

# HomeWorks QS Palladiom HVAC Solution

Add a Palladiom HVAC solution to a HomeWorks QS system for convenient and aesthetically pleasing control of temperature and for intuitive heating and cooling adjustments.

## Features

### HomeWorks QS Palladiom Thermostat

- Aesthetically coordinates with Palladiom keypads.
- Available in plastic, glass and metal finishes. See **Colors and Finishes** at the end of the document for more information.
- Backlit screen and buttons that include Dynamic Backlight Management (DBM) to automatically adjust backlight intensity based on ambient lighting conditions.
- Ability to support separate heating and cooling equipment on one thermostat.<sup>1</sup>
- Displays temperature in Fahrenheit or Celsius.
- Uses Lutron QS link for power and communication with other QS devices.
- Ships with a sealed wallbox for use in new or existing constructions, specifically for hollow walls that may have air movement in the wall cavity.
- IEC SELV/NEC® Class 2 for 24–36 V $\equiv$
- IEC, CE, RoHS, cULus, and NOM compliant.

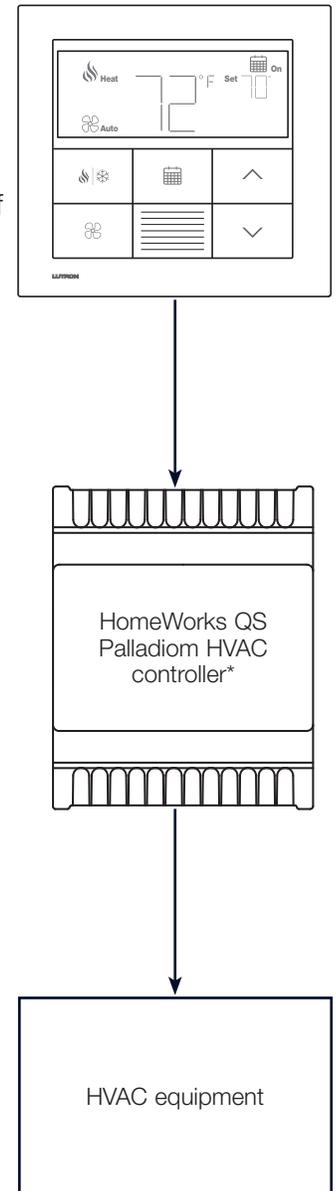
### HomeWorks QS Palladiom HVAC Controller

- Works with most residential HVAC systems.
- Utilizes commonly used control wiring and 24 V from HVAC equipment transformer or other power supply rated 12–24 V $\sim$  50 / 60 Hz, 24 V $\equiv$ ,  $\pm$  10%, SELV
- Supports an optional wired remote temperature sensor to allow for flexibility regarding thermostat installation location. The wired remote temperature sensor is used instead of the internal thermostat sensor.
- Continues operation if communication with the Palladiom thermostat is interrupted (requires wired temperature sensor).
- IEC, CE, RoHS, cULus, and NOM compliant.

### System

- System features programmed in HomeWorks QS software.
- 7-day programmable schedule.
- Schedule events based on time of day or astronomic time.
- Local hold button overrides system HVAC schedules.
- Select alternate setpoints to save energy while on vacation.
- Up to 64 HVAC zones per system.
- Up to 4 Palladiom thermostats per zone (one master thermostat and up to three companion thermostats). The master thermostat connects directly to the HVAC controller. Users can adjust setpoints, operating mode and fan mode from any thermostat.<sup>2</sup>
- Up to 32 Palladiom thermostats per link.
- Palladiom thermostat continues operation if communication with the HomeWorks QS system is interrupted.
- Monitor and control thermostat settings via Lutron Connect mobile device.
- Ability to lock out local button control via HomeWorks QS system configuration.
- Dynamic temperature averaging allows up to 4 thermostat sensors and 4 Remote HVAC controller sensors (up to one remote sensor per HVAC Controller) to be average temperature controlled on 1 zone dynamically via preset actions such as timeclock, occupancy or button press.<sup>3</sup>
- Palladiom thermostat sensor temperature available over Lutron integration protocol.<sup>3</sup>

HomeWorks QS Palladiom thermostat



\* For VRV/VRF applications, use the interfaces on page 3.

<sup>1</sup> Available in thermostat version 2.00 or later.

<sup>2</sup> Available in thermostat version 4.00 or later.

<sup>3</sup> Available in thermostat version 3.00 or later.

# HomeWorks QS Palladiom HVAC Solution

## Model Numbers

HQWT-T-HW-XXX<sup>1</sup>-A – HomeWorks QS Palladiom thermostat (includes corresponding wallbox and color trim ring kit)

SMC55-HWQS – HomeWorks QS Palladiom HVAC controller (includes wire harness LR-HVAC-WIRE-120)

LR-TEMP-FLSH – Wired flush mount sensor (optional remote temperature sensor)

## Compatibility

The HomeWorks QS Palladiom HVAC controller works with residential HVAC systems including:

- Conventional forced air systems using gas, electric, or oil heat, as well as compressor-based cooling-only as split systems or packaged units.
- Heat pumps with or without auxiliary heat<sup>2</sup>
- Fan coil units. Connect the controller's fan-speed outputs to a fan motor relay control board. Do not connect the controller directly to fan motors.
- Hydronic or electric underfloor heating<sup>3</sup>
- Specific VRV/VRF systems (see **VRV/VRF Systems** on page 3). Room temperature will be reported by the VRV/VRF equipment and displayed on the thermostat.
- A combination of one heating system and one cooling system. Example: Radiant floor heating and VRF cooling<sup>4</sup>

## Typical System Configurations

Control wiring is done via conventional isolated relays for stage capacity control. Typical system configurations:

### Heat/Cool Stages (Relays)

- 1 heat / 1 cool conventional ( $W_1, Y_1, G$ )
- 1 heat / 1 cool heat pump (O/B,  $Y_1, G$ )<sup>2</sup>
- 1 heat conventional (with or without fan [G]) ( $W_1$ )
- 1 cool conventional ( $Y_1, G$ )
- 2 heat / 1 cool heat pump (2 stage compressor, no auxiliary heat) (O/B,  $Y_1, Y_2, G$ )<sup>2</sup>
- 2 heat / 1 cool heat pump (1 stage compressor + 1 auxiliary heat) (O/B,  $Y_1, Aux, G$ )<sup>2</sup>
- 2 heat / 2 cool conventional ( $W_1, Y_1, Y_2, W_2, G$ )<sup>2</sup>
- 2 heat / 1 cool conventional ( $W_1, Y_1, W_2, G$ )<sup>2</sup>
- 1 heat / 2 cool conventional ( $W_1, Y_1, Y_2, G$ )<sup>2</sup>
- 2 heat / 2 cool heat pump (2 stage compressor, no auxiliary heat) (O/B,  $Y_1, Y_2, G$ )<sup>2</sup>
- 3 heat / 2 cool heat pump (2 stage compressor + 1 auxiliary heat) (O/B,  $Y_1, Y_2, Aux, G$ )<sup>2</sup>
- 1 heat / no cool radiant hydronic or electric floor (relay) ( $W_1$ )<sup>5</sup>
- 1 heat / no cool radiant hydronic or electric floor (0 – 10 V<sub>===</sub> proportional)<sup>5</sup>

### Fan Coil Units

- 2-pipe, On/Off valve, 3-speed fan with changeover sensor (valve,  $G_1, G_2, G_3$ )
- 2-pipe, On/Off valve, 0–10 V<sub>===</sub> controlled fan with changeover sensor (valve, 0–10 V<sub>===</sub> fan)
- 2-pipe, 0–10 V<sub>===</sub> valve, 3-speed fan with changeover sensor (0–10 V<sub>===</sub> valve,  $G_1, G_2, G_3$ )
- 2-pipe, 0–10 V<sub>===</sub> valve, 0–10 V<sub>===</sub> controlled fan with changeover sensor (0–10 V<sub>===</sub> valve, 0–10 V<sub>===</sub> fan)
- 4-pipe, On/Off valve, 3-speed fan (hot valve, cold valve,  $G_1, G_2, G_3$ )
- 4-pipe, On/Off valve, 0–10 V<sub>===</sub> controlled fan (hot valve, cold valve, 0–10 V<sub>===</sub> fan)
- 4-pipe, 0–10 V<sub>===</sub> valve, 3-speed fan (0–10 V<sub>===</sub> hot valve, 0–10 V<sub>===</sub> cold valve,  $G_1, G_2, G_3$ )
- 4-pipe, 0–10 V<sub>===</sub> valve, 0–10 V<sub>===</sub> controlled fan (0–10 V<sub>===</sub> hot valve, 0–10 V<sub>===</sub> cold valve, 0–10 V<sub>===</sub> fan)

<sup>1</sup> "XXX" in the model number represents color/finish code. See **Colors and Finishes** section at the end of the document for more information.

<sup>2</sup> Included with SMC55-HWQS 7420 or newer and SMC55-RESI version 7302 or newer. The software version of the controller can be found on the top right corner of the unit label.

<sup>3</sup> Included in SMC55-HWQS version 7412 or later.

<sup>4</sup> Available with thermostat version 3.00 or later.

<sup>5</sup> Included in SMC55-HWQS version 7420 or later.

## HomeWorks QS Palladiom HVAC Solution

### VRV/VRF Systems

The HomeWorks QS Palladiom thermostat can be used to control the VRV/VRF systems listed below. Please contact a Lutron representative for regional availability.

#### Daikin® VRV Systems

Requires one of these hardware options:

- HomeWorks QS Palladiom thermostat and CoolAutomation™ CoolPlug interface.<sup>1</sup> See Application Note #650 (048650) at [www.lutron.com](http://www.lutron.com)
  - Daikin® indoor unit requires a P1/P2 connection.
- HomeWorks QS Palladiom thermostat with HomeWorks QS processor and CoolAutomation™ CoolMasterNet interface.<sup>1,2</sup> See Application Note #650 (048650) at [www.lutron.com](http://www.lutron.com)

#### Mitsubishi® VRF Systems

Requires one of these hardware options:

- HomeWorks QS Palladiom thermostat and Mitsubishi® Procon A1M interface.<sup>1</sup> See Application Note #585 (048585) at [www.lutron.com](http://www.lutron.com)
  - Mitsubishi® indoor unit requires CN105 connection.
- HomeWorks QS Palladiom thermostat with HomeWorks QS processor and CoolAutomation™ interface.<sup>1</sup> See Application Note #650 (048650) at [www.lutron.com](http://www.lutron.com)
- HomeWorks QS Palladiom thermostat with HomeWorks QS Palladiom HVAC controller and Mitsubishi® thermostat controller interface.<sup>1</sup> See Application Note #585 (048585) at [www.lutron.com](http://www.lutron.com)

#### LG® VRF Systems

Requires one of these hardware options:

- HomeWorks QS Palladiom thermostat and LG® PDRYCB500 interface.<sup>1</sup> See Application Note #627 (048627) at [www.lutron.com](http://www.lutron.com)
  - Contact LG® engineering for a list of compatible LG® indoor units.
- HomeWorks QS Palladiom thermostat with HomeWorks QS processor and CoolAutomation™ interface.<sup>1</sup> See Application Note #650 (048650) at [www.lutron.com](http://www.lutron.com)
- HomeWorks QS Palladiom thermostat with HomeWorks QS Palladiom HVAC controller and LG® thermostat controller interface.<sup>1</sup> See Application Note #627 (048627) at [www.lutron.com](http://www.lutron.com)\*

### Underfloor Heating Systems with Heatmiser Interface

Requires:

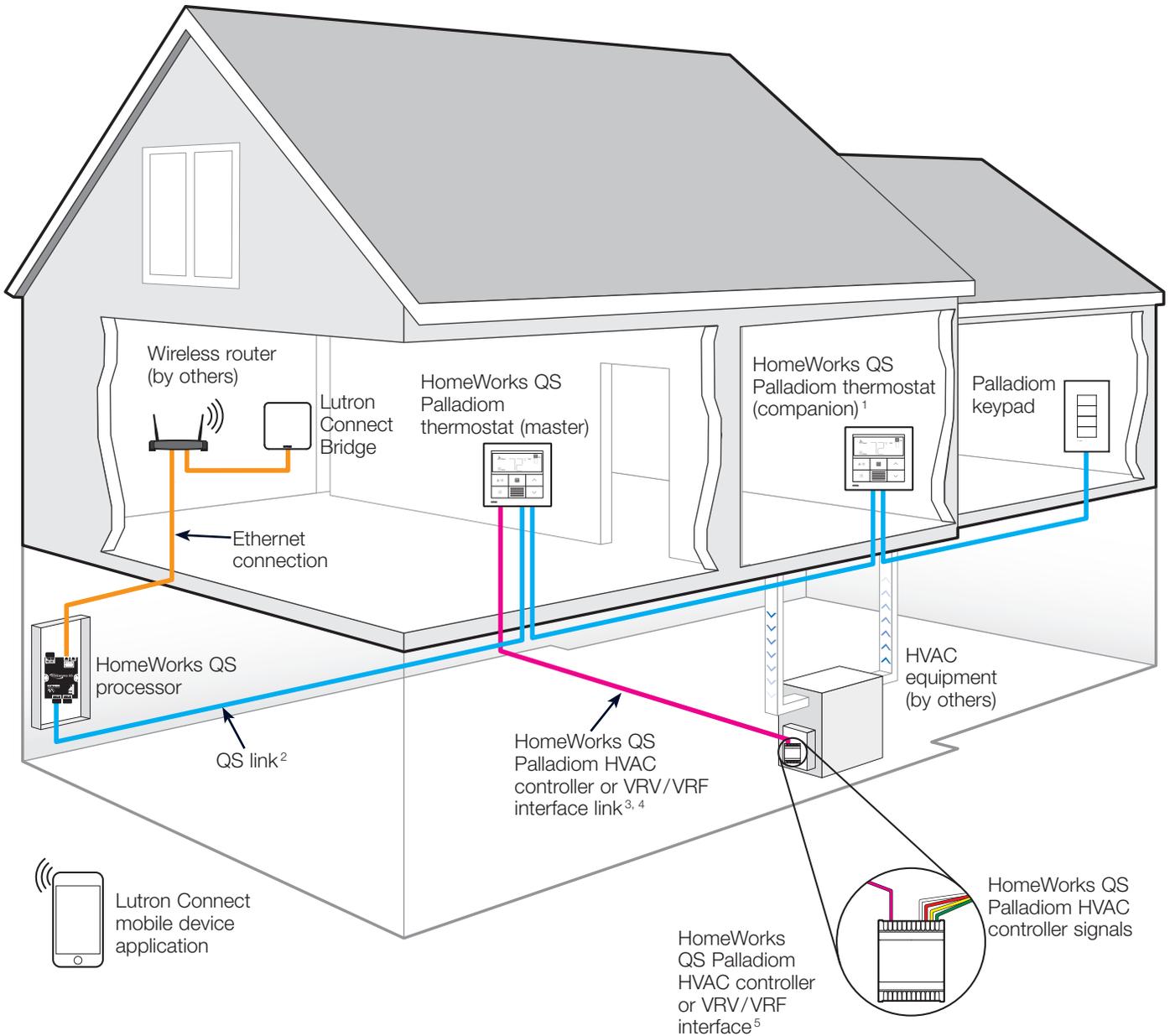
- HomeWorks QS Palladiom thermostat with HomeWorks QS processor and Heatmiser interface.<sup>1</sup> See [Heatmiser HVAC Integration with HomeWorks QS](#) document.

<sup>1</sup> Provided by others.

<sup>2</sup> For information about additional CoolAutomation™ interfaces, see [www.coolautomation.com](http://www.coolautomation.com)

# HomeWorks QS Palladiom HVAC Solution

## System Diagram



<sup>1</sup> Companion thermostats require a HomeWorks QS processor and master thermostat.

<sup>2</sup> For wiring details, see **QS Link** section on page 12.

<sup>3</sup> For wiring details, see **HomeWorks QS Palladiom HVAC Controller Link** section on page 13.

<sup>4</sup> Link can also be used for direct control of VRV/VRF interfaces (e.g., LG<sup>®</sup>, CoolAutomation<sup>™</sup>, Mitsubishi).

<sup>5</sup> See page 3 for more information when using VRV/VRF interfaces in VRV/VRF systems.

# HomeWorks QS Palladiom HVAC Solution

## Technical Specifications

### HomeWorks QS Palladiom Thermostat

Model Number	HQWT-T-HW-XXX*-A
Regulatory Approvals	IEC, CE, cULus, RoHS, and NOM compliant.
Operating Voltage	24–36 V <sub>AC</sub> IEC SELV/ NEC <sup>®</sup> Class 2 Power provided by QS link power supply.
Typical Power Consumption	10 mA at 24 V <sub>AC</sub>
Maximum Power Consumption	60 mA at 24 V <sub>AC</sub> <i>Test conditions:</i> Backlight on full. 3 Power Draw Units (PDUs). For more information, see <b>Power Draw Units on the QS Link</b> (P/N 369405) at <a href="http://www.lutron.com">www.lutron.com</a> .
Environment	<i>Ambient operating temperature:</i> 32 °F to 104°F (0 °C to 40 °C) 5% to 90% relative humidity (non-condensing). Indoor use only. IP20 Rating
Communications	Thermostat communicates with the HomeWorks QS system via 4-wire QS link protocol. It also communicates with the HomeWorks QS Palladiom HVAC controller and VRV/VRF interfaces via 3-wire HomeWorks QS Palladiom HVAC controller link.
Room Temperature Sensor	<i>Temperature display range:</i> 32 °F to 99 °F (0 °C to 37 °C) <i>Temperature setpoint range:</i> 50 °F to 90 °F (10 °C to 32 °C) (programmable) <i>Accuracy:</i> At 70 °F: < +/- 1 °F At 25 °C: < +/- 0.5 °C
Power Failure Memory	Should power be interrupted, the thermostat will retain all settings when power is restored.
Mounting	Mount on a clean, dry, interior wall approximately 4 ft to 5 ft (1.2 m to 1.5 m) above the floor. See <b>Mounting</b> section for more information.
Wiring	IEC SELV/NEC <sup>®</sup> Class 2: 24–36 V <sub>AC</sub> 22 AWG (0.5 mm <sup>2</sup> ) and 18 AWG (0.75 mm <sup>2</sup> ) solid wiring.
Warranty	<a href="http://www.lutron.com/TechnicalDocumentLibrary/warranty.pdf">www.lutron.com/TechnicalDocumentLibrary/warranty.pdf</a> <a href="http://www.lutron.com/TechnicalDocumentLibrary/Intl_warranty.pdf">www.lutron.com/TechnicalDocumentLibrary/Intl_warranty.pdf</a> Warranty only valid if installed by a properly trained climate control specialist.

\*"XXX" in the model number represents color/finish code. See **Colors and Finishes** section at the end of the document for more information.

# HomeWorks QS Palladiom HVAC Solution

## Technical Specifications (continued)

### HomeWorks QS Palladiom HVAC Controller

Model Number	SMC55-HWQS
Regulatory Approvals	RoHS, NOM, UL <sup>®</sup> recognized to UL/CSA 607301, CE certified to EN60730 incorporated control <sup>1</sup>
Operating Voltage	12–24 V~ 50 / 60 Hz, 24 V=, +/- 10%, SELV
Maximum Relay Rating	1 A at 24 V~, maximum inrush current of 12 A <b>Note:</b> Do not connect the controller directly to fan motors. Connect the controller's fan-speed outputs to a fan motor relay control board. For more information, refer to the installation instructions.
Maximum Power Consumption	4 W/6 VA Consider additional power being drawn by the external relay circuits.
Environment	<i>Ambient operating temperature:</i> –4 °F to 131 °F (–20 °C to 55 °C) 10% to 90% relative humidity (non-condensing). Indoor use only. IP20 Rating
Communications	HomeWorks QS Palladiom HVAC controller communicates with the HomeWorks QS Palladiom thermostat using a 3-wire Modbus protocol.
Power Failure Memory	Should power be interrupted, the HomeWorks QS Palladiom HVAC controller will retain system configuration settings when power is restored.
Mounting	Preferred for DIN rail mounting in an enclosure. Install and operate this equipment in an enclosure appropriately rated for the intended environment. See <b>Mounting</b> section for more information.
Wiring	<i>HomeWorks QS Palladiom HVAC Controller:</i> LR-HVAC-WIRE-120 required wire harness (included). For relay outputs, use wires at least 20 AWG (0.5 mm <sup>2</sup> ) with a temperature rating of at least 176 °F (80 °C). Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.  <i>Wired Flush Mount Sensor:</i> IEC SELV/PELV/NEC <sup>®</sup> Class 2; 22 AWG (0.5 mm <sup>2</sup> ) twisted, shielded pair wiring. Maximum wire length is 100 ft (30.5 m).
Warranty	<a href="http://www.lutron.com/TechnicalDocumentLibrary/warranty.pdf">www.lutron.com/TechnicalDocumentLibrary/warranty.pdf</a> <a href="http://www.lutron.com/TechnicalDocumentLibrary/Intl_warranty.pdf">www.lutron.com/TechnicalDocumentLibrary/Intl_warranty.pdf</a> Warranty only valid if installed by a properly trained climate control specialist. Do not disassemble, repair, or modify this equipment.

<sup>1</sup> This device is a component and is intended for use as part of complete equipment rather than for a direct, separate installation in the field.

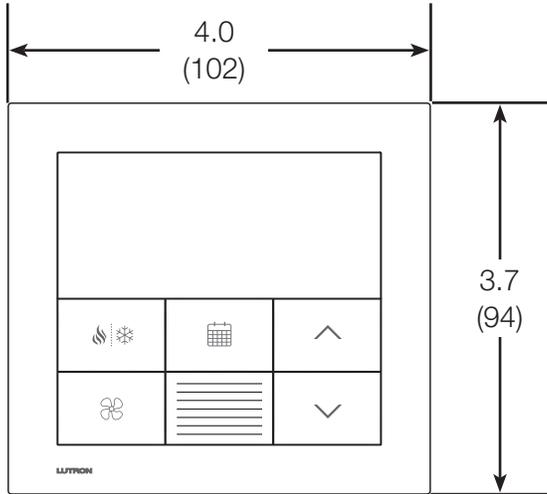
# HomeWorks QS Palladiom HVAC Solution

## Dimensions

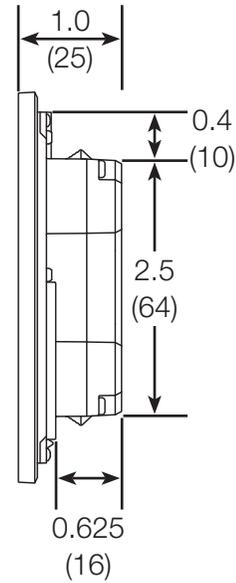
All dimensions shown as: in (mm)

### HomeWorks QS Palladiom Thermostat

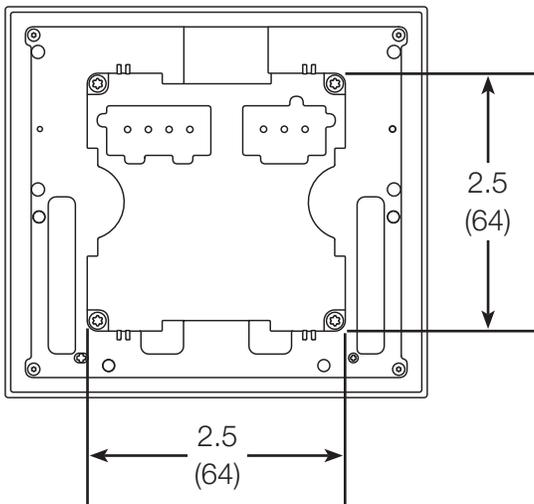
Front View



Side View



Rear View



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# HomeWorks QS Palladiom HVAC Solution

## Dimensions (continued)

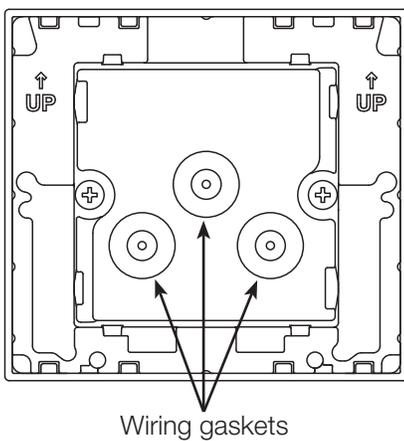
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### Wallboxes and Wallbox Adapters

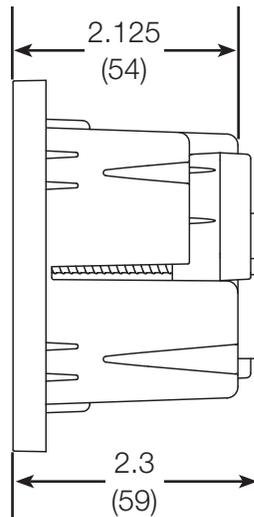
#### Sealed Wallbox and Color Trim Ring (included)

Both the sealed wallbox and color trim ring are included with the thermostat to be installed unless solid masonry or poured concrete walls are used.

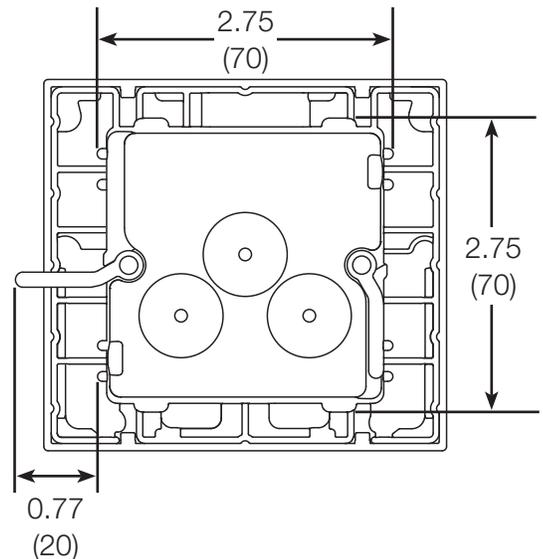
Front View



Side View



Rear View

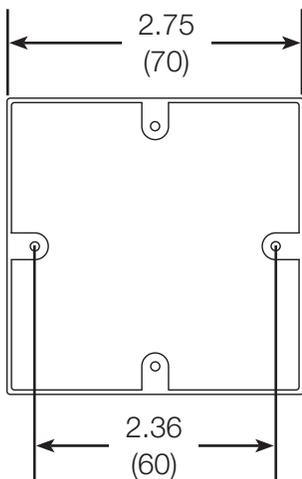


#### EBB-1-SQ (sold separately) and Corresponding Wallbox Adapter (included)

Square, metal wallbox (sold separately) for use with solid masonry or poured concrete walls with no airflow. Corresponding wallbox adapter included with the thermostat. A pack of 15 wallboxes can be purchased by ordering Lutron model number EBB-15-SQ.

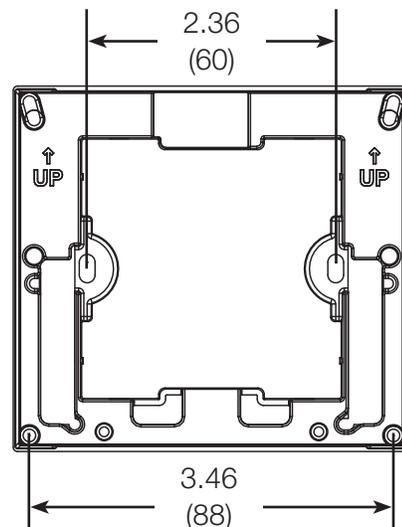
Front View

Wallbox



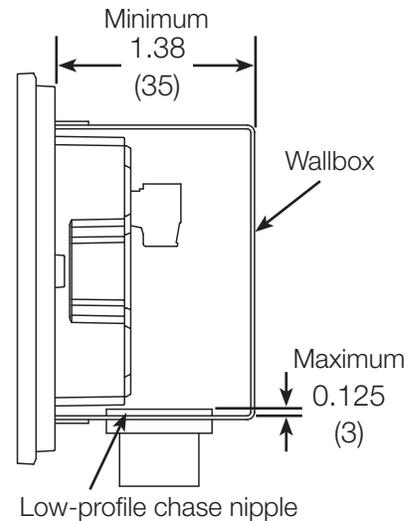
Front View

Adapter



Side View

Thermostat, adapter, and metal wallbox



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1.844.LUTRON1 (U.S.A. / Canada)  
+44.(0)20.7680.4481 (Europe)

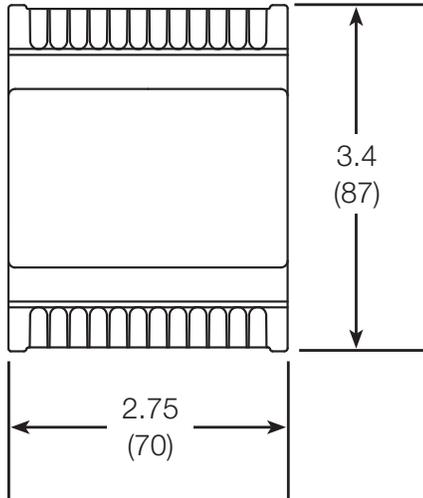
# HomeWorks QS Palladiom HVAC Solution

## Dimensions (continued)

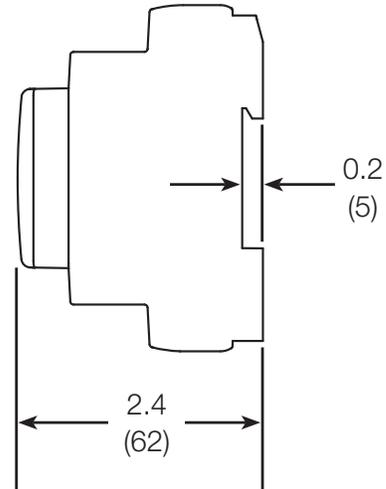
All dimensions shown as: in (mm)

### HomeWorks QS Palladiom HVAC Controller

Front View



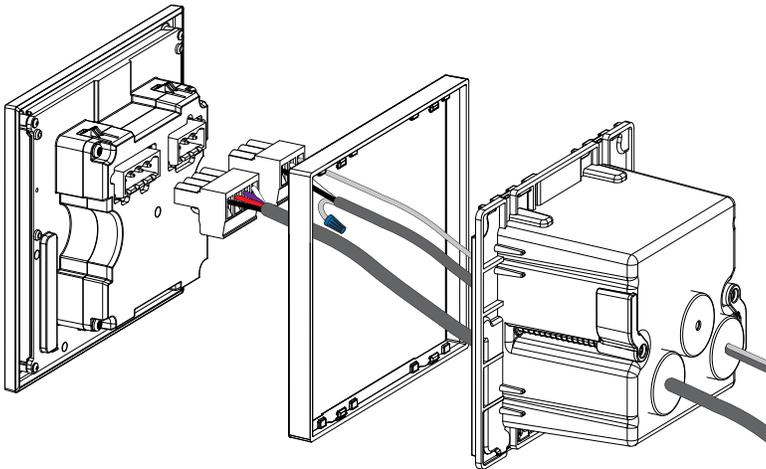
Side View



# HomeWorks QS Palladiom HVAC Solution

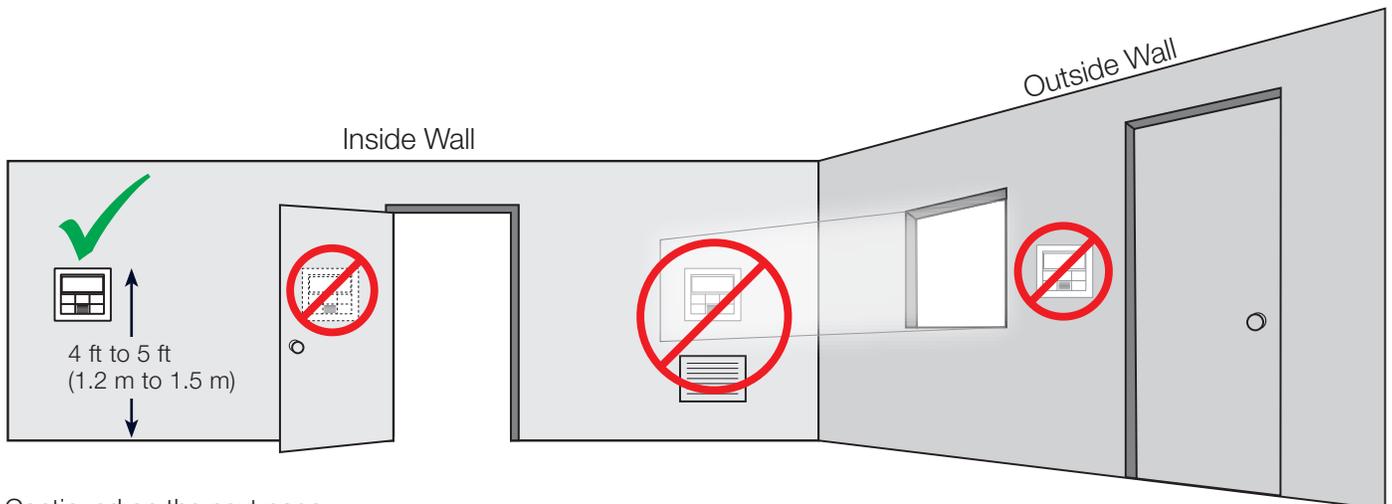
## Mounting

### HomeWorks QS Palladiom Thermostat



- Mount on a clean, dry, interior wall.
- Mount approximately 4 ft to 5 ft (1.2 m to 1.5 m) above the floor. Follow all local and national codes.
- Mount on a wall without pipes, chimneys, or ducts.
- Mount on a wall with good visibility and control access.
- Do not mount on an exterior wall, close to a window, next to a door, or areas with drafts.
- Do not mount in direct airflow from supply and return registers/grilles.
- Do not expose to water (e.g., drips or splashes) or mount in a damp area.
- Do not mount within 4 ft (1.2 m) of heating sources (e.g., direct sunlight, light bulbs, etc.).
- Do not mount in areas with poor circulation (e.g., niches, alcoves, behind curtains, or behind doors).
- Do not mount within 0.75 in (19 mm) of Palladiom keypads.

**Note:** If it is not possible to follow these guidelines, the use of an indoor remote temperature sensor is recommended. For more information, see **Remote Temperature Sensor** section on page 28.



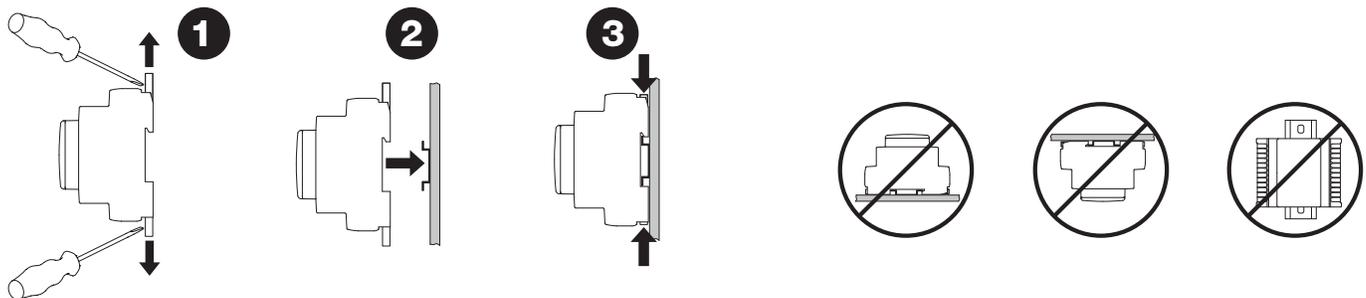
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# HomeWorks QS Palladiom HVAC Solution

## Mounting (continued)

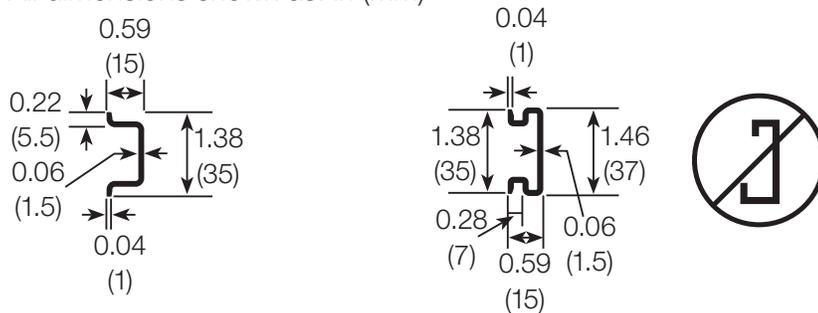
### HomeWorks QS Palladiom HVAC Controller

The HomeWorks QS Palladiom HVAC controller is to be installed in an enclosure designed for the specific environmental conditions and to minimize the possibility of unintended contact with hazardous voltages. All pertinent state, regional, and local safety regulations must be observed when installing and using this product. Use metal enclosures to improve the electromagnetic immunity of the controller system. The preferred installation is DIN rail mounting and requires a 4 DIN wide mounting location. For DIN rail installation, follow the steps below:



#### Acceptable DIN Rail Dimensions

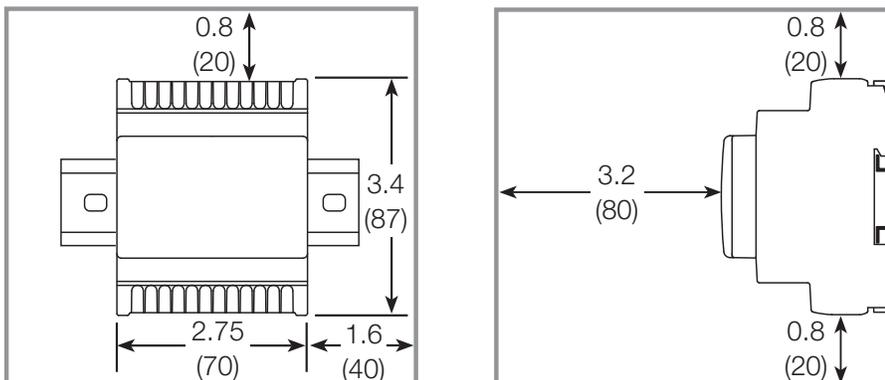
All dimensions shown as: in (mm)



#### Minimum Clearances

The HVAC controller must be installed in an enclosure with the clearances shown below.

All dimensions shown as: in (mm)



**Note:** Multiple HomeWorks QS Palladiom HVAC controllers can be mounted next to each other.

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# HomeWorks QS Palladiom HVAC Solution

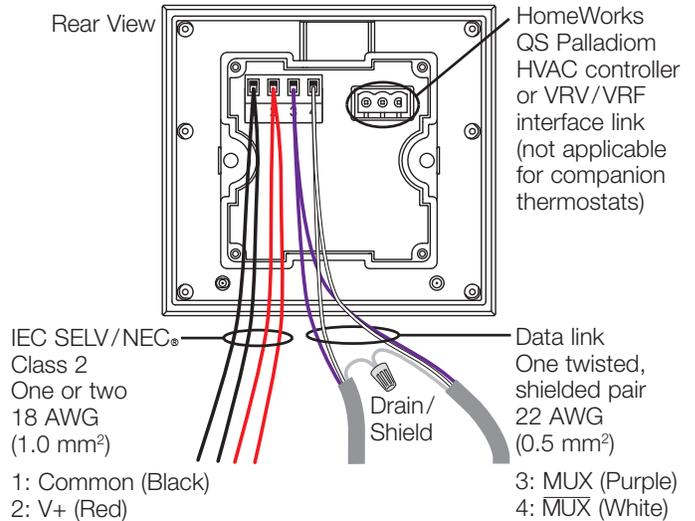
## Wiring

### QS Link

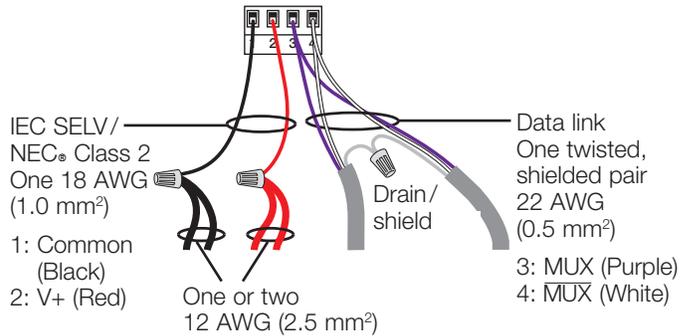
- Use IEC SELV/NEC® Class 2 (24–36 V $\overline{=}$ ) wiring to connect the thermostat to the QS link for power and communication.
- Connect two 22 AWG (0.5 mm<sup>2</sup>) shielded, twisted pair wires to terminals 3 and 4. Shielding (drain) of the twisted pair wires must be connected together as shown, but do not connect the shielding to earth/ground or the thermostat and do not allow it to contact the grounded wallbox.
- Connect the appropriate size wires to terminals 1 and 2 for power, according to your link length (see table below).
- Connect Drain/Shield as shown. Do not connect to Ground (Earth) or the thermostat. Connect the bare drain wires and cut off the outside shield.

**Note:** Use appropriate wire connecting devices as specified by local codes.

Link Wiring < 500 ft (153 m)



Link Wiring 500 ft to 2000 ft (153 m to 610 m)



QS Link Wire Sizes (check compatibility in your area)

QS Link Wiring Length	Wire Gauge	Lutron Cable Part Number
< 500 ft (153 m)	Power (terminals 1 and 2) 1 pair 18 AWG (1.0 mm <sup>2</sup> )	GRX-CBL-346S (non-plenum) GRX-PCBL-346S (plenum)
	Data (terminals 3 and 4) 1 twisted, shielded pair 22 AWG (0.5 mm <sup>2</sup> )	
500 ft to 2000 ft (153 m to 610 m)	Power (terminals 1 and 2) 1 pair 12 AWG (4.0 mm <sup>2</sup> ) <i>This will not fit in terminal. Connect as shown above.</i>	GRX-CBL-46L (non-plenum) GRX-PCBL-46L (plenum)
	Data (terminals 3 and 4) 1 twisted, shielded pair 22 AWG (0.5 mm <sup>2</sup> )	

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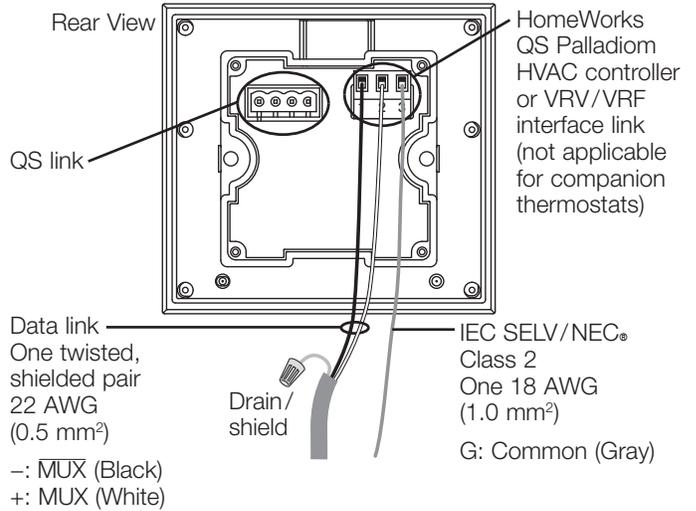
# HomeWorks QS Palladiom HVAC Solution

## Wiring (continued)

### HomeWorks QS Palladiom HVAC controller link

- The HomeWorks QS Palladiom HVAC controller comes with a 3-wire harness in the LR-HVAC-WIRE-120 package. This is to be used on the HomeWorks QS Palladiom HVAC controller link to the thermostat.
- The 3-wire harness can be extended up to 500 ft (153 m) using one 18 AWG (1.0 mm<sup>2</sup>) and 1 pair 22 AWG (0.5 mm<sup>2</sup>) twisted, shielded wire. See table below and diagrams to right.
- Do not connect the drain/shield wire to earth/ground or to the thermostat and do not allow it to contact the grounded wallbox

Link Wiring < 500 ft (153 m)



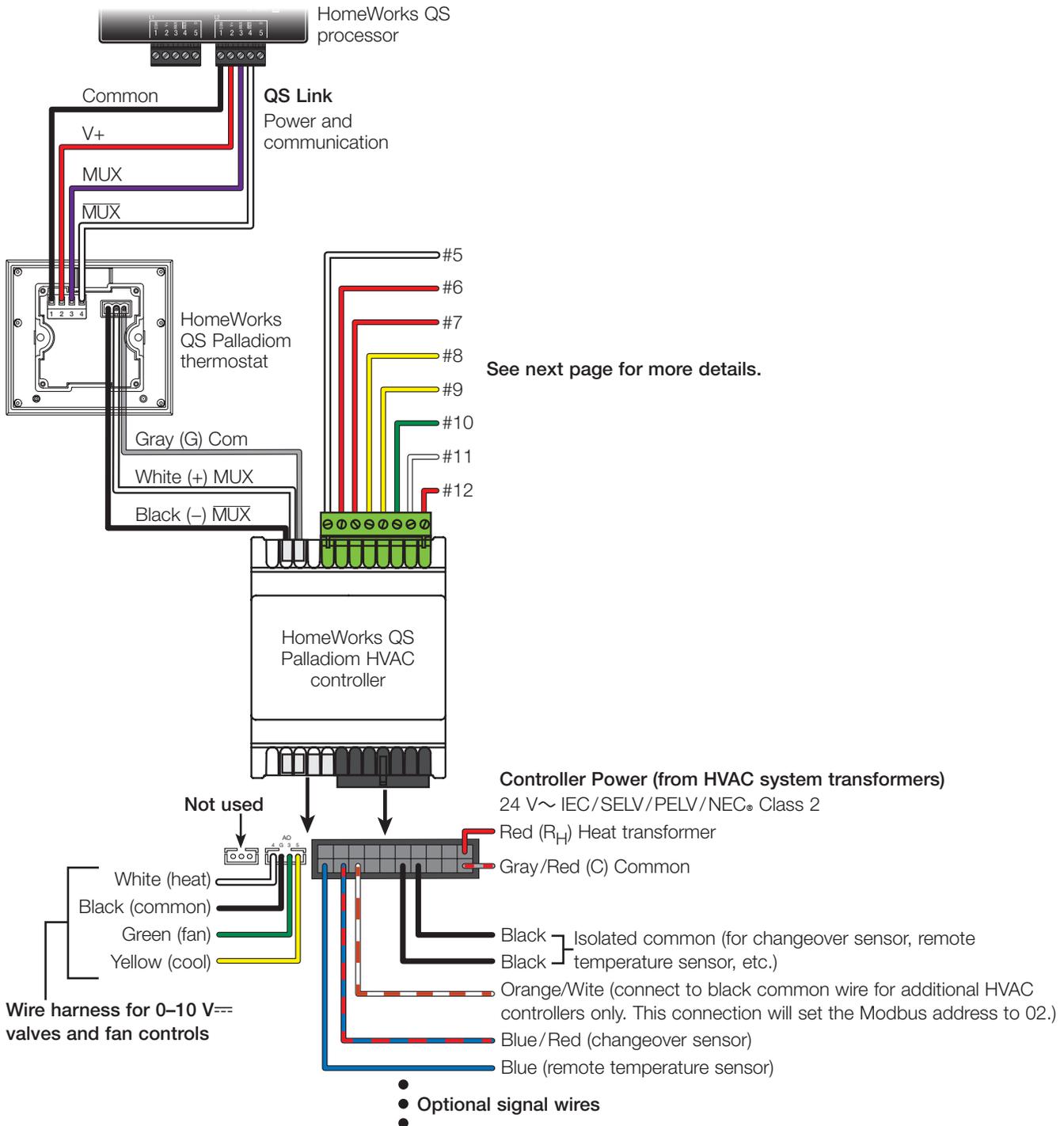
HomeWorks QS Palladiom HVAC Controller Link Wire Sizes (check compatibility in your area)

HomeWorks QS Palladiom HVAC Controller Link Wiring Length	Wire Gauge	Lutron Cable Part Number
< 500 ft (153 m)	Power (COM [G]) One 18 AWG (1.0 mm <sup>2</sup> )	GRX-CBL-346S (non-plenum) GRX-PCBL-346S (plenum)
	Data (MUX and MUX) One twisted, shielded pair 22 AWG (0.5 mm <sup>2</sup> )	

# HomeWorks QS Palladiom HVAC Solution

## Wiring (continued)

### HomeWorks QS Palladiom HVAC controller link (continued)



**Note:** Wire harnesses can be extended using 18 AWG or 22 AWG (1.0 mm<sup>2</sup> or 0.5 mm<sup>2</sup>) wire. Use twisted pair, shielded cables to extend analog I/O and HomeWorks QS Palladiom HVAC controller links. See previous page.

**Note:** All terminal blocks are removable.

Continued on the next page...

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# HomeWorks QS Palladiom HVAC Solution

## Wiring (continued)

### HomeWorks QS Palladiom HVAC controller link (continued)

<b>Relay Terminals</b>				
SPST(NO) 1 A at 24 V~ maximum relays**				
Terminal	Conventional	Heat Pump*	Fan Coil Unit	Radiant Floor
#5	Heat stage 1 ( $W_1$ )	Changeover heat pump valve (O/B)	Hot valve ( $H_{VALVE}$ )	Hot valve ( $H_{VALVE}$ )
#6	Heating stage 1 transformer ( $R_H$ )	Heating transformer ( $R_H$ )	Heat valve transformer ( $R_H$ ) or Valve transformer (R)	Heat valve transformer ( $R_H$ )
#7	Cooling/compressor transformer ( $R_C$ )	Cooling transformer ( $R_C$ )	Fan transformer ( $R_{FAN}$ )	–
#8	Compressor stage 1 ( $Y_1$ )	Compressor stage 1 ( $Y_1$ )	Fan high ( $G_3$ ) <sup>‡</sup>	–
#9	Compressor stage 2 ( $Y_2$ ) <sup>*</sup>	Compressor stage 2 ( $Y_2$ )	Fan medium ( $G_2$ ) <sup>‡</sup>	–
#10	Fan (G) <sup>‡</sup>	Fan (G) <sup>‡</sup>	Fan low ( $G_1$ ) <sup>‡</sup>	–
#11	Heat stage 2 ( $W_2$ ) <sup>*</sup>	Auxiliary heat (AUX)	Cold valve ( $C_{VALVE}$ )	–
#12	Heating stage 2 transformer ( $R_{H2}$ ) <sup>*</sup>	Auxiliary heat transformer ( $R_{AUX}$ )	Cold valve transformer ( $R_C$ )	–

\* Included with SMC55-HWQS version 7420 or newer and SMC55-RESI version 7302 or newer. The software version of the controller can be found on the top right corner of the unit label.

\*\*Controller must be used to drive pilot duty relays or fan coil relay control boards that do not exceed 24 V~. Do not drive fan motors directly. Use interposing relays if controller relay ratings are exceeded.

† Available regionally. Please contact Lutron Customer Assistance to determine availability in your region.

‡ Do not connect the controller directly to fan motors. Connect the controller's fan-speed outputs to a fan motor relay control board.

Continued on the next page...

# HomeWorks QS Palladiom HVAC Solution

## Wiring (continued)

### Signal Wiring Guide

Terminal	Description
W <sub>1</sub>	1 <sup>st</sup> stage heat relay
O/B	Changeover valve relay for heat pumps
H <sub>VALVE</sub>	Hot valve for 4-pipe fan coil units
R <sub>H</sub>	Heating power—Connect to secondary side of heating system transformer <sup>1</sup>
R	Valve transformer
R <sub>C</sub>	Cooling/compressor power—Connect to secondary side of cooling system transformer <sup>2</sup>
R <sub>FAN</sub>	Fan transformer
Y <sub>1</sub>	1 <sup>st</sup> stage compressor relay
Y <sub>2</sub>	2 <sup>nd</sup> stage compressor relay
G (G <sub>3</sub> , G <sub>2</sub> , G <sub>1</sub> )	Fan relay (fan high, fan medium, and fan low for fan coil units) <sup>3</sup>
W <sub>2</sub>	2 <sup>nd</sup> stage heat relay
AUX	Auxiliary heat relay
C <sub>VALVE</sub>	Cold valve for 4-pipe fan coil units
R <sub>H2</sub>	2 <sup>nd</sup> stage heat power—Connect to secondary side of second heating system transformer
R <sub>AUX</sub>	Auxiliary heat power—Connect to secondary side of auxiliary system transformer
Valve	Single valve control for 2-pipe fan coil units
C	Required common wire from secondary side of transformer

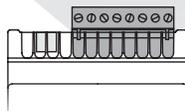
<sup>1</sup> Changeover valve transformer for heat pump systems. Heat stage 1 transformer for conventional systems.

<sup>2</sup> Compressor and fan transformer.

<sup>3</sup> Do not connect the controller directly to fan motors. Connect the controller's fan-speed outputs to a fan motor relay control board.

		Cable Type							
									
Wire Size	AWG	24 to 14	22 to 14	2 x 24 to 18	2 x 24 to 16	2 x 22 to 18	2 x 20 to 16		
	mm <sup>2</sup>	0.2 to 2.5	0.25 to 2.5	2 x 0.2 to 1.0	2 x 0.2 to 1.5	2 x 0.25 to 1.0	2 x 0.5 to 1.5		

 4.4 to 5.3 in-lb  
(0.5 to 0.6 N•m)



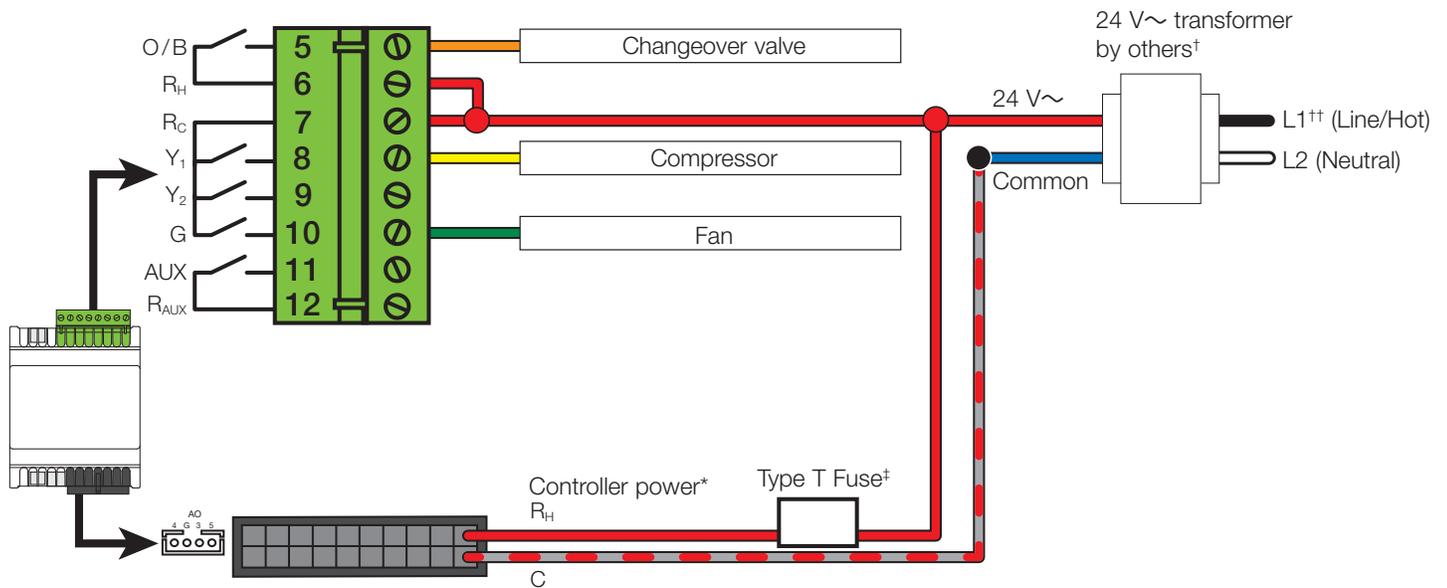
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# HomeWorks QS Palladiom HVAC Solution

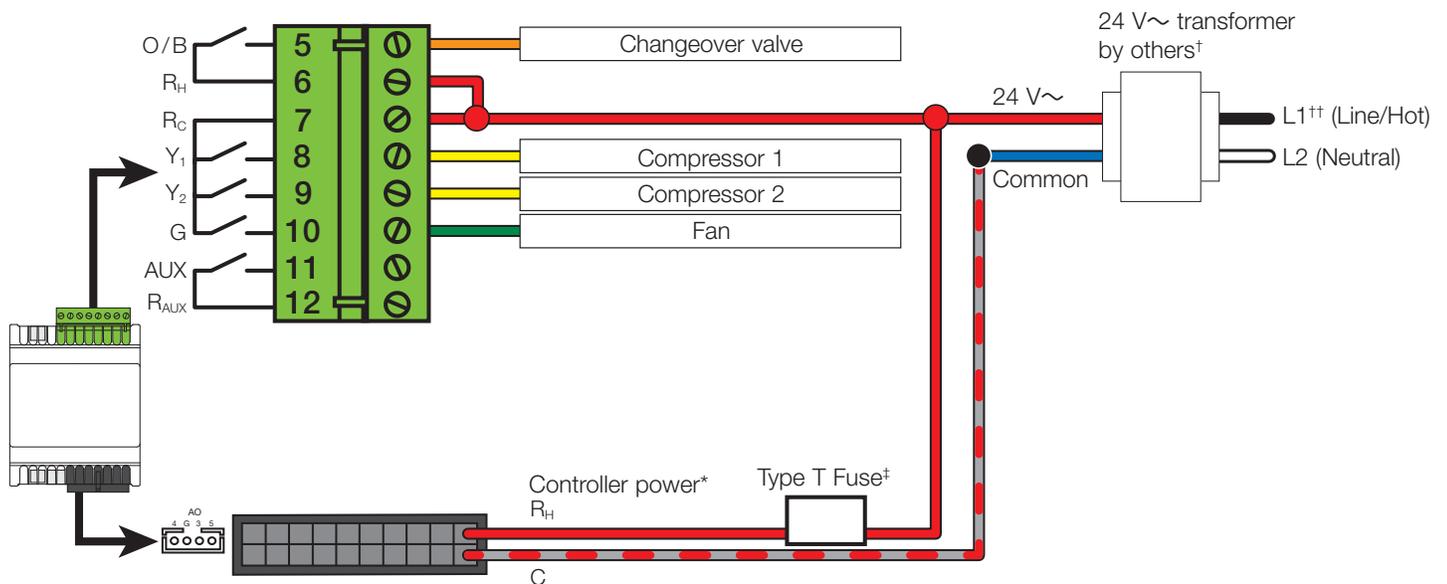
## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams

### Heat Pump Systems

**Diagram 1:** 1 heat stage/1 cool stage heat pump (1 compressor stage, no auxiliary heat)



**Diagram 2:** 2 heat stages/2 cool stages heat pump (2 compressor stages, no auxiliary heat)



\* If the signal source from the HVAC system is not 24 V~, use a separate supply to power the HomeWorks QS Palladiom HVAC controller.

† A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.

‡ Rated for 1.25 A.

†† L1 (Line/Hot) voltage of 120–240 V~ is acceptable.

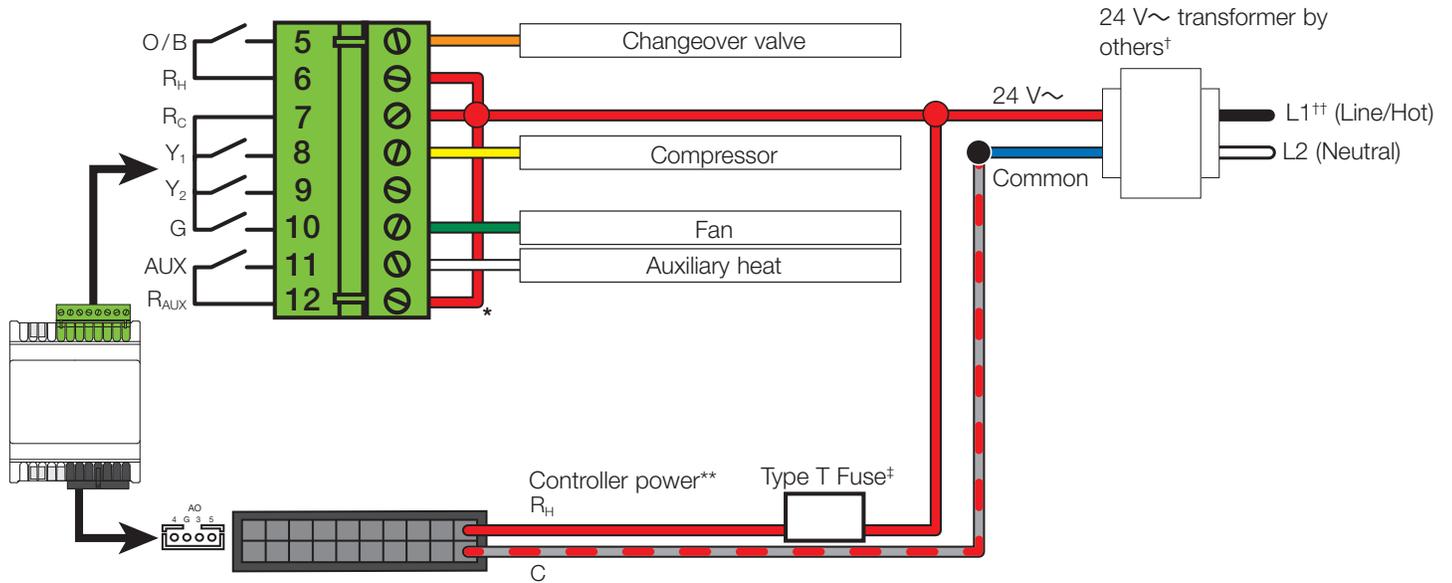
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# HomeWorks QS Palladiom HVAC Solution

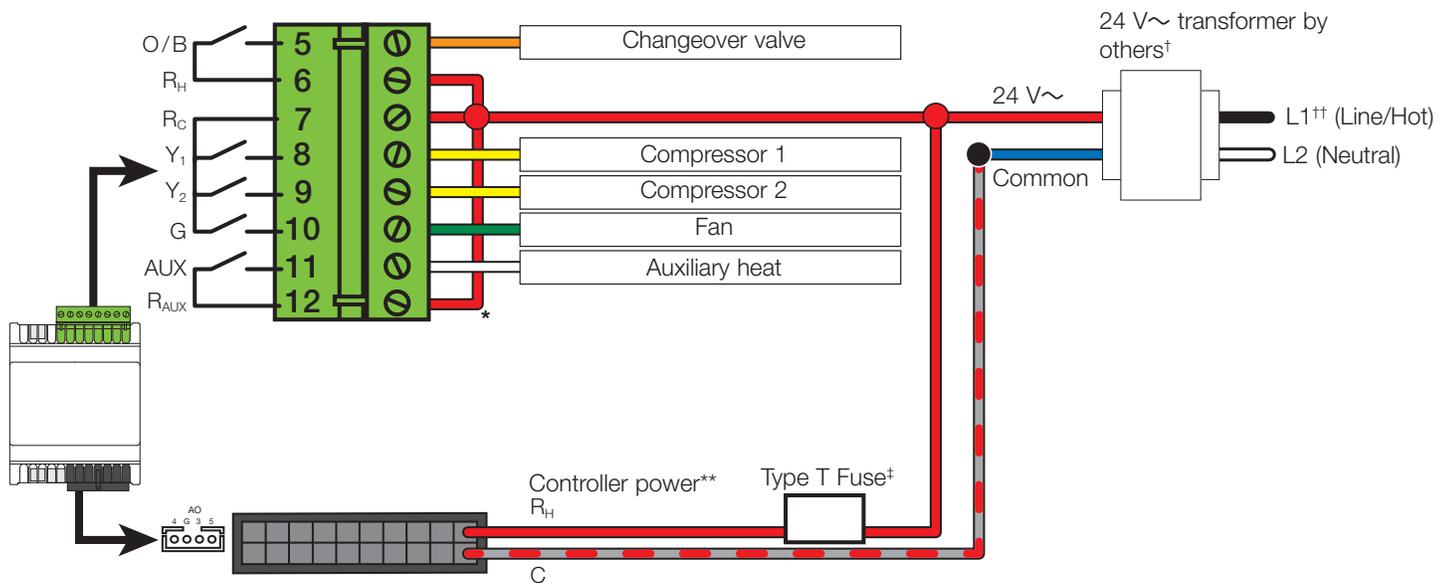
## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

### Heat Pump Systems (continued)

**Diagram 3:** 2 heat stages/1 cool stage heat pump (1 compressor stage, 1 auxiliary heat)



**Diagram 4:** 3 heat stages/2 cool stages heat pump (2 compressor stages, 1 auxiliary heat)



\* If a secondary transformer is available to power the auxiliary heat, connect the auxiliary transformer to pin 12 (R<sub>AUX</sub>).  
 \*\* If the signal source from the HVAC system is not 24 V~, use a separate supply to power the HomeWorks QS Palladiom HVAC controller.  
 † A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.  
 ‡ Rated for 1.25 A.  
 †† L1 (Line/Hot) voltage of 120–240 V~ is acceptable.

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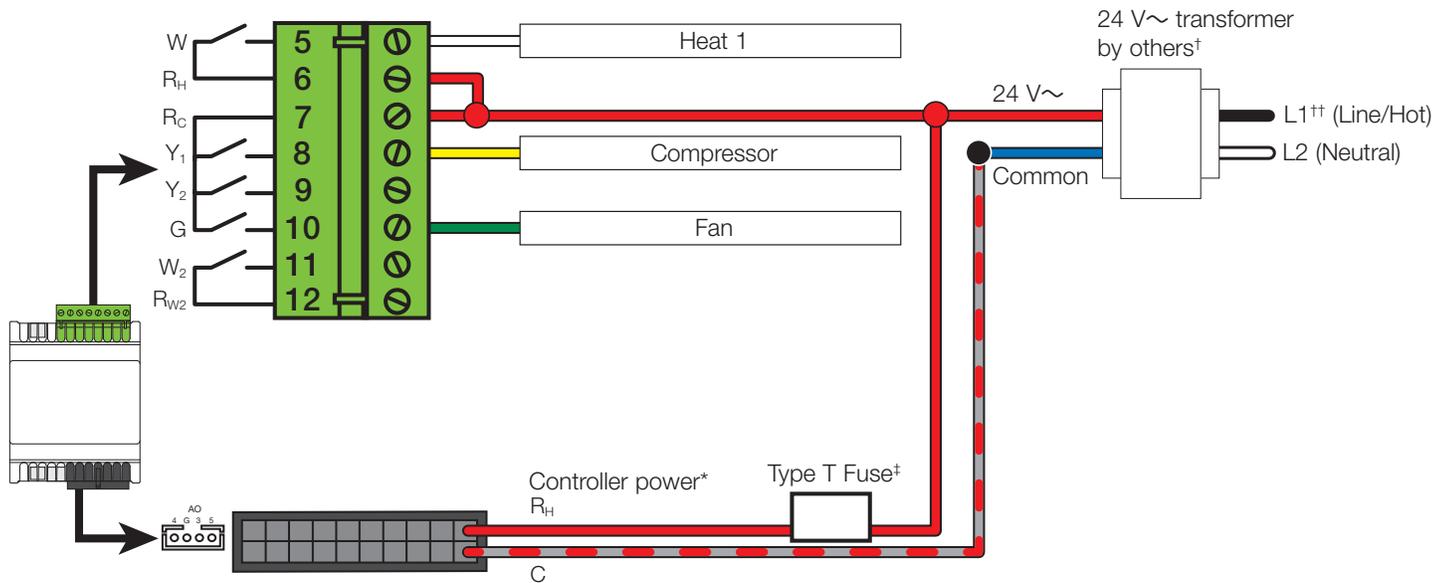
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# HomeWorks QS Palladiom HVAC Solution

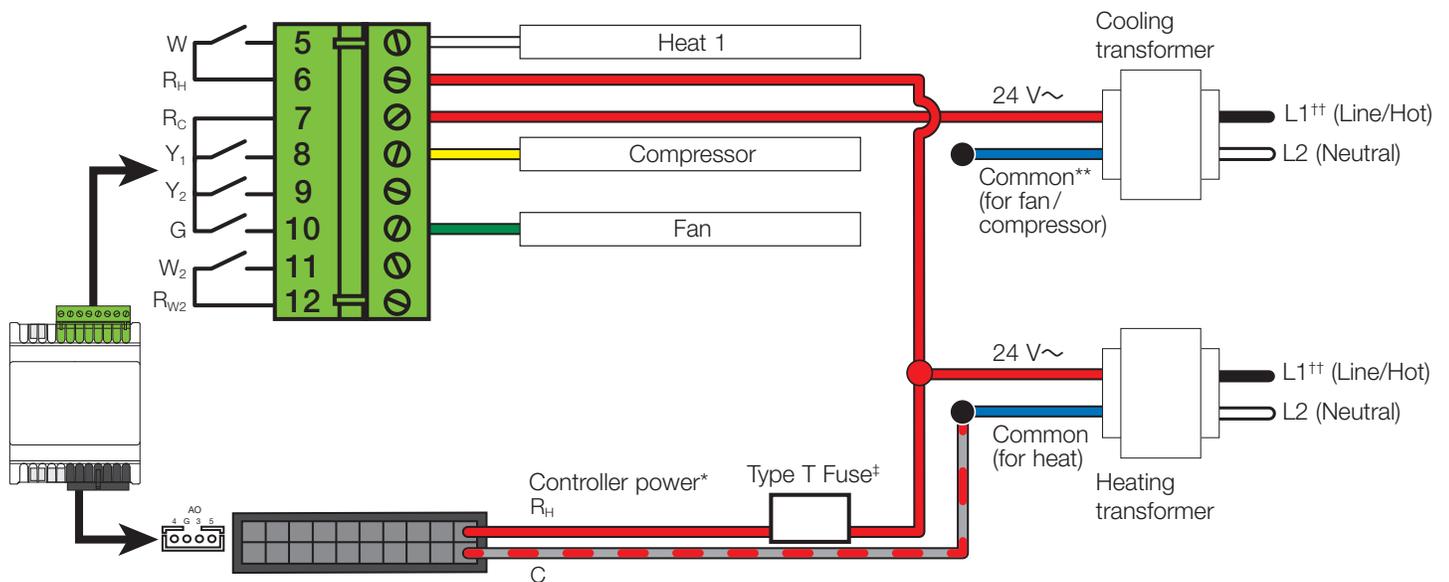
## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

### Conventional Systems

**Diagram 5:** 1 heat stage/1 cool stage system (1 transformer)



**Diagram 6:** 1 heat stage/1 cool stage system (2 transformers)



\* If the signal source from the HVAC system is not 24 V~, use a separate supply to power the HomeWorks QS Palladiom HVAC controller.

\*\* In a two transformer system it is not necessary to connect the compressor common wires.

† A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.

‡ Rated for 1.25 A.

†† L1 (Line/Hot) voltage of 120–240 V~ is acceptable.

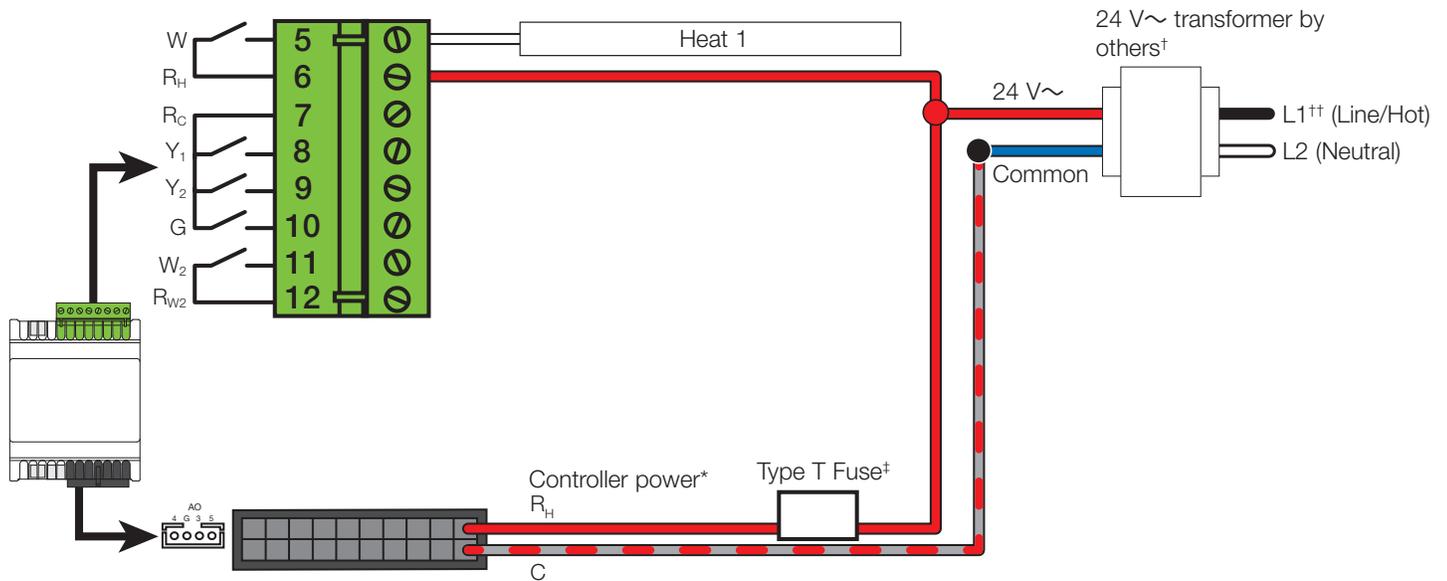
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# HomeWorks QS Palladiom HVAC Solution

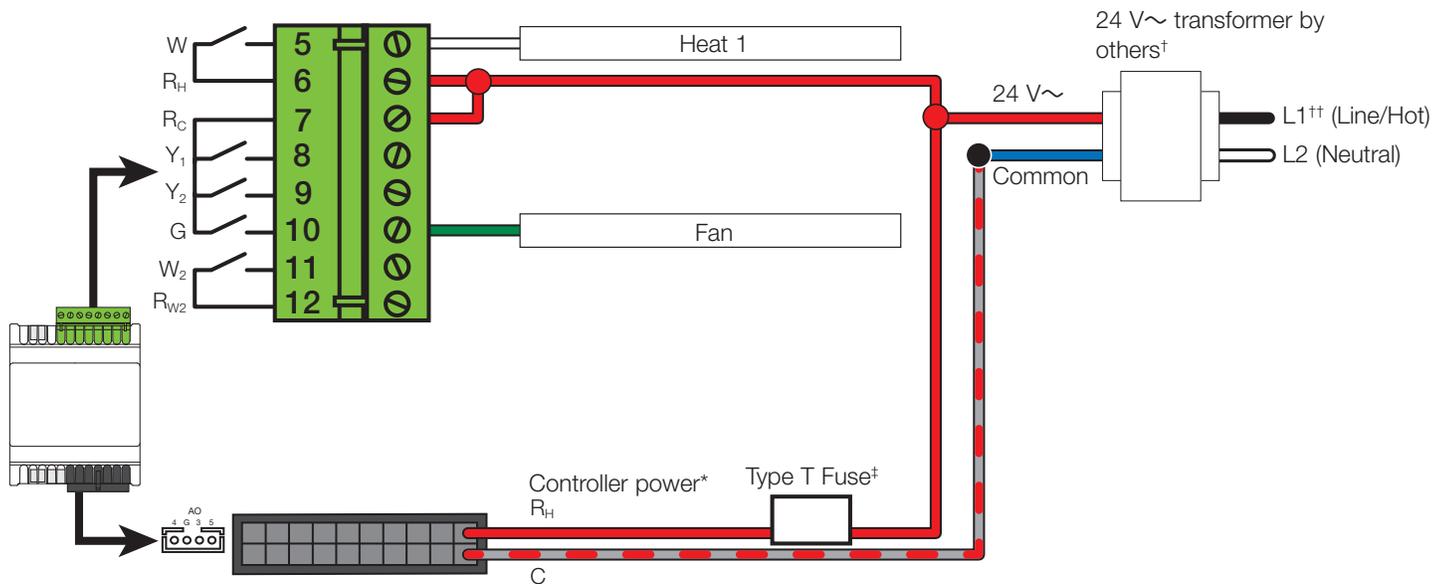
## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

### Conventional Systems (continued)

**Diagram 7:** Heat only system with no fan



**Diagram 8:** Heat only system with fan



\* If the signal source from the HVAC system is not 24 V~, use a separate supply to power the HomeWorks QS Palladiom HVAC controller.

† A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.

‡ Rated for 1.25 A.

†† L1 (Line/Hot) voltage of 120–240 V~ is acceptable.

Continued on the next page...

# HomeWorks QS Palladiom HVAC Solution

## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

### Conventional Systems (continued)

Diagram 9: Cool only system

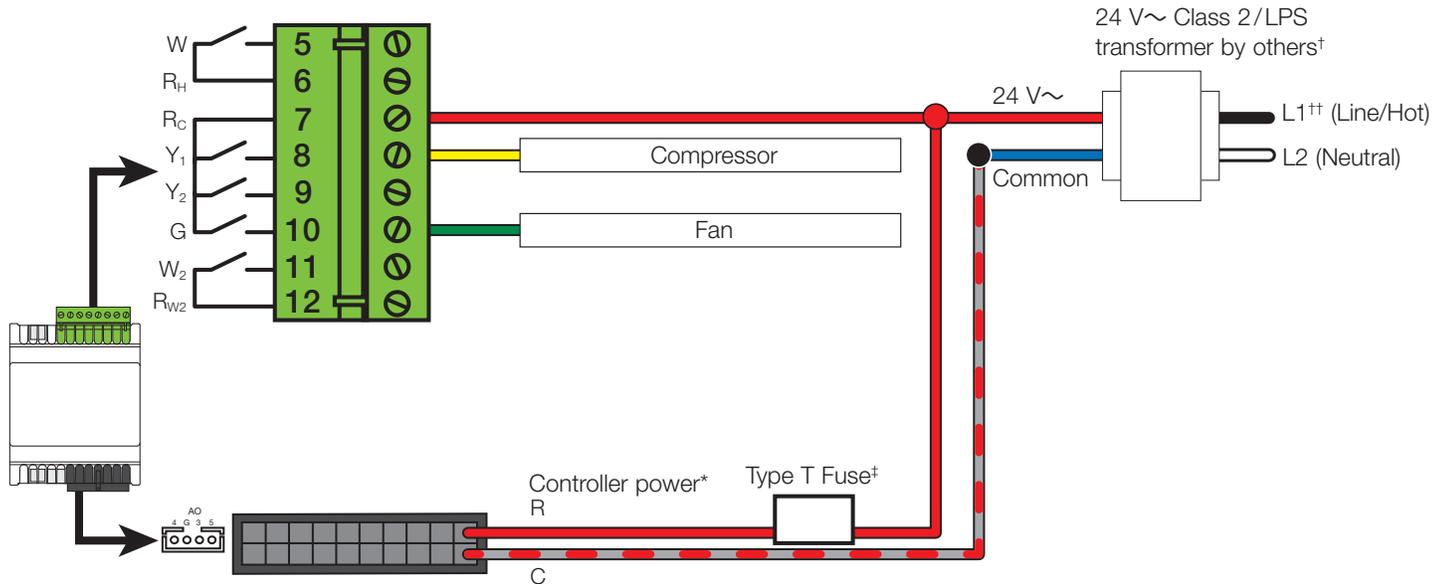
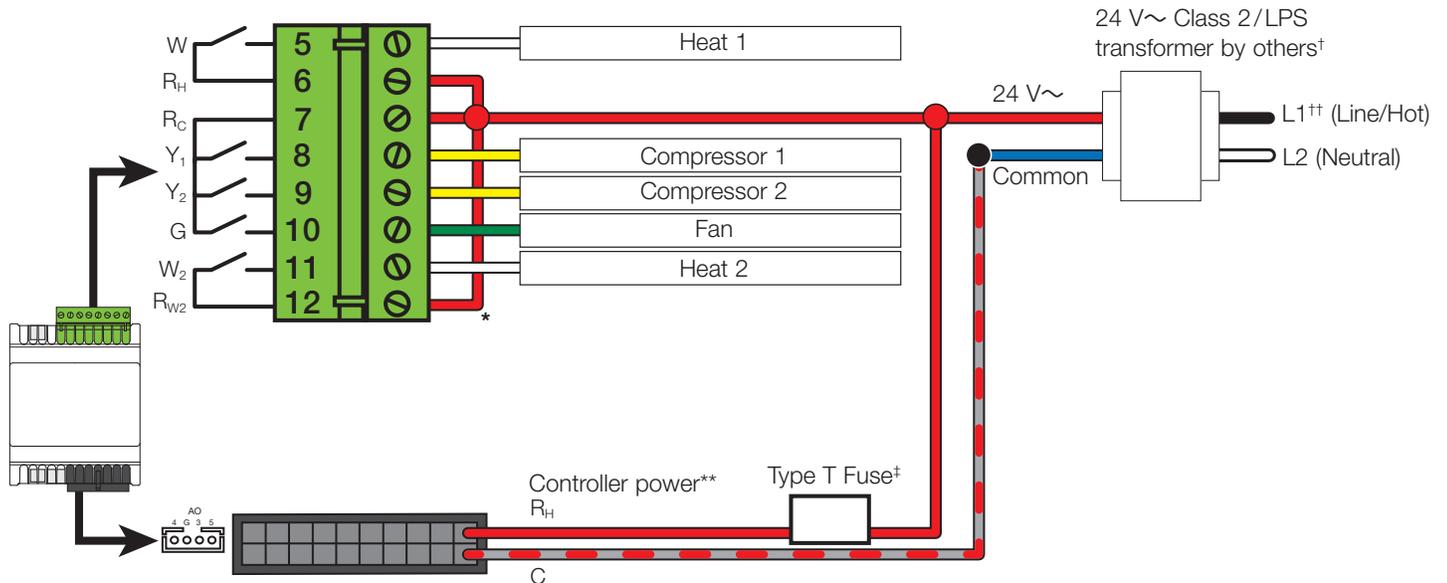


Diagram 10: 2 heat stages/2 cool stages system (1 transformer)



\* If a secondary transformer is available to power the auxiliary heat, connect the auxiliary transformer to pin 12 ( $R_{W2}$ ).  
 \*\* If the signal source from the HVAC system is not 24 V~, use a separate supply to power the HomeWorks QS Palladiom HVAC controller.  
 † A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.  
 ‡ Rated for 1.25 A.  
 †† L1 (Line/Hot) voltage of 120–240 V~ is acceptable.

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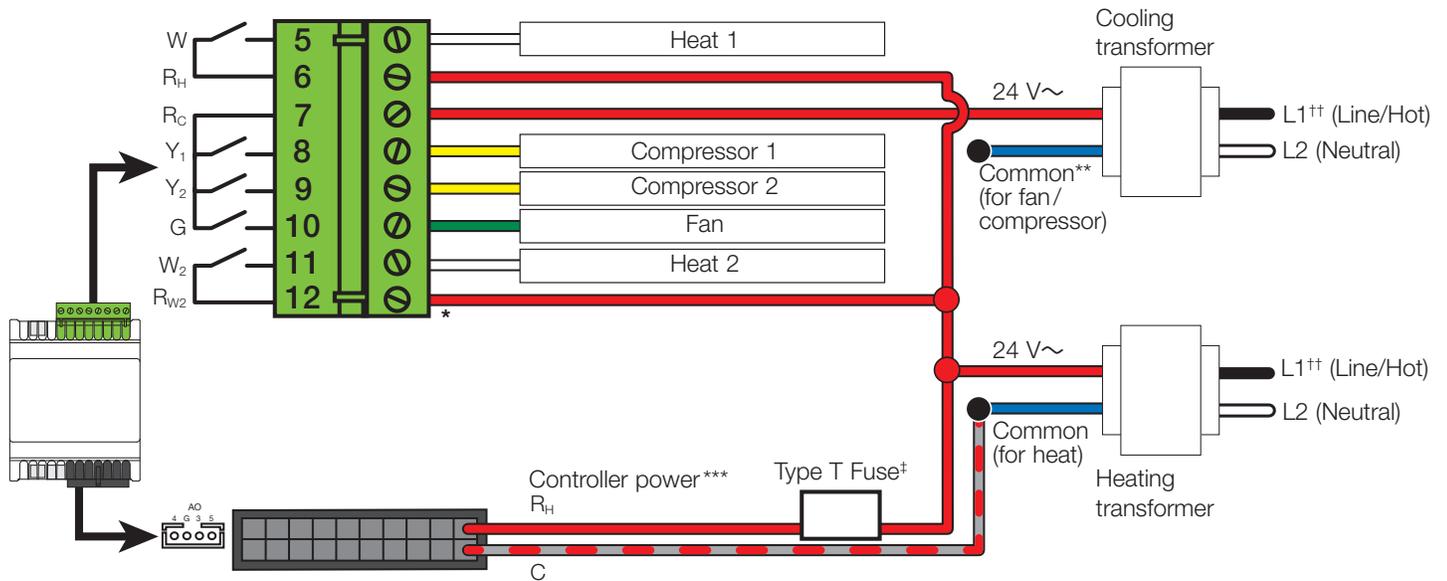
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# HomeWorks QS Palladiom HVAC Solution

## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

### Conventional Systems (continued)

Diagram 11: 2 heat stages/2 cool stages system (2 transformers)



\* If a secondary transformer is available to power the auxiliary heat, connect the auxiliary transformer to pin 12 (R<sub>W2</sub>).  
 \*\* In a two transformer system it is not necessary to connect the compressor common wires.  
 \*\*\* If the signal source from the HVAC system is not 24 V~, use a separate supply to power the HomeWorks QS Palladiom HVAC controller.  
<sup>‡</sup> Rated for 1.25 A.  
<sup>††</sup> L1 (Line/Hot) voltage of 120–240 V~ is acceptable.

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# HomeWorks QS Palladiom HVAC Solution

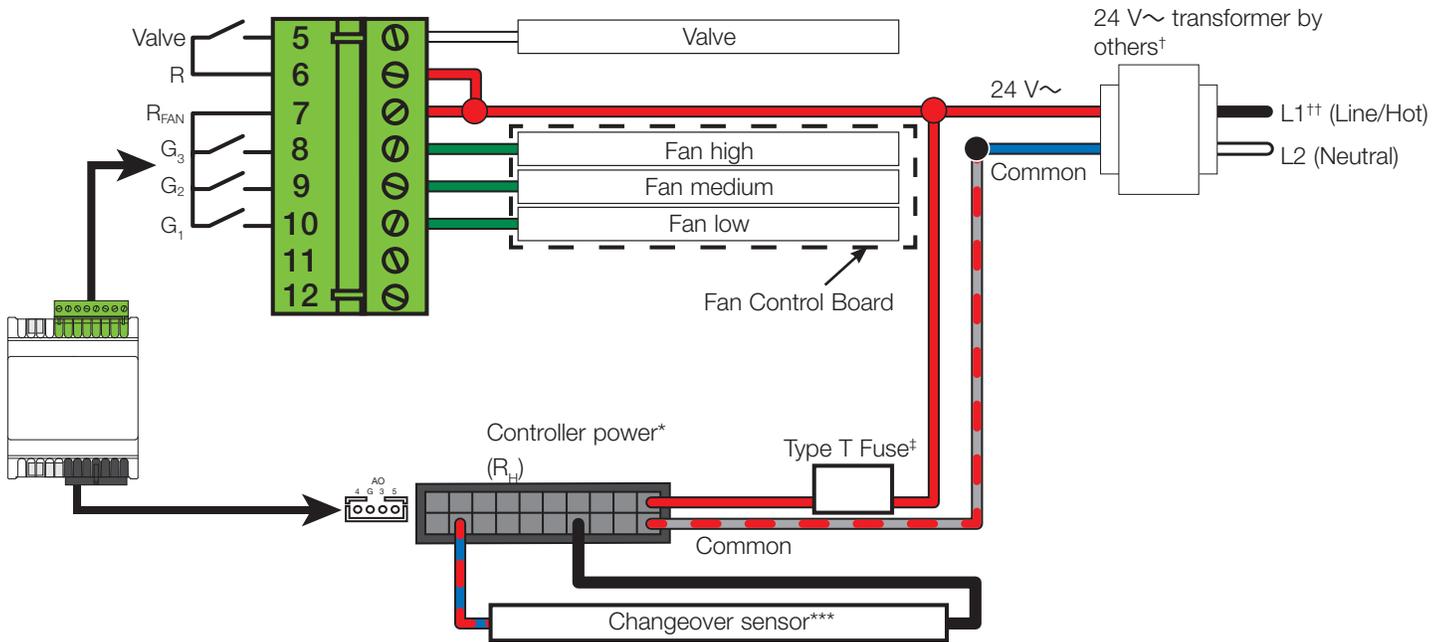
## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

### Fan Coil Units

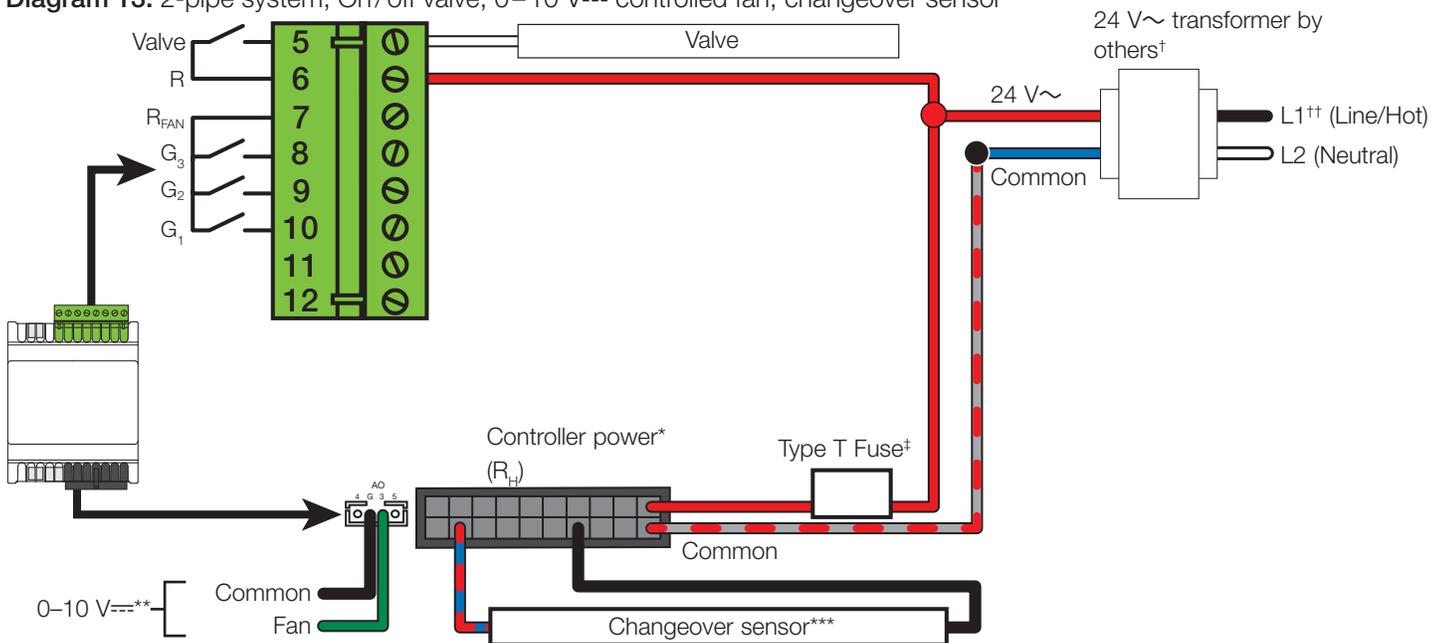
**Note:** Wire the controller according to the diagram below that corresponds to the system, valve, and fan type of the FCU. For more information on wiring using a control board or interposing relays, see Application Note #678 (048678) at [www.lutron.com](http://www.lutron.com). To extend relay life, each inductive load, driven by the relay contacts, must include a suppression device such as a peak limiter, RC circuit, or fly-back diode.

### 2-pipe Systems

**Diagram 12:** 2-pipe system, On/off valve, 3-speed fan, changeover sensor



**Diagram 13:** 2-pipe system, On/off valve, 0–10 V<sub>DC</sub> controlled fan, changeover sensor



\* If the signal source from the HVAC system is not 24 V<sub>AC</sub>, use a separate supply to power the Palladiom HVAC controller.  
 \*\* When using 0–10 V<sub>DC</sub> fan or valve control, a different power supply must be used to power the Palladiom HVAC controller and the 0–10 V<sub>DC</sub> fan/valve actuators. For more information, see Application Note #651 (048651) at [www.lutron.com](http://www.lutron.com)  
 \*\*\* Sensor is optional. Semitec 103AT or equivalent – NTC 10 k at 25 °C  
 † A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.  
 ‡ Rated for 1.25 A.  
 †† L1 (Line/Hot) voltage of 120–240 V<sub>AC</sub> is acceptable.

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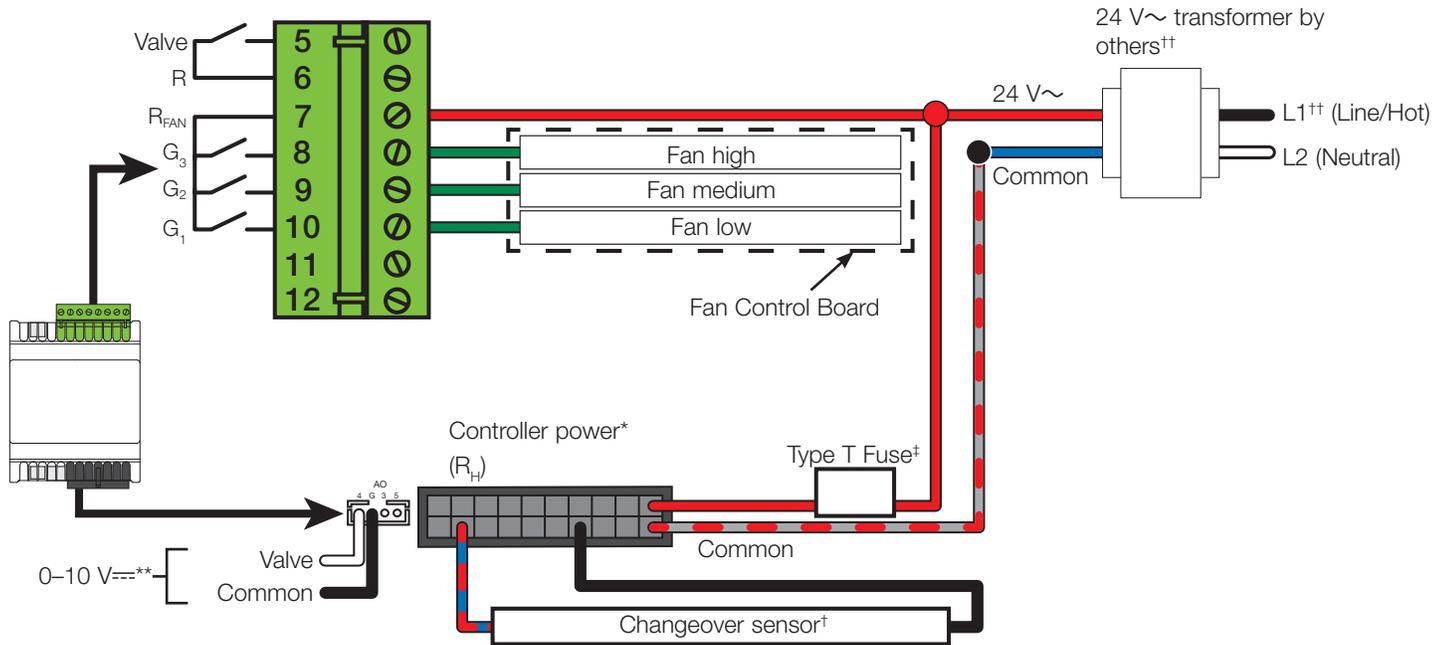
# HomeWorks QS Palladiom HVAC Solution

## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

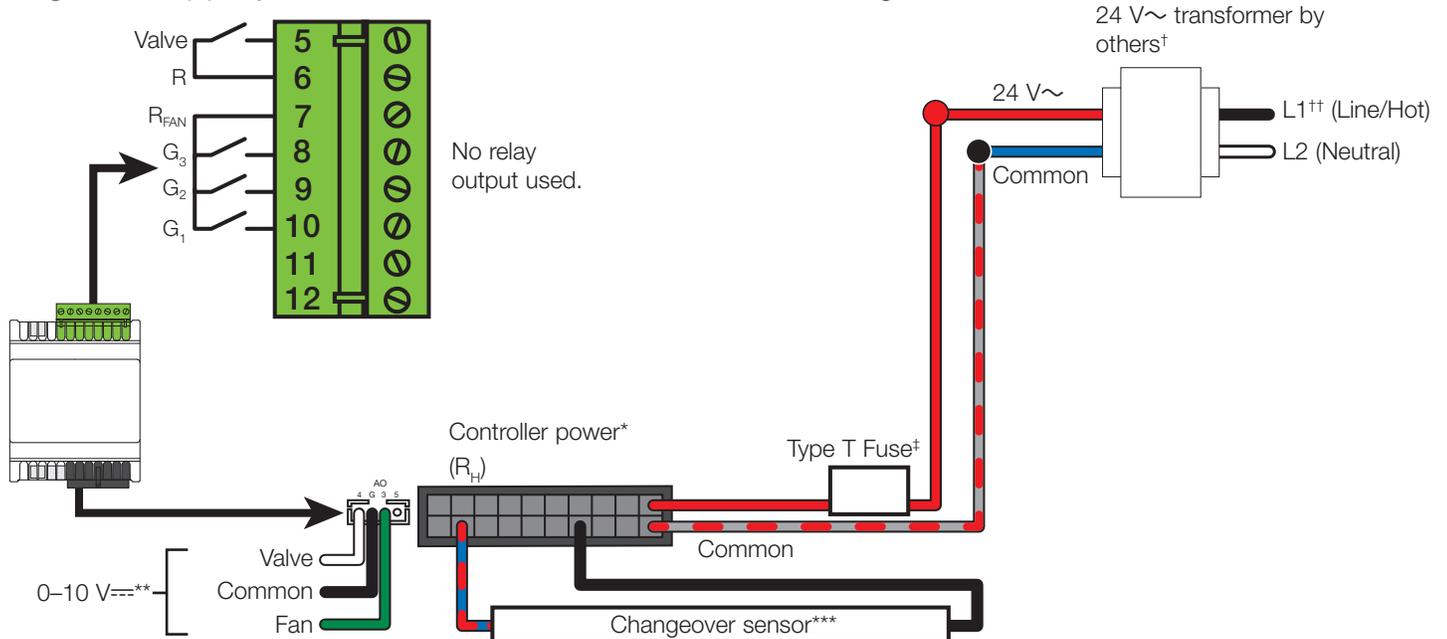
### Fan Coil Units (continued)

2-pipe Systems (continued)

**Diagram 14:** 2-pipe system, 0–10 V<sub>DC</sub> valve, 3-speed fan, changeover sensor



**Diagram 15:** 2-pipe system, 0–10 V<sub>DC</sub> valve, 0–10 V<sub>DC</sub> controlled fan, changeover sensor



\* If the signal source from the HVAC system is not 24 V<sub>AC</sub>, use a separate supply to power the Palladiom HVAC controller.

\*\* When using 0–10 V<sub>DC</sub> fan or valve control, a different power supply must be used to power the Palladiom HVAC controller and the 0–10 V<sub>DC</sub> fan/valve actuators. For more information, see Application Note #651 (048651) at [www.lutron.com](http://www.lutron.com)

\*\*\* Semitec 103AT or equivalent – NTC 10 k at 25 °C

† A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.

‡ Rated for 1.25 A.

†† L1 (Line/Hot) voltage of 120–240 V<sub>AC</sub> is acceptable.

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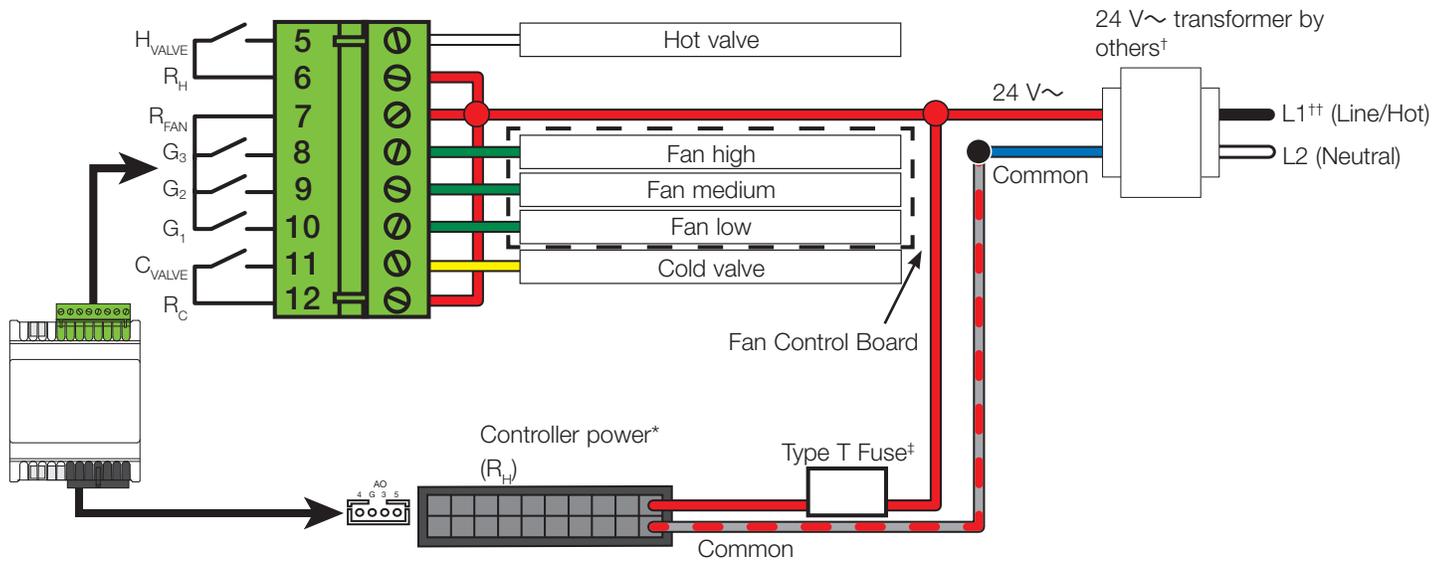
# HomeWorks QS Palladiom HVAC Solution

## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

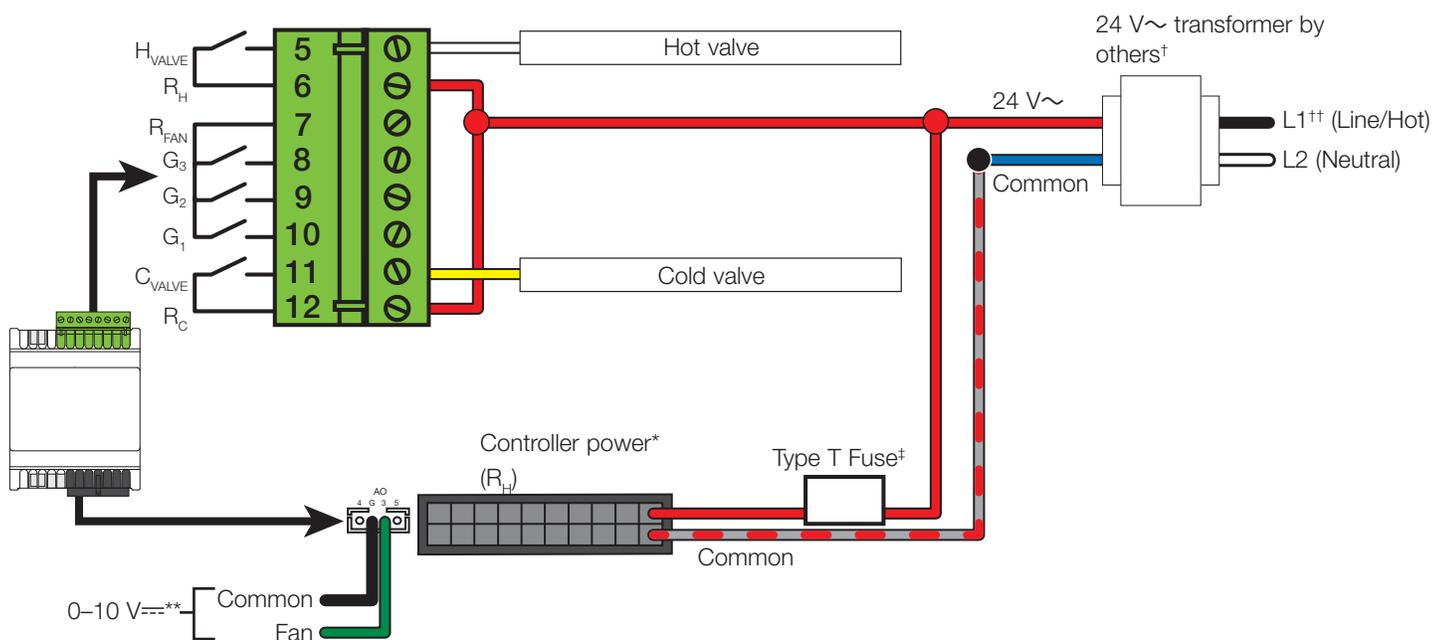
### Fan Coil Units (continued)

4-pipe Systems

**Diagram 16:** 4-pipe system, On/off valve, 3-speed fan



**Diagram 17:** 4-pipe system, On/off valve, 0–10 V<sub>DC</sub> controlled fan



\* If the signal source from the HVAC system is not 24 V~, use a separate supply to power the Palladiom HVAC controller.  
 \*\* When using 0–10 V<sub>DC</sub> fan or valve control, a different power supply must be used to power the Palladiom HVAC controller and the 0–10 V<sub>DC</sub> fan/valve actuators. For more information, see Application Note #651 (048651) at [www.lutron.com](http://www.lutron.com)  
 † A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.  
 ‡ Rated for 1.25 A.  
 †† L1 (Line/Hot) voltage of 120–240 V~ is acceptable.

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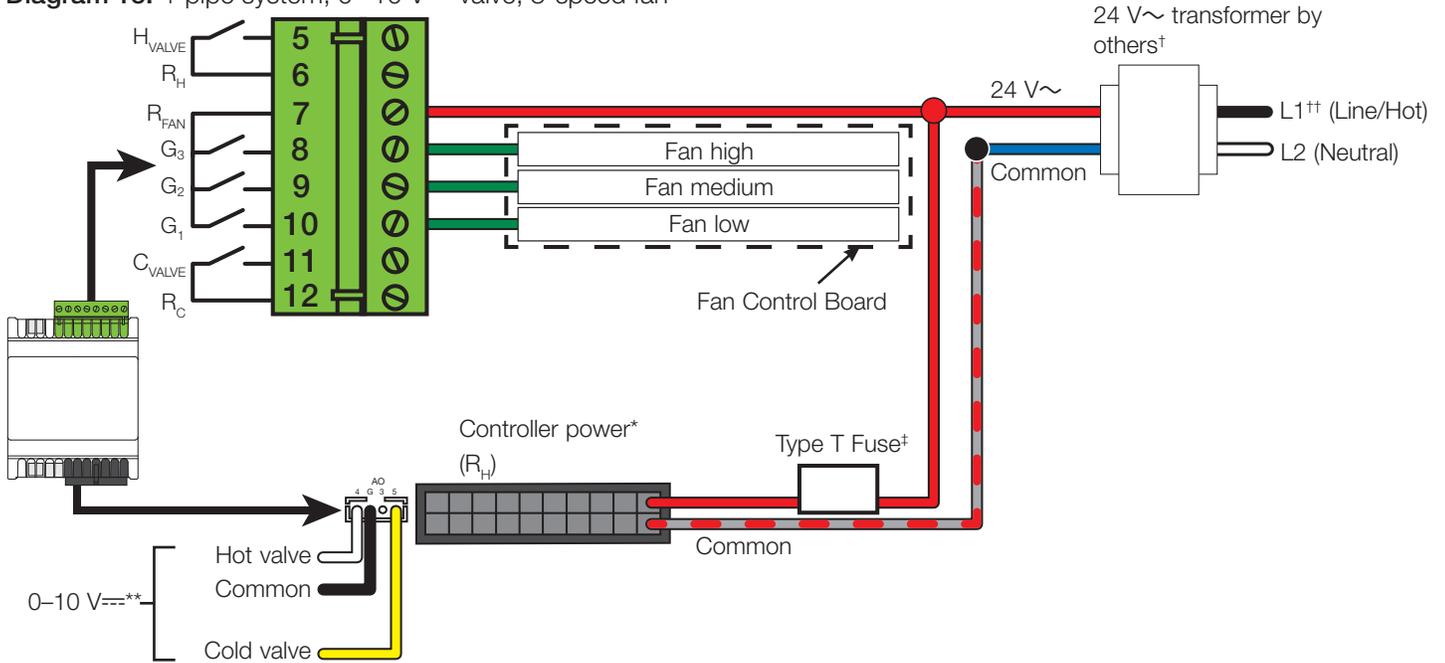
# HomeWorks QS Palladiom HVAC Solution

## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

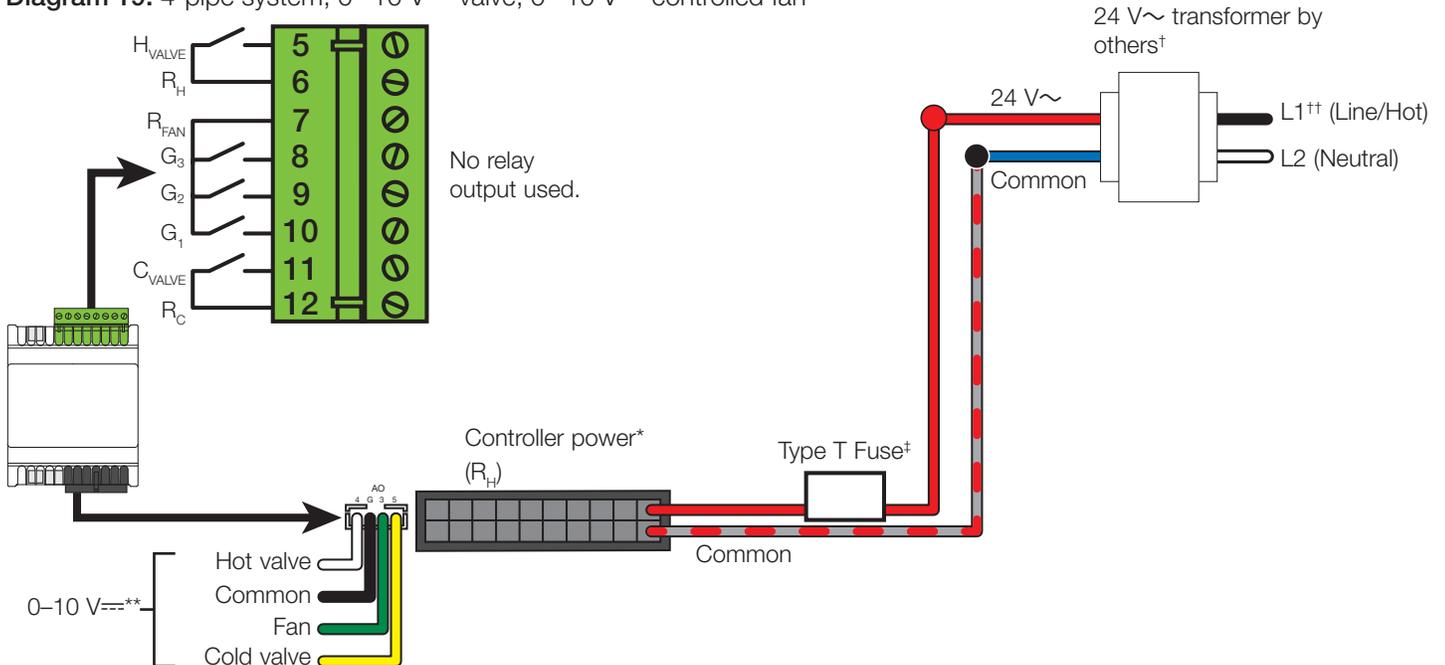
### Fan Coil Units (continued)

4-pipe Systems (continued)

**Diagram 18:** 4-pipe system, 0–10 V<sub>DC</sub> valve, 3-speed fan



**Diagram 19:** 4-pipe system, 0–10 V<sub>DC</sub> valve, 0–10 V<sub>DC</sub> controlled fan



\* If the signal source from the HVAC system is not 24 V<sub>AC</sub>, use a separate supply to power the Palladiom HVAC controller.

\*\* When using 0–10 V<sub>DC</sub> fan or valve control, a different power supply must be used to power the Palladiom HVAC controller and the 0–10 V<sub>DC</sub> fan/valve actuators. For more information, see Application Note #651 (048651) at [www.lutron.com](http://www.lutron.com)

† A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.

‡ Rated for 1.25 A.

†† L1 (Line/Hot) voltage of 120–240 V<sub>AC</sub> is acceptable.

Continued on the next page...

# HomeWorks QS Palladiom HVAC Solution

## HomeWorks QS Palladiom HVAC Controller Wiring Diagrams (continued)

### Radiant Floor

Diagram 20: On/off valve

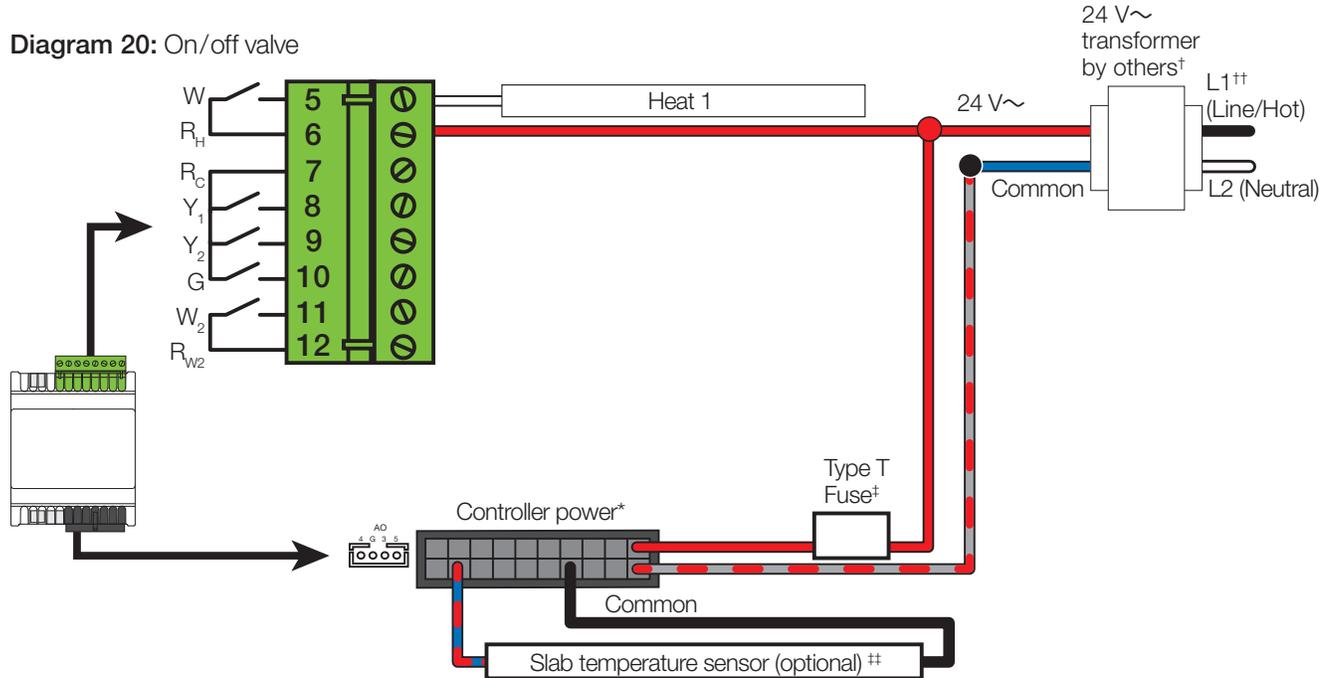
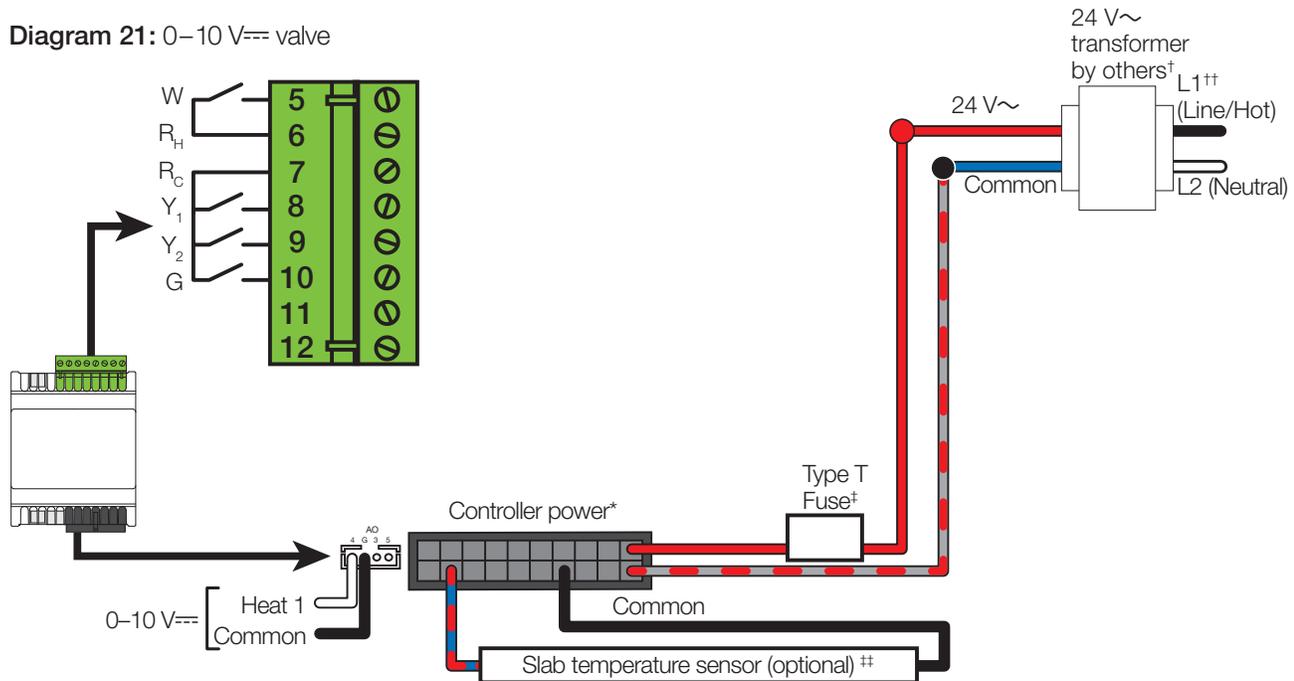


Diagram 21: 0–10 V<sub>DC</sub> valve



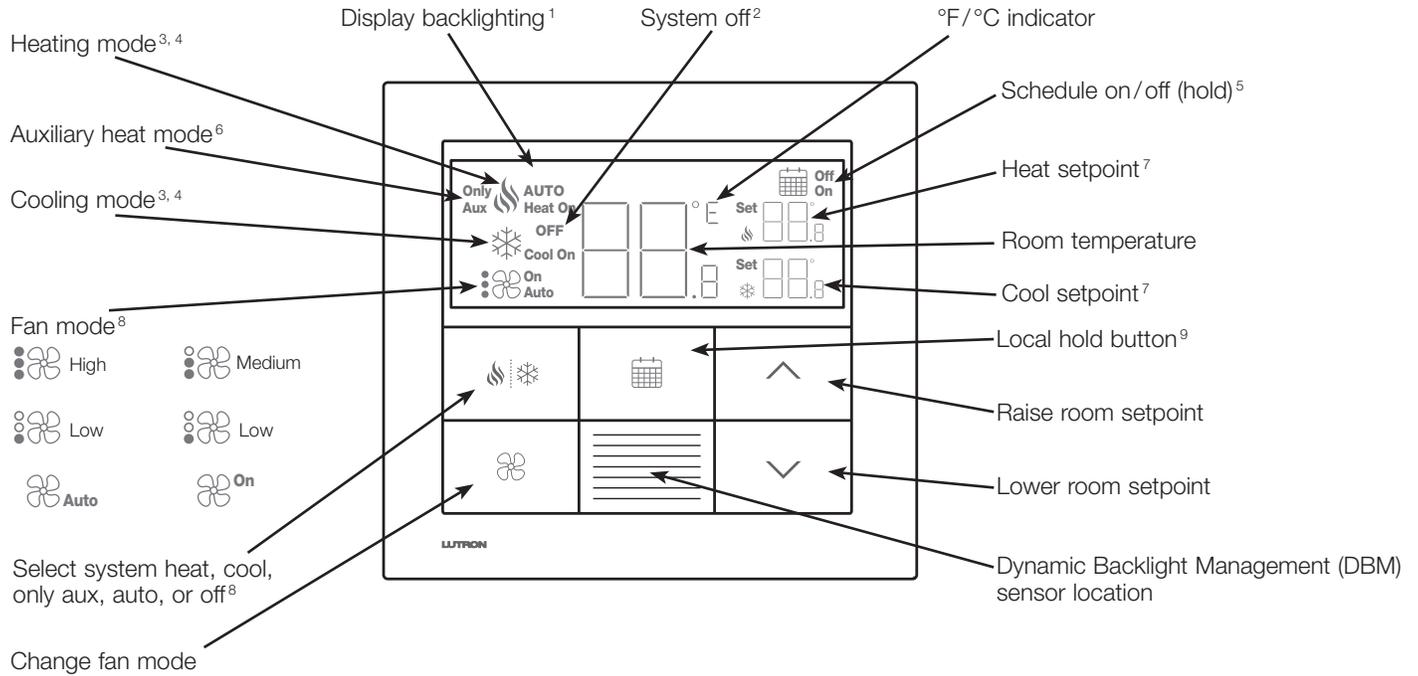
\* If the signal source from the HVAC system is not 24 V<sub>AC</sub>, use a separate supply to power the Palladiom HVAC controller.  
 † A Class 2/LPS transformer should be used. The transformer should be rated to supply the power drawn by external circuits as well as the controller.  
 ‡ Rated for 1.25 A.  
 †† L1 (Line/Hot) voltage of 120–240 V<sub>AC</sub> is acceptable.  
 ††† Use a thermistor type NTC, 10 kΩ at 25°C, or a thermistor with an equivalent temperature-resistance curve.

Temperature	°C	5	10	15	20	25	30	35
	°F	41	50	59	68	77	86	95
Resistance (kΩ)		22.05	17.96	14.69	12.09	10.00	8.31	6.94

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# HomeWorks QS Palladiom HVAC Solution

## User Interface



<sup>1</sup> Turns on when any button is pressed. Turns off after 10 seconds of inactivity (programmable). Dynamic Backlight Management (DBM) automatically adjusts backlight intensity based on ambient lighting conditions.

<sup>2</sup> Room temperature and "OFF" are shown when system is off.

<sup>3</sup> Icons are animated when system is actively heating/cooling.

<sup>4</sup> Icons flash if system is temporarily delayed for HVAC equipment protection.

<sup>5</sup> Indicates HVAC system timeclock event status.

<sup>6</sup> "Aux" indicates that auxiliary heat is running with the other heat stages. "Only Aux" indicates that auxiliary heat is running without the other heat stages (emergency heat).

<sup>7</sup> Display shows the heat or cool setpoint. The first raise/lower button press activates the LCD backlight. Additional raise/lower button presses adjust the setpoint.

<sup>8</sup> Applicable modes are configurable via the HomeWorks QS software.

<sup>9</sup> Enables/disables HVAC system timeclock events.

# HomeWorks QS Palladiom HVAC Solution

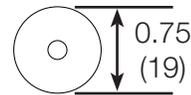
## Remote Temperature Sensor

If it is not possible to follow the recommended mounting guidelines on page 10, use an indoor remote temperature sensor for proper temperature control. The remote temperature sensor must be enabled through advanced programming via the thermostat. There can be a maximum of one remote temperature sensor per HVAC Controller. Doing this will automatically disable the internal thermostat sensor. See the **HomeWorks QS Palladiom Thermostat Configuration Guide** (032498) at [www.lutron.com](http://www.lutron.com)

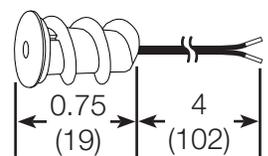
### Wired Flush Mount Sensor (LR-TEMP-FLSH)

- Flush mount on wall in the area to be controlled.
- Field paintable to match decor.

Front View

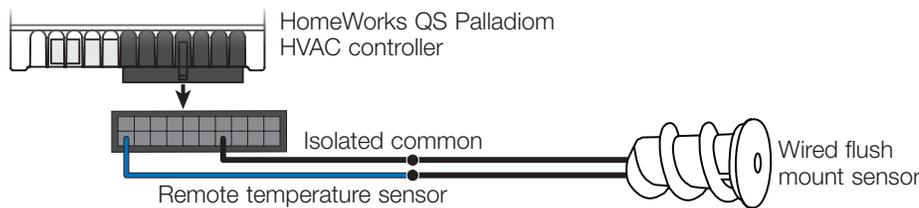


Side View



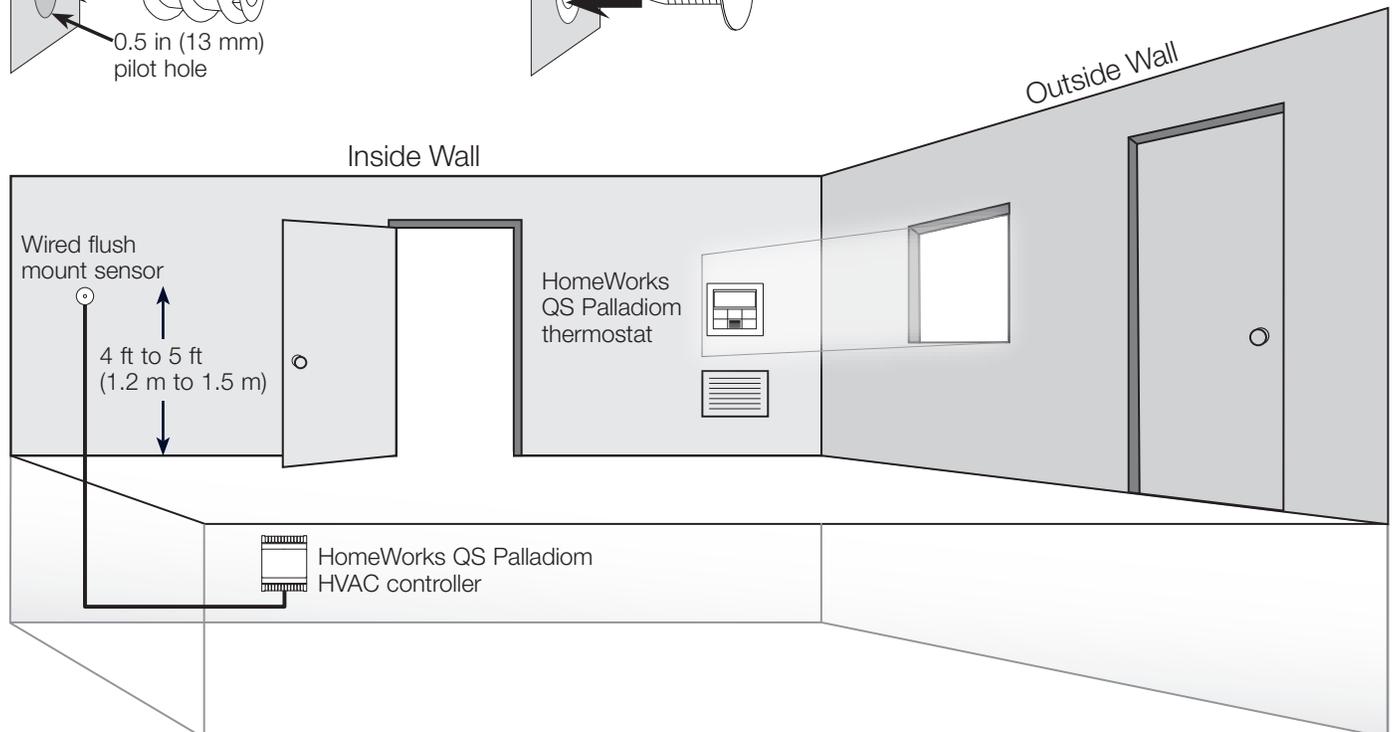
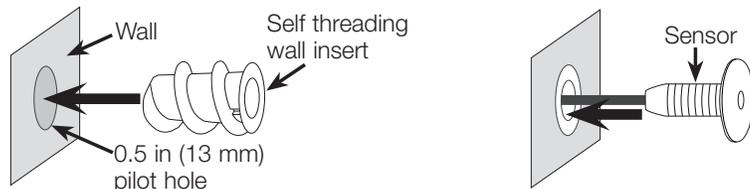
### Wiring

Use 22 AWG (0.5 mm<sup>2</sup>) twisted, shielded pair wiring. Maximum wire length: 100 ft (30.5 m)



### Mounting

Use appropriate mounting instructions from the **Mounting** section on page 10.



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# HomeWorks QS Palladiom HVAC Solution

## Colors and Finishes (thermostat)

### Architectural Matte Finishes

	Almond <b>AL</b>
	Beige <b>BE</b>
	Black <b>BL</b>
	Brown <b>BR</b>
	Gray <b>GR</b>
	Ivory <b>IV</b>
	Light Almond <b>LA</b>
	Sienna <b>SI</b>
	Taupe <b>TP</b>
	White <b>WH</b>

### Architectural Metal Finishes

	Bright Brass <b>BB</b>
	Bright Chrome <b>BC</b>
	Bright Nickel <b>BN</b>
	Polished Graphite <b>PG</b>
	Satin Brass <b>SB</b>
	Satin Chrome <b>SC</b>
	Satin Nickel <b>SN</b>

### Glass Finish

	Clear Black Glass <b>CBL</b>
	Clear White Glass <b>CWH</b>

- Due to printing limitations, colors and finishes shown cannot be guaranteed to perfectly match actual product colors.
- Color chip keychains are available for more precise color matching:
  - Architectural Matte Finishes: AM-CK-1
  - Architectural Metal Finishes: AMTL-CK-1

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LG is a registered trademark of LG Corp.  
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