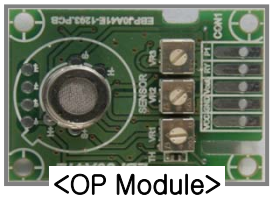
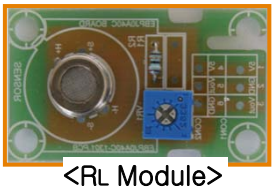
CO Sensor (Carbon monoxide) – for the detection of CO gas

It is applied detection of reducing gases (CO) for Air Cleaner and Ventilation with installing Electric · Electron Machine

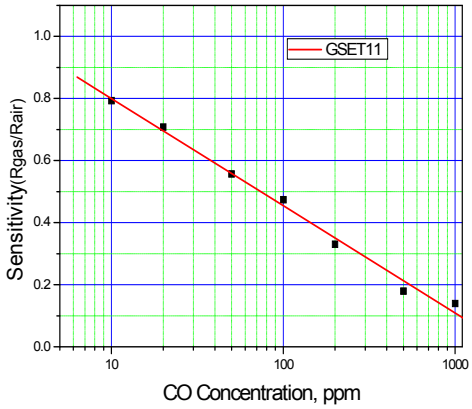
Application * Air Purifier * Damper

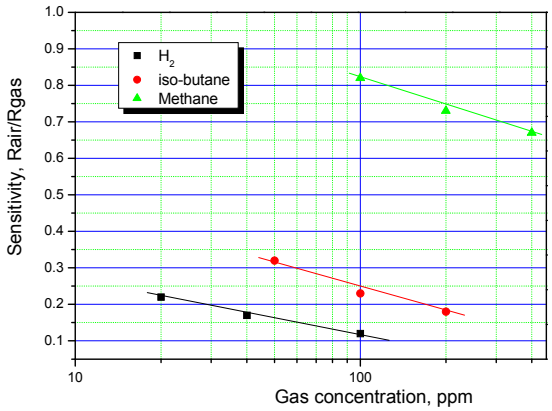

<GSET11>


<OP Module>

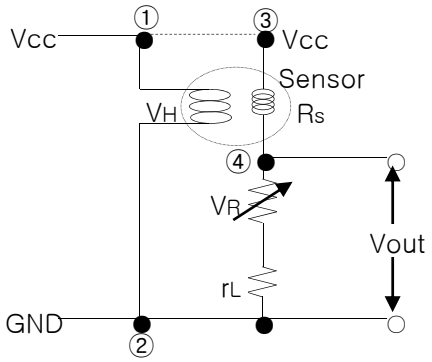

<RL Module>

1. Sensitivity characteristic slope



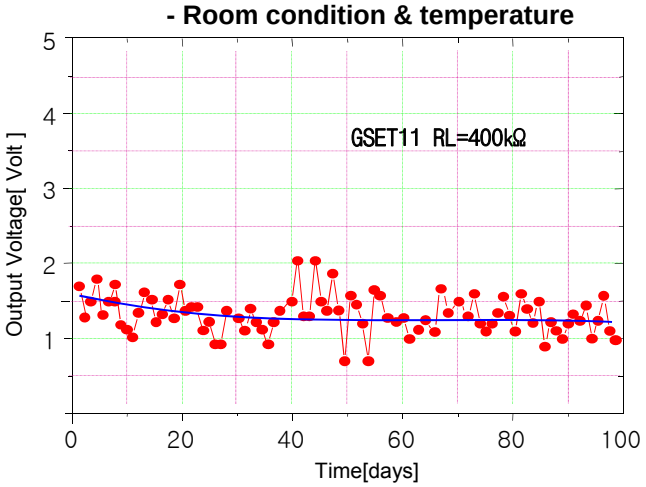


2. Basic Measuring Circuit & Stability



Vcc : Circuit Voltage(5V) VH : Heater Voltage(5V)
RL : Load Resistance Rs : Sensor Resistance
(RL=VR+rL)

Long Term Stability
- Room condition & temperature



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3. Specifications

3.1 Package (GSET11), MOQ : None

a. Characteristics

Index		Spec. & Test condition
Circuit Voltage	Vc	Sensor input Voltage :1~12Volt, Sensor Resistance : refer to Rank table
	VH	Heater input voltage : 5volt±1%, Heater Resistance : 29.0Ω±2.0Ω
	PH	Power consumption : Less than 380㎽, Inrush current : Less than 200mA
Characteristics of sensitivity (β) (Rs,gas / Rs,air)		- CO(10PPM) 0.75≤ β ≤ 0.85, CO(100PPM) 0.30≤ β ≤ 0.60 - Tobacco(2,000ppm-ESSE, KOREA) β ≤ 0.6 - Ethyl alcohol vapor (50ppm) β ≤ 0.50 (Sample is gathered by using injector(10㎖) 자소 10mm/sec speed)
Guarantee		- 3years, - Calibration interval 1years recommended
Operating environment		- Temp. : -10 ~ 50℃, Humidity : 5 ~ 90%RH, Non-condensing - Storage → Temp. : -10 ~70℃, Humidity : 0 ~90%RH
Reaction time(T90)		- Reaction Time(T90) : Less then 10sec - Recovering Time(T90) : Less then 30sec

* Rs,gas : Output Resistance after gas injection
* Rs,air : Output Resistance in Clean air
* Sensitivity(β) = Rgas/Rair

b. Sensitivity of gas concentration, Error : ±15% (Before compensation of temp. & humidity)
Ref. → Vout,air : 1.0volt (Input Voltage 5volt)

130124`

Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)
0	1.00	110	1.84	230	2.19	550	2.84
5	1.10	120	1.88	240	2.22	600	2.92
10	1.21	130	1.91	250	2.24	650	3.01
20	1.34	140	1.94	260	2.27	700	3.09
30	1.43	150	1.97	270	2.29	750	3.17
40	1.51	160	2.00	280	2.31	800	3.25
50	1.57	170	2.03	290	2.33	850	3.33
60	1.62	180	2.06	300	2.36	900	3.40
70	1.67	190	2.09	350	2.46	950	3.48
80	1.72	200	2.12	400	2.56	1,000	3.55
90	1.76	210	2.14	450	2.66		
100	1.80	220	2.17	500	2.75		

$$Con.(ppm) = 113.26043 - 271.01187 \times (Vout) + 148.17739(Vout)^2$$

	Smoke (HC)	Alcohol(C2H5OH)	Hydrogen(H2)	Butane(C4H10)
Concentration	2,000ppm	50ppm	200ppm	500ppm
Sensitivity	0.6	0.3	0.5	0.4

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c. Sensor connection

After confirm Sensor Resistance (Rs) and RL (Refer to '3.1-d'), Please connect Basic measuring circuit('2').

(Caution : Sensor Resistance can be changed, talk over my company)

- Heater(DC 5volt ± 3%) → ① : Vcc ② : GND, None Polar
- Sensor(DC/AC 0 ~ 12volt) → ③ : Vcc ④ : GND, None Polar

d. Release

GSET11-Q■ ■

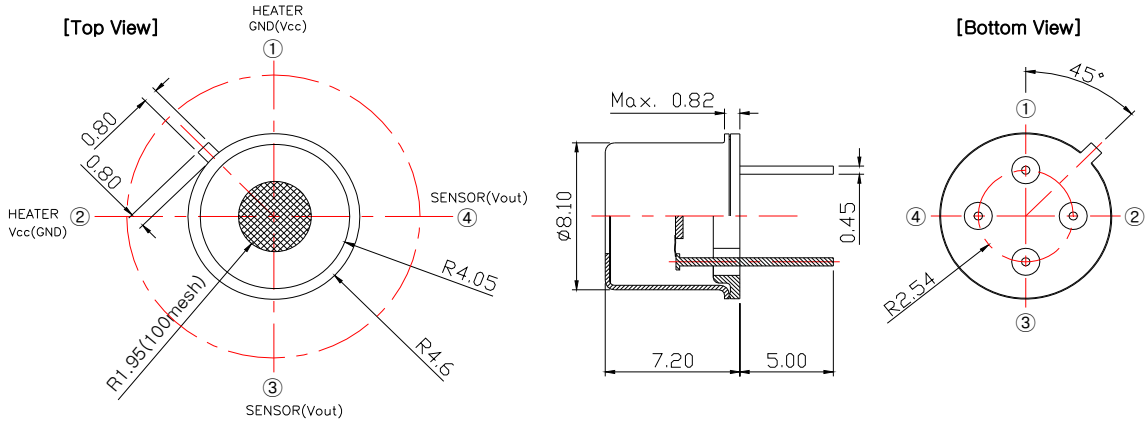
Q ■ ■ : Classified by Sensor resistance ex) Q44 -> Sensor Ra(Rs,air) : 648 ~ 784kΩ

- Sensor Resistance Table (Only package) Rank Table No. : Q

Rank No.	Q Rank Table (kΩ)		
	RL	Low limit	Hi limit
Q38	59.0	215	260
Q39	71.2	260	314
Q40	84.5	314	372
Q41	102	372	449
Q42	121	449	533
Q43	147	533	648

Rank No.	Q Rank Table (kΩ)		
	RL	Low limit	Hi limit
Q44	178	648	784
Q45	215	784	947
Q46	261	947	1,150
Q47	316	1,150	1,392
Q48	383	1,392	1,687
Q49	464	1,687	2,044

e. Structure and Dimensions



① - ② : heater
③ - ④ : sensor

f. Caution

- Please, avoid flux
- If you will do using FR-4(Epoxy PCB), have a gap of 1mm from PCB side.
- In station more than 50mm from sensor side, should be injected gases.

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3.2 OP Module (GSET11-P1xx), MOQ : None

a. Characteristics

Index		Spec. & Test condition
Circuit Voltage	Vc	Module input Voltage : 5±0.1Volt
	PH	Power consumption : 460㎽ 이하, Inrush current : Less than 140mA
Guarantee		- 3years over - Calibration interval 1years recommended
Worm up Time (T90)		- Less then 300sec
Reaction time(T90)		- Reaction Time(T90) : Less then 5sec - Recovering Time(T90) : Less then 30sec

b. Output data sheet by gas concentration

- Output data : 0.5 ~ 5Volt
- Relay Output : More than 4.0Volt
- Error : ±7% (Before temp. & humidity)

- Max. Range : 200ppm (GSET11-P1**1**X)

Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)
0	0.72	130	3.40
10	1.23	140	3.51
20	1.63	150	3.61
30	1.91	160	3.71
40	2.14	170	3.81
50	2.33	180	3.90
60	2.50	190	3.99
70	2.66	200	4.08
80	2.80	210	4.17
90	2.93	220	4.25
100	3.06	230	4.34
110	3.18	240	4.42
120	3.29	250	4.50

$$(ppm) = 7.448 - 19.757*(Vout) + 16.388*(Vout)^2$$

- Max. Range : 500ppm (GSET11-P1**2**X)

Con. (ppm)	Output(Volt)	Con. (ppm)	Output (Volt)
0	0.63	260	3.52
20	1.40	280	3.62
40	1.78	300	3.73
60	2.05	320	3.83
80	2.27	340	3.92
100	2.46	360	4.02
120	2.63	380	4.11
140	2.78	400	4.20
160	2.92	420	4.29
180	3.05	440	4.37
200	3.18	460	4.46
220	3.30	480	4.54
240	3.41	500	4.63

$$(ppm) = 16.806 - 45.739*(Vout) + 32.581*(Vout)^2$$

- Max. Range : 1,000ppm (GSET11-P1**3**X)

Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)
0	0.59	650	3.74
50	1.55	700	3.86
100	1.93	750	3.97
150	2.19	800	4.08
200	2.42	850	4.19
250	2.61	900	4.30
300	2.78	950	4.40
350	2.94	1000	4.51
400	3.09	1050	4.61
450	3.23	1100	4.71
500	3.37	1150	4.81
550	3.50	1200	4.91
600	3.62	1250	5.00

$$(ppm) = -12.256 - 30.431*(Vout) + 46.539*(Vout)^2$$

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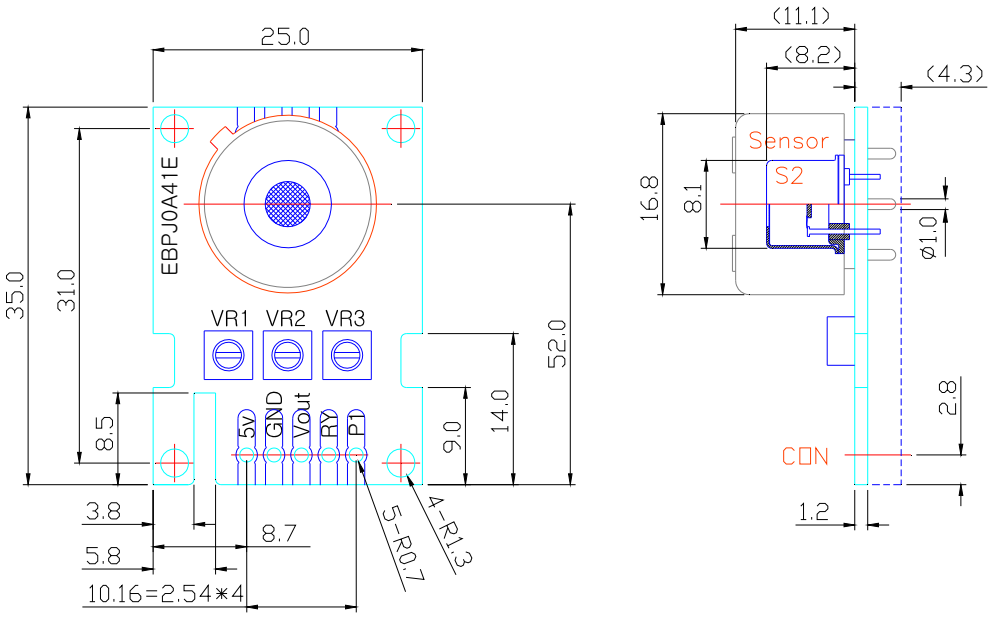
c. Structure and Dimensions



VR1 : Control of initial value in clean air
VR2 : Gain (Control of sensitivity)
VR3 : Offset (Level shift)

d. Data output

□ □ □ □
① ② ③ ④

① Vcc : 5.0volt
② GND
③ Data(Vout, analogue signal)
④ Relay

e. Relay Output

- Normal condition : Less than 0.3volt
- Hi output(4.0~4.1volt) at more than 100ppm(CO) : in case of GSET11-P11X
  at more than 200ppm(CO) : in case of GSET11-P12X
  at more than 400ppm(CO) : in case of GSET11-P13X

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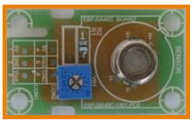
3.3 RL Module(GSET11-P3xx), MOQ : More than 1,000pcs



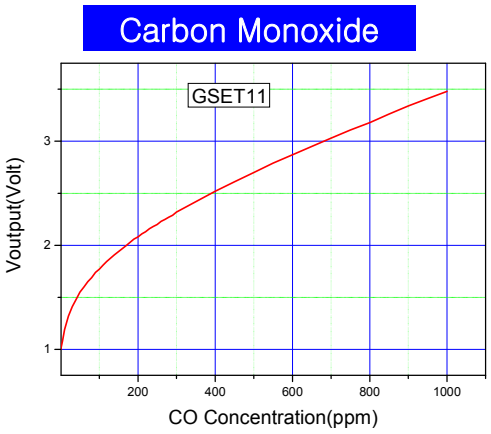
a. Characteristics

Index		Spec. & Test condition
Circuit Voltage	Vc	Module input Voltage : 5±0.1Volt
	PH	Power consumption : 450㎽ 이하, Inrush current : Less than 140mA
Characteristics of Output data		Refer to Datasheet
Guarantee		- 2years over - Calibration interval 1years recommended
Operating environment		- Temp. : -10 ~ 50℃, Humidity : 5 ~ 90%RH, Non-condensing - Storage → Temp. : -20 ~70℃, Humidity : 0 ~90%RH
Reaction time(T90)		- Reaction Time(T90) : Less then 10sec - Recovering Time(T90) : Less then 180sec

b. Output data sheet by gas concentration

Vout,air : 1.0volt (Input Voltage : 5volt)

- Error : ±15% (Before temp. & humidity)



농도 (ppm)	출력 (Volt)	농도 (ppm)	출력 (Volt)	농도 (ppm)	출력 (Volt)	농도 (ppm)	출력 (Volt)
0	1.00	110	1.84	230	2.19	550	2.84
5	1.10	120	1.88	240	2.22	600	2.92
10	1.21	130	1.91	250	2.24	650	3.01
20	1.34	140	1.94	260	2.27	700	3.09
30	1.43	150	1.97	270	2.29	750	3.17
40	1.51	160	2.00	280	2.31	800	3.25
50	1.57	170	2.03	290	2.33	850	3.33
60	1.62	180	2.06	300	2.36	900	3.40
70	1.67	190	2.09	350	2.46	950	3.48
80	1.72	200	2.12	400	2.56	1000	3.55
90	1.76	210	2.14	450	2.66		
100	1.80	220	2.17	500	2.75		

$$(ppm) = 113.260 - 271.012 * (Vout) + 148.177 * (Vout)^2$$

c. Sensor connection

- It should be noted that Con1, Con2 are different to connection.

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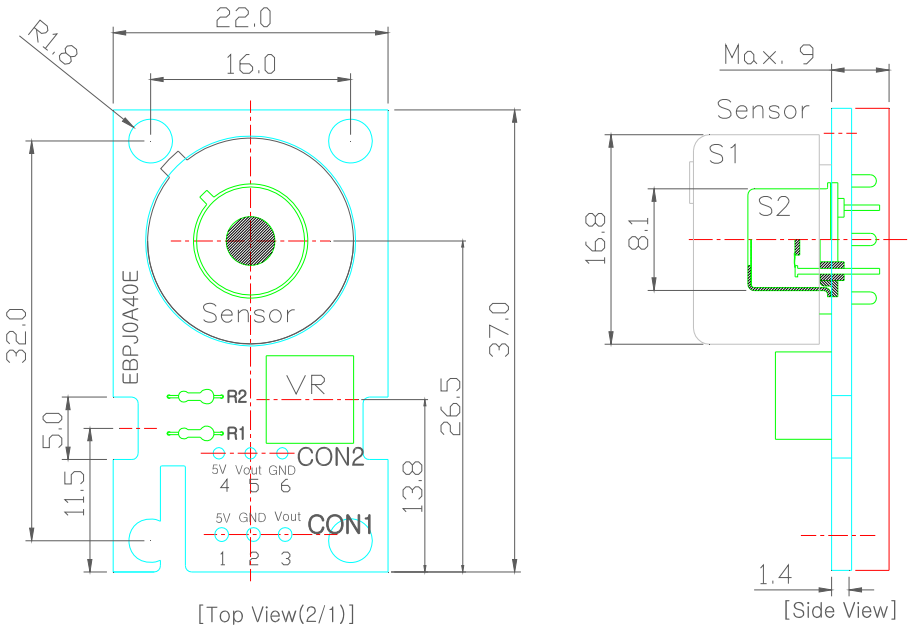
d. Structure and Dimensions



e. Data output (Should be caused CON1, CON2 connection)

CON1 □ □ □
① ② ③

CON2 □ □ □
④ ⑤ ⑥

①, ④	→	Vcc : 5.0volt
②, ⑥	→	GND
③, ⑤	→	Data(Vout, analogue signal)

3.4 Product code & characteristics

Product code	Consumption	Circuit	Output	Worm-up time
GSET11 – P1XX	390㎽ 이하	OP-Amplifying	Data : Analogue Relay : Hi(4V), Low(0V)	Long
Study– P2XX	↑	μ-processor	Data : Digital Open collect	short
GSET11 – P3XX	↑	Basic Circuit	Data : Analogue	Long

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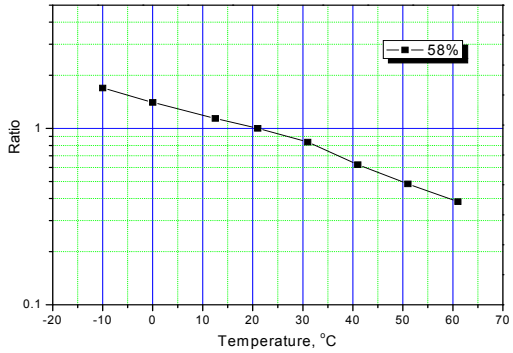
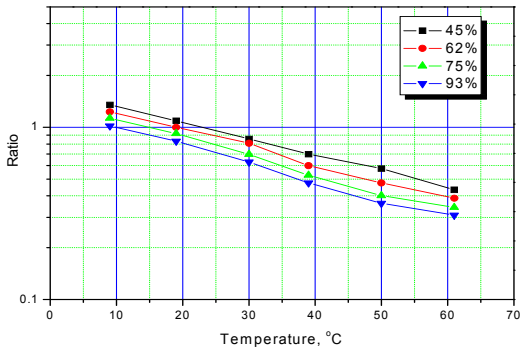
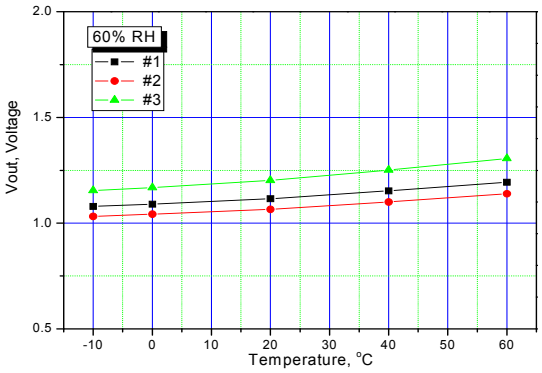
3.5 Dependency of temperature & humidity

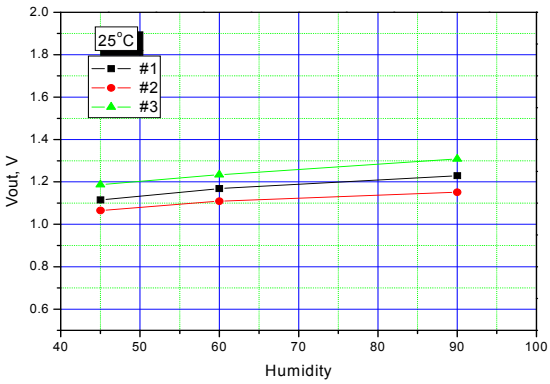
- Sensor





- Module





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4. Comparison of Products

Index	GSET11	GSET11-**P11X**	GSET11-**P21X**study	GSET11-**P3XX**
Circuit	Package	OP-Module	MP-Module	RL-Module
Target Gas	CO Gas			
Accuracy	±15%	±7%	±7%	±10%
Measuring Circuit	Basic Circuit	Op-Amp	Micro Processor	Basic Circuit
Input Voltage	5Volt±3%	←	←	←
Output	0 ~ 4volt	0 ~ 4volt	Open collect	0 ~ 4volt
MOQ	None	None	None	More than 3,000ea

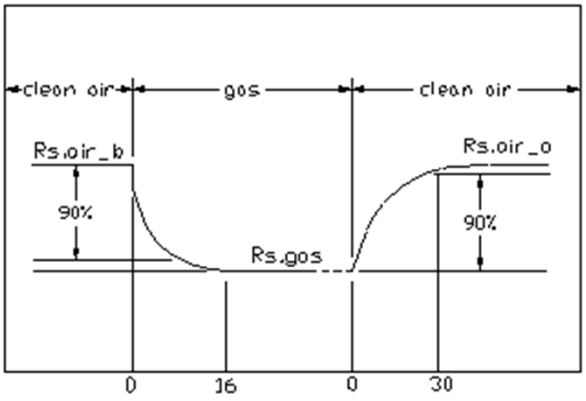
5. Reaction time(T90)

Reaction Time(T90) : Less then 10sec
[Between Rs,air_b & Rs,gas]

Recovering Time(T90) : Less then 30sec
[between Rs,gas & Rs,air_a]

Beginning stability time(T90) : Less then 10 min

Rs,air_b : Sensor Resistance without gases
Rs,gas : Sensor Resistance after blowing gases
Rs,air_a : Sensor Resistance removing gases



6. Application

* Hood, Ventilator
* Damper
* Gas Leak Alarm (Explosive gases)

7. Product code

GSET11-P■ ■ ■
1 2 3

(1) Division Circuit → 1 : Op-amp circuit 2 : Micro processor Circuit 3:Micro-processor
(2) Gas sensing range → **1: Standard**
(3) Connector → 0:None

* This Specifications are summary spec. and there is notify to can change without announcement for the development products.

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