



**48 and 192-Zone Expandable Security  
and Access Control System**

**EVO48 / EVO192**

**Architectural and Engineering Specifications**

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## 1.0 SCOPE OF THIS DOCUMENT

The following document is formatted for the use in a tender specification for a 48 or 192-Zone Expandable Security and Access Control System using Paradox Security Systems products. This document does not detail any specifications required for the installation of equipment or programming of devices.

The document covers control panel version 1.40 and may be revised according to new developments or changes in the released product. For the latest A&E Specifications please review online documentation at [www.paradox.com](http://www.paradox.com). Paradox Security Systems reserves the right to change this document without notification.

## 2.0 SYSTEM DESCRIPTION

The supplied 48 or 192-Zone Expandable Security and Access Control System, hereafter referred to as “the system”, shall meet or exceed the requirements detailed within this section.

### 2.1 General System Overview

- [2.1.1] The system shall be a modular-based system equipped with alarm monitoring and built-in access control capability with a 1024 (EVO48) or 2048 (EVO192) event buffer and programmable automatic Daylight Savings Time adjustment.
- [2.1.2] The system shall provide eight on-board hardwired inputs that can be doubled to 16 with the zone doubling feature. The system shall be expandable to 48 (EVO48) or 192 (EVO192) addressable zones that can be assigned to one of four (EVO48) or eight (EVO192) independent partitions.
- [2.1.3] The system shall be expandable to 127 (EVO48) or 254 (EVO192) modules that can be connected in a star or daisy chain configuration at any point and in any combination on the digital four-wire combus up to 900m (3000ft) from the control panel using 18AWG or up to 305m (1000ft) using 22AWG.
- [2.1.4] The combus shall provide two-way data exchange by using a specialized proprietary communication protocol to constantly convey information between the modules and the control panel. The combus shall offer the option of operating at high speed or normal speed. The combus shall deliver ultra-fast response even on a fully loaded system when set for high-speed communication as well as 16MHz processing.
- [2.1.5] An installer code, system master code and 95 (EVO48) or 998 (EVO192) user codes shall be included in the system. User codes shall be flexible between one and six digits in length or fixed at four or six digits in length.
- [2.1.6] A main telephone line shall be connected directly to the control panel or though a CA38A or RJ31. The main telephone line shall be supervised. The control panel shall include a digital CTR-21 approved dialer.
- [2.1.7] The control panel shall include a 1.7A switching power supply, a power input for a 16Vac 20/40VA 50-60Hz transformer and inputs for one 12Vdc backup battery. The battery charging current shall be programmable at 350mA or 850mA.
- [2.1.8] The control panel shall provide outputs for one 12Vdc 600mA typical (700mA maximum) auxiliary power with fuseless shutdown (PTC protection) at 1.1A and one 1A bell output with fuseless shutdown (PTC protection) at 3A.
- [2.1.9] All control panel and module programming shall be retained in the device’s non-volatile memory in the event of complete battery and AC power loss in the system.
- [2.1.10] The system shall be in-field firmware upgradeable. This shall allow the system’s firmware to be upgraded using a network interfacing module and a firmware upgrade software. The files shall be available on Paradox’s website for download.
- [2.1.11] LCD Keypad modules and Graphic LCD Keypad modules shall display the date and time, partition and zone status, the alarm memory and any troubles in the system unless Confidential Mode or the Shabbat feature are enabled.
- [2.1.12] LED Keypad modules shall display partition and zone status, alarm memory and any troubles in the system unless Confidential Mode or the Shabbat feature are enabled.

- [2.1.13] The control panel shall employ a trouble latch feature that will continue displaying troubles until manually cleared by the user.
- [2.1.14] The control panel shall include on-board a keypad service connector, a serial port connector, a memory key connector, a dialer connector and an ebus connector.
- [2.1.15] The control panel's serial port connector shall have the option of transmitting zone status.
- [2.1.16] The control panel shall incorporate a built-in RTC (Real-Time Clock) that will save the control panel's internal clock when both AC and battery power have been lost.
- [2.1.17] The control panel shall incorporate clock compensation to correct any time drifts in the internal clock.

## 2.2 Programming Methods

- [2.2.1] The control panel and all modules, such as motion detectors and expansion modules, shall be manually programmed by any Graphic LCD Keypad module or LCD Keypad module.
- [2.2.2] The system shall be capable of broadcasting the programmable sections from keypad modules and other modules to comparable modules through the combus.
- [2.2.3] A memory key shall be available for copying and downloading keypad and control panel programming to comparable devices.
- [2.2.4] An uploading/downloading software shall be available to installers for control panel and module programming, on-line monitoring, searching and displaying events, and printing reports. The software shall provide on-site connection at 38,400 baud or 57,600 baud or remote connection via a modem (off-site) at 300 baud or through an IP network with the IP100 module. The software shall be available in several languages, such as English, Spanish, Chinese, Czech, French, Hebrew, Hungarian, Italian, Polish, Portuguese, Russian, Serbo-Croatian, Slovak, Swedish and Turkish.
- [2.2.5] An end-user software shall be available to enable users to set user codes and options, to monitor live system status and to search and print events without compromising security operation and central station communication. The software shall provide on-site connection at 38,400 baud or 57,600 baud. A computer shall be able to connect to the serial port of the control panel to a distance of 8m (25ft) with a serial adapter, 60m(200ft) with a USB adapter or up to 300m (1000ft) with a CONV4USB converter or through an IP network with the IP100 module. The software shall be available in several languages, such as English, Spanish, Czech, French, Hungarian, Italian, Polish, Portuguese, Russian, Slovak and Swedish.

## 2.3 Keypads

- [2.3.1] The Graphic LCD Keypad modules shall display up to 96 zones on up to 32 floor plans. The keypad module shall use simple text- and icon-driven menus as well as incorporate alarm clock and special reminder features. The keypad module shall use up to 15 tunes for use with entry delay, exit delay, burglar alarm, fire alarm and special events. The keypad module shall incorporate a 6.6cm x 6.6cm (2.6" x 2.6") graphic LCD with a resolution of 128 x 128 pixels and with adjustable backlight, contrast and volume. The keypad module shall support up to eight built-in, user selectable languages. The keypad shall incorporate smart search functions and copy and paste user programming. The on-board tamper switch shall not occupy a zone and tamper supervision shall be done through the combus. The keypads will provide one zone input, three keypad-activated panic alarm keys, seven installer function keys, individually programmable chime zones, chime on zone closure, a confidential mode with a timer, keypad muting and audible trouble indicators. The keypad shall be able to display the 16-character labels assigned to zones, users and partitions.
- [2.3.2] The LCD Keypad modules shall include one keypad zone, one 50mA programmable output, AC, locate, combus fault, status and trouble indicators. The LCD Keypad module shall be able to display the status of 192 zones. The on-board tamper switch shall not occupy a zone and tamper supervision shall be done through the combus. The keypad's Super Twisted Nematic LCD shall have a wide viewing angle, two lines of 16 characters, adjustable scrolling speed, backlight, dimming delay, dimming value and contrast. The keypads shall provide one zone input, three keypad-activated panic alarm keys, seven installer function keys, individually programmable chime zones, chime on zone closure, a confidential mode with a timer, keypad muting, audible trouble indicators and a combus

voltmeter. The keypad shall be able to display the 16-character labels assigned to zones, users and partitions. The keypads shall be in-field firmware upgradeable with the CONV4USB.

- [2.3.3] The LCD Keypad modules with Integrated Card Readers shall include one keypad zone, AC, locate, combus fault, status and trouble indicators. The keypad shall include an integrated card reader and support electric door locks, door contacts and Request-for-Exit devices. The LCD Keypad module with Integrated Card Reader shall be able to display the status of 192 zones. The on-board tamper switch shall not occupy a zone and tamper supervision shall be done through the combus. The keypad's Super Twisted Nematic LCD shall have a wide viewing angle, two lines of 16 characters, adjustable scrolling speed, backlight, dimming delay, dimming value and contrast. The keypads shall provide one zone input, three keypad-activated panic alarm keys, seven installer function keys, individually programmable chime zones, chime on zone closure, a confidential mode with a timer, keypad muting, audible trouble indicators and a combus voltmeter. The keypad shall be able to display the 16-character labels assigned to zones, users and partitions. The keypads shall be in-field firmware upgradeable with the CONV4USB.
- [2.3.4] The LED Keypad modules shall include one keypad zone, one 50mA programmable output, AC, locate, combus fault, status and trouble indicators. The on-board tamper switch shall not occupy a zone and tamper supervision shall be done through the combus. The keypad module's 48-zone display shall be programmable to show the status of any zone number from 1 to 96. The keypad module's 4-partition LED display shall be programmable to show the status of any partition. The keypad modules shall provide three keypad-activated panic alarm keys, seven installer function keys, individually programmable chime zones, chime on zone closure, a confidential mode with a timer, keypad muting and audible trouble indicators.
- [2.3.5] The system's status shall be displayed by an annunciator module. The module's LED display shall be programmable to show the status of either partitions 1 to 8, zones 1 to 48 or zones 49 to 96. The module shall be mounted as a stand-alone unit or over any LCD or LED keypad module and shall be capable of stacking up to three annunciators modules.

## **2.4 Monitoring and Access Modules**

- [2.4.1] The system shall support addressable indoor or outdoor digital motion detectors with or without pet immunity. An addressable ceiling mounted motion detector shall be available. The system shall support addressable glass break detectors. Detectors shall provide sabotage-proof protection and individual tamper supervision by connecting directly to the combus without using resistors or additional wiring. Signals received by the motion detectors shall be completely converted, amplified and processed in the digital domain without using analogue circuitry. The motion detectors shall be fully software driven and employ innovative digital processing technologies to effectively eliminate false alarms. The modules' sensitivity shall be adjustable.
- [2.4.2] The system shall support addressable door contacts, a variety of one-, four- and eight-zone hardwire expansion modules, and four-PGM output modules.
- [2.4.3] The access control modules connected to the combus shall support 26-bit Wiegand readers, 4-wire readers, electric door locks, door contacts and Request-for-Exit devices. The access control modules shall support transformer sharing. The module shall support automatic unlocking schedules, safe mode options and unlock door options with buttons, PGM events or during a fire alarm. The access control module shall be in-field firmware upgradeable.
- [2.4.4] Two types of 4-wire detectors shall be available for easy connection to an access control module. One reader shall be available with an integrated 12-key keypad. Both readers shall be weather resistant and shall be usable indoor and outdoor.

## **2.5 Communication Accessories**

- [2.5.1] An audio-verification module shall provide the user and monitoring station with the possibility to listen on the premises. A monitoring station shall only be able to access the audio verification module following an alarm. The module shall record in a loop on the premises and shall produce an audio-verification file that will include a recording of the seconds preceding an alarm. The module shall allow the use of up to 4 substations to provide two way audio communications and an additional 8 substations for broadcast only. The module shall be usable for broadcasting status changes as well

as music. By using voice-prompts available in various languages, the module shall enable users to arm or disarm the system, activate or deactivate a PGM and verify system status via a telephone. The module shall be in-field firmware upgradeable.

- [2.5.2] Substations shall be connected to an audio-verification module. They shall be connected at distances not exceeding 152m(500ft) without the use of an additional power supply and up to 600m(2000ft) with an additional power supply. Primary substations shall have a volume control, mute control, paging and panic features. Secondary substations shall have a volume control and will follow the primary substation's mute status.
- [2.5.3] An internet protocol communication module shall allow the user to control and monitor the system through an IP network. It shall be able to communicate with the software through the internet. It shall allow the system to notify users of alarms and specified events via email. It shall allow access to the system using web browsers in multiple language, such as English, French and Spanish. It shall support a DNS service for dynamic IP addresses. Data transmitted by the module shall be encrypted by using 128-bit (MD5 and RC4) or 256-bit (AES) data encryption. The module shall support two-way dynamic authentication.
- [2.5.4] By using voice-prompts available in several languages, a plug-in voice module connected to the ebus and dialer connectors shall enable users to arm or disarm the system, activate or deactivate a PGM and verify system status via a telephone. The module shall be able to report alarms to 8 programmable phone numbers.
- [2.5.5] By using voice-prompts available in various languages, a voice-assisted arm/disarm module connected to the combus shall enable users to arm or disarm the system, activate or deactivate a PGM and verify system status via a telephone.
- [2.5.6] A GSM Communication module shall allow the system to communicate report codes using a GSM cell phone network. It shall enable notification through SMS text messages for selected group of events for up to 8 phone numbers. It shall allow data transfers over a GPRS network with the end-user software. It shall be compatible with the plug-in voice module.
- [2.5.7] By using SMS text messages, the user shall be able to change the status of the system and receive confirmation messages.

## **2.6 System Accessories**

- [2.6.1] Events shall be printable from a integration module connected anywhere on the combus. The printer module shall include one parallel port, one USB port and one serial port. The module shall support automatic or manual printing of events on-screen or to a printer. The control panel shall supervise printer errors, such as off-line, out of paper and paper jam and shall be programmed to transmit a printer fault report code if such errors occur. The integration module shall provide 16 virtual inputs and 30 virtual PGMs for ASCII or C-BUS interfaces. The integration module shall be in-field firmware upgradeable.
- [2.6.2] The fully-supervised 1.7A switching power supply modules shall include a power input for a 16Vac 20/40VA 50-60Hz transformer, inputs for a 12Vdc backup battery, outputs for 12Vdc 600mA typical (700mA maximum) auxiliary power with fuseless shutdown (PTC protection) at 1.1A, and one form "C" relay rated at 125V with 5A receptive load programmed using control panel's PGM table.
- [2.6.3] A wireless system shall include a transceiver for two way communication, a di-pole antenna, error correction algorithm, a choice of either 433MHz or 868MHz frequencies, up to 32 PIRs and/or door contacts with range (line of sight) of 70m (230ft), up to 999 remote controls with range (line of sight) of 60m (200ft), up to 8 wireless PGMs, Reflow design, one on-board tamper switch, full system supervision (check-in, low battery and tamper) and a transmitter signal strength indicator. The module shall be in-field firmware upgradeable.
- [2.6.4] A hub and combus isolator module shall divide the combus into two completely isolated output ports. The module shall be employed when over 600m (2000ft) of single or multiple bus wires are used. Each output port shall provide communication over a distance of up to 900m (3000ft).

## 3.0 SECURITY

This section covers the features associated with the burglar alarm portion of the system.

### 3.1 Zones

- [3.1.1] The system shall include the following zone definitions: two Entry Delays with timers set by partition, two Stay Delays with timers set by partition, Follow, Instant, 24hr. Buzzer, 24hr. Burglary, 24hr. Hold-up, 24hr. Gas, 24hr. Heat, 24hr. Water, 24hr. Freeze, Delayed 24hr Fire and Standard 24hr Fire. Each zone shall be assigned to one of the partitions.
- [3.1.2] Zones shall include the following options: Auto Zone Shutdown, Bypass, Stay, Force, Steady Alarm, Pulsed Alarm, Silent Alarm, Report Only, Intellizone and Delay before Alarm Transmission.
- [3.1.3] The 48 (EVO48) or 192 (EVO192) zones shall be continually supervised. The system shall optionally restrict arming on wireless module supervision loss, tamper, AC failure, battery trouble or failure, bell or auxiliary failure, TLM failure and module troubles. The system shall be monitored for system, communicator, module, combus, zone tamper, zone low battery, zone fault and clock loss troubles.
- [3.1.4] Only inputs that shall be used in the system need be assigned to zones. Inputs shall be assigned to zones as required to enable flexible configurations without relocating devices.
- [3.1.5] The input speed on the panel shall be set between 30 and 7650 milliseconds. The input speed on the zone expansion module shall be set between 15 milliseconds and 255 minutes.
- [3.1.6] The system shall support two-wire smoke detectors, four-wire smoke detectors and ESL smoke detectors with the CleanMe<sup>®</sup> feature. Two-wire and four-wire smoke detectors shall be reset on any keypad in the system by simultaneously pressing two keys for two seconds.

### 3.2 Keyswitches

- [3.2.1] In addition to the addressable zones, the system shall have 32 keyswitch zones. Each keyswitch shall be assigned to one of the partitions.
- [3.2.2] The system shall include the following keyswitch definitions: disabled, momentary, maintained, generate a Utility Key Event on open and generate a Utility Key Event on open and close. Keyswitches shall also include the following options: arm only, stay arming, force arming, instant arming, regular arming, disarm only, disarm and disarm only if stay/instant armed.
- [3.2.3] The keyswitches shall also be capable of being used as virtual inputs by using events from the control panel's PGM table to activate PGMs.

### 3.3 Programmable Outputs (PGMs)

- [3.3.1] The control panel shall have 2 on-board 100mA solid-state relay PGM output with negative or positive triggering with 2 optional 100mA solid-state relay PGMs with negative or positive triggering and 1 optional Form C relay output rated at 5A/28Vdc N.O. / N.C. (EVO48) or 4 on-board solid-state relay PGM output with negative or positive triggering and 1 Form C relay output rated at 5A/28Vdc N.O. / N.C. (EVO192). The system shall be expandable to 250 PGMs through a combination of low power transistor outputs and 5A relay outputs.
- [3.3.2] The PGM Programming Table shall provide at least 16,000 options. The programmable outputs shall be activated by programming a range of events. PGM deactivation shall be determined by the PGM Deactivation option: by following a programmed range of events, one of two (EVO48) or five (EVO192) timers set in minutes or seconds or a combination of the two.
- [3.3.3] The system shall include a PGM test mode that activates the corresponding PGM for eight seconds.

### 3.4 Reporting Features

- [3.4.1] The system shall support SIA, Ademco Contact ID 2000 edition, Contact ID Pager, Pager and most standard report code formats.

- [3.4.2] Each partition shall have a 4-digit account number. Control panel events shall be divided into three event groups for each partition and two global event groups. Each event group shall be programmed to dial up to four different monitoring station telephone numbers with one used as a backup. The control panel shall dial the backup telephone number after every failed attempt to contact the Monitoring Station or only after the maximum dialing attempts to one monitoring telephone number has failed.
- [3.4.3] The system shall include a police timer feature which shall provide the capability to report a programmed police code to the monitoring station when an alarm condition occurs on a zone and is confirmed within the delay.
- [3.4.4] Several reporting features shall also be provided by the system, such as recent close delay, pager delay, power failure delay, disarm reporting options, zone restore report options and auto report code programming.
- [3.4.5] The Auto Test Report feature shall transmit a report code at a specified time over a cycle of several days, at the same minute every hour, or at regular intervals while the partition is armed or disarmed.
- [3.4.6] The system shall provide the capability to identify when a partition should be armed and disarmed and enable the control panel to communicate deviations from the normal schedule to the monitoring station.

### **3.5 Arming and Disarming features**

- [3.5.1] The system shall be able to provide no movement and timed automatic force or stay arming, one-touch commands, keypad lockout, bell or keypad ring-back options set by partition, maximum bypass entries set by partition, and bell squawk options set by partition for disarming, arming, auto-arming, exit delay, entry delay and remote arming/disarming.
- [3.5.2] A partition shall be able to follow the arming and disarming status of one or more partitions.
- [3.5.3] The system shall include eight exit delay timers programmable from one to 255 seconds with the following features set by partition: exit delay termination, no exit delay on remote arm and switch to stay arming. A special exit delay shall be available for auto-arming, software arming and keyswitch arming.
- [3.5.4] The system shall employ a closing delinquency feature that will verify the last time the system was armed. If the last time the system was armed is greater than the delinquency timer, a Closing Delinquency event will be transmitted to the central monitoring station.
- [3.5.5] An armed follow zone shall be able to switch to an entry delay if the follow zone opens without an entry being triggered.

### **3.6 Alarm Features**

- [3.6.1] The control panel shall be able to toggle the on-board bell/alarm output for each partition. The bell cut-off timers shall be set by partition between one and 255 minutes with each providing no bell cut-off on fire alarm, re-verification of zone status during an alarm, and a recycle delay.
- [3.6.2] The system shall possess five wireless transmitter supervision options, two supervision bypass options, five tamper recognition options, two tamper bypass options, eight Police Code timers set by partition and three keypad panic alarms per partition programmable as audible, silent or fire alarms.
- [3.6.3] False alarm prevention shall be achieved by the following features: audible exit delays, bell squawk options for disarming, arming, auto-arming, exit delay, entry delay and remote arming/disarming, rapid keypad beeping during the last 10 seconds of the exit delays, automatic zone shutdown, alarm transmission delay, confirmation of the alarm situation before generating an alarm, recent close delay, exit delay termination, police code delay, delayed 24hr. fire zones, stay delays, programmable input speeds, switch to stay arming, follow zone switches to entry delay, maximum bypass entries, arming and disarming report schedules, arming/disarming schedule tolerance windows, power failure report delay, automatic trouble shutdown, force on stay arm, and stay arming with delay.



### **3.7 User Codes**

- [3.7.1] User codes shall be programmable with the following options: master, full master, duress, bypass, arm only, stay & instant arming, force arming and regular arming.
- [3.7.2] Users shall be able to access all the partitions assigned to their user codes or only to the partitions assigned in common between the keypad and the user code.
- [3.7.3] Users shall be assigned to one or more partitions and can only arm, disarm and view the status of the partitions assigned to their user codes.
- [3.7.4] The control panel shall include an option to allow the user code to unlock an access control door only during the assigned schedule or at any time.

## **4.0 ACCESS CONTROL**

This section covers the features associated with the access control portion of the system.

### **4.1 Access Control Doors**

- [4.1.1] The system shall support 32 access control doors with programmable labels connected anywhere on the combus. Each access control door shall use an access control module to support any 26-bit Wiegand reader or 4-wire reader, an electric door lock, a door contact, and a Request-for-Exit device. The 26-bit Wiegand readers shall be connected up to 150m (500ft) from the access module. The 4-wire readers shall be connected up to 300m(1000ft) from the access module.
- [4.1.2] The system shall use 16 programmable access levels to determine which access control doors the users can access. Access levels containing from one to 32 access control doors shall be assigned to users through their user codes.
- [4.1.3] Door access shall be granted by presenting a valid card to the door's reader and/or entering a valid user code on the door's keypad or PIN and Proximity Reader. For higher security areas the access control door shall be programmed to require both a valid card and valid user code for access to be granted.
- [4.1.4] Doors shall be assignable to one or more partitions in the security system. Access, arming and disarming shall be capable of being programmed as accessible for users assigned to at least one of the door's partitions or only if the user is assigned to all partitions assigned to the door. Doors unassigned to a partition shall only be used as access doors and shall nor allow arming or disarming.
- [4.1.5] Arming using a card shall be possible by presenting a valid card twice to a reader within 5 seconds.
- [4.1.6] The system shall support an automatic unlocking schedule per door consisting of two programmable time periods that determine the hours, days, and holidays that the door will remain unlocked. During the schedule, users shall not have to present their cards to the reader in order to gain access. The door shall be capable of being set to remain locked until the first valid card is presented and remain unlocked until the end of the schedule.
- [4.1.7] Each door shall provide timers from one to 255 seconds to control the unlock period and extension, the door left open interval and audible feedback, the pre-alarm, and the door forced open audible feedback.
- [4.1.8] The access control door shall be assignable to a zone through its access control module. If the access control door is forced open or left open, the control panel shall generate a burglar alarm and report to the monitoring station. The Door Forced Restore and Door Left Open Restore events shall be programmed to be recorded in the event buffer.
- [4.1.9] The control panel shall be capable of preventing a card from arming or disarming the partition(s) assigned to the door even if the card is programmed to permit access to the door.

## **4.2 Schedules**

- [4.2.1] The system shall support 15 primary schedules and 17 secondary schedules consisting of two programmable time periods. Each schedule shall include a start and end time, the days, and the holidays when the schedule will be valid.
- [4.2.2] The system shall support a 365-holiday schedule.
- [4.2.3] The control panel shall have the ability to verify whether a primary schedule is linked to a primary or secondary schedule. The control panel shall be capable of verifying up to 8 linked schedules, one after another, until it determines whether the card or code is valid to gain access to the door.

## **4.3 Cards**

- [4.3.1] The system shall support 96 (EVO48) or 999 (EVO192) cards programmable with multiple partition assignment, one of 16 access levels, one of 16 schedules, and seven of 11 access control options.
- [4.3.2] The access control door shall allow cards to disarm and/or regular, stay or force arm assigned partitions and omit the exit delay when arming. The system shall have an option to allow a valid card to unlock the door with or without disarming assigned partitions.
- [4.3.3] Each card shall have an option to add from one to 255 minutes before and after the user's assigned schedule granting access to a door.

## **5.0 FCC AND CTR-21 RECOMMENDATIONS**

This section describes the applicable FCC and CTR-21 recommendations.

### **5.1 FCC**

- [5.1.1] The system shall comply with Part 68 of the FCC rules subpart D and CS-03 and shall be tested and found to comply with the limits for Class B digital devices, pursuant to Part 15 of FCC rules.
- [5.1.2] Except for telephone company provided ringers, all connections to the telephone network shall be made through standard plugs and telephone company provided jacks, or equivalent, in such a manner as to allow for easy, immediate disconnection of terminal equipment.

### **5.2 CTR-21**

- [5.2.1] The control panels shall meet the European Union Common Technical Requirement CTR-21. The CTR-21 requirement is an electrical standard that defines the analogue interface for all two-wire telecommunications equipment (i.e. DECT, PABXs, etc.) intended for connection to the Public Switched Telephone Network.

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