



Australian Government

MEM18062 Install, maintain and calibrate instrumentation sensors, transmitters and final control elements

Release: 1

MEM18062 Install, maintain and calibrate instrumentation sensors, transmitters and final control elements

Modification History

Release 1. Supersedes and is equivalent to MEM18062B Install, maintain and calibrate instrumentation sensors, transmitters and final control elements

Application

This unit of competency defines the skills and knowledge required to select and install appropriate sensors and signal transmitters, maintain and diagnose correct operation of sensors and signal transmitters, and complete fault documentation.

It applies to planning corrective action; repairing, replacing and overhauling sensors and signal transmitters; and calibrating, testing, re-installing and recommissioning instrumentation sensors and signal transmitters.

Where soldering of components is required to advanced or military specifications, where the reliability of electrical connections is critical, or where surface mounted devices are being soldered/desoldered then unit MEM05002 Perform high reliability soldering and desoldering should also be selected.

Where diagnosis and repair of electronic equipment is undertaken to component level unit MEM18056 Diagnose and repair analog equipment and components and unit MEM18065 Diagnose and repair digital equipment and components, should also be selected as appropriate.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: B

Unit Weight: 8

Pre-requisite Unit

Path 1	MEM05001	Perform manual soldering/desoldering - electrical/electronic components
	MEM09002	Interpret technical drawing
	MEM11011	Undertake manual handling
	MEM12004	Perform precision electrical/electronic measurement
	MEM12023	Perform engineering measurements

	MEM13015	Work safely and effectively in manufacturing and engineering
	MEM16006	Organise and communicate information
	MEM18001	Use hand tools
	MEM18002	Use power tools/hand held operations
	MEM18054	Fault find, test and calibrate instrumentation systems and equipment
	MEM18055	Dismantle, replace and assemble engineering components
	MEM18057	Maintain/service analog/digital electronic equipment
Path 2	MEM09002	Interpret technical drawing
	MEM11011	Undertake manual handling
	MEM12002	Perform electrical/electronic measurement
	MEM12023	Perform engineering measurements
	MEM13015	Work safely and effectively in manufacturing and engineering
	MEM16006	Organise and communicate information
	MEM18001	Use hand tools
	MEM18002	Use power tools/hand held operations
	MEM18054	Fault find, test and calibrate instrumentation systems and equipment
	MEM18055	Dismantle, replace and assemble engineering components
	MEM18064	Maintain instrumentation system components

Competency Field

Maintenance and diagnostics

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Determine job requirements	1.1	Follow standard operating procedures (SOPs)
		1.2	Comply with work health and safety (WHS) requirements at all times
		1.3	Use appropriate personal protective equipment (PPE) in accordance with SOPs
		1.4	Identify job requirements from specifications, drawings, job sheets or work instructions
2	Select appropriate sensors, transmitters and final control elements for installation	2.1	Determine specification requirements from data sheets, circuit diagrams, engineering drawings
		2.2	Interpret and define specification requirements through application of device characteristics and principles of operation
		2.3	Select equipment and final control elements having regard for measurement range, processes and environment according to their device characteristics, principles of operation and measurement capabilities, in conformance to specifications
3	Install instrumentation sensors, transmitters and final control elements	3.1	Install components using appropriate tools, test equipment, techniques and procedures
		3.2	Plan and cater for maintenance access during installation when mounting connections for power, signal, and process
		3.3	Diagnose installed components for correct operation using appropriate test equipment and procedures and assess results against specifications or manufacturers' technical data sheets
4	Maintain and diagnose correct operation of	4.1	Apply preventative maintenance schedules and procedures to maintain components in optimum condition by interpreting device characteristics and

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
	sensors, transmitters and final control elements		principles of operation
		4.2	Clean and service elements to maintain optimum operating condition by interpreting device characteristics and principles of operation
		4.3	Determine correct operation or malfunction by diagnosing components within the system or as individual devices using appropriate test equipment and procedures
		4.4	Monitor operation of components and assess against predetermined specification or manufacturers' technical data
5	Complete fault documentation and plan corrective action	5.1	Document faults and malfunctions and/or report according to SOPs
		5.2	Plan corrective action autonomously or in consultation with appropriate personnel
6	Analyse control loop and localise faults	6.1	Obtain and interpret engineering specifications and technical information, control device, signal transmission and final element specifications and read and interpret system specifications, including operational data, and historical records and trends
		6.2	Carry out consultation with system operators and other relevant plant personnel and extract relevant data and document to procedures
		6.3	Observe operation of the system using sound knowledge of all external control device characteristics, controller modes, signal transmission and final control devices
		6.4	Set up and apply appropriate signal transmission test equipment
		6.5	Test circuits and control lines to the level necessary to detect and localise fault

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
7	Repair/replace/overhaul sensors, transmitters and final control elements	7.1	Examine and verify components for replacement, repair or overhaul using appropriate tools, test equipment, procedures and techniques
		7.2	Select and obtain replacement items from manufacturers' parts lists or catalogues to meet specifications
		7.3	Repair or overhaul faulty items to meet specifications
		7.4	Refit repaired, overhauled and replacement sensors, transmitters and final control elements
		7.5	Prepare refitted sensors, transmitters and final control elements for testing and calibration
8	Calibrate and test instrumentation sensors, transmitters and final control elements	8.1	Calibrate components against appropriate physical standards using appropriate calibration devices, test equipment, techniques and procedures
		8.2	Perform zero, span and range tests and assess results against manufacturers' instructions sheets
		8.3	Align components to manufacturers' instruction sheets by applying zero and span adjustments
9	Return sensors, transmitters and final control elements and control loops to service	9.1	Put components into service in conformance to specifications with due regard to process requirements, safety, installation/commissioning procedures and sequence of operation
		9.2	Adjust controller modes and actions according to specifications
		9.3	Test electrical and pneumatic transmission lines and take appropriate action, including the use of signal conditioning devices
		9.4	Return instrumentation to service, including configuring, calibrating, adjusting, tuning and validating system performance
		9.5	Return system to service

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Signal transmitting instrumentation sensing indicators include the use of one (1) or more of the following:

- mechanical
- electrical
- electronic (analog and digital)

Signals transmitted include measurement of one (1) or more of the following:

- pressure
- temperature
- level
- flow rate
- weight
- density
- other process variables

Maintenance includes one (1) or more of the following:

- maintenance of control valves (including changing and reseating valve plugs)
- adjustment of valve actuators (pneumatic, electrical and hydraulic)
- maintenance and adjustment of pneumatic, electro-pneumatic and electronic valve positioners and signal converters

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM18062B Install, maintain and calibrate instrumentation sensors, transmitters and final control elements

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM18062 Install, maintain and calibrate instrumentation sensors, transmitters and final control elements

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting equipment specifications, circuit diagrams, engineering drawings, supplier catalogues and replacement components and obtaining relevant data with respect to installing, maintaining and calibrating instrumentation sensors, transmitters and final control elements
- interpreting device characteristics and principles of operation for cleaning and servicing of elements to maintain optimum operating condition
- consultation with relevant plant personnel
- selecting, installing and testing sensors, transmitters and final control elements to site and manufacturers' specifications
- obtaining and performing relevant scheduled/preventive maintenance schedules and determining correct function and recording the results
- identifying, localising, monitoring and reporting/recording faults and preparing sequential action plan to correct faults, including applying procedures to sequential and loop testing
- repairing/overhauling faulty items using appropriate tools, equipment, techniques and procedures to manufacturers' specifications
- refitting sensors, transmitters and final control elements and preparing for testing and calibration
- configuring, calibrating, testing and adjusting tuning and validating system performance against manufacturers' instruction sheets and returning system to service
- completing all service reports according to SOPs.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- characteristics, specifications and principles of operation of the sensors, transmitters and final control elements to be installed

- cleaning and servicing requirements to maintain optimum operating condition for elements
- relevant codes, standards, safety and legislative requirements
- criteria for selecting sensors, transmitters and final control elements and factors that determine the type of test equipment required
- procedures for testing, installing and maintaining sensors, transmitters and final control elements and for reporting/recording and monitoring faults and/or malfunctions in sensors, transmitters and final control elements
- tools, equipment and techniques required to install sensors and transmitters
- connections to be made to sensors, transmitters and final control elements
- variations of test results from specifications and probable causes of variations between test results and specifications
- test equipment and techniques required to determine correct function or malfunction of sensors, transmitters and final control elements
- probable causes of variations between test results and specifications
- need for systematic and/or sequential testing
- procedures for configuring, calibrating, testing, adjusting, tuning and validating system performance, including sensors, transmitters and final control elements
- physical standards against which sensors, transmitters and final control elements are to be calibrated
- devices, equipment and techniques required to calibrate sensors, transmitters and final control elements
- zero, span and range tests to be applied to the sensors, transmitters and final control elements
- procedures for recommissioning sensors, transmitters and final control elements.

Assessment Conditions

- Assessors must:
 - have vocational competency in installing, maintaining and calibrating instrumentation sensors, transmitters and final control elements at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications

- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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