Unit C Finland	Title of the unit: **Working with analogue signals**		
Prerequisites:	- Basic pneumatic systems - Basic knowledge of electricity - Basic knowledge about most common sensors (analogue, optical, inductive, capacitive)		
Work tasks:	- Assembly, programming and commissioning of a production module including a (Logical) FBD-programmed PLC-system. - Creating simple on/off regulating PLC programs - Handling analogue signals, inputs and outputs, (0-10V or 4-20mA) in PLC programs. - Fault finding and recalibration of transmitters - Handling over-ranging and programming an open circuit for safety reasons		
Learning Outcomes:	*Knowledge*	*Skills*	*Competence*
	- He/she knows how to describe the difference between analogue signals and digital signals - He/she knows how to describe the difference between bits, bytes, words and double-words. - He/she knows how to recognize the importance of using HIGH/LOW-limits in an analogue system. - He/she knows how to recognize syntax of FBD-language according to IEC 61131-3.	- He/she is able to read analogue and digital signals in a simple PLC-program. - He/she is able to use analogue and digital signals in a simple PLC-program. - He/she is able to move data between functions in a PLC-program using the right data format. - He/she is able to determine when an analogue signal is behind the HIGH/LOW-level.	- He/she is responsible for monitoring, calculating and scaling an analogue signal to a proper value. - He/she is responsible for creating a program controlling a digital output according to an analogue signal. - He/she is responsible for applying a HIGH/LOW-level limit to a program with analogue signals. - He/she is responsible for applying IEC 61131-3 to create a PLC-program using FBD.
	- He/she knows how to describe the difference between signal modes - He/she knows how to describe the use of a signal transmitter.	- He/she is able to make the right settings to an analogue PLC input for current/voltage signals	- He/she is responsible for applying the right combination of the settings of the analogue modules with the parameters of the sensors. - He/she is responsible for applying the right connections and wiring of a signal sensor to a transmitter and to a PLC analogue input/output to put it into service.
	- He/she knows how to describe the principle of a calibration.	- He/she is able to check the function of a signal transmitter.	- He/she is responsible for performing a complete calibration report. - He/she is responsible for creating a calibration protocol.
	- He/she knows how to describe the principle of industrial bus systems. - He/she knows how to describe how to	- He/she is able to make a connection in an industrial bus system. - He/she is able to make proper setting of	- He/she is responsible for creating a program with an industrial bus system.

	move data from one unit to another using an industrial bus system	addresses.		
				- He/she is responsible for sharing knowledge, experience and insights so that electro technical products and systems will be tested properly.
Reference to national qualification:	**The Netherlands**	**Sweden**	**Finland**	**Spain**
	Middenkader Engineering Technicus (crebo 94421)	El och Energiprogrammet, inriktning Automation Industritekniska programmet, inriktning Drift och underhållsteknik Teknikprogrammet, inriktning Produktionsteknik	Grundexamen inom el- och automationsteknik Grundexamen inom maskin- och metallbranschen	Automatizacion y robotica Industrial Técnico Superior en Mecatrónica Industrial Técnico superiro en Mantenimiento de Equipo Industrial
Reference to NQF:	Level 4	N/A	N/A	Level 5
Reference to EQF:	Level 4*	Level 4*	Level 4*	Level 5*
ECVET points	N/A**			
Assessment:	Observations			

* The unit has been identified as part of the above mentioned national vocational qualifications and has by that been referenced to the same EQF level of the qualification.
** Further experimentation of the concept of ECVET points is required at European level before utilisation in practice.

Assessment Grid	
Name Student:	
Name Assessor:	
Location of Assessment:	
Date of Assessment:	
Time of Assessment:	
Unit Assessed:	**Working with analogue signals**

Level that the student is being assessed on is 'under surveillance'.

	yes	no
1		
The student is able to read an analogue signal and monitor the value on a computer.		
The student is able to use the right format (bit, byte, word, double-word) of a value in a program.		
The student is able to scale an analogue value to the right value.		
The student shows a working ON/OFF control program with HIGH/LOW-level limits.		
2		
The student explains the electrical drawing with analogue inputs and outputs.		
The student explains the function of signal transmitters.		
The student explains the difference between current/voltage signals.		
3		
The student explains the principle of calibration.		
The student is able to connect a signal transmitter and simulate/measure the input/output signal.		
The student is able to perform a complete calibration and adjustment process and print a calibration protocol.		
4		
The student explains the principle of an industrial bus system.		

The student is able to connect a bus cable between a Master and a Slave and to make the right address settings according to a program.		
The student is able to create a program and move information between a Master and a Slave.		
5		5
The student puts off the energy while working on the machine.		
The student works according the safety rules according the workplace.		
6		6
The student co-operates with colleagues.		