EM-FECS(A) - Evaluation Module for FECS-series Sensors

Description:

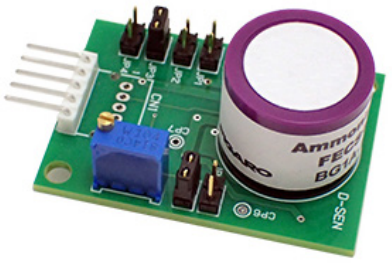
The EM-FECS(A) evaluation module is designed to perform the testing and evaluation of the three-electrode electrochemical gas sensors in the FECS-series. Since the output voltage (V_{OUT}) corresponding to the sensitivity characteristics can be obtained, the characteristics of the FECS sensor can be easily evaluated.

Features:

* Converts sensor output current to voltage output
* Compatible with all FECS-series sensors
* Anti-polarization circuit during power OFF period

Operation:

The FECS-series sensor is placed into the sensor socket on the EM-FECS(A). If target gas is present, the output current generated from the FECS-series sensor (*1) is converted into output voltage. A linear relationship exists between output voltage and target gas concentration. By measuring in advance the output voltage in a known target gas concentration, that gas concentration can be calculated from the measured output voltage values. (*2)



* Sensor not included

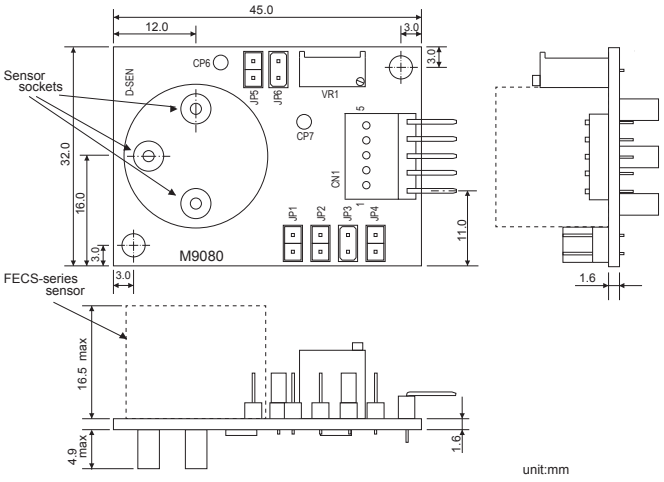
*1 For more detailed specifications of FECS-series sensors, refer to *Product Information* for each model.

*2 The main function of this module is to simply convert sensor output current into voltage output without temperature compensation.

Specifications:

Item	Specification
Model No.	EM-FECS(A)
Product name	Evaluation module for FECS-series sensors
Target gases	CO (FECS40-1000) NO (FECS41-250) NO_2 (FECS42-20) SO_2 (FECS43-20) NH_3 (FECS44-100/200/1000/5000) Cl_2 (FECS45-10) H_2S (FECS50-100)
Input voltage range (V_{IN})	5.0 ± 0.2V DC
Current consumption	<2.0mA
Output voltage (V_{OUT})	- 1.00±0.05V DC in zero air [FECS40-1000, FECS41-250, FECS43-20, FECS50-100, FECS44-100/200/1000/5000] - 4.00±0.05V DC in zero air [FECS42-20, FECS45-10]
Operating conditions	0~60˚C, <95%RH (no condensation) For more details of operating conditions, refer to Product Information for each model.

Dimensions:

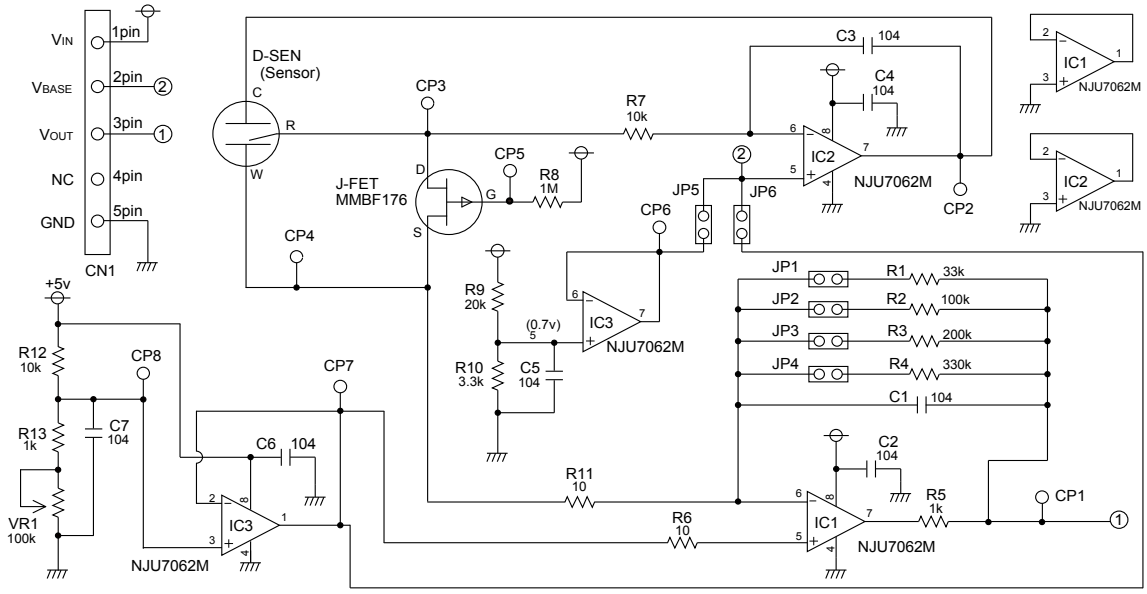


*FECS-series sensor is to be put in the sensor socket as shown in the above photo.

*Suggested female connectors mating to the 5-pin connector (JST MB5P-90S):

JST XHP-5P or JST 05JQ-BT

Schematic Diagram:



Settings by sensor model (Jumper pin connections and Volume adjustment)[*3]

Sensor Model No.	Amplifying factor for I-V conversion		Bias voltage		Base voltage	Volume adjustment
FECS40, FECS50	JP1	33,000 x	JP6	-	1.00V	No need
FECS44-5000	JP2	100,000 x	JP6	-	1.00V	No need
FECS43, FECS44-100, FECS-1000	JP3	200,000 x	JP6	-	1.00V	No need
FECS44-200	JP4	330,000 x	JP6	-	1.00V	No need
FECS41	JP1	33,000 x	JP5	+300mV	1.00V	No need
FECS42	JP3	200,000 x	JP6	-	4.00V	Necessary[*4]
FECS45	JP4	330,000 x	JP6	-	4.00V	Necessary[*4]

[*3] Jumper pins are connected to JP3 and JP6 respectively at time of factory setting.

[*4] Base voltage adjustment method: Please adjust base voltage to 4.0V by VR1 while measuring the voltage value between VBASE (Pin 2) and GND (Pin 5).

Pin connections:

Pin No.	Name	Description	
1	VIN	Input voltage	5.0±0.2V DC
2	VBASE	Base voltage	1.00V±0.05V at time of factory setting
3	VOUT	Output voltage	
4	-	No connection	
5	GND	Ground	

Sensor output current Is (μA) is calculated from output voltage VOUT (V) between Pin #3 (VOUT) and Pin #5 (GND) using the following formula:

$$Is = ((V_{OUT}[Gas] - V_{OUT}[Air]) / \text{I-V conversion amp. factor}) \times 10^6$$

where: VOUT[Air]: sensor output voltage in zero air
VOUT[Gas]: sensor output voltage in target gas

Example: When output voltage of FECS 50-100 (typical sensitivity of 0.7μA for H_2S) are as follows:

VOUT[Air] = 1.00V
VOUT[Gas] = 1.23V

$$Is = ((1.23-1.00)/33{,}000) \times 10^6 \approx 7\mu A$$

* The calculated Is value corresponds to the sensor output in around 10ppm H_2S.

Caution:
This module is designed for evaluation of the FECS-series sensors only. Please do not use this module for any other purpose.

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REV: 03/19