

FORMALDEHYDE (HCHO) SENSOR IN RAE SYSTEMS INSTRUMENTS

SPECIFICATIONS, CALIBRATION, ORDERING, AND INSTRUMENT CONFIGURATION OPTIONS

INTRODUCTION

The formaldehyde (HCHO) sensor for RAE Systems MultiRAE family and ToxiRAE Pro gas monitors can be used for a wide variety of applications, such as automobile and chemical manufacturing, construction, indoor air quality, medical, and many others.

SPECIFICATIONS

Sensor and Size Type

4R+ intelligent sensor (stores calibration information, alarm limits and other relevant data)

- Range:** 0 to 10ppm
- Resolution:** 0.05 ppm
- Response Time:** T50 < 80 seconds
- Storage Life:** 6 months in sealed container
- Warranty:** 1 year from date of shipment

Supported Monitors

- Single-gas:** ToxiRAE Pro (Model PGM-1860)
- Multi-gas:** MultiRAE Pro (PGM-6248)
MultiRAE (PGM-6228)
MultiRAE Lite Pumped (PGM-6208)
MultiRAE Lite Diffusion (PGM-6208D)

CALIBRATION INFORMATION

Calibration Gas

Carbon Monoxide gas (CO, 50 ppm) or
Formaldehyde gas (HCHO, 9 ppm)

Calibration Sequence

If the HCHO sensor is installed in the same multi-gas instrument as sensors for compounds to which the HCHO sensor has cross-sensitivities, the HCHO sensor should be calibrated first, prior to the other sensors.

ORDERING

The HCHO sensor can be ordered with the new ToxiRAE Pro and MultiRAE family of monitors listed in the “Supported Monitors” section, using the Product Assemble-to-Order (ATO) Configurator provided in the Portables Pricing Guide, or as an individual (replacement) sensor.

HCHO [Replacement] Sensor Ordering Information

Part Number: C03-0982-000

CROSS-SENSITIVITY ISSUES AFFECTING INSTRUMENT CONFIGURATIONS INVOLVING THE HCHO SENSOR

Due to the HCHO sensor’s high cross-sensitivities and long recovery times after its exposure to select compounds (especially when the sensor is installed in multi-gas monitors like the new MultiRAE), some sensor combinations cannot be supported in one multi-gas instrument. Other sensor combinations may be feasible, but users should take note of the additional operation and maintenance requirements and/or limitations prior to use for specific applications.

Cross-Interfering Compound	NH ₃ (Ammonia)	CO ₂ (Carbon Dioxide)	CH ₄ (Methane)
Cross-Interfering Compound Concentration	50 ppm	5,000 ppm	50% LEL
HCHO Sensor Cross-Sensitivity Level	None/Minimal	None/Minimal	None/Minimal

Configurations without Cross-Sensitivities

Based on the information provided in the previous table, the HCHO sensor has virtually no cross-sensitivity to the following gases, so no related issues should be expected when the HCHO sensor is installed in the same instrument as the following sensors:

- Ammonia (NH₃)
- Carbon Dioxide (CO₂)
- Methane (CH₄; catalytic bead LEL or NDIR)



Notes:

- Data in the tables within this note are based on the HCHO (formaldehyde) sensor's cross-sensitivity to a single gas of certain concentration.
 - Mixtures of gases were not tested, and results with mixed gases are unpredictable.
 - Cross-sensitivities to all the compounds are only valid for a specified concentration and may be different for higher concentrations of the same compound.
- All specifications have been verified under the following environmental conditions: temperature: 68° F (20° C); relative humidity (non-condensing): 50%; ambient pressure: 1atm (1,013 mbar)

CONFIGURATIONS REQUIRING SPECIAL ATTENTION

The HCHO sensor can be ordered with the sensors listed below, but customers should be aware of the potential issues related to sensor cross-sensitivities and slower recovery times.

- HCN (Hydrogen Cyanide)** – The HCHO sensor not only has a moderate positive cross-sensitivity to HCN gas, but it can also take up to 20 minutes to recover from exposure to HCN gas.

Cross-Interfering Compound	CO (Carbon Monoxide)	H ₂ (Hydrogen)	HCN (Hydrogen Cyanide)	N ₂ S (Hydrogen Sulfide)	C ₄ H ₈ (Isobutylene)	NO (Nitric Oxide)	PH ₃ (Phosphine)	SO ₂ (Sulfur Dioxide)
Cross-Interfering Compound Concentration	50 ppm	200 ppm	10 ppm	10 ppm	100 ppm	25 ppm	5 ppm	5 ppm
HCHO Sensor Cross-Sensitivity Level	Moderate positive	Minimal	Moderate positive	High positive	High positive	Slight positive	High positive	Moderate positive
HCHO Sensor Cross-Sensitivity Approximate Value	20%	1-2%	25%	150%+	100%+	10%	100%+	30%

PROBLEMATIC CONFIGURATIONS

Due to HCHO sensor's negative cross-sensitivities (a potential safety threat!) to respective gases specified below, the users should exercise caution when using the HCHO sensor in the same instrument as the following sensors:

- Chlorine (Cl₂)
- Nitrogen Dioxide (NO₂)

Cross-Interfering Compound	Cl ₂ (Chlorine)	NO ₂ (Nitrogen Dioxide)
Cross-Interfering Compound Concentration	1 ppm	5 ppm
HCHO Sensor Cross-Sensitivity Level	Moderate negative	Moderate negative

- H₂S (Hydrogen Sulfide)** – The HCHO sensor has a very high positive cross-sensitivity to H₂S gas and typical recovery times of up to 10 minutes.
- PH₃ (Phosphine)** – The HCHO sensor has a very high positive cross-sensitivity to PH₃ gas.
- PID (Volatile Organic Compounds)** – HCHO sensor has high cross-sensitivity and long sensor recovery time when exposed to 100 ppm or higher concentrations of Isobutylene.
 - 10 ppm Isobutylene calibration gas can be used to calibrate the PID sensor instead of 100 ppm Isobutylene to reduce its effect on the HCHO sensor.
- As illustrated in the table below, the HCHO sensor also has positive cross-sensitivities to the following gases, so caution should be taken when using respective sensors in the same instrument as the HCHO sensor:
 - Carbon Monoxide (CO)
 - Hydrogen (H₂)
 - Nitric Oxide (NO)
 - Sulfur Dioxide (SO₂)

Cross-Interfering Compound	Cl ₂ (Chlorine)	NO ₂ (Nitrogen Dioxide)
HCHO Sensor Cross-Sensitivity Approximate Value	-20%	-20%

Note: From a safety standpoint, a negative cross-sensitivity may present a higher risk than a positive one, as it will diminish a sensor's response to the target gas and so prevent an alarm.

OTHER CONFIGURATIONS

Customers wishing to order MultiRAE instruments with any other sensor combination involving the HCHO sensor should contact RAE Systems.