

# Portable AC Variable Frequency Drives | Motor Control & Troubleshooting

**Introduction to AC Variable Frequency Drives - W11135-XA01UEN-E1**

Objective 1: Describe the Function and Operation of Two Common Types of Variable Speed AC Drives

**General-Purpose Drive Description**

Single-Phase Input Power

3-Phase Output Power

One common type of variable speed AC drive is the general-purpose drive. This drive has three stages to convert AC power into DC, boost and filter it, and then turn it back into AC power at different frequencies and voltages.

Rectifier  
DC Link  
Inverter

Incoming Power

Rectifier → DC Circuit → Inverter

AC Induction Motor

The diagram illustrates the power flow in a general-purpose AC drive. On the left, a blue sine wave represents 'Single-Phase Input Power'. An arrow labeled 'Incoming Power' points to a dashed box labeled 'General Purpose Drive'. Inside this box, three orange blocks are connected in series: 'Rectifier', 'DC Circuit', and 'Inverter'. The 'Rectifier' block receives the single-phase input. The 'DC Circuit' block is connected to the 'Inverter' block. The 'Inverter' block outputs three-phase power, shown as three overlapping sine waves (red, green, and blue) labeled '3-Phase Output Power'. This output is connected to an 'AC Induction Motor' represented by a grey motor icon. A warning triangle icon is visible in the bottom right corner of the slide.

## eLearning Course: M11135, M11153

Beginning at the foundation of AC Electronic Drives knowledge, the AC Motor Drives eLearning course builds from the basics to advance to AC motor operation, installation, and performance analysis. As learners complete new topics, they'll build skills like jogging control and torque control, ramping commands, DC injection braking, and acceleration methods.

## Teach AC Motor Drives

### Comprehensive AC Motor Drives eLearning Curriculum Connected to Real-World Skills

Amatrol's eLearning curriculum is unique in that it thoughtfully combines in-depth theoretical knowledge with practical, hands-on skills. This powerful combination of knowledge and skills solidifies understanding and creates a strong foundation for pursuing more advanced skills.

For example, the AC Variable Frequency Drive eLearning course covers important topics, such as:

### Introduction to AC Variable Frequency Drives

Learners begin with an introduction to AC variable frequency drives, including variable speed AC drive basics, two- and three-wire control, and jogging control. Individual lessons focus on topics like the function and operation of two common types of variable speed AC drive, advantages of starting a motor with an AC drive instead of line starting, the external control capabilities of a variable AC drive, and how motor jogging is accomplished with a variable frequency AC drive. Learners will also practice skills, such as operating a motor using the program keypad of a VFD, operating a three-wire control circuit using a variable frequency AC drive, programming a two-wire control circuit, and programming, connecting and operating a variable frequency AC drive for motor jogging.

### AC Variable Drives - Speed and Torque Control

In this module, learners will learn control techniques of AC variable frequency drives, including basic speed control, advanced speed control, and torque control. Individual lessons focus on topics like how frequency affects the speed

on an AC induction motor, effects of reflected wave voltage, how to program a variable frequency AC drive for multiple speed selections, and understanding Volts per Hertz ratio. Learners will also practice skills, such as control motor speed using the keypad of a variable frequency AC drive, programming and operating a variable frequency AC drive using preset speeds, calculating Volts per Hertz ratio, and programming and operating a variable frequency AC drive to provide low speed boosts.

## **AC Variable Frequency Drives - Acceleration, Deceleration, and Braking**

To finish up Amatrol's AC Motor Drives eLearning curriculum, the final module focuses on the acceleration, deceleration, and braking of AC variable frequency drives. Individual lessons focus on topics like the importance of ramping, how a variable frequency AC drive can accelerate a motor past its rated speed, and DC injection braking using a variable frequency AC drive. Learners will also practice skills, such as programming and operating a variable frequency AC drive to ramp a motor to stop, programming and operating a variable frequency AC drive to provide S-curve acceleration, and programming and operating a variable frequency AC drive to provide DC injection braking to a motor.

## **Teach Troubleshooting**

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### **Fault Detection and Troubleshooting for AC Variable Frequency Drives**

The M11153 eLearning course consists of an additional module that focuses on fault detection and troubleshooting for AC variable frequency drives. With this, users will learn about the most common faults detected by VFDs, including power loss, stalled motor, motor overload, short circuit, ground fault, and phase-to-phase short. Fault codes, automatic restart parameters, and manual fault resets are also covered.

## **Interactive eLearning**

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### **Highly-Interactive Multimedia Format Appeals to All Learning Styles**

Amatrol's AC Motor Drives eLearning course curriculum features a highly-interactive multimedia format. Stunning 3D animations, videos, pictures, voiceovers of all text, and interactive quizzes and exercises bring learning to life. Amatrol's multimedia curriculum contains elements that will appeal to every learning style, keeping learners motivated and engaged.

### **Anytime, Anywhere Access Promotes Self-Paced Learning**

In today's fast-paced, technology-driven world, it's more important than ever to extend the reach of industrial skill training beyond the borders of traditional classrooms. Amatrol's eLearning meets the challenge for flexibility by offering in-depth, comprehensive technical skills training via an intuitive, easy-to-use web-based Learning Management System (LMS).

With anytime, anywhere online access, Amatrol's eLearning allows learners to set their own pace at home, on the job, in a traditional class setting, or a blended approach of these options. Click here to learn more about [Amatrol's eLearning and LMS](#).

## **Additional Info**

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### **Requires:**

- Computer ([see Computer Requirements](#))

### **Options:**

- Portable AC Variable Frequency Drives Learning System (990-DRV1)
- Portable AC Variable Frequency Drives Troubleshooting Learning System (990-DRV1F)

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### **Address**

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### **Contacts**

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