

Enero-Diciembre, 2013

PROPUESTA EQUIPOS NIVEL PROFESIONAL

**EMAX GREEN CO., LTD
COREA DEL SUR**



(ENTRENADORES PARA LABORATORIOS DE MECATRÓNICA)



TECNODIDÁCTICOS, S. DE R.L. DE C.V.

(Fabricante y distribuidor de equipos didácticos clase mundial)

Propuesta para Laboratorios de Mecatrónica Universidades y Escuelas Técnicas en México

Ingeniería Mecatrónica

Descripción

Mecatrónica es la combinación sinérgica de la ingeniería mecánica de precisión, la electrónica, el control y sistemas informáticos, pensando en el diseño de productos y procesos. En un departamento de Mecatrónica se estudian los principios y estructuras de los sistemas de la manufactura flexible que se usan en la industria para el procesamiento automatizado de producción, usando sistemas robóticos para la manufactura en masa.

Los estudiantes aprenden la teoría y las tecnologías de diseño, producción, operación, mantenimiento y reparación de sistemas automatizados. Los alumnos pueden también aprender sobre los sistemas auxiliares de sistemas automatizados tales como control electrónico control por medio de PLC's, control de sensores, control neumático/hidráulico y en general el control basado en PC para promover y desarrollar habilidades para aplicarlas en la vida real en sistemas de manufactura esbelta en la industria.

Además los estudiantes aprenden como encontrar errores o fallas usando instrumentos de medición, como hacer, instalar, mantener y reparar circuitos electrónicos industriales.

Objetivo de Educación

La meta u objetivo educacional de la Ingeniería Mecatrónica es el entender los principios y estructura de varios Sistemas Mecatrónicos, aprender a diseñarlos, fabricar y operar entrenadores, y alentar o promover el desarrollo de las habilidades para mantener y reparar sistemas Mecatrónicos en los laboratorios tales como los de sistemas de control automático, el de electrónica de control, etc.

Después del curso

Una vez concluido este curso, los estudiantes podrían dedicarse al diseño, mantenimiento o reparación de sistemas Mecatrónicos.

1. Laboratorio de Control Automático

A. Equipo principal y descripción técnica

■ Entrenador de Automatización de Fábrica (Factory Automation Trainer)

Factory Automation Trainer FA-2800 es una herramienta ideal para simular la automatización de una fábrica en los departamentos de mecatrónica o automatización de escuelas técnicas o universidades. El entrenador se diseñó para que los estudiantes puedan practicar cómo controlar una fábrica de manera automática por medio de una interfaz PLC.

■ Entrenador de Robots de 3 Ejes (3 Axes Robot Trainer)

3 Axes Robot Trainer RB-2010 es una herramienta para que los estudiantes se familiaricen con los sistemas robóticos, por medio de la simulación. Este entrenador consiste de un robot de 3 ejes que se controla automáticamente por medio de un programa.

■ Entrenador en Robots PTP (PTP Robot Trainer)

PTP Robot Trainer PTP-1820A es un entrenador educativo que les permite a los estudiantes analizar el funcionamiento y estructura de un sistema robótico. Los estudiantes pueden practicar movimientos horizontales, verticales y de rotación usando componentes neumáticos y electrónicos. Con este entrenador que cuenta con su PLC embebido, se pueden realizar varios experimentos de control y de programación con PLC's.

■ Entrenador en Electroneumática (Electro Pneumatics Trainer)

Electro Pneumatics Trainer EP-5100 es una gran herramienta para que los estudiantes puedan analizar sistemas neumáticos, usando componentes electrónicos y neumáticos básicos. Los alumnos estudiantes aprenderán como usar sistemas neumáticos para operar máquinas automáticas, o sistemas en la industria por medio de programas de automatización a través de un PLC.

■ **Entrenador en Electrohidráulica** **(Electro Hydraulics Trainer)**

Electro Pneumatics Trainer EH-6100 es un entrenador completo para los estudiantes de sistemas hidráulicos, usando componentes electrónicos e hidráulicos básicos. Los alumnos aprenderán como usar sistemas hidráulicos para operar máquinas automáticas, o sistemas en la industria por medio de programas de automatización, tales como los de un PLC.

■ **Entrenador en Elevadores** **(Elevator Trainer)**

Elevator Trainer ELE-1824A es la herramienta ideal para estudiar y simular un elevador en los departamentos de mecatrónica o automatización de una escuela técnica o universidad. Este entrenador se diseñó para que los alumnos puedan operar y entrenarse en el control automático de elevadores con un intermediario de control PLC incluido.

■ **Entrenador en PLC's** **(PLC Trainer)**

PLC Trainer PT-1200 es el entrenador para educación con el que los estudiantes pueden usar, junto con los diversos entrenadores a estudiar y practicar la programación con PLC's. Este entrenador se diseñó para estudiar y controlar varias máquinas automáticas con PLC y con una interfaz de PC. Los estudiantes pueden practicar con los sensores de proximidad y foto transistores usando este entrenador.

■ **Entrenador en Control de Sensores** **(Sensor Control Trainer)**

Sensor Control Trainer ST-3202 es el entrenador ideal para estudiar y entender el funcionamiento de varios tipos de sensores. Los estudiantes pueden monitorear y controlar las salidas de los sensores por medio de una interfaz de PC.

B. Listado de Equipos

No	Equipo	Modelo	Cant (c/u)	Especificaciones
1	Factory Automation Trainer	FA-2800	2	<i>Refer to Auto-1</i>
2	3 axis Robot Trainer	RB-2010	2	<i>Refer to Auto-2</i>
3	PTP Robot Trainer	PTP-1820A	4	<i>Refer to Auto-3</i>
4	Electro Pneumatics Trainer	EP-5100	2	<i>Refer to Auto-4</i>
5	Electro Hydraulics Trainer	EH-6100	2	<i>Refer to Auto-5</i>
6	Elevator Trainer	ELE-1824A	4	<i>Refer to Auto-6</i>
7	DC Motor Control Trainer	DC-1827	4	<i>Refer to Auto-7</i>
8	Stepping Motor Trainer	MS-2010A	4	<i>Refer to Auto-8</i>
9	PLC Trainer	PT-1200	4	<i>Refer to Auto-9</i>
10	Sensor Control Trainer	ST-3202	4	<i>Refer to Auto-10</i>
11	Digital Multi-meter	Protek-81	4	<i>Refer to Auto-11</i>
12	Air compressor	More than 5HP	1	
13	Personal Computer	For PC Network	16	
14	Beam Projector		1	
15	Screen	120 inches	1	
16	Network System	LAN	1	
17	Printer (Laser)	Up to A3 size	1	
18	Air conditioner		1	
Total			58	

2. Laboratorio de Control Eléctrico & Electrónico (Electric & Electronic Control Lab)

A. Equipo principal y descripción técnica

■ Entrenador Eléctrica y Electrónico Básico (Basic Electric & Electronic Trainer)

Basic Electric & Electronic Trainer ET-4600 is the educational trainer that the students can simulate various electrical circuits. This trainer has measuring devices and the students can practice various circuit forms conveniently due to printed circuits on the each panel.

■ Entrenador en Electrónica (Electronics Demonstration Trainer)

Electronic Demonstration Trainer ST-4500 es el entrenador educativo en donde los estudiantes pueden practicar con componentes de circuitos básicos y semi-conductores. Este entrenador está compuesto por un gabinete principal, 24 módulos y 52 circuitos experimentales.

■ Entrenador de Control de Inversión (Inverter Control Trainer)

Inverter Control Trainer IV-5800 es el entrenador educativo con el que los estudiantes aprenderán la estructura y funcionamiento de sistemas de inversión. Este entrenador se diseñó para controlar la velocidad de un motor variando las frecuencias. Los estudiantes pueden practicar controlar la inversión por medio de un programa en PLC que viene embebido.

■ Entrenador de Control de Sensores (Sensor Control Trainer)

Sensor Control Trainer ST-3202 es la herramienta ideal para que los estudiantes puedan entender y simular con varios sensores. Los estudiantes pueden monitorear y controlar las salidas de los sensores por medio de una interfaz de PLC.

■ Entrenador de Electrónica Digital y Análoga (Digital & Analog Trainer)

Digital & Analog Trainer DAT-4044A este entrenador educativo es para que los estudiantes practiquen y aprendan sobre varios circuitos electrónicos. El entrenador se diseñó para medir y monitorear varios valores en una PC por medio de una interfaz con software MV-1100 (incluido) que puede desplegar varias funciones.

■ Entrenador en Transformación (Transformer Trainer)

Transformer Trainer TP-3041 este es un entrenador en que los estudiantes pueden practicar y estudiar los transformadores. Este entrenador se diseñó con cables con conectores intercambiables Y o Δ de 3 fases de transformación, y con voltímetro, amperímetro y vatímetro para hacer mediciones de funciones de voltaje, corriente y potencia.

■ Generador de Funciones (Function Generator)

Function Generator GFG-8216A es un equipo educativo que tiene 3Mhz y pantalla de 6 dígitos LED con rango de frecuencias (0.3Hz ~ 3MHz). La forma de las ondas son Sinusoidales, Triangulares, Cuadradas, Rampas, y salidas TTL y CMOS.

Listado de Equipo

No	Equipo	Modelo	Cant (c/u)	Especificaciones
1	Basic Electric & Electronic Trainer	ET-4600	4	<i>Refer to Elec-1</i>
2	Electronics Circuit Trainer	ST-4000	4	<i>Refer to Elec-2</i>
3	Electronics Demonstration Trainer	ST-4500	4	<i>Refer to Elec-3</i>
4	Inverter control Trainer	IV-5800	4	<i>Refer to Elec-4</i>
5	Sequence Trainer	ST-1130B	4	<i>Refer to Elec-5</i>
6	Sensor Control Trainer	ST-3202	4	<i>Refer to Auto-10</i>
7	Digital & Analog Trainer	DAT-4044A	8	<i>Refer to Elec-6</i>
8	Transformer Trainer	TP-3041	4	<i>Refer to Elec-7</i>
9	Function Generator	GFG-8216A	4	<i>Refer to Elec-8</i>
10	DC Power Supply	3003T	4	<i>Refer to Elec-9</i>
11	Digital Multi-meter	Protek-81	4	<i>Refer to Auto-11</i>
12	Oscilloscope	3006	4	<i>Refer to Elec-10</i>
13	Personal Computer	For PC Network	16	
14	Beam Projector		1	
15	Screen	120 inches	1	
16	Network System	LAN	1	
17	Printer (Laser)	Up to A3 size	1	
18	Air conditioner		1	
Total			73	

Specifications

Product	Sensor Control Trainer	Model	ST-3202
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. Designed to understand and practice various sensors
2. PLC controlling
3. Built-in power supply
4. Module typed experimental boards to use and keep easily

B. Specifications

1. DC Motor & Sensor

- 1-1. DC motor : DC 24V, 60rpm
- 1-2. Relay: 2a, 2b, DC 24V — 2ea
- 1-3. Lamp: DC 24V — 2ea
- 1-4. Proximity sensor (NPN type) — 1ea
 - DC 12~24[V]
 - High frequency generating proximity sensor
- 1-5. Capacity sensor — 1ea
 - DC 12~24[V]
- 1-6. Proximity sensor (PNP type) — 1ea
 - DC 12~24[V]
 - High frequency generating proximity sensor
- 1-7. Round rotation plate
 - Material : MC, φ110
 - Attached φ19 MC, AL, SUS, Iron

2. Power output & digital meter

- 2-1. DC Power: DC 24V, 2[A]
- 2-2. DC Volt meter: 0~30V, Analog 50type.
- 2-3. Pulse meter
 - Max. display range : 5 lines (-19999~99999)
 - Sensor power output: DC 12V, 80 mA
 - Input : IN A, IN B
 - function : Rotation number/speed/frequency, passing time, cycle, time width, time gap, error rate, density, error, etc.
- 2-4. PB SW: 3ea
- 2-5. Digital counter : 4 digits
 - Input : CP1, CP2, Reset
 - Contact : 1a,1b

3. PLC(LG GLOPA)

3-1. Features:

EEPROM, High speed processing (0.5 μ s/step), RS 232C port communication,
IEC61131-3 international standard language, self-analysis function.

3-2. STORED program control mode

3-3. PROGRAM language: IL(instruction list), LD(ladder diagram), SFC(sequential function chart)

3-4. Processing speed: 0.5 μ s/step

3-5. Program memory: 68kbyte

3-6. Input: 18 points

3-7. Output : 12 points

3-8. Output lamp: DC 24V, 4ea

3-9. Input PB switch: 4ea

3-10.Buzzer : 1ea

3-11.PLC/PC connection cable : RS-232C cable

3-12.DC output : DC 24V

3-13. Emergency switch

3-14.Power: AC input Connector, SW & indicator

4. Conveyor

4-1. Conveyer system with timing belt

- Speed control circuit
- CW & CCW control switch

4-2. Photo sensor

- Detection distance : 10~50mm
- Power : DC 12~24V, $\pm 10\%$
- Control output : NPN open collector output

4-3. Photo sensor (Reflection type)

- Detection distance : 300mm
- Power : DC 12~24V, $\pm 10\%$
- Control output : NPN open collector output

4-4. Photo micro-sensor

- Detection distance : Fixed
- Power : DC 5~24V, $\pm 10\%$
- Control output : NPN Open collector output
- Light ON & Dark ON Control

4-5. Photo sensor (Mirror reflection type)

- Detection distance : 0.1~2m
- Power : DC 12~24V, $\pm 10\%$
- Control output : NPN open collector output

4-6. Optical fiber sensor cable

- Minimum detection object : $\varnothing 0.03$
- Permission flexure radius: 30R

4-7. Optical fiber sensor amplifier

- Response speed : less than 1ms
- Power : DC 12~24V, $\pm 10\%$
- Control output : NPN open collector output

5. Aluminum rack

- 5-1. Board mount number : 3ea
- 5-2. Material : AL profile

6. Experimental board

- 6-1. Module: 4ea
- 6-2. Size: 85(H) x 390(W) x 270(D) mm
- 6-3. Attached handle
- 6-4. Material : Plastic injection board case

7. Table & Cabinet

- 7-1. Size: 1300(W) $\times$ 550(D) $\times$ 750(H)mm
- 7-2. Material : Wood & AL profile

C. Accessories

- User's manual: 1ea
- PLC software: 1ea
- Connection cable
- Power cable



< Spec-4>

■ Digital Multi Meter / Protek-81

1. Features

- 3 3/4 digits, 4000 count
- Measurement output saving function
- Basic accuracy : 0.05%
- Diode measurement and buzzer
- Data hold function
- 4000 count capacitance, frequency, temperature measurement

2. Features

Descriptions	Technical Specifications	Remarks
Maximum voltage between any terminal and earth ground	600 V	
DC Voltage	100 mv to 1000 volts	
AC voltage	100 mv to 750 volts	
Current DC	Maximum 10 A	
Current AC	Maximum 10 A	
Resistance	Max. Resolution 0.1 Ohm Maximum 200 M Ohm	
Capacitance	Max. Resolution 0.001 nF Maximum 40 uF	
Frequency	Max. resolution 0.001 Hz Maximum 100 KHz	
Diode Test		
Quantity	22	



Specifications

Item	Factory Automation Trainer	Model	FA-2800
Manufacturer	Emax Green Co., Ltd.	Q'ty	Set

A) Features

- An ideal tool to simulate factory automation at the mechatronics or automation department of schools
- Designed to study the principal of factory automation system
- For understanding and training how to control factory automation system
- For understanding and training factory automation system by pneumatic control
- Available controlling and training each module individually
- Available controlling by PLC
- Pneumatic circuits connected by $\Phi 4$ fitting
- Safety signal control by DC 24V
- Strong and good design

B) Experimental contents

- Manual operation of line movement
- Object transportation by line movement
- Conveyer operation
- Object detection by photo sensor
- Metal/non-metal detection by proximity sensor
- Object pick/place and transportation by vacuum pad
- Sequential transportation by line movement and conveyer
- Sequential transportation by line movement and pick/place
- Sequential transportation by line movement, conveyer and pick/place

C) Specifications

1. Line Movement Module

- Horizontal cylinder
- Load-less air cylinder type and speed controller
- Vertical cylinder
- Attached guide and speed controller
- Finger cylinder
- Horizontal left, right sensing Auto switch
- Vertical up, down sensing Auto switch
- Solenoid valve : 5/2way - 3ea
- Manifold block
- Control Panel
- Control signal input terminal $\phi 4$ jack
- Selector SW : Auto / Manual
- Control PB switch – 3ea
- Emergency switch

2. Conveyor Module- 2ea/set

- DC geared motor
- Motor speed control
- Conveyor direction control switch
- Stopper and separation
- Solenoid valve : 5/2way – 2ea
- Proximity sensor - 1ea
- Capacitive type sensor - 1ea
- Photo sensor – 1ea
- Control panel
- Control signal input terminal $\phi 4$ jack
- Selector switch : Auto / Manual
- Control PB switch – 2ea
- Control toggle switch -- 1ea
- Emergency switch

3. Pick & Place Module

- Vacuum generator and pad
- Rotary cylinder
- Vertical cylinder
- Attached guide and speed controller
- Horizontal left, right sensing Auto switch
- Vertical up/down sensing Auto switch
- Solenoid valve : 5/2way – 3ea
- Manifold block
- Control panel
- Control signal input terminal $\phi 4$ jack
- Selector switch : Auto / Manual
- Control PB switch – 3ea
- Emergency switch

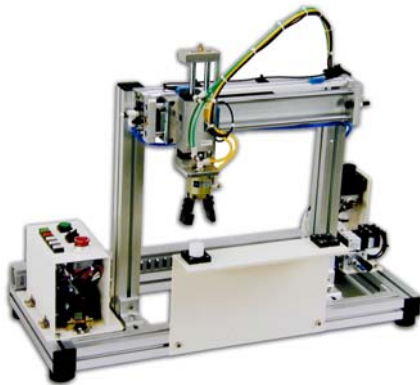
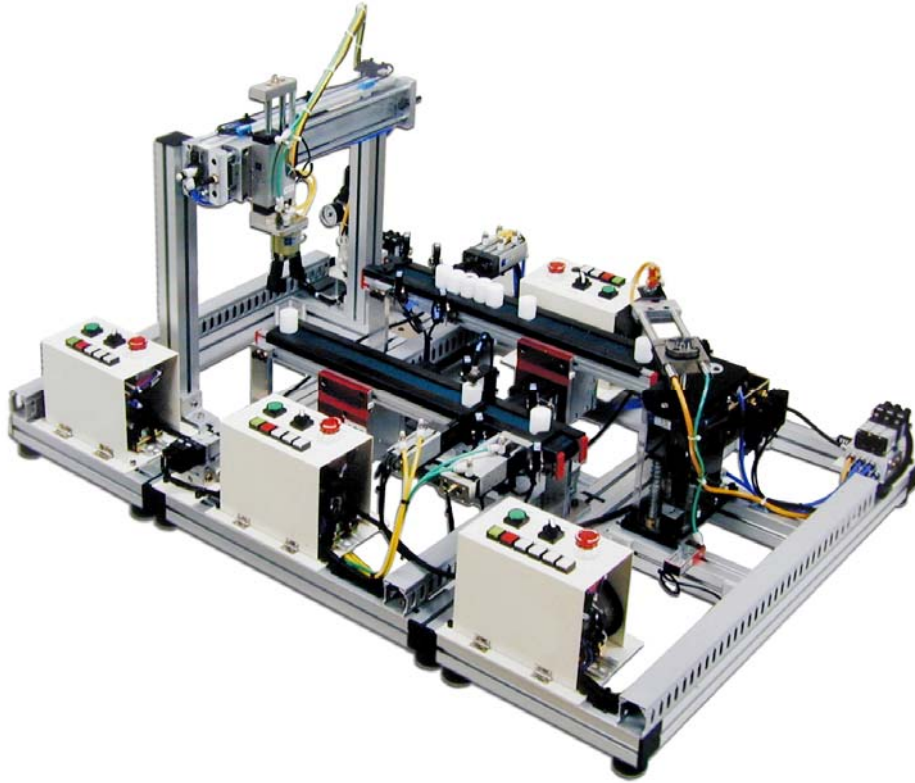
D) Accessories

- $\phi 19$ AL object – 5ea
- $\phi 19$ MC object – 5ea
- Cable --1set
- English manual: 1 ea

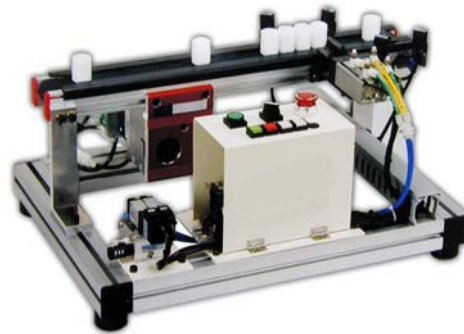
E) Optional

- PLC Trainer : PT-1813A
- Air compressor

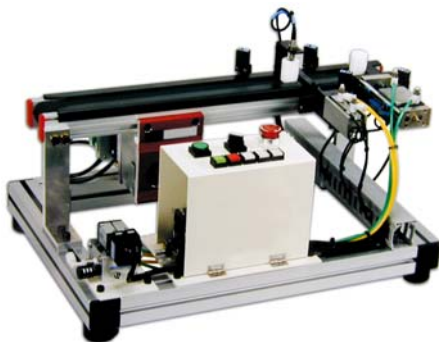
< Factory Automation Trainer FA-2800>



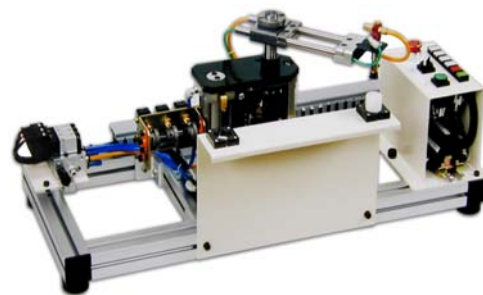
Line Movement Module/ FA-2800A
(Load &Unload)



Conveyer Module-A/ FA-2800B
(Transportation& Separation)



Conveyer Module-B/ FA-2800C
(Transportation& Inspection)



Pick & Place Module/ FA-2800D
(Pick & Place)

※ The specifications and design of the trainer can be changed without prior notice in order to quality improvement.

Specifications

Product	3 Axis Robot System	Model	RB-2010
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	SET

A. Features

1. Interfacing with PC to control
2. 3 axis and operated by servo motor
3. Moving distance indication by control program
4. Starting point return, time delay, position moving programming
5. Vacuum sucker to move objects
6. Good design to practice conveniently

B. Specifications

1. X axis AC servo motor
 - Rated output: 200W
 - Max. speed: 3,000 RPM
2. Y axis AC servo motor
 - Rated output: 100W
 - Max. speed: 3,000 RPM
3. AC servo drive - 2ea
 - Input power: Single phase 220V, 50/60Hz
 - Control mode: PWM controlling by IPM
 - Encoder : Normal/Simple Incremental Encoder
 - External input: Servo ON/OFF, CW/CWW rotation block, CLEAR
 - External output: location control output, alarming
 - Protection function: Over current, overload, over voltage, over speed, low voltage, CPU error, encoder error, communication error, etc.
4. X axis moving
 - Moving distance : 500mm
 - Moving by TM screw

5. Y axis moving

- Moving distance: 300mm
- Moving by TM screw

6. Z axis

- Solenoid valve: 5/2way
- Pneumatic cylinder
- Control signal: DC 24V

7. Vacuum pad

- Vacuum generator: 1ea
- Solenoid valve : 5/2way
- Control signal : DC 24V

8. Position controller

- Control axis number : 2 axes
- Control output : Pulse line output
- Control voltage: DC 24V
- Operation mode : SCAN, CONTINUS, INDEX, PROGRAM
- Position setting mode: ABSOLUTE, INCREMENTAL
- Index step: 64 of each axis
- Position setting range : -8,388,608~+8,388,607(Pulse scale)
- Moving speed setting number : 4
- Moving speed: 1pps ~ 4Mpps
- Output pulse mode : 2 pulse output)
- Starting point return function

9. Photo micro sensor : 2ea

10. Servo drive control switch : 1ea of each axis

11. Limit switch

- X axis limit switch : 2ea
- Y axis limit switch : 2ea

12. Feeder

- Solenoid valve : 5/2way
- Pneumatic cylinder
- Control signal : DC 24V

13. Motion control input switch

- PB switch : 9ea
- Toggle switch : 4ea

14. Input power: AC 220V, 50/60Hz

C. Accessories

- User's manual : 1ea
- Connecting cord : 1 set
- Power cord : 1ea
- Software CD : 1ea

< 3 Axis Robot System RB-2010 >



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Specifications

Product	PTP Robot Trainer	Model	PTP-1820A
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. Designed to practice for rotating and horizontal moving and vertical moving by using pneumatic components.
2. Interfacing with built-in PLC and available various robot control experiment by PLC programming
3. Practicing to transfer an object using robotic tweezer
4. Strong and good design

B. Specifications

1. PTP robot training unit

- 1) Rotation axis : Rotation angle - 180°
: Operating energy - 4.06 kg/cm²
: Automatic sensor - 2ea
: Speed control, oil less slide structure
- 2) Horizontal axis : Moving distance 150 mm, Moving speed 50 ~500 mm/s speed control
: Automatic sensor - 2ea, Position and gap control
: Impact suppression device 0.3~1.5 kg f/cm²
: ø10 guide bar - 2ea
- 3) Vertical axis : Moving distance 75 mm, Moving speed 50 ~500 mm/s speed control
: Automatic sensor - 2ea, Position and gap control
: Anti-rotation cylinder
- 4) Handling : Stroke 6 mm, Pressure 1.4 ~ 3.6 kg f
: ø19 Jig
- 5) Power : AC 220[V], 50/60[Hz]
- 6) Pneumatic valve : 5/2 way solenoid V/V - 5ea
: Manifold block -1ea

2. PLC

- 1) Feature : EEPROM, high speed processing(0.5 μs/step), RS 232C communication
IEC61131-3 international standard language, Self-analysis
- 2) Stored program control
- 3) Program : IL(instruction list), LD(ladder diagram), SFC(sequential function chart)
- 4) Processing speed: 0.5 μs/step
- 5) Program memory : 68kbyte
- 6) Input : 18 points

- Rated input power : DC 24V
- Rated input current: 7 mA
- Response time: On→OFF 5 ms, OFF→ON 5 ms

7) Output : 12 points

- Rated load voltage : DC 24V/AC 220V
- Rated input current : 2A/1 point, 5A/1Com
- Response time: On→OFF 12 ms, OFF→ON 10 ms

8) PLC/PC connection cable : RS232C

3. Control panel

- 1) Main power switch: 1ea
- 2) Emergency switch: 1ea
- 3) Manual/Auto select switch: 1ea
- 4) Manual operation switch: 4ea
- 5) Fuse

C. Accessories

- 1) Power cord: 1ea
- 2) Ø19 supporter: 2sets
- 3) Air hose: 2m
- 4) User's manual: 1ea

< PTP Robot Trainer PTP-1820A>



※ The specifications and design of the trainer can be changed without prior notice in order to quality improvement.

Specifications

Product	Electro Pneumatics Trainer	Model	EP-5100
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. The ideal tool to study and practice electro pneumatics system
2. Basic and electrical pneumatics circuit practice using various pneumatic parts and components
3. Practicing pneumatic controlling by interfacing with PLC or software
4. Circuit drawings on the panel of each component
5. One-touch lever with 2 site clamps
6. Designed aluminum profile and supporter and to move and keep

B. Specifications

1. Experimental table and board : 1 set
2. Air service unit: 1ea
 - Using pressure: 0~10kg/cm²
3. Air distributor: 1ea
 - Using pressure: 0~10kg/cm²
 - Input hole: 1ea
 - Output hole: 6ea
 - One-touch connection
4. Double acting cylinder(SC attached type): 1ea
 - Path distance: 150mm
 - SC attached type
5. Double acting cylinder(Proximity switch attached type): 1ea
 - Path distance: 150mm
 - Proximity switch attached type
6. One way flow control valve: 2ea
 - Using pressure: 0~10kg/cm²
 - One way
7. Rapid drain valve
 - Using pressure: 0~10kg/cm²
8. 5/2 way single solenoid valve: 2ea
 - Using pressure: 0~10kg/cm²
 - DC 24V
 - Response time: Less than 20ms
 - Available manual operation
9. 5/2 way double solenoid valve: 2ea

- Using pressure: 0~10kg/cm²
 - DC 24V
 - Response time: Less than 20ms
 - Available manual operation
10. 3-pair relay unit: 1set
 11. Time-relay unit: 1set
 12. Digital counter unit: 1set
 13. Signal input switch unit: 1set
 14. Emergency switch & Power supply unit: 1set
 15. Buzzer & Lamp unit: 1set
 16. Photo sensor:1ea
 - Switching voltage: DC10~24V
 - Switching distance: 4mm
 - Output current: Max. 400mA
 17. Electrostatic capacity proximity sensor: 1ea
 - Switching voltage: DC10~24V
 - Switching distance: 4mm
 - Output current: Max. 400mA
 18. High frequency generating proximity sensor(PNP):1ea
 - Switching voltage: DC10~24V
 - Switching distance: 4mm
 - Output current: Max. 400mA
 19. Electric limit switch(Left): 2ea
 - Contact point rated voltage: DC24V
 20. Electric limit switch(Right): 2ea
 - Contact point rated voltage: DC24V
 21. 3/2 both way roller valve(Left): 1ea
 - Roller lever
 - Return spring
 - Using pressure: 0~8.5kg/cm²
 22. 3/2 both way roller valve(Right): 1ea
 - Roller lever
 - Return spring
 - Using pressure: 0~8.5kg/cm²
 23. 5/2way double valve: 1ea
 - Double pilot
 - Pilot pressure: 1.4~9.9kg/cm²
 24. 3/2 way selector switch: 1ea
 - 2 position rotation

C. Accessories

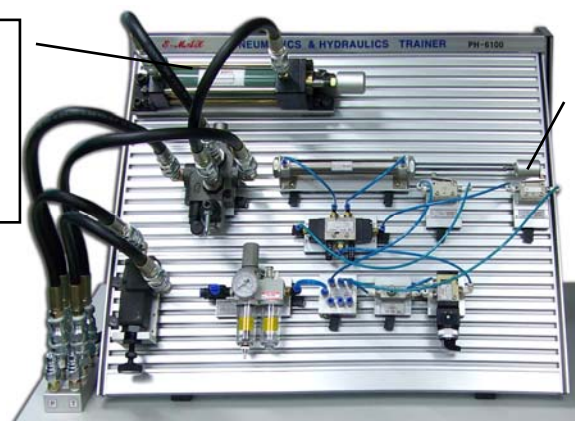
- Connection cable : 1set
- Air hose: 10m
- User's manual: 1ea

D. Optional product

- Air compressor: 1ea



*Fitting example of
Hydraulics Trainer
components and
parts on the board*



*Fitting example of
Pneumatics Trainer
components and parts
on the board*

Specifications

Product	Electro Hydraulics Trainer	Model	EH-6100
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. The ideal tool to study and practice electro hydraulics system
2. Basic and electrical hydraulics circuit practice using various hydraulic parts and components
3. Practicing hydraulics controlling by interfacing with PLC or software
4. Circuit drawings on the panel of each component
5. One-touch lever with 2 site clamps
6. Designed aluminum profile and supporter and to move and keep

B. Specifications

1. Experimental table and board : 1 set
2. Hydraulic unit: 1ea
 - AC 2HP, 3 phase 220V, 50~60Hz
 - Tank: 2~21 liter
3. Hydraulic acting cylinder: 1ea
 - Path distance: 200mm
 - Using pressure: 60kgf/cm²
 - Piston diameter: 40mm
4. Hydraulic hose(500mm): 2ea
5. Hydraulic hose(600mm): 3ea
6. Hydraulic hose(1000mm): 3ea
7. Hydraulic gauge
 - Measuring range: 0~100kgf/cm²
 - Gauge diameter: 60mm
8. Relief valve(Direct type): 2ea
 - Using pressure: 60kgf/cm²
 - Manual adjustment

9. One way flow control valve:2a

- Using range: 0~100kgf/cm²
- Using pressure: 60kgf/cm²
- Manual adjustment

10. Needle valve:2ea

- Using range : 0~100kgf/cm²
- Using pressure: 60kgf/cm²
- Manual adjustment

11. 4/3 way hand lever valve: 1ea

- Using range: 0~100kgf/cm²
- Manual control

12. 4/2 way solenoid valve: 1ea

- Using range: 0~100kgf/cm²
- Power consumption : 12W
- Using voltage: DC24V

13. 4/3 way solenoid valve: 1ea

- Using range: 0~100kgf/cm²
- Power consumption : 12W
- Using voltage: DC24V

14. 3-pair relay unit: 1set

15. Time-relay unit: 1set

16. Digital counter unit: 1set

17. Signal input switch unit: 1set

18. Emergency switch & Power supply unit: 1set

19. Buzzer & Lamp unit: 1set

20. Electric limit switch(Left): 1ea

- Contact point rated voltage: DC24V

21. Electric limit switch(Right): 1ea

- Contact point rated voltage: DC24V

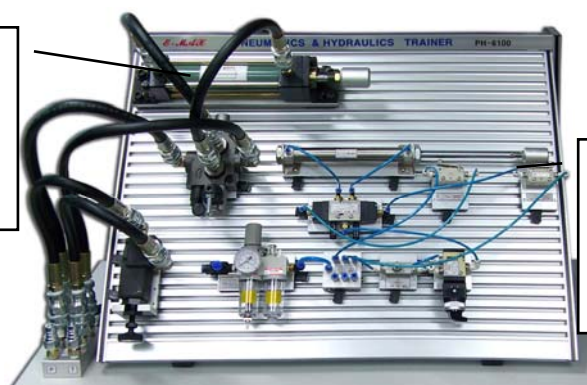
22. Hydraulic distributor: 1ea

C. Accessories

- Connection cable : 1set
- Hydraulic hose: 1set
- User's manual: 1ea



*Fitting example of
Hydraulics Trainer
components and
parts on the board*



*Fitting example of
Pneumatics Trainer
components and parts
on the board*

Specifications

Product	Elevator Trainer	Model	ELE-1824A
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	SET

A. Features

1. Designed to understand and practice how to operate the elevator
2. Good designed front panel for easy understanding of system control
3. Designed to practice wiring to operate the trainer
4. Interfacing with built-in PLC for various applicable operation
5. Strong aluminum profile

B. Specifications

1. Elevator training unit

- 1) Story : 3 stories
- 2) Elevator speed : 30 ~ 60 mm/sec
- 3) Control function : Go-up, go-down, emergency, return
- 4) Control signal : DC 24V
- 5) Operation motor: DC 24V geared motor or AC geared motor
- 6) Elevator inner size : 120 × 150 × 120mm
- 7) Elevator outer size : 500 × 1200 × 400mm
- 8) Moving wheels
- 9) Door : Open/close motor DC 24V, Rack pinion gear

2. PLC

- 1) Feature: EEPROM, High speed processing(0.5 μ s/step)
RS 232C, IEC61131-3 international standard language, Self-analysis
- 2) Stored program control
- 3) Program language: IL(instruction list), LD(ladder diagram),
SFC(sequential function chart)
- 4) Processing speed: 0.5 μ s/step
- 5) Program memory: 68kbyte
- 6) Input : 24 points
 - Rated input power : DC 24V
 - Rated input current: 7 mA
 - Response time: On→OFF 5 ms, OFF→ON 5 ms
- 7) Output : 16 points
 - Rated load voltage : DC 24V/AC 220V
 - Rated input current : 2A/1 point, 5A/1Com
 - Response time: On→OFF 12 ms, OFF→ON 10 ms
- 8) PLC/PC connection cable : RS232C
- 9) Power : DC 24V, 1.2A

3. Elevator training panel

- 1) Operating range: 3 stories
- 2) Operating mode: PLC control
- 3) Input
 - : Over go-up prevention software
 - : Position decision proximity switch
 - : Moving direction PBS
 - : Calling signal PBS
 - : Door Open/close detection software
- 4) Output : Motor, CW/CCW
 - : Position lamp(Digital)
 - : Operation status FND
 - : Calling status lamp
 - : Moving direction lamp
 - : Door Open/Close lamp
- 5) Operation selection: Auto/Manual switch
- 6) Manual operation : Up/Stop/Down switch
- 7) External connect terminal: 25 pin DSUB connector
- 8) Emergency stop: Red locking PBS
- 9) Power: AC 220V 50/60Hz

C. Accessories

- 1) Power cable: 1 set
- 2) User's manual: 1ea

< Elevator Trainer ELE-1824A>



※ The specifications and design of the trainer can be changed without prior notice in order to quality improvement.

Specifications

Item	DC Motor Control Trainer	Model	DC-1827
Manufacturer	Emax Green Co., Ltd.	Q'ty	1 SET

A) Features

1. Designed to control DC motor
2. Interfacing and controlled by PLC
3. Displayed motor' step on the indicator
4. Printed block diagram for easy understanding of system structure
5. Convenient to operate and move

B) Specifications

1. Motor : DC 24[V]. 120rpm
2. Round rotation plate : 110φ
3. Photo interrupt sensor
4. Relay : DC24V
5. FND indicator : 4 digit
6. Zener diode : 6V, 12V, 18V
7. Motor speed control TR
8. PLC controller(MASTER K10S1)
 - Control mode : Built-in program
 - I/O control
 - Program language : Mnemonic Ladder
 - Command : Basic 30 kinds and application 154 kinds
 - Processing speed: 3.2 ~ 7.6 μ s/Step
 - Program memory : 800Step
9. Output lamp : DC 24[V] 5ea
10. Toggle switch : 2ea
11. Selection switch : 1ea
12. Input push button: 4ea
13. Pulse generator
14. Photo couple
15. Power: AC 220V, 50/60Hz

C) Accessories

- Connection cord : 1set
- Power cord : 1set
- User's manual: 1 ea

< DC Motor Control Trainer DC-1817>



※ The specifications and design of the trainer can be changed without prior notice in order to quality improvement.

Specifications

Product	Stepping Motor Trainer	Model	MS-2010A
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. Designed to practice the speed and rotation angle control of stepping motor
2. Available to check control output using oscilloscope
3. Interfacing with PLC and motion controller
4. Practicing of stepping motor characteristics by resolution setting
5. Portable and easy to keep by suitcase type

B. Specifications

1. Pulse Generator : START PB S/W, STOP PB S/W, FREQ ADJ Knob
 - Open collector output
 - Line output
 - Totem pole output
2. One short pulse generator
 - Manual PB S/W
 - Totem pole output
3. Stepping motor
 - Uni-polar wiring
 - 1.8 degree
 - Rotation plate with angle scale
4. Motor driver
 - Pulse input conversion switch : 1P / 2P
 - Rotation direction control switch : FR / RV
5. Resolution setting switch
 - Toggle switch : 4ea
 - Setting rage : 200, 400, 500, 800, 1000, 1600, 2000, 2500, 4000, 5000, 8000
10000, 20000, 25000, 40000, 50000Pulse/rotation
6. Signal input
 - 1 pulse, 2 pulses

7. Control signal

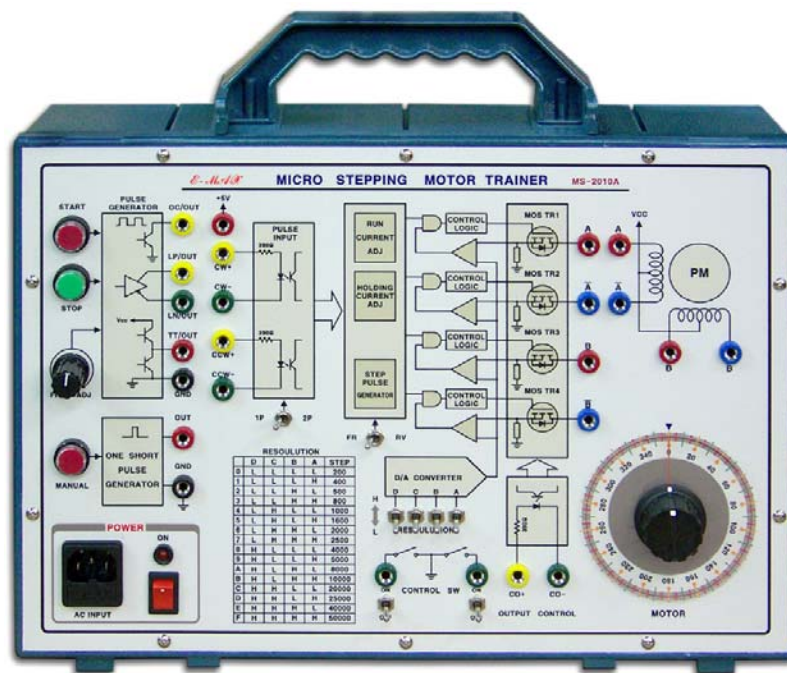
- Stepping motor output control signal
- Control signal : DC 5V
- Control toggle switch : 2ea

8. Power: AC 220V, 50/60Hz

C. Accessories

- Connection cable : 1set
- Power cord: 1ea
- User's manual: 1ea

< Stepping Motor Trainer MS-2010A >



※ The specifications and design of the trainer can be changed without prior notice in order to quality improvement.

Specifications

Product	PLC Trainer	Model	PT-1200
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. Designed to study and control various automation machines by PLC interfacing with PC
2. IEC61131-3 international standard language
3. Practicing for proximity sensor and photo sensor
4. Monitoring PLC I/O by LED and PC
5. 32 processor for high efficiency
6. Strong and good design

B. Specifications

1. Trainer

- 1-1. Push button switch: 16Φ 8ea
- 1-2. Toggle switch: 8ea
- 1-3. Digital switch: BCD output, 4 digits, 25 pins, D-SUB connector
- 1-4. Proximity Sensor
 - High frequency generation proximity sensor
 - NPN output type
 - Power: DC 12~24V
 - Detection distance: 5 mm±10%
- 1-5. Photo sensor
 - Direct reflection photo sensor
 - NPN output type
 - Power: DC 12~24V
 - Detection distance: 200 mm
- 1-6. Photo micro sensor
 - Transparent detection type
 - NPN output type
 - Power: DC 5~24V
 - Detection distance: 5 mm fixed

1-7. DC geared motor

- Power: DC 24V
- CW / CCW switch
- Rotation speed : 50~60rpm
- Rotation number detection by rotation plate

1-8. Lamp: DC 24V 16Φ 8ea

1-9. Buzzer : DC 24V

1-10. E/S Stop switch : 1ea

1-11. Output power: DC 24V, 2A

1-12. BCD: 7Segment LED display, 4 digits, 25 pins, D-SUB connector

1-13. Digital Volt Meter : 3 1/2 digits, Measuring range: 0~199.9V

2. PLC(LG GLOPA)

2-1. Program control: Stored program type, repeat operation, fixed-time operation, interrupt operation.

2-2. I/O control: Scan synchronization batch processing

2-3. Program language: Mnemonic, Ladder, SFC

2-4. Command: Basic function 194ea, basic function block 11ea

2-5. Processing speed: 0.5 μ s/step

2-6. Program memory: 68K byte

2-7. Input module

- Input: 16 points × 2ea
- Rated input voltage: DC 24V
- Rated input current: 7 mA
- Response time: Less than On→OFF 5 ms, OFF→ON 5 ms
- Common mode: 8 points/1Com

2-8. Output module

- Output: 16 points × 2ea
- Rated load voltage: DC 24V/AC 220V
- Rated input current: 2A/1 points, 5A/1Com
- Response time: Less than On→OFF 12 ms, OFF→ON 10 ms
- Common mode: 8 points/1Com

2-9. Power module: 1ea

- Input: AC 220V, Output: DC 24V 0.7A

3. PLC input connection connector: 25 pins, D-SUB connector 2ea

4. PLC output connection connector: 25 pins, D-SUB connector 2ea

5. Power: AC 220V 50,60 Hz

C. Accessories

- Connection cable : 1set
- Power cord: 1ea
- RS232C cable: 1ea
- User's manual: 1ea
- PLC manual: 1ea



Specifications

Product	Sequence Trainer	Model	ST-1130B
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Specifications

1. NFB (3 phases, 15[A]) : 1ea
2. Magnate contact (DC24[V], 15[A], 5a2b) : 3ea
3. Thermal overload relay (DC24[V], 9[A], 1a1b) : 1ea
4. Electronic overload relay (DC24[V], 2[A], 1a1b) : 1ea
5. Small-sized relay (With socket, DC24[V], 4a4b) : 4ea
6. Middle-sized relay (With socket, DC24[V], 4a4b) : 1ea
7. Motor (3 phases 220[V]/380[V],0.75KW) : 1set
8. Inverter (0.75KW) : 1ea
9. TIMER (DC24[V], Variable) : 2ea
10. FL.TIMER (DC24[V]) : 1ea
11. SELECTOR switch : 1ea
12. PUSH switch : 4ea
13. LAMP (DC24[V]) : 5ea
14. BUZZER : 1ea
15. EMS switch : 1ea
16. Reactor (3 phases low voltage) : 1ea
17. SELECTOR (7 steps, 3 circuits) : 1ea
18. TERMINAL BLOCK 6P (15[A]) : 1ea
19. Power : 3 phases AC 220[V](For power), DC24[V](For control)
20. Connecting cable : 3 colored cable - 1set
21. Power supply : AC220V/ DC24V

B. Accessories

- User's manual: 1ea
- Connection cable: 1ea

< Sequence Trainer/ ST-1130B >



Specifications

Product	Digital & Analog Trainer	Model	DAT-4044A
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. Monitoring various values by provided Software(MV-1100)
2. Basic practicing for various electronic circuits
3. Easy to practice without soldering
4. Logic level display on 8 two-colored LEDs
5. Interfacing with PC through RS232 port
6. Portable and easy to keep by suitcase type

B. Specifications

1) Power supply

- ① Positive DC variable power : 3V, 5V, 6V(0.7A),9V,12V,15V(0.4A)
- ② Negative DC variable power : 3V, 5V, 6V(0.7A),9V,12V,15V(0.4A)
- ③ DC fixed power : DC 5V 1.5A
- ④ DC fixed power : DC $\pm 12V$ 0.5A
- ⑤ AC fixed power : AC 15V 0.1A

2) Generator

- ① Sine wave : 1 Hz ~ 100 kHz 4 range
- ② Chopping wave : 1 Hz ~ 100 kHz 4 range
- ③ Square wave : 1 Hz ~ 100 kHz 4 range, variable pulse width

3) Logic display

- ① H(=RED) and L(=GREEN) indication by 2 colored LED - 8 sets
- * LED Off at floating status

4) Hexadecimal display

- ① 0~9 and A~F display by 7 segment by decoder
- ② 2 digit anode/ cathode selectable switch

5) Logic input

Logic switch : Main pulse and sub pulse output - 2 sets

6) Circuit elements

- ① Meter : 1 k Ω , 100 k Ω — 1 ea each
- ② Speaker : 8 Ω /1W — 1ea
- ③ SPDT switch : 3 location setting — 1ea

④ BNC I/O conversion jack — 1ea

7) Digital frequency counter

Audio generator frequency indication

8) Digital voltmeter measuring range : 0.2~20[V]

9) RS232C Port

DVM output and logic display, Interfacing with PC to monitor hexadecimal display

Measuring output display by programming

10) Bread board

Socket Tie-Point : 1260 points

Bus Tie-Point : 300 points

11) Input power

AC 220V, 50/60Hz

12) Monitoring software

① Features

- Simultaneous monitoring of 8 logic levels, 2digit Hexadecimal display value and DVM value
- Selectable maximum value setting(5V, 10V, 20V, 5V, 10V, 15V, 20V)
- within input level(0~20)
- Monitoring changed measuring values by graphic by 100 measuring value comparison
- Saving and displaying the value of digital voltmeter in the PC
- Displaying output with 3 typed graphics
- RUN,STEP, STOP, RESET button
- Data monitoring and saving function
- Operation speed (within0.1~60 seconds) control
- Stable monitoring data by RS232 communication.

② Specifications

- File : Save, Open, Printer
- Port Setting : COM1, COM2
- Graphic setting : Solid line, Dotted line, 2D bar, Color setting
- Input level : 0~5V, 0~10V, 0~15V, 0~20V, 0~5V, 0~10V, 0~15V, 0~20V
- Acquisition speed: 0.1~60 sec.

③ Accessories(Software)

- Communication cable: 1ea
- Installation CD: 1ea

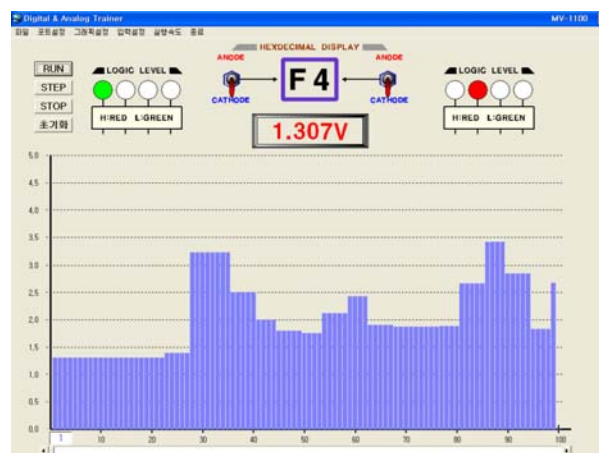
C. Accessories

- ① User's manual : 1ea
- ② MMI software (MV-1100) : 1ea
- ③ Power cord : 1ea
- ④ Circuit connection wire : 1set
- ⑤ Spare fuse(0.5A) : 2ea

< Digital & Analog Trainer DAT-4044A>



< MMI Software MV-1100>



Specifications

Product	Transformer Trainer	Model	TP-3041
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. Changeable wiring Y or Δ line of 3 phase transformer using connection cords.
2. Circuit voltage measuring with voltmeter and Ammeter
3. Load current measuring with wattmeter
4. Strong and good designed case

B. Specifications

1. Power

- Power: AC 3 Φ 380(V) / 220(V)
- Power MCCB 3 phase 5(A): 1ea
- Input terminal 4 Φ jack: 6ea
- Power protection fuse holder fuse 5(A): ea
- Power terminal 6 pins

2. Measurement

- Digital AC Volt Meter: 1ea
 - 3 1/2 digit 0~500[V]
 - 4 Φ input jack: 2ea
- Digital AC Ampere Meter : 1ea
 - 3 1/2 digit 0~5[A]
 - 4 Φ input - 2ea
- Digital AC Watt Meter: 1ea
 - 3 1/2 digit
 - 1 Φ 2W 4 Φ input jack: 4ea
- Ring C. T 5:1 5(A) - 3ea
 - Current transformer output 4 Φ jack: 6ea

3. Transformer

- Auto/Compound transformer power rate
 - Input : 0, 220, 380(V)
 - Output : 0, 110, 220(V)
- Auto/Compound transformer volume(300VA): 3ea

4. 6 pin terminal to connect outer load: 1ea

C. Accessories

- Lead wire : 1set
- Power MCCB cable: 1set
- User's manual: 1ea

< Transformer Trainer TP-3041>



Specifications

Item	Function Generator	Model	GFG-8216A
Manufacturer	Korean company	Q'ty	1 set

A) Features

1. 3MHz Function Generator with 6 Digit LED Display
2. Frequency Range: 0.3Hz ~ 3MHz
3. Waveforms: Sine, Triangle, Square, Ramp, TTL and CMOS Output
4. Variable DC Offset Control
5. Two-Step (-20dBx2) and Variable Attenuator
6. Built-In 6 Digit Counter with INT/EXT Function up to 150MHz/High Resolution

B) Specifications

1. MAIN
 - 1) Frequency Range 0.3Hz ~ 3MHz (7 Range)
 - 2) Amplitude >10Vpp (into 50Ω load)
 - 3) Impedance 50Ω±10%
 - 4) Attenuator -20dB±1dBx2
 - 5) DC Offset <-5V ~ >5V (into 50Ω load)
 - 6) Duty Control 80% : 20% : 80% to 1MHz Continue variable
 - 7) Display 6 digits LED display
2. SINE WAVE
 - 1) Distortion < 1%, 0.3Hz ~ 200kHz
 - 2) Flatness < 0.3dB, 0.3Hz ~ 300kHz
<0.5dB, 300kHz ~ 3MHz
3. TRIANGLE WAVE
 - 1) Linear > 98%, 0.3Hz ~ 100kHz
> 95%, 100kHz ~ 3MHz
4. SQUARE WAVE
 - 1) Symmetry ±2%, 0.3Hz ~ 100kHz
 - 2) Rise or Fall Time < 100nS at maximum output (into 50Ω load)
5. CMOS OUTPUT
 - 1) Level 4Vpp±1Vpp ~ 14.5Vpp±0.5Vpp adjustable
 - 2) Rise or Fall Time < 120nS

6. TTL OUTPUT

- 1) Level : > 3Vpp
- 2) Fan Out : 20 TTL load
- 3) Rise or Fall Time < 25nS

7. VCF

- 1) Input Voltage 0V ~ 10V±1V (100 : 1)
- 2) Input Impedance 10kΩ±10%

8. FREQUENCY COUNTER

- 1) INT./EXT. Switch selector
- 2) Range 0.3Hz ~ 3MHz (5Hz ~ 150MHz EXT.)
- 3) Accuracy Time base accuracy±1 count
- 4) Time Base ±20ppm(23° C ± 5° C) after 30 minutes warm up
- 5) Resolution The maximum resolution is 100nHz for 1Hz and 1Hz for 100MHz
- 6) Input Impedance 1MΩ // 150pF
- 7) Sensitivity < 35mVrms (5Hz ~ 100MHz)
< 45mVrms (100MHz ~ 150MHz)

9. POWER SOURCE AC115V/230V±15%, 50 / 60Hz

C) Accessories

- 1) Instruction manual x 1
- 2) Power cord x 1
- 3) Dimensions : 251(W) x 91(H) x 291(D)mm,



Specifications

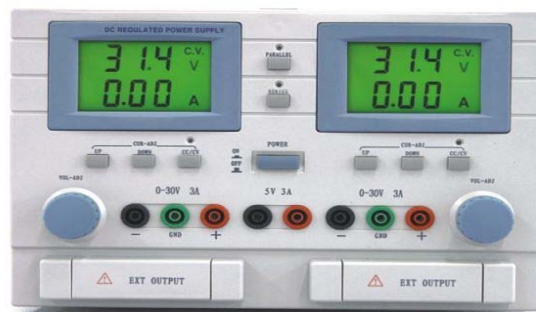
Item	DC Power Supply	Model	3003T
Manufacturer		Q'ty	1 set

A) Features

1. Displayed voltage and current on LCD
2. Displayed adjustment of voltage and current on LCD
3. Automatic conversion of voltage and current
4. High accuracy voltage control by multi -loop system
5. Current control by steps
6. Automatic tracking by serial or parallel connection
7. Stable in full loading
8. Extension output terminal 3MHz Function Generator with 6 Digit LED Display

B) Specifications

1. Output
 - 3 isolated outputs
 - 2 variable CV and CC operation
 - one fixed CV operation
2. Total power output
 - Minimum of 0 - 195 Watts
3. Variable output voltage
 - Voltage: 0 – 60 Volts
 - Current: 0 – 3 Amperes
4. Fixed output voltage
 - 5 volts, 3 amperes
5. Display
 - LCD, dual voltage and current reading
6. Individual/simultaneous channel control (ON/OFF)



< Spec-3 >

■ Oscilloscope / 3006

1. Features

- 200/100/60 MHz Bandwidth with 2 Channels
- 500MSa/s and 1GSa/s Real-Time Sampling Rate
- 25GSa/s Equivalent-Time Sampling Rate
- Large 7 inch Color Display
- Record Length upto 1M
- 4 Math Functions Plus FFT
- Multi-Languages Support
- USB Host and Device Connections

2. Specifications

1) Vertical

- Channels: 2
- Bandwidth: 60 MHz
- Rise Time: 5.8ns Approx.
- Input Impedance: Resistance: 1M +/- 2%
- Polarity: Normal & Invert
- Maximum Input: 400V (DC+AC Peak)
- Waveform Signal Process: CH1+/-CH2, CH1xCH2, CH1/CH2, FFT
- Bandwidth Limit: 20MHz +/- 40% Typical

2) Horizontal

- Sampling Rate: 500MSa/s: Equivalent Max. Sampling Rate is 25GSa/s for all items
- Range (1-2-3 Increments): 50s/div ~ 10ns/div
- Mode: Main Sweep, Main Sweep + Delay Expansion Sweep, X-Y

3) Trigger

- Source: CH1, CH2, EXT., EXT/5, AC Line
- Mode: Auto, Normal, Single
- Trigger Sensitivity: DC: CH1/CH2 (Typical) 1div from DC to 10 MHz ; 1.5div from 10 MHz to full
 - : EXT (Typical) : 200mv from DC to 40 MHz
 - : EXT/5 (Typical) : 1V from DC to 40 MHz
 - : AC : Attenuates signals below 10 Hz
 - : HF Reject: Attenuates signals below 150 kHz
 - : LF Reject: Attenuates signals below 150 kHz
 - : Noise Reject: Reduces trigger sensitivity

- Trigger Level Range: CH1, CH2 : +/- division from center of screen
: EXT. : +/- 1.2V
: EXT/5 : +/- 6V

4) Cursors and measurement

- Voltage measurement: Vpp, Vamp, Vrms, Vhi, Vlo, Vmax, Vmin, Pre-shoot, Overshoot
- Time measurement: Frequency, Rise Time, Fall Time, Positive Width, Negative width, Duty Cycle

5) Display

- TFT LCD Type: 7.0 Inch diagonal liquid crystal display
- Display resolution: 800 x 480 Dots

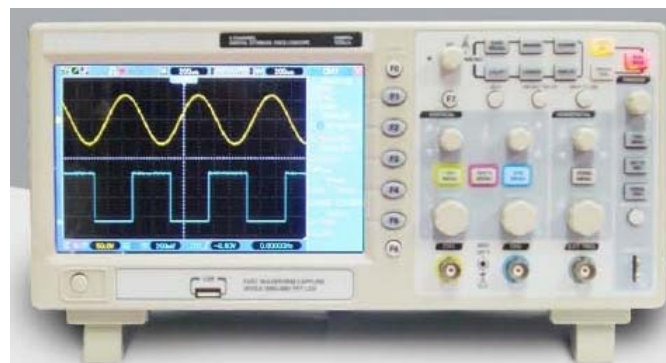
6) Interface

- USB: USB Host / USB Device

7) Power source

- Line voltage range: AC 100V ~ 240V +/-10%, 45 Hz ~ 440 Hz, Auto Selection

Descriptions	Technical Specifications	Remarks
Bandwidth (-3dB)	DC to 60 MHz	
Selectable BW limit	20 MHz	
Channels	2 channels	
Vertical range	2 mV/div to 10 V/div or better	
Time-base range	1 nsec/div to 50 sec/div or better	
Dynamic range	±6 div	
Horizontal modes	Main Sweep, Main Sweep +delayed Expansion sweep, XY	
DC gain accuracy	2 mV/div to 5 mV/div or better 10 mV/div to 5 V/div or better	
Input impedance	1 MΩ ±2% in parallel with 20 pF ± 5 pF	
Line range	100-240 VAC, 50/60 Hz ± 10%	
Standard ports	USB 2.0- compatible with full-speed USB flash drives USB device port	
Display	Minimum 7-inch diagonal color QVGA TFT LCD	
Quantity	22	



Specifications

Item	MMI Soft ware	Model	MV-1100
Manufacturer	Emax Green Co., Ltd.	Q'ty	1 copy

A. Features

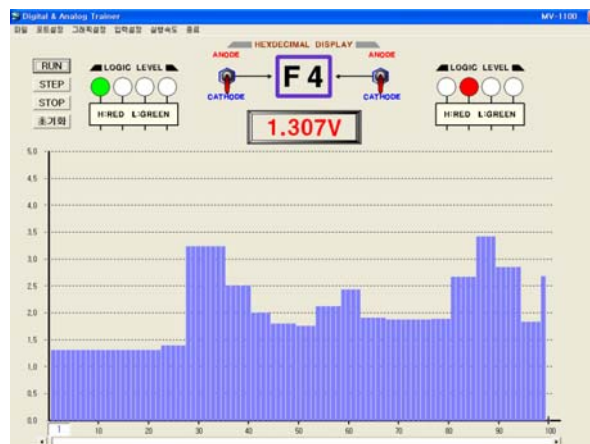
1. Simultaneous monitoring of 8 logic levels, 2digit Hexadecimal display value and DVM value
2. Selectable maximum value setting(5V, 10V, 20V, 5V, 10V, 15V, 20V)
within input level(0~20)
3. Monitoring changed measuring values by graphic by 100 measuring value comparison
4. Saving and displaying the value of digital voltmeter in the PC
5. Displaying output with 3 typed graphics
6. RUN,STEP, STOP, RESET button
7. Data monitoring and saving function
8. Operation speed (within 0.1~60 seconds) control
9. Stable monitoring data by RS232 communication.

B. Specifications

1. File : Save, Open, Printer
2. Port Setting : COM1, COM2
3. Graphic setting : Solid line, Dotted line, 2D bar, Color setting
4. Input level : 0~5V, 0~10V, 0~15V, 0~20V, $\pm 0\sim 5V$, $\pm 0\sim 10V$, $\pm 0\sim 15V$, $\pm 0\sim 20V$
5. Acquisition speed: 0.1~60 sec.

C. Accessories

1. Communication cable : 1ea
2. Installation CD



Specifications

Item	Basic Electric & Electronic Trainer	Model	ET-4600
Manufacturer	Emax Green Co., Ltd.	Q'ty	1SET

A) Features

1. Practicing for electrical basic application circuits.
2. Safety parts and practicing without extra measuring devices
3. Convenient to practice by printed circuits on each front panel
4. Various circuit formation by plugging in module
5. Strong rack and aluminum profile

B) Specifications

1. Panel module

① ET-4600-01 OHM'S LAW

Analog volt meter : DC 15V 2.5 class

Analog ampere meter : DC 1.5A 2.5 class

② ET-4600-02 VOLT - METER

Analog meter : F.S 1 mA 2.5 class, inner resistance 1 k Ω

Range : 1.5, 5, 15, 50V

③ ET-4600-03 AMPERE - METER

Analog meter : F.S 1 mA 2.5 class, inner resistance 1 k Ω

Range : 1 mA, 10 mA, 100 mA, 1A

④ ET-4600-04 OHM - METER

Analog meter : F.S 1 mA 2.5 class, inner resistance 1 k Ω

Range : X10 Ω , X100 Ω , X1 k Ω , Internal Battery

⑤ ET-4600-05 TRANSFORMER & TRANSFORMATION

Primary side : 100V double

Secondary side : 15V double & 5V

⑥ ET-4600-06 INDUCTOR & INDUCTANCE

Frequency range : 1 kHz ~ 100 kHz

⑦ ET-4600-07 CAPACITOR & CAPACITANCE

Variable capacitance : 10 pF ~ 300 pF

⑧ ET-4600-08 LC CIRCUIT & RESONANCE

Frequency range : 1 kHz ~ 100 kHz

⑨ ET-4600-09 KIRCHHOFF'S LAW

KCL, KVL experiment

⑩ ET-4600-10 RESISTANCE BRIDGE

DC bridge or AC bridge

⑪ ET-4600-11 3PHASE TRANSFORMER CONNECTION

Y- Δ convert practice by switch

- ⑫ ET-4600-12 RELAY & LATCH CIRCUIT
Magnetic sustain circuit and relay control
- ⑬ ET-4600-13 HALF & FULL WAVE RECTIFIER (1 ψ)
DC rectifier circuit / Transformer 5V, 10V
- ⑭ ET-4600-14 GENERATION OF ELECTRO MOTIVE FORCE
DC generator — Input : DC 12V, Output : DC Approx 8V
AC generator — Input : DC 12V, Output : AC Approx 8V

2. Supporter: Aluminum sash 2 steps(1260 $\times$ 620 mm)

3. Board size : 380(W) $\times$ 260(H) $\times$ 86(D) mm

4. Module case : 1set

C) Accessories

- ① User's manual: 1ea
- ② Power cord : 1ea
- ③ Connection wire: 1set

< Optional accessories >

Plug in module

- ① Resistance
2.2 Ω , 4 Ω , 4.7 Ω , 10 Ω , 15 Ω , 20 Ω , 50 Ω , 100 Ω , 330 Ω , 470 Ω
1 k Ω , 2 k Ω , 2.7 k Ω , 4 k Ω , 10 k Ω , 22 k Ω , 100 k Ω , 111 k Ω , 2 M Ω
- ② Lamp/ 12V, 100V
- ③ Toggle switch - 2ea
- ④ Diode - 1ea
- ⑤ Manganese / 0.5 ψ 1m, 0.5 ψ 0.5m, 0.25 ψ 1m, 0.25 ψ 0.5m
- ⑥ Jump resistance - 2
- ⑦ Copper wire 0.1 ψ 1m - 1
- ⑧ Condenser/ 0.001 μ F, 0.047 μ F, 0.1 μ F, 2.2 μ F, 4.7 μ F, 100 μ F, 470 μ F

< Basic Electric & Electronic Trainer ET-4600>



※ The specifications and design of the trainer can be changed without prior notice in order to quality improvement.

Specifications

Item	Electronics Circuit Trainer	Model	ST-4000
Manufacturer	Emax Green Co., Ltd.	Q'ty	1SET

A) Features

1. 24 experimental module and 52 experimental circuits
2. Easy to form circuits according to printed circuits on the front panels
3. Experiment of semi-conductor components and basic circuits
4. Power and signal input by main supporting module
5. Strong rack and aluminum profile

B) Specifications

1. Keeping case
 - 1) Board number: 24ea
 - 2) Locking system
2. Experimental board (24ea)
 - 1) Semiconductor characteristic experiment(7ea)
 - ① 4000 - 01 : Diode and Zener-diode Characteristic
 - ② 4000 - 02 : Transistor and Common Emitter Ground Characteristic
 - ③ 4000 - 03 : FET and MOS-FET Characteristic
 - ④ 4000 - 04 : SCR Characteristic
 - ⑤ 4000 - 05 : UJT Characteristic
 - ⑥ 4000 - 06 : Application of SCR and Triac
 - ⑦ 4000 - 07 : LED and Photo Device Characteristic
 - 2) Semiconductor circuit experiment(5ea)
 - ① 4000 - 08 : Base and Common Emitter Ground Amp
 - ② 4000 - 09 : DC Amplifier
 - ③ 4000 - 10 : Complementary Amplifier
 - ④ 4000 - 11 : Differential Amplifier
 - ⑤ 4000 - 12 : Operational Amplifier Circuit
 - 3) Electronic circuit experiment(12ea)
 - ① 4000 -13 : Active Filter Circuit (LPT, HPF, BPF)
 - ② 4000 -14 : Unregulated Power Supply
 - ③ 4000 -15 : DC Voltage Regulator
 - ④ 4000 -16 : Variable Voltage Regulator DC Power Supply
 - ⑤ 4000 -17 : Tank Circuit and Resonance
 - ⑥ 4000 -18 : LC Oscillator (Hartley, Colpitts)
 - ⑦ 4000 -19 : Crystal Oscillator
 - ⑧ 4000 -20 : Wine Bridge Oscillator
 - ⑨ 4000 -21 : Multi-vibrator (Ast, Mon, Bis) and Schmitt Trigger
 - ⑩ 4000 -22 : Timer IC application

- ⑪ 4000 -23 : Ramp generator
- ⑫ 4000 -24 : Modulation and Demodulation

4) Board size : 200(W) × 110(D) × 40(H) mm

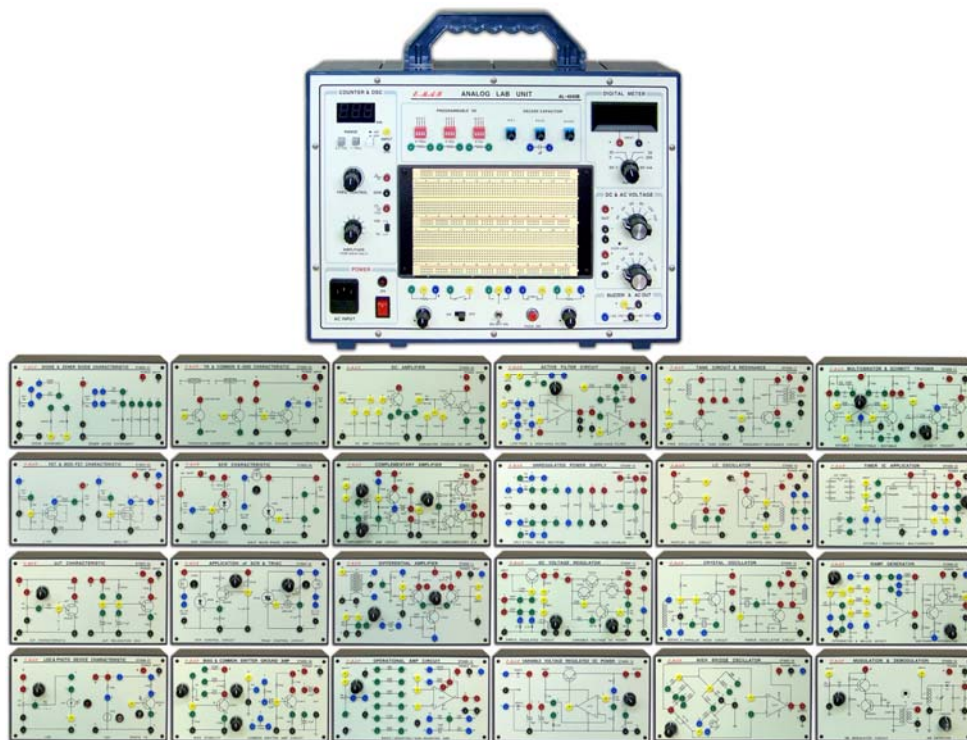
5) Main Body

- ① Output power(DC): DC 3 / 5 / 6 / 9 / 12/ 15V Dual output
- ② Line output : AC 30V CT (15V +15V)
- ③ Low frequency generator : 100 Hz ~10 kHz (2range), continually variable
- ④ Output wave : Sine and Square
 - Sine wave amplitude adjust.
 - Square wave fixed voltage
- ⑤ Decade capacitor : 0.001 μF ~ 0.999 μF (3 Digits)
- ⑥ Decade resistance: 1 k Ω ~ 15 k Ω
 - : 10 k Ω ~ 150 k Ω
 - : 100 k Ω ~ 1.5 M Ω
- ⑦ Variable resistor : 1 k Ω , 100 k Ω (each 1EA)
- ⑧ Control switch : 1-Toggle, 1-Slide, 1-Push
- ⑨ Frequency counter: INT/ EXT convert switch
 - : 3 Digit FND Display
- ⑩ Digital meter : 3 1/2 Digit
 - : DC Voltage 2V / 20V
 - : DC AMPERE 20 mA /200 mA
 - : 4 단 RANGE selection switch
- ⑪ Bread board : Socket Tie-Point — 1260point
 - Bus Tie-Point — 300point
- ⑫ Front Panel : FR-4 (1.6t)
- ⑬ Input Power : AC 220[V], 60[Hz]
- ⑭ Size : 390(W) × 270(D) × 130(H)mm

C) Accessories

- ① User's manual : 1ea
- ② Power cord : 1ea
- ③ Connection wire : 1set

< Electronics Circuit Trainer ST-4000 >



(Module Packing)

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Specifications

Item	Electronics Demonstration Circuit Trainer	Model	ST-4500
Manufacturer	Emax Green Co., Ltd.	Q'ty	1SET

A) Features

1. 24 experimental module and 52 experimental circuits
2. Easy to form circuits due to printed circuits on the front panels
3. Experiment of semi-conductor components and basic circuits
4. Power and signal input by main supporting module
5. Strong rack and aluminum profile

B) Specifications

1. Experimental rack
 - 1) Board number : 3ea
 - 2) Size : Aluminum sash 2 steps(1260×620 mm)
2. Experimental board (24ea)
 - 1) Semiconductor characteristic experiment(7ea)
 - ① 4500 - 01 : Diode and Zener-diode Characteristic
 - ② 4500 - 02 : Transistor and Common Emitter Ground Characteristic
 - ③ 4500 - 03 : FET and MOS-FET Characteristic
 - ④ 4500 - 04 : SCR Characteristic
 - ⑤ 4500 - 05 : UJT Characteristic
 - ⑥ 4500 - 06 : Application of SCR and Triac
 - ⑦ 4500 - 07 : LED and Photo Device Characteristic
 - 2) Semiconductor circuit experiment(5ea)
 - ① 4500 - 08 : Base and Common Emitter Ground Amp
 - ② 4500 - 09 : DC Amplifier
 - ③ 4500 - 10 : Complementary Amplifier
 - ④ 4500 - 11 : Differential Amplifier
 - ⑤ 4500 - 12 : Operational Amplifier
 - 3) Electronic circuit experiment(12ea)
 - ① 4500 -13 : Active Filter Circuit (LPT, HPF, BPF)
 - ② 4500 -14 : Unregulated Power Supply
 - ③ 4500 -15 : DC Voltage Regulator
 - ④ 4500 -16 : Variable Voltage Regulator DC Power Supply
 - ⑤ 4500 -17 : Tank Circuit and Resonance
 - ⑥ 4500 -18 : LC Oscillator (Hartley, Colpitts)
 - ⑦ 4500 -19 : Crystal Oscillator
 - ⑧ 4500 -20 : Wine Bridge Oscillator
 - ⑨ 4500 -21 : Multi-vibrator (Ast, Mon, Bis) and Schmitt Trigger
 - ⑩ 4500 -22 : Timer IC Application
 - ⑪ 4500 -23 : Ramp generator
 - ⑫ 4500 -24 : Modulation and Demodulation

4) Board size : 390(W) × 270(D) × 85(H) mm

5) Board Storage Cabinet

- ① 12 × 2 Cabinet
- ② Movable cast
- ③ Locking system
- ④ Material: MDF

6) Main Support Module

- ① DC Output : 3, 5, 6, 9, 12, 15 Dual output
- ② Decade Capacitor : 0.001[μ F] ~ 0.099[μ F] 2-Digit
- ③ Decade Resistor : 1[k Ω] ~ 999[k Ω] 3-Digit
- ④ AF Generator : 100[Hz] ~ 10[kHz] (In2-Range)
: Output — 1[V]/10[V] (In 2 Range)
: Waveform — Sine and Square
- ⑤ Multi Tester : DC Voltage 10 / 50 / 250 / 500V range
: DC current 250 mA range
: AC voltage 50 / 250 / 500V range
: Resistance × 10/ × 1K range Max 500 k Ω
: Battery check 1.5V/ 9V
- ⑥ AC Output : 30[V] CT (15[V]+15[V]) 0.1[A] Max
- ⑦ Variable Resistor : 1[k Ω] and 100[k Ω]
- ⑧ Switch : Slide, Push, SPDT-Toggle
- ⑨ Input Power : 220V, 60Hz
- ⑩ Size : 130(H) × 390(W) × 270(D)mm

C) Accessories

- ① User's manual : 1ea
- ② Power cord : 1ea
- ③ Connection wire : 1set

< Electronics Demonstration Trainer ST-4500 >



※ The specifications and design of the trainer can be changed without prior notice in order to quality improvement.

Specifications

Product	Inverter Control Trainer	Model	IV-5800
Manufacturer	EMAX GREEN CO., LTD.	Q'ty	1 SET

A. Features

1. Designed to control motor speed by frequency change
2. Output controlling by PWM
3. Operation setting and motor rotation direction setting by control switch
4. Programming practice by built-in PLC
5. Overload protection

B. Specifications

1. Rated capacity: 1HP, 0.75kw
2. Rated current: 5A
3. Output frequency setting range: 0.1~400Hz
4. Output voltage : Φ 3, 200~230V
5. Frequency setting resolution: 0.01hz under 100hz, 0.1hz over 100Hz
Analog: 0.03hz
6. Frequency setting resolution analog control setting range: 0~10V / 4~20mA
7. Multi-speed step setting
8. CW, CCW starting signal
9. Continuous variable operation by variable resistance
10. Multi-function input by toggle switch
11. Jog operation switch
12. Reset switch
13. CW/CCW selection switch
14. Speed control volume
15. Multi-function input switch: 3ea
16. Digital voltmeter : 3 1/2 digit
17. Third phase motor : 1/2HP
18. PLC controller(LG GLOPA)
19. Output amplifier : DC 24V 5ea
20. Input toggle switch : 2ea

- 21. Input push button : 4ea
- 22. PLC/Manual conversion switch
- 23. DC power : DC 24V 1.2A
- 24. Input power: AC 220V, 50/60Hz

C. Accessories

- Connection cable : 1set
- Power cord: 1ea
- User's manual: 1ea

< Inverter Control Trainer IV-5800 >



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