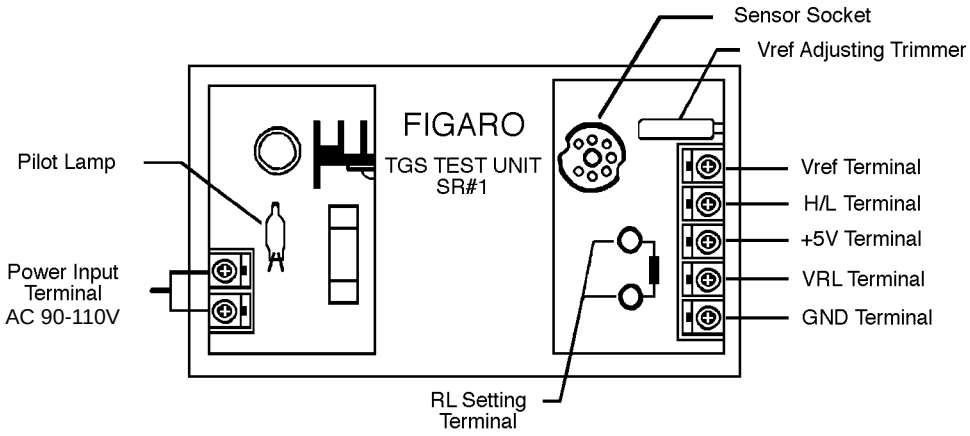
1. Function of SRD-1 Test Unit

The SRD-1 Test Unit is designed for testing and evaluating TGS Gas Sensors. By connecting this unit to a 90~110V (AC) power supply, a sensor output signal (V_{RL}) can be obtained which corresponds to a concentration of test gas in ambient air. From this output voltage, sensor resistance (Rs) can be calculated. In addition, by setting a reference voltage (Vref), a H/L level signal can be output. By using a H/L output signal, this unit can be used to control an external apparatus.

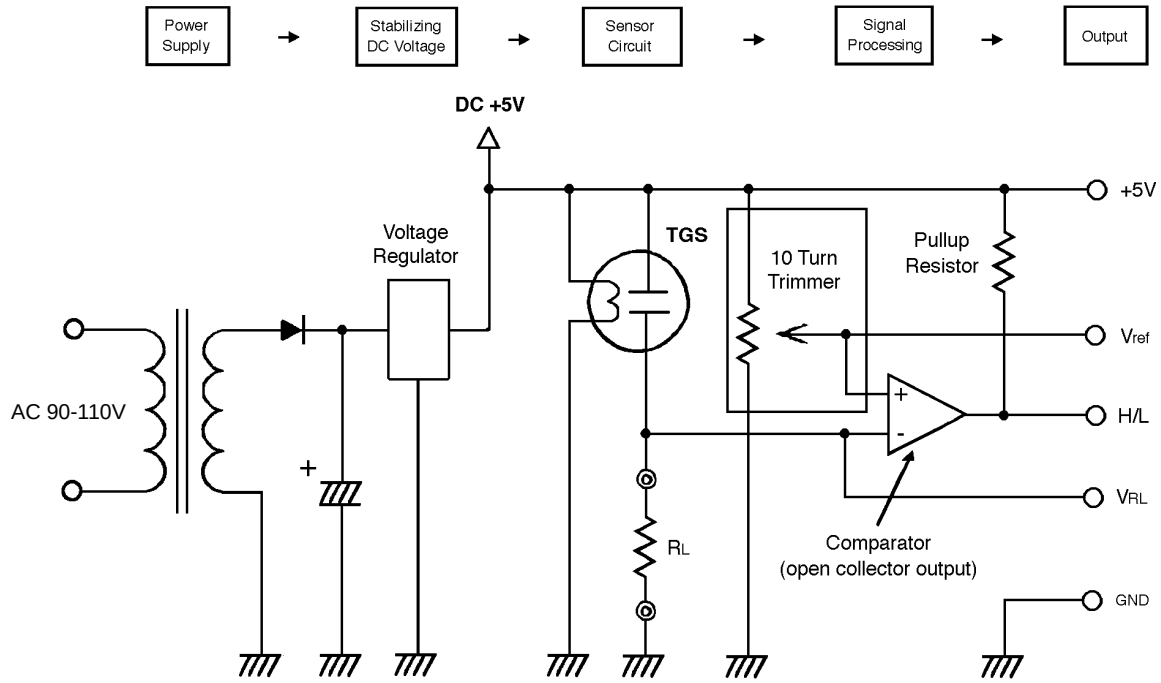
2. Specifications

Item	Specification	
Power Supply	AC 90~110V 50/60Hz	
Power Consumption	approx. 1.6W	
Sensor for Testing	TGS 8-series sensors	
Circuit Condition	V_C = DC 5V ± 5% V_H = DC 5V ± 5% R_L = variable (user defined)	
Output	Sensor Output (*V_{RL} terminal*)	Analog DC 0~5V
	V_{RL} - Vref Comparator Output (*H/L terminal*)	Digital Signal If V_{RL} < Vref, ouptut = 5.0V (H) If V_{RL} > Vref, output = 0.0V (L)
Range of Vref	DC 1.0 ~ 4.5V (controlled by 10 Turn Trimmer) (*Vref terminal*)	
Utility Output Voltage	Vout = DC 5V ± 5% Output current = 100mA max. (*+5V terminal*)	
Operating Temperature	-10˚ ~ +50˚C	
Dimensions	130mm x 77mm x 55mm	
Weight	285 grams	

3. Top View



4. Circuit Diagram

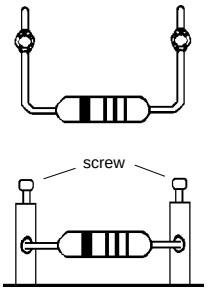


5. Operation

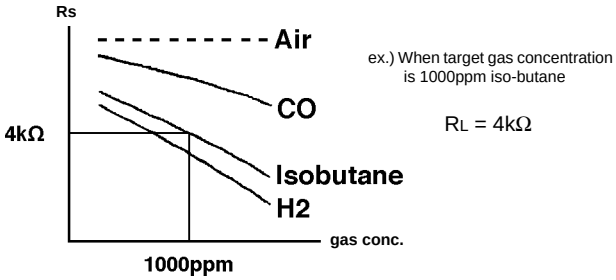
1) *Method to measure VRL*

a) The sensor to be tested should be plugged into the unit's socket (an extension cable can also be used). There is no specific direction for plugging the sensor into the socket.

b) A load resistor (RL) with a proper value is connected between the RL terminals (fixed resistor, variable resistor, etc. can be used).



c) The value of the RL should be selected at a value which is close to the sensor's resistance (Rs) in the target concentration of gas.



This selection is done to achieve the best resolution of VRL in the range of target gas concentration. However, if the RL value is too high, the circuit can easily suffer from the effects of noise because of the high impedance of the circuit. The maximum RL should be less than 100kΩ. A minimum value of RL should be more than 500Ω in order to protect the sensor from excessive current.

d) Connect AC 90~110V to the power terminals. The pilot lamp will be lit and the circuit will begin powering.

e) Connect a DMM (digital multimeter) or a pen recorder to the VRL - GND terminals. These devices are DC voltage measurement equipment, so VRL can be obtained by them. NOTE: Such measurement apparatus should have an input impedance of more than 50 times that of RL.

f) When measuring VRL, either the entire SRD-1 unit or just the sensor as connected to the extension cord should be placed into a sealed gas vessel.

2) *Adjustment method for Vref*

a) According to the results obtained in Item 5.1(c) above, the VRL at the target gas concentration should be used for the value of Vref.

b) If the Vref value identified above falls outside of specifications (see Item 2), the RL value should be changed to bring Vref within specifications.

** If Vref < 1.0V, RL should be adjusted to a larger value*
** If Vref > 4.5V, RL should be adjusted to a lower value*

If Vref falls outside of the specified range, the H/L function cannot work properly.

c) Vref value should be read by connecting a DMM or pen recorder to the Vref - GND terminals. For accuracy, the input impedance of the DC voltage meter should be greater than 1.0MΩ.

d) By turning the Vref adjustment trimmer (10 turn trimmer), Vref value can be set at the value obtained in steps a) and b) above (a clockwise turn will increase Vref).

3. How to monitor and utilize the output of VRL - Vref

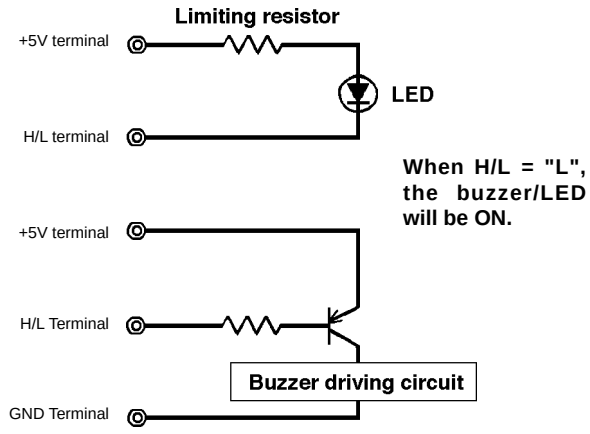
a) The H/L level can be monitored by a DC voltage meter connected between the H/L - GND terminals.

b) The H/L level output is determined by comparing the data obtained in the previous step as follows:

** If VRL < Vref, H/L = 5.0V ("H")*
** If VRL > Vref, H/L = 0.0V ("L")*

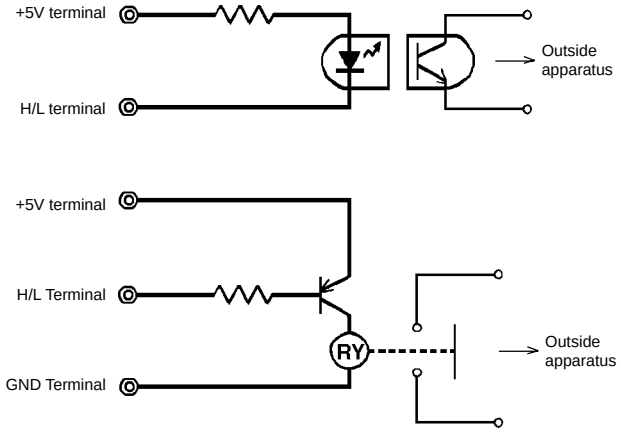
If the V_{RL} value is rather close to that of Vref, the output sometimes may cause a chattering effect (*i.e. H-L-H-L...*). To avoid this phenomenon, add a 1.0~1.5MΩ resistor between the H/L - Vref terminals.

c) If the user chooses to utilize the H/L level signal for controlling an LED or a buzzer, the following connection is recommended. In this case, a utility output voltage a 5.0V should be used.



NOTE: Current to the H/L terminal should be smaller than 20mA.

d) If the user chooses to utilize H/L output to control an outside apparatus for ON - OFF operation, use the circuit example shown below. In this case, the SR-1 unit and the outside apparatus should be isolated electronically.



6. How to Calculate Rs

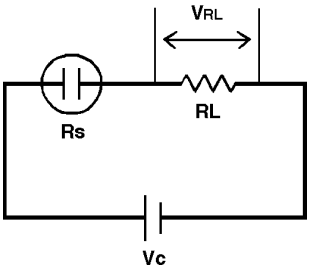
When the user evaluates TGS sensors, sensor resistance (Rs) value is more appropriate than using V_{RL}. The method to calculate Rs is as follows:

a) Set the R_L value according to the advice in Item 5.1(b). This R_L value should be measured in advance.

b) The actual value of Vc between the +5V - GND terminals should be measured during power on.

c) The measured sensor output voltage (V_{RL}), Vc, and R_L are all used to calculate Rs according to the formula shown below:

$$Rs = \frac{Vc \times RL}{VRL} - RL$$



Circuit diagram

Rs : sensor resistance (kΩ)
Vc : circuit voltage (V)
R_L : load resistor (kΩ)
V_{RL} : sensor output (V)

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