



INDUSTRIAL ELECTRICS & CONTROL FUNDAMENTALS FOR NON-ELECTRICAL PERSONNEL (PART 2)

Industrial Electrics & Control Fundamentals for non-electrical personnel (Part 2)

Duration: 5 days

Prerequisites: Attendance on our Industrial Electrics & Control Fundamentals Part 1 course or equivalent level of basic electrical knowledge & competence. To get the most benefit from this course (and not hold back other others), delegates should be able to successfully complete the pre-course assessment.

Aims: This course has been developed primarily for non-electrical maintenance personnel as a Skills-Update course so that fitters & mechanically biased craftsmen can work safely alongside qualified electrical personnel. A brief review of basic tools & techniques is followed by coverage of a range of common modern industrial components & their principle of operation. Tips & techniques regarding how to safely check for correct/abnormal operation are provided. Safe Working Practices are covered & the fundamentals of troubleshooting motors, motor controls, circuits & systems are explained with plenty of practical exercises.

Objectives: For specific course objectives see Training Record Log.

Content: **Module 1 - Review & Develop Current skills**

Review of skills from Part 1
Safety Regulations
Electrical Safety
Electrical Test Tools

Develop skills from Part 1
Industrial Electrical Devices
Electrical Protection Devices, (Fuses, MCBs, RCDs)
Motor Protection Devices
Contactors, Relays, solid state contactors
Timers
Power supplies
Basic recognition, Key features, failure modes & testing of these devices

Electrical Wiring Diagrams
Reading electrical wiring diagrams

Electrical Control Circuits
Build a reversing start/stop motor control circuit with warning timer
Modify the control circuit to include interlocks & indication

Fault Finding Motor Control Circuitry
Principles of logical fault-finding
Practical exercises in fault-finding motor control circuitry

Module 2 – Industrial Motors

Industrial motors

Single phase, three phase, DC, servo

Industrial 3 Phase AC Motors

Practical exercises in non-live motor fault-finding

Practical exercise connecting 3 phase motor to previously built motor control circuit

Motor starting with Star & Delta & softstarts

Practical exercise adding softstart to motor circuit

Module 3 – Safety Circuits

Safety Components in Motor Control Circuitry

An overview of regulations & standards

Machinery protection devices

Overview of devices, including guarding, guard switches, locking systems & electronic safety sensors

Understanding the safety relay

Incorporate a Safety Relay to the reversing start/stop motor control circuit

Practical circuit connections using safety relays & different switching devices

Module 4 – Sensors

Introduction to sensor types

Review what is available & widely used

Understand the connection of PNP & NPN sensors

NO, NC & alarm outputs

Fixed, adjustable & teachable sensors

Digital & analogue

Inductive & Capacitive

Photo electrical sensors (through beam, reflective, diffuse, background suppression)

Practical exercise in connecting & setting up, including how to check & replace & how to read datasheets

Module 5 – Automation

An Overview of Motor Starting & Speed Control Units

Principles of VSD operation

Importance of DC link & PWM output

Examples of wiring diagrams with VSD motor control

Practical exercise in wiring up a VSD & controlling motor speed

Automated Control Sequencing Overlooked

PLC basics

Concepts of I/O & stored programs

I/O indicators

Recognising PLC control in a wiring diagram

Practical exercise in wiring up a PLC to a VSD & sensors, using sensor inputs to control speed & direction of a motor