

model: **Electrical Tech-GTBD1000**

Electrical Technology Trainer

1. Feature

- 1) It is designed and manufactured as a training equipment to practice following electrical concepts ;
 - (1) Electric sequence control
 - (2) Self-holding circuit
 - (3) Interlocking circuit operation for protection
 - (4) Relay, Timer operation
 - (5) Motor jogging circuit
 - (6) Motor reversing using button and contractor
 - (7) Wye-delta circuit
 - (8) VFD application
 - (9) Magnetic contractor and circuit breaker operation
- 2) The theory and practice of electrical circuit wiring are possible by arranging electric parts by using simulation software and wiring the circuit according to the user's contents.
- 3) Manufactured to practice with interlocking with PLC.
- 4) All connection comply relevant international codes or standard for connection, safety, color etc.
- 5) All components come in modular form, which can be freely mounted, on DIN rail frame or any suitable tabletop structure.
- 6) Components is chosen from standard available components that are used in industry.
- 7) All items is labeled with symbol and name according to international standard and in English language.
- 8) Connections via 4 mm banana plug/compatible safely sockets for power and 2 mm safely sockets for control (24 V DC).
All connection positions are standardized and are on safety sockets.
- 9) All AC connections are 50 Hz unless mentioned otherwise.
- 10) All electric components is CE certified. CE marking is visible on body.

2. System configuration



3. Spec

1. Operator Control panel (components)

- 1) Pushbuttons : Min 4 pcs
 - (1) Min 2 pushbutton with NC contacts
 - (2) Min 2 pushbutton with NO contacts
 - 2) Selector switch : Min 1 pc with 2 contacts
 - 3) Emergency button : Min 1 pc with NC contacts
 - 4) Indicator lights : Min 4 pcs (min 1 green and 1 red)
 - 5) Toggle switch : min 1 pc
- All buttons is rated for min 2A - 240 V AC.

2. Power Supply

- 1) 24V DC power supply module ;
 - (1) Input voltage : 1 AC/180-220 V (50Hz)
 - (2) Output voltage : 24 V DC
 - (3) Output current : Min 1 A
- 2) 3 Phase power supply module
 - (1) 3 phase plug
 - (2) Input voltage : 3 phase AC 220 V /min 15 A / 50 Hz
 - (3) Output voltage : 3 phase AC 220 V / min 5 A / 50 Hz
 - (4) with circuit breaker

3. AC inverter drive / frequency converter

- 1) Input : 3 phase 220 V AC, 50Hz
- 2) Output : 3 phase 220 V AC, 0.4 kW
- 3) Min frequency range : 1-500 Hz
- 4) Programmable via PLC

4. 3 Phase induction motor

- 1) Operating power : 3 ± AC 220V / 0.18-.25kW
- 2) Speed : min 1350 RPM
- 3) Y- ,Starting
- 4) Diagram of motor wiring (Y- ,) on the front panel educational safely
- 5) Separately manufactured with a base for educational safely
- 6) Separate operator panel with safely socket (preferred)

5. Programmable Logic Controller Module

: Each trainer board should contain one (01) PLC.

User is free to choose any PLC from following specification.

However, the mentioned minimum number of each PLC is provided.

- 1) CPU S7-1214C (Minimum 04 sets)
 - (1) 75 kByte main memory, 4 Mbyte program memory
 - (2) Interface : RJ45
 - (3) I/Os
 - 14 digital inputs (24 V DC)
 - 10 digital outputs (24 V DC, 500 mA)
 - 2 analogue inputs, 10 bit (0-10 V)
 - (4) CPU module
 - (5) Analogue output SB 1232 AQ
 - (6) AQ 1 x 12 Bit (± 10 V DC / 0 - 20 mA)
 - (7) TIA Portal with STEP 7 Basic v17 or above (educational and perpetual license)
- 2) CPU : FX3S-30MR-ES (2 sers)
 - (1) Supply voltage : 100-240 VAC
 - (2) No. of Inputs : 16
 - (3) No. of outputs ; 14
 - (4) Input type : 24 VDC Sink/Source
 - (5) Output type : Relay
 - (6) Programming software (Educational and perpetual license)
- 3) DVP-ES2 Series (3 sets)
 - (1) Supply/input/output : AC/DC/Realy
 - (2) MPU points : 16
 - (3) Program capacity : 16k steps
 - (4) Built-in with 3 COM ports : 1 RS-232 port and 2 RS-485 ports, all are able to operate independently (Master/Slave)
 - (5) Max. I/O points : 256 input points + 16 output points, or 256 output points + 16 input points
 - (6) DVP-EX2 MPU is built in with 12-bit 4 AD/2DA and offers analog/temperature modules of 14 bit resolution
 - (7) Built-in with 8 high-speed input points (2 points for 100kHz, 6 points for 10 kHz) and supports U/D, U/D Dir, A/B counting modes
 - (8) Programming software (educational and perpetual license)

- 4) CPU : 5069-L320ER (2 sets)
 - (1) Communication ports : 1 type B 2.0 Full-speed USB and 2 Ethernet/IP Ports
 - (2) Application memory 2 Megabytes
 - (3) Module type : CompactLogix Controller
 - (4) Local I/O modules 16 I/O modules
 - (5) Communication rate, Ethernet : 10 Mbps / 100 Mbps / 1 Gbps
 - (6) No. of Ethernet nodes : 40
 - (7) No. of supported sockets : 32
 - (8) Programming software (educational and perpetual license)

6. Fan : operating power, DC 24 V / 9W

7. Electric Contractor /Switch gear set

: All equip,emt is from the reputed brands (e.g: Schneide/ABB/Siemens or equivalent) and have CE certificate.
All rating is appropriate to control offered electro-mechanical machine.

- 1) Fuse Holder Module : 3ea
- 2) Off-delay timer (30 sec) : 1 ea
- 3) On-delay timer (30sec) : 1 ea
- 4) Main magnetic contractor : 2 ea
- 5) Auxiliary magnetic contractor : 1 ea
 - (1) Contact : 1a3b
- 6) Relay module : 6 ea
 - (1) 8-pin relay : 2 ea
 - (2) 11-pin relay : 2 ea
 - (3) 14-pin relay : 2 ea
- 7) Electronic over current relay (EOCR) : 2 ea
Time setting : 0~30sec
- 8) Counter : 1 ea
- 9) Terminal block : 1 ea
 - (1) Structure : 2-stage 20P
- 10) Terminal block : 1 ea
 - (1) Structure : 1-stage 10P
- 11) Temperature relay : 1 ea
 - (1) Input : Thermocouple CA (K) Thermal Resistance Pt (100•ÿ)
 - (2) Control output : relay output
- 12) Thermal overload relay : 1 ea
- 13) DOL starter : 1 ea
- 14) Soft starter : 1 ea

8. Motors

- 1) Three phase induction motor : 2 sets
 - (1) Operating power : $3\phi \pm$ AC 220V / 0.175-.25kW
 - (2) Speed : min 1350 RPM
 - (3) Y- , Starting
 - (4) Diagram of motor wiring (Y- ,) on the front panel
 - (5) Separately manufactured with a base for educational safety
 - (6) Separate operator panel with safety socket (preferred)

9. Workstation

- 1) Aluminium / Steel profile frame for module stacked storage
- 2) Rigid worktable
- 3) Two-sided structure is preferred

10. Simulation software

: The controls simulation software features true simulations of the components of the offered electrical trainer
The precise simulations allow students to complete all the exercises in the training system courseware on a computer without the need for any actual equipment.

- 1) Basic practice part
 - (1) Explain the function, type and principle of operation
 - (2) Training materials necessary for parts training are provided by step by step method
 - (3) Provide learning window function to provide electric parts and actual circuit diagram with explanation in 3D from
- 2) Circuit wiring part
 - (1) Describe the composition and operation principle of the basic circuit of electric wiring
 - (2) Training materials necessary for parts training are provided by step by step method
 - (3) Electric circuit diagram, internal wiring diagram and component cross section diagram
 - (4) Providing follow-up exercises through distribution boards with explanation of circuits
- 3) Exercise part
 - (1) Provide training drawings
 - (2) provide the following fomular exercises along with the description of the circuit configuration
 - (3) The same parts are composed in 3D form for the same effect as the parts are configured on actual distribution board
 - (4) The circuit training part and the dwarding part are provided at the same time so that you can practice while checking the drawings

- (5) All parts' setting are provided by the user's direct input by analog method, not by digital input method
 - (6) Exercise practice circuit
 - (7) motor control circuit
 - (8) conveyor control circuit
 - (9) Lift automatic control circuit
 - (10) Motor time limit control circuit
 - (11) Factory power wiring
 - (12) Water supply equipment control circuit
- 4) Free wiring part
- (1) virtual three-dimensional space of the working space is provided, and 360° screen can be rotated in any direction up, down, left and right, so it can be easily checked in any direction up, down, left and right of the part
 - (2) A total of 60 parts are provided in the same form as the real one in 3D form, and single and three phase parts are used separately
 - (3) Basic R, S, and T terminals are provided on the power distribution training board, and the user can use single and three phases according to their needs through wiring as needed
 - (4) Wires are available in six colors, red, blue, black, yellow, green and white, allowing users to select and wire according to their purpose

11. Connection cables

- 1) The components modified for education use should have 4 mm banana sockets for connection
- 2) Color : Green, Yellow, Red, Blue
- 3) Qty : 5 sets for each length and each color
- 4) Length : 30 cm, 60 cm, 90 cm

12. Manuals

- 1) Instructor's manual : 1 set
- 2) User guide : 1 set
- 3) Language : English