

<b>Title</b>	<b>Demonstrate introductory knowledge of circuit concepts and measurements for electronics</b>		
<b>Level</b>	<b>2</b>	<b>Credits</b>	<b>5</b>

<b>Purpose</b>	People credited with this unit standard are able to: <ul style="list-style-type: none"> <li>– demonstrate knowledge of electrical parameters;</li> <li>– demonstrate knowledge of electric circuits;</li> <li>– demonstrate knowledge of using a multimeter; and</li> <li>– calculate parameters for simple electric circuits.</li> </ul>
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<b>Classification</b>	Electronic Engineering > Electronics Technology
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 For the purpose of this unit standard, parameters refer to charge, current, voltage (V), resistance, energy (E), and power.
- 2 Definition  
*Energy change* – refers to either an energy input or an energy output depending on whether power input or power output is required.
- 3 Range
  - a All calculations and measurements must 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:
    - $I = q/t$
    - $V = E/q$
    - $V = IR$
    - $P = I^2R, P = VI, P = V^2/R$
 Kirchoff's first and second laws (Sum of the currents into a junction = sum of the currents out of the junction; sum of voltage changes around a circuit loop = 0).

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### Outcomes and performance criteria

#### Outcome 1

Demonstrate knowledge of electrical parameters.

#### Performance criteria

- 1.1 Explain electric charge in terms of gaining or losing electrons.

- 1.2 Define electric current in terms of electric charge, time, and relevant units.
- 1.3 Define potential Difference (p.d.) or voltage in terms of energy and charge.
- 1.4 Define Ohm's Law and describe the effect of a change in any one quantity on the other two.
- 1.5 Calculate power in terms of energy change in unit time, and heat dissipated in a resistance by a flow of current.

## Outcome 2

Demonstrate knowledge of electric circuits.

### Performance criteria

- 2.1 Explain the connection of electrical power supply, wires, and resistances to form a circuit in the context of flow of charge, voltage, current, and power.
- 2.2 Explain conventional current flow and electron current flow for circuits.
- 2.3 Determine voltage levels in a circuit relative to the negative terminal of a DC power.

## Outcome 3

Demonstrate knowledge of using a multimeter.

Range multimeter – digital or analogue.

### Performance criteria

- 3.1 Outline precautions with respect to personal safety, damage to the instrument, damage to the circuit being measured, and battery life.
- 3.2 Explain the purpose and operation of different meter ranges in terms of measurement accuracy.  
Range measurements – voltage, current, resistance.
- 3.3 Use a multimeter to make electrical measurements and record the results.  
Range three measurements of different magnitudes for each of voltage, current, and resistance.
- 3.4 Use a multimeter to check electrical continuity.  
Range evidence of two checks is required.

**Outcome 4**

Calculate parameters for simple electric circuits.

**Performance criteria**

4.1 Using Ohm's and Kirchhoff's laws, calculate current at any point in simple electric circuits, and voltage between any two points.

Range battery and up to three resistances in any combination.

4.2 Calculate total resistances of series, parallel, and series-parallel combinations.

Range one calculation for each circuit type is required.

4.3 Use measurements to confirm voltage and current calculations, and account for discrepancies.

4.4 Calculate power dissipation for a resistor.

Range resistance values from calculations carried out in performance criteria 4.1, 4.2, or 4.3 may be used.

<b>Planned review date</b>	31 December 2025
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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	31 December 2024
Rollover and Revision	5	15 March 2012	31 December 2024
Revision	6	15 January 2014	31 December 2024
Rollover	7	27 January 2015	31 December 2024
Review	8	24 June 2021	N/A

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

**Comments on this unit standard**

Please contact The Skills Organisation [reviewcomments@skills.org.nz](mailto:reviewcomments@skills.org.nz) if you wish to suggest changes to the content of this unit standard.