

Carbon Monoxide (CO) Detecting Ventilation Fan Controller Model COSTAR® 24VC-e Single Relay

Part No. 905-0000-09

Replacement Sensor Module is
Part Number 905-0001-09



1. INTRODUCTION

Your COSTAR® 24VC-e carbon monoxide detecting ventilation fan controller is designed for use where ventilation fans are needed to prevent dangerous accumulations of carbon monoxide (CO) from engine exhaust or combustion appliances. The COSTAR® 24VC-e lowers operating costs by activating the fan only when required to maintain good air quality while enhancing safety by alarming if dangerous CO conditions are detected. The COSTAR® 24VC-e features an electrochemical sensor and a microcomputer-based CO detection circuit. The microcomputer provides overall supervisory control, measures CO level and calculates CO dose. It also self-tests the internal electronic circuit and signals a fault warning if a malfunction is detected. The CO sensing element is replaceable every 3 years. Each individual sensor is factory calibrated; no field adjustments are necessary or possible except for sensor replacement. A signal indicating sensor replacement is given when necessary.

There is a 12 Year Main Printed Circuit Board (PCB) end-of-life. At that time the customer will need to replace the PCB in the case. Sixty days prior to end of life, the unit will beep 2 short beeps every 15 seconds until replaced. After warning for 60 days, the unit will go into fault with all LED's flashing (fans will run continuously).

In-Field carbon monoxide testing capability is required. When the test button is pressed, the unit goes into an accelerated test mode for about 3 minutes and will beep 3 short 100 millisecond beeps once before going into the test mode. In this mode, there are no delays associated with the fan or siren. This allows someone to spray some CO on the sensor and see how it responds. A detailed procedure for the testing method is attached as Appendix A – (In-Field CO Testing QCP-190.10.5110). After testing, the unit returns to normal operation and will beep 2 short 100 millisecond beeps before returning to normal operation.

2. IMPORTANT!

When installing the COSTAR®24VC-e:

- A. Read these instructions carefully. Failure to follow them could damage the COSTAR® 24VC-e or cause a hazardous condition.
- B. Check the ratings given in the following instructions, in **Table 1A-COSTAR® 24VC-e Product Features**, and on the COSTAR® 24VC-e to make sure the COSTAR® 24VC-e is suitable for your application.
- C. Installer must be trained and experienced in control systems.
- D. After installation is complete, check out the operation of your COSTAR® 24VC-e as instructed in **Section 7, Power-Up and Test**.

3. SYSTEM OPERATION

Figure 1 shows a typical COSTAR® 24VC-e installation. The COSTAR® 24VC-e provides a single pole dry contact relay for fan control. For maximum safety, connect the COSTAR® 24VC-e directly to a normally closed (N.C.) fan contactor. In clean air, the relay contact K1-K2 is closed and the fans are OFF. Under ambient temperature, when a CO level of greater than 25 parts per million (PPM) is detected, or if a circuit failure occurs, the relay contact K1-K2 is opened and the fans are turned ON. Once turned ON, the fan will run until the COSTAR® 24VC-e senses the CO level has fallen below 25 PPM, or the circuit fault is corrected. To eliminate short cycling, minimum fan cycle time is 2.5 minutes.

WARNING

For proper operation of the COSTAR® 24VC-e ventilation fan controller, the ventilation fan **MUST** be wired such that the fan is OFF when the relay contact K1-K2 is closed.

The COSTAR® 24VC has three indicator lights on the front panel. A flashing green light indicates normal, power-on operation. A yellow light turns on when the COSTAR® 24VC-e calls for fan operation. A red panel light and a built-in audible alarm signal potentially dangerous CO conditions.

For protection from long-term overexposure to CO, the COSTAR® 24VC-e calculates the CO dose over approximately the preceding 8 hours. Using the National Institute of Occupational Safety & Health (NIOSH) ¹, guideline an individual's exposure limit is not to exceed a Time-Weighted Average (TWA) of 35 PPM for an 8-hour workday. At 35 PPM CO for 8 hours equates to a dosage of 280 PPM-Hours. Under ambient to high temperature, if a CO dose of 280 PPM- is accumulated over that 8 hour period, the COSTAR® 24VC-e alarms with a loud beeping tone and flashing of the red panel light. The high dose alarm will reset automatically in clean air. However, the dose calculation continues after the reset and the alarm will reactivate should high dose conditions continue or re-occur.

4. LOCATION AND MOUNTING

Your COSTAR® 24VC-e will monitor up to 10,000 square feet of open area. If the shape of the area to be monitored is unusual or if the airflow is not uniform, then the area monitored by each unit should be appropriately reduced. Select a mounting location in an area of heavy traffic flow, away from drafts, and where the vent holes in the enclosure will not be blocked. Mount the unit at a convenient height, typically about 5 feet from the floor. External mounting feet are provided. Use 6 screws to secure the unit to its mounting surface. **(See Figure 3A)**

5. POWER REQUIREMENTS

WARNING

A. Your COSTAR® 24VC-e is designed for use with a 24 VAC power supply and a 24 VAC relay (control circuit) voltage. Use of higher voltages can damage your unit or cause improper operation or a hazardous condition. Control relay contact K1-K2 is rated at 5 amps, 24 VAC. If a greater load capacity or higher voltage is required, use an intermediate relay between the control relay and the load.

¹ NIOSH 6604 2003-154

B. Both the power circuit and the control circuit of the COSTAR® 24VC-e must be wired with 18 AWG or heavier copper wire. **The power requirement of each COSTAR® 24VC-e unit is approximately 0.1 amps at 24 VAC.** Comply with local codes and standards when installing the COSTAR® 24VC-e.

C. If you have questions call 800-432-5599 and email CS@QGinc.com.

6. WIRING

A. Open the enclosure. The COSTAR® 24VC-e is mounted on the inside of the enclosure. **(See Figure 2)**

B. Terminal block for electrical connections is mounted on a plate in the back of the enclosure **(see Figure 2A).**

C. WARNING: To prevent fire and shock, be sure to turn OFF power to the fan control system and turn OFF power to the 24 VAC supply for the COSTAR® 24VC before wiring and connecting the COSTAR® 24VC-e.

D. Connect 24 VAC supply to terminals T1 and T2 of the terminal block. Each COSTAR® 24VC-e unit requires about 2 watts of power.

E. Connect relay (control) contact K1-K2 in series with the coil of the ventilation fan contactor or the intermediate relay.

WARNING: For proper operation, the COSTAR® 24VC-e MUST be wired such that the fans are OFF when relay contact K1-K2 is closed.

F. Verify correct installation of the CO sensor module **(See Figure 2B).**

7. POWER-UP AND TEST

A. Close and latch enclosure door.

B. Turn ON 24 VAC power to COSTAR® 24VC-e.

C. Within 2 seconds, the audible alarm should give no more than two beeps and green light on the front panel should be flashing. After a further delay of about 1 second, the yellow light should turn ON solid. The yellow light may turn OFF after about 5 minutes. This sequence indicates proper operation of the COSTAR® 24VC-e. If no lights are ON or a different light sequence is observed follow the instructions in **Section 9, Troubleshooting.**

D. Turn OFF power to COSTAR® 24VC-e. Turn ON power to fan control system, then turn ON power to COSTAR® 24VC-e. After a delay of about 2 seconds, the audible alarm should give no more than two beeps and the green light on the front panel should begin flashing. After a further delay of about 1 second, the yellow light should turn ON. The fan should turn ON when the yellow light turns ON. The fan should remain ON as long as the yellow light remains ON (minimum about 5 minutes each time the COSTAR® 24VC-e is powered up). If no lights are ON, if a different light sequence is observed or if the fan does not turn ON, follow the instructions in **Section 9, Troubleshooting.**

E. If power-up tests are satisfactory, secure the enclosure. Your COSTAR® 24VC-e is ready for normal operation **(See Figure 1)**

8. SENSOR REPLACEMENT

The COSTAR® 24VC-e CO sensor has a lifetime of 3.0 years. About 60 days before the end of life, the COSTAR® 24VC-e will begin to beep once every 15 seconds. If the sensor is not replaced within 60 days, the COSTAR® 24VC-e will turn the fan ON and goes into a fault mode. It cannot be reset until the sensor is replaced.

A. Purchase a replacement CO sensor module from your supplier or the Quantum Group Inc.

B. Turn OFF the power to COSTAR® 24VC-e and the fan control system.

C. Open enclosure and remove old sensor module by pulling it straight out of its socket (**See Figure 2B**).

D. Insert new sensor module into socket. Seat firmly.

E. Perform Power-UP and test procedure (Please see **Section 7**).

9. TROUBLESHOOTING

The only user-serviceable part in your COSTAR® 24VC-e is the CO sensor module. Do not attempt to repair or replace any of the other electrical components. Unauthorized repair may result in unsafe operation and will void your warranty.

A. No lights ON Front Panel after Power-Up

1. Turn OFF power to COSTAR® 24VC-e and fan control system.

2. Open enclosure and check that the 24 VAC power supply wiring is securely connected to terminals T1 and T2, (**See Figure 2**).

3. Check that the power cable is correctly connected on the circuit board and that the connection terminals T1 and T2 are tight (**See Figure 2**).

4. Turn ON power to COSTAR® 24VC-e and check for lights on the front panel. If still there are no lights then measure the voltage across terminals T1 and T2 with a voltmeter. If approximately 24 VAC is not measured, trouble is in the power supply, not the COSTAR® 24VC-e.

5. If 24 VAC power is present across terminal T1 and T2 and there are still no lights on the front panel, return the COSTAR® 24VC-e to your supplier or Quantum Group Inc. (call for a Return Authorization Number) for repair or replacement.

B. Fan Does Not Operate When Yellow Light is ON or Fan Does Not Shut Off When Yellow Light is OFF.

1. Turn OFF power to COSTAR® 24VC-e and fan control system.

2. Check that the power cable is seated on the circuit board and that the connections at terminals K1 and K2 are tight. (**See Figure 2**).

3. Disconnect the fan control circuit from terminals K1 and K2. Measure the resistance between terminals K1 and K2 with an ohmmeter. Circuit should be open. If circuit is not open, return COSTAR® 24VC-e to your supplier or Quantum Group Inc. (call for a Return Authorization Number) for repair or replacement.

4. Turn ON power to COSTAR® 24VC-e. Wait for yellow light to turn ON. Measure resistance between K1 and K2 with an ohmmeter. Circuit should be open. If circuit is not open, return COSTAR® 24VC-e to your supplier or Quantum Group Inc. (call for a Return Authorization Number) for repair or replacement.

5. Wait for yellow light to turn OFF. Measure the resistance between terminals K1 and K2 with an ohmmeter. Circuit should be closed. If circuit is not closed, return COSTAR® 24VC-e to your supplier or Quantum Group Inc. (call for a Return Authorization Number) for repair or replacement.

6. If resistance checks across terminals K1 and K2 are satisfactory, reconnect the control circuit to terminals K1 and K2. Turn ON power to both COSTAR® 24VC-e and fan control system. Check fan operation. If fan still does not operate properly, trouble is in the ventilation system or connecting wiring, not in the COSTAR® 24VC-e.

C. Fault Condition: Sequential Flashing of Red, Yellow, and Green Lights.

1. Turn power to COSTAR® 24VC-e OFF then ON.
2. If power cycling does not remove fault condition, turn OFF power to COSTAR®24VC-e and fan control system. Open enclosure and check that sensor module is securely in place and sensor is facing toward center of main board (**See Figure 2B**). Turn ON power to COSTAR® 24VC-e.
3. If steps 1 and 2 do not remove fault condition, return COSTAR® 24VC-e to your supplier or Quantum Group Inc. (call 800-432-5599 for a Return Authorization Number) for repair or replacement.

D. Any Other Light Sequence Not Mentioned Above.

1. Treat as a Fault Condition and follow procedure C above.

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Customer Service
1-800-432-5599
Mon-Fri, 8am-5pm Pacific Time
website: www.QGinc.com
CS@QGinc.com

10. WARRANTY

Quantum Group Inc. (QGI) warrants its COSTAR® products to be free from defects in material and workmanship, under normal use and service, for twenty-four (24) months from the date of purchase with proof of purchase. This applies to all components.

In the event of breach of this warranty, the customer shall promptly return the product (upon receipt of a Return Authorization Number) properly packaged and pre-paid to QGI or its Distributor in accordance with the procedure described below together with a written explanation of the claimed defect. Loss or damage in return shipment to QGI or its distributor shall be at the customer's risk. If, after inspecting the product, QGI determines that the product is defective and covered by this warranty, QGI shall, at QGI's discretion, repair or replace the product or reimburse the customer for the purchase price of the product. In the event QGI determines that the requested repair is a non-warranty repair, QGI will notify the customer prior to beginning the repairs as to the estimated cost of repairing the product. If the product is not to be repaired, it will be returned at the customer's expense and the customer will be charged the regular service charge.

The warranty set forth above is not applicable to any product which (i) has been repaired by anyone other than a QGI Distributor or Service Representative; (ii) has been altered in any way so as, in QGI's judgment, to affect its stability or reliability, (iii) has had the serial or lot number altered, defaced or removed, (iv) has not been used in accordance with the instructions furnished by QGI or (v) has been inadequately maintained or has been used beyond its useful life. This warranty extends only to the original purchaser of this product.

The expressed warranty above constitutes the entire warranty of QGI with respect to COSTAR® products and IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTY OF QUALITY. QGI NEITHER MAKES, NOR AUTHORIZES ANY REPRESENTATIVE OR OTHER PERSON TO MAKE ANY OTHER WARRANTY IN CONNECTION WITH THE SALE, USE OR OTHER DISPOSITION OF QGI'S PRODUCTS. THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE. IN NO EVENT SHALL QGI BE LIABLE FOR ANY INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH ANY QGI PRODUCT.

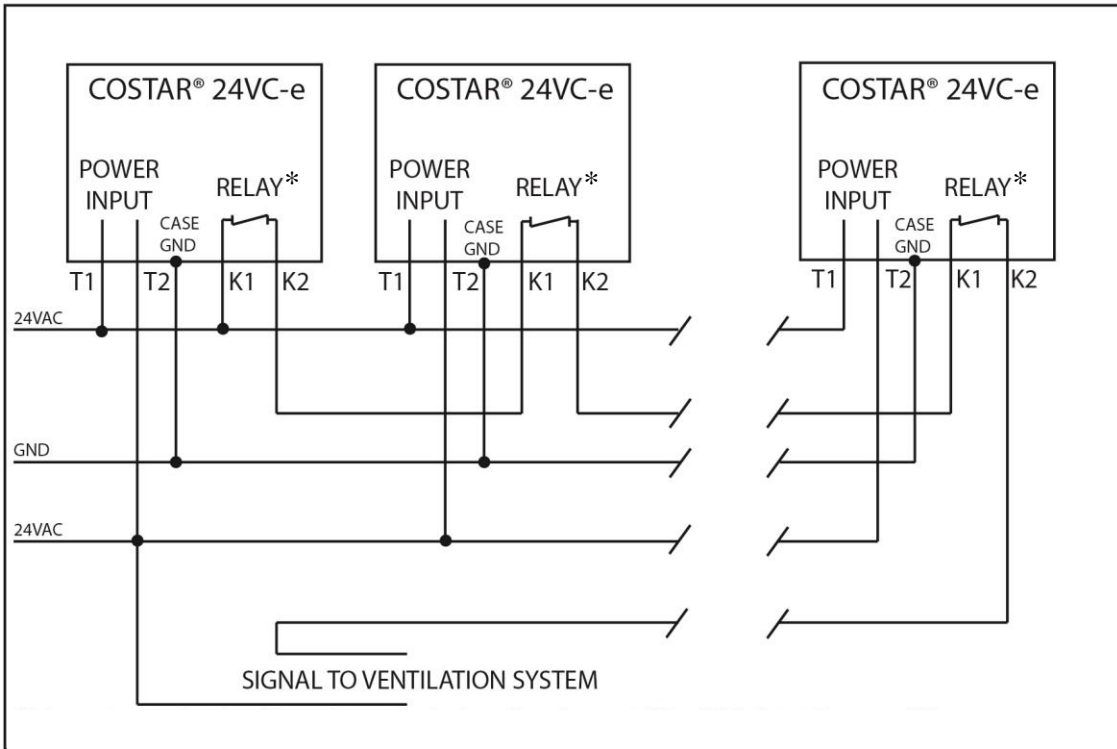
Some states do not allow the exclusion or limitation of incidental or consequential damages, nor permit limitations of the duration of any implied warranty, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which may vary from state to state.

TABLE 1A. Quantum Part No. 905-0000-09

Replacement Sensor: Quantum Part No. 905-0001-09

Alarm Reset:	Automatic reset when alarm condition clears
Audible Alarm:	85 dB piezo-alarm from 3 meters
Sensor Technology:	Electrochemical
Replaceable Sensor Life:	3.0 years
Supply Voltage:	24 VAC, 60 Hz
Relay Contact:	Single pole, normally open
Fan:	OFF when contacts are closed
Enclosure Dimensions:	~ 6" x ~8" x ~4" gray enamel over 16 gauge galvanized steel with hinged, lockable cover, ETL Listed
Weight:	~6 lbs
Operating Conditions:	- 20°C to 55°C (- 4°F to 131°F) 7.5% to 95% Relative Humidity

Figure 1. Typical Installation of COSTAR® 24VC-e to All 3 Relays



*Relay contacts in closed position, unit operating in clean air environment. When CO is detected or power fails relay contacts open and fan turns on.

Figure 2. COSTAR® Model 24VC-e

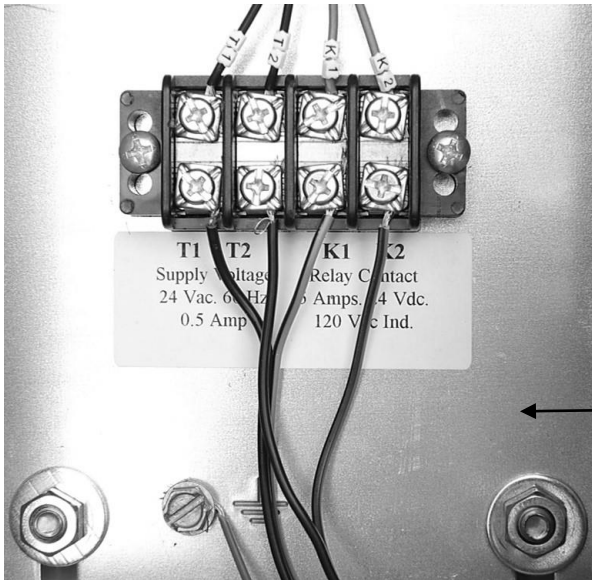


Figure 2A Correct wiring termination

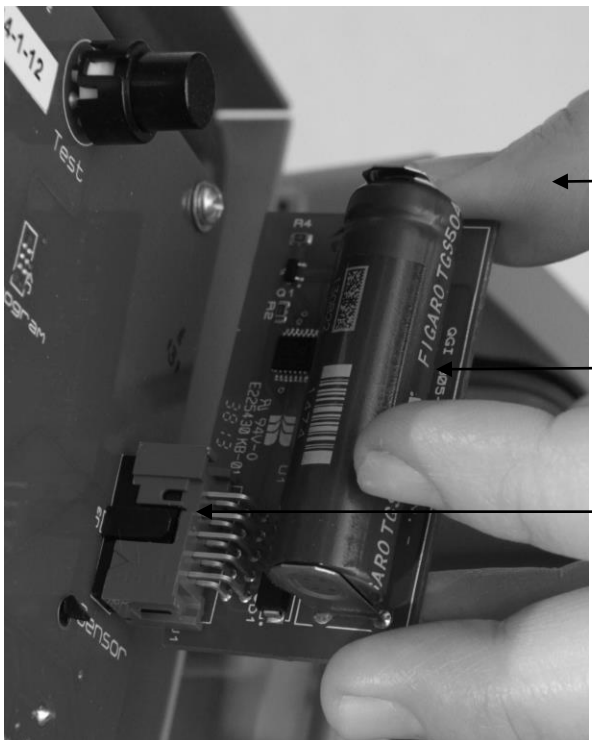


Figure 2B Removal / Replacement of Sensor Module

Sensor Must face in towards main board

Connector key must match

Figure 3. COSTAR® Model 24VC-e

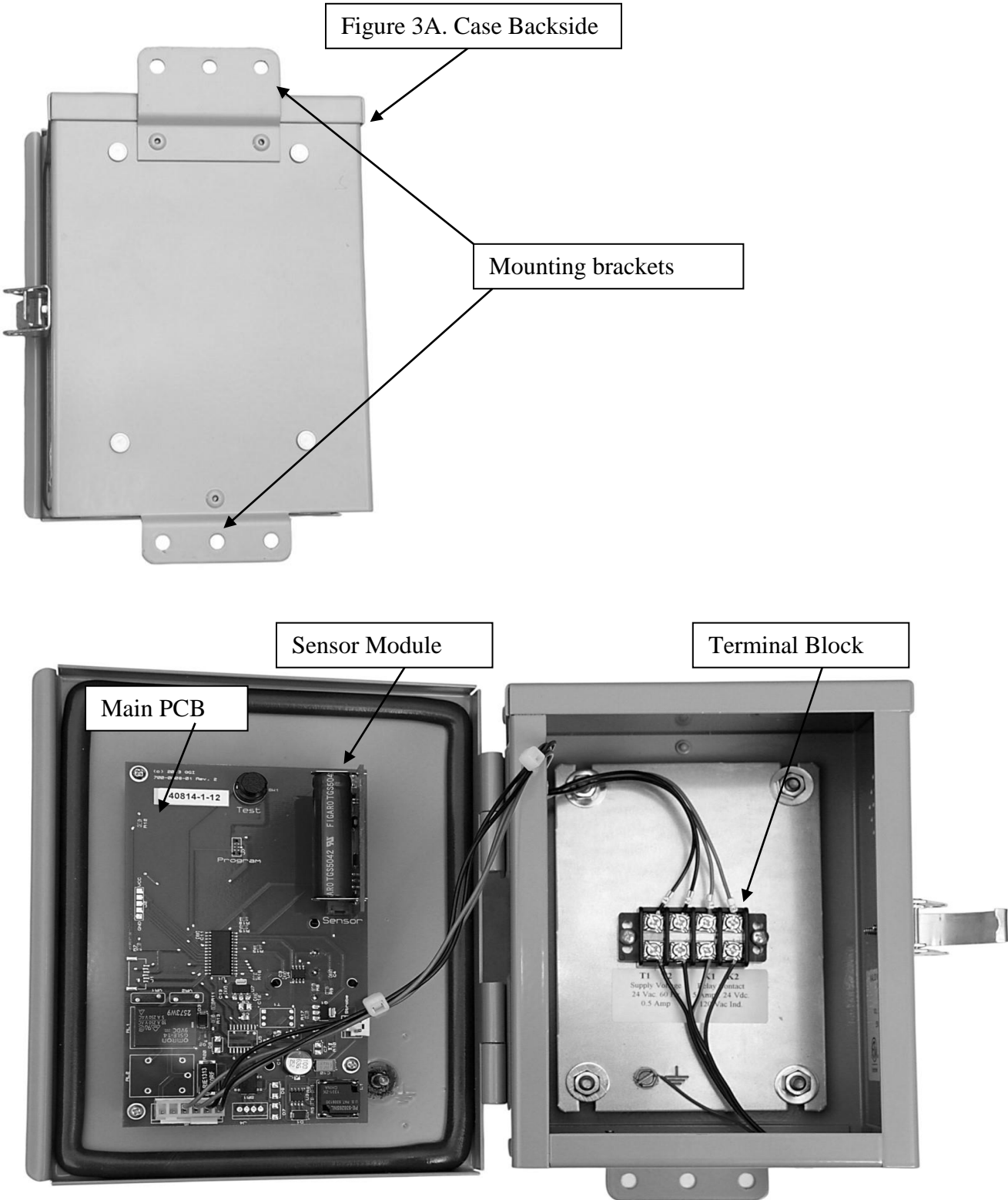


Figure 3A. Case Backside

Mounting brackets

Sensor Module

Terminal Block

Main PCB

Figure 3B. Case Frontside with Door Open

APPENDIX A



QUANTUM GROUP INC.

Quality Control Procedures and Specifications

Specification: QCP-190.10.5110

Revision: N/C

Date: 09/23/13

Revision Date: 05/06/14 MSO

Written by: MSO, AS

President Approval: _____

Reviewed by VP Quality Approval:

Subject: **Procedure for In-Field CO Testing COSTAR® Model 24VC-e Ventilation Controller**

1.0 PRODUCT FEATURES

Description	Signals	[CO] /Comment
Power/Standby/ Normal:	Green LED flashes every second	Clean air
Fan Activation:	Yellow LED turns on solid for 2.5 minutes minimum	>25 ppm
Alarm Activation:	Red LED flashes & Horn sounds	150 ppm CO within 15 minutes
Fault/Trouble:	Green, Yellow & Red LEDs flash & Beeping simultaneously	System failure. Seat sensor securely then reset power. Need service if Power Reset Fails!
CO Test Mode Activation:	Three short beeps, Red LED flashes and solid Green LED On for 3 minutes	2-3 seconds of 1,850 ppm or 1-2 seconds of 2,800 ppm of canned CO spray.
CO Test Mode Deactivation:	Post 3 minutes: 2 beeps, Red LED flashes 2 times, then Green LED resumes flashing. Normal Mode resumes.	Clean air

2.0 PURPOSE:

- 2.1 The purpose of this document is to ensure that procedures are established for CO testing COSTAR® Model 24VC-e Ventilation Controller while installed in the field.
- 2.2 This document is intended to address the need for CO testing COSTAR® Models 24VC-e Ventilation Controller per specification for fan activation and deactivation, while in use in the field.

3.0 SCOPE:

- 3.1 This procedure affects any field personnel who inspects and/or certifies COSTAR® Model 24VC-e Ventilation Controller.

4.0 RESPONSIBILITY:

- 4.1 It is the responsibility of the end user and field personnel of COSTAR® Model 24VC-e Ventilation Controller Distributors to test the unit as required by the local inspector and/or standard.

5.0 ASSOCIATED MATERIALS

- 5.1 1,850 ppm CO in spray can (UL listed C6 CO Detector Tester Solo, Tel: 732-751-9266, Fax: 732-751-9241, www.sdifire.com)
- 5.2 2,800 ppm CO in spray can (UL listed CO Check™ Model HO_CO rev2, His FIRE & Safety Group, Tel: 847-427-8340, Fax: 847-427-8343, www.homesafeguard.com)

6.0 ASSOCIATED EQUIPMENT

- 6.1 COSTAR® Model 24VC-e Ventilation Controller case dimensions: ~8" x ~6" x ~4"
- 6.2 Stopwatch or timer

7.0 PROCEDURE

- 7.1 Ensure that the unit is in standby mode—no fan or alarm mode should be activated.
- 7.2 Open the cover of the case to reveal the PC Board, **Figure 1**.
- 7.3 Assemble the CO spray can and nozzle, either a 1,850 ppm or a 2,800 ppm CO spray can should be sufficient.
- 7.4 Press the TEST/RESET button as shown in **Figure 2** to activate the Test Mode. Three beeps will sound, Red LED flashes and the flashing GREEN LED will now remain ON solid. This mode allows 3 minutes for CO test before the unit automatically resets itself.
- 7.5 Immediately close the cover and ensure that the cover latch is secured. Position the CO nozzle outlet at top of the sensor near the vents as shown in **Figure 3**. **Do not** insert nozzle through the front vents because most CO will deflect back out before reaching the sensor located on the reverse side of the PC Board.
- 7.6 Simultaneously, start the timer and spray CO for 1-2 seconds when using a 2,800 ppm CO, or 2-3 seconds spray when using a 1,850 ppm can CO.

- 7.7 Yellow light and ventilation fan should be activated within 0.5 to 1.5 min follow by alarm activation (siren) within 1.0 to 3.0 minutes.
- 7.8 Open cover to speed up CO ventilation. Alarm deactivation should be results within 1-2 minutes follow by Fan deactivation within another 2-3 minutes after CO dissipates.
- 7.9 After the unit has recovered, it can be retested again within 1-2 minutes—if needed.
- 7.10 When a COSTAR® Model 24VC-e Ventilation Controller unit fails to activate fan and alarm, after repeating the CO tests, two more times, the Sensor Module **MUST BE REPLACED**. Make sure that there is sufficient pressure in the CO can when repeat tests.
- 7.11 Should a **REPLACEMENT SENSOR** be needed, it is necessary to power the unit **OFF** and then **ON** to reset the system to normal/standby mode.
- 7.12 It is necessary to CO test the system with the newly installed sensor module by following the above procedure in this section.
- 7.13 Close the cover and secure the cover latch after a successful test.

7.2 MULTIPLE 24VC-e UNITS in a SYSTEM

- 7.2.1 Wait for the unit in test to return to the standby mode (flashing GREEN LED only). This should take ~1-3 minutes after the test.
- 7.2.2 Move to the next 24VC-e unit and repeat Steps 7.1 to 7.13.

8.0 FIGURES

Figure 1. Cover of the 24VC-e unit open, showing the PC Board

Figure 2. Pressing of the TEST button to activate the Test Mode

Figure 3. The cover is closed with CO nozzle inserted all the way through one of the TOP holes found on the RIGHT SIDE of the case

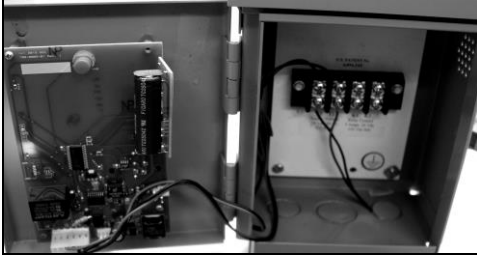


Figure 1. The cover is open to expose PC Board.

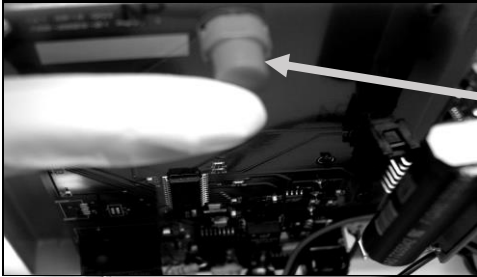


Figure 2. Press the TEST button to activate the Test Mode. Expect 3 short beeps with Red LED flashing and solid Green LED ON for 3 minutes.



Figure 3. Cover is closed and CO nozzle is inserted, all the way in, through one of the TOP holes found on the RIGHT SIDE of the case. Do not insert nozzle through FRONT vents because the CO gas will be rapidly deflected back.