Tachometer [PTE-014-09]**
 - Input voltage : 0V – +10V
 - RPM output : 0 – 300 rpm
- **Potentiometer [PTE-014-10]**
 - Output voltage : Internal or external
 - Internal output voltage : -10V – +10V or 0 – +10V
- **Function Generator [PTE-014-11]**
 - Wave form : Square, triangle and pulse
 - Frequency range : 10Hz – 2kHz
 - Duty cycle : 0 – 100 %
 - Output level voltage : 0V – +/-10V
 - Pulse voltage output : +5V, +15V
- **Power Supply [PTE-014-12]**
 - Input voltage : 220 – 240V, 50Hz
 - Output voltage : +15V, 1.5A
+5V, 1.5A
-15V, 0.5A



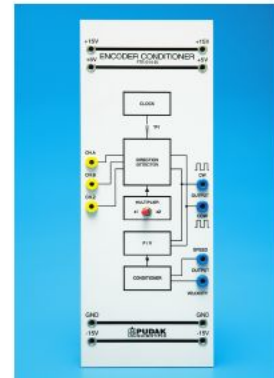
PDP Unit
PTE-014-01



P.W.M Generator
PTE-014-02

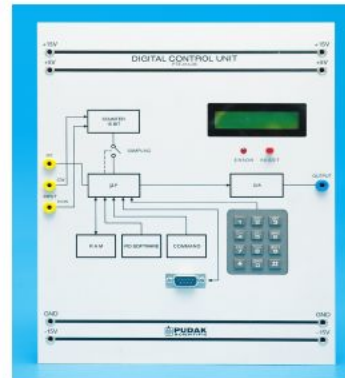


Motor Assembly
PTE-014-04



Encoder Conditioner
PTE-014-05

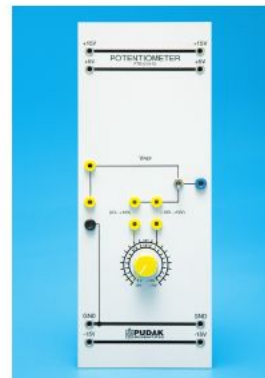
PT 93221 Servo Trainer consists of		
Cat. No.	Description	Qty.
PTE-014-01	Analog PID Unit	1 pc
PTE-014-02	PWM Generator	1 pc
PTE-014-03	Motor Drive	1 pc
PTE-014-04	Motor Assembly	1 pc
PTE-014-05	Encoder Conditioner	1 pc
PTE-014-06	Digital Control Unit	1 pc
PTE-014-07	Analog Summing Block	1 pc
PTE-014-08	Loading Control	1 pc
PTE-014-09	Tachometer	1 pc
PTE-014-10	Potentiometer	1 pc
PTE-014-11	Function Generator	1 pc
PTE-014-12	Power Supply	1 pc
FLS 20.02/097	Connecting Cross	60 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	15 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	10 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	10 pcs
KAL 99/30-100	Connecting Lead 100cm, Blue	10 pcs
D02S-01E	Experiment Manual Book	1 pc
GSN 245	TPS Frame 1200mm	1 set



Digital Control Unit
PTE-014-06



Tachometer
PTE-014-09



Potentiometer
PTE-014-10



Function Generator
PTE-014-11

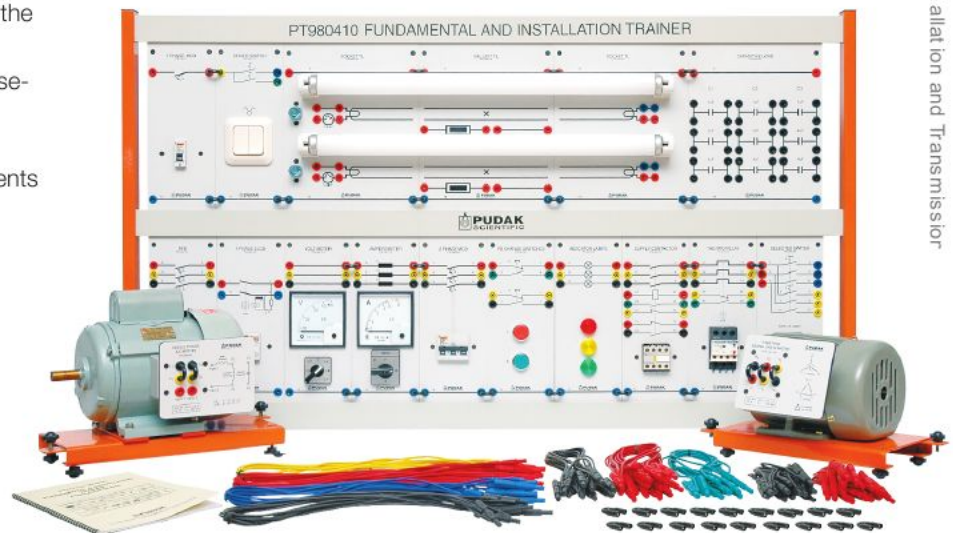
Specifications and illustrations are subject to change without prior notice

Features

- The trainer is designed to provide student with a good foundation in electrical installation technology.
- The system consists of several modules which are suitable to study the electrical measurement, electrical installation and the troubleshooting of electrical installation.
- The trainer can be used to teach of household and industrial installation.
- The electrical control and installation technology are able to perform experiments such as:
 - Electrical Measurement
 - Basic Electrical Control
 - Electrical Installation
 - Power Factor Correction
 - Installation Troubleshooting.
- All inputs and outputs on each panel are equipped with safety socket and safety connecting cross 4-mm.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Fundamental of Installation Trainer

PT 980410



Specification

Covered Topics

- LE04001E Lamp Connection with Single Switch
- LE04002E Lamp Connection with Single Switch and Schuko Socket
- LE04003E Two Lamps Connection with Series Switch and Schuko Socket
- LE04004E Two Way Switching (One Lamp with Change-Over Switch)
- LE04005E Power Factor Correction for Fluorescent Lamp Circuit
- LE04006E Control System Using Magnetic Switch
- LE04007E Control System Using Magnetic with Over Load Protection
- LE04008E Control System Using Magnetic Switch Operated More than One Control Point
- LE04009E Jogging/ Inching Control
- LE04010E Clockwise and Counter Clockwise System Control
- LE04011E Time-Delayed Lighting
- LE04012E Contactor Circuit with Time Delay Relay
- LE04013E Star-Delta Circuit
- LE04014E Sequential Circuit with Two Contactors
- LE04015E Speed Control for Three Phase Induction Motor
- LE04016E One Phase Motor with Magnetic Contactor
- LE04017E Clockwise and Counter Clockwise System Control with Cam Switch

- **Three Phase Source [PTE-045-000]**
Main source voltage 230/ 380 VAC, load maximum 10A
- **NFB [PTE-045-001]**
3 main contact, switch load maximum 10A/15kA, and nominal voltage 220VAC
- **Three Phase ELCB [PTE-045-002]**
4 main contacts, 3 for line and 1 for neutral, switch maximum load 25A, nominal voltage 220VAC and fault circuit breaker 30mA
- **Three Phase MCB [PTE-045-003]**
3 main contacts and switch load maximum 25A / 380VAC, complete with fault simulator for L2 and L3 line on the cover panel.
- **Contactor [PTE-045-004]**
3 Main contact and 1 contact control NO, switch load maximum 25A / 380VAC, coil voltage 220VAC / 50Hz, complete with fault simulator for L1, L2 line and contact coil on the cover panel.
- **Timer Delay-ON [PTE-045-005]**
Time Delay setting range: 0.1 – 30 ms, 3 main contacts and 3 control contacts, 2 NO, 1 NC, switch load maximum 10A / 380VAC, nominal operating voltage 220VAC / 50Hz, complete with fault simulator for L2 line, contact coil and auxiliary contact NO on the cover panel.
- **Selected Switch [PTE-045-006]**
3 main contacts input, and 6 main contacts output, switch load maximum 3A / 220VAC
- **Push-Button Change Switches [PTE-045-007]**
2 unit push-button, 2 NC contacts and 2 NO contacts, switch load maximum 250VAC / 10A, complete with fault simulator on the cover panel.
- **Change-Over Switch [PTE-045-008]**
Flush mounting type 250VAC / 10A, complete with fault simulator for NC/NO contact on the cover panel.
- **Indicator Lamps [PTE-045-009]**
3 Lamp Indicator, lamp covers colors; red, yellow, green. Nominal voltage 220VAC
- **Lamp Socket [PTE-045-010]**
Nominal voltage 220VAC
- **Single Phase MCB [PTE-045-011]**
1 main contact and switch load maximum 25A / 380VAC

Continue >>

Training Panel System

>> Specification Continued

- **Single Phase AC Machine [PTE-045-012]**
Rating for machine operation, power 0.5 HP, nominal voltage 220VAC, 4 pole, frequency 50 Hz, Speed 1450 RPM
- **Supply Contactor [PTE-045-013]**
3 Main contact and 4 control contact, 2 NO and 2 NC, switch load maximum 25A / 380V, coil voltage 220VAC / 50Hz, complete with fault simulator for L2 line, contact coil and auxiliary NO contact on the cover panel.
- **Thermo Relay [PTE-045-014]**
3 pole, with overload trip with single phase, setting range: 1- 1.7A, auxiliary contacts: 1 NC, 1 NO, complete with fault simulator for L1 line and NC/ NO contact on the cover panel.
- **Single Switch [PTE-045-015]**
Flush mounting type 250VAC / 10A, complete with fault simulator on the cover panel.
- **Series Switch [PTE-045-016]**
Flush mounting type 250VAC / 10A, complete with fault simulator on the cover panel.
- **Schuko Socket [PTE-045-017]**
Flush mounting type 250V / 16A AC, 2 – pole with earthen contact
- **Voltmeter [PTE-045-018]**
Measuring range: 0 – 500VAC, instrument: moving coil meter, class 1.5, with selector switch for selecting the phase to measure
- **Amperemeter [PTE-045-019]**
Measuring range: 0 – 10A, instrument: moving coil meter, class 1.5, provided with three current transformers, built in selector switch for selecting the phase to measure
- **Single Phase ELCB [PTE-045-020]**
2 main contact for line and neutral, switch load maximum: 25A, nominal voltage 220VAC, faulty current circuit breaker 30mA
- **Three Phase Squirrel Cage AC Machine [PTE-045-021]**
Rating: power 3/4 HP, voltage 220 / 380VAC Y / D, 1400RPM
- **Socket Fluorescent Lamps Left [PTE-045-022]**
Maximum voltage 250VAC, 50Hz, maximum current: 3A, Starter + Socket; 20-40W
- **Ballast Fluorescent Lamps [PTE-045-023]**
Maximum voltage 250VAC, 50Hz, maximum current 3A
- **Socket Fluorescent Lamps Right [PTE-045-024]**
Maximum voltage 250VAC, 50Hz, maximum current: 3A
- **Capacitive Load [PTE-045-025]**
Maximum voltage 400VAC, capacitor 3 × 1μF ; 3 × 2μF ; 3 × 4μF



Single Phase AC Machine
PTE-045-012

Three Phase Squirrel Cage AC Machine
PTE-045-021



NFB
PTE-045-001



Timer Delay-ON
PTE-045-005



Thermo Relay
PTE-045-014



Amperemeter
PTE-045-019

>>

PT 980410 Fundamental And Installation Trainer consists of

Cat. No.	Description	Qty.
PTE-045-001	NFB	1 pc
PTE-045-002	Three Phase ELCB	1 pc
PTE-045-003	Three Phase MCB	1 pc
PTE-045-004	Contactor	1 pc
PTE-045-005	Timer Delay-ON	1 pc
PTE-045-006	Selected Switch	1 pc
PTE-045-007	Push-Button Change Switches	2 pcs
PTE-045-008	Change-Over Switch	2 pcs
PTE-045-009	Indicator Lamps	1 pc
PTE-045-010	Lamp Socket	2 pcs
PTE-045-011	Single Phase MCB	1 pc
PTE-045-012	Single Phase AC Machine	1 pc
PTE-045-013	Supply Contactor	3 pcs
PTE-045-014	Thermo Relay	1 pc
PTE-045-015	Single Switch	2 pcs
PTE-045-016	Series Switch	1 pc
PTE-045-017	Schuko Socket	1 pc
PTE-045-018	Voltmeter	1 pc
PTE-045-019	Amperemeter	1 pc
PTE-045-020	Single Phase ELCB	1 pc
PTE-045-021	Three Phase Squirrel Cage AC Machine	1 pc
PTE-045-022	Socket Fluorescent Lamps Left	1 pc
PTE-045-023	Ballast Fluorescent Lamps	1 pc
PTE-045-024	Socket Fluorescent Lamps Right	1 pc

Cat. No.	Description	Qty.
PTE-045-025	Capacitive Load	1 pc
PEO 101	Incandescent Lamp 230 VAC/40W	2 pcs
PEO 102	Fluorescent Lamp 230VAC/20W	2 pcs
GSE 233 02	Safety Connecting Lead 100cm, Red	12 pcs
GSE 233 04	Safety Connecting Lead 100cm, Yellow	10 pcs
GSE 233 03	Safety Connecting Lead 100cm, Blue	12 pcs
GSE 233 01	Safety Connecting Lead 100cm, Black	10 pcs
GSE 232 05	Safety Connecting Lead 50cm, Green	15 pcs
GSE 232 02	Safety Connecting Lead 50cm, Red	15 pcs
GSE 232 01	Safety Connecting Lead 50cm, Black	10 pcs
GSE 231 02	Safety Connecting Lead 30cm, Red	15 pcs
GSE 231 01	Safety Connecting Lead 30cm, Black	12 pcs
GSE 235	Safety Connecting Cross	50 pcs
L04S-01E	Experiment Manual Book	1 pc
GSN 245	TPS Frame 1200mm	1 set

>>

Specifications and illustrations are subject to change without prior notice

Features

- The system is modular and complete teaching system to familiarize the student on wide knowledge about how to control high power equipment with low voltage.
- The system consists of modular blocks to enable the student in learning lighting control in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- The trainer also demonstrates and explains clearly many aspects of solid state relay mechanism and low voltage controller type.
- All inputs and outputs on each panel are equipped with safety connecting lead, connecting lead, connecting cross and safety connecting cross 4-mm.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Training Set for Lighting Control

PT 981402



Covered Topics

- LE06001E Introduction to Low Voltage Control System
- LE06002E Touch Control Switch
- LE06003E Light Control Switch
- LE06004E Sound Control Switch
- LE06005E Solid State Relay Circuit
- LE06006E Output Circuit of Control
- LE06007E Low Voltage Control System Circuit

Specification

- **Touch Control Switch [PTE-027-01]**
 - Input voltage : 15VDC
 - Active indicator by LED
 - Provide test-point
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **Light Control Switch [PTE-027-02]**
 - Input voltage : 15VDC
 - Infra red light and sensor
 - Active indicator by LED
 - Provide test-point
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **Sound Control Switch [PTE-027-03]**
 - Input voltage : 15VDC
 - Mic condenser as sound sensor
 - Active indicator by LED
 - Provide test-point
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **Selector Switch [PTE-027-04]**
 - Input voltage : 15VDC
 - Selectable three input
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **SSR Device Circuit [PTE-027-05]**
 - Input voltage : 220VAC, 50Hz
 - Output voltage : 5VDC
 - Opto-coupler device
 - Provide test-point
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

Continue >>

Training Panel System

>> Specification Continued

- **Output Circuit [PTE-027-06]**
 - Input voltage : 220VAC, 50Hz
 - Bridge configuration and thyristor device
 - Output indicator, output voltage 220VAC, max. current 10A
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **Power Supply [PTE-027-07]**
 - Input voltage : 220V, 50Hz,
 - Output voltage : +15V, GND
max. current 1A

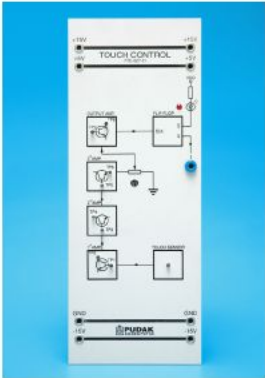
- **Application Circuit 1 [PTE-027-08]**
 - High quality lamp socket
 - Lamp : 40W, 220VAC
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **Application Circuit 2 [PTE-027-09]**
 - Input voltage : 220VAC, 50Hz
 - Warning light device
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

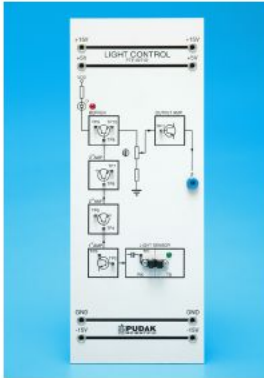
- **Application Circuit 3 [PTE-027-10]**
 - Input voltage : 220VAC, 50Hz
 - Siren device
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

PT 981402 Training Set for Lighting Control consists of

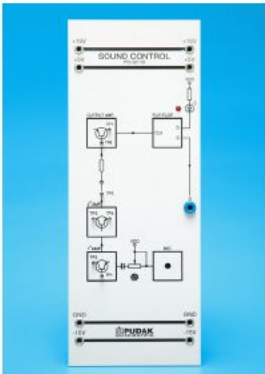
Cat. No.	Description	Qty.
PTE-027-01	Touch Control Switch	1 pc
PTE-027-02	Light Control Switch	1 pc
PTE-027-03	Sound Control Switch	1 pc
PTE-027-04	Selector Switch	1 pc
PTE-027-05	SSR Device Circuit	1 pc
PTE-027-06	Output Circuit	1 pc
PTE-027-07	Power Supply	1 pc
PTE-027-08	Application Circuit 1	1 pc
PTE-027-09	Application Circuit 2	1 pc
PTE-027-10	Application Circuit 3	1 pc
PEO 101	Incandescent Lamp 230VAC/ 40W	1 pc
GSE 233 03	Safety Connecting Lead 100cm, Blue	4 pcs
GSE 232 03	Safety Connecting lead 50cm, Red	6 pcs
KAL 99/40-030	Connecting Lead 30cm, Yellow	15 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	4 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	4 pcs
GSE 235	Safety Connecting Cross	10 pcs
FLS 20.02/097	Connecting Cross	20 pcs
L06S-01E	Experiment Manual Book	1 pc



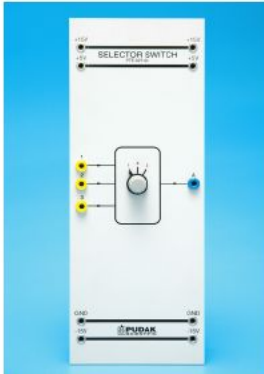
Touch Control
PTE-027-01



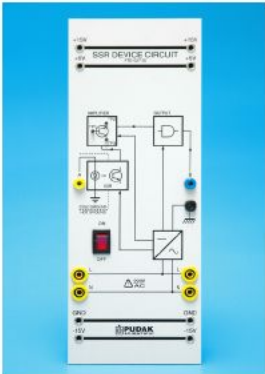
Light Control
PTE-027-02



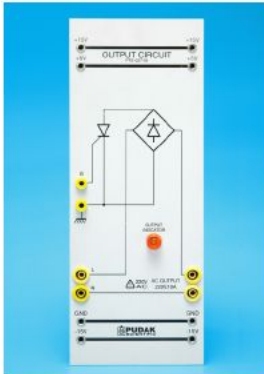
Sound Control
PTE-027-03



Selector Switch
PTE-027-04



SSR Device Circuit
PTE-027-05



Output Circuit
PTE-027-06



Application 2
PTE-027-09



Application 3
PTE-027-10

Specifications and illustrations are subject to change without prior notice

Features

- The trainer is an ideal trainer to teach the fundamental concept of electrical generation from solar energy. The trainer demonstrates the possibilities and the energy advantages offered by a direct utilization of solar energy.
- The system consists of modular blocks to enable the student in learning solar energy in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All DC inputs and outputs on each panel are equipped with robust 4-mm sockets and all AC inputs and outputs are equipped with robust 4-mm safety sockets for easy connection.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Solar Energy Demonstrator Trainer

PT 970510



Covered Topics

- LE01001E Solar Cell Unit
- LE01002E Charge Control Unit
- LE01003E Battery
- LE01004E Inverter
- LE01005E System Application

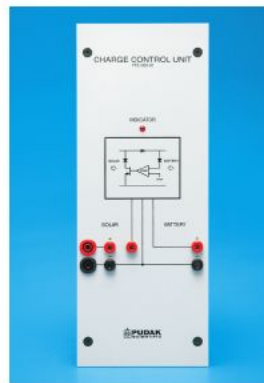
Specification

- **Solar Cell Unit [PTE-029-01]**
 - Power rating : 10W (max.)
 - Nominal module voltage : 12V
 - Rated current : 0.6A
 - Stand frame with angle adjuster
- **Charge Control Unit [PTE-029-02]**
 - Minimum input voltage : 12.5VDC
 - Maximum input voltage : 18VDC
 - Maximum input current : 6.0A
 - Shunt set point voltage : 13.8V
 - Quiescent current : < 1.0mA
 - Blocking diode voltage drop : 0.4V
 - Nominal voltage : 12.0V
- **Battery [PTE-029-03]**
 - Battery type : Lead Acid Battery
 - Voltage : 12VDC
 - Current : 1.2Ah
- **Inverter [PTE-029-04]**
 - Voltage input : 10 – 15VDC
 - Voltage output : 230VAC (Square Wave)
 - Max. power : 150W
- **DC Lamp Socket [PTE-029-05]**
 - Socket type : Bayonet
- **AC Lamp Socket [PTE-029-06]**
 - Socket type : E27
- **Voltmeter [PTE-029-07]**
 - Range : 0 – 30V
- **Amperemeter [PTE-029-08]**
 - Range : 0 – 1A and 0 – 3A

Training Panel System

PT 970510 Solar Energy Demonstrator Trainer consists of

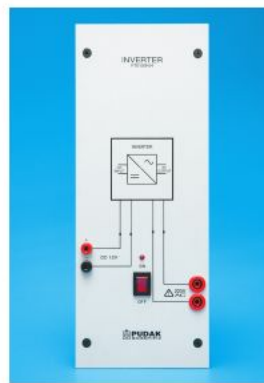
Cat. No.	Description	Qty.
PTE-029-01	Solar Cell Unit	1 set
PTE-029-02	Charge Control Unit	1 pc
PTE-029-03	Battery	1 pc
PTE-029-04	Inverter	1 pc
PTE-029-05	DC Lamp Socket	1 pc
PTE-029-06	AC Lamp Socket	1 pc
PTE-029-07	Amperemeter	1 pc
PTE-029-08	Voltmeter	1 pc
	Lamp 25W, 12V	1 pc
	Energy Saving Lamp 11W, 220VAC	1 pc
FLS 20.02/097	Connecting Cross	15 pcs
GSE 235	Safety Connecting Cross	5 pcs
KAL 99/40-025	Connecting Lead 25cm, Yellow	15 pcs
KAL 99/10-025	Connecting Lead 25cm, Black	5 pcs
KAL 99/20-025	Connecting Lead 25cm, Red	5 pcs
GSE 231 02	Safety Connecting Lead 30cm, Red	5 pcs
L01S-01E	Experiment Manual Book	1 pc
GSN 240	TPS Frame 600mm	1 set



Charge Control Unit
PTE-029-02



Battery
PTE-029-03



Inverter
PTE-029-04



DC Lamp Socket
PTE-029-05



AC Lamp Socket
PTE-029-06



Amperemeter
PTE-029-07



Voltmeter
PTE-029-08

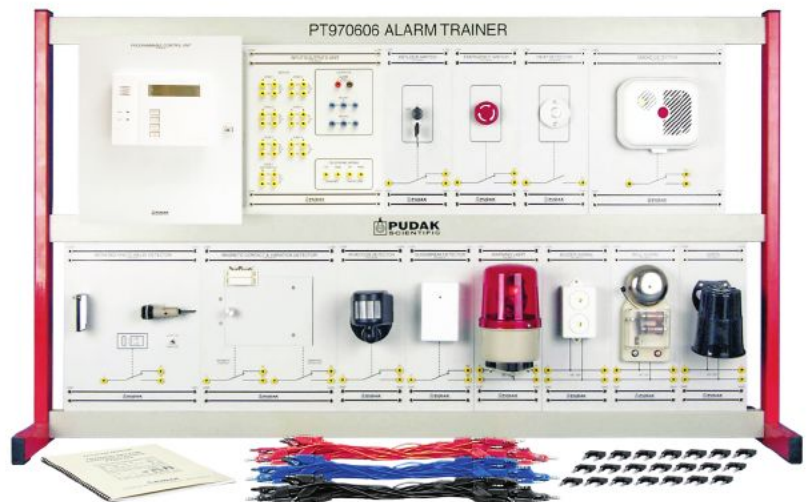
Specifications and illustrations are subject to change without prior notice

Features

- The trainer is developed in such a way to ensure that the basic principle and installation of alarm system can be taught in a practical, interesting and easy way.
- The trainer consist of a complete set, containing alarm equipment system with original component mounted on panel.
- The trainer uses standard commercial control unit for realistic studying in alarm system.
- The system consists of modular system blocks to enable the student in learning alarm system in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All DC inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Alarm Trainer

PT 970606



Covered Topics

- LE02001E Introduction to Electronic Security System
- LE02002E Sensor and Switch as Inputs Of Electronic Security System
 - Keylock Switch
 - Emergency Switch
 - Heat Detector
 - Smoke Detector
 - Infra Red Photo Relay Detector
 - Magnetic Contact & Vibration Detector
 - Infra Red Motion Detector
 - Glassbreak Detector
- LE02003E Programmable Control Unit
- LE02004E Protection Zone
 - Door (Entry Exit) Zone
 - Interior Zone
 - Perimeter/Exterior Zone
 - 24 Hour Zone
 - Panic/Fire Zone
- LE02005E Home Security System
- LE02006E Programming and Configuring the Programmable Control Unit

Specification

- **Programmable Control Unit [PTE-028-01]**
 - Input voltage : 220V / 50Hz
 - Protection zone : 6 Zone
 - Back up battery : 12VDC, 6.5Ah
 - Bell output : 12V, max. 750mA
 - Relay output 1 : Form C, NC, NO
 - Relay output 2 : Form C, NC, NO
 - Telephone connection
 - Detection loop : Programmable
- **Input Output Unit [PTE-028-02]**
Interfacing programmable control unit with others device
- **Keylock Switch [PTE-028-03]**
 - Output switch : Form C, NC, NO
- **Emergency Switch [PTE-028-04]**
 - Output switch : Form C, NC, NO
- **Heat Detector [PTE-028-05]**
 - Temperature : 70°C
 - Output relay : Form C, NC
- **Smoke Detector [PTE-028-06]**
 - Sensor type : Ionization
 - Output relay : Form C, NC, NO
- **Infra Red Photo Relay Detector [PTE-028-07]**
 - Mode (switch able) : Light On or Dark On
 - Output relay : Form C, NC, NO
- **Magnetic Contact & Vibration Detector [PTE-028-08]**
 - Magnetic contact output switch : Form C, NC, NO
 - Vibration detector output relay : Form C, NC, NO
 - Adjustable vibration sensitivity
- **Infra Red Motion Detector [PTE-028-09]**
 - Adjustable sensitivity
 - Adjustable relay ON
 - Output relay : Form C, NC, NO

Continue >>

Training Panel System

>> Specification Continued

- **Glassbreak Detector [PTE-028-10]**
 - Input voltage : 12V
 - Range : 7,6m
 - Alarm relay : Form C, NC, NO
 - Alarm duration : 5 second
 - Complete with glass break simulator

- **Warning Light [PTE-028-11]**
 - Input voltage : 12V

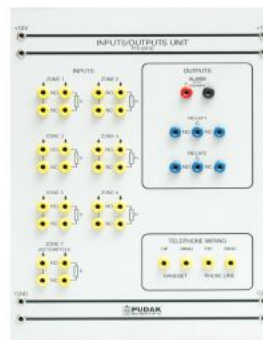
- **Buzzer Signal [PTE-028-12]**
 - Input voltage : 12V

- **Bell Alarm [PTE-028-13]**
 - Input voltage : 12V

- **Sirene [PTE-028-014]**
 - Input voltage : 12V

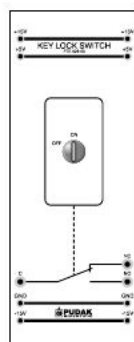


Programmable Control Unit
PTE-028-01

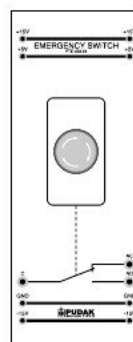


Input / Output Unit
PTE-028-02

PT 970606 Alarm Trainer consists of		
Cat. No.	Description	Qty.
PTE-028-01	Programmable Control Unit	1 pc
PTE-028-02	Input/Output Unit	1 pc
PTE-028-03	Keylock Switch	1 pc
PTE-028-04	Emergency Switch	1 pc
PTE-028-05	Heat Detector	1 pc
PTE-028-06	Smoke Detector	1 pc
PTE-028-07	Infra Red Photo Relay Detector	1 pc
PTE-028-08	Magnetic Contact & Vibration Detector	1 pc
PTE-028-09	Infra Red Motion Detector	1 pc
PTE-028-10	Glassbreak Detector	1 pc
PTE-028-11	Warning Light	1 pc
PTE-028-12	Buzzer Signal	1 pc
PTE-028-13	Bell Alarm	1 pc
PTE-028-014	Sirene	1 pc
FG1025	GlassBreak Simulator	1 pc
PEO 338 01	Resistor 1k2Ω, 1/4W, 5%	2 pcs
DB25	Connecting Cable 10cm	1 pc
FLS 20.02/097	Connecting Cross	50 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	25 pcs
KAL 99/10-100	Connecting Lead 100cm, Black	5 pcs
KAL 99/20-100	Connecting Lead 100cm, Red	5 pcs
KAL 99/30-100	Connecting Lead 100cm, Blue	25 pcs
L02S-01E	Experiment Manual Book	1 pc
L02M-01E	Programmable Control Unit Manual	1 pc
GSN 245	TPS Frame 1200mm	1 set



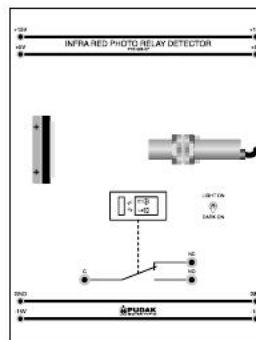
Keylock Switch
PTE-028-03



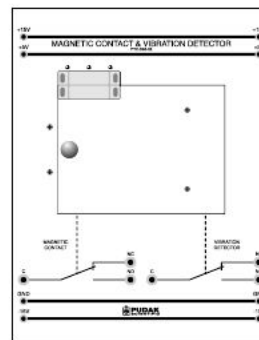
Emergency Switch
PTE-028-04



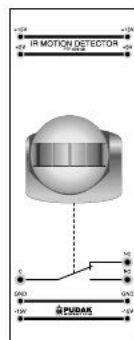
Smoke Detector
PTE-028-06



Infra Red Photo Relay Detector
PTE-028-07



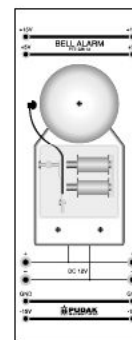
Magnetic Contact & Vibration Detector
PTE-028-08



IR Motion Detector
PTE-028-09



Warning Light
PTE-028-11



Bell Alarm
PTE-028-13

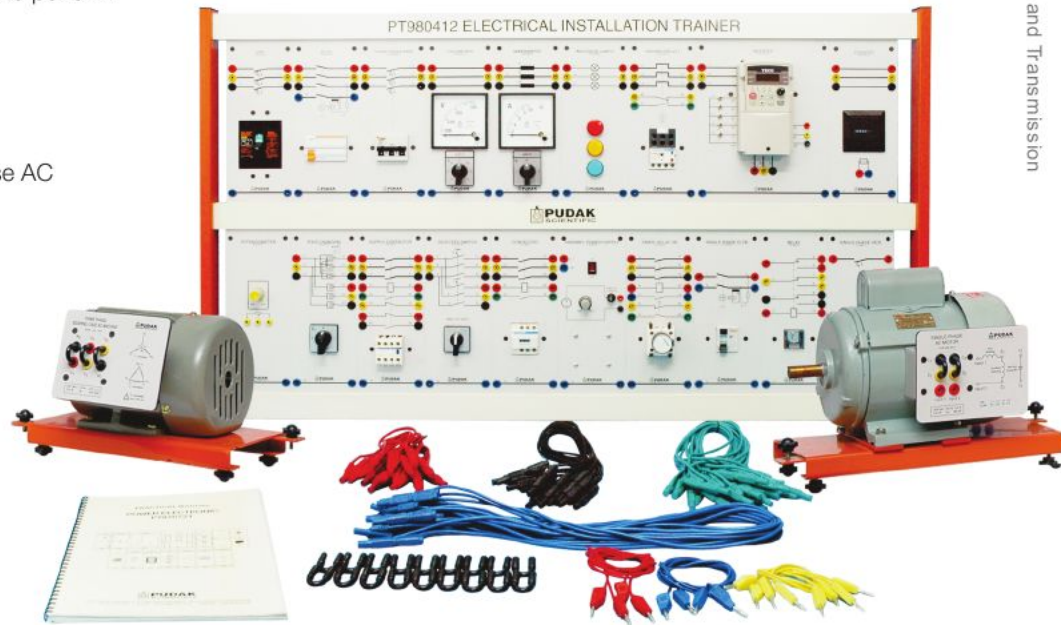
Specifications and illustrations are subject to change without prior notice

Features

- The trainer is designed to provide student with a good foundation in electrical installation.
- The trainer can be used to teach household and industrial electrical installations.
- The electrical installation is able to perform experiments such as:
 - Electrical Measurement
 - Basic Electrical Control
 - Electrical Installation
 - Power Factor Correction
- The brake system of three phase AC machine.
- Controlling speed of three phase AC machine with Inverter.
- All inputs and outputs on each panel are equipped with safety socket and safety connecting cross 4-mm.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

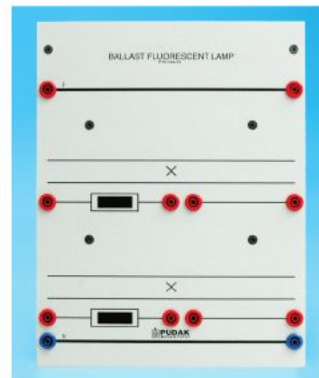
Electrical Installation Trainer

PT 980412



Covered Topics

- | | |
|---|--|
| <ul style="list-style-type: none"> ▪ LE07001E Lamp Connection with Single Switch ▪ LE07002E Lamp Connection with Single Switch and Socket ▪ LE07003E Two Lamps Connection with Series Switch and Socket ▪ LE07004E Two Way Switching (One Lamp with Change-Over Switch) ▪ LE07005E One Lamp with Change-Over Switch and Intermediate Switch ▪ LE07006E Power Factor Correction for Fluorescent Lamp Circuit ▪ LE07007E Time-Delayed Lighting ▪ LE07008E Clockwise and Counter Clockwise System Control with a Switch ▪ LE07009E Speed Control of Three Phase Induction Motor Dual Speed with Cam Switch ▪ LE07010E Control System Using Magnetic Switch for Single Phase AC Machine ▪ LE07011E Control System Using Magnetic with Over Load Protection ▪ LE07012E Clockwise and Counter Clockwise System Control with Magnetic Switch ▪ LE07013E Jogging/Inching Control Completed with Counter ▪ LE07014E Star-Delta Circuit | <p>>></p> <ul style="list-style-type: none"> ▪ LE07015E Speed Control of Three Phase Induction Motor Dual Speed with Magnetic Switch ▪ LE07016E The Brake System of Three Phase AC Machine ▪ LE07017E Speed Control of Three Phase AC Machine with Inverter |
|---|--|



Ballast Fluorescent Lamps
PTE-048-22



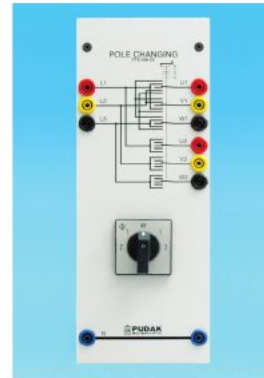
Amperemeter
PTE-048-19

>>

Training Panel System

Specification

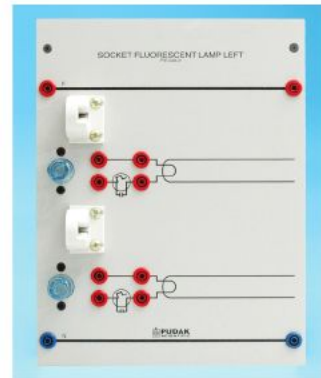
- **Three Phase Source [PTE-048-00]**
Main source voltage 230/ 380 VAC, load maximum 10A.
- **Three-Phase NFB [PTE-048-01]**
3 main contact, switch load maximum 15A / 15kA, and nominal voltage 380VAC
- **Three-Phase ELCB [PTE-048-02]**
4 main contacts, 3 for line and 1 for neutral, switch maximum load 25A, nominal voltage 220VAC and fault circuit breaker 30mA
- **Three Phase MCB [PTE-048-03]**
3 main contacts and switch load maximum 25A / 380VAC, complete with fault simulator for L2 and L3 line on the cover panel.
- **Contactor [PTE-048-04]**
3 Main contact and 1 contact control NO, switch load maximum 25A / 380VAC, coil voltage 220VAC / 50Hz, complete with fault simulator for L1, L2 line and contact coil on the cover panel.
- **Timer Delay-ON [PTE-048-05]**
Time Delay setting range: 0.1 – 30 ms, 3 main contacts and 3 control contacts, 2 NO, 1 NC, switch load maximum 10A / 380VAC, nominal operating voltage 220VAC / 50Hz, complete with fault simulator for L2 line, contact coil and auxiliary contact NO on the cover panel.
- **Selected Switch [PTE-048-06]**
3 main contacts input, and 6 main contacts output, switch load maximum 15A / 220VAC
- **Push-Button Change Switches [PTE-048-07]**
2 unit push-button, 2 NC contacts and 2 NO contacts, switch load maximum 250VAC / 10A
- **Change-Over Switch [PTE-048-08]**
Flush mounting type 250VAC / 10A
- **Indicator Lamps [PTE-048-09]**
3 Lamp Indicator, lamp covers colors; red, yellow, green. Nominal voltage 220VAC
- **Lamp Socket [PTE-048-10]**
Nominal voltage 220VAC



Pole Changing
PTE-048-25



Inverter
PTE-048-30



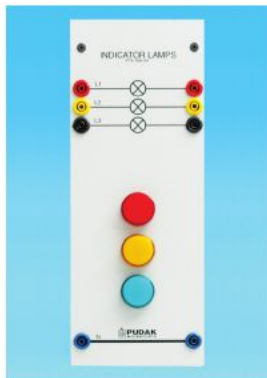
Socket Fluorescent Lamps Left
PTE-048-21



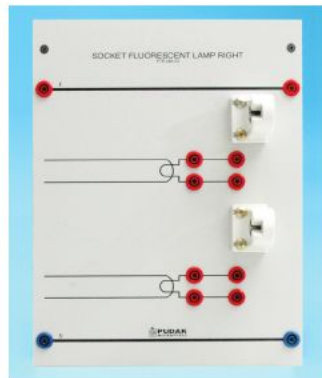
Counter
PTE-048-29

>>

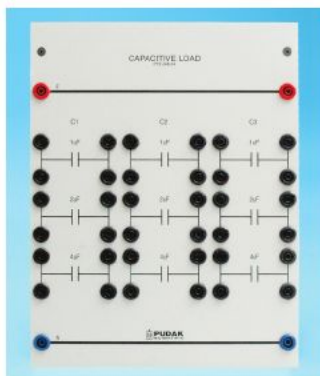
- **Single Phase MCB [PTE-048-11]**
1 main contact and switch load maximum 25A / 380VAC
- **Supply Contactor [PTE-048-12]**
3 Main contact and 4 control contact, 2 NO and 2 NC, switch load maximum 25A / 380V, coil voltage 220VAC / 50Hz, complete with fault simulator for L2 line, contact coil and auxiliary NO contact on the cover panel.
- **Thermo Relay I [PTE-048-13]**
3 pole, with overload trip with single phase, setting range: 0.63 – 1A, auxiliary contacts: 1 NC, 1 NO, complete with fault simulator for L1 line and NC/ NO contact on the cover panel.
- **Thermo Relay II [PTE-048-14]**
3 pole, with overload trip with single phase, setting range: 2.5 – 4A, auxiliary contacts: 1 NC, 1 NO, complete with fault simulator for L1 line and NC/ NO contact on the cover panel.
- **Single Switch [PTE-048-15]**
Flush mounting type 250VAC / 10A, complete with fault simulator on the cover panel.
- **Series Switch [PTE-048-16]**
Flush mounting type 250VAC / 10A, complete with fault simulator on the cover panel.



Indicator Lamps
PTE-048-09



Socket Fluorescent Lamps Right
PTE-048-23



Capacitive Load
PTE-048-24

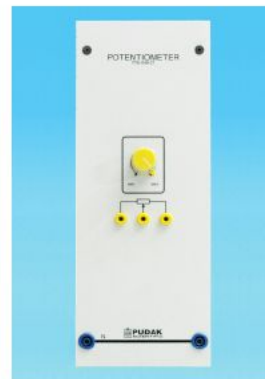


Schuko Socket
PTE-048-17

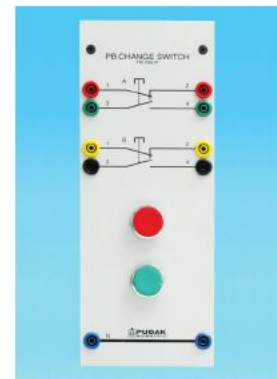
Continue >>

>> Specification Continued

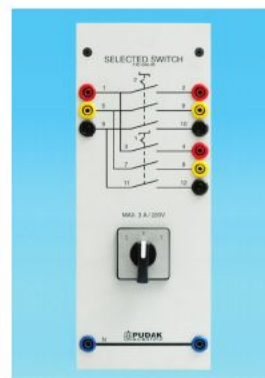
- **Schuko Socket [PTE-048-17]**
Flush mounting type 250V / 16A AC, 2 – pole with earthen contact
- **Voltmeter [PTE-048-18]**
Measuring range: 0 – 500 VAC, instrument: moving coil meter, class 1.5, with selector switch for selecting the phase to measure
- **Amperemeter [PTE-048-19]**
Measuring range: 0 – 10A, instrument: moving coil meter, class 1.5, provided with three current transformers, built in selector switch for selecting the phase to measure
- **Single Phase ELCB [PTE-048-20]**
- 2 main contact for line and neutral, switch load maximum: 25A, nominal voltage 220VAC, faulty current circuit breaker 30mA
- **Socket Fluorescent Lamps Left [PTE-048-21]**
Voltage max: 220 -250VAC, Current max : 3A, Starter + Socket: 20 - 40W
- **Ballast Fluorescent Lamps [PTE-048-22]**
Voltage max: 220 -250VAC, 50Hz, 20/40W
- **Socket Fluorescent Lamps Right [PTE-048-23]**
Voltage max: 220 -250VAC, Current max : 3A
- **Capacitive Load [PTE-048-24]**
- Voltage max : 400VAC
- Capacitor : 3x1 μ F; 3x2 μ F ; 3x4 μ F
- **Pole Changing [PTE-048-25]**
Max. current:10A, 400V, Switch position "2 - 1 - 0 - 1 - 2"
- **Variabel Power Supply [PTE-048-26]**
Max. current 1A. Output voltage: 0 - 20VDC
- **Potentiometer [PTE-048-27]**
Potentiometer 5K Ω /0.25W
Adjustable Potentiometer with pointer knob
- **Relay [PTE-048-28]**
Max. current: 10A, 250V, 3 contact "NC" and 3 contact "NO"
- **Counter [PTE-048-29]**
Nominal voltage 220V
- **Inverter [PTE-048-30]**
Nominal voltage 380V, Power 2HP
- **Intermediate Switch [PTE-048-31]**
Flush mounting type 250VAC / 10A, complete with fault simulator on the cover panel.
- **Single phase ac Machine [PTE-048-32]**
Motor asynchron, 0.5HP, 4 Pole, 50 Hz, 220VAC, 1450RPM
- **Three-Phase AC Machine 1 [PTE-048-33]**
Motor asynchron, 1/4HP, 4 Pole, 50Hz, 220 / 380VAC, 1450RPM
- **Three-Phase AC Machine 2 [PTE-048-34]**
Motor asynchron, 2HP, 4 Pole, 50Hz, 380 / 660VAC, 1450RPM
- **Three-Phase AC Machine Dual-Speed [PTE-048-35]**
Motor asynchron, 1HP, 2/4 Pole, 50 Hz, 380 / 660 VAC, 1500 / 3000RPM



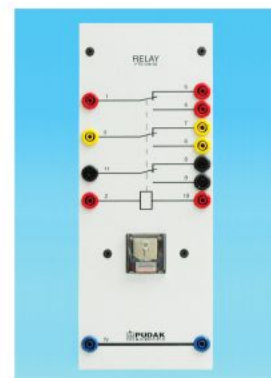
Potentiometer
PTE-048-27



Push-Button Change Switch
PTE-048-07



Selected Switch
PTE-048-06



Relay
PTE-048-28



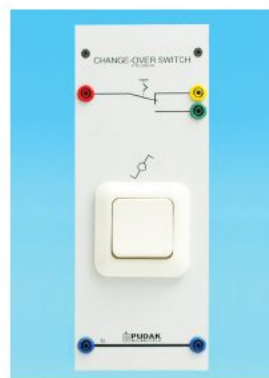
Series Switch
PTE-048-16



Single Phase ELCB
PTE-048-20



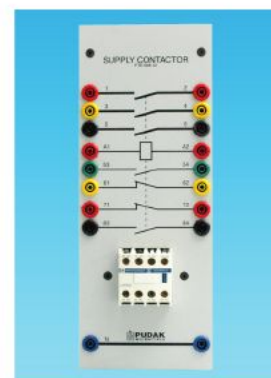
Contactor
PTE-048-04



Change-Over Switch
PTE-048-08



Lamp Socket
PTE-048-10



Supply Contactor
PTE-048-12

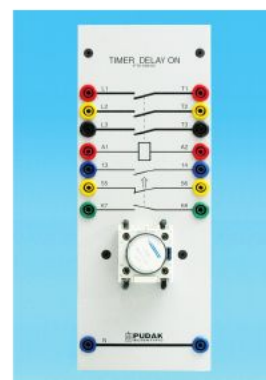
Training Panel System

PT 980412 Electrical Installation Trainer consists of

Cat. No.	Description	Qty.
PTE-048-01	Three-Phase NFB	1 pc
PTE-048-02	Three-Phase ELCB	1 pc
PTE-048-03	Three Phase MCB	1 pc
PTE-048-04	Contactar	1 pc
PTE-048-05	Timer Delay-ON	1 pc
PTE-048-06	Selected Switch	1 pc
PTE-048-07	Push-Button Change Switch	2 pcs
PTE-048-08	Change-Over Switch	2 pcs
PTE-048-09	Indicator Lamps	1 pc
PTE-048-10	Lamp Socket	1 pc
PTE-048-11	Single Phase MCB	1 pc
PTE-048-12	Supply Contactor	3 pcs
PTE-048-13	Thermo Relay I	1 pc
PTE-048-14	Thermo Relay II	1 pc
PTE-048-15	Single Switch	1 pc
PTE-048-16	Series Switch	1 pc
PTE-048-17	Schuko Socket	1 pc
PTE-048-18	Voltmeter	1 pc
PTE-048-19	Amperemeter	1 pc
PTE-048-20	Single Phase ELCB	1 pc
PTE-048-21	Socket Fluorescent Lamps Left	1 pc
PTE-048-22	Ballast Fluorescent Lamps	1 pc
PTE-048-23	Socket Fluorescent Lamps Right	1 pc
PTE-048-24	Capacitive Load	1 pc
PTE-048-25	Pole Changing	1 pc
PTE-048-26	Variabel Power Supply	1 pc
PTE-048-27	Potentiometer	1 pc
PTE-048-28	Relay	1 pc
PTE-048-29	Counter	1 pc
PTE-048-30	Inverter	1 pc
PTE-048-31	Intermediate Switch	1 pc
PTE-048-32	Single-Phase AC Machine	1 pc
PTE-048-33	Three-Phase AC machine 1	1 pc
PTE-048-34	Three-Phase AC machine 2	1 pc
PTE-048-35	Three-Phase AC machine Dual Speed	1 pc
PEO 101	Incandescent Lamp 230VAC/40W	1 pc
PEO 102	Fluorescent Lamp 230VAC/20W	2 pcs
GSE 233 02	Safety Connecting Lead 100cm, Red	12 pcs
GSE 233 04	Safety Connecting Lead 100cm, Yellow	10 pcs
GSE 233 03	Safety Connecting Lead 100cm, Blue	12 pcs
GSE 233 01	Safety Connecting Lead 100cm, Black	10 pcs
GSE 232 05	Safety Connecting Lead 50cm, Green	15 pcs
GSE 232 02	Safety Connecting Lead 50cm, Red	15 pcs
GSE 232 01	Safety Connecting Lead 50cm, Black	10 pcs
GSE 231 02	Safety Connecting Lead 30cm, Red	15 pcs
GSE 231 01	Safety Connecting Lead 30cm, Black	12 pcs
GSE 235	Safety Connecting Cross	50 pcs
L07S-01E	Experiment Manual Book	1 pc
GSN 245	TPS Frame 1200mm	1 set
KAL 99/20-100	Connecting Lead 100cm, Red	4 pcs
KAL 99/30-100	Connecting Lead 100cm, Black	4 pcs
KAL 99/40-50	Connecting Lead 50cm, Yellow	6 pcs



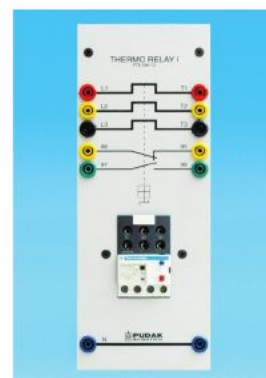
Voltmeter
PTE-048-18



Timer Delay-ON
PTE-048-05



Three-Phase MCB
PTE-048-03



Thermo Relay I
PTE-048-13



Single Phase MCB
PTE-048-11



Single Switch
PTE-048-15

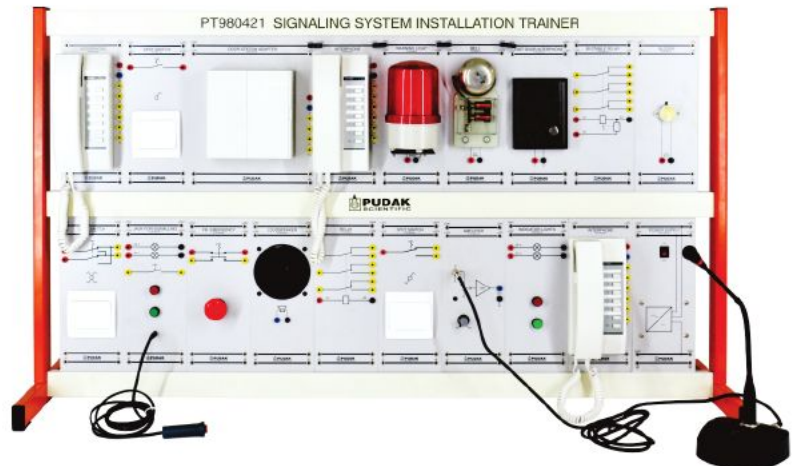
Specifications and illustrations are subject to change without prior notice

Features

- The Signaling System Installation Trainer is designed for easy assembly, analysis and signaling system installation used in hotels, hospitals, offices, and other buildings.
- The Students will learn to install a system connection of interphone, interphone with outdoor, interphone connection, interphone with electric lock connection, and system building emergency alarm.
- The Student also get to know type of switches.
- The system consists of modular blocks to enable the students learn signaling system installation in modular way.
- The panel type construction make it easy for students to conduct experiments
- The system supplied with power supply for conducting experiments.
- All inputs and outputs on each panel are equipped with 4 mm connecting leads, 4 mm connecting cross.
- A comprehensive experiment manual is included to guide the students step by step in conducting experiments.

Signaling System Installations Trainer

PT 980421



Specification

- **Power Supply [PTE-050-01]**
 - Supply voltage : Max. 230VAC, 1 phase 50Hz
 - Output voltage : DC +24V/ 1A; +12V/ 1A
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **SPST Switch [PTE-050-02]**
 - Flush mounting type, switches for domestic uses
 - Dimension : 114 x 297mm
- **SPDT Switch [PTE-050-03]**
 - Flush mounting type, switches for domestic uses
 - Dimension : 114 x 297mm
- **DPDT Switch [PTE-050-04]**
 - Flush mounting type, switches for domestic uses
 - Dimension : 114 x 297mm
- **Push Buttons [PTE-050-06]**
 - Push buttons for domestic uses
 - Dimension : 114 x 297mm
- **Relay [PTE-050-06]**
 - Coil of 24VDC, 3 Contact NO and 3 Contact NC
 - Dimension : 114 x 297mm
- **Electric Lock [PTE-050-07]**
 - Electric Lock, coil of 12VDC
 - Dimension : 228 x 297mm
- **Push Button Emergency [PTE-050-08]**
 - Push buttons, 1NO and 1NC switches
 - Dimension : 114 x 297mm
- **Warning Light [PTE-050-09]**
 - Blinking warning light with 24VDC
 - Dimension : 114 x 297mm
- **Push Buttons for M/ P/ C [PTE-050-10]**
 - Push buttons for domestic uses
 - Dimension : 114 x 297mm

Covered Topics

- LE080001E Buzzer Controlled from one point
- LE080002E Installations of Buzzer with call and reply from 2 point
- LE080003E Installations of Buzzer with call and reply from 3 point
- LE080004E Installations of Buzzer for flats with gate-keeper lodge and electric lock
- LE080005E Building Emergency Alarm
- LE080006E Offices call request
- LE080007E Signaling Installations for Hotel
- LE080008E Signaling installations for Hospital
- LE080009E Installations with a 3-interphone system
- LE080010E Installations with a 3-interphone system and out door interphone
- LE080011E Installations with a 3-interphone system and out door interphone complete with electric lock

Continue >>

Training Panel System

>> Specification Continued

- **M/ P/ C Indicators [PTE-050-11]**
 - Three indicator lamps 24VDC, use calls for Maid, Potter and Cleaner.
 - Dimension : 114 x 297mm

- **Bi-Stable Relay [PTE-050-12]**
 - Relay Set-Reset, coil of 24VDC, 3NO and 3NC
 - Dimension : 114 x 297mm

- **Indicator Lights [PTE-050-13]**
 - Two indicator lights 24VDC red and green colors, use indicator for signalling.
 - Dimension : 114 x 297mm

- **Bell [PTE-050-14]**
 - Nominal voltage 24VDC. Bell for domestic uses
 - Dimension : 114 x 297mm

- **Buzzer [PTE-050-15]**
 - Nominal voltage 24VDC
 - Dimension : 114 x 297mm

- **Jack for Signalling [PTE-050-16]**
 - Switches use for call nurse in hospital signalling
 - Dimension : 114 x 297mm

- **Announcer [PTE-050-17]**
 - Supply with battery 2 x 1,5V Size AA

- **Amplifier [PTE-050-18]**
 - Nominal voltage 24VDC, Output 20Watt
 - Dimension : 114 x 297mm

- **Loudspeaker [PTE-050-19]**
 - Output 20Watt
 - Dimension : 114 x 297mm

- **Interphone [PTE-050-20]**
 - Nominal voltage 12VDC, interphone with six keys for interphone calls, a key for electroswitch and one for special functions.
 - Dimension : 114 x 297mm

- **Out Door Interphone [PTE-050-21]**
 - Out door interphone only special calls and can not recived.
 - Dimension : 114 x 297mm

- **Door Station Adapter [PTE-050-22]**
 - Nominal voltage 12VDC
 - Dimension : 228 x 297mm

PT 980421 Signalling System Installations Trainer consists of

Cat. No.	Description	Qty.
PTE-050-01	Power Supply	1 pc
PTE-050-02	SPST Switch	1 pc
PTE-050-03	SPDT Switch	2 pcs
PTE-050-04	DPDT Switch	1 pc
PTE-050-05	Push Buttons	1 pc
PTE-050-06	Relay	1 pc
PTE-050-07	Electric Lock	1 pc
PTE-050-08	Push Button Emergency	1 pc
PTE-050-09	Warning Light	1 pc
PTE-050-10	Push Buttons for Maid, Porter and Cleaner	1 pc
PTE-050-11	Maid, Porter and Cleaner Indicators	1 pc
PTE-050-12	Bi-Stable Relay	1 pc
PTE-050-13	Indicator Lighs	1 pc
PTE-050-14	Bell	1 pc
PTE-050-15	Buzzer	1 pc
PTE-050-16	Jack for Signalling	1 pc
PTE-050-17	Announcer	1 pc
PTE-050-18	Amplifier	1 pc
PTE-050-19	Loudspeaker	1 pc
PTE-050-20	Interphone	3 pcs
PTE-050-21	Out Door Interphone	1 pc
PTE-050-22	Door Station Adapter	1 pc
KAL 99/40-100	Connecting lead 100cm, yellow	15 pcs
KAL 99/40-75	Connecting lead 75cm, yellow	10 pcs
KAL 99/20-100	Connecting lead 100cm, red	10 pcs
KAL 99/10-100	Connecting lead 100cm, blue	10 pcs
FLS 20.02/097	Connecting cross 100cm, red	30 pcs
L07S-01E	Experiment manual book	1 pc
GSN 245	TPS Frame 1200mm	1 set



Amplifier PTE-050-18



Interphone PTE-050-20



Outdoor Interphone PTE-050-21



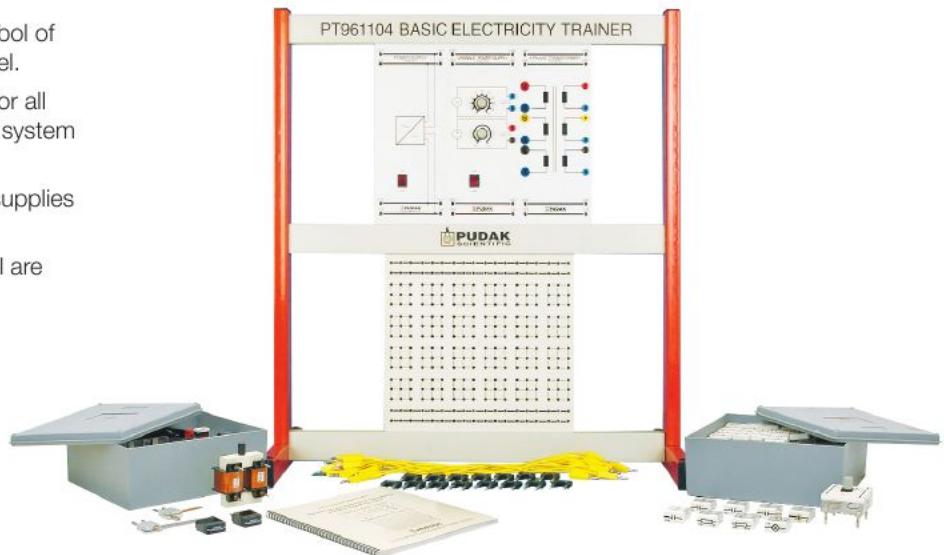
Warning Light PTE-050-09

Features

- The Basic Electricity Trainer is designed for covering the fundamental concept, theory and application of electricity with descriptive, easy to understand and extensive at the same.
- The trainer shows the standard symbol of the control function on the front panel.
- Assembly board provides the base for all circuits constructed with the plug-in system for electricity and electronics.
- The system is supplied with power supplies required to run the experiment.
- All inputs and outputs on each panel are equipped with connecting lead, and connecting cross 4-mm.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Basic Electricity Trainer

PT 961104



Covered Topics

- EE060001E DC Measurement Techniques
- EE060002E Ohm's Law
- EE060003E Resistance in Series and Voltage Divider
- EE060004E Parallel Resistance and Current Divider
- EE060005E The Wheatstone Bridge
- EE060006E Non-Linear Resistor
- EE060007E Series and Parallel Connection of Batteries
- EE060008E Series and Parallel Capacitors
- EE060009E Capacitor and Resistor in Series
- EE060010E Inductor in a DC Circuit
- EE060011E Transformation of Voltage and Current
- EE060012E Working Principle of a Relay
- EE060013E Effect of an AC Signal on a Resistance
- EE060014E Effect of an AC Signal on a Capacitor
- EE060015E Effect of an AC Signal on Inductance (Coil)
- EE060016E Series RLC Circuit and Series Resonance
- EE060017E Parallel RLC and Parallel Resonance
- EE060018E Effect of an AC Signal on Parallel RC Circuit
- EE060019E Effect of an AC Signal on Parallel RL Circuit
- EE060020E Series Compensation
- EE060021E Parallel Compensation
- EE060022E Half-Wave Rectifier
- EE060023E Full-Wave Rectifier
- EE060024E Three Phase Circuit

Specification

- **Power Supply [PTE-022-01]**
 - Supply voltage : Max. 230VAC, 1 phase 5Hz
 - Output : DC +5V / 1A; +15V/1A; GND; -15V/1A
 - Output connections : 4mm sockets
 - Dimensions : 114 x 297mm
- **Variable Power Supply [PTE-022-02]**
 - Supply voltage : Max. 230VAC
 - Output : 0 – 20VDC
 - Current : 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20VAC
 - Output connections : 4mm sockets
 - Dimensions : 114 x 297mm
- **Three Phase Transformer [PTE-022-03]**
 - Input voltage : Max. 3x (0-230) VAC L-N
 - Output voltage : 0 – 9VAC
 - Current : 300mA
 - Output connections : 4mm sockets
 - Dimensions : 114 x 297mm
- **Container Box I [PTE-022-04],** consist of: SPST Toggle Switch, Resistor, LDR, Capacitor, Diode, Diode Zener, Lamp Neon, Incandescent Lamp 3V + Lamp Holder E10, Incandescent Lamp 6V + Lamp Holder E10, SPDT Toggle Switch, Potentiometer
- **Container Box II [PTE-022-05],** consist of: 1.5 Battery Holder + Battery 1.5V, 9V Battery Holder + Battery 9V, Adapter Amperemeter, Coil 500 Turns, Coil 1000 Turns, U and I core, Contact Plate, PTC, NTC, Magnet Bar
- **Basic Meter [KAL 41]**
For use measurement voltage and current, DC only. Equipped with sliding switch to change function, voltage or current meter. Voltage range: 100mV – 1V – 10V and 50V. Current range: 100μA – 100mA – 1A and 5A. Internal resistance approx. 1100Ω. Class accuracy 2.5% on full deflection. 4mm screwed sockets. Total dimension: 165 x 115 x 55mm
- **Assembly Board for TPS Panel [GSE 110]**
Mountable to standard frame, used to assembly the experiment circuit from modular component. 24 socket grids with 24 conducting squares and 216 sockets, 6 socket grids with 36 sockets, 2 conducting path with 18 sockets, each dimensions: 297 x 300mm

Training Panel System

PT 961104 Basic Electricity Trainer
 consists of

Cat. No.	Description	Qty.
PTE-022-01	Power Supply	1 pc
PTE-022-02	Variable Power Supply	1 pc
PTE-022-03	Three Phase Transformer	1 pc
PTE-022-04	Container Box I, consist of:	1 set
FLS 20.04/101	SPST Toggle Switch	1 pc
PEO 341 03	Resistor 3.3 Ω , 2W	1 pc
PEO 339 03	Resistor 10 Ω , 0.5W	2 pcs
PEO 339 07	Resistor 47 Ω , 0.5W	1 pc
PEO 339 09	Resistor 68 Ω , 0.5W	1 pc
PEO 339 10	Resistor 100 Ω , 0.5W	2 pcs
PEO 339 11	Resistor 150 Ω , 0.5W	1 pc
PEO 339 12	Resistor 220 Ω , 0.5W	1 pc
PEO 339 13	Resistor 270 Ω , 0.5W	1 pc
PEO 339 14	Resistor 330 Ω , 0.5W	1 pc
PEO 339 16	Resistor 470 Ω , 0.5W	1 pc
PEO 339 17	Resistor 560 Ω , 0.5W	1 pc
PEO 342 11	Resistor 220Ω, 2W	1 pc
PEO 339 19	Resistor 1k Ω , 0.5W	2 pcs
PEO 339 20	Resistor 1.5k Ω , 0.5W	1 pc
PEO 339 23	Resistor 4.7k Ω , 0.5W	1 pc
PEO 339 36	Resistor 100k Ω , 0.5W	1 pc
FET 23.05	LDR	1 pc
PEO 411 02	Capacitor Non Polar 100nF	1 pc
PEO 411 03	Capacitor Non Polar 470nF	1 pc
PEO 412 01	Capacitor Tantalum 1 μ F, 35V	1 pc
FET 23.02/001	Capacitor Electrolyte 1 μ F, 35V	1 pc
PEO 396 11	Capacitor Electrolyte 2.2 μ F, 35V	1 pc
PEO 396 09	Capacitor Electrolyte 10 μ F, 35V	1 pc
PEO 396 10	Capacitor Electrolyte 100 μ F, 35V	3 pcs
PEO 360 11	Diode 1N60	1 pc
FET 23.01	Diode 1N4002	4 pcs
PEO 365 03	Diode Zener, 5V, 0.25W	1 pc
FET 23.04	Lamp Neon 60V, 1W	1 pc
PEO 120 02	Incandescent Lamp 3V + Lamp Holder E10	2 pcs
PEO 120 03	Incandescent Lamp 6V + Lamp Holder E10	1 pc
PEO 530 03	SPDT Toggle Switch	1 pc
FLS 20.08/101	Potentiometer 1k Ω , 0.25W	1 pc
PTE-022-05	Container Box II, consist of:	1 set
PEO 396 20	Capacitor Electrolyte 2200 μ F/35V	1 pc
FLS 20.31/27	Battery Holder 1.5V	2 pcs
GSE 220	Battery 1.5V	2 pcs
GSE 221 02	Battery Holder 9V	1 pc
GSE 220 04	Battery 9V	1 pc
PEL 222	Adapter Amperemeter	3 pcs
FEM 21.01/500	Coil 500 turns	1 pc
FEM 21.01/102	Coil 1000 turns	1 pc
FEM 21.00	U and I Core	1 pc
FLS 20.13/111	Contact Plate	1 pc
PEO 500 02	PTC	1 pc
PEO 500 01	NTC	1 pc
FLS 20.14/112	Bar Magnet	1 pc
KAL 41	Basic Meter	2 pcs
GSE 110	Assembly Board for TPS Panel	1 pc
KAL 99/40-030	Connecting Leads 30cm, Yellow	10 pcs
KAL 99/30-050	Connecting Leads 50cm, Blue	5 pcs
KAL 99/10-050	Connecting Leads 50cm, Black	5 pcs
KAL 99/20-050	Connecting Leads 50cm, Red	5 pcs
FLS 20.02/097	Connecting Cross	40 pcs
E06S-01E	Experiment Manual Book	1 pc
GSN 240	TPS Frame 600mm	1 set


 Variable Power Supply
 PTE-022-02

 Three Phase Transformer
 PTE-022-03

 Container Box I
 PTE-022-04

 Container Box II
 PTE-022-05

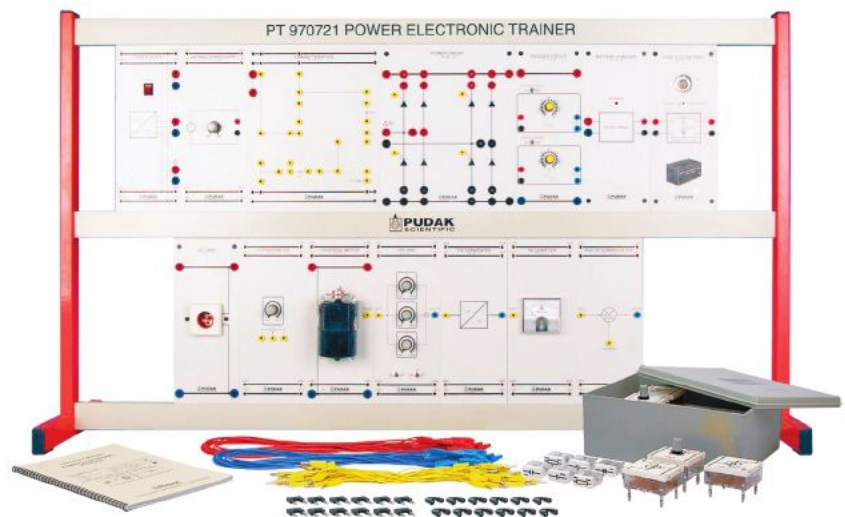
Specifications and illustrations are subject to change without prior notice

Features

- The trainer is designed to present and practice principle of basic power electronic and industrial applications.
- The trainer show standard symbol of electronic control on the front panel. The internal structure of the function units has been exclusively implemented with electronic.
- The system is supplied with power supplies required to run the experiment.
- The connections to and from the modules are easy and save to built.
- All inputs and outputs on each panel are equipped with safety connecting lead, safety connecting cross and connecting cross 4-mm.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Power Electronic Trainer

PT 970721



Covered Topics

- LE030001E Characteristic of Thyristor
- LE030002E Thyristor on DC Circuit
- LE030003E Characteristics of TRIAC
- LE030004E Lighting TRIAC Response
- LE030005E Characteristics of DIAC
- LE030006E Pulse Light Generator with UJT
- LE030007E Nature Commutations on Pulse Generating UJT
- LE030008E Phase Control with UJT
- LE030009E Voltage Rectifier of Single Phase Diode
- LE030010E Half Wave Voltage Rectifier of Single Phase Thyristor
- LE030011E Full Wave Voltage Rectifier of Thyristor Bridge Connection
- LE030012E Full Wave Control TRIAC and Anti-Paralel Thyristor Circuit
- LE030013E Battery Charging
- LE030014E Optical Encoder as Feedback
- LE030015E Identifications of Character Plant
- LE030016E Speed Control Open Loop
- LE030017E Speed Control of Motor AC Closed Loop with PID
- LE030018E Speed Control of Motor DC Closed Loop with PID

Specification

- **Power Supply [PTE-047-01]**
 - Supply voltage : Max. 230VAC, 50Hz
 - Output voltage : +15VDC, +5VDC, GND, 12VAC, 18VAC, 220VAC
 - Current : 3A
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **Variable Power Supply [PTE-047-02]**
 - Supply voltage : +15VDC, -15VDC, GND
 - Output voltage : Var. 0 – 12VDC
 - Current : 500mA
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **Characteristics [PTE-047-03]**
 - Circuit assembly for component resistor, SCR, TRIAC, Capacitor, DIAC, Potentiometer, Diode, SPDT
 - Conductive connections between the terminal points are made with 4mm / 19mm connection plugs
 - Output connections : 4mm sockets
 - Dimension : 228 x 297mm
- **Power Circuit [PTE-047-04]**
 - Provided with diode circuit for rectifier uncontrolled, SCR circuit, TRIAC with RC snubber RC circuit
 - Max. voltage 250VAC
 - Output connections : 4mm sockets
 - Dimension : 228 x 297mm
- **Trigger Circuit [PTE-047-05]**
 - Supply voltage : Max. 230VAC
 - Control voltage : 0 – 12VDC with trigger angle 0° to 180°
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm
- **Battery Charge [PTE-047-06]**
 - Supply voltage : 18VAC
 - Output voltage : 12VDC
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

Continue >>

Training Panel System

>> Specification Continued

- **Lead Acid Battery [PTE-047-07]**
 - Supply voltage : 12VDC
 - Current : 1.2Ah
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **Container Box [PTE-047-08]**, consists of:
Resistor, Capacitor, Diode 1N4002, DIAC DB3, Incandescent Lamp 12V / 3W + Lamp Holder E10, Incandescent Lamp 12V / 25W, SPST Toggle Switch, Potentiometer 10kΩ / 0.25W, Potentiometer 100kΩ / 0.25W, SCR, TRIAC, UJT

- **Lamp Socket [PTE-047-09]**
 - Nominal voltage 220VAC
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **Potentiometer [PTE-047-10]**
 - Potentiometer 100kΩ/0.25W
 - Adjustable potentiometer with pointer knob
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **Universal Motor [PTE-047-11]**
 - Supply voltage : 200 / 250V
 - Input voltage optocoupler : +5VDC, GND
 - Output : 1 / 16HP
 - Current : 0.6A
 - Frequency : 50 / 60Hz
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **PID Unit [PTE-047-12]**
 - Supply voltage : +15VDC, -15VDC, GND
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **F/V Converter [PTE-047-13]**
 - Supply voltage : +15VDC, GND
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

- **Tachometer [PTE-047-14]**
 - Measuring range : 0 – 20000 rpm, instrument:
moving coil, class:2
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm

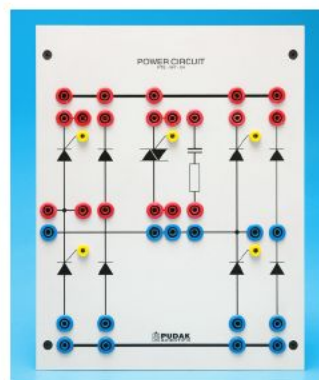
- **Analog Summing Block [PTE-047-15]**
 - Supply voltage : +15VDC, -15VDC, GND
 - Max. input voltage : 15VDC
 - Max. output voltage : 15VDC
 - Output connections : 4mm sockets
 - Dimension : 114 x 297mm



Tachometer
PTE-047-14



Trigger Circuit
PTE-047-05



Power Circuit
PTE-047-04



Universal Motor
PTE-047-11

>>

Cat. No.	Description	Qty.
PEO 339 24	Resistor 10kΩ, 0.5W	1 pc
PEO 411 01	Capacitor Non Polar 10nF	1 pc
PEO 411 06	Capacitor Non Polar 47nF	1 pc
PEO 411 02	Capacitor Non Polar 100nF	1 pc
FET 23.01	Diode, 1N4002	1 pc
PEO 370	DIAC DB3	1 pc
PEO 120 04	Incandescent Lamp 12V + Lamp Holder E10	1 pc
FLS 20.04/101	SPST Toggle Switch	1 pc
FLS 20.08/103	Potentiometer 10kΩ, 0.25W	1 pc
FLS 322 03	Potentiometer 100kΩ, 0.25W	1 pc
PEO 510	SCR BT151	1 pc
PEO 511 01	TRIAC BT137	1 pc
PEO 512	UJT 2N2646	1 pc
PTE-047-09	Lamp Socket	1 pc
PTE-047-10	Potentiometer	1 pc
PTE-047-11	Universal Motor	1 pc
PTE-047-12	PID Unit	1 pc
PTE-047-13	F/V Converter	1 pc
PTE-047-14	Tachometer	1 pc
PTE-047-15	Analog Summing Block	1 pc
PEO 103	Incandescent Lamp 12V / 25W	1 pc
PEO 101	Incandescent Lamp 230VAC / 40W	1 pc
KAL 99/40-030	Connecting Lead 30cm, Yellow	10 pcs
KAL 99/40-050	Connecting Lead 50cm, Yellow	6 pcs
KAL 99/10-075	Connecting Lead 75cm, Black	5 pcs
KAL 99/20-075	Connecting Lead 75cm, Red	5 pcs
GSE 232 02	Safety Connecting Lead 50cm, Red	4 pcs
GSE 233 03	Safety Connecting Lead 100cm, Blue	4 pcs
GSE 231 02	Safety Connecting Lead 30cm, Red	7 pcs
GSE 235	Safety Connecting Cross	15 pcs
FLS 20.02/097	Connecting Cross	25 pcs
L03S-01E	Experiment Manual Book	1 pc

>>

Specifications and illustrations are subject to change without prior notice

PT 970721 Power Electronic Trainer consists of

Cat. No.	Description	Qty.
PTE-047-01	Power Supply	1 pc
PTE-047-02	Variable Power Supply	1 pc
PTE-047-03	Characteristics	1 pc
PTE-047-04	Power Circuit	1 pc
PTE-047-05	Trigger Circuit	1 pc
PTE-047-06	Battery Charge	1 pc
PTE-047-07	Lead Acid Battery	1 pc
PTE-047-08	Container Box, consist of:	1 set
PEO 339 03	Resistor 10Ω, 0.5W	1 pc
PEO 339 10	Resistor 100Ω, 0.5W	1 pc
PEO 339 12	Resistor 220Ω, 0.5W	1 pc
PEO 339 18	Resistor 680Ω, 0.5W	1 pc
PEO 339 19	Resistor 1kΩ, 0.5W	2 pcs
PEO 339 22	Resistor 3.3kΩ, 0.5W	1 pc
PEO 339 23	Resistor 4.7kΩ, 0.5W	1 pc

Features

- The trainer is designed for the teaching the fundamental concepts of transformer and electrical machines. The student will learn about the characteristics of transformer, DC Machine, single phase ac machine, three-phase asynchronous ac machine and three-phase synchronous ac machine as a three phase generator.
- The Trainer uses the most modern genuine industrial machines in accordance with the IEC 60038 and insulation F classes.
- All the electrical machine are in fractional horse power capacity (approx ½ HP), so it is small enough for easy handling.
- Completed with workbench that already equipped with galvanic isolated power supply.
- The workbench equipped with a cupboard to store the motors and other modules.
- The trainer already has basic measuring equipment for electrical machine (Torque meter, RPM meter, Volt meter, Ampere meter and power meter).
- The electrical machine can be attached from one to another with coupling system
- The electrical system is equipped with emergency stop button.
- All inputs and outputs on each panel are equipped with safety socket and safety connecting cross 4-mm.
- Complete with comprehensive experiment manual book to guide student step by step conducting experiments.

Covered Topics

- LE050001E Voltage transformation in single phase transformer
- LE050002E Current transformation in single phase transformer
- LE050003E Single phase transformer at no-load and short circuit
- LE050004E Loading of single phase transformer
- LE050005E Efficiency of a single phase transformer
- LE050006E Three phase transformer in star-star circuit at no-load
- LE050007E Three phase transformer in star-star circuit with unbalanced load
- LE050008E Three phase transformer in delta-star circuit at no-load
- LE050009E Three phase transformer in delta-star circuit with unbalanced load
- LE050010E Three phase transformer in star-delta circuit at no-load
- LE050011E Three phase transformer in star-delta circuit with unbalanced load
- LE050012E Starting characteristic of a single phase capacitor run AC machine
- LE050013E Changing the rotation directional of a single phase capacitor run AC machine
- LE050014E Torque-speed characteristic of a single phase capacitor run AC machine
- LE050015E Starting characteristic of a three phase squirrel cage induction AC machine
- LE050016E Changing the rotation directional of a three phase squirrel cage induction AC machine
- LE050017E Torque-speed characteristic of a three phase squirrel cage induction AC machine
- LE050018E Starting characteristic of a three phase induction ac machine Dahlander
- LE050019E Changing the rotation directional of a three phase induction AC machine Dahlander
- LE050020E Torque-speed characteristic of a three phase induction AC machine Dahlander
- LE050021E Starting characteristic of a Slip-ring three phase induction AC machine
- LE050022E Changing the rotation directional of a Slip-ring three phase induction AC machine
- LE050023E Torque-speed characteristic of a Slip-ring three phase induction AC machine
- LE050024E Starting characteristic of a synchronous three phase induction AC machine
- LE050025E Torque-speed characteristic of a synchronous three phase induction AC machine
- LE050026E V-Characteristic of a synchronous three phase induction AC machine
- LE050027E Three phase synchronous AC machine as a three phase synchronous generator
- LE050028E Synchronizing circuit (light-dark circuit)
- LE050029E No-load and short circuit characteristic of three phase synchronous AC machine
- LE050030E RLC load characteristic of three phase synchronous AC machine
- LE050031E Exciter-regulator characteristic of three phase synchronous AC machine
- LE050032E Starting characteristic of a DC series machine
- LE050033E Changing the rotation directional of a DC series machine

Fundamental of Electrical Machine Trainer

PT 981156



Training Panel System

- LE050034E Speed adjustment of a DC series machine
- LE050035E Torque-speed characteristic of a DC series machine
- LE050036E Starting characteristic of a DC shunt machine
- LE050037E Changing the rotation directional of a DC shunt machine
- LE050038E Speed adjustment of a DC shunt machine
- LE050039E Torque-speed characteristic of a DC shunt machine
- LE050040E Starting characteristic of a DC compound machine
- LE050041E Changing the rotation directional of a DC compound machine
- LE050042E Speed adjustment of a DC compound machine
- LE050043E Torque-speed characteristic of a DC compound machine
- LE050044E Characteristic of separately excited generator at no-load and loaded
- LE050045E DC series generator
- LE050046E DC shunt generator
- LE050047E DC compound generator

Specification

- **Bench Power Supply [PTE-046-01]**
 - Main source power supply 3 x 230V, current 4A
 - AC three phase fixed 3 x (0 - 220 - 380)V
 - AC Single phase adjustable 0 - 240V
 - DC Adjustable 0 - 200VDC
 - Phase control lamps, L1, L2 and L3
 - Push button emergency
 - Each AC or DC source complete with main switch
- **Single Phase Transformer [PTE-046-02]**
 - Primary : 0 - 50V
 - Secondary : 2 x (0 - 12 - 24V)
 - Current : 5A
- **Three Phase Transformer [PTE-046-03]**
 - Primary : 3 x (0 - 50)
 - Secondary : 3 x (0 - 12 - 24)
 - Current : 5A
- **Single Phase Capacitor Run AC Machine [PTE-046-04]**
 - Nominal voltage 230V, power 370Watt, 2.9A, frequency 50Hz, speed 2750RPM, $\text{Cos } \varphi$ 0.72, and Capacitor run 12.5 μF .
- **Three Phase Squirrel Cage AC Machine [PTE-046-05]**
 - Rating for motor operation: 370Watt, 230/400V, current 1.56/ 0.9A Y/ Δ , $\text{Cos } \varphi$ 0.78, 2840RPM, 2 pole and frequency 50Hz
- **Three Phase AC Machine Dahlander [PTE-046-06]**
 - Rating for motor operation: 220 - 290Watt, 400V, current 0.9/1 0.6A Y/ Δ , $\text{Cos } \varphi$ 0.56/ 0.59, 1440/2907RPM, 4/2 pole and frequency 50Hz
- **Three Phase Slip-ring AC Machine [PTE-046-07]**
 - Rating for motor operation: 200Watt, 220/380V, current 1.1/0.65A Y/ Δ , 3000 RPM frequency 50Hz and V. rotor 220VAC.

Continue >>



Inductive Load
PTE-046-19



Capacitive Load
PTE-046-20



Resistive Load
PTE-046-18



Single Phase Load
PTE-046-16

>> Specification Continued

- **Three Phase Synchronous AC Machine [PTE-046-08]**
 - Rating for motor operation: 250Watt, 220/380V Y/Δ , current 0.65/ 0.37A, Cos φ 1 V. excitation 200V DC, I excitation 0.25A, 3000RPM and frequency 50Hz

- **DC Compound [PTE-046-09]**
 - Rating for motor operation: 250Watt, 220VDC, 3000 RPM, and V. Excitation 200VDC

- **Brake Machine [PTE-046-10]**
 - Serves in connection with unit control brake machine to record the torque and speed in electrical machines. The source supply is provided by the unit control brake machine via a connecting lead.
 - Nominal voltage 12VDC, current 0.52A and max torque 5N.

- **Unit Control Brake Machine [PTE-046-11]**
 - For the supply, control and regulation of the magnetic powder brake. the recording of characteristic (speed/ torque) is possible in automatic operation. Main source 220V AC, 50Hz.
 - Equipped with:
 - Instrument to measure speed with scala 0 - 5000 RPM
 - Instrument to measure torque with scala 0 - 5Nm

- **3 Pole For Three Phase Slip-ring AC Machine [PTE-046-12]**
 - 3 Circular rheostat for three phase Slip-Ring AC machine. Resistance 330, 330Watt

- **Starter For DC Machine [PTE-046-13]**
 - Circular rheostat for starting DC Motors Resistance 100, 160Watt

- **Field Regulator For AC And DC Machine [PTE-046-14]**
 - Circular rheostat for starting DC Motors Resistance 3300, 160Watt

- **Field Regulator For AC And DC Generator [PTE-046-15]**
 - Circular rheostat for starting DC Motors Resistance 3300, 160Watt

- **Single Phase Load [PTE-046-16]**
 - Nominal power 30W-300Watt continuously variable

- **Rectifier Circuit [PTE-046-17]**
 - Nominal voltage 230V AC, current source 10A

- **Resistive load [PTE-046-18]**
 - Three resistances with possibility to connect in star/ delta, controlled by three switches with 7 steps variable per phase nominal voltage 220/380VAC and 300W.

- **Inductive Load [PTE-046-19]**
 - Three inductive with possibility to connect in star/ delta, controlled by three switches with 7 steps variable per phase nominal voltage 220/380VAC and 300VAR

- **Capacitive Load [PTE-46-20]**
 - Three capacitive with possibility to connect in star/ delta, controlled by three switches with 7 steps variable per phase nominal voltage 220/380VAC and 300VAR

- **Synchronization Indicators [PTE-046-21]**
 - With three indicator lamps for quality of the phase relationship between mains and generator voltage (bright dark circuit)

- **Main Switch [PTE-046-22]**
 - On/ Off Switch, switch load 10A/ 400V, 4pole and switch position OFF-ON

- **Star Delta Switch [PTE-046-23]**
 - Switch load 10A/ 400V and switch position OFF-Y-Δ

- **Pole Changing [PTE-046-24]**
 - Switch load 10A/ 400V and switch position OFF-1-2

- **Motor Starter And Protective Circuit Breaker [PTE-046-25]**
 - 3 pole equipped with overload and instantaneous short-circuit trip. Setting range 1-1.6A

- **DC Voltmeter [PTE-046-26]**
 - Measuring instrument DC voltage, measuring range 0-125-250VDC, moving coil meter, classes 2. Equipped with selector switch for selection the voltage range.

- **DC Amperemeter [PTE-046-27]**
 - Measuring instrument DC ampere, measuring range 1-5A, moving coil meter, classes 2. Equipped with selector switch for selection the voltage range.

- **Digital Power Meter [PTE-046-28]**
 - Measuring instrument digital power meter, main source 220VAC. can be use measuring voltage, current, frequency, VAR, Watt and power factor. display 4 digit LED.



Electrical Machines

Training Panel System

PT 981156 Fundamental of Electrical Machine Trainer
 Consist of:

Cat. No.	Description	Qty.	Cat. No.	Description	Qty.
PTE-046-01	Bench Power Supply	1 pc	PTE-046-22	Main Switch	1 pc
PTE-046-02	Single Phase Transformer	1 pc	PTE-046-23	Star Delta Switch	1 pc
PTE-046-03	Three Phase Transformer	1 pc	PTE-046-24	Pole Changing	1 pc
PTE-046-04	Single Phase Capacitor Run AC Machine	1 pc	PTE-046-25	Motor Starter & Protective Circuit Breaker	1 pc
PTE-046-05	Three Phase Squirrel Cage AC Machine	1 pc	PTE-046-26	DC Voltmeter	1 pc
PTE-046-06	Three Phase AC Machine Dahlander	1 pc	PTE-046-27	DC Amperemeter	1 pc
PTE-046-07	Three Phase Slip-Ring AC Machine	1 pc	PTE-046-28	Digital Power Meter	1 pc
PTE-046-08	Three Phase Synchronous AC Machine	1 pc	GSN305	Coupling	2 pcs
PTE-046-09	DC Compound Machine	1 pc	GSE-233 02	Safety connecting lead 100cm, red	12 pcs
PTE-046-10	Brake Machine	1 pc	GSE-233 04	Safety connecting lead 100cm, yellow	10 pcs
PTE-046-11	Unit Control Brake Machine	1 pc	GSE-233 03	Safety connecting lead 100cm, Blue	6 pcs
PTE-046-12	3-Pole Rheostat for these Slip-Ring AC machine	1 pc	GSE-233 01	Safety connecting lead 100cm, Black	10 pcs
PTE-046-13	Starter for DC machine	1 pc	GSE-233 05	Safety connecting lead 100cm, Yellow-green	5 pcs
PTE-046-14	Field Regulator for AC and DC Machine	1 pc	GSE-232 02	Safety connecting lead 50cm, Red	9 pcs
PTE-046-15	Field Regulator for AC and DC Generator	1 pc	GSE-232 01	Safety connecting lead 50cm, Black	7 pcs
PTE-046-16	Single Phase Load	1 pc	GSE-231 02	Safety connecting lead 30cm, Red	9 pcs
PTE-046-17	Rectifier Circuit	1 pc	GSE-231 01	Safety connecting lead 30cm, Black	7 pcs
PTE-046-18	Resistive Load	1 pc	GSE 235	Safety connecting cross	10 pcs
PTE-046-19	Inductive Load	1 pc	GSN 245	TPS Frame 1200mm	1 set
PTE-046-20	Capacitive Load	1 pc	L05S-01E	Experiment manual book	1 pc
PTE-046-21	Synchronization indicators	1 pc			



Measure Characteristics of Three Phase Asynchronous AC Machine

Specifications and illustrations are subject to change without prior notice

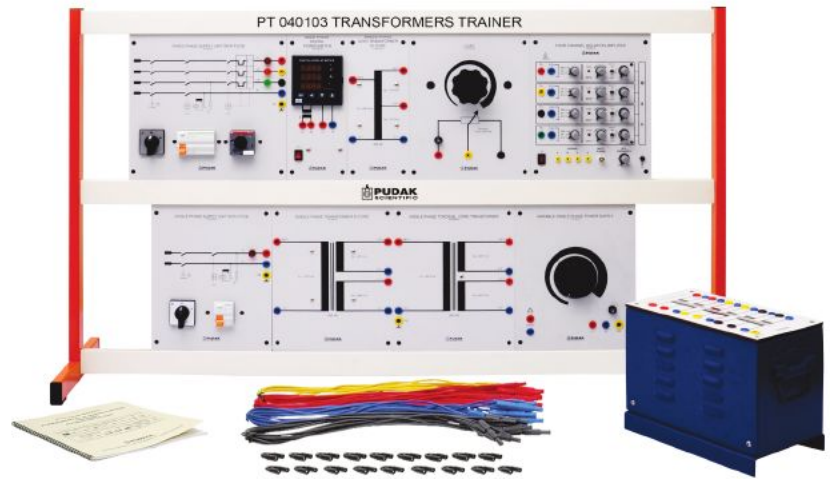
Features

- The trainer is designed to teach fundamental concept of single phase and three phase transformer.
- The student will learn the characteristic of transformers.
- The Panel printed graphic symbol and technical data of the transformer.
- The trainer already has basic measuring equipment for transformers (Digital power meter).
- Current protection panel suitable for providing earth fault protection. Operation fault current of 30 mA with indicating light.
- All input and output on each panel are equipped with safety socket and safety connecting cross 4-mm.
- Complete with comprehensive experiment manual book to guide student step by step conducting experiments.

NEW PRODUCT

Transformers Trainer

PT 040103



Covered Topics

- LE090001E Voltage Transformation in single phase transformer EI Core
- LE090002E Current transformation in single phase transformer EI Core
- LE090003E Single phase transformer at no-load and short circuit for EI and Toroidal Core
- LE090004E Loading of EI and Toroidal Core a single phase transformers
- LE090005E Efficiency of EI and Toroidal Core a single phase transformers
- LE090006E Operating characteristic of single phase auto-transformer
- LE090007E Three phase transformer Yy0 - Yyn0 Connection at No-Load
- LE090008E Three phase transformer Yy0 - Yyn0 Connection with unbalanced Load
- LE090009E Three phase transformer Dy5 - Yyn5 Connection at No-Load
- LE090010E Three phase transformer Dy5 - Yyn5 Connection with unbalanced Load
- LE090011E Three phase transformer Yd5 - Ydn5 Connection at No-Load
- LE090012E Three phase transformer Yd5 - Ydn5 Connection with unbalanced Load
- LE090013E Three phase transformer Yz5 - Yzn5 Connection at No-Load
- LE090014E Three phase transformer Yz5 - Yzn5 Connection with unbalanced Load

Specification

- **Three Phase Supply Unit with FCCB [PTE-052-01]**
 - Ceme Switch 4 pole
 - Fault Current circuit breaker 30 mA
 - Phase Control Lamps L1, L2, L3
 - Main Cabel with Plug
- **Single Phase Supply Unit [PTE-052-02]**
 - Ceme Switch 2 pole
 - Fault Current circuit breaker 30 mA
 - Phase Control Lamp L1
 - Main Cabel with Plug
- **Single Phase Variable Power Supply [PTE-052-03]**
 - Supply Voltage : 230 V, 50 Hz.
 - Output : 0 - 240 VAC
 - Current : Max. 5A
 - Power : Max. 1 kVA
- **Single Phase EI Core Transformer [PTE-052-04]**
 - Primary : 230V, 50Hz
 - Secondary : 2 x (0 - 115)V
 - Nominal Current : Max. 0.9A
 - Power : Max. 200 VA
- **Single Phase Toroidal Core Transformer [PTE-052-05]**
 - Primary : 230V, 50Hz
 - Secondary : 2 x (0 - 115)V
 - Nominal Current : Max. 0.9A
 - Power : Max. 200 VA
- **Single Phase Auto Transformer [PTE-052-06]**
 - Primary : 230V, 50Hz
 - Secondary : 115 V; 1.8 A/ 240 V; 0.9A
 - Nominal Current : Max. 0.9A
 - Power : Max. 200 VA
- **Three Phase Transformer [PTE-052-07]**
 - Suitable for : Star-star Connection
Delta-star Connection
Star-delta Connection
Star-zigzag Connection
 - Primary : 3 x 230V/ 400 V, 50Hz
 - Secondary : 3 x 2 x (0 - 115)
 - Nominal Current : Max. 0.9A
 - Power : Max. 600 VA

Continue >>

Training Panel System

>> Specification Continued

- **Load [PTE-052-08]**
 - Circular rheostat for transformer load.
 - Resistance : 470 Ω
 - Power : 300Watt

- **Single Phase Digital Power Meter [PTE-052-09]**
 - Measuring instrument power meter, main supply 220VAC. Can be used for measuring voltage current, frequency, power VA, power Watt, power VAR, Power Factor.
 - Display 4 digit LED.

- **Four Channel Isolation Amplifier [PTE-052-10]**
 - Channel : A, B, C, D
 - Input Voltage : Max. 450 V
 - Measuring Ranges : 1 : 1, 1 : 10, 1 : 100
 - Overdrive indication with LEDs

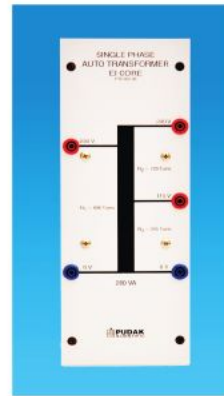
PT 040103 Transformers Trainer consists of		
Cat. No.	Description	Qty.
PTE-052-01	Three Phase Supply Unit with FCCB	1 pc
PTE-052-02	Single Phase Supply Unit with FCCB	1 pc
PTE-052-03	Single Phase Variable Power Supply	1 pc
PTE-052-04	Single Phase EI Core Transformer	1 pc
PTE-052-05	Single Phase Toroidal Core Transformer	1 pc
PTE-052-06	Single Phase Auto Transformer	1 pc
PTE-052-07	Three Phase Transformer	1 pc
PTE-052-08	Load	1 pc
PTE-052-09	Single Phase Digital Power Meter	1 pc
PTE-052-10	Four Channel Isolation Amplifier	1 pc
GSE-233 02	Safety connecting lead 100cm, red	4 pcs
GSE-233 04	Safety connecting lead 100cm, Yellow	4 pcs
GSE-233 03	Safety connecting lead 100cm, Blue	4 pcs
GSE-233 01	Safety connecting lead 100cm, Black	4 pcs
GSE-231 04	Safety connecting lead 100cm, Yellow - Green	2 pcs
GSE-232 02	Safety connecting lead 50cm, Red	4 pcs
GSE-231 02	Safety connecting lead 30cm, Red	5 pcs
GSE-231 01	Safety connecting lead 30cm, Black	5 pcs
GSE-231 05	Safety connecting lead 30cm, Yellow	5 pcs
L09S-01E	Experiment Manual book	1 pc
GSN 245	TPS Frame 1200mm	1 pc



Single Phase Digital Power Meter PTE 052-09



Four Channel Isolation Amplifier PTE 052-10



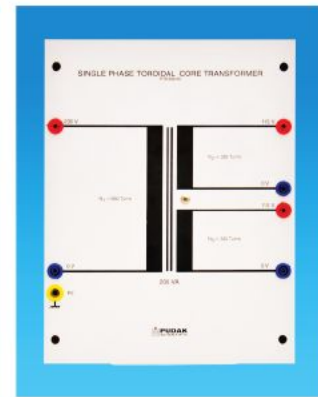
Single Phase Auto Transformer EI Core PTE 052-06



Load PTE 052-08



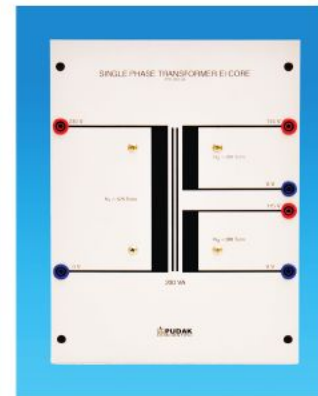
Variable Single Phase Power Supply PTE 052-03



Single Phase Toroidal Core Transformer PTE 052-05



Single Phase Supply Unit with FCCB PTE 052-02



Single Transformer EI Core PTE 052-04

Specifications and illustrations are subject to change without prior notice

Features

- The trainer is designed to teach fundamental concept of a asynchronous single phase and three phase AC Machine
- The student will learn the characteristic of a asynchronous single phase and three phase AC machine
- The trainer already has measuring equipment for electrical machine (Torque, Speed, Voltage, current, Power and Frequency).
- The electrical machine can be attached from one to another with coupling system
- The system consist of modular block to enable the student to learn the asynchronous machine in modular way.
- The panel type construction are easy to handle by student when conducting the experiment
- Current protection panel suitable for providing earth fault protection. Operation fault current of 30 mA with indicating light
- All input and output on each panel are equipped with safety socket and safety connecting cross 4-mm
- Complete with comprehensive experiment manual book to guide student step by step conducting experiments.



NEW PRODUCT

Asynchronous Machine Trainer

PT 040104

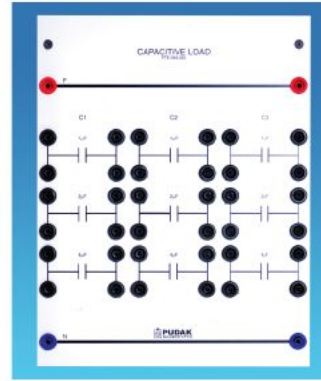
Covered Topics

- LE10001E Starting characteristic of a single phase capacitor AC machine
- LE10002E Changing the rotational directional of a single phase AC machine
- LE10003E Load characteristic $n, I, \cos\sigma, I_{hi}, P_2, s, \eta = f(M)$ of a single-phase induction machine
- LE10004E Starting characteristic of three-phase induction machine with squirrel-cage rotor
- LE10005E Changing the rotational directional of three-phase induction machine with squirrel-cage rotor
- LE10006E Compensation of reactive power of three-phase induction machine with squirrel-cage rotor
- LE10007E Load Characteristic $n, I, I_u, I_v, I_w \cos\sigma = f(M)$ of Three-phase induction machine with squirrel-cage rotor-Steinmetz circuit
- LE10008E Load Characteristic $n, I, I_u, I_v, I_w \cos\sigma = f(M)$ of Three-phase induction machine with squirrel-cage rotor
- LE10009E Starting characteristic of three-phase Induction machine with slip-ring rotor
- LE10010E Changing the rotational directional of three-phase induction machine with slip-ring rotor
- LE10011E Load characteristic $n, I, \cos\sigma, P_2, \eta, s = f(M)$ of three-phase induction machine with slip-ring rotor
- LE10012E Rotational-frequency characteristics $n = f(R_v)$ of Three-phase induction machine with slip-ring rotor
- LE10013E Pole changeable (dahlander circuit) connection and change rotation of three-phase induction machine with squirrel-cage rotor
- LE10014E Load characteristics $n, I, \cos\sigma, P_2, s, \eta = f(M)$ Three-phase induction machine with squirrel-cage rotor, pole changeable (dahlander circuit)

Training Panel System

Specification

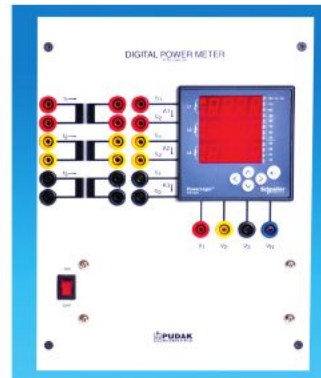
- Three Phase Supply Unit with FCCB [PTE-052-01]**
 - Came Switch 4 pole
 - Fault Current Circuit Breaker 30 mA
 - Motor Protection Switch 2.5 - 4 A
 - Phase Control Lamps L1, L2, L3
 - Main Cabel with Plug
- Single Phase Supply Unit [PTE-052-02]**
 - Came Switch 2 pole
 - Fault Current Circuit Breaker 30 mA
 - Phase Control Lamp L1
- Single Phase Variable Power Supply [PTE-052-03]**
 - Supply Voltage : 230 V, 50 Hz.
 - Output : 0 - 240 VAC
 - Current : Max. 5 A
 - Power : Max. 1 kVA
- Three Phase Variable Power Supply [PTE-052-011]**
 - Supply Voltage : 380 V, 50 Hz.
 - Output : - Three Phase Variabel Power Supply, max. 0 - 415 VAC
 - Three Phase Supply Voltage, 380 VAC.
 - Power : Max. 3 kVA
- Single Phase Capacitor AC Machine [PTE-046-04]**
 - Nominal voltage 230VAC, Power 370Watt, 2.9A, Frequency 50Hz, Speed 2750RPM, Cos ϕ 0.72, Capacitor run 12.5uF.
- Three Phase Squirrel Cage AC Machine [PTE-046-05]**
 - Rating for machine operation: Power 370Watt, Voltage 230/400V
 - Current 1.56/ 0.9A Y/ Δ , Cos ϕ 0.78, Speed 2840RPM, 2 pole, frequency 50Hz
- Three Phase AC Machine Dahlander [PTE-046-06]**
 - Rating for machine operation: Power 220 - 290Watt, Voltage 400V
 - Current 0.9/ 1.06A , Cos ϕ 0.56/0.59, Speed 1440/ 2907RPM, 4/2 pole frequency 50Hz
- Three Phase Slip-Ring AC Machine [PTE-046-07]**
 - Rating for machine operation: Power 200Watt, Voltage 220/ 380V Δ /Y
 - V rotor 220V, Current 1.1-0.65A, Speed 3000RPM, frequency 50Hz
- Unit Control Brake Machine [PTE-046-10]**
 - Serves in connection with the brake machine control unit to record the torque and speed in electrical machines. The source is provided by the brake machine control unit via a connecting lead.
 - Nominal voltage: 12 VDC, current: 0.52 A, and max. torque: 5 N.m
- Unit Control Brake Machine [PTE-046-11]**
 - For the supply control and regulation of the magnetic powder brake.
 - The characteristic (speed/torque) recording is possible in automatic operation.
 - Main source : 220 V/ 50 Hz.
 - Display :- RPM reading are four digits and maximum: 0 - 9.999 RPM.
 - Torque reading are three digits and the maximum number the digital meter handled is 5.00 for torque and residual torque is 0.1N.m
 - Dimension : 228 x 297mm
- 3-Pole Rheostat for Three Phase Slip-Ring AC Machine [PTE-046-12]**
 - 3 Circular rheostat for three phase Slip-Ring ac machine
 - Resistance: 330 Ω , 330W



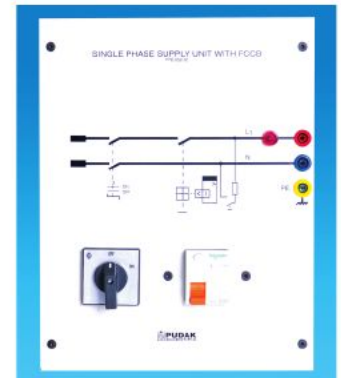
Capacitive Load
PTE-045-025



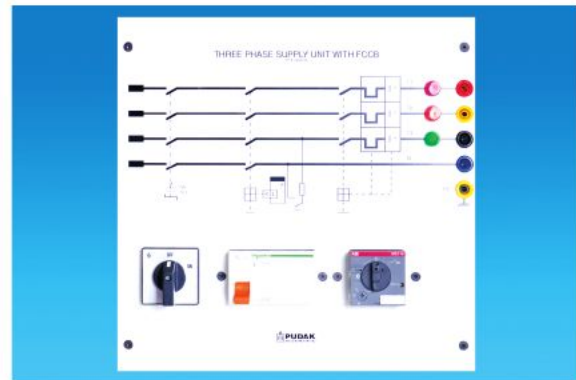
Unit Control Brake Machine
PTE-046-11



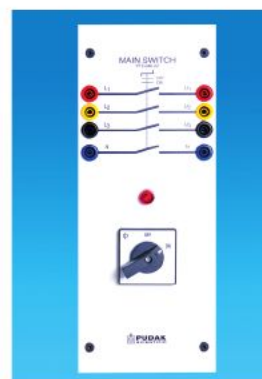
Digital Power Meter
PTE-046-28



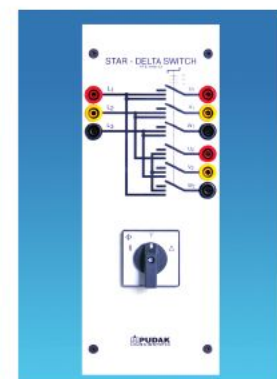
Single Phase Supply Unit with FCCB
PTE-052-02



Three Phase Supply Unit with FCCB
PTE-052-01



Main Switch
PTE-046-22



Star - Delta Switch
PTE-046-23

Continue >>

>> Specification Continued

- Main Switch [PTE-046-22]**
 - On/Off switch, switch load 10 A/ 400 V, 4 pole
 - Switch position : OFF - ON
 - Dimension : 114 x 297 mm

- Star Delta Switch [PTE-046-23]**
 - Switch Load : 10 A / 400 V, switch position: OFF - Y - Δ
 - Dimension : 114 x 297 mm

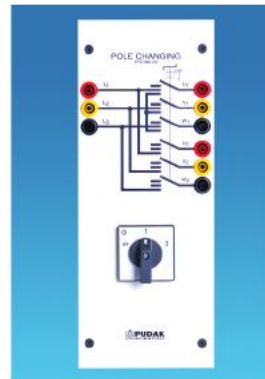
- Pole Changing [PTE-046-24]**
 - Switch Load: 10A / 400V, switch position: OFF - 1 - 2

- Motor Starter & Protective Circuit Breaker [PTE-046-25]**
 - 3 pole equipped with overload and instantaneous short-circuit trip
 - Setting range : 1 - 1.6 A
 - Dimension : 114 x 297 mm

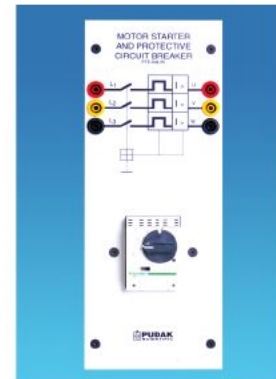
- Digital Power meter [PTE-046-28]**
 - Measuring instrument power meter, main supply 220VAC. Can be used for measuring voltage current, frequency, power VA, power Watt, power VAR, and power factor. Display 4 digit LED.

- Capacitive Load [PTE-045-025]**
 - Voltage max: 450VAC
 - Capacitor : 3x1uF; 3x2uF ; 3x4uF

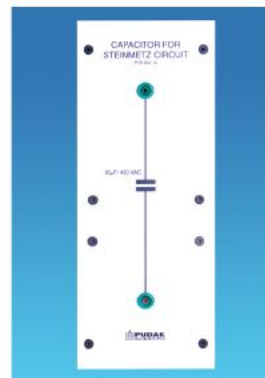
- Capacitor for Steinmetz Circuit[PTE-052-12]**
 - Voltage max: 400VAC
 - Capacitor 26uF



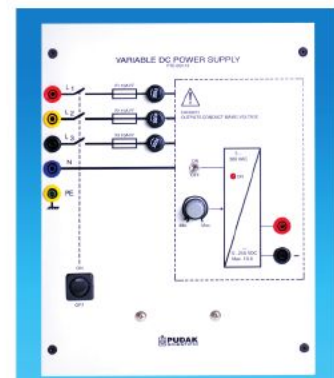
Pole Changing
PTE-046-24



Motor Starter And Protective Circuit Breaker
PTE-046-25



Capacitor for Steinmetz Circuit
PTE-052-12



Variable DC Power Supply
PTE-052-13



Three Phase Variable Power Supply
PTE-052-011



3 Pole Rheostat for Three Phase Slip-Ring AC Machine
PTE-046-12

Training Panel System

PT 040104 Asynchronous machine Trainer
 consists of

Cat. No.	Description	Qty.
PTE-052-01	Three Phase Supply Unit with FCCB	1 pc
PTE-052-02	Single Phase Supply Unit	1 pc
PTE-052-03	Single Phase Variable Power Supply	1 pc
PTE-052-11	Three Phase Variable AC Variable Power Supply	1 pc
PTE-046-04	Single Phase Capacitor AC Machine	1 pc
PTE-046-05	Three-Phase Squirrel Cage AC Machine	1 pc
PTE-046-06	Three-Phase AC Machine Dahlander	1 pc
PTE-046-07	Three-Phase Slip-Ring AC Machine	1 pc
PTE-046-10	Brake Machine	1 pc
PTE-046-11	Brake Machine	1 pc
PTE-046-12	3-Pole Rheostat for These Slip-Ring AC Machine	1 pc
PTE-046-22	Main Switch	1 pc
PTE-046-23	Star Delta Switch	1 pc
PTE-046-24	Pole Changing	1 pc
PTE-046-25	Machine Starter & Protective Circuit Breaker	1 pc
PTE-046-28	Digital Power Meter	1 pc
PTE-045-025	Capacitive Load	1 pc
PTE-052-12	Capacitor for Steinmetz Circuit	1 pc
GSE-233-02	Safety Connecting Lead 100cm, Red	15 pcs
GSE-233-04	Safety Connecting Lead 100cm, Yellow	10 pcs
GSE-233-03	Safety Connecting Lead 100cm, Blue	10 pcs
GSE-233-01	Safety Connecting Lead 100cm, Black	10 pcs
GSE-231-04	Safety Connecting Lead 100cm, Yellow-Green	5 pcs
GSE-232-05	Safety Connecting Lead 50cm, Green	10 pcs
GSE-232-02	Safety Connecting Lead 50cm, Red	10 pcs
GSE-232-01	Safety Connecting Lead 50cm, Black	10 pcs
GSE-231-02	Safety Connecting Lead 30cm, Red	15 pcs
GSE-231-01	Safety Connecting Lead 30cm, Black	10 pcs
GSE-235	Safety Connecting Cross	20 pcs
L05S-01E	Experiment Manual Book	1 pc
GSN-245	TPS Frame 1200mm	1 pc


 Brake Machine
 PTE-046-10

 Single Phase Capacitor Run AC Machine
 PTE-046-04

 Three Phase Squirrel AC Machine
 PTE-046-05

 Three Phase AC Machine Dahlander
 PTE-046-06

 Three Phase Slip Ring AC Machine
 PTE-046-07

Specifications and illustrations are subject to change without prior notice