



INDUSTRIAL ELECTRICS & CONTROL FUNDAMENTALS FOR NON-ELECTRICAL PERSONNEL (PART 1)

Industrial Electrics & Control Fundamentals for non-electrical personnel (Part 1)

Duration: 5 days

Prerequisites: Basic engineering background & awareness of electrically controlled & automated machinery.

Aims: This course was developed primarily for non-electrical maintenance personnel as a Skills-Update course so they can work safely alongside a qualified electrician. Many modern industrial components are discussed along with the principle of operation & how to easily check for fault status. Safe Working Practices are covered along with an introduction to fault finding with practical experiments. This course has proven very popular since it is a basic introduction to electrical systems within a modern production plant.

Objectives: For specific course objectives see Training Record Log.

Content: **MODULE 1 - Electrical Safety & Regulations**

Safety Regulations

- Appreciate the relevant regulations
 - Health & Safety at Work Act overview
 - Electricity at Work Regulations overview
 - I.E.E. 16th Edition overview
 - PAT Portable Appliance Testing overview
- Appreciate the difference between electrical safety & mechanical safety

Electrical Safety

- Understand the concept of electrical safety:
 - Machine safety, Personal safety
- Identify electrical safety hazards
- Importance of personal Risk Assessment
- Importance of the correct & safe hand tools
- Isolation procedure for making a circuit dead
- Understand the importance of the earth connection

MODULE 2 - Basic Electrical Theory

How Electricity Works

- Understand the principles of electricity (AC & DC)
- Understand basic terms:
 - Voltage, Current, Power, Resistance
- Recognise units of measurement

Electrical Measurement

- Understand how to measure voltage, current & resistance
- Recognise the correct measurement tools:
 - Analogue meter, Digital meter, Voltage probe, Current clamp & Insulation tester
- Understand the importance of Insulation Resistance & Earth Leakage testing

Electrical Generation and Supply

- Understand the difference between AC & DC
- Understand the difference between single phase & three phase electrical supplies
- Understand the role of the neutral conductor & earth conductor
- Understand common AC & DC voltages used in the industrial environment

MODULE 3 - Industrial Electrics

Industrial Electrical Devices

- Electrical Protection Devices, (Fuses, MCBs, RCDs)
- Motor Protection Devices
- Contactors, Relays
- Timers
- Power supplies
- Basic recognition, Key features & testing of these devices

Electrical Circuits & Wiring Diagrams

- Understand the common symbols used in electrical diagrams
- European & American wiring standards
- Be able to follow electrical circuit drawings in different layouts
- Understand basic electrical circuits:
 - Series & Parallel
 - NO & NC contacts
 - Relay contacts and coils
 - Timer circuits
- Understand the operation of simple electrical circuits used in industrial applications

Panel Layouts

- Understand the factors relating to cabinet layout & circuit separation
- Understand the importance of
 - Cable sizes
 - Cable identification
 - Cable routing
 - Cable colours
 - Cable protection

Practical Exercise

- Practical circuit connection exercise including cable preparation
- Practical circuit recognition exercise & fault-finding exercises

MODULE 4 - Industrial Motors

How AC Motors Work

- Squirrel Cage Motor
- Understand the motor characteristics
- Basic fault-finding techniques for motor circuits
- Preventative electrical maintenance with motors
- How to test a motor

Starting a Motor

- DOL
- Reversing