

Crestron **TPMC-4XG**

Isys i/O™ Handheld WiFi Touchpanel

Operations Guide



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Isys i/O™ Handheld WiFi Touchpanel: TPMC-4XG

Introduction

Features and Functions

- Stylish and ergonomic handheld design
- 3.5" active matrix touchscreen display | 240 x 320 resolution
- 16-bit Isys i/O™ graphics | Synapse™ image rendering algorithm
- Backlit hard buttons, thumbpad and scroll wheel
- Microsoft Windows CE .NET operating system
- Windows® SideShow™ enabled
- Wireless video from network cameras and servers
- 802.11b/g Wi-Fi 2-way wireless communications
- Includes stylus with onboard storage slot
- Includes docking station and Li-Ion battery pack

Handheld Touchpanel Control

Far more than a mere universal remote, the TPMC-4XG is ingeniously designed to provide a powerful wireless control solution that is easy to hold and intuitive to use. True Crestron® touchpanel versatility is afforded through a 3.5" active matrix color touchscreen display, producing stunning 16-bit graphics with 3D (Synapse™) effects, high res images, dynamic graphics and text, PNG translucency and animation. A stylus is even included for use with the on screen keyboard, conveniently stowed in its own storage slot.

EL Backlit Hard Buttons

Complementing its touchpanel are 19 tactile pushbuttons comprised of 10 smartly placed buttons designated for most common functions, a 5-way navigation thumbpad and four context-assignable "hard keys" positioned along the bottom of the touchscreen. Every button is fully programmable to support quick access to functions ranging from simple volume adjustment and channel selection to on-screen menu navigation or even pan/tilt camera control. Adjustable electroluminescent button backlighting provides a striking appearance while facilitating operation in a darkened home theater or conference room.

Scroll Wheel

A scroll wheel is located on the right side of the TPMC-4XG, positioned for easy navigation through lengthy menus on the touchscreen or television. Incremental up and down scrolling and press-to-select commands are programmable to allow the scroll wheel to be adapted for custom applications.

Wi-Fi Wireless

Integrated 802.11b/g Wi-Fi technology delivers secure, high speed 2-way wireless performance, communicating with Crestron control systems, computers and media servers via a wireless Ethernet access point. Fully bidirectional behavior means the TPMC-4XG is perfect for searching through tracks and titles on a music server complete with the dynamic display of cover art graphics. Of course, true feedback is afforded for every connected device be it audio, video, satellite radio, lighting, security or climate control.

Windows® SideShow™ Enabled

New Crestron support for Windows SideShow gives the TPMC-4XG access to all kinds of PC and web based content such as news feeds, sports scores, stock tickers, weather alerts, media guides, email message and appointment notifications all through a simple network connection to a Windows Vista™ computer.

Wireless Video

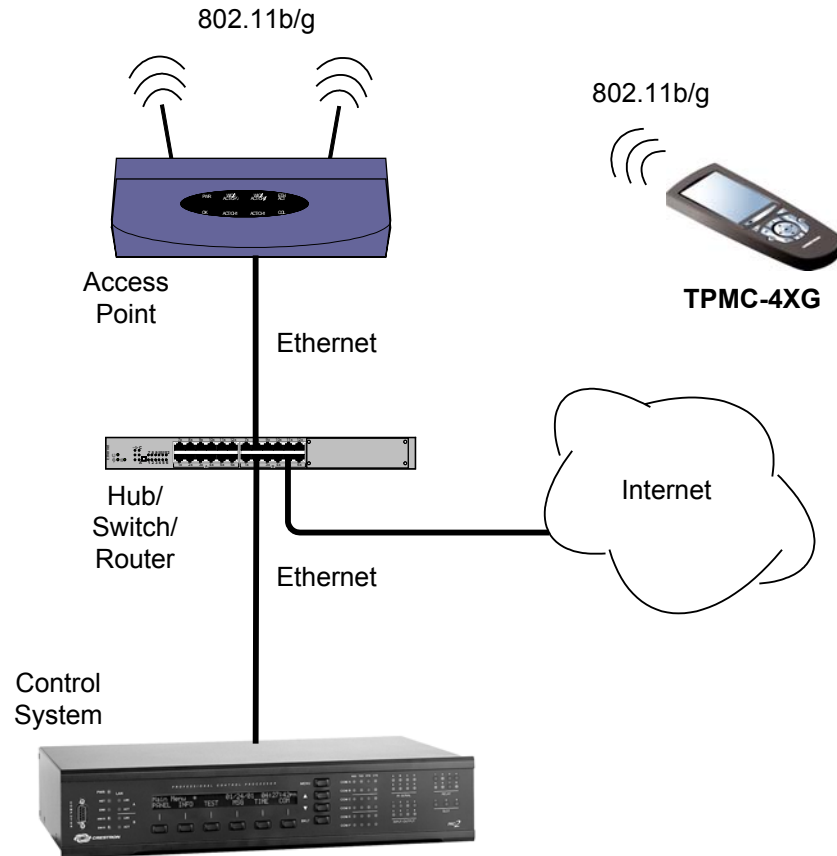
For presentation preview, surveillance or pure entertainment, the TPMC-4XG makes it possible to view security cameras, movies and other video sources right on its touchscreen. The TPMC-4XG includes native support for wireless streaming video from a variety of third party web cameras and servers using the motion JPEG and MPEG4 formats.

Li-Ion Rechargeable Batteries

A field replaceable Lithium Ion battery pack provides fast charging, long lasting wireless operation without the "memory" issues typical of other rechargeable batteries. Adjustable standby helps preserve battery life and the included docking station provides charging convenience with an elegant appearance.

Applications

The following diagram illustrates a basic configuration that connects a TPMC-4XG WiFi touchpanel to a control system via a wireless access point (WAP).

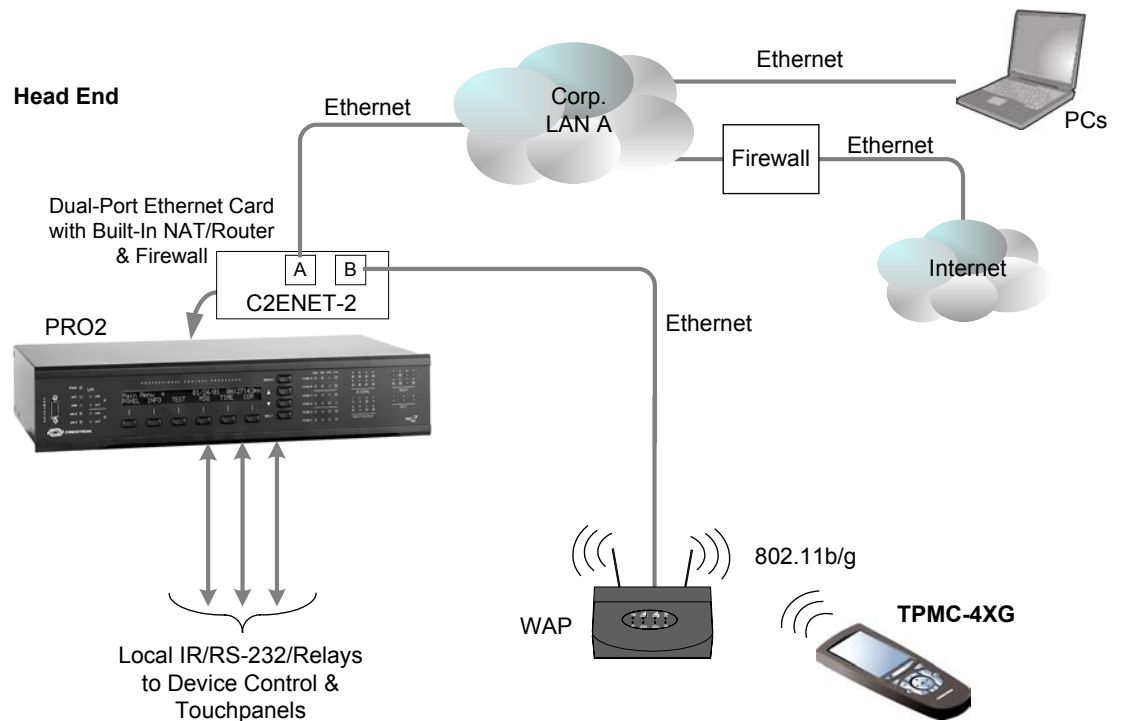


- The distance between the TPMC-4XG and the dedicated WAP should not exceed 30 feet. The TPMC-4XG is not a roaming device.
- Use a dedicated wireless router/access point for each TPMC-4XG device.

The diagram on the next page presents a more complex configuration. In this scenario, the WAP is connected to port B of the control system's C2ENET-2 card. Port A is connected to the corporate LAN. The card's internal firewall controls data flow thus isolating the two subnets.

NOTE: When using a dual-port Ethernet card, Ports A & B must be different subnets (e.g., Port A = 128.x.x.x; Port B = 192.x.x.x).

For additional information on setting up and understanding an Ethernet network, refer to the latest version of the Crestron e-Control Reference Guide (Doc. 6052), which is available from the Crestron website (www.crestron.com/manuals).



Specifications

Specifications for the TPMC-4XG are listed in the following table.

TPMC-4XG Specifications

SPECIFICATION	DETAILS
Touchscreen Display	
Display Type	Transreflective TFT active matrix color LCD
Size	3.5 inch (8.89 cm) diagonal
Aspect Ratio	3:4 QVGA (portrait orientation)
Resolution	240 x 320 pixels
Brightness	115 nits typical, 90 nits minimum
Contrast	100:1 typical, 80:1 minimum
Color Depth	16-bit, 64k colors
Viewing Angle	±60° horizontal, ±55° vertical
Illumination	White LED backlit
Touchscreen	Resistive membrane
Processor	Freescale™ i.MX21 266 MHz CPU
Memory	
SDRAM	64 MB
Flash	64 MB
Maximum Project Size	12 MB
Operating System	Microsoft® Windows® CE .NET 5.0 Professional Edition

(Continued on following page)

TPMC-4XG Specifications (Continued)

SPECIFICATION	DETAILS
Graphic Engine	16-bit non-palette graphics, 65,536 colors; Synapse™ image rendering algorithm; multi-mode objects, dynamic graphics and text; Windows® SideShow™ support, PNG translucency; 24 fps animation
Embedded Applications ¹	Crestron MJPEG Viewer, Axis® Media Control.
RF Wireless	IEEE 802.11b/g Wi-Fi, 2.4 GHz, 2-way RF, static IP or dynamic IP via DHCP, 64 and 128-bit WEP encryption, WPA and WPA2 with TKIP and AES 30 feet (10 meters) @ 54 Mbps, range and speed vary based upon environmental conditions, roaming not supported Requires a dedicated 802.11b/g wireless access point (Crestron CEN-WAP-ABG-1G or equivalent) and Ethernet enabled Crestron 2-Series control system.
RF Transceiver	
Range	
Gateway	
Video	MJPEG and MPEG4 via Crestron MJPEG Viewer and Axis® Media Control.
Streaming/File Formats	
Battery	Lithium Ion, 3.7 Volt, 1880 mAh (included) 3.5 hours continuous at full brightness 2 hours 50 minutes
Battery Type	
Usage per Charge	
Charging Time	
Power Requirements	1 Amp @ 5 Volts DC, Crestron model TPMC-4XG-DS included 0.3 Amp @ 100-240 Volts AC, 60 Hz
TPMC-4XG-DS Docking Station/Charger (included)	
Power Supply (included)	
Default IP ID ²	03
Minimum 2-Series Control System Update File ^{3,4}	Version 3.137 or later
Environmental	32° to 122° F (0° to 50° C) 10% to 90% RH (non-condensing) 17 BTU/Hr
Temperature	
Humidity	
Heat Dissipation	
Enclosure	Injection molded plastic, silver; stylus storage slot (stylus included); integral docking station port
Dimensions - TPMC-4XG	1.17 in (2.96 cm) 3.08 in (7.81 cm) 7.39 in (18.76 cm)
Height	
Width	
Depth	

(Continued on following page)

TPMC-4XG Specifications (Continued)

SPECIFICATION	DETAILS
Dimensions - TPMC-4XG-DS	
Height	2.25 in (5.72 cm)
Width	3.63 in (9.22 cm)
Depth	6.25 in (15.88 cm)
Weight	
TPMC-4XG (with battery)	9 oz (259 g)
TPMC-4XG (without battery)	8 oz (220 g)
TPMC-4XG-DS	4 oz (120 g)
Included Accessories	
TPMC-4XG-DS	Docking Station/Charger
TPMC-4XG-BTP	Internal Battery Pack

1. Contact Crestron for a current list of compatible devices and embedded applications. To ensure reliable performance, new device drivers and applications are available only from Crestron through firmware updates.
2. Refer to “Identity Code” on page 12 for details.
3. The latest software versions can be obtained from the Crestron website. Refer to NOTE after last footnote.
4. Crestron 2-Series control systems include the AV2 and PRO2. Consult the latest Crestron Product Catalog for a complete list of 2-Series control systems that are Ethernet-enabled directly or via a C2ENET-2 dual port Ethernet card.

NOTE: Crestron software and any files on the website are for Authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).



Battery must be recycled. Deliver the battery to an appropriate recycling facility.

Physical Description

This section provides information on the connections, controls and indicators available on your TPMC-4XG.

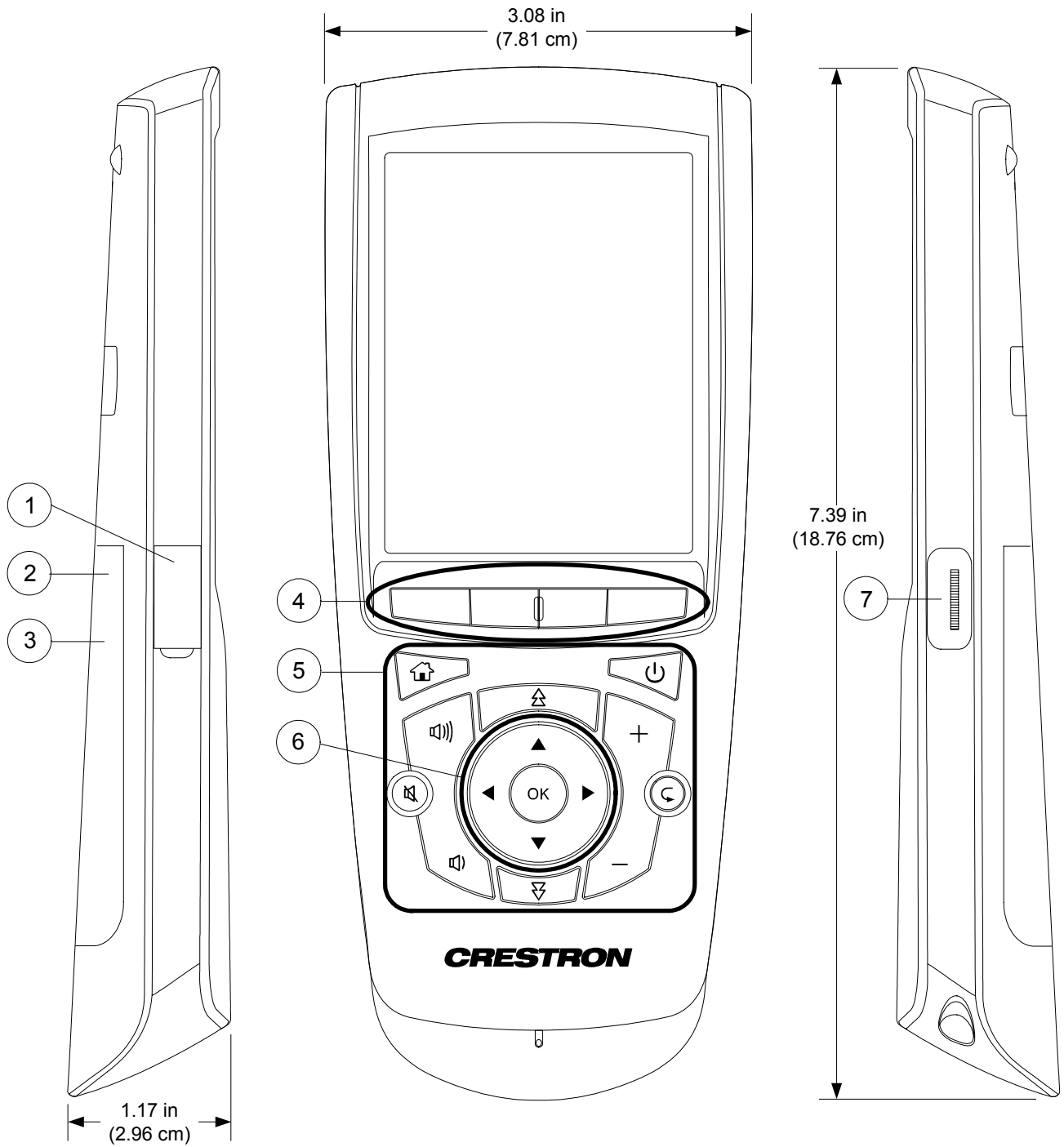
TPMC-4XG Physical View (Left, Front and Right)



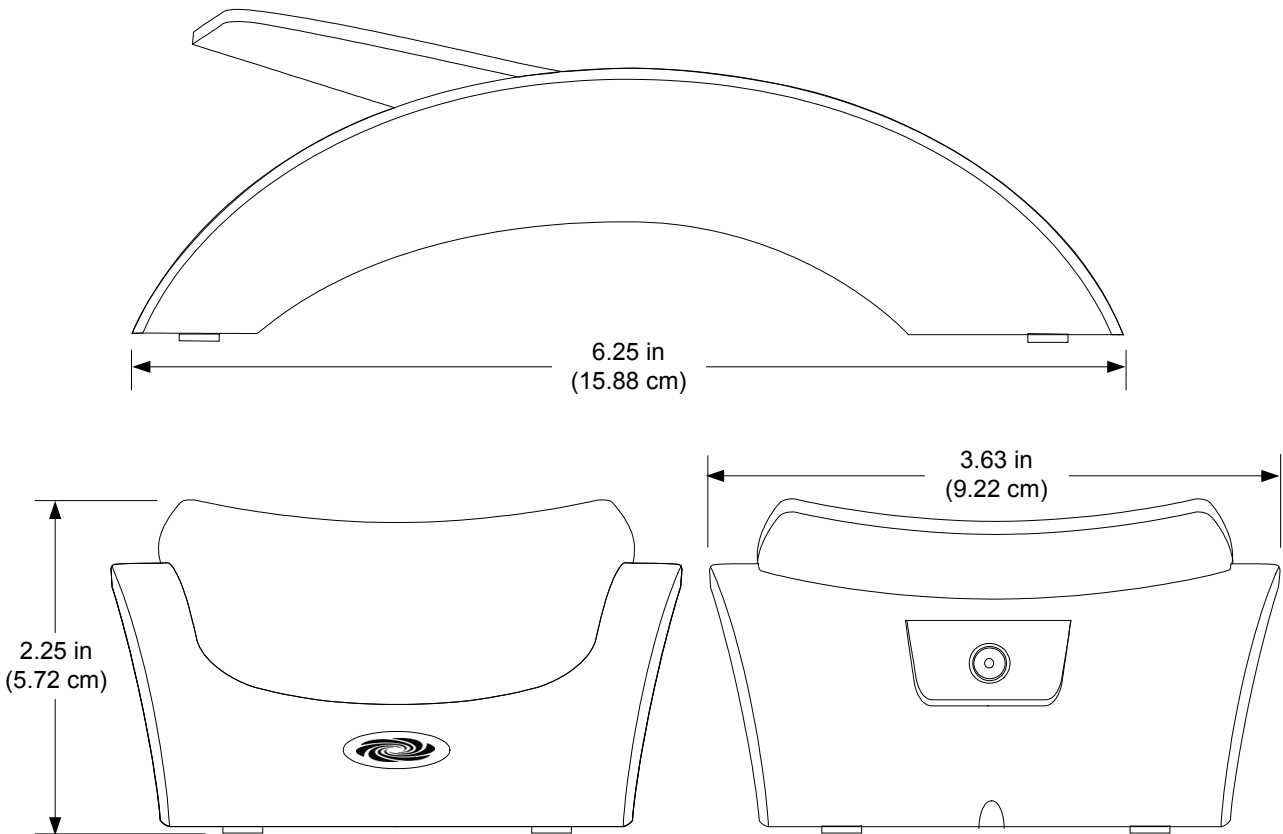
TPMC-4XG Physical View (Rear)



TPMC-4XG Overall Dimensions (Left, Front and Right Views)



TPMC-4XG Docking Station Dimensions (Side, Front and Rear Views)



NOTE: When the TPMC-4XG-DS docking station/charger is connected to AC power and a TPMC-4XG is placed on the dock, the Crestron swirl logo on the front will light for approximately five seconds. If the switch on the bottom of the TPMC-4XG-DS is moved to the *On* position, the logo will remain lit for as long as the touchpanel is on the docking station.

Connectors, Controls & Indicators

#	CONNECTORS & CONTROLS	DESCRIPTION
1	USB	(1) Mini Type B female behind cover; USB 2.0 computer console port, cable included.
2	ON/OFF	(1) Recessed slide switch (in battery compartment), turns unit on or off.
3	RESET	(1) Recessed miniature button (in battery compartment), reboots the touchpanel
4	HARD KEYS	(4) Programmable pushbuttons below touchscreen.
5	FUNCTIONS	(10) Programmable pushbuttons with white EL backlit labeling for home, volume (up and down), mute, up/fwd, down/rwd, +, -, return and power.
6	THUMBPAD	(1) Programmable 5-way thumbpad (4-way navigation plus center "OK" button) with white EL backlit labeling.
7	SCROLL WHEEL	(1) 360° programmable scroll wheel with push-to-select.

Industry Compliance

As of the date of manufacture, the TPMC-4XG has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling.



NOTICE: FCC NOTICE: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy if not installed and used in accordance with the instructions and may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human's body proximity to the device should not be less than 20 cm during normal operation.

WARNING: Changes or modifications of this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC ID: MG372400C
IC ID: 2575A-URC7240C

**CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.**

The socket-outlet shall be installed near the equipment and shall be easily accessible.

The equipment is to be supplied from an identified USB port complying with the requirements of Limited Power Source.

Corporate Headquarters
Universal Electronics
6101 Gateway Drive
Cypress, CA 90630-4841
714-820-1000
www.uei.com

Setup

Identity Code

The IP ID is set within the TPMC-4XG's table using Crestron Toolbox™ or during configuration of the unit in the Setup pages of the TPMC-4XG. For information on setting an IP table, refer to the Crestron Toolbox help file. The IP IDs of multiple TPMC-4XG devices in the same system must be unique.

When setting the IP ID, consider the following:

- The IP ID of each unit must match an IP ID specified in the SIMPL™ Windows® program.
- Each device using IP to communicate with a control system must have a unique IP ID.

Power

The TPMC-4XG is powered via its internal battery. Connect the included power supply to the TPMC-4XG-DS docking station.

NOTE: Before using the TPMC-4XG for the first time, charge its internal battery for at least eight hours by placing it on the TPMC-4XG-DS docking station.

It takes the TPMC-4XG about eight hours to recharge while in use. A fully charged battery can provide up to three hours of use at the full screen brightness setting.

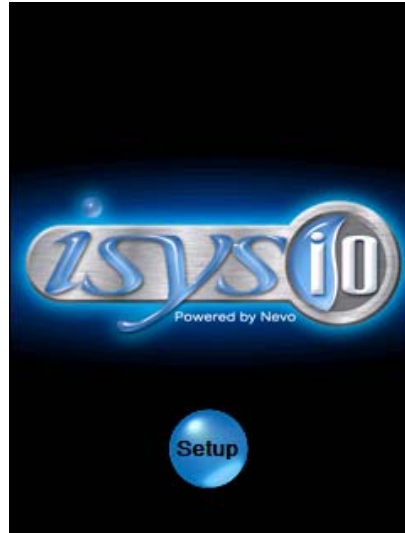
The battery recharge capacity is 500 cycles to 80% of original capacity.

NOTE: When not using the TPMC-4XG, store the unit on its docking station.

Configuring the Touchpanel

When power is applied to the unit for the first time, the following screen appears.

Initial Opening Screen



Touch **Setup** with the stylus or your finger to display the following TPMC-4XG setup screen.

Setup Screen



The setup screen enables basic configuration procedures prior to regular operation of the touchpanel.

NOTE: During regular operation of the touchpanel, there are three ways to activate the setup functions. Either place a button on the project main page and assign the reserved join number (17242) that activates Setup or hold your finger on the screen, use the stylus to press the **Reset** button (located inside the battery compartment), replace the battery cover and continue to keep your finger on the screen until the setup screen appears (about 30 seconds). If the system bar is visible at the top of the display, you can also access the setup screen by touching the Crestron swirl logo in the upper left corner.

NOTE: The battery cover must be on the TPMC-4XG in order for the unit to function.

NOTE: The battery strength meter in the system bar at the top of the setup screen will show full strength when the TPMC-4XG is on its dock and charging.

Setup Functions

The setup functions control the basic operation of the TPMC-4XG.

Disable System Messages

Touching **Disable System Messages** allows you to disable pop-up messages that warn of communication failure between the TPMC-4XG and the WAP or the control system.

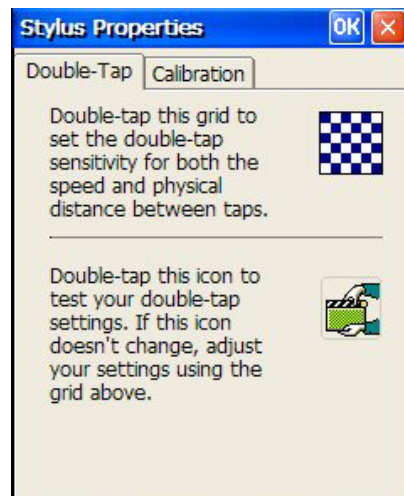
Touch Screen

Touch the **Touch Screen** button to display the “Stylus Properties” window, which allows you to set stylus properties and perform screen calibration.

Use the supplied stylus and follow the instructions to customize the unit’s sensitivity to your use of the stylus.

NOTE: The double-tap function is not supported at this time.

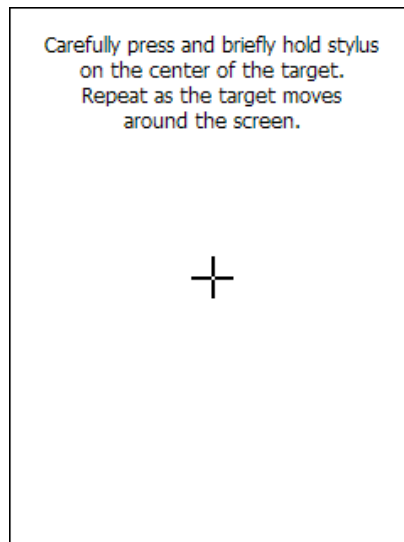
“Stylus Properties” Window (Double-Tap Tab)



“Stylus Properties” Window (Calibration Tab)



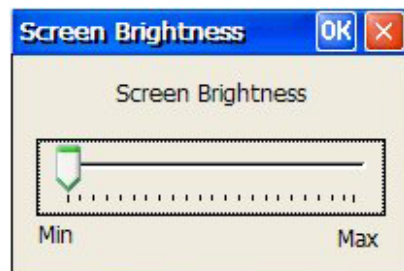
“Stylus Properties” Recalibration Window



Brightness

Touch **Brightness** to display the “Screen Brightness” window. Brightness can be set from *Min* to *Max* (full brightness). Lower brightness settings extend battery life.

“Screen Brightness” Window

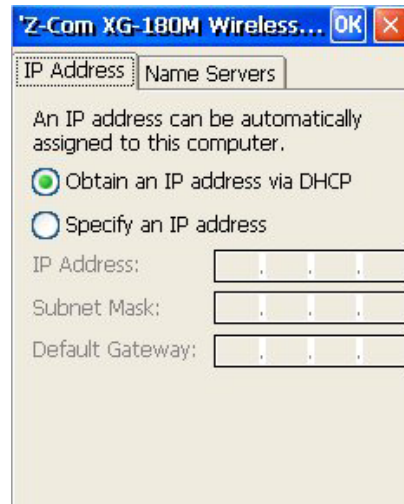


IP Config

Touch **IP Config** to display a window with an *IP Address* tab and a *Name Servers* tab.

On the *IP Address* tab, you can select *Obtain an IP address via DHCP* to automatically assign an IP address or you can select *Specify an IP address*, which allows you to enter a specific *IP Address*, *Subnet Mask* and *Default Gateway*.

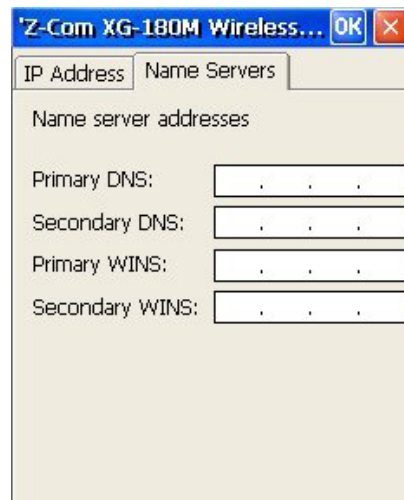
IP Config Window (IP Address Tab)



The screenshot shows a window titled "Z-Com XG-180M Wireless..." with "OK" and "X" buttons. It has two tabs: "IP Address" (selected) and "Name Servers". Below the tabs, it says "An IP address can be automatically assigned to this computer." There are two radio buttons: "Obtain an IP address via DHCP" (selected) and "Specify an IP address". Below these are three input fields for "IP Address:", "Subnet Mask:", and "Default Gateway:", each with a dotted pattern for input.

On the *Name Servers* tab, you can enter a specific *Primary DNS*, *Secondary DNS*, *Primary WINS* and *Secondary WINS*.

IP Config Window (Name Servers Tab)



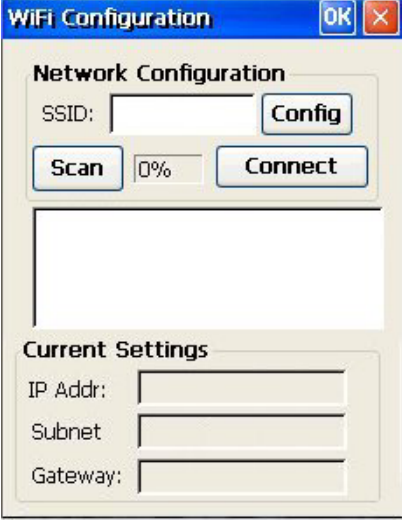
The screenshot shows the same window with the "Name Servers" tab selected. It says "Name server addresses:" followed by four input fields: "Primary DNS:", "Secondary DNS:", "Primary WINS:", and "Secondary WINS:", each with a dotted pattern for input.

WiFi Access Point

Touch **WiFi Access Point** to display the “WiFi Configuration” window, which allows you to set up the parameters used to communicate with the control system via a wireless access point (WAP). Crestron recommends using a dedicated WAP for each TPMC-4XG in the system.

NOTE: For screens that require data entry, touching an entry field with the stylus causes a keyboard display to appear at the bottom of the screen, allowing you to use the stylus to “type in” the necessary data.

“WiFi Configuration” Window

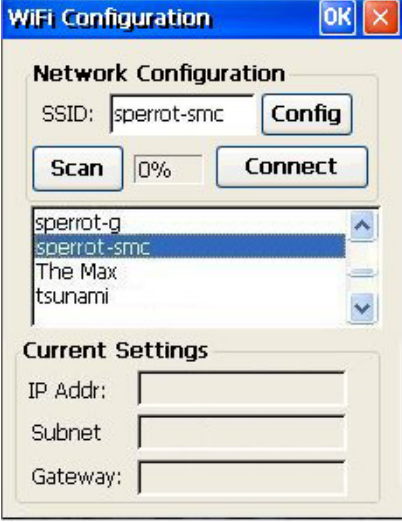


The screenshot shows the "WiFi Configuration" window. At the top, there is a title bar with "WiFi Configuration" and "OK" and "X" buttons. Below the title bar is the "Network Configuration" section, which includes an "SSID:" label followed by an empty text input field and a "Config" button. Below this are "Scan" and "Connect" buttons, with a "0%" indicator between them. A large empty rectangular box is positioned below the "Scan" button. At the bottom of the window is the "Current Settings" section, which contains three empty text input fields labeled "IP Addr:", "Subnet", and "Gateway:".

Touch **Scan** to build a list of available access points in the box below the button.

Touch the name of the access point you wish to select. Its name will appear in the *SSID* box at the top of the window.

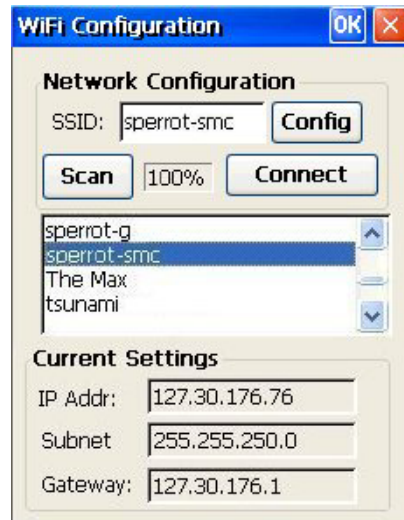
“WiFi Configuration” Window (Shown After Scan and Selection)



The screenshot shows the "WiFi Configuration" window after a scan. The "SSID:" field now contains the text "sperrot-smc" and the "Config" button is visible. The "Scan" and "Connect" buttons are still present, with the "0%" indicator. Below the "Scan" button, a list of access points is displayed in a scrollable box: "sperrot-g", "sperrot-smc" (which is highlighted in blue), "The Max", and "tsunami". The "Current Settings" section at the bottom remains the same, with empty input fields for "IP Addr:", "Subnet", and "Gateway:".

Touch **Connect** to establish communication with the selected access point. The box next to the **Scan** button will show the signal strength. The *IP Addr*, *Subnet* and *Gateway* boxes will show the settings.

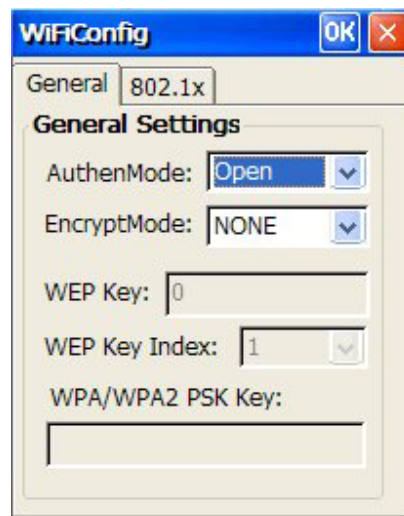
“WiFi Configuration” Window (Shown After Connection)



If you have not yet configured your wireless access point, touch **Config** to display the “WiFi Config” window with its *General* tab and *802.1x* tab.

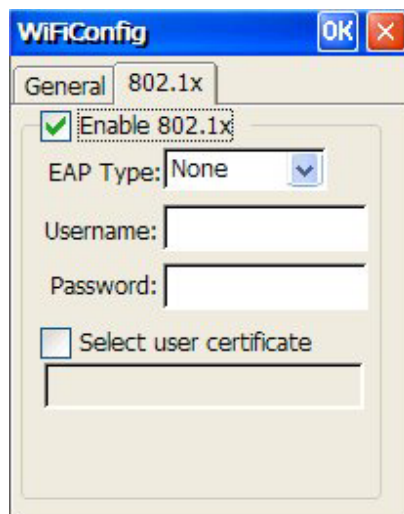
The *General* tab allows you to select the authentication mode, encryption mode, enter the *WEP Key* and *WEP Key Index* and see the *WPA/WPA2 PSK Key*.

“WiFi Config” Window (General Tab)



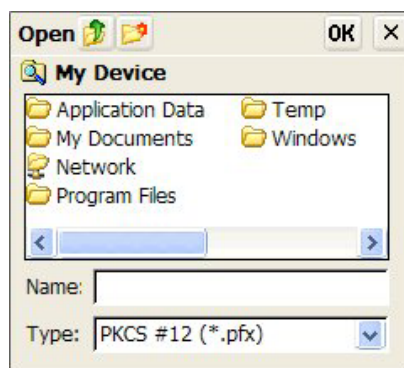
The *802.1x* tab has a checkbox for enabling/disabling 802.1x, a drop down list for selecting *EAP Type*, text boxes for *Username* and *Password* and a checkbox to *Select User Certificate*.

“WiFi Config” Window (802.1x Tab)



Touch the checkbox next to *Select User Certificate* to open a browse window where you can navigate to and select the certificate you wish to use.

Browse Window

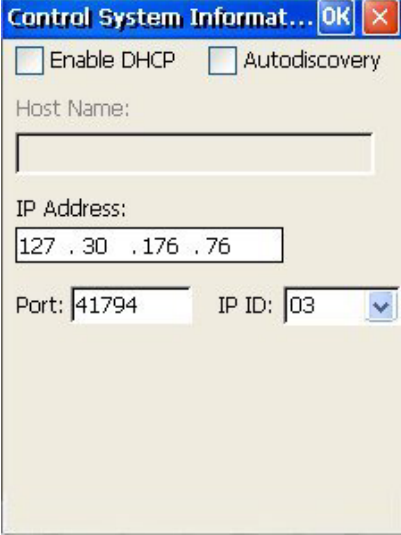


After configuring your wireless access point, close the “WiFi Config” window and touch **Connect** to establish communication with the selected access point. The box next to the **Scan** button will show the signal strength. The *IP Addr*, *Subnet* and *Gateway* boxes will show the settings, as shown in the illustration at the top of page 18.

CtrlSys IP Address

Touching **CtrlSys IP Address** displays the “Control System Information” window which allows you to *Enable DHCP* and *Autodiscovery* as well as enter the *Host Name*, *Port* and *IP ID*.

“Control System Information” Window



Power Down and Standby Timeouts

Use these two settings on the setup screen to specify the *Power Down* and *Standby* timeout values. *Power Down* timeout (default is 25 minutes) is the time (up to 120 minutes) it will take the TPMC-4XG to go from standby mode to turning off power. *Standby* timeout (default is 5 minutes) is the time (up to 120 minutes) it will take the TPMC-4XG to go from the last use of the touchpanel into standby mode (where the screen display is off but the unit is still on). Both timeouts are adjustable in one-minute increments.

About

Touch **About** to display a screen that shows software and OS version information.

Save & Exit

Touch **Save & Exit** to save any setup changes you have made and exit to normal operation mode.

General Use and Safety

WARNING: To avoid possible damage to the unit, do not use the touchpanel in the rain or expose it to unnecessary moisture.

Recommended Cleaning

Keep the surface of the touchscreen free of dirt, dust or other materials that could degrade optical properties. Long-term contact with abrasive materials can scratch the surface, which may detrimentally affect image quality.

For best cleaning results use a clean, damp, non-abrasive cloth with any commercially available non-ammonia glass cleaner. The surrounding plastic enclosure may not provide a watertight seal. Therefore, apply cleaning solution to the cloth rather than the surface of the touchscreen. Wipe touchscreen clean and avoid getting moisture beneath the screen.

Programming Software

Have a question or comment about Crestron software?

Answers to frequently asked questions (FAQs) can be viewed in the Online Help section of the Crestron website. To post a question or view questions you have submitted to Crestron's True Blue Support, log in at <http://support.crestron.com>. First-time users will need to establish a user account.

Earliest Version Software Requirements for the PC

NOTE: Crestron recommends that you use the latest software to take advantage of the most recently released features. The latest software is available from the Crestron website.

Crestron has developed an assortment of Windows®-based software tools to develop a controlled system. For the minimum recommended software versions, visit the Version Tracker page of the Crestron website (www.crestron.com/versiontracker).

Programming with Crestron SystemBuilder

Crestron SystemBuilder is the easiest method of programming but does not offer as much flexibility as SIMPL Windows. For additional details, download SystemBuilder from the Crestron website and examine the extensive help file.

Programming with SIMPL Windows

NOTE: While SIMPL Windows can be used to program the TPMC-4XG, it is recommended to use SystemBuilder for configuring a system.

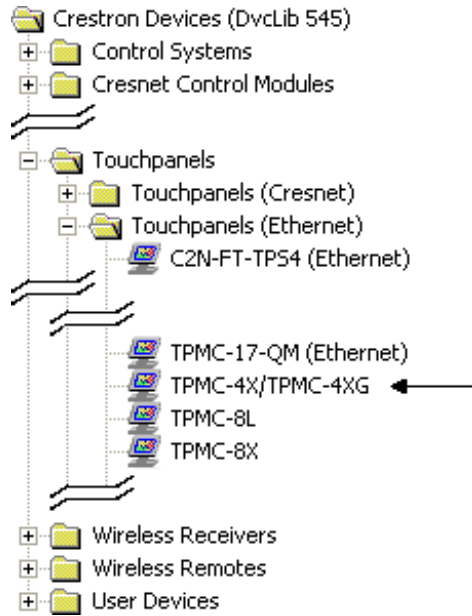
SIMPL Windows is Crestron's premier software for programming Crestron control systems. It is organized into two separate but equally important "Managers".

Configuration Manager

Configuration Manager is the view where programmers "build" a Crestron control system by selecting hardware from the *Device Library*.

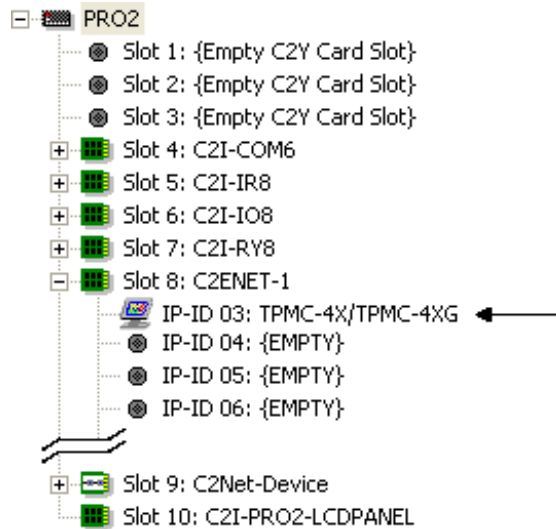
- To incorporate the TPMC-4XG into the system, drag the TPMC-4XG from the Touchpanels | Touchpanels (Ethernet) folder of the *Device Library* and drop it in the *System Views*.

Locating the TPMC-4XG in the Device Library

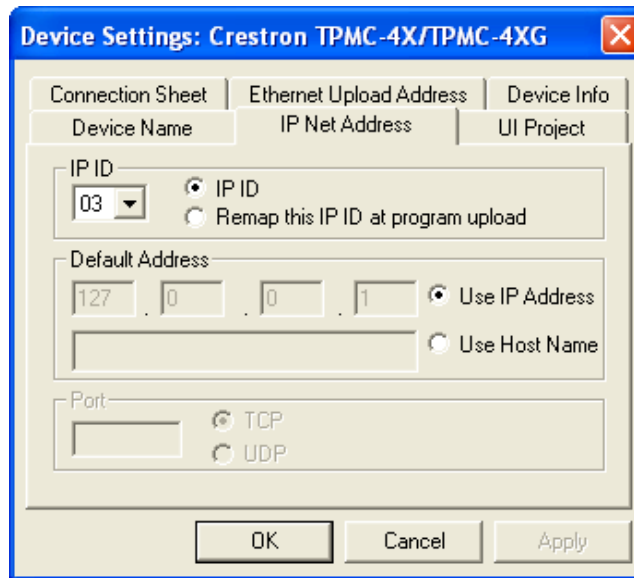


- The system tree of the control system displays the device in the appropriate slot with a default IP ID as shown in the following illustration.

C2Net Device, Slot 8



- Additional TPMC-4XG devices are assigned different IP ID numbers as they are added.
- If necessary, double click a device to open the “Device Settings” window and change the IP ID as shown in the following figure.

“TPMC-4XG Device Settings” Window

- The ID code specified in the SIMPL Windows program must match the IP ID of each unit.

Program Manager

Program Manager is the view where programmers “program” a Crestron control system by assigning signals to symbols.

The symbol can be viewed by double clicking on the icon or dragging it into *Detail View*. Each signal in the symbol is described in the SIMPL Windows help file (F1).

Programming with VisionTools Pro-e

Touchpanel screens should be created in VisionTools® Pro-e (VT Pro-e) to allow accessing the embedded applications, switching of source signals to desired outputs as well as selection of the system mode. There are no special programming requirements to use the functions of the TPMC-4XG in a room control system.

Multi-Mode Objects

Multi-mode objects offer high-performance programming!

The single most advanced VisionTools Pro-e high performance programming technique involving the TPMC-4XG is the concept of multi-mode objects. A multi-mode object (i.e. button, legend, etc.) is an object drawn on a VisionTools Pro-e page that can have one or more active and inactive visible settings (*modes*).

For examples, refer to www.crestron.com/exampleprograms and search for multi-mode object examples. This file contains the VisionTools Pro-e touchpanel files and SIMPL Windows files that illustrate the high-performance capabilities of multi-mode objects.

Bit Depth and File Size

A bit depth refers to the number of memory bits used to store color data for each pixel in a raster image. A touchpanel raster image consists of a rectangular grid of picture elements (pixels). Each pixel uses the same amount of memory to store its color data. The amount of memory is called the bit depth of the image.

Greater bit depths are required to represent finer gradations of color. Increasing bit depth necessarily increases file size. A black and white drawing requires only one bit

per pixel to store all the available color information. Using a 32-bit per pixel bit depth for a black and white image increases the file size 32 times without adding anything to the black and white image quality.

In an 8-bit per pixel system, the associated 8-bits of video memory for every screen pixel contain a value referring to a location in an 8-bit color table. In this way any one of the specific 256 color table locations is assigned to a pixel.

A 16-bit highcolor system is considered sufficient to provide life-like colors. It is encoded using 5-bits to represent red, 5-bits to represent blue and (since the human eye is more sensitive to the color green) 6-bits to represent 64 levels of green. These can therefore be combined to provide 65,536 mixed colors ($32 \times 32 \times 64 = 65,536$).

In a 24-bit graphics display, the video memory allocates 24 bits for each pixel on the screen enabling each pixel to take on any one of a possible 16.7 million colors. Each 24-bit value is composed of 8-bits for red, 8-bits for green and 8-bits for blue. These triplets of 8-bit values are also referred to as the red, green and blue color planes. A 24-bit image is actually composed of three component images which combine to create the truecolor picture. The reason this is called truecolor is that this is near the maximum number of colors the human eye is able to detect.

Truecolor images are sometimes represented by a 32-bit value. The extra 8-bits do not enhance the precision of the color representation but act as an alpha channel that represents pixel translucence. 32-bit truecolor has become popular on the computer desktop to provide effects such as translucent windows, fading menus and shadows.

In graphics intensive applications such as touchpanels, raising or lowering the color depth of the displayed graphics can achieve a balance of performance and quality. Lower color depths do not require as much frame buffer memory or display bandwidth, allowing them to be generated and displayed more quickly. Increasing color depth results in higher color quality at the expense of display speed and responsiveness. By using mostly 8-bit or 16-bit graphics and holding 32-bit graphics to a minimum (e.g. for a family photo, etc.), you can create a sophisticated project that will fit in the memory space provided and have the touchpanel remain very responsive.

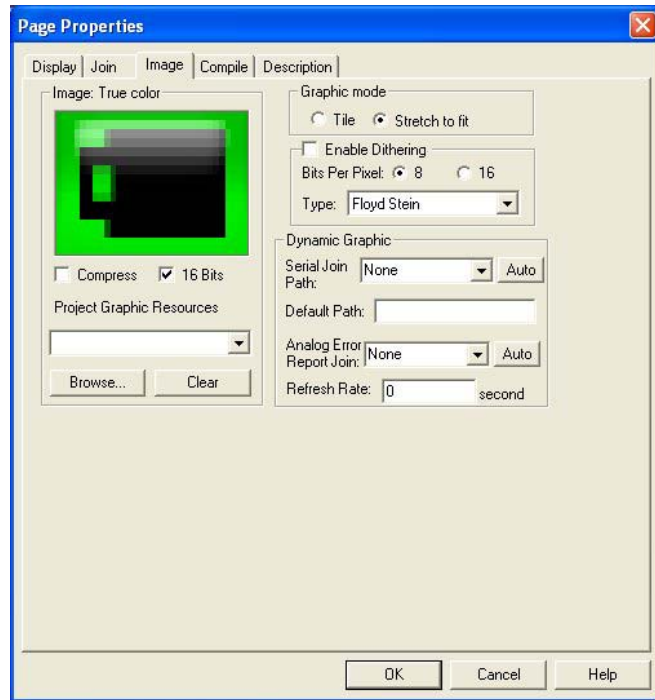
Relationship of Bits to Colors

NUMBER OF BITS	NUMBER OF COLORS
1 bit	Black and White
2 bits	4 Colors
4 bits	16 Colors
8 bits	256 Colors
16 bits	65,536 Colors (Highcolor)
24 bits	16.7 million Colors (Truecolor)
32 bits	16.7 million Colors plus Transparency

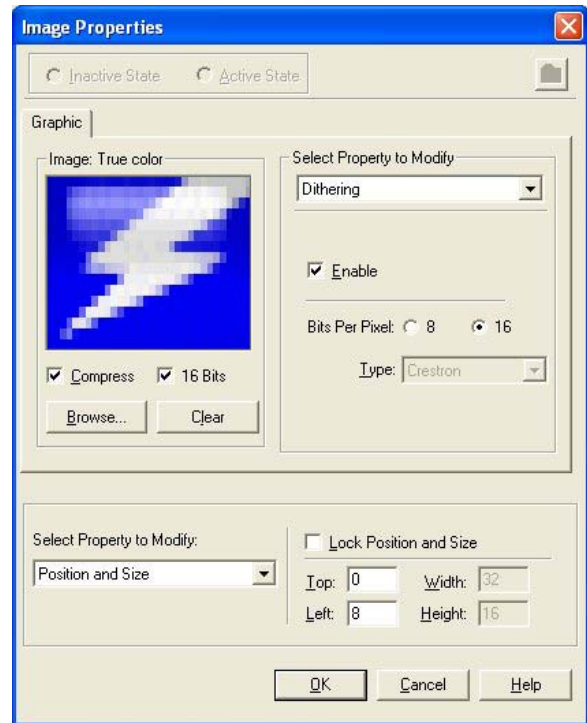
When creating a VisionTools Pro-e project you can elect to compress and reduce the image size in the “Page Properties” window for the entire page and/or perform the same function of reducing the image size using the “Image Properties” window. A reduction in image size will save a considerable amount of memory space for your project.

In VisionTools Pro-e, the **Compress** checkbox permits the image to be compressed when compiling. The **16 Bits** checkbox converts a 24-bit or 32-bit image to 16 bits. This conversion to a 16-bit image may cause the loss of some subtle shading. To compensate for this, use the dithering to simulate the original shading. Various dithering types are available. Refer to the following illustrations.

VT Pro-e “Page Properties” Window – Bit Depth Selection



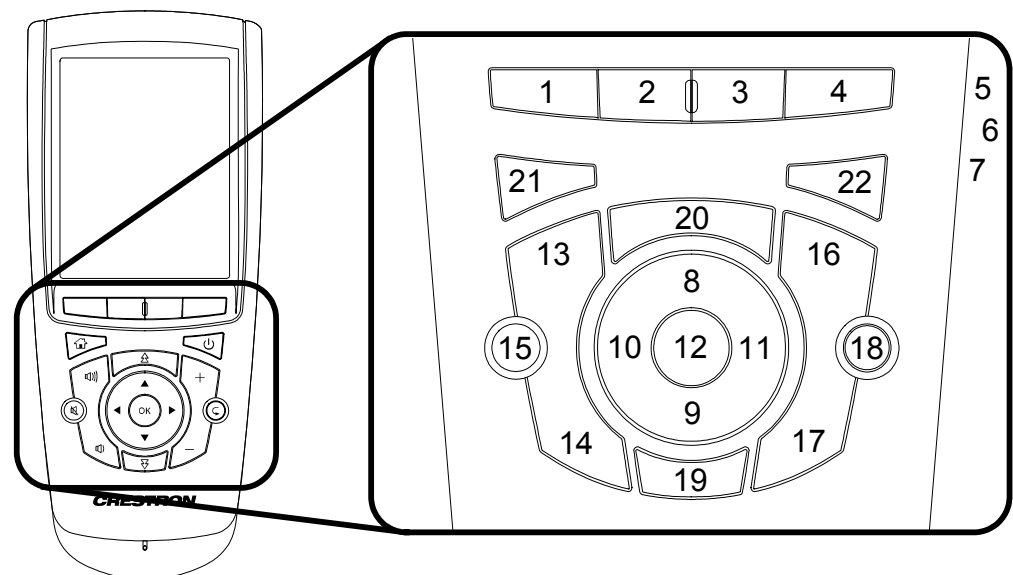
VT Pro-e “Image Properties” Window – Bit Depth Selection



Pushbutton Programming

The hard pushbuttons, the five-way thumbpad and the toggle wheel are programmable and can provide tactile control of many functions such as audio volume, channel selection, OSM navigation or even pan/tilt cameras. Refer to the following illustration for their assigned join numbers. A description for each button signal is described in the SIMPL Windows help file (F1).

Pushbutton Layout and Join Number Assignment



MultiByte International Characters

Most languages use a single byte of eight bits to represent a character, e.g. English, French, German, Hebrew, Russian, Thai, etc.

Multibyte character fonts require more than the usual eight bits to specify a character. This occurs when a language has more than 256 characters (2^8) in a font. For example, Chinese fonts contain several thousand characters. Other multibyte languages include Japanese and Korean.

There are two separate applications with multibyte characters – static text on buttons and indirect text on buttons. No Isys touchpanel firmware changes are required in either case.

Indirect text on a button is entered in VisionTools Pro-e and the actual string to be displayed is entered in SIMPL Windows. As of this publication date only completely single byte or completely multibyte strings may be entered or they will not be compiled correctly in SIMPL Windows. In other words, you cannot enter Chinese characters interspersed with numbers. You can enter Chinese characters or numbers in separate strings or you can pad each number with “\x00” to make it multibyte and then combine it with Chinese characters in the same string.

Of course you can always use the workaround of showing a graphic that displays the string but it is not dynamic. To compile and use multibyte characters it is essential that the operating system understand the language. Windows XP and Vista are available in many international languages and add-on software is available for other versions of Windows.

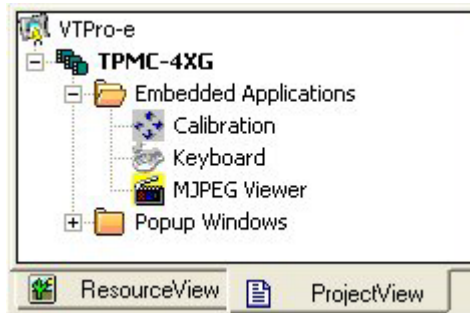
Embedded Applications

The following third-party or in-house applications are embedded in a VT Pro-e TPMC-4XG project. (Refer to illustration on the following page.)

- Calibration
- Keyboard
- MJPEG Viewer

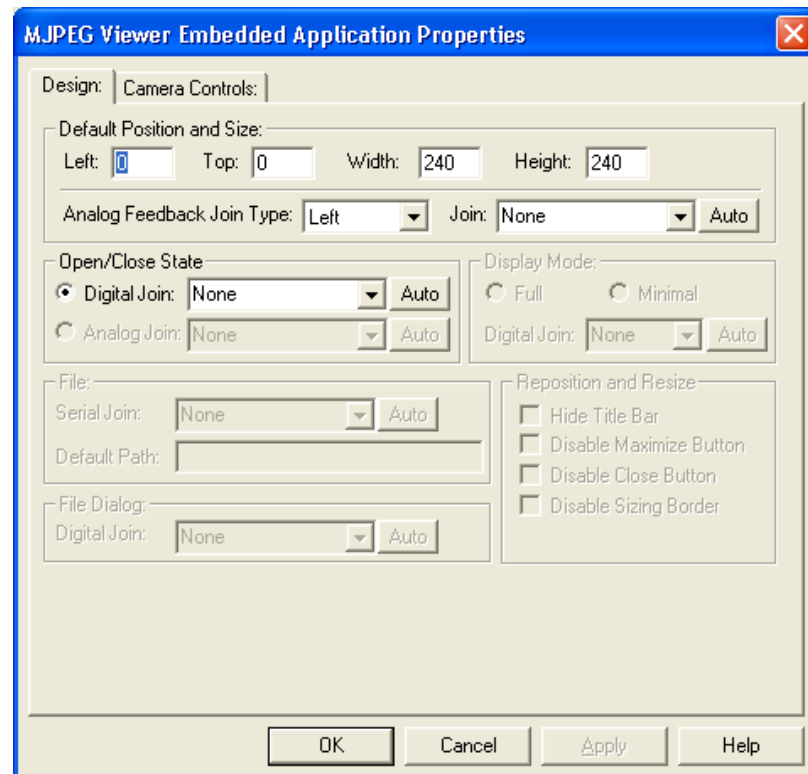
The embedded applications have the following features:

- All embedded applications listed in the VT Pro-e ProjectView workspace are created by default for a new TPMC-4XG project.
- All applications are created at project-level – one instance per project.
- The static position and size of each application can be viewed from any page.
- Four analog joins can be assigned to each application to dynamically change position and size.
- One digital feedback join or one analog join can be assigned to dynamically show/hide an application.

Embedded Applications in ProjectView

The “Embedded Application Property” window permits a choice of positions on the screen, assignment of an analog touch join type and number, and a show/hide join number.

Edit the *Default Position and Size* in the “Embedded Application Property” window to point to your new location.

“Embedded Application Property” Window

Uploading and Upgrading

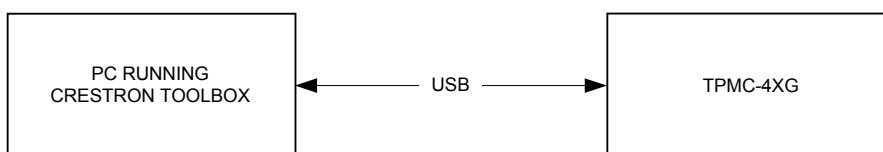
Crestron recommends using the latest programming software and that each device contains the latest firmware to take advantage of the most recently released features. However, before attempting to upload or upgrade it is necessary to establish communication. Once communication has been established, files (for example, programs, projects or firmware) can be transferred to the control system (and/or device). Finally, program checks can be performed (such as changing the device ID or creating an IP table) to ensure proper functioning.

Establishing Communication

Use Crestron Toolbox for communicating with the TPMC-4XG; refer to the Crestron Toolbox help file for details. There two methods of communication.

USB

USB Communication



- The TPMC-4XG should be used with a static IP address whenever possible.
- Use a USB cable to connect the TPMC-4XG to a PC running the Crestron Toolbox.
- Open the System Info window; click the “Enter an address . . .” icon (pencil) to display the “Edit Address” window.
- Select USB as the connection type, and select “TPMC-4XG” from the **Device Type** drop down list (click OK when the “Warning” notice appears).


TCP/IP

NOTE: Required for operation with a Crestron control system.

Ethernet Communication



- Establish wireless communication between TPMC-4XG and PC via the WAP.
- Enter the IP address, IP mask, and default router of the TPMC-4XG via the Crestron Toolbox (**Functions | Ethernet Addressing**); otherwise enable DHCP.
- Confirm Ethernet connections between TPMC-4XG and PC.

- Use the Address Book in the Crestron Toolbox to create an entry for the TPMC-4XG with the TPMC-4XG's TCP/IP communication parameters.
- Display the “System Info” window (click the  icon) and select the TPMC-4XG entry.
- Use the Crestron Toolbox to create the TPMC-4XG IP table.
 - ⇒ Select **Functions | IP Table Setup**.
 - ⇒ Add, modify or delete entries in the IP table. The TPMC-4XG can have only one IP table entry.
 - ⇒ A defined IP table can be saved to a file or sent to the device.
- Edit the control system's IP table to include an entry for the TPMC-4XG. The entry should list the TPMC-4XG's IP ID (specified on the TPMC-4XG's IP table) and the internal gateway IP address 127.0.0.1.
- To prevent interference with other 802.11 devices that may be operating nearby, channels should be adequately spaced when configuring your wireless network; channels 1, 6, and 11 are the only non-overlapping channels. Refer to the information supplied with the WAP for instructions concerning channel selection.

Programs, Projects and Firmware

Program, project or firmware files may be distributed from programmers to installers or from Crestron to dealers. Firmware upgrades are available from the Crestron website as new features are developed after product releases. One has the option to upload programs and projects via the programming software or to upload and upgrade via the Crestron Toolbox. For details on uploading and upgrading, refer to the SIMPL Windows help file, VisionTools Pro-e help file or the Crestron Toolbox help file.

SIMPL Windows

If a SIMPL Windows program is provided, it can be uploaded to the control system using SIMPL Windows or Crestron Toolbox.

VisionTools Pro-e

Upload the VisionTools Pro-e file to the touchpanel using VisionTools Pro-e or Crestron Toolbox.


Firmware

Check the Crestron website to find the latest firmware. (New users may be required to register to obtain access to certain areas of the site, including the FTP site.)

Upgrade TPMC-4XG firmware via Crestron Toolbox.

- Establish communication with the TPMC-4XG and display the “System Info” window.
- Select **Functions | Firmware...** to upgrade the TPMC-4XG firmware.

Program Checks

For Ethernet connections, display the “System Info window (click the  icon) and select the **Functions** menu to display actions that can be performed on the TPMC-4XG. Be sure to use Crestron Toolbox to create the TPMC-4XG IP table.

- Select **Functions | IP Table Setup**.
- Add, modify or delete entries in the IP table. The TPMC-4XG can have only one IP table entry.

- A defined IP table can be saved to a file or sent to the device.

Edit the control system's IP table to include an entry for the TPMC-4XG. The entry should list the TPMC-4XG's IP ID (specified on the TPMC-4XG's IP table) and the internal gateway IP address 127.0.0.1.

To prevent interference with other 802.11 devices that may be operating nearby, channels should be adequately spaced when configuring your wireless network; channels 1, 6 and 11 are the only non-overlapping channels. Refer to the information supplied with the WAP for instructions concerning channel selection.

NOTE: ActiveSync 3.7 or later is required for Toolbox to communicate with the TPMC-4XG via USB to upload firmware and display lists. Refer to the Microsoft website www.microsoft.com to download the ActiveSync driver.

Problem Solving

Troubleshooting

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

TPMC-4XG Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Touchpanel does not turn on.	On/Off switch in battery compartment is not fully in the On position.	Verify On/Off switch in battery compartment is fully in the On position. NOTE: If TPMC-4XG behaves erratically, check that On/Off switch in battery compartment is fully in the On position.
	Battery was not charged or is discharged	Place the TPMC-4XG on the docking station and charge the battery using the provided power supply.
Cannot upload VT Pro-e project or firmware from Toolbox via Wi-Fi.	TPMC-4XG is off or in suspend mode or has no power.	Verify the TPMC-4XG has power and is on or in standby mode.
	No WAPs defined/selected on the TPMC-4XG.	Refer to “WiFi Access Point” which starts on page 17 to define/select WAPs.
	No IP address configured/obtained on the TPMC-4XG.	Refer to “IP Config” on page 16 to define IP addresses. If the TPMC-4XG is set up to use DHCP, you can use the “IP Config” window’s <i>IP Address</i> tab to verify the IP address provided. If the number is invalid for your subnet or no number is present, verify the DHCP server is working properly.
	TPMC-4XG is out of range or has poor access to the WAPs.	The TPMC-4XG is out of range of the WAP or is experiencing interference. Refer to the WAP documentation for instructions on setting up a wireless network with minimum interference and no dead spots.
TPMC-4XG does not show feedback and/or does not control any devices.	No WAPs defined/selected on the TPMC-4XG.	Refer to “WiFi Access Point” which starts on page 17 to define/select WAPs.

(Continued on following page)

TPMC-4XG Troubleshooting (Continued)

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
TPMC-4XG does not show feedback and/or does not control any devices (Continued).	No IP address configured/obtained on the TPMC-4XG.	Refer to “IP Config” on page 16 to define IP addresses. If the TPMC-4XG is set up to use DHCP, you can use the “IP Config” window’s <i>IP Address</i> tab to verify the IP address provided. If the number is invalid for your subnet or no number is present, verify the DHCP server is working properly.
	Invalid control system IP address / IP ID set up on TPMC-4XG.	The IP address (or host name) for the control system is invalid or the IP ID does not match the one defined in the SIMPL program. Refer to “IP Config” on page 16 to define IP addresses.
	TPMC-4XG is out of range or has poor access to the WAPs.	The TPMC-4XG is out of range of the WAP or is experiencing interference. Refer to the WAP documentation for instructions on setting up a wireless network with minimum interference and no dead spots.
TPMC-4XG shows unexpected or intermittent feedback and/or has intermittent device control.	TPMC-4XG is out of range or has poor access to the WAPs.	The TPMC-4XG is out of range of the WAP or is experiencing interference. Refer to the WAP documentation for instructions on setting up a wireless network with minimum interference and no dead spots.
TPMC-4XG boots up in setup screens every time.	Invalid VT Pro-e project or no VT Pro-e project is loaded.	Load/reload VT Pro-e project using the Toolbox.

Reference Documents

The latest version of all documents mentioned within the guide can be obtained from the Crestron website (www.crestron.com/manuals). This link will provide a list of product manuals arranged in alphabetical order by model number.

List of Related Reference Documents

DOCUMENT TITLE
Crestron e-Control Reference Guide

Further Inquiries

If you cannot locate specific information or have questions after reviewing this guide, please take advantage of Crestron's award winning customer service team by calling Crestron at 1-888-CRESTRON [1-888-273-7876].

You can also log onto the online help section of the Crestron website (www.crestron.com/onlinehelp) to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

Future Updates

As Crestron improves functions, adds new features and extends the capabilities of the TPMC-4XG, 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 periodically for manual update availability and its relevance. Updates are identified as an “Addendum” in the Download column.

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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, 6 Volvo Drive, Rockleigh, 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.

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