

**SKILLS FRAMEWORK FOR BIOPHARMACEUTICALS MANUFACTURING  
TECHNICAL SKILLS & COMPETENCIES (TSC) REFERENCE DOCUMENT**

<b>TSC Category</b>	Engineering and Maintenance					
<b>TSC</b>	Automated Operation Monitoring					
<b>TSC Description</b>	Monitor automated equipment and control systems to ensure quality execution of the manufacturing process flow					
<b>TSC Proficiency Description</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>	<b>Level 6</b>
		<b>BPM-ENM-2002-1.1</b>	<b>BPM-ENM-3002-1.1</b>			
		Monitor the performance of automated equipment and control systems in executing manufacturing processes	Rectify automated equipment and control systems to minimise disruption to manufacturing processes			
<b>Knowledge</b>		<ul style="list-style-type: none"> <li>• Functions of automated manufacturing equipment and control systems</li> <li>• Procedures of operating automate equipment interfaces</li> <li>• Automated equipment performance parameters</li> <li>• Basic troubleshooting of automated equipment</li> <li>• Biopharmaceuticals manufacturing process flows</li> <li>• Hazards and safety precautions associated with operating automated equipment</li> <li>• Electrical symbols and schematic diagrams</li> <li>• Programmable Logic Control (PLC) programming and controls</li> <li>• Electrical alternating current/direct current (AC/DC) wiring diagrams and electronics components circuitry for troubleshooting purposes</li> </ul>	<ul style="list-style-type: none"> <li>• Automated equipment performance parameters</li> <li>• Automated equipment performance measurement tools</li> <li>• Systematic troubleshooting approach (top-down or bottom-up) and component level verification</li> <li>• Pneumatics and hydraulics functionalities</li> <li>• Methods of optimising biopharmaceutical manufacturing process controls</li> </ul>			

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<p><b>Abilities</b></p>		<ul style="list-style-type: none"> <li>• Monitor performance of automated processes in assigned manufacturing areas</li> <li>• Document performance of automated processes in accordance with organisational procedures</li> <li>• Operate user interface &lt;to do what?&gt;</li> <li>• Perform first-line troubleshooting on automated equipment</li> <li>• Document equipment malfunctioning in accordance with organisational procedures and escalate if necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Configure performance measurement tools on automated equipment and control systems</li> <li>• Monitor patterns in performance results for automated equipment</li> <li>• Investigate performance deviations in automated equipment</li> <li>• Troubleshoot performance deviations of automated equipment and control systems</li> </ul>			
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