**Technical Data**

Original Instructions

**A·B** QUALITY *Allen-Bradley*
by **ROCKWELL AUTOMATION**

# CENTERLINE 1500 Motor Control Center with IntelliCENTER Technology Using an EtherNet/IP Network

Bulletin Numbers 1500, 1512A, 1512B, 1560, 1562, 1591

**Rockwell Automation**

## Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

| Topic | Page |
|---|---|
| Replaced graphics to reflect 36 in. incoming line unit cabinet | Throughout |
| Replaced SMC Flex with SMC-50 | 3 |
| Changed 20-COMM-E to 20-COMM-E/ER | 3 |
| Added information regarding combining Stratix switches | 5 |
| Specified the power supplies are optional redundant | 8 |
| Clarified direction of Ethernet cable direction | 9 |
| Added information regarding combining Stratix switches | 11 |
| Changed number of connected devices from eight to 48 | 15 |
| Added 1560F-UM001 to Additional Resources table | 19 |

# About This Publication

This document is for engineers or technicians directly involved in the installation, connection, commissioning, energizing, and maintenance of the CENTERLINE® 1500 Motor Control Center (MCC) with EtherNet/IP™ network. See <u>Commissioning Checklist</u> before applying power to the MCC.

This document provides the following information about CENTERLINE 1500 MCCs with EtherNet/IP network:

- System architecture
- Factory installed components
- EtherNet/IP network connections
- 24V DC power connections commissioning
- Expansion of the existing lineup
- Integration of the EtherNet/IP network into your plant-wide network

This table defines abbreviations that are used in this manual.

**Table 1 - Terminology**

| Abbreviation | Full Term | Definition |
|---|---|---|
| MCC | Medium Voltage Motor Control Center | An assembly of one or more enclosed sections that contains motor control units, have a common power bus, and are connected using an EtherNet/IP network. |
| IMC | Intelligent Motor Control | Motor Control and Protection devices that can connect to a communication network. |
| CPwE | Converged Plantwide Ethernet | Rockwell Automation and Cisco initiative to standardize Ethernet network implementation across the manufacturing and enterprise networks. |
| REP | Resilient Ethernet Protocol | Redundant network topology/feature in the Stratix® 5700 switch. |

# IntelliCENTER Motor Control Center with Ethernet/IP Network Overview

The IntelliCENTER® EtherNet/IP MCC couples the reliability of the CENTERLINE 1500 MCC with robust EtherNet/IP network, Intelligent Motor Control (IMC) devices, and intuitive IntelliCENTER software to deliver an effective and integrated motor control solution.

The IntelliCENTER EtherNet/IP MCC is an assembly of one or more enclosed vertical sections powered by a common power bus. Each section can typically contain one or two intelligent motor control devices.
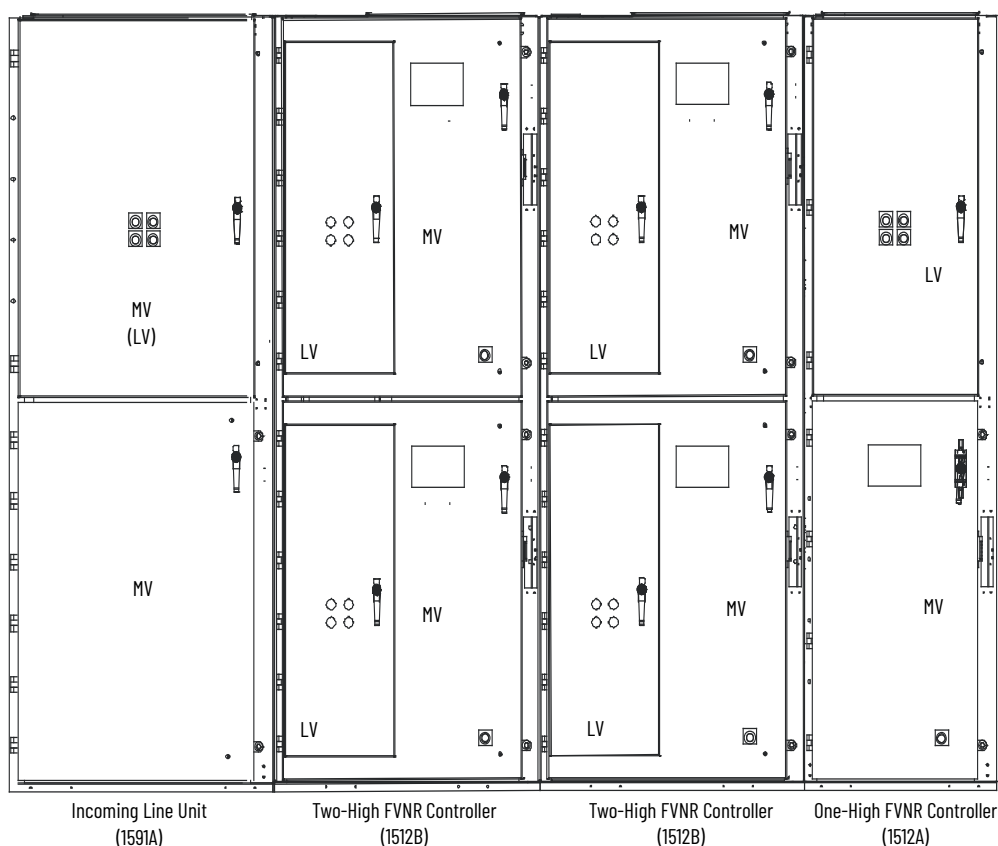
IMC devices available within the MCC include:

- Bulletin 857 or 865 motor/feeder protection relay
- E300™ electronic overload relay
- E1 Plus™ electronic overload relay via EtherNet/IP side module
- IntelliVAC™ control module via POINT I/O™ adapter (1734-AENT)
- SMC-50™ control module via PowerFlex® 20-COMM-E/ER EtherNet/IP adapter[a]
- PowerMonitor™ 5000 device

The MCC section has a 15.2 x 15.2 cm (6 x 6 in.) horizontal low voltage (LV) wireway across the top of the structure where the wiring connections and Ethernet cable routings are made. The 15.2 x 15.2 cm (6 x 6 in.) LV wireway is an enforced option when the EtherNet/IP network method is selected with MCCs.

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(a)   SMC-50 controller is not currently included in IntelliCENTER software.

**Figure 1 - Example of a CENTERLINE 1500 MCC Lineup**



| Incoming Line Unit (1591A) | Two-High FVNR Controller (1512B) | Two-High FVNR Controller (1512B) | One-High FVNR Controller (1512A) |

The EtherNet/IP network is an industrial version of an Ethernet network. IntelliCENTER EtherNet/IP MCCs use the EtherNet/IP network to connect IMC devices in your application. The EtherNet/IP network provides one robust and reliable network solution for your entire factory from the front office to the MCC. The integrated EtherNet/IP network within your IntelliCENTER MCC is preconfigured, tested, and validated at the factory before shipment. The EtherNet/IP network integrates with current IT networks and lets you collect data to determine plant production, energy efficiency, and other metrics.

The EtherNet/IP network can accommodate a vast number of nodes and has no specific maximum number of nodes like other fieldbus networks. The limit varies based on the number of connections the EtherNet/IP scanner can make within the controller application, and the network topology that is implemented. The number of connections that are used by each node varies. To estimate the number of connections a network uses, see the Advanced EtherNet/IP capacity tool that is embedded in the Integrated Architecture® Builder (IAB)[a] software http://raiseinstall.rockwellautomation.com/pst-lite.html.

## IntelliCENTER MCC with EtherNet/IP System Architecture and Connections

The IntelliCENTER EtherNet/IP MCC system architecture is composed of a physical infrastructure that enables the appropriate network layout and topology for MCC applications. The physical infrastructure consists of industrial Ethernet switches, industrial Ethernet cables, integrated 24V DC power, and IMC device connections. This section focuses on these topics and describes how your MCC is shipped from the factory.

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(a)    Bulletin 857 and 865 Relays are not available in IAB.

## Industrial Ethernet Switch

The IntelliCENTER EtherNet/IP MCC is designed with Stratix 5700 Layer 2 managed switches. The Stratix 5700 is a family of managed industrial Ethernet switches that provide a wide range of advanced features. These advanced features let the IntelliCENTER EtherNet/IP MCC connect to the plant-wide EtherNet/IP network while providing a reliable, robust, and secure connection.

The Stratix 5700 switch is factory-configured with user-defined static IP addresses and subnet masks based on your information provided upon ordering an MCC. All network connections are tested and validated during the system level test at the factory, before shipping.

The standard IntelliCENTER EtherNet/IP MCC design contains a 10-port (Figure 2) or 20-port (Figure 3) Stratix 5700 managed switch or a combination of the two, up to 60 ports (48 usable for IMC devices) as standard. A larger network can be engineered upon request. The configuration of a Stratix switch that is installed in the MCC depends on the number of EtherNet/IP devices in the lineup and customer preference. Two versions of Stratix 5700 Ethernet switches are available as standard (Lite and Full). For a detailed list of options and differences, see publication ENET-PP005.

*For Networks with up to 8 IMC Devices*

The standard MCC design uses the 10-port Stratix 5700 switch when eight or fewer EtherNet/IP devices exist. Each 10-port Stratix 5700 switch has eight copper ports for IMC device-to-switch connections and two combination ports for switch-to-switch and switch-to-plant connections. Optional combination ports support fiber-optic or copper Ethernet connections. The standard MCC design uses copper connections for switch-to-switch connections. See the Industrial Ethernet Cable section for more information.

> 💡 Optional fiber-optic Ethernet cables are available for switch-to-switch connections.

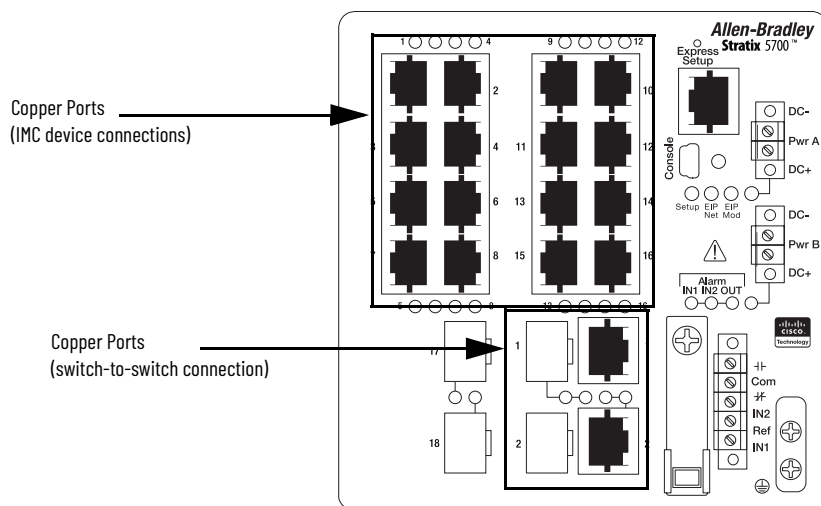**Figure 2 - 10-port Stratix 5700 Switch Example**
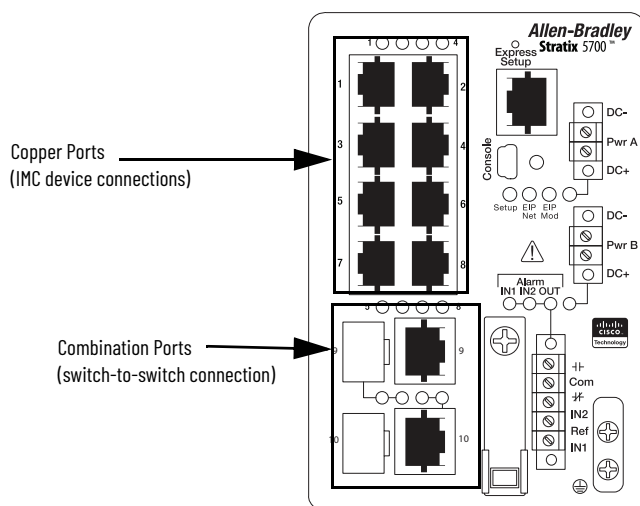


| IMPORTANT | The 10-port Stratix 5700 switch that is shown is catalog number 1783-BMS10CL. For information on other Stratix 5700 switch catalog numbers, see the Stratix Managed Switches User Manual, publication 1783-UM007. |
|---|---|

*For Networks with 9...16 IMC Devices*

A Stratix 5700 20-port switch is used when 9...16 EtherNet/IP devices exist in the lineup. Each 20-port switch has 16 copper ports for IMC device-to-switch connections, two ports for switch-to-switch and switch-to-plant, and two ports for fiber-optic cable connections only.

**Figure 3 - 20-port Stratix 5700 Switch Example**



| IMPORTANT | The 20-port Stratix 5700 switch that is shown is catalog number 1783-BMS20CL. For information on other Stratix 5700 switch catalog numbers, see the Stratix Managed Switches user manual, publication 1783-UM007. |
|---|---|

*For Networks with more than 16 IMC Devices*

If more than 16 EtherNet/IP devices are required, you must add additional Stratix 5700 switches. Up to three switches (48 usable ports) are available in standard configurations with the possibility for expansion. Contact Rockwell Automation for more information.

*Stratix 5700 Switch Mounting*

The standard mounting of the Stratix 5700 switch is in the LV section within the incoming line unit (Figure 4) or within a dedicated low-voltage cabinet (typically a 36 in. wide Bulletin 1599 structure).

**Figure 4 - Stratix 5700 Switch Top Horizontal Wireway Mounting Example**
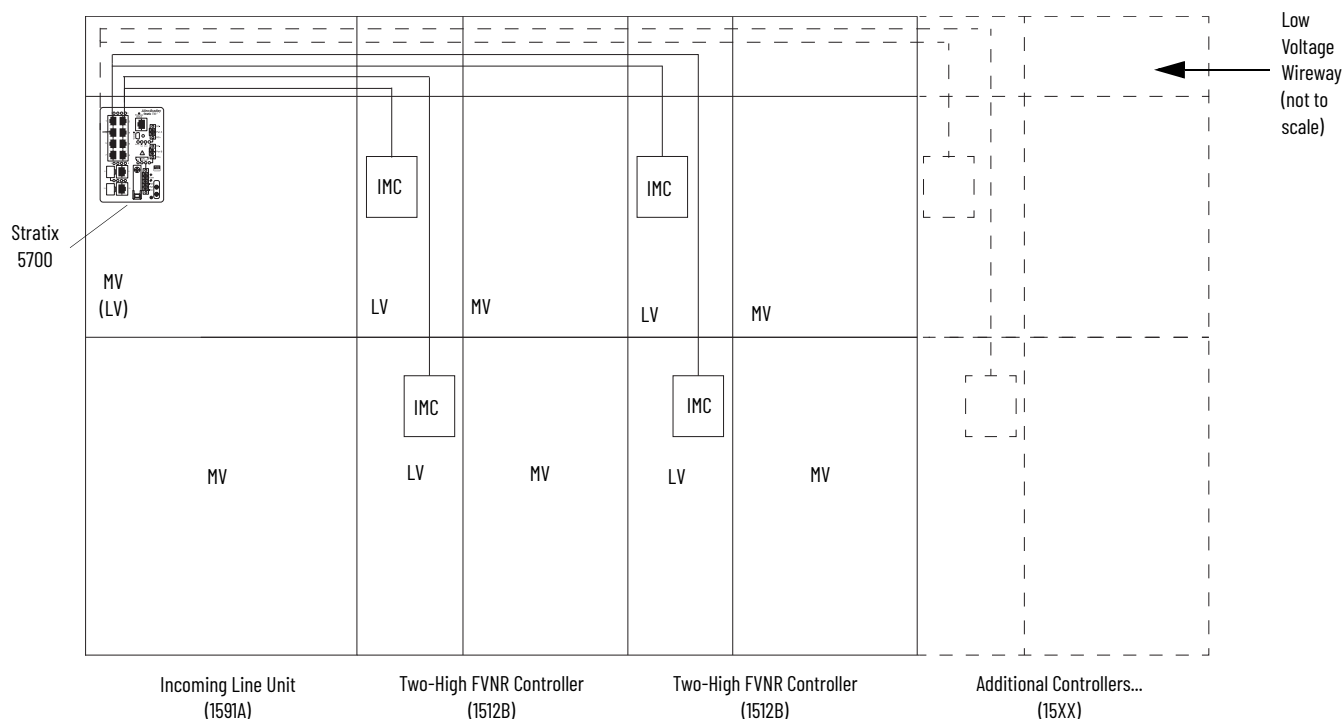


## Industrial Ethernet Cable

Due to the high potential of electrical interference in an MCC, a proper industrial Ethernet communication cable is critical to provide a reliable and robust EtherNet/IP network. The EtherNet/IP network can technically use the same copper Ethernet cable that is used in an enterprise Ethernet network. But, to use that same enterprise rated Ethernet cable in an MCC is not a reliable and robust solution. Due to the potential of electrical noise in the MCC, the enterprise Ethernet rated cable can be exposed to electrical noise greater than its rated immunity. The IntelliCENTER EtherNet/IP MCC uses an exclusive 600V, UL Listed, Category 5e industrial EtherNet/IP cable to provide the noise immunity necessary in an MCC.

With this 600V UL Listed industrial Ethernet cable, the EtherNet/IP network in the IntelliCENTER MCCs has been tested to the most rigorous standards for electrical noise immunity. These test results let Rockwell Automation deliver a robust, noise-immune EtherNet/IP network within the MCC:

- Surge - Simulates lightning strike
  - ± 2 KV, 40 A surge that is repeatedly applied to the network cable
  - IEC 61000-4-5
- Fast Transient Burst - Simulates industrial noise
  - ± 1 KV high voltage burst applied to the network cable
  - IEC 61000-4-4
- Conducted Immunity - Simulates radio frequency interference
  - 150 kHz...80 MHz interference that is applied to the network cable
  - IEC 61000-4-6
- Electrostatic Discharge Immunity - Simulates static discharge
  - ± 8 KV ESD event at 12 locations on the MCC and network cable
  - IEC 61000-4-2

**Figure 5 - Industrial Ethernet Cable**



Table 2 shows the three speeds that the Category 5e industrial EtherNet/IP cable supports. The higher speed data rates transfer more data in a shorter period, which is vital for applications that require short response times.

**Table 2 - Category 5e Copper Cabling**

| Speed Rating | Data Speed |
|---|---|
| 10BASE-T | 10 Mb/s |
| 100BASE-TX | 100 Mb/s |
| 1000BASE-T | 1 Gb/s |

The standard Ethernet cable for switch-to-device connections is the 600V UL Listed copper Ethernet cable. However, fiber-optic Ethernet cable is sometimes required for switch-to-switch Ethernet connections in certain Ethernet topologies.

The 600V UL Listed industrial Ethernet cable is recommended to connect the MCC to the plant-wide EtherNet/IP network.

## 24V DC Power Supply

The Stratix 5700 switches are powered by a 24V DC power supply. An optional redundant 24V DC power supply is also offered to power the Stratix 5700 switch. Both DC power supplies are powered from the medium voltage (MV) bus through a control power transformer that is installed in the incoming line unit (Figure 6), or from a customer-supplied power supply. You can use your own power supply, but it must be EtherNet/IP compatible as specified in ODVA requirements.

> ⚠ **ATTENTION:** Non-compatible power supplies can damage the EtherNet/IP signal and components, or may not comply with local codes and inspection.

## EtherNet/IP Network and 24V DC Connections

This section is for engineers or technicians that are directly involved with commissioning the EtherNet/IP network and 24V DC connections in the MCC. As explained in the Network Topology section, the standard MCC design uses a linear/star topology. In this design, the Stratix 5700 switch-to-switch connections use a linear topology, and the IMC device connections to the Stratix 5700 switches use a star topology. A ring/star topology is also available and is identical to the linear/star topology, but the Stratix 5700 switch-to-switch connections use a ring topology in place of the linear topology. These topologies are implemented throughout the MCC lineup by using an EtherNet/IP network. The EtherNet/IP network requires connections in each LV section that contains EtherNet/IP devices.
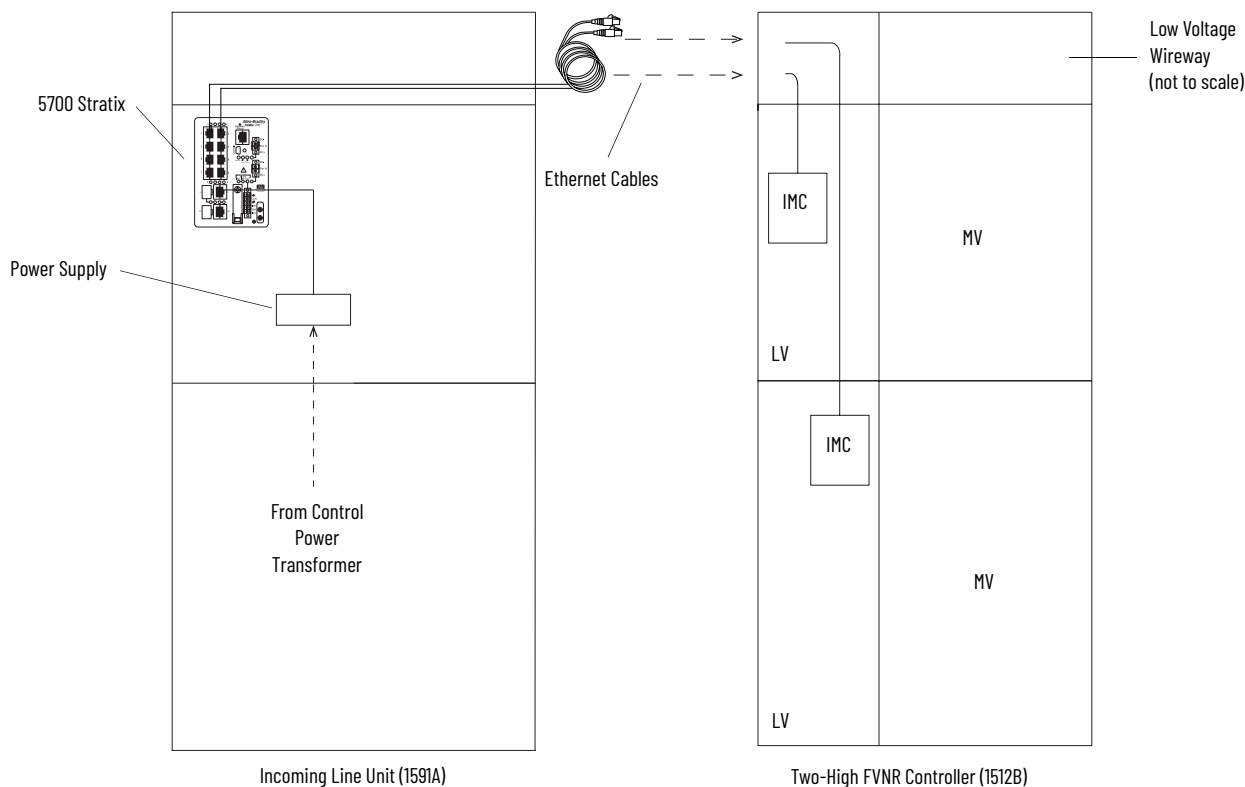
## EtherNet/IP Network and 24V DC Connections Within an MCC

This section provides detailed instructions for commissioning EtherNet/IP network power connections within the MCCs.

Because each motor controller within the lineup is shipped individually, it is impossible to pre-wire the switch-to-device Ethernet cables at the factory.

On delivery, the incoming line unit contains a pre-wired Stratix 5700 switch, a 24V DC power supply, and a control power transformer. The Stratix 5700 switch is pre-connected with the required number of Ethernet cables, which are based on the number of devices in the lineup. Because the controllers are shipped individually, the Ethernet cables are coiled, labeled, and hang outside of the Incoming Line Unit. You can also have the cables placed in a box in the incoming line unit.

**Figure 6 - Incoming Line Unit and Controller Showing Bundled EtherNet/IP Cables**



Incoming Line Unit (1591A)                    Two-High FVNR Controller (1512B)

## EtherNet/IP Network and 24V DC Connections Across an MCC Lineup

This section provides detailed instructions for the commissioning of the EtherNet/IP network across a full MCC lineup.

As specified in EtherNet/IP Network and 24V DC Connections Within an MCC, when an MCC is shipped, each motor controller within the lineup is shipped individually, making it impossible to pre-wire switch-to-device Ethernet cable connections at the factory.

After you receive the entire lineup, uncoil the Ethernet cables and route them through the top horizontal wireway from the Stratix switch in the incoming line unit to the respective MCC sections (indicated by the Ethernet cable labels)

| IMPORTANT | The length of each Ethernet cable is predetermined for connections to IMC devices in the lineup. For example, controllers that are closely coupled to the incoming line unit have a shorter cable, and subsequent controllers will inversely have a longer cable. |
|---|---|

**Figure 7 - Incoming Line Unit Showing the Control Wire Conduit Opening (Structure Code 24.1)**



Front View                                          Top View
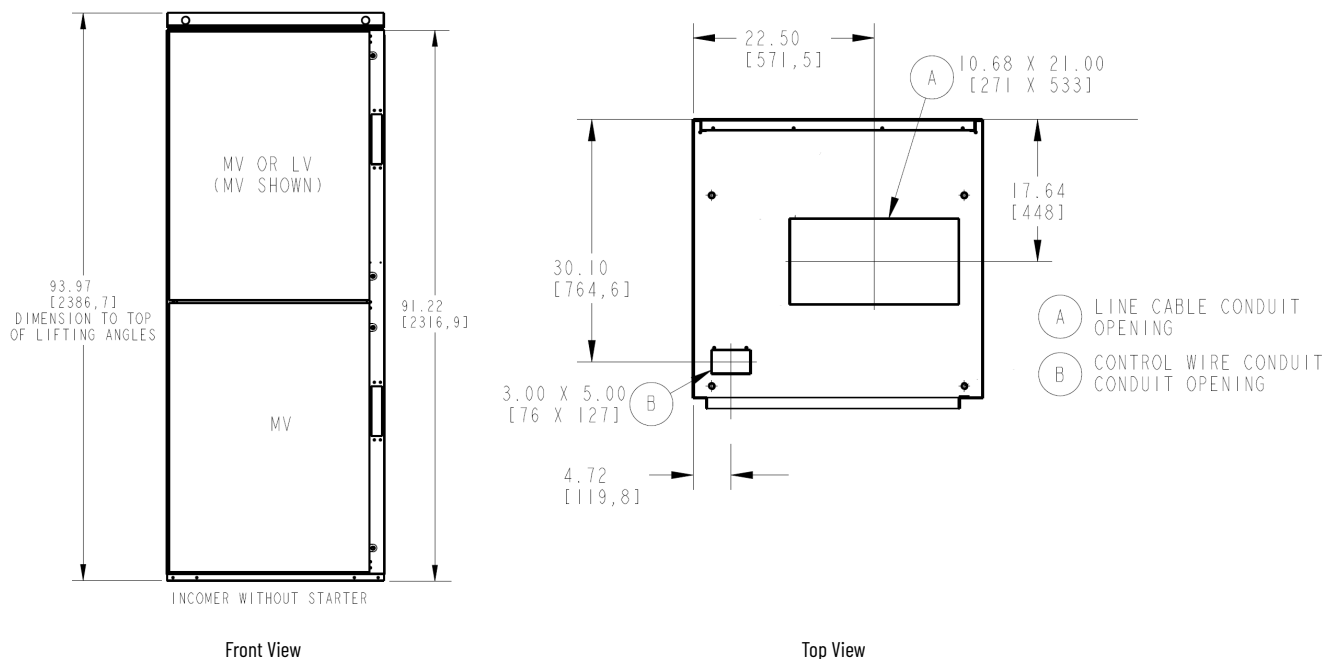
*EtherNet/IP Switch-to-switch Connection*

The IntelliCENTER EtherNet/IP MCC design includes at least one Stratix 5700 switch in the incoming line unit. Each EtherNet/IP switch has two ports that are reserved for the switch-to-switch connections. The Stratix 5700 switches within an incoming line unit are pre-wired at the factory using the 600V rated industrial Ethernet copper cable (see the Industrial Ethernet Cable section for further details). But, fiber-optic cables must be used if the switch-to-switch length is >100 m (328 ft)[a].

> **IMPORTANT** The type of units that are installed in the section does not change the switch-to-switch connection method.

The 10-port Stratix 5700 switch is used in the incoming line unit in an MCC lineup with 8 or less IMC devices. As shown in Figure 8, port 9 and port 10 on 10-port Stratix 5700 switches are reserved for connections between switches and for uplink connections to the plant-wide network. Ports 9 and 10 are designated for the left and right switch-to-switch connection or the uplink connection.
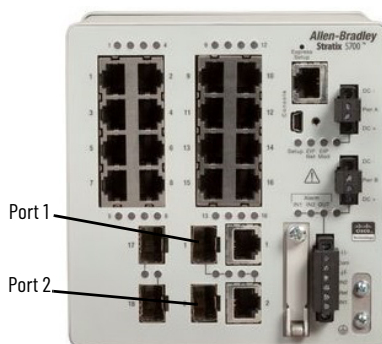
**Figure 8 - Example of a 10-port Stratix 5700 Switch**
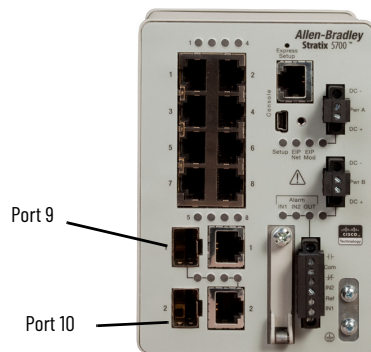


> **IMPORTANT** The 10-port Stratix 5700 switch that is shown is catalog number 1783-BMS10CL. For information on more Stratix 5700 switch catalog numbers, see the Stratix Managed Switches User Manual, publication 1783-UM007.

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(a)   For networking multiple MV MCC lineups.

The 20-port Stratix 5700 switch is used in the incoming line unit in an MCC lineup with 9...16 devices. As shown in [Figure 9](#), port 1 and port 2 are reserved for connections between the switches and uplink connections. Ports 1 and 2 are designated for the left and right switch-to-switch connection or the uplink connection. A combination of up to three 10-port or/and 20-port Stratix 5700 switches is available as a standard offering (resulting in a range of 8...48 IMC ports), however larger networks can be engineered upon request.

**Figure 9 - Example of a 20-port Stratix 5700 Switch**



| | |
|---|---|
| **IMPORTANT** | The 20-port Stratix 5700 switch that is shown is catalog number 1783-BMS20CL. For information on more Stratix 5700 switch catalog numbers, see the Stratix Managed Switches user manual, publication [1783-UM007.](#) |
| **IMPORTANT** | It is critical to maintain the organization of the MCC sections (left-to-right orientation must follow section numbering scheme). Reorganizing sections can affect the MCC network uplink and 24V DC power distribution conditions. |
| **IMPORTANT** | Stratix 5700 switches with gigabit Ethernet ports label the switch-to-switch or uplink ports as port 1 and port 2. See the Stratix Managed Switches user manual, publication [1783-UM007](#). |
| **IMPORTANT** | After making the EtherNet/IP network connections, see the [Commissioning Checklist](#) prior to applying power. |

## Plant-wide Connections

The EtherNet/IP network provides an easy to use, robust, and flexible network solution. This section is focused on the integration of the MCC into an existing plant-wide network. The MCC uses a star topology at the IMC device level and either a linear or ring topology at the industrial Ethernet switch level.

*MCC Uplink Connections*

The MCC connects to the rest of your plant EtherNet/IP network through industrial Ethernet cable referred to as uplink connections. Based on the best practice EtherNet/IP guidelines in Converged Plantwide Ethernet (CPwE) and Implementation Guide, publication [ENET-TD001](#), there is a ten switch limit before another uplink is required to the plant network. The ten switch uplink requirement is imposed irrespective of the topology that is used at the switch level.

| | |
|---|---|
| **IMPORTANT** | After making the EtherNet/IP network connections, see the [Commissioning Checklist](#) before applying power. |

The maximum length of copper twisted-pair wiring is 100 m (328 ft) between devices. If distances longer than 100 m (328 ft) between devices are required, fiber-optic Ethernet cables must be used. Fiber-optic Ethernet cable maximum distances vary by design of the cable, but can be kilometers in length. See the Fiber Optic Infrastructure Application Guide, publication [ENET-TD003](#), for more information about how to use a fiber-optic Ethernet cable in an EtherNet/IP architecture. Consult the design specifications of the fiber-optic Ethernet cable being used for actual length limitations. Additionally, fiber-optic Ethernet cables provide a more noise-immune cabling solution than standard copper Ethernet cabling and also provide faster uplink speeds that are sometimes required to meet performance requirements or to support redundant topologies. For more information on fiber-optic Ethernet cable requirements for redundant topologies within the MCC, see [Switch-level Ring Topology](#).

# Network Topology

An EtherNet/IP network is flexible and supports multiple topologies. The network topology within an MCC must provide a robust and flexible network solution.

*Linear/Star Topology*

The standard IntelliCENTER EtherNet/IP MCC design uses a star topology for the IMC device connections and a linear topology for the Stratix 5700 switch-to-switch connections. An example of the linear/star topology is shown in Figure 10.

**Figure 10 - Linear/Star Topology**
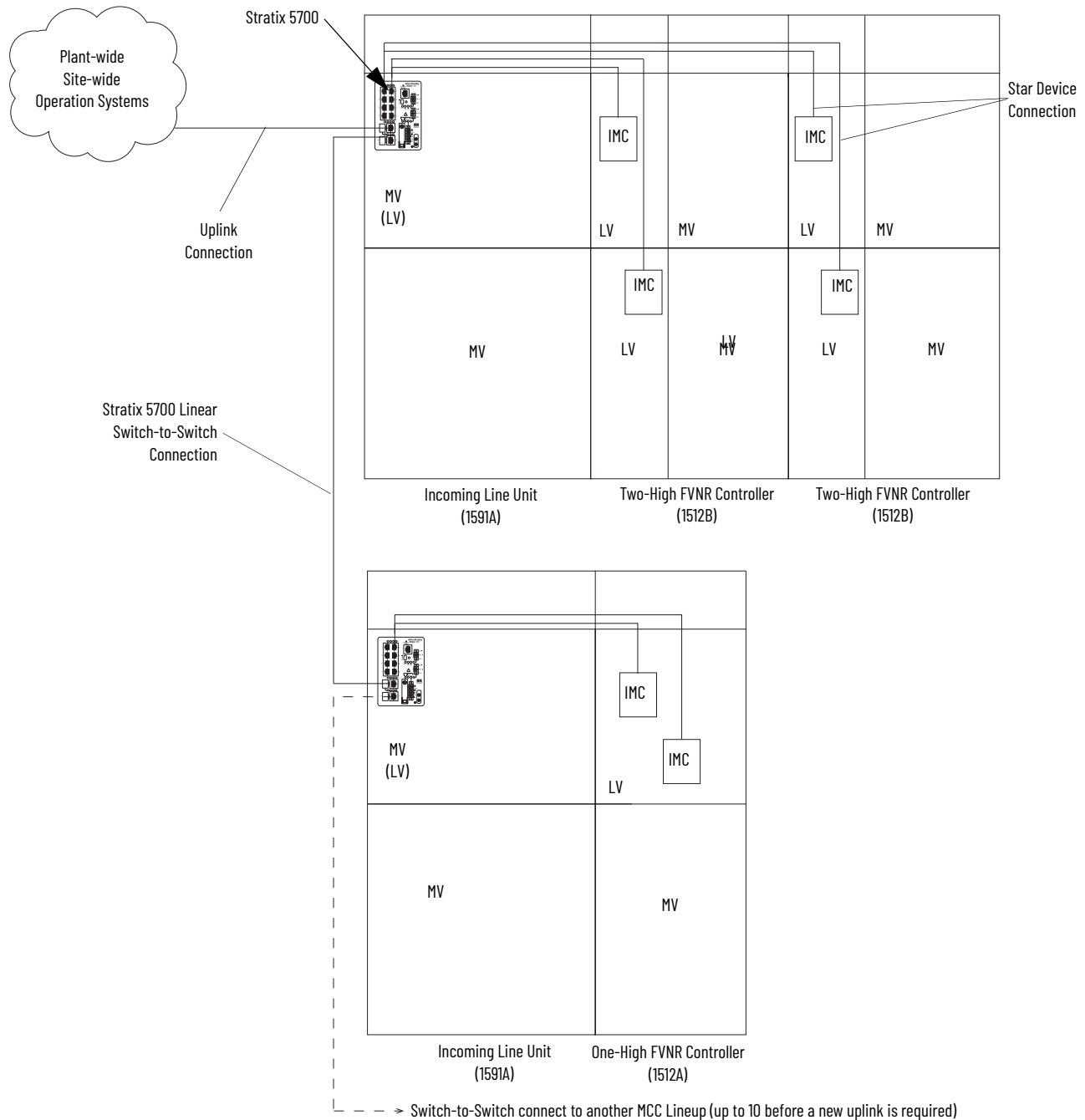
*Switch-level Ring Topology*

The IntelliCENTER EtherNet/IP MCC is designed to provide an easy to use, resilient, and serviceable motor control center solution. Building on the typical linear/star topology of an IntelliCENTER EtherNet/IP MCC, the industrial Ethernet switches throughout the MCC lineup can also be connected in a switch-level ring topology. The Resilient Ethernet Protocol (REP), a protocol that is provided by Stratix managed switches, provides a level of resiliency at the switch level. The IMC devices in each section still maintain a star topology. In an IntelliCENTER EtherNet/IP MCC, the Stratix 5700 industrial Ethernet switch uses REP to provide the switch-level ring redundant-path topology. The implementation of the switch-level ring topology within an IntelliCENTER EtherNet/IP MCC is similar to the linear/ star topology example in Figure 10. But the switch-level ring topology adds an industrial Ethernet cable that connects the last MCC section in the switch-level ring back to the plant network, which creates a ring topology. If one industrial Ethernet cable or industrial Ethernet switch fails, communication is converged in the other direction around the ring to make sure that all other switches are still connected to the network. The switch-level ring topology is highlighted in Figure 11.

**Figure 11 - Switch-level Ring Topology Within an IntelliCENTER EtherNet/IP MCC**
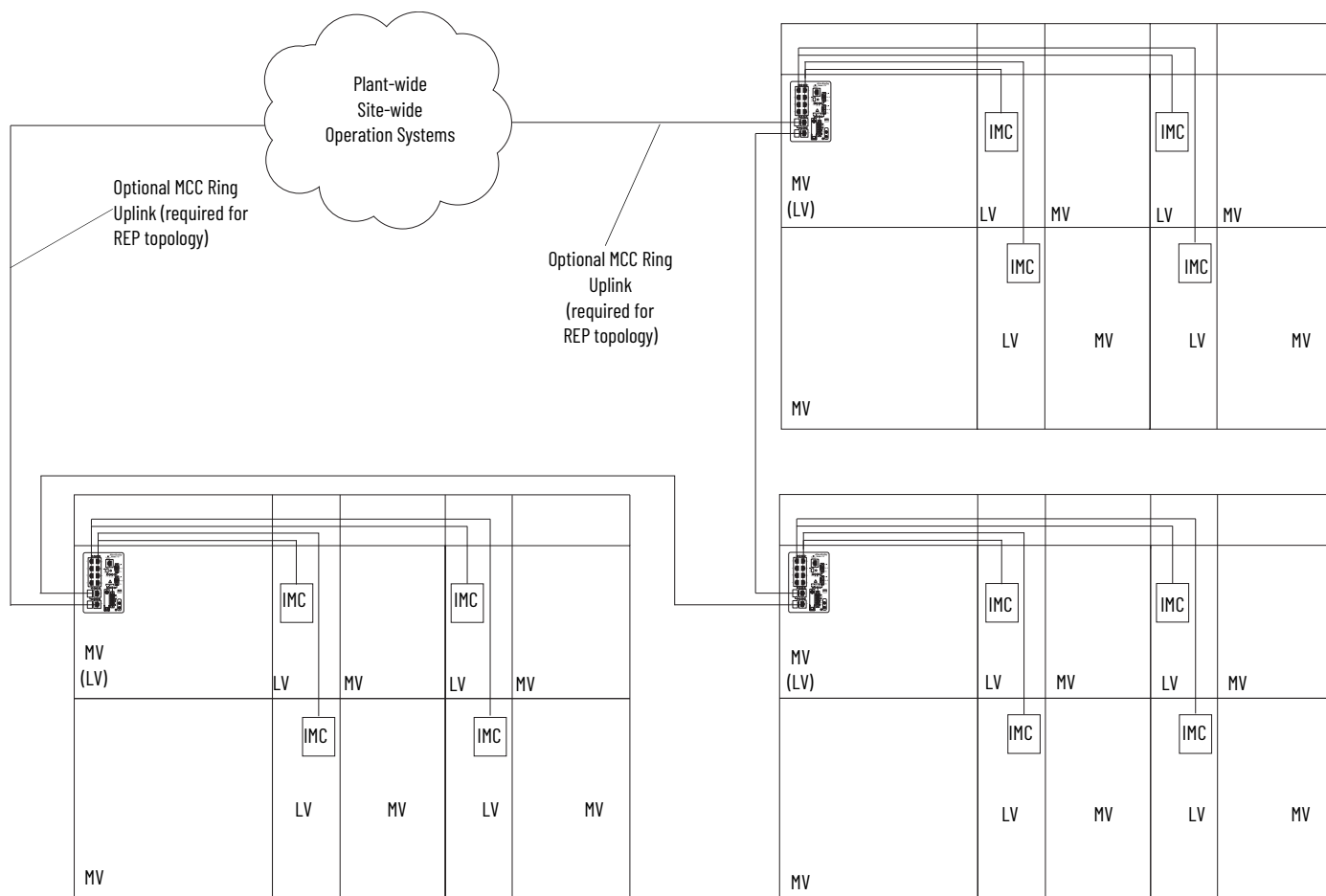
## New IntelliCENTER EtherNet/IP MCC Lineup Commissioning

This section is for engineers or technicians directly involved with installing new MCC lineups, commissioning EtherNet/IP networks and 24V DC connections, and energizing the CENTERLINE 1500 MCC with EtherNet/IP network.

### MCC Lineup Installation

If you are installing a new IntelliCENTER MCC lineup, see the applicable CENTERLINE 1500 MCC user manual. See Additional Resources for a list of publications.

### EtherNet/IP and 24V DC Connections

See the section EtherNet/IP Network and 24V DC Connections on page 8 for details on commissioning EtherNet/IP network and 24V DC power connections across the entire MCC lineup.

| | |
|---|---|
| **IMPORTANT** | After making the EtherNet/IP network connections, see the Commissioning Checklist before applying power. |

## IntelliCENTER EtherNet/IP MCC Expansion

This is for engineers or technicians who are directly involved with installing new sections or rearranging sections and commissioning EtherNet/IP network and 24V DC power connections within the existing MCC lineup.

The IntelliCENTER EtherNet/IP MCC with EtherNet/IP network is a flexible and expandable motor control solution. This section provides information on the methods to expand your MCC through the life of the system.

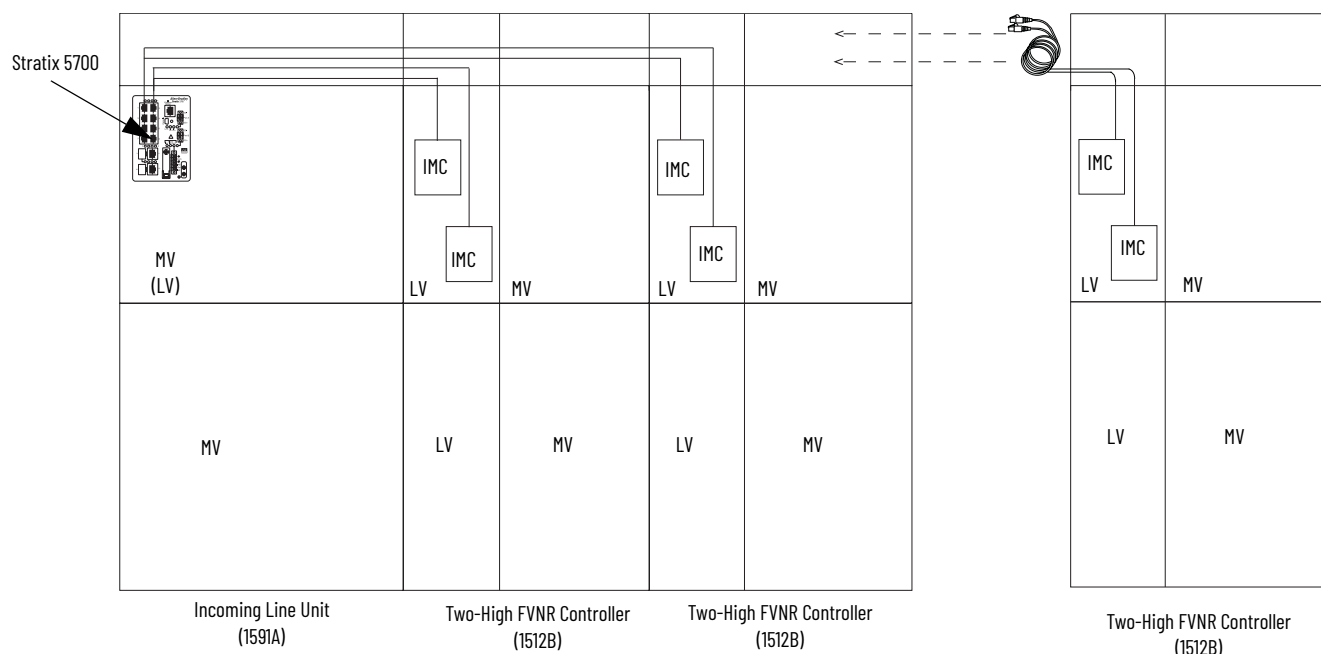### Adding Sections to an Existing Lineup

If you are adding new sections to an existing MCC lineup, planning must be done to make sure IMC devices in the new section work flawlessly.

*24V DC Power Supply Planning*

If sections are added to an existing lineup, no new Stratix 5700 switches are needed if the device limit conforms to the port availability of the original Stratix 5700 switch in the lineup. Therefore, all 24V DC Power Supply planning is accounted for and no extra planning is needed.

| | |
|---|---|
| **IMPORTANT** | If you are expanding to nine devices from eight, we need to know if we should change from a 10-port to a 20-port switch. Contact Rockwell Automation concerning custom switch placement in the LV compartment. |

| | |
|---|---|
| **IMPORTANT** | It is critical to maintain the organization of the MCC sections (left-to-right orientation must follow section numbering scheme). Reorganizing sections can affect the MCC network uplink. |

**Figure 12 - Adding a Cabinet to the Right in an MCC Lineup**



| Incoming Line Unit (1591A) | Two-High FVNR Controller (1512B) | Two-High FVNR Controller (1512B) | Two-High FVNR Controller (1512B) |

If you are using IntelliCENTER software, order the IntelliCENTER Data CD so the new section can be added to the IntelliCENTER software database. The IntelliCENTER Data CD merges the new section database with the existing lineup database. See the IntelliCENTER EtherNet/IP Software section for further details.

*Connecting EtherNet/IP Network Connections to an Existing MCC lineup*

When adding a new MV controller to an existing MCC, see the applicable User Manual. Ethernet cables are connected to each EtherNet/IP device within the factory. The cables are coiled and placed in an appropriate location in the low voltage wireway that is based on the direction of extension of your lineup (for example, if you are adding to the left of an MCC lineup, the cables should be on the right side of the LV wireway; and vice-versa for an extension on the right).

Once the customer receives the new section, see the User Manual for installation instructions (Additional Resources on page 19). Once installed, route the Ethernet cables through the LV wireway and connect it to the Stratix 5700 switch.

> ⚠️ **ATTENTION:** All equipment must be de-energized before making any connections. See the MCC Commissioning Checklist for guidelines.

> **IMPORTANT**   After making the EtherNet/IP network and 24V DC power connections, see the Commissioning Checklist before applying power.

## Rearranging Sections Within an Existing Lineup

As described in the EtherNet/IP Network and 24V DC Connections section, standard MCC with IntelliCENTER sections are designed to accommodate up to 48 EtherNet/IP connected IMC devices (engineered solutions can accommodate a larger network). Therefore, if there are any spare Stratix 5700 ports in the incoming line unit, then IntelliCENTER devices can be purchased and easily installed.

If you are adding new sections to an existing IntelliCENTER EtherNet/IP MCC or if you rearrange existing units within a section, planning must be done to make sure the IMC devices work flawlessly.

When rearranging MCC sections within an MCC, refer to the installation manuals for step-by-step instructions.

When rearranging an MCC, pay attention to the Ethernet cable lengths. When rearranging sections, follow these steps:

> ⚠️ **ATTENTION:** Equipment must be de-energized before making connections. Refer to MCC Commissioning Checklist for guidelines.

1. Unplug the switch-to-device connections from each EtherNet/IP device only. Leaving the connections within the incoming line unit provides an easier implementation method.
2. To make desired rearrangement of MV sections, see the applicable MCC User Manual (Additional Resources).
3. Connect the shortest Ethernet cable to the closest MV cabinet with EtherNet/IP devices. Repeat this process until the longest cable is used for the furthest away EtherNet/IP device.
4. Review MCC commissioning checklist before applying power.

> 💡 If you are using IntelliCENTER software, make sure to order the IntelliCENTER Data CD so the unit can be added to the IntelliCENTER software database. The IntelliCENTER Data CD lets you add the new unit to your IntelliCENTER software lineup by merging the existing lineup database. See the IntelliCENTER EtherNet/IP Software section for detailed information on how to add units to an existing IntelliCENTER software lineup.

# IntelliCENTER EtherNet/IP Software

The IntelliCENTER software is an intuitive software package that is customized to your particular MCC configuration. The software provides a system-level dashboard, which is a graphical representation of your MCC. Individual views of each IMC device provide monitoring and configuration functionality. This graphical interface can be accessed on the plant floor, in the plant control room, or from a secure remote connection. The ability to monitor remotely, diagnose, and modify intelligent device parameters keeps personnel from hazardous areas. The software has been designed to keep your MCC lineup operating well into the future.

For information on how to install IntelliCENTER software or use the various software tools available, see the IntelliCENTER Software User Manual, publication MCC-UM001.

# Commissioning Checklist

When installing a new CENTERLINE 1500 MCC lineup with EtherNet/IP network, see the following commissioning checklist before applying power.

**Table 3 - CENTERLINE 1500 using EtherNet/IP Network Commissioning**

| Step | Commission | Tasks | Status |
|------|-----------|-------|--------|
| 1 | Lineup Installation | See each Medium Voltage Controller User Manual within the lineup. Refer to General Handling Procedures for Medium Voltage Controllers, publication MV-QS050. | |
| 2 | EtherNet/IP network and 24V DC power connections | See EtherNet/IP Network and 24V DC Connections Within an MCC for detailed information about connections within each section. The EtherNet/IP network and 24V DC connections within each section are made at the factory, before shipping. | |
| | | IP addresses and subnet masks for the IMC devices and industrial Ethernet switches within each section are pre-configured at the factory before shipping. | |
| | | See EtherNet/IP Network and 24V DC Connections Across an MCC Lineup and make required switch-to-switch, switch-to-plant-wide network, and 24V DC power (if required) connections. | |
| | | IMPORTANT: Understand MCC uplink connections limitations before making connections. See MCC Uplink Connections for further details. | |
| 3 | Connections Integrity | Check the integrity of the horizontal bus splice connections, new EtherNet/IP network, and power connections. Finally, inspect all of the other connections for loose wires, opens, and shorts as well. | |
| 4 | Physical Inspection | Inspect the enclosure and units for damage and verify that electrical clearances have been maintained based on the voltage and impulse rating of the equipment. All covers and doors must be in place before applying power to the MCC. | |

**Table 3 - CENTERLINE 1500 using EtherNet/IP Network Commissioning (Continued)**

| Step | Commission | Tasks | Status |
|---|---|---|---|
| 5 | Pre-energizing Check | Finally, before applying the power perform the pre-energizing check procedure and then apply power to the MCC. For details on the pre-energizing check, see the applicable user manual within the lineup. See Additional Resources on page 19. | |
| 6 | Troubleshooting | If there is an issue with EtherNet/IP and 24V DC power operations recheck the integrity of the EtherNet/IP and 24V DC power connections. Before rechecking the connections integrity, de-energize, lockout, and tag-out all sources of power to the MCC. | |
| | | IMPORTANT: The static IP address and subnet masks for the IMC devices are already configured and tested at the plant before shipping. Hence, the functionality issue can reside in the integrity of the network wiring. | |
| | | ATTENTION: De-energize the MCC and follow appropriate lockout and tag-out policies before commencing the troubleshooting processes. Failure to de-energize all power sources can result in severe injury or death. | |

When installing a new vertical section within the existing CENTERLINE 1500 MCC lineup with EtherNet/IP network, see the following commissioning checklist before applying power.

**Table 4 - Adding Sections to an Existing Lineup**

| Step | Commission | Tasks | Status |
|---|---|---|---|
| 1 | Vertical Section - Installation | See the applicable User Manual within the lineup. See Additional Resources on page 19. | |
| | | ATTENTION: De-energize all power sources to the motor control center before adding new vertical section to the existing MCC lineup. Failure to de-energize all power sources can result in severe injury or death. | |
| | | IMPORTANT: Maintaining the organization of the MCC sections is critical (left-to-right orientation must follow section numbering scheme). Reorganizing vertical sections can affect the MCC network uplink and 24V DC power distribution conditions. | |
| 2 | EtherNet/IP network and 24V DC power connections | See Adding Sections to an Existing Lineup for 24V DC power supply planning. | |
| | | See EtherNet/IP Network and 24V DC Connections Within an MCC for detailed information about connections within each section. The EtherNet/IP network and 24V DC connections within each section are made at the factory, before shipping. | |
| | | IP addresses and subnet masks for the IMC devices and industrial Ethernet switches within each section are pre-configured at the factory before shipping. | |
| | | See EtherNet/IP Network and 24V DC Connections Across an MCC Lineup and make required switch-to-switch, switch-to-plant-wide network, and 24V DC power (if required) connections. | |
| | | IMPORTANT: Understand MCC uplink connections limitations before making connections. See MCC Uplink Connections for further details. | |
| | | ATTENTION: De-energize all power sources to the motor control center before adding new vertical sections to the existing MCC lineup. Failure to de-energize all power sources can result in severe injury or death. | |
| 3 | Connections Integrity | Check the integrity of the horizontal bus splice connections, new EtherNet/IP network, and power connections. Finally, inspect all of the other connections for loose wires, opens, and shorts as well. | |
| 4 | Physical Inspection | Inspect the enclosure and units for damage and verify that electrical clearances have been maintained based on the voltage and impulse rating of the equipment. All covers and doors must be in place before applying power to the MCC. | |
| 5 | Pre-energizing Check | Finally, before applying the power perform the pre-energizing check procedure and then apply power to the MCC. For details on the pre-energizing check, see the applicable user manual within the lineup. See Additional Resources on page 19. | |
| 6 | Troubleshooting | If there is an issue with EtherNet/IP and 24V DC power operations, recheck the integrity of the EtherNet/IP and 24V DC power connections. Before rechecking the connections integrity, de-energize, lockout, and tag-out all sources of power to the MCC. | |
| | | IMPORTANT: The static IP address and subnet masks for the IMC devices are already configured and tested at the plant before shipping. Hence, the functionality issue can reside in the integrity of the network wiring. | |
| | | ATTENTION: De-energize the MCC and follow appropriate lockout and tag out policies before commencing the troubleshooting processes. Failure to de-energize all power sources can result in severe injury or death. | |

When installing a new unit or rearranging a unit within the existing CENTERLINE 1500 MCC lineup with EtherNet/IP network, see the following Commissioning Checklist before applying power.

**Table 5 - Adding or Rearranging EtherNet/IP IntelliCENTER MV Controllers Within an Existing Lineup**

| S. No | Commission | Tasks | Status |
|---|---|---|---|
| 1 | MCC Units - Installation | See the applicable user manual for details on how to install each controller. See Additional Resources on page 19. | |
| | | ATTENTION: De-energize all power sources to the motor control center before installing or rearranging the units within the existing MCC lineup. Failure to de-energize all power sources can result in severe injury or death. See the NFPA 70E Standard for Electrical Safety in the Workplace publication. | |
| 2 | EtherNet/IP Network and 24V DC Power Connections | See EtherNet/IP Network and 24V DC Connections Within an MCC for further information on switch-to-device and 24V DC power (if required) connections within the section. Make the required switch-to-device connections. | |
| | | IP addresses and subnet masks for the IMC device within the LV compartment are preconfigured at the factory before shipping. | |
| | | IMPORTANT: The static IP address and subnet masks for the IMC devices in each section are already configured and tested at the plant before shipping. | |
| 3 | Connections Integrity | Check the integrity of the new EtherNet/IP network and power connections. Finally, inspect all of the other connections for loose wires, opens, and shorts as well. | |
| 4 | Physical Inspection | Inspect the enclosure for damage and verify that electrical clearances have been maintained based on the voltage and impulse rating of the equipment. All covers and doors must be in place before applying power to the MCC. | |
| 5 | Pre-energizing Check | Finally, before applying the power perform the pre-energizing check procedure and then apply power to the MCC. For details on the pre-energizing check, see the applicable user manual within the lineup. See Additional Resources on page 19. | |
| 6 | Troubleshooting | If there is an issue with EtherNet/IP and 24V DC power operations, recheck the integrity of the EtherNet/IP and 24V DC power connections. Before rechecking the connections integrity, de-energize, lockout, and tag-out all sources of power to the MCC. | |
| | | IMPORTANT: The static IP address and subnet masks for the IMC devices are already configured and tested at the plant before shipping. Hence, the functionality issue can reside in the integrity of the network wiring. | |
| | | ATTENTION: De-energize the MCC and follow appropriate lock out tag out policies before commencing the troubleshooting processes. Failure to de-energize all power sources can result in severe injury or death. | |

# Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

| Resource | Description |
|---|---|
| Converged Plantwide Ethernet (CPwE) Design and Implementation Guide, publication ENET-TD001 | Describes how to design a Converged Plant-wide Ethernet Network. |
| EtherNet/IP Media Planning and Installation Manual ODVA Pub. 148 and EtherNet/IP Network Infrastructure Guidelines ODVA Pub.35[1] | Describes EtherNet/IP media planning. |
| Fiber Optic Infrastructure Application Guide, publication ENET-TD003 | Describes fiber-optic infrastructure. |
| IntelliCENTER Software User Manual, publication MCC-UM002 | Provides information on how to install and use IntelliCENTER software. |
| 400A One-High Cabinet Medium Voltage Controllers User Manual, publication 1512A-UM100 | Provides information on installation and maintenance on standard and arc resistant enclosures. |
| 200/400A Two-High Cabinet, Medium Voltage Controllers User Manual, publication 1500-UM055 | Provides information on installation and maintenance on standard and arc resistant enclosures. |
| 800A One-High Cabinet, Medium Voltage Controllers User Manual, publication 1512A-UM102 | Provides information on installation and maintenance on standard and arc resistant enclosures. |
| Medium Voltage SMC Flex Motor Controller (for Series K or later) User Manual, publication 1560E-UM051 | Provides information on installation, commissioning, troubleshooting, parameter information, and maintenance on standard and arc resistant enclosures. |
| CENTERLINE Medium Voltage SMC-50 Motor Controller User Manual, publication 1560F-UM001 | Provides information on installation, commissioning, troubleshooting, parameter information, and maintenance on standard and arc resistant enclosures. |
| Resilient Ethernet Protocol in a Converged Plantwide Ethernet System (CPwE), publication ENET-TD005 | Deploying REP in a Converged Plantwide Ethernet Network. |
| Bulletin 857 Protection System User Manual, publication 857-UM001 | Provides information on installation, configuration, protection function descriptions, and technical data information |
| Bulletin 865 Differential Protection System User Manual, publication 865-UM001 | Provides information on installation, configuration, protection function descriptions, and technical data information |
| E300 Electronic Overload Relay User Manual, publication 193-UM015 | Provides information on installation, diagnostics, warning functions, firmware updates, troubleshooting, and specifications. |
| E1 Plus EtherNet/IP Side Mount Module User Manual, publication 193-UM012 | Provides information on installation, configuration, parameters, specifications, and troubleshooting. |
| PowerMonitor 5000 Unit, publication 1426-UM001 | Provides information on installation, setup, metering, specifications, and operation. |
| PowerFlex 20-COMM-E EtherNet/IP Adapter User Manual, publication 20COMM-UM010 | Provides information on installation, configuration, operation, specifications, and troubleshooting. |
| Stratix 5700 Industrial Ethernet Switch Product Profile, publication ENET-PP005 | Provides Stratix 5700 switch information. |
| Stratix 5700 Ethernet Managed Switches User Manual, publication 1783-UM007 | Provides Stratix 5700 switch information. |
| Integrated Architecture Builder (IAB) | The Advanced EtherNet/IP capacity tool that is embedded in IAB is a system sizing tool that can provide EtherNet/IP network performance and Logix controller utilization estimates based on a particular system layout. |
| EtherNet/IP Network Devices User Manual, ENET-UM006 | Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network. |
| Ethernet Reference Manual, ENET-RM002 | Describes basic Ethernet concepts, infrastructure components, and infrastructure features. |
| System Security Design Guidelines Reference Manual, SECURE-RM001 | Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment. |
| Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002 | Provides a quick reference tool for Allen-Bradley industrial automation controls and assemblies. |
| Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1 | Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components. |
| Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1 | Provides general guidelines for installing a Rockwell Automation industrial system. |
| Product Certifications website, rok.auto/certifications. | Provides declarations of conformity, certificates, and other certification details. |

(1)   For ODVA publications, see the ODVA EtherNet/IP library at http://odva.org/Home/ODVATECHNOLOGIES/EtherNetIP/EtherNetIPLibrary/tabid/76/lng/en-US/Default.aspx

You can view or download publications at rok.auto/literature.

# Rockwell Automation Support

Use these resources to access support information.

| Technical Support Center | Find help with how-to videos, FAQs, chat, user forums, and product notification updates. | rok.auto/support |
|---|---|---|
| Knowledgebase | Access Knowledgebase articles. | rok.auto/knowledgebase |
| Local Technical Support Phone Numbers | Locate the telephone number for your country. | rok.auto/phonesupport |
| Literature Library | Find installation instructions, manuals, brochures, and technical data publications. | rok.auto/literature |
| Product Compatibility and Download Center (PCDC) | Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes. | rok.auto/pcdc |

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