1. Module details

Module name

Transmitters and Converters

Module duration

It is anticipated that a student possessing the skills and knowledge developed in the prerequisites will achieve the module purpose in 18 – 20 hours. *Note: replacement for NI210*

Module code

NUE159

Discipline code

0703325

2. Module purpose

This module aims to provide students with the knowledge and skills required to understand the operating principles of different types of transmitters and converters and signal conditioning units and enable students to calibrate and adjust these units for normal operation, within a control system.

3. Prerequisites

NI 202 Pressure

NE161 Electrical Principles 2

or NE03 AC Principles

4. Relationship to competency standards

This module addresses some of the knowledge and skills underpinning competence in the following standards:

UTE NES 106DA UTE NES 402DA

UTE NES 206DA

UTE NES 301DA

5. Content

Pneumatics
Principles of pneumatic relays, air to current and current to air converters, square root extractors, integrators, multipliers and dividers.

Electronics
Electronic transmitters (non–smart, smart and intelligent).

Analog to digital and digital to analog converters.

Handbooks
Manufacturers handbooks
Maintenance procedures and calibration.

Intrinsic safety
Zener barriers/Signal isolators

Explosion/flame proof enclosure

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer tests, problem solving, practical exercises/tests, assignments, workshop calibration report

Conditions of assessment

Normally learning and assessment will take place in a formal environment learning that is conducive to learning.

7. Learning outcome details

On completion of this module the learner will be able to:

Learning outcome 1

Explain the principle of operation of a range of pneumatic and electronic transmitters and converters.

Assessment criteria

1.1 Explain the operation of a range of transmitters and converters

Learning outcome 2

Configure and/or calibrate various transmitters and converters to within manufacturers' specifications.

Assessment criteria

2.1 Set up equipment and calibrate transmitters/converters to manufacturers' specifications.

Learning outcome 3

Identify typical applications for a range of transmitters and converters and A to D and D to A converters used in instrumentation.

Assessment criteria

3.1 Identify typical applications for a range of transmitters and converters.

3.2 Identify typical applications for common A to D and D to A converters used in instrumentation.

Learning outcome 4	**Interpret calibration practices from instrument manuals.**
Assessment criteria	4.1 Perform calibrations and configurations in accordance with instructions in manufacturers' manuals
Learning outcome 5	**Employ manufacturers handbooks to establish correct maintenance procedures.**
Assessment criteria	5.1 Given various types of transmitters and converters; use equipment handbooks to complete the manufacturers' recommended maintenance and installation procedures.
Learning outcome 6	**Compare various methods of signal interconnections and communications.**
Assessment criteria	6.1 Interconnect instrumentation using various forms of signal conditioning devices. 6.2 Compare signal connection methods and communication techniques used with Non-smart, HART and Foundation Fieldbus devices.
Learning outcome 7	**State the special needs and precautions employed with instruments used in hazardous locations.**
Assessment criteria	7.1 Explain the need for intrinsic safety barriers and signal isolators and the methods used in installing them. 7.2 Identify typical intrinsic safety barrier and signal isolator applications. 7.3 Explain intrinsic safety device coding practices as outlined in AS2430 and AS2381.

8. Delivery of the module

Delivery strategy	Delivery strategies must be suitable for both theoretical and/or practical learning and module purpose. It is recommended that learning and assessment be facilitated in a holistic manner which may require a learning outcome sequence other than that indicated in body of this module.

	Also an integrated theory/practice approach should be used where students learn by experimentation and through research and laboratory reports.
Resource requirements	To complete this module students will need access to sufficient measurement, test and signal generation equipment to allow each student to undertake individually the practical and assessment tasks. *Suggested Learning Resource:* • Bolton, W. 1991, *Instrumentation and Process Measurement,* Longman Group UK Limited. • Jones, E.B. 1985, *Jones' Instrument Technology,* Vols. 1 and 2, 4th Edition, Butterworths, Borough Green, England. • Considine, D.M. 1985, *Process Instruments and Controls Handbook,* 4th Edition, McGraw-Hill, New York. • Anderson, N.A. 1980, *Instrumentation for Process Measurement and Control,*3rd Edition, Chilton Company, Adnor, Pennyslvania. • Johnston, C. 1993, *Process Control Instrumentation,* 4th Edition, Regents/Prentice Hall, Englewood Cliffs, New Jersey. • Relevant Australian Standards Where this module is used in an approved Traineeship or Apprenticeship program learners should be advised to obtain, where available, respective EEQSBA1 ***User Guides*** (*these outline in detail what training and work performance the Learner is required to undertake for the program*).
Occupational health and safety requirements	A safe and healthy environment will be provided for students in regard to classroom and laboratory safety.

1 EEQSBA - ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd