**ENGINEERING SPECIFICATION**

**DT5-1112 CO Gas Transmitter & DGC5 Gas Control Panel**

**CARBON MONOXIDE (CO) SENSOR/TRANSMITTER**

1. The carbon monoxide (CO) gas sensor/transmitter shall provide monitoring of the carbon monoxide levels in the parking garage and control the ventilation system via the Digital Gas Controller (DGC5) and BAS in accordance with all applicable codes and standards.
2. The sensors shall be electrochemical type. The sensor/transmitter shall have plug-in technology for ease of troubleshooting and replacement of both the element and the printed circuit board. Solid-state sensors or air sampling devices shall not be acceptable.

1. The sensor range shall be 0-250 ppm carbon monoxide. A microprocessor-based transmitter shall communicate over serial bus. The wiring between the transmitter and the controller (DGC5) shall be a 4-wire, polarity protected daisy-chained networked configuration. Communication circuitry shall be protected from accidental application to maximum of 30V power and also short circuit and surge protection to the serial bus. Each sensor/transmitter shall cover between 5,000 and 10,000 square feet of the garage floor and placement shall be applied strategically and appropriately per floor plan requirements. The sensor shall have stability and resolution of 3.0 ppm of reading Repeatability ±3.0% of reading, Long term output drift< 0.4% signal loss/month Response time t90 < 50 sec. Sensor life expectancy 3-5 years, The permissible ambient working temperature shall be 14°F to 104°F and permissible ambient humidity shall be 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration. The manufacturer shall provide a two 2-year warranty for materials and workmanship.
2. The sensor shall have stability and resolution of 3.0 ppm of reading Repeatability ±3.0% of reading, Long term output drift< 0.4% signal loss/month Response time t90 < 50 sec. Sensor life expectancy 3-5 years, The permissible ambient working temperature shall be 14°F to 104°F and permissible ambient humidity shall be 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration. The manufacturer shall provide a two 2-year warranty for materials and workmanship
3. Each digital sensor/transmitter printed circuit board shall have the capability of adding one (1) 4-20 mA transmitter input to monitor temperature, humidity or any other gas.

1. The sensor/transmitter shall be RFI/EMI protected and contained in a NEMA4X enclosure to prevent vandalism. The enclosure for the sensor /transmitter shall be installed on walls or columns approximately 5 feet AFF.
2. The sensor/transmitter shall be NRTL performance tested and conforms to ANSI/UL 61010-1.
3. The sensor shall be able to be addressed and calibrated with a digital programming tool (DPT). The DPT shall be capable of determining if the sensing element ever needs replacement. Potentiometer calibration is not acceptable. While performing calibration at the sensor it shall be possible to communicate with the controller to change any parameters and to visually see the status of all other sensors.
4. If the level of Carbon Monoxide reaches 25 PPM in the area of detection, the low alarm shall activate and the exhaust fans will be started. If the level of CO increases to 100 PPM, the high alarm shall activate. Where VFD’s are used analog output must be provided locally to ramp up the VFD based on concentration level.
5. The contractor shall supply the PolyGard® Series DT5-1112 CO sensor/transmitter, by INTEC Controls; phone (858) 578-7887; fax (858) 578-4633.

**DIGITAL GAS CONTROL PANEL**

1. The control panel shall provide continuous monitoring of the designated gas levels in the assigned area and control the ventilation system via digital and analog outputs in accordance with all applicable codes and standards.
2. The control panel shall provide optional upward communication via BACnet, LON or MODBUS communication protocol to any compatible electronic control, DDC/PLC control or automation system. Connection shall be capable at any point on the trunk.
3. The control panel shall be capable of having 1 to 8 communication trunks, each with full trunk protection for the RS-485 and DC power. The trunks shall be capable of any distance with the appropriate number of REP5-PS1.5 repeaters/power boosters.

1. The control panel shall have the capability to accept up to 98 RS-485 digital gas transmitters of the DT5-1112 series or 48 pairs of digital/analog combinations. Each digital transmitter can connect to one 4-20 mA transmitter of any type gas or temperature or humidity transmitter to control the ventilation fans.
2. The Digital Control Panel shall provide for (5) stage thresholds for each sensor. Any of the five stages can be assigned to any one of up to (30) local or remote relay outputs. Each remote relay module shall be able to control VFDs via analog outputs. The outputs shall be programmable in the field. Each of the sensing points is freely addressable to any of the analog outputs.
3. The Digital Control Panel parameters shall be password protected. There shall be four password levels to allow operation without modifying critical parameters.
4. The system must monitor all communications and health of the system. Up to 20 system errors must be stored for review by the operator and also stored in history for review by the service technician.
5. The controller shall have (4) digital inputs that can be assigned for override or remote reset of the relays.
6. The control panel shall have a supply output of 24VDC available for remote horn/strobes.
7. The operator shall be able to connect to any digital sensor on the system via laptop to enable programming of all controller parameters and also allow display of all sensor values including alarm levels. This data can also be saved in historical csv files with time and date.
8. To facilitate system startup and lifecycle maintenance, the system shall be capable of recording sensor values, alarms and system events.
	* + 1. Sensor values shall be recorded for all active channels at a user defined interval between once every 10 seconds and once every 2 hours. The sensor value file must record the readings in scaled engineering units (i.e. PPM, %LEL, etc.) and indicate with error codes in appropriate cells if the sensor is locked (alarms inhibited), if data is unavailable due to a communication error, or if the reading of an analog channel is below 3mA.
			2. The alarm data file shall contain a time and date stamped entry each time any sensor crosses an alarm threshold both in the direction of the alarm or in the direction of return-to-normal (including hysteresis). Each alarm entry shall identify the sensor address, the gas type, the sensor reading, all currently exceeded threshold values for the channel and the relay number that is associated with each threshold alarm.
			3. The system event log file shall record communication errors and system power resets.

Data files shall be stored on commercially available, non-volatile, removable media such as a USB flash drive, in CSV or other non-proprietary text file format. For security purposes, the memory device shall not be visible when the controller is in its normal operating state. To ensure that file sizes do not exceed the limits of any analytic software, all files shall contain data for no more than one calendar day. Controllers or auxiliary data logging devices that record data in a proprietary format or which require proprietary software for viewing or analysis shall not be accepted.

1. The control panel shall have a 90db audible alarm assignable to stage level S1, S2, S3, S4, or S5. An external manual reset switch via the digital input or through the control panel menu shall acknowledge the alarm.
2. The control panel shall have status indicator LEDs located on the front; Green = Power On, Flashing Red = Alarm, Flashing Yellow = Fault/Sensor Failure.
3. The control panel shall include a two line, backlit LCD display of 16 characters per line, at 1 digit resolution.
4. The controller shall be NRTL performance tested and certified to ANSI/UL 2017.
5. The contractor shall supply the PolyGard® Series DGC5 digital controller, by INTEC Controls; phone (858) 578-7887; fax (858) 578-4633.