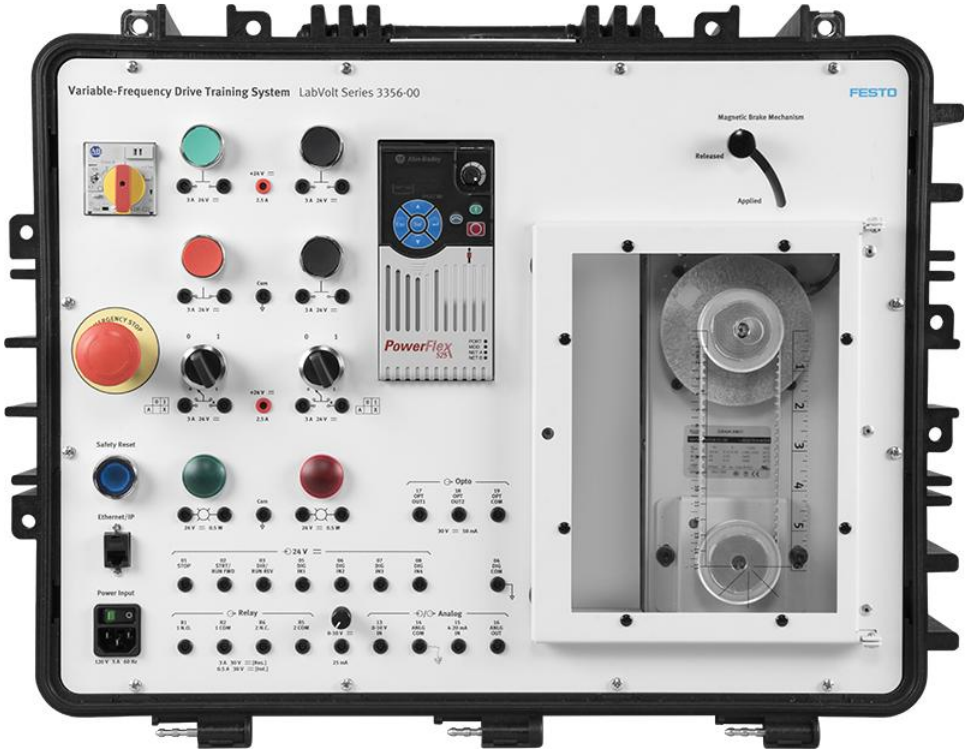
Variable-Frequency Drive Training System
592614 (3356-00)

LabVolt Series

Datasheet



Festo Didactic
en 120 V - 60 Hz
10/2020

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General Description

The Variable-Frequency Drive Training System is a state-of-the-art training system specifically designed to introduce students to the basic principles of variable-frequency drives (VFDs). It provides a comprehensive, high-quality, and cost-effective solution to rapidly build student knowledge in VFDs and their motor applications. It is designed for portability and powered using a standard single-phase ac outlet.

Through theory and hands-on exercises, the Variable-Frequency Drive Training System fully covers motor drives, three-phase induction motors, VFD operation with basic and advanced control functions, VFD load types and control methods, and VFD troubleshooting. An optional exercise also covers the use of VFDs with programmable logic controllers (PLCs) and human-machine interfaces (HMIs), and combines the Variable-Frequency Drive Training System with the Advanced PLC Training System, Model 3355.

The Variable-Frequency Drive Training System comprises an advanced modern variable-frequency drive (Allen-Bradley PowerFlex 525), as well as an industrial low-power three-phase induction motor. All electrical and rotating components are easy to access and safe for student experimentation. A dc power supply provides power to the 24 V dc control components. The training system itself is powered from a standard single-phase 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 consists of seven exercises that progressively introduce students to variable-frequency drives and their more advanced functions. Each exercise includes 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. An exercise also introduces students to troubleshooting variable-frequency drives and their circuits.

The part number of the student manual and instructor guide are 52693-00 and 52693-10.

Components

The following components are fixed to the front panel of the Variable-Frequency Drive Training System:

- Variable-frequency drive (Allen-Bradley Powerflex 525)
- 14 inputs/outputs for the variable-frequency drive
- AC induction motor
- Padlockable circuit breaker controlling main supply
- 24 V dc power source
- Load pulley/brake disk
- Optical incremental encoder
- Magnetic brake
- Emergency stop and reset switch
- Four push-button switches
- Two selector switches
- Two indicator lights
- Variable dc signal source
- Ethernet/IP coupler

The Variable-Frequency Drive Training System also includes the following individual components that can be fixed to or stored in the case lid.

- Connection leads set
- Tachometer
- Timing belt
- Digital multimeter
- Padlock and hasp
- Tools

The Variable-Frequency Drive 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.

Carrying Case

The Variable-Frequency Drive Training System is contained in a sturdy, easy-to-transport carrying case.The carrying case containing the Variable-Frequency Drive 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 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.

Courseware

The courseware included in the Variable-Frequency Drive Training System consists of a student manual providing comprehensive theory presentations, guided, easy-to-understand lab procedures, and review questions. An instructor guide that includes both the content of the student manual as well as the results and answers to questions is also included with each 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

- Motor drives
- Three-phase induction motor characteristics and operation
- VFD characteristics and operation
- VFD control circuits and advanced functions, such as acceleration and deceleration, motor braking, jogging, and protection
- VFD load types and control methods
- VFD installation, maintenance, and troubleshooting
- Optional exercise about VFD operation with programmable logic controllers (PLCs) and human-machine interfaces (HMIs)

Features & Benefits

- Fully introduces students to all the important concepts of both variable-frequency drives and three-phase induction motors.
- Comprises a modern Allen-Bradley PowerFlex 525 drive designed for the control of industrial motors.
- The variable-frequency drive, the induction motor, and all the electrical and control components are easy to access and safe for student experimentation.
- Powered using a standard single-phase ac outlet. Control components operate 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: 20 hours

List of Manuals

Description	Manual number
Motor Control Using Variable-Frequency Drives (Student Manual)	593895 (52693-00)
Motor Control Using Variable-Frequency Drives (Instructor Guide)	593897 (52693-10)

Table of Contents of the Manual(s)

Motor Control Using Variable-Frequency Drives (Student Manual) (593895 (52693-00))

- 1 Introduction to the Variable-Frequency Drive Training System
- 2 Three-Phase Induction Motors
- 3 VFD Basics
- 4 VFD Control Circuits and Functions
- 5 VFD Load Types and Control Methods
- 6 VFD Installation, Maintenance, and Troubleshooting
- 7 VFD Operation with PLCs and HMIs (Optional)

Optional Equipment

Qty	Description	Model number
1	Variable-Frequency Drives - eSeries	8111314 (81113-14)

Specifications

Parameter	Value
Variable-Frequency Drive	
Model	Allen-Bradley PowerFlex 525
I/O	14 inputs and outputs available via 2 mm banana jacks on the front panel
Motor	
Type	Three-phase squirrel-cage induction motor
Number of Poles	4
Power	40 W
Frequency	50/60 Hz
Voltage	200/230 V
Current	0.32/0.3 A
Speed	1300/1600 r/min
Main AC Power Supply	
Thermal-Magnetic Circuit Breaker	6.3-10 A
Incremental Encoder	
Type	TRDA-20 medium-duty, solid-shaft
Output	Line driver (differential)
Pulse per Revolution	1024
Maximum Speed	5000 r/min
Switches	
NO Push Button (3), NC Push Button (1)	each: 3 A, 24 V dc
Selector (2)	each: 3 A, 24 V dc, two positions

Parameter	Value
Indicator Lights (2)	
Ratings	24 V dc, 0.5 W
Color	Green (1), red (1)
Potentiometer	
Analog Output	0-10 V dc
Ethernet/IP coupler	Modular coupler, RJ45K
Connection leads	
Miniature banana plug leads (30)	2 mm with a length of 45 cm (18 in), 15 red lead and 15 black leads
Tachometer	Photo and contact modes, 5 digit display, wide r/min and linear surface speed measurements, accuracy of 0.05%, maximum resolution of 0.1 r/min
Insertable faults	6 insertable faults used to study troubleshooting
System Requirements	
Standard AC Outlet	120 V, 15 A, 60 Hz
Maximum Sytem Current	3 A
AC Power Network Connector	C14
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

Module Options Description

Variable-Frequency Drives - eSeries 8111314 (81113-14)

This eSeries course introduces students to the basic principles of motor drives, three-phase induction motors, VFD operation with basic and advanced control functions, VFD load types and control methods, and VFD troubleshooting. It is meant to be used in conjunction with the Variable-Frequency Drive Training System.

Each course exercise begins with a pretest and ends with a posttest. The course includes the topics covered in the book-based content and their related hands-on exercises. Exercise procedures are presented in enhanced PDF format. Completed exercises may be printed, saved to a specific location, and submitted (emailed) to the instructor. Exercise presentation of technical content is accompanied by voiceover narration to minimize the amount of onscreen reading.

The following learning platforms are available:

- 8111314: Variable-Frequency Drives - eSeries
- TBD: Variable-Frequency Drives - SCORM
- TBD: Variable-Frequency Drives - Stand-Alone

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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