Unit B the Netherlands	Title of the unit: **Working with motor controllers**		
Prerequisites:	- Basic knowledge about most common sensors (optical, inductive, capacitive, mechanical) - Basic principle of motors and generators - Working with 400V systems - Basic knowledge of using relays and contactors - Basic knowledge of electricity		
Work tasks:	- Produce general scheme drawing of a production module using CAD systems - Assembly, programming and commissioning of a production module including Ladder programming with PLC and motor drivers. - Assembly, programming and commissioning of a production module including Sequence Ladder programming with PLC. - Using relays and contactors controlled by PLC in order to put the Y/D motor into service. - Applying general safety rules according to the low voltage directive - Working with frequency controllers - Using basic principles of measurement in a motor control circuit for fault finding		
Learning Outcomes:	*Knowledge*	*Skills*	*Competence*
	- He/she knows how to define the basic processes using Ladder methods. - He/she knows how to recognise syntax of Ladder-language according to IEC 61131-3. - He/she knows how to describe how to program the production modules.	- He/she is able to analyse the process that has to be controlled. - He/she is able to run through a PLC program, using a given Ladder, and check if it works properly.	- He/she is responsible for applying IEC 61131-3 to create a PLC-program using Ladder.
	- He/she knows how to define the basic components of a frequency controller. - He/she knows how to define the basic parameters and connections of the motor.	- He/she is able to connect a frequency controller to a motor. - He/she is able to connect input to start frequency controller.	- He/she is responsible for applying the right combination of settings of the frequency controller with the parameters of the motors. - He/she is responsible for applying the correct wiring of Y/D motor with its contactors
	- He/she knows how to define the basic principles of a CAD systems. - He/she knows how to recognise electro technical symbols and knows how to use them.	- He/she is able to produce a drawing using CAD.	- He/she is responsible for creating a new up-to-date drawing when changes have been made.
	- He/she knows how to describe the general safety rules for the low voltage directive.	- He/she is able to point out when a machine doesn't meet with certain safety standards - He/she is able to work in proper conditions, trying to avoid any kind of risk.	- He/she is responsible for applying general and specific branch related safety rules and procedures according to low voltage directives in his/her work.

	- He/she knows how to explain the method of measuring the parameters of a motor controlled by a frequency controller.	- He/she is able to measure the current voltage and power of a motor controlled by a frequency controller.	- He/she is responsible for analysing the condition of the motor using the measuring results.
			- 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.*

Working in Industrial Automation

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<table>

Assessment Grid

Name Student:	
Name Assessor:	
Location of Assessment:	
Date of Assessment:	
Time of Assessment:	
Unit Assessed:	**Working with motor controllers**

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

	yes	no
1a		
The student shows an analysis of the work process on paper.		
The student makes an input output list (on the computer).		
The student chooses the right sequence combination series parallel.		
The student shows a working program.		
2		
The student explains the electrical drawing with inputs and outputs on the controller.		
The student explains the electrical drawing with the main current inputs and outputs.		
The student explains what the action of the controller and motor is when the command input is high.		
The student is able to measure the current and voltage that's coming out of the controller.		
The student is able to measure the connection between the PLC and controller or controller and motor to determine if it is really broken.		
3		
The student uses the basis commands in a CAD program for making an electrical drawing.		
The student can explain the symbols that are used in the electrical drawing.		
The student explains how to identify a broken component.		

4		
The student makes notes of his measurements.		
5		
The student puts off the energy while working on the machine.		
The student works according to the safety rules according the workplace.		
6		
The student co-operates with colleagues.		
1a		
The student shows an analysis of the work process on paper.		