



# **SPECIFICATION**

## **MultiGard Gas Sampling System**

### **User Instructions For The MultiGard Gas Sampling System**

The user must modify and customize the specification to make it functional. The following items should be completed:

1. Paragraph 1.1 - Fill in the number of points monitored.
2. Paragraph 1.2 - Fill in the gas to be measured and full scale value to be measured.
3. Paragraph 1.6 - State the operating principle for the analyzer used.

## SPECIFICATION FOR THE MultiGard Gas Sampling System

- 1.0 Gas Sampling System Specification - Paragraphs 1.1 through 2.2 details the specification for the Gas Sampling System.
- 1.1 General - The monitoring system shall draw, via an internal pump, gas samples to the internal analyzer(s) from (NO.) locations and sequentially measure the gas concentration. The system shall provide visual alarm indication when preset levels are exceeded. Relay outputs for the purpose of external alarm or control shall be provided.
- 1.2 Measured Gas - The system shall measure (Gas (es)) in the concentration range of zero to (value) full scale.
- 1.3 System Configuration - The system shall consist of the following three sub-systems:
- 1 - System Controller
  - 2 - Gas Sample Handler
  - 3 - up to four Analytical or Sensors

All sub-systems shall be mounted in a single enclosure. Any of the analytical sub-systems, however, may be optionally located separately.

- 1.3.1 Enclosure Type - The system enclosure shall be rated as one of the following depending on the number of locations monitored.

Number of Locations Monitored	Rating
8	NEMA 12
16	NEMA 12
24	NEMA 12
32	NEMA 12
16 with a dual sequencer	NEMA 1
32 with a dual sequencer	NEMA 1

**NOTE:** All components on these system are general purpose. They are NOT suitable for use in hazardous areas as defined by Article 501 of the National Electric Code.

- 1.3.2 Enclosure Attributes - As a minimum, the system enclosure shall be as specified in Paragraphs 1.3.2.1 through 1.3.2.7.

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- 1.3.2.1 Access Door - A full length front access door shall be provided.
  - 1.3.2.2 Electrical Entry - A gasketed, removable plates shall be provided in the enclosure bottom for purposes of providing electrical entry.
  - 1.3.2.3 Sample Tubing Connection - NPT fittings suitable for the connection of 1/8 inch tubing shall be provided on the sides of the enclosure for the purposes of connection, sample lines, calibration gases and exhaust.
  - 1.3.2.4 Indicators - An impact resistant:
    - a. 5" diagonally measured monochrome LCD Display for 8 or 16 gas sample point systems or
    - b. 9" diagonally measured monochrome EL Display for 24 or 32 gas sample point systems and dual systems shall be provided on the access door of the enclosure for the purpose of viewing all operational parameters of the unit. An optional color display shall also be available.
  - 1.3.2.5 Mounting - Brackets suitable for wall mounting shall be provided.
  - 1.3.2.6 Size - No dimension (Height, Width, Depth) shall exceed 1.5 meters (4.5 feet).
  - 1.3.2.7 Controls - There shall be no switches, levers or buttons on the front cover of the unit. The operator interface to the unit shall be via the Asoft buttons@ on the front panel display. These Asoft buttons@ are activated by touching the front panel display screen.
- 1.4 Controller - The controller sub-system shall conform to Paragraphs 1.4.1 through 1.4.8.
- 1.4.1 Type - The controller shall be an Allen-Bradley=s (AB) SLC-500 Small Logic Controller.
  - 1.4.2 Programmable Functions - All programmable functions will be entered via the Asoft keys@ on the front panel touch screen. The following functions shall be programmable:
    - a. Sequencing point order
    - b. Manual calibration sequence
    - c. Automatic calibration sequence and associated timing parameters and adjustment limits
    - d. Parameters for the common alarm relays:

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1. latching or non-latching alarm function
  2. upscale or down scale acting alarms
  3. fail safe or non fail safe relay operation
  4. On delay relay operation
  5. Off delay relay operation
  - e. Removal or skipping of any location from the sampling sequence
  - f. Setting Trouble, Warning and Alarm trip point levels per sampling point per analyzer or sensor
  - g. Changing the password
  - h. Setting the gas sample transport time per sampling point
  - I. Setting the analysis time
  - j. Enabling the extended analysis time with the following trigger threshold parameters:
    1. Rate of signal rise per analyzer or sensor
    2. Signal level increasing to a preset level
    3. Signal level decreasing to a preset level
  - k. Setting the alarming hysteresis per analyzer or sensor
  - l. Parameters for the optional user configured output relays:
    1. fail safe or non fail safe relay operation
    2. On delay relay operation
    3. Off delay relay operation
    4. Steady or pulsed outputs
- 1.4.3 Programming Lock Out - A password shall be necessary for the purpose of preventing unauthorized personnel from altering the systems programmed parameters.
- 1.4.4 Programming Display - A lighted alpha-numeric display shall be provided to aid in programming set up or change.
- 1.4.5 System Memory - All programmed values shall be held in non-volatile memory. Battery backup shall be provided to retain current status if power is lost.
- 1.4.6 Alarm/Control - Four common alarm/control set point levels shall be provided for all sample location. These four will be: Horn, Trouble, Warning and Alarm. These relays will be single pole double throw (SPDT) at least 8 amp @ 250 VAC. The system shall have the capability of providing up to 64 optional user configurable discrete alarm relays or solid state outputs.
- 1.4.6.1 Optional user configurable discrete alarm relays

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- 1.4.6.1.1 These optional discrete alarm relays shall be single pole double throw (SPDT) at least 10 amp @ 250 VAC.
- 1.4.6.1.2 These optional discrete alarm relays shall be available in the following configuration:
  - a. 16 warning & 16 alarm relays
  - b. 32 warning & 32 alarm relays
- 1.4.6.2 Optional user configurable solid state outputs
  - 1.4.6.2.1 These optional solid state outputs shall be capable of sinking 100 mA @ 24 VDC.
  - 1.4.6.2.2 These optional solid state outputs shall be available in the following configuration:
    - a. 16 warning & 16 alarm outputs
    - b. 32 warning & 32 alarm outputs
- 1.4.7 Front panel display- The front panel display shall be provided for the purpose stated in Paragraphs 1.4.7.1 through 1.4.7.5.
  - 1.4.7.1 Alarm Indication
  - 1.4.7.2 Location Indicator
  - 1.4.7.3 Malfunction Indicator - The display shall be indicate any of the following conditions:
    - a. analyzer under range
    - b. analyzer over range
    - c. automatic calibration limit exceeded
    - d. flow failure
  - 1.4.7.4 Sequence Mode Indication
  - 1.4.7.5 Calibration Mode Indication
- 1.4.8 Automatic Analyzer Correction - The controller must be capable of introducing zero and calibration gases and automatically correcting the gas value reading. Timing and limits setting shall be programmable according to Paragraph 1.4.2.
- 1.5 Sample Handling - The sample handling sub-system shall conform to Paragraphs 1.5.1 through 1.5.7.
  - 1.5.1 Sample Line Compatibility - The system shall be capable of drawing a gas sample through 1/8 NPT tubing for a distance of 166.6 meters (500 feet).
  - 1.5.2 Sample Line Flow Rate - The system shall be capable of drawing a gas sample through 0.175" ID tubing at a rate of at least 20 SCFH (10 LPM) typical, no load.

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The full load rate shall be: 10 SCFH (5 LPM) typical.

- 1.5.3 Gas sampling scheme - The system shall employ a look ahead bypass sampling scheme. The system will not only pump on the current sampling point but also pump on the next sampling point even if the sampling point order is not in numeric order.
- 1.5.4 Sample Conditioning - The system shall provide adequate filtration of the sample suitable to protect the analyzer.
- 1.5.5 Exhaust - Exhaust fitting shall be provided on the side of the enclosure for the purpose of attaching exhaust lines to the sample and bypass flows.
- 1.5.6 Calibration Gas Connection - Inlet fittings shall be provided on the side of the enclosure for the purpose of connecting the calibration gas supplies (zero and span).
- 1.5.7 Flow Failure Detection - The system shall be capable of detecting a flow failure in any of the sampling lines.
- 1.6 Analyzer - The analyzer(s) sub-system shall operate on the (specify) principle.
- 1.7 System Performance - The system shall meet the requirements of Paragraphs 1.7.1 through 1.7.3.
  - 1.7.1 Analyzer Reproducibility requirement - The analyzer(s) must keep its output signal reproducible within the limits of +2% Full Scale (FS).
  - 1.7.2 Analyzer Stability requirement - The 24 hour zero or span drift of the analyzer(s) must be less than 2% without the aid of automatic or manual recalibration.
  - 1.7.3 Environmental Specifications
    - 1.7.3.1 Temperature - The system shall operate over the range:.  
Operating- 321 to 951 F (01 to 351 C)  
Non-Operating- 141 to 1401 F (-101 to 601 C)  
Gas Sample-01 to 1401 F (-171 to 601 C)
    - 1.7.3.2 Humidity- The system shall operate over the range:  
30 to 85% RH non-condensing
- 1.8 Programming Limits - The system parameters shall be capable of being adjusted within the following limits:

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- a. Gas Sample Point Dwell Time = 10-300 seconds (in one second increments) per point.
  - b. Alarm Levels = 0-100% of full scale in one percent increments
  - c. Frequency of Automatic Zero = Every 8 hours
  - d. Frequency of Automatic Span = Every 8 hours
  - e. Automatic Adjustment Limits = "5% (before trouble is indicated).
- 1.9 Power Requirement - The system shall need the following electrical power to operate:  
5 Amp. @ 115 VAC, 60 Hz, Single Sequencer Systems  
10 Amp. @ 115 VAC, 60 Hz, Dual Sequencer Systems
- 2.0 Max System Maintenance Requirement - With the exception of resupply of zero and span gas, no routine maintenance shall be required.
- 2.1 Manufacturer Capability Requirements - As a minimum, the system manufacturer must meet the following requirements:
- a. be capable of supplying all equipment used to calibrate the system
  - b. be capable of providing on site service with factory trained personnel
  - c. be capable of providing start-up assistance and training
- 2.2 Gas Monitoring System shall be a Mine Safety Appliances Company MultiGard Gas Sampling System or equal.