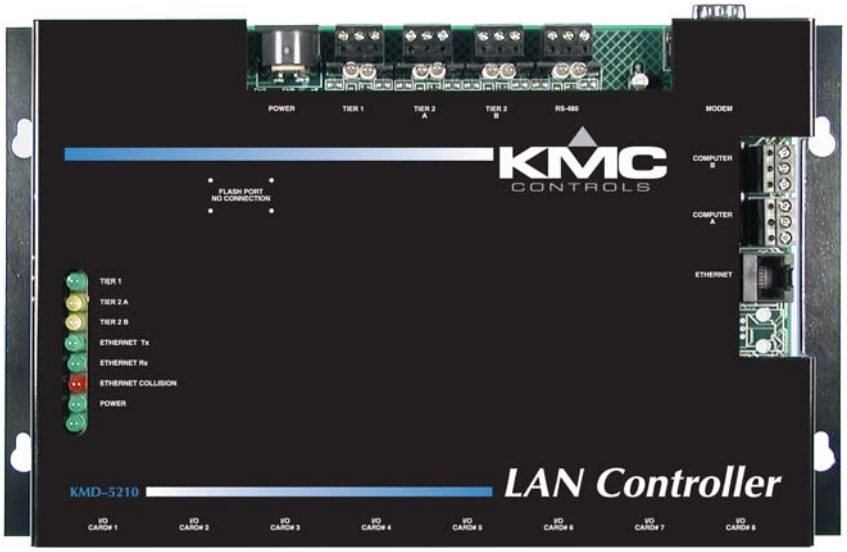
# Installation and Operation Guide

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## KMD-5210 LAN Controller
## KMD-5210–001 LAN Controller with BACnet 802.3
## KMD-5210–002 LAN Controller with BACnet MS/TP

Revision E

883-019-07E

## Important notices


Printed in U.S.A.

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# Contents

# SECTION 1

## About the LAN controller

This section provides a general introduction to the KMD-5210 LAN Controller. It also introduces safety information. Review this material in its entirety before installing or operating the controller.

### Introduction

The KMD-5210 LAN Controller is a programmable, direct digital controller used to facilitate high-level, peer-to-peer network communications for facilities management purposes. The LAN Controller may be operated in a stand alone configuration or as part of a fully networked digital system to intelligently monitor and control HVACR equipment.

The KMD-5210 uses a token passing protocol in Tier 1 networks using an Ethernet network to communicate with other LAN Controllers. The LAN Controller also supports Tier 2 networks with two dedicated EIA–485 ports. Up to 32 KMD-5210 controllers can be integrated into a single peer-to-peer network, each supporting up to 124 nodes on a Tier 2 network.

The controller also supports remote access through a modem port and provides two ports for direct connection with up to two PCs. The firmware in the controller uses a high-level, easy-to-learn programming language to ensure reliability, rapid programming, and compatibility with future KMC system. This programming function is available from within the KMC Controls WinControl application.

### BACnet options

**BACnet 802.3** The KMD-5210-001 adds BACnet functionality to the LAN Controller. Through Control Basic statements the controller communicates with 802.3 BACnet devices on the same Ethernet broadcast segment.

**BACnet MS/TP** The KMD-5210-002 adds BACnet MS/TP functionality to the LAN Controller functionality. By using Control Basic programming, the controller exchanges data with native BACnet devices on an MS/TP network.

# Specifications

| | |
|---|---|
| **Processor** | Motorola 68360, 32–bit, 33 MHz |
| **Memory** | |
| **Flash** | 2 megabytes, nonvolatile, operating programs and data storage |
| **RAM** | 2 megabytes, 72–hour capacitor backup |
| **Inputs and Outputs** | The KMD-5210 controller includes eight universal I/O ports for optional input and output modules. Connect up to eight KMD-5220 input modules, eight KMD-5221 output modules or a combination of input and output modules in any combination. |
| **I/O Ports** | Eight, 16–pin connectors. Software selectable as analog or digital standard or custom units of measure. |
| **Inputs** | 16–bit analog-to-digital (A/D)<br>Software selectable as analog or digital standard or custom units of measure. Install up to 8, 16 input modules for up to 128 universal inputs. |
| **Output** | 12–bit digital to analog (D/A) |
| **Communications** | |
| **Tier 1** | EIA–485 protocol at rates up to 38 kilobaud. Connector type is a three-screw terminal block, 12–22 AWG wire.<br>**Note:** Use the Tier 1 connection only when replacing KMD–5110 MultiNet controllers and Ethernet is not available. Contact KMC Controls techncial support for networking details. |
| **Tier 2 A and B** | EIA–485 protocol at rates up to 38 kilobaud. Connectors are three-screw terminal blocks, 12–22 AWG wire. Two ports, each of which support up to 124 KMC Tier 2 controllers. |
| **EIA–485** | EIA–485 protocol at rates up to 38 kilobaud. Connector is a three-screw terminal block, 12–22 AWG wire. Supports BACnet MS/TP in KMD-5210–002. |
| **Modem** | EIA–232 in parallel with Computer B. Dial-in and dial-out for with alarm and paging capability, 9–Pin (DB-9). |
| **Computer A and B** | Two EIA–232 ports, operate up to 38.4 kilobaud. Connectors are three-screw terminal blocks, 12–22 AWG wire. |
| **Ethernet** | 10baseT, RJ–45 supports up to 31 networked Tier 1 controllers and BACnet 802.3 in KMD-5210–001 |

| | |
|---|---|
| **Programmable Features** | |
| **Control Basic Programs** | 128 user-definable program areas |
| **Networked Points In** | 512 from each Tier 2 network<br>127 from Tier 1 network |
| **Networked Points Out** | 64 to each Tier 2 network<br>64 out to a Tier 1 network |
| **PID Control Loops** | 64 PID control loops |
| **Program Variables** | 256 - Software selectable as analog or digital with standard or custom ranges, manually set or program driven values |
| **Time keeping** | Real-time clock with power backup. Programmable for automatic daylight saving time by date, day of month and time of day. |
| **Tables** | 5 user defined |
| **Logging** | |
| **Trend Logs** | 96 trend logs each supporting up to 6 analog, digital, or virtual elements or points |
| **Runtime Logs** | 28 runtime logs with time/date stamp and cumulative runtime |
| **Schedules** | |
| **Weekly Schedule** | 32 schedules with 2 override days |
| **Annual Schedule** | 16 for holiday schedules |
| **Alarms** | Alarm buffering for up to 128 alarms<br>50 alarm messages for distribution<br>On-board 68-character alarm or maintenance text messages |
| **Power Loss** | Power fail with auto restart<br>On-board real-time clock with 72–hour capacitor backup. |
| **Security** | Six operator access levels<br>256 operator names with passwords |
| **Custom Graphics** | 64 system groups each of which can manage 160 points with animated and color graphics. |
| **Regulatory** | UL 916 Energy Management Equipment listed<br>CE compliant<br>FCC Class B, Part 15, Subpart B<br>SASO PCP Registration KSA R-103263 |

| | |
|---|---|
| **Power Supply** | Requires KMD–5563, International-ready 120/240 VAC, 1.35 ampere power supply |
| **Environmental Limits** | |
| **Operating** | 32° to 120° F (0° to 49° C) |
| **Shipping** | –40° to 140° F (–40° to 60° C) |
| **Humidity** | 0–95% RH, non-condensing |
| **Weight** | 1.8 pounds (816 grams) |
| **Compatibility** | |
| **Software** | WinControl XL Plus 1.06 or later<br>TotalControl 1.8.1 or later |
| **Controllers** | Compatible with Tier 1 controllers firmware build 2.01 or later |

**Dimensions**

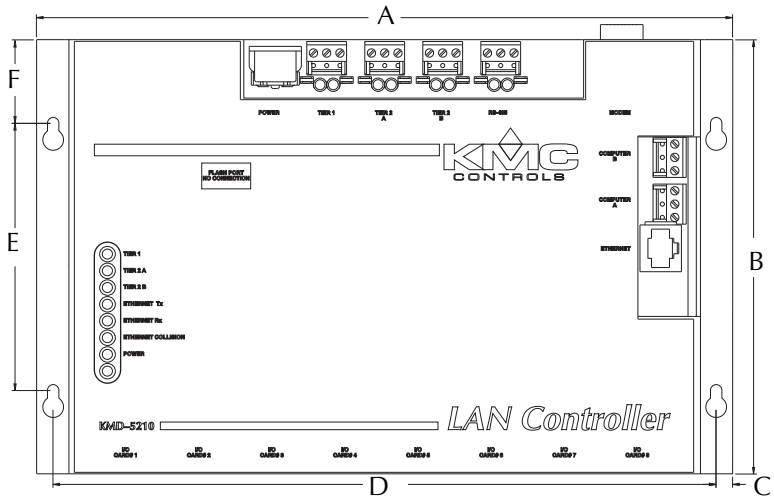


***Illustration 1-1 KMD-5210 Components***

***Table 1-1 KMD-5210 Dimensions***

| A | B | C | D | E | F | Height (not shown) |
|---|---|---|---|---|---|---|
| 10.50 in. | 6.50 in. | 0.25 in. | 10.00 | 4.00 in. | 1.25 in. | 0.98 in. |
| 267 mm | 165 mm | 6 mm | 254 mm | 102 mm | 32 mm | 25 mm |

## Options and Accessories

| | |
|---|---|
| **Modules** | |
| **KMD-5220** | Input Module |
| **KMD-5221** | Output Module |
| **Ribbon Cables for Input and Output Modules** | |
| **KMD-5660** | 6 inch (15 cm) ribbon cable |
| **KMD-5668** | 9 inch (23 cm) ribbon cable |
| **KMD-5661** | 14 inch (36 cm) ribbon cable |
| **KMD-5662** | 19 inch (48 cm) ribbon cable |
| **KMD-5663** | 24 inch (61 cm) ribbon cable |
| **Power** | |
| **KMD-5563** | International-ready power supply, 120/240 volts AC, 1.35 amperes |
| **XEE-6112-100** | 100 VA Transformer, 24 volts AC (required only for KMD-5221 output module) |
| **Upgrades** | |
| **HTO-1102** | Flash Kit Module; KMD/BAC-5XXX, BAC-7XXX (Replaces KMD-5696) |
| **Enclosures** | |
| **HCO-1035** | Panel Enclosure (20 x 24 x 6 inches) (508 x 610 x 152 mm) |
| **HCO-1036** | Panel Enclosure (24 x 36 x 6 inches) (610 x 914 x 152 mm) |

## Controls and Connections

Before installing the KMD-5210 LAN Controller, take some time to become familiar with the controller layout and components.

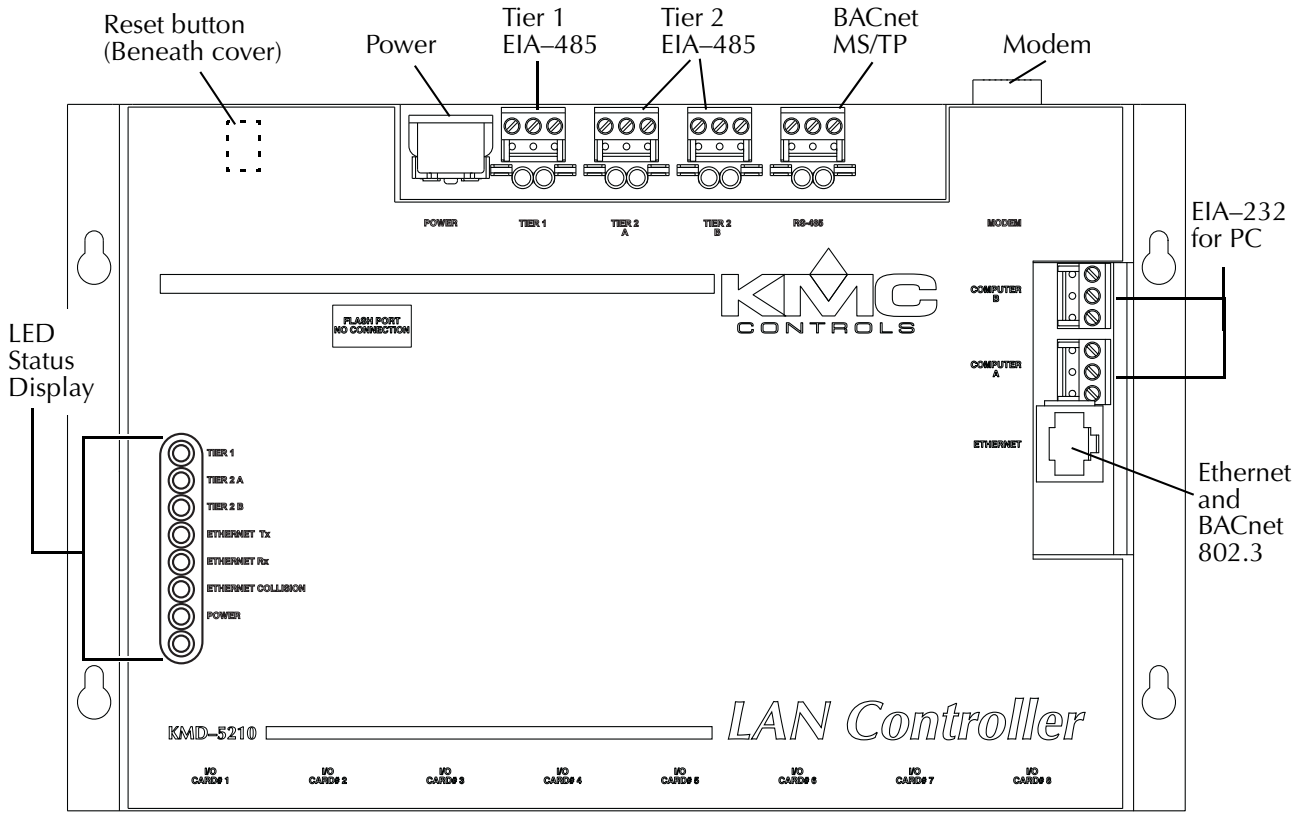


***Illustration 1-2 Controls and indicators***

## Safety Considerations

KMC controls assumes the responsibility for providing you with a safe product and safety guidelines for its proper use. Safety means protection to all individuals who install, operate and service the equipment as well as protection of the equipment itself. To promote safety, we use hazard alert labeling in this manual. Follow the associated guidelines to avoid hazards.

### Danger

Danger represents the most severe hazard alert. Bodily harm or death will occur if danger guidelines are no t followed.

### Warning

Warning represents hazards which could result in severe injury or death.

### Caution

Caution indicates potential personal injury or equipment or property damage if instructions are not followed.

**Note**

Notes provide additional important information.

**Detail**

Provides programming tips and shortcuts which may save time.

# SECTION 2

## Installation

This section provides important instructions and guidelines for installing the KMD-5210 LAN Controller. Carefully review this information prior to installation.

### Mounting

Mount the controller inside of a metal enclosure. KMC Controls recommends using a UL-approved Enclosed Energy Management Equipment Panel such as a KMC model HCO–1034, HCO–1035 or HCO–1036. Insert #6 or #8 hardware through the two mounting holes on each side of the controller to securely fasten it to a flat surface. See *Illustration 1-2* on page 10 for mounting hole locations and dimensions. To maintain RF emission specifications, use either shielded connecting cables or enclose all cables in conduit.

**Note**

Provide sufficient clearance around the controller for cables and wiring.

- Allow a minimum of 3 inches (7.6 cm) of clearance at the top edge of the controller for the power and modem connectors.
- Allow a minimum of 1.5 inches (3.8 cm) of clearance for the ribbon cables at the bottom of the controller.

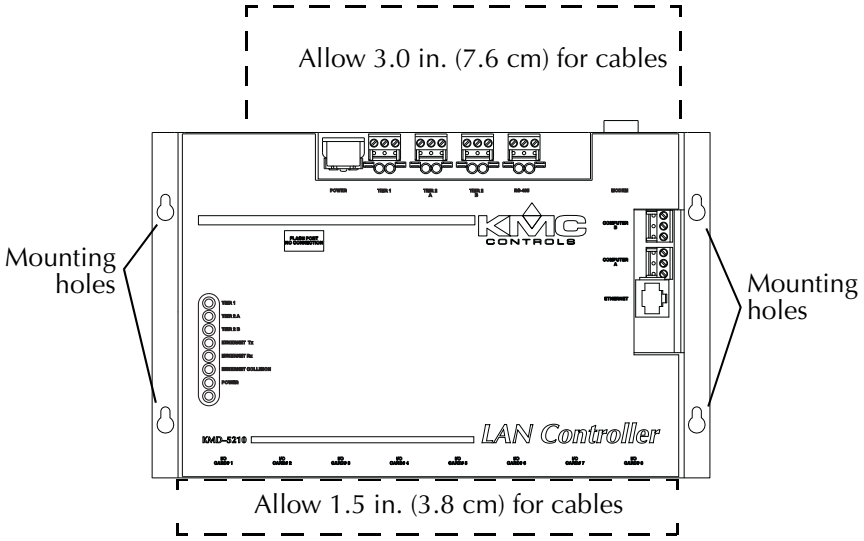


***Illustration 2-1 Mounting details***

## Network connections

Prior to making network connections, determine which connections will be used and how the network will be configured. An example of a typical installation is shown in Illustration 2-2.

Each KMD-5210 in a KMC digital network may operate in either a stand-alone mode or connected by network to other controllers. The LAN Controller may be connect to other controllers using one or more of four network technologies.

- KMC Tier 1 networks using standard 10BaseT, CAT 5 Ethernet cabling or EIA–485 wiring and hardware.
- KMC Tier 2 networks using EIA–485 wiring and hardware.
- BACnet 802.3 networks using standard 10BaseT CAT 5 Ethernet cabling (KMD-5210-001 only)
- BACnet MS/TP using EIA–485 wiring and hardware (KMD-5210-002 only)

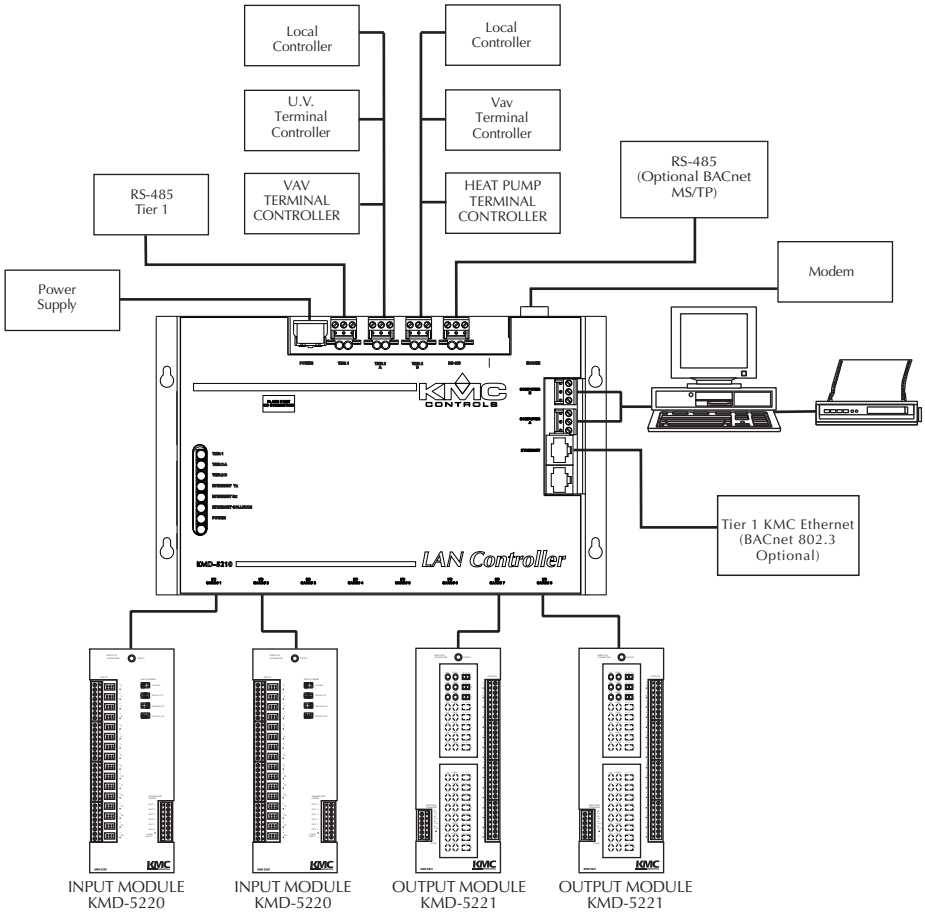


***Illustration 2-2 Typical network configuration***

Up to 32 LAN Controllers can be connected to the same Ethernet backbone in a common Ethernet network. This configuration also allows multiple PCs to access the system through the Ethernet network.

Connect the controller to the network by connecting a standard 10BaseT Ethernet cable (CAT 5) to the Ethernet/BACnet port on the controller and to a port on the network hub or router. (See "Ethernet Settings" later in this guide for recommended Ethernet Software Settings.)

**Note**

For reliable operation, use CAT 5 or equivalent Ethernet cables for all connections. If cables are custom made, they must meet the CAT 5 specification.

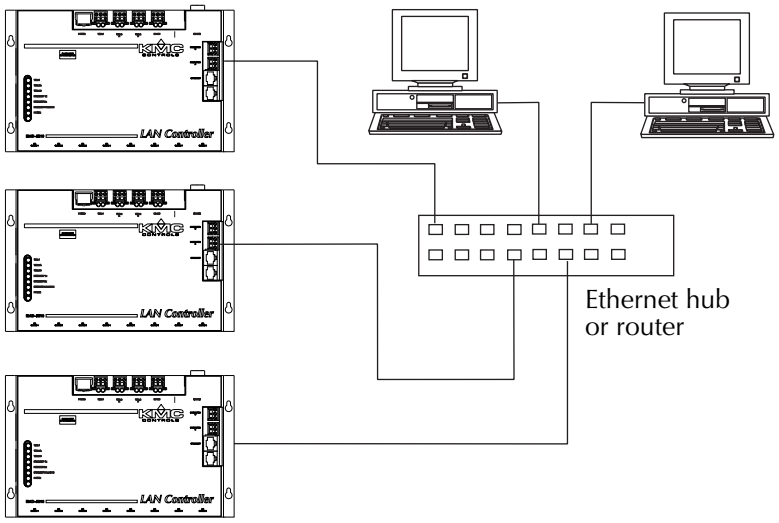


***Illustration 2-3 Typical Ethernet network configuration***

## EIA–485 networks

The KMD-5210 LAN Controller provides four active EIA–485 connection ports.

- Tier 1
- Tier 2A
- Tier 2 B
- EIA–485 for BACnet MS/TP

Use the Tier 1 port (marked Main Net on older controllers) to connect several KMD-5210. This is an alternative to connecting LAN Controllers to each other with Ethernet. This port will allow up to 31 controllers to be connected together by network.

**Note**

The Tier 1 EIA–485 port is disabled when the controller is assigned an IP address for operation on an Ethernet network. Tier 2 A and Tier 2 B will function normally. Ethernet IP addresses are configured with *Hardware Configuration manager*.

The Tier 2 A and Tier 2 B ports are for connection to Tier 2 networks. Each port supports up to 124 individual controllers.

**Note**

For reliable operation, use Belden cable model #82760 or equivalent (18 gauge, twisted, shielded, 50 picofarads or less) for all EIA–485 network wiring.

### Wiring notes

All EIA–485 network segments (KMC protocol or BACnet) use the same wiring principles.

- Use approved shielded cable and the following principles when connecting a controller to a Tier 2 (sub LAN) network:
- Connect no more than 31 KMC addressable controllers or devices to the Tier 1 RS-485 connector.
- Connect no more than 124 KMC programmable controllers to the Tier 2 A or Tier 2 B connectors.
- Connect the *A* terminal in parallel with all other *A* terminals.
- Connect the *B* terminal in parallel with all other *B* terminals.
- Connect the shields of the cable together at each controller.
- Connect the shields to an earth ground (if available) or chassis ground only at one end of the segment; tape back the shield ground at the other end.
- Use a KMD–5575 repeater between every 32 Tier 2 controllers or if the cable length of a Tier 1 or Tier 2 network exceeds 4000 feet (1220 meters). Use no more than seven repeaters per network.
- Place a KMD–5567 surge suppressor in the cable where it exits a building.

Refer to Illustration 2-4 for an example of typical EIA–485 connections.

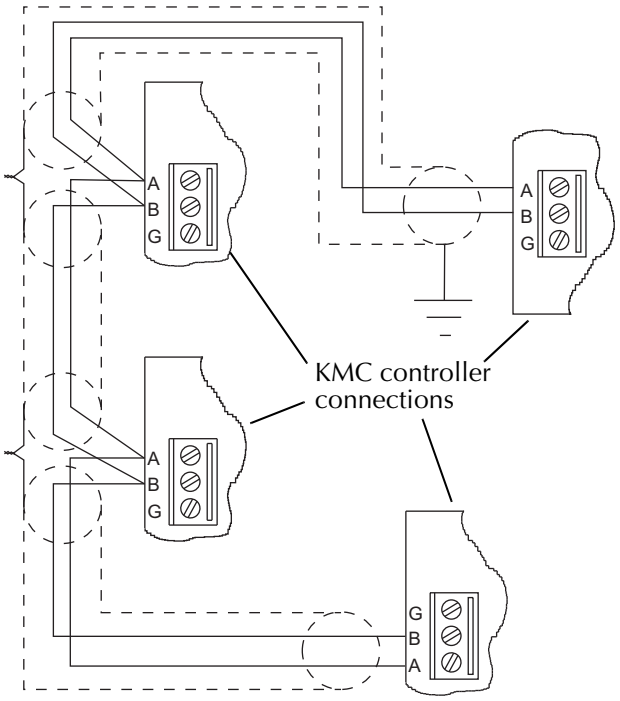


***Illustration 2-4 Typical EIA–484 Wiring Configuration***

## End-of-line termination

Each EIA–485 network segment requires end-of-line termination for proper operation of the network. Proper termination prevents signal degradation and EMI type interference with other system wiring. Termination jumpers are located on both sides of each EIA–485 connector (one each for the A and B terminals; see Illustration 2-5.)

To activate the end-of-line termination, leave the jumpers in place. If termination is not required, position the jumpers so they only cover one pin on the header.

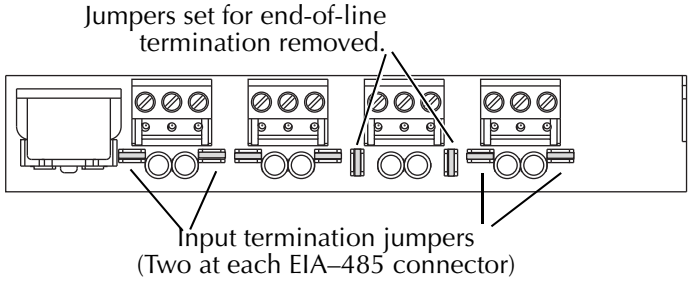


***Illustration 2-5 End-of-line Termination Jumpers***

**Note**

The controller with only one EIA–485 cable connected is normally the end-of-line. This is also the controller where the cable shield ground is tied to earth or a chassis ground

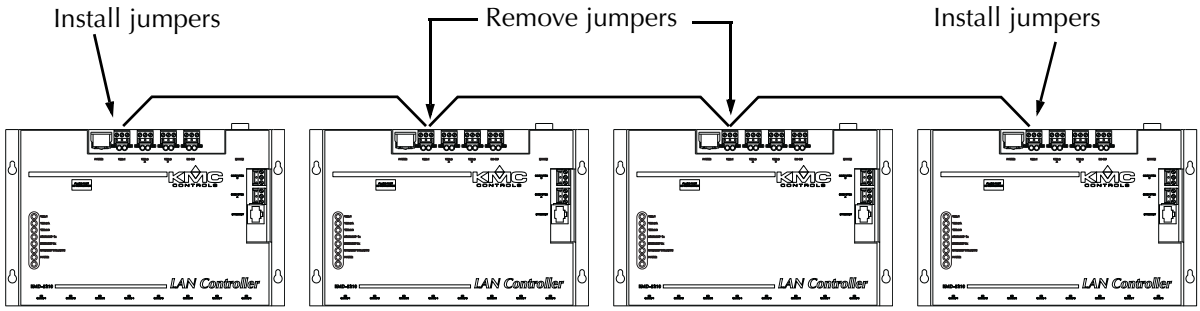


***Illustration 2-6 End-of-line termination jumper sample for a Tier 1 network***

## BACnet networks

The KMD-5210 LAN Controller supports an optional Class 3 Conformance Level of the BACnet specification. The BACnet protocol is implemented using either one or the other of the following network configurations.

- Ethernet 802.3 specification in KMD-5210-001
- MS/TP EIA–485 in KMD-5210—002.

See the section *Programming for BACnet in WinControl XL* on page 36 for details on BACnet features.

**Note**

The BACnet options are licensed for each controller. To upgrade a KMD-5210 controller to BACnet, contact KMC Controls for license information.

### BACnet 802.3

The KMD-5210–001, the BACnet 802.3 version of the LAN controller, connects to the LAN in the same manner as the standard LAN controller. See *Network connections* on page 14.

The BACnet internetwork most likely will use one or more BACnet routers to manage the BACnet internetwork and devices. The KMD-5210–001 must be connected to the same Ethernet broadcast domain segment as at least one BACnet router and the router must be enabled for BACnet 802.3 traffic. To configure a KMD-5210–002 for network connections, see *BACnet configuration* on page 35.

### BACnet MS/TP

Connect a KMD-5210–002 controller to a BACnet MS/TP network at the connector *EIA–485*. See *EIA–485 networks* on page 16 for network wiring techniques. To configure a KMD-5210–002 for network connections, see *BACnet configuration* on page 35.

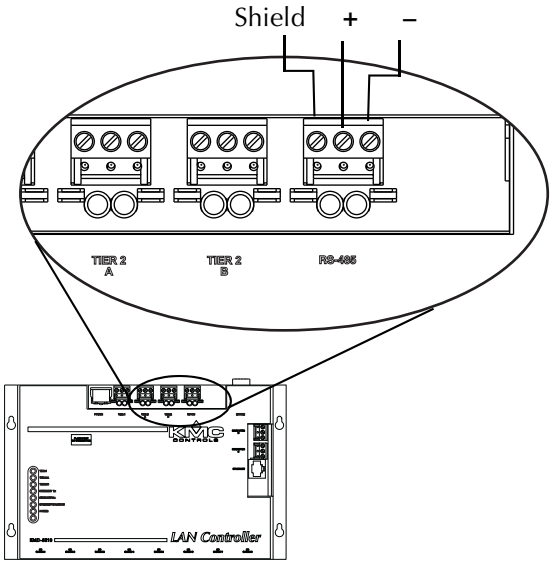


***Illustration 2-7 BACnet MS/TP connections***

## Planning for input and output modules

To connect inputs or output devices to a KMD-5210 controller, use KMD-5220 input and KMD-5221 output modules. The KMD-5210 controller includes eight universal I/O ports for up to eight KMD-5220 input modules, eight KMD-5221 output modules or any combination of up to eight modules.

Each module connects to the controller using a flat ribbon cable. When connecting input and output modules, use the following guidelines.

- Connect the first KMD-5220 input module to connector *I/O Card 1*; add continue adding input modules from left to right
- Connect the first KMD-5221 output module to connector *I/O Card 8* and continue adding output modules from right to left.
- Use ribbon cables no longer than 24 inches (61 cm).
- KMD-5221 output modules require an output transformers.

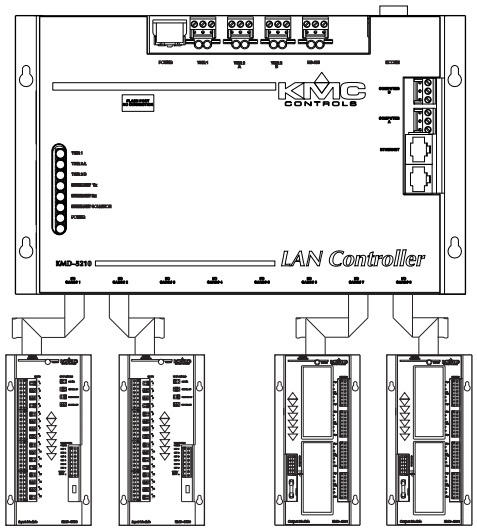


***Illustration 2-8 Typical input and output module connection***

## Module installation

1. Position and mount the modules in the enclosure using the supplied mounting holes.
2. Connect the ribbon cable to the LAN Controller. Estimate the required cable length and select from one of the cables from KMC Controls. See *Ribbon Cables for Input and Output Modules* on page 9 in the *Options and Accessories* section.

**Note**

Observe the orientation of the cable header. If the pin 1 edge is reversed, the controller will not communicate with the module.

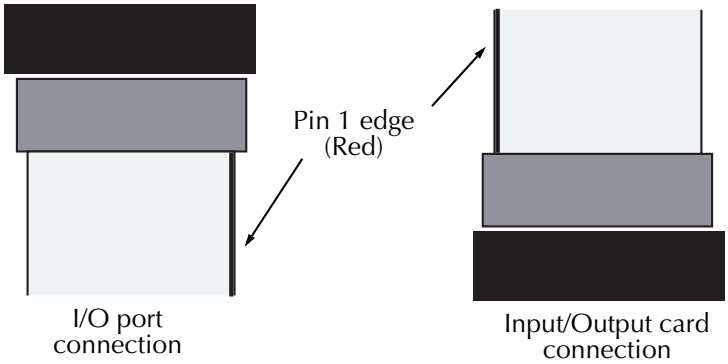


***Illustration 2-9 Ribbon cable orientation***

3. Connect the other end of the ribbon cable to the input or output module. You may find it necessary to fold the cable to properly route it to the module.

To accommodate turns, fold the cable gently to change direction. To make a fold, overlay the cable at a right angle and press gently until the cable holds the fold as shown in Illustration 2-10.

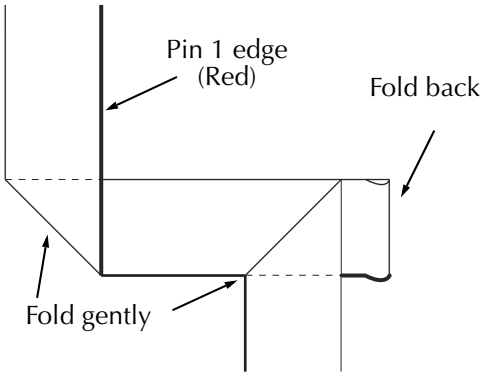


***Illustration 2-10 Ribbon cable fold***

**Caution**

Do not crimp the cable in a tight fold. This may result in separation of cable strands and result in unreliable operation of the module.

4. Connect input and output devices to the modules. Refer to the manuals supplied with the KMD-5220 input module and the KMD-5220 output module for details.

## Connecting Power

Each KMD-5210 LAN Controller requires a KMD–5563 power supply for operating power. Mount the power supply in a convenient location near the KMD-5210 and route the supply cable to the controller.

The controller will automatically power on when the power connection is complete. The controller does not use an power switch. See *Applying power* on page 27 for additional information.

**Caution**

Use only a KMC Controls power supply. Powering the controller with an improper supply may result in damage to the controller.

# Connecting to a Computer

To program the controller with WinControl, a computer must be able to access the controller. Choose from one of the following connection methods.

- Modem
- Ethernet
- EIA–232 connection

## Installing a modem interface

By adding an optional modem to the modem port, an off-site computer can access the controller through a dial-up connection. The modem connection also supports dial-in and the Control Basic functions *TPAGE* and *NPAGE*. If the modem port is enabled, Computer B port is disabled and is not available for direct connection with a computer.

**Note**

KMC Controls recommends using U.S. Robotics modems for off-site communications. KMC does not offer support for other modem installations.

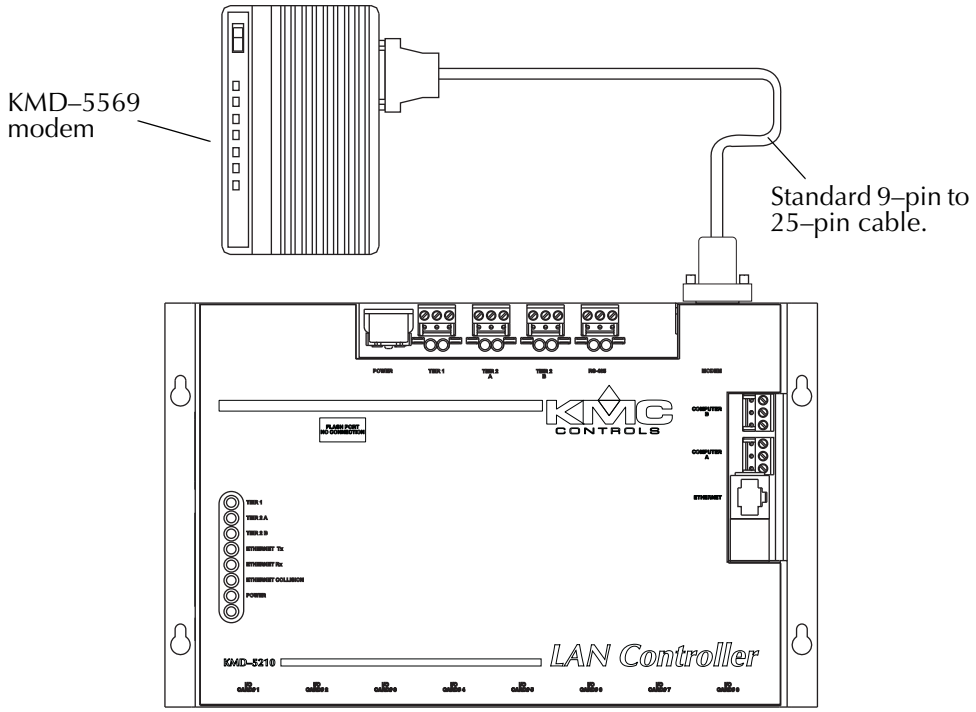


***Illustration 2-11 KMD–5569 modem connection to KMD-5210 controller***

To install a modem:

1. Connect a a standard DB-9 to DB-25 computer-to-modem cable between the KMD–5569 modem and a serial port on a computer on which WinControl is installed. This cable is available from computer supply sources.
2. Connect the modem to a telephone line dedicated to the network system.

3. Verify the configuration switches on the back of the modem are in the correct position for the firmware in the controller.

***Table 2-1 Configuration switches: Firmware 4.0 and later***

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| Up | Up | Down | Down | Down | Up | Up | Down |

***Table 2-2 Configuration switches: Firmware earlier than 4.0***

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| Up | Up | Down | Down | Up | Up | Up | Down |

4. Use HCM to initialize Computer Port B for modem operation.

## Connecting a KMD-5210 to an Ethernet LAN

To connect a PC to the controller via the Ethernet, the PC a must have a valid IP address on the Ethernet network that connects to the controller and install the PC on the Ethernet. Refer to the section *Configuring a controller with HCM* on page 32 for additional information.

## Direct Serial Port Connection

Two RS-232 ports are provided on the controller for connecting a PC directly to the controller. Connect the PC to the controller using a KMD–5672 PC to Controller cable. Refer to Illustration 2-12.

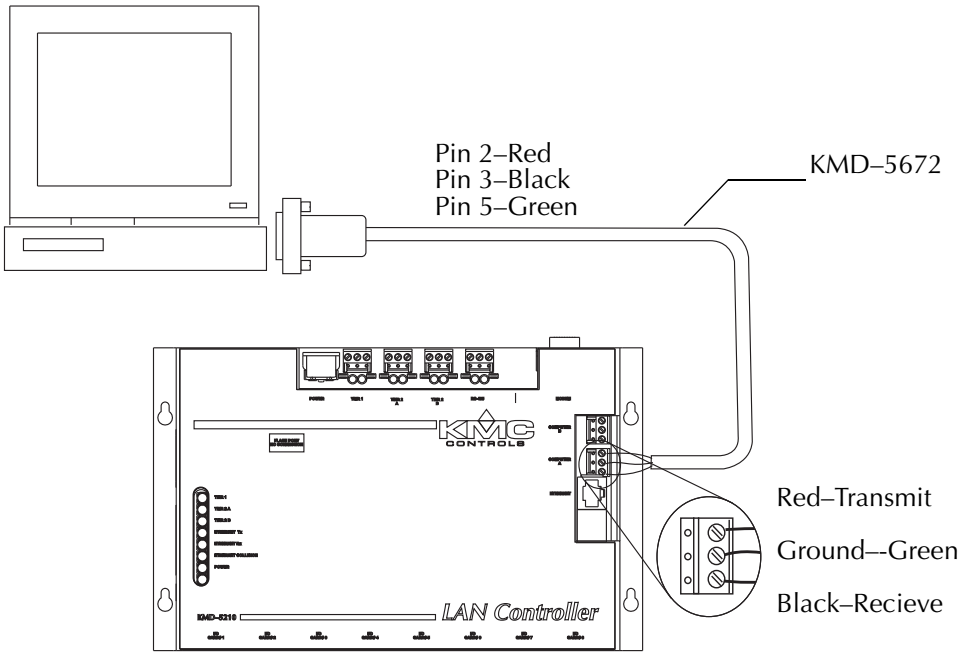


***Illustration 2-12 PC-controller cable connection***

**Note**

EIA–232 port B is assigned the same address as the modem port. When the modem port is in use, a PC cannot be connected to the controller through serial port B.

# SECTION 3

# Operation

This section provides general operating instructions for your KMD-5210 LAN Controller. Included are a description of the Isolation Bulbs, the LED status display, and instructions for resetting the controller. Carefully review this information as it applies to the task at hand.

## Applying power

The KMD-5210 LAN Controller is automatically powered when the power supply module is connected and plugged in. Verify all external connections are complete before applying power to the controller.

If an error in an EIA–485 network is indicated by a glowing lamp near one of the EIA–485 connectors, remove power and troubleshoot the circuit before you reapply power to the controller. (See *Isolation Bulbs* in the following section.)

## Lights and indicators

The controller provides a number of different status and diagnostic indicators. These are described in this section.

### Isolation bulbs

Located near each EIA–485 connector you will find two small glass bulbs. These serve as protective isolation devices for the Tier 2 and BACnet MS/TP, EIA–485 networks. The bulbs serve three functions:

- When illuminated they indicate improper network phasing. Improper phasing occurs when the ground potential of the controller is higher than the phase or the ground potential of other controllers on the network.
- The bulbs protect the controller from damage by limiting the input signal. If voltage or current exceeds safe operating conditions, the bulbs will act as fuses and open the connections between the controller and the network.
- By removing the bulbs from their sockets you can isolate the controller from the associated network.

The illustration *Isolation bulbs* on page 28 locates the isolation bulbs on the LAN Controller.

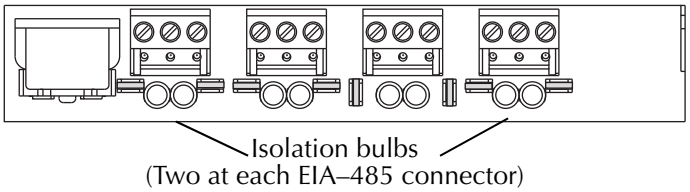


***Illustration 3-1 Isolation bulbs***

## LED Indicators

The LAN Controller uses seven LEDs to indicate the status of the controller and the different networks connected to the controller. The following table lists the LEDs and their functions.

***Table 3-1 Status LED descriptions***

| LED | Function |
|---|---|
| Tier 1 | This green LED indicates the status of the MAIN EIA–485 network. This LED blinks whenever the controller is transmitting data. |
| Tier 2A | This yellow LED indicates the status of the Tier 2 A EIA–485 network. This LED blinks whenever the controller is transmitting data. |
| Tier 2B | This yellow LED indicates the status of the Tier 2 B EIA–485 network. This LED blinks whenever the controller is transmitting data. |
| Ethernet Tx | This green LED blinks when the controller is transmitting data to the Ethernet network. |
| Ethernet Rx | This green LED blinks when the controller is receiving data from the Ethernet network. |
| Ethernet Collision | This red LED blinks when there is a collision of data packets on the Ethernet. While collisions are normal, excessive collisions indicate a problem somewhere in the network. |
| Power | The green power LED indicates the status of the controller:<br><br>*Steady Blink* – If the controller is operating normally, the LED blinks at a steady rate.<br><br>*Dark/Not Lit* – If the LED is not lit, it may indicate the controller is locked or does not have power. You can try resetting the controller or you can reload the panel information using the KMC Flash Wizard.<br><br>*Erratic or Repeating Pattern Blink* – If the LED is blinking, but not at a steady rate, the controller is indicating there is a problem with the license. Contact KMC Controls for assistance. |

## Resetting the controller

Should the controller appear to lock up or stop operating, you must reset the controller to the factory default state. After the controller is reset, you must reload any existing panel files to restore normal operation. (See the section *Configuring a controller with HCM* on page 32 for additional details

Locate the Reset Button beneath the cover in the upper left corner of the controller. See Illustration 3-2 for the reset button location.

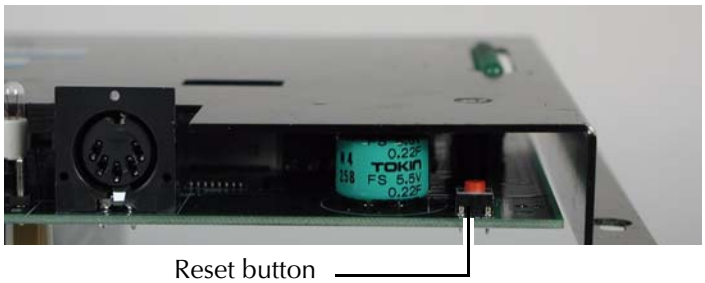


***Illustration 3-2 Reset button location***

To reset the LAN Controller:

1. Remove power from the controller by unplugging the power supply.
2. Remove the EIA–485 three–terminal connector blocks for all connected EIA–485 ports. Also, remove Ethernet cables, modem cables, and any PC connections.
3. Unplug all I/O ribbon cables.
4. Depress and hold the Reset Button while reestablishing power to the LAN Controller.
5. Continue to hold the reset button until MAIN, Tier 2 A and Tier 2 B LEDs light.

**! Caution**

Do not remove power during the reset process. Damage may result to the board if this happens.

6. Release the Reset Button and allow the controller to continue to power up steady blink Power LED).
7. Remove power from controller.
8. Return all cables and terminal blocks to their proper positions.
9. Reapply power to the LAN Controller and allow it to return to the normal operating state (blinking Power LED).
10. If this is a new installation, the controller must be configured before it can be placed into operation. Refer to *Configuration and programming* on page 31 of this guide for instructions.
11. If you are resetting the controller but not replacing it, use the HCM program to reload panel files.
12. Cycle power to the controller to establish the newly configured operating parameters.

# SECTION 4

## Configuration and programming

This section describes the individual configuration instructions used to establish the operating parameters for the KMD-5210 LAN Controller. This section includes basic configuration, Ethernet configuration, BACnet configuration and Ethernet verification.

### Related materials

In addition to the material presented in this installation and operation guide, review and have available the following reference materials.

- WinControl XL Plus User's Manual and installed help
- HCM reference guide
- TotalControl Design Studio Reference Guide
- System plans with controller addresses

### Programming Considerations

The design of the KMD-5210 LAN Controller provides areas where specific user programs may be stored. This allows a great deal of versatility and function in the way the controller is used. It also allows for changes to the system to meet changing requirements or conditions.

All programming functions are accomplished using the WinControl WinControl XL Plus applications from KMC Controls. Please refer to the current version of the WinControl User's Manual for programming instructions and functions.

## Configuring a controller with HCM

Before placing a controller into service, it must be initialized and addressed with the KMC *Hardware Configuration Manager* (HCM) software. HCM is distributed with application programs; complete instructions for HCM are included in the *Hardware Configuration Manager* manual and the context sensitive help system built into HCM.

**Caution**

The Hardware Configuration Manager sets all controllers on the Tier 2 network to the same parameters. To prevent disruption to other controllers on the network, disconnect the network cables or remove the isolation bulbs on the controller prior to starting HCM.

1. Start HCM, connect the controller to the computer and establish communications with the controller.
2. Make the entries as described in the section *KMC digital network configuration* on page 33.
3. Setup the Ethernet routing table. See *Ethernet routing table* on page 34.
4. If applicable, enter BACnet parameters. See *BACnet configuration* on page 35.
5. Cycle the power to the controller. The controller can now be connected to a network and additional programming can be performed with WinControl XL or the Acuity Configuration tool.

**Note**

Ethernet settings do not take effect in a controller until the power is cycled.

## KMC digital network configuration

The entries in the table *HCM Configuration Screen setup fields* on page 33 are required for controller-to-controller communications on a KMC controls digital network.

***Table 4-1 HCM Configuration Screen setup fields***

| Setting | Description |
|---|---|
| Address | Enter the address that is assigned to the controller on the network. Valid numbers are 1–31. This address is also the BACnet MS/TP MAC address in KMD-5210–002 controllers. |
| Last Panel | Check this box only if the controller is assigned to the highest address number in the system. This controls token passing in the network. Last Panel is not applicable for Tier 1 controllers connected with Ethernet. |
| SubLAN A<br>SubLAN B<br>Main Network<br>BACnet | Sets the connection speed of the Tier1, Tier 2 or BACnet MS/TP port to which the LAN controller is connected. Set each baud to match the baud of the other controllers on each network. |
| Modem String | For Firmware 4.0 and later: The string *AT&A &B1 &C1 &D2 &H1 &K0 &R1* is stored in Flash memory and cannot be changed. Entries in *Modem String* are sent to the modem after the default string is sent. This provides a method to override settings in the default string. For example, entering ATS0=5 sets the modem to answer on the fifth ring.<br><br>Firmware earlier than 4.0: The controller automatically transmits the default initialization string *AT&A &B1 &C1 &D2 &H1 &K0 &R1* to the modem. The default string can be modified by making changes in *Modem String*.<br><br>See *Installing a modem interface* on page 23 for modem installation and switch settings. |
| Computer A | Use this field to set the communication speed if a PC is directly connected to this port. |
| Computer B | Use this field to set the communication speed if a PC is directly connected to this port. If you are using the modem port on the LAN controller, check the *Modem* box to indicate a modem is attached to the controller. If you have a modem attached, you cannot use the Computer B connector. |
| I/O Card Configuration | Use the fields in this area to enable communications with input or output cards connected to the controller. Click on the button to step through the choices. Input cards are connected to the controller starting at position #1; output cards are connected starting at position #8. If a port is unused, leave it marked as *Unused* in HCM. |

### Ethernet routing table

The Ethernet routing table is a list that associates the KMC network addresses assigned to Tier 1 controllers with the IP addresses required by the LAN protocol. If the controller is not configured correctly, it will not communicate with other controllers and may cause problems with the rest of the network. Before starting the HCM initializing process you will need information about the controller and the LAN which is listed in Table 4-2.

***Table 4-2 Tier 1 (LAN) controller Ethernet settings***

| Setting | Description |
|---|---|
| IP address | Supplied by network administrator. Enter the address next to the panel address of the LAN Controller. |
| MTU | 1400 or as supplied by system administrator |
| Gateway | Use default (255.255.255.255) unless a router (gateway) is located between two Tier 1 controllers. The router IP address is supplied by the network system administrator. |
| MAC address | The MAC address is located on the white label on front of controller. MAC addresses for KMC Controls products begins with 00-D0-6F. |
| Broadcast sever | For controllers 1 - 16, select the *Broadcast Server* check box only for the controller to which HCM is connected.<br>Select the *Broadcast Server* check box for all other controllers. |
| Interval | Sets the interval for the broadcast message. The broadcast message is for KMD controllers and not a LAN broadcast message. The default setting is 20 seconds. |
| Subnet mask | Set the Subnet Mask address to 255.255.255.0. or as supplied by network system administrator. |

**Note**

Ethernet settings do not take effect in a controller until the power is cycled.

### Ethernet troubleshooting

If the controller does not appear Network Status in the WinControl program, try the following.

1. Obtain a crossover cable (available in most stores that carry network products).
2. Connect the crossover cable between the Ethernet connection on your computer and the Ethernet connector on the LAN Controller.
3. Open an MS-DOS window on your computer and Ping the controller's IP address. If the controller is operating correctly, you should receive a response to the ping command.

If you are unfamiliar with the above steps, contact KMC Controls for assistance.

### BACnet configuration

If the controller is configured for BACnet and connected to a BACnet network, the controller must be configured to communicate with the network. BACNet is a licensed option in models listed below. This procedure applies only to these models.

- KMD-5210–001 (BACnet 802.3)
- KMD-5210–002 (BACnet MS/TP)

***Table 4-3 Tier 1 BACnet settings***

| Setting | Description |
|---|---|
| Instance | The device instance number as assigned by the BACnet system designer. Instance numbers are required, must be unique among all devices on the internetwork and range from 0 to 4,194,303. |
| Name | A required 16-character label of the device. *Name* must be unique among all devices on the internetwork. The set of characters used in *Name* is restricted to printable characters. |
| Location | Optional information used to further identify a piece of equipment. |
| Description | Optional information used to further identify a piece of equipment. |
| APDU Timeout | Indicates the period—in milliseconds— between retransmissions of an APDU requiring an acknowledgement for which no acknowledgment has been received. The default value is 3000 milliseconds. |
| Max Master | Enter the highest MAC address the controller will attempt to locate while polling for a master device on the local network. |
| Token Timeout | Enter the period a controller must wait to see if a remote node responds to a request or starts using the token. The range is 20-100 milliseconds. |

**Detail**

BACnet device settings are covered in more detail in the BACstage Reference Guide that is available in Adobe Acrobat format on the KMC Controls web site. See the topic *Device Objects* in the section *The Object Menu*.

## Programming for BACnet in WinControl XL

The LAN Controller supports the BACnet object types listed in Table 4-4.

***Table 4-4 Supported BACnet object types***

| Mnemonic | Object type |
|---|---|
| AI | Analog Input |
| AO | Analog Output |
| BI | Binary Input |
| BO | Binary Output |
| AV | Analog Value |
| BV | Binary Value |

Program the LAN Controller as would other KMD series controllers. Observe the following details when programing an interface to a BACnet internetwork:

- Only inputs, outputs and variables within the LAN Controller appear as objects in a device on the BACnet internetwork.
- A point configured as a KMD digital point will appear as a BACnet binary object. Analog points appear as analog objects.
- To be visible as an object to BACnet devices or operator workstation, configure the KMD point with both a description and a label in WinControlXL Plus. In TotalControl configure the point with both a description and name.
- Use BAC-SET, BAC-GET and BAC-RLQ in Control Basic to read and write other objects on other BACnet devices.

KMC Controls recommends that all BACnet services have adequate error handling protocols within your control program. A sample Control Basic code segment is provided below to demonstrate reading the state of Binary Input 8 in a BACnet device with instance number 1.

*Example:*

```
250 G = BAC-GET( 1 , BI8 ) : REM BACnet read
260 ON-ERROR 280 : REM If error, bad read, don't use it
270 1-VAR16 = G : REM Read was good, use the value.
280 WAIT 0:00:15 : REM Release so other CB programs can
run
290 END
```

## Access to the LAN Controller from BACnet

To access the LAN Controller, use a BACnet operator workstation such as BACstage.

- The LAN Controller will appear in the BACstage device list but cannot be selected. Its objects are not accessible for configuration from the BACstage *Object* menu.
- The configured points within the KMD-5210 are the only points visible in BACnet.
- In BACstage, use *BACnet Read/Write Property* under the *System* menu in BACstage to manually view or change properties.
- KMC BACnet controllers and third-party devices may read and write to the objects in the KMD-5210 with off-panel reads and writes.

## Firewalls and network communications

Firewalls are commonly installed on networks to prevent unauthorized traffic or electronic probes from entering the network. If the LAN Controller must communicate with a network where a firewall is in place the following actions must be taken.

LAN controllers communicate through one of three Ethernet Ports:

- WinControl to LAN Controller: UDP 21068
- LAN Controller to LAN Controller: UDP 21069
- LAN Controller to LAN Controller: UDP 21070

These ports must be open for communications to pass through a firewall.

If the LAN Controller resides behind a Network Address Translation (NAT) router, the IP address for the controller must be preceded by the lowercase letter ‘r’ in the system menu. (For example, r128.1.1.5.)

Adding this prefix letter will cause WinControl to disregard the IP table and download from the panel itself.

**Note**

If you use this method you will only be able to connect *one* LAN Controller through the router.

## System time keeping

The controllers feature real-time clocks. Once the clock is set with WinControl XL, the controller maintains accurate time even during power loss. A KMC digital network uses the lowest addressed Tier 1 (LAN) controller with a real-time clock as the system time keeper.