

UEERE9995Y Fault find and repair grid-connected photovoltaic power supply systems

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 fault find and repair grid-connected photovoltaic (PV) power supply systems.

It includes providing known solutions to predictable problems in photovoltaic modules arrays and energy storage systems.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or 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 work health and safety (WHS)/occupational health and safety (OHS) regulations.

Note: Those holding an Unrestricted Electrician's Licence or equivalent issued in an Australian state or territory meet the prerequisite requirement for UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories. Other prerequisites must still be completed.

Pre-requisite Unit

UEERE9999Y Conduct site survey for grid-connected photovoltaic and battery storage systems
UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

PERFORMANCE CRITERIA

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

1 Prepare to fault find and repair grid-connected PV systems

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
- 1.2** The nature of the fault/issue is identified from stakeholders and relevant data and documentation
- 1.3** Requirements for working with other stakeholders are confirmed and applied
- 1.4** Required materials, tools, apparatus and testing devices are identified, accessed and checked for correct operation and safety
- 1.5** Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures

2 Fault find and repair grid-connected PV systems

- 2.1** Circuits/apparatus are isolated in accordance with WHS/OHS requirements and workplace procedures
- 2.2** Nature of reported fault/issue is verified
- 2.3** System testing is conducted and documented
- 2.4** Fault or faults are diagnosed, faulty equipment is identified, and the replacement products required are documented
- 2.5** System is made safe, faulty apparatus is dismantled, recorded and stored in accordance with manufacturer guides and stakeholder instructions
- 2.6** Repaired or replaced apparatus is assembled in accordance with manufacturer guidelines, industry standards and regulation

3 Complete and report repair work activities

- 3.1** Repaired apparatus is tested and commissioned in accordance with manufacturer guidelines, industry standards and regulation

3.2 Work area is cleaned and made safe

3.3 Repair is documented and stakeholders notified

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.

Fault finding and repair grid-connected photovoltaic power supply systems must include at least three of the following:

- determining the operating parameters of an existing apparatus/modules
- identifying and locating electrical faults
- determining solar radiation faults and problems
- identifying and locating mechanical fault.

Unit Mapping Information

This is a new unit

Links

UEE - Electrotechnology Training Package Companion Volume Implementation Guide at:
[sector webpage link here]

Assessment Requirements for UEERE9995Y Fault find and repair grid-connected photovoltaic power supply systems

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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 occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) procedures
- finding and repairing faults/issues in grid-connected photovoltaic power supply systems including:
 - verifying the reported faults/issues
 - diagnosing fault/issue based on measured and expected values
 - determining and implementing solution
 - documenting issue and justification for the solution used.

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 the following. Additional advice and definitions for some items is provided in the UEE Training Package Companion Volume Implementation Guide (CVIG).

- grid-connected system fault finding:
 - procedures for individual equipment
 - procedures for interconnected systems
- grid-connected system maintenance procedures including:
 - requirements for individual equipment
 - requirements for interconnected systems.
 - requirements including relevant industry standards, regulations and manufacturer requirements
- grid-connected system testing and commissioning procedures including:
 - safe testing of equipment
 - safe testing of system operation
- daily irradiation

- PV modules
- module characteristics including:
 - definition of the terms: I-V curve, operating point, MPP, cell temperature co-efficient, voltage and power output co-efficient
 - family of current - voltage (I-V) curves for a PV module, labelling major points and showing the effects of variation in irradiance and variation in cell temperature
 - major ratings of a PV module from manufacturer's information or nameplate data
 - configuration of a typical PV array
 - the effect of partial shading of a PV module or array, the impact of bypass diodes and the significance of their configuration on output current in typical operating conditions
 - the scope and content of Australian or international standards relevant to the performance of PV modules
 - module level power electronics
- calculation of the daily energy output of a PV array in accordance with relevant industry standards, and by using "rule of thumb" de-rating factors
- relevant manufacturer specifications.

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.

Links

UEE - Electrotechnology Training Package Companion Volume Implementation Guide at:
[sector webpage link here]

CVIG Content

daily irradiation may include:

- definition of the terms: sunshine hours, latitude, direct and diffuse radiation, azimuth and altitude angles, radiance, solar window, tilt angle,
- interpretation of solar radiation data tables
- how radiation varies throughout the year on the surface of a fixed collector
- factors affecting the optimal tilt and orientation of PV arrays

PV modules may include:

- definition of the terms: cell, module, array, mono-crystalline, poly-crystalline, amorphous
- basic physical principles of PV cell operation for the main types of commercially available PV modules
- mechanical and electrical features necessary for the long life of a PV module under a wide range of operating conditions