HOMEWORKS®

Installation Instructions
Please Read Before Installing

RF Processor
HRP5-120
120 V∼ 60 Hz (15 V⎓ 900 mA adapter)

Overview

HomeWorks RF Processors comprise the major communication hub of a *HomeWorks* radio frequency system. Each RF Processor will support up to 32 RF Keypads and up to 64 RF Dimmers or RF Switches.

Each RF Processor covers approximately 2500 square ft. (232 m²) of living space.

Up to Hybrid Repeaters may be used with each processor to extend the communications range of the system.

A maximum of 16 *HomeWorks* Processors may be connected together in a system.

HRP5-120
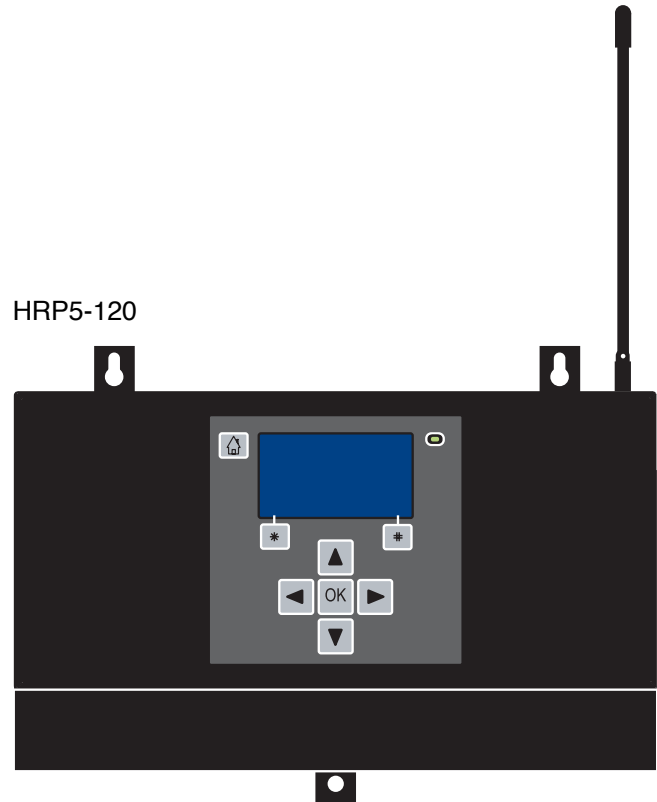
Important Notes

Codes: Install in accordance with all local and national electrical codes.

Power: Use only the adapter provided by Lutron with the RF Processor (Lutron model # T120-15DC-9-BL).

⚠ **Caution -** Using an adapter not rated for the following specifications could damage the processor and possibly overheat the adapter.
- Input: 120 V∼ 60Hz
- Output: 15 V⎓ 900 mA
  NEC Class 2; IEC PELV

Environment: Ambient operating temperature: 0-40°C, 32-104°F, 0-90% humidity, non-condensing. Indoor use only.

Cleaning: To clean, wipe with a clean damp cloth. **DO NOT** use any chemical solutions. **DO NOT** paint the RF Processor.

Mounting: DO NOT ground the RF Processor. **DO NOT** mount the RF Processor in a metal enclosure.

RF Device Placement: RF devices that are to be controlled by the RF Processor must be located within 30 ft. (9 m) of the RF Processor or a Hybrid Repeater.

The range and performance of RF devices in a *HomeWorks* system is highly dependent on a variety of complex factors such as:
- Distance between RF devices
- Geometry of the home
- Construction of walls separating RF devices
Range and performance can be adversely affected by:
- Mounting in a metal enclosure
- Mounting within 3 ft. (1 m) of other RF devices

Setup: RF Processors will not function until they are addressed and programmed. See the *HomeWorks* Illumination™ Software online help.

LUTRON®

Installation

1. **Find a suitable location for the RF Processor.** Place the RF Processor in a convenient and accessible location. See RF Coverage Diagrams on page 8 and 9.

2. **Mount the RF Processor.** Mount RF Processor to wall using the appropriate mounting hardware provided (see Mounting Diagram). Orient the processor's antenna for optimal performance. For most installations, the antenna should be oriented vertically.
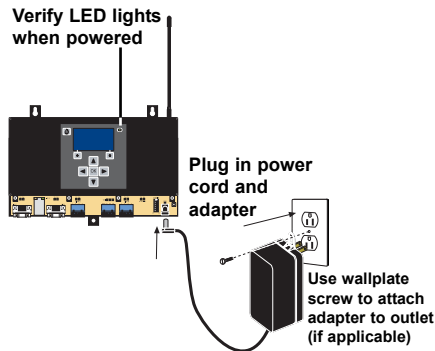
> ⚠️ **Note: DO NOT** ground the RF Processor. **DO NOT** mount the RF Processor in a metal enclosure.

3. **Connect Inter-processor Link (if applicable).** The inter-processor link is used for communication between multiple HomeWorks® processors. Connect control wiring to the Inter-Processor link (4-position terminal block), if required. Do not connect the +15V terminal (terminal 2).

    If this processor is to be the first or last processor in the daisy chain, attach one of the LT-1 link terminators provided across the MUX and $\overline{\text{MUX}}$ (terminals 3 and 4). (See Low-Voltage (Class 2/PELV) Wiring Diagram, page 5). If LT-1s are unavailable, a 1/2 W resistor between 100 and 150 Ohms may be placed across terminals 3 and 4 to provide termination. **Important:** Use only the blue terminal block connector that is provided with the RF Processor.

4. **Apply power to the RF Processor.**

Verify LED lights when powered

Plug in power cord and adapter

Use wallplate screw to attach adapter to outlet (if applicable)

The RF Processor has battery-backed memory and timeclock devices. The battery provides power to these devices during power outages and other temporary power interruptions. In vacation homes and other residences which are not continuously occupied, the RF processor **MUST** be powered by a circuit that is never turned off even when the residence is unoccupied.

5. **Address the RF Processor.** Use the RF Processor display to set address.

6. **Connect Serial Link (if applicable).** Connect a standard DB9 male connector to the Link 3 or 7 RS-232 connector on the RF Processor for system programming or communications with other equipment. A cable with all 9 pins straight through (not a null modem) is required for programming the system via the serial link using a laptop.

If the RF Processor is connected to a modem, a null modem adapter is needed between the processor and the attached modem.
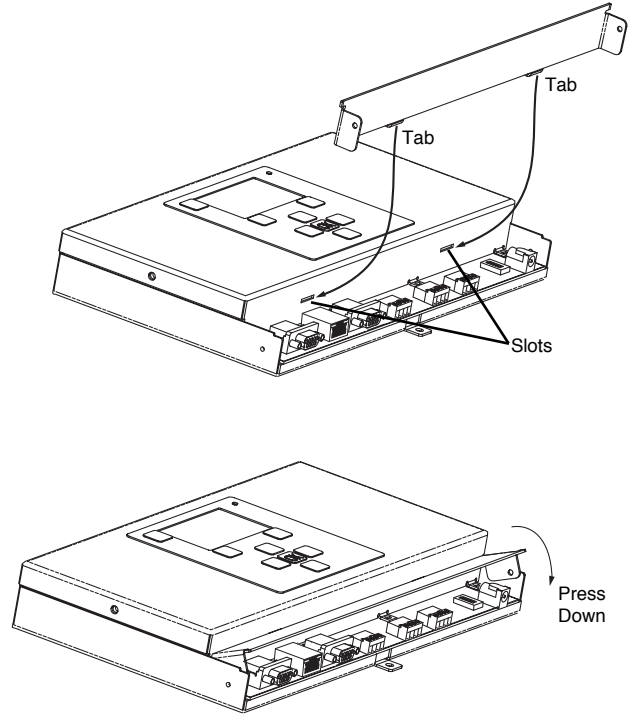
7. **Connect Ethernet Link (if applicable).** Connect a standard RJ45 connector to the Link 9 Ethernet jack on the processor for system programming or communications with other equipment. A crossover cable is required for a direct connection to a computer. If plugging in to a network, a standard cable is used (see Processor Board Connections, page 7). The orange LED (ACT) will illuminate when there are any Ethernet signals being transmitted or received on Link 9. The green LED (CON) will illuminate when the Link 9 is connected to a hub/switch/router or a computer.

8. **Connect Hybrid Repeater Link (if applicable).** For Hybrid Repeaters that control wireless devices, connect the communication wires to Link 8 as configured in the *HomeWorks* Illumination™ Software. **Important:** Use only the blue terminal block connector that is provided with the RF Processor.

9. **Connect external input closures (if applicable).** The processor accepts three low-voltage dry contact closures. **Important:** Use only the blue terminal block connector that is provided with the RF Processor.

    When using the input closures: Verify compatibility of external devices. The input closures are intended for use with devices that provide dry contact closures. The inputs may be used with ground-referenced, solid-state closures if the closures have an on-state saturation voltage of less than 2 V⎓ and an off-state leakage of less than 50 μA. Dry contact or solid-state closures must be capable of switching 15 V⎓ at 10 mA. The closures must stay in the closed or open states for at least 40 msec in order to be recognized by the processor. If there is any question as to whether the contact closure device is compatible with these specifications, contact the manufacturer of that device.
    The Contact Closure Input Status LEDs will illuminate when a contact closure is closed on the corresponding input.
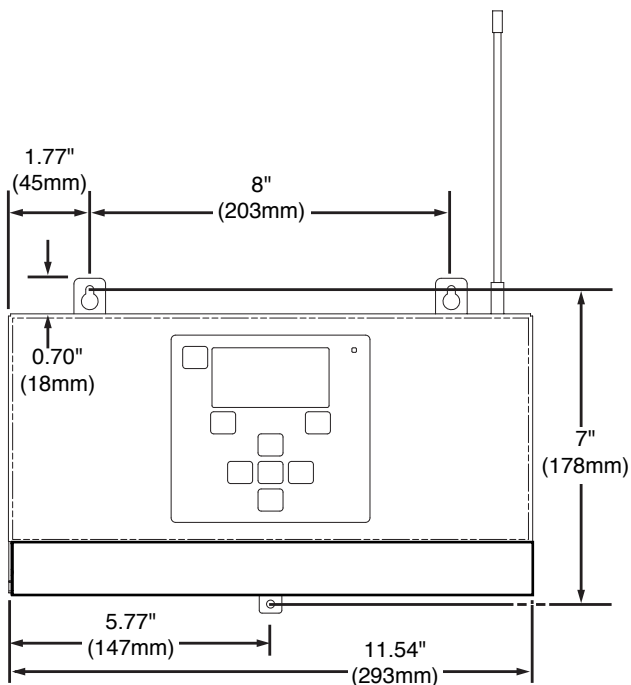
░▒▓ **LUTRON**®

Port Cover Removal and Installation

The Port Cover can be removed for access to the Initialize Button, Configuration DIP Switches, and Diagnostic LEDs. The cover is removed by gently pulling up on the front edge to disengage the snaps. Replace the cover by inserting the two tabs on the back of the cover into the slots on the processor. Gently press down on the front edge to engage the snaps.
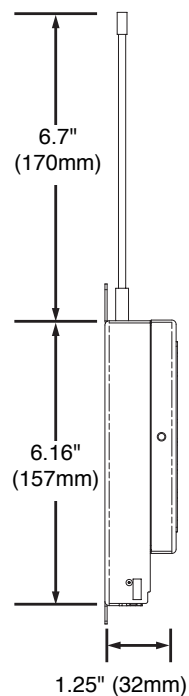
Tab

Tab

Slots

Press Down

Dimensions

Front View
(Port Cover attached)

Side View

1.77"
(45mm)

8"
(203mm)

0.70"
(18mm)

7"
(178mm)

5.77"
(147mm)

11.54"
(293mm)

6.7"
(170mm)

6.16"
(157mm)

1.25" (32mm)

Mounting Diagram

Wall Anchors

Mounting Screw

Mounting Screw

Optional Mounting Screw

Included:

Drywall Anchors (3)

Masonry Anchors (3)

Mounting Screws (3)

Mounting Screws (3)
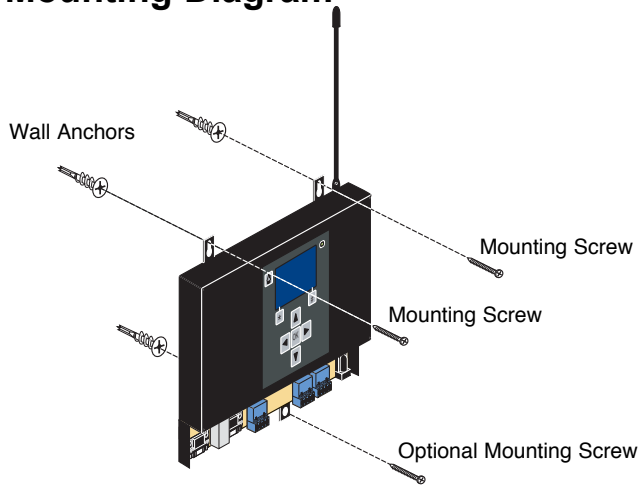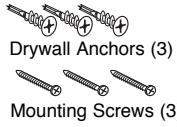
Contact Closure Wiring Diagram

CCI

COM C1 C2 C3

Closure 3

Closure 2

Closure 1

Common
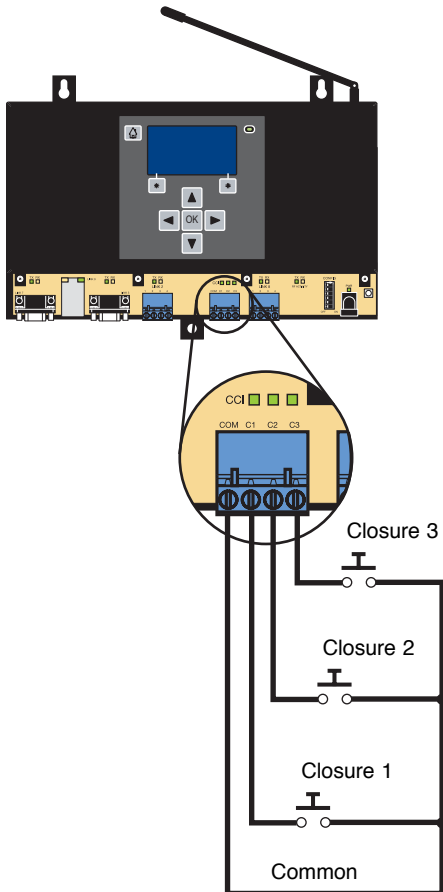
Class 2/PELV wiring connections from customer supplied contact closure devices. (See Installation step 9 on page 2.)

LUTRON.

Low-Voltage (Class 2/PELV) Wiring Diagram

4 Series™
Processor

8 Series™
Processor

RF Processor

LT-1 Link
Terminator

Pin 1 - 1 18 AWG (1.0 mm²)
Pins 3 & 4 - 1 pair 22-18 AWG (0.5 - 1.0 mm²)
          twisted/shielded for data
Pin 2 is not connected

1000 ft. (305 m) maximum total wire run distance

LT-1 Link
Terminator

LT-1 Link
Terminator
Wiring Detail

LINK 3   LINK 4   LINK 5

TX RX   TX RX   TX RX
BUS   BUS   BUS
 2   3   4

LT-1 Link
Terminator
Wiring Detail

◆ **LUTRON**®

Operation and LEDs

Home Key [1]

[12] **Display Power LED**

[11] **LCD Display**

Menu Navigation Keys [2]

Ethernet Link 9 Activity LEDs [3]

RS-232 Link 7 Activity LEDs [4]

[10] **Power In LED**

[5] **RS-232 Link 3 Activity LEDs**

[7] **Contact Closure Input Status LEDs**

[9] **RF Activity LEDs**

[6] **Inter-Processor Link 2 Activity LEDs**

[8] **Hybrid Repeater Link 8 Activity LEDs**

1. **Home Key:** Returns the user to the Home Screen.
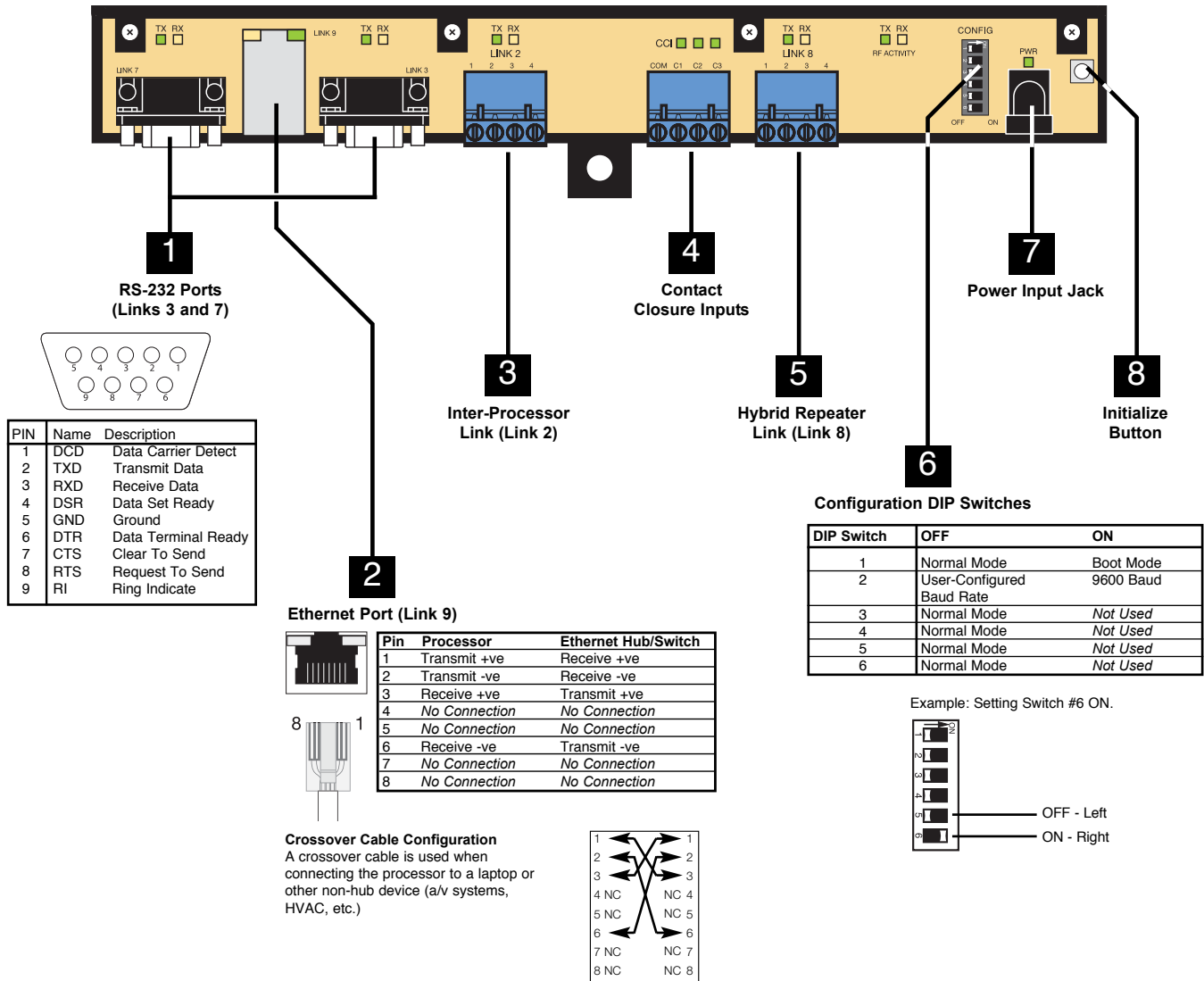
2. **Menu Navigation Keys:** Used to navigate the various menus and screens for the processor.

3. **Ethernet Link 9 Activity LEDs:** The orange LED will illuminate when there are any Ethernet signals being transmitted or received on Link 9. The green LED will illuminate when the ethernet port is connected to a hub/switch/router or a PC.

4. **RS-232 Link 7 Activity LEDs:** The LEDs will illuminate when there are any RS-232 signals being transmitted (TX LED) or received (RX LED) on Link 7.

5. **RS-232 Link 3 Activity LEDs:** The LEDs will illuminate when there are any RS-232 signals being transmitted (TX LED) or received (RX LED) on Link 3.

6. **Inter-Processor Link Activity LEDs:** The LEDs will illuminate when there are any processor communication signals being transmitted (TX LED) or received (RX LED) on Link 2.

7. **Contact Closure Input Status LEDs:** The LEDs will each illuminate when a contact closure is closed on the corresponding input.

8. **Hybrid Repeater Link 8 Activity LEDs:** The LEDs will illuminate when there are any wired signals being transmitted (TX LED) or received (RX LED) on Link 8.

9. **RF Link Activity LEDs:** The LEDs will illuminate when there are any RF signals being transmitted (TX LED) or received (RX LED) on that link.

10. **Power In LED:** This LED illuminates when power from the adapter is present at the Power Input Jack.

11. **LCD Display:** Displays programming and diagnostic information. The LCD Display will shut off after 45 minutes of inactivity. To restore the display, simply press any key.

12. **Display Power LED:** This LED will illuminate when the LCD Display has power.

LUTRON

Processor Board Connections

RS-232 Ports (Links 3 and 7) — 1

Ethernet Port (Link 9) — 2

PIN	Name	Description
1	DCD	Data Carrier Detect
2	TXD	Transmit Data
3	RXD	Receive Data
4	DSR	Data Set Ready
5	GND	Ground
6	DTR	Data Terminal Ready
7	CTS	Clear To Send
8	RTS	Request To Send
9	RI	Ring Indicate

Inter-Processor Link (Link 2) — 3

Contact Closure Inputs — 4

Hybrid Repeater Link (Link 8) — 5

Power Input Jack — 7

Initialize Button — 8

Ethernet Port (Link 9)

Pin	Processor	Ethernet Hub/Switch
1	Transmit +ve	Receive +ve
2	Transmit -ve	Receive -ve
3	Receive +ve	Transmit +ve
4	No Connection	No Connection
5	No Connection	No Connection
6	Receive -ve	Transmit -ve
7	No Connection	No Connection
8	No Connection	No Connection

Crossover Cable Configuration
A crossover cable is used when connecting the processor to a laptop or other non-hub device (a/v systems, HVAC, etc.)

Configuration DIP Switches

DIP Switch	OFF	ON
1	Normal Mode	Boot Mode
2	User-Configured Baud Rate	9600 Baud
3	Normal Mode	Not Used
4	Normal Mode	Not Used
5	Normal Mode	Not Used
6	Normal Mode	Not Used

Example: Setting Switch #6 ON.

OFF - Left
ON - Right

1. **RS-232 Port (Link 3 and 7):** Standard 9-Pin male connectors for connecting to a computer for programming, to a modem for remote programming, or to an external control system (A/V system, HVAC, etc.).

2. **Ethernet Jack (Link 9):** Standard 8-Pin RJ-45 jack for connecting the processor to an Ethernet Hub/Switch, to a laptop computer for remote programming, or to an external control system (A/V system, HVAC, etc.).

3. **Inter-Processor Link (Link 2):** Allows up to 16 processors (both RF and Wired) to be connected together.

4. **Contact Closure Inputs:** connection for 3 dry contact closures plus common.

5. **Hybrid Repeater Link (Link 8):** Allows connection of Hybrid Repeaters.

6. **Configuration DIP Switches:** All DIP switches should be placed in the OFF (left) position for normal operation. The HomeWorks® Utility will prompt the programmer if any subsequent changes to the DIP switches are required.

7. **Power Input Jack:** Input jack for the 15 VDC adapter. Center pin is positive.

8. **Initialize Button:** Used to reset the processor.
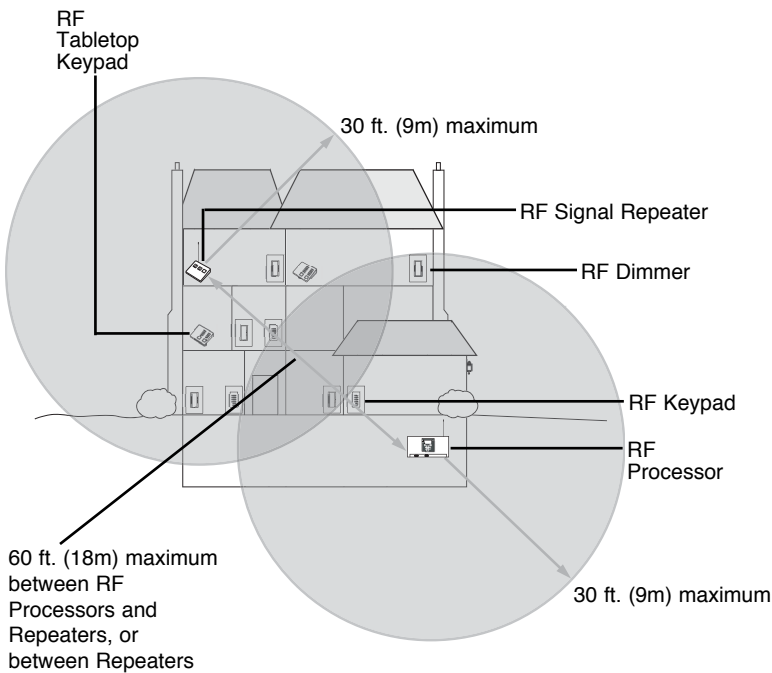
LUTRON

RF Coverage Diagrams

Home A: 2500 sq. ft. (232m²) or less - all RF devices within 30 ft. (9m) of RF Processor
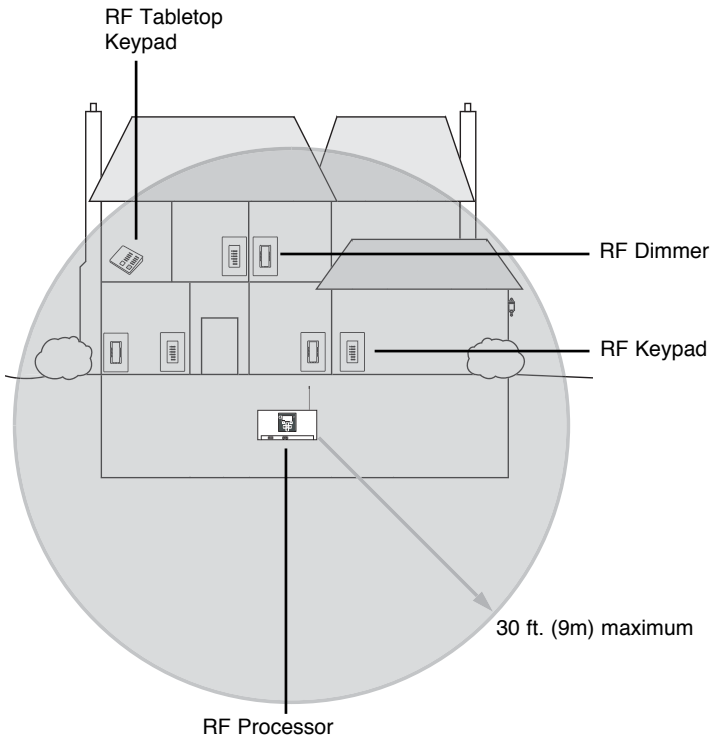
RF Tabletop Keypad

RF Dimmer

RF Keypad

30 ft. (9m) maximum

RF Processor

System Communication Notes

- RF Dimmers and Keypads must be located within 30 ft. (9m) of an RF Signal Repeater or an RF Processor.

- RF Signal Repeater must be located within 60 ft. (18m) of an RF Processor or another RF Signal Repeater.

- Multiple processors or repeaters may be necessary to provide adequate coverage. Up to 16 processors (with up to 4 repeaters each) may be connected together in a system.

- RF Dimmers cannot be controlled by the system and RF Keypads do not function until they are addressed and programmed. See the HomeWorks® Utility online help.
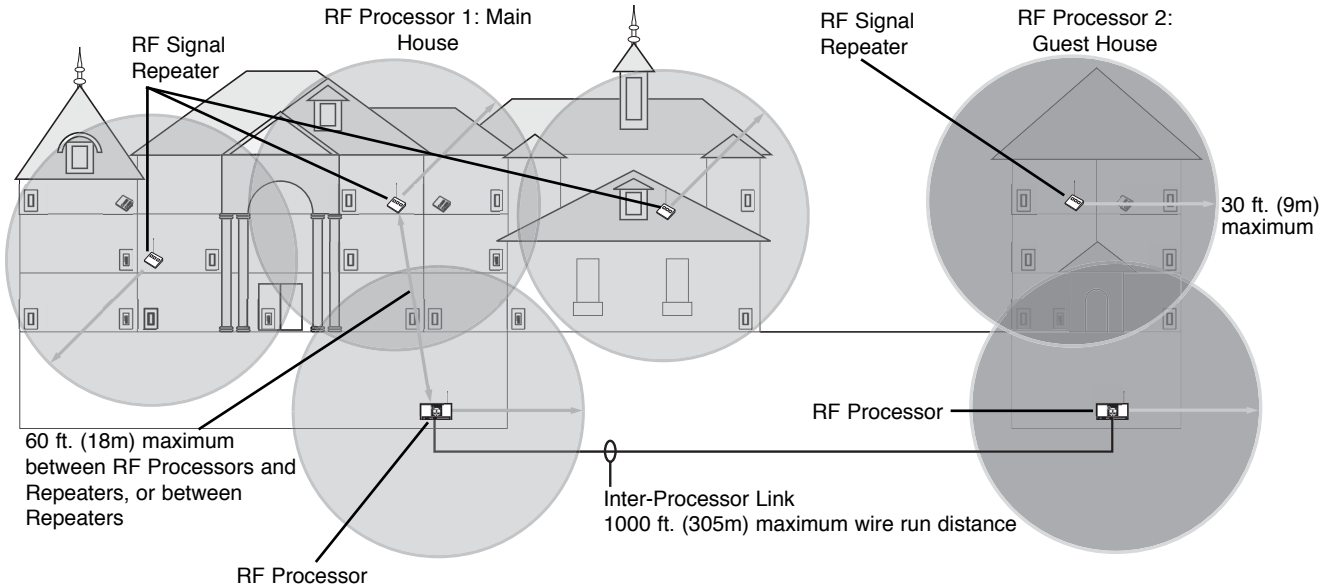
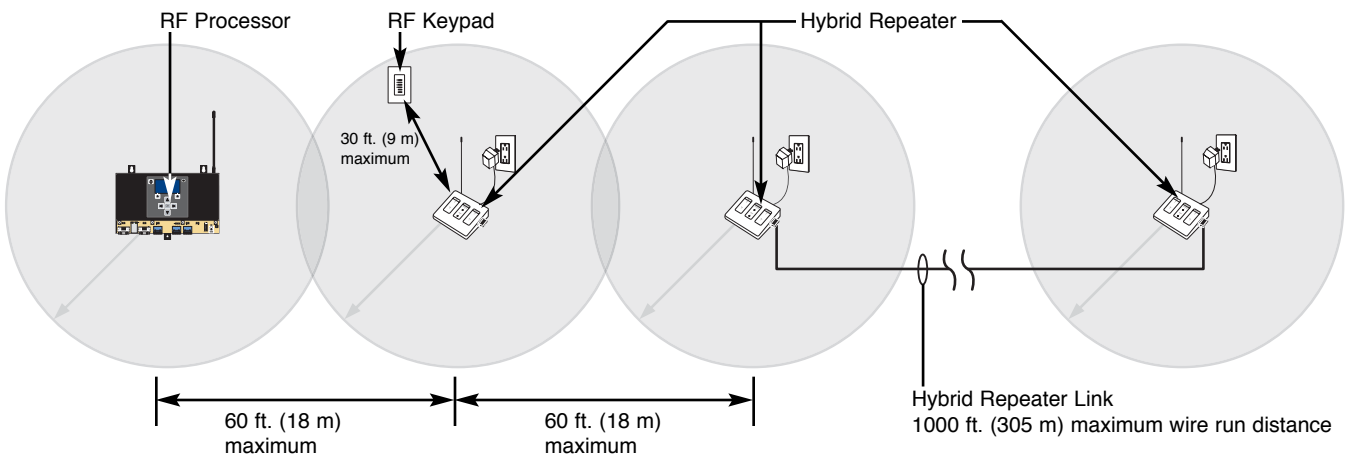**Home B: 2500 sq. ft. (232m²) or greater - some RF devices more than 30' (9m) from RF Processor**

RF Tabletop Keypad

30 ft. (9m) maximum

RF Signal Repeater

RF Dimmer

RF Keypad

RF Processor

60 ft. (18m) maximum between RF Processors and Repeaters, or between Repeaters

30 ft. (9m) maximum

⁑LUTRON.

RF Coverage Diagrams - Continued

Home C: 10000 sq. ft. (928m²) or greater - or multiple structures/buildings

RF Signal Repeater

RF Processor 1: Main House

RF Signal Repeater

RF Processor 2: Guest House

30 ft. (9m) maximum

RF Processor

60 ft. (18m) maximum between RF Processors and Repeaters, or between Repeaters

RF Processor

Inter-Processor Link
1000 ft. (305m) maximum wire run distance

System Communication Notes

• RF Dimmers and Keypads must be located within 30 ft. (9m) of an RF Signal Repeater or an RF Processor.

• RF Signal Repeater must be located within 60 ft. (18m) of an RF Processor or another RF Signal Repeater.

• Multiple processors or repeaters may be necessary to provide adequate coverage. Up to 16 processors (with up to 4 repeaters each) may be connected together in a system.

• RF Dimmers cannot be controlled by the system and RF Keypads do not function until they are addressed and programmed. See the HomeWorks® Illumination™ Software online help.

Hybrid Repeater Link

RF Processor

RF Keypad

Hybrid Repeater

30 ft. (9 m) maximum

60 ft. (18 m) maximum

60 ft. (18 m) maximum

Hybrid Repeater Link
1000 ft. (305 m) maximum wire run distance

☀ LUTRON®

Troubleshooting Guide

Symptom	Cause and Action
LCD Display is blank	LCD is shut off. 　• Press any key to restore the LCD. No power available to RF Processor. 　• Make sure adapter is plugged in. 　• Faulty adapter. 　• Check to make sure circuit breaker is not tripped or OFF.
RF controls not communicating with RF Processor	No power available to unit. 　• Make sure adapter is plugged in. 　• Faulty adapter. RF Processor not within 30 ft. (9 m) of controls. 　• Place processor within 30 ft. (9 m) of RF controls.
RF Processor functions intermittently	RF Processor not within 30 ft. (9 m) of controls. 　• Place processor within 30 ft. (9 m) of RF controls. RF Processor in boot mode. 　• All configuration DIP switches should be in the OFF (left) position for normal operation. No power to RF Control 　• Check circuit breaker. 　• Check FASS™ on RF Dimmers/Switches and their Accessory Controls. 　• Replace batteries in battery-powered controls. RF Controls not addressed. 　• See the HomeWorks® Illumination™ Software online help for addressing details. RF Processor has no database. 　• Upload database to RF Processor.
RF Processor not communicating with other processors on Inter-Processor Link	Link miswired. 　• Check wiring to make sure it agrees with installation instructions and wiring diagrams. 　• Be sure to use only the blue terminal block provided with the processor. Link Terminator missing or miswired. 　• Make sure that a Link Terminator has been installed across terminals 3 and 4 on the first and last processors on the Inter-Processor Link. If LT-1s are not available, a 1/2 Watt resistor (100-150 Ohms) may be used. See Low-Voltage (Class 2/PELV) Wiring Diagram (page 5). 　• Check to make sure that the numbers on the link terminator agree with the terminal numbers they are wired to.
RF Processor will not accept uploads	RF Processor in boot mode. 　• All configuration DIP switches should be in the OFF (left) position for normal operation. Inter-Panel Link miswired. 　• Check wiring to make sure it agrees with installation instructions and wiring diagrams. 　• Be sure to use only the blue terminal block provided with the processor. Faulty RS-232 connection. 　• Make sure cable is a standard serial cable with all 9 pins straight through. COM Port settings incorrect. 　• Verify COM Port settings in the *HomeWorks Illumination* Software.
RF Processor does not respond in *HomeWorks* Utility Terminal Menu	Terminal prompt has been disabled. 　• Type "prompton" (without quotes) in the *HomeWorks Illumination* Software Terminal Menu to enable the prompt.

░LUTRON®

Notes

FCC Information

Note: 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 and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception. 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 seperation 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.

Caution: Changes or modifications not expressly approved by Lutron Electronics Co. could void the user's authority to operate this equipment.

Operation is subject to the following: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Technical and Sales Assistance

If you need assistance, call the toll-free *Lutron Technical Support Center*. Please provide exact model number when calling.

(800) 523-9466 (U.S.A., Canada and the Caribbean)

Other countries call:

Tel: (610) 282-3800

Fax: (610) 282-3090

Visit our Web site at www.lutron.com

LIMITED WARRANTY

Lutron will, at its option, repair or replace any unit that is defective in materials or manufacture within two years after purchase. For warranty service, return unit to place of purchase or mail to Lutron at 7200 Suter Rd., Coopersburg, PA 18036-1299, postage pre-paid. Telephone the Lutron Technical Support Center toll free at 800-523-9466. After the two year period, a pro-rated warranty applies to this product until eight years after the purchase. For more information regarding this warranty contact your Lutron representative.

THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS WARRANTIES, AND THE IMPLIED WARRANTY OF MERCHANTABILITY IS LIMITED TO TWO YEARS FROM PURCHASE. THIS WARRANTY DOES NOT COVER THE COST OF INSTALLATION, REMOVAL OR REINSTALLATION, OR DAMAGE RESULTING FROM MISUSE, ABUSE, OR IMPROPER OR INCORRECT REPAIR, OR DAMAGE FROM IMPROPER WIRING OR INSTALLATION. THIS WARRANTY DOES NOT COVER INCIDENTAL OR CONSEQUENTIAL DAMAGES. LUTRON'S LIABILITY ON ANY CLAIM FOR DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE MANUFACTURE, SALE, INSTALLATION, DELIVERY, OR USE OF THE UNIT SHALL NEVER EXCEED THE PURCHASE PRICE OF THE UNIT.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This product may be covered by one or more of the following U.S. patents: 4,889,999; 5,170,068; 5,237,207; 5,736,965; 5,838,226; 5,848,054; 5,905,442; 5,982,103 and corresponding foreign patents. U.S. and foreign patents pending. Lutron, Maestro, and HomeWorks are registered trademarks, and 4 Series, 8 Series and FASS are trademarks of Lutron Electronics Co., Inc.

© 2004 Lutron Electronics Co., Inc.

LUTRON