

<b>Domain</b>	<b>Control and Instrumentation</b>
<b>Title:</b>	<b>Apply knowledge of Programmable Logic Controllers</b>
<b>Level: 5</b>	<b>Credits: 9</b>

**Purpose**

This unit standard specifies the competencies required applying knowledge of Programmable Logic Controllers; it includes Demonstrate fundamental knowledge of PLCs, Configure PLCs hardware, Install PLCs., Perform maintenance, diagnosis and repairs on PLCs. This unit standard is intended to those who work in an instrumentation and control environment

## 1. Entry information:

Prerequisite

- *Unit I&C24 - Apply knowledge of combinational digital electronic circuits*
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## 2. Assessment evidence may be collected from a real workplace or an appropriate simulated realistic environment in which Instrument and Control operations are carried out.

## 3. To demonstrate competence, minimum evidence of understanding, designing, configuring and testing a Programmable Logic Controller, including maintenance and fault finding

## 4. All inspection, operation and maintenance procedures associated with the use of tools and equipment shall comply with manufacturers' guidelines and instructions

## 4. Glossary of terms:

- *specifications'* refers to any, or all of the following: manufacturers' specifications and recommendations, workplace specific requirements
- I/O – input/output
- PLC - Programmable Logic Controllers
- IEC 61499 – standard for function block diagrams
- IEC 61131- standard for programmable logical controller

## 5. Regulations and legislation relevant to this unit standard include the following:

- Labour Act 2007, No. 11, 2007
- IEC 61499
- IEC 61131
- Regulations relating to the health & safety of employees at work under Schedule 1 (2) of the Labour Act No.11 of 2007
- And all subsequent amendments

## 6. Performance of all elements in this unit standard must comply with industry standards.

**Quality Assurance Requirements**

This unit standard and others within this subfield may be awarded by institutions which meet the accreditation requirements set by the Namibia Qualifications Authority and the

Namibia Training Authority and which comply with the national assessment and moderation requirements. Details of specific accreditation requirements and the national assessment arrangements are available from the Namibia Qualifications Authority and the Namibia Training Authority. All approved unit standards, qualifications and national assessment arrangements are available on the Namibia Training Authority website [www.nta.com.na](http://www.nta.com.na).

## **Elements and Performance Criteria**

### **Element 1: Demonstrate fundamental knowledge of PLCs**

#### **Range**

#### **Performance Criteria**

- 1.1 Types of PLCs supplied by various manufacturers are identified and the differences in their architecture and capabilities explained
- 1.2 Basic PLCs circuits diagrams and related symbols are interpreted
- 1.3 Programming software and version compatibility are explained
- 1.4 Languages such as ladder, function block, relay logic, sequential function chart and script are used according to the design.
- 1.5 Types of components such as power supply, processor, memory and I/O are identified and their functions explained.

### **Element 2: Configure PLCs hardware**

#### **Performance Criteria**

- 2.1 Tools, equipment and software are selected and used to configure PLCs.
- 2.2 PLCs layout is carried out as per I/O requirement in the functional specification.
- 2.2 Firmware are installed and updated .
- 2.3 PLCs programs are uploaded and downloaded according to job requirements.
- 2.4 PLCs configuration is validated according to card and rack layout program PLCs including comments according to process control strategy.
- 2.5 External communication is configured with other systems and devices.
- 2.6 Tuning, configuration and programming are verified to determine if PLCs controls the process according to operational requirements.
- 2.7 Document programming, configuration, settings and parameters are backed- up for future data recovery.

### **Element 3: Install PLCs.**

#### **Performance Criteria**

- 3.1 Installation tools and equipment are selected and used according to manufactures' specifications and requirements.
- 3.2 PLCs to be installed is determine according to engineering designs, application, and control strategy.
- 3.3 Installation details of PLCs are confirmed.
- 3.4 Mount racks and additional equipment according to engineering designs and common practices.
- 3.5 Wiring and networking to PLCs are connected according to engineering designs such as schematics and drawings, and manufacturers' specifications.
- 3.6 Environmental conditions and ergonomics such as temperature and contamination are addressed to comply with the environmental protection rules.
- 3.7 PLCs circuits are installed in accordance with relevant installation regulations.

### **Element 4: Perform maintenance, diagnosis and repairs on PLCs.**

- 4.1 Tools and equipment such as software and multimeters are selected and used according to manufacturers' recommendations and engineered designs.
- 4.2 Routine scheduled maintenance are performed by replacing back-up batteries, observing indicator lights and verifying environmental conditions such as temperature and cleanliness.
- 4.3 Error codes, logs and status lights are diagnosed to identify problem.
- 4.4 Probable root cause are identify by investigating symptoms and conditions to determine location of faults.
- 4.5 Diagnostic procedures such as forcing I/O, setting traps and counters are performed.
- 4.6 Steps required to address faults based on results of root cause analysis are determined.
- 4.7 Replace components such as I/O cards, racks and power supplies according to job procedures and manufacturers' recommendations.
- 4.8 Program and configuration from back-up are restored.
- 4.9 PLC programming and configuration are verified according to job procedures and manufacturers' recommendations.
- 4.10 Back up and document PLCs program and configuration for future data recovery

### **Registration Data**

<b>Subfield:</b>	Electrical Engineering

<b>Date first registered:</b>	
<b>Date this version registered:</b>	
<b>Anticipated review:</b>	
<b>Body responsible for review:</b>	Namibia Training Authority