MCU COURSE DESCRIPTIONS

Course Title - VLT HVAC Drive Startup and Operation

Course Length - 2 Days (Classes typically begin at 8:30 a.m. and conclude at 4:00 p.m., including a 1 hour lunch break)

Prerequisite - None

This course begins with a basic introduction to variable frequency drives and their operation. Following the introduction, the course will guide the student through the procedures and guidelines involved with installing a VLT HVAC Drive FC 102 series product. The next section of the class deals with programming the drive for basic startup, including parameter settings and wiring of the I/O terminals. A basic introduction to the Danfoss MCT-10 setup software is also included*. Guided lab exercises provide the students with hands-on experience programming the VLT HVAC Drive for common applications. The session ends with programming troubleshooting exercises that provide students with valuable problem solving techniques. Students will receive a USB flash drive loaded with relevant documentation on the product and course material. Lunches will be provided by Danfoss.

Students can expect to learn how to:

- Perform a proper physical installation of a Danfoss drive
- Connect the input voltage to the drive
- Connect the output to the motor
- Safely power on the drive
- Understand how to manipulate & interpret the LCP of the drive
- Program the drive for a basic startup

A written exam will be given at the end of class to measure the students' success.

*students are encouraged to bring a laptop to obtain full benefit of the session, but it is not required.

Course Title - VLT AQUA Drive Startup & Operation
Course Length - 2 Days (Classes typically begin at 8:30 a.m. and conclude at 4:00 p.m., including a 1 hour lunch break)
Prerequisite - None

This course begins with a basic introduction to variable frequency drives and their operation. Following the introduction, the course will guide the student through the procedures and guidelines involved with installing a VLT AQUA Drive FC 202 series product. The next section of the class deals with programming the drive for a basic startup, including parameter settings and wiring of the I/O terminals. A basic introduction to the Danfoss MCT-10 setup software is also included.* Guided lab exercises provide the students with hands-on experience programming the VLT AQUA Drive for common applications. The session ends with programming troubleshooting exercises that provide students with valuable problem solving techniques. Students will receive a USB flash drive loaded with relevant documentation on the product and course material. Lunches will be provided by Danfoss.

Students can expect to learn how to:

- Perform a proper physical installation of a Danfoss drive
- Connect the input voltage to the drive
- Connect the output to the motor
- Safely power on the drive
- Understand how to manipulate & interpret the LCP of the drive
- Program the drive for a basic startup

A written exam will be given at the end of class to measure the students' success.

*students are encouraged to bring a laptop to obtain full benefit of the session, but it is not required.

Course Title - VLT AutomationDrive Startup & Operation
Course Length - 2 Days (Classes typically begin at 8:30 a.m. and conclude at 4:00 p.m., including a 1 hour lunch break)
Prerequisite - None

This course begins with a basic introduction to variable frequency drives and their operation. Following the introduction, the course will guide the student through the procedures and guidelines involved with installing a VLT AutomationDrive FC 302 / 301 series product. The next section of the class deals with programming the drive for a basic startup, including parameter settings and wiring of the I/O terminals. A basic introduction to the Danfoss MCT-10 setup software is also included.* Guided lab exercises provide the students with hands-on experience programming the VLT AutomationDrive for common applications. The session ends with programming troubleshooting exercises that provide students with valuable problem solving techniques. Students will receive a USB flash drive loaded with relevant documentation on the product and course material. Lunches will be provided by Danfoss.

Students can expect to learn how to:

- Perform a proper physical installation of a Danfoss drive
- Connect the input voltage to the drive
- Connect the output to the motor
- Safely power on the drive
- Understand how to manipulate & interpret the LCP of the drive
- Program the drive for a basic startup

A written exam will be given at the end of class to measure the students' success.

*students are encouraged to bring a laptop to obtain full benefit of the session, but it is not required.

Course Title - Danfoss Drive Troubleshooting & Repair
Course Length - 3 Days (Classes typically begin at 8:30 a.m. and conclude at 4:00 p.m., including a 1 hour lunch break)
Prerequisite - Basic VFD and electrical knowledge

This class focuses on both hardware and software troubleshooting. Students will deal with various programming issues that may surface when commissioning and troubleshooting a drive system. Guided lab exercises and drive demo units containing various programming errors are handed to the students. They are asked to figure out each problem before moving on to the next one. The Danfoss MCT-10 setup software is thoroughly reviewed and explored as a programming and troubleshooting tool. Detailed VFD theory of operation is presented to the class. The most common alarm codes and fault symptoms are covered in lecture. Time is spent in the lab where the students will troubleshoot and make actual repairs to drives, including rectifier sections, IGBT's, cap banks, fans, power and control cards. Students will receive a USB flash drive loaded with relevant documentation on the product and course material. Lunches will be provided by Danfoss.

Students can expect to learn how to:

- Determine the causes of alarm various codes
- Identify bad power components and circuit boards
- Disassemble a drive and replace defective components
- Understand VFD theory of operation
- Correct programming issues
- Perform multiple diagnostics tests to a VFD

A written exam will be given at the end of class to measure the students' success.

*students are encouraged to bring a laptop to obtain full benefit of the session, but it is not required.

Course Title - VLT AQUA Drive Application Specific Programming
Course Length - 2 Days (Classes typically begin at 8:30 a.m. and conclude at 4:00 p.m., including a 1 hour lunch break)
Prerequisite - VLT AQUA Drive Startup, Installation & Basic Troubleshooting or experience with the basic programming of Danfoss VFD's

This course provides the student with instruction on the advanced operating parameters and functions of the VLT AQUA Drive FC-202. Students can expect to gain an understanding of the advanced attributes of the drive including:

- Closed Loop Setup / PID Control
- Smart Logic Controller Functionality
- Timed Based Functions / Real Time Clock
- Basic Cascade Control
- Pipe Fill Mode
- Dry Pump Detection
- No Flow
- Sleep Mode

Configurable Options

The class begins with a classroom introduction to the advanced software features, where they are typically applied and the resulting benefits. The majority of the class is dedicated to lab exercises. During lab, each student will gain hands-on experience setting up and programming the advanced features of the VLT AQUA Drive.

A practical exam will be given at the end of class to measure the students' success.

*students are encouraged to bring a laptop to obtain full benefit of the session, but it is not required.

Course Title - VLT HVAC Drive Application Specific Programming
Course Length - 2 Days (Classes typically begin at 8:30 a.m. and conclude at 4:00 p.m., including a 1 hour lunch break)
Prerequisite -VLT HVAC Drive Startup, Installation & Basic Troubleshooting or experience with the basic programming of Danfoss VFD's

This course provides the student with instruction on the advanced operating parameters and functions of the VLT HVAC Drive FC 102 Series product. Students can expect to gain an understanding of the advanced attributes of the drive including:

- Closed Loop Setup / PID Control
- Smart Logic Controller Functionality
- Timed Based Functions / Real-Time Clock
- Firefighter's Override Mode
- Basic Cascade Control
- Sleep Mode
- Flying Start
- Extended Closed Loop
- Configurable Options

The class begins with a classroom introduction to the advanced software features, where they are typically applied and the resulting benefits. The majority of the class is dedicated to lab exercises. During lab, each student will gain hands-on experience setting up and programming the advanced features of the VLT HVAC drive.

A practical exam will be given at the end of class to measure the students' success.

*students are encouraged to bring a laptop to obtain full benefit of the session, but it is not required.

Course Title - VLT AutomationDrive Application Specific Programming
Course Length - 2 Days (Classes typically begin at 8:30 a.m. and conclude at 4:00 p.m., including a 1 hour lunch break)
Prerequisite -VLT AutomationDrive Startup, Installation & Basic Troubleshooting or experience with the basic programming of Danfoss VFD's

This course provides the student with instruction on the advanced operating parameters and functions of the VLT AutomationDrive FC 302/301 Series product. Students can expect to gain an understanding of the advanced attributes of the drive including:

- Closed Loop Setup / PID Control
- Smart Logic Controller Functionality
- Safe Stop Terminal Function
- Process Closed-Loop / PID Control
- Speed Closed Loop (Encoder Feedback)
- Master / Slave setups
- Torque Mode

The class begins with a classroom introduction to the advanced software features, where they are typically applied and the resulting benefits. The majority of the class is dedicated to lab exercises. During lab, each student will gain hands-on experience setting up and programming the advanced features the VLT AutomationDrive.

A practical exam will be given at the end of class to measure the students' success.

*students are encouraged to bring a laptop to obtain full benefit of the session, but it is not required.