OMRON
MICROSCAN

MS-Connect 210 User Manual

P/N 84-210210 Rev A

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Disclaimer

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About the MS-Connect 210

The key features of the MS-Connect 210 are:

- Easy Ethernet configuration with ESP® Software
- Ethernet TCP/IP and EtherNet/IP™
- Trigger and New Master controls on external button panel
- Output indicator LEDs
- Easy-to-access ports, Micro-Change connectors, and cabling routes
- Clearly labeled terminal blocks
- Spacious interior for easy wiring access
- Convenient quick-reference insert with default settings and output options
- Easy mounting, with available DIN rail option
- Ultra-bright alphanumeric display (with FIS-0210-0001G and FIS-0210-0003G models)

About This Manual

This manual provides complete information on setting up the MS-Connect 210 and using it in an application setting. The information is presented in the order that the MS-Connect 210 might be set up and made ready for operation.

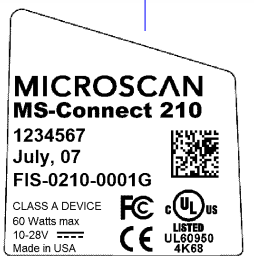
Highlighting

Cross-references and web links are highlighted in **blue bold**. Menu topics and other points of emphasis are highlighted in **Bold Initial Caps**. References to the titles of external documents are italicized.

Product Labels

The following labels are located on the MS-Connect 210:

WEEE (Waste Electronic and Electrical Equipment) label.



Product ID, serial number, date of manufacture, FIS number, electrical and safety information.

Statement of Agency Compliance

The MS-Connect 210 has been tested for compliance with FCC (Federal Communications Commission) regulations and has been found to conform to all applicable FCC Rules and Regulations.

To comply with FCC RF exposure compliance requirements, this device must not be co-located or operate in conjunction with any other antenna or transmitter.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The MS-Connect 210 has been tested for compliance with CE (Conformité Européenne) standards and guidelines, and has been found to conform to applicable CE standards, specifically EN 55024:1998 ITE Immunity Standard and EN 61000-6-2:2001.

The MS-Connect 210 has been tested by an independent electromagnetic compatibility laboratory in accordance with the applicable specifications and instructions.

Statement of RoHS Compliance

All Omron Microscan readers with a ‘G’ suffix in the FIS number are RoHS-Compliant. All compliant readers were converted prior to March 1, 2007. All standard accessories in the Omron Microscan Product Pricing Catalog are RoHS-Compliant except 20-500013-01 and 98-000039-02. These products meet all the requirements of “Directive 2002/95/EC” European Parliament and the Council of the European Union for RoHS compliance. In accordance with the latest requirements, our RoHS-Compliant products and packaging do not contain intentionally added Deca-BDE, Perfluorooctanes (PFOS) or Perfluorooctanic Acid (PFOA) compounds above the maximum trace levels. To view the document stating these requirements, please visit:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:EN:HTML

and

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:372:0032:0034:EN:PDF

Please contact your sales manager for a complete list of Omron Microscan’s RoHS-Compliant products.

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The information provided in this certification notice is correct to the best of Omron Microscan’s knowledge at the date of publication. This notice is not to be considered a warranty or quality specification. Users are responsible for determining the applicability of any RoHS legislation or regulations based on their individual use of the product. In regards to “RoHS Directive 2011_65_EU” Omron Microscan produces Monitoring and Control Instruments as well as Industrial Monitoring & Control Instruments as defined within the directive. Omron Microscan has developed and is implementing a RoHS2 compliance plan with the intention of bringing all active products listed in our current marketing literature within full compliance as per the directive deadlines.
Key milestones for the transition plan are as follows:

- Complete internal product audit by July 2014.
- Initial “Monitoring and Control Instruments” RoHS2 compliant products available by December 2014
- Initial “Industrial Monitoring & Control Instruments” RoHS2 compliant products available by July 2015
- All new products introduced in 2015 are expected to be WEEE & RoHS2 compliant.

Omron Microscan will mark the products with the ‘CE’ marking that complies with the RoHS2 process to acquire ‘CE’ certification per the example given: Example >> Machinery directive + EMC directive + RoHS2 = Declaration of Conformity.

1 Setting Up the Device

Contents

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This section is designed to get your MS-Connect 210 up and running quickly.

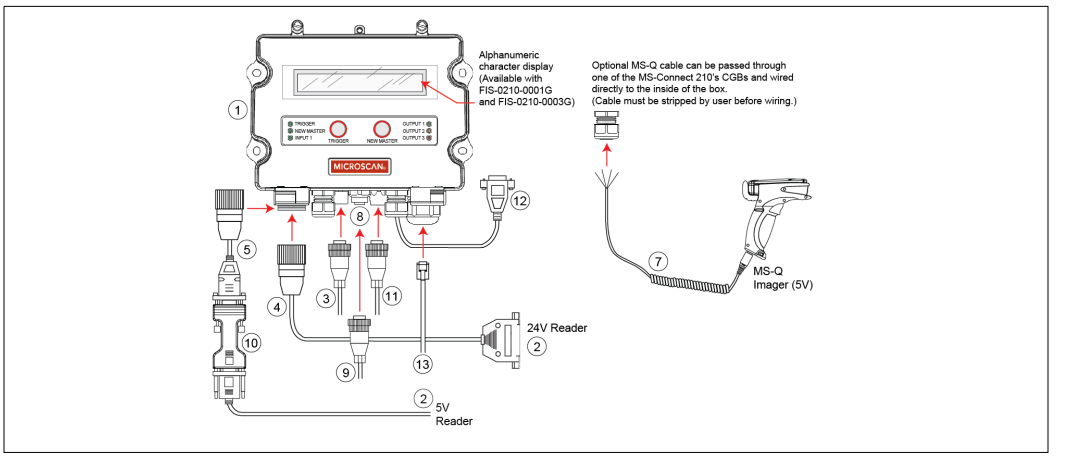
Following these steps will allow you to get a sense of the product's capabilities while you set it up for active operation.

Check Required Hardware

Stand-Alone Configuration

Item	Description	Part Number
1	MS-Connect 210 Connectivity Box with Display MS-Connect 210 Connectivity Box MS-Connect 210 Connectivity Box with Display and Ethernet	FIS-0210-0001G FIS-0210-0002G FIS-0210-0003G
2	Omron Microscan Reader (10-28V or 5V)	FIS-XXXX-XXXXG
3	Power Supply (10-28V)	97-100004-15
4	Reader Cable, 19-pin to 25-pin, Host RS-422/485 Reader Cable, 19-pin to 25-pin, Host RS-232, Aux RS-232 Reader Cable, 19-pin to 25-pin, Ethernet	61-000122-01 61-000123-01 61-000124-01
5	Reader Cable, 19-pin to 15-pin, Host RS-232 (5V readers and MS-9)* Reader Cable, 19-pin to 15-pin, Host RS-422/485 (5V readers and MS-9)*	61-000127-02 61-000139-01
6	Reader Cable, 19-pin to 15-pin, Host RS-232 Reader Cable, 19-pin to 15-pin, Host RS-422/485	61-000121-02 61-000138-01
7	MS-Q Reader Cable (optional; must be stripped before wiring)	61-000066-02
8	Internal Ethernet Cable (optional), 8-pin M12 external Micro-Change to RJ45 Ethernet module connector	61-000128-01
9	Industrial Ethernet Cable (optional), 8-pin M12 Micro-Change	User-supplied
10	IC-332 Power Adapter (5V readers)	FIS-0001-0035G
11	Object Detector (optional)	99-000017-02
12	Host Cable (pre-stripped to 9-pin)	61-000105-01
13	Ethernet Cable (optional), RJ45	User-supplied
14	Pluggable Relay Module, 120VAC, Series 70, Type SM (optional; not shown)	98-000013-04
15	Pluggable Relay Module, 240VAC, Series 70, Type SM (optional; not shown)	98-000013-05
16	Pluggable Relay Module, 24VDC, Series 70, Type SM (optional; not shown)	98-000013-06
17	DIN Rail Mounting Kit (optional; not shown)	98-000093-01

*IC-332 not required with MS-9.



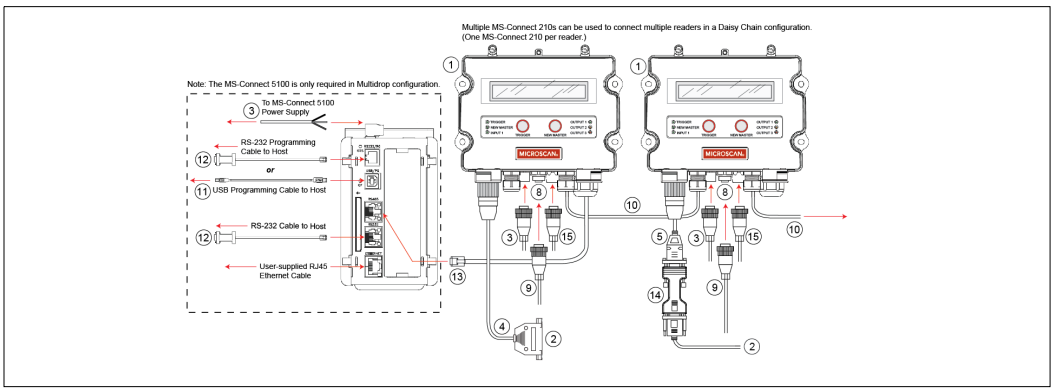
Hardware Required for Stand-Alone Configuration

Check Required Hardware (cont.)

Multidrop and Daisy Chain Configurations

Item	Description	Part Number
1	MS-Connect 210 Connectivity Box with Display MS-Connect 210 Connectivity Box MS-Connect 210 Connectivity Box with Display and Ethernet	FIS-0210-0001G FIS-0210-0002G FIS-0210-0003G
2	Omron Microscan Reader (10-28V or 5V)	FIS-XXXX-XXXXG
3	Power Supply (10-28V)	97-100004-15
4	Reader Cable, 19-pin to 25-pin, Host RS-422/485 Reader Cable, 19-pin to 25-pin, Host RS-232, Aux RS-232 Reader Cable, 19-pin to 25-pin, Ethernet	61-000122-01 61-000123-01 61-000124-01
5	Reader Cable, 19-pin to 15-pin, Host RS-232 (5V readers and MS-9)* Reader Cable, 19-pin to 15-pin, Host RS-422/485 (5V readers and MS-9)*	61-000127-02 61-000139-01
6	Reader Cable, 19-pin to 15-pin, Host RS-232 Reader Cable, 19-pin to 15-pin, Host RS-422/485	61-000121-02 61-000138-01
7	MS-Q Reader Cable (optional; not shown; must be stripped before wiring)	61-000066-02
8	Internal Ethernet Cable (optional), 8-pin M12 external Micro-Change to RJ45 Ethernet module connector	61-000128-01
9	MS-Connect 210 Industrial Ethernet Cable (optional), 8-pin M12 Micro-Change	User-supplied
10	MS-Connect 210 Multidrop / Daisy Chain Cable (must be stripped and wired to MS-Connect 210's RS-422 terminal blocks)	User-supplied
11	MS-Connect 5100 USB Programming Cable, Type A to Type B, 6 ft.	61-000112-01
12	MS-Connect 5100 Host Cable, 9-pin to RJ12, 6 ft.	61-000108-01
13	MS-Connect 5100 Concentrator Cable, user-stripped to RJ45	User-supplied
14	IC-332 Power Adapter (5V readers)	FIS-0001-0035G
15	Object Detector (optional)	99-000017-02
16	Pluggable Relay Module, 120VAC, Series 70, Type SM (optional; not shown)	98-000013-04
17	Pluggable Relay Module, 240VAC, Series 70, Type SM (optional; not shown)	98-000013-05
18	Pluggable Relay Module, 24VDC, Series 70, Type SM (optional; not shown)	98-000013-06
19	DIN Rail Mounting Kit (optional; not shown)	98-000093-01

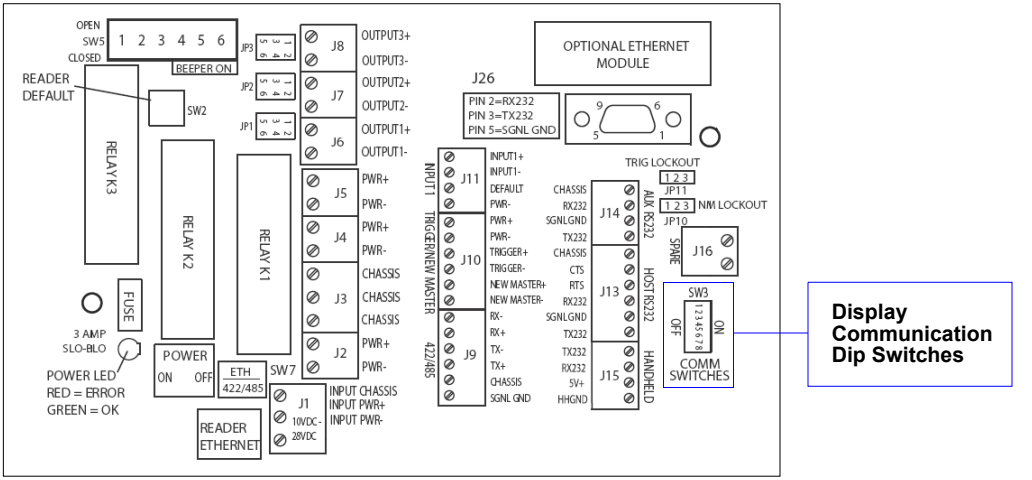
*IC-332 not required with MS-9.



Hardware Required for Multidrop or Daisy Chain Configuration

Configure the Display

If you are using a version of the MS-Connect 210 with an alphanumeric character display (FIS-0210-0001G or FIS-0210-0003G), you must configure the display before applying power to the system. For the MS-Connect 210's display to operate correctly, all communication settings *must match those of the reader*. Settings can be matched using the dip switches located on the board at **SW3**.



Important: The dip switches located at **SW4** on the board are **FOR FACTORY USE ONLY** and should not be moved.

Display Communication Dip Switches*

	BAUD RATE					DATA BITS		PARITY		CLEAR SCREEN	
SWITCH	***9.6K***	19.2K	38.4K	57.6K	115.2K	***7***	8	***EVEN/ODD***	NONE	YES	***NO***
1	***OFF***	ON	ON	ON	ON						
2	***ON***	OFF	OFF	ON	ON						
3	***ON***	OFF	ON	OFF	ON						
4-5	NOT USED										
6										ON**	***OFF***
7						***OFF***	ON				
8								***ON***	OFF		

* Settings must match reader. Default settings shown in bold italics.

** Sends a Form Feed command (0x0C) to the display, clearing the screen whenever the MS-Connect 210 receives new data. The reader's Preamble must be set to 0x0C for Clear Screen to function.

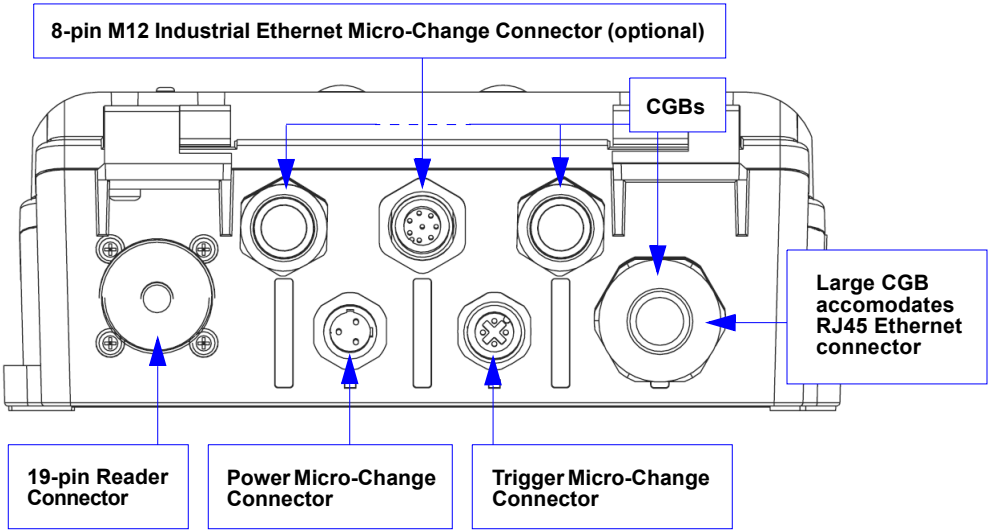
Once the MS-Connect 210's dip switches are configured to match reader settings, decoded symbol data and other information will display correctly during operation of the system.

Note: Power must be cycled to the MS-Connect 210 each time the dip switch settings for baud rate are changed.

Connect the System

There are a number of different ways to connect a reader, the MS-Connect 210, and a host.

The 19-pin reader connector; the Micro-Change connectors for the power supply, optional Ethernet, and optional object detector; and three CGBs are located at the back of the unit.



MS-Connect 210 Connectors

Connecting a 10-28 Volt Reader to the MS-Connect 210

If you are using an MS-9, QX-830, QX-870, or MS-890:

1. Attach the 19-pin to 25-pin Reader Cable to the MS-Connect 210 via the 19-pin reader connector, shown in the illustration above.

   Important: The MS-9 requires a **19-pin to 15-pin Reader Cable**.
2. Tighten the cable housing at the 19-pin reader connector on the back of the MS-Connect 210 unit.
3. Attach cabling inside the wiring box.
4. Attach an Object Detector (optional) to the MS-Connect 210 via the trigger Micro-Change connector, shown in the illustration above.
5. Attach the Power Supply to the MS-Connect 210 via the power Micro-Change connector, shown in the illustration above.

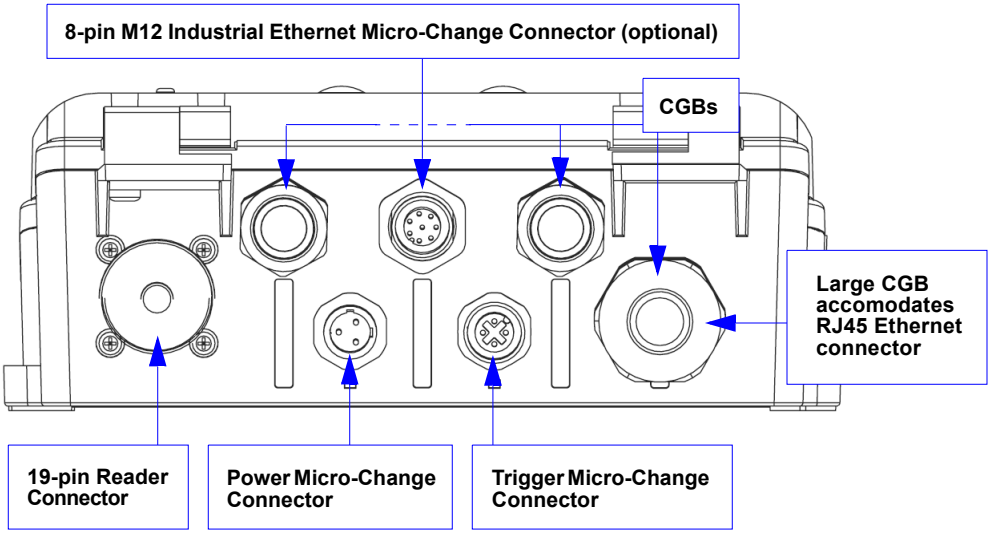
> **CAUTION:** Be sure that all cables are connected **BEFORE** applying power to the system. Always power down **BEFORE** disconnecting any cables.

Connecting a 5-Volt Reader to the MS-Connect 210

If you are using an MS-1, MS-2, MS-3, MS-4, Quadrus MINI, Quadrus MINI 3, or Quadrus MINI Velocity:

1. Attach the **19-pin to 15-pin Reader Cable** to the MS-Connect 210 via the 19-pin reader connector, shown in the illustration below.
2. Tighten the cable housing at the 19-pin reader connector on the back of the MS-Connect 210 unit.
3. Attach the 15-pin end of the Reader Cable to the 10-28VDC end of the **IC-332 Power Adapter**, and attach the reader's cable to the 5VDC end of the IC-332 Adapter. **Important:** Reversing the IC-332 in this configuration may seriously damage the interface.
4. Attach cabling inside the wiring box.
5. Attach an Object Detector (optional) to the MS-Connect 210 via the trigger Micro-Change connector, shown in the illustration below.
6. Attach the Power Supply to the MS-Connect 210 via the power Micro-Change connector, shown in the illustration below.

> **CAUTION:** Be sure that all cables are connected **BEFORE** applying power to the system. Always power down **BEFORE** disconnecting any cables.

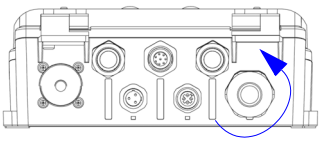


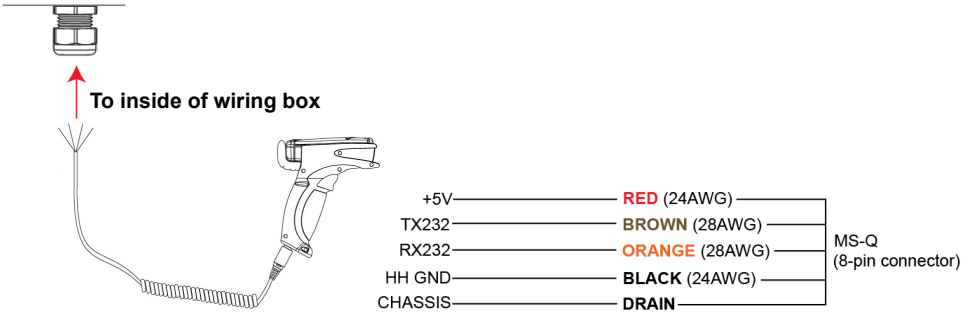
MS-Connect 210 Connectors

Connecting an MS-Q Imager to the MS-Connect 210

Once you have a reader connected to the MS-Connect 210 by RS-232, you can simultaneously connect an MS-Q by wiring it directly to the MS-Q terminal block inside the box (**J15**).

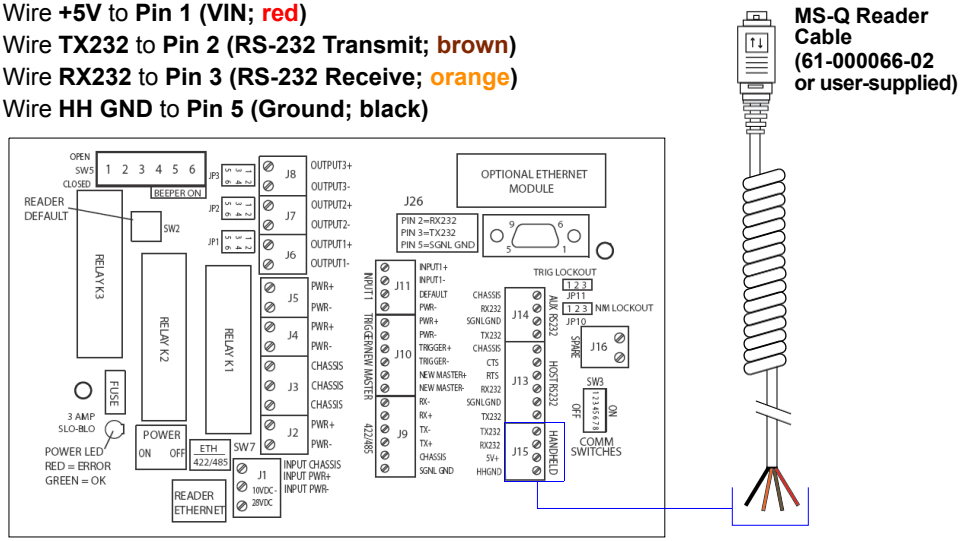
1. Unscrew one of the three CGB caps at the back of the unit.
2. Clear the CGB's access hole to create a cabling route into the box.
3. Pass a pre-stripped MS-Q Reader Cable (61-000066-02 or user-supplied) through the access hole so that the reader connector is *outside* the box and the end to be wired is *inside* the box.





4. Wire the MS-Q Reader Cable to the MS-Q terminal block (**J15**).

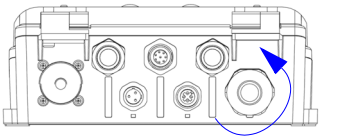
   - Wire **+5V** to **Pin 1 (VIN; red)**
   - Wire **TX232** to **Pin 2 (RS-232 Transmit; brown)**
   - Wire **RX232** to **Pin 3 (RS-232 Receive; orange)**
   - Wire **HH GND** to **Pin 5 (Ground; black)**



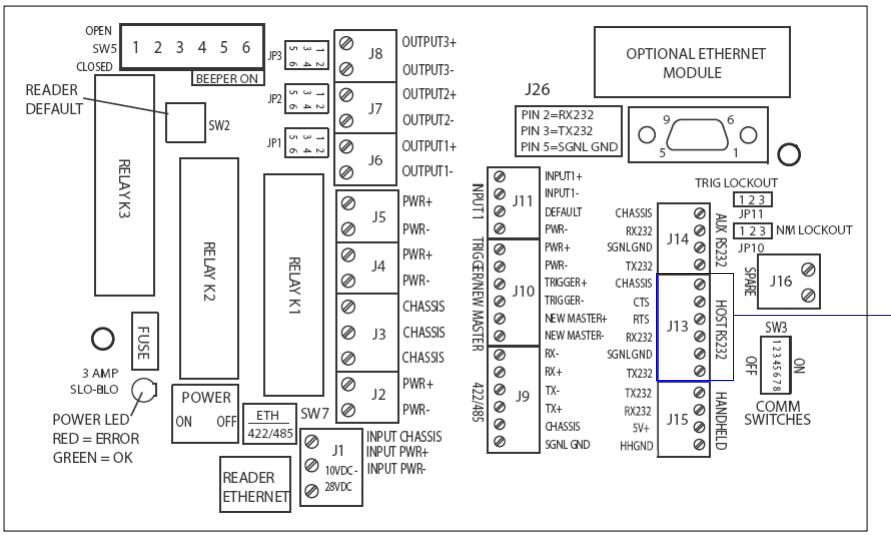
Connecting the MS-Connect 210 to a Host

Once you have a reader connected to the MS-Connect 210 by RS-232, you have the option of connecting the MS-Connect 210 to a host computer.

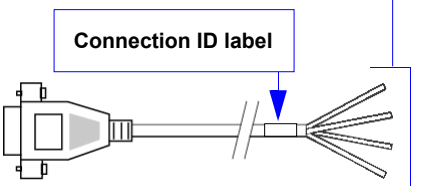
1. Unscrew one of the three CGB caps at the back of the unit.
2. Clear the CGB's access hole to create a cabling route into the box.
3. Pass a pre-stripped RS-232 Host Cable (P/N 61-000105-01) through the access hole so that the 9-pin connector is *outside* the box, and the end to be wired is *inside* the box.



4. Wire the Host Cable to the "Host RS-232" terminal block (**J13**).
   Important: Refer to the label on the Host Cable (61-000105-01) for color-coded pin assignments.
5. Connect the Host Cable to the host's RS-232 port.



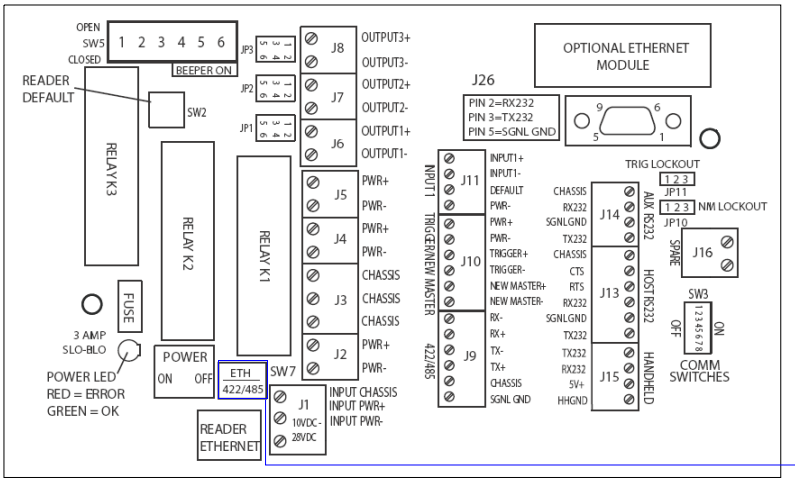
- Wire **CHASSIS** to **Host Cable Shield Wire**
- Wire **TX232** to **Host Receive, Pin 2**
- Wire **RX232** to **Host Transmit, Pin 3**
- Wire **SGNL GND** to **Host Ground, Pin 5**



Host Cable (61-000105-01)

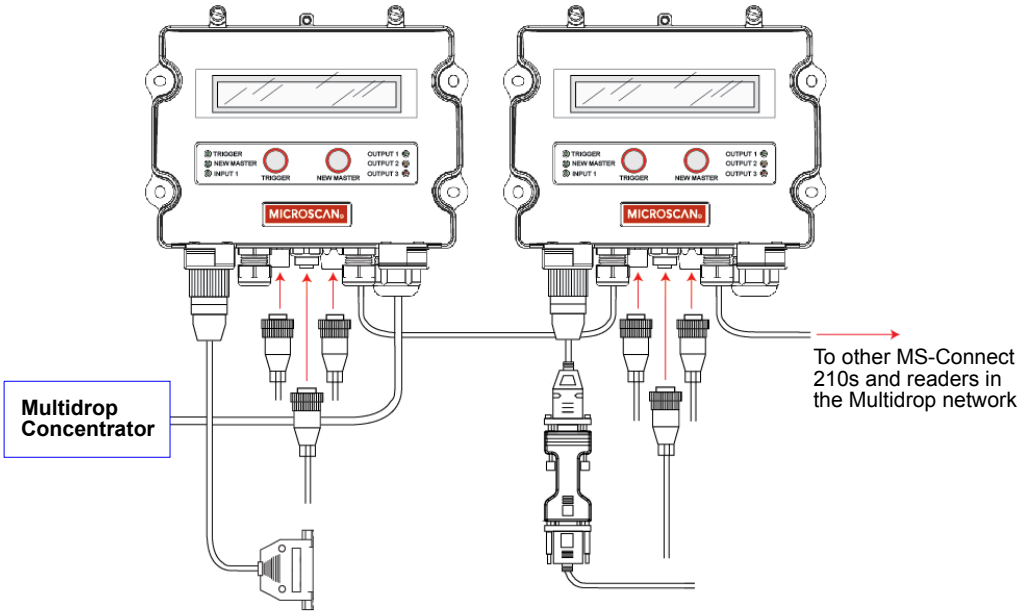
Connecting the MS-Connect 210 to a Multidrop Network

Once you have a reader connected to the MS-Connect 210 by RS-232, you have the option of connecting the MS-Connect 210 and reader to a Multidrop network.



Important: Before connecting to a Multidrop network, be sure that all four switches at **SW7** are in the **UP** position. This closes the circuits to allow Multidrop communication.

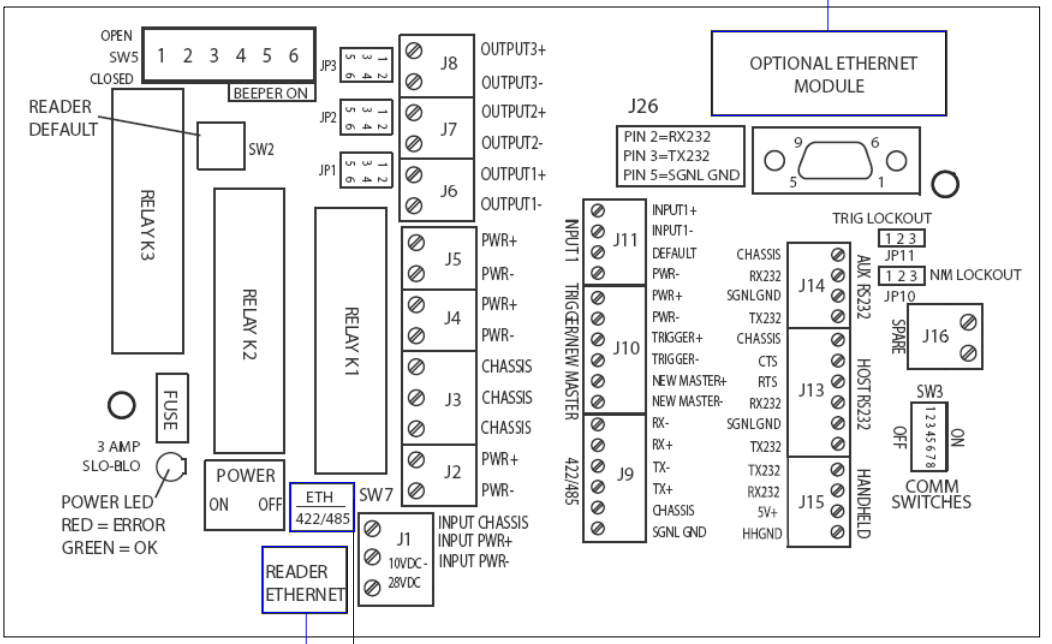
Multiple MS-Connect 210s and readers can be added to a Multidrop network (one reader per MS-Connect 210).



Connecting the MS-Connect 210 to Ethernet

Once you have a reader connected to the MS-Connect 210 by RS-232, you have the option of connecting the MS-Connect 210 and reader to Ethernet.

The Optional Ethernet Module converts RS-232 to Ethernet for readers without embedded Ethernet.



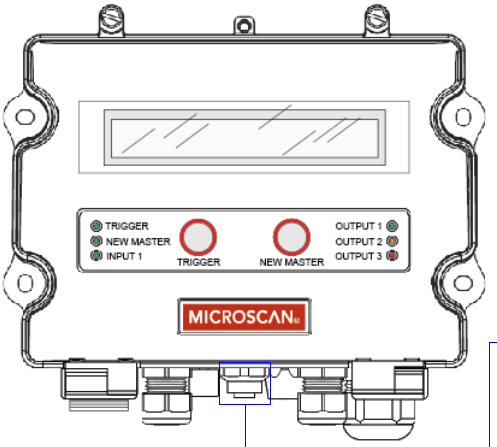
Important: Before connecting to Ethernet using the **Reader Ethernet** port, be sure that all four switches at **SW7** are in the **DOWN** position. This opens the circuits to create a pass through condition.

The **Reader Ethernet** port is intended for readers that have embedded Ethernet.

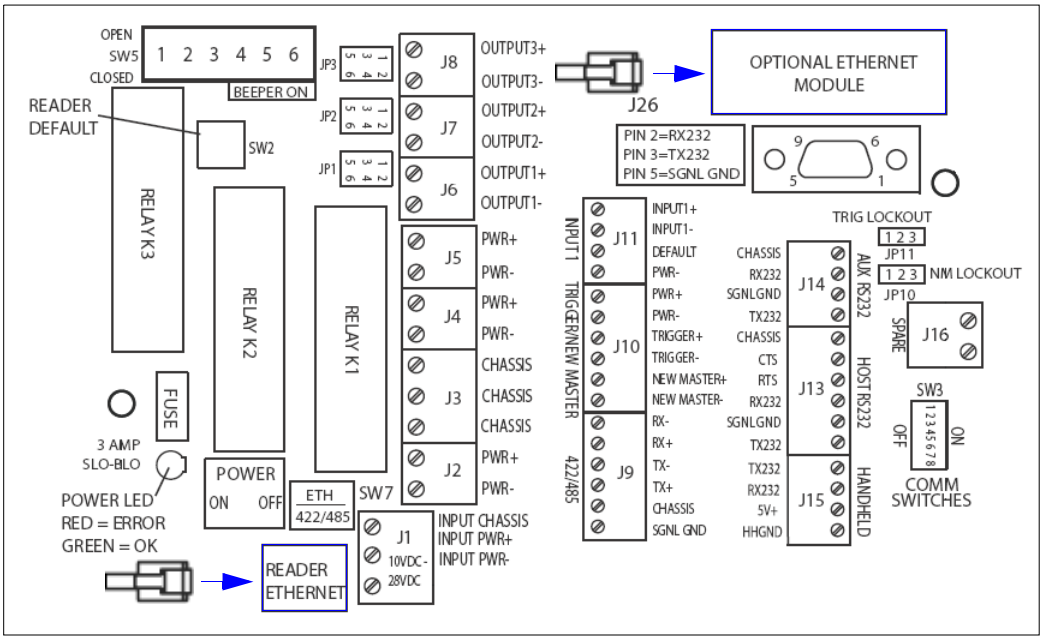
See Chapter 2, **Using Ethernet**, for more detail about how to configure the MS-Connect 210 for Ethernet operation.

Using the Internal Ethernet Cable

The optional internal Ethernet cable (61-000128-01) provides a quick, water-tight connection to an Ethernet network.



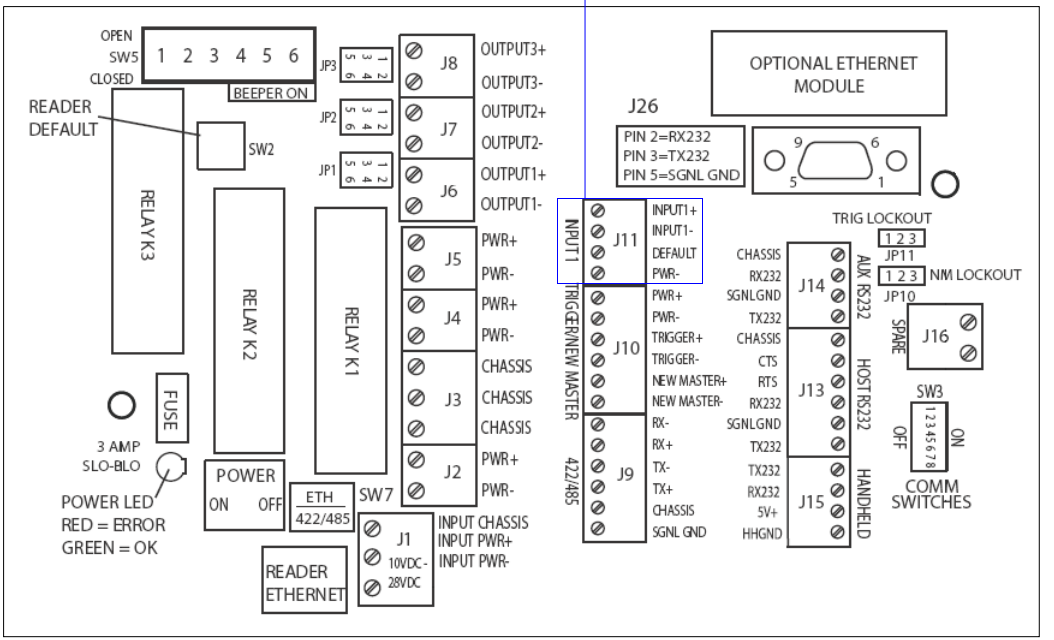
The 8-pin M12 Micro-Change end of the internal Ethernet cable is externally visible. The RJ45 end of the cable is inside the box, and can be connected to either of the Ethernet modules highlighted below.



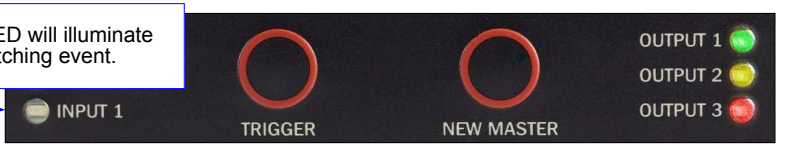
Using Input 1

The **Input 1** terminal block (**J11**) allows you to wire buttons or other external devices for resetting counters, unlatching outputs, or other application requirements.

Wire the external device to the **Input 1** terminal block at **J11**.



The **Input 1** LED will illuminate to signal a switching event.

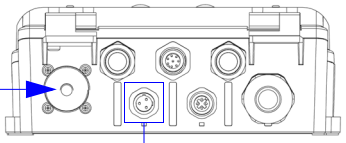


Powering Additional Readers from the Terminal Blocks

The MS-Connect 210 can power up to three additional readers during active operation. This is accomplished by wiring the additional readers to terminal blocks **J2** through **J5** inside the box, as shown below.

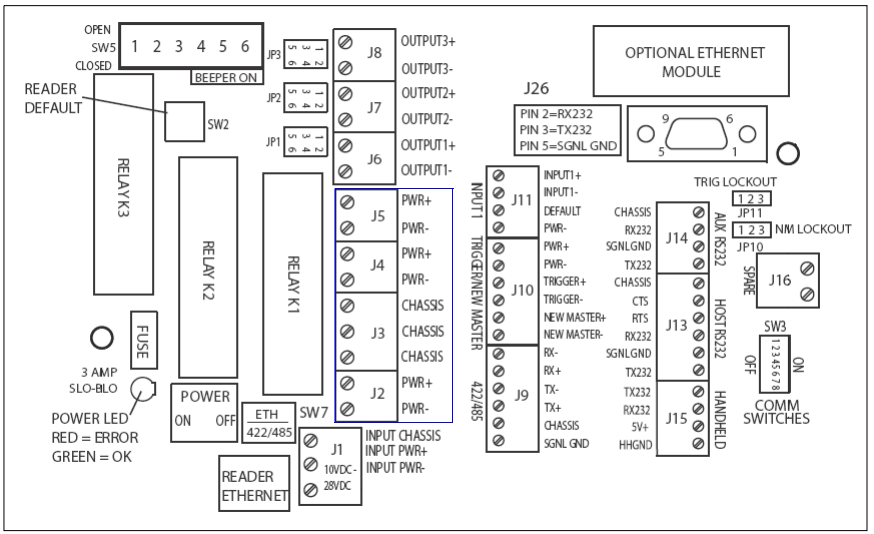
Note: If you are using MS-890s, the MS-Connect 210 can power up to **two** additional readers, due to the greater power demands of those products.

The primary reader, or **Reader 1**, is powered through the 19-pin reader connector at the back of the unit.



MS-Connect 210 Power Supply Micro-Change Connector

Terminal Blocks J2 - J5



Reader 2

Connect the positive wire of the reader's Reader Cable to **J2 PWR+** (Pin 1), the negative wire to **J2 PWR-** (Pin 2), and the Chassis GND wire to **J3** (Pin 3).

Reader 3

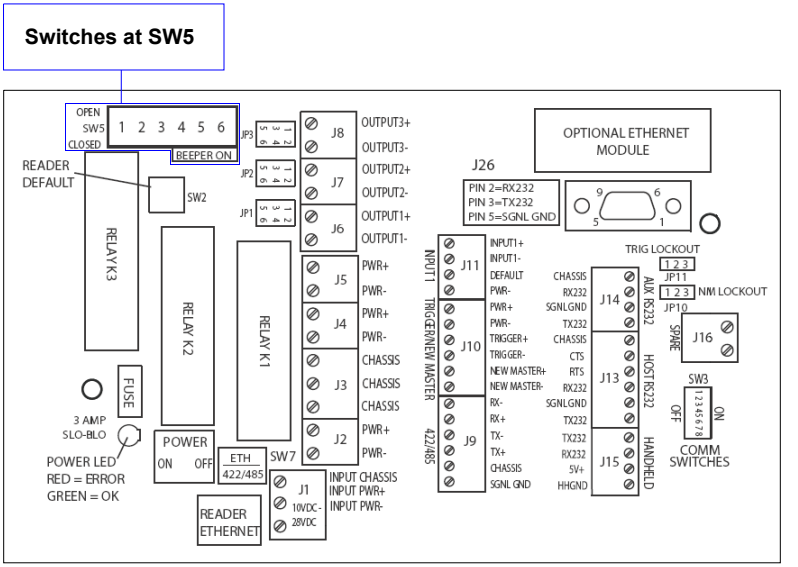
Connect the positive wire of the reader's Reader Cable to **J4 PWR+** (Pin 1), the negative wire to **J4 PWR-** (Pin 2), and the Chassis GND wire to **J3** (Pin 2).

Reader 4

Connect the positive wire of the reader's Reader Cable to **J5 PWR+** (Pin 1), the negative wire to **J5 PWR-** (Pin 2), and the Chassis GND wire to **J3** (Pin 1).

Configure Output Settings

Outputs are configured by manipulating the dip switches and jumpers on the board.

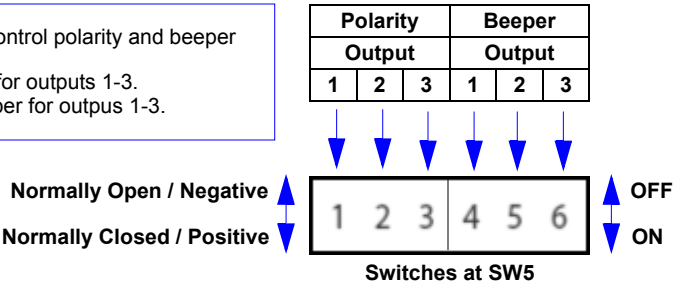


Configuring the Outputs and Beeper

The switches for controlling outputs 1, 2, and 3 and the beeper are located at **SW5**.

Reader Output	Reader Output State / Polarity	Beeper
Output 1	POS 1 (Up = Normally Open)	POS 4 (Up = Off)
Output 2	POS 2 (Up = Normally Open)	POS 5 (Up = Off)
Output 3	POS 3 (Up = Normally Open)	POS 6 (Up = Off)

The switches at **SW5** on the board control polarity and beeper activity for outputs 1, 2, and 3.
Switches 1, 2, and 3 control polarity for outputs 1-3.
Switches 4, 5, and 6 control the beeper for outpus 1-3.



Beeper Characteristics at Power-On

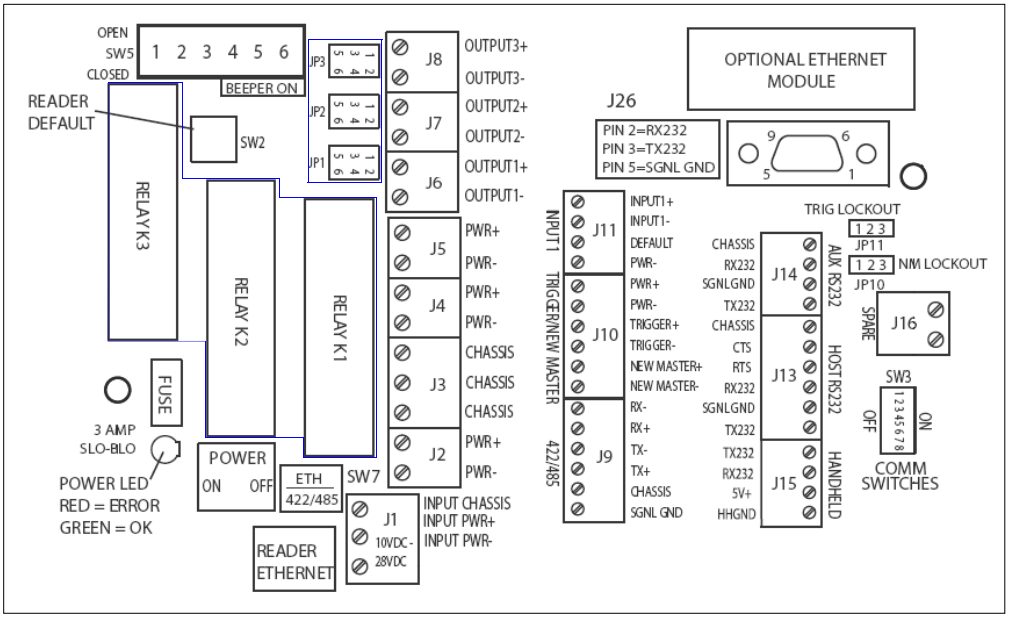
The MS-Connect 210 will beep at power-on for most readers. The duration of the beep depends upon which reader is connected. The table below shows which readers cause the MS-Connect 210 to beep at which durations.

	MS-Connect 210 Beep Duration*
MS-3	No beep at power-on
MS-4	< 3 seconds
MS-9	< 3 seconds
MS-890	~ 3 seconds
Quadrus MINI	< 3 seconds
Quadrus MINI 3	< 3 seconds
Quadrus MINI Velocity	< 3 seconds

* Beep duration may vary depending on reader and firmware.

Configuring the Relays

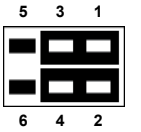
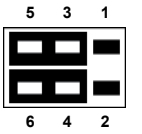
The MS-Connect 210's three pluggable relay modules and three jumpers for controlling the relays are outlined below.



Relay Module Options K1 - K3

The two possible jumper configurations for **JP1**, **JP2**, and **JP3** are shown below.

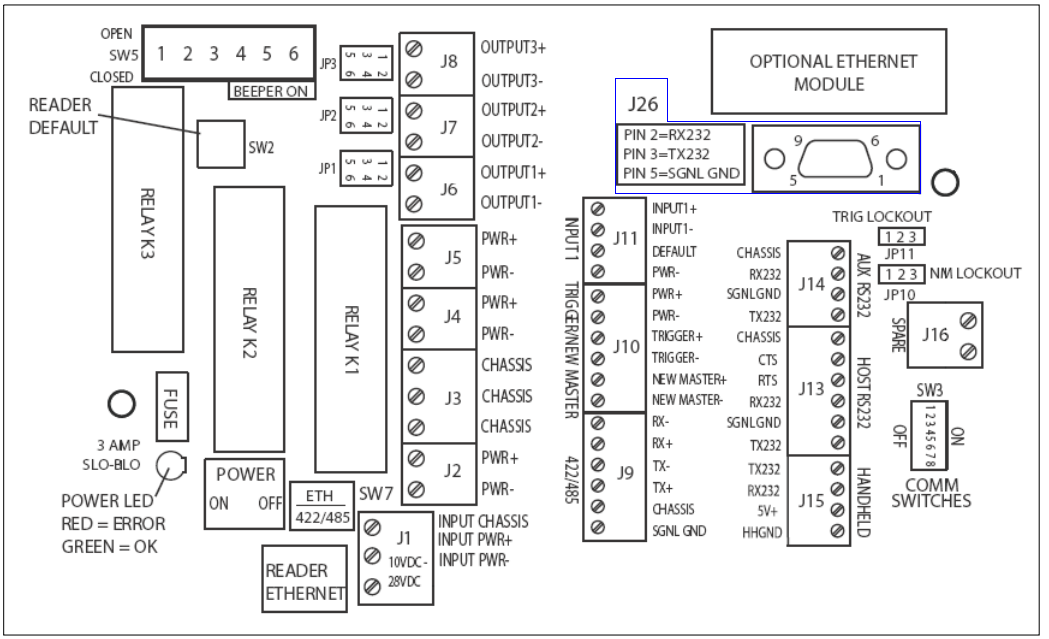
Config A passes through the reader's opto-isolated relays to the terminal block.
Config B inserts the relay module between the reader's output and the terminal block.

JP1 **JP2** **JP3**	***Pass Through (Default)***	**Config A** 
	Relay Module K1, K2, K3	**Config B** 

Using the 9-pin Configuration Port

In applications without a communication cable wired to the host connector, you can use the 9-pin configuration port at **J26** on the board to program the connected reader.

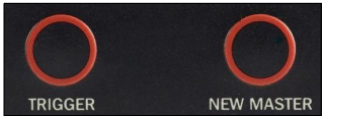
> Configuration port pinouts are on the reinforced paper insert inside the MS-Connect 210.

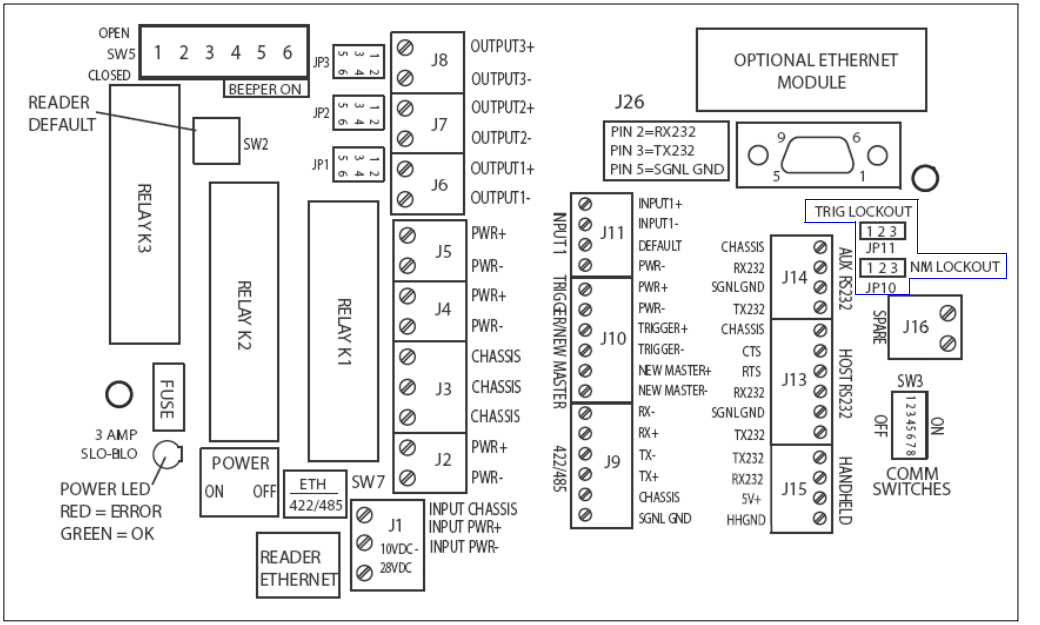


Using the Trigger and New Master Lockouts

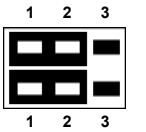
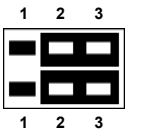
The Trigger and New Master lockouts allow you to disable the buttons on the front panel of the MS-Connect 210.

When JP10 (New Master Lockout) and JP11 (Trigger Lockout) are in their Config B positions, the Trigger and New Master buttons on the front panel will be disabled.



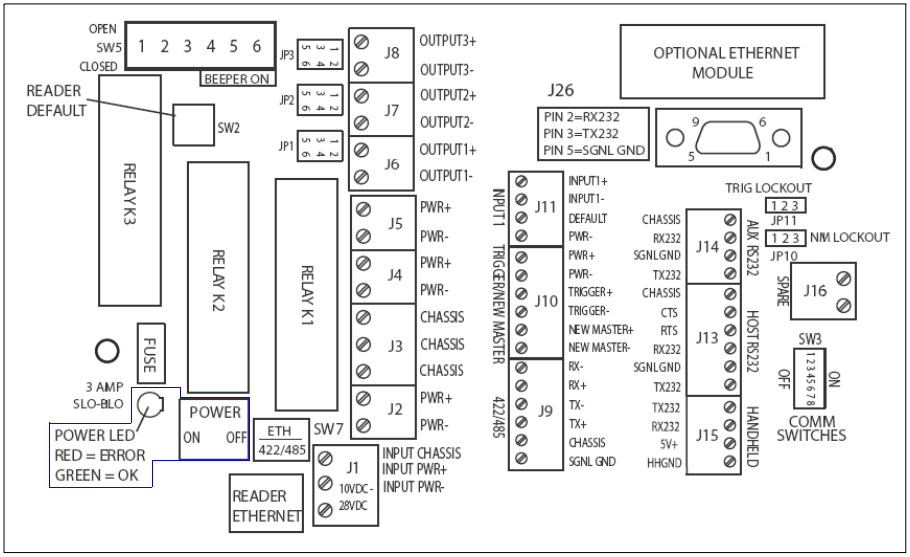


The two possible jumper configurations for **JP10** and **JP11** are shown below.

JP10 **JP11**	***Enabled (Default)***	
	Lockout (Disabled)	

Power-On the MS-Connect 210

Once your reader is connected to the MS-Connect 210 and all other cabling is connected and secured, it is safe to turn on the system.



Note: If the polarity of your power connection is incorrect when you turn on the MS-Connect 210, the Power LED will illuminate as **RED**. If polarity is correct, the Power LED will illuminate as **GREEN**.

The MS-Connect 210 has reverse-voltage circuit protection up to 30V to prevent damage to the wiring box and attached equipment. If the Power LED illuminates as **RED**, no power will be sent to the wiring box. Power will still be provided to the large green power terminals, but not to the smaller black terminals.

Note: The power input terminal inside the wiring box **(J1)** is always powered-on, regardless of the power switch position.

Install ESP

Easy Setup Program (ESP) is Omron Microscan's proprietary setup and testing application. The purpose of **ESP** is to provide a quick and easy way to set up and configure Omron Microscan products.

When the MS-Connect 210 is connected to a host computer (Windows Vista, XP, or 2000), **ESP** can be used to configure Ethernet settings and to set up communications between the MS-Connect 210 and a host or network.

If installing from the Omron Microscan Tools Drive:

1. Insert the Omron Microscan Tools Drive into a USB port on your computer.
2. Select **ESP Software** from the navigation bar at the left of the screen.
3. Click on **ESP Software** under the **Current Version** heading.
4. Click the **Run** button and follow the prompts in the **ESP** Setup Wizard.
   Note: During installation, you may see an Internet Explorer Security Warning that states: "The publisher could not be verified." If you see this warning, click **Run** to continue installation.

If downloading from the web:

1. Go to the Download Center at **www.microscan.com**.
2. Create a new member account or, if you are already a member, enter your user name and password.
3. Navigate to the "Omron Microscan Software" section of the Download Center (near the top of the page).
4. Click on the link showing the latest version of **ESP**. Extract the **ESP** installation files to a location of your choice on the host computer. *Note where your **ESP.exe** file is stored on your hard drive.*
5. At the end of the installation process, the following icon will appear on your desktop:

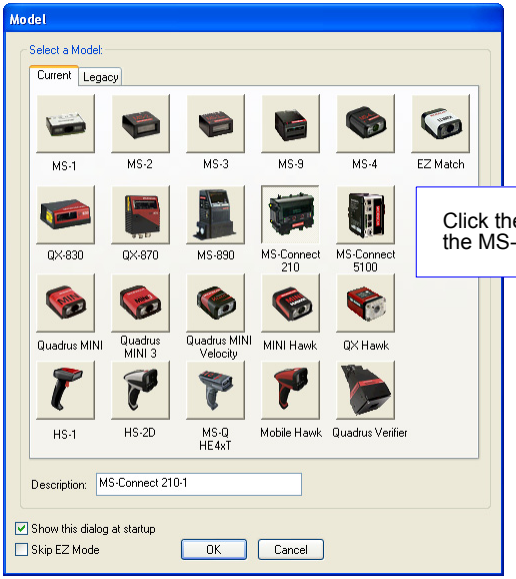
6. Click the **ESP** icon to start the program.

System Requirements for ESP

- 233 MHz Pentium PC
- Windows 8, 7, Vista, or XP operating system (32-bit or 64-bit)
- Internet Explorer 6.0 or higher
- 128 MB RAM or greater
- 160 MB free disk space
- 800 x 600 256 color display (1024 x 768 32-bit color recommended)

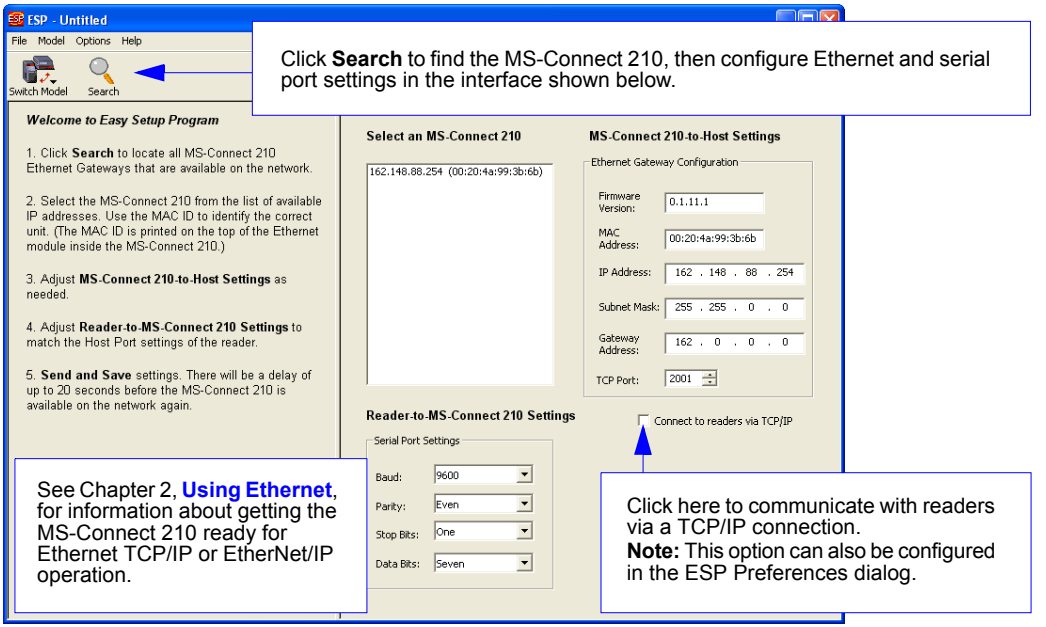
Select and Identify the MS-Connect 210

When you start **ESP**, you will see this menu:



Click the button showing the MS-Connect 210.

The following view will appear:



Click **Search** to find the MS-Connect 210, then configure Ethernet and serial port settings in the interface shown below.

See Chapter 2, **Using Ethernet**, for information about getting the MS-Connect 210 ready for Ethernet TCP/IP or EtherNet/IP operation.

Click here to communicate with readers via a TCP/IP connection.
Note: This option can also be configured in the ESP Preferences dialog.

2 Using Ethernet

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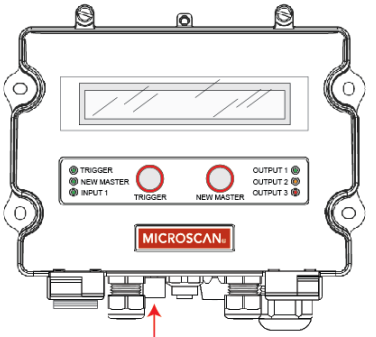
The MS-Connect 210 supports EtherNet/IP™, an industrial communications protocol based on the Common Industrial Protocol (CIP™). EtherNet/IP can handle large amounts of data at high speeds, and it typically employs a **star topology**, making it easy to set up and maintain network communication over a wide area. An EtherNet/IP network can support several kinds of communication nodes, including mainframes, PCs, I/O devices and adapters, robots, and PLCs.

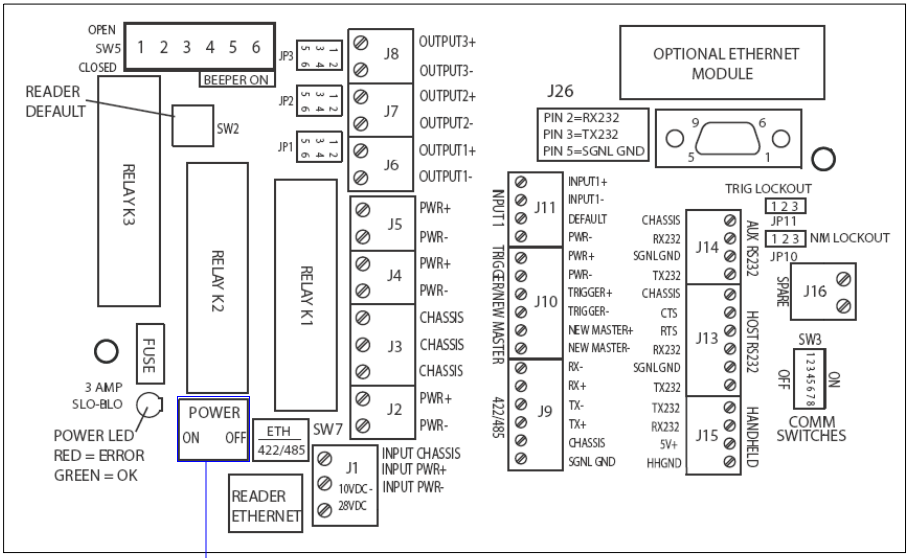
This section describes how to configure the MS-Connect 210 for use with EtherNet/IP, as well as Ethernet TCP/IP.

Power-On the System

When your reader is connected to the MS-Connect 210 and all other cabling is connected and secured, it is safe to turn on the system.



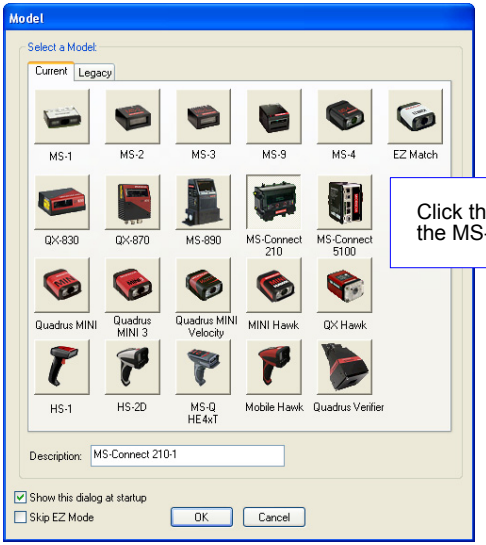
Power supply cable (97-100004-15)



Set the Power switch to **ON** to cycle power.

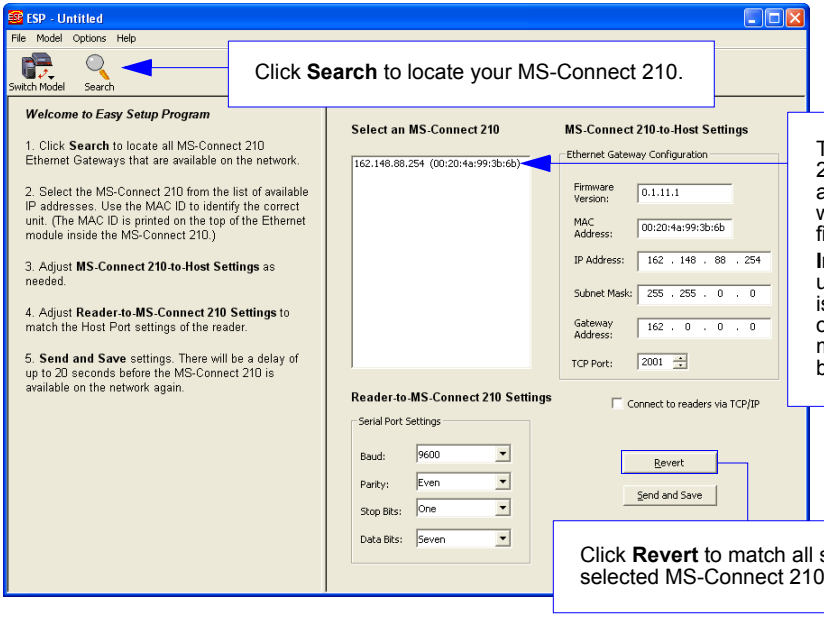
Select and Identify the MS-Connect 210

When you run **ESP**, you will see the model menu shown below. Select the **MS-Connect 210** by double-clicking on the MS-Connect 210 button, or by clicking it once and then clicking **OK**.



Click the button showing the MS-Connect 210.

The **MS-Connect 210** view (shown below) will then appear.



Click **Search** to locate your MS-Connect 210.

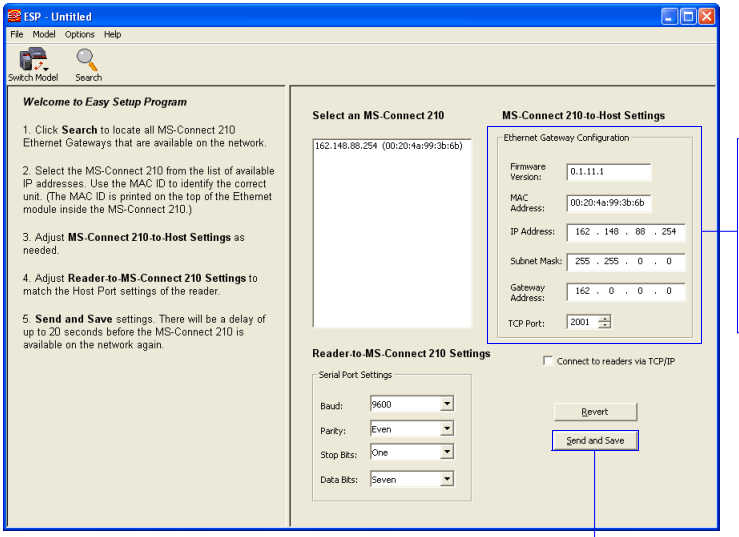
The MS-Connect 210's IP address and MAC address will appear in this field.

Important: The unit's MAC address is printed on the top of the Ethernet module inside the box.

Click **Revert** to match all settings to the selected MS-Connect 210's current settings.

Set Network Parameters

You can use **ESP** to change Ethernet settings. Clicking **Send and Save** updates the settings in the MS-Connect 210's Ethernet module.



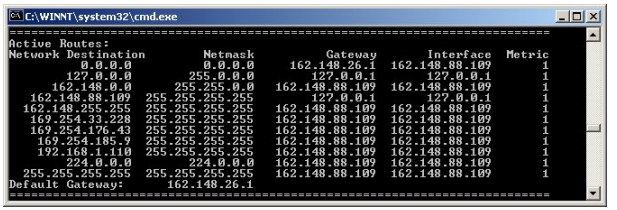
The firmware version, MAC address, and IP address will automatically populate the fields shown at left. Select the appropriate Subnet Mask, Gateway address, and TCP port.

Send and Save network parameters.

Configuring Network Parameters

The following example is based on a default IP address of **169.254.33.228** for the MS-Connect 210 Ethernet module.

1. Determine the host computer's IP address on the host network.
   - Go to the **Start** menu, select **Run**, type **cmd**, and type **Enter**.
   - Type **ipconfig** at the command prompt.
   - Note the IP address of the host computer.
2. At the command prompt, type **route add 169.254.33.228 [host computer IP address]** and type **Enter**. This adds the MS-Connect 210's IP address to the host computer's routing table.
3. At the command prompt, type **route print** and type **Enter**.
   The command prompt will display a list similar to the following:

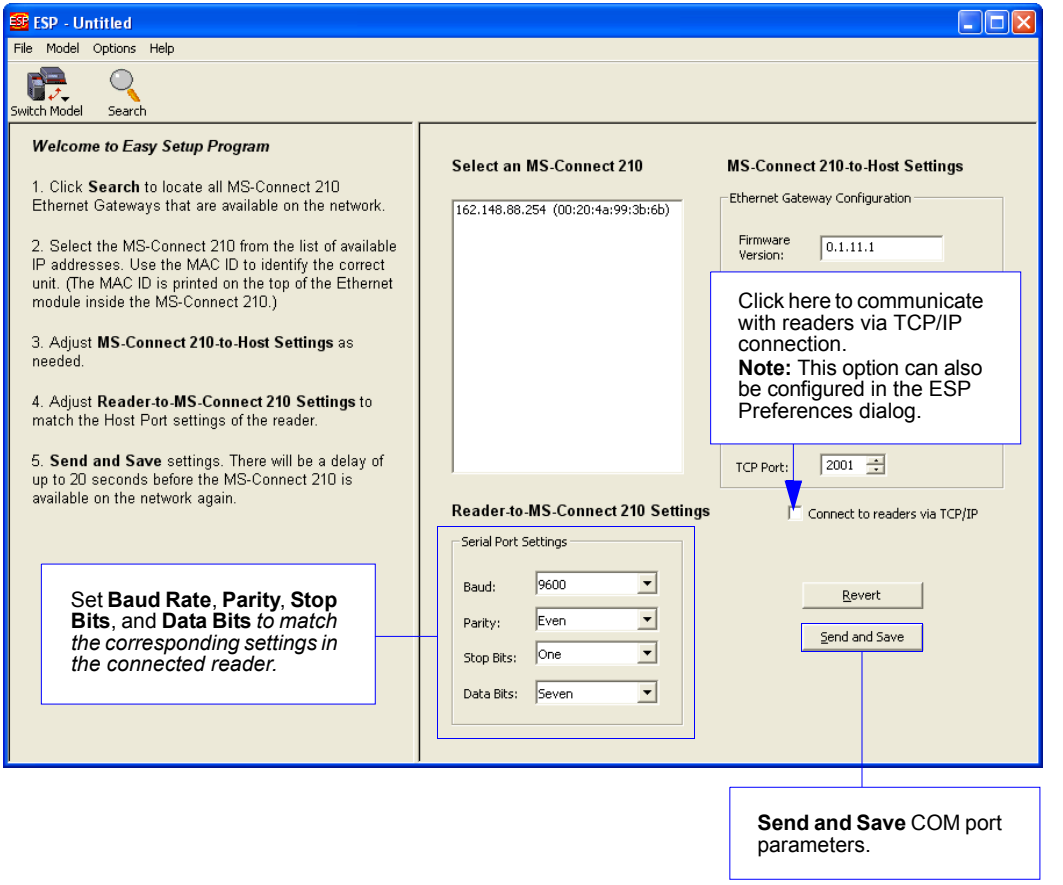


Configuring Network Parameters (cont.)

4. Look for the default IP address in the **Network Destination** column. If it does not appear there, contact your IT department.
5. At the command prompt, type **telnet [MS-Connect 210 IP address] 9999** and type **Enter**.
6. At the Telnet prompt, type **Enter**.
7. To configure the IP address in the Telnet session, type **0** and **Enter**.
   Note: "Netmask: Number of Bits for Host Port" will appear in the command prompt. This defines the number of cleared bits ("0" bits) in the LSB (least significant bit) of the 32-bit Netmask, starting at the right.
   Example: 255.255.255.0 = 8 "0" bits
   255.255.0.0. = 16 "0" bits
   255.0.0.0 = 24 "0" bits
8. Follow the command prompts to configure the IP address.
9. When done, type **9** and **Enter** to save settings.
10. At the command prompt, type **ping [MS-Connect 210 IP address]** and type **Enter**.
11. If the MS-Connect 210 responds to the pings, it is ready to communicate.

Set COM Port Parameters

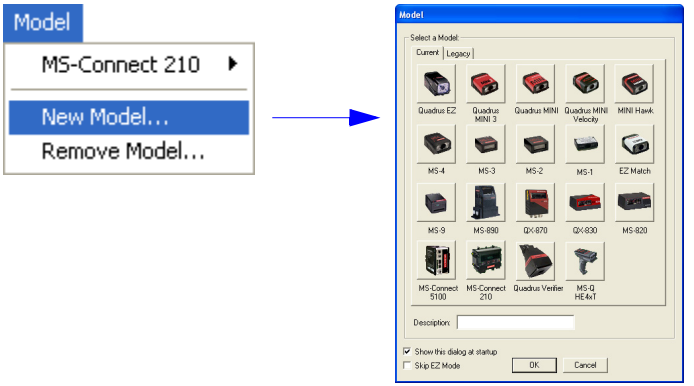
The serial port settings of the MS-Connect 210 must match those of the reader for Ethernet communication to be successful.



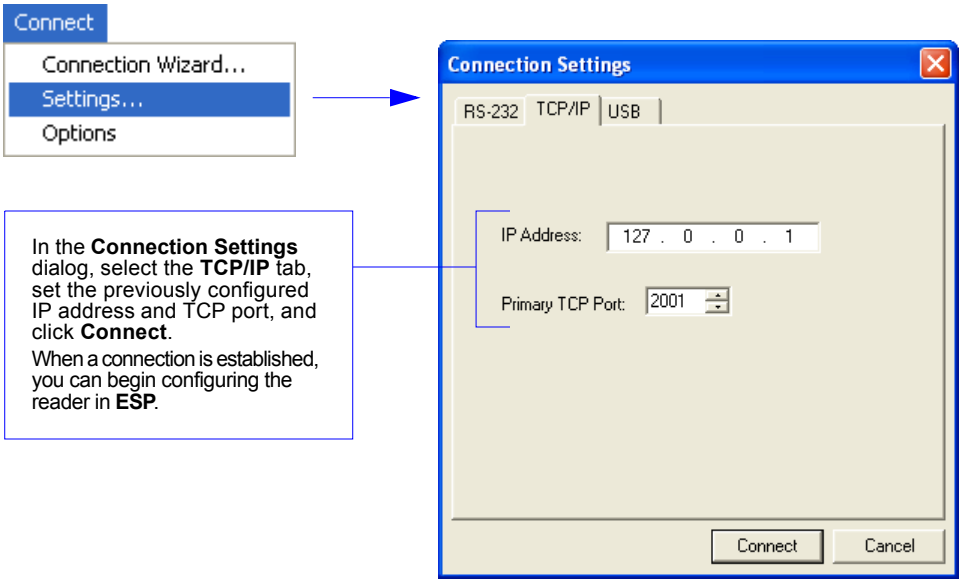
Select Reader Model and Connect

Once the MS-Connect 210's Ethernet and serial port settings are configured, click the **Switch Model** button and select your reader model from the dropdown menu.

If your reader model does not appear on the dropdown menu, select **New Model** to bring up the model menu shown below.



When your reader is selected, select **Settings** from the **Connect** dropdown menu in **ESP**'s menu toolbar.



In the **Connection Settings** dialog, select the **TCP/IP** tab, set the previously configured IP address and TCP port, and click **Connect**.

When a connection is established, you can begin configuring the reader in **ESP**.

Configure the Connected Reader

Each Omron Microscan reader has different configuration requirements. Refer to the user manual for the Omron Microscan reader or readers being used in your application.

Once the reader is configured, you can begin communicating via Ethernet.

Important: If the reader's settings for **baud rate**, **parity**, **stop bits**, or **data bits** are changed, you must reconfigure those settings in the MS-Connect 210 to match the new settings in the reader. See **Set COM Port Parameters**.

Configuring the Ethernet Port

The MS-Connect 210's Ethernet Port behaves as an EtherNet/IP or TCP server device capable of communicating with one or more serial devices. The port is identified as an EtherNet/IP communication adapter. The interface is designed to support remote serial transmit and receive using Explicit and I/O messaging. The port converts EtherNet/IP communication from TCP/IP and UDP to the serial interface.

The Ethernet Port has the following features:

- Supports one EtherNet/IP I/O connection and two EtherNet/IP TCP connections.
- Serial buffer status updated on the I/O connection.
- Serial master command-response handling with one request.
- Packing parameters available in each read request.
- Serial-configurable and Telnet-configurable.
- Internal TFTP server to upload new firmware.
- Supports BOOTP.

Configurable Ethernet Port Parameters

The Ethernet Port is both serially configurable and Telnet-configurable. The configurable parameters are:

Network

- IP Address
- Network Mask
- Gateway IP Address

Serial

- Interface (RS-232 or RS-422/485 4-wire and 2-wire)
- Baud Rate
- Data Format (Data Bits, Parity, Stop Bits)
- Flow Control

Serial operation is controlled by parameters of the serial "read" and "write" commands.

Ethernet Port Configuration Tools

The following tools are necessary for configuring the MS-Connect 210's Ethernet Port:

- BOOTP Server — The Ethernet Port initially powers on and attempts to obtain an IP address using BOOTP. If no BOOTP server responds, the Ethernet Port will revert to a default IP address.
  Note: To configure an IP address using a PC as a DHCP/BOOTP server, download the free Allen-Bradley DHCP/BOOTP Utility from this location:
  http://www.ab.com/networks/bootp.html
- EtherNet/IP Messaging Tool — This can be a PLC or software tool, and must be capable of establishing an explicit messaging connection and sending Get_Attribute_Single and Set_Attribute_Single EtherNet/IP explicit messages.
- Omron Microscan's ESP Software or Telnet communication software for configuration.
- DeviceInstaller — This firmware is compatible with the Lantronix DeviceInstaller tool for device discovery (Search) and Telnet. DeviceInstaller may be used instead of ESP or Telnet for configuration purposes.
  Note: Lantronix also offers a COM Port Redirector for applications that require data to be sent over an Ethernet network using TCP/IP instead of the local port. The COM Port Redirector can be downloaded from this location:
  http://www.lantronix.com/device-networking/utilities-tools/com-port-redirector.html
- A terminal emulation or serial communication tool such as HyperTerminal or ESP.
- TFTP client software — Required to upload new firmware.

Ethernet Port Custom Features

Serial Configuration Menu

The MS-Connect 210 Ethernet Port's custom firmware allows the user to access the **Serial Configuration Menu** from Telnet at port 9999 (see **Ethernet Port Operation**), or from the RS-232 serial port.

To access the Serial Configuration Menu via the serial port:

At power-on, if the module receives a series of three "x" characters at 9600-8-N-1, the menu is activated.

The menu allows the user to configure the following:

- Network IP, Subnet, Gateway, and Tunneling TCP Port
- UART bps, data, parity, stop bits

Dual Mode Connections: Raw tcpserial and EtherNet/IP

Both raw tcpserial and EtherNet/IP connections are available on different TCP ports. The EtherNet/IP port numbers are defined by that standard. The raw tcpserial port number is configurable.

Parameter	Raw tcpserial Port
Default Setting	2001
Optional Setting	**1** to **65535**

Serial UART

The Serial UART can be customized in three ways:

1. The default UART settings are customized to match the majority of Omron Microscan products (9600 7E1).
2. Packet control options are disabled.
3. Flush Mode options are disabled. All ports are flushed whenever TCP connection status changes.

The serial port operates in standard RS-232, point-to-point, non-flow control mode.

Parameter	Bit Rate (bps)	Data Bits	Parity	Stop Bits
Default Setting	9600	7	Even	1
Optional Setting	300	7	None	1
	600	8	Even	2
	1200		Odd	
	2400			
	4800			
	9600			
	19200			
	38400			
	57600			
	115200			

EtherNet/IP Customization

Postamble Processing

The Postamble is useful when a series of unknown bytes defines the end of a packet.

Parameter	Status	Postamble String	Send Postamble
Default Setting	N/A	CR LF (0x0D 0x0A)	N/A
Optional Setting	Disabled, Enabled	One to four characters, with the exception of NUL (0x00)	Disabled, Enabled

Status

When enabled, all received serial data is buffered and is not transmitted to Ethernet until the Postamble sequence is detected. A maximum of 470 bytes can be buffered, including the Postamble.

Postamble String

One to four ASCII characters, 0x01 to 0xFF. Do not use NUL (0x00).

Send Postamble

When enabled, the Postamble string is sent to the Ethernet host.
When disabled, the Postamble string is not sent to the Ethernet host.

Receive Timeout (Total Receive Timeout)

Receive Timeout is the time the host is willing to wait for the total Receive Length. The module is guaranteed to respond at the end of the timeout whether or not any data has been received. This ensures a deterministic response time from the module, which helps the host sustain a consistent polling rate.
This value is definable for a range of **0** to **1000 ms** in 1 ms increments. A setting of **0** disables the timeout, causing the module to respond immediately.

Parameter	Timeout (in milliseconds)
Default Setting	Always specified
Optional Setting	**0** to **1000** **0** = Immediate response

Receive Idle Timeout (Intercharacter Receive Timeout)

Idle Timeout is the time the host is willing to wait once data is available. Idle Timeout is useful if a time gap between serial bytes defines the end of a packet.
Idle Timeout is definable for a range of **0** to **255 ms** in 1 ms increments. If **0**, the Ethernet module responds immediately once data is available. To be effective, the Idle Timeout must be shorter than the Receive Timeout. If **255**, the Idle Timeout is disabled and the Ethernet module will wait for the Receive Timeout before responding.

Parameter	Idle Timeout (in milliseconds)
Default Setting	Always specified
Optional Setting	**0** to **255** **0** = Immediate response with any data **255** = Disabled (Wait until Receive Timeout)

Receive Length

Receive Length is useful for:

- Defining a data packet as a known number of bytes.
- Allowing the host to limit the amount of data transferred per communication cycle.

Receive Length is configurable for **1** to **470** bytes in 1 byte increments.

Parameter	**Idle Timeout (in bytes)**
Default Setting	Always specified
Optional Setting	**0** to **470** **0 =** No receive

Ethernet Port Operation

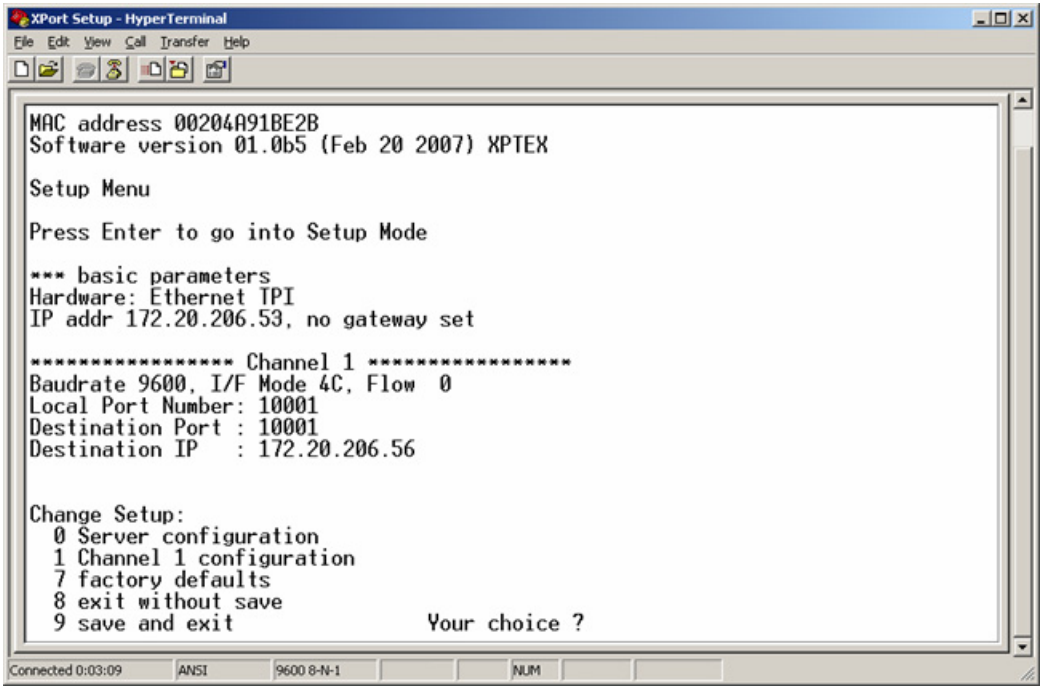
Serial Configuration

To enter configuration via the Ethernet Port's serial port, the Ethernet Port must be reset or power must be cycled. In the first 1.5 seconds after reset, the Ethernet Port will look for a series of three "x" characters using a default setting of 9600 baud, 8 data bits, no parity and 1 stop bit (9600,8,N,1). You will then be prompted to enter the configuration menu.

Telnet Configuration

The configuration menu can also be entered using Telnet to port 9999. If a password has been configured, you must enter the password. You will then be prompted to enter the configuration menu. The Telnet entered from a Windows command prompt is shown below:

C:\>telnet w.x.y.z 9999



EtherNet/IP Serial Interface (Class 0x68)

Data is sent and received on the serial port using explicit messaging. The host should send Get_Attribute_Single (0x0E), Set_Attribute_Single (0x10) or vendor-specific service Send_with_Response (0x45) to vendor-specific Object Class 104 (0x68), Instance 1, Attribute 106 (0x6A).

The Set_Attribute_Single and Send_with_Response services include a 16 byte header that specifies parameters for control of the serial interface. However, the Set_Attribute_Single service cannot receive any data in the response so only the Send parameters are valid.

Attribute ID (dec)	Access	Name	Data Type	Description
106	Get/Set/ SendResp	Serial Interface	Struct. of:	
			UINT	Send length (0-470)
			UINT	Receive length (0-470)
			UINT	Receive timeout [ms]
			USINT	Receive idle timeout (low byte) [ms]
			USINT	Reserved
			USINT	Send flags
			USINT	Receive flags
			USINT	Reserved
			USINT	Frame trailer (Postamble) flags
			USINT [4]	Frame trailer (Postamble) (1-4 bytes)
			USINT [x]	Data

The Get_Attribute_Single service does not supply any data, and so cannot specify any parameters, but will always provide the 16 byte header in the response, along with all the bytes available in the receive queue (maximum 470). The host should insure that adequate space is available for the maximum response data.

The Send_with_Response service is the most flexible, and can supply data in both the command and response. This service is useful for sending a serial command and waiting for a serial response based on a defined protocol.

All UINTs are little-endian, with the least significant byte or USINT sent first, followed by the most significant byte.

Send Length

This parameter specifies the length of the send data. The maximum number of bytes that can be sent in one message is 470 bytes.

Receive Length

This parameter specifies the largest amount of receive data the host can accept. It is only effective in the Send_with_Response service. In a Send_with_Response or Get_Attribute_Single reply it indicates the number of data bytes actually included in the message. The Get_Attribute_Single reply will contain all the bytes available in the receive queue up to the maximum. The maximum number of bytes that can be received in one message is 470 bytes.

Receive Idle Timeout

This parameter specifies the longest amount of idle time in milliseconds (ms) the host is willing to wait once any data is available. It is only effective in the Send_with_Response service. For the Get_Attribute_Single service this value is assumed to be 0. A value of 0 is used for immediate idle timeout and the service will reply immediately after data is available. A value of 255 (FF in hex) disables the idle timeout. In a Send_with_Response reply it indicates the number of milliseconds of idle time the firmware actually waited for additional receive data.

Send Flags

The Send Flags field gives the host some additional controls over the serial output.

Bit (0 = LSB)	Status Flag
0	Flush — Flushes the serial output queue before sending the data enclosed in the message.
1-7	Reserved

Flushing the output queue allows the host to remove outgoing data and replace it with newer or higher-priority data.

Receive Flags

The Receive Flags field gives the host some additional controls over the serial input. It is only effective in the Send_with_Response service.

Bit (0 = LSB)	Status Flag
0	Flush — Flushes the serial input queue before receiving new incoming data.
1-2	Reserved
3	Framing — Serial protocol framing is enabled (see **Frame Trailer (Postamble) Flags**). This bit can be checked in the response to see if the correct frame format was received.
4-7	Reserved

Flushing the input queue allows the host to remove irrelevant data that was collected by the communication adapter.

Frame Trailer (Postamble) Flags

The Frame Trailer (Postamble) Flags field describes the trailer portion of the serial frame and the processing options. It is only effective in the Send_with_Response service when Framing is enabled in the Receive Flags.

Bit (0 = LSB)	Status Flag
0-2	Postamble length (1-4 bytes)
3	Reserved
4	Strip — Strip the trailer from the response
5-7	Reserved

Note: The Receive Length field should be set to a value large enough for the data and trailer portions even if the Strip option is enabled.

Frame Trailer (Postamble)

The Frame Trailer (Postamble) field contains the byte values expected at the end of a valid serial input frame. The number of significant bytes comes from the Frame Trailer (Postamble) Flags field.

Data Field

The Data field contains the bytes that will be output on the serial port. The length of this field should equal at least the amount of data specified in Send Length, but can be longer to simplify programming. In a Get_Attribute_Single or Send_with_Response reply it contains the incoming serial data acquired.

Input (T –>O) Assembly Object (Class 0x04, Instance 0x64)

The EtherNet/IP Assembly Object Instance 0x64 defines the Input data message that will be sent from the Ethernet Port to the EtherNet/IP connection originator via an I/O message. the input data buffer is 32 bytes (16 words) and is organized as follows:

16 bits	16 bits	16 bits	
Number of bytes in Serial Output Queue	Number of bytes in Serial Input Queue	Time since last byte received (ms)	. . .

The first word provides the number of bytes/characters stored in the serial output queue. This value is identical to Class 101, Instance 1, Attribute 100. It can be used to throttle the amount of data queued to the serial device so that the Ethernet Port's 1K queue does not overflow.

The second word provides the number of bytes/characters stored in the serial input queue. This value is identical to Class 101, Instance 1, Attribute 101. It can be examined to determine when serial data needs to be read from the Ethernet Port.

The third word tells the amount of time in milliseconds (ms) since the last character was received from the serial port.

Output (O –>T) Assembly Object (Class 0x04, Instance 0x65)

The EtherNet/IP Assembly Object Instance 0x65 defines the output data message that will be sent from the EtherNet/IP connection originator to the Ethernet Port via an I/O message. The output data is one 16-bit word (UINT) and is currently reserved for future use. It should be set to 0.

Configuration Assembly Object (Class 0x04, Instance 0x80)

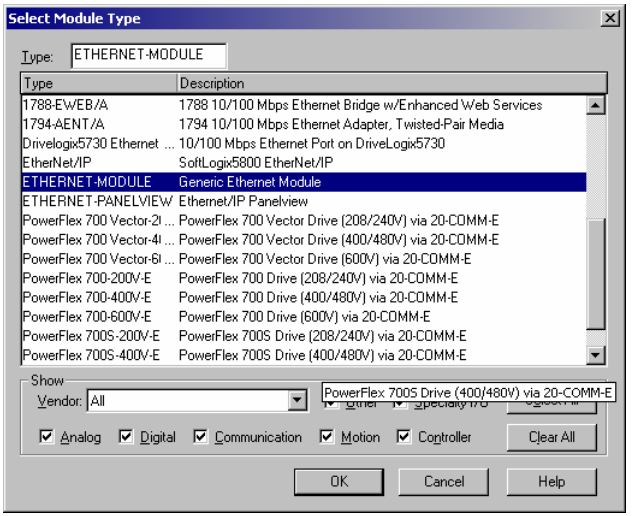
The Configuration Assembly Object is not implemented. However, some EtherNet/IP clients require one. If this is the case, use Instance ID 0x80 with a data length of 0.

Service-Object Summary

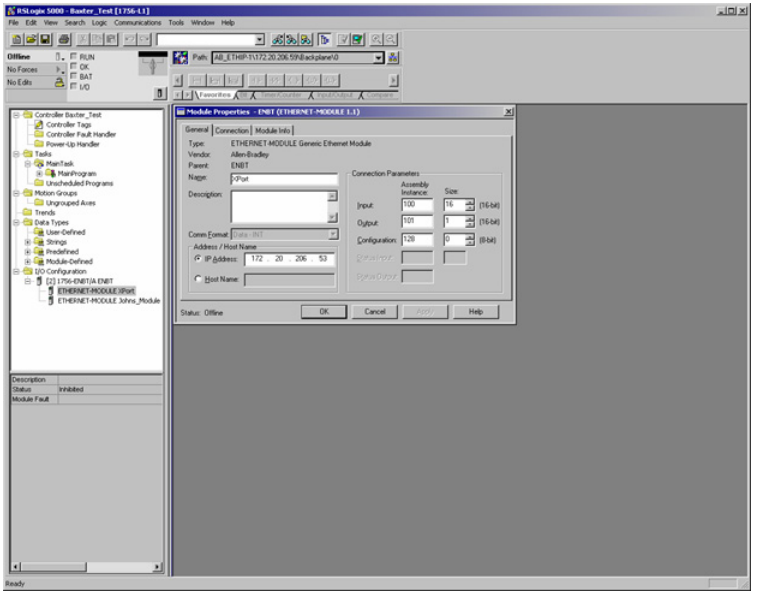
Service Code	Class ID	Instance ID	Attribute ID	Description
0x0E / 0x10	101 (0x65)	1	100-115 (0x64 - 0x73)	Configuration (Future)
0x0E / 0x10 / 0x45	104 (0x68)	1	110 (0x6A)	Serial Interface
0x0E	4	100 (0x64)	3	Input Assembly Object

RSLogix Examples

1. Right-click the 1756-ENBT/A ENBT module under **I/O Configuration**.
2. Select **New Module**.
3. From the list of module types, select **ETHERNET-MODULE, Generic Ethernet Module**.

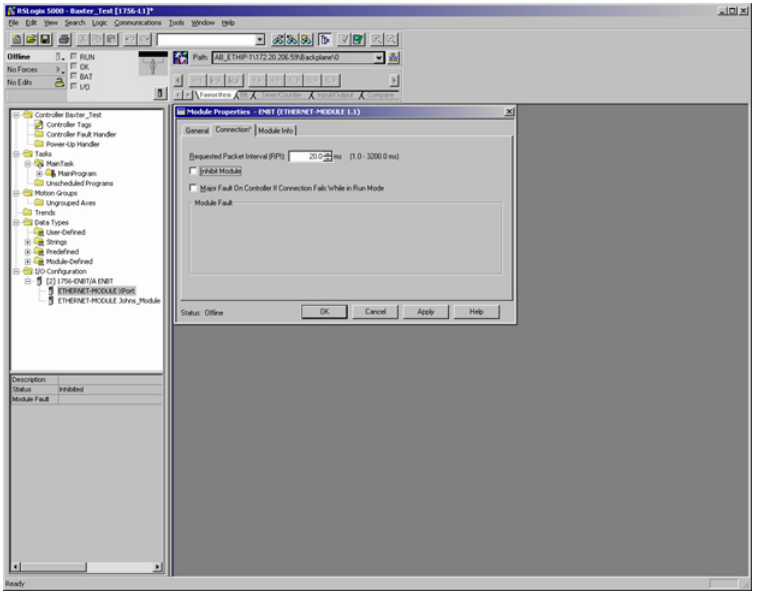


4. Enter the data as shown below, but with the appropriate IP address and a unique name of your choice. Be sure to select **Data - INT** in the Comm. Format selection box. This cannot be modified once the module is added.

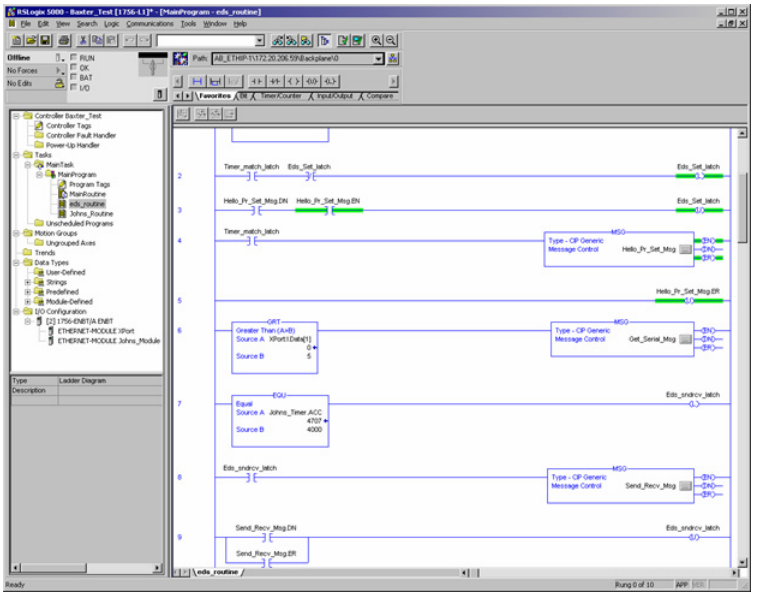


RSLogix Examples (cont.)

5. Fill in the **Requested Packet Interval** field. It is not recommended that you enter a value below 10 ms with the Ethernet Port of NET232/485.

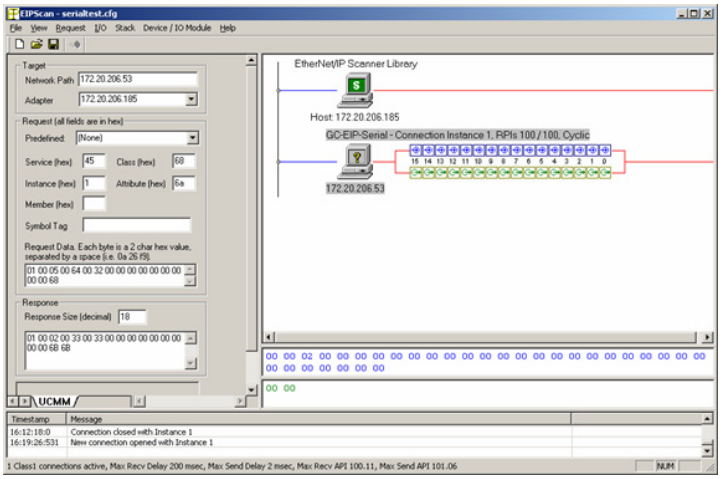


An example of I/O data logic is shown below. **Rung 6** checks if the number of received bytes is greater than **5** before sending a Get_Attribute explicit message.

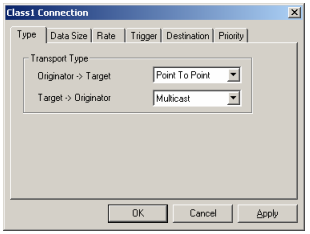


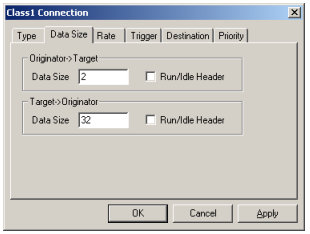
EIPScan Examples

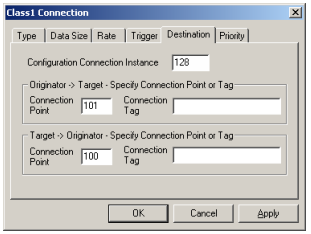
In the example below, an “h” is send, followed by a wait of 100 ms for up to 5 bytes of data with an idle timeout of 50 ms.



The following settings are for a Class 1 connection. Other screens can be left at default.







TFTP Services

The Ethernet Port contains an embedded TFTP server that can be used to update the Ethernet Port firmware. The TFTP server only supports standard TFTP, not Extended TFTP.

Free TFTP client software is available at **http://www.weird-solutions.com/**.

When the server requests transmission of a packet, the TFTP client transmits the *next* packet's data using the block number of the packet requested for re-transmission. Therefore, the server accepts it as the re-transmitted data, since the block numbers match. Re-transmission attempts occur only when using the Ethernet Port on a half-duplex hub with other network traffic present. The connection is extremely reliable over a full-duplex switch.

Firmware Upload

Use a TFTP client to upload firmware. The firmware file must be a valid DSTniSPB (Special Program Binary) file with the ".spb" extension. Currently, any file name is accepted. The file's first TFTP packet contains the SPB header and checksum information, which is validated before any data is written to flash. Note that due to RAM limitation in the Ethernet Port, the firmware file must be written to flash as the TFTP packets are received — one by one. Therefore, it is important to allow a firmware file enough time to upload completely before resetting the target Ethernet Port of closing the TFTP client. Once the header is validated and the upload begins, the old firmware is already being overwritten. Canceling the transfer before completion will result in corrupt firmware that will not load after the Ethernet Port is reset. If an error occurs during the transfer, DO NOT reset the Ethernet Port. Remedy the problem described in the TFTP error message and then attempt the upload again. A subsequent version of firmware will contain the capability for recovery from a corrupt state via an Ethernet boot. The current version supports recovery by loading firmware over the serial port.

Appendices

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Appendix G Glossary of Terms A-12

Appendix A — General Specifications

Mechanical

Mounting Hole Dimensions: 6.6" (168 mm) x 2.5" (63.5 mm)
Full Length: 7.3" (184 mm)
Width: 6.3" (160 mm)
Height: 2.8" (71 mm)
Weight: 1.6 lb. (726 g)

Environmental

Enclosure: IP65
Humidity: Up to 90% (non-condensing)
Operating Tempurature: 0° to 50°C (32° to 122°F)
Storage Tempurature: -30° to 70°C (-22° to 158°F)

Electrical

Power Requirements: 5.1 Watts (max.) w/ Display and Ethernet, 10-28VDC, 200mV p-p max. ripple
Box Only: 32 mA
Box + Display: 90 mA
Box + Ethernet: 62 mA
Box + Display + Ethernet: 120 mA @ 24VDC (typ.)
Trigger, New Master, Input 1: 5 to 28V rated (6.5mA @ 24VDC)
Output 1, 2, 3: Pass through: Optoisolated, 1-28V rated, (Ice<100mA max., must be limited by user)
Relay: See Relay Module specifications.

		Minimum	Maximum
High	V_{in}	4.5V	28V
	I_{in}	4mA	7mA
Low	V_{in}	0V	2V
	I_{in}	0mA	1mA

Connectors

Reader: M23 19-pin circular socket connector
Industrial Ethernet Connector: 8-pin M12 Micro-Change
Trigger: 4-pin Micro-Change socket
Power: 3-pin Micro-Change plug

CGBs

Small: Access diameter range 0.18" to 0.39" (4.5 to 10 mm)
Large: Access diameter range 0.2" to 0.5" (5 to 12.7 mm)

Indicators

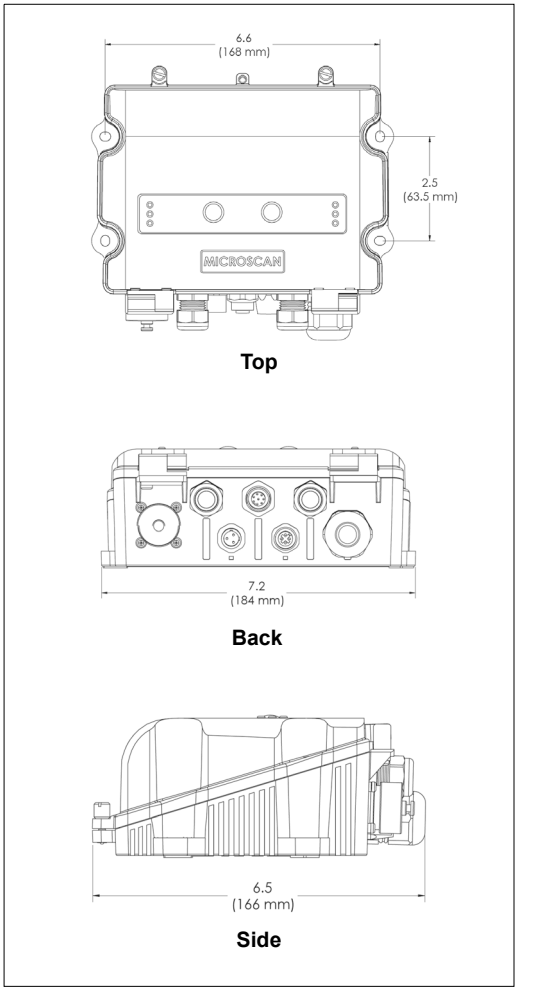
Display: 2x20 alphanumeric characters
LEDS: I/O status, Serial
Beeper: Configurable

Communication Protocols

Standard Interfaces: RS-232, RS-422, Ethernet

Other Accessories

Type: DIN Rail Kit, Pluggable Relay Modules



MS-Connect 210 Dimensions

FIS Options

MS-Connect 210 with Display: FIS-0210-0001G
MS-Connect 210 without Display: FIS-0210-0002G
MS-Connect 210 with Ethernet + Display: FIS-0210-0003G

CE Mark

General Immunity for Light Industry:
EN 55024:1998 ITE Immunity Standard
EN 61000-6-2:2001

Safety Certifications

FCC, UL/cUL, CE, CB, RoHS/WEEE

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All rights reserved. Specifications subject to change.
Product specifications are given for typical performance at 25°C (77°F) using grade A labels. Performance characteristics may vary at high temperatures or other environmental extremes. Warranty–One year limited warranty on parts and labor. Extended warranty available.

Appendix B — Electrical Specifications

Power: 55 Watts (max.)

Pluggable Relay Modules

K1	Pluggable Series 70 Relay Module
K2	Pluggable Series 70 Relay Module
K3	Pluggable Series 70 Relay Module

Inputs / Outputs

J1	Input Power 10-28VDC
J2	Output Power 10-28VDC
J3	Chassis
J4	Output Power 10-28VDC
J5	Output Power 10-28VDC
J6	Output 1
J7	Output 2
J8	Output 3
J9	RS-422/485
J10	Trigger / New Master
J11	Input 1
J13	Host RS-232
J14	Aux RS-232
J15	MS-Q 5VDC
J16	Spare

Jumpers

JP1	Relay 1 Options
JP2	Relay 2 Options
JP3	Relay 3 Options
JP10	New Master Button Lockout
JP11	Trigger Button Lockout

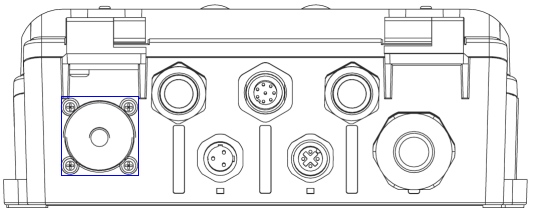
Terminal Blocks Max. Rating

	J1 through J8
Wire Range	26 to 14 AWG.
Wire Strip Length	11 mm
	J9 through J15
Wire Range	22 to 18 AWG.
Wire Strip Length	5 mm
	J2 through J5
Max. Voltage	28VDC
Max. Current	4 Amps
	J6 through J8
Max. Voltage	240VAC
Max. Current	3 Amps

Switches

SW1	Power On / Off
SW2	Reader Default
SW3	Display Comm. Switches
SW5	Reader Output Indicators
SW7	Ethernet/RS-422/485 Control Switches

19-pin Reader Connector



Pin	MS-Connect 210			
	Host RS-232			
	+ CTS/RTS	**+ Aux RS-232**	**+ Aux RS-422/485**	**+ Ethernet**
1	Output 1 (+)			
2	Output 2 (+)			
3	Output 3 (+)			
4	TX232			
5	RX232			
6	Power/Signal GND			
7	Trigger			
8	New Master			
9			RxD (–)	Rx –
10	RTS	Aux TxD	TxD (+)	Tx +
11	CTS	Aux RxD	RxD (+)	Tx –
12	Trigger/New Master/Input Common			
13	Output 2 (–)			
14	Output 3 (–)			
15	Default			
16	Input 1			
17			TxD (–)	Rx +
18	Output 1 (–)			
19	Power (+)			

Optoisolator Outputs

Optoisolator circuits can transfer pulses between the wiring box and peripherals with no direct connection to the internal circuitry. However, not every optoisolator configuration provides complete isolation. The diagrams below show fully optoisolated and non-optoisolated circuits.

Note: The table below only shows delays for the MS-Connect 210. Refer to the connected reader's specifications for additional delay information.

	I_{load}=5mA	I_{load}=50mA	I_{load}=100mA
V_{Out-On}[a]	0.05V	0.6V	1.2V
t_{On-Typ}	0.7ms	0.9ms	1.1ms
$t_{Off-Typ}$	1.6ms	1.5ms	1.5ms

a. Voltage drop across output when activated.

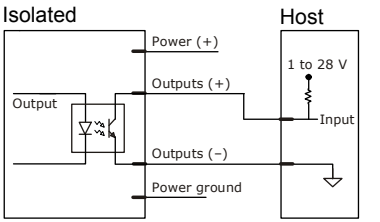
Output Circuit Examples

Note: The following internal optoisolator examples do not represent all possible configurations. Refer to original manufacturer's specifications for any output modules that are installed.

Fully Optoisolated

This circuit is fully optoisolated and is the recommended configuration. It allows the user to apply 1 – 28 VDC to the circuit.

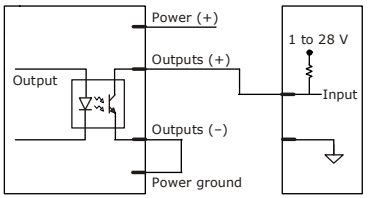
Caution: The maximum current that can pass through the optoisolator is 100mA.



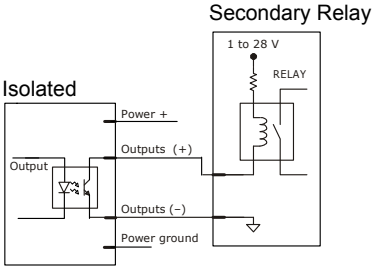
Grounded (Not Optoisolated)

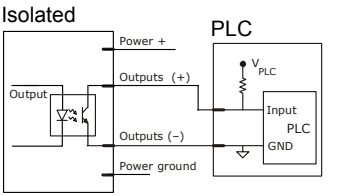
In this diagram, power is applied externally, but the power ground is used to complete the circuit. This setup involves some risk to the optoisolator if excessive voltages are applied.

Caution: The maximum current that can pass through the optoisolator is 100mA.



Additional Isolated Output Circuit Examples



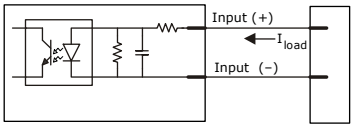


Optoisolator Inputs

All discrete inputs can be fully isolated pulses as PNP or NPN circuits.

	Minimum	Maximum
VIN-HIGH/IIN-HIGH	4.5 V/4.0 mA	28 V/7 mA
VIN-LOW/IIN-LOW	0 V/0 mA	2.0 V/1 mA

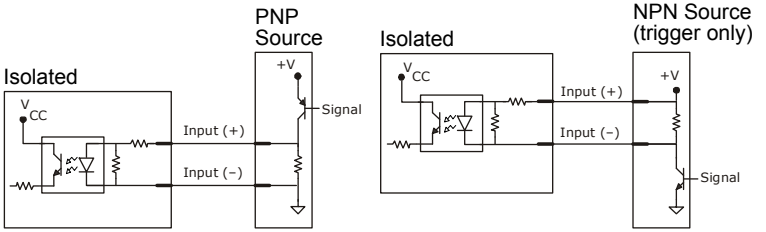
	5V	24V
t_{On}	8 µs	4 µs
t_{Off}	20 µs	30 µs



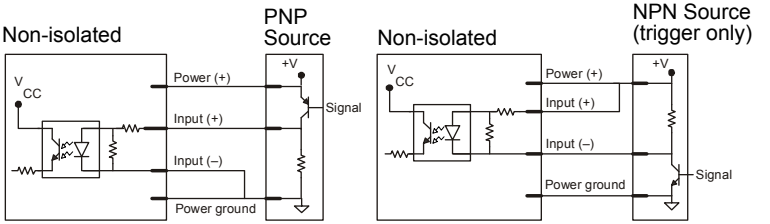
Input Examples

Important: The following examples do not represent all possible wiring configurations.

Fully Optoisolated



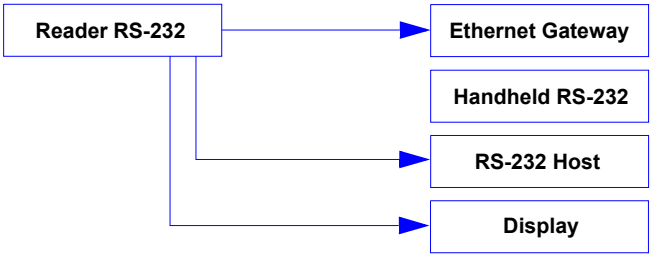
Not Optoisolated



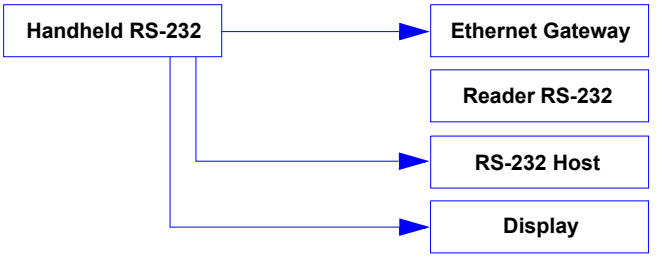
Appendix C — Data Flow Between Ports

The following diagrams demonstrate how data moves between an MS-Connect 210 display, an RS-232 cabled reader, a handheld, a host computer, and the Ethernet gateway.

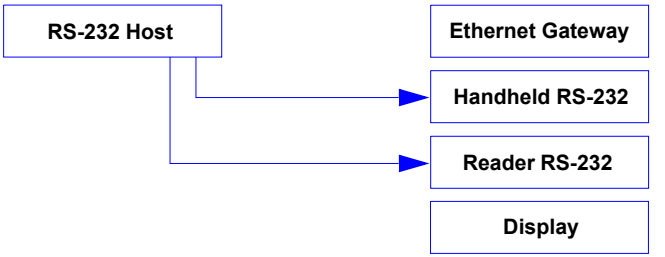
Initiated from Reader



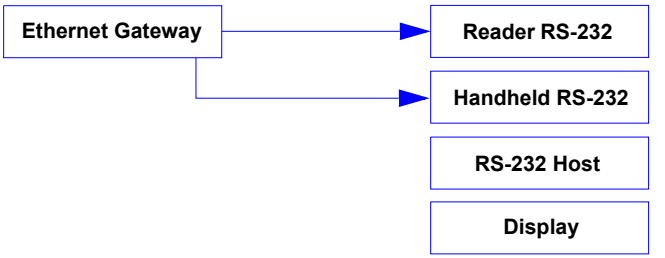
Initiated from Handheld



Initiated from Host



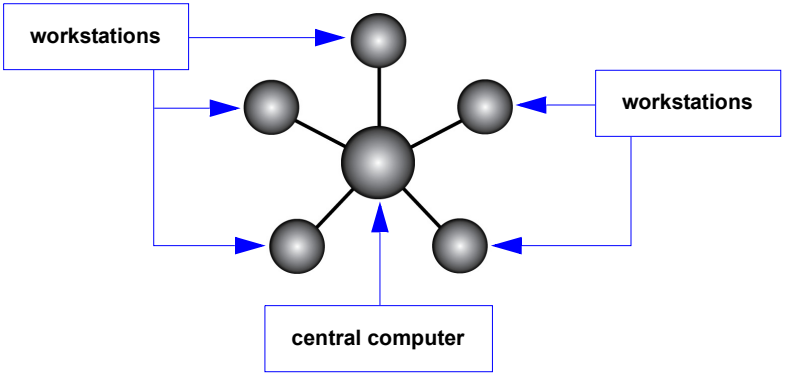
Initiated from Ethernet



Appendix D — Star Network Topology

A star network is a local area network (LAN) that directly connects multiple workstations, or nodes, to a central computer. All workstations on the network are indirectly connected to each other through the central computer.

Star networks allow multiple workstations to communicate from scattered locations throughout a large physical area. The illustration below shows a simplified model of a star **topology**. The large center sphere represents the central computer, and the five smaller spheres represent workstations on the network. The straight lines represent cabling.



One of the main advantages of the star network topology commonly used in EtherNet/IP is that a cable failure isolates a single workstation instead of affecting the entire network. In addition, the isolation of a single node makes the diagnostic process relatively simple.

Appendix E — Interface Standards

RS-232

RS-232 defines an interface between two devices such as, for example, the wiring box and a host computer. It differs from the other interfaces by dedicating individual pins to specific functions and by requiring both devices to share a common ground line. Since both device chassis are connected to a common ground, a ground loop potential and the possibility of noise interference exists. Therefore cable lengths are limited to a maximum of 50 feet (15.24 m). Despite being the most limited, this interface is used frequently because of the large installed base of RS-232 equipment.

RS-422

RS-422, unlike RS-232, measures signals deferentially; that is, the receiver looks at the potentials between the two receive (or transmit) wires rather than the potential between signal and ground. As a result, cables, if shielded, can be up to 4,000 feet (1,219m) in length. Like RS-232, RS-422 communication is designed for only two devices on a single line and must have a common ground. It can be used wherever RS-232 is used.

RS-485

RS-485, like RS-422, can transmit up to 4,000 feet (1,219 m) using differential voltages. Unlike RS-422, its transmitters are turned off until a request for data is received from the host. RS-485 is used exclusively in Multidrop configuration.

Ethernet

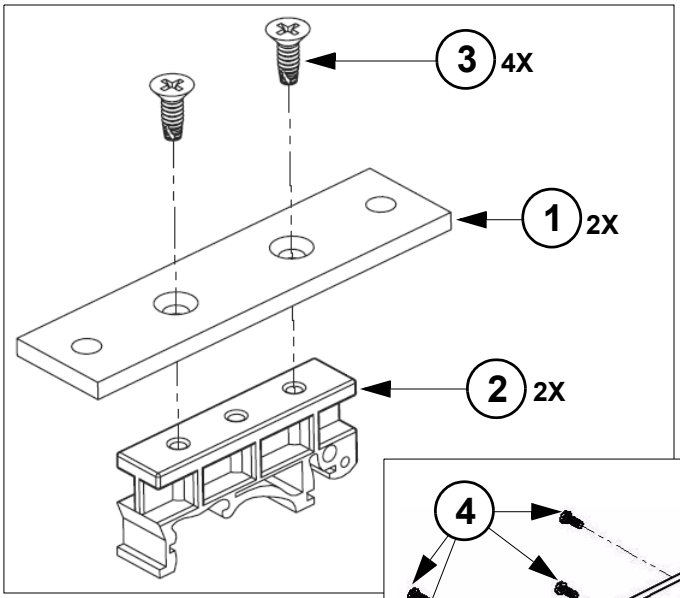
Ethernet is supported for 10/100M, TCP/IP, UDP, and EtherNet/IP. A 6-byte address is used, which is divided into a 3-byte vendor ID and a 3-byte vendor-defined field. Ethernet manufacturers are assigned a unique vendor ID, and are then responsible for insuring that all of their devices have unique addresses in the last 3 bytes.

Appendix F — DIN Rail Mounting

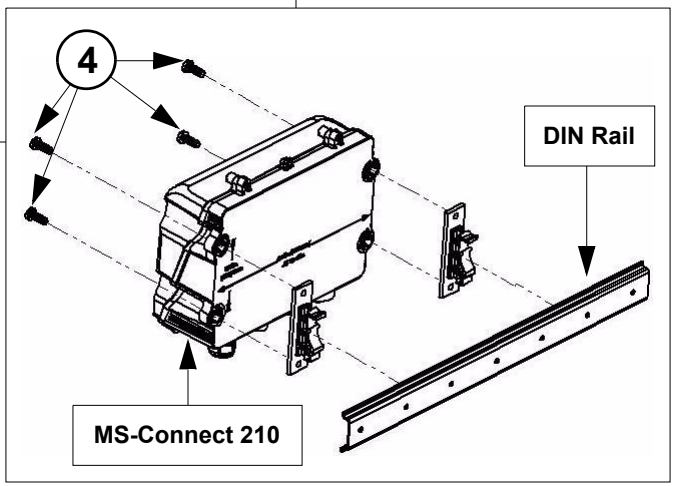
The MS-Connect 210 can be mounted on a wall or other vertical surface using Omron Microscan's DIN Rail Mounting Kit (P/N 98-000093-01).

DIN Rail Mounting Kit Includes:

Item	Qty.	Description	Part Number
1	2	Mount, Adapter, DIN Rail, MS-Connect 210	10-000247-01
2	2	Adapter, DIN Rail	12-000298-01
3	4	Screw, 6-32 x 3/8", Thread Cutting, FH, PHIL, SS	12-000303-01
4	4	Screw, 10-32 x 9/16", PH, PHIL, SS	12-000302-01



1. Attach the DIN Rail Adapter Mount (**1**) to the DIN Rail Adapter (**2**) using the two screws provided (**3**).
2. Repeat Step 1 with the other DIN Rail Adapter Mount and DIN Rail Adapter.



3. Attach the two DIN Rail Adapter Mounts (**1**) to the underside of the MS-Connect 210 using the four screws provided (**4**), as shown in the illustration at right.
4. Mount the MS-Connect 210 on an available DIN Rail using the two DIN Rail Adapters (**2**).

Appendix G — Glossary of Terms

Aux RS-232—The connection between a reader's auxiliary port and a host. The MS-Connect 210 passes the RS-232 signal through, creating a condition in which the host's RX/TX is connected directly to the reader.

Baud Rate—The number of discrete signal events per second. Bits per second.

Connector—Physical device (plug or socket) on a device or cable to provide in/out connectivity for various circuits and pins.

Data Bits—The number of bits used to represent one character of data output.

Decode—A Good Read. The successful capture and output of the information encoded in a symbol.

Discrete I/O—Inputs and outputs characterized by discrete signal transitions from one voltage level to another so that digital switching can occur.

Firmware—Software hard-coded in non-volatile memory.

Good Read—A decode. The successful capture and output of the information encoded in a symbol.

Host—A computer, PLC (Programmable Logic Controller), or other device that is used to execute commands and to process data and discrete signals.

Host RS-232—Enables a reader to communicate with a host although they are not directly connected. The reader is routed through the MS-Connect 210, and then to the host.

Host RS-422—The RS-422 connection between the MS-Connect 210 and the host. The MS-Connect 210 passes RS-422 from the reader to the host.

Input—A channel or communications line. The decoded data or discrete signal that is received by a device.

LED (Light-Emitting Diode)—Often used as a performance indicator, as on the exterior of the MS-Connect 210.

Master Symbol—A symbol whose data is stored in a reader and compared to other symbols in an application as they are decoded. Useful in applications that require sortation and routing.

Matchcode—A method of comparing current decoded symbol data against stored master symbol data. Useful in applications that require sortation and routing.

Micro-Change—A threaded, sealed connector that provides secure cabling in industrial and automation environments.

New Master—A condition in which a reader decodes and stores a new master symbol in an application using matchcode.

No Read—A condition in which a reader fails to decode a candidate symbol.

Normally Closed—A discrete output state that is only active when open.

Normally Open—A discrete output state that is only active when closed.

Opto-isolation—The transfer of signals between elements of a circuit (typically a transmitter and receiver) while keeping the elements electrically isolated. An example of opto-isolation is the relationship of an LED and a light sensor, separated from each other so that light can travel across a barrier but electrical current cannot.

Output—A channel or communications line. The data or discrete signals that are transmitted or displayed by a device.

Parity—An error detection routine in which one data bit in each character is set to 1 or 0 so that the total number of 1s in the data field is even or odd.

Port—Logic circuit for receiving and transmitting data. (One or more ports may be included within a single connector.)

Protocol—The rules for communication between devices, providing a means to control the orderly flow of information between linked devices.

Read Cycle—A pre-defined period of time during which a reader will attempt to capture symbol data.

RoHS (Reduction of Hazardous Substances)—A directive that restricts the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ether (PBDE) in the manufacture of certain types of electronic and electrical equipment.

Signal—A transmission of analog or digital information, electrical current, voltage, or another specific quantity, that can be varied in such a way that it conveys information from one point to another.

Symbology—A symbol type, such as Code 39 or Code 128, with special rules to define the widths and positions of bars (or 2D modules) and spaces to represent specific numeric or alphanumeric information.

Terminal Block—An insulated block on a printed circuit board (PCB) that secures two or more wires together using a clamping device (usually screws or spring clips).

Topology—The arrangement of a network, including communication nodes and connection lines.

Trigger—A signal, transition, or character string that initiates a read cycle.

UART (Universal Asynchronous Receiver/Transmitter)—A hardware device that converts bytes of data to and from bit streams represented as binary electrical impulses. Typically used with other communication standards, such as RS-232.

VFD (Vacuum Fluourescent Display)—A very bright type of display (brighter than a liquid crystal display) often used on consumer electronics. The MS-Connect 210's display is a VFD.

Watchdog—A hardware timing device that restores the normal operation of a computer system (the display driver, in the case of the MS-Connect 210) if it stops functioning properly.

WEEE (Waste Electrical and Electronic Equipment)—A directive that requires manufacturers of electrical and electronic equipment to take responsibility for the disposal of that equipment.