AC/DC Training System
587589 (3351-00)

LabVolt Series

Datasheet

Festo Didactic
en 120 V - 60 Hz
01/2019

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General Description

The AC/DC Training System is a state-of-the-art training system that is specifically designed to introduce students to the basic principles of electrical circuits, both in direct current (dc) and alternating current (ac). It provides a comprehensive, high-quality, and cost-effective solution to rapidly build student knowledge in electricity and electrical circuits.

Through theory and hands-on exercises, the AC/DC Training System fully covers the following topics: nature of electricity, Ohm's law, Kirchhoff's voltage and current laws, using measuring instruments, solving series and parallel circuits, electromagnetism, electrical distribution, and troubleshooting electrical circuits.

The AC/DC Training System comprises the most common electrical components in modern electrical circuits, easy to access and safe for student experimentation. Two 24 V power supplies provide dc power and ac power. The training system itself can be powered from a standard ac wall outlet.

All the components come in a rugged carrying case for easy transportation. During experiments, the top lid of the case can be removed, allowing access to the components. The form of the case also enables multiple units of the training system to be conveniently and securely stacked one atop the other.

The curriculum included in this training system is divided into two courses designed so that students learn progressively the different concepts important to the study of dc and ac circuits. The two courses are divided into exercises that each include all the theory required to the study of a particular topic, as well as hands-on experimentations. These experimentations reinforce the theoretical concepts and help students develop the skills necessary to work in the field of electricity. Whenever possible, the curriculum also introduces students to troubleshooting electrical circuits.

Carrying Case

The AC/DC Training System is contained in a sturdy, easy-to-transport carrying case.

The carrying case containing the AC/DC Training System is designed for maximal protection of the system components while still allowing easy transportation. Transport is facilitated by the sturdy wheels and telescopic handle.

The lid of the carrying case is fixed into place with durable plastic locks, but can be removed easily when performing experiments, allowing access to the components. The lid also includes a storage compartment for the leads in the system, as well as for other individual components. The two multimeters included in the training system can also be conveniently fixed on the interior of the lid to protect them from damage.

The external form of the case enables multiple units of the training system to be conveniently and securely stacked one atop the other when the training system is not being used. The tight, waterproof, and sturdy case prevents damage to the equipment during prolonged storage periods.

Components

The following components are fixed to the front panel of the AC/DC Training System:

- DC power source (protected)
- AC power source (protected)
- A selection of resistors
- An inductor, parallel-connected to a fluorescent light
- Two capacitors
- Transformer
- A selection of switches: SPST, SPDT, DPDT, NO push button, NC push button, selector switch, knife switch
- DC relay
- AC relay
- A selection of indicator lights: green, yellow, red
- Potentiometer
- DC motor
- Solenoid
- Buzzer
- Circuit Breaker with test components
- Fuse

The AC/DC Training System also includes the following individual components that can be fixed to or stored in the case lid.

- Two multimeters
- Connection leads set
- Compass
- Iron rod (for electromagnetism experiments)

The AC/DC Training System also includes six built-in faults that each can be individually inserted in the system using a toggle switch. These faults are designed to test and improve the troubleshooting skills of students.

Courseware

The courseware included in the AC/DC Training System consists of two student manuals providing comprehensive theory presentations, guided, easy-to-understand lab procedures, and review questions. Two instructor guides that include both the content of the student manuals as well as the results and answers to questions is also included with the system. See the Table of Contents of the Manual(s) section of this datasheet for more information on the content of the manuals.

Topic Coverage

- Basic concepts of electrical circuits, both in direct current (dc) and alternating current (ac)
- Ohm’s law
- Kirchhoff’s voltage and current laws
- Using measuring instruments (voltmeters, ammeters, ohmmeters, etc.)
- Solving series and parallel circuits
- Electromagnetism
- Electrical distribution

- Troubleshooting electrical circuits
- Exploration of the most common electrical components: power sources, resistors, inductors, capacitors, transformers, switches, relays, motors

Features & Benefits

- Fully introduces students to all the important concepts in both dc circuits and ac circuits.
- Comprises the most common electrical components in modern electrical circuits, easy to access and safe for student experimentation.
- Powered using a standard ac wall outlet and operates at a low voltage for student safety.
- Includes six built-in faults that can be inserted using toggle switches, enabling students to test and improve their troubleshooting skills.
- Training system enclosed in a rugged case fitted with sturdy wheels and a telescopic handle for easy transportation. The case also allows training systems to be conveniently stacked for storage.
- Comprises student and instructor manuals that provide comprehensive theory presentations, guided easy-to-understand lab procedures, and review questions.
- Complete, cost-efficient learning package
- Estimated program duration: 50 hours

List of Manuals

Description	Manual number
DC Circuit Fundamentals (Student Manual)	583852 (20316-00)
DC Circuit Fundamentals (Instructor Guide)	583854 (20316-10)
AC Circuit Fundamentals (Student Manual)	583855 (20317-00)
AC Circuit Fundamentals (Instructor Guide)	583856 (20317-10)

Table of Contents of the Manual(s)

DC Circuit Fundamentals (Student Manual) (583852 (20316-00))

- 1 Introduction to the AC/DC Training System
- 2 Switches
- 3 Series and Parallel Circuits
- 4 Voltage, Current, and Measuring Instruments
- 5 Resistance and Ohm's Law
- 6 Solving Series Circuits and Kirchhoff's Voltage Law
- 7 Solving Parallel and Mixed Circuits and Kirchhoff's Current Law
- 8 DC Capacitors
- 9 Electromagnetism
- 10 DC Relays

AC Circuit Fundamentals (Student Manual) (583855 (20317-00))

- 1 AC Circuits and AC Capacitors
- 2 DC and AC Inductors
- 3 Transformers
- 4 AC Relays and Contactors
- 5 Electrical Distribution
- 6 Troubleshooting Methods

Optional Equipment

Qty	Description	Model number
1	AC/DC Training System (Manuals on CD-ROM)	583853 (20316-A0)

Specifications

Parameter	Value
DC Power Source	
Ratings	24 V, 1.2 A
Protection	Thermal-magnetic circuit breaker located on the ac side of the power source, 0.5 A
AC Power Source	
Ratings	24 V, 1 A, 60 Hz
Protection	Thermal-magnetic circuit breaker, 250 V ac, 1.5 A
Resistors (4)	
First	62 Ω ±5%, 15 W
Second and Third	120 Ω ±5%, 15 W
Fourth	200 kΩ ±1%, 0.5 W (used to study RC circuits)
Inductor	
Ratings	1 H ±15%, 240 mA, 30 V
Characteristics	The inductor is parallel-connected to a fluorescent light used to study the inductor operation.
Capacitors (2)	
Ratings	8.8 µF ±5%, 230 V
Type	Oil capacitors
Transformer	
Ratings	24 V, 20 VA, 50/60 Hz
Turns Ratio	1:1 (isolation transformer)
Protection	Fuse, slow blow, 0.2 A, 250 V
Switches	
SPST (1), SPDT (1), DPDT (1)	each: 15 A, 125 V, 50/60 Hz
NO Push Button (1), NC Push Button (1)	each: 2 A, 30 V dc - 3 A, 120 V ac
Selector	3 A, 24 V dc - 6 A, 120 V ac three positions
SPST Knife	1.2 A, 24 V dc - 1.2 A, 24 V ac
DC Relay	
Coil Ratings	24 V dc
Contact Types	2 NO contacts, 2 NC contacts
Contacts Ratings	32 V, 10 A in dc - 125 V, 10 A, 50/60 Hz in ac
AC Relay	
Coil Ratings	24 V ac
Contact Types	2 NO contacts, 2 NC contacts
Contact Ratings	32 V, 10 A in dc - 125 V, 10 A, 50/60 Hz in ac
Indicator Lights (3)	
Ratings	24 V, 2 W in dc and ac
Color	Green (1), yellow (1), red (1)
Potentiometer	
Ratings	0-125 Ω ±10%, 12.5 W
DC Motor	
Ratings	24 V, 30 mA, 56 r/min
Characteristics	Bidirectional, rotor fitted with a plastic blade
Solenoid	
Ratings	24 V dc
Characteristics	A plunger is inserted in the solenoid
Buzzer	
Ratings	24 V dc
Characteristics	Emits a high-pitched noise
Circuit Breaker	
Ratings	250 V, 0.1 A, 50/60 Hz
Type	Thermal-magnetic
Test Circuit for Circuit Breaker	
Power Source	One line of the power network
Resistor	250 Ω ±5%, 25 W
NO Push Button	Each: 2 A, 30 V dc - 3 A, 120 V ac
Fuse	

Parameter	Value
Ratings	0.2 A, 250 V
Type	Slow blow
Iron Rod	Used to study electromagnetism
Compass	45 mm diameter, used to study electromagnetism
Iron Rod	Used to study electromagnetism
Compass	45 mm diameter, used to study electromagnetism
Connection leads	
Miniature banana plug leads (15)	2 mm with a length of 60 cm (24 in)
Safety banana plug leads (1)	4 mm with a length of 30 cm (12 in)
Digital Multimeters (2)	
Type	Compact digital multimeter MN47 by Extech Instruments
Functions	Non-contact voltage detector, dc/ac voltage, dc/ac current, resistance, capacitance, frequency, temperature, duty cycle, continuity/diode test.
Accuracy	Voltage: 0.5-2%, current: 1-3%, resistance: 1.2-2%, capacitance 3-5%, frequency: 1.2-1.5%, duty cycle: 1.2%, temperature: 3%, diode test: 10%
Features	Safety recessed test lead connections, autoranging, low battery indication, audible continuity, overload protection, includes a retractable base, relative and data hold functions
Dimensions (H x W x D)	145 x 65 x 50 mm (5.7 x 2.6 x 2.0 in)
Insertable faults	6 insertable faults used to study troubleshooting
Power Requirements	
Standard AC Outlet	120 V, 1 A, 60 Hz
Physical Characteristics	
Dimensions (H x W x D)	625 x 475 x 290 mm (24.6 x 18.7 x 11.4 in)
Net Weight	TBE

Reflecting the commitment of Festo Didactic to high quality standards in product, design, development, production, installation, and service, our manufacturing and distribution facility has received the ISO 9001 certification.

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