

SmartWireless® CXT

Mobile Gas Detection System

With Display



Operator's Installation and Instruction Manual



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1. Introduction

1.1 Features

The Detcon SmartWireless® CXT controller (Figure 1) is a multi-channel mobile gas detection control system that may be wall mounted or mounted on a Detcon tripod accessory. The CXT can be utilized for self-contained gas detection, display/alarm system package or wirelessly connected to the main network. The controller offers a non-intrusive magnetic interface with backlit LCD display that supports either wireless or a hard wire connection to gas detection sensors. The CXT is equipped with an auto configure system to automatically search for Detcon equipment associated with the controller.

Remote mounted gas detection sensors include any analog 4-20mA DC device such as;

- toxic gas,
- combustible gas, or
- oxygen deficiency sensors.

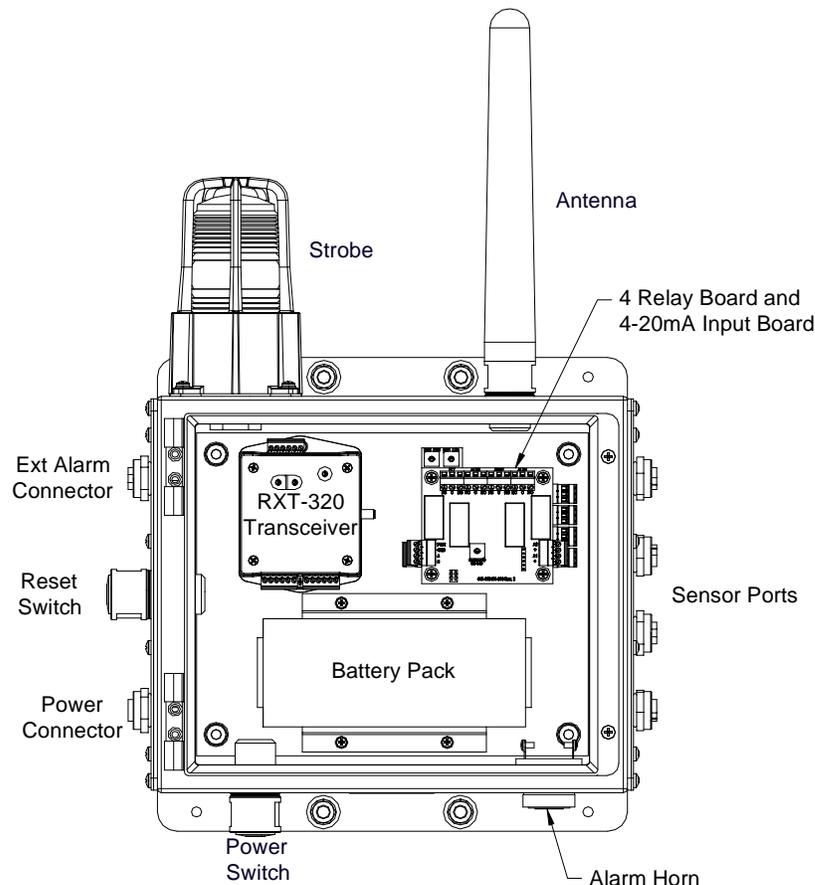


Figure 1 SmartWireless® CXT Controller

Standalone wireless sensors or a maximum of four wired sensors can be monitored by the SmartWireless® CXT. The SmartWireless® CXT control package is a Division 2 assembly housed in a 316 stainless steel enclosure that offers various connector options for multiple configurations.

System components of the SmartWireless® gas detection system include;

- Smart Wireless CXT Controller
- Smart Wireless CX Sensor Station,

- alarm stations and
- gas detection sensors
- BM25 Portable Gas Detector

SmartWireless® CXT Controller

The Detcon SmartWireless® CXT controller is a multi-channel mobile gas detection control system mounted on a tripod or wall mounted. The CXT can be utilized as a self-contained gas detection, display/alarm system package or wirelessly connected to the main network. The CXT is equipped with an auto configure system to automatically search for Detcon equipment associated with the controller.

SmartWireless® CX

The SmartWireless® CX Sensor Station is an accessory to the SmartWireless® CXT. The CX wirelessly transmits the data from up to 4 wired sensors back to the CXT and includes a battery that powers the radio, alarm devices, and the attached sensors.

Alarm Stations

Alarm stations can be used as part of the gas detection system. Class I Division 1 and Class I Division 2 alarm stations are available. The stations are battery powered and controlled wirelessly by the CXT. The strobe and horn installed on the CX are activated by the CXT when the alarms levels are reached.

Alarm options for the CXT are as follows:

1. Integral audio visual mounted on the control panel (Class 1; Division 2 Groups A,B,C,D only)
2. Standalone audio visual alarm station (Class 1; Division 2)
3. Standalone audio visual alarm station (Class 1; Division 1)
4. Four-strobe or two-strobe alarm bar powered directly by the SmartWireless® CXT controller

Gas Detection Sensors

Gas sensors with a 4-20mA output can be connected directly to the CXT. The Detcon CXT-IR and CXT-DM sensors are designed to be used wirelessly with the SmartWireless® CXT.

BM25 Portable Gas Detector

The BM 25 is a portable gas detector that can be used in explosive gas atmospheres according to directive ATEX 94/9/EC and the IECEx international certification system. It provides simultaneous detection of up to 5 gases present in the air by means of sensors specific to each risk to be evaluated (under-oxygenation, explosive or toxic gases).

The BM 25A is powered by an interchangeable and rechargeable battery pack. Under normal operating conditions, and depending on the sensor configuration, operating runtime varies between a minimum of 75 hours and a maximum of 170 hours (100 hours standard).

Figure 2 provides a complete systematic description of the CXT Controller System with Integration Options.

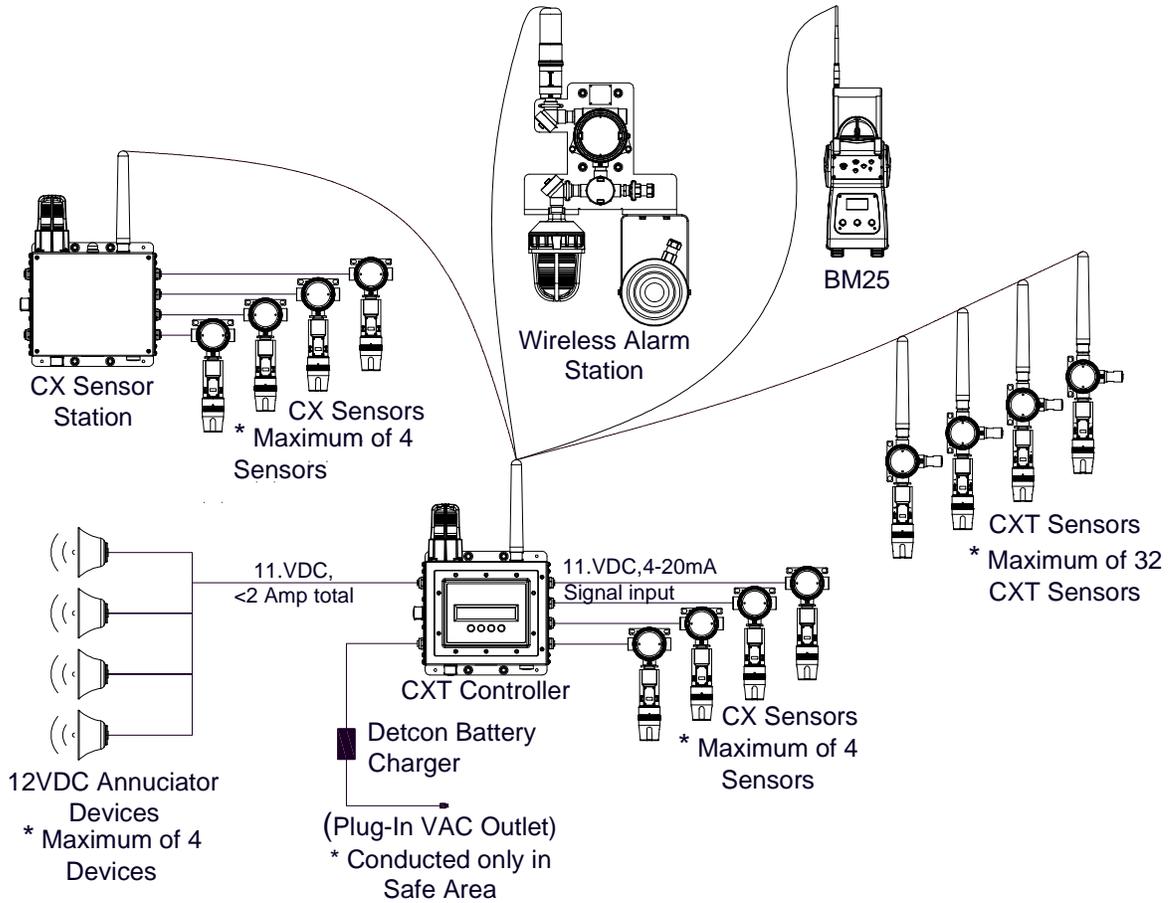


Figure 2 CXT Controller System Integration Description

Associated Accessories

The accessories associated for the CXT Controller product are as follows:

- Detcon Tripod
- Detcon Battery Charging Accessory
- Detcon Division 2 cables (various)
- Detcon Programming Magnet
- Detcon Operators Manual

1.2 Optional Components

Optional components for the SmartWireless® CXTController are as follows:

- reset switch
- two or four sensor ports
- strobe
- horn
- external ‘Wet’ or ‘Dry’ alarm port

1.3 Alarms and Fault Condition

The CXT alarms are used to activate annunciating devices when a gas reading exceeds a user-configured threshold. There are three alarms (Alarm1, Alarm2 and Alarm3) and a fault condition. If installed, the strobe is associated with Alarm 1, and the horn is associated with Alarm2. The external alarm connector provides all alarm outputs (alarm 1, 2 and 3) for connection to external alarm devices. There are two types of external alarm connectors: 'Wet' and 'Dry'. The 'Wet' output connector provides 12V outputs for external alarms or the two-strobe/four-strobe alarm bar. The 'Dry' output connector provides dry contacts for external power to control external alarms. The field configurable user interface permits the user to set alarm values and fault conditions to cause an assigned relay to fire, triggering external alarm devices. The assigned relay outputs will return to normal state when a gas alarm or a fault condition clears. When the alarm level is reached either the devices mounted to the box or attached to the external alarm connector are activated, or both. An external manual switch can be wired to the CXT, acting as an acknowledge/reset switch (Section 1.13).

When the CXT is in alarm, the display will remain on the channel group with the alarm. The user can manually cycle to any group page that exists using the arrow switches. After a time out period, the CXT will resume page cycle protocols based upon the existence of alarms/faults. Four LED indicators on the front panel show alarm/fault alarm output status and are labeled respectively as ALM 1 (yellow), ALM 2 (yellow), ALM 3 (red), and FAULT (blue).

All alarms can be configured as Energized/De-Energized, Latching/Non-Latching and Silenceable/Non-Silenceable for the relays.

Energized Mode

The normally open contact is closed if the alarm level has not been reached or if the sensor is not in fault. Energized mode provides for fail-safe operation since a loss of power or cable failure will cause the contact to be open.

De-Energized Mode

The normally open contact is open if the alarm level has not been reached or if the sensor is not in fault.

Silenceable

The corresponding alarm LED and relay can be deactivated by acknowledging the Alarm Silence function on the front panel of the CXT controller or by activating the external acknowledge switch if installed (Section 1.13 and 5.2.2).

Non-Silenceable

The corresponding alarm LED and relay will remain activated until the cause of the alarm or fault is clear.

Latching Mode

The relay can only be deactivated by acknowledging the Alarm Reset function on the front panel of the CXT controller or by activating the external reset switch if installed (Section 1.13 and 5.2.2).

Non-Latching Mode

The relay is deactivated as soon as the sensor alarm or fault condition is clear.

1.4 Power Supply-Internal Rechargeable Battery and Charging Accessory

SmartWireless® CXT is powered by an internal rechargeable Smart Battery capable of delivering continuous operation in a no alarm condition for two to eight weeks depending on the quantity and type of sensors tied to the control panel. The internal re-chargeable battery pack shall only be charged in a non-

hazardous area where the required operating temperature limits are 0C to +40C. It may be used in the field and be discharged in the temperature range of -20C to +60C.

**CAUTION**

The internal re-chargeable battery pack shall only be charged in a non-hazardous area where the required operating temperature limits are 0C to +40C. Charging outside this temperature range may degrade the life of the battery pack.

**CAUTION**

The Battery Pack Detcon PN 360-3S6PFP-290 contains an internal protection circuit which maintains its safe operation against all potential hazard conditions.

**CAUTION**

No other Battery Pack except Detcon PN 360-3S6PFP-290 may be used in the operation of this device.

The internal battery can only be recharged in a non-hazardous area and only using the Detcon supplied Battery Charger Accessory that runs on AC power.

Detcon Approved Battery Charger Accessory Ratings:

AC Input Power

Voltage: 100-240 VAC, 50-60 Hz (requires correct PN version for optional 110 or 220 VAC use)

Current: 2.0 Amps maximum

DC Output Power

Voltage: 24+/- 1 VDC

Current: 3.1 Amps maximum

NOTE 1 No other Battery Charger or VDC input power source may be used with this CXT Controller product.

1.5 LCD Main Display Function

The main display is an 1¹/₄" x 6" backlit LCD that is four lines by forty characters and displays up to eight configured channels at one time. The four internal magnetic switches are located above the backlit LCD display and offer basic navigation for a complete configuration of the controller (Section 5).

Real time sensor status includes;

- channel number,
- gas concentration,
- device tag (gas type) and
- alarm/fault status.

Each channel displays the current status of three alarm levels and a fault condition on the front panel LED indicators.

1.6 Radio Module

The SmartWireless® CXT offers a wireless option to connect it to other devices wirelessly. The Radio Module includes a transceiver that operates at 2.4GHz and conforms to non-licensed radio frequency usage worldwide. Spread spectrum technology supports integrity and security for the wireless network.

The SmartWireless® CXT and CX products use a wireless network with a mesh topology. If radio communication directly between two devices is impossible due to distance or obstruction, each wireless device is capable of locating an alternate route through an additional wireless device to communicate with the designated device. This innovative technology is designed to create a robust network that automatically routes around congestion and line-of-sight obstacles while improving throughput as subscriber device density increases.

The radio module is housed in a black ABS box mounted inside of the CXT stainless steel enclosure. The standard package includes two PCAs mounted inside the black ABS box (radio PCA and Smart battery charging PCA), 5 dB antenna, and a protective antenna cover. The battery PCA includes circuitry to safely recharge the battery from a 24VDC input and a fuel gauge circuit to monitor the charge remaining in the battery.

The radio PCA includes a 2.4GHz radio and a rotary switch for setting the RF channel of the system (Figure 3). Use a small screwdriver to rotate the switch until the arrow points to the desired RF channel number (16 channels available, 0h-Fh).

NOTE All devices within the network must be on the same RF channel to operate correctly.

The radio module is required to have a Modbus address. This address should always be set to F0h. The radio PCA includes a pair of rotary switches to set this address (Figure 3).

NOTE The switch for the most significant digit (MSD) is on the right and the least significant digit (LSD) is on the left.

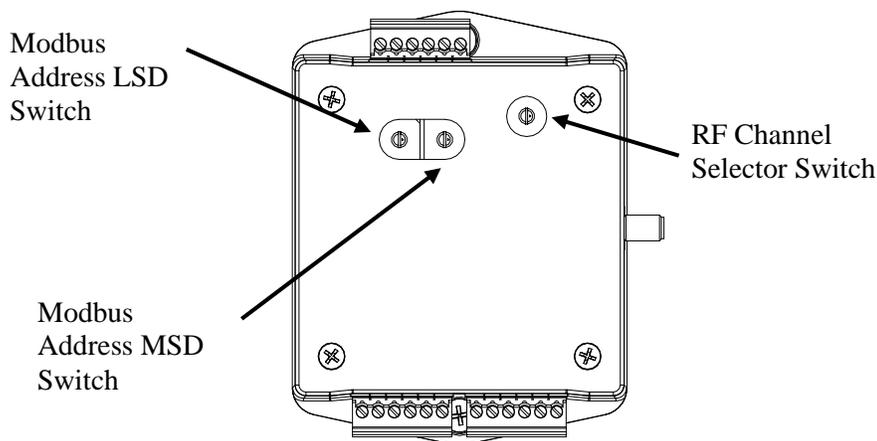


Figure 3 SmartWireless® CXT Radio Module

1.7 Sensor Inputs

The SmartWireless® CXT includes a Sensor Input PCA that accepts 4-20mA inputs from up to 4 attached sensors. The PCA includes two rotary switches to set its Modbus address (Figure 4). This address is set to 01 for SmartWireless® systems using a CXT or Model X40 controller. If an MCX-32 controller is being used, this address needs to be unique for each CXT in the system. For an MCX-32 system, the addresses should start at 40h and continue sequentially for each CXT in the system.

NOTE If the wired sensor inputs are not being used, the rotary switches should be set to 00h.

Sensor Connector Ratings

Voltage: 9-11.2 VDC

Current: 100 mA max through any single sensor connector

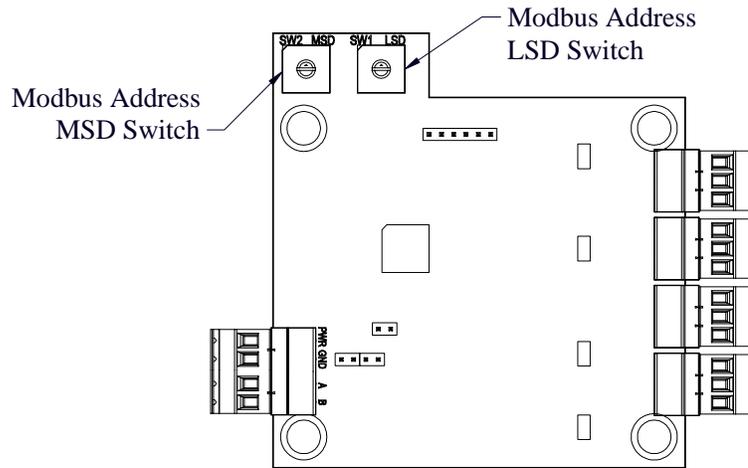


Figure 4 Sensor Input PCA

Four "quick connects" on the side of the CXT provide sensor connection (Figure 5), supply power to the sensor from the internal battery, and accept the 4-20mA signal from the sensor.

NOTE Power supplied to the sensors is 11VDC. Any attached sensor must be designed to work at this voltage level.

The four sensor input lines are fused at the PC board level for safety purposes. These fuses are not designed for field replacement and shall not under any circumstances be attempted to be changed out by anyone but Detcon Factory trained Service personnel.



CAUTION

These PC board mounted fuses are not designed for field replacement and shall not under any circumstances be attempted to be changed out by anyone but Detcon Factory-Trained Service personnel.

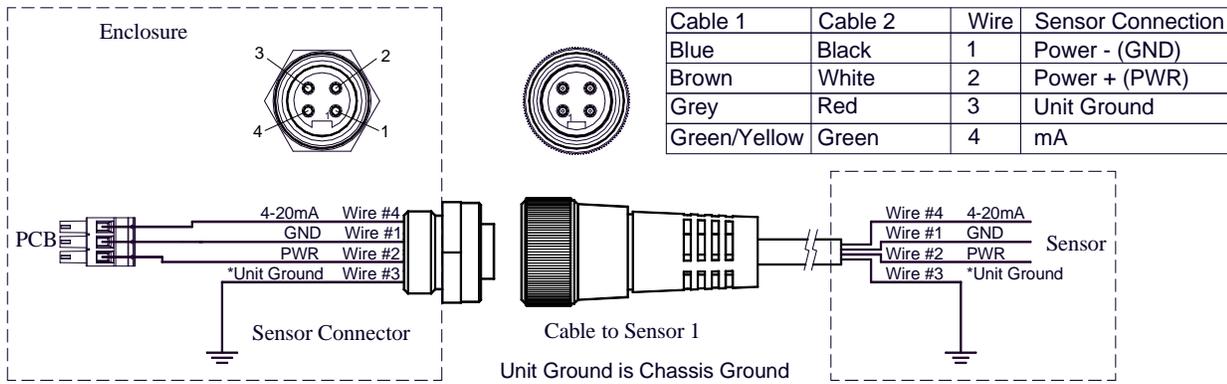


Figure 5 Sensor Input Connector Pin-out



CAUTION

There are two possible styles of sensor cables used in the field for wiring the sensor. It is very important to note which style of cable is being connected to the sensor, and that the sensor is properly wired. Improper wiring of the sensor will cause the sensor to be inoperative.

1.8 Alarm Outputs

The SmartWireless® CXT can optionally include one or two internal Relay PCAs for activating alarm annunciators. Each Relay PCA includes four Class I Division 2 Groups A,B,C,D relays. If the SmartWireless® CXT includes an attached strobe and/or horn, these devices are also activated by the Relay PCA.

Each Relay PCA must have a unique Modbus address. The Relay PCA includes a single rotary switch to set its Modbus address (Figure 6). The most significant digit of the address is hard-wired to “8”. The least significant digit (LSD) is controlled by the rotary switch. The first Relay PCA should be addressed at 80h and the second Relay PCA (if present) should be addressed at 81h.

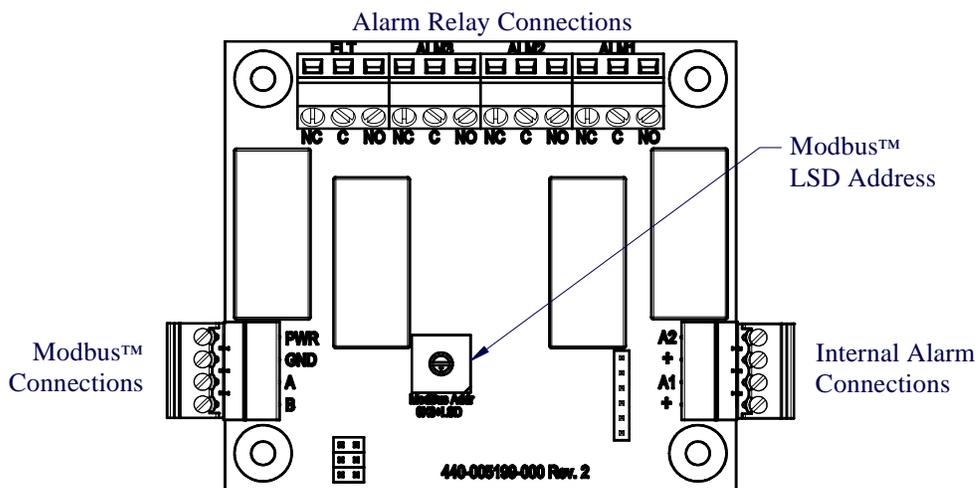


Figure 6 Relay PCA

If the Smart Wireless® CXT is ordered with the Relay PCA option, the Relay PCA can be configured to provide either ‘Wet’ or ‘Dry’ contacts for external annunciator activation. The ‘Wet’ contact option provides a nominal 11V Battery Power to external annunciators when an alarm is initiated. These wet relay outputs are rated for 9-11.1 VDC, 2A max total (A1, A2, A3, and FLT outputs combined). The ‘Wet’ contacts are available on a 5 pin (Figure 7) or 6-pin (Figure 8) Alarm Connector. These outputs are specifically meant for external 12V annunciators such as the external A1 C1D2 Horn or four-strobe/two-strobe alarm bar, which is designed to operate on the unit’s 12V Battery.

The 6-pin Alarm connector is intended for use with the Detcon Four-Strobe or Two-Strobe Alarm Bar. The Two-Strobe Alarm Bar has strobes that are activated when alarm 1 or alarm 2 are active on the CXT controller. The Four Strobe alarm bar has strobes that can be configured to activate individually when a specific sensor is in alarm (See Section 5.3.2 for configuration information).

Wet Relay Connector Ratings

Voltage: 9-11.2 VDC

Current: 2 Amps max through single relay connector (2 Amps max total across all pins).



CAUTION

When utilizing ‘Wet’ contacts, the maximum power that can be drawn by the annunciators is 2A.

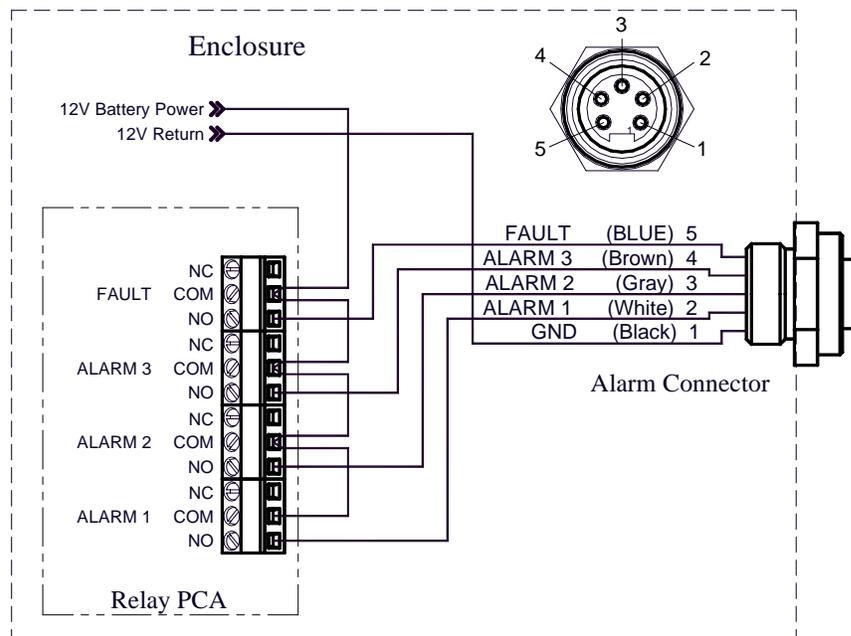


Figure 7 5-pin External Alarm Connector for ‘Wet’ Alarm Contacts

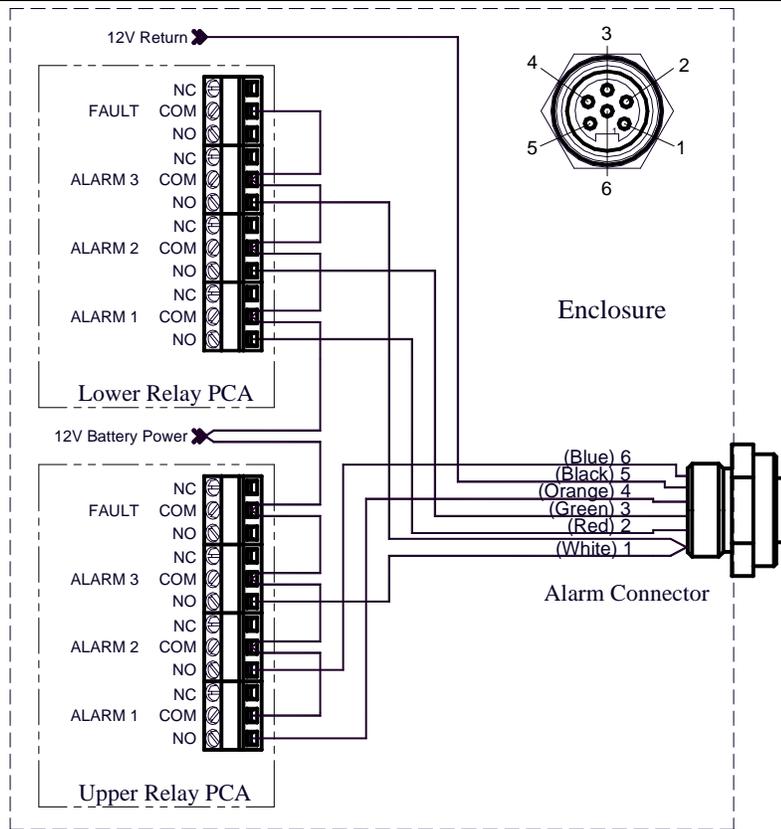


Figure 8 6-pin External Alarm Connector for 'Wet' Alarm Contacts

The Smart Wireless® CXT is also available with 'Dry' relay contacts (Figure 9). Dry relay Contacts allow the user to control annunciators that operate off an exterior power source that relies on the controller to provide only contact closure to apply voltage to the annunciator. The 'dry' relays are rated for 120-220VAC/24VDC, 2A max. It is important to note that the 'Dry' contact feature utilizes a common return for all annunciators.

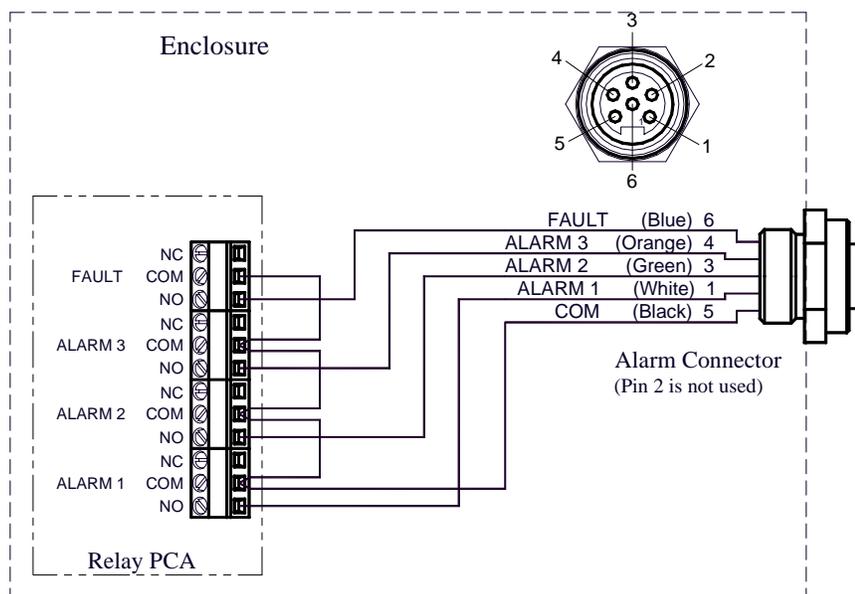


Figure 9 External Alarm Connector Pin out for 'Dry' alarm contacts

1.9 Power Switch

Power to the SmartWireless® CXT is controlled by a power switch located on the bottom of the enclosure (Figure 1). Pressing this switch while the power is off will turn the CXT on. Pressing the switch while the power is on will turn the power off.

1.10 Power Connector

The internal battery inside the SmartWireless® CXT controller can be recharged by connecting 24VDC to the power connector on the side of the enclosure (Figure 1). A VAC/24VDC battery charging adapter is included with every CXT.

Detcon Approved Battery Charger Accessory Ratings:

AC Input Power

Voltage: 100-240 VAC, 50-60 Hz (requires correctly selected 110 VAC or 220 VAC Cord)
 Current: 2.0 Amps maximum

DC Output Power

Voltage: 24+/- 1 VDC
 Current: 3.1 Amps maximum



The SmartWireless® CXT must be charged with the Detcon supplied Battery Charger. (Detcon P/N: 976-0003BC-00T for 110VAC and P/N 976-0003BC-220 for 220VAC). Use of any other charger may damage the controller.

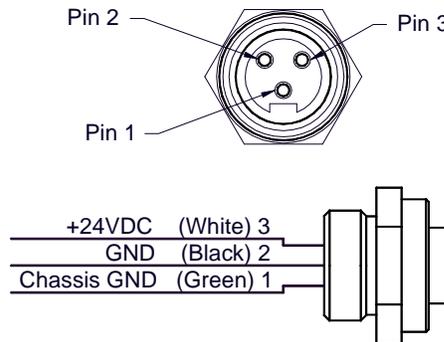


Figure 10 Power Connector

1.11 External Modbus Connector

The SmartWireless® CXT controller is available with an optional external Modbus connector. This connector allows the CXT controller to be monitored by a DCS or PLC via Modbus RTU. It also allows for connection of the SiteWatch remote monitor.

The external Modbus port communicates using 9600 baud, 8 bits, no parity, and one stop bit. The Modbus A, Modbus B, and ground signals must all be connected to the Modbus master for proper operation. The

Modbus address of the CXT controller is set to 01 by default. See Section 11.2.3 for instructions on changing this address.

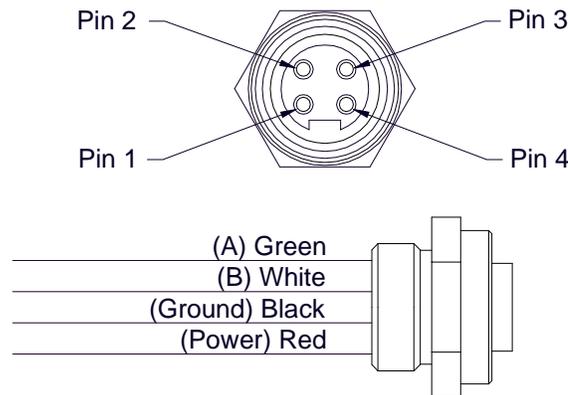


Figure 11 Modbus Port



Warning

If the CXT Controller is used with the SiteWatch remote monitor, the SiteWatch must be located in a non-hazardous area.

1.12 Data Logging SD Card

The SmartWireless® CXT controller contains a factory installed SD card on the display PCA (printed circuit assembly) that allows data logging. The SD card can be removed (Section 6) and viewed on a computer using Detcon's Log File Viewer application.



Warning

Removal or installation of the SD Card shall only be done in a non-hazardous location.

1.13 Remote Alarm Reset/Acknowledge Switch

An optional remote Alarm Reset/Acknowledge switch enables the user to reset or acknowledge alarms without having to open the CXT enclosure. The switch is a normally-open push button mounted on the side of the enclosure.

1.14 Remote I/O Cabling Accessory and Safe Use

The I/O cabling option designed for the CXT Controller and its safe use is described in the cabling Specification section in Section 11.1. A specific list of Detcon approved cabling option lengths are given in the Spare Parts List.

Security clips, which require a tool for removal, are provided and are required for all I/O cables. All connectors should have the security clip engaged at all times except for when disconnecting them in the safe area.

**CAUTION**

Use only Detcon specified cable accessories described in this Manual to maintain the Division 2 rating and safe use of this product.

**CAUTION**

Security clips, which require a tool for removal, are provided and are required for all I/O cables. Connectors should have the security clip engaged at all times except for when disconnecting in the safe area.

2. Safety Guidelines for Safe Use

If equipment is used in a manner not specified by Detcon, the protection provided by the equipment may be impaired. It is mandatory to read and follow all of the Safety Warnings and Cautions listed below.



Warning

This apparatus is suitable for use in Class I, Division 2, Groups A,B,C,D, or unclassified locations.



Warning

Explosion Hazard. Do not make any disconnections while the circuit is live or unless the area is known to be free of ignitable concentrations.



Warning

Charging of the internal Battery Pack shall never be done while equipment is located in the Division 2 hazardous area. The equipment must be moved to a non-hazardous indoor location area for the battery charging to take place. The temperature during the indoor battery charging shall be between 0-40C.



Warning

Explosion Hazard. Do not remove or replace the SD Card unless power has been disconnected or the area is known to be free of ignitable concentrations of flammable gases or vapors.



Warning

Explosion Hazard. Do not remove or replace the Lithium Ion Battery Pack unless power has been disconnected or the area is known to be free of ignitable concentrations of flammable gases or vapors.



Warning

Substitution of any component may impair suitability for Class 1 Division 2 use.



Warning

Exposure to some chemicals may degrade the sealing properties of materials used in the following devices used in this equipment; namely the Class 1 Div2 Strobe, relay contacts, and magnetic programming switches



Warning

All I/O cable connectors have dust/water sealing caps that are mandatory to be installed on any connector that is not actively connected to a cable. This is required to maintain the safety rating of this device. These caps are tethered adjacent to each of the connector fittings for convenient connection.

**CAUTION**

The user must consult this manual for more information about any location marked with this symbol.

**DANGER**

Danger of electrical shock. User must ensure that power has been disconnected prior to installation or servicing of the equipment.



Warning

When moving the base CXT controller unit, handle it with 2 hands securely around the body of the unit so as to prevent a possible dropping or lifting hazard.



Warning

When wall mounting the CXT Controller unit, make sure to have 2 people working together and follow the recommended wall mounting instruction in Section 3.1.9, which requires suitable securement that holds four times the weight of the unit. This will prevent chances of a dropping hazard during the installation or prevent the risk of the unit falling off from the wall mount.



Warning

When moving or manipulating the CXT Controller unit mounted to the Tripod Assembly, 2 people are required to work together to avoid possible lifting risk. Do not place your fingers in the areas of the sliding tripod legs as there is risk of hand injury. Personnel should wear safety gloves while moving and setting up the tripod assembly.



Warning

To avoid accidental tip-over risk of injury, press and anchor the 3 pointed legs of the tripod deep and firmly into the soft ground. If the ground is too hard for use of the point, use an independent anchored pin and a short chain connecting to each leg to secure the unit.



Warning

To avoid a tripping hazard, hang a brightly colored flag type marker half down each tripod leg to provide visual warning of the location of the tripod legs.



Warning

To avoid any possible ergonomic risk in interfacing with the CXT unit, make sure it is installed at a height of 4-5 feet. Place the unit in place where it is easy to access the front of the unit and as possible avoid placing it where there is constant direct sunlight.

3. Installation

3.1 Initial Setup

The Detcon tripod (P/N 975-TRIPOD-100) provides a stable and mobile base for the SmartWireless® CXT. A maximum of two sensors can be secured to the tripod using Detcon brackets (P/N 943-004413-000) installed on the tripod.

1. Unpack the tripod, open the legs and place on a level surface. The tripod must have the 3 legs extended to widest position possible and be locked in place. The tripod must be firmly located on level terrain or this is an extreme safety risk of the unit tipping over and causing personnel harm or equipment damage. As is possible, the points of the tripod legs should be equally plunged into the ground to make the tripod most firmly stabilized.



CAUTION

The tripod must have the 3 legs extended to widest position possible and be locked in place. It then shall be firmly located on level terrain or there is an extreme safety risk of the unit tipping over and causing personnel harm and/or equipment damage.

2. Mount the CXT to the center pipe using the supplied U-bolts in accordance with Figure 12. The height position should be about 4-5 feet maximum to minimize tip-over potential. The U-bolts should be thoroughly tightened such that there is no vertical slide of the controller up or down the tripod center pipe. If it slides it may be a safety issue related to personnel injury.



CAUTION

The installed height position should be 4-5 feet maximum to minimize tip-over potential. The U-bolts should be thoroughly tightened so there is no chance for vertical slide of the controller up or down the tripod center pipe. If it slides unexpectedly it is a safety issue related to personnel injury and/or tipping over.

NOTE Position the CXT controller on the tripod and position the tripod such that all disconnecting devices are readily accessible.

1. Install the 8" antenna onto the antenna connector on the top right side of the CXT controller (Figure 1).
2. Secure the antenna cover over the antenna.
3. If wired gas sensors are being used with the controller, attach the sensor mounting brackets to the tripod legs using the supplied 1/4" bolts, nuts and lock washers in accordance with Figure 13.
4. Secure the sensors to the brackets on the tripod using the hook and pin supplied with the bracket.
5. Connect sensor cables to the sensor ports on the CXT (Figure 1).

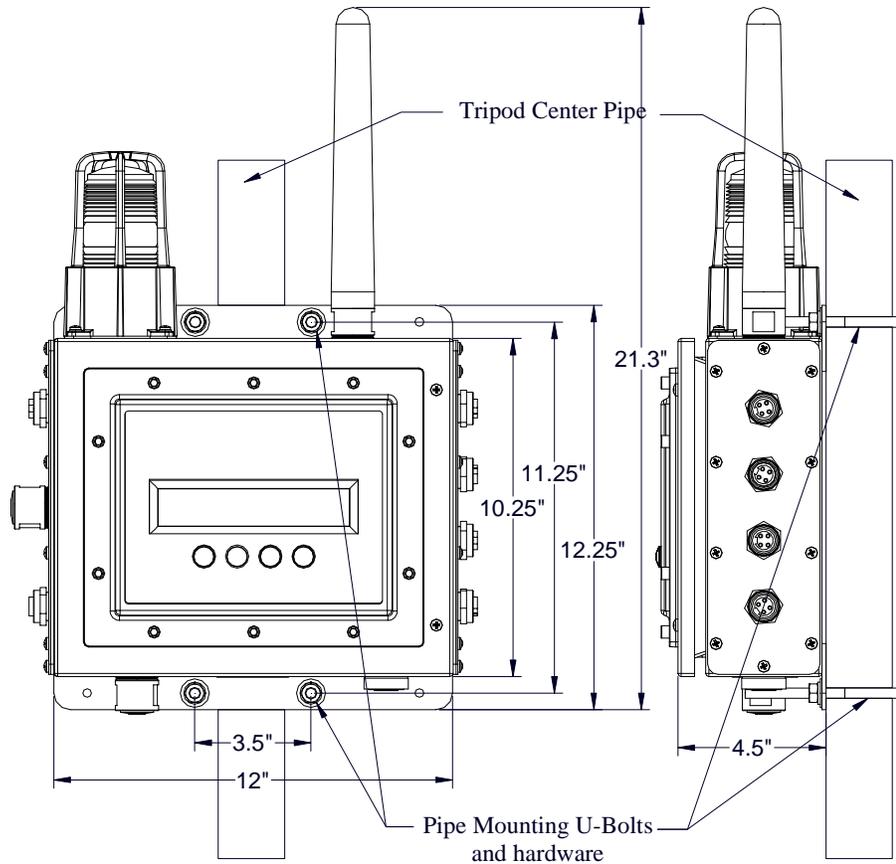


Figure 12 Mount CXT on Tripod

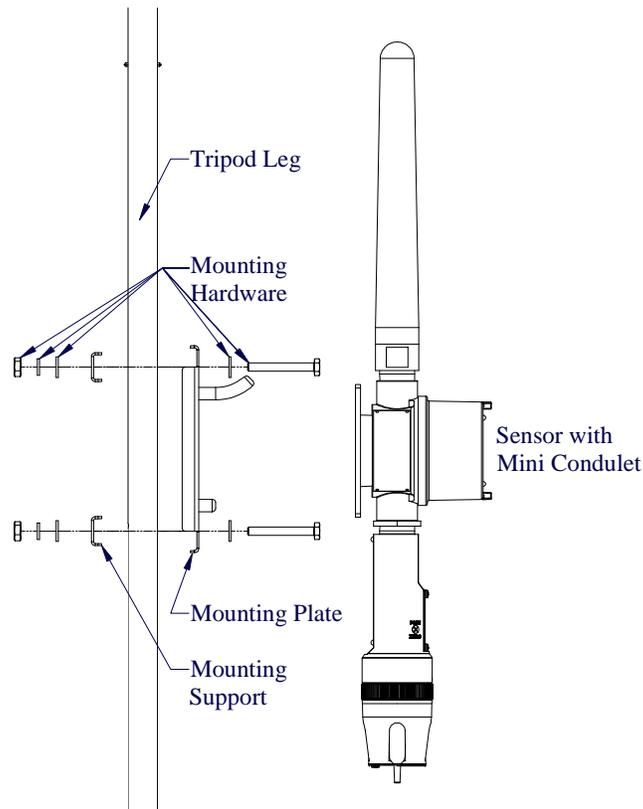


Figure 13 Attach Sensor Brackets to Tripod

6. The CXT Controller can also be wall-mounted using the four holes provided in the mounting brackets. The method of securing the device to the wall is via all four mounting holes, which shall safely support four times the weight of the unit. The unit's weight is 17 lbs = 7.7 Kg and the safe weight support requirement is 68 lbs = 31 Kg.
7. The correct wall installation will be attachment to a solid plywood structure of minimum 0.5" thick. The recommended mounting bolt specification is a 3/8"-16 x 1-1/2" long 316SS hex head bolt. The recommended nut and washer components are a 3/8"-16 316SS hex nut and 3/8"-16 316SS flat washer. The unit should be marked and measured for wall mounting at approximately four feet height. The unit shall be held up to wall to mark off the location of the four outer spread mounting holes located on the two mounting ears of the enclosure. Four clearance holes of 0.5" OD should be drilled through the wood. The unit is then held up in place and the bolts are passed through the enclosure mounting ear holes and the wood. On the back side of the wood, an assistant should secure the washers and hex nuts to hand tight torque.



CAUTION

The method of securing the device to the wall is via all four mounting holes, which shall safely support four times the weight of the unit. The unit weight is 17 lbs = 7.7 Kg and the safe weight support requirement is 68 lbs = 31 Kg. This is required to avoid the unit from unexpectedly falling off and causing a safety hazard.

NOTE

Position the wall mounted CXT controller such that all disconnecting devices are readily accessible.

8. If the unit is ordered with the optional external A1 C1D2 Horn, the horn should be mounted either on the tripod, or on a separate tripod. The optional A1 C1D2 Horn requires the cable for the External 'Wet' Alarms.
 - a. The horn should be wired to the 'Wet' Alarm Output cable per Figure 14.
 - b. The alarm Cable should be connected to the External Alarm Connector on the controller.

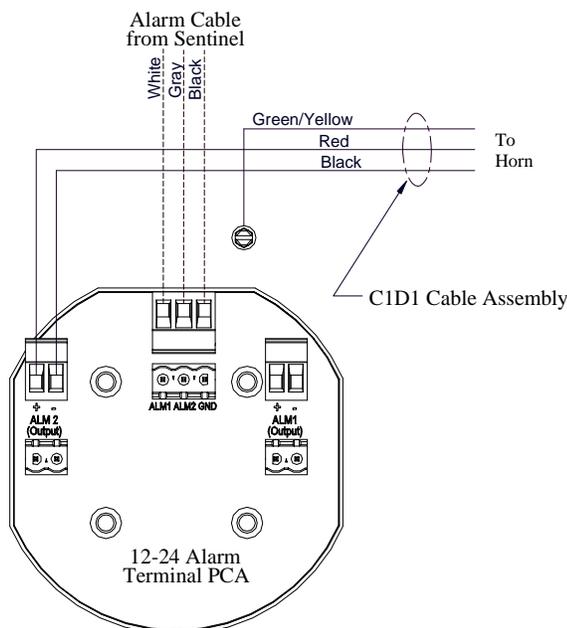


Figure 14 A1 C1D2 Alarm Connections

Battery Installation

9. Loosen the screws holding the door panel in place, and swing the front door of the enclosure open to gain access to the battery bracket.

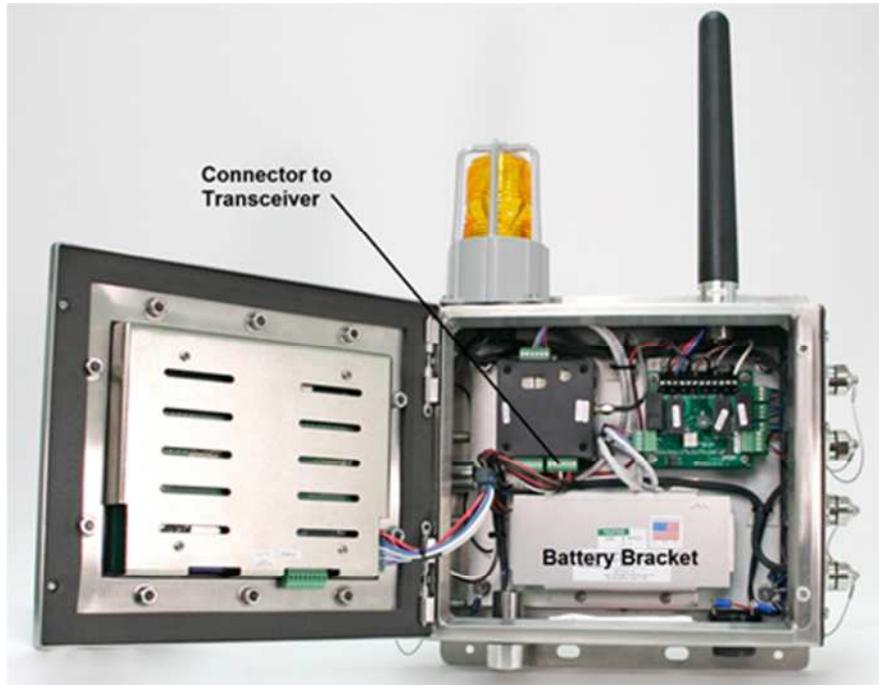


Figure 15 Enclosure

10. Unplug the connector from the transceiver, and move it out of the way to gain access to the screws holding the battery bracket in place. There should be enough of a service loop to safely move this connector out of the way for removal/installation of the battery bracket.

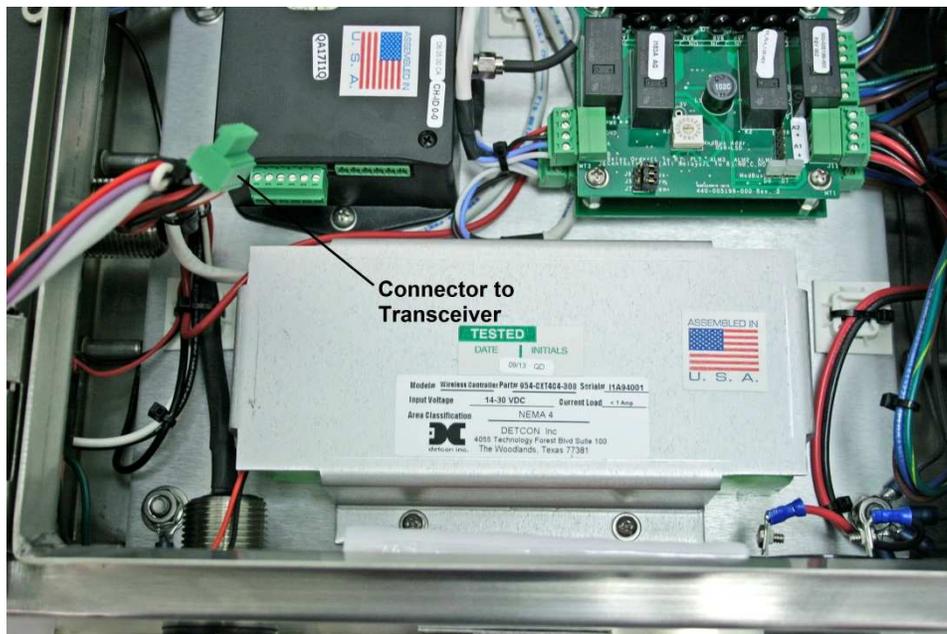


Figure 16 Connector to Transceiver

11. Remove the 6-32 screws and washers holding the battery bracket in place, and remove the bracket from the enclosure. Retain the screws and washers for installation of the bracket with the battery pack.

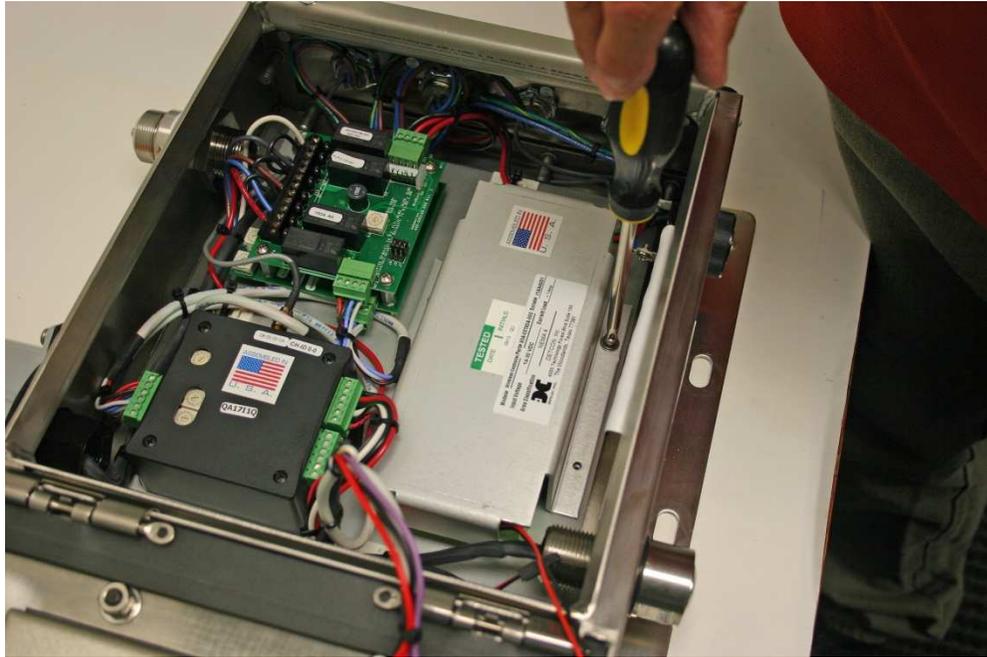


Figure 17 Battery Bracket in position

12. Install the battery pack in the bracket. The battery will fit snugly into the holder, being somewhat held in place by the foam padding in the bracket.

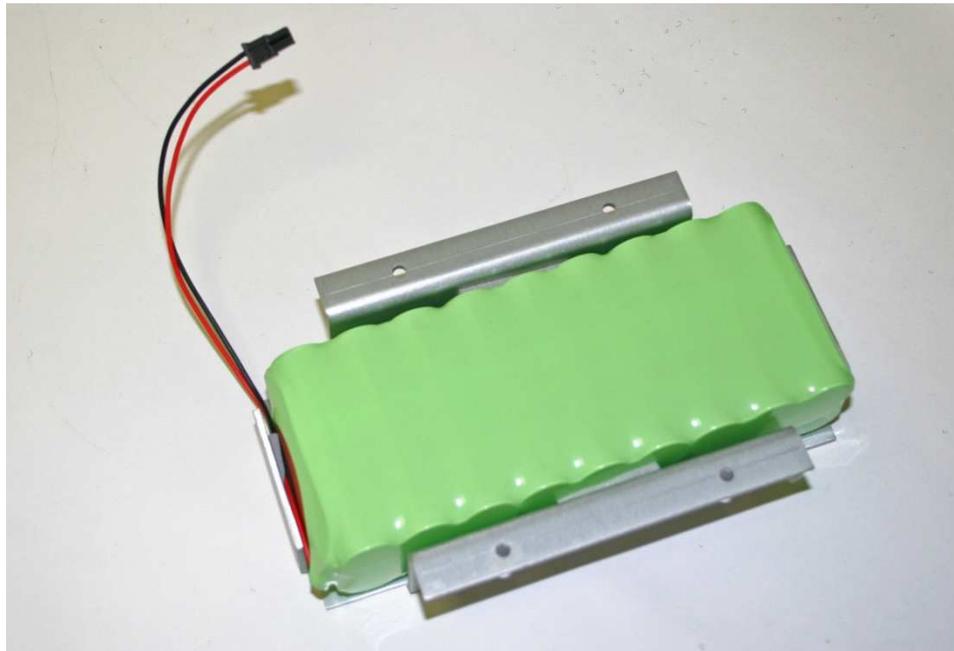


Figure 18 Battery and Battery Bracket

13. Position the battery bracket (and battery) with the connector on the left side, and install the battery and bracket in the enclosure using the 6-32 screws and hardware removed in step 11. Some wiring may need to be moved out of the way during this process to ensure that the wiring is not caught under the bracket.
14. Locate the connector mate for the battery connector, and plug the two connectors together.

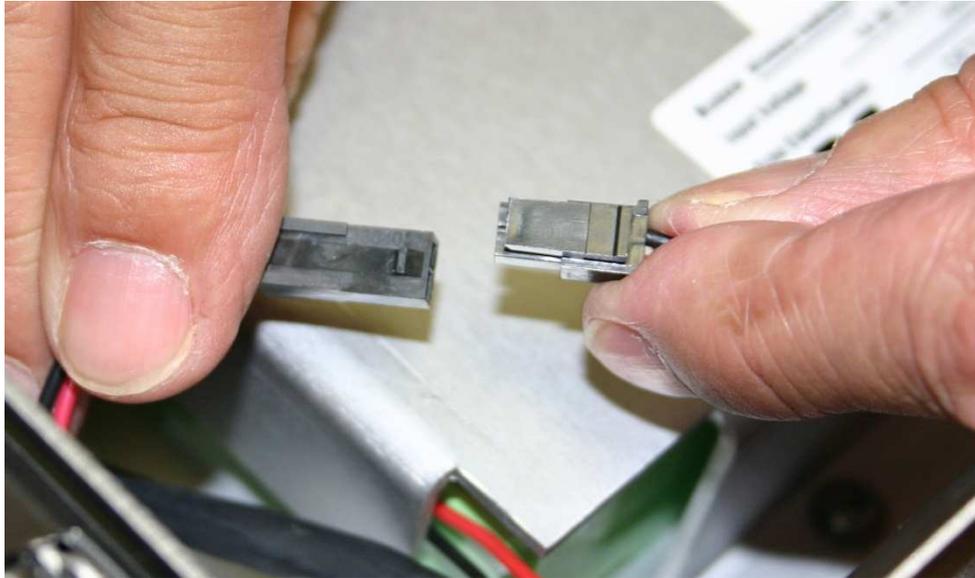


Figure 19 Battery Connections

15. Re-install the connector to the transceiver (removed in step 10).
16. Cycle power to ensure that the unit powers up. Close the front door panel and screw the front cover down. The screws should be tightened down to a 'snug' fit. These screws do not need to be tightened down completely, but need to be tightened down enough to give the front door a water tight seal.
17. Verify normal operation once power is applied to the unit. The unit will cycle through the following:
 - Boot up and display the company name, model, firmware version and COMM ports available.
 - Proceed to poll Modbus™ addresses of any attached devices.
 - The LCD will then refresh and display the next eight channels and so on until the LCD cycles back to the first eight channels and repeats the process.
 - The blue fault LED will remain off.

4. Recharging the Internal Battery Pack

4.1 Non-Hazardous and Indoor Location

At a safe time interval prior to full discharge of the internal battery pack, relocate the CXT Controller to a non-hazardous indoor location area that has suitable 110 VAC or 220 VAC AC power receptacles available.

4.2 Connecting to Mains Supply

Connect the battery charger connector to the external port labeled external power. Using the appropriate Battery Charging Accessory product (PN 976-0003BC-00T for 110 VAC or PN 976-0003BC-220 for 220 VAC), find the corresponding Mains Supply receptacle in an indoor non-hazardous area and plug-in the pronged end of the cable. Operate the charger for the necessary time it takes to accomplish a full charge.



CAUTION

Only the Mains supply cord that is supplied with the Detcon-approved Battery Charger Accessory product shall be used. Use of any other Mains supply cords will impair the safety of this device.



Warning

Charging of the internal Battery Pack shall never be done while equipment is located in the Division 2 hazardous area. The equipment must be moved to a non-hazardous indoor location area for the battery charging to take place. The temperature during the indoor battery charging shall be between 0-40C.



Warning

The charging power supply is only safely rated for indoor use, so use of the Detcon charging accessory is limited to indoor non-hazardous areas.

5. System Configuration

5.1 System Operation

The setup of the controller is critical for proper operation. Modbus™ addresses must be correct on all the devices connected to the controller before the controller will acknowledge the devices. Each wireless sensor must have a unique Modbus address (refer to sensor manual for details).

5.2 Operator Interface

5.2.1 Magnetic Programming Tool

The magnetic programming tool (Figure 20) is used to operate the magnetic switches. For switch activation, the programming magnet is briefly held on the switch marker (⊗) and then removed. This action will be referred to as a "swipe" for the remainder of this manual.



Figure 20 Magnetic Programming Tool

5.2.2 Front Panel User Interface

The front panel user interface (Figure 21) contains four switches necessary to configure the CXT controller.

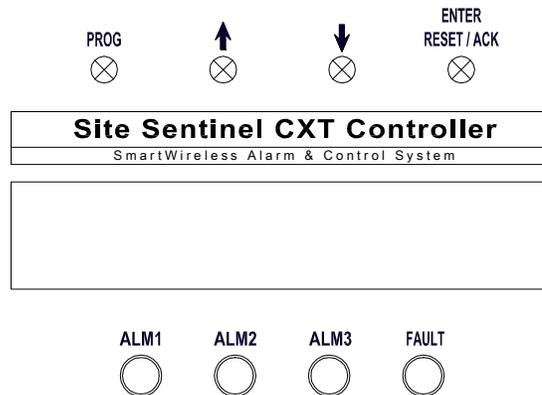


Figure 21 Front Panel User Interface

PROG Switch

From the Main Display, the PROG switch enters into the Main Menu. Once inside the Main Menu, the PROG switch acts as an "Escape" switch that moves backwards in the menu flow chart.

NOTE While in Main Menu mode there are no updates to gas readings and hence no alarms will take place.

↑ Up Arrow Switch

This switch moves the user up the Main Menu flow chart. It is also used to change selected entries in the menu selections in the upward direction.

↓ Down Arrow Switch

This switch moves the user down the Main Menu flow chart. It is also used to change selected entries in the menu selections in the downward direction.

ENTER and RESET/ACK Switch

This switch has multi-purpose use:

- The ENTER function is used to accept selections in all menu screens and to execute the Reset and Acknowledge functions.
- The Reset function releases all latched relays once the alarm/fault condition has cleared.
- The Acknowledge function will disengage any silenceable relays that are in an active state. This is used to silence alarms once the end-user has assessed the alarm condition.
- The RESET/ACKNOWLEDGE function of the switch is only applicable from the Main Display and not while in Main Menu mode.

5.3 Main Display Functions

When no alarms or faults exist on the SmartWireless® CXT, the Main Display will show the status of all the sensors in the gas detection system. When the SmartWireless® CXT is in alarm, the LCD display will stay on the channel group with the channel in alarm. If multiple alarms/faults exist, the CXT will cycle through group pages with alarms/faults including the transceiver, RL-4/alarm station, and AO-4 group pages. At any time the user can manually cycle to any group page using the arrow switches. After a time out period (15 seconds), the CXT will resume page cycle protocols based upon the existence of alarms/faults.

Four LED indicators on the front panel show alarm and fault alarm output status. The LEDs represent ALM 1 (yellow), ALM 2 (yellow), ALM 3 (red) and FAULT (blue).

NOTE The CXT only cycles through sensor group pages when no alarms/faults exist.

5.3.1 Sensor Group

XX> YYY "Device Tag"

XX – represents the corresponding channel number

YYY – the gas concentration value

"Device Tag" – Either user enter tag or COMM ERROR.

- IN ALARM# = If any channel is in any gas alarm condition, # is the alarm level.
- IN FAULT = If any gas channel is in fault.
- 0 COMM ERR = If any channel is not appropriately communicating with the device.

5.3.2 Transceiver Group

WTXX 'Status' YYY%

XX – represents the transceiver Modbus slave address.

'Status' – Status message of the alarm station.

- OFFLINE = Not communicating.
- DC POWER = Communicating; line powered.
- BATT ERR = Communicating; cannot read smart battery pack.
- LOW BATT = Communicating; smart battery time to empty below the set threshold.
- 45+ DAYS = Communicating; smart battery pack has more than 45 days before empty.
- 0-45 DAYS = Communicating; the number of days until smart battery pack is empty.

5.3.3 YYY% - represents the link quality of the transceiver. Relay Module

RMXX> 'Status'

XX – represents the relay module Modbus slave address.

'Status' – Status message of the relay module.

- COMM ERR = Not communicating with module.
- RL4 MODULE = Communicating with module.
- RF SILENCE = CXT Controller is in RF Silence mode
- ALM INHIBIT = CXT Controller is in Alarm Inhibit mode

5.3.4 • ALM TEST = CXT Controller is in Alarm Test mode Wireless Alarm Station/BM25

ASXX 'Status' YYY%

XX – represents the alarm station Modbus slave address.

‘Status’ – Status message of the alarm station.

- OFFLINE = Not communicating.
- DC POWER = Communicating; line powered.
- BATT ERR = Communicating; cannot read smart battery pack.
- LOW BATT = Communicating; smart battery state of charge below the set threshold.
- 0 – 100% = Communicating; current charge state of the rechargeable battery pack
- RF SILENCE = CXT Controller is in RF Silence mode
- ALM INHIBIT = CXT Controller is in Alarm Inhibit mode
- ALM TEST = The CXT Controller is in Alarm Test mode
- 0.00-99.99V = Communicating; battery powered; measured voltage of the battery pack
- BM25 FLT = Alarm station is a BM25; BM25 is in fault
- LOW LITH = Alarm station is a BM25; BM25 has a low battery
- VL BATT = Alarm station is a BM25; BM25 battery is completely discharged

YYY% - represents the link quality of the alarm station.

5.4 Menu Mode

1. The PROG switch is used to enter the menu mode of the unit by swiping a programming magnet over the corresponding marker (⊗). Once in the menus, all Modbus™ polling stops, sensor values are not read and alarm outputs are not updated.

NOTE If the CXT is in alarm when the user enters the menu, it will stay in alarm until they exit the menu.

2. Upon entering the MAIN MENU, the LCD will display the following:

MAIN MENU

AUTO CONFIGURE SYSTEM

3. Use the down arrow "↓" switch to move to the next menu item or use the up arrow "↑" switch to move to the previous menu item by swiping the programming magnet over the corresponding markers. Swiping the **PROG** switch again will return the unit to normal operation.
4. Swipe the **ENTER** marker when the appropriate menu item is located to enter the menu.

The Main Menu and consists of seven menu items:

1. Auto Configure System
2. Set Channel Alarms
3. Set Relay Function
4. Inhibit & Alarm Test Mode
5. System Diagnostics
6. Time and Date
7. View TWA & Peak

Reference the Menu Flow Chart (Figure 22) to learn how to easily navigate the menus and make changes.

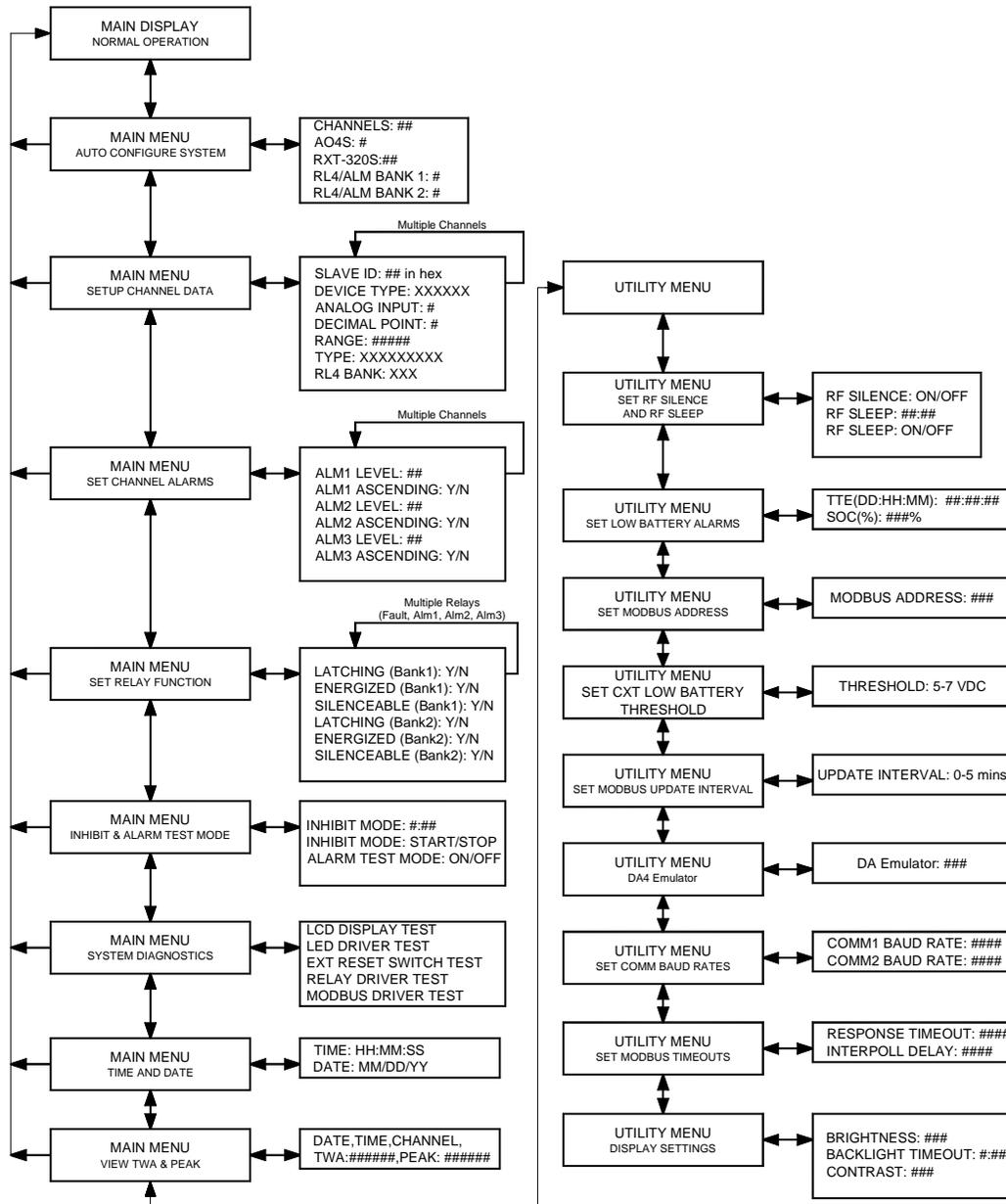


Figure 22 Menu Flow Chart

5.4.1 Auto Configure System

1. Ensure that the addresses on all sensors are correctly set.
2. Verify that all 4-20mA inputs are turned on. Only currents above 1.80mA will be detected.
3. Upon entering Auto Configure menu, the LCD will display:

CONFIGURATION SUMMARY
CHANNELS:## AO4S:## WIRELESS TRANSCEIVER WTS:##
RL4/ALARM STATION COUNT:##
[RUN SYSTEM AUTO CONFIGURE]

4. Swipe the ENTER marker to initiate the search. The CXT controller will perform an incremental search for available 700/100 and 600 serial sensors starting with Modbus™ address 01h and analog inputs with a minimum current of 1.80mA.

NOTE All sensors must be powered on to be detected correctly.

NOTE The channel tags for the analog inputs will be set to “PPM H2S” by default. These can be changed in the Utilities menu (Section 11.2).

NOTE The channel tags for detected serial sensors will be set to gas type and units by default. These can be changed through the Utilities menu.

5. The search will continue until Modbus™ address 7Fh is reached or until it is terminated by swiping the ENTER marker which will save the serial sensors. When all of the connected sensors are identified, swipe ENTER to begin detecting alarm stations with Modbus™ address 80h.
6. The search will continue until Modbus™ address 8Fh is reached or until it is terminated by swiping the ENTER marker which will save the alarm stations. When all of the connected alarm stations are identified, swipe ENTER to begin detecting wireless radios with Modbus™ address 01h.
7. The search will continue until Modbus™ address 7Fh is reached or the search is terminated by swiping the ENTER marker which will save the wireless radio modules found.

NOTE A swipe of the PROG marker at any time while in search mode will cancel the search and restore the default settings. Any devices found up to that point will not be saved.

5.4.2 Set Channel Data

The Setup Channel Data menu configures each channel represented by its assigned sensor or device. When a sensor or device is added to the controller, the information can be added/modified in this menu. Information to be configured is as follows:

1. Slave ID fixed
2. Device Type fixed
3. Analog Input fixed
4. Decimal Point DA4 only
5. Range DA4 only
6. Type
7. RL4 Bank Count

1. Upon entering this menu, the LCD will display:

CHANNEL 1 DATA:	DECIMAL POINT:#
SLAVE ID:##	RANGE:#####
DEVICE TYPE:XXX	TYPE:XXXXXXXXXX
ANALOG INPUT:#	RL4 BANK CNT:XXX

2. A flashing cursor will appear on SLAVE ID. Swipe the magnet over the markers of the up or down arrows to move the flashing cursor to the desired function. A swipe over:
 - The ENTER marker will select the function indicated by the flashing cursor.
 - The markers of the up or down arrows will change the value.
 - The ENTER marker will save the selected value and return to the flashing cursor.

NOTE The SLAVE ID is the Modbus™ address in hex of the sensor or device being assigned to a specific channel. This will be a Modbus™ slave device to the CXT controller.

Device Type Value

The Device Type values available are 100, 700, 600C, 600D (Detcon serial sensor models), DA4/DI4 (analog sensors), CXT-320, BM25 (wireless devices) or RXT-320 (when analog inputs are in use). Ensure that the appropriate value corresponding to the sensor or device is assigned to the indicated channel.

Analog Input Value

The Analog Input is only available for DA4/DI4, CXT-320, BM25, and RXT-320 devices. For analog sensors (DA4/DI4), the available value is 1, 2, 3, or 4 corresponding to the input position on the DA4/DI4 module. For a BM25, the available values are 1, 2, 3, 4, or 5 corresponding to the cell number. For an RXT-320 wireless radio module, the available value is 1 or 2 corresponding to the input position of the connected sensor.

Decimal Point Value

The Decimal Point value is set to 0, 1 or 2. This value can be edited if the device is a DA4, DI4, or RXT-320. The number of digits displayed to the right of the decimal point of the gas concentration value is as follows:

- Sensor range is less than 10, this value will be 2.
- Sensor range is between 10 and 25, this value will usually be 1.
- Sensor range is greater than 25, the value should be 0.

Range Value

The Range value is 1-9,999 and corresponds to the gas range value of the sensor. This value can be edited if the device is a DA4, DI4, or RXT-320.

NOTE If the range is changed, the alarm levels will have to be reset.



CAUTION

The range value must match the range on the sensor for proper operation.

Type Value

The Type value is an alphanumeric string of ten characters and corresponds to the tag that is displayed with the gas concentration value. This field is used to define the gas concentration units and the gas type.

1. Swipe the magnet over the markers of the up or down arrows to modify the first alphanumeric character indicated by an underscore.
2. A swipe over the ENTER marker will select the displayed value and the next character to be changed will be indicated by an underscore.
3. Repeat Steps 1 and 2 to update all ten characters.

4. Swipe over the ENTER marker to return to the flashing cursor.

RL4 Bank Count

The RL4 Bank Count value can be 1, 2, 3, 4, 5, 6, 7, or 8 and defines the total number of banks that the channels have been assigned. When selected, a new page allows the user to toggle the channel's relay bank assignments for all eight banks.

1. Swipe the ENTER marker to change the number of banks assigned to the channel. When ENTER is swiped, the RL4 BANK ASSIGNMENT menu is displayed:

RL4 BANK ASSIGNMENT

[1] 2 3 4 5 6 7 8

2. The brackets [x] indicate the bank that is selected. Use the down arrow to change the bank selection. Swiping the up arrow enables or disables the alarm bank. If the bank number is shown, then the alarm bank is enabled. If “—“ is shown, then the bank is disabled
3. Swipe ENTER to save and exit
4. Swipe MENU to exit without saving

Swipe the down arrow marker while the flashing cursor is on RL4 BANK CNT to scroll the display to the next channel allowing for its configuration.

A swipe of the up arrow marker while the flashing cursor is on SLAVE ID will return to the previous channel.

5.4.3 Set Channel Alarms

The Set Channel Alarms menu allows configuration of each channel's alarms. The information to be configured is the;

- ALM1 LEVEL,
- ALM1 ASCENDING,
- ALM2 LEVEL,
- ALM2 ASCENDING,
- ALM3 LEVEL, and
- ALM3 ASCENDING.

1. Upon entering this menu, the LCD will display:

CHANNEL 1 ALARMS:	ALM2 LEVEL: ##
	ALM2 ASCENDING: X
ALM1 LEVEL: ##	ALM3 LEVEL: ##
ALM1 ASCENDING: X	ALM3 ASCENDING: X

2. A flashing cursor will appear on ALM1 LEVEL. Swiping the magnet over:
 - The markers of the up or down arrows will move the flashing cursor to the desired function.
 - The ENTER marker will select the function indicated by the flashing cursor
 - The markers of the up or down arrows will change the value.
 - The ENTER marker will save the selected value and return to the flashing cursor.

3. If there is more than one channel, a swipe of the down arrow marker while the flashing cursor is on ALM3 ASCENDING will scroll the display to the next channel allowing for its configuration. To return to the previous channel, a swipe of the up arrow marker should be performed while the flashing cursor is on ALM1 LEVEL.
4. Ensure that the gas alarm relay (if not being used) has a setting of 0 to make it inactive.

NOTE For proper compliance with IEC 61010 Safety Standard, it is required that any dangerous level alarms (those that require possible user action/intervention) shall only be assigned to the Red LED indicator (Alarm Level 3). It is also required for the case in which if only 1 of the 3 possible alarms is chosen to be set, that it shall set to Alarm Level 3 which is the Red LED indicator.

NOTE Any channels that are in alarm or fault will not display the device tag on the main display.

NOTE If the channel range is changed, then the alarm set points must be re-entered.

5.4.4 Set Relay (Alarm) Functions

1. Upon entering this menu, the LCD will display:

FAULT RELAY SETUP: BANK 1
LATCHING:X
ENERGIZED:X
SILENCEABLE:X

NOTE Relays are displayed in the following order:

- FAULT
- ALARM1
- ALARM2
- ALARM3

2. A flashing cursor will appear on LATCHING for Bank1. Swiping the magnet over:
 - The markers of the up or down arrows will move the flashing cursor to the desired function.
 - The ENTER marker will select the function indicated by the flashing cursor.
 - The markers of the up or down arrows will change the value.
 - The ENTER marker will save the selected value and return to the flashing cursor.
 - The down arrow marker while the flashing cursor is on SILENCEABLE for Bank1 will scroll the display to the next relay allowing for its configuration.
 - The up arrow marker to return to the previous relay while the flashing cursor is on LATCHING for Bank1.
3. Repeat Step 2 for the remaining banks containing three alarms and a fault.
4. Ensure that all four relay outputs in all eight banks are set-up to account for the following three settings (Section 1.3). The values selected can be either Y (Yes) or N (No).

- Latching or Non-Latching
- Energized or De-Energized
- Silenceable or Non-Silenceable

NOTE It is generally recommended to set the FAULT relay as energized so that it will trip upon loss of power.

NOTE The FAULT condition is assigned to the FAULT relay as a standard. It cannot be disengaged in the configuration of the controller. The Main Display will show IN FAULT for any channel that is in fault.

5.4.5 Inhibit and Alarm Test Mode

Inhibit mode permits testing of sensors while preventing alarms from being activated. Alarm test mode permits testing of the attached alarm devices without having to apply gas to the sensors.

1. Upon entering this menu, the LCD will display:

INHIBIT & ALARM TEST MODE

INHIBIT MODE		ALARM TEST MODE:
#:#		
START		OFF

2. These values can be changed by swiping the magnet over the markers of the up or down arrows to move the arrow prompt "→" to the desired function. A swipe over:
 - The ENTER marker will select the function indicated by the arrow prompt "→".
 - The markers of the up or down arrows will change the value.
 - The ENTER marker will save the selected value.
3. Activate inhibit mode by entering the timer value in minutes and seconds (0-60 minutes).
4. Select **START** and all relay outputs on the network will be disabled until the timer reaches 0 or is manually stopped by the user by turning off the inhibit mode.
5. Activate alarm test mode to verify that connected alarm devices are functioning properly by swiping the magnet over the markers. All channels will simultaneous go from 0 to full scale in 5% increments. When they reach full scale they will return to 0 in 5% increments. This will continue indefinitely until alarm test mode is turned off.
6. Verify that the relays fire according to their configuration as the readings cross their respective alarm set points.

5.4.6 System Diagnostics

The System Diagnostics menu performs function tests for the following:

- LCD display,
- Panel LED's,
- External reset switch,
- Relays, and

- Modbus™ interface.

Upon entering this menu, the SmartWireless® CXT controller will automatically initiate a function test that displays every pixel LCD display. The controller then performs a function test of the LED drivers by activating all four LED's. After the LED test, the controller initiates a test for the external reset switch which lets the user know when the reset switch is pressed.

The user will be prompted:

1. To "press (swipe) enter key (marker) to continue" which will initiate the relay driver test and the controller will then reset all the relays and turn on the alarm 1 relay.
2. To "press (swipe) any key (marker)" which will turn on the alarm 2 relay.
3. To "press any key" and the alarm 3 relay will be turned on.
4. To "press any key" and the fault relay will be turned on.
5. To "press any key" and all the relays will be reset.
6. Connect COMM1 (master) to COMM2 (slave) for a Modbus™ loop back test at different baud rates and "press any key" to continue or swipe any marker to stop the test.

NOTE When performing the Modbus™ loop back test, the loop back cable should be installed between the **COMM1** (Master) port and the **COMM2** (Slave) port. Disconnect all other external Modbus™ interfaces from the loop and bypass any installed modules.

5.4.7 Time and Date

1. Upon entering this menu, the LCD will display:

TIME AND DATE:
 ##:##:## | ##:##:##
 |
 [TIME] [DATE]

2. Verify that [TIME] is selected and swipe the magnet over the ENTER marker to enter the SET TIME menu.
3. Swipe the magnet over the markers of the up or down arrows to move the arrow prompt "→" to the desired field.
4. A swipe over the ENTER marker will select the field indicated by the arrow prompt "→" and the value can be changed by swiping over the markers of the up or down arrows.
5. Another swipe over the ENTER marker will save the selected value.
6. Once the desired values have been set, move the arrow prompt to "Update Time" and swipe the ENTER marker to update the time with the changes entered.
7. Swipe the magnet over the marker of the down arrow and verify [DATE] is selected.

8. Swipe the magnet over the ENTER marker to enter the SET DATE menu.
9. Swipe the magnet over the markers of the up or down arrows to move the arrow prompt to the desired field.
10. A swipe over the ENTER marker will select the field indicated by the arrow prompt and the value can be changed by swiping over the markers of the up or down arrows.
11. Another swipe over the ENTER marker will save the selected value.
12. Once the desired values have been set, move the arrow prompt to "Change Date" and swipe the ENTER marker to update the date with the changes entered.
13. A swipe of the PROG marker at any time while setting the time or date will escape out of the current menu with no changes saved.

5.4.8 View TWA and Peak

1. Verify that a secure digital (SD) memory card is installed in the SD slot of the CXT controller board (J9).
2. Upon entering this menu, the user can view the data recorded from the SD card and is displayed as:

**<File Name>:
MM/DD/YY, HH:MM:SS, Channel #, TWA #, PEAK #**

**Example:
TWA_P08.CSV:
05/17/11,23:00:09,17, 51, 100**

The sensor readings are continuously logged to the SD card. This data can also be viewed by removing the SD card (Section 6) and inserting it in a laptop using the Detcon Log File Viewer application. Refer to the Detcon Log File Viewer instruction manual for detailed information.

5.5 BM25 Portable Gas Monitor Configuration

The SmartWireless® CXT Controller can be configured to work with the BM25 Portable Gas Monitor. The CXT Controller can monitor the status of up to 5 sensors on the BM25. It can also activate the strobe and buzzer on the BM25 when any sensor in the network is in alarm.

Any BM25s in the network can be automatically detected by the CXT controller during Auto Configure (see Section 5.4.1). The RF channel of the BM25 must be the same as that of the CXT controller and the BM25 must have a unique Modbus address between 01h and 10h. The sensor cells in the BM25 must also be "active" for them to be detected during the Auto Configure process. See the BM25 Instruction Manual for more information on setting the RF channel, changing the Modbus address, and activating the sensor cells of the BM25.

NOTE The maximum number of BM25s that can be used with the CXT controller is 16. The Modbus address of the BM25 must be in the range of 01h – 10h.

Any BM25 channels that are found during Auto Configure will have “#xx” added to the end of the channel tag, where “xx” is the Modbus address of the BM25. For example, if a BM25 with Modbus address 03 is detected, all the channel tags for that BM25 will have “#03” at the end.

The Auto Configure process will also detect a BM25 as an alarm station. The BM25 will be listed in the Alarm Station menu (Section 5.3.4) as “AS8x”, where ‘x’ is the hexadecimal value of the Modbus address of the BM25 minus one. For example, if the BM25 has a Modbus address of 0Eh, then it will be listed as “AS8D” in the Alarm Station menu.

When used with the CXT controller, the BM25 is responsible for activating its own alarms when it detects gas. The CXT controller reads the alarm status from the BM25, and if it is in alarm, activates the strobe and buzzer of any other BM25s in the network. It also activates any wired or wireless alarm stations in the network. The alarm levels for a BM25 must be set using the BM25 menus. It is not possible to set these levels using the CXT menus. The Set Channel Alarms menu (Section 5.4.3) reports the levels set on the BM25, but does not allow the user to change them.

NOTE The alarm levels for the BM25 channels cannot be set using the CXT Controller menus. These levels must be set in the BM25.

5.6 Wireless Sensor Configuration

The CXT Controller can be configured to communicate with up to 32 CXT Wireless Sensors. All of the sensors and the CXT Controller must be on the same RF channel. See Section 1.6 for information on setting the RF channel of the CXT Controller. Refer to the CXT-DM and CXT-IR manuals for information on setting their RF channels.

Each CXT sensor must have a unique Modbus address between 01h and 32h. Any CXT sensor that has a Modbus address outside this range will not be properly recognized during Auto Configure.

NOTE The CXT Wireless sensors must be addressed between 01h and 32h.

5.7 Four-Strobe Alarm Bar Configuration

The Detcon Four-Strobe Alarm Bar is designed to supply a visual indication when the controller is in alarm or fault. Alternatively, it can be used to indicate which of four attached wired sensors are in alarm. The configuration of the channel alarms is different for each mode.

If the Four-Strobe Alarm Bar is used to indicate Alarm 1, Alarm 2, Alarm 3, and Fault, then all of the channels should be assigned to Relay Bank 1. By default all channels are assigned to Bank 1, so typically no additional configuration is needed. The user should set the alarm levels for each channel as appropriate (see Section 5.4.3).

If the Four-Strobe Alarm Bar is used to signal which of the attached wired sensors are in alarm, then some channels will need to be assigned to Bank 2. See the configuration in the following table:

Channel #	Alarm 1 Level	Alarm 2 Level	Alarm 3 Level	Alarm Bank
1	User Set	0	User Set	1

2	0	User Set	User Set	1
3	User Set	0	User Set	2
4	0	User Set	User Set	2

Using the above configuration, one strobe on the alarm bar will be activated for *each* channel that goes into low alarm. The horn on the alarm bar will be activated when *any* channel goes into high alarm. See Section 5.4.2 for information on assigning the channels to relay banks.

6. Maintenance and Service Personnel Activities

NOTE

Only service or maintenance related activities as described below in Sections 6.1 - 6.5 (but excluding 6.4.2) are allowed to be performed by the on-site un-certified service personnel. Any other required service or maintenance related activity shall only be performed by a Factory-Certified Detcon technician.



CAUTION

Any maintenance or servicing performed outside the allowable scope of this section may impair the safe operation of this device.

The following is a list of items that are supplied standard with the CXT Controller. They can also be purchased for service or maintenance needs. These components are only to be supplied by Detcon as part of this product configuration. No substitutions are allowed.

Rechargeable Battery Pack (Detcon PN 360-3S6PFP-290)

SD Card for Data-logging (Detcon PN 995-SDSDB2-048)

Condensation Prevention Packet (Detcon PN 960-798434-000)

Battery Charging Accessory (Detcon PN 976-0003BC-00T or PN 976-0003BC-220)

6.1 Removal of SD Card

1. Relocate the CXT controller to a non-hazardous area. Remove power from the CXT Controller by turning the power switch to OFF. Open the hinged door to gain access to Display PCB unit on the back of the hinged door.
2. Locate the SD slot (J9) on the back of the controller's PCA and remove the SD card.
3. Data on the SD card can be viewed using Detcon's Log File Viewer PC application.



Warning

Explosion Hazard. Do not remove or replace the SD Card unless power has been disconnected or the area is known to be free of ignitable concentrations of flammable gases or vapors. Removal or installation of the SD Card should only be done in a non-hazardous location.

6.2 Installation of SD Card

1. Remove power from the CXT Controller.
2. Locate the SD slot (J9) on the back of the controller's PCA and install the SD card.

3. Re-Apply power to the unit. The controller will automatically format the card and create the necessary files for data logging. Refer to Section 5.4.8 for more information regarding the data logging feature.

6.3 Replacement of Condensation Prevention Packet

On an annual or bi-annual basis, the Condensation Prevention packet should be exchanged with a new packet. Remove the CXT Controller to a non-hazardous area and turn power OFF. Open hinged door and locate packet. Remove packet and replace with a new packet in the same physical position. Close hinged door and turn power ON.

6.4 Replacement of Lithium Ion Battery Pack (and Coin Cell)



Warning

Explosion Hazard. Do not remove or replace the Lithium Ion Battery Pack unless power has been disconnected or the area is known to be free of ignitable concentrations of flammable gases or vapors. Removal or replacement of the Lithium Ion Battery Pack should only be done in a non-hazardous location.

1. If there are any warnings or fault indicators that suggest there is a problem with the lithium ion battery pack (ie. not charging when expected), it should be removed and replaced. Relocate the CXT Controller to a non-hazardous area and remove power from the CXT Controller by turning the power switch to OFF. Open the hinged door to gain access to interior. Locate the four screws that attach the metal bracket that secures the battery pack. Undo the four screws and set them aside carefully. Lift metal bracket and expose battery pack. Disconnect the two wire male/female connector to free the pack. Replace the old pack with a new pack and reverse the directions given above, making sure the wire connections are made correctly.
2. There is a small 3.0 VDC; 0.2 Amp-hr lithium ion coin cell located and soldered onto the Main PCB that powers the clock. There is no expectation that the coin battery will ever need to be replaced during the 12 year service lifetime of the product. If it is concluded that it does need exchange, the unit must be returned to the Detcon Factory for replacement of the coin cell.

6.5 Proper Cleaning Procedure

If the unit requires cleaning, take a clean water-damped wet cloth and wipe off the exterior surfaces of the unit as required. Allow for air dry. It is **not** necessary to relocate the unit to a non-hazardous area to perform cleaning.

6.6 Servicing Risks and Verification of Safe State after Servicing

While performing any of the above-mention user-authorized service activities, proper caution shall be used to avoid safety risks.

The first protective measure and mandatory requirement is that the CXT controller must be relocated to a non-hazardous area while performing these functions.

The second protective measure is to make sure the power switch is turned OFF while opening the enclosure and addressing internal components.

The third protective measure is to use static protection while touching any internal components within the controller enclosure.

The fourth protective measure is to follow these instructions properly and secure the hinged enclosure cover fully closed before returning unit to the hazardous area.

Once all servicing has been completed turn power ON and verify that all configured gas sensors are reading the correct value and also verify that the battery charge level is correct. Once verified, it is safe to return the unit to active usage.

7. Modbus™ Slave Communications Port

A Modbus™ RTU master can poll the slave port on the CXT Controller allowing the Modbus master to remotely monitor the status of the CXT. If multiple CXTs are being used on a single Modbus™ network, each controller must be set to a different device address. See Section 11.2.3 for more information on setting the Modbus address.

7.1 Modbus™ Register Map

Table 1 CXT Register Map

Channel #	Register	Description	Channel #	Register	Description
Channel 1	40000	Reading	Channel 17	40032	Reading
	40001	Status		40033	Status
Channel 2	40002	Reading	Channel 18	40034	Reading
	40003	Status		40035	Status
Channel 3	40004	Reading	Channel 19	40036	Reading
	40005	Status		40037	Status
Channel 4	40006	Reading	Channel 20	40038	Reading
	40007	Status		40039	Status
Channel 5	40008	Reading	Channel 21	40040	Reading
	40009	Status		40041	Status
Channel 6	40010	Reading	Channel 22	40042	Reading
	40011	Status		40043	Status
Channel 7	40012	Reading	Channel 23	40044	Reading
	40013	Status		40045	Status
Channel 8	40014	Reading	Channel 24	40046	Reading
	40015	Status		40047	Status
Channel 9	40016	Reading	Channel 25	40048	Reading
	40017	Status		40049	Status
Channel 10	40018	Reading	Channel 26	40050	Reading
	40019	Status		40051	Status

Channel #	Register	Description	Channel #	Register	Description
Channel 11	40020	Reading	Channel 27	40052	Reading
	40021	Status		40053	Status
Channel 12	40022	Reading	Channel 28	40054	Reading
	40023	Status		40055	Status
Channel 13	40024	Reading	Channel 29	40056	Reading
	40025	Status		40057	Status
Channel 14	40026	Reading	Channel 30	40058	Reading
	40027	Status		40059	Status
Channel 15	40028	Reading	Channel 31	40060	Reading
	40029	Status		40061	Status
Channel 16	40030	Reading	Channel 32	40062	Reading
	40031	Status		40063	Status

Reading Register

Current gas reading of the channel assigned to the register.

Status Register

Bit 0	Alarm 1	0 = No Alarm	1 = In alarm 1
Bit 1	Alarm 2	0 = No Alarm	1 = In alarm 2
Bit 2	Alarm 3	0 = No Alarm	1 = In alarm 3
Bit 3	Fault	0 = No Fault	1 = Sensor/Alarm Fault
Bit 4 ¹	Cal	0 = Normal Operation	1 = In Cal
Bit 5	Comm Error	0 = Normal Operation	1 = Communication Error
Bit 6 & Bit 7 ¹	Decimal Point	00 = No Decimal Point (No Divisor)	10 = 2 Decimal Point (Divisor of 100)
		01 = 1 Decimal Point (Divisor of 10)	11 = Undefined (Default to No Decimal Point)
Bit 8	Smart Battery Pack	0 = No Smart Battery Pack	1 = Smart Battery Pack
Bit 9	Battery Error	0 = No Battery Error	1 = Battery Error
Bit 10	Low Battery	0 = No Low Battery	1 = Low Battery
Bit 11	Not Used		
Bit 12	Wireless Network Type	0 = 320	1 = 300
Bits 13-15	Type	000 = Channel Disabled	100 = Repeater ⁵
		001 = CXT Sensor	101 = Sensor
		010 = Alarm Station	110 = Undefined (Sensor)
		011 = SmartHMI ⁵	111 = Undefined (Sensor)

¹ These bits are only active for sensor devices

8. Troubleshooting Guide

Sensor COMM Error

- Verify all devices are set to the same RF Channel.
- Verify all SmartWireless® CXT devices have a unique Modbus ID number.
- Verify the Sensor Input PCA and Relay PCA Modbus address are set correctly
- Verify the Radio Module Modbus address is set correctly

Sensor Fault

- Verify if sensor displays any fault. If so, follow sensor trouble shooting notes.
- Verify if sensor cell needs replacement.

Low Battery

- Attach external battery charger (this can only be done in an indoor non-hazardous area)

Poor Link Quality

- Verify antenna is securely attached to all devices.
- Verify obstructions are eliminated or minimized between SmartWireless CXT devices and controller or other CXT devices.

Slow Gas Response

- Some delay in gas response is normal if the network update rate is greater than zero. To increase response time, reduce the update rate. Reducing the update rate will reduce the battery life for devices.

SmartWireless CXT not found during controller Auto Configure

- Verify CXT device set to correct RF Channel
- Verify Radio Module has correct Modbus address
- Verify the Sensor Input PCA and Relay PCA Modbus address are set correctly
- Verify a proper mA load is present on sensor input. Sensor inputs are not detected unless the mA input is greater than 1.9mA.

Contact the Detcon Service Department for further troubleshooting assistance at 713-559-9200

9. Customer Support and Service Policy

Detcon Headquarters

Shipping Address: 4055 Technology Forest Blvd, The Woodlands, Texas 77381

Mailing Address: P.O. Box 8067, The Woodlands Texas 77387-8067

Phone: 713.559.9200

Fax: 281.298.2868

- www.detcon.com
- service@detcon.com
- sales@detcon.com

All Technical Service and Repair activities should be handled by the Detcon Service Department via phone, fax or email (contact information given above). RMA numbers should be obtained from the Detcon Service Department prior to equipment being returned. For on-line technical service, have the model number, part number, and serial number of product(s) in question available.

All Sales activities (including spare parts purchase) should be handled by the Detcon Sales Department via phone, fax or email (contact information given above).

NOTE All additional parts must be supplied by Detcon. Use of parts from a third party will void warranty and safety approvals.

NOTE CXT should only be repaired by Detcon personnel or a Detcon trained representative.

10. Warranty Notice

Detcon Inc. warrants the SmartWireless® CXT System to be free from defects in workmanship of material under normal use and service for two years from the date of shipment on the transceiver electronics.

Detcon Inc. will repair or replace without charge any such equipment found to be defective during the warranty period. Full determination of the nature of, and responsibility for, defective or damaged equipment will be made by Detcon Inc. personnel.

Defective or damaged equipment must be shipped to the Detcon Inc. factory or representative from which the original shipment was made. In all cases, this warranty is limited to the cost of the equipment supplied by Detcon Inc. The customer will assume all liability for the misuse of this equipment by its employees or other contracted personnel.

All warranties are contingent upon the proper use in the application for which the product was intended and does not cover products which have been modified or repaired without Detcon Inc. approval, or which have been subjected to neglect, accident, improper installation or application, or on which the original identification marks have been removed or altered.

Except for the express warranty stated above, Detcon Inc. disclaims all warranties with regard to the products sold. Including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of Detcon Inc. for damages including, but not limited to, consequential damages arising out of, or in connection with, the performance of the product.

11. Appendix

11.1 Specifications

System Specifications

Capacity:	32 I/O Channels
Sensor Inputs:	Up to 4 Analog 4-20mA or up to 32 wireless sensors
Outputs:	4 switched alarm outputs, (11VDC)
Warranty:	One year

Environmental Specifications

1) Operating Temperature:	-20C to +60C (for field use where battery pack is only discharging)
2) Operating Temperature:	0C to +40C (for non-hazardous indoor area where battery is only charging)
Storage Temperature:	-40C to +85C
Humidity:	0-99%RH, non-condensing
Altitude:	0 – 2000m

Electrical Specifications

Battery Charger Input:	100-240 VAC, 50-60 Hz, Max Current 1.5 Amps
Battery Charger Output:	24 +/- 0.1 VDC nominal, Max Current 3.25 Amps
Internal Battery Pack:	Rechargeable Lithium-Ion, 9-11.2 VDC, 17.4Ah capacity
External Alarm Connectors:	‘Wet’: 9-11.1 VDC, 2A max total (A1, A2, A3, and FLT outputs combined) ‘Dry’: Dry contact 120-220VAC/24VDC, 2A max
Sensor Input Connectors:	9-11.1 VDC, 100mA max per connector
RFI/EMI Protection:	Complies with EN61326
Electrical Classification:	NEMA 4X, Class I Division 2 Groups A,B,C,D

Cabling Specifications

External Alarms Cables:	Use only Detcon cables, termination insulation resistance > 10K ohms. ‘Wet’: Connector style is 5 pin Turck connector with security clip. ‘Dry’: Connector style is 6 pin Turck connector with security clip.
Sensor Input Cables:	Use only Detcon cables, termination insulation resistance > 10K ohms Connector style is 4 pin Turck connector with security clip.
Power Input Cable:	Use only Detcon Battery Charging Accessory product Connector style is 3 pin Turck connector with security clip.

Mechanical Specifications

Display:	1 ¹ / ₄ " x 6" Backlit LCD
Dimensions:	12" W x 21.3" H x 4.73" D (including antenna and strobe) 12" W x 12.25" H x 4.73 D (without antenna and strobe)

Wireless Specifications

Frequency:	ISM 2.4GHz
Range:	Indoor/No Line of Sight – 1,000ft Outdoor RF Line of Sight– 1.5 Miles
Spread Spectrum:	Digital-Sequence Spread Spectrum (DSSS)
Modulation:	0-QPSK
Sensitivity:	-102dBm (1% PER)

11.2 Utilities



CAUTION

Contact a Detcon representative prior to changing any settings in this section. Default settings are functional for the majority of applications. Any adjustments made to other items may cause the controller or various components to not work properly.

SmartWireless® CXT controller advanced setup is accomplished through the Utilities Menu and consists of 9 menu items:

1. Set RF Silence and RF Sleep
2. Set Low Battery Alarms
3. Set Modbus Address
4. CXT Low Battery Threshold
5. Module update rates
6. DA4 Emulation
7. Set COMM Baud Rates
8. Set Modbus™ Timeouts
9. Display Settings

NOTE To access the Utilities Menu, advance to the View TWA and Peak menu. Hold the magnet over the ENTER marker for 20 seconds without removing it.

11.2.1 Set RF Silence and RF Sleep

The Set RF Silence and RF Sleep menu allows the user to initiate radio silence for a predetermined amount of time, over the entire network. RF Sleep terminates communication (sleep command) between all of the wireless radio modules in the network as a power saving feature. A longer sleep time will increase delay between alarm conditions occurring and the alarms being activated. RF Silence prevents radios from interfering with other RF devices on site (remote detonators). This feature will stay on until the user turns it off, the sensors are not monitored and no alarms can be activated.

1. Upon entering this menu, the LCD will display:

RF SILENCE AND SLEEP	
RF SILENCE:	RF SLEEP:
XXX	##:##
XXX	SLEEP:XXX

2. Swipe the magnet over the markers of the up or down arrows to move the arrow prompt "→" to the desired location. A swipe over:
 - The ENTER marker for RF SILENCE and SLEEP will toggle the value between ON and OFF.
 - The ENTER marker for the RF SLEEP will select the function indicated by the arrow prompt "→".
 - The markers of the up or down arrows will change the value.
 - The ENTER marker will save the selected value.
 - The sleep timer has a range from zero to five minutes and is set in minutes and seconds.

11.2.2 Set Low Battery Alarms

The Set Low Battery Alarms menu establishes low battery alarm thresholds for wireless radio modules using Detcon's Smart Battery Pack interfaced to the controller.

1. Upon entering this menu, the LCD will display:

LOW BATTERY ALARM:
TTE(DD:HH:MM): | **SOC(%):**
##:##:## | **##%**
| **ALARM STATIONS ONLY**

2. To change the TTE (time to empty in days, hours and minutes) and/or SOC (state of charge in percentage) values, swipe the magnet over the markers of the up or down arrows to move the cursor to the desired field. A swipe over:
 - The ENTER marker will select the field indicated by the cursor and enclose the value in brackets.
 - While in brackets, the markers of the up or down arrows will change the value.
 - Another swipe over the ENTER marker will save the selected value.
 - A swipe of the PROG marker at any time while setting the TTE or SOC will escape out of the current field with no changes saved.

The recommended value for the TTE should be five days and applies to all battery powered wireless radio modules transceivers other than alarm stations. The SOC value applies to alarm stations **only** and the recommended value should be 25%. The blue LED on the controller will be activated and begin flashing when any battery in the network falls below the set thresholds.

11.2.3 Set Modbus™ Address

The SET Modbus™ Address menu establishes the serial address of the CXT controller when being polled by another master device through the RS-485 Modbus™ RTU slave port (COMM2).

1. Upon entering this menu, the LCD will display:

MODBUS ADDRESS:

###

2. This value can be changed by performing a swipe:
 - Over the ENTER marker and then swiping
 - Over the markers of the up or down arrows.
 - Another swipe over the ENTER marker will save the selected value.
3. Ensure that the range of values for the Modbus™ address is 1-127 in decimal value.

11.2.4 CXT Low Battery Threshold

CXT gas sensors offer the option to use non-rechargeable batteries. If this option is used, the low battery alarm is determined by the voltage of the batteries. When the battery voltage falls below the threshold the low battery fault will be activated.

This value can be changed by performing a swipe:

- Over the ENTER marker and then swiping
- Over the markers of the up or down arrows.
- Another swipe over the ENTER marker will save the selected value.

11.2.5 Module Update Interval

The AO4 outputs and battery life readings from the wireless radio modules on the CXT are updated periodically. This menu setting controls the rate at which these updates occur. The default rate is 60 seconds.

This value can be changed by performing a swipe:

- Over the ENTER marker and then swiping
- Over the markers of the up or down arrows.
- Another swipe over the ENTER marker will save the selected value.

11.2.6 DA4 Emulation

The CXT Controller can be used as a satellite controller for another Detcon controller (X40, CXT, or MCX-32), a DCS, or a PLC. The DA4 Emulation mode can only be used when four or less sensors (wired or wireless) are attached. In this mode, the CXT acts as a stand-alone controller and processes the alarms for the sensors connected to it. In other words, if one of the sensors connected to the CXT goes into alarm, the strobe and/or horn of the CXT will be activated. It will also activate any alarm stations or alarm bars connected to it.

In DA4 Emulation mode, the output of the Modbus slave port on the CXT is formatted to emulate that of the Detcon DA4 module. This allows the CXT controller to act as a stand-alone controller, but also relay its concentration readings to another Detcon controller, or a higher level PLC or DCS. In this mode, the CXT controller appears as a DA4 module to the higher level controller.

Upon entering this menu, the LCD will display:

DA4 EMULATOR:

###

A swipe over:

- The markers of the up or down arrows will change the value from OFF to ON and vice versa
- A swipe over the enter marker will save the value and return to the Utility menu

If the CXT controller is being used as a satellite controller for an MCX-32 then the Modbus address needs to be set in the range of 40h – 4Fh. If it is used with an X40 or another CXT controller, then the address should be set to 01h – 32h. See Section 11.2.3 for more information on setting the Modbus address of the CXT controller.

NOTE

When DA4 Emulation mode is enabled, the format of the Modbus registers does not conform to the chart shown in Section 7.1.

It is possible to wirelessly connect the CXT controller to a higher level controller. For this configuration, the CXT controller must be supplied with a radio connected to its Modbus slave port. Contact the Detcon factory for more information on this option.

11.2.7 Set COMM Baud Rates

The Set COMM Baud Rates menu displays the current baud rate settings for COMM1 (master) and COMM2 (slave).

Upon entering this menu, the LCD will display:

SET COMM BAUD RATES:

COMM1 BAUD RATE:9600

COMM2 BAUD RATE:9600

NOTE

The value shown is pre-configured to 9600 and should not be altered unless directed to do so by Detcon factory personnel.

11.2.8 Set Modbus™ Timeouts

The Set Modbus™ Timeouts menu establishes the response timeout for Modbus™ communications and the inter-poll delay. Response timeout is the amount of time in milliseconds the CXT controller will wait for a sensor to respond to a poll request. Inter-poll delay is the amount of time in milliseconds the CXT will wait after receiving a poll response from one sensor before it polls the next sensor. Ten missed poll responses will result in the sensor being declared in COMM ERR. The range of values for the response timeout is 100-1000 milliseconds and 10-255 milliseconds for the inter-poll delay. The recommended value for the response timeout is 500 and 150 for the inter-poll delay.

1. Upon entering this menu, the LCD will display:

SET MODBUS TIMEOUTS:

RESPONSE TIMEOUT:###

INTERPOLL DELAY:###

2. Values can be changed by swiping the magnet over the markers of the up or down arrows to move the arrow prompt "→" to the desired function. A swipe over:
 - The ENTER marker will select the function indicated by the arrow prompt "→".
 - The markers of the up or down arrows will change the value.
 - The ENTER marker will save the selected value.

11.2.9 Display Settings

The Display Settings menu customizes the brightness, contrast and backlight duration of the display. Values for brightness and contrast range between 0 and 100. Available values for the backlight timeout function (turn off due to inactivity) are OFF, 10 seconds, 30 seconds and 1 to 5 minutes.

1. Upon entering this menu, the LCD will display:

DISPLAY SETTINGS

BRIGHTNESS: ###
BACKLIGHT TIMEOUT: #:##
CONTRAST: ###

2. These values can be changed by swiping the magnet over the markers of the up or down arrows to move the arrow prompt "→" to the desired function. A swipe over:
 - The ENTER marker will select the function indicated by the arrow prompt "→".
 - The markers of the up or down arrows will change the value.
 - The ENTER marker will save the selected value.

11.3 Spare Parts and Wireless Accessories

Part Number	Spare Parts
976-0003BC-00T	CXT Battery Charger Accessory for 110 VAC
976-0003BC-220	CXT Battery Charger Accessory for 220 VAC
976-0003A4-200	Antenna Assembly
960-798434-000	Condensation Prevention Packet (replace annually)
894-7845K6-400	Hole Plug
500-005199-000	Relay Board
500-005194-000	Sensor Input Board
360-3S6PFP-ASM	Battery Pack
320-N45161-000	Power Switch
302-RSFCC0-05M	Connector Dust Cap
302-RFK40D-05M	Sensor Connector
302-RFK380-05M	Power Connector
302-RFK520-05M	External Alarm Connector for 'Wet' Relay Contacts
302-PRSF63-M20	External Alarm Connector for 'Dry' Relay Contacts
976-001320-CHR	Radio Module (320 Network)
949-005142-500	Display Assembly
995-SDSDB2-048	Replacement SD Card
Part Number	Accessories
975-TRIPOD-100	Detcon tripod
943-004413-000	Detcon tripod sensor brackets
975-TRIPOD-MNI	Mini Sensor Tripod
980-PRSM40-02M	2m Sensor Cable (with security clip)
980-PRSM40-10M	10m Sensor Cable (with security clip)
980-PRSM40-30M	30m Sensor Cable (with security clip)
980-PRSM40-45M	45m Sensor Cable (with security clip)
980-PRSM52-02M	2m External Alarm Cable for 'Wet' Alarms (with security clip)
980-PRSM52-30M	30m External Alarm Cable for 'Wet' Alarms (with security clip)
980-PRSM52-45M	45m External Alarm Cable for 'Wet' Alarms (with security clip)
980-PRKM63-30M	30m External Alarm Cable for 'Dry' Alarms (with security clip)
980-PRKM63-45M	45m External Alarm Cable for 'Dry' Alarms (with security clip)

11.4 Revision Log

Revision	Date	Changes made	Approval
1.0	3/28/13	Release	LBU
1.1	10/30/13	Update for removable battery pack	LBU
1.2	11/20/13	Updates for Approval Agency	BM
1.3	01/31/14	Updates for Approval Agency	BM
1.4	04/04/14	Updates to sensor wiring, and battery charging	BM
1.5	05/30/14	Various corrections, clarifications and addition of final Warnings	BM
1.6	03/16/15	Correct Sensor Wiring	LU
1.7	05/21/15	Add sections 5.3.3, 5.3.4, 5.4.2, 5.5, 5.6, 5.7, 7, and 11.2.6	LU

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