

# YCCS System Manager and Zone Coordinator

## YK-SMU2xx-0, YK-ZCUxx0-0 Installation Instructions

### Applications

The System Manager and Zone Coordinator are members of the York Commercial Comfort System (YCCS) family. The System Manager and Zone Coordinator bring an entirely new generation of Building Automation System (BAS) technology to light commercial systems. The System Manager and Zone Coordinator are system level controllers that manage facilities using information and Internet Technology.

### North American Emissions Compliance

#### United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

#### Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### Installation

Follow these guidelines when installing the System Manager or ZC:

- transport the System Manager or ZC in the original container to minimize vibration and shock damage.
- Do not drop the controllers or subject it to shock.
- Do not open the controller housing. The controllers have no user-serviceable parts inside.

### Parts Included

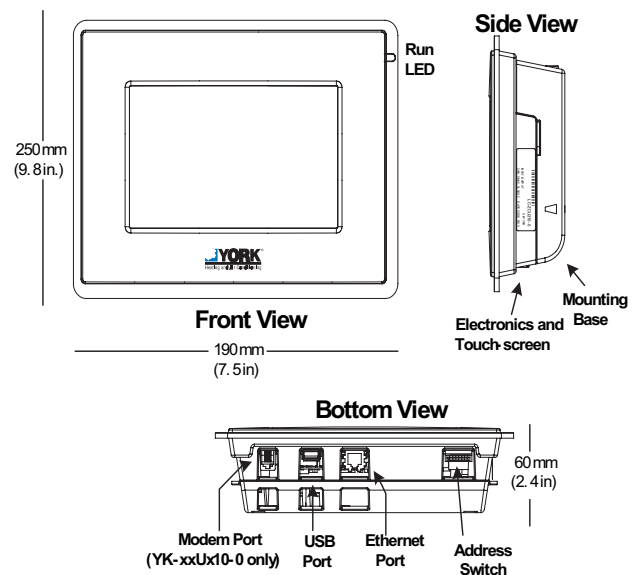
One System Manager or Zone Coordinator with removable mounting base.

### Materials and Special Tools Needed

- Three fasteners appropriate for the mounting surface (M4 screws - #8 screws)
- Wire Strippers
- Phillips head screwdriver
- a small straight head screwdriver
- 22 gauge 3 conductor twisted shielded wire with a drain wire, electricians tape, and wire nuts for 22 gauge drain wire

**Note:** This drain wire is only used to group the shielded cable. Do not use this drain wire as a connection to the board.

### Dimensions



**Figure 1: System Manager and Zone Coordinator Dimensions and Configuration**

## Accessories

Table 1 lists the System Manager and Zone Coordinator accessory.

**Table 1: System Manager and ZC Accessory**

Product Code Number	Description
Y65T42-0	Transformer, 120/208/240 VAC primary to 24 VAC secondary, 40 VA hub mount, Class 2

## Mounting

### Location Considerations

Follow these guidelines when mounting the System Manager or Zone Coordinator:

- Ensure that the mounting surface can support the controller and any user-supplied enclosure.
- Mount the controller in proper orientation (Figure 1).
- Mount the controller on an even surface in wall mount applications whenever possible. If you must mount the controller on an uneven surface, be careful not to crack the controller housing when tightening the screws. Use shims or washers to mount the controller evenly on the uneven surface.
- Mount the controller in areas free of corrosive vapors, and observe the environmental limitations. See the Technical Specifications section.
- Allow sufficient space for cable and wire connections (Figure 2).
- Do not mount the controllers where ambient temperatures may exceed 50°C (122°F).
- Do not mount the controller on surfaces prone to vibration or in areas where electromagnetic emissions can interfere with controller communication.
- Do not obstruct the controller housing ventilation holes.
- Do not mount power transformers below the controller.

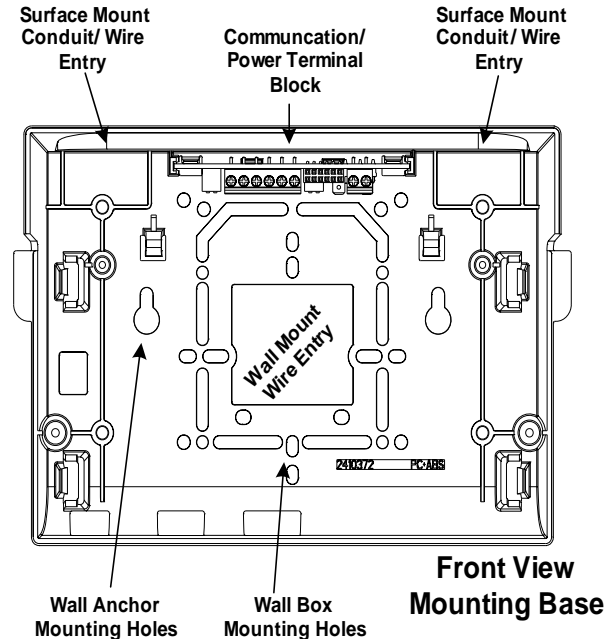
For applications where the controller is mounted inside a panel or enclosure, follow these additional guidelines:

- Do not install the controller in airtight enclosures
- Do not install heat-generating devices in the enclosure with the controller that may cause the ambient temperature to exceed 50°C (122°F)

### Mounting the Controller

To mount the controller on a vertical surface:

1. Hold the controller base up to the wall and mark the location of the wall mount holes.
2. Drill holes in the wall at the locations marked.
3. Position the controller base, insert the screws through the holes in the mounting base, and carefully tighten the screws.



**Figure 2: Mounting Base Configuration**

**IMPORTANT:** Do not overtighten the mounting screws. Overtightening the screws may damage the controller housing.

### Enclosure Mount Applications

Follow the manufacturer's installation instructions when mounting the enclosure. See [Location Considerations](#) and [Mounting the Controller](#) for details on mounting the controller within the controller.

### Wiring

#### Power Supply, Network, and Communication Bus Connections

See Figure 1 and Figure 3 for the location of System Manager or Zone Coordinator ports, modular jacks, and terminal blocks.

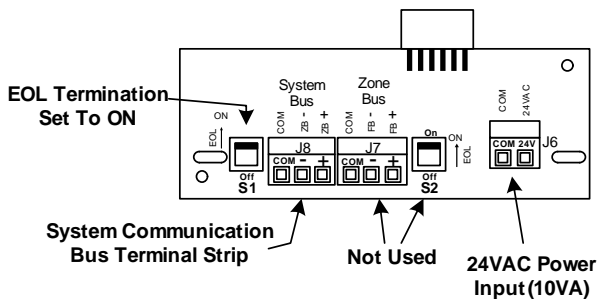
#### Power Supply

In North America, the Zone Coordinator and System Manager requires a dedicated Class 2, 24 VAC, 10 VA minimum power supply.

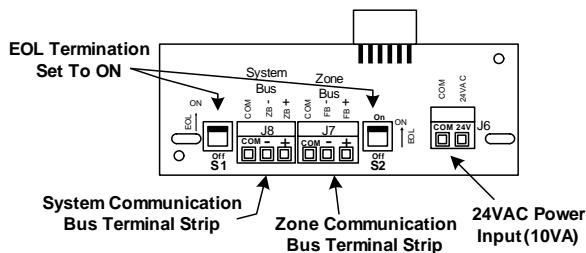
## System Communication/Zone Communication Bus Port

The YK-SMUxxx-0 models support the System Bus. The YK-ZCUxxx-0 models are designed to support one System Communication Bus and one Zone Communication bus.

Connect a System Communication Bus to the 3-wire terminal block plug labeled System Bus on the System Manager (Figure 3). Connect a Zone Communication Bus to the 3-wire terminal block plug labeled System Bus on the ZC (Figure 4). Table 2 and Table 3 describe the bus rules and bus device limits.



**Figure 3: System Manager System Communication Terminal Block Detail**



**Figure 4: Zone Coordinator System Communication Terminal Block Detail**

## USB Port

The Universal Serial Bus (USB) port connects an external memory storage device (USB memory stick, Type U1 or U2) for configuration parameter backup purposes.

## Ethernet Port

The Ethernet connection (10 or 100 Mbps) is an 8-pin RJ-45 network port (Figure 1). Use the Ethernet port to connect to Internet Protocol (IP) networks for remote user access.

## Optional Internal Modem

Both the YK-SMU210-0 and the YK-ZCUx10-0 controller models have an internal modem and a 6-pin RJ-11 modular jack. Insert a standard phone line plug to connect the internal modem.

## Wiring the System Manager and Zone Coordinator



### CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

**IMPORTANT:** Use copper conductors only. Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the System Manager or Zone Coordinator's electrical rating.

**IMPORTANT:** Prevent static electricity discharge to the controllers. Static electric discharge may damage the controller and void any warranties.

**IMPORTANT:** Ensure the building automation network wiring meeting the specifications, rules, and guidelines in the *Power Supply, Network, and Communication Bus Connections* section.

**Note:** Securely mount the controller before wiring. See the *Mounting the Controller* section.

Follow these guidelines when wiring the System Manager and Zone Coordinator controllers:

- Route the supply power wires and communication cables at least 50 mm (2 in.) away from the vent slots on the sides of the controller housing.
- Provide slack in the wires and cables. Keep cables routed neatly around the controller to promote good ventilation, Light-Emitting Diode (LED) visibility, and ease-of-service.

To Wire the Controller:

1. Connect the Ethernet communication cable to the RJ-45, 8-pin Ethernet port (Figure 1).

**Note:** The Ethernet communication cable is optional. It is only required for remote access to the controller.

2. Connect the three System Communication Bus wires to the 3-terminal block for the System Manager and/or connect the three Zone Communication Bus wires for the Zone Coordinator (Figure 3 and Figure 4).

**Note:** When the controllers are connected to the System Communication Bus, you must set the End-of-Line (EOL) switch to the ON position (Figure 3 and Figure 4).

3. Connect the telephone line to the modem port, if necessary.
4. Connect the 24 VAC power supply wires from the transformer to the terminal block (Figure 3 and Figure 4).

**Note:** Power supply wire colors may be different on transformers not manufactured by Johnson Controls, Inc. Follow the manufacturer's transformer instructions or project installation drawings.

**Note:** The 24 VAC power should be connected to all network devices so transformer phasing is uniform across the devices. Powering devices with uniform 24 VAC supply power phasing reduces noise, interference, and ground loop problems. The controllers do not require an earth ground connection.

Table 2 outlines the System and Zone Communication Bus rules for the controllers.

**Table 2: System and Zone Communication Bus Rules**

Category	Rules and Maximums Allowed
<b>General</b>	One System Communication Bus trunk support per System Manager. Only daisy-chained field controllers. One System Communication Bus and one Zone Communication Bus supported per ZC. Only daisy-chained field controllers.
<b>Number of Devices Supported</b>	YK-SMU2xx-0 models support up to 38 devices on the System Communications Bus. Acceptable controllers on the System Bus are Zone Coordinators (maximum of 10), factory-mounted or field-mounted Rooftop Unit (RTU) controllers (maximum of 24), and Input/Output Modules (IOM) controllers (maximum of 4). The YK-ZCUxxx-0 models can support up to 26 devices on the Zone Communication Bus. Acceptable controllers on the Zone Communication Bus are Zone Damper Controllers (maximum of 24), factory-mounted or field-mounted Change-over/Bypass RTU controllers (maximum of 1), and Bypass Damper Controller (maximum of 1).
<b>Bus Length</b>	1,000 feet of cable
<b>Cable Type</b>	Stranded 0.6 mm (22 AWG) 3-wire twisted, shielded cable with drain wire. Stranded 0.6 mm (22 AWG) 4-wire (two-twisted-pairs) shielded cable is acceptable. <b>Note:</b> The + and - bus leads should be a twisted pair. On Bus applications using 4-wire (two-twisted-pairs) cable, isolate and insulate unused conductors.
<b>Terminations</b>	One EOL switch in the ON position.

**Table 3: Controller Ethernet Rules**

Category	Rules and Maximums Allowed
<b>General</b>	Point-to-point star topology with network hubs/switches.
<b>Line Length and Type</b>	2,012 m (6,600 ft) for plastic/glass fiber optic with external adapter. 100 m (330 ft) CAT5 cable.
<b>Terminations</b>	For 10/100 BaseT, no line terminators allowed.

## Setup and Adjustments

To quickly set up your YCCS network:

1. On each end of the three-conductor cable, strip the outside insulation back approximately 2 inches. Tear off excess foil shield, leaving the bare drain wire and the three insulated conductors. On each end of the three insulated conductors in the cable, strip the insulation back approximately 1/8 to 1/4 inch.  
Pick a color pattern to follow and insert each of the three conductors into one each of the three terminals on the YCCS board communication

- connector. Tighten each terminal until the wire is secure. Ground the drain wire at one end only of the communication trunk. Do this on the last unit in line. Use an existing hole or drill a hole and insert a sheet metal screw in the back plate below the communication connector. Wrap the bare drain wire around the screw and tighten the screw. This is the only location where the shield is grounded.
2. Daisy chain the three-conductor wire between the remaining controller assemblies. Connect the drain wires together with the wire nuts. Follow the stripping and connecting procedure in Step 1.

- Run the cable from the last unit to the location of the Zone Coordinator. Follow the connection instructions for the controllers. Figure 7 displays a typical communication riser.
- Make sure all the controllers are powered and operating properly.
- Go to each unit and repeat the set-up instructions.

**Note:** Ensure to observe polarity of each of the conductors in the communication cable.

**Communication Bus**

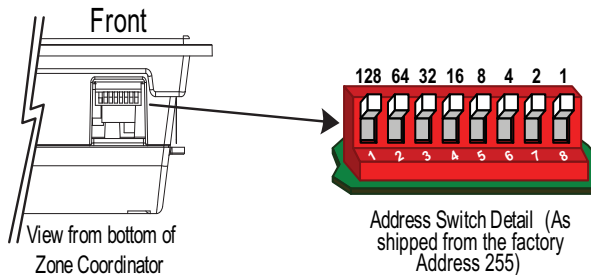
**Determining the System Manager Address Switch**

The System Manager address switch is always set to 0; therefore, you do **not** need to determine the System Manager address.

**Determining the Zone Coordinator Bus Address**

The bus address switch sets a unique address for this controller on the System Communication bus. The default address setting is 255 (all ON). You must change the default address.

Set consecutive addresses 8-17 for Zone Coordinator on the System Communication bus. Use sequential addressing with no gaps in the device address range to ensure best bus performance. Table 4 and Figure 6 show System Communication Bus address switch settings.



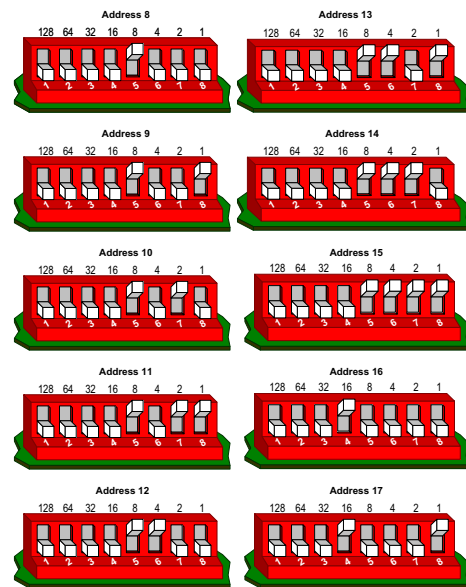
**Figure 5: ZC Address Switch Detail**

**Table 4: System Communication Bus Address Summary**

Address	Description
8 - 17	Zone Coordinator on the System Communication Bus

**Setting the EOL Switch**

System Communication RS-485 serial protocol bus segments require proper EOL termination to reduce interference from signal bounce back on the bus segment. They system requires at least one termination on the bus segment.



**Figure 6: Zone Coordinator Address Switch Settings**

The System Manager and Zone Coordinator are shipped with the EOL switch in the factory default, ON (up) position.

**Powering On the System Manager and Zone Coordinator**

After applying 24 VAC power, the controllers require approximately 2 minutes to start up and become operational. Startup is completed and the controllers are operational when the Homepage appears on the screen. The green RUN LED appears and is On steady.

**IMPORTANT:** Wait for the controller to complete the start-up sequence and the RUN LED to go On before initiating other actions.

**Disconnecting Power from the System Manager and Zone Coordinator**

When the 24 VAC power supply is disconnected or lost from the System Manager or Zone Coordinator, the controllers are non-operational.

**Sequence of Operation**

**Rooftop Unit (RTU) Controller Heat/Cool Mode Determination**

The Zone Coordinator determines the Heat or Cool Mode of the RTU controller based on the individual votes from its associated zones. Controller zone votes can be one of the five following states:

- Urgent Heat
- Heat

- Satisfied
- Cool
- Urgent Cool

The Zone Coordinator collects votes from zones every 5 seconds. Details on the Zone Coordinator voting:

- Any zone with its zone Voting Attribute (set in the user interface, Default = True) set to FALSE are not counted.
- Any zone with an unreliable zone sensor is not counted.
- Any zone with a zone temperature remaining more than 3 degrees from setpoint for 60 minutes is not counted. Zone temperatures must return within 1 degree of active setpoint to return to voting status.

Upon initial powerup or upon the transition from unoccupied to occupied modes, the Zone Coordinator sets the Heating or Cooling mode based on the greatest number of heating or cooling requests. In the event of an equal number of heating and cooling requests, the default is Heat.

Once the Zone Coordinator has selected a Heating or Cooling Mode, it changes based on the following conditions:

- Number of Requests is  $\geq$  Minimum Number of Requests to Change (set in the user interface, Default = 2) **and** all current Requests have been satisfied (Zone votes changed to Satisfied)

**or**

- Number of Urgent Requests is  $\geq$  Minimum Urgent Request to Change (set in the user interface, Default = 2)

**and**

- Minimum Time Between Changeovers has been met (set in the user interface, Default = 15 minutes)

#### **Discharge Air Temperature (DAT) Setpoint Determination**

When the Heat/Cool mode is set to Cool, the DAT setpoint is set to the Cooling DAT setpoint (set in the user interface, Default = 55°F).

When the Heating/Cooling mode is set to heat the DAT setpoint is set to the Heating DAT setpoint (set in the user interface, Default = 110°F).

#### **Morning Warm-up and Pre-cool Operation**

Upon transition to the Occupied mode, the system enters the Morning Warmup/Pre-cool mode. In this mode, the unit Economizer module disables unless the mode is Cool. The unit stays in this mode until one of the following conditions has occurred:

- one hour passes
- 50% of the voting zones are satisfied or have opposing votes (such as calling for cooling during the morning warm-up)
- the Heat/Cool mode changes

#### **Balancer Mode**

When the system is placed in the Balancer Mode, the following occurs:

- Rooftop Unit (RTU) controller runs the fan and lockout heating or cooling
- Zone dampers fully open
- Bypass controllers fully close

#### **Troubleshooting**

Table 5 helps you troubleshoot potential zone and bypass controller issues.

**Table 5: Status LEDs**

<b>LED INdication</b>	<b>Description</b>
<b>Green</b>	On Steady. The controller is getting power from the 24 VAC power supply and no unacknowledged alarms are present.
<b>Red</b>	On Steady. The controller is getting power from the 24 VAC power supply and unacknowledged alarm conditions are present.
<b>Off</b>	Controller is not receiving 24 VAC power or the controller is in start-up mode.

The following information helps you troubleshoot the YK-SMU2x0-0 and the YK-ZCUxx0-0 controllers.

#### **Communication Problems**

Several factors may influence the behavior of the System Communication bus. In addition, certain problems can affect the bus in multiple ways and have multiple symptoms, which makes the exact diagnosis difficult. For example, duplicate addresses on the bus can degrade performance, make the device go offline, or stop communication completely.

**Incomplete Address**

The YK-ZCUxx0-0 Zone Coordinator must have the address switch set to a range between 8 - 17 on the System Communication bus. Other settings prevent the Zone Coordinator from communicating on the System Communication bus.

**Duplicate Addresses**

Two or more devices on a communication bus cannot have the same address; for example, two Zone Coordinators on the System Communication bus cannot both have an address of 8. If two devices on the same bus have the same address, performance can degrade or serious communication problems may occur. This includes the devices not coming online and all communication stopping completely.

Check for duplicate addresses, in the following ways, depending on the severity of the situation:

- If the bus performance is degraded, check the address switch settings at the devices with unreliable communications.
- If the bus communication problems are severe, and no communication is present, or you can not determine where communication is unreliable, partition (disconnect and isolate a portion of the bus for testing purposes) and test the bus portion connected to the System Manager and Zone Coordinator controllers.

**Correcting Physical Communication Bus Problems**

The communication bus is subject to a number of physical factors that can affect performance. Consider the following list of common physical attributes:

- Check wires
- Verify proper wire gauge, connections, polarity, and lengths
- Look for opens and shorts
- Check terminations
- Check addresses
- Check for duplicate addresses
- Verify the address range is sequential
- Check for and eliminate T-Taps (wire configurations that create a T shape) and star configurations.
- Check for sources of interference
- Verify power at the controller

**Repair Information**

If the System Manager or Zone Coordinator controllers fail to operate within their specifications, replace the unit. For a replacement controller, contact the nearest Source 1 representative.

Figure 7 shows a System Manager and Zone Coordinator communication riser.

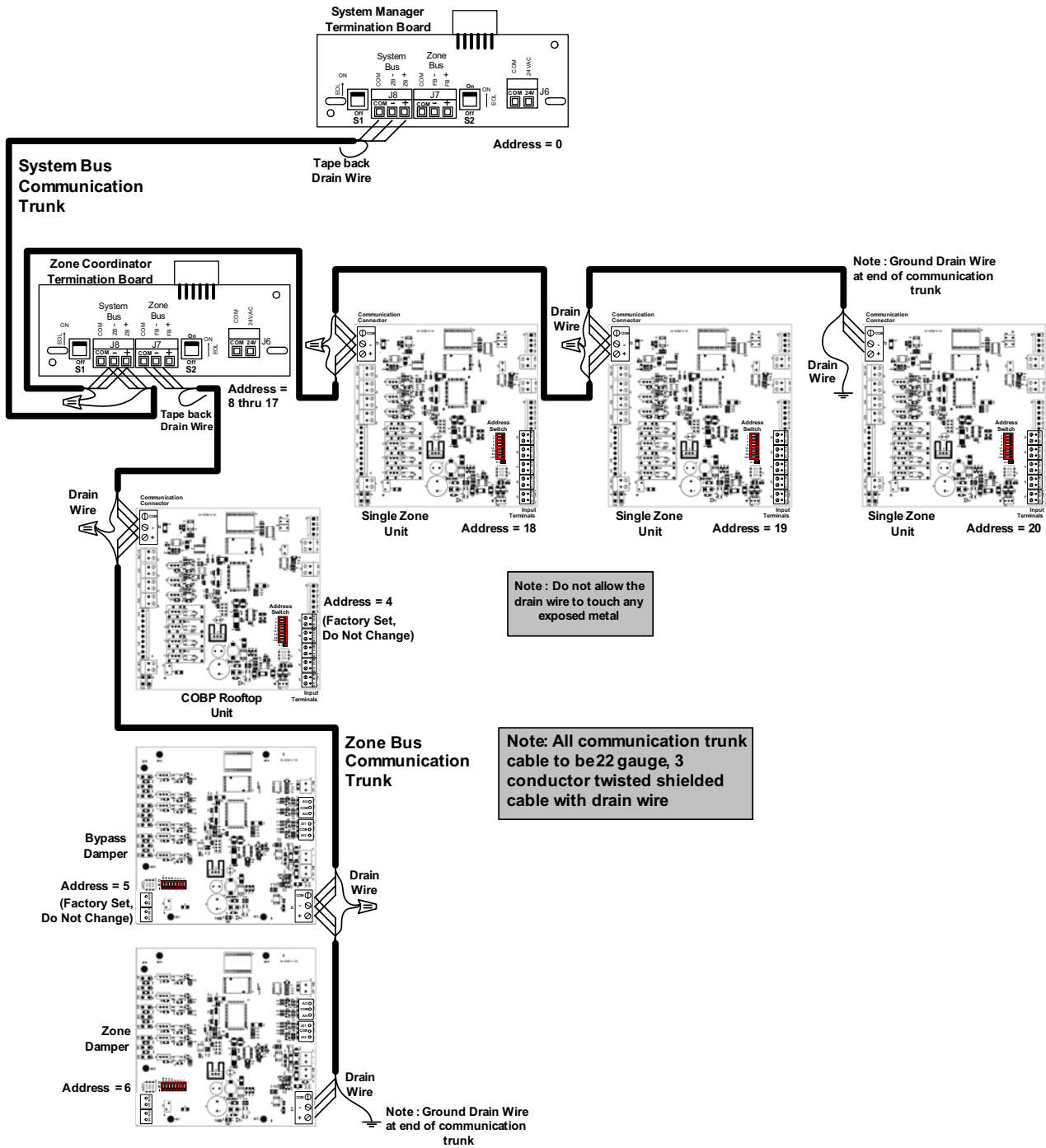


Figure 7: Typical System Communication Riser

## Technical Specifications

### YCCS System Manager Controller

<b>Product Code Number</b>	York Commercial Comfort System (YCCS): System Manager Controllers: YK-SMU200-0: System Manager with color touch-screen user interface and Ethernet port for Web browser access. YK-SMU210-0: System Manager with color touch-screen user interface and Ethernet port for Web browser access, and optional internal modem.
<b>Power Supply Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America) at 50/60 Hz (20 VAC minimum)
<b>Power Consumption</b>	20 to 30 VAC @10 VA
<b>Ambient Conditions</b>	Ambient Operating Conditions: 0 to 50°C (32 to 122°F); 5 to 95% RH condensing Ambient Storage Conditions: -40 to 85°C (-40 to 185°F); 10 to 90% RH
<b>Processor</b>	192 MHz Renesas SH4 7760 RISC processor
<b>Memory</b>	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup
<b>Housing</b>	Plastic housing material: ABS + polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
<b>Mounting</b>	With screws on a flat surface or a four square box
<b>Dimensions (Height x Width x Depth)</b>	250 x 190 x 60 mm (9.8 x 7.5 x 2.4 in.)
<b>Shipping Weight</b>	Approximately 1.97 lb
<b>Compliance</b>	<p><b>United States</b> UL Listed, File E107041, CCN PAZX, UL 916 FCC Compliant to CFR47, Part 15, Subpart B, Class A</p> <p><b>Canada</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003</p> <p><b>Europe</b> CE Mark, EMC Directive 89/336/EEC, in accordance with EN 61000-6-4 (2001) Generic Emission Standard for Heavy Industrial and EN 61000-6-2 (2001) Generic Immunity Standard for Heavy Industrial Environment</p> <p><b>Australia and New Zealand</b> C-Tick Mark, Australia/NZ Emissions Compliant</p>

### YCCS Zone Coordinator Controller (Part 1 of 2)

<b>Product Code Number</b>	York Commercial Comfort System (YCCS): Zone Coordinator Controllers: YK-ZCU100-0: Zone Coordinator without color touch-screen user interface and Ethernet port for Web browser access YK-ZCU110-0: Zone Coordinator without color touch-screen user interface and Ethernet port for Web browser access, and optional internal modem YK-ZCU200-0: Zone Coordinator with color touch-screen user interface and Ethernet port for Web browser access YK-ZCU210-0: Zone Coordinator with color touch-screen user interface and Ethernet port for Web browser access, and optional internal modem
<b>Power Supply Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America) at 50/60 Hz (20 VAC minimum)
<b>Power Consumption</b>	20 to 30 VAC @10 VA
<b>Ambient Conditions</b>	Ambient Operating Conditions: 0 to 50°C (32 to 122°F); 5 to 95% RH condensing Ambient Storage Conditions: -40 to 85°C (-40 to 185°F); 10 to 90% RH
<b>Processor</b>	192 MHz Renesas SH4 7760 RISC processor

## YCCS Zone Coordinator Controller (Part 2 of 2)

<b>Memory</b>	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup
<b>Housing</b>	Plastic housing material: ABS + polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
<b>Mounting</b>	With screws on a flat surface or a four square box
<b>Dimensions (Height x Width x Depth)</b>	250 x 190 x 60 mm (9.8 x 7.5 x 2.4 in.)
<b>Shipping Weight</b>	approximately 1.97 lb
<b>Compliance</b>	<b>United States</b> UL Listed, File E107041, CCN PAZX, UL 916 FCC Compliant to CFR47, Part 15, Subpart B, Class A
	<b>Canada</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
	<b>Europe</b> CE Mark, EMC Directive 89/336/EEC, in accordance with EN 61000-6-4 (2001) Generic Emission Standard for Heavy Industrial and EN 61000-6-2 (2001) Generic Immunity Standard for Heavy Industrial Environment
	<b>Australia and New Zealand</b> C-Tick Mark, Australia/NZ Emissions Compliant