



Australian Government

UEENEEI138A Provide solutions to extra low voltage (ELV) electro-pneumatic control systems and drives

Release: 2

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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	Replaced "essential knowledge and associated skills" with "required skills and knowledge"	
2	Edit	N/A	Inserted topic numbering in Required Skills and Knowledge	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers developing and implementing control solutions for systems using electro-pneumatic elements operating at extra-low voltage and variable speed drives. It encompasses safe working practices, establishing required control functions, checking device installation, entering instruction into programmable devices, following written and oral instruction and procedures and completing necessary documentation.

Note:

Electrical connections referred to in this unit are confined to pre-assembled plug and socket sets. This unit does not cover competencies for installation and connection of electrical wiring.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

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, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
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Prerequisite Unit(s) 4)

UEENEEI101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

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 3 Writing 3 Numeracy 3

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 developing solutions. | 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures. |
| | 1.2 Established OHS risk control measures and procedures are followed in preparation for the work. |
| | 1.3 Safety hazards that have not previously been identified are reported and advice on risk control measures is sought from the work supervisor. |
| | 1.4 The functions that the control and drive system is required to perform is established and documented from instruction from work supervisor or customer. |
| | 1.5 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety. |
| 2 Provide solutions. | 2.1 Established OHS risk control measures and procedures for carrying out the work are followed. |
| | 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures. |
| | 2.3 The circuits for the electro-pneumatic control and drive system are developed to meet the required functions and documented. |
| | 2.4 Locations of control field devices are checked and adjusted to ensure they function correctly. |
| | 2.5 The circuits for the electro-pneumatic control and drive system component connections are checked against the developed circuits |
| | 2.6 The required functioning of the systems is entering into programmable components and parameters set in accordance with developed circuit and manufacturer programming |

ELEMENT

PERFORMANCE CRITERIA

instructions.

3 Test and document solutions.

- 3.1 Operation of the electro-pneumatic control and drive system is tested in strict accordance OHS requirements and procedures.
- 3.2 Operating anomalies are identified and corrected in accordance with established procedures.
- 3.3 OHS work completion risk control measures and procedures are followed.
- 3.4 Work site is cleaned and made safe in accordance with established procedures.
- 3.5 Work completion is reported and appropriate person(s) notified in accordance with established procedures

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 entering and verifying operating instruction in basic microprocessor equipped devices.

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

KS01-EI138A Electrical and pneumatic control fundamentals

Evidence shall show an understanding of electrical and pneumatic control fundamentals to an extent indicated by the following aspects:

T1 Electrical and pneumatic safety encompassing:

- Hazardous and safe working methods and procedures
- Pneumatic operating pressures
- Isolation procedures

T2 Electrical/pneumatic drawing types and applications encompassing:

- Drawing layouts and conventions (electrical and pneumatic schematics, wiring and piping diagrams)
- Drawing symbols

T3 Electrical and pneumatic control system components

Electrical components include power, HMIs, relays, plug and socket connectors; Pneumatic components include air supply systems, HMIs, valves, actuators, tubing and connectors.

T5 Electrical relay types encompassing:

- Operation
- Contact configurations

T6 Pneumatic control valves and actuators encompassing:

- Types and their operation
- Activated and deactivated configurations

T6 Basic logic as applied to control systems

Logic confined to AND, OR, NOT and NOR functions

KS02-EI138A Variable speed drive (VSD) functions and configuration

T1 Evidence shall show an understanding of variable speed drive (VSD) functions and set up to an extent indicated by the following aspects:

T2 Basic function of a variable speed drive in controlling an induction motor.

REQUIRED SKILLS AND KNOWLEDGE

- T3 Configuring a variable speed drive encompassing:
- T4 Configuration includes setting rated motor voltage and current, digital and analogue inputs, speed range, ramp times and the like.
- T6 Testing procedures

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 this 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. It is recognised that, 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 have a bearing on the decision as to how much and how detailed 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 shall be met.

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

- A representative body of performance criteria 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:
 - Enter and verify operating instructions in microprocessor equipped devices as described in 8) and including:
 - A Establishing and documenting functions that the control and drive system is required to perform
 - B Developing and documenting circuits for the electro-pneumatic control and drive systems that meet the required functions.
 - C Checking location of control field devices and adjusting to ensure correct functioning.
 - D Checking electro-pneumatic control and drive system components connections
 - E Entering functions and parameters into programmable components correctly
 - F Correcting programming anomalies.
 - G Testing and verifying correct operation.
 - H Reporting work completion to appropriate persons in accordance with established procedures
 - I Dealing with unplanned events.

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 should 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 in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment 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 provide solutions to ELV electro-pneumatic control systems and drives.

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 primarily intended 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)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEI150 Develop, enter and verify discrete control
A programs for programmable controllers

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 shall be demonstrated in relation to:

An electro-pneumatic control system that includes:

- a drive system with VSD;
- programmable controller,
- proximity detection devices,
- operational indicators,
- electro-pneumatic control valves,
- actuators.

with emergency stop and stop/reset function and at least three of the following functions;

- Accelerating drive to set speed when started
- Decelerating drive when stopped
- Rejection/acceptance
- Counting
- Operation indication

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