ED–5100  MOTOR/GENERATOR TRAINING SET

- Complete Motor/Generator Training System
- Various load characteristics (Resistance, L/C Reactance and Torque)
- Selectable System (ED-5100-1, ED-5100-2, ED-5100-3 or Full Set)

GENERAL CHARACTERISTICS
- **Motor Input Voltage**
  - AC Motor
    - 110V, 60Hz (2-Phase)
    - 220V, 60Hz (3-Phase)
  - DC Motor: 110V DC
- **Generator Output Voltage**
  - AC Generation: 110V/220V, 60Hz
  - DC Generation: 110V
- **Dimension**
  - Motor/Generator: 240(W) x 276(H) x 345(D)mm
  - Panel Equipment: 480(W) x 180(H) x 210(D)mm
  - M/G Mounting Base: 810(W) x 70(H) x 395(D)mm
  - Bench-Top Console (BTC-180-6)
    - 1500(W) x 790(H) x 380(D)mm (with ED-5100-2 or ED-5100-3)

SPECIFICATION

ACCESSORIES
- Patch Cord (ø4 Plug): 1set
- Experimental Manual (DC, AC): 2ea
ED-5100 MOTOR/GENERATOR TRAINING SET

> Motor/Generator/Load-Torque

DM-250 DC Machine
- Motor: 1/3HP
- Generator: 110V, 2A
- RPM: 1800
- Weight: 18.5kg

SM-250-3 Synchro Machine
- Motor: 1/3HP
- Alternator: 120VA
- RPM: 1800
- Weight: 18kg

MFM-250 Multi-Function Motor
- Split-phase, Capacitor Start/Run
- Power: 1/3HP
- RPM: 1725
- Weight: 19kg

IM-250-3 Induction Motor
- Squirrel-cage rotor
- Power: 1/3HP
- RPM: 1725
- Weight: 16kg

WRM-250-3 Wound Rotor Motor
- Slip-ring, Synchro
- Power: 1/3HP
- RPM: 1725
- Weight: 22kg

RSIM-250 Repulsion Induction Motor
- Wound Stator & Rotor
- Power: 1/3HP
- RPM: 1750
- Weight: 21.5kg

DYN-250 Electro Dynamometer
- Torque: 0~30 (kg-cm)
- Rate: 1/3HP (Motor), 250W (Generator)
- Dimension: 380(W) x 200(H) x 390(D)mm
- Weight: 26.5kg

DYN-250 Electro Dynamometer
- Max. Speed: 3000 RPM
- FS Torque: 0~30 (kg-cm)
- Dimension: 300(W) x 330(H) x 360(D)mm
- Weight: 8kg

ED-5115 Wound Rotor Speed Controller
- Control Phase: 3-phase, 5steps
- Power Rate: 1/3HP
- Dimension: 320(W) x 180(H) x 235(D)mm
- Weight: 4.7kg

ED-5121 Switch Module
- Contacting
  - 10A 2-way (1ea)
  - 10A 3-way (1ea)
- Dimension: 250(W) x 190(H) x 200(D)mm
- Weight: 4.1kg

ED-5120 Three-phase Voltage Controller
- Input: AC 380V, 3-phase, 60Hz
- Output
  - 380V (15A), 3-phase (Fixed)
  - 0~208V (3A), 4-wire
- Protection: NFB
- Dimension: 310(W) x 260(H) x 415(D)mm
- Weight: 19.5kg

ED-5101 Resistance Load
- Resistance Range: 57Ω~3600Ω ±5%
- Load Current: 2.1A (0.1A Steps)
- Power Rate: 250W (Max.)
- Load phase: 3-way (3-phase)
- Weight: 8.4kg
ED–5100  MOTOR/GENERATOR TRAINING SET

> Motor/Generator/Load-Torque

**ED-5104**  
Reactance Load  
- Load Rate: 100W (Max.) x 3-way  
- Resistance Range: 330Ω~2kΩ (in 6 steps)  
- Reactance (3-way)  
- Weight: 16kg

**ED-5105**  
DC Volt./AMP. Meter  
- Range (Voltage): 0~50/150V (Dual Ind.)  
- Range (Amperes): 0~1/2.5/5A (Dual Ind.)  
- Type of Meter: 80 x 40mm, 2.5 Class  
- Protection: Over input protection  
- Weight: 6.2kg

**ED-5106**  
AC Volt./AMP. Meter  
- Range (Voltage): 0~150/300V (Dual Ind.)  
- Range (Amperes): 0~1/2.5/5A, 0~2/5/10A  
- Type of Meter: 80 x 40mm, 2.5 Class  
- Protection: Over input protection  
- Weight: 6.3kg

**ED-5109**  
AC Watt Meter  
- Range (Watt): 0~300/600/1200W (Dual)  
- Voltage Input: 150/300V  
- Current Input: 2/4/8A  
- Protection: Over current protection  
- Weight: 8.8kg

**ED-5113**  
SCR Speed Control  
- Control Power: 10~300W  
- Input Voltage: AC 110/220V  
- Output Voltage: 0~150V Half Wave  
- Maximum Current: 2A  
- Protection: Over load protection  
- Weight: 17.5kg

**ED-5119**  
AC/DC Power Supply  
- Power Input: AC 220V, 50/60Hz  
- AC Output: 0~140V, 4A (Variable), 220V, 15A (Fixed)  
- DC Output: 0~125V (5A), 0~150V (1A)  
- Protection: Over load protection  
- Dimension: 495(W) x 190(H) x 360(D)mm  
- Weight: 20kg
ED-5100 MOTOR/GENERATOR TRAINING SET

> Motor/Generator/Load-Torque

**ED-5122 Power Factor Meter**

- Measuring Range: $\cos: -0.5 \sim +0.5$ (or 0~100%)
- Accuracy: ±0.25% of Full Scale
- Auxiliary Power: AC 110/220V
- Dimension: 250(W) x 190(H) x 200(D)mm
- Weight: 5.2kg

**MGM-250-2 M/G Mounting Base**

- Type: 2-unit fixing base
- Material: Metal Plate
- Dimension: 820(W) x 115(H) x 430(D)mm
- Weight: 11.3kg

**BTC-180-6 Bench-Top Console**

- 2-part separation type
- Panel Rack: 1ea
- Instrument Rack: 1ea
- Material: PB-HPM Board
- Weight: 95kg

**MC-128ED Mobile Rack Console**

- 2-part separation type
- Panel Rack: 1ea
- Motor/Generator Rack: 1ea
- Material: PB-HPM Board
- Weight: 60kg
# ED–5100
MOTOR/GENERATOR TRAINING SET

## SYSTEM COMPONENT LIST

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MG-5211 DC(SHUNT, SERIES) MOTOR / DC GENERATOR

- Starting and load characteristics of shunt/series DC motor
- DC generator’s rotating speed and output characteristics

> EXPERIMENTS
- Start and load characteristics of DC shunt-wound motor
- Start and load characteristics of DC series-wound motor
- Loss and efficiency of DC motor
- Relationship of motor speed with the electromotive force
- Load characteristics of DC compound motor
- Cumulative compound and differential compound characteristics
- Generator rotating speed and output characteristics
- Loss and efficiency of DC compound generator

> SPECIFICATION

» MOTOR SECTION
- Winding Type : Shunt/Series
- Speed : 1250~1800 RPM
- Input Voltage : 0~120V, 3.5A
- Shunt Field Excitation : 0.4A(Sep.), 120V
- Number of poles : 2 poles
- Horsepower : 1/3 HP
- Shunt Field Rheostat : 0~300Ω, 50W
- Armature Rheostat : 0~10Ω, 80W
- Indication Meter : 2-current, 1-voltage, 1-RPM(digital)
- Overload Trip : 4A
- Series Field Rheostat : 0~50Ω, 50W
- Indication Meter : 2-current, 1-voltage
- Overload Trip : 2A
- Load Resistance : 48Ω~480Ω, 500W

» GENERATOR SECTION
- Winding Type : Compound
- Speed : 1800 RPM
- Output power : DC 0~120V, 1A
- Number of poles : 2 poles
- Field Excitation : Self excited
- Shunt Field Rheostat : 0~300Ω, 50W

- Main Input Voltage : AC 220V, single phase
- Rating : 30 minutes
- Dimension of system : 990(W) x 670(H) x 475(D)mm
- Weight : 75kg

ACCESSORIES
- Patch Cords(ø4 Plug) : 1set
- AC Power Cord : 1ea
- Experimental Manual : 1ea

www.ed.co.kr
MG-5212 SQUIRREL CAGE INDUCTION MOTOR/DC GENERATOR

- Starting and load characteristics of squirrel cage induction motor
- DC generator’s no load saturation characteristics

> EXPERIMENTS
- Start and load characteristics of squirrel cage induction motor
- Alteration of the rotative directions of squirrel cage Induction Motor
- Slip speed and torque of induction motor
- Induction motor’s no-load power factor and load power factor
- Load characteristics of separately excited DC shunt-wound generator
- Generator’s no-load saturation characteristics
- Shunt field and output
- DC shunt-wound generator’s loss and efficiency

> SPECIFICATION

» MOTOR SECTION
- Winding Type
  » Squirrel cage rotor
  » Split-phase stator
- Speed : 1725 RPM
- Input Voltage : AC 110V, 60Hz
- Input Current : 6.6A
- Horsepower : ⅓ HP
- Start Capacitor : 180~220μF
- Indication Meter : 1-current, 1-voltage, 1-RPM, 1-watt
- Over Load Trip : 7A

» GENERATOR SECTION
- Winding Type : Shunt(separately excited)
- Speed : 1725 RPM
- Output Power : 120V, 1A
- Number of Poles : 4 poles

- Field Excitation : Separately excited
- Shunt Rheostat : 0~300Ω, 50W
- Exciting Power : DC 0~120V, 1A
- Indication Meter : 2-current, 2-voltage
- Overload Trip : 2A
- Load Resistance : 480~480Ω, 500W

» GENERAL CHARACTERISTICS
- Main Input Voltage : AC 220V, single phase
- Rating : 30 minutes
- Dimension of System : 990(W) x 670(H) x 475(D)mm

ACCESSORIES
- Patch Cords(ø4 Plug) : 1set
- AC Power Cord : 1ea
- Experimental Manual : 1ea
WOUND-ROTOR INDUCTION MOTOR/DC GENERATOR

MG-5213

• Starting and load characteristics of wound rotor induction motor
• Load characteristics of DC shunt/compound generator

> EXPERIMENTS

- Start characteristics of wound-rotor induction motor
- Speed and torque of wound-rotor induction motor
- Power factor of wound-rotor induction motor
- Y-and Δ-connections

- Load characteristics of shunt-wound and compound generators
- Generator’s speed and output by winding type
- Loss and efficiency comparisons by winding type

> SPECIFICATION

» MOTOR SECTION
- Winding Type: Wound Rotor & Stator
- Speed: 1750 RPM
- Frequency: 60Hz
- Input Voltage: 208V, 3-phase(Y-connection: 360V)
- Full Load Current: 1.7A
- Number of Pole: 4 Poles
- Horsepower: ⅓ HP
- Speed Controller: 0~50Ω(3-way)
- Indication Meter: 2-current, 1-voltage, 1-RPM(digital), 1-watt
- Over Load Trip: 3A

» GENERATOR SECTION
- Winding Type: DC Shunt/Compound
- Speed: 1750 RPM
- Number of poles: 2 poles
- Output Power: 115V, 1.5A
- Field Excitation: self-excitation

- Shunt Field Rheostat: 0~300Ω, 50W
- Series Field Rheostat: 0~50Ω, 50W
- Indication Meter: 2-current, 2-voltage
- Overload Trip: 4A
- Load Resistance: 48Ω~480Ω, 500W

» GENERAL CHARACTERISTICS
- Main Input Voltage: AC 220V, 3-phase
- Rating: 30 minutes
- System Dimension: 920(W) x 670(H) x 460(D)mm
- Weight: 90kg

ACCESSORIES
- Patch Cords(Ø4 Plug): 1set
- AC Power Cord: 1ea
- Experimental Manual: 1ea
MG-5214 DC(SHUNT, COMPOUND) MOTOR/AC GENERATOR

- Load characteristics and loss / efficiency of DC motor
- 3-phase AC generator’s characteristics by synchronous machine

> EXPERIMENTS
- DC motor’s load characteristics
- DC motor’s loss and efficiency
- Alteration of the motor’s rotative directions
- Motor’s speed and torque
- Saturation curve of AC generator
- Load characteristics of AC generator
- Loss and efficiency of AC generator
- Y-and Δ-connections

> SPECIFICATION

» MOTOR SECTION
- Winding Type: Shunt/Compound
- Speed: 1250~1800 RPM
- Input Voltage: 120V, 3.6A
- Horsepower: ⅓ HP
- Number of Poles: 2 poles
- Shunt Field: 120V, 0.4A
- Indication Meter: 2-current, 1-voltage, 1-RPM(digital)
- Overload Trip: 4A

» GENERATOR SECTION
- Winding Type: Synchronous Machine
- Alternator Power: 120VA
- Output Voltage: 200V, 3-phase, 4Wire
- Speed: 1800 RPM
- Frequency: 60Hz
- Number of Poles: 4 poles

- Exciting Power: DC 0~120V, 1A
- Indication Meter: 2-current, 2-voltage
- Overload Trip: Approx. 2A
- Load Resistance: 375Ω~2kΩ, 600W

» GENERAL CHARACTERISTICS
- Main Input Voltage: AC 220V, single phase
- Rating: 30 minutes
- Dimension: 960(W) x 670(H) x 480(D)mm
- Weight: 89kg

ACCESSORIES
- Patch Cords(Ø4 Plug): 1set
- AC Power Cord: 1ea
- Experimental Manual: 1ea
• Starting and load characteristics of synchronous motor
• Load characteristics of self-excited shunt-wound generator

MG-5215 SYNCHRONOUS MOTOR (3-PHASE)/DC GENERATOR

• Start characteristics of wound-rotor induction motor
• Speed and torque of wound-rotor induction motor
• Power factor of wound-rotor induction motor
• Y-and Δ-connections

> EXPERIMENTS

• Load characteristics of shunt-wound and compound generators
• Generator’s speed and output by winding type
• Loss and efficiency comparisons by winding type

> SPECIFICATION

» MOTOR SECTION
• Winding Type : Synchronous Machine
• Speed : 1750 RPM
• Input Voltage : 120/208V, 3-phase 4 Wire
• Frequency : 60Hz
• Number of Poles : 4 poles
• Horsepower : ⅓ HP
• Motor Current : 1.7A Approx.
• Indication Meter : 2-voltage, 2-current, 1-RPM(digital), 1-watt
• Overload Trip : 2A

» GENERATOR SECTION
• Winding Type : Shunt
• Speed : 1800 RPM
• Output Power : 120V, 1A
• Number of Poles : 2 poles
• Field Excitation : Self-excited

• Shunt Rheostat : 0~300Ω, 50W
• Indication Meter : 2-current, 2-voltage
• Overload Trip : 2A Approx.
• Load Resistance : 48Ω~480Ω, 500W

» GENERAL CHARACTERISTICS
• Main Input Voltage : AC 220V, 3-phase
• Rating : 30 minutes
• Dimension : 990(W) x 670(H) x 475(D)mm
• Weight : 91kg

ACCESSORIES
• Patch Cords(ø4 Plug) : 1set
• AC Power Cord : 1ea
• Reference Manual : 1ea
MG-5216 REPULSION MOTOR / DC GENERATOR

- Starting and drive characteristics of repulsion induction motor
- Load characteristics of separately excited DC shunt-wound generator

> EXPERIMENTS
- Start and driving characteristics of repulsion induction motor (RIM)
- Alteration of RIM's rotative directions
- RIM's load characteristics

> SPECIFICATION

**MOTOR SECTION**
- Winding Type: Repulsion Start, 2 Field Stator
- Speed: 1750 RPM
- Input Voltage: AC 220V, 60Hz
- Input Current: 5A(110V), 2.5A(220V)
- Number of Poles: 4 poles
- Horsepower: \(\frac{1}{3}\)HP
- Direction of Rotation: CW, CCW
- Indication Meter: 1-voltage, 2-current, 1-RPM(digital), 1-watt
- Overload Trip: 7A

**GENERATOR SECTION**
- Winding Type: Shunt(Separator)
- Speed: 1750 RPM
- Output Power: 120V, 1A
- Number of Poles: 2 poles
- Field Excitation: Separately excited

- RIM’s no-load power factor and load power factor
- Load characteristics of separately excited DC shunt-wound generator
- No-load saturation characteristics of generator
- DC shunt-wound generator’s loss and power factor

**GENERAL CHARACTERISTICS**
- Main Input Voltage: AC 220V, single phase
- Rating: 30 minutes
- Dimension: 960(W) x 670(H) x 480(D)mm
- Weight: 91kg

**ACCESSORIES**
- Patch Cords(Ø4 Plug): 1set
- AC Power Cord: 1ea
- Experimental Manual: 1ea
MG-5219  SQUIRREL CAGE INDUCTION MOTOR/ELECTRODYNAMOMETER

• Torque and load characteristics measurement by Electro-dynamometer
• Start and load characteristics of squirrel cage induction motor

> EXPERIMENTS
• Squirrel cage induction motor’s start characteristics and slip
• Alteration of the rotative directions of squirrel cage induction motor
• Induction motor’s slip speed and torque
• Measurement of induction motor’s power efficiency
• How to use electro-dynamometer
• Torque Measurements by dynamometer
• Use of separately excited DC generator

> SPECIFICATION

» MOTOR SECTION
• Winding Type
  » Squirrel cage rotor
  » Split-phase stator
• Speed : 1725 RPM
• Input Voltage : AC 110V, 60Hz
• Input Current : 6.6A
• Number of Poles : 4 poles
• Horsepower : 1/3 HP
• Start Capacitor : 180~220μF
• Indication Meter : 1-current, 1-voltage, 1-RPM(digital), 1-watt
• Overload Trip : 7A(Approx.)

» GENERATOR SECTION
• Winding Type : Shunt(Separator)
• Speed : 1800 RPM
• Horse Power : 1/3 HP
• Number of Poles : 2 poles
• Shunt Rheostat : 0~300Ω, 50W
• General Output : 120V DC, 2.4A
• Exciting Power : DC 0~120V, 1A
• Indication Meter : 2-current, 2-voltage
• Overload Trip : Approx. 4A
• Load Resistance : 48Ω~480Ω, 500W

» GENERAL CHARACTERISTICS
• Main Input Voltage : AC 220V, single phase
• Rating : 30 minutes
• System Size : 960(W) x 860(H) x 475(D)mm
• Weight : 80kg

ACCESSORIES
• Patch Cords(Ø4 Plug) : 1set
• AC Power Cord : 1ea
• Reference Manual : 1ea
ED-5300  ELECTRICAL MACHINE TRAINER

- 19 types of Modules & Graphic Boards
- 25 types of Electrical Machine Assembly
- Experimental Board Rack & Storage Trolley

> EXPERIMENTS

» BASIC EXPERIMENTS ON GENERATOR
- Principles of the generator
- Single-phase AC generator using permanent magnet
- DC Generator using permanent magnet
- Separately excited DC shunt-wound generator by field coil
- Self-excited DC shunt-wound generator by field coil
- Generator’s no-load saturation
- Load characteristics of separately excited DC shunt-wound generator
- Revolving field, single-phase AC shunt-wound generator
- Load characteristics of AC generator
- Principles of 3-phase generator
- Revolving field, 3-phase AC generator
- Revolving armature-type 3-phase AC generator
- Principles of rotary converter

» BASIC EXPERIMENTS ON MOTOR
- Principles of the motor
- DC Motor using permanent magnet
- DC series-wound motor using the field coil
- DC shunt-wound motor by starter and field resistor
- DC compound motor
- AC commutator motor (universal motor)
- Rotary field of 3-phase induction motor
- Squirrel cage induction motor
- 2-step speed control of induction motor
- Repulsion motor
- Split-phase motor by condenser
- Polarized (shading coil type) motor

> SPECIFICATION

» EXPERIMENTAL BOARD RACK(BR-6)
- Installation Capacity : 8ea
- Dimension : 1480(W) x 740(H) x 320(D)mm

» BOARD STORAGE CABINET(BS-20)
- Storage Capacity : 13ea
- Dimension : 680(W) x 1080(H) x 450(D)mm

» EXPERIMENTAL MODULES LIST
- NO-5301 Field Rheostat : 1ea
- NO-5302 Starting Rheostat : 1ea
- NO-5303 AC/DC Machine Load Unit : 1ea
- NO-5304 Three-Phase(Y-Δ) Load Unit : 1ea
- NO-5305 Variable R, L, C Load Unit : 1ea
- NO-5306 AC/DC Power Supply : 1ea
- NO-5307 AC Volt/Ampere Meter : 1ea

ED-5300 ELECTRICAL MACHINE TRAINER
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- NO-5308 DC Volt/Ampere Meter : 1ea
- NO-5309 DC Milliammeter : 1ea
- NO-5310 AC/DC Machine Field Frame : 1ea
- NO-5311 Auto Driving Unit : 1ea
- NO-5312 Pole Changing Unit : 1ea

> GRAPHIC BOARDS LIST
- NO-5313 DC Machine Board : 1ea
- NO-5314 Three-Phase Machine Board : 1ea
- NO-5315 Rotary Convertor Board : 1ea
- NO-5316 Compound Motor Board : 1ea
- NO-5317 Speed Control of Induction Motor Board : 1ea
- NO-5318 Repulsion Motor Board : 1ea
- NO-5319 Split-Phase Motor Board : 1ea

> MACHINE PARTS LIST
- 3-Pole Rotor & Other Rotors : 6ea
- Wide Magnetic Pole Pieces : 15ea
- Shunt Field & Various Field Coil : 10ea
- Permanent Magnet(Round Type) : 2ea
- Brush & Brush Holder set : 3ea(built-in brush)
- Supporter for Rotator and Stator : 12ea
- Filament Lamp(3/6/12V) : 15ea

- Compass : 1ea
- Belt for M/G : 1ea
- Fixing Bolt : 10ea

> GENERAL CHARACTERISTICS
- Input Voltage
  » AC 220V(No-5306, No-5311)
- Operating Temperature : 0~45˚C, below 80% R.H.
- Dimension
  » Module Size(A) : 170(W) x 302(H)mm : 7ea
  » Module Size(B) : 340(W) x 302(H)mm : 5ea
  » Graphic Board : 340(W) x 300(H)mm : 7ea
- System Weight : 110kg

> ACCESSORIES
- Patch Cord(ø4 Plug Type) : 1set
- AC Power Cord : 2ea
- Experimental Manual : 1ea
- Operation Manual : 1ea

> COMPONENT LIST

> EXPERIMENTAL MODUL
ED-5300  ELECTRICAL MACHINE TRAINER

> COMPONENT LIST

» EXPERIMENTAL GRAPHIC BOARDS

» MACHINE PARTS

» BOARD STORAGE CABINET
ED-4400B DC SERVO TRAINER

- Analog Feedback Loop & DC servo system
- Modularized by the function of servo circuits
- Overload protection for the Servo Amp and power supply output
- Servo Motor with Tacho Generator and Speed Reduction Gear
- PID Control Exercise [option : PID Control Module U-165]

> EXPERIMENTS
- Transient Characteristics of Servo Motor
- Response Characteristics
- Speed Detection and Closed Circuit’s Composition
- Steady Speed Control
- Load Characteristics
- Position Detection and Operational Amplification
- Error Signal Detection and Closed Circuit’s Composition
- Position Control
- Closed Circuit’s Gain and Response Speed
- Servo Circuit Applications
- PID Control (Option)

> SPECIFICATION
- **Servo System Method**: Analog Feed-back Loop, DC Servo
- **Circuit Composition**: Modular System (10 Modules and Motor, Electronic Brake)
- **Speed Control Range**: 0.01 RPM~60 RPM (Reduction Ratio 60:1)
- **Position Resolution**: Less than ±3˚
- **Operating Temperature**: 0~45˚C, Below 85% R.H.
- **Input Voltage**
  - Modules: ±15V, 0.6A Max. (by DC Power Supply)
  - System: AC 220V, 50~60Hz
- **Dimension**
  - Modules: 110(W) x 55(H) x 110(D)mm
  - System case: 615(W x 175(H) x 470(D)mm
- **System Weight**: 18.2kg

> AUXILIARY MODULES
- Function Generator U-162: 1ea
- RPM Meter U-159: 1ea
- Magnet Brake U-163: 1ea

OPTION
- PID Control Module U-165

ACCESSORIES
- Aluminum Brake Disk: 1ea
- Inertia Flywheel Disc: 2ea
- Patch Cord (ø4 Plug): 1set
- AC Power Cord: 1ea
- Experimental Manual: 1ea
ED-4400B  DC SERVO TRAINER

> Motor/Generator/Load-Torque

» U-151 Attenuator

The dual rotary type attenuator consists of 10 steps and each step reduces by 10%.

- **Input Resistance**: 10kΩ x 10 = 100kΩ
- **Attenuation**: 10% x 10 = 100%

» U-152 Summing Amp

Performs add-up operations for the current of three circuits and experiments on the gain and transfer characteristics.

- **Input Circuit**: 3-input analog summing
- **Delay**: Int./Ext.

» U-153 Pre-Amp

Designed to control DC offset voltage and can control DC zero offset coming from the DC Amplifier.

- **Offset Range**: Approx. ±5V
- **Gain**: 20dB

» U-154 Motor Drive-Amp

This 10W DC differential amplifier has overload protection circuits and drives the Servo Motor.

- **Output Power**: 15V 700mA Max.
- **Gain**: 34dB Current Amp.

» U-155 Tacho Detector

Changes the tacho generator’s output in frequency-to-conversion and makes the RPM proportional DC voltage polarized in (+) or (-) output along the motor’s rotational direction.

- **Input**: AC 1~1200Hz, 0~3V
- **Output**: DC ±0~15V
- **Polarity Sensitivity**: Less than 0.1V
ED-4400B  DC SERVO TRAINER

> Motor/Generator/Load-Torque

» U-156 Power Supply
Supplies power to the Servo Motor and other systems with overprotected DC outputs. The mounted ammeter shows current status of the motor's load.
- Output: ±15V 0.2A (for modules), ±15V 0.5A (for motor)
- Protection: Overload and short circuit protection
- Input Voltage: AC 220V, 50/60Hz

» U-157/U-158 Potentiometer
The 360° rotary scales are mounted on this precision potentiometer for position setup and detection.
- Input Resistance: 1/10kΩ
- Input Voltage: 30V Max.
- Resolution: Less than 1/1000 Division
- Power Dissipation: 2W at 25°C

» U-159 RPM Meter
This RPM Meter is used together with U-155 Tacho Detector, and it indicates the Servo Motor's RPM along the output of Tacho Detector.
- Max. Indication: 4000 RPM
- Input Impedance: Approx. 150kΩ

» U-161 DC Servo Motor
Consists of the speed reduction gear and the tacho generator.
- Input Voltage: DC 12V, 4.5W Max.
- Tacho Output: about 3Vp-p (at 4000RPM)
- RPM: 5000 Max.
- Gear Ratio: 60:1 Down Speed

» U-162 Function Generator
Generates Square Wave for experiments on the motor's response speed and transient characteristics. Also, it provides Ramp outputs for timing axis.
- Frequency Range: 0.1~1Hz, 1~10Hz
- Output: DC 15Vp-p

» U-163 Magnet Brake
The Magnet Brake has rotational load by eddy currents presented to the aluminum rotational disk which is mounted on the motor's high speed axis.
- Magnet Power: 5~500AT variable
- Magnet Air-gap: 4mm
- Input Voltage: AC 220V, 50/60Hz