



Australian Government

UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop, enter and verify programs for programmable logic controller (PLC) (also known as programmable controller) for a system requiring discrete control functions.

It includes working safely, using control systems and control system development methods, using ladder diagrams/statement list/function block diagram instruction sets, following written instructions, and documenting program development and testing activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Identify control system requirements

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

1.1 PLC operating functions, parameters and specifications are determined from relevant documentation, electrical drawings or persons to determine the control system scope of work

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| | <p>1.2 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied</p> <p>1.3 Control system scenario is developed from job specifications of process/plant/machine controlled through consultation with relevant person/s</p> <p>1.4 PLC block diagram is developed using industry standard symbols</p> <p>1.5 Infotechnology equipment, software and measuring devices needed to carry out the PLC work are obtained and checked for correct operation and safety</p> <p>1.6 Installation of PLC is checked for compliance with relevant industry standards, regulations and job specifications</p> |
| <p>2 Develop control system, enter and test program</p> | <p>2.1 Established WHS/OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Circuits/machines/plant are checked and isolated in accordance with workplace procedures</p> <p>2.3 Control system solutions are developed and documented based on specified control mode and using acceptable methods for designing control systems</p> <p>2.4 Developed control system is converted to an appropriate form</p> <p>2.5 Program is entered into the PLC using appropriate infotechnology and software</p> <p>2.6 Entered instructions and settings are tested in accordance with job specifications by control system scenario</p> <p>2.7 Appropriate methods and tools are used to test control system and operating faults and anomalies are identified and rectified</p> <p>2.8 Unplanned situations are responded to in accordance with workplace procedures, in a manner that minimises risk to persons and equipment</p> |
| <p>3 Verify document and report programming</p> | <p>3.1 WHS/OHS work completion risk control measures and procedures are followed</p> |

activities

- 3.2 Program is transferred from PLC to external medium for storage
- 3.3 Control system specification and program are documented in accordance with workplace procedures
- 3.4 Work completion is documented and relevant persons notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing, entering and verifying programs for PLCs must include at least five (5) of the following functions/controls:

- bit shift registers
- cascading counters
- cascading timers
- combining timers and counters
- constant duty cycle
- derived timers (off delay)
- internal relays/flags/markers
- jump instructions
- latching relays (set/reset)
- master control instructions
- one shot
- retentive (power fail) functions
- reversible counters
- scan time considerations
- self-resetting
- simple step sequence instructions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI150A Develop, enter and verify discrete control programs for programmable controllers.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including identifying programmable logic controller (PLC) risk control measures
- connecting the PLC
- correcting programming anomalies
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to persons and control equipment
- developing applications for PLC functions including operation and programming of inputs and outputs
- developing a control system solution to specified operating functions and parameters
- developing a PLC block diagram, including identifying industry standard PLC symbols
- documenting control system and programming
 - identifying PLC modules and applications
- programming a PLC using industry standard methods such as master control, jump, shift register, step sequencing, timers and counters
- testing and verify control system inputs and outputs operation
- transferring programs to PLC
- documenting control system and programming clearly
 - identifying non-compliance conditions of device installation
 - converting control system to a PLC program
- entering programming functions and parameters correctly
- transferring program to external storage.

Knowledge Evidence

- Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:
 - PLC introduction including:

- evolution of the programmable controller and applications
- relay control, static logic control and programmable control
- programmable controller block diagram (inputs and outputs)
- programmable controller advantages, symbols and functions
- numbering systems start-up procedures
- programming inputs and outputs
- operation of programmable controller inputs
- PLC operation: scan cycle
- basic programming
- types of PLC programs, including:
 - ladder diagrams
 - basic programming
 - program modification
 - ladder diagram development
- connecting the programmable controller
- programming timers, including:
 - purpose of timers
 - timer instructions
 - on-delay and off-delay timer instruction
 - programming timers
 - retentive and non-retentive timers
 - cascading timers
 - the self-resetting timer
 - monitoring timers
 - circuit conversion
- programming counters, including:
 - counter instructions
 - retentive and non-retentive, up/down, programming, self-resetting and cascading counters
 - circuit conversion
- program storage, including:
 - PLC terms
 - memory
 - the programmable read only memory (PROM) pack
 - printing ladder diagrams
- PLC input and output modules, including:
 - purpose of modules
 - analogue, dry contact, alternating current (a.c.) and direct current (d.c.) input modules
 - relay, triac, transistor and analogue output modules
- PLC installation requirements, including:

- installation precautions
- safety systems
- mounting the PLC
- installation documentation
- routing signal and power cables
- earthing requirements
- master control, including:
 - master control relay
 - master control relay ladder diagram
 - programming master control relays
- jump function, including:
 - jump function
 - jump function ladder diagram
 - programming jump functions
- the shift register, including:
 - purpose of registers
 - the shift register
 - shift register operation
 - clock input
 - shift register requirements
 - programming shift registers
- the step sequencer, including:
 - step sequencers
 - step sequencer operation
 - clock input
 - step sequencer requirements
 - programming step sequencer
- PLC diagnostics and fault finding, including:
 - PLC fault finding
 - controller status
 - input/output (I/O) faults
 - program faults
 - relevant risk mitigation processes
 - relevant WHS/OHS legislated requirements
 - relevant workplace documentation, including relevant industry standard documentation and regulations related to PLCs
 - relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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