

NOCC-A21 Electrician: Competence Package

Relevant Occupation/trade title: Electrician			SAQA ID: 91761		
Learning Area 9: Design, install, wire, maintain and troubleshoot electric motors and associated control systems - Advanced			Total Hours:	176	
Learning Project 1: Design, install and wire motor controls and protection (including starters, VFD controls, overload and over-current devices)			Total Hours:	120	
Requisite learning areas/projects to be in place (Pre-requisite and co-requisite):		<ul style="list-style-type: none"> • Phase 1 completed • LA8 LP4 			
Learning project description: Apprentices learn to install and wire motor controls and protection.					
Activity phase	Practical Skills Modules Content	Underpinning Knowledge Module Content	Work Experience Module Content (Exposure to be given)	Didactical-methodological advice	Learning materials/Tools and Equipment
Reference to QCTO Curriculum	PM-None	KM-05 (KT01, 03) KM-06 (KT01) KM-08 (KT01)	WM-None		
Planning/Preparation	<p><u>Provide access to (Given):</u> Different scenarios in which motor configurations will be used. Contactors, stop/start push buttons, timers, overload relays, over-current devices, emergency stop buttons, limit switches (training panel).</p> <p><u>Apprentices must be able to do/perform the following (hard and soft) skills:</u></p> <ul style="list-style-type: none"> • Select correct PPE • Conduct risk assessment • Select the correct tools and equipment • Design/draw different control circuits as per task instruction: • Transport materials and equipment safely to work station 	<p><u>Knowledge of:</u> Motor control components</p> <ul style="list-style-type: none"> • Contactor (coil ,main contacts, auxiliary contacts, voltages) • Overload relays (magnetic, thermal) • current-devices (circuit breakers, fuses) • Time relays and time switches (electronic, electromagnetic, on-delay, off-delay, electro - pneumatic) • Limit switches (proxies, light sensors, mechanical, pressure) • Stop start push buttons • Emergency stop button • Symbols used in wiring diagrams • Rotary switches- single and 3-phase • Variable frequency drives 	<p><u>Under supervision:</u></p> <ul style="list-style-type: none"> • Install a starter or controller for an electric motor (single phase, three phase, and DC) • Install limit switches, stop buttons, overloads, over-current protection • Test a control circuit (single phase, three phase and DC) • Commission a control circuit (single phase, three phase and DC). 	Lecture, presentations DVDs, audio-visual Group/individual work Training models	<p>Print materials, electronic files, software applications incl.:</p> <ul style="list-style-type: none"> • Training manuals for trainers and apprentices incl. multimedia software • Set of presentation aids (videos, slides) for overhead or LED/LCD projectors <p>Tools, equipment and materials incl.:</p> <p>Range of materials and tools to be covered (minimum):</p> <p>Tools Electrical standard toolbox</p> <ul style="list-style-type: none"> • Multi-meter

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<p>Implementation/ Execution Repair</p>	<ul style="list-style-type: none"> • Install and wire a three phase motor control circuit • Install and wire a single phase motor control circuit • Install and wire a DC motor control circuit • Test and commission three phase, single phase and DC control circuits 	<p>Reading and interpreting wiring diagram</p> <p>Applicable SANS 10142</p>			<ul style="list-style-type: none"> • Insulation resistance tester • Drilling machine • Drill bits • Crimping tool • Cable strapping tool
<p>Evaluation/ Documentation</p>	<ul style="list-style-type: none"> • Evaluate the correctness of the completed task according to drawings and/or instructions • Report work progress to appropriate personnel • Inspect and clean tools • Store and secure tools and materials • Complete applicable work documentation • Perform housekeeping 				<p>Equipment and Materials:</p> <ul style="list-style-type: none"> • Training panel • Conductors • Contactors relays • Overloads • Over-current devices • Stop/start buttons • Limit switches • Various starters • Rotary switches • Timers <p>Controls for three phase motors</p> <ul style="list-style-type: none"> • Direct-on-line starter; • Automatic star/delta starter; • Forward reverse using contactors, • Sequence starters (various) • oscillating panel (limit switches); • Rotary switch (forward reverse and two speed); • Variable frequency drive • Two speed motor using contactors <p><u>Control for single phase motor:</u></p>

Work in Progress

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					<ul style="list-style-type: none"> • Direct on-line starter • Forward reverse using contactors • Forward reverse using rotary switch <p>Control for dc motors: Range: Series, shunt and compound motors</p> <ul style="list-style-type: none"> • Dc control circuits {resistance starter, change direction}
Total	Hours: 120				
Specialisation additions	Equipment that requires authorisation				
Assessment guidance					
<ul style="list-style-type: none"> • Self assessment • Group assessment • Theory test <p>Criteria for assessment:</p> <ul style="list-style-type: none"> • The circuit is wired as per task instruction • The circuit functions as per instruction • Overloads are at the correct setting • Over-current devices selected are at the correct rating • Safety procedures are followed 					