



Australian Government

UEENEEI120A Provide solutions to problems in industrial control systems

Release: 3

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Modification History

Release	Action	Core/Elective	Details	Points
2	Edit	N/A	Show full pre-req chain in the unit	
2	Edit	N/A	Correct literacy, numeracy and writing scale	
2	Edit	N/A	Inserted topic numbering in Required Skills and Knowledge	
3	Edit	N/A	In Pre-requisites, edit name to reflect correct unit title UEENEEI124A Fault find and repair analogue circuits and components in electronic control systems	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers solving problems in industrial control systems. The unit encompasses safe working practices, interpreting process and circuit diagrams, applying knowledge of industry controls to problem solving techniques, safety and functional testing and completing the necessary documentation.

Note.

Typical basic industrial control system problems are those encountered in meeting performance requirements and compliance standards, revising control operating parameters and dealing with control malfunctions.

Application of the Unit

Application of the Unit 2)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after

Prerequisite Unit(s)**4)**

competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Electrical

Instrumentation

Common Unit Group

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE1 04A Solve problems in d.c. Circuits

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG1 01A Solve problems in electromagnetic devices and related circuits

UEENEEG1 02A Solve problems in low voltage a.c. circuits

UEENEEI12 4A Fault find and repair analogue circuits and components in electronic control systems

UEENEEI13 9A Diagnose and rectify faults in digital controls systems

Electrical Pathway Group

UEENEEG0 06A Solve problems in single and three phase low voltage machines

UEENEEG0 33A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG0 63A Arrange circuits, control and protection for general electrical installations

UEENEEG1 Terminate cables, cords and accessories for

Prerequisite Unit(s)	4)
	06A low voltage circuits
	UEENEEG1 08A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	Instrumentation and Control Pathway Group
	UEENEEE1 19A Solve problems in multiple path extra low voltage (ELV) a.c. circuits
	UEENEEI10 1A Use instrumentation drawings, specification, standards and equipment manuals
	UEENEEI10 2A Solve problems in pressure measurement components and systems
	UEENEEI10 3A Solve problems in density/level measurement components and systems
	UEENEEI10 4A Solve problems in flow measurement components and systems
	UEENEEI10 5A Solve problems in temperature measurement components and systems
	UEENEEI10 6A Set up and adjust PID control loops
	UEENEEI11 0A Set up and adjust advanced PID process control loops
	UEENEEI11 2A Verify compliance and functionality of instrumentation and control installations
	UEENEEI11 3A Setup and configure Human-Machine Interface (HMI) and industrial networks

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to provide solutions to industrial control system problems	1.1 OHS processes and procedures for a given work area are identified, obtained and understood
	1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3 The extent of industrial control system problems are determined from performance specifications and situation reports and in consultations with relevant persons.
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.

ELEMENT	PERFORMANCE CRITERIA
	1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
2 Provide solutions to industrial control system problems	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of industrial control system device and circuit operation, characteristics and applications are applied to developing solutions to control problems.
	2.3 Parameters, specifications and performance requirements in relation to each industrial control system problems are obtained in accordance with established procedures.
	2.4 Approaches to resolving industrial control system problems are evaluated to provide most effective solutions.
	2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.6 Problems are solved efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3 Test and document solutions to industrial control system problems	3.1 OHS risk control measures and procedures for carrying out the work are followed.
	3.2 Solutions to industrial control system problems are tested to determine their effectiveness and modified where necessary.
	3.3 Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed. (See Note)
	3.4 Justification for solutions used to solve industrial control system problems are documented in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

Note:

A license to practice in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

Required Skills and Knowledge**REQUIRED SKILLS AND KNOWLEDGE**

8) This describes the required skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to problems in industrial control systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI120 Industrial control systems**A**

Evidence shall show an understanding of industrial control systems to an extent indicated by the following aspects:

REQUIRED SKILLS AND KNOWLEDGE

- T1 Control amplifiers encompassing:
- Introduction
 - Amplifier Operation
 - Operational Amplifiers
 - Operational Amplifier Configurations
- T2 Industrial transducers encompassing:
- Introduction
 - SI Units
 - Forms of Energy
 - Transducer Terminology
 - Temperature Measurement
 - Force Measurement
 - Speed Measurement
 - Positional Measurement
- T3 Industrial final control elements encompassing:
- Introduction
 - Electromagnetic Devices
 - Valves
 - Solid State Switching Devices
- T4 Industrial control systems encompassing:
- Automatic Control
 - Open Loop Control
 - Closed Loop Control
 - Control System Terminology
 - Control System Evaluation
 - Two Position Control
 - Proportional Control (P)
 - Proportional + Integral Control (P+I)
 - Proportional + Derivative Control (P+D)
 - Proportional + Integral + Derivative Control (P+I+D)
- T5 Industrial control loops and control signals encompassing:
- Introduction
 - Control Loops
 - Converters (D to A and A to D)
 - Multiplexing

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the required skills and knowledge as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Provide solutions to problems in industrial control systems as described in 8) and including:
 - A Understanding the extent of the industrial control system problem
 - B Obtaining electronic device and circuit parameters, specifications and performance requirements

appropriate to each problem.

- C Testing and solutions to industrial control system problems
- D Documenting justification of solutions implemented in accordance established procedures
- E Dealing with unplanned events by drawing on required skills and knowledge to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to providing solutions to problems in industrial control systems.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required skills and knowledge described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement**RANGE STATEMENT**

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to providing solutions to at least four industrial control system problems.

Note.

Examples are process control, speed control, positional control.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Instrumentation and control