

Title	Demonstrate knowledge of transducers and strain gauges and their applications in industrial measurement		
Level	3	Credits	7

Purpose	People credited with this unit standard are able to: <ul style="list-style-type: none"> – demonstrate knowledge of transducers and their applications in industrial measurement; – demonstrate knowledge of transducer installation requirements; – demonstrate knowledge of strain gauge theory; – demonstrate knowledge of load cells in weighing systems; and – describe weighing system calibration methods.
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Classification	Industrial Measurement and Control > Industrial Measurement and Control - Theory
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Available grade	Achieved
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Guidance Information

None.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of transducers and their applications in industrial measurement.

Performance criteria

- 1.1 Categorise common transducer types and specify associated units of measurement.
- Range transducers – position, velocity, vibration, acceleration; units – metres (m), metres per second (m/s), metres per second squared (m/s²).
- 1.2 Describe position transducer types (linear and rotary), compare their features, and identify their applications.
- Range potentiometers, linear variable differential transformers and inductors, capacitive, rotary shaft encoders (absolute and incremental).

- 1.3 Describe velocity transducer types, compare their features, and identify their applications.
- Range direct current (DC) tachogenerator, alternating current (AC) tachogenerator, electromagnetic, optical types.
- 1.4 Describe proximity detector types, compare their features, and identify their applications.
- Range types – inductive, capacitive, optical;
applications – eccentricity, linear displacement, proximity, vibration, speed sensing;
rotary equipment applications – turbine, generator, motor rotating shafts.
- 1.5 Describe vibration transducer types, compare their features, and identify their applications.
- Range magnetic, piezo electric.

Outcome 2

Demonstrate knowledge of transducer installation requirements.

Performance criteria

- 2.1 Describe the installation requirements of inductive and capacitive proximity detectors.
- Range speed of response, placement to metals, recessing, placement of other detectors, clearance distances.

Outcome 3

Demonstrate knowledge of strain gauge theory.

Performance criteria

- 3.1 Define terms associated with strain gauge weighing systems.
- Range stress, strain, Young's modulus (of elasticity), gauge factor.
- 3.2 Explain the operation of strain gauges based on applied load.
- Range stress, strain, original resistance, gauge factor.
- 3.3 Perform calculations to find change in resistance of strain gauge.
- Range stress, strain, original resistance, gauge factor.

3.4 Describe and compare strain gauge types.

Range wire on paper backing, foil etched, semiconductor.

Outcome 4

Demonstrate knowledge of load cells in weighing systems.

Performance criteria

4.1 Describe and compare strain gauge load cells.

Range tensile, compressive, shackle, cantilever beam.

4.2 Describe strain gauge load cells in belt weighing systems.

Outcome 5

Describe weighing system calibration methods.

Performance criteria

5.1 Describe typical methods used for calibrating weighing systems with reference to precision weights, alignment, and bridge measuring circuit calibration.

Replacement information	This unit standard replaced unit standard 2653 and unit standard 2659.
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Planned review date	31 December 2021
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	28 November 2013	N/A
Rollover	2	28 June 2018	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>.

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.