Shocker EDGE

EARLY DETECTION OF GAS EXPOSURE

ShockerEDGE is the newest technology in more than 50 years to control a diesel engine runaway. ShockerEDGE is also the first of its kind to control a spark ignited gasoline engine.

PATENTED

We install a state-of-the-art gas sensor in the air intake system of the engine, that reads flammable gases. Unlike Cat bead/Pellister type sensors, the gas sensor calibrates itself every 2.0 seconds using up to date ambient temperature, barometric pressure, and relative humidity. It does not require bump gas, docking stations or an instrument technician to recalibrate 4 times a year.

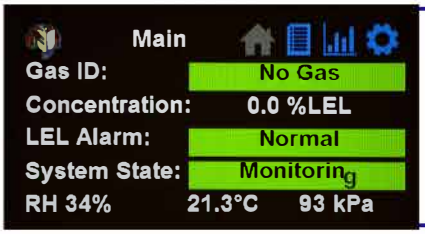
The sensor reads the chemical composition of the air being drawn into the engine, then transmits the data to the ShockerEDGE controller and the ShockerEDGE display.

Once the data is received by the controller, it can be programmed to turn the engine off at 7.5% LEL, long before a diesel engine runaway can occur, or a gasoline engine starts to backfire. The controller can also be programmed to activate your ShockerPASS air shutoff valve on a diesel engine.

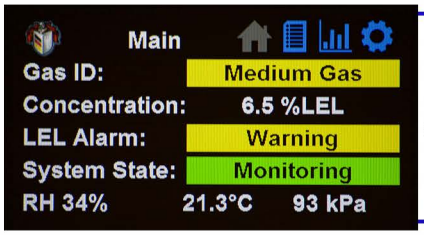
Main Screens

The data is also sent to the display, giving you a real time display of the sensors findings.

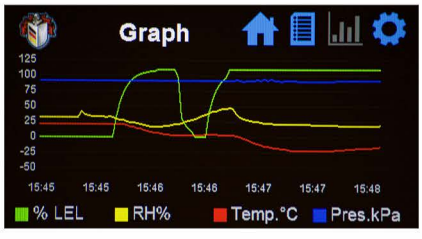
Including:
- System and sensor status
- Temperature, humidity, and barometric pressure
- Settings tab
- Gas status and identification
- Concentration of gas detected
- Alarm Status
- Data logging

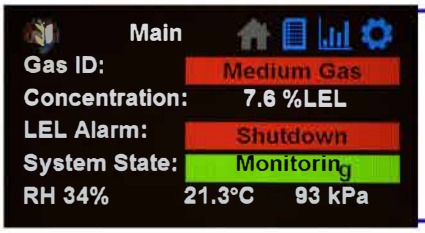


Less than 2.5% Gas Detected

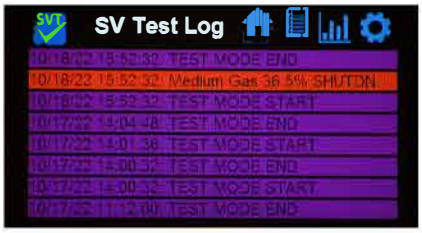


2.5% to 7.5% Gas Detected





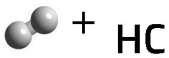
More than 7.5% Gas Detected



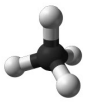
GAS CLASSIFICATION

CLASS 1: Hydrogen
Molecular Weight: 2.0 [g/mol]
Density: 0.09 [kg/m^3]
Number of Carbons: 0

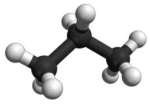
CLASS 2: Hydrogen Mixture
Avg. Mol. Weight: 1-14 [g/mol]
Avg. Density: 0.1-0.6 [kg/m^3]
Number of Carbons: varies
This classification is unique as it guarantees the presence of hydrogen and another flammable gas



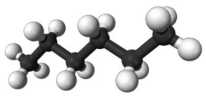
CLASS 3: Methane/Natural Gas
Avg. Mol. Weight: 16 to 19 [g/mol]
Avg. Density: 0.6-0.9 [kg/m^3]
Typical Number of Carbons: 0-2
Gases having molecular properties similar to that of methane may be classified as methane (e.g. ammonia, acetylene)



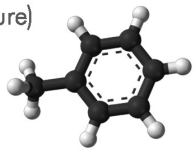
CLASS 4: Light Gas (or Light Gas Mixture)
Avg. Mol. Weight: 25 to 75 [g/mol]
Avg. Density: 1.2-2.5 [kg/m^3]
Typical Number of Carbons: 1-4
Example Gases: Ethane, Propane, Isopropanol



CLASS 5: Medium Gas (or Medium Gas Mixture)
Avg. Mol. Weight: 50 to 120 [g/mol]
Avg. Density: 1.5-4.0 [kg/m^3]
Typical Number of Carbons: 2-8
Example Gas: Pentane



CLASS 6: Heavy Gas (or Heavy Gas Mixture)
Avg. Mol. Weight: 80+ [g/mol]
Avg. Density: 3.5+ [kg/m^3]
Typical Number of Carbons: 6+
Example Gases: Octane, Toluene, Xylene



GASES

Gas	Formula	Class[5]	Detection Range [%LEL]	% Volume of gas at 100 %LEL (ISO 10156)	MPS Accuracy 0 to 50 %LEL (ISO 10156)	% Volume of gas at 100 %LEL (IEC60079-20-1)	MPS Accuracy 0 to 50 %LEL (IEC60079-20-1)
butane	C_4H_{10}	4	0-100	1.8 %VOL	±5 %LEL	1.4 %VOL	±5 %LEL
ethane	C_2H_6	4	0-100	3.0 %VOL	±5 %LEL	2.4 %VOL	±5 %LEL
hydrogen	H_2	1	0-100	4.0 %VOL	±5 %LEL	4.0 %VOL	±7 %LEL
isobutane	$HC(CH_3)_3$	4	0-100	1.8 %VOL	±5 %LEL	1.3 %VOL	±9 %LEL
isobutylene	C_4H_8	4	0-100	1.8 %VOL	±5 %LEL	1.8 %VOL	±5 %LEL
isopropanol	C_3H_8O	4	0-100	2.0 %VOL	±10 %LEL	2.0 %VOL	+20 %LEL
methane	CH_4	3	0-100	5.0 %VOL	±3 %LEL	4.4 %VOL	±3 %LEL
MEK	C_4H_8O	5	0-100	1.4 %VOL	±5 %LEL	1.5 %VOL	+16 %LEL
pentane	C_5H_{12}	5	0-100	1.5 %VOL	±5 %LEL	1.1 %VOL	±6 %LEL
propane	C_3H_8	4	0-100	2.1 %VOL	±6 %LEL	1.7 %VOL	±8 %LEL
propylene	C_3H_6	4	0-100	2.4 %VOL	±5 %LEL	2.0 %VOL	±5 %LEL
acetone	C_3H_6O	5	0-100	2.5 %VOL	+20 %LEL	2.5 %VOL	+24 %LEL
ethylene	C_2H_4	4	0-100	2.7 %VOL	−12 %LEL	2.3 %VOL	−14 %LEL
heptane	C_7H_{16}	5	0-100	1.1 %VOL	±12 %LEL	0.85 %VOL	±15 %LEL
octane	C_8H_{18}	6	0-100	1.0 %VOL	±12 %LEL	0.8 %VOL	±15 %LEL
styrene	C_8H_8	6	0-100	1.1 %VOL	−20 %LEL	1.0 %VOL	−17 %LEL
toluene	C_7H_8	6	0-100	1.2 %VOL	±12 %LEL	1.0 %VOL	±13 %LEL
xylene	C_8H_{10}	6	0-100	1.1 %VOL	±12 %LEL	1.0 %VOL	±13 %LEL

HWS has confirmed the MPS to detect diflouroethane, and diesel fuel(60*C). The MPS is also confirmed to detect other gasses including hexane, ammonia, acetylene, ethanol and methanol. The MPS does not detect Carbon Monoxide(CO) or Hydrogen Sulfide(H2S).