

CRIR M1

Commercial Carbon Dioxide (CO₂) Sensor, 400 ppm to 2000 ppm, up to 10000 ppm Extended Range

DESCRIPTION

The CRIR M1 Commercial Carbon Dioxide (CO₂) sensor is a single channel, non-dispersive infrared (NDIR) sensor. Within the CRIR M1 is a sensing chamber with an infrared source at one end and a detector fitted with an optical filter at the other end. The source emits radiation at wavelengths which include the absorption band of CO₂. The filter blocks wavelengths which are not sensitive to the presence of CO₂, thereby increasing selectivity and sensitivity. As the light passes through the sensing chamber, a fraction is absorbed if CO₂ is present. The difference between the light emitted by the source and received by the detector can then be converted to a CO₂ concentration reading.

The Automatic Baseline Correction (ABC) function can automatically calibrate the sensor's lowest reading over a pre-configured interval to 400 ppm CO₂. This enhances long term stability and may eliminate the need for calibration.

VALUE TO CUSTOMERS

- Small size
- Maintenance free for normal indoor applications
- Enhanced long term stability
- Higher accuracy: ± 40 ppm $\pm 3\%$ of reading
- Consistency and repeatability
- Easy integration

POTENTIAL APPLICATIONS

- HVAC, demand controlled ventilation
- Indoor air quality (IAQ) measurement
- Air purification systems
- Smart /IoT (Internet of Things) systems



FEATURES

- Single channel, non-dispersive infrared technology
- Automatic Baseline Correction
- Temperature compensation
- UART digital interface

COMMERCIAL CARBON DIOXIDE SENSOR, 400 PPM TO 2000 PPM, UP TO 10000 PPM EXTENDED RANGE, CRIR M1

TABLE 1. SPECIFICATIONS

CHARACTERISTIC	PARAMETER
Target gas	carbon dioxide (CO ₂)
Operating principle	non-dispersive infrared (NDIR)
Standard range ^{1,2}	400 ppm to 2000 ppm, up to 10000 ppm extended range
Measurement interval	4 s
Accuracy ³	±40 ppm ±3% of reading
Typical response time (T ₉₀)	≤120 s
Sensor warm-up time	3 min typical
Repeatability	>97%
Operating voltage	4.5 V to 5.5 V unprotected against surges and reverse connection
Power consumption	300 mA peak, 30 mA average
Alarm output, open collector	1000 ppm/800 ppm normal state is conducting max 100 mA. Transistor open at CO ₂ high or at sensor failure (see Figure 1).
Serial communication ⁵	UART, Modbus protocol
Operating temperature range	0°C to 50°C
Storage temperature range	-40°C to 70°C
Operating humidity	0 %RH to 90 %RH non-condensed
Expected operating life	10 years
Maintenance ⁶	maintenance-free for normal indoor applications
Weight	<8 g
Dimensions	33 mm x 22 mm X 11,2 mm (tolerance ±0,5 mm)

¹ The CRIR M1 is designed to measure CO₂ in the range of 400 ppm to 2000 ppm with the accuracy specified in Table 1; however, exposure to concentrations below 400 ppm may result in incorrect operation of the ABC algorithm and should be avoided when the ABC is ON.

² The CO₂ sensor provides readings via UART in the extended range; however, the accuracy is reduced.

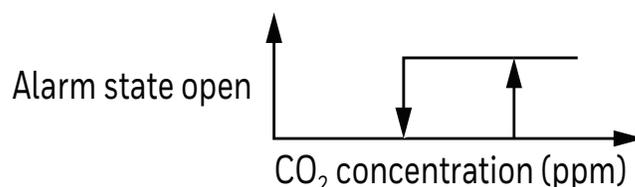
³ In normal IAQ applications, the sensor accuracy is defined after a minimum of three ABC periods of continuous operation.

⁴ The sensor accuracy is specified over the operating temperature range and referenced to certified calibration mixtures. Uncertainty of calibration gas mixtures (±1% currently) is to be added to the specified accuracy for absolute measurements.

⁵ See the CRIR M1 User Guide for Modbus address and parameter definitions.

⁶ The CO₂ sensor normally does not require maintenance in IAQ applications; however, for some industrial applications, maintenance may be required.

FIGURE 1. ALARM STATE DIAGRAM



COMMERCIAL CARBON DIOXIDE SENSOR, 400 PPM TO 2000 PPM, UP TO 10000 PPM EXTENDED RANGE, CRIR M1

FIGURE 2. MOUNTING DIMENSIONS (FOR REFERENCE ONLY: MM)

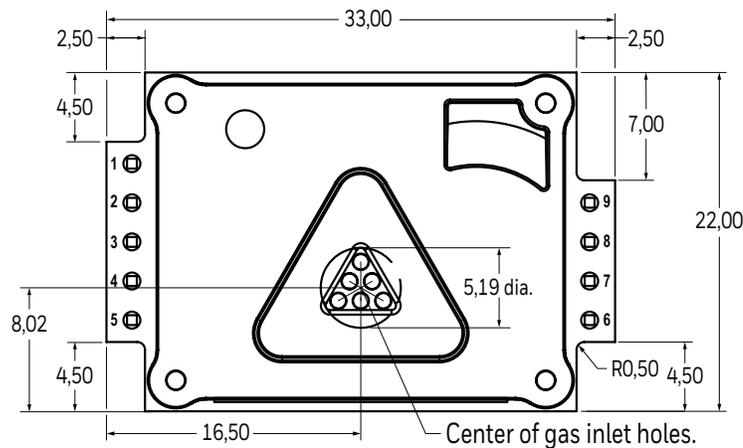


TABLE 2. PINOUT

PIN NUMBER	FUNCTION
1	bCAL_in/CAL_in
2	UART_R/T
3	UART_TXD
4	UART_RXD
5	DVCC_out (3.3 V)
6	Vin_(4.5 V to 5.5 V)
7	GND
8	Alarm output
9	PWM output

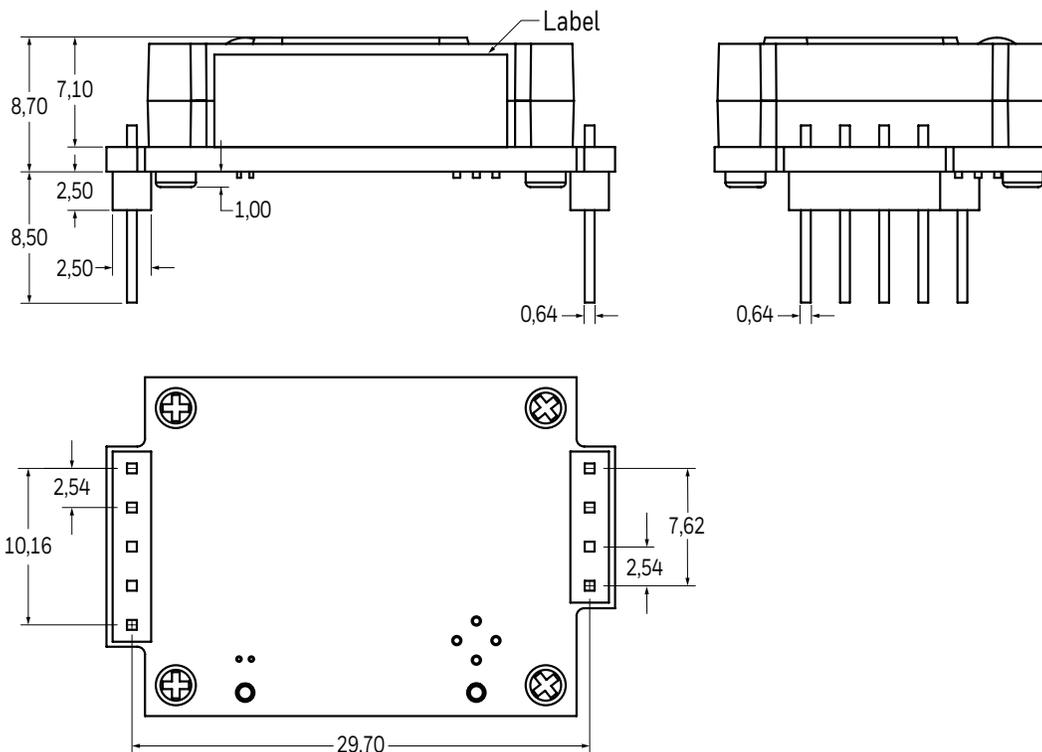


TABLE 3. ORDER GUIDE

CATALOG LISTING	DESCRIPTION
C06-0801-000	CRIR M1 Commercial Carbon Dioxide Sensor, 400 ppm to 2000 ppm