Title	Demonstrate and apply intermediate knowledge of programmable logic controller engineering applications		
Level	5	Credits	15

Purpose	This unit standard covers the concepts of PLC systems, applications and programming for engineers. People credited with this unit standard are able to: – demonstrate knowledge of programmable logic controller hardware concepts; – demonstrate and apply knowledge of programmable logic controller software concepts; and – demonstrate knowledge of systems associated with PLCs.

Classification	Electronic Engineering > Core Electronics

Available grade	Achieved

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 skill and knowledge of programmable logic controller engineering, the other being Unit 22729, *Demonstrate and apply advanced knowledge of programmable logic controller engineering applications*. It is recommended that competency in this unit standard be achieved before assessment against unit standard 22729 is attempted.

3   References
Health and Safety in Employment Act 1992;
IEC 61131-3 (1993-03) Programmable controllers – Part 3: Programming languages; and all subsequent amendments and replacements.

4   Definitions
FBD – function block diagram.
HMI – human-machine interface.
I/O – input output.
Industry practice – practice used and recommended by organisations involved in the electrotechnology industry.
Intermediate knowledge – means employing a broad knowledge base, with substantial depth in some areas of the subject matter, to analyse and interpret a wide range of information.
PLC – programmable logic controller.
SCADA – supervisory control and data acquisition.
SFC – sequential function chart.

5   All measurements are to be expressed in Système International (SI) units, and,
        where required, converted from Imperial units into SI units.

6   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.

7   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 programmable logic controller hardware concepts.

Performance criteria

1.1   The concept of a PLC system is explained in terms of purpose and application
        in accordance with industry practice.

        Range   power supply, processor, I/O modules, backplane; programming
                    facilities; memory; scan cycle.

1.2   The hardwiring associated with a PLC is described.

        Range   power supply, earthing, discrete and analogue input modules,
                    discrete and analogue output modules, source circuits, sink
                    circuits.

Outcome 2

Demonstrate and apply knowledge of programmable logic controller software concepts.

Performance criteria

2.1   Ladder logic programming is used to create simple applications.

        Range   applications involving typically four discrete inputs, two discrete
                    outputs, counters, timers, shift registers, sequencers, simple
                    arithmetic;
                    evidence of at least three applications is required.

2.2   The purpose of IEC 61131-3 is explained in general terms.

2.3   Key programming languages listed in IEC 61131-3, in addition to ladder logic, are compared and evaluated.

        Range   instruction list, structured text, SFC, FBD.

Outcome 3

Demonstrate knowledge of systems associated with PLCs.

Performance criteria

3.1   Systems associated with a PLC are described, and relationships explained in accordance with industry practice.

        Range   associated systems include but are not limited to – bus systems, distributed I/O, communications networks, SCADA/HMI, operator interfaces.

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

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