Crestron **C2COM-3**
2-Series RS-232/422/485 Expansion Card
Operations & Installation Guide

CRESTRON

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Contents

2-Series RS-232/422/485 Expansion Card: C2COM-3

Introduction

Functions and Features

The 2-Series C2COM-3 RS-232/422/485 Expansion Card provides RS-232, RS-422, or RS-485 serial communication for a Crestron 2-Series Control System (PRO2 or AV2 with cage card). The C2COM-3 fits in either control system's Y-bus (3) slots. The Y-bus provides high-speed communications and supports current and enhanced Crestron control system expansion cards. All C2COM-3 ports can communicate with the Network Poll Accelerator.

NOTE: The Network Poll Accelerator allows a 2-Series control system to maintain a fast response time (high-speed communication) between the control system and a large number of Cresnet devices. For more information, refer to the latest revision of the Network Poll Accelerator Operations Guide (Doc. 6087).

The C2COM-3 supports baud rates up to 115,200 bps, and supports a variety of communication parameters with hardware and software handshaking. Valid parameters are shown in the Functional Summary.

Functional Summary

- Baud rates: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200.
- Parity may be even, odd, none, or zero stick (parity bit always 0). When specifying the parity use E, O, N, or Z, respectively.
- Data bits may be 7 or 8.
- Stop bits may be 1 or 2.
- Both XON/XOFF software handshaking and RTS/CTS hardware handshaking are supported. XON/XOFF handshaking may be supported by specifying XON (for both transmit and receive), XONR (for receive only), or XONT (for transmit only). XON/XOFF and RTS/CTS handshaking are mutually exclusive in the C2COM-3. If both are enabled, RTS/CTS is used. If CTS handshaking is enabled, the CTS line is monitored by the C2COM-3. The CTS line can also be enabled as a digital input to the control system; the RTS line can be enabled as a digital output.
- Supports RS-422. Refer to *Non-standard COM Pinout* table on page 4.
- Break sequence can be generated under program control.
- Supports RS-485. Refer to *COM Pinout to RS-485 Bus* table on page 4. When programming in SIMPL™ Windows®, specify RS-485 and use RS-485 communication settings.

NOTE: Due to non-standard pin configuration that allows Crestron to support RS-232/422/485, Data Set Ready (DSR) and Data Terminal Ready (DTR) are not supported.

Specifications

The following table provides specifications for the C2COM-3.

C2COM-3 Specifications

SPECIFICATION	DETAILS
Power Requirements	24 VDC, 0.125A, 3 Watts
RS-232/422/485 Baud Rate	Up to 115.2K baud
Output Signal Levels	0 to 5VDC (compatible with most RS-232 devices)[1]
Handshaking	Hardware - CTS, RTS, CTS/RTS
	Software - XON transmit, receive, bi-directional
2-Series Control Systems Update File[2]	Version 1.014.CUZ or later[3]
Dimensions	Height: 0.98 in (2.49 cm)
	Width: 5.00 in (12.70 cm)
	Depth: 6.80 in (17.28 cm)
	Weight: 4.50 oz (.14 kg)

1   In some cases, RS-232 devices require a different output voltage. Refer to the device manufacturer documentation for more information.
2   Crestron 2-Series control systems include the AV2 with CAGE2, PAC2, PRO2, and RACK2.
3   Filenames for 2-Series control system update files have a CUZ extension and can be obtained from the Downloads | Software Updates section of the Crestron website (www.crestron.com).

Physical Description

The C2COM-3 is a circuit board fastened to an aluminum faceplate. The card is manufactured to easily fit in an unoccupied C2Y card slot of a Crestron 2-Series Control System.

C2COM-3 Faceplate

The faceplate contains three identical bidirectional DB9 male connectors. The connectors are labeled A, B and C.

Industry Compliance

As of the date of manufacture, the C2COM-3 has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling (N11785).

NOTE: This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Setup

Installation

Tools/hardware required
C2COM-3 card
Non-standard DB9 (RS-232/422/485) cable
(Refer to DB9 cable information on page 4)
Phillips screwdriver
Grounding strap

The following provides C2COM-3 installation instructions.

CAUTION: The C2COM-3 contains electrostatic sensitive devices (ESD); observe precautions for handling ESDs to avoid damaging the card.

NOTE: If you install the C2COM-3 in an AV2, it is assumed that the CAGE2 has been installed.

1. Disconnect power from the control system.

2. Remove the two screws and blank faceplate from the desired slot in the control system using a Phillips screwdriver.

3. Align the C2COM-3 with the card guides in the open slot and slide the expansion card in the slot.

4. Firmly press both ends of the C2COM-3 faceplate to seat the expansion card in the control system connector.

5. Tighten the thumbscrews to secure the C2COM-3 to the control system.

6. Connect DB cable(s).

7. Reapply power to contol system.

Hookup

Three non-standard DB9 connectors provide three distinct bidirectional serial ports on the C2COM-3. Refer to the sample hookup illustration below.

Sample Hookup Connections for C2COM-3
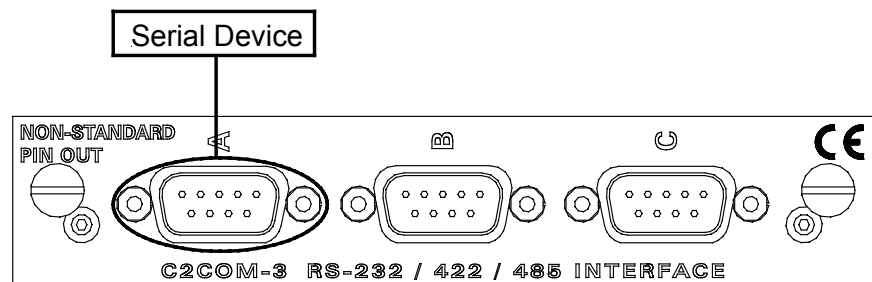
NOTE: The pinout of each 9-pin port is non-standard. Therefore, do not use a straight-through DB9 cable. The following table contains pinout descriptions for RS-232 and RS-422. Conflicts with some equipment may occur unless the controlled devices are properly wired. Certain devices have specific voltage requirements. Therefore, do not use all nine pins in a given application. Although the possibility is remote, improper wiring may result in damage to the controlled device. Only the required pins for each communication type should be connected.
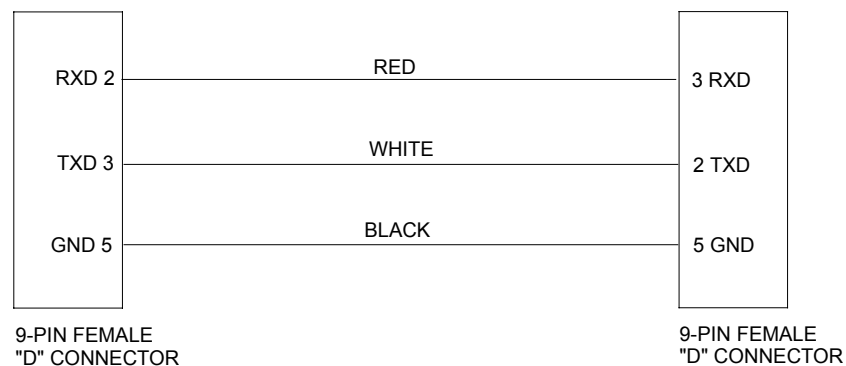
Non-Standard COM Pinout (for RS-232 and RS-422 Communication)

PIN	DIRECTION	DESCRIPTION
1*	To C2COM-3	(RXD-) RS-422 Receive Data (Idles low)
2	To C2COM-3	(RXD) RS-232 Receive Data
3	From C2COM-3	(TXD) RS-232 Transmit Data
4	From C2COM-3	(TXD+) RS-422 Transmit Data (Idles high)
5	Ground	RS-232 and RS-422 Signal Common
6	To C2COM-3	(RXD+) RS-422 Receive Data (Idles high)
7	From C2COM-3	(RTS) RS-232 Request to Send
8	To C2COM-3	(CTS) RS-232 Clear to Send
9	From C2COM-3	(TXD-) RS-422 Transmit Data (Idles low)

Where: * = RS-422 transmit and receive are balanced signals requiring two lines plus a ground in each direction. RXD+ and TXD+ should idle high (going low at start of data transmission). RXD- and TXD- should idle low (going high at start of data transmission). If necessary, RXD+/RXD- and TXD+/TXD- may be swapped to maintain correct signal levels.

A common application is to use a three-wire null modem serial cable to communicate with a PC, as shown below. Since the pinout on the C2COM-3 is non-standard, the card should not be plugged into the PC directly. The pinout in this illustration emulates the IBM PC AT connector except for the RS-422 signals on pins 1, 4, 6, and 9.

Three-Wire Null Modem Serial Cable

RXD 2	RED	3 RXD
TXD 3	WHITE	2 TXD
GND 5	BLACK	5 GND

9-PIN FEMALE "D" CONNECTOR   9-PIN FEMALE "D" CONNECTOR

NOTE: To support RS-485, tie pin 1 (RXD-) to pin 9 (TXD-) and pin 4 (TXD+) to pin 6 (RXD+) in the cable (refer to the following table).

COM Pinout to RS-485 Bus

COM (DB9) CONNECTOR	RS-485 BUS
Tie Pins 1 & 9	+
Tie Pins 4 & 6	-
Pin 5	G

Important Information for PRO2 Users

Once you power up the PRO2, the front panel displays the Main Menu (shown below). The COM menu function button (directly below COM) allows you to monitor transmission and reception traffic on every COM-type device and card that is active in the SIMPL Windows program loaded in the control system, including the C2COM-3.

PRO2 Front Panel (Sample of Main Menu)

When you press the COM button, (default front panel page) the display shows a list of devices and cards to be monitored (one at a time). You can select the slot and port for the C2COM-3 by using the NEXT or PREV buttons on the panel. Make sure you select the correct slot/port for the card. For more information, refer to the 2-Series Integrated Dual Bus Control System Operations Guide (latest revision of Doc. 5957). It is available from the Downloads | Product Manuals section of the Crestron website (www.crestron.com).

Programming

You can create a program that allows you to control the C2COM-3 through a Crestron control system using the Crestron programming tools Crestron Application Builder™ (App Builder) and SIMPL™ Windows®. These tools are intended for users with different levels of programming knowledge. The flexibility of each tool is proportional to the degree of programming expertise (i.e., the more flexible, the more a programmer needs to know and account for). Of course, one can initiate programming using the easiest method (Crestron AppBuilder) and use advanced techniques that are available from SIMPL Windows to customize the job.

The following are recommended software version requirements for the PC:

- SIMPL Windows version 2.01.06 or later. Requires SIMPL+ Cross Compiler version 1.1.

- Crestron Database version 15.6.8 or later.

- Application Builder version 1.0.9 or later. Requires SIMPL Windows.

Programming with the Crestron AppBuilder

The easiest method of programming, but does not offer as much flexibility as SIMPL Windows.

The Crestron AppBuilder offers automatic programming for such residential and commercial applications as audio distribution, home theater, video conferencing, and lighting. The interface of this tool guides you through a few basic steps for designating rooms and specifying the control system, touchpanels, devices, and functionality. The Crestron AppBuilder then programs the system, including all touchpanel projects and control system logic.

The Crestron AppBuilder is fully integrated with Crestron's suite of software development tools, including SIMPL Windows, VT Pro-e, Crestron Database, User IR Database, and User Modules Directory. The Crestron AppBuilder accesses these tools behind the scenes, enabling you to easily create robust systems.

Programming with SIMPL Windows

NOTE: The following assumes that the reader has knowledge of SIMPL Windows. If not, refer to the extensive help information provided with the software.

NOTE: In the following, the PRO2 control system is used.

SIMPL Windows is Crestron's primary software for programming Crestron control systems. It provides a well-designed graphical environment with a number of workspaces (i.e., windows) in which a programmer can select, configure, program, test, and monitor a Crestron control system. SIMPL Windows offers drag and drop functionality in a familiar Windows® environment.

This section explains how to create a SIMPL Windows program that includes the C2COM-3. It also gives descriptions of parameters and features of the selected control and serial devices and drivers.

Configuration Manager is where programmers "build" a Crestron control system by selecting hardware from the *Device Library*. In Configuration Manager, drag the PRO2 from the Control Systems folder of the *Device Library* and drop it in the upper pane of the *System Views*. The PRO2 with its associated communication ports is displayed in the *System Views* upper pane.

PRO2 System View
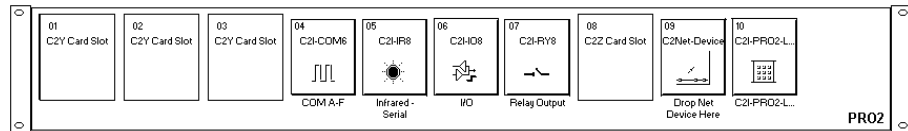
The *System Views* lower pane displays the PRO2 system tree. This tree can be expanded to display and configure the communications ports.

*Expanded PRO2 System Tree*
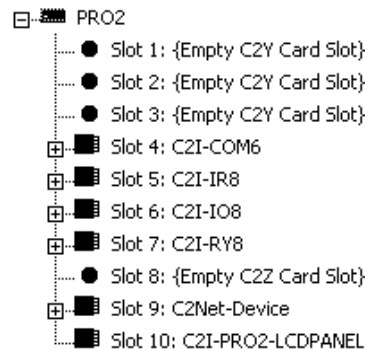
C2Y Card Slot in Configuration Manager

The C2Y Card Slots 01-03 can hold a C2COM-3. Once a C2COM-3 is configured in a C2Y Card Slot, the slot allows serial communication using RS-232/422/485 between a serial device and the PRO2 control system.

In Configuration Manager, drag the C2COM-3 from the Plug-in Control Cards | Cards (2-Series Y Bus) folder of the *Device Library* and drop it on the C2Y Card Slot (01) in *System Views*. The PRO2 displays the C2COM-3 serial driver in slot 01. The PRO2 system tree displays the C2COM-3 in Slot 1. Click + to expand the tree so you can view the C2COM-3 ports. Refer to following graphic.

Expanded Slot 1:C2COM-3
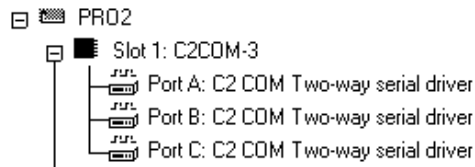
Each port has a built-in serial driver with communication settings that must be specified in Configuration Manager: double-click *Port A* to open the "Device Settings" window, and then click the *Serial Settings* tab.

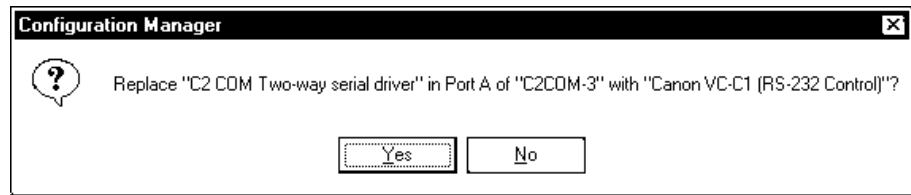*Device Settings Window/Serial Settings tab*
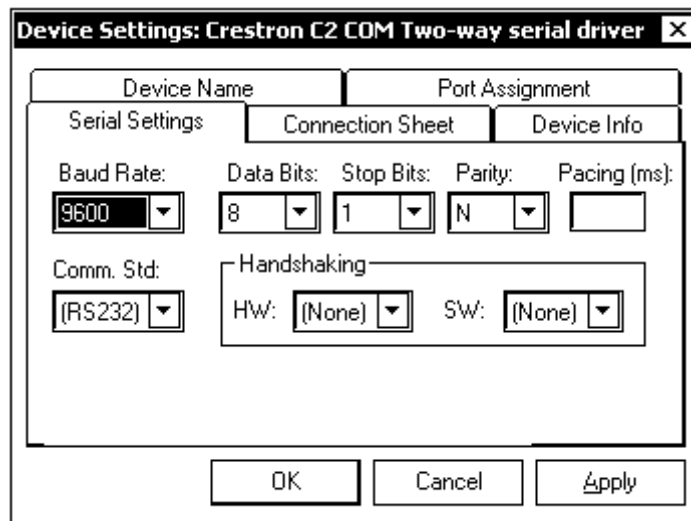
These settings define the protocol that a controlled serial device expects, and include the baud rate, parity, and the number of data bits and stop bits. In addition, a device might require hardware or software handshaking, which controls the flow of data between two devices. The exact protocol will be described in the manufacturer's documentation. The graphic above shows the default settings for the C2COM-3.

NOTE: If you connect a different serial device to Port A, these values may need to be changed to the required settings for the device. SIMPL Windows can automatically set the values for a controlled device that is selected from the Crestron device database.

The Crestron database includes numerous serial devices, with default logic and pre-configured communication settings that are compatible with the ports on the COM card. Simply drag the serial device from the Crestron Database folder to one of the ports on the COM card and click **Yes** when prompted (window is shown on the next page) to replace the serial driver for that port. In most cases, the default logic should be loaded as well.

Configuration Manager Prompt

Configuration Manager   ☒

(?) Replace "C2 COM Two-way serial driver" in Port A of "C2COM-3" with "Canon VC-C1 (RS-232 Control)"?

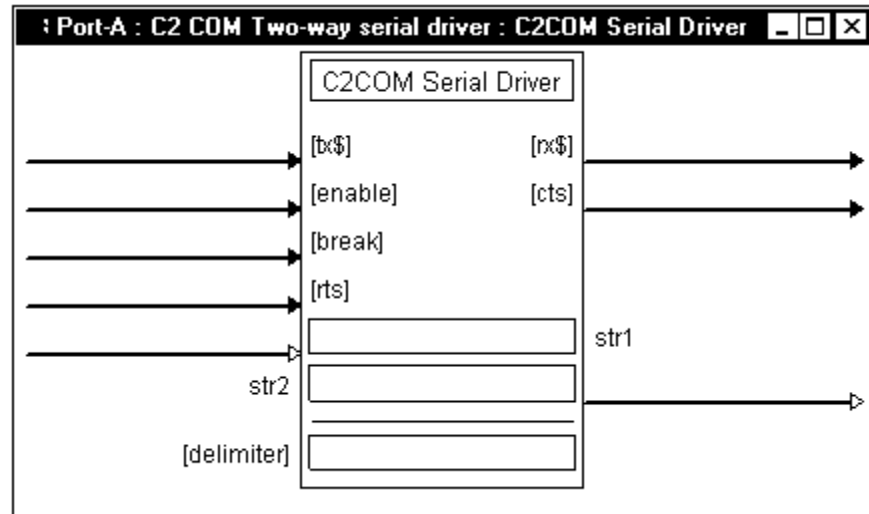[<u>Y</u>es]   [<u>N</u>o]

For example, drag the Canon VC-C1 (RS-232 Control) serial driver from the Crestron DB | Canon | Camera folder, and drop it on C2COM-3, Port A. SIMPL Windows prompts you to replace the existing driver. Click **Yes** twice. Now double-click the Canon driver in the system tree. The *Serial Settings* tab in the "Device Settings" window displays the values for the Canon driver.

NOTE: Some serial devices in the Crestron Database have the same serial driver settings as the SIMPL Windows default settings.

C2COM-3 Symbol in Programming Manager

Programming Manager is where programmers "program" a Creston control system by assigning signals to symbols. The following illustrates the symbol associated with the ports of the C2COM-3 in SIMPL Windows.

Detail View of an C2COM-3 Device Symbol in SIMPL Windows' Programming Manager

: Port-A : C2 COM Two-way serial driver : C2COM Serial Driver   _ ☐ ☒

```
                    C2COM Serial Driver

──────────────►    [tx$]            [rx$]    ──────────────►

──────────────►    [enable]         [cts]    ──────────────►

──────────────►    [break]

──────────────►    [rts]
                   ┌──────────────┐
──────────────▷    │              │  str1
            str2   │              │
                   │              │  ──────────────▷
                   ├──────────────┤
                   ├──────────────┤
        [delimiter]│              │
                   └──────────────┘
```

The <**tx$**> (transmit) and <**rx$**> (receive) signals transmit serial data to and from the COM port in whatever port or driver settings is specified for the device in Configuration Manager. The protocol that a device expects will be described in the manufacturer's documentation and includes the speed of communication (baud rate), error checking (parity), the number of data bits and stop bits, and any hardware or software handshaking that may be required to control the flow of data between devices.

Some devices require a <**break**> to enable synchronization. The <**break**> input drives the transmit pin of the associated COM port low, thus interrupting transmission of data. Some <**break**> signals can be 17 to 20 bits of logic low, whereas others hold transmission low for as long as <**break**> remains high. Again, the hardware documentation will contain information about the type of <**break**> a device generates.

The <**rts**> (request to send) input and the <**cts**> (clear to send) output are hardware handshaking signals for use in applications where explicit handshaking control is required. These signals are enabled *only* when the *Handshaking* setting of the device is set to **None** in Configuration Manager.

Some serial driver symbols go beyond the basic serial drivers and have the added capability to function as Serial I/O symbols. That is, in addition to the signals just described, these symbols have an <**enable**> input, <**str**> and <**delimiter**> parameters, and digital inputs and outputs. Together with <**tx$**> and <**rx$**>, these signals function identically to a Serial I/O symbol, except that the positions of the input and output signals are reversed.

For more information, refer to the latest release of the SIMPL Windows help.

Example Program

An example program for the C2COM-3 is available from the Crestron FTP site (www.ftp.crestron.com). Select the Examples folder and search for C2COM-3.SMW.

Problem Solving

Troubleshooting

The table below provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

C2COM-3 Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
C2COM-3 does not function.	Control System is not receiving power.	Verify power to Control System.
	Circuit card is not properly seated in slot.	Verify C2COM-3 is properly inserted into Control System slot per procedures in this Operations Guide.
	Cable from C2COM-3 to controlled equipment is incorrect.	Verify wiring. Connect only the required pins for each communication type (refer to page 4). Check Crestron cable database. The latest version is in the Downloads	Software Update section of the Crestron website (www.crestron.com).
	Incorrect serial port settings.	Verify the communication parameters assigned in the "Device Settings" window as described in the Programming section.
	Programming error.	Check SIMPL Windows program.
Framing Error or Parity Error	Cable noise* or improper comm settings in program.	Verify comm settings (Serial Settings tab) and wiring.
Overrun Error or RX Buffer Full	C2COM-3 is receiving data at a higher rate than program can process.	Enable Hardware or Software handshaking in comm settings (Serial Settings tab) and in device.
TX Buffer Full	C2COM-3 is sending large quantities of data in excess of the device baud rate or handshaking is enabled and the receiving end is preventing the system from transmitting.	Change program to reduce serial data to device or use a higher baud rate if device can support the higher rate.

*Cable noise can be caused by high frequency interference, etc.

Further Inquiries

If after reviewing this Operations and Installation Guide, you cannot locate specific information or have questions, please take advantage of Crestron's award winning customer service team by calling:

- In the US and Canada, call Crestron's corporate headquarters at 1-888-CRESTRON [1-888-273-7876] or 1-201-767-3400

- In Europe, call Crestron International at +32-15-50-99-50

- In Asia, call Crestron Asia at +852-2341-2016

- In Latin America, call Crestron Latin America at +5255-5093-2160

- In Australia and New Zealand, call Creston Pacific at +613-9480-2999

Firmware Upgrades

To take advantage of all the C2COM-3 features, it is important that the unit contains the latest firmware available. Therefore, please check our website (http://www.crestron.com/downloads/software_updates.asp) for the latest version of firmware. Not every product has a firmware upgrade, but as Crestron improves functions, adds new features, and extends the capabilities of our products, firmware upgrades are posted. For questions regarding upgrade procedures, contact Crestron customer service.

Future Updates

As Crestron improves functions, adds new features, and extends the capabilities of the C2COM-3, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website (www.crestron.com) periodically for manual update availability and its subjective value. Updates are available from the Downloads | Product Manuals section and are identified as an "Addendum" in the Download column.

Return and Warranty Policies

Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange, or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address.

2. Products may be returned for credit, exchange, or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, Cresskill, N.J., or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.

3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

CRESTRON Limited Warranty

CRESTRON ELECTRONICS, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from CRESTRON, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touchscreen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

This warranty extends to products purchased directly from CRESTRON or an authorized CRESTRON dealer. Purchasers should inquire of the dealer regarding the nature and extent of the dealer's warranty, if any.

CRESTRON shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall CRESTRON be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. CRESTRON is not liable for any claim made by a third party or made by the purchaser for a third party.

CRESTRON shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

Except as expressly set forth in this warranty, CRESTRON makes no other warranties, expressed or implied, nor authorizes any other party to offer any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supercedes all previous warranties.

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change without notice.