

4 Relays (SPDT) • Removable Connector



- Indicator Lights
- Door Locks
- Gate Control
- Interface with a PLC



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	X-21s User Manual Revisions
Revision	Description
1.0	Initial release

Section 1: Introduction

The X-21s[™] 4 SPDT Relay expansion module is used with the X-400/X-600M controller. The X-21s has four relays, each with Form-C contacts (SPDT) that are accessed throug a removable terminal connector. One or more X-21s expansion modules can be connected to an X-400/X-600M controller with a ribbon cable. The ribbon cable provides both power and communications to the expansion modules.

The X-400/X-600M controller modules are multi-function web-enabled industrial I/O controllers. They perform control, logic, and monitoring functions similar to that of a Programmable Logic Controller (PLC). However, unlike a PLC, these controllers are designed for web-based applications from the ground up.

No add-on software or hardware is required. The controller modules can be fully configured, programmed and tested using its built-in web server. The web setup pages are intuitive and easy to use and do not require special programming skills.

The X-400/X-600M controllers, together with expansion modules such as the X-21s provide an easy, flexible and reliable way to monitor and control systems and devices over a network. The X-21s is suitable for use with moderate loads such as solenoid valves, alarms and indicator lights.



1.1 Connectors & Indicators

Relays

The X-21s has four relays. Terminals are provided for the *Common, Normally Open, and Normally Closed* contacts of each relay. A 12-position plug-in screw terminal is used to make it easy to wire the device. The terminals are wired directly to the internal relays with no internal fuse or other over-current protection. The relays are isolated from all other circuits inside. When a relay coil is energized, the NO contacts are closed and the NC contacts are opened. The load device that is connected to the relay contacts will be on when the coil is energized.

Expansion Bus

The expansion bus allows a variety of expansion modules to be connected directly to the X-400/X-600M controllers. The modules connect directly to the controller using a ribbon cable rather than through an Ethernet switch. The cable can be a daisy chain with multiple connectors. The ribbon cable expansion

bus provides both power and communications connections.

Power Supply

The expansion bus can provide up to 1.7 Amps for powering up to 32 expansion modules; however, the maximum number of expansion modules depends on the module type and power source attached to the controller. The X-21s requires relative high current to operate the relays and the 1.7 Amp limit will be reached long before 32 modules are attached. To overcome this limitation an expansion bus power injector can be put inline on the expansion bus. See the <u>Power Requirements</u> section in Appendix A for current draw for the X-21s under different configurations.

The X-21s employs a modern switch-mode power supply. With this type of power supply the current draw <u>decreases</u> as the voltage increases; therefore, you can add more expansion modules by using a 24-volt power supply than you can with a 12-volt power supply. See the <u>X-600M</u> or <u>X-4xx series User</u> <u>Manual</u> for more details.

Indicators

The green, power LED indicator is illuminated whenever the module is powered. To identify the module during installation the controller can send a blink command which will cause the power LED to blink for three seconds. The 4 yellow LEDs indicate the status of the relays and are illuminated when the respective relay coils are energized.

1.2 Part Numbers and Accessories

Device	Description	Part Number
X-21s	4-Relay (SPDT) Expansion Module	X-21s
Spare Connector	12-Position Screw Terminal Connector	X-1803675

Section 2: Installation and Connections

Installation consists of mounting the X-21s and connecting it to an X-600M or X-400 controller with a 10conductor ribbon cable. Programming and testing is done by using a web browser to configure the relays for your specific needs.

2.1 Installation Guidelines

- This unit must be installed by qualified personnel.
- This unit must not be installed in unprotected outdoor locations.
- This unit must not be used for medical, life saving purposes, or for any purpose where its failure could cause serious injury or the loss of life.
- This unit must not be used in any way where its function or failure could cause significant loss or property damage.

This equipment is not rated for installation <u>within</u> or as part of a circuit breaker panel. When used to control AC line voltages the X-21s must be mounted and protected in a suitable electrical enclosure.

2.2 Mounting

X-21s can be mounted to a standard (35mm by 7.55mm) DIN-Rail. Normally expansion modules are mounted to the left side (embossed logo side of the enclosure) of the X-600M or X-400 controller so that the ribbon cable doesn't cover the power connector. The X-21s should be located in a clean, dry location where it is protected from the elements. Ventilation is recommend for installations where high ambient air temperatures are expected to be high. See *Appendix A: Mechanical Information* for additional mechanical details.



2.2.1 DIN-Rail Mounting

Attach the X-21s to the DIN-Rail by hooking the top hook on the back of the enclosure to the DIN-Rail and then snap the bottom hook into place. To remove the X-21s from the DIN-Rail, use a flat-head screwdriver. Insert the screw driver into the notch in the release tab and pry against the enclosure to release the bottom hook.

2.3 Making Connections

CAUTION: Make sure the power is shut off before making connections CAUTION: This unit should be installed by a qualified technician. CAUTION: Miswiring or misconfiguration could cause permanent damage to the X-21s, the equipment to which it is connected, or both.

The correct wiring procedure is as follows:

- 1. Make sure power is turned off.
- 2. Remove the terminal connector from the X-21s and make wiring connections to the terminals. This technique avoids stressing the internal components while torquing the screws.
- 3. Reconnect the terminal connector.
- 4. Apply power.

It is recommended that any load (device to be controlled) not be connected to the expansion modules until after the X-600M or X-400 has been configured and tested. By doing this, wiring and configuration mistakes will not cause the load device to turn on unexpectedly.

12-Pin Connector Pinout				
Terminal	Description			
4NC	Relay 4 Normally Closed			
4C	Relay 4 Common			
4NO	Relay 4 Normally Open			
3NC	Relay 3 Normally Closed			
3C	Relay 3 Common			
3NO	Relay 3 Normally Open			
2NC	Relay 2 Normally Closed			
2C	Relay 2 Common			
2NO	Relay 2 Normally Open			
1NC	Relay 1 Normally Closed			
1C	Relay 1 Common			
1NO	Relay 1 Normally Open			

Make certain the wires are properly inserted into to the terminals and that the screws are tight.

Wire Specification:

Use wire rated for 75°C (min) for connections to the terminal blocks

Connector Specifications:

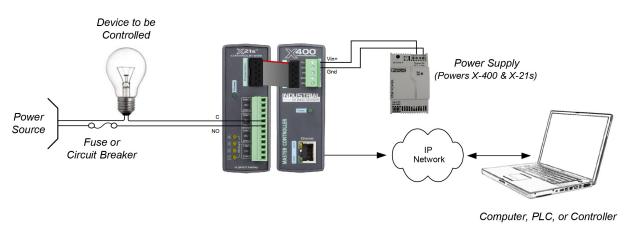
Туре:	12-position, removable, 3.81 mm pitch
Connection wire:	Use wire rated for 75°C (min) for connections to the terminal blocks
Stripping Length:	7mm
Connection capacity:	1.5mm ² stranded, 1.5mm ² solid
Conductor minimum:	30AWG (UL/CUL)
Conductor maximum:	14 AWG (UL/CUL)
Conductor Type:	Copper
Tightening torque:	0.22 Nm (min), 0.25 Nm (max)

Section 3: Example Applications

3.1 Control a device over an IP network

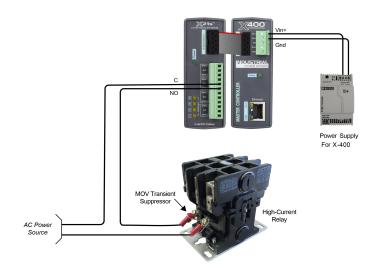
The illustration below shows a simple example of using the X-21s to control a device over an IP network. The device to be controlled is wired in series with the relay contacts.

Note: A fuse or circuit breaker is shown to limit current overload.



3.2 High Current Relay

The illustration below shows an example of how the X-21s is used to control an AC motor. A highcurrent relay is used to switch the load current to the motor. In this example a MOV (Metal Oxide Varistor) is used to help protect the relay contacts of the X-21s from arc damage. Under normal conditions the resistance of the MOV is very high. When a spike or surge occurs, the resistance of the MOV drops and shunts the high voltage transients.



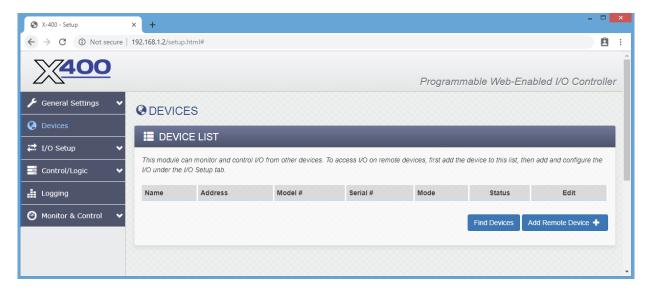
Section 4: Configuration and Setup

4.1 Setup Example with the X-400 Controller

After making the power and Ethernet connections, the X-400 can automatically scan for the presence of any ControlByWeb[™] Ethernet devices (on the same sub-net) and also for any expansion modules connected to the X-400 via the ribbon-cable connector.

To quickly add a device, do the following:

1. Click on the **Devices** menu tab to pull up the *Devices Overview* page. Then click on the **Find Devices** button to scan the expansion bus and the local network for ControlByWeb devices and expansion modules.



2. In this example we are going to add an *X-21s 4 Relay Expansion Module*. Click the **Add** button for the X-21s.

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Logging	X-21s	000000023AF	N/A	Add +
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3.In the Device Name field, name your device. Then click Add Device.

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4. In the Add I/O column, click the check boxes of the I/O components you would like to configure.

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			Add Selected I/O Cancel	

Click Add Selected I/O to submit these changes.

5. Click on the **Monitor & Control** menu tab, then click on the Control Page Setup tab to configure what will appear on the Control Page.

6. Click Add I/O to Control Page.

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7. Click the check boxes of the I/O you would like to add to the control panel, then click Add I/O to submit these changes.

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Control/Logic	Gap	
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	Relays Select which relays will appear on the control page	
Control Page	Device 1 Relay 1	
Control Page Setup	Device 1 Relay 2	
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	Device 1 Relay 3	A
	Device 1 Relay 4	
	Registers Select which registers will appear on the control page	+ Add I/O to Control Page
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	Vin Select which vin will appear on the control page	* Update Control Order, Header Text, Etc.
	Vin	
Copyright Information	Add I/O Cancel	Xytronix Research & Design, Inc

8. On the main menu, click the **Control Page** menu tab. The **Control Page** tab shows the relays that were just added along with their current states. The relays can be turned on, off, and pulsed from this page.

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Logging	Device 1 Relay 3		Off	Device 1 Relay 4	*****	Off
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Control Page	On	Off	Pulse	On	Off	Pulse
Control Page Setup			For support, go to	www.ControlByWeb.com		
Graph Log File						

4.2 Setup Example with the X-600M Controller

The Quick Start Demo

After making the power and Ethernet connections, the X-600M can automatically scan for the presence of any ControlByWeb[™] Ethernet devices (on the same sub-net) and also for any expansion modules connected to the X-600M via the ribbon-cable connector. It also automatically creates a dashboard web page and populates it with all of the resources (components) supported by the Ethernet devices and expansion modules. This makes it easy to start experimenting with the web page's user interface and to try out the relays and sensors.

To quickly add a device, do the following:

1. Click on the **Devices** menu tab to pull up the *Devices Overview* page. Then click on the **Find New Devices** button to scan the expansion bus and the local network for ControlByWeb devices and expansion modules.

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	Note: The Find New Device button resets all the devices attached to the expansion bus. This will turn off any relays and outputs on these devices.	_
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View Dashboards	Showing 1 - 1 of 1 Devices	
Status: Ready.	For product support go to www.ControlByWeb.com Xytronix Research & Design, Inc.	

2. In this example we are going to add an X-21s (SPDT) 4 Relay expansion module. Click the Add button for the X-21s.

Configuration and Setup

X-21s[™] Users Manual

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X-301 (X-301)	00:0c:c8:02:55:6f	ETHERNET	192.168.1.96	AUTO_GENERATE	AUTO_GENERATE	Add
X-410 (X-410)	00:0c:c8:00:12:34	ETHERNET	192.168.1.97	AUTO_GENERATE	AUTO_GENERATE	Add
X-418 (X-418)	00:0c:c8:03:f9:08	ETHERNET	192.168.1.99	AUTO_GENERATE	AUTO_GENERATE	Add
X-400 (X-400)	00:0c:c8:04:41:7d	ETHERNET	192.168.1.102	AUTO_GENERATE	AUTO_GENERATE	Add
	X-301 (X-301) X-410 (X-410)	Devices Find Devices List of automatically detected new devices. New Devices Found Rescan Back Show 10 • entries Model Serial Number X-228 (8 Analog Input Slave) 00000089 X-155 (8 Input Slave) 00000027 X-155 (8 Input Slave) 00000063 X-21S (4 Relay Slave) 0000023af X-400 (X-400) 00 0c c8 00:00:00 X-420 (X-420) 00 0c c8 03:10 10 X-301 (X-301) 00 0c c8 02:55:67 X-410 (X-410) 00 0c c8 00:12:34	Devices Find Devices List of automatically detected new devices. New Devices Found Back Show 10 • entries Model Serial Number X-228 (8 Analog input Slave) 00000a8e X-155 (8 Input Slave) 00000063 X-155 (8 Input Slave) 00000063 X-215 (4 Relay Slave) 00000237 X-400 (X-400) 00 0.cc.8 00.00.00 X-400 (X-400) 00 0.cc.8 03.10.10 X-400 (X-400) 00 0.cc.8 05.10.10 X-400 (X-400) 00 0.cc.8 05.10.10 X-401 (X-410) 00 0.cc.8 05.17.34	Devices Find Devices List of automatically detected new devices. New Devices Found Back Show 10 • entries Model Serial Number Comm Type Address X-228 (8 Analog input Slave) 0000088 SERIAL X-158 (8 Input Slave) 00000063 SERIAL X-158 (8 Input Slave) 00000063 SERIAL X-218 (4 Relay Slave) 0000027 SERIAL X-218 (4 Relay Slave) 0000023rf SERIAL X-400 (X-400) 00 0: cit 80:00:00 ETHERNET X-420 (X-420) 00 0: cit 80:310:10 ETHERNET X-301 (X:301) 00 0: cit 80:255:6f ETHERNET X-410 (X-410) 00 0: cit 80:012:34 ETHERNET	Model Serial Number Comm Type Address Description X-228 (8 Analog input Slave) 00000088 SERIAL AUTO_GENERATE AUTO_G	Model Serial Number Comm Type Address Description Name X-228 (B Analog Input Slave) 0000008e SERIAL AUTO_GENERATE AUTO_GENERATE

3. In the *Select* column, click the check boxes of the I/O components you would like to configure and select the **Create Device Widget** checkbox (This will automatically add the status of the I/O to the Dashboard).

Click Add Checked I/O to submit these changes.

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dit Dashboards	X-22S (8 Analog Input SI	Showing 1 to 4 of 4 entries Select All Add Checked I/O Create device widget on panel1 • I/O List: This shows the type and reference number of each input and output on the device. I/O Description: Tax can be entered here to identify the I/O in a format that is easy to understand and recognize. It can include spaces and the maximum number of characters is 60. If nothing is entered a description will be automatically generated. I/O Name: This is a unique name given to each I/O. This name is used to reference the I/O when writing scripts. This name must start with an alphabelic (not a number) character and cannot include spaces. The name can be up to 20 characters long. If nothing is entered a name will automatically be generated. Select: Each I/O that is selected (checked) will be added to the X-600M database and can then be used by the X-600M. For optimal performance it is recommended that only I/O which will be used be selected. Note that I/O can be added and deleted at anytime under the I/O tab.				AUTO_GENERATE	Add
	X-15S (8 Input Slave)					AUTO_GENERATE	Add
/iew Dashboards	X-15S (8 Input Slave)					AUTO_GENERATE	Add
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	X-420 (X-420)					AUTO_GENERATE	Add
	X-301 (X-301)					AUTO_GENERATE	Add
	X-410 (X-410)					AUTO_GENERATE	Add
	X-418 (X-418)					AUTO_GENERATE	Add
	X-400 (X-400)					AUTO_GENERATE	Add
	X-310 (X-310)					AUTO_GENERATE	Add
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	X-15S (8 Input Slave)	0000027	SERIAL	AUTO_GENERATE	AUTO GENERATE	AUTO GENERATE	Add
view Dashboards	X-15S (8 Input Slave)	0000063	SERIAL	AUTO_GENERATE	AUTO GENERATE	AUTO GENERATE	Add
	X-400 (X-400)	00:0c:c8:00:00:00	ETHERNET	192.168.1.2	AUTO_GENERATE	AUTO_GENERATE	Add
	X-420 (X-420)	00:0c:c8:03:f0:10	ETHERNET	192.168.1.92	AUTO_GENERATE	AUTO_GENERATE	Add
	X-301 (X-301)	00:0c:c8:02:55:6f	ETHERNET	192.168.1.96	AUTO_GENERATE	AUTO_GENERATE	Add
	X-410 (X-410)	00:0c:c8:00:12:34	ETHERNET	192.168.1.97	AUTO_GENERATE	AUTO_GENERATE	Add
	X-418 (X-418)	00:0c:c8:03:f9:08	ETHERNET	192.168.1.99	AUTO_GENERATE	AUTO_GENERATE	Add
	X-400 (X-400)	00:0c:c8:04:41:7d	ETHERNET	192.168.1.102	AUTO_GENERATE	AUTO_GENERATE	Add
	X-310 (X-310)	00:0c:c8:03:a4:61	ETHERNET	192.168.1.103	AUTO_GENERATE	AUTO_GENERATE	Add
	Showing 1 to 10 of 16 entries						Previous Next

4. Click **Commit Settings.** Once clicked, the X-600M begins to monitor the newly added device.

5. On the main menu, click the **View Dashboards** menu tab. The **View Dashboards** page shows a display similar to what users will see when accessing the X-600M's Control Page. Use this page to test and debug the dashboards, panels, widgets and components in real time. A pull-down menu allows access to other dashboards. Within minutes you can experience the power and flexibility of the dashboard's user interface and experiment/test the buttons, sliders, and data entry boxes to meet your needs for your specific application.

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Logging	Relay 3: Off On Off	
	Relay 4: Off On Off	
View Dashboards		Fri, 02 Aug 2019 11:08:13
Status: Ready	For product support go to www.ControlByWeb.com	Xytronix Research & Design, Inc.

Xytronix Research & Design, Inc.

Appendix A: Specifications

Power Requirements

Input Voltage: 9-28 VDC (power is supplied via the X-400 or X-600M controller, 24V recommended) Current: See table below for typical values at 25°C

Power Supply	Relays OFF	Relays ON
9 VDC	17 mA	270 mA
12 VDC	13 mA	189 mA
24 VDC	7 mA	110 mA

Relays

Number of relays: 4

Relay Contacts

Load Type:	General purpose
Contact Form:	SPDT (1 form C)
Contact Material:	Silver nickel
Max Voltage:	125VAC, 28VDC
Max Current:	2.5A (per relay)
Electrical Life:	100K cycles, typical @ rated load
Environmental Rating:	Over voltage Category II, Pollution Degree 2
Control Options:	On/Off, Pulse and Toggle
Pulse Timer Duration:	100ms to 86400 Seconds (1-day)

Relay Connector

Туре:	12-position, removable, 3.81 mm pitch
Connection wire:	Use wire rated for 75°C (min) for connections to the terminal blocks
Stripping Length:	7mm
Connection capacity:	1.5mm ² stranded, 1.5mm ² solid
Conductor minimum:	30AWG (UL/CUL)
Conductor maximum:	14 AWG (UL/CUL)
Conductor Type:	Copper
Tightening torque:	0.22 Nm (min), 0.25 Nm (max)

(Replacement part number, Phoenix Contact 1803675)

Expansion Connector:

Connector:	Ribbon cable, 2x5-position, polarized 0.100" pitch
Communications:	RS-485

LED Indicators

Green:	Power On
Yellow:	Relay 1 thru 4

Environmental

Indoor use or NEMA-4 protected location			
Altitude:	Up to 2000m		
Operating Temperature:	-40°C to 65.5°C (-40°F to 150°F)		
Storage Temperature:	-40°C to 85°C (-40°F to 185°F)		
Humidity:	5-95%, non-condensing		

Mechanical

Size: Weight: 1.41 x 3.88 x 3.1 in. (35.7 x 98.5 x 78 mm), (not including connector) 4.8 oz (136 g)

Electromagnetic Compliance

IEC CISPR 22, CISPR 24 FCC 47CFR15 (Class B) EN55024 ITE Immunity (2010) EN55022 Emissions (2010)

Product Safety Compliance

IEC 61010-1 (Electrical Equipment for Measurement, Control, and Laboratory Use)



Appendix B: Trademark and Copyright Information

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Appendix C: Warranty

This Xytronix Research & Design, Inc. product is warrantied against defects in material and workmanship for a period of five years from the date of shipment. During the warranty period, Xytronix Research & Design, Inc. will, at its option, either repair or replace products that prove to be defective. This warranty is extended to the original purchaser of the equipment only.

For warranty service or repair, the customer must contact Xytronix Research & Design, Inc. technical support (support@ControlByWeb.com) and obtain a Return Authorization number (RA#). Before issuing an RA#, a support technician will work with customer to try to resolve the issue without returning the product. If technician determines that product must be returned for service an RA# will be issued. Next, the product must be properly packaged and returned to Xytronix Research & Design, Inc. with the RA# clearly marked on the package. The purchaser shall prepay all charges for shipping to Xytronix Research & Design, Inc. For warranty repairs of products less than one year old, Xytronix Research & Design, Inc. will pay the shipping charges to return the product to the purchaser as long as the product is shipped within the continental United States. If the product is shipped outside of the continental United States or the product was shipped more than one year earlier, the purchaser shall pay all shipping charges both ways.

Limitation

The foregoing warranty shall not apply to defects or damage resulting from improper use or misuse, unauthorized repair, tampering, modification, improper connection, or operation outside the electrical/environmental specifications for the product. Further, the warranty does not cover damage from Acts of God, such as lightning, fire, flood, hurricanes and tornadoes. This warranty does not cover damage to property, equipment, direct, indirect, consequential, or incidental damage (including damage for loss of business profit, business interruption, loss of data, and the like) arising out of the use or misuse of this product.

UNDER NO CIRCUMSTANCES WILL THE LIABILITY OF XYTRONIX RESEARCH & DESIGN, INC. TO THE PURCHASER OR ANY OTHER PARTY EXCEED THE ORIGINAL PURCHASE PRICE OF THE PRODUCT, REGARDLESS OF THE FORM OF THE CLAIM. No other warranty is expressed or implied. Xytronix Research & Design, Inc. specifically disclaims the implied warranties or merchant-ability and fitness for a particular purpose. Some jurisdictions may not allow the exclusion of limitation of liability for consequential or incidental damage.

Appendix D: FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Warning

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. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interference to radio communications. There is no guarantee, however, 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 a relay on a circuit different from where the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Appendix E: Mechanical Dimensions

