Product Data Bulletin

Lexium® Motion Controller and Magelis® HMI Connectivity
Using Modbus® Motion Controller and Magelis® TCP/IP Protocol

Retain for future use.

Overview

This bulletin contains a tutorial on connecting a Lexium® motion controller to a Magelis® HMI using Modbus® TCP/IP protocol.

Presumption

This document is written for individuals familiar with Vijeo® Designer software and Ethernet networks. If you are not familiar with this software or network operation, please consult your system administrator before attempting to connect a Lexium motion controller to a Magelis HMI.

Requirements

The following hardware and software are required:

Hardware

- Lexium Motion Controller (LMC)
- Magelis HMI (with Modbus/TCP Support)
- Ethernet CAT5 Cable
- Ethernet Switch
- 24 Vdc Power

Software

- Vijeo Designer software
- Motion Pro software (Version 2.3.7.5 or higher)
- Internet Browser to access the LMC Web Server

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Safety Information

Notice

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards, or to call attention to information that clarifies or simplifies a procedure.

A lightning bolt or ANSI man symbol in a “Danger” or “Warning” safety label on the equipment indicates an electrical hazard which, as indicated below, can or will result in personal injury if the instructions are not followed.

The exclamation point symbol in a safety message in a bulletin indicates potential personal injury hazards. Obey all safety messages introduced by this symbol to avoid possible injury or death.

Symbol	Name
	Lightning Bolt
	ANSI Man
	Exclamation Point

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** property damage.

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Qualified Personnel

For the protection of personnel and equipment, a qualified person must perform the procedures detailed in this bulletin.

A qualified person is one who has skills and knowledge related to the construction and operation of this electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved. Refer to the most current release of NFPA 70E®, “Standard for Electrical Safety in the Workplace®,” for safety training requirements.

In addition, the person must be:

- Able to read, interpret, and follow the instructions and precautions in this data bulletin and the other documentation referenced.
- Able to use the required tools listed in this data bulletin in a safe and correct manner.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guards on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED MACHINERY CAN CAUSE SERIOUS INJURY

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, and government regulations. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only the user can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine; therefore, only the user can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, the user should refer to the applicable local and national standards and regulations. The National Safety Council’s Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator’s hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason, the software cannot be substituted for or take the place of point-of-operation protection.

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Ensure that the appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ CAUTION

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code® in the USA, for instance). If high-potential voltage testing is necessary, follow recommendations in the equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

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Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- "Regardless of the care exercised in the design and manufacture of equipment or in the selection and rating of components, there are hazards that can be encountered if such equipment is improperly operated."
- "It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment."
- "Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics."

Related Documents

If there are no documents recommended, this subsection can be removed.

Title of Documentation	Reference Number
Lexium Controller: Ethernet Modbus TCP/IP User's Manual	LMC_Ethernet_EN
Lexium Controller: Modbus User's Manual	LMC_Modbus_EN

You can download these technical publications and other technical information from our website at www.us.schneider-electric.com.

Product Related Information

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment. Disconnect the power at the processor and at the power source.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- Confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

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⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link. [1]
- Each implementation of an Altivar 31C drive must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

1. For additional information refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and to NEMA ICS 7.1 (latest edition), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.”

User Comments

We welcome your comments about this bulletin. You can reach us by e-mail at oem.solutions@schneider-electric.com.

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Hardware Setup

Figure 1: Hardware Description

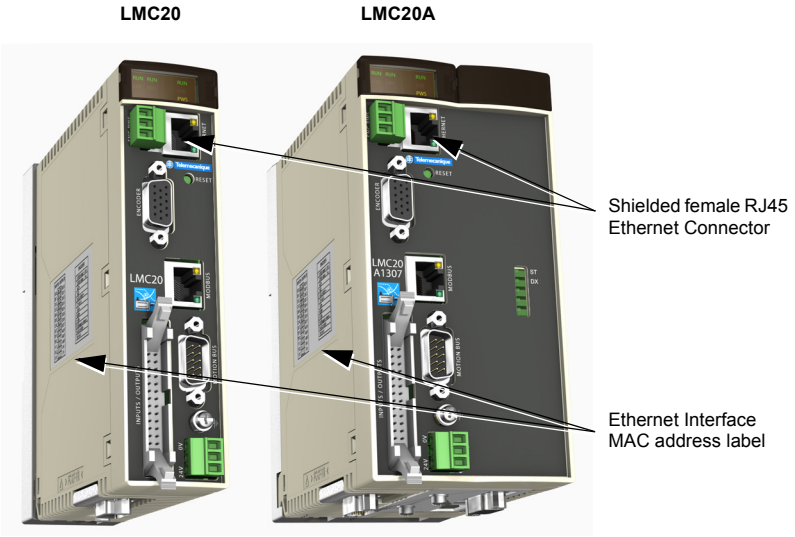
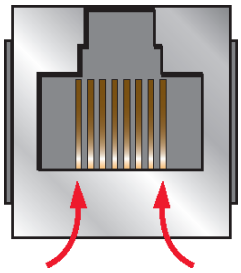


Figure 2: LMC Shielded Ethernet Connector Pinout



Pin	Signal
1	TD+
2	TD–
3	RD+
4	not connected
5	not connected
6	RD–
7	not connected
8	not connected

The Ethernet port supports 10 Mbps or 100 Mbps, full or half duplex.

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Configuration

Ethernet [VAR] Configuration

Communication between the Modbus/TCP port of an LMC and the Ethernet port of a Magelis HMI requires the following:

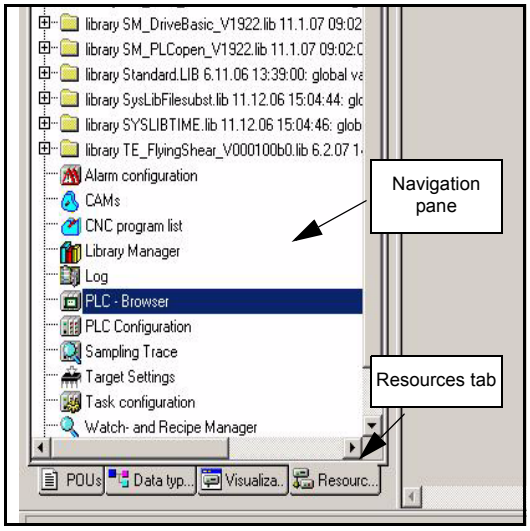
- An Ethernet connection between the LMC and the Magelis HMI
- A hub or a 10/100 Ethernet switch or crossover cable
- Vijeo® Designer software
- Motion Pro software

Lexium Motion Controller—Ethernet Master IP Configuration

This procedure establishes an Ethernet connection for the LMC.

Using Motion Pro software, follow the steps below. For information on accessing the Web server for the Lexium controller, refer to the *Lexium Controller Ethernet Modbus TCP/IP* manual.

Figure 3: Motion Pro Software



1. Configure the LMC for Ethernet communication.
   a. Click the Resources tab on the bottom left side of the navigaton pane.
   b. In the navigation pane, double-click PLC Configuration.
   c. Right-click Lexium Controller V01.
   d. Select Append Subelement **>** Ethernet[VAR].
   e. Save the configuration.
   f. Expand the Ethernet[VAR] directory.
   g. Expand the Ethernet Parameters[FIX] directory.
2. Access the LMC using Motion Pro software and configure the communication settings.
   a. In the navigation pane on the left side of the Motion Pro software screen, double-click Modbus_TimeOut AT %QW12.
   b. Enter the number 6, which equates to 60 ms.
   c. Ensure that IoScan_Activation is set to 0.
   d. Double-click Master_IP_Address_1 to set the first octate of the Magelis download Ethernet IP address.
   e. Repeat Step 2. d. to set the remaining 3 octates of the IP address.
   f. While still connected to the LMC via Motion Pro software, save the configuration.

This IP address is the Magelis download Ethernet IP address.

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Magelis HMI—Modbus TCP/IP Driver Configuration

Figure 4: Vijeo® Designer

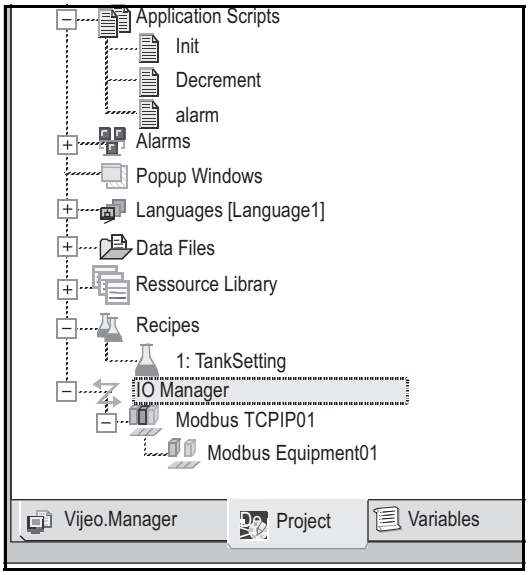
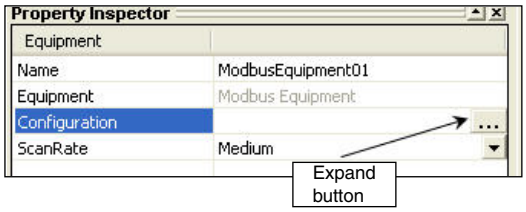


Figure 5: Property Inspector

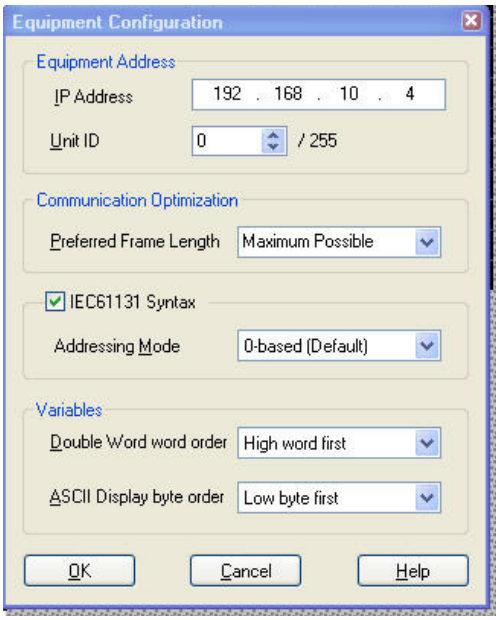


This procedure establishes a Modbus TCP/IP connection for the Magelis HMI.

Using Vijeo® Designer software, follow the steps below. Refer to Figures 4 and 5.

1. In the navigation pane on the left side of the screen, right-click IO Manager.
2. Select New Driver > Insert.
3. Select the manufacturer, Schneider Electric Industries SAS.
4. Select the driver, ModbusTCP/IP.
5. Click OK.
6. Expand IO Manager > Modbus TCPIP01.
7. Select ModbusEquipment01.
8. In the Property Inspector window, click the Expand (…) button.
9. In the Equipment Configuration window:
   a. Set the IP Address to the LMC address (in this example,192.168.10.4).
   b. Set the Unit ID to 0 (Modbus server 0).
   c. Check the IEC61131 Syntax box.
   d. Ensure that the other parameters are set to their default values. See Figure 6.

Figure 6: Equipment Configuration Window



10. Click OK to close the Equipment Configuration window.
11. Save the configuration.

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Variable Addressing

When following the procedures below, you can rename Target1.

Creating an IEC Integer Variable

Using Vijeo® Designer software:

1. In the navigation pane, select the Variables tab.
2. Right-click Target1.
3. Highlight New Variable, then set the Data Type to Integer.
4. Rename the Integer variable as ACT_VEL.
5. Set the ACT_VEL variable's Device Address (Modbus IEC) to %MW1.

Creating an IEC Double Word Variable

Using Vijeo Designer software:

1. In the navigation pane, select the Variables tab.
2. Right-click Target1.
3. Highlight New Variable, then set the Data Type to Integer.
4. Rename the Integer variable as ACT_POSI (actual position).
5. Click OK.
6. Save and download the configuration.

Creating an IEC Boolean Variable

Using Vijeo Designer software:

1. In the navigation pane, select the Variables tab.
2. Right-click Target1.
3. Highlight New Variable, then set the Data Type to Boolean.
4. Rename the Boolean variable, LMC_ENABLE.
5. Set the MC_ENABLE variable's Device Address to %MW0:X1.
6. Click OK.
7. Save and download the configuration.

LMC (%MW) Memory Word Address

Two LMC Memory Word data areas are available. Refer to Table 1.

Table 1: LMC Memory Word Data Areas

Data Area	Description	Comments
%MW0 – 99	Web Service Data Area / LMC Data Area (Shared)	Fixed field. Data is viewable from the Monitoring section of the LMC Web page.
%MW100 – 16,383	LMC Data Area	Data is not accessible from the Web service.

AT Declaration

An AT declaration links a variable directly to a definite address. Below are some examples:

```
xCounterHeat7 AT %QX0.0: BOOL;
wLightcabinetimpulse AT %IW2: WORD;
xDownload AT %MX2.2: BOOL;
```


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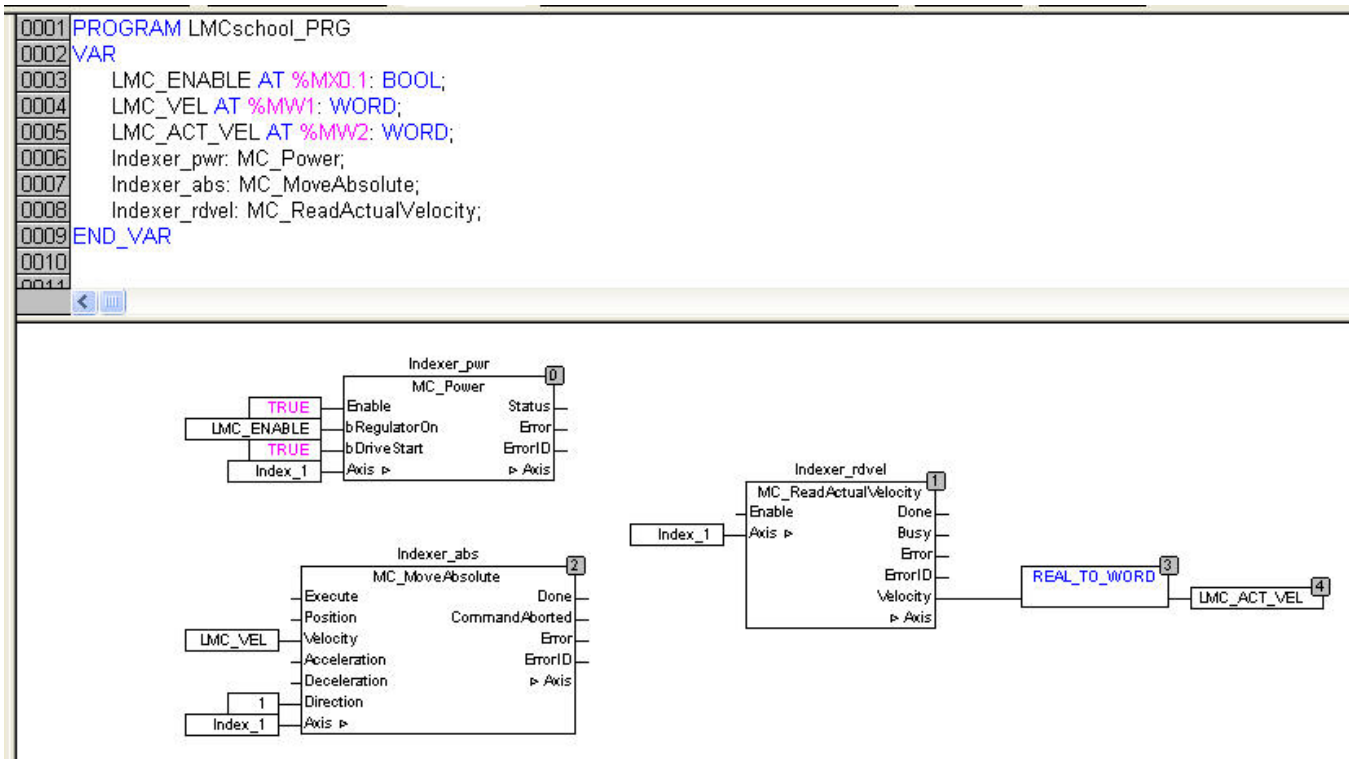
Figure 7: Sample LMC Code Linking the Variables



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