ELEC 102

● ● ○ Intermediate 45 hours 3 modules · 21 lessons

Motors, Drives & Standby Power

Motor control centers, variable frequency drives and emergency power — the equipment that keeps pumps turning and plants running through an outage.

45	3	21	3,000	105	9
HOURS OF TRAINING	MODULES	LESSONS	STUDY CARDS	SCENARIOS	3D SIMULATORS

COURSE OBJECTIVES

By the end of this course you will be able to:

1. Describe MCC construction, bucket and bus details, and size motor branch circuits, overloads and short-circuit protection under NEC Article 430.
2. Compare across-the-line, reduced-voltage, soft-start and VFD starting methods for heavy pumping loads.
3. Explain how a VFD converts power (rectifier, DC bus, inverter, PWM) and apply the affinity laws to save energy.
4. Recognize and mitigate harmonics, reflected-wave voltage stress, bearing currents and cable-length problems.
5. Size standby generators for motor-starting kVA and voltage dip, and sequence automatic transfer switches.
6. Estimate UPS and battery runtime and plan load shedding and testing under NFPA 110 concepts.
7. Run safe start-up, testing and exercising routines for motors, drives and standby systems.

WHAT YOU WILL LEARN

MCCs & starters
Bucket anatomy, bus and stabs, starter types, overload and short-circuit protection.

Heavy pumping dynamics
Inrush, torque, voltage dip and the effect of starting method on pumps and the grid.

Variable frequency drives
Topology, PWM, parameters, bypass schemes and the affinity-law energy savings.

Harmonics & drive installation
THD/TDD, IEEE 519 concepts, reflected waves, shielded cable and grounding.

Emergency power
Generator sizing, ATS transfer sequence, runtime testing and fuel management.

UPS & batteries
Power paths, battery chemistry, runtime derating and maintenance.

MAJOR TOPICS COVERED

Module 3	Motor Control Centers & Heavy Pumping Dynamics	7 lessons
Module 4	Variable Frequency Drives & Harmonic Mitigation	7 lessons
Module 7	Emergency Power, Standby Generation & UPS Systems	7 lessons

COURSE HIGHLIGHTS

- **45 hours** of structured, self-paced instruction with active-time tracking.
- **9 interactive 3D simulators** — rotate, explode and cut away real equipment, then change the controls and watch the numbers respond.
- **105 field scenarios** with background, decision points and worked answers.
- **3,000 study cards**, 21 printable checklists and hands-on calculators.
- **Module quizzes** and a completion certificate with a verification code.

WHO IT'S FOR

Electricians and electrical maintenance technicians responsible for MCCs, VFDs, generators, ATS and UPS systems at water and wastewater facilities.

BEFORE YOU START

ELEC 101 recommended (codes, distribution and electrical safety).

WHERE TO NEXT

ELEC 103 — Instrumentation, SCADA, Diagnostics & Troubleshooting

Start learning Create a free account at tryetech.com, open **Electrical & Controls** and begin with Module 3.