

Basics of AC Drives and Motors

Program Description

Tuition Fee - \$450.00

Basics of AC Motors and Drives

Program Goals

The goal of this program is to teach students the fundamentals of what an AC Drive and motor is, and the basics of how an AC drive and motor works.

Program Type and Duration

The duration is 30 hours. This program is a Web Base Training (WBT) software program meaning it is 100% on-line and self-paced. Tests are conducted throughout the training to ensure competence.

Student Profile

This training is targeted to employees new to AC drives and motors, and those that need to understand the basic components of an AC drive and motor (Operators, Technicians, Electricians and electrical support staff). This program is also useful as a "refresher" program for those that have used AC drives and motors before, but need a review of the basic components and operation characteristics.

Prerequisites

Students should have a basic knowledge of electricity and magnetism (high school science). This program is geared for anyone with little to no AC drives and motor background.

Program Objectives

Upon completion of this program, students will be able to:

- Identify the basic components and operating characteristics of a 3-Phase, AC induction motor
- Identify the basic components of an AC drive, and what those components do
- Identify the basic relationship between hardware and software characteristics
- Describe the normal operating conditions of an AC drive: Motor Start, Drive Start and Stop, Drive Reverse
- Identify the drive operating characteristics that control the speed, torque and direction of a 3-Phase, AC induction motor
- Identify how a drive controls the motor



US9125 Course Description

Course Agenda Overview

- Components of the AC induction motor
- AC motor theory and principles of operation
- Magnetic fields
- Three Phase power
- Magnetic induction
- Synchronous speed
- Speed regulation and slip
- Torque
- Starting current
- Current and Torque
- Volts per Hertz
- Components of the AC PWM Drive
- Operating parameters
- AC Drive principles of operation

Details

AC Motor Basics

- Define what it is
- Theory of Operation
- ID Parts (Define) Rotor Stator laminations end bell
- Types
 - Asynchronous Standard Induction Motor (Squirrel Cage))
 - Synchronous. (PM Motors)
 - Synchronous/Reluctance
- Enclosure types - TEFC, TENV, etc.
- NEMA vs. IEC (Speed/Torque Curves, DOL)
- Nameplate NEMA specs, IEC Specs.,
- Insulation Systems (Class A,B,F,H)
- Protection Klixon, Drive, current overload (110%, 150%)

Drives Basics - General

- What is a drive
- Definitions - H.P., Torque, Power, Work, Watts, Freq. (Hz), AC vs DC Voltage, RPM vs Hz, Low/Med/High Voltage Levels
- Speed/Torque Curves
- Application Types - VT, CT, CHP
- Open loop
- Closed Loop
- Regenerative Operation
- Enclosures - NEMA/IEC
- Overload (110/150%)
- Protection – Circuit Breakers, Fuses, Motor Thermal Overloads (MTO)

- Ratings (Normal/Heavy/Continuous)

AC Drives Basics

- Parts & Functions: Inverter/DC Bus/Converter
- Control Methods PWM, Flux Vector. Sensorless, V/Hz, Direct Torque Control
- Braking Methods - Coast. Ramp, DC Injection, Flux, Mechanical, Regen, Dynamic Braking
- Operation
- Reversing - Electronic, contactor, Wire Swap
- Protection- MTO, Class 10/20 30 overload, 110/150% with time
- Regeneration - How does it do it? Parts and Pieces,
- General Connections - Power, Motor, Control, Communications.
- What do you need for a satisfied drive
- Enclosures

Drive Options

- Feedback
- Communications
- Common bus
- PLC Interface
- Copper & Fiber Connectivity
- Safe Torque Off (STO)
- Filters

Power Issues

- Power Quality
- Imbalance
- Power Factor
- Power Demand
- Spikes
- Surges
- Reflected Wave
- Notching
- Harmonics (6, 12, 18 Pulse, Ultra Low Harmonic [ULH])
- Bearing Currents

