Critical Environment Technologies™

Installation Manual

Rev. B | 2016.07

QCC Quad Channel Controller and QCC-RDM Remote Display

www.critical-environment.com

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1 POLICIES

1.1 Important Note

Read and understand this manual prior to using this instrument. Carefully read the warranty policy, service policy, notices, disclaimers and revisions on the following pages.

This product must be installed by a qualified electrician or factory trained technician and according to instructions indicated in this manual. This instrument should be inspected and installed by a qualified and trained technician. For more information, refer to Section *11 Maintenance* of this manual.

This instrument has not been designed to be intrinsically safe. For your safety, **do not** use it in classified hazardous areas (explosion-rated environments).

INSTRUMENT SERIAL NUMBER:

_____

PURCHASE DATE:

_____

PURCHASED FROM:

_____

1.2 Warranty Policy

Critical Environment Technologies Canada Inc. (CETCI), also referred to as the manufacturer, warrants this instrument, (excluding sensors, battery packs, batteries, pumps and filters) to be free from defects in materials and workmanship for a period of **two years from the date of purchase from our facility.** If the product should become defective within this warranty period, we will repair or replace it at our discretion.

The warranty status may be affected if the instrument has not been used and maintained per the instructions in this manual or has been abused, damaged, or modified in any way. This instrument is only to be used for purposes stated herein. The manufacturer is not liable for auxiliary interfaced equipment or consequential damage.

Due to ongoing research, development, and product testing, the manufacturer reserves the right to change specifications without notice. The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data.

All goods must be shipped to the manufacturer by prepaid freight. All returned goods must be pre-authorized by obtaining a Returned Merchandise Authorization (RMA) number. Contact the manufacturer for a number and procedures required for product transport.

1.3 Service Policy

CETCI maintains an instrument service facility at the factory. Some CETCI distributors / agents may also have repair facilities; however, CETCI assumes no liability for service performed by anyone other than CETCI personnel.

Repairs are warranted for 90 days after date of shipment (sensors have individual warranties).

Should your instrument require non-warranty repair, you may contact the distributor from whom it was purchased or you may contact CETCI directly.

Prior to shipping equipment to CETCI, contact our office for a Returned Merchandise Authorization (RMA) number. All returned goods must be accompanied with an RMA number.

If CETCI is to do the repair work, you may send the instrument, prepaid, to:

Attention: Service Department
Critical Environment Technologies Canada Inc.
Unit 145, 7391 Vantage Way
Delta, BC, V4G 1M3

Always include your RMA number, address, telephone number, contact name, shipping / billing information, and a description of the defect as you perceive it. You will be contacted with a cost estimate for expected repairs, prior to the performance of any service work.

For liability reasons, CETCI has a policy of performing all needed repairs to restore the instrument to full operating condition.

Pack the equipment well (in its original packing if possible), as we cannot be held responsible for any damage incurred during shipping to our facility.

1.4 Copyrights and Registered Trademarks

1.5 Disclaimer

Under no circumstances will CETCI be liable for any claims, losses or damages resulting from or arising out of the repair or modification of this equipment by a party other than CETCI service technicians, or by operation or use of the equipment other than in accordance with the printed instructions contained within this manual or if the equipment has been improperly maintained or subjected to neglect or accident. Any of the foregoing will void the warranty.

Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires. It is CETCI policy that all wiring of our products meet this requirement.
It is CETCI policy that all wiring be within properly grounded (earth or safety) conduit.

1.6 Revisions

This manual was written and published by CETCI. The manufacturer makes no warranty or representation, expressed or implied including any warranty of merchantability or fitness for purpose, with respect to this manual.

All information contained in this manual is believed to be true and accurate at the time of printing. However, as part of its continuing efforts to improve its products and their documentation, the manufacturer reserves the right to make changes at any time without notice. Revised copies of this manual can be obtained by contacting CETCI or visiting

www.critical-environment.com

Should you detect any error or omission in this manual, please contact CETCI at the following address:

Critical Environment Technologies Canada Inc.
Unit 145, 7391 Vantage Way, Delta, BC, V4G 1M3, Canada
Toll Free: +1.877.940.8741
Telephone: +1.604.940.8741
Fax: +1.604.940.8745
Email: marketing@cetci.com
Website: www.critical-environment.com

In no event will CETCI, its officers or employees be liable for any direct, special, incidental or consequential damages resulting from any defect in any manual, even if advised of the possibility of such damages.

2 INTRODUCTION

NOTE: *The **QCC Installation Manual** outlines the basic features and functionality of the QCC and includes information about installing the system. If you require more in depth information about how the QCC can be configured (channels, relays, strobe/audible and analog input and output settings), using passcodes, logic and priority settings and the Modbus® holding registers, please download the **QCC Operation Manual** from our website:*

www.critical-environment.com/support/product-library/operation-manual.html

2.1 General Description

Thank you for purchasing our QCC Quad Channel Controller. The QCC is a fixed system controller that offers up to four gas channel configurations for monitoring toxic, combustible and/or refrigerant gases for non-hazardous, non-explosion rated, commercial applications.

The QCC is designed to accept inputs from up to four remote digital and/or analog transmitters using Modbus® RS-485 or 4-20 mA analog input.

The QCC is available in two models:

1. QCC-M with Modbus® RTU wide area network (WAN) output to Building Automation System (BAS) or Direct Digital Control (DDC) system
2. QCC-B with BACnet® MS/TP WAN output to BAS or DDC

Both models of the QCC feature:

- Three configurable SPDT dry contact relays with field configurable time delays and trigger levels
- LCD display and three LED indicators for alarm status and fault condition
- A USB port for firmware upgrades (and data logging if the optional onboard Analog Output module is installed).
- With the Analog Output module (option -AO) installed, the QCC can be configured to generate two separate 4-20 mA outputs for VFD control or useable by any other device requiring a signal representing the levels of gases detected.
- A door mounted, loud audible alarm that is ideal for noisy environments. Water tight option available.
- Additional application specific options include: a manual shutoff switch, a top mounted strobe and a water tight, door mounted audible alarm.
- The QCC can be connected to an RSH-24VDC Remote Strobe/Horn combo, a QCC-RDM Remote Display and the following peripheral devices: LNK-AO Analog Output, LNK-EXT Network Extender, RRM-4 Remote Relay and an RPS-24VDC Remote Power Supply.

If after reading through the manual, you have any questions, please do not hesitate to contact our service department for technical support.

2.2 Key Features

- Four gas channel operation with any combination of up to 4 analog and/or digital transmitters
- Configured with either a Modbus® RTU RS-485 or a BACnet® MS/TP digital output signal for WAN communications (for communicating with a BAS)
- Two configurable 4-20 mA outputs and data logging (option -AO)

- 4-line, 20 character LCD display and LED indicators for alarm STATUS 1, 2, 3 and Fault conditions
- Three 5-amp SPDT dry contact relays @ 120 / 240 volts each
- Six conduit entry ports
- Thermal resetting fuses
- RoHS compliant circuit boards

3 INSTRUMENT SPECIFICATIONS

3.1 Technical Specifications

GAS TYPE
No internal gas sensors

MECHANICAL	
Enclosure	ABS / Polycarbonate, rated UL94-HB. Copper coated interior to reduce RF interference. IP54 rated with door mounted, water tight buzzer installed.
Weight	1.7 kg (3.78 lbs)
Size	254 mm x 226 mm x 113 mm (10.0" x 8.9" x 4.44")

USER INTERFACE	
Display	4-line, 20 character LCD display and LED indicators for "STATUS 1, 2 and 3", "FAULT"
Manual Shutoff Switch (option -SW)	Required in refrigeration applications to meet B52 code requirements.

INPUT/OUTPUT	
Inputs	- Modbus® RS-485 - 4-20 mA analog
Outputs	- Modbus® RS-485 (model: QCC-M) - BACnet® MS/TP to BAS (model: QCC-B) - Two 4-20 mA analog outputs with data logging (option -AO) - Remote and Peripheral devices on a Modbus® RTU network - One 24 VDC drive output for strobe/horn
Relays	Three SPDT dry contact relays, rated 5A @ 240 VAC

Audible Alarm	- Door mounted audible alarm rated 90 dB @ 30 cm (0.98 ft) - Optional door mounted water tight buzzer (option -WA), rated 85 dB @ 60.96 cm (2 ft)
Top Mounted Strobe (option -L)	7 cm dia x 12.7 cm H (2.75" dia x 5" H), 24 V

ELECTRICAL

Power Requirement Line Voltage	 90 - 240 VAC, 50 - 60 Hz, 75 W
Current Draw Line Voltage (110 VAC) Line Voltage (220 VAC)	 Approximately 1.0 Amp Approximately 0.5 Amp
Wiring	- VAC (line voltage) three-conductor (Line, Neutral, Ground) shielded minimum 18 awg stranded within conduit - LAN Modbus® RTU 4-conductor shielded - WAN (output to BAS) RS-485 4-conductor shielded
Communication: Modbus® RTU over RS-485	Baud rate: 19,200 (default, configurable) Data bits: 8 Start bits: 1 Stop bits: 1 Parity: none
Fuses	Automatic resetting thermal

ENVIRONMENTAL

Operating Temperature	-20°C to 50°C (-4°F to 122°F) with optional internal heater -40°C to 50°C (-40°F to 122°F)
Operating Humidity	15 - 90% RH non-condensing

CERTIFICATION

Model: QCC-M-xx or QCC-B-xx
S/N: QCCM1603B00001 (example)
Rating: 90-240 VAC, 50-60 Hz, 75 W
Max Temp: -20ºC to 50ºC (-4ºF to 122ºF)

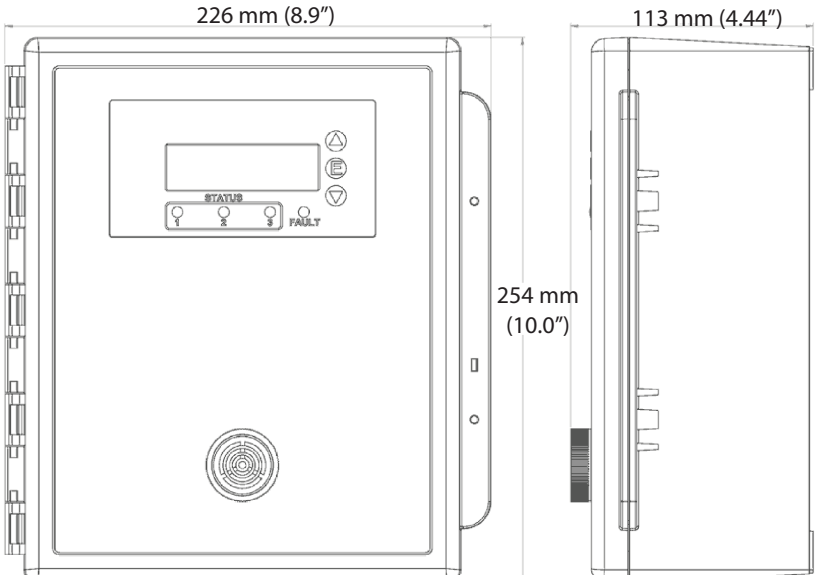
CERTIFIED FOR ELECTRIC SHOCK & ELECTRICAL FIRE HAZARD ONLY. LA CERTIFICATION ACNOR COUVRE UNIQUEMENT LES RISQUES DE CHOC ELECTRIQUE ET D'INCENDIE D'ORIGINE ELECTRIQUE.

Conforms to: CSA-C22.2 No. 205-12 / UL508 (Edition 17):2007
Conforms to: EMC Directive 2004/108/EC, EN 50270:2006, Type 1, EN61010
Conforms to: FCC. This device complies with part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTES:

- System is configured such that all relays are "FAIL SAFE" (relay coils are always energized in non-alarm state).
- Relays are activated by multiple alarm conditions.

3.2 Enclosure Dimensions



4 LIST OF COMPATIBLE DEVICES

NOTE: The QCC does not have internal gas sensors. It is strictly a controller that can accept inputs from up to 4 remote digital and/or analog transmitters and/or peripheral devices.

4.1 CETCI Analog and Digital Transmitters

Analog Transmitters	Output Signal	Gases	Sensor Type
LPT Low Power	4-20 mA	CO, NO_2	Electrochemical
LPT-A Analog	4-20 mA	NH_3, CO, NO_2, CLO_2, Cl_2, C_3H_4, C_2H_4O, CH_2, H_2, H_2S, HCl, HCN, NO, O_2, O_3, PH_3, SIH_4, SO_2, CH_4, C_3H_8, TVOCs, Refrigerants	Electrochemical, Solid State, Catalytic
AST-IS series of transmitters	4-20 mA	CO_2	Infrared
ART Infrared Refrigerant	4-20 mA	R123, R134A, R404A, R407A, R407C, R407F, R410A, R427A, R507, HF01233ZD, R422A, R422D, HR01234YF, HF01234ZE, R22	Infrared

CXT Explosion Proof	4-20 mA	NH_3, CO, CO_2, H_2, H_2S, NO_2, O_2, PH_3, SO_2, CH_4, C_3H_8, C_5H_{12}	Electrochemical, Infrared, Catalytic

Digital Transmitters	**Output Signal**	**Gases**	**Sensor Type**
LPT-M Modbus®	Modbus®	same as LPT-A	same as LPT-A
LPT-P Digital Car Park	Modbus®	CO, NO_2, H_2, CH_4, C_3H_8	Electrochemical and Catalytic

4.2 CETCI Peripheral and Remote Devices

Peripheral Devices	**Output Signal**		**# of Devices Limit**
LNK-AO Analog Output	Modbus®	Four 4-20 mA outputs	1
LNK-EXT Network Extender	Modbus®	Network BUS Extender	4

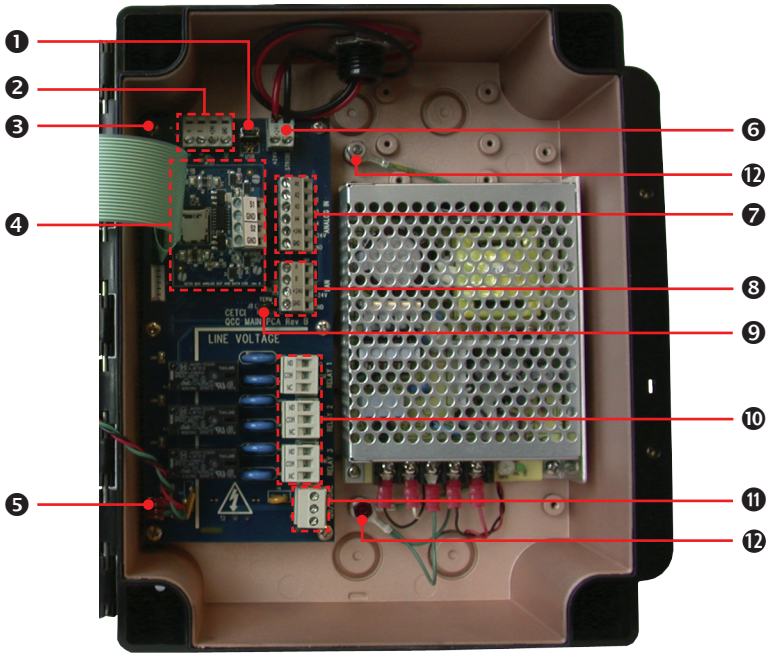
Remote Devices			
QCC-RDM Remote Display	Modbus®	Mirrors QCC display	4
RRM-4 Remote Relay	Modbus®	Four 5 Amp, 120/240 VAC	1
RPS-24VDC Remote Power Supply	Modbus®	24 VDC, 2 Amp	4
RAA-90 Remote Audible Alarm		24 VDC, 2-wire	1 (one or the other)
RAA-90-W Remote Audible Alarm (water tight)			
RSH-24VDC Remote Strobe/Horn		Use relay or strobe drive	1

5 INSTRUMENT FEATURES

5.1 Front Exterior Enclosure

NUMBER	FEATURE	FUNCTION
❶	Display	4x20 characters. Indicates controller operation.
❷	Status 1, 2, 3 LEDs	Indicates channel alarm status.
❸	ARROW UP	Press to scroll up through menu.
❹	ENTER	Press to select menu choice.
❺	ARROW DOWN	Press to scroll down through menu.
❻	Fault LED	Indicates unit fault condition.
❼	Door Screws	Secures the door of the enclosure.
❽	Door Mounted Buzzer	Audible buzzer that sounds when a channel has gone into alarm. Factory default is set for high alarm.

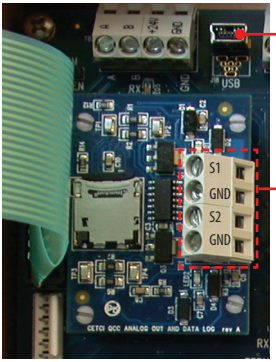
5.2 Interior System Layout (shown with option -AO)



NUMBER	FEATURE	FUNCTION
❶	USB Connector	Logging download and system updates
❷	WAN Terminal	For connection to BAS (Modbus® or BACnet)
❸	WAN End of Line Jumper	120 ohm line termination
❹	Option: -AO	Optional daughter board with 2 Analog Outputs and Data Logging capabilities
❺	Buzzer Terminal	Connection for door mounted buzzer
❻	Remote Strobe Horn Terminal	Connection for Remote 24 VDC horn or strobe combination (RSH-24VDC) 0.5 amps max.
❼	Analog IN Terminal	Connection for up to four 4-20 mA transmitters
❽	LAN Terminal	Connection of up to four digital (Modbus®) transmitters and/or peripheral devices
❾	LAN End of Line Jumper	120 ohm line termination
❿	Dry Contact Relay Terminals 1, 2 & 3	Three SPDT relays, rated 5 amps @ 240 V

⓫	Line Voltage Terminal	120 or 240 VAC input
⓬	Earth Ground	Earth/safety ground connection

5.3 Optional Analog Output with Data Logging Board Layout (option -AO)



Micro USB connection for downloading data logging files.

4-20 mA Output Terminal with two analog outputs

6 INSTALLATION

6.1 General Safety Warnings

The QCC is intended for indoor use, permanently mounted in a locked electrical room. It should be protected from extreme weather conditions.

The QCC requires no assembly and virtually no maintenance other than configuration of the channels and ensuring that excess water or dust is not somehow entering the enclosure and physically damaging the circuit board or internal components.

6.2 Protection Against Electrical Risks

Warning High Voltage. Indicates hazardous voltage may be present in the area inside the QCC enclosure marked with this symbol.

Disconnect all power before servicing. There may be multiple power sources. Power supply must have a building installed circuit breaker /switch that is suitably located and easy to access when servicing is required and should be labelled as QCC supply (disconnecting power to the QCC). Appropriate markings should be visible at the circuit breaker / switch that is supplying power to the QCC. The relays may be connected to alternate circuit breakers and these should be appropriately marked.

This device may interfere with pacemakers. Modern pacemakers have built-in features to protect them from most types of interference produced by other electrical devices you might encounter in your daily routine. If you a have a pacemaker, follow your healthcare provider's instructions about being around this type of equipment.

6.3 Protection Against Mechanical Risks

Be aware that the QCC enclosure has a hinged door that could potentially pinch fingers and the sharp edges and/or jumper pins on the board could potentially prick or cut fingers if not handled carefully.

6.4 System Installation

The QCC should be installed on a flat vertical surface using the four 0.175" (4.4 mm) diameter mounting holes provided to maintain water tight status. There are also four areas that can be drilled out for mounting to a double gang electrical box.

If used in a wet environment application, the QCC should be ordered with the optional watertight door mounted alarm and the conduit hub entering the QCC enclosure must be a liquid tight type. Any water or physical damage to the QCC that occurs from the installer drilling their own installation holes will not be covered under CETCI's warranty.

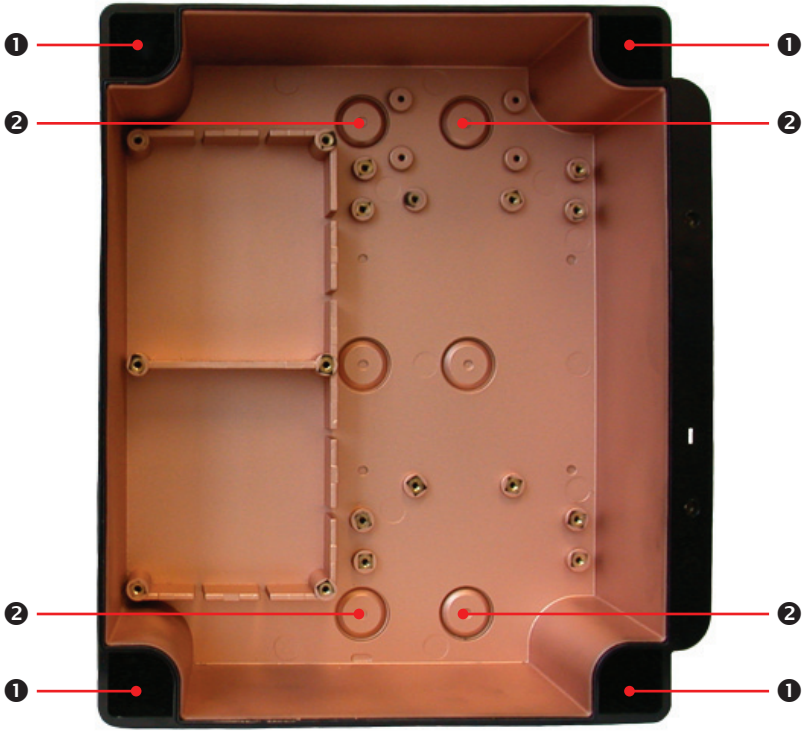
There are six conduit entry points for the standard mounting setup (against a flat surface). Three entry points are located along the top of the enclosure and three are located along the bottom. These points must be drilled out as needed. If mounting to a double gang electrical box there is an entry point provided that must also be drilled out of the back of the enclosure. Some disassembly is required to access this entry point. Refer to Section *6.5 Standard Enclosure Mounting Components*.

NOTE: When mounting the enclosure, allow enough room to allow the end user to open the door fully to access the internal adjustments.

When finished installing or servicing it is recommend you perform a test to ensure the unit and all relays are working properly. See Section *7.7 Test Mode Functions* (passcode 0001).

6.5 Standard Enclosure Mounting Components

6.5.1 Enclosure Interior Base

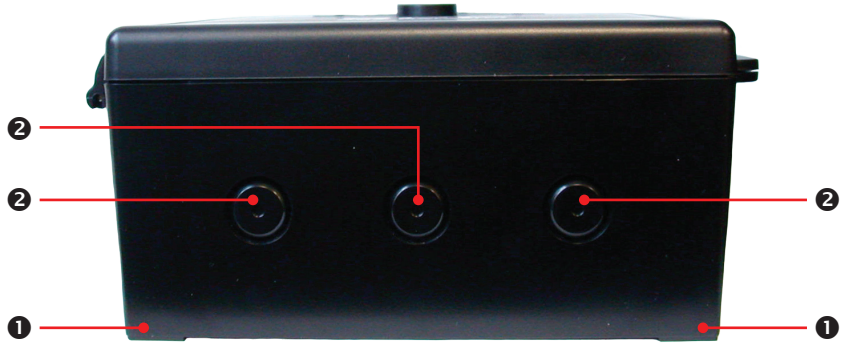


NUMBER	FUNCTION
1	Molded-in mounting holes
2	Conduit entry

6.5.2 Enclosure Top

NUMBER	FUNCTION
1	Molded-in mounting holes
2	Conduit entry

6.5.3 Enclosure Bottom



NUMBER	FUNCTION
1	Molded-in mounting bracket
2	Conduit entry

6.6 Wiring Power Supply Connections

Very carefully, drill out one or more of the PVC conduit entry hole plugs located on the top, bottom or back of the system enclosure base. Refer to Section *6.5 Standard Enclosure Mounting Components* for the locations of the conduit entry holes.

The QCC requires a 90 - 240 VAC power supply (line voltage power). This source should be on an independent breaker that is properly marked. Wire the field wiring to the Line Voltage Terminal (J15), refer to Section *5.2 Interior System Layout*. These are the power connections and should be supplied with a minimum 3-conductor, 18 AWG stranded wiring.

All wiring should be run within properly grounded (earth or safety) conduit. Building code requires low voltage wiring not to be within the same conduit as line voltage wiring.

NOTE: WARRANTY MAY BE VOID IF DAMAGE OCCURS TO CIRCUIT BOARD COMPONENTS FROM THE USE OF SOLID CORE WIRE ATTACHED DIRECTLY TO THE WIRING TERMINALS. When using solid core wiring for distribution (in the conduit), use stranded wire pigtails 18 awg within the enclosure to connect to the circuit board. The rigidity of solid-core wire can pull a soldered terminal strip completely off a circuit board and this will not be covered under warranty.

6.7 Wiring Analog and Digital Inputs

The QCC provides 24 VDC (low voltage power) at the LAN and Analog Input Terminals and can be wired to a maximum of four remote 4 - 20 mA and/or digital transmitters/sensors in any combination. The 24 VDC power supply can be daisy-chained to the remote transmitters/sensors.

6.7.1 Wiring Remote 4-20 mA Analog Transmitter

A1 through A4 on the Analog IN terminal provides up to four connections for analog transmitters. Three-conductor, 16-18 gauge wire / cable must be shielded when connecting to a remote analog transmitter. The voltage supplied by the QCC Controller to each remote analog transmitter should measure approximately 24 VDC nominal at the transmitter(s). If this voltage is not attained after installation, the wrong gauge wire may have been used or the wiring run is too long.

The enclosures of the LPT family of transmitters have several conduit entry locations (general purpose enclosure). Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires.

Common wire colours for positive, negative and signal VDC wires are:

- Red for positive
- Black for negative
- White or Yellow for signal

NOTE: DO NOT use solid-core wire for connection to wiring terminal strip. Any damage caused by using solid-core wire will void warranty. Use stranded wire ONLY.

WARNING: Maximum distance information between the QCC and a remote analog transmitter can be found in that particular analog transmitter's Operation Manual.

6.7.2 Wiring Remote Digital Transmitter

The LAN terminal offers an A and B connection for up to a total of 4 digital transmitters in a daisy -chain configuration. Four-conductor, 16-18 gauge wire / cable must be shielded when connecting to digital transmitters. The voltage supplied by the QCC Controller to the remote digital transmitter should measure approximately 24 VDC nominal at the transmitter(s). If this voltage is not attained after installation, the wrong gauge wire may have been used or the wiring run is too long. 14 gauge wire should be used for longer wire runs to minimize voltage drop.

The LPT series of transmitter enclosures have several conduit entry locations (general purpose enclosures). Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires.

Common wire colours for positive, negative and digital wires are:

- Red for positive
- Black for negative
- White for Data A
- Green for Data B

NOTE: DO NOT use solid-core wire for connection to wiring terminal strip. Any damage caused by using solid-core wire will void warranty. Use stranded wire ONLY.

WARNING: Maximum distance information between the QCC and a remote digital transmitter can be found in the digital transmitter's Operation Manual. If signal lines to Digital Transmitters need to be extended, the LNK-EXT Network Extender peripheral device can be used and if required, a RPS-24VDC Remote Power Supply.

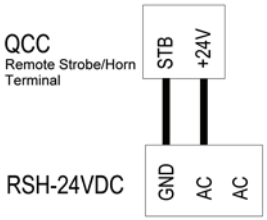
6.8 Wiring Analog and Digital Outputs

6.8.1 Analog Output (option -AO)

If the optional Analog Output board is installed, it offers two 4-20 mA outputs for the control of VFDs (Variable Frequency Drives). Data logging is included with the -AO option.

6.8.2 Wiring Remote Strobe / Horn Output

The QCC provides a 24 VDC @ 500 mA for connecting a remote horn/strobe (such as the RSH-24VDC) at the Remote Strobe & Horn Terminal. This will nominally allow for one remote horn/strobe.



Multiple horn/strobe devices can be accommodated by adding more relays and power supplies.

6.9 Relay Connections

The QCC has three SPDT dry contact relays rated MAX 5A at 240 VAC or 30 VDC each. These relays can be used to control fan starters or coils used for HVAC equipment. The contacts can also be used for signaling other equipment like fire panels or alarm systems. Terminal blocks are provided to connect to the three MAX 5A / 250 VAC - 30 VDC relays.

NOTES:

- The system does not provide any power from these terminals. Dry contacts operate like a switch to simply activate (switch on) or de-activate (switch off) equipment to be controlled, such as fan starters.
- System relays are SPDT (single pole, double throw) thereby providing one set of usable dry contacts. Because the QCC series systems are designed to be fail-safe. **The relay coils are normally energized in non-alarm state for failsafe operation.** If required, the QCC can be configured for normal Relay operation. Refer to the QCC Operation Manual Section *10 Relay, Strobe and Audible Settings and Configurations*.

6.10 Wiring the QCC-RDM Remote Display

The QCC-RDM Remote Display is specifically designed to communicate with the QCC Quad Channel Controller using Modbus® communication protocol and it displays the same information as the QCC. The QCC-RDM is ideal for refrigeration (or other) applications where there are two entrances to the room. The QCC can be mounted outside one entrance and the QCC-RDM outside the other to provide visual confirmation of the gas level readings inside the room at both entrances prior to entry.

24VDC power is supplied to the QCC-RDM from the QCC. Four-conductor, 16-18 gauge wire / cable must be shielded when connecting the QCC to the QCC-RDM.

For more information on the QCC-RDM, refer to Section *10 QCC-RDM Remote Display*.

6.11 Wire Gauge vs Run Length

Refer to the specific Operation Manual of the remote device in question.

7 SYSTEM OPERATION

7.1 Navigating the Menu Structure

There are three push-button keys to the right of the display that are used to navigate through the QCC menu structure. To enter the menu structure press E.

ARROW UP - used for going up through the menus or incrementing values or selecting an alpha character

ENTER - used pirmarily as an enter key, either for getting to the next screen or stepping through a numeric or alpha value

ARROW DOWN - used for scrolling down through the menus or decrementing values or selecting an alpha character

After entering the menus, pressing the ARROW UP key will normally take you to the Exit screen. Most menus are circular and will bring you back to the Exit screen.

7.2 Accessing the Menu with Passcodes

The main menu structure is broken down by the passcode access entry. These passcodes allow for direct access to the parts of the menu system of interest.

CODE	NAME	DESCRIPTION
0001	Test Mode	Test Relays, Strobe, Audible Alarm and View Priorities
1001	Basic	Display Contrast, Set Clock, Data Logging, Baud Rates

7.3 Power Up and Warm-up

Upon power up, the QCC will show the initializing display for about 4 seconds of warm-up after which time it will show the normal display.

After the warm up period, the system may exhibit gas alarm condition(s) if any of the sensors have not completely stabilized during the warm up period. This is normal and the length of time the gas alarms exist is dependent upon the length of time since the unit was last powered up and the state of the environment it is installed in. After warm up, only the display should be active, indicating normal operation, and the relays should be energized indicating normal "Fail-safe" status.

7.4 Normal Display

In normal operation, the QCC will display the channel numbers with their corresponding gas type and level. If fewer than 4 channels are being used, there will be a blank line for each channel not being used. For example, the image below shows channel 1 and 2 in use only.

At the end of each line a letter may be displayed that provides information about the status of the Channel:

Letter	Description
none	System working normally
d	Channel disabled
F	Channel is in Fault condition
C	Channel cannot communicate with transmitter
c	Channel Configuration Fault
L	Channel is in low alarm
M	Channel is in mid alarm
H	Channel is in high alarm
S	Channel has a STEL alarm
T	Channel has a TWA alarm
I	Channel has an IDLH alarm

NOTE: The display may show additional information related to the channels and relays dependent on additional settings that can be enabled. Some of these setting are Override and ON/OFF Delays. These will show a counter indicating how much time is remaining until the action will end or start.

NOTE: You can temporary view the Splash Screen when the device is set to Normal Display by pressing the ARROW UP button once. This allows you to check the model and firmware version of the QCC**.** The screen will display this information and then return to the Normal Display. **If the Analog Output (option -AO) board is installed the system time and date will be displayed on the bottom line of the splash screen.**

NOTE: If the QCC is connected to a QCC-RDM, whatever display configuration is chosen will be mimicked on the QCC-RDM display.

7.5 Display Relay Status and Strobe / Audible Status

The QCC has three SPDT dry contact relays labeled R1, R2 and R3. A normal status for each relay will display FAILSAFE (not in alarm). The Strobe/Audible is labeled S1 and for a normal status will display NORMAL. The relay status and the strobe/audible status will be displayed as well as any active delays.

From the normal display, press the ARROW DOWN button to scroll to view the screen that displays the status of the relays and strobes.

7.6 Door Mounted Audible Alarm Operation

The QCC comes with an external, door mounted, audible alarm. The alarm will sound when the high alarm is reached.

The QCC has an extensive range of programming functions for alarm conditions. Please refer to the QCC Operation Manual Section *9 Channel Settings and Configuration* for information on configuring alarm functions.

To silence the alarm, push any button on the front of the QCC enclosure and the buzzer will stop for a preconfigured amount of time (the factory default is 5 minutes).

7.7 Test Mode Functions

To enter the Test Mode Menu, press the E key and use the ARROWS to enter the code 0001 on the password screen.

In the Test Mode, you can test the audible alarm, strobe and relays to ensure they are working correctly.

For each test you can set the length of time for the test to last. The maximum length of time each test can be set to last is:

	Enter Length of Time	Maximum Length of Time
Audible Test	0 to 999 seconds	16 minutes
Strobe Test	0 to 999 seconds	16 minutes
Relays Test	0 to 9999 seconds	2.7 hours

When the test starts, it will continue as long as the time was set. You can exit the Test Mode without

affecting the time. **If you want to end the test before the time is up, you must re-enter the Test Mode and enter a value of "0" for the test length of that function.**

7.7.1 Test Audible (Buzzer)

NOTE: Before testing the audible alarm, warn people in the vicinity of the sound so unnecessary distress or response is not caused.

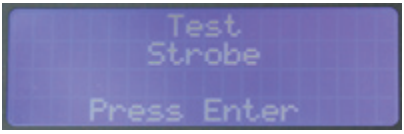
In Test Mode (passcode 0001), use the ARROW keys to scroll through the menu and select Audible Test.

Press E to enter the Test Audible menu. Use the ARROW keys to find the audible device you want to test. Press E to select and enter the length of time (in seconds: 0 to 999) you want the test to last. Press E to save the entry and start the test.

7.7.2 Test Strobe

NOTE: Before testing the strobe, warn people in the vicinity of the sound so unnecessary distress or response is not caused.

In Test Mode (passcode 0001), use the ARROW keys to scroll through the menu and select Strobe Test.



Press E to enter the Test Strobe menu. Use the ARROW keys to find the strobe you want to test. Press E to select and enter the length of time (in seconds: 0 to 999) you want the test to last. Press E to save the entry and start the test.

7.7.3 Test Relays

NOTE: Before testing the relays, notify the appropriate people so unnecessary distress or response is not caused.

In Test Mode (passcode 0001), press the ARROW keys to scroll through the menu and select Test Relays.

Press E to enter the Test Relays menu. Scroll through the menu to find the relay you want to test. Press E to select and enter the length of time (in seconds 0 to 9999) you want the test to last. Press E to save the entry and start the test.

NOTE: Relay ON delays do NOT apply in test mode, however Relay OFF delays will apply when test mode times out. If the relays were tested (tripped) they will remain so after test mode for the duration of their respective OFF delay. (Refer to the QCC Operation Manual Section *10 Relay, Strobe and Audible Settings and Configurations* for more information on RELAY ON / OFF DELAYS.

7.8 Data Logging (included with the -OA option)

The optional Analog Output Module comes with data logging functionality that includes internal logging memory that will store over one year's worth of readings when logging once per minute. Data is saved in a Microsoft® Excel friendly .csv format and can be extracted from the unit with a standard USB connection. Users can then analyze and graph data using CETCI's proprietary data logging software or any program that works with .csv files. The files are stored in directories organized by months and years.

8 BASIC SETTINGS AND CONFIGURATIONS

To enter the Basic Menu, press E and then use the ARROWS to enter the code "1001" on the password screen.

8.1 Set LCD Display Contrast

In the Basic Menu (passcode 1001), use the ARROW keys to scroll through the menu and select Set LCD Contrast. Press E to select.

Use the ARROW buttons to change the numbers according to your preferred brightness/darkness of the display. Press E to save the entry. The minimum value is 15 and the maximum is 85. The display cannot be made completely blank.

8.2 Set Clock (included with the Analog Output option -AO)

NOTE: The Set Clock function will only be available if the on board Analog Output (option -AO) is installed.

In the Basic Menu (passcode 1001), use the ARROW keys to scroll through the menu and select Set Clock. The first step is to set the year. Press E to select and use the ARROW keys to change the numbers to the correct last two digits of the year.

Press E to save the entry and continue to the Set Month screen.

Continue using the ARROW keys to enter the information required and press E to save and continue through the Set Day, Set Hour, Set Minutes and Set Seconds screens.

NOTE: This is a 24 hour clock (ie. 9am = 09 and 1pm = 13).

8.3. Data Logging (included with the Analog Output option -AO)

NOTE: The Data Logging function will only be available if the on board Analog Output (option -AO) is installed.

Data logging includes internal logging memory that will store over one year's worth of readings (when set at a rate of logging once per minute). Data is saved in a Microsoft® Excel friendly .csv format and can be extracted from the unit with a standard USB connection. Data can be analyzed and graphed using CETCI's proprietary data logging software or any program that works with .csv files. The files are stored in directories organized by months and years.

To set the Program Sample Rate, enter the Basic Menu (passcode 1001), use the ARROW keys to scroll through the menu and select Data Logger.
Use the ARROW keys to change the Program Sample Rate and the Enter button to select and move forward.

NOTE: If the message "SD Card Not Present" shows on the display, check to make sure the Analog Output module is installed and that the SD card is properly installed. If the SD card is missing or dislodged, UNPOWER the QCC before gently depressing the card slot door and slide up to open. Put in the SD card or fix the position of the card and close the slot door. Power the QCC back on.

9 QCC-RDM REMOTE DISPLAY

9.1 General Description

The QCC-RDM is a remote display device specifically designed to communicate with the QCC Quad Channel Controller. It displays the same information as the QCC and can be viewed from a remote, relevant location such as a refrigeration application where there are two different entrances to the chiller room. The QCC should be mounted at one entrance and the QCC-RDM at the second entrance, providing a visual confirmation of the gas level readings inside the room prior to entry.

The QCC-RDM will mirror what is displayed on the QCC Controller except when the QCC is being configured, at which time, the QCC-RDM will display "Tech Maintenance".

The QCC-RDM employs connection loss detection to ensure the information that is displayed is current. In the event that the QCC-RDM loses connection with the QCC, the QCC-RDM display will show "Connection Lost".

Simple configurations such as adjusting the display contrast and setting the Modbus® ID and baud rate can be done in the field and the display can be configured to show/not show one or more channels of interest.

The QCC-RDM comes in a standard water / dust tight, corrosion resistant ABS / polycarbonate enclosure with a hinged, secured door.

9.2 Key Features

- 4-lines, 20 character LCD display and LED indicators for alarm STATUS 1, 2, 3 and Fault conditions
- Internal audible alarm
- Modbus® RS-485 RTU communication
- Output for remote strobe and/or horn connection
- Connection loss detection to ensure accurate information

9.3 Technical Specifications

GAS TYPE
No internal gas sensors

MECHANICAL	
Enclosure	ABS / Polycarbonate, rated UL94-5VA, designed to meet IP54 standards. Copper coated interior to reduce RF interference.
Weight	272 g (9.6 oz)
Size	127 mm x 127 mm x 71 mm (5.0" x 5.0" x 2.8")

USER INTERFACE	
Display	4-line, 20 character LCD display and LED indicators for "STATUS 1, 2 and 3", "FAULT" Configurable contrast (default is 20)
Indicator	Status LED indicators for low, mid, high and fault alarms
Menu	Accessed using up, down and enter push buttons

INPUT/OUTPUT	
Communication	Receives Modbus® commands from QCC and duplicates the QCC display information
Outputs	One drive output for a 24V, max 500 mA remote strobe/horn
Audible Alarm	Internal buzzer

ELECTRICAL	
Power Requirement	500 mW of power using the 24 VDC supplied by the QCC
Current Draw	20.8 mA
Wiring	4-wire shielded network wiring between the QCC and QCC-RDM
Communication: Modbus® RTU over RS-485	Baud rate: 19,200 (default) Modbus® ID: 230 (default) Modbus® Broadcast ID: 253 (default) Data bits: 8 Start bits: 1 Stop bits: 1 Parity: none
Fuses	Automatic resetting thermal

ENVIRONMENTAL	
Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity	15 - 90% RH non-condensing

CERTIFICATION

Model: QCC-RDM
S/N: QRDM1603B00001
Rating: 24 VDC, 500 mWatt, Class 2
Max Temp: -20ºC to 40ºC (-4ºF to 104ºF)

CERTIFIED FOR ELECTRIC SHOCK & ELECTRICAL FIRE HAZARD ONLY. LA CERTIFICATION ACNOR COUVRE UNIQUEMENT LES RISQUES DE CHOC ELECTRIQUE ET D'INCENDIE D'ORIGINE ELECTRIQUE.

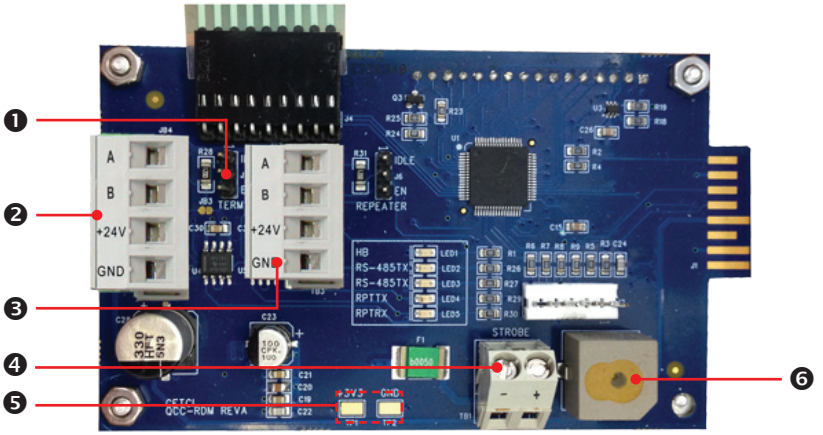
Conforms to: CSA-C22.2 No. 205-M1983 (R2009) / UL508 (Edition 17):2007
Conforms to: EMC Directive 2004/108/EC, EN 50270:2006, Type 1, EN61010
Conforms to: FCC. This device complies with part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

9.4 Front Exterior Enclosure

NUMBER	FEATURE	FUNCTION
❶	Door Hinge	Secures door.
❷	Display	4 lines x 20 characters. Mirrors QCC display.
❸	Status 1, 2, 3 LEDs	Indicates channel alarm status.

❹	ARROW UP	Press to scroll up through menu.
❺	ENTER	Press to select menu choice.
❻	ARROW DOWN	Press to scroll down through menu.
❼	Fault LED	Indicates unit fault condition.
❽	Door Screw	Secures the door of the enclosure.

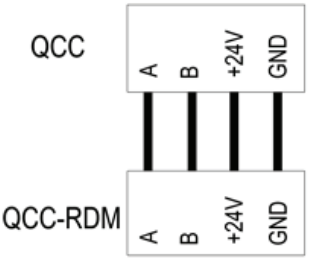
9.5 Interior System Layout



NUMBER	FEATURE	FUNCTION
❶	Jumper Bank (J5)	Termination resistor. If this device is the last one in the network chain, a termination resistor should be connected by placing a jumper in the EN position
❷	Modbus® Connector (TB2)	Terminal used to connect to the QCC-RDM to the QCC
❸	Modbus® Connector (TB3)	Terminal used to connect other devices in the Modbus® network
❹	Strobe (TB1)	Connection for remote strobe or strobe/horn 24V 500 mA max.
❺	Test Points: TP1 & TP2	Used for measuring voltage output
❻	Buzzer	Internal audible alarm

9.6 Connecting the QCC-RDM to the QCC

24VDC power is supplied to the QCC-RDM from the QCC. Four-conductor, 16-18 gauge wire / cable must be shielded when connecting the QCC to the QCC-RDM.



Either TB2 or TB3 can be used to connect the QCC to the QCC-RDM. Both are Modbus® connections. The QCC-RDM will automatically broadcast the display information to Modbus® ID 253. This is the common Modbus® ID for all QCC-RDMs on the network and is used to listen for broadcasts from the QCC and receive screen updates from the QCC. The read and write default QCC-RDM Modbus® ID is 230.

Once the QCC-RDM is wired to the QCC, the QCC needs to be told that the QCC-RDM exists as a remote device. Refer to the QCC Operation Manual Section *8.5 Number of Connected Remote / Peripheral Devices* for instructions on how to add the QCC-RDM as a Remote Display.

Next, in order for the QCC to communicate with the QCC-RDM, the two devices must have the same baud rate. Refer to the QCC Operation Manual Section *8.4.2 Remote Baud* for instructions on how to set the Remote Baud rate.

9.7 Set LCD Display Contrast Level

The contrast level of the LCD display can be changed to be made more visible in high light, low light and/or different temperatures that may require a different contrast setting.

In the Basic Menu (passcode 1001), press the ARROW keys to scroll through the menu and select Set LCD Contrast. Press E to select.

Use the ARROW buttons to change the numbers according to your preferred brightness/darkness of the display. Press E to save the entry.

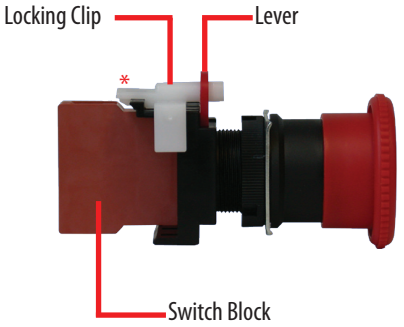
10 OPTIONS AND ACCESSORIES

10.1 Top Mounted Strobe (option -L)

High powered, red LED flashing beacon factory installed on the top of the QCC enclosure. Offers excellent flash intensity, durable vibration resistant construction and a long life 100,000 hour LED technology. Made of tough lexan spun welded to the base to completely seal out moisture. Nema 4X and UL recognized. Ideal for refrigeration applications; when combined with the Manual Shutoff Switch, meets B52 code requirements.

Voltage	12 - 80 VDC
Amperage	200 mA @ 24 VDC
Size	114 mm (4.5 in) H x 76 mm (3 in) dia
Lens Colour	Red (other colours may be available upon request)
# of Flashes	75 Neobe® flashes per minute
Flash Pattern	each flash consists of 7 rapid bursts of light
Operating Temperature	-40°C to 65°C (-40°F to 149°F)

10.2 Manual Shutoff Switch (option -SW)



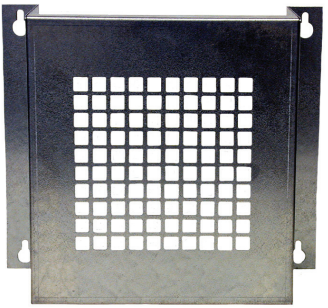
An optional emergency stop, push button switch that is factory installed on the side of the QCC enclosure. Allows manual shutdown of equipment in the event of an emergency such as a gas leak. Ideal for refrigeration applications; when combined with the Top Mounted Strobe, meets B52 code requirements.

To Remove For Wiring:
Remove the white locking clip by pulling up gently on the bottom clip part (see * in diagram above) and twist slightly to remove. Rotate the red lever and remove the switch block. Connect the wires. Put the switch block back on, rotate the lever back in place and replace the locking clip.

For more information and detailed instructions, refer to the *Manual Shutoff Switch Datasheet*.

Voltage Rating	1100 VAC, 24 VDC
Current Rating	10A (AC/DC)
Button Size	40 mm (1.57 in) dia
Mode of Operation	1 NC contact, SPST-NC
Switch Function	ON-OFF
Features	Push-Lock, Turn-Reset

10.3 Metal Protective Guard (p/n: SCS-8000-SPG)



The metal protective guard is made of heavy duty metal and helps to protect against abrasive damage, theft or vandalism to the controller. It is made from 16-gauge galvanized steel and has 13 mm (½") square openings in the front to allow gas and air to flow through to the sensor.
With only four slotted mounting holes, installation and removal for equipment servicing is easy.

NOTE: The metal guard will not fit over a QCC that has a Manual Shutoff Switch installed.

Enclosure	16 gauge galvanized steel
Weight	1.7 kg (3.8 lbs)
Size	254 mm W x 241 mm H x 121 mm D (10.0" W x 9.5" H x 4.8" D)

10.4 Calibration Kit (p/n: CET-715A-CK1)

The Calibration Kit contains the items necessary for common field and shop calibration. It comes in a durable, hard plastic carrying case. **Gas cylinders are not included in the Kit.** They must be ordered separately from the CETCI factory. Many gases are carried in inventory but not all. Check with any CETCI authorized distributor for availability of specific gas types. **Gas cylinders cannot be shipped from Canada to other countries, including the USA.**

11 MAINTENANCE

The QCC or the QCC-RDM require no assembly and virtually no maintenance. It is important to ensure that water and/or dust is not somehow entering the enclosure and physically damaging the circuit board or internal components.

11 TROUBLESHOOTING

QCC won't power up.
Is the power properly connected? Check the connections. Refer to *Section 6.6 Wiring Power Supply Connections* for more information.

On the normal display, one of the channels shows a C at the end of the line, indicating the QCC cannot communicate with the transmitter assigned to that channel.

- Check to make sure the Com Type ANALOG or DIGITAL is correctly set for the type of transmitter (analog or digital) assigned to that channel. Refer to the QCC Operation Manual Section *9.1 Channel Hardware* for more information.
- Check that local area network wiring is correct, especially the A and B lines to make sure they are not swapped between devices on the network.
- Check that the remote device is working properly itself.

QCC-RDM constantly shows "Connection Lost". Check that the number of Remote Devices is set correctly. Refer to the QCC Operation Manual Section *8.5 Number of Connected Remote / Peripheral Devices* for more information.

Critical Environment Technologies Canada Inc.
Unit 145, 7391 Vantage Way, Delta, BC, V4G 1M3, Canada
Toll Free: +1.877.940.8741
Tel: +1.604.940.8741
Fax: +1.604.940.8745

www.critical-environment.com

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