

Specifications for The Draeger Well Guard Gas Detection System

1. System Overview

- a. The Gas Detection System shall be a single enclosure design and capable of drawing a gas sample from up to 100'
- b. The system shall be capable of monitoring multiple components with up to 4 separate sensors per enclosure or three sensors per enclosure and a signal from a remote sensor.
- c. The system shall be housed in a Nema 4X Fiberglass Enclosure.
- d. The system enclosure shall include an integral touch screen panel to act as a user interface as well as simultaneous display of all Gas Concentrations, alarm status and fault status.
- e. The system enclosure shall include an integral Strobe Light and Horn to indicate an alarm condition.
- f. The Horn shall have the option of being silenced during an alarm condition while the strobe will continue to flash until the alarm condition clears.
- g. The system shall have the option of offering additional relay contacts for remote alarms.
- h. The system shall include a safety shut down of the pump in the event of a flood condition in the Well. The shut down system shall be automatic without human intervention. A flood or pump shut down shall also activate a relay for notification.
- i. The system shall have provisions and the option of sampling from two different areas simultaneously within the well and segregating the sample points.
- j. The system shall be 120 VAC powered.

2. Integral Sample Delivery System

- a. The sample delivery system shall utilize a sample pump with a brushless DC motor.
- b. The rated service life of the pump motor shall be over 20,000 hours.
- c. The pump shall be a diaphragm style with field replaceable diaphragms and diaphragm plate to allow for periodic maintenance in the field if required.
- d. The pump shall have a flow capacity of up to 2.1 lpm, a maximum operating pressure of 1.3 Bar (gauge) and a maximum vacuum of 330 mbar (absolute).

- e. The sample flow shall be monitored continuously and give a fault indication upon loss of flow due to blocked inlet tube, pump failure, etc. Additionally, the system shall monitor for flooding conditions and automatically switch off the pump in the event the water level reaches within 4-6 inches of the sample inlet. This condition will be displayed on the screen as well as indicate the flow fault.
- f. The sample system shall include an adjustable flow meter.
- g. The sample system shall have integral protection to filter water, condensate and particulates.
- h. The sample shall be delivered to up to four sensors simultaneously.

3. Gas Sensors

- a. The Sensors shall be powered by an internal 24 VDC power supply.
- b. Gas concentrations, error messages, and software menu choices shall be displayed on a 3 digit LCD display internal to the enclosure.
- c. Access to the software for each individual sensor shall be obtained by tapping a magnetic wand on the front of the sensor board at the appropriate arrow indicators. In this way, each sensor can be configured, calibrated and maintained during normal maintenance procedures.
- d. There shall be three magnetic reed switches for navigating the menu corresponding to up, down and enter.
- e. Wiring Terminals shall be located on the back of the PCB. The PCB shall be mounted on a bezel that is easily pulled out without the need for tools from the housing. The terminal connections shall be plug in type.
- f. Sensor Boards shall be a universal Sensor Boards and accept a H₂S or O₂ Sensor. The Sensor Boards shall have a sensor Lock Feature that can be set once the sensor is installed. This will protect from inadvertent attempts to install sensors other than the intended gas type for a specific Sensor Boards or area.
- g. Menu Functions shall be capable of being password protected with a user selectable, three digit pass code.
- h. The measuring range of the instrument shall be adjustable and user defined within the limits of the specified sensor. The Oxygen Sensor shall be configurable 0-25% and the H₂S sensor shall be configurable to the following ranges: 0..20/50/100 ppm
- i. The Sensor Boards shall have a user selectable Calibration signal that is transmitted by the 4-20 mA output anytime you access the software menu. The two possibilities shall be a steady 3 mA signal or an oscillating 3-5 mA signal with a frequency of 1 Hz. The default value shall be a steady 3 mA signal.

- j. Sensor Boards shall be capable of receiving information from a smart sensor and having all sensor information uploaded.
- k. The sensor Housing shall be Stainless Steel and shall have a removable, threaded sensor cap to allow access to the sensor.
- l. The Sensor connection shall be keyed so as to not allow mis alignment of the pin connections.
- m. The Sensor shall connect to the Sensor Boards via a ribbon cable through the Stainless Steel Sensor Housing.
- n. If the sensor is removed or not connected properly, the Sensor Boards shall display “pls con snr”
- o. For a bad or unsupported sensor the display shall read “snr err”
- p. If there is a Hardware fault, the Sensor Boards shall display “flt”
- q. The electrochemical gas sensor shall be housed within the GRP enclosure, it shall be robust to temperature, humidity and gas over range, all data shall be stored on an EEPROM on the sensor allowing for calibration remote from the Sensor Boards.
- r. The electrochemical Oxygen Sensor shall be a capillary style with a non-consumptive electrochemical reaction with a life expectancy of greater than 3 years from the time the sensor is placed into the Sensor Boards. Galvanic Style/ Self Consuming Oxygen Sensors are not acceptable.
- s. The electrochemical Oxygen sensor shall have a replaceable hydrophobic/dust filter.
- t. The electrochemical oxygen sensor shall have a temperature element integral to the sensor for temperature compensation. Temperature sensors external to the actual sensor are not acceptable.
- u. The H₂S sensor shall be a three electrode, amperometric, electrochemical sensor with a non-consuming chemical reaction.
- v. Sensor shall include a removable, replaceable hydrophobic dust filter on the inlet.
- w. Sensor shall be capable of operating in temperatures from –40 °C to 65 °C (–40 °F to 150 °F)
- x. All Electrochemical Sensors shall have a large electrolyte reservoir with a vent to relieve any internal over pressure or under-pressure.
- y. All Electrochemical Sensors shall have a PTFE lined internal electrolyte reservoir.
- z. All Sensors, Sensor Boards shall be solely manufactured by the same company.
- aa. **Methane and Hydrocarbon Vapor Sensors shall be Infrared type.**

- bb. Sensor shall be IR Type capable of operating in temperatures from $-40\text{ }^{\circ}\text{C}$ to $65\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $150\text{ }^{\circ}\text{F}$)
- cc. The IR Sensor shall have three pre-configured Gas Categories which are field programmable for Methane, Propane and Ethylene.
- dd. Setting the Target Gas Category shall be accomplished directly at the IR sensor via Magnetic Pins
- ee. The IR Sensor shall measure in the range of 0-100% LEL.
- ff. The Optical Bench of the IR sensor shall be single source/ Dual Wavelength
- gg. The IR sensor shall be heated to keep condensation from forming on the optical surfaces.
- hh. The IR Sensor shall include a Dust Filter and Cal Adapter that is permanently attached.
- ii. The IR Sensor shall have an expected Operational Life Time of > 15 years

4. Level Switch

5. Control System

- a. The Control system shall receive all information from the individual sensors, sample system and Level Switch and display all information on the front touch screen display.
- b. The system shall have individual 4-20mA output signals for each of the gas sensors that is proportional to the gas concentration, faults and maintenance signals.
- c. The system shall have relay contacts for initiating remote gas alarms or fault conditions or to act as digital inputs to other control systems.
- d. The system shall have the option of Modbus, Ethernet , or BACnet communications