

Title	Demonstrate introductory knowledge of circuit concepts and measurements for electronics		
Level	2	Credits	5

Purpose	<p>This unit standard is intended for use in high school or pre-employment electronics courses, or in the training of electronics technicians. It covers the concepts of basic electric circuits, and associated calculations and measurements.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> - explain and define electrical parameters; - explain the concept of an electric circuit; - use a multimeter to make electrical measurements; and - calculate parameters for simple electric circuits and confirm by measurement.
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Classification	Electronic Engineering > Electronics Technology
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Available grade	Achieved
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Explanatory notes

- 1 For the purpose of this unit standard, *parameters* refers to charge, current, voltage, resistance, work (energy change), and power.
- 2 Range
 - a All calculations and measurements are to be expressed in Système International (SI) units and multipliers.
 - b Candidates are expected to be able to memorise and use power of ten multipliers, and their SI prefixes and abbreviations from pico (10^{-12}) to giga (10^9).
 - c Candidates are expected to be able to use the following laws:
 - $I = q/t$
 - $V = W/q$
 - $V = IR$
 - $P = I^2R$
 Kirchoff's first and second laws (sum of currents at a point = 0; sum of voltage changes around a circuit = 0).

Outcomes and evidence requirements

Outcome 1

Explain and define electrical parameters.

Evidence requirements

- 1.1 Electric charge is explained in terms of electrons and examples of charged bodies are given.
- 1.2 Electric current is defined in terms of electric charge and time, and the units stated.
- 1.3 Potential Difference (p.d.) or voltage is defined in terms of energy and charge, and the units stated.
- 1.4 Ohm's Law is stated with units, and the effect of a change in any one quantity on the other two is described.
- 1.5 Power is calculated in terms of work done in unit time and in terms of heat dissipated in a resistance by a flow of current, and units are stated.

Outcome 2

Explain the concept of an electric circuit.

Evidence requirements

- 2.1 The connection of battery, wires, insulation, and resistances to form a circuit is explained in the context of flow of charge, voltage, current, and power.
- 2.2 Conventional and electronic directions of current flow are explained.
- 2.3 Voltage levels are indicated on a diagram of the circuit.

Outcome 3

Use a multimeter to make electrical measurements.

Range multimeter – digital or analogue.

Evidence requirements

- 3.1 Precautions in the use of the instrument are described with respect to personal safety, damage to the instrument, damage to the circuit being measured, and battery life.
- 3.2 The purpose and operation of different meter ranges are explained, with reference to measurement accuracy.

Range measurements – voltage, current, resistance.
- 3.3 Measurements state quantity and units, and use optimum meter ranges.

Range three measurements of different magnitudes for each of voltage, current, and resistance.

3.4 Use of the instrument to check electrical continuity is demonstrated.

Outcome 4

Calculate parameters for simple electric circuits and confirm by measurement.

Range simple electric circuits – battery and up to three resistances in any combination.

Evidence requirements

- 4.1 Using Ohm's and Kirchhoff's laws, current is calculated at any point in simple electric circuits, and voltage across any two points.
- 4.2 Combined resistances of series, parallel, and series-parallel connections are calculated.
- 4.3 Measurements confirm voltage and current calculations, and discrepancies are accounted for.
- 4.4 Power dissipation for each resistance is calculated.

Planned review date	31 December 2018
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 April 2001	31 December 2012
Revision	2	12 March 2002	31 December 2012
Revision	3	17 March 2004	31 December 2012
Review	4	25 May 2007	N/A
Rollover and Revision	5	15 March 2012	N/A
Revision	6	15 January 2014	N/A
Rollover	7	27 January 2015	N/A

Consent and Moderation Requirements (CMR) reference	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.