

Siemens AG

MPI Adapter Driver

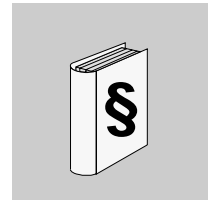
03/2012

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Safety Information



Important 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.



The addition of this symbol to a Danger safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

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.

NOTICE

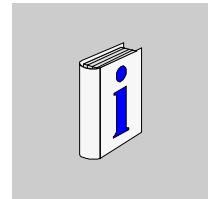
NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

This manual describes the device driver communication settings in the Vijeo Designer screen editing software. Vijeo Designer enables you to design Magelis target machines that communicate with PLCs, drives, field devices, and other equipment.

For more information about Vijeo Designer and Magelis target machines, please refer to Vijeo Designer user documentation.

Validity Note

The data and illustrations found in this book are not binding. We reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be construed as a commitment by Schneider Electric.

Documentation Conventions

Target Machine: Human-Machine Interface (HMI) that runs user applications designed in Vijeo Designer screen editing software. A target machine is also known as a terminal.

Product Related Information

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.*
- Each implementation of a Magelis XBTGT, HMISTO, HMISTU, HMIGTO, XBTGH, XBTGK, XBTGC, iPC, and XBTGTW 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.

* For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control."

User Comments

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

MPI Adapter Driver

1

Subject of this Chapter

This chapter explains the MPI Adapter Driver.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
System Structure	10
Target Machine Serial Interface	11
Cable Diagrams	18
Supported Device Addresses	21
Consecutive Equipment Addresses	23
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System Structure

Overview

The following table describes the basic system setup for connecting the target machine to Siemens Series PLCs over a serial connection.

To view a cable connection diagram for a particular communication format, see *Cable Diagrams*.

Connection

Series	CPU	Link I/F	Comm. Format	Diagram
Simatic S7-300/400 Series	CPU312IFM CPU313 CPU314 CPU315 CPU315-2DP CPU413-2DP	MPI Port	RS-232C	Cable Diagram 1

Target Machine Serial Interface

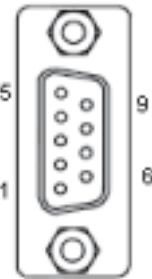
Use the following serial interface diagrams in combination with the cable diagrams in Section 3 to wire connections between the target machine and external equipment.

Magelis iPC Series (Smart, Compact, and Flex) and XBTGTW Series

The iPC Series (Smart, Compact, and Flex) and the XBTGTW Series target machines come with one to four COM ports. All serial ports use 9-pin D-Sub male connectors and support RS-232C serial communication. The following table illustrates the pin layout for these target machines.

COM1, COM2, COM3, OR COM4 (9-pin D-Sub Plug)

RS-232C

	Pin Number	Symbol	Description
	1	CD	Carrier Detect
	2	RD(RXD)	Receive Data
	3	SD(TXD)	Transmit Data
	4	ER(DTR)	Data Terminal Ready
	5	GND	Common Ground
	6	DR(DSR)	Data Set Ready
	7	RS(RTS)	Request to Send
	8	CS(CTS)	Send Possible
9	CI(RI)	Called status display	

Magelis XBTGK, XBTGC2000, XBTGH2000, and XBTGT2000 Series or higher

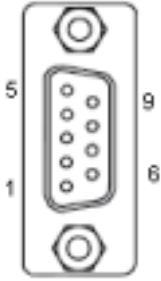
All XBTGK and XBTGT2000 Series and higher target machines have two COM ports: COM1 and COM2. The XBTGC2000 Series has one COM port: COM1. XBTGH2000 Series (Junction Box) has one COM port: COM1.

COM1 is a 9-pin D-Sub male connector and COM2 is an RJ45 socket. The following tables illustrate the pin layout for these target machines.

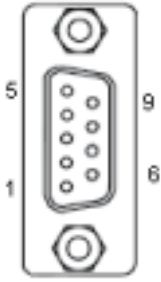
COM1 (9-pin D-Sub Plug)

This COM port can act as either an RS-232C or RS-422 interface.

RS-232C

	Pin Number	Symbol	Description
	1	CD	Carrier Detect
	2	RD(RXD)	Receive Data
	3	SD(TXD)	Transmit Data
	4	ER(DTR)	Data Terminal Ready
	5	GND	Common Ground
	6	DR(DSR)	Data Set Ready
	7	RS(RTS)	Request to Send
	8	CS(CTS)	Send Possible
9	CI(RI)	Called status display or +5V \pm 5% output 0.25A	

RS-422

	Pin Number	Symbol	Description
	1	RDA	Receive Data A
	2	RDB	Receive Data B
	3	SDA	Send Data A
	4	ERA	Data Terminal Ready A
	5	GND	Common Ground
	6	CSB	Send Possible B
	7	SDB	Send Data B
	8	CSA	Send Possible A
9	ERB	Data Terminal Ready B	

Note:

- When making your own connections, attach a loop back between pins 6 (CSB) and 9 (ERB), and between 4 (ERA) and 8 (CSA).
- To simplify the wiring, you can use the COM Port Conversion Adapter (Schneider Electric: XBTZGCOM) and Terminal Block Conversion Adapter (Schneider Electric: XBTZG949). These accessories allow access to the RS-422 signals using screw terminals. For information on the signals of the screw terminals, see the user manual for the XBTZG949.

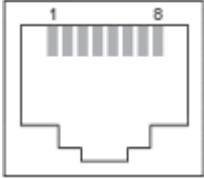
COM2 (RJ45 Socket)

⚠ WARNING**UNINTENDED EQUIPMENT OPERATION**

When making your own connections, use shielded RJ45 connectors. The shielded connector provides isolation against electromagnetic interference and provides a more secure physical connection in the RJ45 socket. Use of an improper RJ45 connection could lead to insecure connections.

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

COM2 supports RS-422/485 signals only.

	Pin Number	Symbol	Description
	1		
	2		
	3		
	4	D1(+)	Send Data (Positive Signal)
	5	D0(-)	Send Data (Negative Signal)
	6		
	7		
	8	GND	Common Ground

Magelis HMIGTO Series

The HMIGTO target machines have two COM ports (COM1 and COM2), with the exception of the HMIGTO1310. The HMIGTO1310 has one COM port (COM1), which uses an RJ45 connector. For more information, see *Magelis XBTGT1000, XBTGT1005, HMIGTO1310, HMISTO, and HMISTU Series*.

COM1 is a 9-pin D-Sub male connector, and COM2 is an RJ45 socket. The following tables illustrate the pin layout for these target machines.

COM1 (9-pin D-Sub Plug)

This COM port can act as either an RS-232C or RS-422/RS-485 interface.

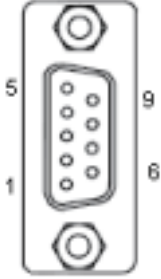
⚠ CAUTION

LOSS OF COMMUNICATION

- All connections to the communication ports must not put excessive stress on the ports.
- Securely attach communication cables to the panel wall or cabinet.
- Use only D-Sub 9-pin cables with a locking tab in good condition.

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

RS-232C

	Pin Number	Symbol	Description
	1	CD	Carrier Detect
	2	RD(RXD)	Receive Data
	3	SD(TXD)	Transmit Data
	4	ER(DTR)	Data Terminal Ready
	5	SG	Signal Ground
	6	DR(DSR)	Data Set Ready
	7	RS(RTS)	Request to Send
	8	CS(CTS)	Send Possible
	9	CI(RI/VCC)	Called status display or +5V \pm 5% output 0.25A
Shell	FG	Frame Ground (Common with SG)	

Note:

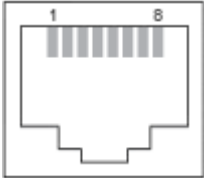
- You can switch pin 9 between RI and VCC via software. The VCC output is not protected against overcurrent. To prevent damage or a unit malfunction, use only the rated current.
- You can use the Cable Connector (Omron Corporation: XMD-0901), Cable Cover (Omron Corporation: XM2S-0913), and Jack Screw #4-40 UNC (Omron Corporation: XM2Z-0073).

COM2 (RJ45 Socket)**⚠ WARNING****UNINTENDED EQUIPMENT OPERATION**

When making your own connections, use shielded RJ45 connectors. The shielded connector provides isolation against electromagnetic interference and provides a more secure physical connection in the RJ45 socket. Use of an improper RJ45 connection could lead to insecure connections.

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

COM2 supports RS-422/485 signals only.

	Pin Number	Symbol	Description
	1	NC	–
	2	NC	–
	3	NC	–
	4	Line A	Transfer Data (RS-485)
	5	Line B	Transfer Data (RS-485)
	6	RS(RTS)	Request to Send
	7	NC	–
	8	SG	Signal Ground

 **DANGER**

ELECTRIC SHOCK

The serial port is not isolated. The SG (signal ground) and FG (frame ground) terminals are connected inside the unit.

When using the SG terminal to connect an external device to the panel:

- Verify that a short-circuit loop is not created when you set up the system.
- Connect the #8 SG terminal to remote equipment when the host (PLC) unit is not isolated. Connect the #8 SG terminal to a known reliable ground connection to reduce the risk of damaging the circuit.

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

Magelis XBTGT1000, XBTGT1005, HMIGTO1310, HMISTO, and HMISTU Series

XBTGT1000, XBTGT1005, HMIGTO1310, HMISTO, and HMISTU Series machines come with one COM port which uses an RJ45 connector. The RJ45 socket closest to the power connector is the COM1 port. This COM port can act as an RS-422/485 interface.

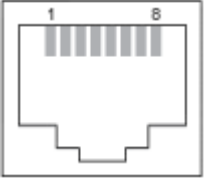
COM1 (RJ45 Socket)

⚠ WARNING**UNINTENDED EQUIPMENT OPERATION**

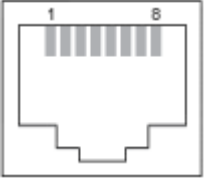
When making your own connections, use shielded RJ45 connectors. The shielded connector provides isolation against electromagnetic interference and provides a more secure physical connection in the RJ45 socket. Use of an improper RJ45 connection could lead to insecure connections.

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

RS-232C

	Pin Number	Symbol	Description
	1	RD(RXD)	Receive Data
	2	SD(TXD)	Transmit Data
	3		
	4		
	5		
	6		
	7		
8	GND	Common Ground	

RS-422/485 (2-wire)

	Pin Number	Symbol	Description
	1		
	2		
	3		
	4	D1(+)	Send Data (Positive Signal)
	5	D0(-)	Send Data (Negative Signal)
	6		
	7		
8	GND	Common Ground	

Cable Diagrams

The illustrated cable diagrams and those recommended by Siemens may differ. However, Schneider Electric recommends using the following diagrammed connections.

When creating your own cables, to identify which pins to connect on the target machine, see *Target Machine Serial Interface*.

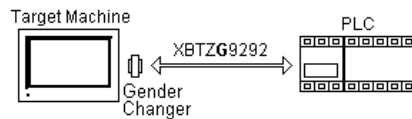
- Ensure that the equipment is properly grounded as indicated in the user manual and follows all applicable country standards.
- When making your own communication cable, be sure to connect the SG signal.

Diagram 1 - RS-232C

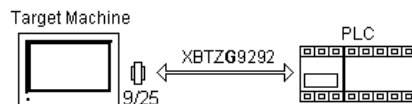
To connect the target machine and the PLC, use the recommended cables and accessories.

Target Machine	Cable / Adapter	Comments
iPC or XBTGTW Series (COM1/COM2/COM3/COM4), XBTGK Series (COM1), XBTGT2000 Series or higher (COM1), XBTGH2000 Series (Junction Box COM1), HMIGTO Series (excluding HMIGTO1310) (COM1)	a Cable for Siemens MPI Port Adapter (Schneider Electric: XBTZG9292) and DB9 Female to Female gender changer	Sub D9 cable connection
XBTGT1005 Series (COM1), XBTGT 1000 Series (COM1), HMIGTO1310 (COM1), HMISTO Series (COM1), HMISTU Series (COM1)	b Cable for Siemens MPI Port Adapter (Schneider Electric: XBTZG9292) and standard 9/25 pin adapter	9/25 pin adapter: Sub D9 male to Sub D25 female
	c Connection Diagram	Sub D9 adapter to RJ45

a. Cable for Siemens MPI Port Adapter (Schneider Electric: XBTZG9292) and Sub D9 Female to Female gender changer

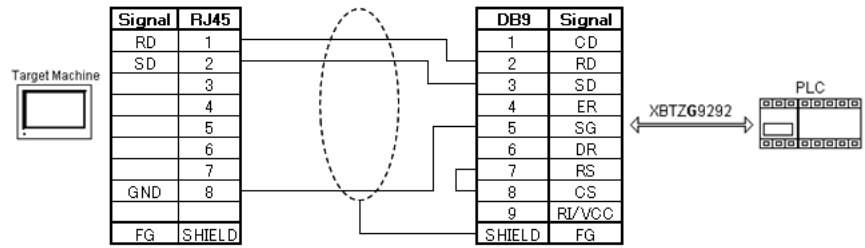


b. Cable for Siemens MPI Port Adapter (Schneider Electric: XBTZG9292) and standard 9/25 pin adapter with Sub D9 male and Sub D25 female connectors



c. Cable for Siemens MPI Port Adapter (Schneider Electric: XBTZG9292) and

standard DB9 pin adapter to RJ45



Supported Device Addresses

Overview

WARNING

UNINTENDED EQUIPMENT OPERATION

Design your system to avoid conflicting write processes between the target machine and PLC program. Make sure that:

- The target machine and PLC program do not simultaneously write to the same register.
- PLC programs or other devices do not write 16-bit word values to registers being accessed in a bitwise manner.

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

The following table lists the device address ranges you can enter from the Device Address keypad.

For actual device address ranges supported by the PLC, refer to the corresponding PLC manual.

Device	Bit Address ^{*1}	Word Address	16 bit	32 bit
Input ^{*2}	I00000.0-I65535.7	IW00000-IW65534 ^{*7}	H/L ^{*8}	H/L ^{*8}
Output ^{*2}	Q00000.0-Q65535.7	QW00000-QW65534 ^{*7}		
Internal Bit ^{*2}	M00000.0-M65535.7	MW00000-MW65534 ^{*7}		
Data Block ^{*2*6}	DBX1.DBX00000.0 - DBX65535.DBX65535.7	DB1.DBW 00000 - DB65535.DBW65534 ^{*7}		
Timer Word ^{*3*4*5}	—	T00000-T65535		
Counter Word ^{*3*4*5}	—	C00000-C65535		

*1 Read-modify-write. When you write to one of these bit addresses, the target machine reads the entire word address, sets the defined bit, then returns the new value to the PLC. If the ladder program writes data to this word address during the bit read/write process, the resulting data may be incorrect.

*2 Device size is 1 byte.

*3 Device size is 2 bytes, or 1 word.

*4 Integer variable type. Valid range in BCD is 0000 to 0999.

*5 Read-only.

*6 Data blocks are created by the user. Available addresses depend on what the user has created.

*7 PLC word addresses defined for integer, float, and string variables must be even-numbered. i.e., IW5 is not a valid device address for an integer variable. Must be either IW4 or IW6.

- *8 16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

		16 bit					32 bit		
Byte					Word				
0	7	...	0	L (Low)	0	15	...	0	L (Low)
1	15	...	8	H (High)	1	31	...	16	H (High)

Consecutive Equipment Addresses

Overview

The following table lists the maximum number of consecutive addresses that can be read by each PLC. Refer to this table when using block transfers.

Note:

- To speed up data communication, use consecutive variable addresses on the same panel screen.
- The following situations increase the number of times that the equipment is read, which reduces the data communication speed between the target machine and the equipment:
 - when the number of consecutive addresses exceeds the maximum
 - when different device types are used.

Device	Max. Consecutive Addresses	Gap Span
Input (I)	111 bytes (Bit Access) ^{*1}	22 bytes (Bit Access) ^{*1}
Output (Q)		
Internal Bit (M)		
Data Block (DBX)		
Input (IW)	55 words (Word Access) ^{*2}	11 words (Word Access) ^{*2}
Output (QW)		
Internal Bit (MW)		
Data Block (DBW)		
Timer Word (T)		
Counter Word (C)		

*1 Vijeo-Designer Runtime accesses bit addresses in byte units. For example, when the bit address IW101.3 is assigned to a Vijeo-Designer discrete variable, the entire byte address (IW101) is read. The bit address gap span can have up to 22 byte addresses.

*2 Vijeo-Designer Runtime accesses word addresses in even-numbered bytes (2 bytes = 1 word). For example, when the byte address IW100 is assigned to a Vijeo-Designer 16bit integer variable, a word (IW100, IW101) is read. The word address gap span can have up to 11 word addresses.

Environment Setup

Overview

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Read and understand the instructions in this section to ensure data is properly transferred. If you do not follow these instructions, incorrect data could be written to the PLC and the target machine.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following table lists the communication settings, recommended by Schneider Electric, for the target machine and Siemens PLCs.

For details, see *Driver Configuration*, and *Equipment Configuration*.

Target Machine Settings		PLC Settings		
Driver	Serial Interface	RS-232C	—	
	Flow Control	DTR(ER)/CTS	—	
	Transmission Speed ^{*1}	115,200 bps	Baud Rate ^{*2}	187,500 bps
	Retry Count	2	—	
	Parity Bit	Odd	—	
	Stop Bit	1 bit	—	
	Data Length	8 bits	—	
	Rcv Time Out	10 sec	—	
	TX Wait Time	0 msec	—	
Equipment	Local Node ^{*3}	0-126	MPI Address ^{*4}	2-126
	Target Node ^{*4}	2-126	—	
	Highest Node Number ^{*5}	15/31/63/126	Highest Node Number ^{*5}	15/31/63/126

*1 When using a MPI Port Adapter, Transmission speed can be 19200 bps, 38400 bps or 115200 bps.

*2 The MPI adapter always converts the signal to 187,500 bps.

*3 The Local Node (set up on the target machine) must NOT match the MPI Address (PLC).

*4 The Target Node (set up on the target machine) must match the MPI Address (PLC).

*5 The Highest Node Number, which identifies the highest possible node address on the network, must be the same on the target machine and PLC. The Local Node, Target Node, and MPI addresses must be less than or equal to the Highest Node Number.

I/O Manager Configuration

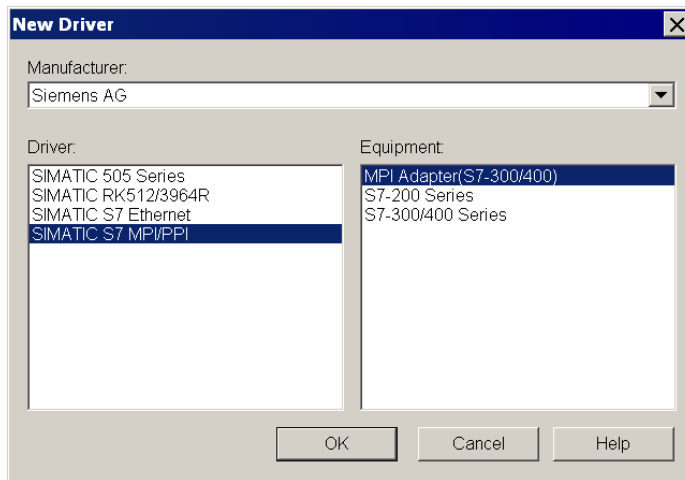
Overview

The driver and equipment, which enable communication between the target machine and the PLC, depends on the PLC type.

Note:

- For information on how to display the [New Driver] dialog box, see the Vijeo Designer Help.

Screen example of I/O Manager Configuration



Driver Configuration

Overview

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Read and understand the instructions in this section to ensure data is properly transferred. If you do not follow these instructions, incorrect data could be written to the PLC and the target machine.

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

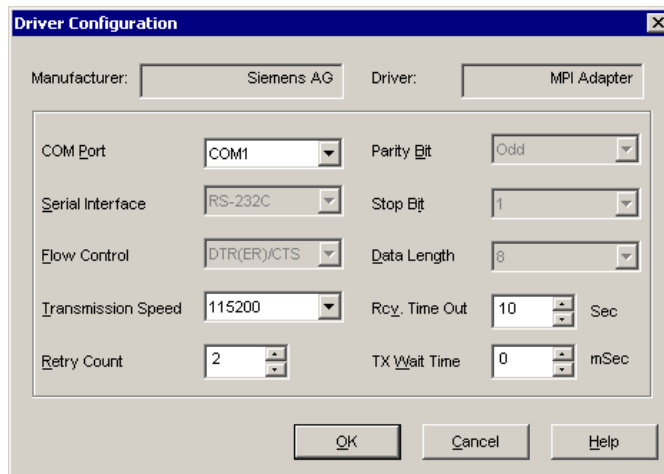
To configure the communication settings of the serial driver in the target machine, use the [Driver Configuration] dialog box. Make sure the settings match those of the PLC.

For an overview of the driver and device settings, see *Environment Setup*.

Note:

- For information on how to display the [Driver Configuration] dialog box, see the Vijeo Designer Help.

Screen example of Driver Configuration



Screen Description

Area	Description
Manufacturer	Displays the name of the PLC manufacturer.
Driver	Displays the type of serial connection used to connect the target machine to the PLC.
COM Port	Defines which COM port to use on the target machine, for connecting to the PLC.
Serial Interface	Defines the serial connection as RS-232C. For details about the supported connections, see <i>Cable Diagrams</i> .
Flow Control	Defines the signals that control the data flow.
Transmission Speed	Sets the communication speed in bits per second. This setting must match the PLC baud rate.
Retry Count	Defines the number of times the driver tries to send or receive data when an error has been detected.
Parity Bit	For detecting communication errors, sets the parity bit to Odd.
Stop Bit	Defines the stop bit as 1.
Data Length	Defines the length of each unit of data as 8 bits.
Rcv. Timeout	Defines the length of time the target machine waits for a response before it outputs a timeout error or sends another communication.
TX Wait Time	Defines the number of milliseconds that the target machine waits, after receiving a communication packet, before sending a response.

Equipment Configuration

Overview

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Read and understand the instructions in this section to ensure data is properly transferred. If you do not follow these instructions, incorrect data could be written to the PLC and the target machine.

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

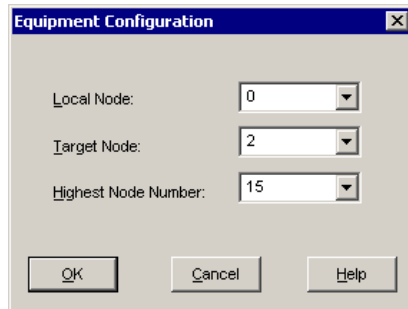
To set up details about the communication process between the target machine and the PLC, use the [Equipment Configuration] dialog box.

For an overview of the driver and equipment settings, see *Environment Setup*.

Note:

- For information on how to display the [Equipment Configuration] dialog box, see the Vijeo Designer Help.

Screen example of Equipment Configuration



Screen Description

Area	Description
Local Node	Enter a value [0 to Highest Node Number (HNN)] to identify the target machine. This value must NOT be the same as the MPI Address set up on the PLC.
Target Node	Enter a value (2 to HNN) to identify the PLC. This value must be the same as the MPI Address set up on the PLC.
Highest Node Number	Enter a value (15, 31, 63 or 126) to identify the Highest Node Number (HNN). Be sure this setting is the same as the PLC unit's Highest Address setting.

Device Address Configuration

Overview

WARNING

UNINTENDED EQUIPMENT OPERATION

Read and understand the instructions in this section to ensure data is properly transferred. If you do not follow these instructions, incorrect data could be written to the PLC and the target machine.

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

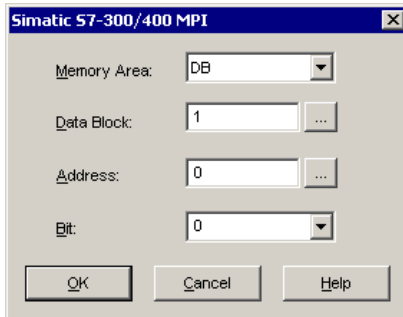
To set up a PLC variable in the Variable List, use the Device Address Keypad from the variable properties.

See *Supported Device Addresses*.

Note:

- For information on how to display the Device Address Keypad, see the Vijeo Designer Help.

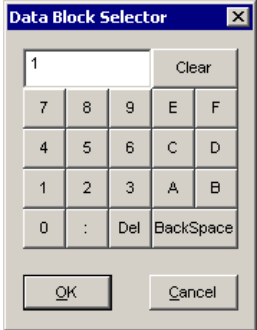
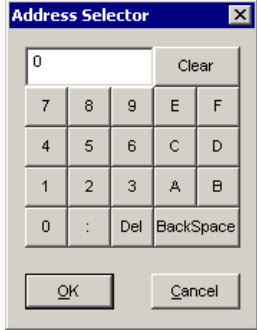
Screen example of Device Address Configuration



The screenshot shows a dialog box titled "Simatic 57-300/400 MPI". It contains the following fields and controls:

- Memory Area:** A dropdown menu with "DB" selected.
- Data Block:** A text input field containing "1" and a button with three dots.
- Address:** A text input field containing "0" and a button with three dots.
- Bit:** A dropdown menu with "0" selected.
- At the bottom, there are three buttons: "OK", "Cancel", and "Help".

Screen Description

Area	Description
Memory Area	Lists the PLC devices.
Data Block	<p>Available when the Memory Area is DB (Data Block). Data Blocks are memory areas created by the user.</p> <p>Click the ellipsis [...] to display the [Data Block Selector] keypad, which assists you in entering a valid data block number.</p> 
Address	<p>Enter the device address number here.</p> <p>When mapping an integer, float, or string variable to a PLC device, you can enter only even addresses.</p> <p>When mapping a discrete variable to a PLC device, you can enter both odd or even addresses.</p> <p>In the Address field, click the ellipsis [...] to display the [Address Selector] keypad, which assists you in entering a valid device address.</p> 
Bit	Available when mapping discrete variables to a PLC device. Lists the available bits (0-7).

