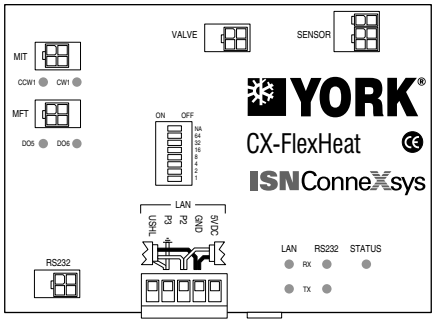
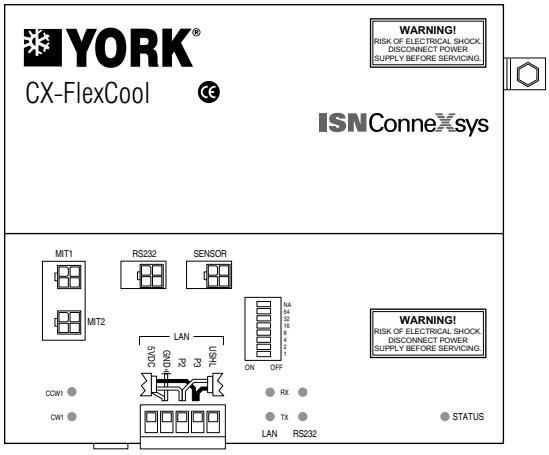
YORK®	CX-FlexHeat and CX-FlexCool Controllers FlexSys Underfloor System	
USER GUIDE	New Release	Form 450.24-NOM8 (904)

CX-FlexHeat
CX-FlexCool





BMA™ BACnet Manufacturers Association

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to, refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

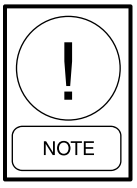
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



NOTE is used to highlight additional information which may be helpful to you.

CHANGEABILITY OF THIS DOCUMENT

In complying with YORK's policy for continuous product improvement, the information contained in this document is subject to change without notice. While YORK makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest YORK Sales, Service and Authorized Distributor offices.

It is the responsibility of operating/service personnel as to the applicability of these documents. If there is any question in the mind of operating/service personnel as to the applicability of these documents, then, prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current documentation is available.

SUMMARY OF CHANGES

904 Original Release

REFERENCE INSTRUCTIONS

DESCRIPTION	FORM NO.
CX-FlexCool Controller Specifications	450.24-S11
CX-FlexHeat Controller Specifications	450.24-S12
CX-FlexCool/CX-FlexHeat PICS/BIBBs Statement	450-24-TD8
Schematics for CX-FlexHeat/FlexCool Controllers and MIT Underfloor Air Applications	450.20-AD11
CX-FlexFloor Specifications	450.24-S13
CX-FlexFloor Users Guide	450.24-NOM9
Conduit Installation	450.20-N30

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

SECTION 1

GENERAL INFORMATION

Overview

The CX-FlexCool and CX-FlexHeat controllers work in conjunction with the Modular Integrated Terminals (MIT) and Modular Fan Terminals (MFT) used in the FlexSys underfloor air system. The CX-FlexCool controller operates with the MIT boxes, modulating the damper in response to the cooling demands of the zone. The CX-FlexHeat controller operates through the MFT boxes for perimeter zones. The CX-FlexHeat controller sequences the fan and heat functions in the MFT boxes and provides signals for control of the corresponding MIT boxes.

A remote zone sensor measures the temperature and returns the signal to the controller.

The CX-FlexCool controller uses 115/230 VAC transformer and can operate up to 14 MIT boxes. The CX-FlexHeat controller draws 24 VAC from the MFT box. Outputs to the box control the heat (water or 2-stage electric) and power the fan. While not powered directly from the controller, the CX-FlexHeat controller provides a signal to the MFT which sends power to the MIT boxes for damper actuation.

The CX-FlexCool and CX-FlexHeat controllers can be placed at any location under the floor (in the cool air plenum) and cables routed to the various boxes and remote sensor.

Communication

The CX-FlexCool and CX-FlexHeat controllers expand on the capabilities of the FlexSys underfloor system by adding networking capabilities. The ISN ConneXsys network allows YORK products to communicate with one another using the standard BACnet protocol developed by ASHRAE.

Typically, a FlexSys system is comprised of a single floor with CX-FlexCool, CX-FlexHeat, and CX-FlexFloor devices are connected into a single network. Additional floors, or networks, can be connected using CX-Routers to make an internetwork.

As a standard protocol, BACnet is embraced by many manufacturers. By using BACnet, YORK allows the ISN ConneXsys network to interface with other manufacturers BACnet systems.

Setup

To simplify the setup of the CX-FlexCool and CX-FlexHeat controllers, default setpoints and deadbands are programmed into the software. If desired, these default values can be changed or simply viewed using a VT100 terminal emulation program connected through an RS232 port.

To simplify the CX-FlexCool and CX-FlexHeat controllers further, Reports are preconfigured to allow access to monitor the system setpoints or change the setpoints, network transfers, etc. The Reports provide a simple interface for fine tuning an application.

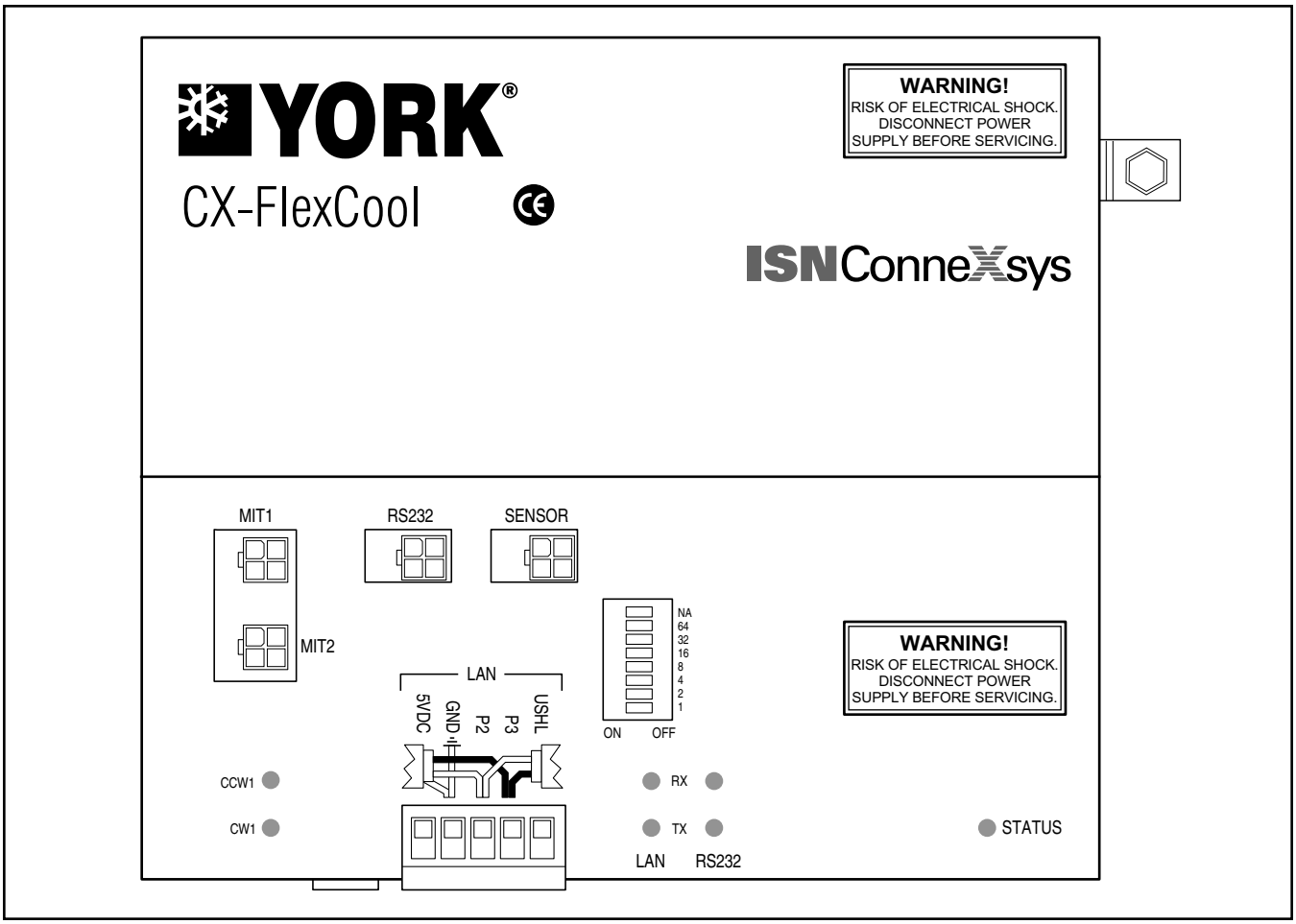


Figure 1. CX-FlexCool Controller

Components

The CX-FlexCool controller is a small footprint controller that operates from a 115/230 VAC line voltage power supply. The transformer converts power to 24 VAC for operation of the circuit board and MIT boxes.

Based on the CX-TDCE controller, the input and output points are specifically adapted for use with the FlexSys system and the modular cabling used by previous versions of FlexSys controllers. This allows the same cables to be used. The cables consist of

PAP-A – 25 ft. (7.5 m) 4-conductor cable with a Molex plug at each end. This is used between the controller, MIT, and MFT boxes.

PAP-B – 50 ft. (15 m) 4-conductor cable with a Molex plug at one end. The other end has the individual conductors available for connection to screw terminals. This connects to the zone sensor for temperature input to the controller or data transfer through the RS232 port on the sensor. The Molex plug end attaches to the controller.

PAP-C – 50 ft. (15 m) 4-conductor cable with a Molex socket on one end and a Molex plug on the other end. This is used for extending the length between devices.

PAP-D – 25 ft. (7.5 m) 2-conductor cable with a Molex plug on one end for connection to the auxiliary sensor input on the CX-FlexHeat. The other end has individual conductors available for connection to screw terminals.

PAP-E – 5 ft. (1.5 m) 4-conductor cable with a Molex plug at each end. This is used between the controller and an MFT box (shorter version of PAP-A).

PAP-F – 10 ft. (3 m) 4-conductor cable with a Molex plug at one end. The other end has the individual conductors available for connection to screw terminals (short version of PAP-B).

An 8-way DIP switch allows the controller's MAC Address to be configured. The binary-weighted rocker switches allow the user to specify the network address of the controller. The MAC Address must be between

1 and 99. Although configurable, the CX-FlexFloor is preconfigured for MAC Address 64.

NOTE: If not connected to a network, i.e., standalone operation, the MAC Address may be ignored. For new installations, the recommended network transfer speed is 38.4 kbaud which is set in the software.

There are several LEDs to indicate the condition of the communications and operating status.

STATUS LED – The red LED indicates the current operating condition of the unit.

MIT LEDs – Two LEDs per MIT connector indicate the direction of rotation of the MIT box actuator. CCW1 indicates the damper is driving open (more cooling), CW1 indicates the damper is driving closed (less cooling).

MFT LEDs (CX-FlexHeat only) – Two LEDs indicate the status of the outputs. This is an indication of the current heating stage.

Communication LEDs – Two LEDs for the LAN and two for the RS232 port indicate when data is transmitted (red) or received (green).

Zone Sensor

Input to the CX-FlexCool and CX-FlexHeat controllers is via a YORK zone sensor. The zone sensor includes a Type III thermistor (10 kOhm at 77° F), a 20 kOhm setpoint adjust, and an override push-button switch (Normally Open in parallel with the zone sensor) programmed to extend occupied hours if scheduling is used.

NOTE: Occupied and unoccupied states are only applicable if networked to a controller which uses a clock for time management. The CX-FlexCool and CX-FlexHeat do not contain a real time clock.

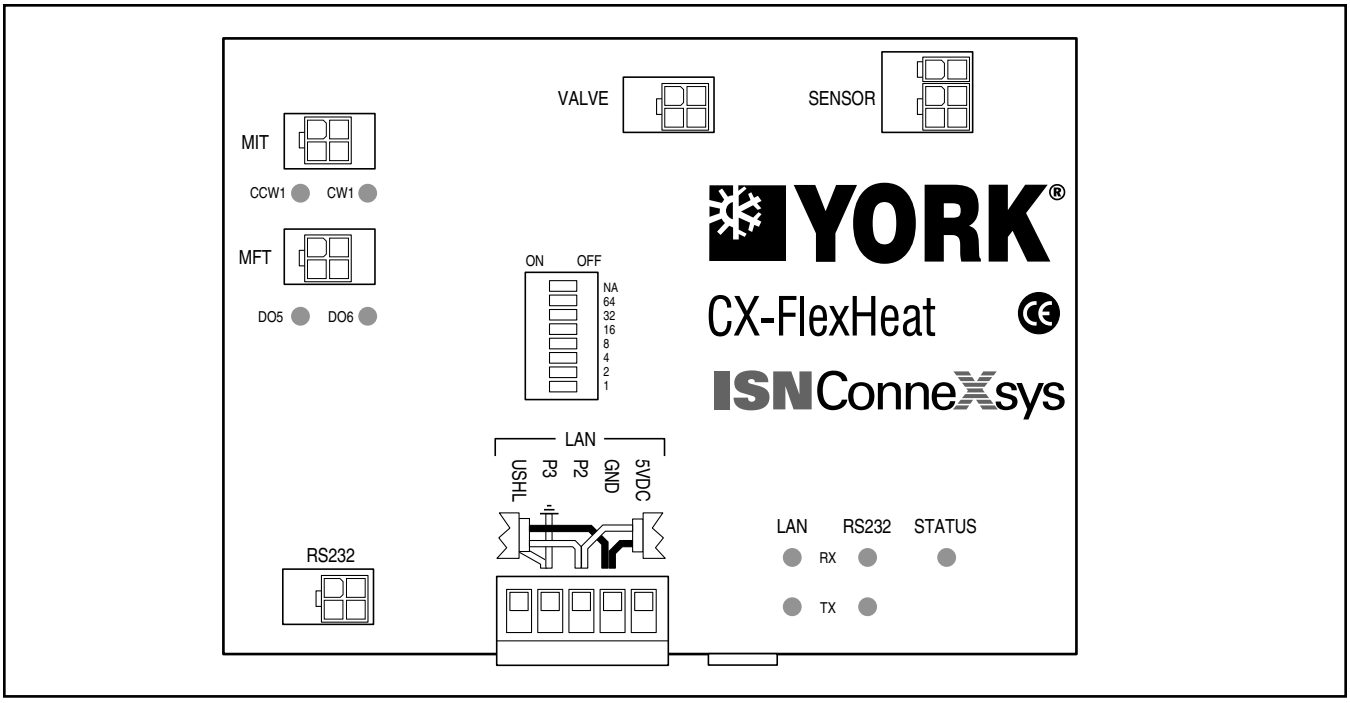


Figure 2. CX-FlexHeat Controller

Communications

To aid the technician in setup, an optional RS232 port is available on the zone sensor. By connecting an RS232 device, such as a laptop computer or Portable Digital Assistant (PDA) to the RS232 port, access to the controller Reports can be obtained without having to remove any floor panels.

Logging on via the user's password provides convenient access to data such as temperature, setpoints, occupied status, and damper position. A complete start-up can be accomplished from this level, including sensor calibration, setpoint adjustment, damper synchronization, and tuning.

SECTION 2

NETWORK TOPOLOGY

General

The CX-FlexCool and CX-FlexHeat controllers may be operated as single, stand-alone units controlling the MIT and MFT boxes. However, the controllers can be connected to other devices to form a network. The network allows the transfer of data between controllers and other network devices.

Networks can be connected to one another using routers to form an internetwork. The internetwork can consist of a building or complex to form a Building Automation System (BAS) or Building Management System (BMS). The internetwork can also be expanded beyond the BAS through the use of modems or web servers.

The native protocol for ISN ConneXsys controllers from YORK is BACnet MS/TP protocol from ASHRAE. The controllers utilizes RS485 as the physical layer while the routers utilize Ethernet (802.3).

ISN ConneXsys controllers function as Client/Servers. This allows data to be exposed to any other BACnet client. Clients can also retrieve data from slave devices.

Physically, a twisted-pair (2-core) shielded cable is daisy-chained between the network devices.

Devices

As an open protocol, BACnet devices from other manufacturers may also be placed on the same network along with YORK devices. While these devices can communicate, not all data is exposed to all BACnet devices. As a minimum, the DE and FI Objects must be exposed although there are additional BACnet Objects exposed (see Appendix).

YORK provides all the devices which are necessary for a BACnet network. Some of these devices are:

- Controllers: CX-VAV, CX-FlexCool, CX-FlexHeat, CX-UDC, CX-IDC, and CX-TDCE controllers allow monitoring and control of various devices through the use of voltage, resistance, pulse, and current inputs and voltage and digital relay outputs.
- The CX-Repeater amplifies the network signal to extend the physical length and/or the number of controllers within a network.
- The CX-Router connects networks to form an internetwork. The CX-Router connects MS/TP (RS485), Ethernet (10Base-T), and serial (RS232) devices such as modems.
- ISN ConneXsys Operator Work Station (OWS) provides a graphical interface of the system, allowing monitoring of data and control of setpoints.
- ISN ConneXsys Web Server provides the ability to expose data from the system across the internet to be viewed by any standard web browser.

Network Architecture

BACnet allows a variety of “technologies” to be used in its implementation. YORK uses several different types of data link layer to communicate between devices.

At the Management level, standard Ethernet is used. Devices that operate at the Management level include the ISN ConneXsys Operator Work Station, routers, and some large controllers. When exposing information through a web browser, Ethernet/IP can be used.

The Automation level includes various building controllers, such as the Solution controller. At this level, Ethernet may be used as well as RS485.

At the Field level are the terminal controllers. These almost always operate on an RS485 network.

Ethernet

An Ethernet network is arranged in a star network with all devices connecting to hubs. Many buildings have existing Ethernet networks which may be utilized by HVAC devices.

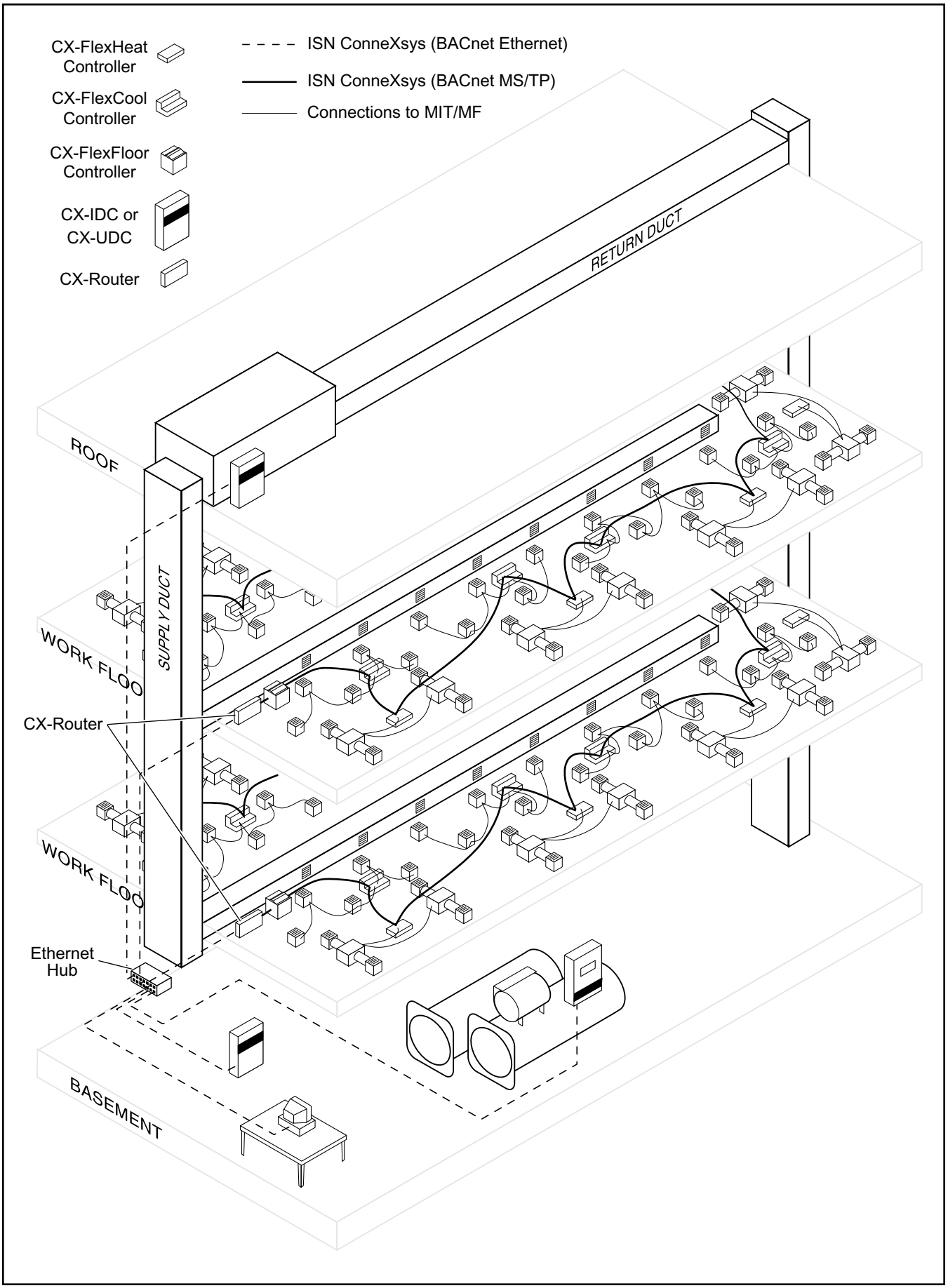
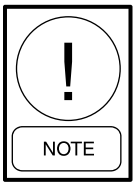


Figure 3. Typical Network Configurations

Existing Ethernet networks are typically not managed by maintenance/HVAC personnel. Therefore, it is required that permission to utilize these networks be obtained prior to design of the network.

A separate network may be setup for the HVAC devices to utilize Ethernet. Along with the Ethernet cabling, additional issues must be resolved. While Ethernet is a physical layer similar to RS485, there are a variety of types of Ethernet, each with its own set of standards and rules which are managed by the IEEE under standard 802.3. Some of the issues in setting up an Ethernet network include different media (10Base-T, 10Base-2, 100Base-TX, Fiber Optic, etc.) and speeds (10 Mbps, 100 Mbps, 1 Gbps) and the accompanying devices (hubs, repeaters, transceivers, etc.).

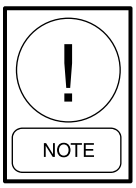


NOTE: It is recommended that, when installing an Ethernet network, an experienced Ethernet subcontractor be consulted. The subcontractor will be equipped with the supporting devices, special tools, and testing equipment required for installation of an Ethernet network.

A typical Ethernet network for the Management level of a YORK control system consists of Category 5 twisted-pair cabling (10Base-T) using RJ-45 connectors and an 8-port hub. If distances greater than 330 ft. (100 m), Ethernet repeaters must be used.

RS485

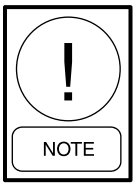
The RS485 standard is a multi-drop system with devices daisy-chained together. Typically, twisted-pair, shielded cabling is used as the transfer media. The shield reduces the effects of electrical and magnetic noise and is typically grounded at some point on each segment. Termination modules are utilized at each end of the segment to balance and "center" the + and – communication signals. The termination module also provides a method of grounding the shielding.



NOTE: The CX-Repeater has selectable termination on board.

Due to signal degradation, the maximum length of an RS485 segment is 4000 ft. (1200 m). This can be extended with the use of repeaters. A repeater amplifies the signal to allow another segment to be added.

The network signal will also degrade as it passes through each node or device connection. This is known as a physical load. This limitation is 32 loads for each segment with maximum of 96 loads on a network.



NOTE: Network devices, such as repeaters and routers, must be included when summing devices on a network. Repeaters typically consume 2 loads, a router consumes a single load.

In a parallel repeater arrangement, the repeaters are daisy-chained to the router, creating a "header" cable, i.e., between the router and repeaters. This header cable must be under 4000 ft. (1200 m) and must not contain any devices other than the CX-Repeaters. Each segment can then connect 32 devices, including the repeater.

Communication Method

BACnet allows a variety of physical connection types. At the controller level, the controllers are connected using RS485 through twisted-pair (2-core) shielded cable. This cable is daisy-chained between the controllers and repeaters. The data link is MS/TP.

The routers connect to the RS485 network and convert the packets to Ethernet (IEEE 802.3) or to RS232 for Point-to-Point (PTP) for dial-up, asynchronous communication.

As an MS/TP network, each controller receives a token, which is passed around the network with packetized data. As the token is received by the next device, the device reads the packet to determine if it needs to receive the data. If it does, it copies the data and forwards the token to the next device.

If an empty token is received, the controller places data in it, if it has any, and forwards it along the network. If the controller has no data to forward, the token is passed along "empty" to the next device.

BACnet uses standard services, or commands, to manipulate standard or proprietary objects. Some services require return of an acknowledgement, others do not.

If a response to a service is required and the device does not respond, the sending device will automatically resend the request. If a response is not received after the retry, the sending controller starts to increase the amount of time between transmissions. Retransmission of the message then occurs automatically every hour until receipt is acknowledged.

The CX-FlexCool and CX-FlexHeat support 9.6, 19.2, and 38.4 kbaud. All the devices on the network must be set to the same transfer speed.

Summary of Network Restrictions

- The maximum RS485 network length is 12,000 ft. (3600 m). This is obtained using 2 repeaters to combine 3 segments.
- The maximum RS485 segment length is 4000 ft. (1200 m).
- A load is created for every device connected to the network. Each segment can contain up to 32 nodes. A CX-Repeater creates a load on each port.
- The maximum number of loads on an MS/TP network is 96. To connect segments CX-Repeaters must be used. If connected to a CX-Router for internetwork connectivity, the router must also be counted as a load.
- The CX-Router communicates on MS/TP, PTP and Ethernet layers.
- When the network is extended between different buildings, the ground/earth voltage of the buildings must be at the same potential. If this cannot be guaranteed, two separate routers should be used to create two networks isolated by the Ethernet network. If a single network is used, the repeater must be powered by two separate transformers to provide 500 volt isolation between the segments.
- The maximum length of Ethernet 10Base-T cable is 330 ft. (100 m). If additional distance is required, an Ethernet repeater must be used.

SECTION 3

INSTALLATION

Installation Guidelines

This manual assumes the installer is competent in environments with moving machinery, and is able to recognize and protect against any inherent hazards, such as, but not limited to, refrigerants, oil, corrosive chemicals or gases, materials under pressure, rotating parts, and both high and low voltages. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death.

It is the obligation and responsibility of the operating/service personnel to identify and recognize inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment, as well as severe personal injury or death. In addition to following standard local, state and country codes and procedures, it is recommended that a lockout procedure be used to prevent inadvertent start up of equipment during installation and maintenance procedures.

All wiring should be carried out in a safe and neat manner and should always comply in all respects to the latest edition of any local, state or country codes that may be applicable. The wiring should be installed in a manner that does not cause a hazard and is protected against electrical and mechanical damage.

Care should also be taken when mounting the enclosure so access to other equipment within the vicinity is not restricted.

Environment

The CX-FlexCool and CX-FlexHeat controllers are designed to operate in the underfloor air plenum of a FlexSys system. They are intended to be placed on the floor of the air plenum within reasonable proximity to the zone sensor and FlexSys terminal boxes being controlled.

The air plenum space must be within the following:

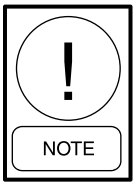
Temperature: 32 to 122° F (0 to 50° C).

Humidity: 10% to 95% non-condensing.

The controllers should never be mounted outside the confines of a building.

Electrical

Use a suitably sized wire (refer to the table titled "Recommended Cable Specifications") to connect the line voltage feed to the CX-FlexCool controller. The line voltage power source should be "clean" and separately fused for either 115 or 230 VAC.



NOTE: The CX-FlexHeat controller connects to the MFT box and draws 24 VAC. Use the PAP-A or PAP-E cable for connection.

3

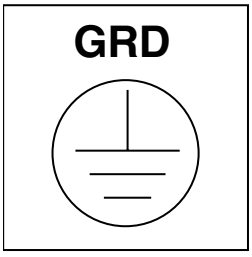
Electrical Noise

As with all electrical equipment, a YORK controller may be affected by external electrical noise. This noise may take the form of Radio Frequency Interference (RFI) or Electro-Magnetic Interference (EMI). To minimize the affects of electrical noise, choose a mounting location where the controller is removed from all possible RFI and EMI sources. These include high voltage cables, high voltage transformers, breakers, and high frequency drives.

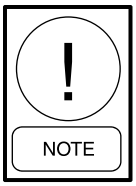
All high voltage wiring (>75 volts) must be run in conduit and kept separate from low voltage communication wiring. This will greatly reduce network communication problems.

Ground/Earth

All YORK controllers are designed to use the building ground (earth) as a reference point. This electrical orientation helps maintain all electronic components communicating to the controller within their specified voltage limits.



CAUTION: The controller must connect to a true building ground. Failure to do so may cause equipment damage and will void all warranty claims.



NOTE: The CX-FlexHeat controller is grounded through the MFT box. Hence, the MFT box must be properly grounded.

Electrical grounding also protects the controller from the effects of lightning strikes. When lightning strikes near an ISN ConneXsys installation, it alters the potential of the building's ground. If the controller is properly grounded, it responds to this change much faster than if the ground connection is inadequate. Controllers that are poorly grounded provide a lower resistance path through their signal or power connections than the actual ground of the building. Under these circumstances large surge currents may flow through the controller and result in component failure.

An example of a poor ground would be a galvanized steel cold water pipe. As the pipe corrodes it no longer acts as a true ground. The corrosion acts as an insulator, raising the potential of the pipe with respect to earth ground.

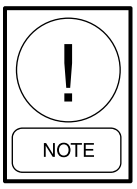
YORK strongly recommends that the building's ground be checked prior to the start of the installation. The power distribution panel should be checked to ensure that it is not connected to a corroded or galvanized pipe. As a minimum, it must be connected with 14 AWG wire.

Cable Specifications

The cables (other than the LAN cable) used with the FlexSys components are modular cables with Molex® connectors. These pre-assembled cables provide communication and power to various devices connected to a controller. Additional cables required are the line voltage power cable for the CX-FlexCool controller, any network cables, and the connection cable to the RS232 device (PDA or laptop computer).

Power Cables

CAUTION: Aluminum wire is absolutely not acceptable.

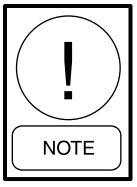


NOTE: The MFT box should follow the same guidelines as outlined in the following section.

The CX-FlexCool controller requires a 3-conductor cable for the line voltage power supply. This power cable should be at least a 16 AWG copper wire rated for 10 amps per core at 250 volt AC. The ground conductor must be, as a minimum, the same size with the same current carrying capacity as the live and neutral conductors.

The controller (or MFT box) should be wired to a non-switched, fused spur to prevent the power from being turned off accidently. The supply spur should be protected with a either a suitable fuse or an approved circuit breaker.

FlexSys Modular Cables



NOTE: Be sure cables are securely attached without tensile load.

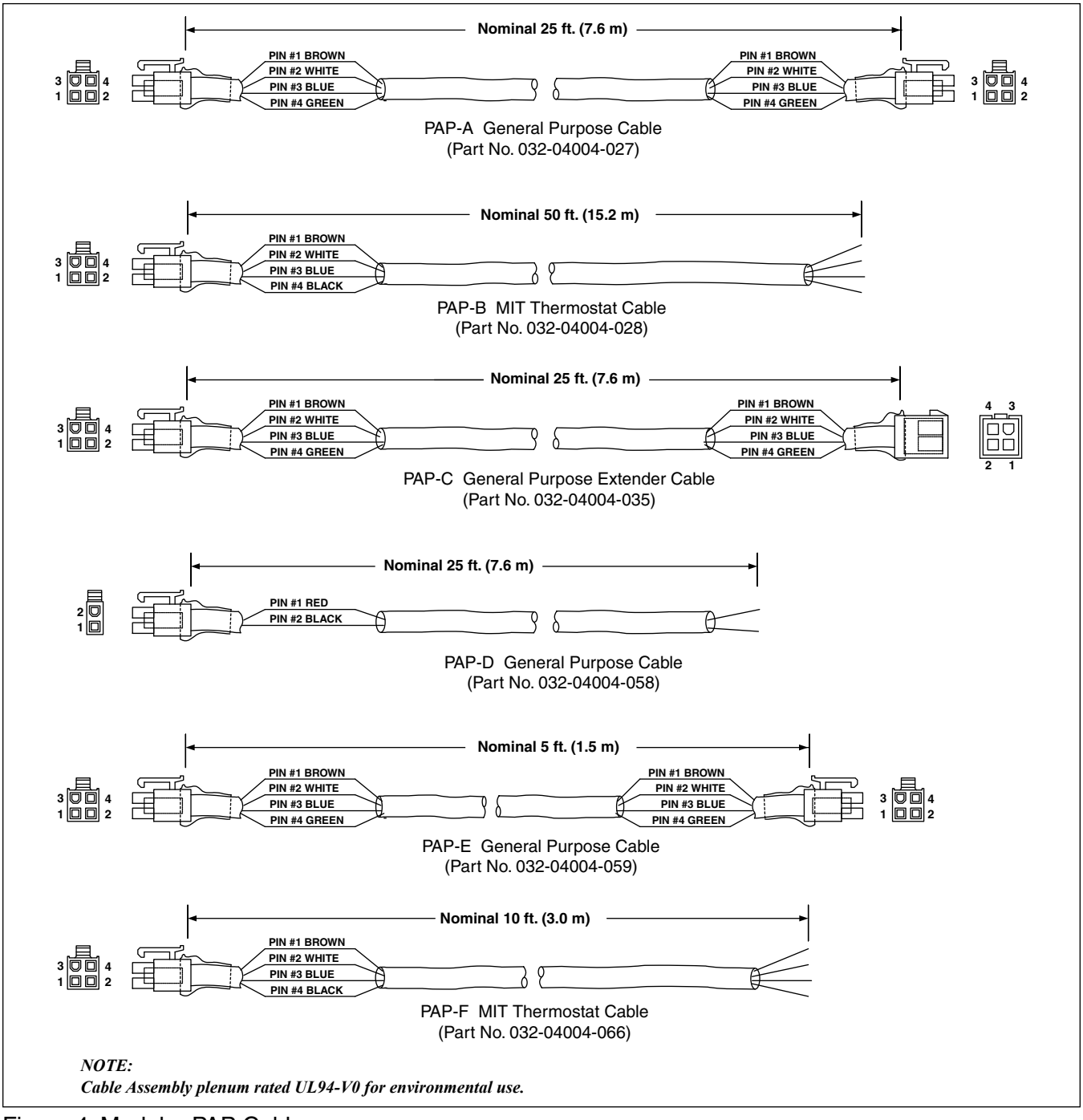
FlexSys system uses modular cables that are plug and play (PAP). These cables provide connection between the CX-FlexCool or CX-FlexHeat controllers, the MIT and MFT boxes, and the zone sensor. An extender cable allows greater distances between the components when needed.

Each cable, excluding the PAP-D, has four conductors. The function of the individual conductors varies depending on the use of the cable.

CAUTION: All ports accept the same connector. Be sure the cable is connected properly at both ends to prevent supplying power to unintended locations.

PAP-A – 25 ft. (7.5 m) 4-conductor cable with a Molex plug at each end. This connects a controller to the MFT or MIT boxes. It also is used to daisy-chain the MFT or MIT boxes together.

PAP-B – 50 ft. (15 m) 4-conductor cable with a Molex plug at one end. The other end has the individual conductors available for connection to screw terminals. Two PAP-B cables connect between the controller and the zone sensor. One cable provides the temperature to the controller (port labelled SENSOR) and the other cable

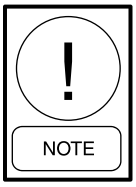


NOTE:
Cable Assembly plenum rated UL94-V0 for environmental use.

Figure 4. Modular PAP Cables

transfers data through the RS232 port on the zone sensor (port labelled RS232 on the controller).

PAP-C – 50 ft. (15 m) 4-conductor cable with a Molex socket on one end and a Molex plug on the other end. PAP-C, when connected to either PAP-A or PAP-B, extends the distance between the controller and/or MIT and MFT boxes.



NOTE: The theory behind a temperature zone ensures that devices are not typically located at great distances. Therefore, use of the PAP-C cable is limited.

PAP-D – 25 ft., (7.5 M) 2-conductor cable with a Molex plug at one end. The other end has the individual conductors available for connection to screw terminals. This is for connecting from the CX-FlexHeat controller to an additional sensor.

PAP-E – 5 ft. (1.5 m) 4-conductor cable with a Molex plug at each end. This connects an CX-FlexHeat controller to the MFT box when the PAP-A cable is too long (shorter version of PAP-A).

PAP-F – 10 ft. (3 m) 4-conductor cable with a Molex plug at one end. The other end has the individual conductors available for connection to screw terminals (short version of PAP-B).

CX-FlexCool Controller

The CX-FlexCool controller resides in the plenum under the raised floor. Included with each controller are DIN rail clips to be attached to the back of the controller. Ensure that cabling includes sufficient slack to allow positioning of the controller and MIT boxes.

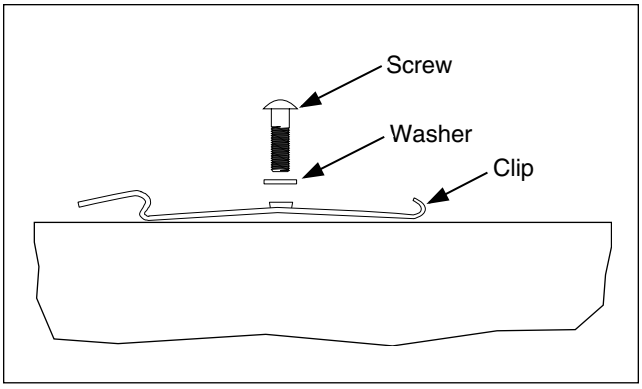
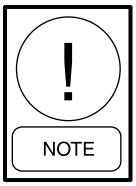


Figure 5. DIN Rail Clip Attachment



NOTE: Take care not to restrict access to other equipment in the installation area.

Line Voltage Power Supply

CAUTION: Do not apply power to the CX-FlexCool controller until all components have been installed and commissioning checks completed.

DANGER: Disconnect any line voltage power supply at the source before attaching wiring to prevent possible electrocution.

The CX-FlexCool controller requires a line voltage power supply of either 115 or 230 VAC. A switch selects the correct input voltage level. The unit is shipped with the switch in the 115 volt position. If a 230 volt line voltage is to be connected to the CX-FlexCool controller, remove the cover and change the switch position. The switch is located near the line voltage input connector.

The line voltage power supply should be wired to a non-switched fused spur to prevent the power from being turned OFF accidentally. Ensure that all wiring meets local, state and country codes, as well as follows NEC recommendations.

The CX-FlexCool controller includes a removable power supply connector with individual screw terminals. This style connector allows the technician to obtain cabling which meets the requirements for the proper color codes. This must be acquired locally. The cable should be a 3-conductor cable with conductors from 12 to 16 gauge.

A conduit box is available for the CX-FlexCool controller to aid in attachment of 1/2 in. conduit which is often required by building specifications or local codes. The two-piece conduit box allows use of the standard, removable power supply connector.

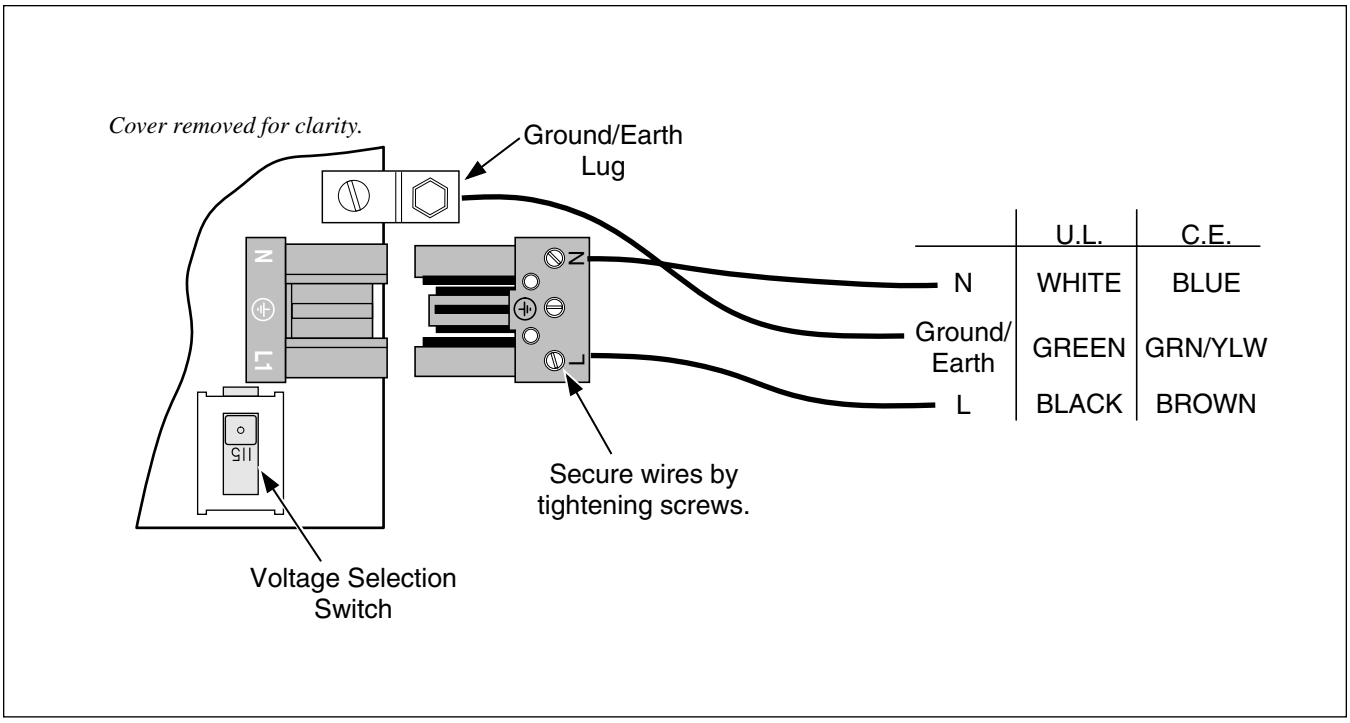


Figure 6. Power Supply Connector

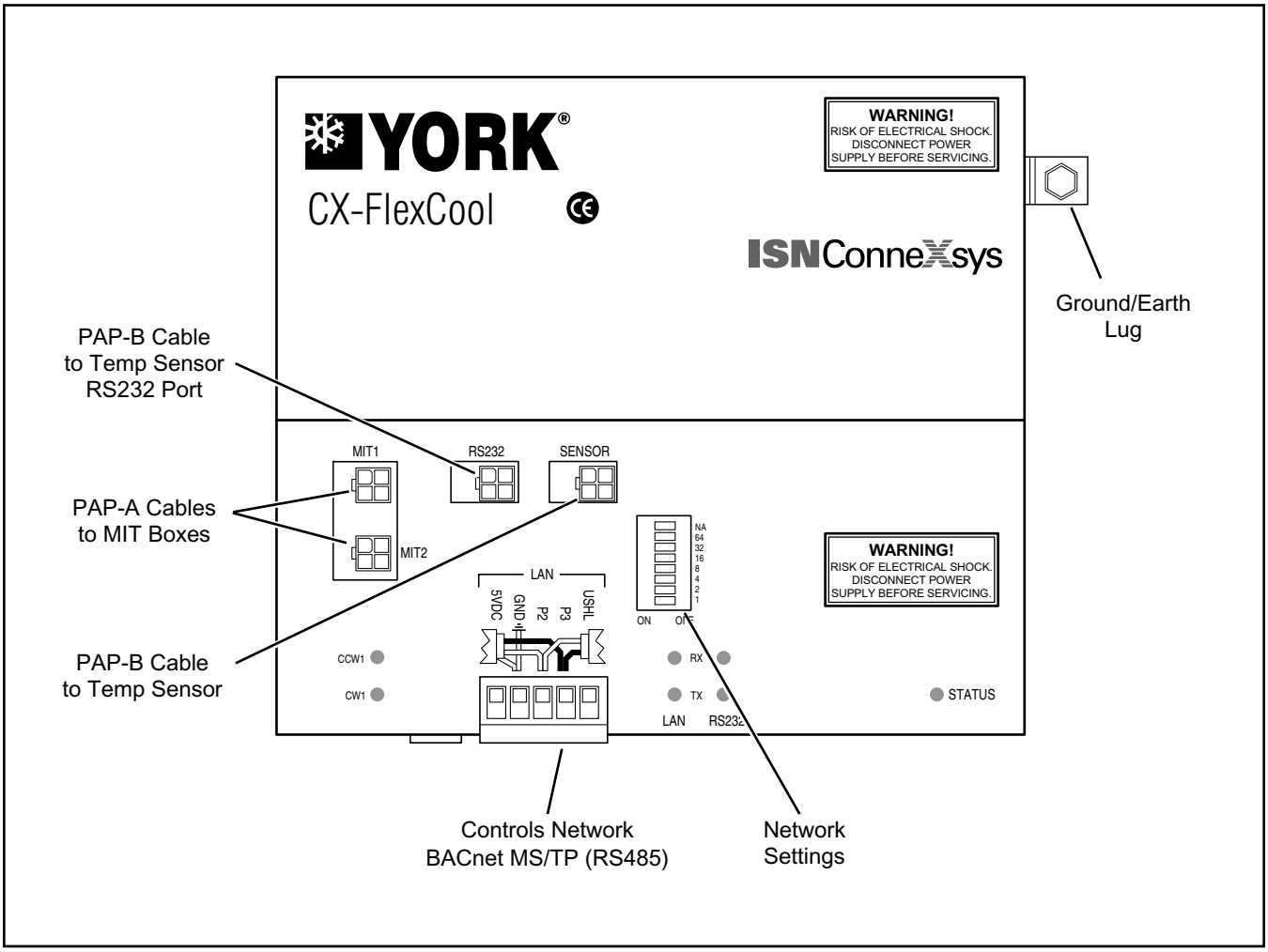


Figure 7. CX-FlexCool Controller Connections

DANGER: Always disconnect the power before working inside or around an electrical enclosure.

The power supply connector has three terminals. A ground lug is located next to the connector. The ground lug is connected to the board, providing a ground for the device even when the power connector is removed for service.

Connect the appropriate color-coded conductor to the connector as shown in the figure titled "Power Supply Connector." Connect the Line and Neutral conductors to the connector. Connect the ground conductor to the ground lug.

To connect power to the CX-FlexCool controller, push the connector into the socket until the latch closes. To remove the connector, use a small screwdriver to raise the latch before pulling the connector from the socket.

MIT Box Connection

The outputs from the CX-FlexCool controller to the MIT boxes are through two, 4-pin connectors labeled MIT. Each connector has two digital outputs. The outputs power the actuator in either a clockwise or counterclockwise direction, closing or opening the damper.

There are two connectors but a single set of outputs sized to handle up to 14 damper motors (3.2 amps @24 volts). The CX-FlexCool controller can be placed anywhere within the daisy-chain of 14 MIT boxes, i.e., at either end or any point in the middle. The box is placed based on zone layout and convenience.

CAUTION: The use of more than 14 MIT boxes will draw more current than the output circuit can handle, resulting in damage to the controller.

A modular cable (PAP-A or PAP-C) connects the controller to an MIT box. The MIT boxes are daisy-chained from one to another using the same modular cables. The two connectors allow for one or two "chains" for flexible cable routing.

Additional CX-FlexCool Connections

The CX-FlexCool controller has two additional Molex connectors. The connector labelled SENSOR connects to the zone sensor through a PAP-B cable. The cable is wired to the Type 3 thermistor and the 20 kOhm temperature setpoint adjust potentiometer.

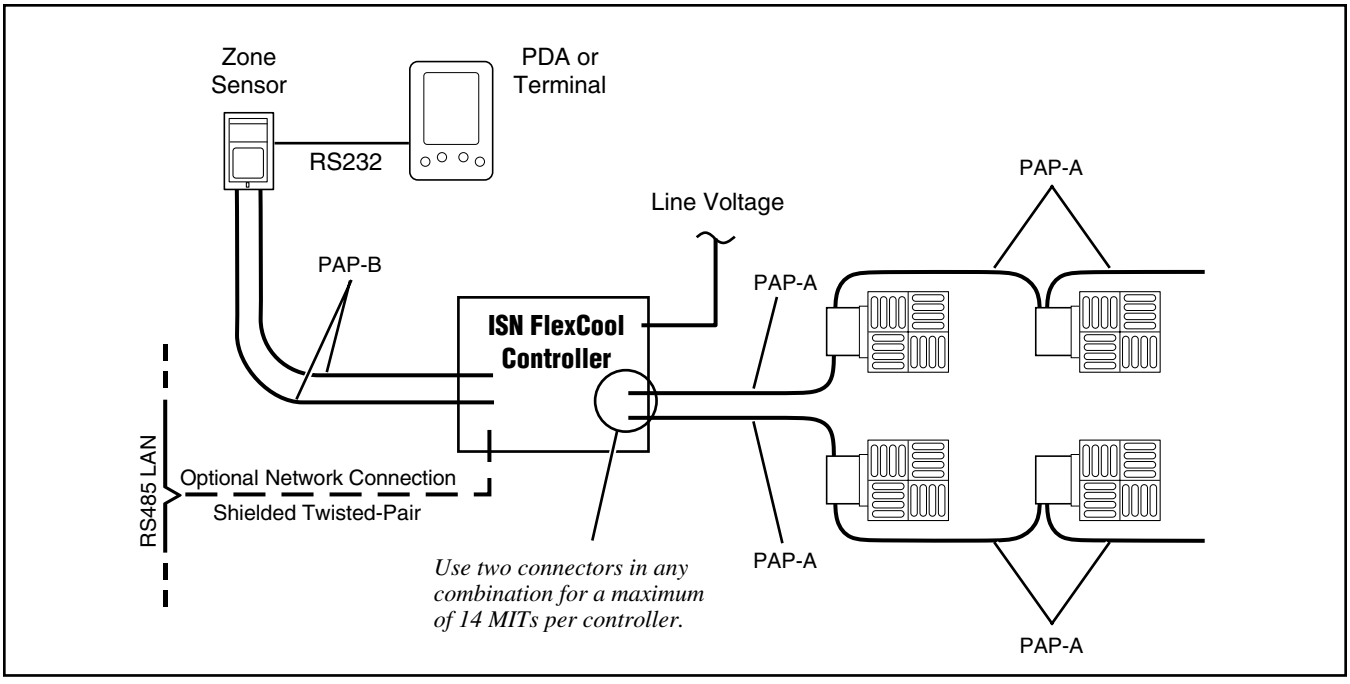


Figure 8. Typical CX-FlexCool Configuration

NOTE: Do not cut the PAP-B cable. Allow any excess wire to remain in the plenum to allow for future movement of the zone sensor and/or controller.

The second connector is labelled RS232 and, using a PAP-B cable, it also connects to the zone sensor. This allows an RS232 device to be connected to the controller without the need to locate and remove the proper access panel from the floor.

NOTE: Details concerning each of the above connections are described in the respective section.

To connect a network to the CX-FlexCool controller, a 5-pin connector is provided to attach the ISN ConneXsys network.

CAUTION: Do not use PAP cables for network wiring. LAN cable must be shielded.

CX-FlexHeat Controller

The CX-FlexHeat controller resides in the plenum under the raised floor. Included with each controller are DIN rail clips for attaching the controller to the MFT box or a floor support.

Ensure that cabling includes sufficient slack to allow positioning of the controller and MIT or MFT boxes.

NOTE: Take care not to restrict access to other equipment in the installation area.

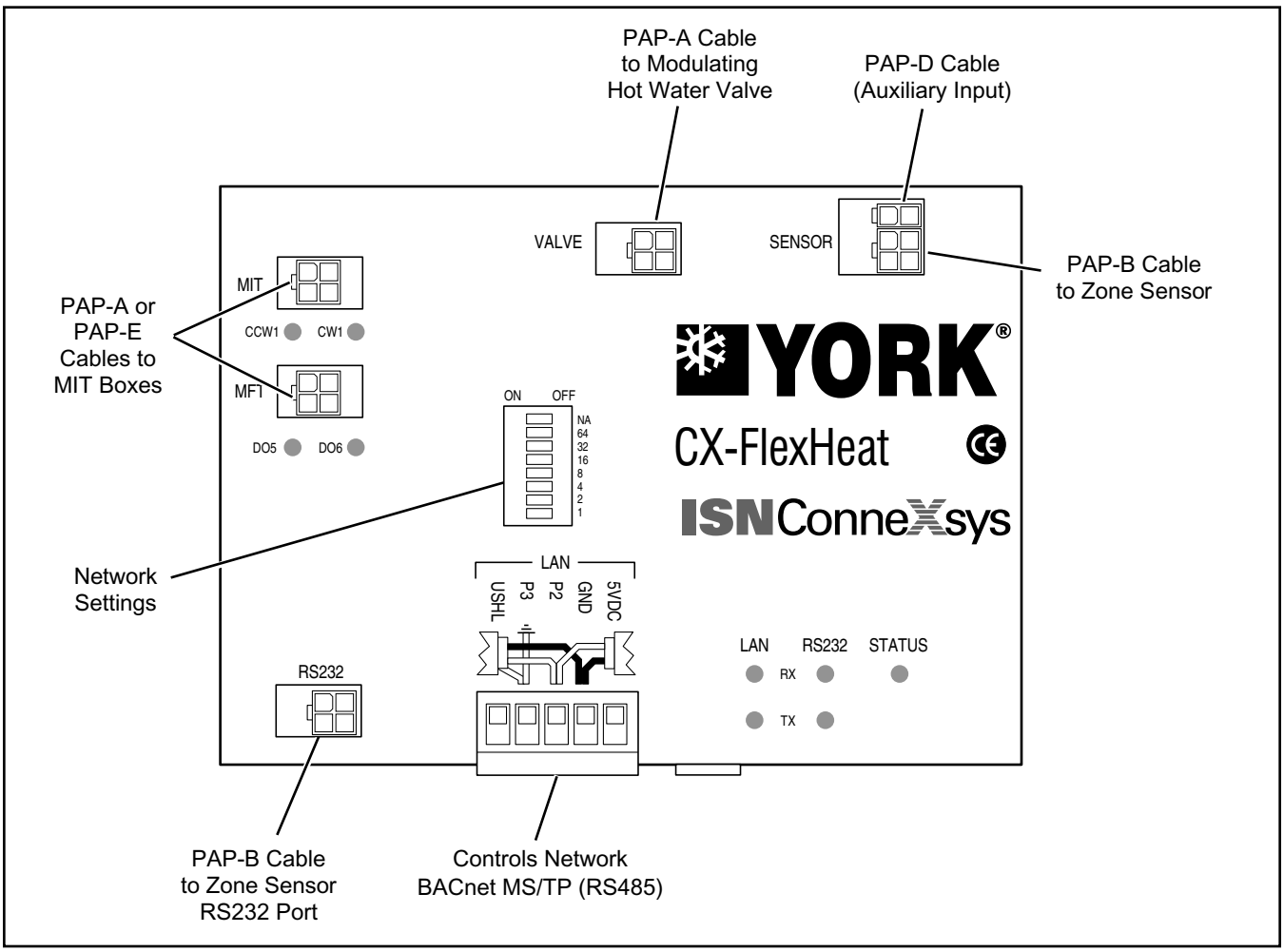


Figure 9. CX-FlexHeat Controller Connections

The CX-FlexHeat controller requires 24 VAC power to operate. The 24 VAC is obtained through the PAP-A or PAP-E communication cable(s) from the MFT box. Mounting the CX-FlexHeat directly on the MFT box ensures a common ground/earth. If the controller is not mounted directly to the MFT box, a ground/earth wire (minimum of 18 AWG) must be installed between the two devices.

CAUTION: When attaching DIN rail to the MFT box, avoid areas where contact with electrical wiring or heater coils may occur.

The line voltage is supplied directly to each MFT box for operation of the heater, fan and subsequent MIT boxes. The CX-FlexHeat controller provides digital signals to relays located on the MFT box. The power to drive the MIT dampers is obtained from the MFT box.

MFT Box Connection

The two connections on the CX-FlexHeat controller are labelled MIT and MFT. Both connectors utilize PAP-A or PAP-E cables to interface with the relay panel on the MFT box. (Refer to Figure 10 for cable routing.) The relay panel, in turn, controls up to 14 MIT boxes and up to 3 stages of heat (fan, first stage, second stage). The relay panel can also daisy-chain to an additional MFT box through two additional PAP-A cables. In this way a series of MFT cables can be daisy-chained together, all controlled by a single CX-FlexHeat controller with a single zone sensor.

The outputs from the connector labelled MIT operate in the same manner as the CX-FlexCool controller outputs but do not power the MIT dampers directly.

A digital signal from the CX-FlexHeat controller closes the appropriate relay in the MFT, completing the control circuit which turns the MIT actuator in either a clockwise or counterclockwise direction. Each MFT box is capable of powering a maximum of 14 MIT boxes due to the limitations of the MFT transformer.

CAUTION: The use of more than 14 MIT boxes will draw more current than the MFT relay circuits can handle, resulting in damage to the MFT box.

Two PAP-A or PAP-E cables are required to connect the controller to the MFT box. The cables are the same but connect to different ports on the MFT box. The connectors are labelled according to their function.

Each MFT has its own line voltage power source. This allows multiple MFT boxes to be daisy-chained together without the limitation of controller power output. However, the number of MFTs per zone (or sensor) is limited by the suitability of one zone sensor to measure a specific area. If a large daisy-chain is used, the chain can be broken and an additional sensor/controller added to begin a new chain and zone.

Hot Water Valve

There are two options for hydronic heat:

Two-position hot water valve – This is wired into a terminal strip within the relay panel and takes the place of the electric heat in the control sequence.

Modulating hot water valve – This is wired into the CX-FlexHeat via a PAP-B cable. The signal is 0-10 VDC. 24 VAC is also supplied to power the device.

Additional Sensor

A connection point for an additional sensor is provided on the CX-FlexHeat controller. This additional input requires custom programming. The additional input is not included in the standard CX-FlexHeat software sequences.

Use a PAP-D cable to connect to this additional 2-pin input.

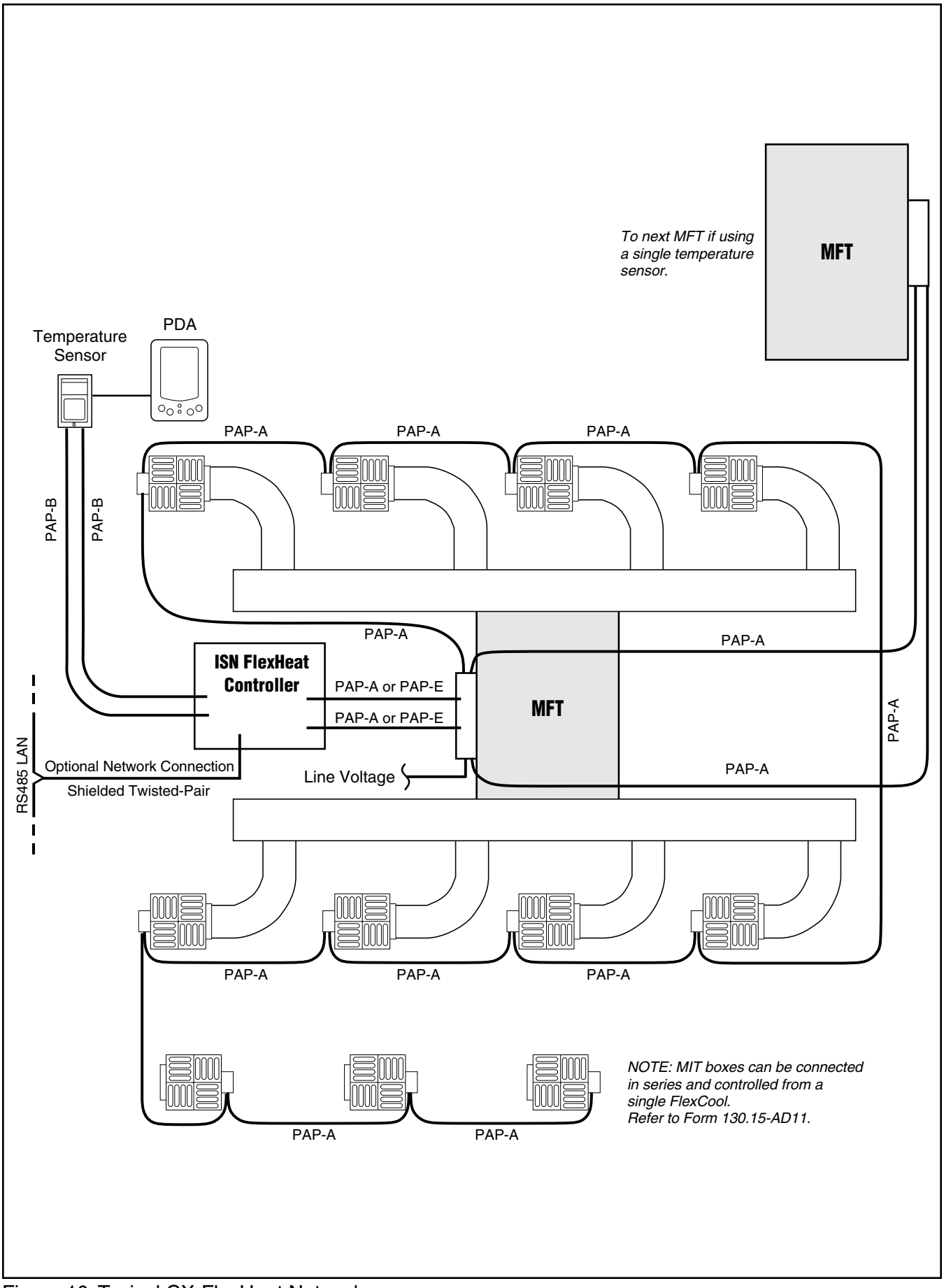
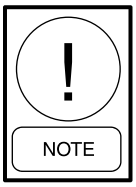


Figure 10. Typical CX-FlexHeat Network

Zone Sensor

The temperature of the zone is measured by a wall-mounted zone sensor. YORK recommends a sensor with an adjustable potentiometer and an override switch. The potentiometer allows variation of the setpoint by users and the override switch can be used to change the status of the room from unoccupied to occupied.



NOTE: Occupied and unoccupied states are only applicable if networked to a controller which uses a clock for time management.

The CX-FlexCool and CX-FlexHeat require a potentiometer with a 20 kOhm resistor. The variance from the setpoint is determined by the software in the controller. This can be changed based on the software configuration.

Zone Sensor Connection

The zone sensor connects to the controller using a pre-manufactured cable (PAP-B). Individual screw terminals secure the PAP-B cable to the zone sensor and a Molex connector plugs into the port labelled SENSOR on the controller. Connect the blue wire to the "signal" output terminal and the white wire to the "return" terminal on the temperature sensor.

RS232 Port

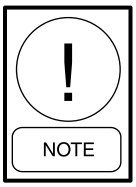
To communicate with the controller, an RS232 port is provided. However, the location of the controller under the floor can be difficult to locate. To simplify access to the RS232 port of the controller, the zone sensor provides a port to connect an RS232 device.

RS232 Connection to the Zone Sensor

The RS232 port available at the zone sensor connects to the controller using a pre-manufactured cable (PAP-B). Individual screw terminals secure the cable to the zone sensor and a Molex connector plugs into the port labelled RS232 on the controller.

LAN Communications

The LAN port uses a removable connector with individual screw terminals for each wire connection. Two LEDs are used to indicate the transmitting and receiving of information on the RS485 port.



NOTE: For information on LED codes, connecting to a terminal and troubleshooting, refer to Section 5.

The incoming and outgoing LAN wiring must both be connected to this single connector to ensure the continuity of the network is not broken if the connector is removed from the controller.

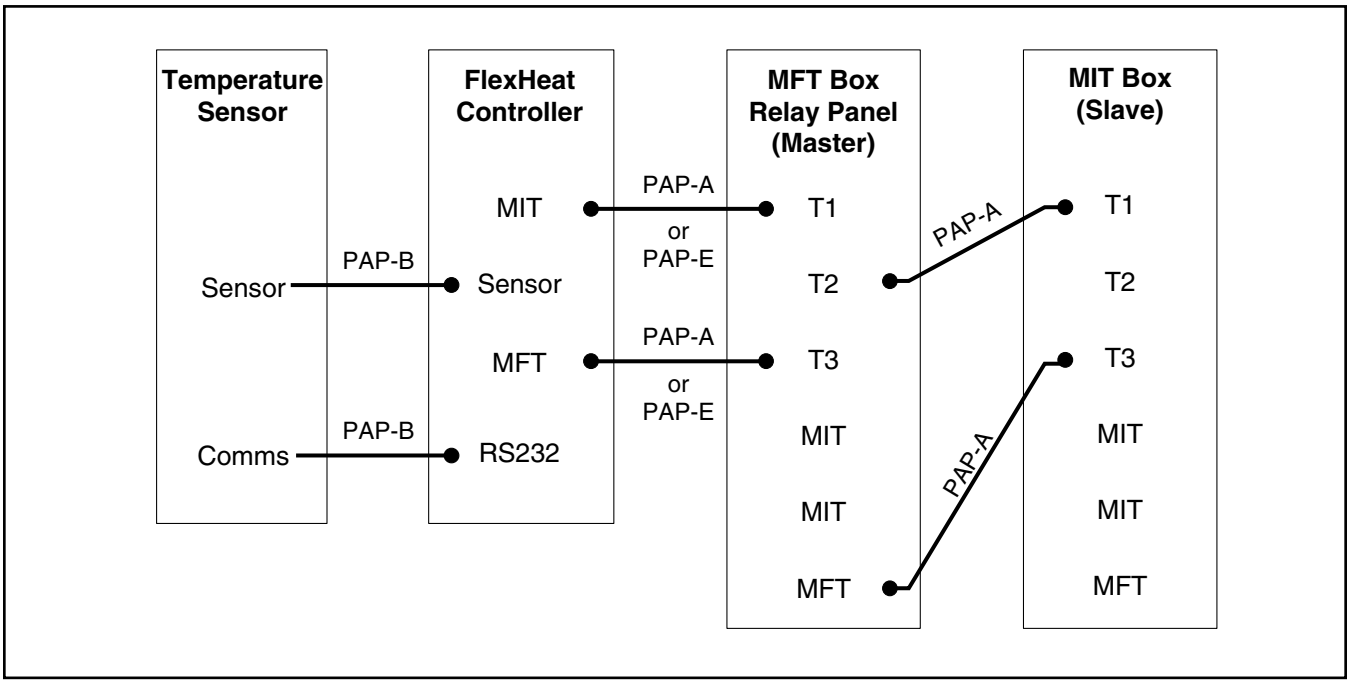


Figure 11. CX-FlexHeat Network Cables and Connectors

To attach the controller to the LAN connect the wiring as shown in the figure titled "LAN Port Wiring Details." Note that the shield must be connected to ground either directly or through the Termiation Module or CX-Repeater.

If a device is located at the end of a network line or "leg," a Termination Module must be installed. The Termination Module is an assembly of three resistors which provide impedance matching to improve the integrity of network communications.

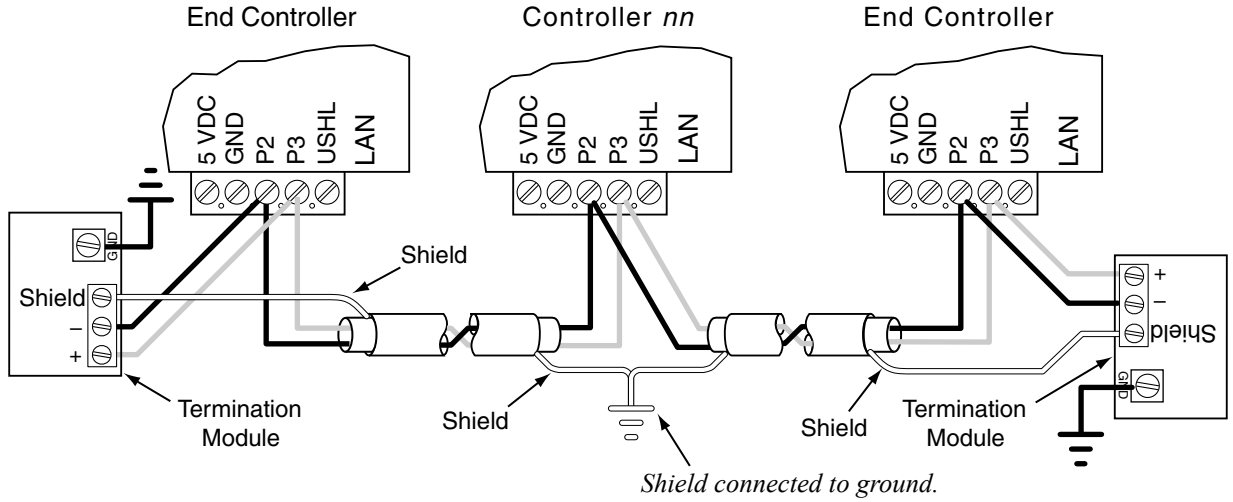
Network Communications

Located on the controller is an 8-way DIP switch for setting the network MAC Address. This binary-weighted switch uses seven of the rockers to set an address between 1 and 99.

NOTE: MAC Address 64 is reserved for the CX-FlexFloor controller.

The CX-FlexCool and CX-FlexHeat are capable of network transport speeds of 9.6, 19.2, or 38.4 kbaud. The network communication speed is set in the software via the Reset Report (07). Unless matching speeds with an existing network, always select the fastest speed (38k4).

TWO TERMINATION MODULES. SHIELD CONNECTED DIRECTLY TO GROUND IN THE MIDDLE OF THE SEGMENT.



ONE CX-REPEATER AND ONE TERMINATION MODULE GROUND. SHIELD GROUNDED THROUGH THE MODULE.

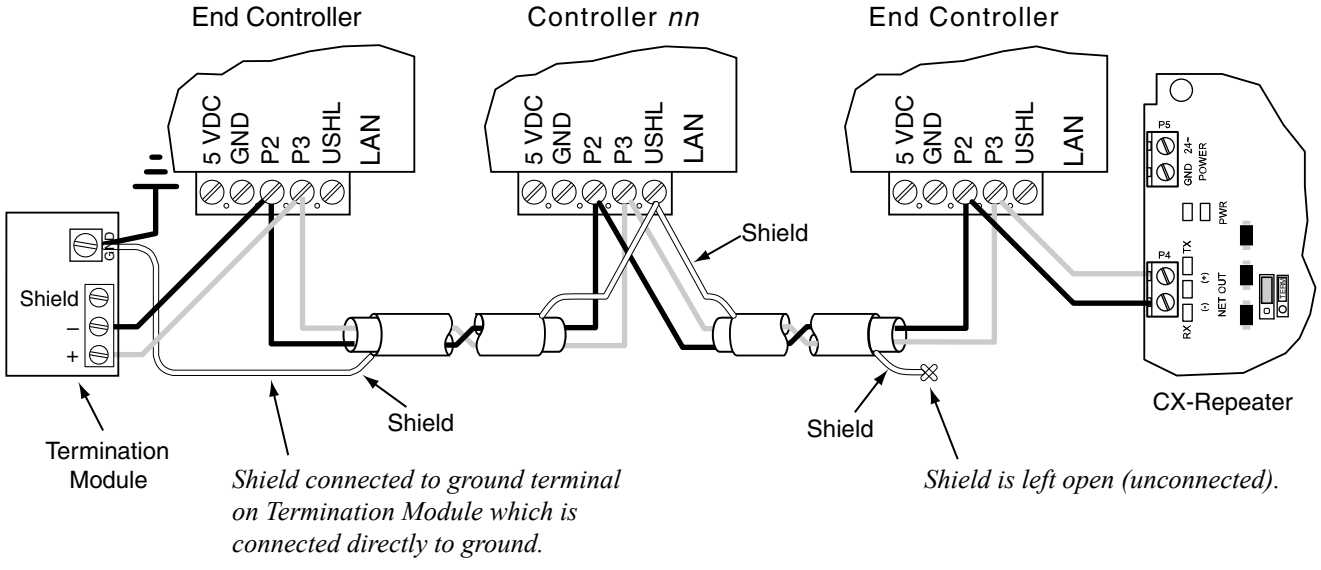


Figure 12. LAN Port Wiring Details

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 4

OPERATION

Introduction

The CX-FlexCool and CX-FlexHeat controllers are plug-and-play devices and, as such, will begin to operate as soon as power is applied. The default parameters have been chosen to work in most buildings. In this case, no configuration adjustments are required and the controller(s) and FlexSys system should run for many years.

However, in some cases, fine tuning may be required to allow for the specifics of a particular installation. Provisions for fine tuning are part of the product and are simple to do.

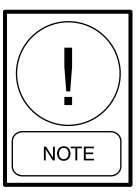
Tools

To accomplish the configuration an interface with the controller must be established. If the zone sensor includes an RS232 port (RJ-11 connector), it allows the connection of a device using VT100 terminal emulation software. Otherwise, a device must be connected directly to the controller.

The RS232 device can be a laptop computer or PDA provided it is capable of RS232 communication and has VT100 terminal emulation software available.

Connection

The CX-FlexCool and CX-FlexHeat controllers each have an RS232 port. Although a laptop or PDA can be connected here, the physical location of the controller under the floor is often difficult to locate and access. The CX-FlexCool and CX-FlexHeat controllers are designed to connect to the zone sensor located on the wall. This connection method provides simple, instant access to the controller, eliminating the need to remove floor panels and physically locate the device.



NOTE: The RS232 cable connection between the controller and zone sensor is optional. If communication does not readily occur, verify proper installation of the PAP-B cable.

It is recommended that a zone sensor with an RJ-11 connector be used. With this type of zone sensor the RS232 connector on the controller can be wired to the sensor through a PAP-B cable. This allows the laptop or PDA to be connected to the sensor and communicate with the controller very quickly and simply.

A serial port cable is required to interface between the laptop or PDA and the zone sensor. Most zone sensors utilize an RJ-11 connector as the optional RS232 jack. If connecting to a laptop, the serial port typically utilizes a DB-9 connector. Because of the wide variety of connector styles used on PDA devices, refer to the device documentation to obtain a PDA to DB-9 serial cable.

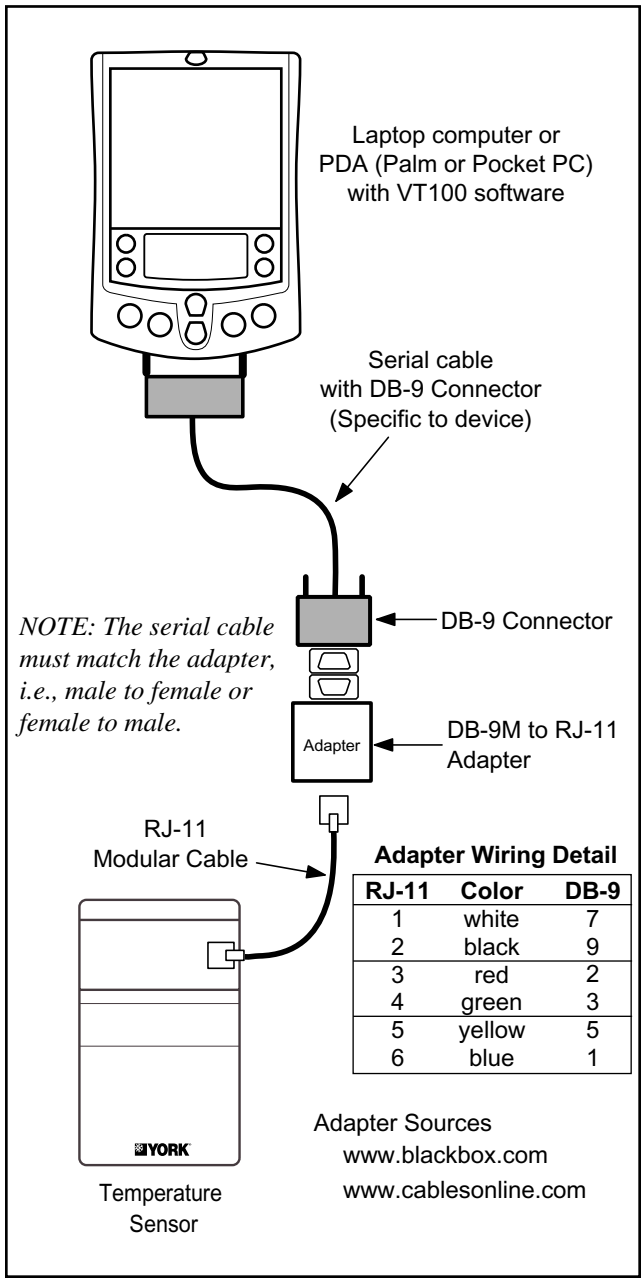


Figure 13. PDA Connection

Setting the DIP Switch

The CX-FlexCool and CX-FlexHeat controllers control air flow to the respective zones as standalone devices. A CX-FlexFloor controller controls the air flow into the underfloor plenum in much the same way. To operate these devices more efficiently, they can be linked together into a network to share data.

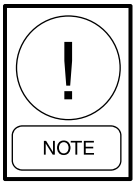
This network is an ISN ConneXsys network. The following set of rules apply:

Observe the RS485 standard, i.e., maximum of 32 nodes, 4000 ft. (1220 m) per segment, etc.

More than 32 nodes and greater distances may be accommodated through the use of repeaters. Up to three segments can be combined into a network. Networks can be combined using routers to form an internetwork.

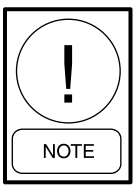
Each device on an internetwork must have a unique identifier. The identifier is known as the DE Object. The DE Object consists of numerous properties such as the network number and the MAC Address. This MAC Address is set using the DIP switch on the controller.

If multiple plenums are used, such as in a multi-floor building, each plenum requires a CX-FlexFloor and at least one router (CX-Router). Each router provides the connection point for each network to form an internetwork.



NOTE: The software in each CX-FlexCool and CX-FlexHeat controller is configured to communicate to a CX-FlexFloor controller with a MAC Address of 64 on a local network. It is assumed the network architecture has only one CX-FlexFloor per network.

The CX-FlexCool and CX-FlexHeat controllers use a DIP switch consisting of eight individual rocker switches that are binary-weighted. To determine the numeric value assigned to the switch, add the value of each corresponding rocker switch in the ON position. The result is the number (MAC Address) selected.



NOTE: Rocker switch 8 is not used.

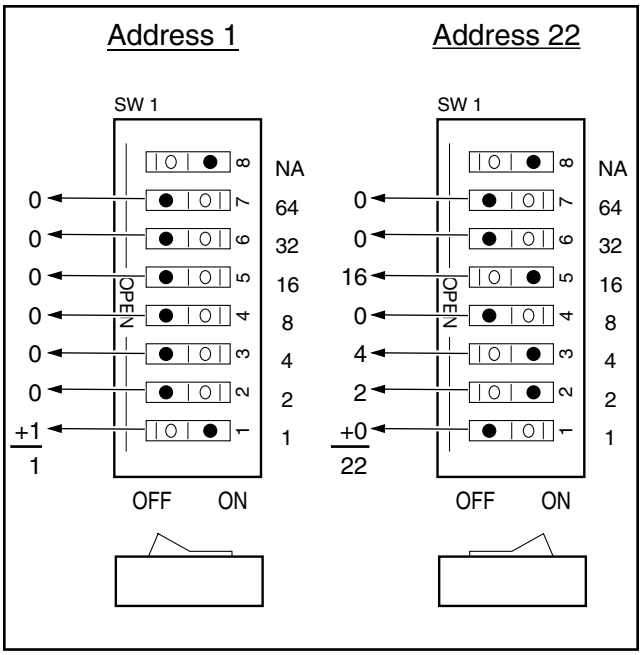


Figure 14. Node Switch Usage

Network Transfer Rate

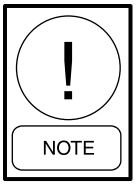
The ISN ConneXsys network sets the communications rate in the firmware. When installing a new network always select 38.4 kbaud. Refer to Report 07 for details.

VT100 Terminal Interface

A VT100 terminal interface program allows configuration of the application program within the CX-FlexCool or CX-FlexHeat controllers through an RS232 connection. With the appropriate password entered, any VT100 terminal emulation program can be configured to provide access to Reports which guide the technician in configuring a CX-FlexCool or CX-FlexHeat controller to a specific job.

Passwords

After the controller is properly connected to a laptop or PDA, communication can begin. As with all YORK controllers, the application is protected by a password.



NOTE: All commands must be entered in lower case.

Communication is initiated by typing

logon

in the edit field of the VT100 terminal emulation software. The screen displays

PLEASE ENTER PASSWORD:

There are two password levels. Level **1** provides access to read the Summary Report. Level **2** provides access to read data in all six Reports and change operating parameters where applicable.

Table 1 – Passwords

	Password	Access	Rights
Level 1	1	Summary	Read Only
Level 2	2	All Reports	Read/Write

Enter the appropriate password and ENTER.

Using the Software

The controller displays the unit name, node number, day, date and time at the top of the main menu. The main menu lists the available Reports. The six Reports are:

01. Summary
02. Local Setup
03. Calibration
04. Network Command
05. Transfer Out
06. Reset

Each Report can be access by typing the appropriate two-digit number. When the Report is accessed a list of the Pages in the Report appears which contain data.

Report Navigation

The controller responds to the following commands:

p – cycles through the available Pages within the selected Report.

r – lists the Pages in the selected Report.

b – backs up one menu level.

help – displays a list of terminal commands.

Each of the commands must be followed by the ENTER key.

Entering and Editing Data

To enter or edit data, the appropriate Page must first be selected. From the appropriate Report, the Page number can be entered (p05) or the letter "p" and ENTER pressed until the appropriate Page is displayed (ppppp[ENTER]).

Some data is editable and other data is not. If data is editable, type **e** and press ENTER to enter the field. Modify the data as desired and press **e** and to exit or move to the next field. If additional fields are editable within the Page, they are accessed sequentially until the Page is exited.

When editing the Page is redisplayed with the first editable field replaced with appropriate place holders. The place holders indicate the type of field or data that can be entered.

vvvv.v – indicates a **v**ariable can be entered, such as 72.4.

mmmmm – indicates the entries are restricted to a **m**enu, or list, of items. An example might be YES or NO. The items can be cycled through by continuing to type “m”. When the desired selection is visible press ENTER.

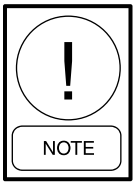
dddd – indicates a date field. The date is entered formatted as day-month. For example, August 31 is entered as 3108.

yyyy – indicates a year field such as 2004.

hhhh – indicates a time field. The time is entered formatted as hour-minute on a 24 hour basis. For example, 3:16 pm is entered as 1516.

ttttt – indicates a text field. This is used as a descriptor such as ROOM 456. The alpha characters must be upper case.

In addition to the type of field, the size of the field is indicated by number of characters. For example, a text field of vvvvv allows 5 digits to be entered.



NOTE: In this manual, editable fields are shown in lower case characters, noneditable fields are shown in upper case characters. Default values are shown in parenthesis after the field.

4

Application Notes

The application software loaded into the CX-FlexCool and CX-FlexHeat controllers is the same. The Reports for the CX-FlexCool controller show items applicable only to the CX-FlexHeat controller and vice versa.

Network parameters are visible as part of the application but are not editable from the CX-FlexHeat and CX-FlexCool controllers. These items are editable only from a remote controller, such as the CX-FlexFloor controller. If not connected to a network, these parameters have no effect.

The CX-FlexCool and CX-FlexHeat controllers do not contain a Real Time Clock (RTC) and cannot, on their own, change status from occupied to unoccupied. Typically, the CX-FlexFloor or Air Handling Unit controller contain the RTC. Scheduling can be made from this single location and distributed through the network to each CX-FlexCool and CX-FlexHeat controller. As standalone controllers, the default is occupied and will not change unless overridden by a network command.

Summary Report

Table 2 – Summary Report (Section 01)

Page	Description
1	ZONE TEMP VVV.V
2	OCCUPIED MMM (YES) TIMER VVV.V (60.0)
3	OCC. CLG.SP VVV.V (75.0) HTG.SP VVV.V (73.0)
4	UNOCC. CLG.SP VVV.V (75.0) HTG.SP VVV.V (73.0)
5	DAMPER POSITION VVV.V
6	HEATING PERCENT VVV.V
7	ttttttttttt (XZN-) NODE: VV

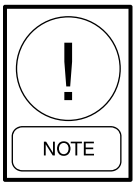
Factory default shown in parenthesis

The Summary Report shows the current setpoints and parameter settings for the attached controller. The items shown in the Summary Report cannot be edited from this report. Where applicable, data shown in the Summary Report can be edited in the Local Setup Report.

The Summary Report data is as follows:

ZONE TEMP – This is the temperature (°F) as measured by the zone sensor and adjusted by the calibration value.

OCCUPIED – When connected to a network controller equipped with a clock function, the status of the zone can be changed from occupied to unoccupied with different setpoints to reduce energy usage.



NOTE: The CX-FlexCool and CX-FlexHeat controllers do not include a clock function and are not capable of changing occupational status.

If not connected to a clock-equipped controller, the occupational status is always “occupied.”

TIMER – The zone sensor includes a push-button switch to override the unoccupied state. Pressing the switch changes zone from unoccupied to an occupied status for a predetermined time period (default 60 minutes). This field displays the time remaining in the override condition.

Press the switch a second time to extend the override condition an additional time period. To return to the unoccupied state, press and hold the switch 5 seconds.

OCC CLGSP (Occupied Cooling Setpoint) – In occupied periods, the MIT damper opens when the zone temperature is above this setpoint. The default occupied cooling setpoint is 75° F.

OCC HTG.SP (Occupied Heating Setpoint) – In occupied periods the heating sequence begins when the zone temperature is below this setpoint. The default occupied heating setpoint is 73° F.

UNOCC CLG.SP (Unoccupied Cooling Setpoint) – This is the cooling setpoint when the occupational status is "unoccupied." The default unoccupied cooling setpoint is 85° F (29° C).

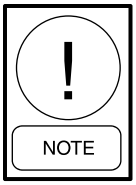
If not networked to a clock-equipped controller, this setpoint has no effect on the controller.

UNOCC HTG.SP (Unoccupied Cooling Setpoint) – This is the heating setpoint when the occupational status is "unoccupied." The default unoccupied heating setpoint is 65° F.

If not networked to a clock-equipped controller, this setpoint has no effect on the controller.

DAMPER POSITION – This indicates the position of the damper as a percentage of its full travel. It is a calculation based on the sum of the open and close pulses.

HEATING PERCENT – Indicates the heating demand on the CX-FlexHeat controller. The heating requirement is based on a calculation. This calculation generates a commands which cause either the MFT box to operate or, if in Perimeter Heat mode, an analog valve to open. If using a modulating valve, the heating percent is an indication of how open the valve is. If using an MFT with stages of heat, the percentage corresponds to a heat stage.



NOTE: Additional information on the heating percentage calculation can be found under Calculation Theory.

(Location) – This is a location name used to identify the controller. This is typically a room location or other identifier to differentiate the controller from other controllers. It also appears on the graphic when viewed on an Operator Work Station. The default is XZN -.

NODE – Indicates the MAC Address of the device and is set using the DIP switch. The MAC Address identifies the device, along with other DE Object properties to other BACnet devices.

Local Setup Report

Table 3 – Local Setup Report (Section 02)

Page	Description
1	ZONE TEMP vvv.v CALIBR vvv.v (0.0)
2	SP ADJ RANGE vvv.v (5.0) ACTUAL vvv.v
3	OCC. CLG.SP vvv.v (75.0)
4	CLG-HTG DEADBAND vvv.v (2.0)
5	UNOCC. OFFSET vvv.v (10.0)
6	FAN ON IN DEADBAND? MMMM mmmm (OPEN)
7	PERIMETER HEAT? MMMM mmmm (OPEN)
8	STORE CONFIGURATION? ttttt (5555)

Factory default shown in parenthesis

The Local Setup Report allows the user to set the parameters required for the CX-FlexCool or CX-FlexHeat controller to operate as a standalone system. Most of the items reported in the Summary Report can be edited here.

ZONE TEMP – This is the temperature (°F) as measured by the zone sensor and adjusted according to the calibration of sensor.

CALIBR – This field is used to calibrate the temperature. To enter a calibration value, use an accurate thermometer to measure actual room temperature. Compare the measured temperature with the temperature shown in the ZONE TEMP field. Enter the difference in the CALIB field. Negative numbers are acceptable.

SP ADJ RANGE (Setpoint Adjustment Range) – This field sets the range of adjustment available using the potentiometer on the zone sensor. The potentiometer allows an equal amount of adjustment up and down. The default is ±5.

Since the heating setpoint is based on a deadband (difference from the cooling setpoint) the heating setpoint is also adjusted by the position of the potentiometer. The unoccupied setpoint does not take into account the potentiometer position.

The potentiometer is based on a resistor which may or may not be exact in both directions. To overcome this, move the potentiometer fully

one direction, observe the value and repeat in the other direction. Edit the range field until the actual values are within an acceptable level.

ACTUAL – This field indicates the position, in degrees, of the potentiometer. Move the potentiometer fully in either direction to display the Setpoint Adjustment Range.

OCC. CLG SETPT (Occupied Cooling Setpoint) – This field sets the occupied cooling setpoint. This is the setpoint when the potentiometer is centered and the controller is in an occupied state. The default occupied cooling setpoint is 75° F.

CLG-HTG DEADBAND (Cooling-Heating Deadband) – This field sets the difference between the cooling setpoint and the heating setpoint. The number must be a positive number greater than 1. This deadband, subtracted from the Occupied Cooling Setpoint, sets the Occupied Heating Setpoint. The default is 2.

UNOCC. OFFSET (Unoccupied Offset) – This field sets the difference between the Occupied Cooling Setpoint and the unoccupied temperature. The number is added to the Occupied Cooling Setpoint (without slider adjustment correction) to establish the Unoccupied Cooling Setpoint. Similarly, the number is subtracted from the Occupied Cooling Setpoint to establish the Unoccupied Heating Setpoint.

The default Occupied Cooling Setpoint is 75° F and the default Unoccupied Offset is 10. This establishes an Unoccupied Cooling Setpoint of 85° F and an Unoccupied Heating Setpoint of 65° F.

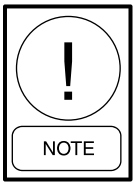
FAN ON IN DEADBAND? – This field activates an option to operate the fan in an MFT box when in the Heating Deadband, the temperature range between the cooling and heating setpoints when approached from a lower temperature. If approached from a higher temperature, it is considered Cooling Deadband and the fan does not operate. The default is NO (OPEN). To change to YES, select the MADE menu option.

To change the operation mode, enter the field and select between MADE and OPEN. When the desired choice is visible in the field, type **e**.

PERIMETER HEAT? – This field sets the controller to operate with a perimeter heat method other than an MFT box. It uses a Power Control Module (PCM) to provide power to the CX-FlexHeat which typically employs an analog valve. This analog valve is connected to the VALVE port of the CX-FlexHeat controller and opens on a one-to-one ratio according to the heating percent rather than the "staged" effects of the MFT box. The default status is NO (OPEN). To change to ON, select the MADE menu option.

To change the operation mode, enter the field and select between MADE and OPEN. When the desired choice is visible in the field, type **e**.

STORE CONFIGURATION? – This field sends the current configuration to be stored in the FLASH memory. Normally, changes made during a terminal session are stored in BRAM. This is volatile memory and, if power is lost, any changes are lost. By activating this Page, changes are immediately stored in FLASH.



NOTE: BRAM memory is automatically backed up to FLASH memory once every 24 hours by the firmware. If STORE CONFIGURATION is not activated immediately and a power loss occurs before the automatic save is completed, information will be lost.

This Store Configuration function should be the last item completed when changing operating parameters on the CX-FlexCool and CX-FlexHeat controllers.

To invoke the Store Configuration process, enter the field and type **5555e** and press ENTER to complete the process.

Calibration Reports

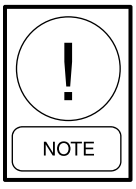
Table 4 – Calibration Report (Section 03)

Page	Description
1	ACTUATOR TRAVEL vvv SEC (420)
2	ACTUATOR SCALE FACTOR vvv (30)
3	ACTUATOR CALC.INTERVAL vvv (30.0) SEC
4	HTG PI CALC. INTERVAL vvv (120) SEC
5	HTG PI CALC. CONSTANT vvv (25) SEC
6	DAMPER FORCE OPEN mmmm POS vvv.v
7	DAMPER FORCE CLSE mmmm POS vvv.v
8	HEATER CONTROL vvv% mmmm (AUTOMATIC)
9	POWERUP CALIBRATION TIMER vvvv (550)
10	STORE CONFIGURATION? ttttt (5555)

Factory default shown in parenthesis

The Calibration Reports provide access to items and constants used in calculations within the controller. By modifying these items, the tuning loops can be fine tuned for specific applications. The factory defaults typically provide adequate control.

CAUTION: Only experienced technicians should modify these items. Changing constants to unreasonable values can make the system inoperable.



NOTE: Additional information can be found in the Calculation Theory section of this manual.

ACTUATOR TRAVEL – This field sets the amount of time (time constant) required to fully open or close an MIT damper. Based on a travel distance of 10 inches, the input electrical frequency determines the time. Assuming an input frequency of 60 Hz, the travel time is 420 seconds, which is the default value. If using a 50 Hz electrical supply, the time required to travel the full 10 inches is lengthened to 504 seconds. This must be manually edited on this page.

ACTUATOR SCALE FACTOR – This field sets a constant used in determining the length of the pulse. It has been set based on past experience. Increasing the value decreases the length of the pulse.

ACTUATOR CALC. INTERVAL – This field sets how often the temperature of the zone is analyzed and the position of the damper adjusted.

HTG PI CALC. INTERVAL – This field sets the amount of time before recalculating the heating percent. This determines the stage of heat or position of the analog valve (if Perimeter Heat is invoked).

HTG PI CALC. CONSTANT – This field sets a constant for calculating the heating percent. The default has been chosen based on past experience. Increasing the value increases the length of the pulse.

DAMPER FORCE OPEN – This invokes a command which operates all dampers to fully open. Normally, this is indicated as OPEN and the POS (position) is indicated as a percentage.

To change the operation mode, enter the field and type m until MADE is visible in the field. Type **e** and the controller will immediately begin to drive the damper open. This will continue until the DAMPER FORCE OPEN field is changed to OPEN.

To stop the controller from driving the damper open, enter the field and type **m** until OPEN appears in the field. Type **e** to close the field and turn off the function.

CAUTION: The DAMPER FORCE OPEN and DAMPER FORCE CLOSE commands override any calculations or automatic operation. They must be turned off before normal operation can resume.

DAMPER FORCE CLSE – This actuates a command which operates all actuators to close the damper. Normally, this is indicated as OPEN and the POS (position) is indicated as a percentage.

To invoke this function, enter the field and type **m** until MADE is visible. Type **e** and the controller will immediately begin to drive the

damper closed. This will continue until the DAMPER FORCE CLOSED field is changed to OPEN.

To stop the controller from driving the damper closed, enter the field and type **m** until OPEN appears in the field. Type **e** to close the field and turn off the function.

HEATER CONTROL – This allows the technician to verify heater operation. Normally, this is an Automatic mode, with heater operation controlled by the CX-FlexHeat controller.

To invoke this function, enter the field and type **m** until MANUAL is visible. Type **e** to exit the field. The percentage of heat value will not change.

To change the percentage of heat value, enter the field and enter the value desired in the field. Type **e** to exit the field and the controller will immediately demand that percentage of heat. This percentage of heat corresponds to a heat stage or valve position, creating heat in the zone.

To change the controller back to an AUTOMATIC mode of heat demand, enter the field and type **m** until AUTOMATIC is visible in the field. Type **e** to close the field and turn off the function.

CAUTION: When the Heater Control is in MANUAL mode it will always create the manually entered amount of heat. It must be reset back to AUTOMATIC before normal operation can resume.

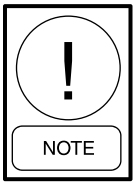
POWERUP CALIBRATION TIMER – This indicates the amount of time remaining for the damper (actuator) to be forced closed at powerup. To calibrate the damper position, the controller forces the dampers closed for 550 seconds to establish position.

STORE CONFIGURATION? – This field sends the current configuration to be stored in the FLASH memory. Normally, changes made during a terminal session are stored in BRAM. This is volatile memory and, if power is lost, any changes are lost. By activating this Page, changes are immediately stored in FLASH.

This Store Configuration function should be the last item completed when changing operating parameters on the CX-FlexCool and CX-FlexHeat controllers.

To invoke the Store Configuration process, enter the field, type **5555e** and press ENTER to complete the process.

Network Command Report



NOTE: These items cannot be modified at this level and should be ignored if not connected to a network.

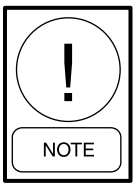
Table 5 – Network Command Report (Section 04)

Page	Description
1	DEVICE NODE NUMBER VV
2	OCC. CLG.SP VVV.V
3	SP ADJ. RANGE VVV.V ACTUAL VVV.V
4	OVERRIDE MINUTES VVV.V
5	UNOCC. OFFSET VVV.V
6	OCCUPIED MMMM TIMER VVV.V
7	DMPR.FORCE OPEN MMMM POS VVV.V
8	DMPR.FORCE CLSE MMMM POS VVV.V
9	FAN ON IN DEADBAND MMMM X-FER MMMM
10	PERIMETER HEAT MMMM X-FER MMMM

The Network Command Report shows the parameters received from another networked controller, such as the CX-FlexFloor controller. These values override the local values in the CX-FlexCool or CX-FlexHeat controller. The default network values are set outside the normal range, causing the controller to ignore them when not networked. When a network controller is connected and acceptable values are received by the CX-FlexCool or CX-FlexHeat controller, the local values are overridden by the network values.

The values are typically the same as shown on the Summary Report but the setup values and constants are received from the network controller and not editable from the local controller. Using a CX-FlexFloor controller allows the values to be entered once at a single location without the need to set parameters at each CX-FlexCool and CX-FlexHeat controller.

DEVICE NODE NUMBER – This is the MAC Address of the CX-FlexCool or CX-FlexHeat controller. It is set using the DIP switch on the controller and must be a unique number on the network.



NOTE: It is recommended that MAC Address 64 be reserved for the CX-FlexFloor controller. CX-FlexCool and CX-FlexFloor controllers are preconfigured to transfer to address 64 and the CX-FlexFloor is preconfigured to use this MAC Address.

OCC. CLG SETPT (Occupied Cooling Setpoint) – This is the network setpoint received from the network controller. The default is -40. Anything greater than 0 causes the network setpoint to override the local setpoint.

SP ADJ RANGE (Setpoint Adjustment Range) – This is the range of adjustment available to the user when the slide potentiometer on the zone sensor is moved. It overrides the local Setpoint Adjustment Range.

ACTUAL – This is the setpoint of the local zone sensor with the effect of the potentiometer taken into account.

OVERRIDE MINUTES – This field indicates the time remaining in the override state when the override button on the zone sensor is activated. Refer to the section regarding TIMER on the Summary Report.

UNOCC. OFFSET (Unoccupied Offset) – This field shows the difference between the Occupied Cooling Setpoint and the unoccupied temperature.

OCCUPIED – This indicates the current status of occupancy. It is received from the network controller and is usually based on time setting.

DMPR. FORCE OPEN – This indicates the status of the damper actuation. If MADE, it indicates that the network controller has actuated a command which is forcing all dampers open.

POS – This indicates the current position, as a percentage, of the dampers attached to the local controller.

DMPR. FORCE CLSE – This indicates the status of the damper actuation. If MADE, it indicates that the network controller has actuated a command which is forcing all dampers closed.

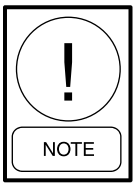
POS – This indicates the current position, as a percentage, of the dampers attached to the local controller.

FAN ON IN DEADBAND – This indicates that the MFT fan operates in the deadband between the Cooling Setpoint and the Heating Setpoint. The status is indicated as NO (default) or YES.

PERIMETER HEAT – This indicates the type of perimeter heat selected. If NO, heat is generated using the MFT box. If YES, perimeter heat is generated using a modulating analog valve.

Transfer Out Report

CAUTION: Only experienced technicians should modify these items. Changing constants to unreasonable values can make the system inoperable.



NOTE: The Transfer Out Report is only relative when connected to a network.

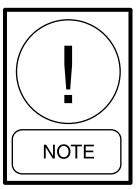
Table 6 – Transfer Out Report (Section 05)

Page	Description
1	F27S01 CH:m ND: W (64) ZONE TEMP VVV.V
2	F27S02 CH:m ND: W (64) HT-DB-CL VVV.V
3	F27S03 CH:m ND: W (64) DMPR. POS VVV.V
4	F27S04 CH:m ND: W (64) HTG % VVV.V
5	F27S05 CH:m ND: W (64) OCCUPIED VVV.V
6	STORE CONFIGURATION? ttttt (5555)

Factory default shown in parenthesis

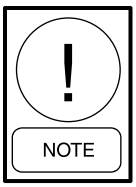
The Transfer Out Report configures the CX-FlexCool or CX-FlexHeat controller to supply information to an outside controller such as the CX-FlexFloor controller. This data is used by the AHU controller to adjust the temperature of the air in the underfloor space according to the needs in the interior zone.

The first five Pages indicate information that can be transferred, if desired. To transfer a specific Page of data, change the Channel No. to 1.



NOTE: Available channel numbers are blank, 1, and 2. These correspond to a port. Channel number 1 is the LAN port, Channel number 2 is the RS232 port.

The data can be transferred to any node on the network. The default MAC Address (node) for transfer is 64, which is the default node address of the CX-FlexFloor controller. This can be changed, if desired.



NOTE: F27S01 through F27S05 is the final programming block destination of the data. For example: all zone temperature can be transferred to net=0, node=64, Feature 27, Section 01 where the highest and lowest value is selected.

This Report is not used if a network is not connected to the controller. If the controller is connected and information is required by another controller(s), the channel must be turned "on", indicated by a 1, and the receiving node selected.

The information normally required by the CX-FlexFloor for effective AHU management, loaded as factory defaults, is:

ZONE TEMP (S01) – This is the temperature of the zone.

HT-DB-CL (S02) – This is the operational mode of the controller. If heating, 1 is indicated. If cooling, -1 is indicated. If within the deadband, 0 is indicated. The AHU controller can count the number of zones in cooling versus heating and make the appropriate adjustments to the output of the AHU.

DMPR. POS (S03) – The Damper Position is an indication of underfloor air temperature requirement. If most of the dampers are open fully, the underfloor temperature may be lowered. If most of the dampers are closed, the underfloor temperature may be raised.

HTG. % (S04) – The Heating Percentage changes the underfloor air temperature based on the amount of heat required in a similar manner as the Damper Position.

OCCUPIED (S05) – The Occupied status changes the underfloor pressure based on the need for air flow. In an unoccupied state, air pressure can be reduced.

STORE CONFIGURATION? – This field sends the current configuration to be stored in the FLASH memory. Normally, changes made during a terminal session are stored in BRAM. This is volatile memory and, if power is lost, any changes are lost. By activating this Page, changes are immediately stored in FLASH.

This Store Configuration function should be the last item completed when changing operating parameters on the CX-FlexCool and CX-FlexHeat controllers.

To invoke the Store Configuration process, enter the field, type **5555e** and press ENTER to complete the process.

Reset Report

Table 7 – Reset Report (Section 06)

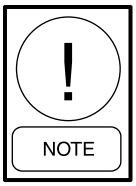
Page	Description
1	RESET SYSTEM? ttttt (5555)
2	APPLICATION NAME: tttttttt (OCS TDCL)
3	APPLICATION VERSION: 1
4	PROGRAM VERSION: t.t.ttt (CX-XZN-V25-1)
5	LAN TYPE: BACNET SPEED: mmmm (38K4)
6	LOCATION NAME: ttttttttttt (XZN-)
7	OWS GRAPHIC: ttttttttttt (FX_ZN_CL.GPC)
8	STORE CONFIGURATION? ttttt (5555)

Factory default shown in parenthesis

The Reset Report provides access to view/modify system information and to return to local control after a network controller has been connected.

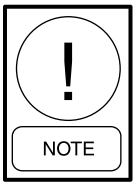
RESET SYSTEM? – The CX-FlexCool and CX-FlexHeat application software gives priority to the network controller, if a network controller is connected. To do this, the default network values are unrealistic when shipped from the factory so the controller ignores them. This allows the local parameters to have priority.

When a network controller is connected, it changes these unrealistic network values to real values. The controller then uses these new network values instead of the local parameters. The realistic network values are then held in BRAM memory. Since the original, unrealistic values still remain in Flash memory, they may be "reinstated" by invoking Page 1 or the Reset Report.



NOTE: Network transfers must be stopped before invoking the reset or network parameters will be re-installed upon power up. This can be accomplished by either disconnecting the network cable or stopping transfers from the sending controller.

To invoke the command enter the field, type **5555e** and press ENTER.



NOTE: Invoking this command will cause the controller to drive the dampers closed for 550 seconds. This process cannot be stopped.

APPLICATION NAME: – This is the name of the application. The factory application is named OCS TDCL.

APPLICATION VERSION: – This is the version of the application. This is factory set.

PROGRAM VERSION: – This is the version of the program. The first field indicates the operating system, the second field indicates the application and the third field indicates the configuration. This is factory set.

LAN TYPE: This is the type of LAN. This is expressed as BACnet.

SPEED – This is the current transfer rate of the network. The options for CX controllers are 9.6, 19.2 or 38.4 kbaud. The default speed is 38k4.

LOCATION NAME: – This text field can be used to enter a location for the controller. It is not used by the controller but can be used as reference by the user, in particular it can be displayed on the OWS screen with the default graphic. The default is XZN-_.

OWS GRAPHIC – This field sets the graphic that appears in the ISN ConneXsys OWS when the controller is selected. The default graphic is FX_ZN_CL.GPC which is for a CX-FlexCool controller. For the CX-FlexHeat, enter FX_ZN_HT.GPC.

Within the OWS graphics library are other graphic files for other devices. The appropriate file name must be entered in this field to ensure the correct graphic appears when the device is selected in the OWS.

Calculation Theory

MIT Damper Actuation

The MIT dampers open and close to allow cool air to flow from the underfloor space to the occupied zone. As the zone sensor determines the need, an actuator in each box moves the dampers.

To prevent over-reaction of the dampers, the controller operates for a given amount of time (ACTUATOR CALC. INTERVAL) before calculating the length of time to open (or close) the damper. This time is known as a pulse.

The formula for calculating a pulse is based on the overall travel length and the temperature difference between the setpoint and actual temperature. A constant (ACTUATOR SCALE FACTOR) is also used.

$$\text{Length of Pulse} = \frac{(T-SP)}{SF}\,(\text{ACT. TRAVEL})$$

If T–SP is negative the actuator is driven the opposite direction.

Example:

Zone Temp (T) = 76
Setpoint (SP) = 75

$$\text{Length of Pulse} = \frac{(76-75)}{30}\,(420)$$

$$= 14 \text{ seconds}$$

To obtain the correct amount of air flow and temperature adjustment speed, these factors can be modified. To slow the rate of temperature change, the scale factor (SF) can be increased to decrease the length of the pulse or the Actuator Calc. Interval can be increased to change how often the calculation is performed.

Using the default values, the length of a pulse is 14 seconds or approximately 3% of total travel. The calculation is performed every 30 seconds until the temperature difference is 0.

Stages of Heat

The MFT box has three methods of providing heat to the zone. These are referred to as stages as each one becomes increasingly aggressive. The first stage uses the fan in the MFT to draw air from the warmer, interior zone and supply it to the cooler perimeter. Since the temperature is significantly warmer than the 63° F typically in the underfloor zone, this begins to heat the room.

In the second stage, a heater coil in the MFT box is activated, adding additional heat to the air blowing through the fan.

The third stage adds a second heater coil to increase the heat flowing through the MFT box.

Since the % Heat is an analog value, operational ranges have been assigned to each of the stages. The actuation of each stage differs depending upon the percent heat required.

Two methods of controlling hydronic heat are available. One method uses the MFT box with a binary valve incorporated to open and close flow to a heat exchanger in the MFT box. The valve is connected to and controlled by the logic in the MFT box.

Using this method changes the number of stages to two, with the fan being the first stage and operating at the same on/off points. The second stage opens

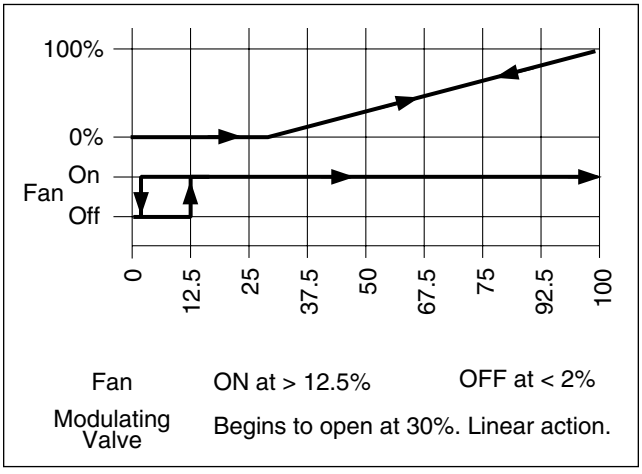


Figure 15. Modular Valve Change Points

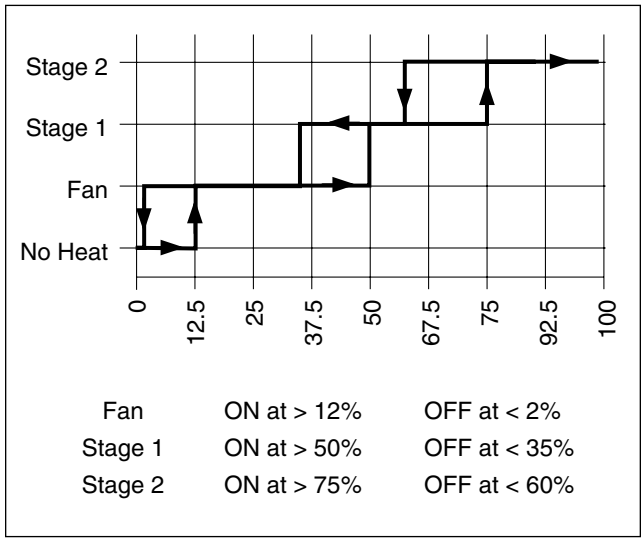


Figure 16. Stage Heat Change Points

the valve fully and uses the same on/off points as the First Stage with electric heat.

A second method of hydronic heat is to use an analog valve. This connects directly to the CX-FlexHeat controller. The valve is opened 50% when the second stage of heat is required and fully open when the 3rd stage of heat is called for.

MFT Heater Actuation

In much the same way as the MIT dampers must be modulated, so, too, must the heater function. To do this, the CX-FlexHeat controller takes advantage of a PI loop to adjust the amount of heat required. A PI loop is a formula which takes into account the history of the function. Two constants are chosen, a multiplier (or gain) and a time interval to allow changes to take effect.

The formula takes into account the previous heat percentage.

$$\% \text{ Heat} = K(SP - T) + \text{Last } \% \text{ Heat}$$

If SP–T is negative the heat requirement is reduced.

Example:

Zone Temp (T) = 72
Setpoint (SP) = 73
K = 25

$$\% \text{ Heat} = 25(73 - 72) + \text{Last } \% \text{ Heat}$$

The percentage of heat can be modified by changing one of two variables.

1. If the constant K (HTG PI CALC. CONSTANT) is increased, the percent of heat required is increased.
2. If the HTG PI CALC. INTERVAL is reduced, the calculation is performed more often.

The default values have been chosen for efficiency and from previous experience. Using the default values and assuming a 1/2° difference, the maximum time for the fan to engage is 2 minutes. For the first stage of heat to engage is 8 minutes.

SECTION 5

MAINTENANCE

LEDs

The CX-FlexHeat and CX-FlexCool controllers are equipped with LEDs to aid in troubleshooting operation and communications.

STATUS LED

The CX-FlexCool and CX-FlexHeat controllers each utilize a STATUS LED. This LED indicates a processor fault or the software status.

The following table indicates the codes used by the STATUS LED.

Communication LEDs

LAN LEDs

The LAN port has two LEDs; the TX LED indicates the controller is transmitting and the RX LED indicates the controller is receiving data across the ISN LAN. Data transmission can be due to a request by another controller or, if properly configured, due to the application within the controller.

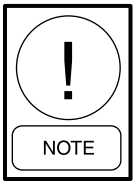
ISN software requires an acknowledgement anytime communications are sent. Due to this required response, a TX flash will be followed by an RX flash, The RX flash signifies the receipt of the acknowledgement.

RS232 LEDs

The RS232 port also has a TX and RX LED. By observing the LEDs a technician can determine that the controller is receiving or transmitting data. Although a limited amount of information can be ascertained, it is helpful in eliminating possible causes of communication failure.

Output LEDs

The output channels on the CX-FlexCool and CX-FlexHeat controllers incorporate LEDs to signify status. The connectors to the MIT boxes signify rotation in either a clockwise (CW) or counterclockwise (CCW) direction.



NOTE: The clockwise LED indicates the damper is opening. Counterclockwise indicates the damper is closing.

5

Table 8 – STATUS LED Codes

LED	Code	Action
OFF	System is OFF or has failed (crashed).	Reboot system. If failure repeats, contact York Service.
ON	System is operating correctly.	
Quick Flash	(1.6 sec on, 0.2 sec off) System is resetting.	Normal. If continues for more than 1 minute, contact York Service.
2 flashes	System is in the UNCONFIGURED mode.	Software is not loaded. Contact York Service.
3 flashes	System is in the HALT mode.	Contact York Service.
4 flashes	System is in the MONITOR mode.	Contact York Service.
5 flashes	System has UNACKNOWLEDGED alarms.	This may indicate unconnected sensors. If unit does not function properly, contact York Service. Otherwise, alarms may be ignored
10 flashes	System is in the RTOS mode (application is not loaded).	Software is not loaded. Contact York Service.

For the CX-FlexCool controller, a pair of LEDs indicate rotation for both the MIT1 and MIT2 connectors. The output through both these connectors is always the same.

For the CX-FlexHeat controller the MIT cable connects to the MFT box initially but the LED indicates the signal to the MFT box which controls the MIT actuator.

The CX-FlexHeat controller has two additional LEDs to indicate heat output. These outputs provide a signal to the MFT box relay card. By using an ON-OFF logic table, the two outputs can provide three stages of control. The following table indicates the heating stage for the output logic as indicated by the LEDs labeled DO5 and DO6.

Table 9 – Heating Stage LEDs

Heat Stage	D06	D05
No heat	OFF	OFF
Fan only	OFF	ON
Heat Stage 1	ON	OFF
Heat Stage 2	ON	ON

SPECIFICATIONS

CX-FlexCool Specifications

General		
	Primary Power Source	115/230 VAC, (±10%) Switch selectable
	Frequency	45-65 Hz
	Protection	Internal Thermal Reset on Transformer
	Power Consumption	Nominally 75 VA (1.5 VA plus connected load)
	Storage Temperature	-40 to 160° F (-40 to 70° C)
	Operating Environment	32 to 120° F (0 to 50° C) 10 to 95% RH non-Condensing
	Size (H x W x D)	5.8 x 6.5 x 2.6 in. (147 X 165 X 66 mm)
	Weight	5 lb. (2.2 kg)
Processor		
	Type	NEC V25 Operating at 8 MHz
	Memory PROM	128 kbytes of CMOS EPROM
	Memory RAM	128 kbytes of CMOS RAM
	Memory Backup	256 kbytes Flash Memory
Connections		
	MIT 1 and MIT 2	2 Connectors provide access to a single set of triac outputs. Each output is 24 VAC and 3.0 amps. Connects up to 14 MITs via PAP-A cable.
	Sensor	2 Analog Inputs from thermostat. Connects to temperature input and setpoint adjuster via a PAP-B cable.
	RS232	RS232 communication link to zone sensor via PAP-B cable.
	LAN	BACnet MS/TP; RS485
	LAN Speeds	9.6, 19.2, 38.4 kbaud
	LAN Connection	5-pin screw terminals
	LAN Cable	Screened Twisted-Pair (Belden 89841 or Equivalent)
Interface		
	LEDs	Controller Status; LAN Communication; RS232 Communication; MIT Actuator Rotation Direction
	Switch Selections	MAC Address (1-99) (64 is reserved for Air Handler)
	Configuration	VT100 Terminal Emulation Software
Certifications		
	UL 916 Listed UL 94-5VB Listed (Plenum Flammability Rating) FCC Part 15 Class A LVD Standard EN61010: 2001 CE Directive EN61000: 2001	
Ordering Information		
	CX-FlexCool (115 VAC)	371-04472-001
	CX-FlexCool (230 VAC)	371-04472-002
	PAP-A Cable	32-04004-027
	PAP-B Cable	32-04004-028
	PAP-C Cable (Extender)	32-04004-035
	PAP-D Cable	32-04004-058
	PAP-E Cable	32-04004-059
	PAP-F Cable	32-04004-066
	Conduit Box, Gray	371-04490-000 (allows connection of power line via conduit)

NOTE: Refer to 450.24-NOM7 or 450.20-S34 for Temperature Sensor information

CX-FlexHeat Specifications

General		
	Primary Power Source	24 VAC ±15% (from MFT box via PAP-A cable)
	Frequency	45 to 65 Hz
	Protection	At MFT box
	Max. Power	18 VA
	Storage Temperature	-40 to 160° F (-40 to 70° C)
	Operating Environment	32 to 120° F (0 to 50° C) 10 to 95% RH non-Condensing
	Size (H x W x D)	3.9 x 5.5 x 1.0 in. (100 X 140 X 25 mm)
	Weight	1 lb. (0.45 kg)
Processor		
	Type	NEC V25 Operating at 8 MHz
	Memory PROM	128 kbytes of CMOS EPROM
	Memory RAM	128 kbytes of CMOS RAM
	Memory Backup	256 kbytes Flash Memory
Connections		
	MIT	2 Digital Triac Outputs. Each output is 24 VAC and 0.5 amps per channel. Connects to MFT via PAP-A or PAP-E cable for control of up to 14 MITs.
	MFT	2 Digital Triac Outputs to control MFT via PAP-A or PAP-E cable. 24 VAC 0.5 amps per channel.
	Sensor	2 Analog Inputs from thermostat. Connects to temperature input and setpoint adjuster via a PAP-B cable. Additional analog input for customization
	Valve	Analog Output 10 mA @ 0-10 VDC, Connects via PAP-A cable.
	RS232	RS232 communication link to zone sensor via PAP-B cable.
	LAN	BACnet MS/TP; RS485
	LAN Speeds	9.6, 19.2, 38.4 kbaud
	LAN Connection	5-pin screw terminals
	LAN Cable	Screened Twisted-Pair (Belden 89841 or Equivalent)
Interface		
	LEDs	Controller Status; LAN Communication; RS232 Communication; MIT Actuator Rotation Direction; MFT Heat Stage
	Switch Selections	MAC Address (1-99) (64 is reserved for Air Handler)
	Configuration	VT100 Terminal Emulation Software
Approvals		
	UL 916	
	UL 94-5VB Plenum Flammability Rating	
	FCC Part 15 Class A	
	CE Directive 61010: 2001	
Ordering Information		
	CX-FlexHeat	371-04473-001
	PAP-A Cable	32-04004-027
	PAP-B Cable	32-04004-028
	PAP-C Cable (Extender)	32-04004-035
	PAP-D Cable	32-04004-058
	PAP-E Cable	32-04004-059
	PAP-F Cable	32-04004-066

NOTE: Refer to 450.24-NOM7 or 450.20-S34 for Temperature Sensor information

BACnet Objects Exposed in F20

Name	BACnet Object Type and Instance	Read/Write	Point List Description	Report and Page No.
MODE	AV26	W	BACnet - Mode of Operation	*
ZONE.SP.RMT	AV21	W	BACnet - Occupied Cooling Setpoint	*
TIME.ADJ.RMT	AV22	W	BACnet - Setpoint Adjustment	*
TIME.EXT.RMT	AV23	W	BACnet - Override Time Extension	*
UNOC.OFS.RMT	AV24	W	BACnet - Unoccupied Offset	*
ZONE.T	AV1	R	Zone Space Temperature	r01p01
OCCUPIED	BV5	R	Occupied Mode	r01p02
OCC.TMR.MIN	AV2	R	Occupied Override Timer	r01p02
OCC.CLG	AV3	R	Occupied Cooling Setpoint	r01p03
OCC.HTG	AV4	R	Occupied Heating Setpoint	r01p03
UNOCC.CLG	AV5	R	Unoccupied Cooling Setpoint	r01p04
UNOCC.HTG	AV6	R	Unoccupied Heating Setpoint	r01p04
DMP.FEEDBACK	AI14	R	Zone Damper Position Feedback	r01p05
HTG_MAN-AUTO	AV7	R	Heating Required %	r01p06
CLG.SP	AV8	R	Cooling Setpoint - Active	
HTG.SP	AV9	R	Heating Setpoint - Active	
FORCE.OPEN	BV7	R	Mode Status - Force Open	r03p06
FORCE.CLSE	BV8	R	Mode Status - Force Closed	r03p06
FAN.ON_DBAND	BV32	R	Mode Status - Fan On Deadband	r02p06
PERIM.HEAT	BV33	R	Mode Status - Perimeter Heating	r02p07
DO5	BV36	R	Heating Output - Stage 1	
DO6	BV37	R	Heating Output - Stage 2	
HTG.VLV	AV10	R	Heating Output - % Open	
SP.LCL	AI9	R	Local - Zone Cooling Setpoint	r02p03
ZONE.ADJ.LCL	AI10	R	Local - Zone Adjustment Setpoint	r02p02
HTG-DB-CLG	AV11	R	Heating-Deadband-Cooling	r05p02
YSA F01	YSA1	Proprietary**	Alarm Status - Feature 1 - Maintenance	
YSA F01	YSA2	Proprietary**	Alarm Status - Feature 1 - HVAC	
YSA F01	YSA 3	Proprietary**	Alarm Status - Feature 1 - Critical	
YSA F01	YSA4	Proprietary**	Alarm Status - Feature 1 - System	
YSC F10	YSC1	Proprietary**	Calendar/Clock	
YAH F15	YAH1	Proprietary**	Analog History - Section 1	
YAH F15	YAH2	Proprietary**	Analog History - Section 2	
YAH F15	YAH3	Proprietary**	Analog History - Section 3	
YAH F15	YAH4	Proprietary**	Analog History - Section 4	
YDH F16	YDH1	Proprietary**	Digital History - Section 1	
YDH F16	YDH2	Proprietary**	Digital History - Section 2	
YDH F16	YDH3	Proprietary**	Digital History - Section 3	
YDH F16	YDH4	Proprietary**	Digital History - Section 4	
YDH F16	YDH5	Proprietary**	Digital History - Section 5	
YDH F16	YDH6	Proprietary**	Digital History - Section 6	
YFS F30	YFS1	Proprietary**	Fixed Sequencing - Feature 30 - Heating	
YSD F50	YSD1	Proprietary**	System Diagnostics - Feature 50	
YSS F60	YSS1	Proprietary**	System Status - Feature 60	

** Data received from CX-FlexFloor.*

*** Proprietary items are exposed to allow for future enhancements.*

NOTES

NOTES

P.O. Box 1592, York, Pennsylvania USA 17405-1592
Tele. 800-861-1001 website: www.york.com

Form 450.24-NOM8 (904)
New Release