Title	**Demonstrate knowledge of programmable logic controllers (PLCs)**		
Level	**4**	**Credits**	**3**

Purpose	This unit standard covers a basic knowledge of Programmable Logic Controllers (PLCs), including the ability to design and implement a simple program on any one type of PLC. People credited with this unit standard are able to: – demonstrate knowledge of PLC principles; and – design, write, and store a PLC program.

Classification	Electrical Engineering > Core Electrical

Available grade	Achieved

Guidance Information

1 This unit standard has been developed for learning and assessment off-job.

2 This unit standard and unit standards 29422, 29434, 29471, 29475, 29481, and 29482 together meet the requirements of ERAC EPC 51.

3 Any type of PLC that is capable of implementing the range of outcome 2 may be used for assessment purposes.

4 Definitions
EEPROM / *E^2PROM* – Electrically Erasable Programmable Read-Only Memory.
EPC – Essential Performance Capabilities.
EPROM – erasable programmable read-only memory
ERAC – Electrical Regulatory Authorities Council.
EWRB – Electrical Workers Registration Board.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
PLC – programmable logic controller.
PROM – Programmable read-only memory
RAM – random access memory.
ROM – read-only memory.
Safe and sound practice – as it relates to the installation of electrical equipment is defined in AS/NZS 3000:2007, *Electrical Installations (known as the Australian/New Zealand Wiring Rules).*

5 Range
a Candidates may refer to current legislation and Standards during assessment.
b Demonstration of safe working practices and installation in accordance with *safe and sound practice* are essential components of assessment of this unit standard.

c All activities and evidence presented for all outcomes and performance criteria in this unit standard must be in accordance with:
- i legislation;
- ii policies and procedures;
- iii ethical codes;
- iv Standards – may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010;
- v applicable site, enterprise, and industry practice; and,
- vi where appropriate, manufacturers' instructions, specifications, and data sheets.

6 Recommended skills and knowledge:
Unit 2780, *Demonstrate and apply knowledge of a personal computer system*; or demonstrate equivalent knowledge and skills.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of PLC principles.

Performance criteria

1.1 Compare PLC's to relay and hard-wired logic, and state advantages.

Range multiple contacts, variety of control tasks, ease of alteration and duplication, time savings, on-line documentation.

1.2 Describe PLC functional components and hardware modules.

Range input device, input interface, microprocessor or central processing unit (CPU), memory, programmer, output interface, output device; Input/Output (I/O) devices, I/O modules, I/O signal types, high-speed counter, timer, power supply.

1.3 Describe program memory types from the point of view of information storage and retrieval, and explain acronyms.

Range EPROM, EEPROM, RAM, ROM, PROM.

1.4 Describe operating sequence of a PLC.

Range program steps, scan or execution time, image table, register update, diagnostic checking.

1.5 Describe PLC programmers and programming methods.

1.6 Explain PLC terms with reference to the operation of a typical PLC.

1.7 Explain the need to program normally-closed emergency stop buttons as normally-open.

Outcome 2

Design, write, and store a PLC program.

Range minimum of three digital inputs, two digital outputs, one timer, one counter, two internal relays or flags.

Performance criteria

2.1 Follow programming language rules in terms of power flow directions and programming direction.

2.2 Match symbols and address systems to the type of PLC used.

Range inputs, outputs, timers, counters, internal relays or flags.

2.3 Enter program in accordance with manufacturer's instructions.

2.4 Verify program operation against requirements.

2.5 Save program in accordance with manufacturer's instructions.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 April 1996	31 December 2013
Review	2	10 February 1999	31 December 2013
Review	3	26 May 2005	31 December 2021
Rollover and Revision	4	15 March 2012	31 December 2021
Revision	5	15 January 2014	31 December 2021
Review	6	21 July 2016	31 December 2027
Review	7	25 May 2023	31 December 2027

Consent and Moderation Requirements (CMR) reference	0003

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do