SCQF level 5
Unit Specification

Electronics and Control

SCQF: level 5 (6 SCQF credit points)

Unit code: J29E 75

Unit outline

The general aim of this Unit is to develop an understanding of electronic control systems. Learners will investigate and explore engineering problems and design, simulate, construct, test and evaluate solutions.

Learners who complete this Unit will be able to:

1 Develop analogue electronic control systems
2 Develop digital electronic control systems

This Unit is available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes* which provides advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in the *Unit Assessment Support.*

Recommended entry

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- Numeracy (SCQF level 4)
- Electronics and Control (National 4)

Equality and inclusion

This Unit Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the *Unit Support Notes.*

Standards

Outcomes and assessment standards

Outcome 1

The learner will:

1 Develop analogue electronic control systems by:

1.1 Describing a range of analogue components and their functions and purpose within a circuit
1.2 Producing circuit diagrams of analogue electronic circuits
1.3 Using simple formulae to calculate appropriate component values
1.4 Simulating or constructing analogue electronic control systems
1.5 Testing and evaluating analogue electronic solutions against a specification

Outcome 2

The learner will:

2 Develop digital electronic control systems by:

2.1 Describing a range of digital components and their functions
2.2 Producing flowcharts and programs for digital control systems
2.3 Simulating or constructing digital control systems
2.4 Testing and evaluating digital electronic solutions against a specification

Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners, to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

For this Unit, learners will be required to demonstrate technological skills, knowledge and understanding in the context of electronic control systems.

Evidence of Outcomes may take many forms, including oral or written evidence, or may be demonstrated by carrying out practical tasks. Evidence of Outcomes and Assessment Standards may be generated during one or more activities. Although learners are expected to develop a range of digital and analogue control systems, evidence is only required for one of each.

Exemplification of assessment is provided in the *Unit Assessment Support.*
Advice and guidance on possible approaches to assessment is provided in the *Unit Support Notes*.

Assessment standard thresholds

If a candidate successfully meets the requirements of the specified number of Assessment Standards they will be judged to have passed the Unit overall and no further re-assessment will be required.

The specific requirements for this Unit is as follows:

- 6 out of 9 Assessment Standards must be achieved.

It should be noted that there will still be the requirement for candidates to be given the opportunity to meet all Assessment Standards. The above threshold has been put in place to reduce the volume of re-assessment where that is required.

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop in this Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

2 Numeracy

2.1 Number processes
2.3 Information handling

4 Employability, enterprise and citizenship

4.2 Information and communication technology (ICT)

5 Thinking skills

5.3 Applying
5.4 Analysing and evaluating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work.* The level of these skills should be at the same SCQF level of the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the *Unit Support Notes.*

Appendix: unit support notes

These support notes provide advice and guidance on approaches to delivering and assessing this unit. They are intended for teachers and lecturers who are delivering this unit. They should be read in conjunction with:

- the *unit specification*
- the *unit assessment support packs (UASP)*

Calculations	manipulating given formulae to obtain answers
Analogue electronic control systems	function and purpose within a circuit of: battery; switch; resistor; variable resistor; LDR; thermistor; LED; buzzer; diode; motor; lamp; ammeter and voltmeter description of function of a circuit in terms of input, process and output calculations involving the relationship between voltage, current and resistance (Ohms' Law) calculations involving resistors in series and parallel calculations of voltage, current and unknown values in a fixed voltage divider design of a voltage divider to provide an input signal for a control circuit interpretation of information given of characteristics for an LDR and an ntc thermistor function of relays function of a protection diode in an electronic circuit explanation of the switching function of a transistor the operation of an electronic control circuit which includes a variable voltage divider, transistor, relay and output transducer
Digital electronic control systems	AND, OR and NOT gates, and combinations with up to three inputs, using truth tables, logic diagrams and Boolean expressions examples of the use of microcontrollers in commercial and industrial applications advantages and disadvantages of microcontroller-based control systems compared to a hard-wired electronic equivalent use of correct symbols (start, stop, input, output, branch, loop) to construct flowcharts showing solutions to simple control programs, involving time delays, continuous and fixed loops use of suitable commands, including high, low, for…next, if…then, pause, end (or their equivalents) to design programs to solve simple control problems, involving time delays, continuous and fixed loops

Administrative information

Published: July 2019 (version 2.0)

Superclass: XL

History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
1.1	Assessment standard thresholds added Unit Support Notes added.	Qualifications Manager	September 2018
2.0	Unit code updated	Qualifications Manager	July 2019

This specification may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged. Additional copies of this Unit can be downloaded from SQA's website at www.sqa.org.uk.

Note: readers are advised to check SQA's website: www.sqa.org.uk to ensure they are using the most up-to-date version of the Unit Specification.

© Scottish Qualifications Authority 2019