YORK®	CX-FlexFloor Controller FlexSys Underfloor System	
USER GUIDE	NEW RELEASE	Form 450.24-NOM9 (904)

CX-FlexFloor

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.

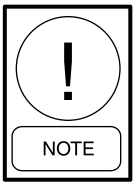
SAFETY SYMBOLS

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-FlexFloor Specifications	450.24-S13
CX-FlexFloor PICS/BIBBs Statement	450.24-TD10
CX-FlexCool Controller Specifications	450.24-S11
CX-FlexHeat Controller Specifications	450.24-S12
CX-FlexCool/CX-FlexHeat PICS/BIBBs Statement	450-24-TD9
Schematics for CX-FlexHeat/CX-FlexCool Controllers and MIT Underfloor Air Applications	450.20-AD11
CX-FlexCool/CX-FlexHeat Users Guide	450.24-NOM8

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GENERAL INFORMATION

FlexSys Overview

Modern buildings need to cope with continually changing floor plans and the associated problems of moving power, telephone, and network cables. Raised floor systems resolve these issues by placing utilities under the floor where they can be easily accessed and modified.

York's FlexSys system extends the flexibility inherent in raised floor systems to the HVAC system by using the space under the floor as a supply air plenum. It is similar in some respects to an overhead VAV system except the conditioned supply air enters the conditioned spaces through many Modular Integrated Terminal (MIT) units. The MIT units sit in the floor panels, moving a damper in response to a temperature sensor.

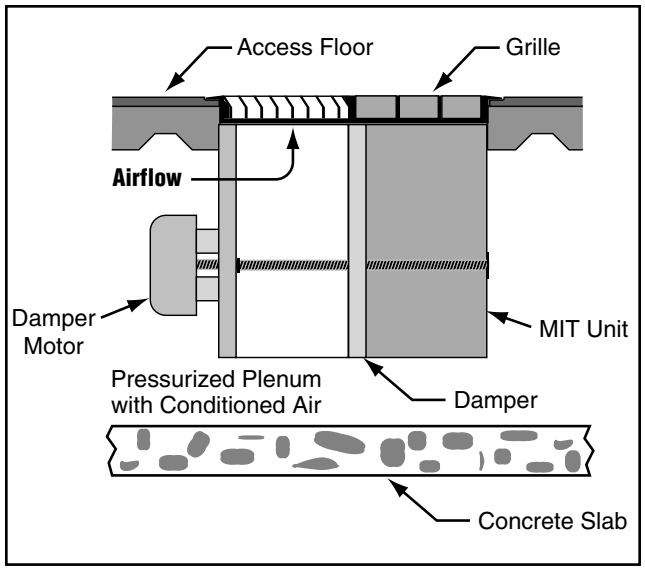

Figure 1. MIT Unit

Temperature sensors are located throughout the interior zones. The number and location depend on differences from zone to zone, the degree of flexibility desired, and the cost. Each temperature sensor is connected to a zone controller (CX-FlexCool), which modulates all the cooling MIT unit dampers within the zone. Zones can range from a single MIT box to a maximum of 42 MIT boxes.

Perimeter Zones

Perimeter zones have the added problem of heat gain or loss from outside the building, particularly if large windows are present. Supplemental heat is often required. To provide supplemental heat, a fan terminal unit specifically designed for underfloor duty is used called a Modular Fan Terminal (MFT). Special cooling/heating MIT units with duct collars are placed on the suction and discharge side of an MFT unit.

When heating is required, the MFT turns on. Air is drawn from the interior space via the MIT on the suction side, through the MFT and its heating coil, and discharged through the other MIT unit. The dampers in both the MIT units are closed, isolating the underfloor plenum from the air flow and creating a pathway to the occupied space.

When cooling is required, the MFT is turned off and the MIT boxes connected to it function exactly the

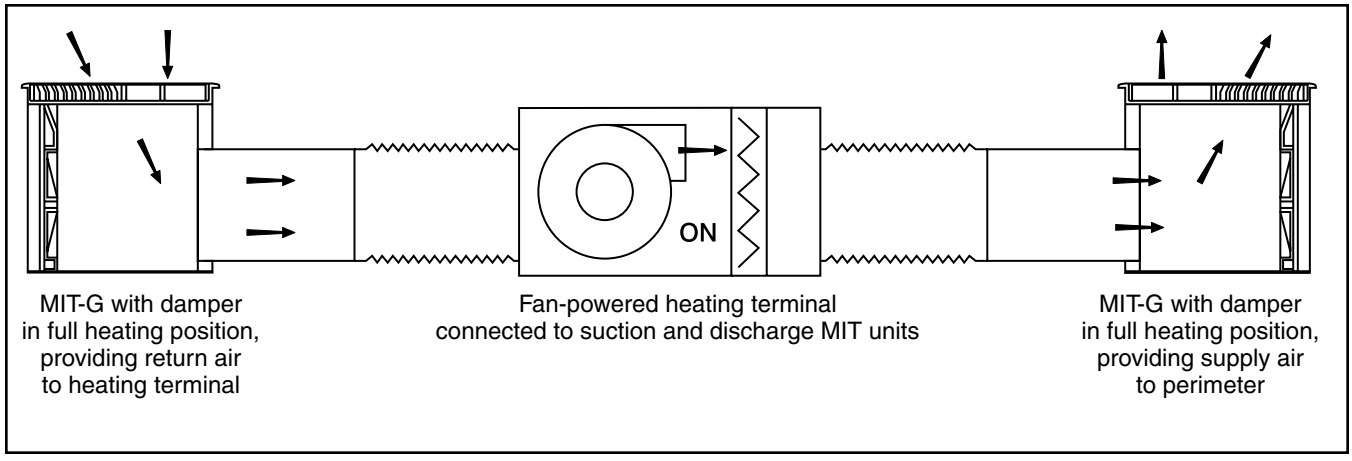

Figure 2. MFT and MIT Units Connected for Perimeter Heating

same as the other MIT units throughout the interior zones. They open on a rise intemperature and close on a fall in temperature.

Controlling a FlexSys Underfloor System

To control the FlexSys components, there are several control products available. The CX-FlexCool modulates cool air flow from the underfloor air plenum into the occupied space. The CX-FlexHeat provides a method to control the heating and cooling of air around the perimeter of the building. A separate manual provides information for these products.

An essential part of the FlexSys system is the proper control of the underfloor plenum. The CX-FlexFloor controls the flow of air into the underfloor plenum by modulating two dampers: one at the inlet to the underfloor plenum to maintain plenum pressure and one in the bypass duct around the cooling coils at the air handler to maintain the supply air temperature to the plenum.

The primary purpose of the CX-FlexFloor is to control these conditions:

Underfloor Pressure – Underfloor pressure controls the air velocity through the MIT grilles. If too low, the air is not distributed uniformly throughout the underfloor plenum. Too high and the air velocity will disturb the stratification resulting in overly mixed air between the occupied layer and the upper, unused layer. Typical underfloor pressures are between 0.02 and 0.08 in. W.G. (5.0 and 20.0 Pa).

Underfloor Temperature – Too high and the space cannot be adequately cooled. Too low and occupants become uncomfortable from walking on cold floors or from cold air streams from the MIT units. Typical supply air temperatures are between 60 and 65° F (15.5 and 18.3° C).

Underfloor Humidity – Aside from personal comfort considerations, the dewpoint of the supply air must be maintained above the temperature of the cement slab forming the bottom of the underfloor plenum. Otherwise, condensation will occur.

CX-FlexFloor

The CX-FlexFloor consists of a specially configured controller mounted in a standard-sized MIT housing along with temperature, pressure, and relative humidity sensors. One additional sensor, the slab temperature, is included and must be attached to the floor of the plenum. 115 and 230 VAC models are available. Additional inputs and network connections are available at the controller portion of the CX-FlexFloor.

Outputs from the controller are connected to the cooling coil bypass damper and underfloor pressure control device. LAN connections for an ISN ConneXsys network are available. BACnet* is an standard protocol and is used in many existing buildings and applications. This provides the ability to connect with non-YORK devices which also use BACnet. Voltage signal outputs are available for the transfer of sensor information to a non-BACnet controller or BAS.

The CX-FlexFloor can operate as a standalone device or be networked to the CX-FlexCool and CX-FlexHeat controllers in the plenum. When networked, inputs are received from the zone controllers to provide a greater degree of control.

There are two LEDs to indicate the condition of the CX-FlexFloor.

Power LED – The orange LED indicates that power is supplied to the unit.

Alarm LED – Red LED indicates when an alarm has occurred in the controller. This is triggered by deviation from the pressure setpoint over 0.015 in. (0.38 mm) in. W.G. or when the air dewpoint is within 3° F of the slab temperature.

<u>Access</u>

The CX-FlexFloor slips into place in the same manner as an MIT box. It uses a floor grill to allow air flow past the sensors. The controller can be accessed by removing the grill. The LEDs, an RS232 connector, and Keypad and Display Module connector are all accessible with the grill removed.

For initial setup and connection of power, sensors, and network, the rear panel can be removed.

The CX-FlexFloor application is loaded with applicable defaults configured, excluding time and cal-

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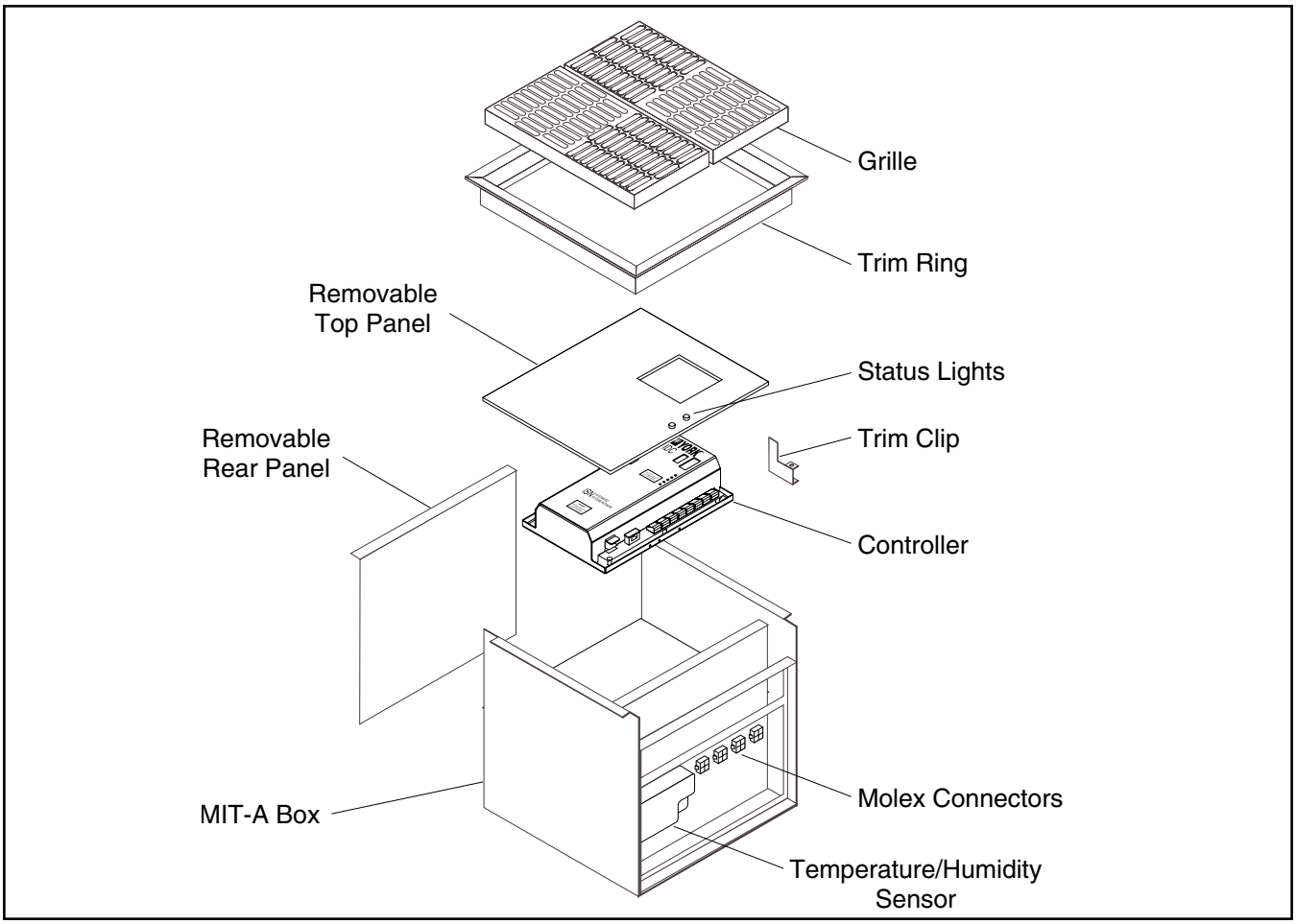


Figure 3. CX-FlexFloor Controller

endar setup. When modifications to the defaults are desired a simple report-style interface allows access to configuration parameters without requiring knowledge of the YORK's programming language. All pertinent information, such as pressure, temperature, deadbands, etc., can be accessed using the reports.

To access the reports, several devices can be used.

- Laptop computer or PDA operating a VT100 terminal emulation program. This is typically the interface for the CX-FlexCool and CX-FlexHeat controllers.
- Optional Keypad and Display Module (also used with other YORK controllers). This is the recommended device for interfacing with the CX-FlexFloor.

Design Considerations for the FlexSys Underfloor Air Distribution System

Temperature/Humidity Control

Mixed air (return air mixed with outside air) must be cooled and dehumidified which typically requires the air leaving the cooling coil to be 55° F (12.7° C) or cooler. Since this is too cold for an underfloor system, part of the return air is bypassed around the cooling coil to achieve the nominal 62° F (16.7° C) setpoint. The CX-FlexFloor modulates the bypass damper to achieve this underfloor setpoint.

Pressure Control

The underfloor pressure is critical to the stratification of conditioned air within the occupied space. Too high and excessive mixing occurs; too low and cool air "puddles" on the floor. Proper setpoint is established by raising or lowering the pressure setpoint until a wide-open MIT box near the perimeter delivers 150 cfm (70.8 L/sec). The CX-FlexFloor modulates the volume device (variable frequency drive,

inlet guide vanes, or damper) to maintain the under-floor pressure setpoint.

NOTE

NOTE: Depending upon the air handler capabilities, the bypass damper may be controlled by the air handler.

Ventilation

Regardless of temperature a minimum amount of ventilation is required for occupied spaces. Ventilation is achieved in three ways:

1.) Uncontrolled, constant volume boxes can be installed throughout the occupied area with special consideration given to areas with high constant loads.

2.) At the design pressure, a certain amount of leakage between floor tiles is expected and should be accounted for when selecting and positioning the constant-volume MIT boxes.

3.) Based on zone temperature (or return air temperature) the supply air temperature setpoint can be reset based on a configurable schedule. In essence, if too many MIT boxes are closed to provide proper ventilation, the air handler supply temperature can be raised to force the air dampers to a more open position. This requires an ISN network and a CX-FlexFloor.

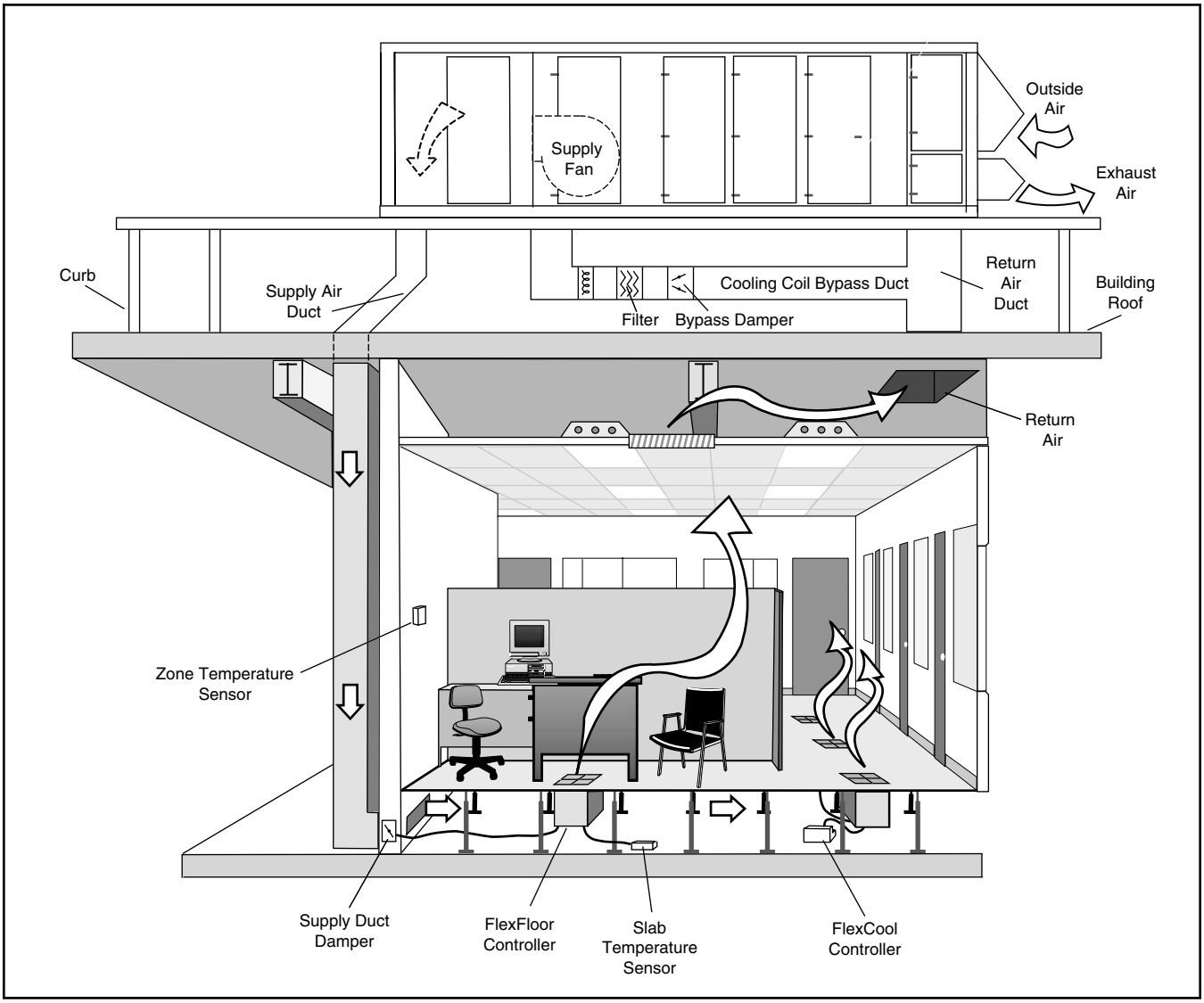


Figure 4. Typical Component Layout

Occupancy Schedules

Because of the concrete slab which forms the bottom of the supply air plenum and the higher supply air temperatures, an underfloor system typically has a slower zone temperature response time than a conventional overhead VAV system. Note that this also achieves a more stable zone temperature over time than an overhead VAV system. For this reason it is not recommended that the FlexSys air distribution system be shut down overnight. However, temperatures and pressure setpoints can and should be relaxed.

Unoccupied Operation

Regardless of whether an unoccuped period is configured within the CX-FlexFloor, the zones are frequently unoccupied (after hours, weekends, holidays, etc.) and this is reflected in the zone heat loads. The FlexSys system responds to the lack of heat by closing the MIT zone dampers. If the temperature continues to drop due to infiltration through constant-volume boxes and floor joints, the MFT heating units will respond to maintain the temperature setpoint.

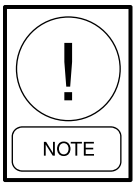
Configuring the CX-FlexFloor to lower the plenum pressure greatly reduces the amount of infiltration. Configuring the CX-FlexFloor to raise the plenum temperature also reduces the effect of the infiltration that continues to exist. The underfloor plenum will continue to be in control but at reduced levels.

The zone controllers (CX-FlexCool and CX-FlexHeat) do not contain schedules and, absent a network, constant 24 hour, 7 day operation is assumed. The zone controllers will operate as though occupied but at reduced effectiveness since the pressure is reduced and the temperature raised. When perimeter heating is required, the MFTs continue to operate at full effectiveness since they are fan-powered and do not depend on plenum pressure to function.

Operational Alarms

The CX-FlexFloor has two operational alarms which trigger the red alarm light which can be viewed through the floor grille.

Pressure Alarm – Occurs when the plenum pressure deviates from setpoint by more than 0.015 in. W.G. (3.7 Pa) for more than 60 seconds.



NOTE: The alarm is disabled for 5 minutes following a setpoint change.

Dewpoint Alarm – Occurs whenever the plenum air dewpoint temperature is within 3° F (1.7° C) of the slab temperature, indicating condensation is imminent.

Connectivity

Standalone Operation

The simplest installation of the CX-FlexFloor provides pressure, humidity, and temperature monitoring and control of a bypass damper and a volume device (variable speed fan, inlet guide vanes, or damper).

Non-YORK Controller

If a non-YORK BAS system is present, the CX-FlexFloor is capable of transferring data through scaled 0 to 10 vDC signals. There are five output channels preconfigured for the following data:

Table 1 – Controller Outputs

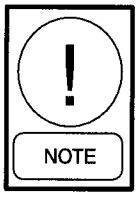
DESCRIPTION	SIGNAL	SCALE TO	BACnet OBJECT AND INSTANCE
Dewpoint Differential (Dewpoint - Slab Temp)	0-10 V	0-20° F	AV29
Relative Humidity	0-10 V	0-100%	AI11
Plenum Pressure	0-10 V	0-0.25 in. WG	AV27
Slab Temperature	0-10 V	40-90° F	AV30
Plenum Temperature	0-10 V	50-100° F	AV25

In addition, data can be transferred to a non-YORK BACnet system. Table 1 shows the preconfigured BACnet Objects and Instances for the CX-FlexFloor.

Simple FlexSys Network

While the CX-FlexFloor, CX-FlexCool, and CX-FlexHeat function as standalone devices, connecting the devices within a single floor or plenum to form a network can greatly enhance overall system performance and operator convenience.

Scheduling – A network provides the zone controllers access to the occupied/unoccupied flag within the CX-FlexFloor, allowing them to participate in the night setback strategy. Each zone can override the unoccupied flag by pushing the override button on the sensor. Should an overrride exist anywhere on the network, the CX-FlexFloor will also be overridden.



NOTE: Only the zone sensor with the override assumes the occupied setpoints. Other zone sensors remain at the unoccupied setpoints.

Plenum Temperature Reset – A networked CX-FlexFloor will reset supply air temperature based on a configurable reset schedule and a physical temperature input. The temperature input can be either a room temperature or return temperature.

When a network is present and the reset input is not present, the reset schedule uses the average of all zone temperature sensors.

Zone Data – A networked CX-FlexFloor provides the user with convenient access, through a PDA, laptop computer, or the Keypad and Display Module, to the following zone data:

Zone Temperature Average

Number of zones in heating mode

Number of zones in cooling mode

Percentage open of the highest cooling damper

Average percent heating load

Number of occupied zones

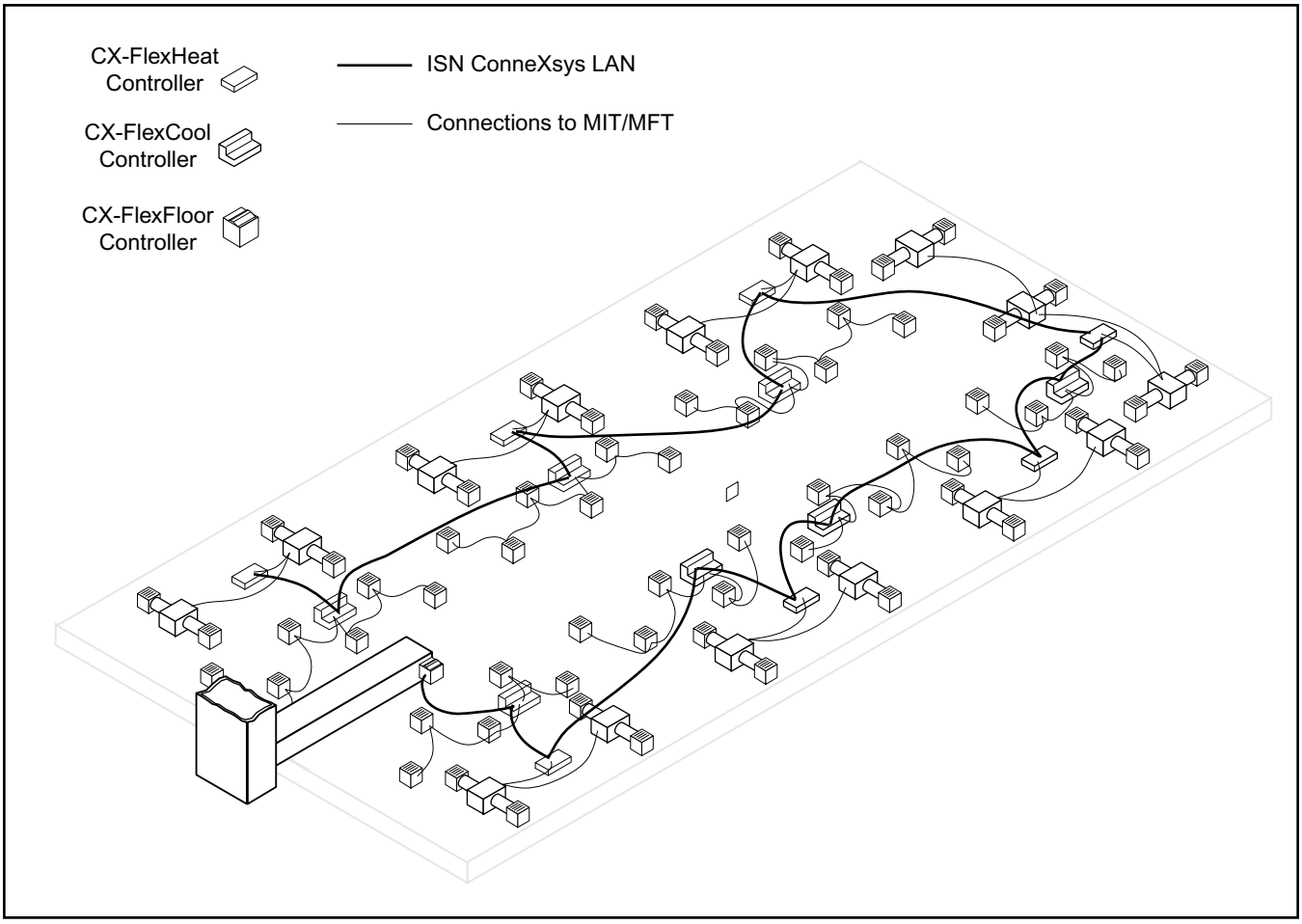


Figure 5. Single Floor FlexSys Layout

Zone Configuration – With a network the following configuration data can be entered from the CX-FlexFloor and transferred to all zone controllers on the network:

- Occupied Cooling Setpoint
- Temperature Setpoint Slide Adjust Range
- Override Time Extension (minutes)
- Unoccupied Temperature Offset
- Maintain Fan Operation within the Heating Deadband
- Enable Perimeter Heating (as opposed to heating with MFT units)

Two additional commands can be entered from the CX-FlexFloor to assist in air balance testing:

- MIT dampers force OPEN
- MIT dampers force CLOSE

Without a network these parameters and commands must be accomplished at each individual zone controller.

Complex FlexSys Network

Multiple plenum installations can be viewed as a collection of single plenum installations with each CX-FlexFloor controlling a plenum supply damper to maintain the plenum's pressure setpoint. However, large installations with multiple plenums and multiple air handling units require control and automation sequences customized for the specific installation. Such customization involves strategies that are beyond the scope of the programs pre-configured within the CX-FlexFloor. However, such strategies are not beyond the capability of the YORK controller within the CX-FlexFloor.

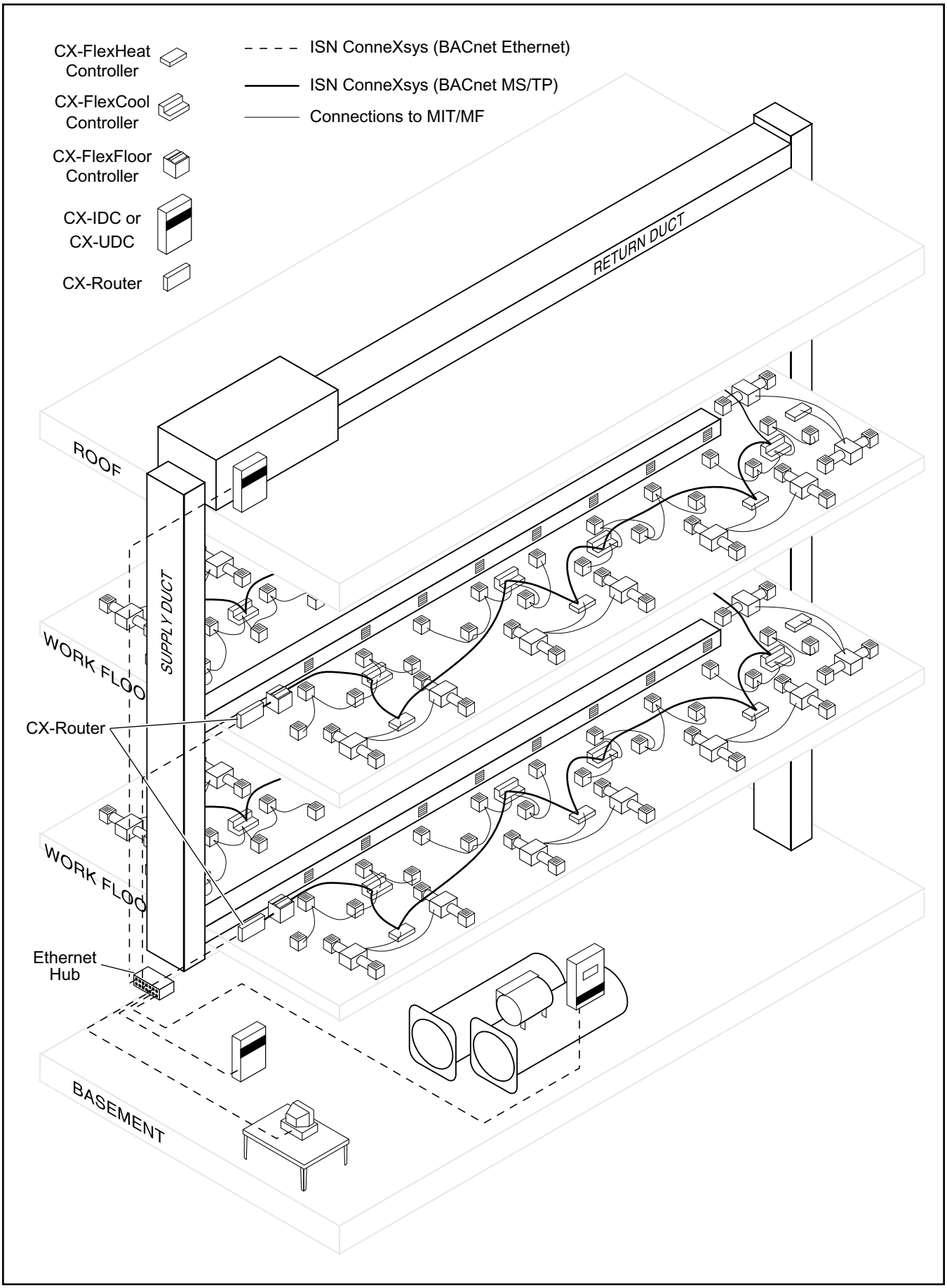


Figure 6. Typical Network Configurations

SECTION 2

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 controller so access to other equipment within the vicinity is not restricted.

Environment

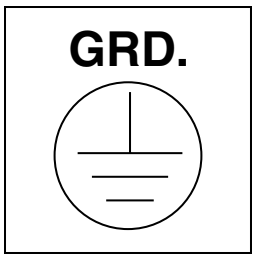
The CX-FlexFloor is placed in a raised floor panel the same way as an MIT unit. The CX-FlexFloor should be oriented so the pressure probe is on the side opposite of the underfloor air supply vent (out of the draft).

Electrical

Use a 3-conductor copper wire with a minimum of 16 AWG (1.5 mm²) to connect the line voltage feed to the CX-FlexFloor controller. The line voltage power source should be “clean” and separately fused for either 115 or 230 VAC, as applicable.

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.

Electrical grounding also protects the controller from the effects of lightning strikes. When lightning strikes near an controls installation, it alters the potential of the building’s ground. If the YORK 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 16 AWG wire.

Cable Specifications

The cables (other than the network 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 the CX-FlexFloor. Additional cables required are the line voltage power cable for the CX-FlexFloor controller, any network cables, and the connection cable to the RS232 device (PDA or laptop computer).

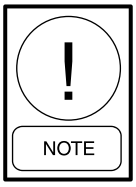
Power Cable

CAUTION: Aluminum wire is absolutely not acceptable.

The CX-FlexFloor 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 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



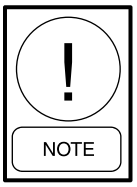
NOTE: Be sure cables are securely attached without tensile load.

The CX-FlexFloor uses a PAP-B cable to connect to the damper actuators and temperature sensors. An extender cable (PAP-C) allows greater distances between the components when needed.

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-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.

PAP-C – 25 ft. (7.6 m) 4-conductor cable with a Molex socket on one end and a Molex plug on the other end. This cable extends the distance between the controller and the connected device.



NOTE: Other cables are available and used with other devices. The CX-FlexFloor only uses the PAP-B with the PAP-C being used to extend cable runs.

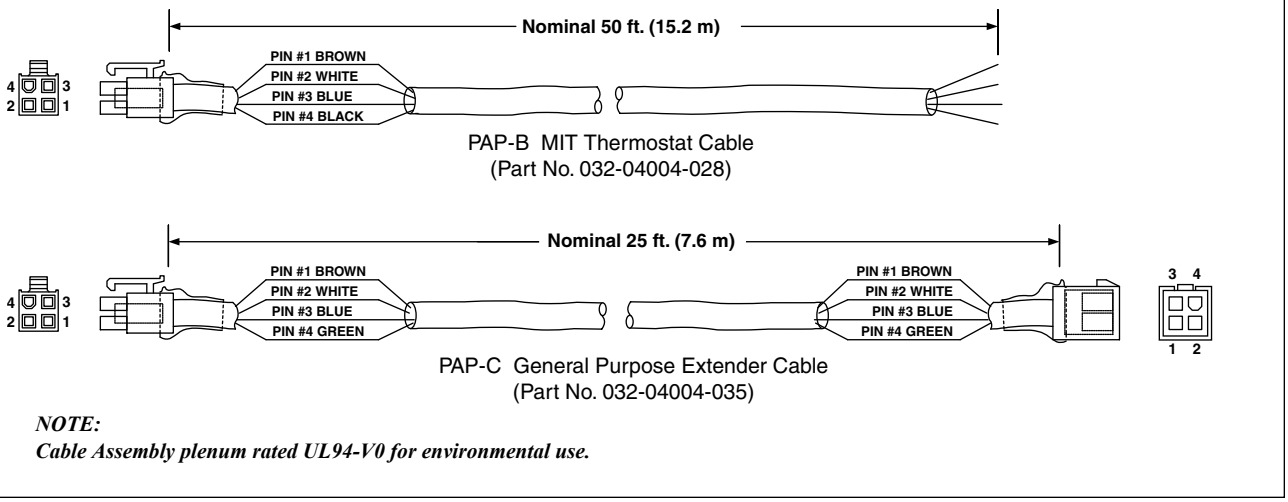


Figure 7. Modular PAP Cables

CX-FlexFloor Controller

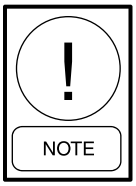
The CX-FlexFloor is a YORK ISN ConneXsys controller mounted within an MIT-A. The CX-FlexFloor is provided as a package with the controller and applicable sensors installed and attached. The only requirements for installing the CX-FlexFloor, other than placing it into the floor, are power connection, external sensor installation, connection to dampers, and network or external BAS connections.

Power Connection

CAUTION: Do not apply power to the CX-FlexFloor 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-FlexFloor controller requires a line voltage power supply of either 115 or 230 VAC depending upon which model of CX-FlexFloor was ordered.



NOTE: Verify that the correct model was ordered for the desired input voltage.

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.

To access the power wires on the CX-FlexFloor controller:

1. Loosen the two lower screws at the rear of each side panel. Remove the top screw on the rear panel and pivot the rear panel down to access the wiring inside the unit.
2. Remove a knockout from the front panel of the unit.
3. Route the 3-conductor power cable through the knockout hole until accessible through the rear panel. Use applicable bushings to protect the cable at the knockout.
4. Inside the box are three wires color-coded to the proper country standards for connection to the power source. Connect these wires to the proper conductors in the power cable using suitable connectors or splices.

Table 2 – Power Cable Color Codes

	Color Code		
Standard Code	Line	Neutral	Ground/Earth
U.L.	Black	White	Green
C.E.	Brown	Blue	Green w/ Yellow Stripe

Sensor Connection

The CX-FlexFloor has four Molex® sockets on the face of the box. Two of these, labeled SPACE and SLAB, are for connecting temperature sensors to measure the occupied space temperature and slab temperature.

Slab Temperature

Condensation will form on the concrete slab which forms the base of the air plenum if the slab temperature is below the dewpoint of the supply air. The slab temperature is monitored and will trigger an alarm if the dewpoint comes within 3° F (1.7° C) of the slab temperature.

The sensor should be securely attached to the slab using tape. Placement of the sensor can be anywhere within reach of the sensor leads.

Table 3 – Slab Temperature Sensor Wiring

Slab Temp Sensor	PAP-B/PAP-F Wire Color
Signal	Blue
Return	White

The slab sensor uses a PAP-B or PAP-F cable to connect to the CX-FlexFloor. One end of the cable plugs into a Molex socket on the front of the terminal box labeled SLAB. The other end, with individual conductors, should be connected to the slab sensor as shown in Table 3.

The Slab Temperature sensor included with the CX-FlexFloor is a 10 kOhm, Type III thermistor connected internally to Input Channel I05.

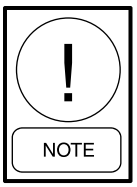
Space Temperature

Assuming the CX-FlexFloor is controlling supply air temperature (the cooling coil bypass damper is connected), the CX-FlexFloor can reset temperature based on zone conditions. Space conditions are determined in one of three ways:

1) a space temperature sensor installed in an occupied zone.

2) a return air temperature sensor in the return duct.

3) the average of the zone controllers if a network exists.



NOTE: If the CX-FlexFloor is networked and a temperature sensor is connected to the SPACE connector on the CX-FlexFloor, the connected temperature sensor will take priority over the network values.

Choose a temperature sensor with the appropriate mounting style for its desired location, i.e., a wall mount or duct mount. The temperature sensor must be a 10 kOhm, Type III thermistor and is connected internally to Input Channel I07.

This space temperature sensor uses a PAP-B or PAP-F cable to connect to the CX-FlexFloor. This cable allows one end to plug into the Molex socket on the front of the terminal box labeled SPACE and the other end, with individual conductors, connects to the temperature sensor. Connect the blue wire to the "signal" output terminal and the white wire to the "return" terminal on the temperature sensor.

Actuator Output

The CX-FlexFloor has four Molex sockets on the face of the box. Two of these, labeled BYPASS and DAMPER/VFD, are for connecting actuators to control the supply air temperature and plenum pressure.

Supply Duct Damper (or VFD)

The plenum pressure (differential pressure between the plenum and occupied space) is controlled by the air flow into the underfloor plenum. This air flow is modulated using either a damper or a variable speed fan. As air flow is required to maintain the pressure, the damper opens or the fan speed increases.

The supply duct damper connects to the CX-FlexFloor using a PAP-B cable. One end of the cable plugs into a Molex socket on the front of the terminal box labeled DAMPER/VFD. The other end, with individual conductors, should be connected to the damper as shown in Figure 8 (the methodology depends upon the type of actuator). A jumper on the controller must be set to AO to provide a 0 to 10 VDC signal (this is set at the factory before shipment). The supply duct damper connects to Output Channel 01.

Cooling Coil Bypass Damper

Most air handlers are designed to provide air at approximately 45° F (7° C). Since the FlexSys system requires air in the 62 to 65° F (16 to 19° C) range, a duct is typically installed to bypass return air around the cooling coils. A damper, controlled by the CX-FlexFloor, is installed in this bypass duct to modulate the air bypassing the coils, thereby controlling the temperature of the air supplied to the plenum.

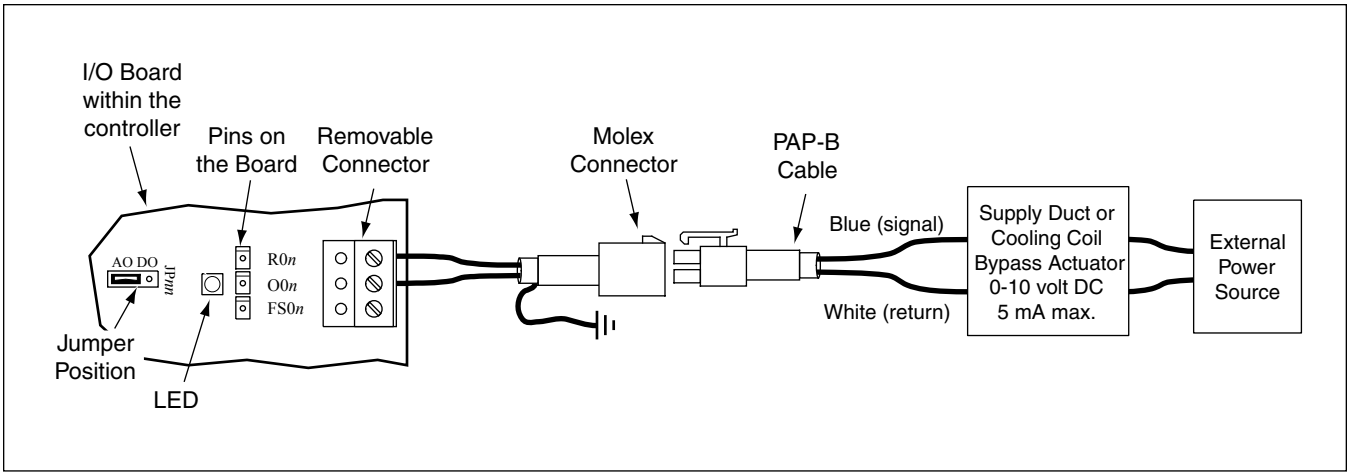


Figure 8. Actuator Connection

Some AHU's, in particular the eco², can be factory-equipped with the cooling coil bypass and damper for use specifically with the FlexSys system. In this case, control of the bypass damper can be managed by the AHU and connection to the CX-FlexFloor is not required.

The bypass damper connects to the CX-FlexFloor using a PAP-B cable. One end of the cable plugs into a Molex socket on the front of the terminal box labeled BYPASS. The other end, with individual conductors, should be connected to the damper as shown in Figure 8 (the methodology depends upon the type of actuator). A jumper on the controller must be set to AO to provide a 0 to 10 VDC signal (this is set at the factory before shipment). The bypass duct damper is connected to Output Channel 03.

Network Communications

Two options exist for communicating with other devices. The most versatile is for the controller to be connected to a YORK ISN ConneXsys network. This allows communication with other BACnet devices in the building or communication just with the CX-FlexCool and CX-FlexHeat devices within the plenum or floor. A second method for conveying data to an external, non-BACnet BAS is through five output channels which provide a 0 to 10 VDC signals.

External BAS

The following data and the appropriate output channels are:

Table 4 – Outputs to non-BACnet Controller

DESCRIPTION	OUTPUT CHANNEL	SCALE TO
Dewpoint Differential (Dewpoint – Slab Temperature	04	0-20° F
Underfloor Relative Humidity	05	0-100%
Underfloor Pressure	06	0-0.25 in. of WG
Slab Temperature	07	40-90° F
Plenum Temperature	08	50-100° F

Use two-core cable with a minimum of 20 guage conductors to connect between the CX-FlexFloor controller and a non-York controller. All outputs are configured to supply 0 to 10 VDC within the range indicated in the table. Refer to Figure 9 for connection details.

ISN ConneXsys Network Connection

The best method of connecting the CX-FlexFloor to a network is to use the BACnet protocol. The CX-FlexFloor application is pre-configured to communicate to the CX-FlexCool and CX-FlexHeat zone controllers as part of an ISN ConneXsys network. Connection to

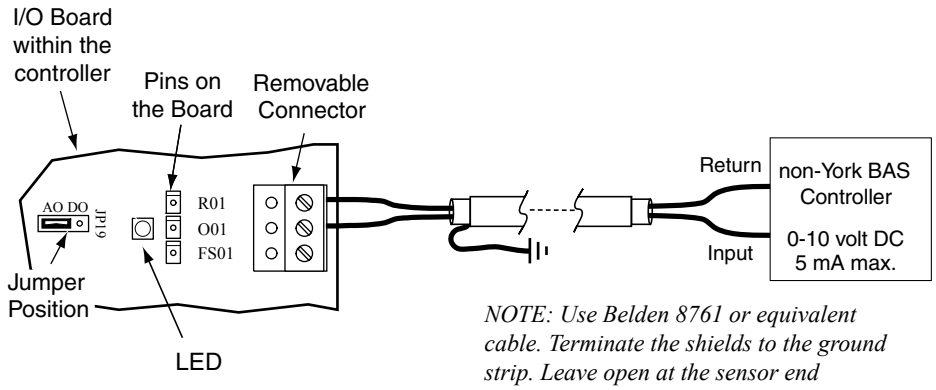


Figure 9. External BAS Connection

devices other than the zone controllers is outside the scope of the application and an experienced Application Engineer is required to configure the software.

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

NOTE

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

Each device on the LAN must be connected as shown in Figure 10. The incoming and outgoing network 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.

At each end of the network, or "leg," a Termination Module must be installed. The Termination Module is an assembly of three resistors which provide DC biasing and impedance matching to improve the integrity of network communications.

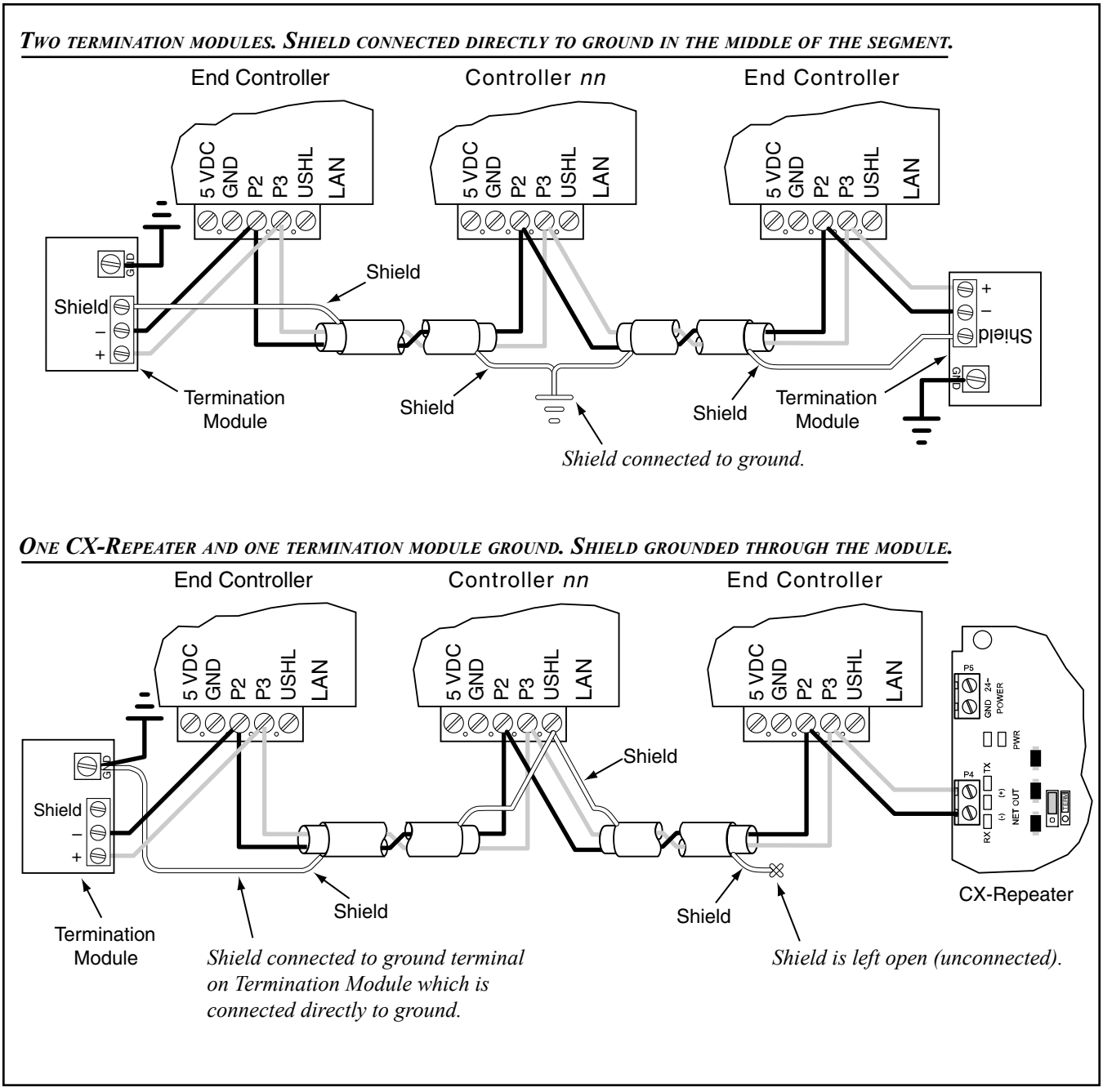


Figure 10. LAN Port Wiring Details

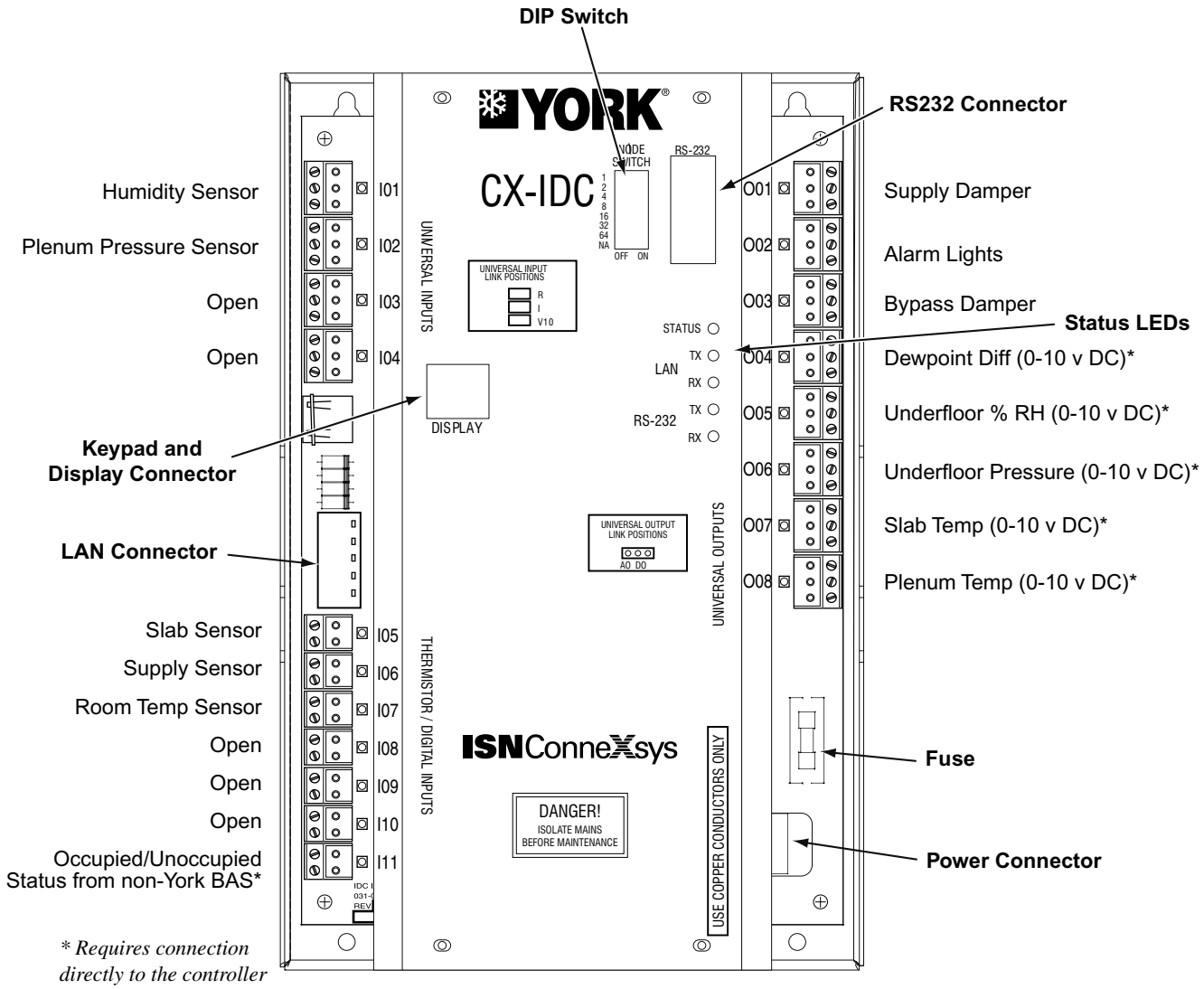


Figure 11. CX-FlexFloor Controller Channels and Components

MAC Addresses

To communicate on a network, the DIP switch must be set to an appropriate MAC Address to identify the device to other devices. Although the MAC Address can be chosen as desired, the plug-and-play operation requires that the CX-FlexFloor MAC Address is 64. When operating the CX-FlexFloor as a standalone device, the MAC Address is irrelevant.

NOTE

NOTE: The application in each CX-FlexCool and CX-FlexHeat controller is configured to communicate to a CX-FlexFloor controller at MAC Address 64. If the MAC Address on the CX-FlexFloor is changed, the reference in all the CX-FlexCool and CX-FlexHeat controllers must also be changed.

The CX-FlexFloor DIP switch consists of eight individual rocker switches that are binary-weighted. To determine the numeric value assigned to the switch (the network address) add the numbers above rockers 1 through 7 (rocker 8 is not used) in the ON position. The result is the value of the switch and, therefore, the MAC Address.

The network is a BACnet network. As a BACnet network, the following set of rules apply:

Observe the RS485 standard, i.e., maximum of 32 nodes, 4000 ft. (1220 m) per segment, etc. (Each CX-FlexCool and CX-FlexHeat comprises a node.)

If more than 32 nodes or 4000 ft (1220 m) are required, the use of a repeater boosts the signal. Two repeaters can be used to create a maximum of three segments. Additionally, internetworks can be created using routers to combine networks. This requires additional programming of the CX-FlexFloor application and is not covered in the scope of this manual. Contact an Application Engineer for additional information.

Each device on a network must have a unique identifier (MAC Address). This is set using the DIP switch on the network device.

If multiple plenums are used, such as in a multi-floor building, then each plenum requires a CX-FlexFloor and a router. This is not covered in the scope of this manual. Contact an Application Engineer for additional information.

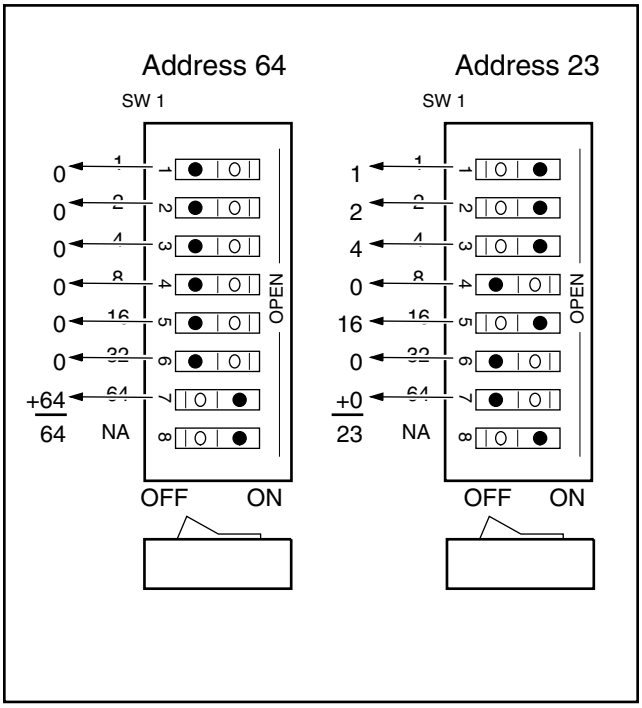


Figure 12. Node Switch Usage

Network Transfer Rate

The CX-FlexFloor is capable of network transfer rates of 9.6, 19.2, and 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 selecty the fastest speed (38k4).

SECTION 3

OPERATION

Introduction

The CX-FlexFloor is a plug-and-play device 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.

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.

Interface

To view or modify the configuration an interface with the controller must be established. The grill can be easily removed from the CX-FlexFloor to gain access to the controller. A DB-9 connector, labelled RS232, and RJ-11 connector, labelled Display, are both visible at the top of the controller. The DB-9 connector allows connection of an RS232 device, such as a laptop or PDA operating a VT100 terminal emulation program. An optional Keypad and Display Module (the same as that used with the CX-UDC controller) can be connected to the RJ-11 connector using the Display connector.

RS232 Device and Software

When connecting to a CX-FlexFloor controller, most RS232 devices operating VT100 terminal emulation software will work. IcE is a graphical application design tool that operates on a laptop under various Windows® environments. This should only be used by technicians thoroughly trained and familiar with IcE and the YORK software.

Keypad and Display Module

The optional Keypad and Display Module is the same device that is used with the CX-UDC and CX-IDC controllers. It is hot-swappable and connects to a controller using an RJ-11 connector. It can be stored

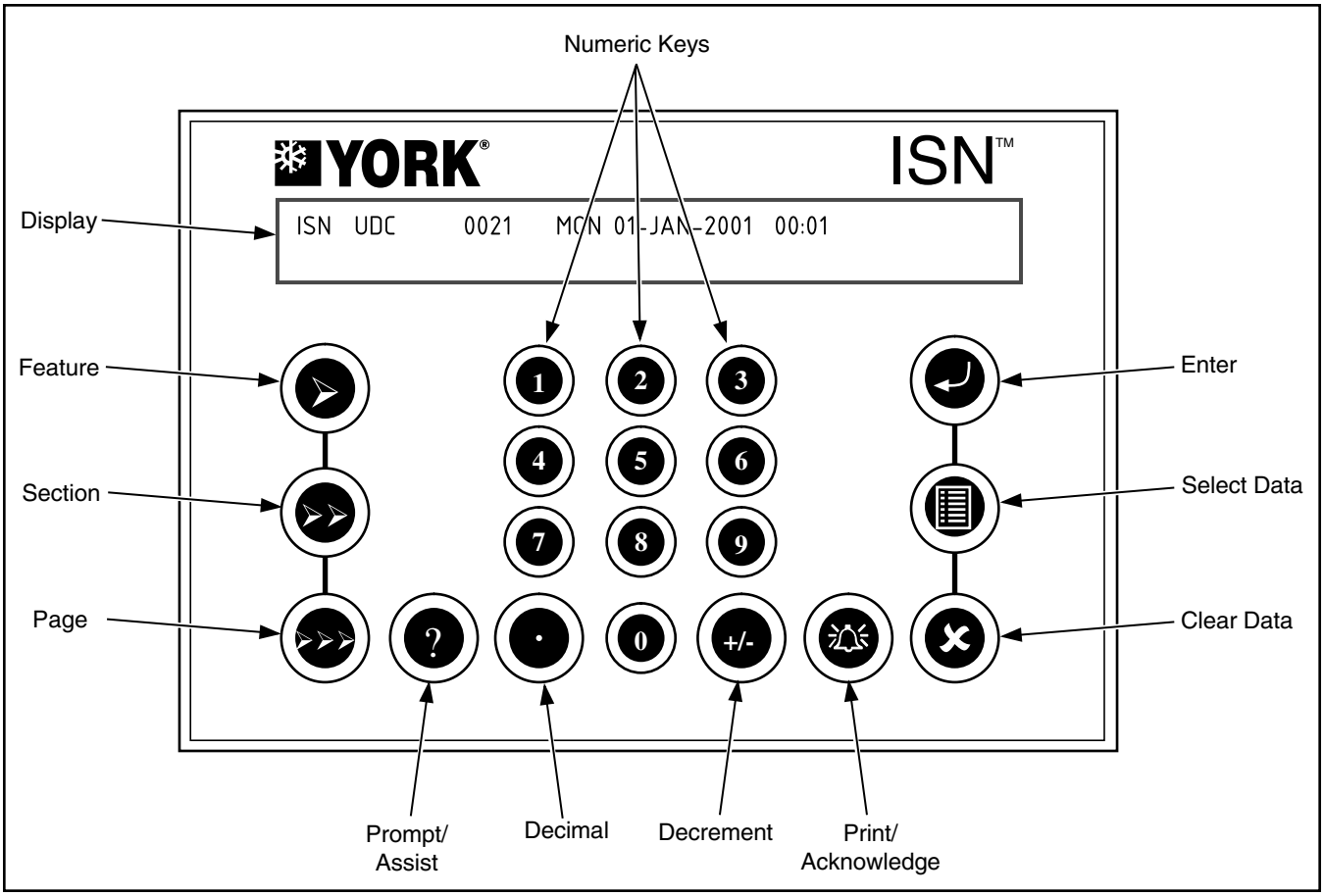


Figure 13. Keypad and Display Module

with the controller or used as a service tool. Figure 13 shows a Keypad and Display Module, calling out the function of the buttons.

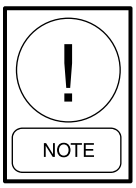
This manual assumes that the Keypad and Display Module is used as the interface to the CX-FlexFloor. Reference is only made to the keys on the Keypad and Display Module.

Space Sensor

The CX-FlexFloor can monitor the temperature of a representative zone or return duct using a space sensor. This information is then used to determine the temperature requirement in the plenum based on a reset schedule.

If connected to a network, the temperature from all the CX-FlexCool and CX-FlexHeat sensors can be averaged to determine the required plenum temperature. The CX-FlexFloor also has provision for operation without a space sensor.

The zone sensor connects to the controller using a PAP-B cable, the same cable assembly used with the CX-FlexCool and CX-FlexHeat controllers. A connection diagram is shown in the figure titled “Terminal Cables.”



NOTE: The same zone sensor as the CX-FlexCool and CX-FlexHeat can be used. However, the CX-FlexFloor does not use the communication, reset button, or adjustable potentiomenter capabilities.

CX-FlexFloor Reports

The CX-FlexFloor is preconfigured with defaults to simplify setup. Any of the standard defaults can be changed using a simple report style interface. These Reports are accessed using the Keypad and Display Module.

The level of report and ability to change parameters is controlled by a password. A Level 1 password allows a User to review a summary of functions and reset any alarms. A Level 2 password allows access to view and edit applicable parameters within the CX-FlexFloor controller.

Table 5 – Passwords

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

When the Keypad and Display is plugged in, it displays the unit name, date, time, and any active alarms. This is the Advisory Level.

To enter a password, press the Enter key.

A Level 2 password provides access to the three categories of report. These categories can be selected by pressing the Feature key (➢).

Within each category are Reports. Reports can be selected by pressing the Section key (➢➢).

The Reports display data on Pages. The various data can be accessed by pressing the Page key (➢➢➢).

Navigation between the Categories, Reports, and Displays (or Feature, Section, Page) can be done by pressing the desired key to move to the next Category, Report, or Page and the other levels will not change. For instance, from F01S03P04, pressing the Section key (➢➢) will move directly to F01S04P04.

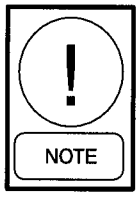
Table 6 lists the available Reports within each category along with the numeric Feature and Section locations. Each Report can also be accessed directly by pressing the Feature and/or Section key and entering the numeric report number (➢➢05).

Table 6 – Available Reports

Advisory Level	
Advisory Level	F00
Configuration Reports	
Summary (Read Only)	F01S01
Plenum Alarm	F01S02
Zone Data	F01S03
CX-FlexFloor Setpoint*	F01S04
Zone Setpoint*	F01S05
Calibration*	F01S06
Loop Tuning*	F01S07
Nodes 1 to 50*	F01S08
Nodes 51 to 63*	F01S09
Reset*	F01S10
System Calendar	
System Calendar	F02S01
Time Schedule	
Time Schedule	F03S01

* *These items are only available with a Level 2 Password*

Each of the ten Configuration Reports provides information specific to the CX-FlexFloor, categorized by function. Selecting the System Calendar or Time Schedule provides access to the standard OCS Feature 10 and Feature 33, respectively.



NOTE: All Reports are based on the Feature-Section-Page architecture of the software. The System Calendar and Time Schedule reports are accessed on the same level as a Feature but do not correspond to the same Feature number in the Software Reference Manual.

Within each Report are Pages. Each Page consists of fields which may or may not be editable, depending upon the password level and type of information contained within the field. Some Pages contain a single field of data and other Pages contain multiple fields. As in the Feature and Section concepts, the Pages can be cycled through by pressing the Page key (➢➢➢) or pressing the Page key and appropriate Page number.

If a change in the value is desired, press the Enter key (↵). This will "open" the field for editing. Enter the desired value using either the numeric keys or the Select Data key, which will cycle through any available choices. Press the Enter key again to close the field and either move to the next field or close the page for editing.

Design Considerations

The CX-FlexFloor controls the pressure in the underfloor plenum. There are several other factors, such as supply air temperature, humidity, slab temperature, etc., which the CX-FlexFloor considers when maintaining this pressure setpoint. The source of this information can be obtained directly by the CX-FlexFloor (standalone operation) or through a network from the CX-FlexCool and CX-FlexHeat controllers. Although the network can be part of the entire Building Automation System (BAS), the CX-FlexFloor application is specifically configured to operate within a single plenum, or floor, communicating only with the CX-FlexCool and CX-FlexHeat controllers within the specific plenum.

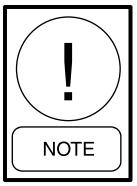
Standalone Operation

Installation of the CX-FlexFloor can be as a standalone device without any network connections. Control of a bypass damper and the supply device to the underfloor plenum are all that is required. The bypass damper compensates for the warmer air (62° F) required by the FlexSys system as opposed to the colder air (<55° F) normally provided by an AHU. Modulation of the bypass damper is accomplished by a reverse-acting PI loop.

The pressure in the underfloor plenum determines the ability of the FlexSys system to properly condition the air in the occupied space. When pressure is too high, excessive mixing of the cool, conditioned air with the warm, used air occurs. When pressure is too low, there is insufficient distribution of the air into the occupied space. A direct-acting PI loop modulates the supply device (variable speed fan, inlet guide vanes or damper) to maintain the underfloor pressure setpoint. The pressure setpoint is established by measuring 150 cfm at a fully open MIT box located across at least 1/2 the distance of the maximum plenum length.

The CX-FlexFloor controller includes a Real Time Clock (RTC) that provides the ability to schedule occupied vs unoccupied temperature setpoints and pressures for the underfloor plenum through the Time

Schedule Feature. The System Calendar Feature allows daily scheduling and definition of up to 15 holiday periods.



NOTE: The FlexSys system typical incorporates a concrete slab as the bottom of the plenum. This provides a more stable zone temperature in the plenum, reducing the need to shut down the system at night.

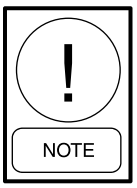
Even in a non-BACnet environment, it is still possible to transfer information to a Building Automation System. Five output channels have been configured to provide information through analog voltage signals. The output channels are shown in Table 7.

Table 7 – Output Channels

DESCRIPTION	SIGNAL	SCALE TO
Dewpoint Differential (Dewpoint - Slab Temp)	0-10 V	0-20° F
Relative Humidity	0-10 V	0-100%
Plenum Pressure	0-10 V	0-0.25 in. WG
Slab Temperature	0-10 V	40-90° F
Plenum Temperature	0-10 V	50-100° F

Network Operation

A more desirable method of operation is to connect the CX-FlexFloor controller to a network. This provides a simple method to obtain and provide information to the various CX-FlexCool and CX-FlexHeat controllers within the plenum. This results in more accurate and efficient operation of all the devices within the plenum.



NOTE: Although the network can be extended throughout the building or campus, the preconfigured CX-FlexFloor application is for a single floor or plenum. Connection to devices outside the plenum requires a technician experienced in ISN ConneXsys controls and software.

Within a network the following benefits are realized:

Standard setpoints, such as the occupied cooling setpoint, deadbands, setpoint adjustment range, etc., can be conveyed from the CX-FlexFloor to the CX-FlexCool and CX-FlexHeat controllers from a single location.

Information from the CX-FlexCool and CX-FlexHeat, such as the average zone temperature, number of heating and cooling zones and number of occupied zones, can be conveyed to the CX-FlexFloor.

The average zone temperature from the CX-FlexCool and CX-FlexHeat can be used by the CX-FlexFloor to modulate the dampers.

Time schedules can create occupied and unoccupied time periods. The time schedule is used to vary the setpoints at the CX-FlexCool and CX-FlexHeat controllers reducing energy usage.

The unoccupied override button can be used to provide conditioned air during unoccupied time periods.

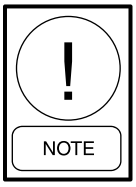
The System Calendar can program holidays, providing reduced energy usage.

A Force Damper Open or Closed command can be sent to all CX-FlexCool controllers from a single location to enhance initial setup or calibrate dampers.

A temperature reset schedule provides temperature control to the plenum based on either the occupied zone temperature or return duct temperature. Additional information regarding the reports and configuration options are found in the appropriate Report Section.

Configuration Reports

Within the Configuration Reports category are 10 Reports. All of these a accessible using a password Level 2. Only the first three are accessible using password Level 1. The first three reports provide a summary of the operating condition of the FlexSys components. The only user-entry capability involves acknowledgement of alarms.



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

Summary Report

Table 8 – Summary Report (Section 01)

Page	Description
1	PLENUM TEMP VVV.V SETPOINT VVV.V (63.0)
2	PLENUM PRESX1000 VVV.V SETPOINT VVV.V (50.0)
3	PLENUM %RH VVV.V
4	PLENUM DEWPOINT VVV.V
5	SLAB TEMP. VVV.V
6	ROOM/RETURN TEMP. VVV.V
7	OCCUPIED MMM
8	TEMP.SP OCC. VVV.V (63.0) UNOCC. VVV.V (67.0)
9	PRES.SP/1000 OCC. VVV.V (50.0) UNOCC. VVV.V (25.0)
10	DATE DDMM TIME HH SECONDS SS

Factory default shown in parenthesis.

The Summary Report shows the current setpoints and parameter settings for the CX-FlexFloor controller, plenum, and zone. 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 other reports.

The Summary Report data is as follows:

PLENUM TEMP – This is the temperature (°F) measured by the sensor mounted within the CX-FlexFloor.

SETPOINT – This is the plenum temperature setpoint stored in the CX-FlexFloor.

PLENUM PRESX1000 – This is the pressure measured by the sensor mounted within the CX-FlexFloor. The value displayed must be divided by 1000 to obtain the actual units of in. water (in. W.G.). A value of 0.050 in. W.G. is indicated as 50.0.

SETPOINT – This is the pressure setpoint stored in the CX-FlexFloor. The value displayed must be divided by 1000 to obtain the actual units of in. W.G. A value of 0.050 in. W.G. is indicated as 50.0.

PLENUM %RH – This is the measured percent of relative humidity in the plenum.

PLENUM DEWPOINT – This is the dewpoint of the air in the plenum as calculated from the plenum temperature and percent relative humidity.

SLAB TEMP – This is the temperature (°F) of the slab as measured by the sensor attached to the CX-FlexFloor.

ROOM/RETURN TEMP – This is the temperature (°F) measured by a sensor installed in either the occupied zone or in the return duct. This temperature is used to reset the supply air temperature setpoint.

OCCUPIED – The occupied flag is used to select which pressure and temperature setpoints to use. The source of the flag is one of the following:

a.) the internal schedule.

b.) an external contact (Input 11 connected to a non-BACnet controller).

c.) the override button on the zone sensors if connected via a network.

TEMP.SP OCC (Occupied Cooling Setpoint) – This is the occupied plenum temperature setpoint. The default setpoint is 63° F (17.2° C).

UNOCC (Unoccupied Cooling Setpoint) – This is the unoccupied plenum temperature setpoint. The default setpoint is 67° F (19.4° C).

PRES.SP/1000 OCC (Occupied Pressure Setpoint) – This is the occupied pressure setpoint in the plenum. The default setpoint is displayed as 50.0, which is 0.050 in. W.G.

UNOCC (Unoccupied Pressure Setpoint) – This is the occupied pressure setpoint in the plenum. The default setpoint is displayed as 25.0, which is 0.025 in. W.G.

DATE – This displays the current date and time in hours and seconds. DDMM indicates the day and month, HH indicates the hour of the day, SS indicates the number of seconds.

Plenum Alarm Report

Table 9 – Plenum Alarm Report (Section 02)

Page	Description
1	PL_PRES VVV.V SP: VVV.V ALARM MMM
2	PL_TEMP VVV.V SP: VVV.V ALARM MMM
3	DEWPOINT VVV.V ST VVV.V ALARM MMM
4	PRESS/TEMP ALARM? mmmm (YES)
5	ALARM DESTINATION NET= VVVV (0) DE= VVVV (0)
6	STORE CONFIGURATION? tttttttt (5555)

Factory default shown in parenthesis

An alarm is indicated by a red light shining through the grill. The Plenum Alarm Report provides addtional information regarding the cause of the alarm.

PL_PRESS (Plenum Pressure) – This is the pressure measured by the sensor mounted within the CX-FlexFloor. The value displayed must be divided by 1000 to obtain the actual units of in. W.G.

SP: (Plenum Pressure Setpoint) – This is the active pressure setpoint, which can be either the occupied or unoccupied. The value displayed must be divided by 1000 to obtain the actual units of in. W.G.

ALARM – Indicates if the alarm is invoked. YES indicates an alarm. NO indicates an untripped alarm.

The alarm will trigger if the plenum pressure deviates from the setpoint by more than 0.015 in. W.G. for more than 60 seconds. If the setpoint is changed, the alarm is disabled for 300 seconds (5 minutes).

The alarm automatically resets when the plenum pressure returns to within 0.010 in. W.G. of the setpoint.

This alarm can be disabled.

PL_TEMP (Plenum Temperature) – This is the current plenum temperature.

SP: (Setpoint) – This is the current plenum temperature setpoint.

ALARM – Indicates if the alarm is invoked. YES indicates an alarm. NO indicates an untripped alarm.

The alarm will trigger if the plenum temperature deviates from the setpoint by more than 3° F for more than 600 seconds (10 minutes). If the setpoint is changed, the alarm is disabled for 300 seconds (5 minutes). Also, the alarm is disabled if no temperature input is present.

The alarm automatically resets when the plenum temperature returns to within 1° F of the setpoint.

This alarm can be disabled.

DEWPOINT – This is the calculated dewpoint temperature.

ST (Slab Temperature) – This is the slab temperature as measured by the sensor.

ALARM – Indicates if the alarm is invoked. YES indicates an alarm. NO indicates an untripped alarm.

The alarm will trigger if the slab temperature is within 3° F of the plenum temperature for more than 60 seconds. If the setpoint is changed, the alarm is disabled for 300 seconds (5 minutes). Also, the alarm is disabled if no slab temperature input is present.

The alarm automatically resets when the difference between the slab temperature and plenum temperature is greater than 4° F for more than 300 seconds (5 minutes).

This alarm cannot be disabled.

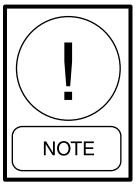
PRESS/TEMP ALARM? – This enables or disables the plenum pressure and plenum temperature alarms. To change the selection, press the Return key. Press the Menu key until the desired choice appears, then press the Return key. OPEN indicates the alarms are turned off, also indicated by NO. MADE indicates the alarms are turned on, also indicated by YES.

ALARM DESTINATION NET= – This is the network location where the alarms shown on Pages 01, 02, or 03 are sent. This is typically an ISN ConneXsys OWS. If 0 is selected, the network is the local.

The default is 0.

DE= – This is the Device Object Instance of the OWS or controller that is receiving the alarms.

STORE CONFIGURATION? – This field sends the current configuration with any changes to 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-FlexFloor controller.

To invoke this command, type 5555 at the prompt.

Zone Data Report

Table 10 – Zone Data Report (Section 03)

Page	Description
1	ZONE TEMP AVG VVV.V
2	NO. HTG ZONES VVV.V
3	NO. CLG ZONES VVV.V
4	DAMPER POS HI VVV.V
5	HTG. LOAD AVG VVV.V
6	OCCUPIED ZONES VVV.V
7	ttttttttttt (FXL-) NODE= NN (64)

The Zone Data Report displays information from the various CX-FlexCool and CX-FlexHeat controllers networked to the CX-FlexFloor. If the controllers are not networked, the fields will display 0.0.

The zone controllers must be configured to transfer data to the network, which is the default. If desired, network transfers can be disabled at the individual CX-FlexCool or CX-FlexHeat controller.

ZONE TEMP AVG – This field displays the average temperature of the zone sensors communicating with the CX-FlexCool and CX-FlexHeat controllers.

NO. HTG ZONES (Number of Heating Zones) – This displays the number of CX-FlexHeat controllers which are in a heating mode. A heating mode is any stage of heat.

NO. CLG ZONES (Number of Cooling Zones) – This displays the number of CX-FlexCool and CX-FlexHeat controllers which are in the cooling mode. A cooling mode is any MIT box which is open.

DMPR. POS HI (Damper Position High) – This displays, as a percentage, how far open the most open damper is.

HTG. LOAD AVG (Heating Load Average) – This displays, as a percentage, the average heat value. The % of heat is calculated by each CX-FlexHeat controller, transferred to the CX-FlexFloor and averaged.

OCCUPIED ZONES – This indicates the number of zones in occupied mode. If the CX-FlexFloor is in occupied mode, this number should match the number of zones connected to the CX-FlexFloor.

If the CX-FlexFloor status is unoccupied, this indicates the number of push-button overrides that have been activated in the zone.

Location Name – This is a location name used to identify the CX-FlexFloor controller. This is typically a room location or other identifier to differentiate the one controller from another. It also appears on the graphic when viewed on an Operator Work Station.

The default name is FXL-.

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

The default MAC Address for the CX-FlexFloor is 64.

CX-FlexFloor Setpoint Report

Table 11–CX-FlexFloor Setpoint Report (Section 04)

Page	Description
1	TEMP.SP OCC= vvv.v (63.0) UNOCC= vvv.v (67.0)
2	PRES.SPX1000 OCC= vvv.v (50.0) UNOCC= vvv.v (25.0
3	OCC OVERRIDE IF>= vvv.v (1.0) REQUESTS vvv.v
4	SAT RST1: IF RAT= vvv.v (76.0) THEN SAT1= vvv.v (56.0)
5	SAT RST2: IF RAT= vvv.v (70.0) THEN SAT2= vvv.v (71.0)
6	STORE CONFIGURATION? ttttttt (5555)

Factory default shown in parenthesis

The CX-FlexFloor Setpoint Report allows configuration of setpoints used by the CX-FlexFloor in controlling the plenum damper and cooling coil bypass damper.

TEMP.SP OCC (Temperature Setpoint Occupied) – This establishes the temperature setpoint when in occupied mode. If the temperature in the plenum is below setpoint, the bypass damper opens to allow more return air to bypass the cooling coils, resulting in warmer air in the supply duct and plenum.

The default value is 63.0° F.

UNOCC (Temperature Setpoint Unoccupied) – This establishes the temperature setpoint when in unoccupied mode.

The default value is 67.0° F.

PRES.SPX1000 OCC (Pressure Setpoint Occupied) – This establishes the pressure setpoint when in occupied mode. If the pressure in the plenum is below setpoint, the supply damper opens to allow increased air flow into the plenum, increasing the pressure. The displayed value must be divided by 1000 to obtain the actual units of in. W.G.

The default value is 50.0 (0.050 in. W.G.).

UNOCC (Pressure Setpoint Unoccupied) – This establishes the pressure setpoint when in unoccupied mode.

The default value is 25.0 (0.025 in. W.G.).

OCC OVERRIDE IF>= (Occupational Override If Greater Than) – This field sets the number of reset buttons (located on each zone sensor) which must be pressed before the CX-FlexFloor overrides the unoccupied status. When sufficient override requests are recieved, the CX-FlexFloor will maintain temperature and pressure settings at the occupied level.

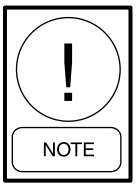
The occupied status is maintained until the number of active override requests is below the listed number. Each push-button override remains active for 1 hour, depending upon the configuration within the individual zone controller.

The default number of overrides required is one (1).

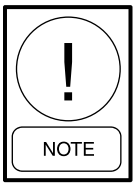
If the zone controllers are not networked to the CX-FlexFloor, this will have no effect.

SAT RST*n*: IF RAT = VVV.V THEN SAT= VVV.V – These two Pages establish points (*n* represents either point 1 or point 2) on the temperature reset schedule. The temperature reset schedule establishes a relationship between the room temperature or return duct temperature (RAT), and

the supply air temperature (SAT) setpoint. The bypass damper is then modulated to maintain this setpoint which is now based on demand.



NOTE: The basis for the SAT can be either the room temperature or return duct temperature. Keep in mind that the exhaust duct temperature will be higher than the room temperature. The label in the report does not change.



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

The default value for RAT1 is 76.0° F and RAT2 is 70.0° F. The default value for SAT1 is 56.0° F and SAT2 is 71.0° F.

STORE CONFIGURATION? – This field sends the current configuration with any changes to 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-FlexFloor controller.

To invoke this command, type 5555 at the prompt.

Zone Setpoint Report

Table 12 – Zone Setpoint Report (Section 05)

Page	Description
1	OCC. CLG.SP vvv.v (75.0) ADJ RANGE vvv.v (5.0)
2	OVERRIDE MINUTES vvv.v (60.0)
3	UNOCC. OFFSET vvv.v (10.0)
4	OCCUPIED mmmm (YES)
5	DMPR.FORCE:OPEN mmmm CLSE mmmm
6	FAN ON IN DEADBAND? mmmm
7	PERIMETER HEAT? mmmm
8	STORE CONFIGURATION? tttttttt (5555)

Factory default shown in parenthesis

The Zone Setpoint Report allows the configuration of the information that is supplied to the networked controllers. This information consists of setpoints, deadbands, and operational status modes which override the local information setup in the CX-FlexCool and CX-FlexHeat controllers.

Zone controller data can be entered at either the individual zone controllers (if no network is present) or at the CX-FlexFloor (if a network is present). In a networked system data entered at the CX-FlexFloor will overwrite any local data entered at the zone controllers.

If the zone controllers are not networked to the CX-FlexFloor, the information within this Report will have no effect.

OCC. CLG.SP (Occupied Cooling Setpoint) – This is the occupied cooling setpoint provided to the CX-FlexCool and CX-FlexHeat controllers within the network. This allows the setpoint to be established for all the zone controllers from a single point.

The default value is 75.0° F.

ADJ RANGE (Adjustment Range) – This field sets the range of adjustment available from the potentiometer on the zone sensor. The potentiometer allows an equal amount of adjustment up and down.

The default is 5.0° F.

OVERRIDE MINUTES – This field sets the time remaining in the override state when the override button on the zone sensor is activated.

The default is 60.0.

UNOCC. OFFSET (Unoccupied Offset) – This field sets the difference between the Occupied Cooling Setpoint and the unoccupied temperature. If the occupied setpoint is 75° F, the unoccupied setpoint becomes 85° F.

The default is 10.0.

OCCUPIED – This is the signal provided to the zone controllers to indicate the current status of occupancy. It is based on the parameters established in the Time Schedule and System Calendar Features, the number of resets received, or the external digital contact (Input 11). Occupied status is indicated as YES. Unoccupied status is indicated as NO.

DMPR. FORCE OPEN – This invokes a command which operates all dampers on all networked zone controllers to open fully. MADE indicates the command is active, forcing the dampers open. OPEN indicates the command is inactive.

To invoke this function, select the Enter key then the Menu key. Press the Menu key until the desired choice appears, then press the Enter key.

If MADE is selected all the zone controllers will immediately begin to drive the dampers open. This will continue until the DAMPER FORCE OPEN field is changed to OPEN.

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.

CLSE (Damper Force Closed) – This invokes a command which operates all dampers on all networked zone controllers to fully close. MADE indicates the command is active, forcing the dampers close. OPEN indicates the command is inactive.

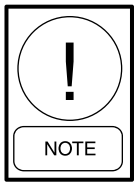
To invoke this function, press the Enter key then the Menu key. Press the Menu key until the desired choice appears, then press the Enter key.

If MADE is selected all the zone controllers will immediately begin to drive the dampers closed. This will continue until the CLSE field is changed to OPEN.

FAN ON IN DEADBAND? – This field sends a signal to operate the fan in the MFT boxes 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 OPEN to not operate in the deadband. To operate in the deadband, select the MADE menu option.

To change this function, press the Enter key then the Menu key. Press the Menu key until the desired choice appears, then press the Enter key.

PERIMETER HEAT – This is the signal that sets the type of perimeter heat used. If NO, perimeter heat is generated using the MFT box. If YES, perimeter heat is generated using a modulating analog valve.



NOTE: For additional information on types of heating refer to the CX-FlexCool/CX-FlexHeat User Guide.

The default status is OPEN. To change the function, select the MADE menu option.

To change the operation mode, press the Enter key then the Menu key. Press the Menu key until the desired choice appears, then press the Enter key.

STORE CONFIGURATION? – This field sends the current configuration with any changes to 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-FlexFloor controller.

To invoke this command, type 5555 at the prompt.

Calibration Reports

Table 13 – Calibration Report (Section 06)

Page	Description
1	PLENUM TEMP. VVV.V CALIBR vvv.v (0.0)
2	PLENUM PRESSX1000 VVV.V ZERO ADJ vvv.v (0.0)
3	PLENUM %RH VVV.V CALIBR vvv.v (0.0)
4	PLENUM DEWPOINT VVV.V CALIBR vvv.v (0.0)
5	SLAB TEMP. VVV.V CALIBR vvv.v (0.0)
6	ROOM TEMP. VVV.V CALIBR vvv.v (0.0)
7	STORE CONFIGURATION? ttttttt (5555)

Factory default shown in parenthesis

The Calibration Report provides the ability to fine tune the sensors attached to the CX-FlexFloor. To determine the correct calibrations, an accurate measuring device for each type of sensor must be available to find the "true" value.

PLENUM TEMP. – This field displays the plenum temperature measured by the sensor installed in the CX-FlexFloor, including the calibration factor.

CALIBR (Plenum Temperature Calibration) – This field is used to calibrate the temperature value received from the plenum temperature sensor installed in the CX-FlexFloor.

To determine a calibration factor, use an accurate thermometer to measure actual plenum temperature. Compare the measured temperature with the temperature shown in the PLENUM TEMP field when the CALIBR factor is set to 0.0. Enter the difference in the CALIB field. Negative numbers are acceptable.

PLENUM PRESX1000 (Plenum Pressure) – This is the pressure measured by the sensor mounted within the CX-FlexFloor. The value displayed must be divided by 1000 to obtain the actual units of in. W.G.

CALIBR (Plenum Pressure Calibration) – This field is used to calibrate the pressure value received from pressure sensor installed in the CX-FlexFloor.

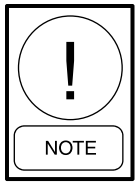
To enter a calibration factor, turn off all ventilation sources to and from the occupied zone and plenum, including the CX-FlexFloor, CX-FlexCool, and CX-FlexHeat and any exhaust fans. This will equalize the pressure in the occupied zone and plenum. The value in the PLENUM PRESSX1000 field should go to 0.0. If not, enter the correction factor in the CALIBR field. Negative numbers are acceptable.

PLENUM %RH – This field indicates the percent relative humidity measured by the sensor mounted within the CX-FlexFloor, including the calibration factor.

CALIBR (Plenum %RH Calibration) – This field is used to calibrate the percent of relative humidity value received from the sensor installed in the CX-FlexFloor.

To determine a calibration factor, use an accurate relative humidity sensor to measure the actual relative humidity in the plenum. Compare the measured relative humidity with the value shown in the PLENUM %RH field when the CALIBR factor is set to 0.0. Enter the difference in the CALIB field. Negative numbers are acceptable.

PLENUM DEWPOINT – This field displays the plenum dewpoint as calculated in the CX-FlexFloor, including the calibration factor.



NOTE: The Plenum Dewpoint is a calculation based on the Plenum Temperature and % Relative Humidity. Since there are devices which can measure dewpoints directly, they may be used to determine a calibration factor

CALIBR (Plenum Dewpoint Calibration) – This field is used to enter a calibration factor for the Plenum Dewpoint.

To determine a calibration factor, use an accurate dewpoint sensor to measure the actual dewpoint in the plenum. Compare the measured dewpoint with the value shown in the PLENUM DEWPOINT field when the CALIBR factor is set to 0.0. Enter the difference in the CALIB field. Negative numbers are acceptable.

SLAB TEMP – This field displays the slab temperature measured by the sensor attached to the CX-FlexFloor, including the calibration factor.

CALIBR (Slab Temperaute Calibration) – This field is used to calibrate the temperature value received from the slab temperature sensor.

To determine a calibration factor, use an accurate thermometer to measure the actual slab temperature. Compare the measured temperature with the temperature shown in the SLAB TEMP

field when the CALIBR factor is set to 0.0. Enter the difference in the CALIB field. Negative numbers are acceptable.

ROOM TEMP. – This field displays the room temperature (occupied zone) measured by a sensor attached to the CX-FlexFloor, including the calibration factor. This sensor may also be located in the exhaust duct.

If no sensor is attached, the field displays 0.0.

CALIBR (Room Temperature Calibration) – This field is used to calibrate the temperature value received from the temperature sensor attached to the CX-FlexFloor.

To determine a calibration factor, use an accurate thermometer to measure actual room or exhaust duct temperature. Compare the measured temperature with the temperature shown in the ROOM TEMP field when the CALIBR factor is set to 0.0. Enter the difference in the CALIB field. Negative numbers are acceptable.

STORE CONFIGURATION? – This field sends the current configuration with any changes to 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-FlexFloor controller.

To invoke this command, type 5555 at the prompt.

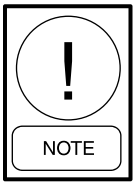
Loop Tuning Report

Table 14 – Loop Tuning Report (Section 07)

Page	Description
1	PRESS CNTRL vvv.v mmm (AUTOMATIC)
2	PRES.SPX1000 vvv.v (50.0)
3	PRESSX1000: VVV.V TIME: HHMM SS
4	PRESS PI: K= vvv.v (0.5) INTERVAL= vvv.v (120) mmm (REVERSE)
5	TEMP.CNTRL vvv.v% mmm (AUTOMATIC)
6	TEMP.SP VVV.V
7	TEMP: VVV.V TIME: HHMM SS
8	TEMP PI: K= vvv.v (0.5) INTERVAL= vvv.v (30) mmm (DIRECT)
9	STORE CONFIGURATION? ttttttt (5555)

Factory default shown in parenthesis

The Loop Tuning Report allows the user to fine tune the PID calculations.



NOTE: Additional information concerning PID Loops and the calculations involved can be found in the Calculation Theory section of this manual.

PRESS CNTRL (Pressure Control) – This allows the technician to verify damper operation. Normally, this is in AUTOMATIC mode, with damper modulation controlled by the CX-FlexFloor controller. It can be changed to MANUAL mode and a specific position entered.

Changing the mode from AUTOMATIC to MANUAL is a 2-step process. The mode must be changed before the specific position is entered. If the position field is modified before the mode is changed, it will reset to the current position.

To change the mode, press the Enter key twice, passing “through” the position field. In the mode field, press the Menu key until the desired selection appears. Press the Enter key.

To change the position, the report must indicate MANUAL mode. Press the Enter key and type the desired position as a percentage. Press the Enter key twice, passing “through” the mode field.

CAUTION: When PRESS CNTRL is in MANUAL mode the supply duct damper will stay in the selected position. It must be reset back to AUTOMATIC before normal operation can resume.

PRES.SPX1000 (Pressure Setpoint) – This is the pressure setpoint stored in the CX-FlexFloor. The value displayed must be divided by 1000 to obtain the actual units of in. W.G.

This field is provided as a reference and is not editable from this report. The default Pressure Setpoint value is 50.0.

PRESSX1000 (Measured Pressure) – This is the pressure measured by the sensor mounted within the CX-FlexFloor. The value displayed must be divided by 1000 to obtain the actual units of in. W.G.

TIME – This is the current time and is provided as a convenience for the loop tuner.

PRESS PI: K= (Pressure PI Loop Constant) – This field sets a constant used to determine the change in damper position required to correct for error (difference from setpoint). It has been set based on past experience. Increasing the value of K will open the damper more for a given temperature error. Refer to Calculation Theory section for additional information.

The default value is 0.5.

INTERVAL – This field sets how often the pressure in the plenum is analyzed. A higher number results in a slower acting system, a lower number in a faster acting system.

The default value is 120.

(Mode) – This field sets the Action of the supply duct damper. As the pressure in the plenum raises above the setpoint, the damper must reduce the air flow. Assuming a normally closed damper, this requires a lower voltage signal is sent to the damper to close it. The raised measurement causing a lower signal is considered a REVERSE reaction. If a raised measurement causes a raised signal, it is considered a DIRECT reaction.

The default value is REVERSE.

TEMP CNTRL (Temperature Control) – This allows the technician to verify damper operation. Normally, this is in AUTOMATIC mode, with damper modulation controlled by the CX-FlexFloor controller. It can be changed to MANUAL mode and a specific position entered.

Changing the mode from AUTOMATIC to MANUAL is a 2-step process. The mode must be changed before the specific position is entered. If the position field is modified before the mode is changed, it will reset to the current position.

To change the mode, press the Enter key twice, passing "through" the position field. In the mode field, press the Menu key until the desired selection appears. Press the Enter key.

To change the position, the report must indicate MANUAL mode. Press the Enter key and type the desired position as a percentage. Press the Enter key twice, passing "through" the mode field.

CAUTION: When TEMP CNTRL is in MANUAL mode the cooling coil bypass damper will stay in the selected position. It must be reset back to AUTOMATIC before normal operation can resume.

TEMP.SP (Temperature Setpoint) – This is the temperature setpoint stored in the CX-FlexFloor.

This field is provided as a reference and is not editable from this report. The temperature displayed can be either the occupied or unoccupied setpoint, depending upon the active mode.

TEMP (Measured Temperature) – This is the temperature measured by the sensor mounted within the CX-FlexFloor.

TIME – This is the current time and is provided as a convenience for the loop tuner.

TEMP PI: K= (Temperature PI Loop Constant) – This field sets a constant used in determining the change in damper position required to correct for error (difference from setpoint). It has been set based on past experience. Increasing the value of K will open the damper more for a given temperature error. Refer to Calculation Theory section for additional information.

The default value is 0.5.

INTERVAL – This field sets how often the temperature in the plenum is analyzed. A higher number results in a slower acting system, a lower number in a faster acting system.

The default value is 30.

(Mode) – This field sets the Action of the cooling coil bypass duct damper. As the temperature in the plenum raises above the setpoint, the damper must increase the air flow across the coils. Assuming a normally closed damper, this requires a lower voltage signal is sent to the damper to close it. The raised measurement causing a lower signal is considered a REVERSE reaction. If a raised measurement causes a raised signal, it is considered a DIRECT reaction.

The default value is REVERSE.

STORE CONFIGURATION? – This field sends the current configuration with any changes to 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-FlexFloor controller.

To invoke this command, type 5555 at the prompt.

Node Reports (1 to 50 and 51 to 63)

Table 15 – Nodes 1 to 50 Report (Section 08)

Page	Description
1	NODES 1 0 0 0 0
2	NODES 0 0 0 0 0
3	NODES 00 00 00 00 00
4	NODES 00 00 00 00 00
5	NODES 00 00 00 00 00
6	NODES 00 00 00 00 00
7	NODES 00 00 00 00 00
8	NODES 00 00 00 00 00
9	NODES 00 00 00 00 00
10	NODES 00 00 00 00 00

Table 16 – Nodes 51 to 63 Report (Section 09)

Page	Description
1	NODES 00 00 00 00 00
2	NODES 00 00 00 00 00
3	NODES 00 00 00
4	MAXMASTERS nn (64)
5	STORE CONFIGURATION? ttttttt (5555)

There are two Node Reports due to the limitation of the number of Pages within a Report. They operate the same other than the Store Configuration Page. The Node Reports provide a way of turning on or off the nodes (MAC Addresses) that information is transferred to.

NODE *nn* – Each Page lists up to 5 nodes (MAC Addresses) for a total of 63 nodes. The data shown in the Zone Setpoint Report is transferred to each of these MAC Addresses. To ensure efficient network transfer usage, only one MAC Address is preconfigured. Each additional zone controller (CX-FlexCool or CX-FlexHeat) must be entered before the CX-FlexFloor will transfer data to it.

To remove or add a node press the Enter key on the desired Page. Continue pressing the Enter key until the desired field is selected. To add a node, type the appropriate number. To remove a node, type 00 over the existing node number.

Press the Enter key to exit the Page.

MAX MASTERS – This is the number of master devices on the network. For efficient communications, it should be set to the highest MAC Address on the network.

The default is 64.

STORE CONFIGURATION? – This field sends the current configuration with any changes to 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-FlexFloor controller.

To invoke this command, type 5555 at the prompt.

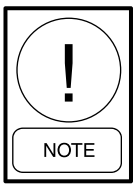
Reset Report

Table 17 – Reset Report (Section 10)

Page	Description
1	RESET SYSTEM? ttttt (5555)
2	APPLICATION NAME: TTTTTTTT (OCS UDC)
3	APPLICATION VERSION: NN (1)
4	PROGRAM VERSION: ttttttttttt (CX-FXL-V25-1)
5	LAN TYPE: BACNET SPEED: mmmm (38K4)
6	LOCATION NAME: ttttttttttt (FXL-)
7	OWS GRAPHIC: ttttttttttt (FX_FL.GPC)
8	STORE CONFIGURATION? ttttttt (5555)

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? – This field allows the user to reset the CX-FlexFloor controller, clearing the BRAM memory. BRAM memory retains information from network transfers and recent changes. This will not reset setpoints that have been stored in Flash memory. Setpoints are stored in Flash when the Store Configuration? command is invoked or once every 24 hours.



NOTE: The OCS firmware transfers applicable data to Flash memory every 24 hours. If the scheduled time (randomly assigned by the controller) is only 2 hours away, the information is transferred at that time.

To invoke the command enter the field, type 5555 at the prompt.

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

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

PROGRAM VERSION: – This is a 12-character field used to track the program configuration. If changes, other than setpoints, are made to the application, this should be used to track those changes.

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 FXL-.

OWS GRAPHIC – This field sets the graphic that appears in the ISN ConneXsys OWS when the controller is selected. The default graphic is FX_FL.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.

STORE CONFIGURATION? – This field sends the current configuration with any changes to 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-FlexFloor controller.

To invoke this command, type 5555 at the prompt.

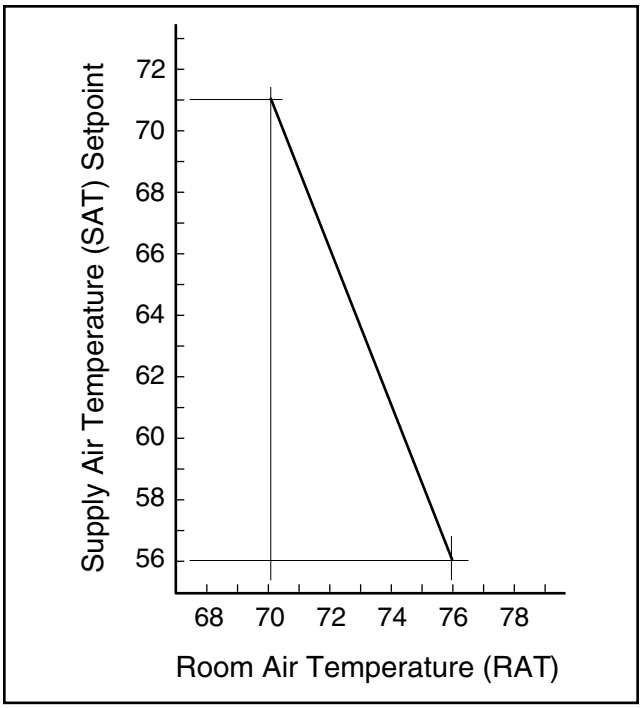


Figure 14. Stage Heat Change Points

Calculation Theory

Damper Actuation

There are two damper control schemes in the CX-FlexFloor controller, one for the plenum supply duct and one in the cooling coil bypass duct. These dampers are modulated by the CX-FlexFloor based on the logic in the controller. Based on the CX-FlexFloor calculations, a signal is sent to the applicable damper to open or close to maintain the correct pressure or temperature.

The amount of actuator movement is calculated by the CX-FlexFloor using a PI loop. A PI loop is a formula which takes into account the history of the function. The PI formula uses a constant (K), the difference between setpoint and actual, and the previous position of the damper to determine a new damper position.

An additional factor that effects the damper position is how often the calculation is performed. Both the calculation interval and the constant (K) can be modified to tune the PI loop.

The following formula and example show how the PI loop operates.

% Damper = K(T–SP) + Last % Damper

If T–SP is negative the damper is moved toward closed.

Example:

Plenum Temp (T) = 63.0
Setpoint (SP) = 65.0
K = 0.5

% Damper = 0.5(63–65) + 45.3

% Damper = 44.3 *New damper position*

When the damper is set to REVERSE (default position), a lower signal will open the damper. This will bypass more air around the coil, raising the supply air temperature.

The amount of damper change can be adjusted by modifying the constant (K). More frequent calculations can be made by modifying the interval. Both values are modified in the Loop Tuning Report.

CAUTION: The default values for K and the calculation interval have been chosen based on experience and testing. Only experienced technicians should modify these values.

Temperature Setpoint and Reset Schedule

The CX-FlexFloor has three methods of setting the plenum temperature setpoint.

1. The setpoint is determined by the occupied and unoccupied time periods configured in the Time Schedule and System Calendar.
2. The setpoint is determined by a reset schedule and temperature sensor placed in either the occupied zone or return duct. During unoccupied periods, the unoccupied setpoint is used regardless of the RAT.
3. The setpoint is determined by the reset schedule and the average temperature recieved from all the zone controllers. During unoccupied periods, the unoccupied setpoint is used regardless of the RAT.

Selection of the setpoint methodology is automatic using the priorities built into the controller. When no network or temperature sensor is present, the CX-FlexFloor uses the occupied setpoint configured in the CX-FlexFloor Setpoint Report. If a network is present and data is transferred from the zone controllers, the CX-FlexFloor uses the averaging method for temperature input and the reset schedule. When a Room Air Temperature (RAT) sensor is connected, the CX-FlexFloor controller uses the local sensor for temperature input and the reset schedule.

Different zone temperatures require different plenum tempratures. If the plenum temperature is too cool, the zone dampers will be at minimum open position, minimizing ventilation. The reset schedule allows the user to establish the appropriate plenum temperature for the zone temperature.

The reset schedule provides a means to vary the Supply Air Temperature (SAT) based on RAT. As the measured temperature (SAT) rises, the bypass damper opens or closes according to the reset schedule, providing warmer or cooler air into the plenum. This can be particularly helpful if ventilation sources exist outside of the FlexSys components.

The reset schedule can be varied as desired by establishing two points on a line. The CX-FlexFloor determines the SAT based on this relationship with the RAT.

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SECTION 4

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.

Table 18 – Status LED Codes

LED	CODE
OFF	System is OFF or has failed (crashed).
ON	System is operating correctly.
Quick Flash	(1.6 sec on, 0.2 sec off) System is resetting.
2 flashes	System is in the UNCONFIGURED mode.
3 flashes	System is in the HALT mode.
4 flashes	System is in the MONITOR mode.
5 flashes	System has UNACKNOWLEDGED alarms.
10 flashes	System is in the RTOS mode (application is not loaded)

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.

Accessing the CX-IDC

DANGER: Disconnect any line voltage power supply at the source before opening the CX-FlexFloor to prevent possible electrocution.

The CX-FlexFloor uses an CX-IDC controller located within the MIT unit. To access the controller:

1. Loosen the two screws at the lower rear of the side panels and remove the top screw securing the rear panel. Pivot the rear panel down.
2. Remove the three screws on the front panel and remove the top panel. Take care not to damage the sensor or indicator LEDs.
3. If necessary, label and remove any connectors from CX-IDC.
4. Remove the four screws securing the CX-IDC to the mounting plate.

Battery Replacement

Located on the processor board of the CX-IDC is a lithium battery. The battery prevents the loss of the Real Time Clock in the event of a power failure. Typical life of a battery is 1 year of operation or 5 years of non-use (storage).

WARNING: Personnel should always be grounded before touching any internal CX-IDC components. An Anti-Static Ground Strap is recommended. As a minimum, firmly grasp grounded metal before working on the unit.

CAUTION: Dispose of used batteries in a safe manner. Follow all local, state, and country codes regarding disposal of old batteries.

Located next to the battery is a Battery Enable Jumper. The Battery Enable Jumper allows the Real Time Clock to be disabled or reset.

To replace the battery:

1. Disconnect the power supply to the CX-IDC by either removing the connector or turning off the fused power supply. All LEDs should be off.
2. Disconnect the LAN from Port 1 by removing the connector.
3. Remove the four screws securing the cover on the IDC. Remove the cover.
4. Slide the battery out of the housing and remove. It may be necessary to use a small screwdriver.
5. Place the replacement battery (Part No. 031-02440-000) in the battery housing under the terminal clip (hold-down). Ensure that the positive side is visible.

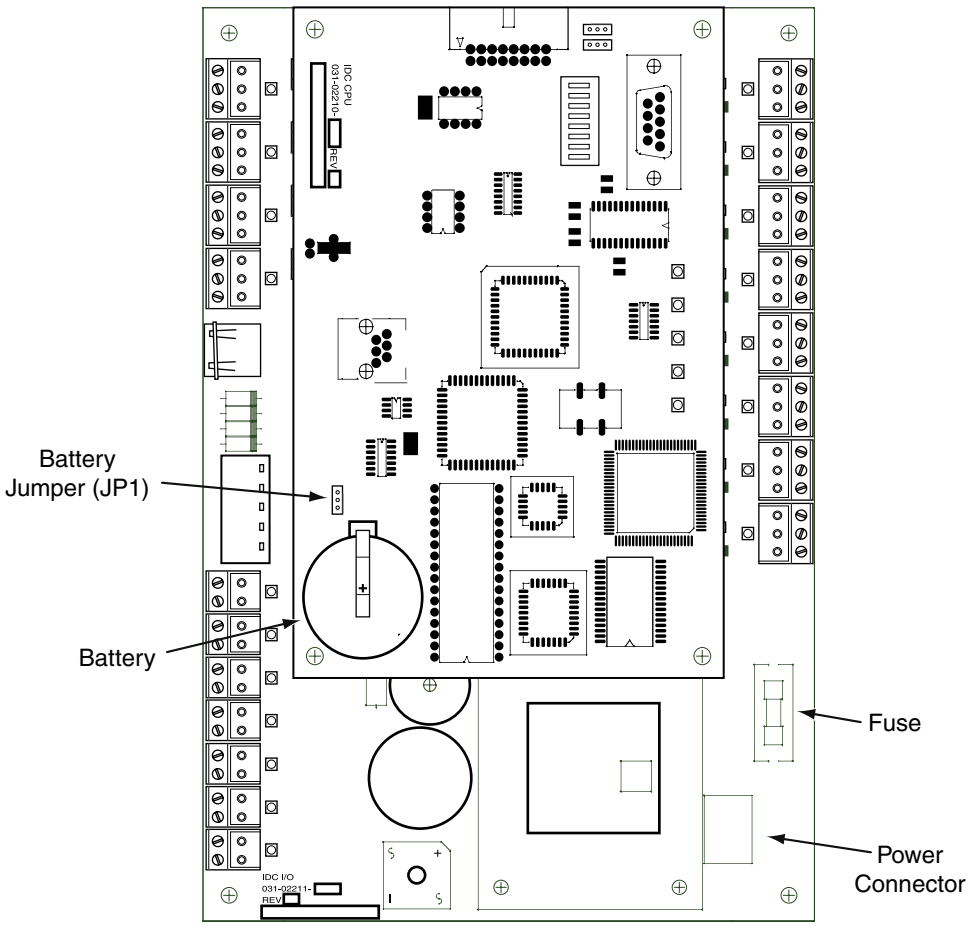

Figure 15. CX-IDC Battery and Fuse Locations

6. Install the metal cover on the CX-IDC using the four screws previously removed.
7. Reconnect the power supply to the CX-IDC.
8. Verify that the status LED is illuminated before inserting the LAN connector in the CX-IDC.

Fuse Replacement

Located on the Processor Module is a 5 x 20 Slow-Blow, ceramic, 0.4-amp fuse. This fuse protects the CX-IDC components against electrical supply overload.

If the fuse melts, indicating a power overload, determine the cause of the overload before replacing the fuse.

WARNING: Personnel should always be grounded before touching any internal CX-IDC components. An Anti-Static Ground Strap is recommended. As a minimum, firmly grasp grounded metal before working on the unit.

CAUTION: Always replace the fuse with a similarly rated ceramic fuse or damage to the components may occur.

To replace the fuse:

1. Disconnect the power supply to the CX-IDC by either removing the connector or turning off the fused power supply. All LEDs should be off.
2. Disconnect the LAN from Port 1 by removing the connector.
3. Remove the fuse cover from the board and replace the fuse.
4. Install the fuse cover with the new fuse into the fuse housing.
5. Reconnect the power supply to the CX-IDC.
6. Verify that the status LED is illuminated before inserting the LAN connector in the CX-IDC.

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APPENDIX

Specifications

General		
	Power Source	115/230 ±10% VAC
	Frequency	45 to 65 Hz
	Protection	0.4 A Slow-Blow Fuse
	Battery	1 year operation and 5 years storage
	Storage Temperature	-22 to 160° F (-30 to 70° C)
	Operating Environment	32 to 120° F (0 to 50° C) and 10 to 95% non-condensing
	Size (H x W x D)	10 x 10 x 10 in. (254 x 254 x 254 mm)
	Weight	20.8 lb. (9.4 kg)
Processor		
	Type	NEC V25 Operating at 8 MHz
	PROM Memory	128 kbytes
	BRAM Memory	512 kbytes
	FLASH Memory	480 kbytes w/10 year retention
	RTC Accuracy	±30 sec/year
Interface		
	LAN	BACnet MS/TP; RS485
	LAN Speeds	9.6, 19.2, 38.4 kbaud
	LAN Connection	Removable connector with 5-pin screw terminals
	LAN Cable	Screened Twisted-Pair (Belden 89841 or Equivalent)
	Serial Devices	RS232 DB-9 Male Connector
	LEDs	Power; System OK; System Alarm
	Switch Selections	MAC Address (1-99)
	Non-York/BACnet BAS	Five Outputs with 0 to 10 vDC Analog Signals % Relative Humidity (0-100%) Slab Temperature (40-90° F) Plenum Pressure (0-0.25 in. WG) Underfloor Temperature (50-100° F) Differential Dewpoint (0-20° F)
Sensors		
	Plenum Relative Humidity	±3%
	Plenum Temperature	±0.36° F (0.20° C)
	Plenum Pressure	±1% Full Scale
	Slab Temperature	±0.36° F (0.20° C)
Outputs		
	Damper/VSD Control	Two Channels 0 to 10 vDC Analog Signals
Compliance		
	Conforms to UL873 (ITS 3033613-001)	
	IDC Controller is UL916 and UL94-5VB (Plenum Flammability)	
	FCC Part 15 Class A	
	LVD Standard EN60950	
	CE Directives EN55022, EN61000, EN50204	
Ordering Information		
	CX-FlexFloor Controller (115 VAC)	Contact AirSide Marketing
	CX-FlexFloor Controller (230 VAC)	Contact AirSide Marketing
	Keypad and Display Module	371-03640-000
	PAP-B Cable	32-04004-028

BACnet Objects Exposed in F20 Section 01

Name	BACnet Object and Instance	Read/ Write	SSS	Description	Report and Page No.
MODE	AV20	R	420	BACnet - Mode of Operation	
ZONE.SP.RMT	AV21	W/R	421	BACnet - Occupied Cooling Setpoint	
ZONE.ADJ.RMT	AV22	W	422	BACnet - Setpoint Adjustment	
TIME.EXT.RMT	AV23	W	423	BACnet - Override Time Extension	
UNOC.OFS.RMT	AV24	W	424	BACnet - Unoccupied Offset	
OCC_PR.SP	AV01	W	401	BACnet - Occupied Plenum Pressure Setpoint	r04p02
UNOCC.PR.SP	AV02	W	402	BACnet - Unoccupied Plenum Pressure Setpoint	r04p02
OCCUPIED	BV04	W	604	BACnet - Occupied Mode	r05p04
OCC_SAT.SP	AV03	W	403	BACnet - Occupied Supply Air Temperature Setpoint	r04p01
UNOCC_SAT.SP	AV04	W	404	BACnet - Unoccupied Supply Air Temperature Setpoint	r04p01
RESET_X1	AV05	W	405	BACnet - Supply Air Reset Schedule - X1	r04p05
RESET_X2	AV06	W	406	BACnet - Supply Air Reset Schedule - X2	r04p04
RESET_Y1	AV07	W	407	BACnet - Supply Air Reset Schedule - Y1	r04p05
RESET_Y2	AV08	W	408	BACnet - Supply Air Reset Schedule - Y2	r04p04
ALARM.ENBL	BI13	R	513	OWS Alarm Enable	r02p04
PL-TMP.AVG	AV25	R	425	Plenum Temperature - SLTA	r01p01
SAT.SP	AV26	R	426	Plenum Temperature Setpoint	r01p01
PL-PRESS	AV27	R	427	Plenum Pressure - SLTA	
PRESS.SP	AV28	R	428	Plenum Pressure Setpoint	r02p01
PLEN-%RH	AI11	R	211	Plenum Relative Humidity	r01p03
DEWPOINT	AV29	R	429	Plenum Dewpoint	r01p04
SLAB-TEMP	AV30	R	430	Plenum Slab Temperature	r01p05
ROOM-TEMP	AV31	R	431	Space Temperature	r01p06
2701:T-AVG	AI22	R	222	Slave Zones - Temperature Average	r03p01
2702:HTG-SUM	AI24	R	224	Slave Zones - # Zones in Htg Mode	r03p02
2702:CLG-SUM	AI25	R	225	Slave Zones - # Zones in Clg Mode	r03p03
2703:DMP-HI	AI26	R	226	Slave Zones - Highest Damper Position	r03p04
2703:DMP-LO	AI27	R	227	Slave Zones - Lowest Damper Position	
2704:HTR-HI	AI28	R	228	Slave Zones - Highest Heater Position	
2704:HTR-AVG	AI29	R	229	Slave Zones - Average Heater Position	r03p05
2705:OCC-SUM	AI30	R	230	Slave Zones - Sum of Zones Occupied	r03p06
EXTEND	AV32	R	432	Slave Zones - Sum of Override Requests	
ZONE.SP.LCL	AI01	R	201	Local - Occupied Cooling Setpoint	r05p01
ZONE.ADJ.LCL	AI02	R	202	Local - Setpoint Adjustment	r05p01
TIME.EXT.LCL	AI03	R	203	Local - Override Time Extension	r05p02
UNOC.OFS.LCL	AI04	R	204	Local - Unoocupied Offset	r05p03
FORCE.OPEN	BI09	R	509	Mode Status - Force Open	r05p05
FORCE.CLOSE	BI10	R	510	Mode Status - Force Closed	r05p05
FAN.ON_DBAND	BI11	R	511	Mode Status - Fan On Deadband	r05p06
PERIM.HEAT	BI12	R	512	Mode Status - Perimeter Heating	r05p07
PRESS.CTRL	AV33	R	433	Plenum Pressure Control Calculated Position	r07p01
SAT.CTRL	AV34	R	434	Plenum Temperature Control Calculated Position	r07p05
DATE	AI09	R	209	Date - FlexFloor Controller	
TOD	AI10	R	210	Time - FlexFloor Controller	
YND27.1	Prop	Proprietary	2701	Network Data	
YND27.2	Prop	Proprietary	2702	Network Data	
YND27.3	Prop	Proprietary	2703	Network Data	
YND27.4	Prop	Proprietary	2704	Network Data	
YND27.5	Prop	Proprietary	2705	Network Data	
YSC1	Prop	Proprietary	1001	Calendar/Clock	

BACnet Objects Exposed in F20 Section 02

Name	BACnet Object and Instance	Read/Write	SSS	Description	Report and Page No.
YSA F01	YSA1	PROPRIETARY	101	Alarm Status - Feature 1 - Maintenance	
YSA F01	YSA2	PROPRIETARY	102	Alarm Status - Feature 1 - HVAC	
YSA F01	YSA3	PROPRIETARY	103	Alarm Status - Feature 1 - Critical	
YSA F01	YSA7	PROPRIETARY	107	Alarm Status - Feature 1 - System	
YSR F09	YSR1	PROPRIETARY	901	Reset Schedule - Feature 9 - Plenum Pressure	
YAA F11	YAA1	PROPRIETARY	1101	Analog Alarm - Feature 11 - Plenum Pressure	
YAA F11	YAA2	PROPRIETARY	1102	Analog Alarm - Feature 11 - Dewpoint	
YAA F11	YAA3	PROPRIETARY	1103	Analog Alarm - Feature 11 - Plenum Temperature	
YTS F33	YTS1	PROPRIETARY	3301	Time Schedule - Feature 33 - Occupancy	
YTP F31	YTP1	PROPRIETARY	3101	Time Program - Feature 31 - Occupancy	
YSD F50	YSD1	PROPRIETARY	5001	System Diagnostics - Feature 50	
YSS F60	YSS1	PROPRIETARY	6001	System Structure - Feature 60	
YMC F07	YMC11	PROPRIETARY	711	Modulating Control - Feature 7 - Plenum Pressure Control Output (0-100%)	
YMC F07	YMC13	PROPRIETARY	713	Modulating Control - Feature 7 - Plenum Temperature Control Output (0-100%)	
YMC F07	YMC14	PROPRIETARY	714	Modulating Control - Feature 7 - Dewpoint Differential Output (0-20 Degrees)	
YMC F07	YMC15	PROPRIETARY	715	Modulating Control - Feature 7 - Relative Humidity (0-100%)	
YMC F07	YMC16	PROPRIETARY	716	Modulating Control - Feature 7 - Plenum Pressure Output (0-.25”WC)	
YMC F07	YMC17	PROPRIETARY	717	Modulating Control - Feature 7 - Slab Temperature (40-90 Degrees)	
YMC F07	YMC18	PROPRIETARY	718	Modulating Control - Feature 7 - Supply Air Temperature (50-100 Degrees)	
EXT_OCC	BI8	R	508	External Occupancy Status - Physical Input	
ALARM.O/P	BV11	R	611	Alarm Enable Status (To OWS)	

BACnet Objects Exposed in F20 Section 03

Name	BACnet Object and Instance	Read/Write	SSS	Description	Report and Page No.
YAH F15	YAH1	Proprietary	1501	Analog History - Section 1	
YAH F15	YAH2	Proprietary	1502	Analog History - Section 2	
YAH F15	YAH3	Proprietary	1503	Analog History - Section 3	
YAH F15	YAH4	Proprietary	1504	Analog History - Section 4	
YAH F15	YAH5	Proprietary	1505	Analog History - Section 5	
YAH F15	YAH6	Proprietary	1506	Analog History - Section 6	
YAH F15	YAH7	Proprietary	1507	Analog History - Section 7	
YAH F15	YAH8	Proprietary	1508	Analog History - Section 8	
YAH F15	YAH9	Proprietary	1509	Analog History - Section 9	
YAH F15	YAH10	Proprietary	1510	Analog History - Section 10	
YAH F15	YAH11	Proprietary	1511	Analog History - Section 11	
YAH F15	YAH12	Proprietary	1512	Analog History - Section 12	
YAH F15	YAH13	Proprietary	1513	Analog History - Section 13	
YAH F15	YAH14	Proprietary	1514	Analog History - Section 14	
YAH F15	YAH15	Proprietary	1515	Analog History - Section 15	
YAH F15	YAH16	Proprietary	1516	Analog History - Section 16	
YAH F15	YAH17	Proprietary	1517	Analog History - Section 17	
YAH F15	YAH18	Proprietary	1518	Analog History - Section 18	
YAH F15	YAH19	Proprietary	1519	Analog History - Section 19	
YAH F15	YAH20	Proprietary	1520	Analog History - Section 20	
YAH F15	YAH21	Proprietary	1521	Analog History - Section 21	
YAH F15	YAH22	Proprietary	1522	Analog History - Section 22	
YAH F15	YAH23	Proprietary	1523	Analog History - Section 23	
YAH F15	YAH24	Proprietary	1524	Analog History - Section 24	
YAH F15	YAH25	Proprietary	1525	Analog History - Section 25	
YAH F15	YAH26	Proprietary	1526	Analog History - Section 26	
YAH F15	YAH27	Proprietary	1527	Analog History - Section 27	
YAH F15	YAH28	Proprietary	1528	Analog History - Section 28	
YAH F15	YAH29	Proprietary	1529	Analog History - Section 29	
YAH F15	YAH30	Proprietary	1530	Analog History - Section 30	
YAH F15	YAH31	Proprietary	1531	Analog History - Section 31	
YAH F15	YAH32	Proprietary	1532	Analog History - Section 32	
YAH F15	YAH33	Proprietary	1533	Analog History - Section 33	
YAH F15	YAH34	Proprietary	1534	Analog History - Section 34	
YAH F15	YAH35	Proprietary	1535	Analog History - Section 35	
YAH F15	YAH36	Proprietary	1536	Analog History - Section 36	
YAH F15	YAH37	Proprietary	1537	Analog History - Section 37	
YAH F15	YAH38	Proprietary	1538	Analog History - Section 38	
YAH F15	YAH39	Proprietary	1539	Analog History - Section 39	
YAH F15	YAH40	Proprietary	1540	Analog History - Section 40	

BACnet Objects Exposed in F20 Section 04

Name	BACnet Object and Instance	Read/Write	SSS	Description	Report and Page No.
YDH F16	YDH1	PROPRIETARY	1601	Digital History - Section 1	
YDH F16	YDH2	PROPRIETARY	1602	Digital History - Section 2	
YDH F16	YDH3	PROPRIETARY	1603	Digital History - Section 3	
YDH F16	YDH4	PROPRIETARY	1604	Digital History - Section 4	
YDH F16	YDH5	PROPRIETARY	1605	Digital History - Section 5	
YDH F16	YDH6	PROPRIETARY	1606	Digital History - Section 6	
YDH F16	YDH7	PROPRIETARY	1607	Digital History - Section 7	
YDH F16	YDH8	PROPRIETARY	1608	Digital History - Section 8	
YDH F16	YDH9	PROPRIETARY	1609	Digital History - Section 9	
YDH F16	YDH10	PROPRIETARY	1610	Digital History - Section 10	
YDH F16	YDH11	PROPRIETARY	1611	Digital History - Section 11	
YDH F16	YDH12	PROPRIETARY	1612	Digital History - Section 12	
YDH F16	YDH13	PROPRIETARY	1613	Digital History - Section 13	
YDH F16	YDH14	PROPRIETARY	1614	Digital History - Section 14	
YDH F16	YDH15	PROPRIETARY	1616	Digital History - Section 15	
YDH F16	YDH16	PROPRIETARY	1616	Digital History - Section 16	
YDH F16	YDH17	PROPRIETARY	1617	Digital History - Section 17	
YDH F16	YDH18	PROPRIETARY	1618	Digital History - Section 18	
YDH F16	YDH19	PROPRIETARY	1619	Digital History - Section 19	
YDH F16	YDH20	PROPRIETARY	1620	Digital History - Section 20	
YDH F16	YDH21	PROPRIETARY	1621	Digital History - Section 21	
YDH F16	YDH22	PROPRIETARY	1622	Digital History - Section 22	
YDH F16	YDH23	PROPRIETARY	1623	Digital History - Section 23	
YDH F16	YDH24	PROPRIETARY	1624	Digital History - Section 24	
YDH F16	YDH25	PROPRIETARY	1625	Digital History - Section 25	
YDH F16	YDH26	PROPRIETARY	1626	Digital History - Section 26	
YDH F16	YDH27	PROPRIETARY	1627	Digital History - Section 27	
YDH F16	YDH28	PROPRIETARY	1628	Digital History - Section 28	
YDH F16	YDH29	PROPRIETARY	1629	Digital History - Section 29	
YDH F16	YDH30	PROPRIETARY	1630	Digital History - Section 30	
YDH F16	YDH31	PROPRIETARY	1631	Digital History - Section 31	
YDH F16	YDH32	PROPRIETARY	1632	Digital History - Section 32	
YDH F16	YDH33	PROPRIETARY	1633	Digital History - Section 33	
YDH F16	YDH34	PROPRIETARY	1634	Digital History - Section 34	
YDH F16	YDH35	PROPRIETARY	1635	Digital History - Section 35	
YDH F16	YDH36	PROPRIETARY	1636	Digital History - Section 36	
YDH F16	YDH37	PROPRIETARY	1637	Digital History - Section 37	
YDH F16	YDH38	PROPRIETARY	1638	Digital History - Section 38	
YDH F16	YDH39	PROPRIETARY	1639	Digital History - Section 39	
YDH F16	YDH40	PROPRIETARY	1640	Digital History - Section 40	

NOTES

NOTES

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Form 450.24-NOM9 (904)
New Release