

Title	Demonstrate and apply advanced knowledge of programmable logic controller engineering applications		
Level	6	Credits	15

Purpose	<p>This unit standard covers advanced knowledge of PLC systems, applications, and programming methods.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate knowledge of and use PLCs in advanced practical applications; and – describe and implement advanced input/output modules, communication methods, and control systems relevant to PLCs.
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Classification	Electronic Engineering > Core Electronics
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Available grade	Achieved
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Guidance Information

- 1 This unit standard is intended for use in engineering courses at diploma level.
- 2 This unit standard is one of two designed to cover knowledge of the concepts of PLC systems, applications and programming for engineers, the other being Unit 22727, *Demonstrate and apply intermediate knowledge of programmable logic controller engineering applications*. It is recommended that competency in unit standard 22727 be achieved before assessment against this unit standard is attempted, or equivalent knowledge and skills demonstrated.
- 3 Reference
Health and Safety in Employment Act 1992;
and all subsequent amendments and replacements.
- 4 Definitions
Advanced knowledge – means employing specialised knowledge, with depth in more than one area of the subject matter, to analyse, reformat, and evaluate a wide range of information.
ASCII – American Standard Code for Information Interchange.
AS-i – actuator sensor interface.
DH+ – data highway +.
DSC – distributed control system.
HMI – human-machine interface.
Industry practice – practice used and recommended by organisations involved in the electrotechnology industry.
MES – Manufacturing Execution System.

PID – proportional, integral, derivative.

PLC – programmable logic controller.

SCADA – Supervisory Control and Data Acquisition.

TCP/IP – transmission control protocol over internet protocol.

- 5 As technology develops different types of processing systems may be implemented, for example DCS embedded microcontroller, soft PLC.
- 6 All measurements are to be expressed in Système International (SI) units, and, where required, converted from Imperial units into SI units.
- 7 All activities must comply with: any policies, procedures, and requirements of the organisations involved; the standards of relevant professional bodies; and any relevant legislative and/or regulatory requirements.
- 8 Range
 - a performance in relation to the elements of this unit standard must comply with the Health and Safety in Employment Act 1992;
 - b laboratory and workshop safety practices are to be observed at all times.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of and use PLCs in advanced practical applications.

Performance criteria

- 1.1 Complex function blocks are described and implemented in accordance with industry practice.

Range may include but is not limited to – PID control, communication functions.

- 1.2 Advanced programming methods are described and applied to a PLC application in accordance with industry practice.

Range advanced programming methods include but are not limited to – function block, sequential function chart, advanced ladder logic, structured text.

Outcome 2

Describe and implement advanced input/output modules, communication methods, and control systems relevant to PLCs.

Performance criteria

2.1 Advanced input/output modules are described and applied to practical applications in accordance with industry practice.

Range advanced input/output modules may include – high-speed counters, motion control modules;
practical applications include – measurement and control of product temperature, pressure, physical strain in a structural member; motor or generator speed, acceleration and load position, fluid flow rate and volume, product mass, product dimensions; measurement and control of environment temperature, humidity, chemicals, gas concentrations;
evidence of four practical applications is required.

2.2 Industrial data communication systems applicable to PLCs are described and implemented on practical applications in accordance with industry practice.

Range may include but is not limited to – PLC to PLC; PLC to distributed input/output; PLC to MES;
communication formats may include but are not limited to – Modbus, ModbusPlus, DH+; Ethernet, DeviceNet, Foundation® Fieldbus, AS-I, Profibus, TCP/IP.

2.3 Control interfaces are applied to practical applications and configured in accordance with industry practice.

Range control interfaces may include but are not limited to – touch screen, SCADA, HMI;
practical applications include – measurement and control of product temperature, pressure, physical strain in a structural member; motor or generator speed, acceleration and load position, fluid flow rate and volume, product mass, product dimensions; measurement and control of environment temperature, humidity, chemicals, gas concentrations;
evidence of four practical applications is required.

Replacement information	This unit standard replaced unit standard 11579.
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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	18 December 2006	31 December 2024
Review	2	25 May 2023	31 December 2024

Consent and Moderation Requirements (CMR) reference	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

This unit standard is expiring