

MODEL 221R
OXYGEN DEFICIENCY MONITOR
zirconium oxide sensor-based operation

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish, install, place into proper operation, and warrant the MODEL 221R, as shown on the Plans and described by the Specifications.
- B. All items detailed in this section shall be provided by the same manufacturer.

1.2 REFERENCE STANDARDS

- A. Equipment shall, as applicable, meet the requirements of the following industry standards:
 - 1. General Purpose UL 61010-0 Standard
- B. Controllers shall, as applicable, meet the requirements of the following Regulatory Agencies:
 - 1. National Electrical Manufacturer's Association (NEMA) Standards
 - 2. National Electrical Code (NEC)
 - 3. Underwriters Laboratory (UL and cUL)
 - 4. International Electrotechnical Commission (IEC)

1.3 QUALITY ASSURANCE

- A. Identification
 - 1. Equipment shall be identified with a metal corrosion-resistant nameplate affixed in a conspicuous location.
 - 2. Nameplate information shall include manufacturer's name, equipment model number, input power, serial number and report number from a NRTL indicating compliance with the UL 61010-0 Standard.
- B. Manufacturer
 - 1. Supplier shall have a current ISO9001 certification for the manufacturing facility of the equipment.
 - 2. Supplier shall conduct factory testing and verification of equipment prior to shipment.
 - 3. Supplier shall have a factory and repair center in USA.
 - 4. Supplier shall have USA-based phone support available from 7AM to 3:30PM PST.

1.4 SUBMITTALS

A. Approval Documents

Supplier shall submit approval documents in .pdf format. Submittals shall include equipment descriptions, functional descriptions, dimensional and assembly drawings, and manufacturer's instructions.

Supplier shall submit certification from a NRTL that the product meets the UL 61010-0 Standard.

Supplier shall submit the manufacturer's current ISO9001 certification.

B. Operation and Maintenance Manuals

The supplier shall submit one (1) printed copy of a suitable operation & maintenance manual. An electronic version shall be readily available online. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques, a recommended maintenance schedule, and recommended accessories and spares.

C. Warranty Documentation

The supplier shall submit a warranty statement clearly identifying the scope and term of the warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging and Shipment

1. Equipment shall be packaged in containers or boxes for normal shipping, handling, and storage.
2. Equipment shall be protected from rain, snow, impact and abrasion while in the possession of the carrier.

B. Delivery and Acceptance Requirements

Contractor shall review the contents of the shipment at time of delivery and promptly notify the carrier and supplier of any discrepancies.

C. Storage and Handling Requirements

1. Equipment shall remain in the packaging provided by the supplier until it is installed.
2. Equipment shall be stored in a dry environment between 40° F (4.5° C) and 100° F (37.8° C).

D. Packaging Waste Management

Contractor shall be responsible for discarding all packaging materials in an environmentally-friendly manner and in accordance with state and local regulations.

1.6 WARRANTY

Manufacturer must offer a standard 24-month limited warranty for the equipment.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Equipment shall be in accordance with these plans and specifications and shall be supplied by one of the following manufacturers:
1. Advanced Micro Instruments, Inc., 225 Paularino Ave., Costa Mesa, CA 92626; Tel: 714-848-5533

MODEL 221R
 2. Approved equal.
- B. Manufacturers requesting to be selected as an approved equal shall satisfy the requirements of the following section "Pre-Approval of Alternate Equipment."

2.2 PRE-APPROVAL OF ALTERNATE EQUIPMENT

- A. Manufacturers requesting to be selected as an approved equal shall either: (i) perform a pilot test at the facility, or; (ii) coordinate a site visit to allow the Engineer and owner the opportunity to witness the performance of the proposed equipment. This task shall be completed a minimum of 10 days prior to the bid. All expenses associated with (i) or (ii) above shall be paid for by the submitting manufacturer.
- B. Manufacturers requesting to be selected as an approved equal shall also submit certified documentation demonstrating compliance with performance, operation, construction and ETL approval to UL standards a minimum of ten (10) days prior to bid opening. Selected equipment manufacturers shall be added to the list of approved manufacturers at the engineer's discretion.

2.3 PERFORMANCE REQUIREMENTS

A. General

Oxygen deficiency monitor shall measure oxygen levels in atmospheric air in real-time within the vicinity of the installed equipment or the optional remote sensing probe.

B. Design Summary

- | | |
|---|-----------------------------------|
| 1. Number of Monitor Main Units | 1 |
| 2. Number of oxygen sensors | 1 |
| 3. Environment rating | General Purpose |
| 4. Standard approval from ETL | UL 61010-1 Standard |
| 5. Supply power characteristics | 90-240 VAC, 50/60 Hertz (11 Watt) |
| 6. Maximum altitude | 15,000 ft |
| 7. Monitor Main Unit Ingress Protection | Designed to meet IP65 |
| 8. Operating Temperature Range | 14°F to 122°F (-10°C to 50°C) |
| 9. Measurement range | 0.0% - 25% of Oxygen |
| 10. Minimum Detection Threshold | 0.05% of Oxygen |
| 11. Oxygen Sensing Technology | Zirconium Oxide sensor |

12. Life Expectancy of Oxygen Sensor	up to 10 years
13. Minimum number of Alarms points	2
14. Alarm Preprogramming	OSHA standards for 19.5% and 23.5%
15. Audible level of Alarms	95 dB
16. Minimum number of Relays	2

2.4 OXYGEN DEFICIENCY MONITOR

A. General

Oxygen Deficiency Monitor shall consist of a main control unit and oxygen sensor. There shall be the option to have a power cord and remote sensing probe added by the manufacturer. The main unit shall house the oxygen sensor unless the unit includes the optional remote sensing probe, which would then house the oxygen sensor instead.

B. Components

1. Monitor Main Control unit

- a. Enclosure of the main control unit shall be of powder coated metal construction and be NEMA 4X.
- b. Main unit including oxygen sensor must have protection from intermittent low pressure water spray while in operation.
- c. Main unit shall have an internal pocket to house the oxygen sensor.
- d. Main unit shall have a 4-digit LCD screen to display oxygen level.
- e. Main unit shall have LED indicator that display SAFE level (normal), CAUTION level, DANGER level and ENRICHED level.
- f. Main unit shall house a built in 95 dB audible alarm.
- g. Main unit shall have a momentary SILENCE BUTTON for alarm bypass accessible from the front panel.
- h. Main unit shall have front panel accessibility for adjustment of span during calibration.
- i. Main unit shall have built-in battery back-up power for 1 hour.
- j. Main unit shall have 4 mounting holes.
- k. Main unit shall house two alarm relays that can energize and de-energize rated 3A @ 24VDC/115VAC
- l. Main unit shall have I/O access for power capable of maintaining NEMA 4X compliance when wired.
- m. Main unit shall have I/O access for hard wiring for RS485 communications, analog outputs, and alarm relays capable of maintaining NEMA 4X compliance when wired.

- n. Main unit shall have an external protective earth ground lug.
- o. The main control unit shall have a latching door that can be opened without tools. Door must have a sealing method that maintains NEMA 4X integrity of analyzer and allows clear visibility of analyzer status and current oxygen measurement.

2. Oxygen Sensor

- a. Oxygen sensor shall be zirconium oxide.
- b. Oxygen sensor shall be housed inside the main unit or the remote sensing probe.

3. Optional Power Cord

- a. Power cord shall have a Type B male wall plug
- b. Power cord shall a minimum length of 6 ft.
- c. Power cord shall be installed by the manufacturer

4. Optional Remote Sensing Probe

- a. Cord of probe shall have a minimum length of 12 ft (3.7 m).
- b. Probe shall have the ability to extend the maximum length of its cord to 300 ft (91 m).
- c. Probe shall have a bracket provided by the manufacturer that can be used for mounting.

B. Operation

- 1. When AC power is initially supplied, the monitor shall warm-up and initialize. There shall be visible indication that the monitor is in initialization mode. The alarms shall be disabled during initialization.
- 2. When normal, safe oxygen levels are detected, the LED of the monitor shall display a solid green light. The audible alarm shall not engage. Relay 1 shall energize, and Relay 2 shall energize.
- 3. When oxygen levels fall to 20.0%, the LED of the monitor shall display a solid yellow light. The audible alarms shall not engage. Relay 1 shall de-energize, and Relay 2 shall energize.
- 4. When oxygen levels fall to 19.5%, the LED of the monitor shall display a solid red light. The lower audible alarm shall engage. Relay 1 shall de-energize, and Relay 2 shall de-energize.
- 5. When oxygen levels increase to 23.5%, the LED of the monitor shall display a solid red light. The upper audible alarm shall engage. Relay 1 shall de-energize, and Relay 2 shall de-energize.

6. When AC power is lost, the monitor's battery back-up power shall engage, and the LED shall display a flashing red light. The audible alarms shall not engage, but the two relays shall energize.
 - a. When battery back-up power has been running for ~45 minutes, the LED shall continue displaying a flashing red light. The audible alarms shall trigger. The LCD shall have no display reading. The two relays shall de-energize.

2.6 FINISHES

A. Paint Coatings

Monitor main unit shall have a paint finish that is both power-coated and UV-resistant, clear-coated.

Clear viewing windows shall be abrasion resistant and resistant to UV damage.

PART 3 - EXECUTION

3.1 INSTALLATION

The Contractor shall complete installation of the equipment in accordance with the manufacturer's installation instructions, drawings and related specification sections, and in accordance with all OSHA, local, state, and federal codes and regulations.

The main control unit shall have a clearance of 12" around all faces of the monitor.

3.2 SYSTEM START-UP

System start-up should follow the steps outlined in the supplied product manual.

The equipment supplier shall provide the support services of a factory or manufacturer's representative to the Contractor, if required, to ensure proper installation and operation.

The Contractor shall apply power for the first time and confirm the equipment operates as intended. The Contractor shall also provide services as detailed in training below.

3.3 TRAINING

Field training shall be provided for operations, maintenance, and supervisory staff members.

Field training shall cover key components of the equipment, operating and maintenance requirements and troubleshooting techniques as outlined in the supplied product manual.

END OF SECTION