4-20 mA Analog Transmitter Board

NGB-3A User Manual

This manual describes the NGB-3A 4–20 mA Analog Transmitter Board ("the Product") manufactured by Nemoto & Co., Ltd.
Before using the Product, please read this manual carefully to ensure safe and proper operation. Retain this manual for future reference. If the Product is supplied with a warranty card, verify that the purchase date and distributor information have been completed and keep it together with this manual.

1. Overview

By integrating the Product into your system, gas concentration can be monitored through a standardized current output without requiring direct handling of the gas sensor signal.

- Compatible with Nemoto's proven electrochemical gas sensors, including CO, H_2S, and NH_3 models.
- Available with three connector configurations:
  Straight Pin Header / Right-Angle Pin Header / Straight Connector
- Optional 1–5 V voltage output available.

2. Product Appearance

※For ordering information, refer to Section 6, "Ordering Code."

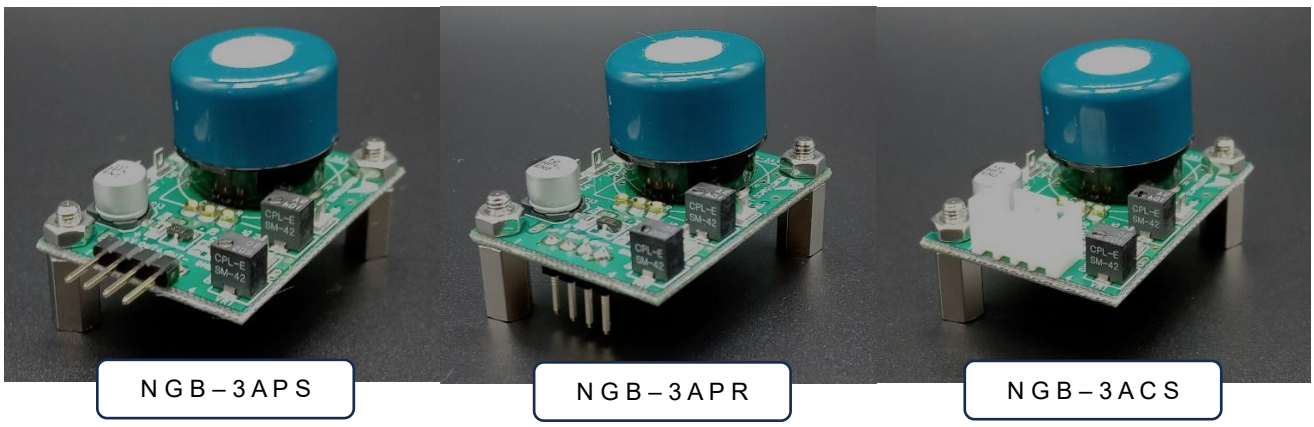

Figure 2-1 Product Appearance and Model Variations by Connector Type

3. Board Layout

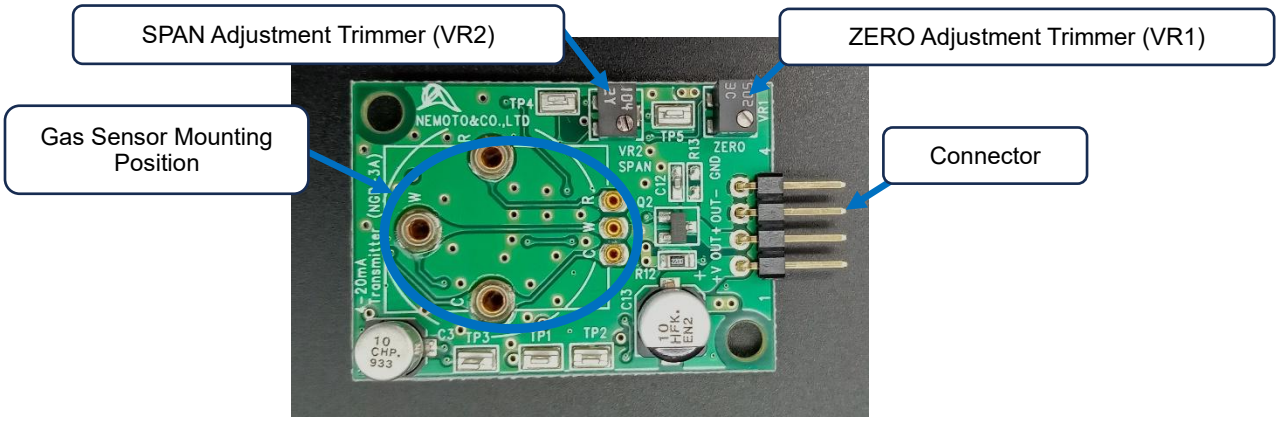

Figure 3-1 Component Identification

4. Specifications

Table 4-1 4-20mA Analog Transmitter Board Specifications

Model	**4-20mA Analog Transmitter Board NGB-3A**		
Measurement Principle	Electrochemical		
Detection Method	Diffusion Type		
Supported Sensors and Factory Calibration Ranges	Target Gas	Sensor Model	Factory Calibration Range
	CO	NAP-505R	0 - 1,000ppm
	CO	NE4-CO	0 - 1,000ppm
	H2S	NE4-H2S	0 - 100ppm
	NH3	NE4-NH3	0 - 100ppm
Sensor Protection During Power-Off	When power is removed, the sensing electrode is shorted to the reference electrode via a JFET to help protect sensor performance		
Output Signal	4–20 mA		
Power Supply	DC 12–24 V ±5% (factory calibrated at DC 15 V)		
Sensor Performance	Refer to the individual sensor technical documentation		
Output Accuracy	±0.4% F.S. (excluding sensor accuracy)		
Maximum Load Resistance	700 Ω @ DC 20 V		
Operating Conditions	Temperature: -20 to 50°C; Humidity: 15–90% RH (non-condensing)		
Storage Conditions	Temperature: -30 to 50°C; Humidity: 30–70% RH (non-condensing)		
Dimensions / Weight	40 mm × 28 mm; approx. 6 g		
Connector Options	Product Model	Connector Type	Connector Part Number
	NGB-3APS	Straight Pin Header	PSH-410256-04
	NGB-3APR	Right-Angle Pin Header	JLS-2504
	NGB-3ACS	Straight Connector	B4B-XH-A
Functions	● Zero Adjustment ● Span Adjustment (Factory settings are shown in the sensor table above.) ● Optional 1–5 V voltage output available		

Precautions

- Please read the instruction manual carefully before use.
- The ZERO adjustment trimmer (VR1) and SPAN adjustment trimmer (VR2) are factory-set to provide a 4–20 mA output range. Adjusting either trimmer will change the output scaling and calibration. Use caution when making adjustments.
- Specifications are subject to change without notice for product improvement purposes.

5. Connector Pin Assignment

Table 5-1 Connector Pin

Pin Name	Description
V＋	Power Supply Input
OUT＋	Current Output (+)
OUT－	Current Output (−)
GND	Ground

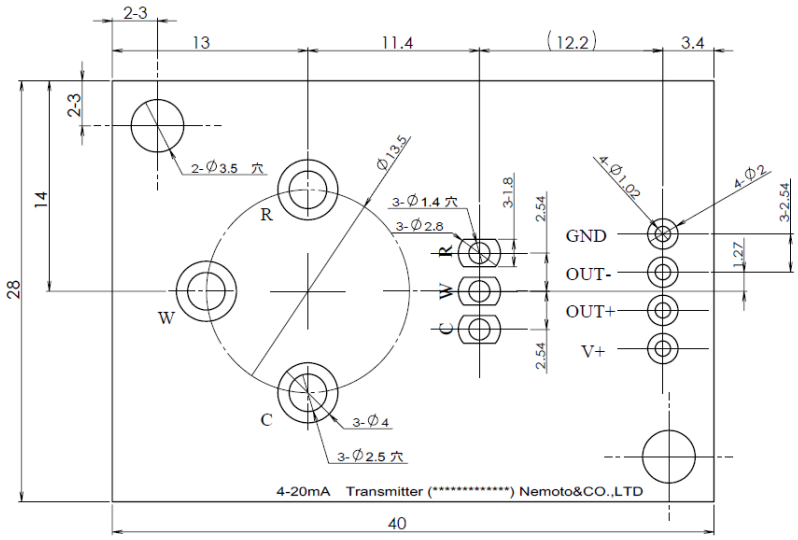

Figure 5-1 PCB Mounting Hole Dimensions

6. Ordering Code

The ordering code for this product consists of the base model number followed by the optional voltage output designation (+V) and the applicable gas sensor model number.

NGB - 3Axx (+ V) + Gas Sensor Model

NGB-3A：Product Series

xx：Connector Type

PS：Straight Pin Header

PR：Right-Angle Pin Header

CS：Straight Connector

V：Optional Voltage Output (1–5 V Output)

Gas Sensor Model：

NAP-505R

NE4-CO

NE4-H2S

NE4-NH3

Ex1：NGB-3APS ＋ NAP-505R

Ex2：NGB-3ACS ＋ V ＋ NE4-NH3

Figure 6-1 Ordering Code Structure

7. Basic Operation

The following procedure describes the basic operation of the product. Adapt the procedure as necessary to suit your specific application and measurement environment.

7.1. Install Mounting Spacers

The board includes two mounting holes for M3 metal or plastic spacers. Install the spacers using M3 nuts. If spacers are not used, place the board on an antistatic cushioned surface.

7.2. Connect the Cable

For the NGB-3ACS model, use a mating cable assembly equipped with the JST XHP-4 connector.

7.3. Install in the Measurement Environment

Install the Product in the area where gas concentration monitoring is required.

7.4. Apply Power

Connect the Product to a regulated DC power supply and apply the specified voltage.
Factory calibration and inspection are performed at DC 15 V.

7.5. Verify Zero Output

Measure the output current or voltage using a current meter, voltmeter, or digital multimeter.
Under clean-air conditions, verify that:

- Current Output: 4 mA
- Voltage Output Option: 1 V

Allow approximately 20 minutes for stabilization.

7.6. Expose to Target Gas

Expose the sensor to its specified target gas and verify that the corresponding output signal is produced.

7.7. Shutdown Procedure

After measurement is complete:

- Turn off the power supply.
- Disconnect the cable from the Product.

8. Recalibration

The NGB-3A board supports all sensor models listed in the specifications table. Whenever a sensor is replaced, recalibration of the 4–20 mA output (or optional 1–5 V output) is required.
Recalibration is also performed after repair service. Contact Nemoto if recalibration is required.

9. User Zero and Span Adjustment

All supported sensors are factory calibrated so that:

- 4 mA corresponds to zero concentration.
- 20 mA corresponds to the specified full-scale concentration.
- For voltage output models, the output range is 1–5 V.

Zero Adjustment

After powering the Product for approximately 20 minutes, adjust the ZERO trimmer (VR1) using a flat-blade screwdriver while monitoring the output signal.

CAUTION: The trimmer has no mechanical stop. Excessive rotation may damage the trimmer.

Span Adjustment

Expose the sensor to a known concentration of target gas. After the output stabilizes (approximately 5 minutes), adjust the SPAN trimmer (VR2) until the desired output value is obtained.

Zero Verification

After span adjustment:

- Stop gas exposure.
- Purge with clean air or nitrogen.
- Allow the sensor to stabilize:
  - Approx. 20 minutes for most sensors
  - Approx. 30 minutes for NH_3 sensors

The output should return within:

- ±1% of zero reading
- ±5% for NH_3 sensors

10. Troubleshooting

Symptom	Possible Cause / Corrective Action
Output current or voltage does not increase when the sensor is exposed to the target gas.	● Verify that the power supply voltage is within the specified operating range.
Output current or voltage is unstable during gas exposure.	● Allow approximately 20 minutes for the output to stabilize before use. ● Output instability may occur if airflow from air-conditioning systems, fans, or other sources is directed toward the product.

Note:

If the problem persists after performing the above actions, the product may be malfunctioning.

Please contact Nemoto or your authorized distributor for assistance.

11. Storage

- Store the product in a clean indoor environment at normal temperature and humidity levels, free from dust and organic solvents.
- Do not subject the product to strong mechanical shock, such as impact caused by dropping, even while it is in its original packaging.
- Store the product indoors and protect it from water exposure and condensation.
- The gas sensor installed in this product may deteriorate if left unpowered for an extended period. For best performance, the storage period should not exceed six months.