



Accredited Africa Training Institute for Capacity Development

Unit FO409, Hatfield Plaza · 1122 Burnett St, Hatfield 0028 · Pretoria, Gauteng · South Africa

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COURSE BROCHURE

Instrumentation Component Repair And Maintenance Training

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 115287 · NQF Level 4 · 25 Credits · 22 Days

COURSE OVERVIEW

This course equips learners with the skills to repair and maintain instrumentation components used in industrial processes. Participants will gain practical knowledge of diagnostic techniques, calibration, and preventive maintenance to ensure optimal performance and reliability of measurement and control instruments.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	115287
Accreditation	SAQA Accredited · NQF Level 4 · 25 Credits
Duration	22 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply diagnostic procedures to identify faults in instrumentation components.
- Demonstrate correct disassembly, repair, and reassembly of instruments according to manufacturer specifications.
- Implement calibration techniques to ensure accuracy and compliance with standards.
- Analyze instrument performance data to determine maintenance requirements.
- Evaluate the effectiveness of repair and maintenance activities through testing and verification.
- Design preventive maintenance schedules to extend instrument lifespan and reduce downtime.

WHO SHOULD ATTEND

- This course is designed for technicians, maintenance personnel, and engineers involved in the repair and upkeep of instrumentation systems in manufacturing, process control, and related industries.

COURSE OUTLINE

Day 1: Introduction to Instrumentation and Safety

- Overview of instrumentation in process control
- Safety standards (OHS Act, SANS 10142)
- Personal protective equipment (PPE) requirements
- Introduction to instrument symbols and P&IDs;
- Workshop safety and emergency procedures

Day 2: Measurement Principles and Calibration Basics

- Measurement units and SI system
- Pressure, temperature, flow, and level measurement basics
- Calibration terminology (accuracy, precision, hysteresis)
- Calibration standards and certificates
- Hands-on: Pressure gauge calibration using a deadweight tester

Day 3: Pressure Instruments: Types and Maintenance

- Bourdon tube, diaphragm, and capacitive pressure sensors
- Pressure transmitters (4-20 mA, HART)
- Troubleshooting pressure gauge drift and zero errors
- Maintenance: cleaning, seal replacement, and recalibration
- Pressure testing procedures and safety

Day 4: Temperature Instruments: Types and Maintenance

- Thermocouple types (J, K, T) and RTD Pt100
- Thermowells and installation considerations
- Maintenance: sensor replacement, wiring checks
- Calibration of temperature transmitters
- Hands-on: Loop check and sensor simulation

Day 5: Flow Instruments: Types and Maintenance

- Orifice plates, venturi, and pitot tubes
- Magnetic and ultrasonic flow meters
- Maintenance: cleaning electrodes, checking grounding
- Troubleshooting flow signal fluctuations
- Hands-on: DP flow meter calibration

Day 6: Level Instruments: Types and Maintenance

- Differential pressure level transmitters
- Radar and ultrasonic level sensors
- Maintenance: displacer replacement, stilling well cleaning
- Calibration of level transmitters (wet/dry leg)
- Hands-on: Level switch testing

Day 7: Analytical Instruments: pH, Conductivity, and Gas Detection

- pH electrodes and buffers
- Conductivity cells and temperature compensation
- Gas detectors (O₂, H₂S, LEL)
- Maintenance: electrode cleaning, sensor replacement

- Hands-on: pH meter calibration and gas detector bump test

Day 8: Control Valves and Actuators

- Valve characteristics (linear, equal percentage)
- Actuator components: diaphragm, spring, positioner
- Maintenance: packing replacement, seat lapping
- Calibration of valve positioners
- Hands-on: Valve stroke check and I/P converter testing

Day 9: Transmitters and Signal Conditioning

- Smart transmitters (HART, Foundation Fieldbus)
- Signal conditioning: isolation, amplification, filtering
- Loop checking and troubleshooting
- Configuration using handheld communicator
- Hands-on: HART communicator use and loop test

Day 10: Programmable Logic Controllers (PLC) Basics

- PLC hardware: CPU, I/O modules, power supply
- Ladder logic fundamentals (contacts, coils)
- Digital and analog I/O wiring
- Troubleshooting PLC faults (LED indicators)
- Hands-on: Simple program download and I/O test

Day 11: Distributed Control Systems (DCS) Overview

- DCS vs PLC: application differences
- DCS components: controllers, I/O racks, operator stations
- Communication networks (Ethernet, Profibus)
- Maintenance: card replacement, backup procedures
- Hands-on: DCS screen navigation and alarm acknowledgment

Day 12: Fieldbus and Industrial Networks

- Profibus PA and DP, Modbus RTU/TCP
- Network wiring, termination resistors, and repeaters
- Maintenance: segment check, device replacement
- Troubleshooting using diagnostic tools
- Hands-on: Network scanner and device address assignment

Day 13: Instrumentation Drawing and Documentation

- P&ID; symbols and tag numbering
- Loop diagrams: wiring, terminals, and power supply
- Instrument index and calibration sheets
- Maintenance logs and work orders
- Hands-on: Drawing a loop diagram from a P&ID;

Day 14: Preventive Maintenance Planning

- Preventive maintenance strategies (time-based, condition-based)
- Inspection checklists for field instruments
- Cleaning procedures for sensors and enclosures
- Lubrication and seal replacement
- Hands-on: Creating a PM schedule for a pressure transmitter

Day 15: Troubleshooting Techniques

- Troubleshooting methodology (checklist, half-split)
- Multimeter usage: voltage, current, resistance
- Loop calibrator: sourcing and simulating signals
- Common faults: wiring, power supply, sensor drift
- Hands-on: Troubleshooting a faulty temperature loop

Day 16: Instrument Installation and Commissioning

- Installation standards (SANS, ISA)
- Mounting, piping, and electrical connections
- Pre-commissioning: visual inspection, continuity test
- Commissioning: power-up, configuration, loop check
- Hands-on: Commission a pressure transmitter

Day 17: Advanced Calibration Techniques

- Multi-point calibration procedures
- Uncertainty calculation and traceability
- Calibration software and data management
- Hands-on: Calibrate a smart transmitter with documented results

Day 18: Hazardous Area Instrumentation

- Gas groups, temperature classes, and zones
- Intrinsic safety barriers and isolators
- Explosion-proof enclosures and conduit seals
- Maintenance: hot work permits, Ex d equipment
- Hands-on: Inspect and test an intrinsic safety loop

Day 19: Instrumentation System Integration

- Signal scaling in DCS/PLC (4-20 mA to engineering units)
- Loop tuning basics (PID parameters)
- System integration testing (SIT)
- Change management and revision control
- Hands-on: Configure a loop in a DCS and tune a simple process

Day 20: Final Assessment and Practical Application

- Practical assessment: troubleshoot and repair a faulty instrument loop
- Written assessment: theory and procedures
- Course review and feedback
- Certification documentation
- Career pathways and continuous learning

ASSESSMENT & CERTIFICATION

Delegates are assessed through exercises and a final test. A mark of **50% or above** earns an **AATICD Certificate of Completion**, issued digitally with a unique verification code. This course carries **25 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 66,600.00	R 66,600.00
1	In-House	R 86,600.00	R 86,600.00
1	On-Campus (Pretoria)	R 99,900.00	R 99,900.00

UPCOMING SESSIONS

Start	End	Method	Venue
04 Aug 2026	02 Sep 2026	On-Campus	Johannesburg, South Africa
05 Aug 2026	03 Sep 2026	On-Campus	Mauritius
06 Aug 2026	04 Sep 2026	On-Campus	Cape Town, South Africa
07 Aug 2026	07 Sep 2026	On-Campus	Dubai, UAE
10 Aug 2026	08 Sep 2026	On-Campus	Abu Dhabi, UAE
11 Aug 2026	09 Sep 2026	On-Campus	Durban, South Africa
11 Aug 2026	09 Sep 2026	On-Campus	Mauritius
12 Aug 2026	10 Sep 2026	On-Campus	Cape Town, South Africa

Contact us if no suitable date is listed – on-demand sessions can be arranged for groups.

HOW TO GET A QUOTE OR APPLY

- 1. Get an instant quotation online:** visit www.aaticd.co.za, open the page for this course (Unit Standard 115287) and click **Get A Quote / Apply**. Select your training method and number of delegates – your quotation is generated immediately and emailed to you with the course brochure attached.
- 2. Apply by email:** send the course title, your preferred training method (Online, In-House or On-Campus Pretoria), the number of delegates and your preferred dates to apply@aaticd.co.za – our team will reply with a formal quotation.
- 3. Apply by phone or WhatsApp:** call +27 12 004 8389 or WhatsApp +27 65 077 6310 and we will prepare your quotation and reserve your seats.
- 4. Confirm your booking:** accept the quotation and settle the invoice. As soon as payment is confirmed your delegates are enrolled and receive their AATICD LMS login details by email, along with joining instructions for their chosen training method.

Group discounts apply automatically – the more delegates you enrol, the lower the price per delegate. No payment is required to request a quotation.

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