		Unit ID: 2053
Domain	**Instrumentation and Control**	
Title:	**Demonstrate knowledge of industrial communication**	
Level: 3		**Credits: 12**

Purpose

This unit standard is intended for those who demonstrate knowledge of industrial communication. People credited with this unit standard are able to demonstrate knowledge on fundamental concepts of industrial communication, demonstrate knowledge on earthing, grounding and shielding, demonstrate knowledge on RS232 interface standard and RS485 interface standard, demonstrate knowledge on TCP/IP communication protocol, demonstrate knowledge on MODBUS protocols and demonstrate knowledge on DATA HIGHWAY PLUS (DH485).

This unit standard is intended for those who work in an Instrumentation and Control industry.

Special Notes

1. Entry information:

   Prerequisite
   - *Unit 2039 - Plan and organise work in instrumentation work environment.*
   - *Unit 2040 - Apply and maintain safety rules in an Instrumentation and Control Workplace environment.*

2. Assessment evidence may be collected from a real workplace or a simulated workplace in which Instrumentation and Control operations are carried out.

3. 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
   - DNP3 – Distributed Network Protocol 3
   - OSI – Open Systems Interconnection
   - EPA – Enhance Performance Architecture
   - IEC – International Electro Technical Commission
   - EMC – Electromagnetic Compatibly
   - RS232 and RS485 are Recommended Standard
   - IP - Internet Protocol
   - ICMP - The Internet Control Message Protocol
   - ARP - Address Resolution Protocol

5. Regulations and legislation relevant to this unit standard include the following:
   - IEC 61334, IEC 61158, IEC 61784
   - Labour Act 2007, No. 11, 2007
   - 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

Elements and Performance Criteria

Element 1: Demonstrate knowledge on fundamental concepts of industrial communication

Performance criteria

1.1 Functions of OSI and EPA models are described.

1.2 DNP3 message structure is described.

1.3 The IEC standards is described.

Element 2: Demonstrate knowledge on earthing, grounding and shielding

Performance Criteria

2.1 Cables and connections are explained based on application.

2.2 Knowledge on cable routing and screening requirements is explained.

2.3 Concepts on protection and filtering is explained.

2.4 Concepts on shielding requirement is explained.

Element 3: Demonstrate knowledge on RS232 interface standard and RS485 interface standard

Performance Criteria

3.1 Main features of the RS232 and RS485 communication protocol are underlined.

3.2 RS232 and RS485 related problems are explained.

3.3 Half-duplex operation of RS232 communication protocol is outlined.

3.4 RS232/RS485 convertors and current loop hardware are described.

Element 4: Demonstrate knowledge on TCP/IP communication protocol

Performance Criteria

4.1 Basic operations of internet layer protocols (IP, ARP and ICMP) are explained.

4.2 Differences between classes A, B, C addressing are explained.

4.3 The relationship between NET ID and HOST ID is explained.

4.4 Concepts of SUBNET MASKS and prefixes are explained.

4.5 Basic principle of routing is explained.

4.6 Concepts of TCT ports and connections are explained.

Element 5: Demonstrate knowledge on MODBUS protocols

Performance Criteria

5.1 The MODBUS messaging protocol is explained.

5.2 MODBUS memory allocation and function codes and application is explained.

5.3 Transportation of MODBUS request and responses on serial networks are explained.

5.4 Differences between MODBUS RTU and ASCII are explained.

5.5 Knowledge on MODBUS TCP and MODBUS PLUS is explained.

Element 6: Demonstrate knowledge on DATA HIGHWAY PLUS (DH485)

Range

Performance Criteria

6.1 Main features of DH485 are described.

6.2 DH485 related problems are explained.

Registration Data

Subfield:	Electrical Engineering
Date first registered:	13 June 2019
Date this version registered:	13 June 2019
Anticipated review:	2024
Body responsible for review:	Namibia Training Authority