



**Australian Government**

# **UEENEEI127A Analyse complex electronic circuits controlling fluids**

**Release: 2**

## UEENEEI127A Analyse complex electronic circuits controlling fluids

### Modification History

Release	Action	Core/Elective	Details	Points
2	Edit	N/A	Show full pre-req chain in the unit	
2	Edit	N/A	Inserted topic numbering in Required Skills and Knowledge	
2	Edit	N/A	Replaced "essential knowledge and associated skills" with "required skills and knowledge"	

### Unit Descriptor

#### Unit Descriptor

#### 1) Scope:

#### 1.1) Descriptor

This unit covers the analysis of complex electronic control circuits that integrate with the operation of fluid control systems on machinery. It encompasses working safely, applying extensive knowledge of equipment and electronic and fluid control circuit operations, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine 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 5 or higher.

## 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, codes of work practice and standard work procedures related to the operation of automated machinery.

## Pre-Requisites

### Prerequisite Unit(s) 4)

### Competencies 4.1)

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

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

UEENEEE1 02A Fabricate, assemble and dismantle utilities industry components

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

UEENEEI12 5A Provide solutions to fluid circuit operations

### 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<sup>7</sup>

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 analyse complex circuits controlling fluids.	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 the circuit analysis is 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

ELEMENT	PERFORMANCE CRITERIA
2 Analyse complex circuits controlling fluids	<p>the work.</p> <p>1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.</p> <p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of complex control concepts and electro-fluid control circuits are applied to developing analytical solutions to machine parameters.</p> <p>2.3 Parameters, specifications and performance requirements in relation to each circuit are obtained in accordance with established procedures.</p> <p>2.4 Approaches to analysing circuit parameters are carried out to provide the most effective solution.</p> <p>2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards</p>
3 Document and report on the results of the circuit analysis and actions taken.	<p>3.1 Solutions to circuit analysis are tested to determine their effectiveness and modified where necessary.</p> <p>3.2 Analysis is documented including details of all findings, calculations and assumptions.</p> <p>3.3 Analysis is reported to appropriate personnel to establish suitable action to be taken based on findings.</p> <p>3.4 Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with</p>

**ELEMENT****PERFORMANCE CRITERIA**

professional standards.

## 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 analysing complex electronic circuits controlling fluids.

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

#### **KS01-EI127A    Electronic control of fluid processes**

Evidence shall show an understanding of interfacing electronics with hydraulic and pneumatic devices and systems to an extent indicated by the following aspects:

**REQUIRED SKILLS AND KNOWLEDGE**

- T1 Determining control static and dynamic operating conditions for stages in a control process from block diagrams
- T2 Identification of process characteristics from process test data and process flow diagrams
- T3 Linearisation functions and feedback
- T4 Placement of sensors and actuators to eliminate dead time
- T5 Lag reduction strategies
- T6 Consideration of steady state gain vs. offset and stability vs. performance
- T7 Controller tuning and calibration
- T8 Analyse control system functions
- T9 Construct a time-displacement diagram for a functional system
- T10 Design relay logic ladder diagram for the system
- T11 Identification of components required by a fluid power circuit
- T12 Selection of proportional valves to suit fluid applications
- T13 Determination of ramp time for motor and cylinder circuits
- T14 Determine maximum flow rates in cylinder circuits that accelerate and decelerate a load and selection of an appropriate valve spool
- T15 Determine pressure in cylinder circuits
- T16 Design fluid power circuits using proportional valves
- T17 Adjust points on a proportional valve control card to meet specifications

## 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:
  - Analyse complex electronic circuits controlling fluids as described in 8) and including:

- A Understanding the operation of electronic and fluid controls
- B Forming effective strategies for analysing circuit performance
- C Obtaining circuit control parameters,

- specifications and performance requirements appropriate to each situation.
- D Testing the results of the analysis
- E Documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed.
- F Documenting justification of actions to be implemented in accordance with professional standards
- G 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 analysing complex electronic circuits controlling fluids.

**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)**

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

UEENEEI126 Provide solutions to pneumatic/ hydraulic system operations  
A

## 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 analysing complex circuits controlling integrated electro-fluid systems on at least 2 types of machine:

Note.

Typical circuits are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions

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

<b>Competency Field</b>	<b>11)</b>
	Instrumentation and Control