Title	**Install automation and control systems in switchboards**		
Level	**4**	**Credits**	**3**

Purpose	This unit standard is for people engaged in the manufacture of switchboards in the electrotechnology industry. People credited with this unit standard are able to: – install energy monitoring, management, and power conditioning components in switchgear assemblies – install communication and signal cables between devices and/or termination points – install programmable controllers within control panels and switchgear assemblies.

Classification	Electrical Engineering > Electric Switchboards

Available grade	Achieved

Guidance Information

1 This unit standard may be used for learning and assessment on-job.

2 References
- Accident Compensation Act 2001
- AS/NZS 3000 (version as cited in the Electricity (Safety) Regulations), *Electrical installations* (*known as the Australian/New Zealand Wiring Rules*)
- AS/NZS 61439.4:2016, *Low-voltage switchgear and controlgear assemblies – Part 4: Particular requirements for assemblies for construction sites (ACS),* available at Standards NZ
- Electricity Act 1992
- Electricity (Safety) Regulations 2010
- Health and Safety at Work Act 2015
- The New Zealand Electrical Codes of Practice, available at WorkSafe New Zealand, worksafe.govt.nz

and all subsequent amendments and replacements.

3 Definitions
BMS – Building Management Systems.
DCS – Distributed Control System.
EMC – Electromagnetic Compatibility.
HVAC – Heating, Ventilation, and Air Conditioning.
HMI – Human Machine Interface.
I/Os – Inputs/Outputs.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.

PLC – Programmable Logic Controller.
P&ID – Piping and Instrumentation Diagram.
RTU – Remote Terminal Unit.
Safe and sound practice – this relates to the installation of electrical equipment and is defined in AS/NZS 3000.

4 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 evidence presented for assessment against 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
  - vi where appropriate manufacturers' instructions, specifications, and data sheets.

Outcomes and performance criteria

Outcome 1

Install energy monitoring, management, and power conditioning components in switchgear assemblies.

Range may include but is not limited to – active and passive power factor correction, load shedding, transfer systems, power quality meters, surge protection, reactive power chokes, motor control centres.

Performance criteria

1.1 Identify components in an assembly or a pictorial display.

1.2 Explain operation of components in terms of their function and principles of operation.

1.3 Explain and demonstrate all precautions to safely operate and handle components.

Range installation may include but is not limited to – shorting links, stored energy, environmental damage high temperatures forced ventilation, explosion risk, ingress protection, segregation.

1.4 Install components in electric switchboards.

Outcome 2

Install communication and signal cables between devices and/or termination points.

Range cables may include but are not limited to – Ethernet, serial ports/bus, fibre optic, coaxial.

Performance criteria

2.1 Identify communication and signal cables in an assembly or a pictorial display.

2.2 Match appropriate termination points or ports to communication type and/or plugs from symbol or manufacturer's documentation.

2.3 Discuss key aspects of installation of communication and data cables in accordance with Standards.

2.4 Attach a range of standard connectors to communication and data cables in accordance with manufacturer's instructions.

2.5 Explain rules around termination of screened cables in accordance with manufacturers' instructions.

Outcome 3

Install programmable controllers within control panels and switchgear assemblies.

Range programmable controllers may include but are not limited to – PLCs smart relays, HVAC controllers, HMIs, BMS, RTUs, DCSs, remote I/O.

Performance criteria

3.1 Explain and match controller terms to documentation examples.

Range may include but is not limited to – processor, rack, I/O, communication, software, firmware, digital signal, analogue signal, sinking, sourcing, instrument earth, protective earth, EMC, card, slot, tag, P&ID, network cards.

3.2 Identify four controllers and controller peripherals in an assembly or a pictorial display, and discuss the application of each controller based on size of installation, cost, processing power, and specialist installations.

3.3 Install programme controller hardware.

3.4 Install digital and analogue controller I/O wiring.

Range wire I/O from schedules and schematic drawings.

Planned review date	31 December 2026

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 November 2016	N/A
Rollover and Revision	2	25 July 2024	N/A

Consent and Moderation Requirements (CMR) reference	0003

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

Comments on this unit standard

Please contact the Waihanga Ara Rau Construction and Infrastructure Workforce Development Council qualifications@WaihangaAraRau.nz if you wish to suggest changes to the content of this unit standard.