

MACURCO

GAS DETECTION

SECTION 28 42 00 GAS DETECTION AND ALARM

Last Updated: 10-31-24

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. [Commercial series gas detectors.](#)
 - 1. [Combo Carbon Monoxide/Nitrogen Dioxide.](#) (CX-6) (CX-12)
 - 2. [Carbon monoxide.](#) (CX-6-CO) (CX-12-CO) (CM-6) (CM-12)
 - 3. [Nitrogen dioxide.](#) (CX-6-NO2) (CX-12-NO2) (TX-6-ND) (TX-12-ND)
 - 4. [Propane.](#) (GD-6) (GD-12)
 - 5. [Methane.](#) (GD-6) (GD-12)
 - 6. [Hydrogen.](#) (GD-6) (GD-12)
 - 7. [Hydrogen sulfide.](#) (TX-6-HS) (TX-12-HS)
 - 8. [Ammonia.](#) (TX-6-AM) (TX-12-AM)
 - 9. [Oxygen.](#) (OX-6) (OX-12)
 - 10. Carbon Dioxide.
 - a. [\(CD-6MC Manual Cal Low Range\)](#)
 - b. [\(CD-12MC Manual Cal Low Range\)](#)
 - c. [\(CD-6G Manual Cal High Range 0-5 percent by vol. works with Macurco Control Panels\)](#)
 - d. [\(CD-6B Auto/Manual Cal High Range 0-5 percent by vol. does not work with Macurco Control Panels\)](#)
- B. [Detection ventilation control panels.](#)
- C. [Analog to digital converter.](#)
- D. [Horns and strobes.](#)

1.2 RELATED SECTIONS

- A. Division 16 - Electrical.

1.3 REFERENCES

- A. Canadian Standards Association (CSA):
 - 1. CAN/CSA-C22.2 - General requirements - Canadian Electrical Code, Part II.
- B. Intertek Group (ETL).

- C. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA 1 - Enclosures constructed for indoor use.
 - 2. NEMA 4x - Enclosures constructed for outdoor use and offer a superior level of protection from corrosion and extreme environments.
- D. Underwriters Laboratories (UL):
 - 1. UL 2017 - Standard for Safety General-Purpose Signaling Devices and Systems.
 - 2. UL 2075 - Standard for Gas and Vapor Detectors and Sensors
 - 3. ULC 588 - Standard for Gas and Vapour Detectors and Sensors, Including Accessories
 - 4. UL 61010-1 – Standard for Electrical Equipment for Measurement, Control, and Laboratory Use
 - 5. UL CSA C22.2#61010-1 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
- C. Verification Samples: Two representative units of each type, size, pattern and color.
- D. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
- D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
 - 1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
 - 2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
 - 3. Retain mock-up during construction as a standard for comparison with completed work.
 - 4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 PRE-INSTALLATION CONFERENCE

- A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9 WARRANTY

- A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Macurco Inc., which is located at: 1504 W. 51st Street; Sioux Falls, SD 57105

Toll Free Tel: 877-367-7891; Email: quotes@macurco.com; Web: <https://macurco.com/>

- B. Substitutions:

- 1. RKI
- 2. MSA

- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 COMMERCIAL SERIES GAS DETECTORS

- A. Features:

- 1. Certifications: ETL Listed. See detector manual for additional certifications.
- 2. Size: 4-1/2 x 4 x 2-1/8 inch (114 X 102 X 54 cm). Weight: 1 pound (0.45 kg).
- 3. Mounting: 4 x 4 inch (101 x 101 mm) electrical box.
- 4. User selectable settings with default to industry standards via two button interface.
- 5. LED Display: Can turn on/off. Easily shows gas concentrations.
- 6. End of life notification.
- 7. Fan Relay: 5 Amp SPDT.
- 8. Alarm Relay: 0.5 Amp. Control fans, valves, louvers, horn and strobes.
- 9. Outputs: 4 to 20 mA. Controls VFDs and to send to BMS. User adjustable settings.
- 10. Operating Temperature: 0 to 125 degrees F (minus 18 to 52 degrees C) unless otherwise specified.
- 11. Ambient Humidity: 10 to 90 percent RH Noncondensing.
- 12. Current Loop: Analog 4 to 20 mA, Digital with MRS-485 Adapter Digital Modbus.
- 13. Housing Color: Grey.
- 14. Housing Color: White.
- 15. Warranty Two Year Limited Warranty.
- 16. Accessories:
 - a. Control Panel: [DVP-120.](#)
 - b. Control Panel: [DVP-120M.](#)
 - c. Control Panel: [DVP-120B.](#)
 - d. Control Panel: [DVP-120C.](#)
 - e. Control Panel: [DVP-1200.](#)
 - f. Addressable Adapter [MRS-485.](#)
 - g. Horn and Strobe: [HS-A. Color: Amber.](#)

- h. Horn and Strobe: [HS-B. Color: Blue.](#)
 - i. Horn and Strobe: [HS-R. Color: Red.](#)
 - j. Horn and Strobe: [HS-C. Color: Clear.](#)
 - k. Horn and Strobe: [HS-G. Color: Green.](#)
 - l. Strobe: [MSG-A. Color: Amber.](#)
 - m. Strobe: [MSG-B. Color: Blue.](#)
 - n. Strobe: [MSG-C. Color: Clear.](#)
 - o. Strobe: [MSG-R. Color: Red.](#)
 - p. Strobe: [MSG-G. Color: Green.](#)
 - q. Horn Only: [MHG. Gray Housing.](#)
 - r. Duct Mount Kit: [DMK-1.](#)
 - s. Field Calibration Kits: Based on gas type.
 - t. Weatherproof Housing Kit: [WHK-1.](#)
 - u. Power Supply:
 - v. Model PS-24. Standalone plug in 24 VDC transformer.
 - 1) Size: 2.8 x 1.3 x 1.9 inches (71 x 33 x 48 mm).
 - 2) Input: 90 to 264 VAC.
 - 3) Output Voltage: 24 VDC. Output Current: 1.05 Amps.
 - 4) Operating Temperature: Minus 4 to 104 degrees F (Minus 20 to 40 degrees C).
- B. Gas Type: Carbon Monoxide/Nitrogen Dioxide. [Model: CX-6.](#)
- 1. Carbon Monoxide Range: 0 to 200 ppm.
 - 2. Nitrogen Dioxide Range: 0 to 20 ppm.
 - 3. Carbon Monoxide Low Level Alarm; Adjustable: 0, 15, 25, 35 (default), 50 or 100 ppm.
 - 4. Carbon Monoxide High Level Alarm; Adjustable: 0, 50, 100, 150 or 200 (default) ppm.
 - 5. Nitrogen Dioxide Low Level Alarm; Adjustable: 0, 0.5, 0.7, 1.0, 1.2, 1.5, 1.7, 2.0, 2.2, 2.5 (default), 2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0 ppm.
 - 6. Nitrogen Dioxide High Level Alarm; Adjustable: 0 to 20 ppm; (5 ppm default).
 - 7. Expected Life of Replaceable Sensor: 5 years.
 - 8. Recommended Coverage Area: 7500 sq ft (697 sq m).
 - 9. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 - 10. Certification: ETL listed to UL2075 & ULC 588, LADBS Approved
- C. Gas Type: Carbon Monoxide/Nitrogen Dioxide. [Model: CX-12.](#)
- 1. Carbon Monoxide Range: 0 to 200 ppm.
 - 2. Nitrogen Dioxide Range: 0-20 ppm.
 - 3. Low Level Alarm; Adjustable: 0, 15, 25, 35 (default), 50 or 100 ppm.
 - 4. High Level Alarm; Adjustable: 0, 50, 100, 150 or 200 (default) ppm.
 - 5. Nitrogen Dioxide Low Level Alarm; Adjustable: 0, 0.5, 0.7, 1.0, 1.2, 1.5, 1.7, 2.0, 2.2, 2.5 (default), 2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0 ppm.
 - 6. Nitrogen Dioxide High Level Alarm; Adjustable: 0 to 20 ppm; (5 ppm default).
 - 7. Expected Life of Replaceable Sensor: 5 years.
 - 8. Recommended Coverage Area: 7500 sq ft (697 sq m).
 - 9. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 - 10. Certification: Complies to UL2075, LADBS Approved
- D. Gas Type: Carbon Monoxide. [Model: CX-6-CO.](#)
- 1. Carbon Monoxide Range: 0 to 200 ppm.
 - 2. Carbon Monoxide Low Level Alarm; Adjustable: 0, 15, 25, 35 (default), 50 or 100 ppm.
 - 3. Carbon Monoxide High Level Alarm; Adjustable: 0, 50, 100, 150 or 200 (default) ppm.
 - 4. Expected Life of Replaceable Sensor: 5 years.

5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: ETL listed to UL2075 & ULC 588, LADBS Approved
- E. Gas Type: Carbon Monoxide/Nitrogen Dioxide. [Model: CX-12-CO](#).
1. Carbon Monoxide Range: 0 to 200 ppm.
 2. Low Level Alarm; Adjustable: 0, 15, 25, 35 (default), 50 or 100 ppm.
 3. High Level Alarm; Adjustable: 0, 50, 100, 150 or 200 (default) ppm.
 4. Expected Life of Replaceable Sensor: 5 years.
 5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 12-Series:
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: Complies to UL2075, LADBS Approved
- F. Gas Type: Nitrogen Dioxide. [Model: CX-6-NO2](#).
1. Nitrogen Dioxide Range: 0 to 20 ppm.
 2. Nitrogen Dioxide Low Level Alarm; Adjustable: 0, 0.5, 0.7, 1.0, 1.2, 1.5, 1.7, 2.0, 2.2, 2.5 (default), 2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0 ppm.
 3. Nitrogen Dioxide High Level Alarm; Adjustable: 0 to 20 ppm; (5 ppm default).
 4. Expected Life of Replaceable Sensor: 5 years.
 5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: ETL listed to UL2075 & ULC 588, LADBS Approved
- G. Gas Type: Nitrogen Dioxide. [Model: CX-12-NO2](#).
1. Nitrogen Dioxide Range: 0-20 ppm.
 2. Nitrogen Dioxide Low Level Alarm; Adjustable: 0, 0.5, 0.7, 1.0, 1.2, 1.5, 1.7, 2.0, 2.2, 2.5 (default), 2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0 ppm.
 3. Nitrogen Dioxide High Level Alarm; Adjustable: 0 to 20 ppm; (5 ppm default).
 4. Expected Life of Replaceable Sensor: 5 years.
 5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 12-Series:
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: Complies to UL2075, LADBS Approved
- H. Gas Type: Carbon Monoxide. [Model: CM-6](#).
1. Range: 0 to 200 ppm.
 2. Low Level Alarm; Adjustable: 0, 15, 25, 35 (default), 50 or 100 ppm.
 3. High Level Alarm; Adjustable: 0, 50, 100, 150 or 200 (default) ppm.
 4. Expected Life of Sensor: 10 years.
 5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: ETL listed to UL2075, CE, LADBS Approved
- I. Gas Type: Carbon Monoxide. [Model: CM-12](#).
1. Range: 0 to 200 ppm.
 2. Low Level Alarm; Adjustable: 0, 15, 25, 35 (default), 50 or 100 ppm.
 3. High Level Alarm; Adjustable: 0, 50, 100, 150 or 200 (default) ppm.

4. Expected Life of Sensor: 10 years.
 5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: ETL listed to UL2075, LADBS Approved
- J. Gas Type: Nitrogen Dioxide. Model: [TX-6-ND](#).
1. Range: 0-20 ppm.
 2. Low Level Alarm; Adjustable: 0, 0.5, 0.7, 1.0, 1.2, 1.5, 1.7, 2.0, 2.2, 2.5 (default), 2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0 ppm.
 3. High Level Alarm; Adjustable: 0 to 20 ppm, (5 ppm default).
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: ETL Listed to 61010-1
- K. Gas Type: Nitrogen Dioxide. Model: [TX-12-ND](#).
1. Range: 0-20 ppm.
 2. Low Level Alarm; Adjustable: 0, 0.5, 0.7, 1.0, 1.2, 1.5, 1.7, 2.0, 2.2, 2.5 (default), 2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0 ppm.
 3. High Level Alarm; Adjustable: 0 to 20 ppm; (5 ppm default).
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 7500 sq ft (697 sq m).
 6. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: ETL Listed to 61010-1
- L. Gas Type: Propane. Model: [GD-6](#).
1. Range: 0 to 50 percent Lower Explosive Limit (LEL).
 2. Low Level Alarm; Adjustable: 0, 3, 4, 5, 6, 7, 8, 9, 10 (default), 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 percent LEL.
 3. High Level Alarm; Adjustable: OFF, 5, 10, 15, 20 (default), 25 percent LEL.
 4. Expected Life of Sensor: 5 years.
 5. Recommended Coverage Area: Up to 1,257 sq ft (116.8 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: UL2075, CE, ULC S588
- M. Gas Type: Propane. Model: [GD-12](#).
1. Range: 0 to 50 percent Lower Explosive Limit (LEL).
 2. Low Level Alarm; Adjustable: 0, 3, 4, 5, 6, 7, 8, 9, 10 (default), 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 percent LEL.
 3. High Level Alarm; Adjustable: OFF, 5, 10, 15, 20 (default), 25 percent LEL.
 4. Expected Life of Sensor: 5 years.
 5. Recommended Coverage Area: Up to 1,257 sq ft (116.8 sq m).
 6. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: Complies to UL2075, ETL Listed to 61010-1
- N. Gas Type: Methane. Model: [GD-6](#).
1. Range: 0 to 50 percent Lower Explosive Limit (LEL).

2. Low Level Alarm; Adjustable: 0, 3, 4, 5, 6, 7, 8, 9, 10 (default), 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 percent LEL.
 3. High Level Alarm; Adjustable: OFF, 5, 10, 15, 20 (default), 25 percent LEL.
 4. Expected Life of Sensor: 5 years.
 5. Recommended Coverage Area: Up to 1,257 sq ft (116.8 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: UL2075, CE, ULC S588
- O. Gas Type: Methane. [Model: GD-12.](#)
1. Range: 0 to 50 percent Lower Explosive Limit (LEL).
 2. Low Level Alarm; Adjustable: 0, 3, 4, 5, 6, 7, 8, 9, 10 (default), 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 percent LEL.
 3. High Level Alarm; Adjustable: OFF, 5, 10, 15, 20 (default), 25 percent LEL.
 4. Expected Life of Sensor: 5 years.
 5. Recommended Coverage Area: Up to 1,257 sq ft (116.8 sq m).
 6. Voltage and Current: 12-Series:
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: Complies to UL2075, ETL Listed to 61010-1
- P. Gas Type: Hydrogen. [Model: GD-6.](#)
1. Range: 0 to 50 percent Lower Explosive Limit (LEL).
 2. Low Level Alarm; Adjustable: 0, 3, 4, 5, 6, 7, 8, 9, 10 (default), 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 percent LEL.
 3. High Level Alarm; Adjustable: OFF, 5, 10, 15, 20 (default), 25 percent LEL.
 4. Expected Life of Sensor: 5 years.
 5. Recommended Coverage Area: Up to 1,257 sq ft (116.8 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: UL2075, CE, ULC S588
- Q. Gas Type: Hydrogen. [Model: GD-12.](#)
1. Range: 0 to 50 percent Lower Explosive Limit (LEL).
 2. Low Level Alarm; Adjustable: 0, 3, 4, 5, 6, 7, 8, 9, 10 (default), 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 percent LEL.
 3. High Level Alarm; Adjustable: OFF, 5, 10, 15, 20 (default), 25 percent LEL.
 4. Expected Life of Sensor: 5 years.
 5. Recommended Coverage Area: Up to 1,257 sq ft (116.8 sq m).
 6. Voltage and Current: 12-Series:
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: Complies to UL2075, ETL Listed to 61010-1
- R. Gas Type: Hydrogen Sulfide. [Model: TX-6-HS.](#)
1. Range: 0 to 50 ppm.
 2. Low Level Alarm; Adjustable: 0, 2, 3, 4, 5, 6, 7, 8 (default), 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 ppm.
 3. High Level Alarm; Adjustable: 0, 5, 10, 15, 20 (default), 25, 30, 35, 40, 45, 50 ppm.
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 900 sq ft (83.6 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.

7. Certification: ETL Listed to 61010-1
- S. Gas Type: Hydrogen Sulfide. [Model: TX-12-HS.](#)
1. Range: 0 to 50 ppm.
 2. Low Level Alarm; Adjustable: 0, 2, 3, 4, 5, 6, 7, 8 (default), 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 ppm.
 3. High Level Alarm; Adjustable: 0, 5, 10, 15, 20 (default), 25, 30, 35, 40, 45, 50 ppm.
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 900 sq ft (83.6 sq m).
 6. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: ETL Listed to 61010-1
- T. Gas Type: Ammonia. [Model TX-6-AM.](#)
1. Range: 0 to 100 ppm.
 2. Low Level Alarm; Adjustable: 0, 15, 20, 25 (default), 30, 35, 40, 45, 50, 55, 60, 65, 70, or 75 ppm.
 3. High Level Alarm; Adjustable: 0, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75 (default), 80, 85, 90, 95 or 100 ppm.
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 900 sq ft (83.6 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: ETL Listed to 61010-1
- U. Gas Type: Ammonia. [Model TX-12-AM.](#)
1. Range: 0 to 100 ppm.
 2. Low Level Alarm; Adjustable: 0, 15, 20, 25 (default), 30, 35, 40, 45, 50, 55, 60, 65, 70, or 75 ppm.
 3. High Level Alarm; Adjustable: 0, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75 (default), 80, 85, 90, 95 or 100 ppm.
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 900 sq ft (83.6 sq m).
 6. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: ETL Listed to 61010-1
- V. Gas Type: Oxygen. [Model: OX-6.](#)
1. Range: 0 to 25 percent V/V.
 2. Low Level Alarm; Adjustable: 0, 18, 18.1, 20.2 (default), 20.3, 20.4, 20.5 v/v and high 23.5 percent v/v; preset.
 3. High Level Alarm; Adjustable: 0, 18.5, 19, 19.5 (default), 20, 20.5 and high 23.5 percent v/v; preset.
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 900 sq ft (83.6 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
 7. Certification: ETL Listed to 61010-1
- W. Gas Type: Oxygen. [Model: OX-12.](#)
1. Range: 0 to 25 percent V/V.
 2. Low Level Alarm; Adjustable: 0, 18, 18.1, 20.2 (default), 20.3, 20.4, 20.5 v/v and high 23.5 percent v/v; preset.

3. High Level Alarm; Adjustable: 0, 18.5, 19, 19.5 (default), 20, 20.5 and high 23.5 percent v/v; preset.
 4. Expected Life of Replaceable Sensor: 2 years.
 5. Recommended Coverage Area: 900 sq ft (83.6 sq m).
 6. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
 7. Certification: ETL listed to 61010-1
- X. Gas Type: Carbon Dioxide. [Model: CD-6MC \(Manual Cal\)](#).
1. Range: 0 to 5000 ppm.
 2. Low Level Alarm; Adjustable: 0, 600, 700, 800, 900, 1000 (default), 1100, 2000 to 5000 ppm.
 3. High Level Alarm; Adjustable: 0, 900, 1000, 1100, 4000 (default), to 5000 ppm.
 4. Expected Life of Replaceable Sensor: 15 years.
 5. Recommended Coverage Area: 900 to 5000 sq ft (83.6 to 454.5 sq m).
 6. Voltage and Current: 6-Series:
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
- Y. Gas Type: Carbon Dioxide. [Model: CD-12MC \(Manual Cal\)](#).
1. Range: 0 to 5000 ppm.
 2. Low Level Alarm; Adjustable: 0, 600, 700, 800, 900, 1000 (default), 1100, 2000 to 5000 ppm.
 3. High Level Alarm; Adjustable: 0, 900, 1000, 1100, 4000 (default), to 5000 ppm.
 4. Expected Life of Replaceable Sensor: 15 years.
 5. Recommended Coverage Area: 900 to 5000 sq ft (83.6 to 454.5 sq m).
 6. Voltage and Current: 12-Series.
 - a. Power: 100 to 240 VAC (50 to 60 Hz).
 - b. Current: 1.0 A maximum.
- Z. Gas Type: Carbon Dioxide. [Model: CD-6G \(Manual Cal High Range 0 to 5 percent by vol. works with Macurco Control Panels\)](#).
1. Range: 0 to 5 percent by volume.
 2. Low Level Alarm; Adjustable: OFF, 0.09, 0.1, 0.11, 0.12, 0.13, 0.14, 0.15, 0.16, 0.17, 0.18, 0.19, 0.2 (default), 0.21, 0.22, 0.23, 0.24, 0.25, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00.
 3. High Level Alarm; Adjustable: OFF, 0.09, 0.1, 0.11, 0.12, 0.13, 0.14, 0.15, 0.16, 0.17, 0.18, 0.19, 0.2, 0.21, 0.22, 0.23, 0.24, 0.25, 0.50 (default), 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00.
 4. Expected Life of Sensor: 15 years.
 5. Recommended Coverage Area: 900 to 5000 sq ft (83.6 to 454.5 sq m).
 6. Voltage and Current: 6-Series.
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.
- AA. Gas Type: Carbon Dioxide. [Model: CD-6B \(Auto/Manual Cal High Range 0 to 5 percent by volume does not work with Macurco Control Panels\)](#).
1. Range: 0 to 5 percent by Vol.
 2. Low Level Alarm; Adjustable: OFF, 0.25, 0.50 (default), 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00.
 3. Medium Level Alarm; Adjustable: OFF, 0.25, 0.50, 1.00, 1.50 (default), 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00.
 4. High Level Alarm; Adjustable: OFF, 0.25, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00 (default), 3.50, 4.00, 4.50, 5.00.

5. Expected Life of Sensor: 15 years.
6. Recommended Coverage Area: 900 to 5000 sq ft (83.6 to 454.5 sq m).
7. Voltage and Current: 6-Series.
 - a. Power: 3 Watts maximum from 12 to 24 VAC or 12 to 32 VDC.
 - b. Current at 24 VDC: 75 mA in alarm, 50 mA fan relay on, and 23 mA stand by.

2.3 DETECTION VENTILATION CONTROL PANELS

- A. [Model: DVP-120B](#). BACnet - 99 Digital Connections. BACnet MSTP output.
- B. [Model: DVP-120C](#). BACnet - 99 Digital Connections. Title 24 compliant; carbon monoxide and nitrogen dioxide only.
- C. [Model: DVP-120M](#). 87 digital sensor connections (RS-485) and 12 analog (4 to 20 mA) sensor connections.
- D. [Model: DVP-120](#). 12 Analog (4 to 20 mA) sensor connections.
 1. Certifications:
 - a. ETL Listed to UL 2017.
 - b. CAN/CSA-C22.2 No.
 - c. 14-13, LADBS Approved.
 2. Size: 10.5 x 12.5 x 2 inches (267 X 318 X 51 mm). Weight: 6.5 lbs (2.9 kg).
 3. Compatible with Macurco 6-Series.
 4. Auto recognizes Macurco detectors.
 5. Voltage Current: Power Input: 90 to 250 VAC, 1 Amp, 47 to 63 Hz, single phase.
 6. Operating Temperature: 32 to 120 degrees F (0 to 49 degrees C).
 7. Two Drivers for Horns and Strobes: 24 VDC.
 8. Ambient Humidity: 0 to 90 percent RH non-condensing.
 9. Settings: Customizable, default is per OSHA.
 10. LCD Display: 2 rows of 16 characters with backlight.
 11. Settings: External keypad for user selection of transducer and alarm display and setting the configuration.
 12. Relays: Three 10 Amp, 240 VAC SPDT fan and alarm.
 13. Status Indicators: (LED): Power, Alarm and warning, hush, Relay 1, 2, and 3.
 14. Alarms: Drivers for external Horn and Strobe, externally visible system, alarm and relay status indicators.
 15. Enclosure: Lockable NEMA 1 type enclosure.
 16. Mounting: Mounting holes in each corner.
 17. Warranty: Two-year limited warranty.
 18. Accessories:
 - a. Model MRS-485. Addressable Adapter; 6 series only.
 - b. Horn and Strobe: Model HS-A. Color: Amber.
 - c. Horn and Strobe: Model HS-B. Color: Blue.
 - d. Horn and Strobe: Model HS-R. Color: Red.
 - e. Horn and Strobe: Model HS-C. Color: White/Clear.
 - f. Horn and Strobe: Model HS-C. Color: Green.
 - g. Power Supply: Model MAC6AMP-4. Application: System.
 - 1) Size: 13.5 x 13 x 3.3 inches (342 x 330 x 83 mm).
 - 2) Input: 115 VAC.
 - 3) Output Voltage: 12 to 24 VDC. Output Current: 6 A.
 - 4) Operating Temperature: 32 to 120 degrees F (0 to 49 degrees C).
 - 5) Number of Outputs: 4.
 - h. Power Supply: Model MAC10AMP-4. Application: System.
 - 1) Size: 15.5 x 12 x 4.5 inches (394 x 305 x 114 mm).
 - 2) Input: 115 VAC.
 - 3) Output Voltage: 24 VDC. Output Current: 10 A.
 - 4) Operating Temperature: 32 to 120 degrees F (0 to 49 degrees C).

5) Number of Outputs: 4.

E. [Model: DVP-1200 Control Panel.](#)

1. Certifications: ETL Listed to UL 2017.
2. Size: 13 x 10 x 2.75 inches (330 X 254 X 70 mm). Weight: 12.4 lbs (5.6 kg).
3. Voltage Current: Power Input: 100 to 240 VAC, 1 Amp, 50/60 Hz, single phase.
4. Operating Temperature: 32 to 104 degrees F (0 to 40 degrees C).
5. Ambient Humidity 0 to 95 degrees RH non-condensing.
6. LCD Display: 320 x 240 pixels graphic with backlight.
7. Three, RS-485 Channels: Connects up to 192 detectors; 64 per channel.
8. Relays: 4 SPDT, 120/240 VAC, 10 Amp Maximum; resistive.
 - a. Additional relay boards; 2.
 - b. Additional relay boards; 4.
 - c. Remote Relays: Up to 4.
9. VFD Control Outputs: Three, 4 to 20 mA.
10. Outputs for Alarm, Trouble, and Remote Notification: Four, 24 VDC.
11. BACnet IP: Ethernet connection.
12. Definable Zones: Eight.
13. Event logging.
14. Settings: External keypad for user selection of transducer, alarm display, and setting configuration.
15. Status Indicators: Power, trouble, hush, warning, alarm, and relay.
16. Alarms: Internal buzzer; 90 dBA at 1 ft (610 mm).
17. Enclosure: Lockable NEMA-4X rated.
18. Mounting: Mounting holes in each corner.
19. Warranty: Two-year limited warranty.
20. Accessories:
 - a. Remote Relay: RD-24.
 - b. Remote Relay: RR-24.
 - c. Addressable Adapter. Model MRS-485. 6-series.
 - d. Horn and Strobe: Model HS-A. Color: Amber.
 - e. Horn and Strobe: Model HS-B. Color: Blue.
 - f. Horn and Strobe: Model HS-R. Color: Red.
 - g. Horn and Strobe: Model HS-C. Color: White/Clear.
 - h. Power Supply: Model MAC6AMP-4. Application: System.
 - 1) Size: 13.5 x 13 x 3.3 inches (34.2 x 33 x 8.3 cm).
 - 2) Input: 115 VAC.
 - 3) Output Voltage: 12 to 24 VDC. Output Current: 6 A.
 - 4) Operating Temperature: 32 to 120 degrees F (0 to 49 degrees C).
 - 5) Number of Outputs: 4.
 - i. Power Supply: Model MAC10AMP-4. Application: System.
 - 1) Size: 15.5 x 12 x 4.5 inches (394 x 305 x 114 mm).
 - 2) Input: 115 VAC.
 - 3) Output Voltage: 24 VDC. Output Current: 10 A.
 - 4) Operating Temperature: 32 to 120 degrees F (0 to 49 degrees C).
 - 5) Number of Outputs: 4.

2.4 REMOTE RELAY

A. [Model RD-24:](#) Remote Device box allowing flexibility in the field.

1. Modbus addressable relays, analog outputs, analog inputs.
2. Compatible with Macurco DVP-1200 Control Panel.
3. Enclosure: Wall mount NEMA 4X.
4. Four expansion slots for expansion boards: up to 8 relays, up to 8 analog outputs, or up to 12 analog inputs or a combination of the three
5. Dry Contact Relays: (up to 8 per device), 10 Amp, 250 VAC SPDT

6. Expansion Analog Input: 4 Analog Inputs - max current draw 300mA
7. Expansion Analog Output: 2 Analog Outputs - max current draw 70mA
8. Input: 24 VDC, 0.5 Amp.
9. Status Indicators (LED): Power, communication, Slots 1-4
10. Size: 10.26" x 11.06" x 3.16" (26.06 x 28.09 x 8.03 cm)
11. Input: 24 VDC, 0.5 Amp.
12. Operating Temperature: 32 to 125 degrees F (0 to 52 degrees C).

B. [Model RR-24](#): Remote Relay box allowing flexibility in the field.

1. Modbus addressable relay.
2. Compatible with Macurco DVP-1200 Control Panel.
3. Enclosure: Wall mount NEMA 4X.
4. Dry Contact Relays: Two, 10 Amp, 250 VAC SPDT
5. Input: 24 VDC, 0.5 Amp.
6. Status Indicators (LED): Power, communication, relay 1, relay 2.
7. Size: 8.48 x 6.36 x 3.94 inches (215 X 161 X 100 mm).
8. Input: 24 VDC, 0.5 Amp.
9. Operating Temperature: 32 to 104 degrees F (0 to 40 degrees C).

2.5 ANALOG TO DIGITAL CONVERTER

A. Basis of Design: [MRS-485 Modbus](#) RS-485 Addressable Adapter as manufactured by Macurco. Mounting screw and screwdriver included.

1. Operates in the RTU Modbus transmission mode.
2. Interfaces the detector power and 4 to 20 mA output lines with a mounted connector.
3. Monitors sensor type, gas level and trouble status communications from any Macurco 6-Series detector.
4. Communication: On a Modbus serial line.
5. Enclosure: Commercial type to protect and support the electronics.
6. Tricolor LED: Indicates power, test and communication status.
7. Power and Current with Detector: 3.25 Watts maximum from 12 to 24 VAC or VDC, 8 5 mA alarm, 60 mA fan relay on and 33 mA stand by at 24 VDC.
8. Size: 3-1/2 x 2 x 1-3/4 in. (89 X 51 X 44 mm).
9. Operating Environment: 0 to 125 degrees F (minus 18 to 52 degrees C), 10 to 90 percent RH non-condensing.
10. Connections: Plugs and terminals.
11. Baud Rate: 4800, 9600, 19200; default, 38400, 57600, 115200 bps.
12. Connection:
 - a. Output: Four terminal screw type connectors.
 - b. Wired in standard 2 W Modbus circuits definition with selectable built-in terminating resistors at the ends of the RS-485 bus.
 - c. Power for MRS-485 Adapter: Two terminal screw type connector; 12 to 24 VAC or 12 to 24 VDC and no polarity.
 - 1) Modbus Cable Run: Not to be adjacent to or in same conduit with high voltage wires.

2.6 HORNS AND STROBES

A. [Model HS-Series](#), Horn and Strobe as manufactured by Macurco. Flexible optic design to meet or exceed the light output on vertical/horizontal dispersion.

1. Strobe Candela: Adjustable at 15, 30, 75 or 110 cd; based on test result with clear lens cover.
2. Adjustable Two Audible Tone Settings; (high/low) and Temporal four; (high/low).
3. Size: 5-1/2 x 4-3/4 x 2 inches (140 x 121 x 51 mm).
4. Pulse Duration: 20 milliseconds.
5. Low current draw.

6. High power cool white LED.
7. Strobe Flash Rate: 1 flash per second.
8. Nominal Voltage: Regulated 24 VDC.
9. Operating Voltage: 16 to 33 VDC.
10. Operating Environment: 32 to 120 degrees F (0 to 49 degrees C). 10 to 93 percent RH.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturer's recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.