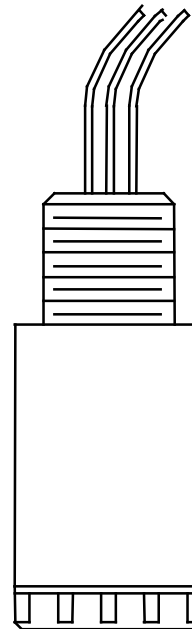
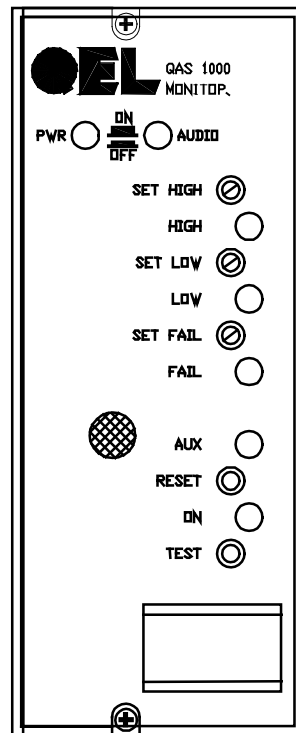


**QAS-10000 SERIES
PLUG-IN CONTROLLERS
c/w SOLID STATE SENSOR**



**INSTALLATION,
OPERATION AND MAINTENANCE
MANUAL**

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GENERAL SPECIFICATIONS:

MODEL NUMBER: _____

SERIAL NUMBER: _____

OPERATING RANGE:

GAS TYPE	ALARM SETTING	
	LOW	HIGH
<input type="checkbox"/> Carbon Monoxide	50 ppm/VE	100 ppm/VE
<input type="checkbox"/> Propane	10% LEL	20% LEL
<input type="checkbox"/> Ammonia	35 ppm	300 ppm
<input type="checkbox"/> Freon_____	500 ppm	1000 ppm
<input type="checkbox"/> Other_____	_____	_____

SENSOR: Solid State Semiconductor

Onboard Switch Setting:

A		B	
OFF	ON	OFF	ON
1 _____	1 <u>X</u>	1 _____	1 <u>X</u>
2 <u>X</u>	2 _____	2 _____	2 <u>X</u>
3 _____	3 <u>X</u>	3 _____	3 <u>X</u>
4 _____	4 <u>X</u>	4 <u>X</u>	_____
5 <u>X</u>	5 _____	5 <u>X</u>	_____
6 _____	6 <u>X</u>	6 <u>X</u>	_____
7 <u>X</u>	7 _____	7 <u>X</u>	_____
8 <u>X</u>	8 _____	8 <u>X</u>	_____
9 _____	9 <u>X</u>	9 <u>X</u>	_____
10 <u>X</u>	10 _____	10 <u>X</u>	_____

TIME DELAYS:

HIGH RELAY Immediate

LOW RELAY Immediate

AUX / FAIL RELAY Immediate

RELAYS:

HIGH RELAY Not Energized

LOW RELAY Not Energized

AUX / FAIL RELAY Energized

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QAS-10000 SERIES
PLUG-IN CONTROLLERS c/w SOLID STATE SENSOR

1. SPECIFICATIONS:

Power Supply: 120 VAC, +10% - 15%, 50 TO 60 Hz
5VA per module

Relays: Three DPDT dry contacts: Lo, Hi, Fail/Aux
240 VAC/30 VDC 5 Amp Resistive, 3.7 Amp Inductive
Field configurable latching, or non-latching
Field configurable energized, or not energized
Field configurable time delays

Audio Alarm: 85 dB at 1 foot

Panel Indicators:	Power ON	Green LED
	High Set point	Red LED
	Low Set point	Yellow LED
	Aux Set point	Red LED
	Sensor Fail indication	Red LED

Sensor: Solid State Semiconductor

Calibration: Recommended once per year.

Expected Sensor Life: In excess of 5 years

Environment: Temperature -30 C to 40 C
Humidity 0 to 90 % non-condensing

Recommended mounting height:	Carbon Monoxide	4 to 6 feet above floor
	Propane	1 foot above floor
	Ammonia	9" to 18" below ceiling
	Freon	1 foot above floor
	Other	Consult Factory

Do not mount near fans or doors where high velocity drafts occur, or where clean air enters area.

2. THEORY OF OPERATION:

The QAS-10000 series is a modular multi point hydrocarbon detector/controller designed for general-purpose applications. The QAS-10000 series detects hydrocarbons and controls three relays (DPDT) that may be used to actuate fans, alarms, etc. An internal audio alarm will sound if the sensor fails, if a high, or aux. alarm state exists (field configurable).

The sensor is a broad spectrum, economical, highly reliable sensor, with a practical life expectancy of five years minimum. The semiconductor material in the sensing element is heated to about 300 C. In the presence of a reactant gas a chemical reaction occurs at the surface, altering the quantity of Oxygen atoms adsorbed onto the surface of the semiconductor. This causes a change in the resistance of the material. The change in resistance is measured and compared to the set points to actuate relays.

These sensors are 'broad spectrum' sensors in that they respond to virtually all hydrocarbons. They are also affected to a much lesser amount by humidity and temperature.

The solid-state sensor responds to all components of vehicle exhaust. Although Carbon Monoxide is a major factor in vehicle exhaust recent research has show that the unburnt fuel has long-term exposure hazards. With a sensor response relationship of 1 part CO signal to 3 parts hydrocarbon signal, we use a times 4 compensation factor for calibration gases when this sensor is used for vehicle exhaust e.g. 200 ppm CO calibration gas calibrates for 50 ppm CO in vehicle exhaust. This calibration ensures that the atmosphere remains clean of carbon monoxide and of fuel residuals.

3. INSTALLATION:

CO: Automobile-parking garages: Mount 4-6 feet above the floor.

Bus and truck barns: Mount where vehicles exhaust upwards, it is often useful to mount the units on the ceiling.

C3H8: Propane is heavier than air. Mount close to the floor and take note of any low points where gas may pool or collect.

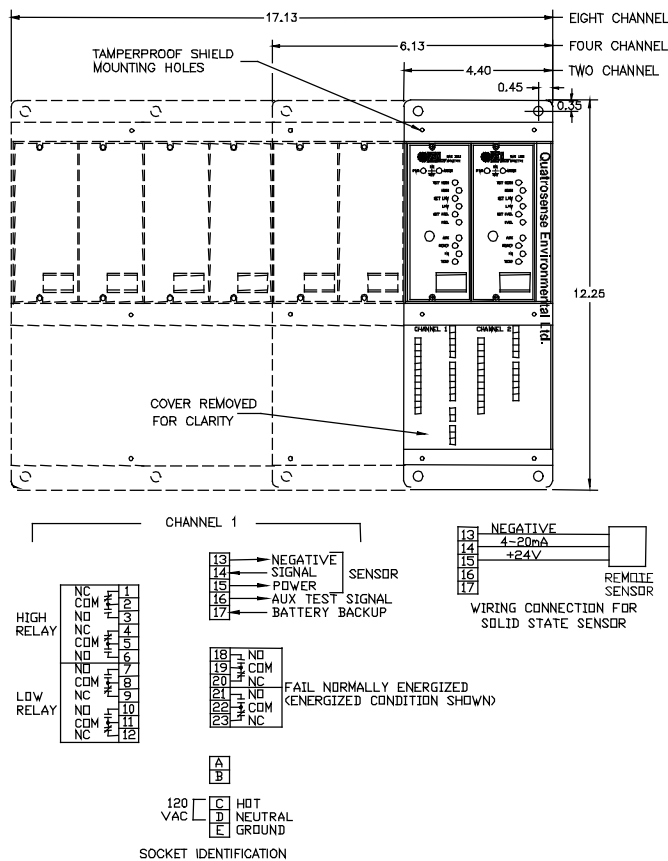
NH3: Mount at ceiling height. For high ceilings, two sensors are recommended, the second about 6 feet above the floor.

Freon: Freon gases are heavier than air. Mount near the floor and take note of any low points where gas may pool or collect:

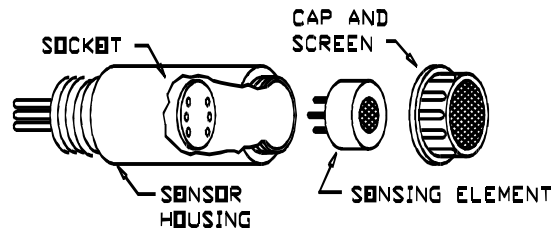
Always try to mount the unit with sensor point downwards.

Do not mount near fans, doors, or other places where high velocity occurs or where clean air enters.

Most users will find it useful to have a time delay on fan starting off 5 to 10 minutes to prevent 'nuisance' alarms.



SENSOR INSTALLATION:



3-wire sensor. Shipped loose, the sensor must be removed and mounted to the enclosure, or placed remote from the unit mounted to a standard 2" x 4" electrical junction box.

- : Red to sensor '+' (Terminal 15)
- : Black to sensor '-' (Terminal 13)
- : Yellow to signal 'sig' (Terminal 14)

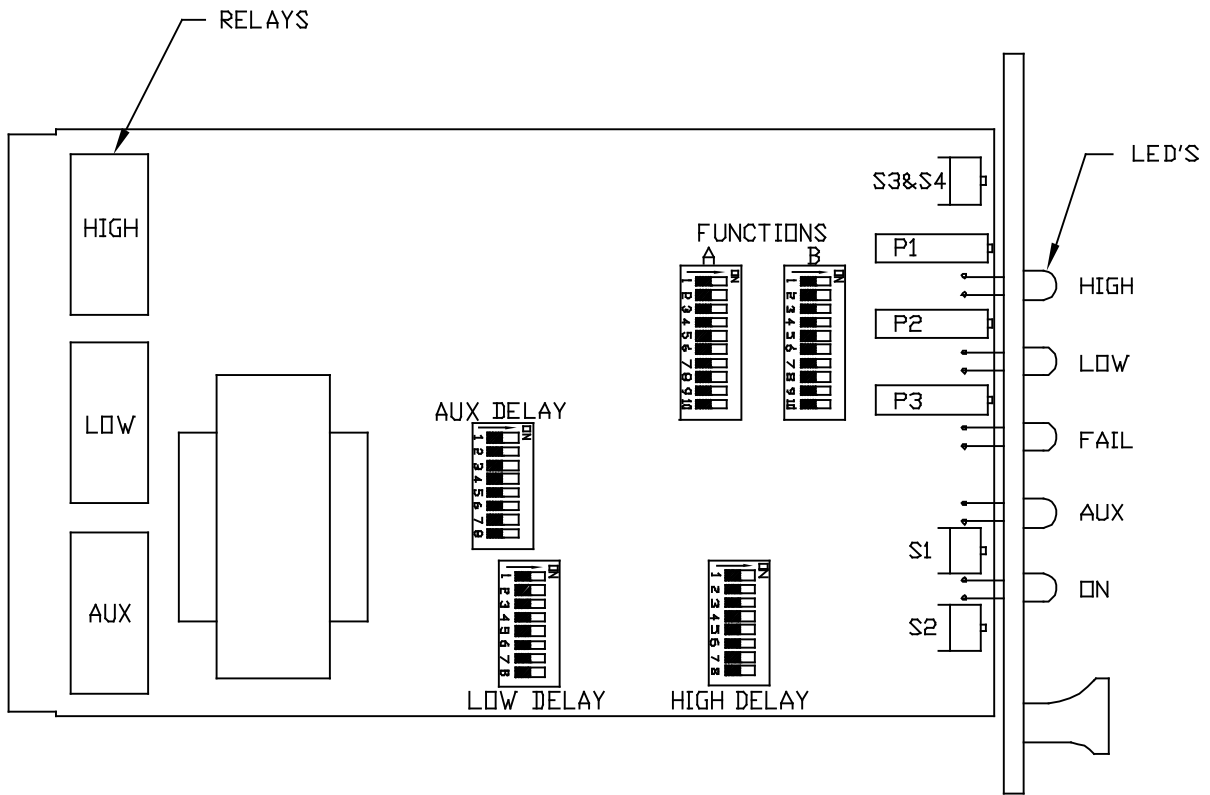
Maximum loop resistance is 35 ohms for remote sensor placement (over 4000 ft for 16 AWG standard)

FUNCTION CONTROL SWITCHES:

The QAS-10000 series has switches on the circuit board for controlling a number of functions: relay action, time delays, buzzer enable, relay actuation in case of sensor failure. Turn off power and pull the card module from the enclosure to set these switches.

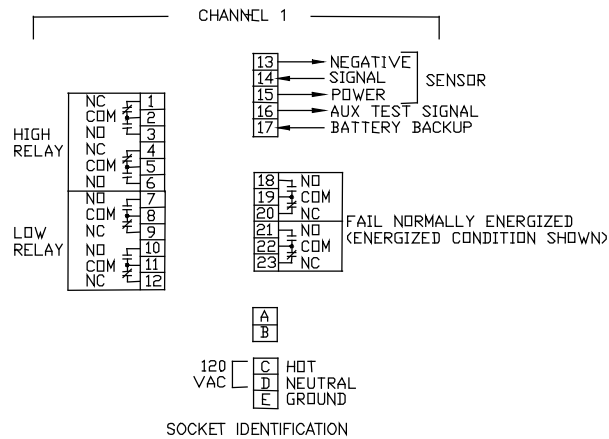
Function Switch A	Function Switch B	Low and High Relay Delay Switches	Aux/Fail Relay Delay Switches
1) Low Relay On = Not normally energized Off = Normally energized	1) Buzzer On = Sounds w/Aux. Setpoint	1) 34 seconds	1) 136 seconds
2) Low Relay On = Latching Off = Non-latching	2) Buzzer On = Sounds w/High Relay	2) 68 seconds	2) 273 seconds
3) Low Relay On = Instant actuation Off = Delayed actuation	3) Buzzer On = Sounds w/Aux. Relay	3) 136 seconds	3) 546 seconds
4) High Relay On = Not normally energized Off = Normally energized	4) Buzzer On = Latching	4) 273 seconds	4) 1092 seconds
5) High Relay On = Latching Off = Non-latching	5) Aux. Setpoint On = Ordinary setpoint Off = Fail or deficiency	5) 546 seconds	5) 2184 seconds
6) High Relay On = Instant actuation Off = Delayed actuation	6) Buzzer On = Sounds after High Delay. 2B must Be off	6) 1092 seconds	6) 4368 seconds
7) Aux. Relay On = Not normally energized Off = Normally energized	7) High Relay On = Latches after Delay	7) 2184 seconds	7) 8737 seconds
8) Aux. Relay On = Latching Off = Non-latching	8) Aux. Setpoint On = Activates High Relay	8) 4368 seconds	8) 17475 seconds
9) Aux. Setpoint On = Instant actuation	9) Aux. Setpoint On = Activates Low Relay		
10) Aux. Setpoint On = Delayed actuation	10) Aux. Relay On = High setpoint activates Aux. relay in delay mode		

Note: The LED's will always turn on immediately, regardless of switch settings.



RELAY WIRING:

The relays are double pole, double throw, meaning that each relay is two relays in one. Each "side" having one normally open contact, and one normally closed contact arranged about a common center pin.

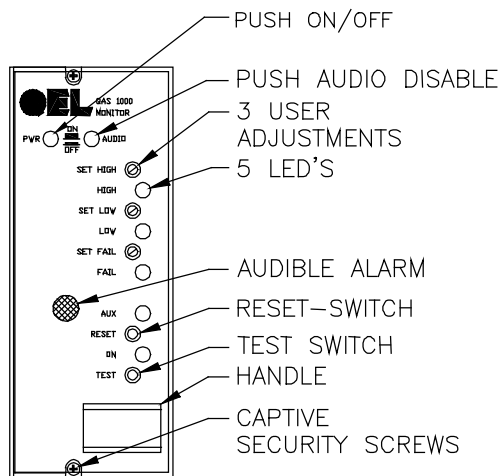


4. TURN-ON AND TROUBLE SHOOTING:

Upon unit power up, there is a characteristic turn-on cycle. As the sensor comes up to operating temperature and stabilizes, the signal may rise to high alarm before settling again to zero. This takes two or three minutes. (If relay time delays are turned on, this phase should pass without activating the relays). If the unit has been off for more than three days, it is best to wait three days before calibration to ensure that it has stabilized fully. If the unit has been off for only an hour or two wait at least an hour before calibrating.

TEST SWITCH:

Pressing the test switch on the front panel will simulate a high alarm condition. This tests the LED and relay actuation. If time delay switches are active, then the relays will activate after their proper delays.



SENSOR FAIL DETECTION:

The fail circuit detects when the sensor fails or connecting wiring is broken.

The audio alarm will sound during fail, providing that the appropriate switches are on. The low and high relays may be selected to engage during a fail condition providing the appropriate switches are on.

5. CALIBRATION PROCEDURE:

You will need two concentrations of the target gas (three if Aux. is used as a setpoint) for low and high setpoints. See 'General Specifications' on page i for concentrations.

Apply the gas at the concentration you wish to set alarm actuation, allow 1-2 minutes for the sensor to stabilize (monitor the voltage at terminals 13 and 14 on the panel if necessary) and adjust the potentiometer on the front of the QAS-10000 monitor until the appropriate LED just turns on. The sensors are quite variable from sensor to sensor and very non-linear in response to gas.

The sensors are somewhat affected by ambient humidity; but the gas supplied for compressed air cylinders is completely dry. Use a small humidifier when calibrating to give approximately ambient humidity. QEL's humidifying calibration caps give about 60% RH when fully wetted. Note that bubbler type humidifiers can give the reverse problem, which is fully saturated humidity.

A voltage reading is supplied on the panel terminal blocks for each channel. Measure between Auxiliary Setpoint Signal (Terminal 16) and Neg. (Terminal 13.). FAIL is set at 0.15 Volts at the factory.

6. WARRANTY STATEMENT:

The information contained in this manual is based upon data considered accurate; however, no warranty is expressed or implied regarding the accuracy of this data. All QEL equipment is warranted against defects in material and workmanship for a period of two years from date of shipment with the following exceptions:

Electrochemical Sensors (Toxic)	Six Months
Catalytic Sensors (Combustible)	One Year

During the warranty period we will repair or replace, at our discretion, any components or complete units that prove, in our opinion, to be defective. We are not liable for consequential or incidental damage to auxiliary interfaced equipment.

A returned material authorization number should be obtained from the factory prior to returning any goods. All return shipments must be shipped freight prepaid and a copy of the maintenance records should accompany the unit concerned.

Warranty should be considered F.O.B. the factory. Labour and travel time are chargeable for any field site visits required for warranty work.

LIMITED LIABILITY

All QEL systems shall be installed by a qualified technician/electrician and maintained in strict accordance with data provided for individual systems in the form of installation/maintenance manuals. QEL assumes no responsibility for improper installation, maintenance, etc., and stresses the importance of reading all manuals. QEL shall not be responsible for any liability arising from auxiliary interfaced equipment nor any damage resulting from the installation or operation of this equipment.

QEL's total liability is contained as above with no other liability expressed or implied, as the purchaser is entirely responsible for installation and maintenance of systems.

This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for QEL any liability in connection with the sales of our products other than that set forth herein.

NOTE: Due to on-going product development, QEL reserves the right to change specifications without notice and will assume no responsibility for any costs as a result of modifications.

For further information or assistance, contact:

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