



**KILIMANJARO INTERNATIONAL INSTITUTE FOR TELECOMMUNICATIONS, ELECTRONICS  
AND COMPUTERS**

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**Course:** Programmable Logic Controllers (PLCs)

**Duration:** 5 Days

**Dates:** 30<sup>th</sup> March to 3<sup>rd</sup> April 2020

**Venue:** KIITEC, Arusha (Along Nelson Mandela Road --- Moshono)

**Tuition Fees:** Tanzania shillings **500,000.00** per participant, which is inclusive of tea/coffee and lunch

**Prerequisites:** Knowledge of electrical schematics, motors and motor controls is recommended

**Target group:** Engineers/technicians in the fields of mining, building automation, manufacturing, and electrical/mechanical design and

**Delivery Method:** Instructor led, group-paced, classroom-delivery learning model with structured hands-on activities/labs

## **Performance-Based Objectives:**

Upon successful completion of this course, participants shall be able to:

- Understand differences between PLC, relay and PC-based control
- Understand basic PLC architecture.
- Understand PLC programming languages-ladder logic & Sequential Flow Chart.
- Understand PLC I/O mapping, memory organization and addressing.
- Perform wiring of typical sensors and actuators to PLC I/O modules.
- Carry out typical PLC installation wiring
- Design a flowchart, given the operation description of a sequential process
- Translate a sequential process flowchart to ladder language program.
- Understand the use of program control and its use in applications
- Implement a sequential process control using a counter, shift register or sequencer function blocks.
- Implement a PID control in a PLC
- Understand function block diagrams and their differences from ladder logic diagrams
- Write Sequential Flow Charts and ladder logic programs for sequential applications.
- Understand the general PLC fault diagnosis method.
- Implementation of RS232 and RS485 communications with PLC's.
- Understand and configure CANopen, AS-i PLC-to-PLC, networks
- Diagnose problems with the PLC hardware and program.

## **Course Content:**

### **Module1: Introduction to PLC's**

Automatic Control in Manufacturing  
Control System Classifications  
PLC Versus Other Technologies  
PLC Architecture

### **Module2: Basic Ladder Logic Programming**

Simple Ladder Logic & Basic Symbols  
Ladder Logic Diagram  
Ladder Logic Programming  
Memory Organization and Addressing

### **Module3: Input/ Output Modules and Installation**

Introduction-I/O configuration & Memory Mapping

Why I/O configuration is required

How the I/O modules are addressed

Source & Sink Concepts

Analog & Discrete Sensors and Actuators

Discrete Modules

Analog Modules

Analog Inputs (0-5V/0-10V/4-20mA)

Scaling Analog Inputs

Averaging Analog Inputs

Wiring Different field Devices to PLC

Detailed description of different PLC modules & cards

### **Module4: Sequential Process Control Applications**

Writing a Process Flowchart

Implementing Flow Chart in Ladder Logic

Key Questions in Sequential Design Process and Parallel Operations

Sequential Function Chart Design and Function Block Diagrams

Design& Implementation of a Sequential Process Control system

### **Module5: Advanced Instructions**

Drum Sequencer Circuits

Timer Circuits

Counter Circuits

Comparison Circuits

Memory word and bit manipulation

Ladder logic program with a subroutine

### **Module6: PID Control**

PID Controller & Tuning

Operational Aspects

PLC PID Function Blocks

### **Module7: Troubleshooting**

General troubleshooting Procedures

Troubleshooting I/O Modules

Program and Communication Problems

Designing for Fault Diagnosis