

Title	Demonstrate and apply knowledge of advanced control loop methods		
Level	4	Credits	7

Purpose	People credited with this unit standard are able to: <ul style="list-style-type: none"> – demonstrate knowledge of advanced control loop methods; – configure advanced control loops; and – tune advanced control loops.
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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 advanced control loop methods.

Performance criteria

1.1 Describe limitations of single loop control.

Range no load correction, no supply correction.

1.2 Describe principles and application of cascade control.

Range primary loop, secondary loop 5 to 10 times faster;
inner loop types – valve positioner, flow, temperature (fast), pressure.

1.3 Describe application and principles of ratio control.

Range mixing and blending, multiplier module, feedback trim.

1.4 Describe application and principles of feed-forward control.

Range demand compensation, improved control loop response;
feed-forward element – flow, pressure, temperature.

- 1.5 Describe application and principles of split range control.
- Range two control valves, heating and cooling applications.
- 1.6 Describe application and principles of auto-selector control.
- Range select high, select low.
- 1.7 Describe application and principles of adaptive control.
- Range pre-programmed adaptive, self-adaptive, self-tuning.
- 1.8 Describe boiler feed-water control principles.
- Range single element, two element, three element, temperature and pressure compensation, shrink-swell dynamics of the drum.

Outcome 2

Configure advanced control loops.

Performance criteria

- 2.1 Configure cascade control loops and make operational.
- Range controller action (primary and secondary), element selection, transmitters, correct interconnection of controller components.
- 2.2 Configure feed-forward control loops and make operational.
- Range transmitters, feed-forward element selection, controller action, summer variables, correct interconnection of controller components.
- 2.3 Configure ratio control loops and make operational.
- Range transmitters, linear, square root controller inputs, controller action, correct interconnection of controller components.
- 2.4 Locate, interpret, and apply technical information to maintaining equipment.
- Range transmitters, controllers.

Outcome 3

Tune advanced control loops.

Performance criteria

- 3.1 Identify tuning and adjustment methods to be applied to each type of control loop.
- Range initial controller settings, systematic trial and error, ultimate sensitivity, reaction curve.
- 3.2 Tune cascade control loops and interpret and document resulting chart records.
- Range inner (secondary) loop first, outer (primary) loop second.
- 3.3 Tune ratio control loops and interpret and document resulting chart records.
- 3.4 Tune feed-forward control loops and interpret and document resulting chart records.
- 3.5 Apply personal and plant safety precautions.
- Range pressure, temperature, chemicals.

Replacement information	This unit standard replaced unit standard 2660 and unit standard 2661.
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This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	28 November 2013	31 December 2027
Rollover and Revision	2	28 June 2018	31 December 2027
Review	3	30 January 2025	31 December 2027

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>.