Siemens AG

Simatic 505 NITP/TBP Driver

03/2012

Schneider Electric

Table of Contents

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
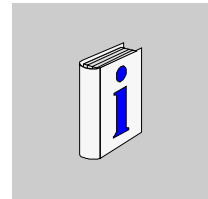
At a Glance

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

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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.*
- 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.

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* 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.

Simatic 505 NITP/TBP Driver

1

Subject of this Chapter

This chapter explains the Simatic 505 NITP/TBP Driver.

What's in this Chapter?

This chapter contains the following topics:

System Structure

Overview

The following table describes the basic system setup for connecting the target machine to a single Siemens Simatic PLC over a serial connection.

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

Connection

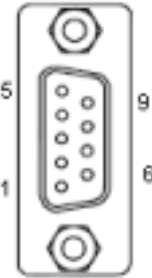| Series	CPU	Comm. Format	Diagram
Simatic 505 Series	520 525 535 545 (1103, 1104, 1105, 1106) 555 (1103, 1104, 1105, 1106) 565 575 (2104, 2105, 2106)	RS-232C	Cable Diagram 1

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

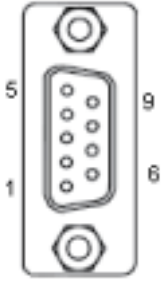All XBTGK and XBTGT2000 Series and higher target machines have two COM ports: COM1 and COM2. The XBTGC2000 Series has one COM port: COM1. XBTGH2000 Series (Junction Box) has one COM port: COM1.

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.
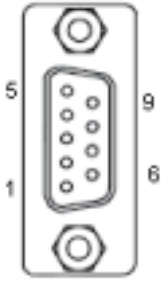
COM1 (9-pin D-Sub Plug)
This COM port can act as either an RS-232C or RS-422 interface.

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 ±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.
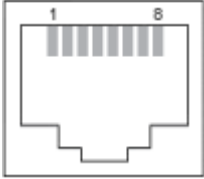
COM2 (RJ45 Socket)

⚠ **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)

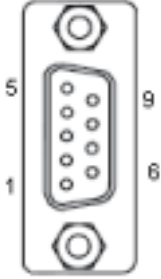This COM port can act as either an RS-232C or RS-422/RS-485 interface.

> ## ⚠ 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

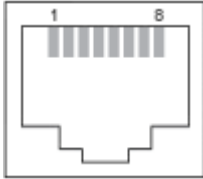| Pin Number	Symbol	Description
1	CD	Carrier Detect
2	RD(RXD)	Receive Data
3	SD(TXD)	Transmit Data
4	ER(DTR)	Data Terminal Ready
5	SG	Signal Ground
6	DR(DSR)	Data Set Ready
7	RS(RTS)	Request to Send
8	CS(CTS)	Send Possible
9	CI(RI/VCC)	Called status display or +5V ±5% output 0.25A
Shell	FG	Frame Ground (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.
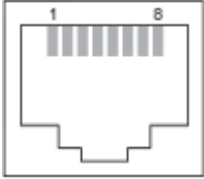
COM1 (RJ45 Socket)

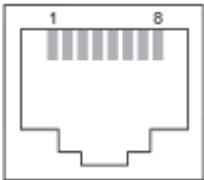| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| When making your own connections, use shielded RJ45 connectors. The shielded connector provides isolation against electromagnetic interference and provides a more secure physical connection in the RJ45 socket. Use of an improper RJ45 connection 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.
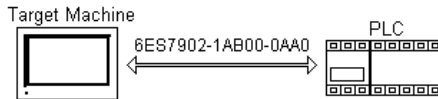
Diagram 1 - RS-232C

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

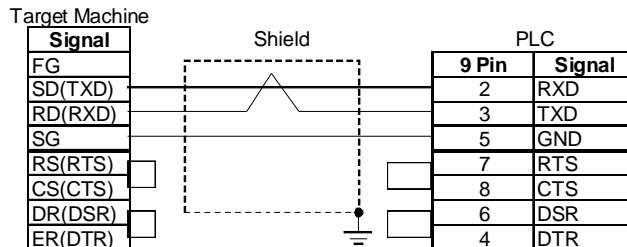| Target Machine		Cable / Adapter	Comments
iPC or XBTGTW Series (COM1/COM2/COM3/ COM4), XBTGK Series (COM1), XBTGC2000 Series or higher (COM1), XBTGT2000 Series or higher (COM1), XBTGH2000 Series (Junction Box COM1), HMIGTO Series (excluding HMIGTO1310) (COM1)	a	RS-232C Cable (Siemens: 6ES7902-1AB00-0AA0)	
iPC or XBTGTW Series (COM1/COM2/COM3/ COM4), XBTGK Series (COM1), XBTGC Series (COM1), XBTGT Series (COM1), HMIGTO Series (COM1), HMISTO Series (COM1), HMISTU Series (COM1), XBTGH Series (Junction Box COM1)	b	Connection Diagram	Cable length: 15m (50 ft) max.

Note:

● When connecting to the RJ45 COM port on the target machine, set its polar switch ON.

a. RS-232C Cable (Siemens: 6ES7902-1AB00-0AA0)

b. Connection Diagram

Target Machine

Signal	Shield		PLC	
			9 Pin	**Signal**
FG				
SD(TXD)			2	RXD
RD(RXD)			3	TXD
SG			5	GND
RS(RTS)			7	RTS
CS(CTS)			8	CTS
DR(DSR)			6	DSR
ER(DTR)			4	DTR

Note:

- When working with XBTGT1000, XBTGT1005, HMIGTO1310, HMISTO, or HMISTU Series target machines, do not add the loop back between RS(RTS) and CS(CTS) and between DR(DSR) and ER(DTR).
- When signal lines overlap as drawn below, indicates a twisted pair.

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 tables list 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.

Category = General

Device	Bit Address[1]	Word Address	16 bit	32 bit
Variable	--	V1 - V999936	H/L[3]	H/L[3]
Constant	K1.1 - K999936.16[1]	K1 - K999936		
Constant Long	--	KL1 - KL999935		
Drum Counter Preset	--	DCP1.1 - DCP2304.16		
Drum Counter Current	DCC1.1 - DCC2304.16[1][2]	DCC1 - DCC2304[2]		
System Status Word	STW1.1 - STW262144.16[1]	STW1 - STW262144		
Global Memory	G1.1 - G32768.16[1]	G1 - G32768		
Global Application Memory	GA1.1 - GZ32768.16[1]	GA1 - GZ32768		
Timer/Counter Preset	TCP1.1 - TCP20480.16[1]	TCP1 - TCP20480		
Timer/Counter Current	TCC1.1 - TCC20480.16[1]	TCC1 - TCC20480		
Drum Step Preset	--	DSP1 - DSP2304		
Drum Step Current	--	DSC1 - DSC2304		
Word Input	WX1.1 - WX8192.16[1]	WX1 - WX8192		
Word Output	WY1.1 - WY8192.16[1]	WY1 - WY8192		
Discrete Input	X1 - X8192[1]	--		
Discrete Output	Y1 - Y8192[1]	--		
Control Relay	C1 - C56320[1]	--		
Device	Address		16 bit	32 bit
Variable Float	VF1 - VF999935		--	H/L[3]
Constant Float	KF1 - KF999935		--	

[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] Read-only.

[3] 16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

Category = Analog Alarm (16 bit)

Device	Address	16 bit
Alarm Acknowledge Flag	AACK1 - AACK512	
Alarm Alarm Deadband	AADB1 - AADB512	
Alarm C-Flags High Word	ACFH1 - ACFH512	
Alarm C-Flags Low Word	ACFL1 - ACFL512	
Alarm Error	AERR1 - AERR512[1]	
Alarm High Alarm Limit	AHA1 - AHA512	
Alarm High-High Alarm Limit	AHHA1 - AHHA512	
Alarm Low Alarm Limit	ALA1 - ALA512	LH[2]
Alarm Low-Low Alarm Limit	ALLA1 - ALLA512	
Alarm Orange Deviation Alarm Limit	AODA1 - AODA512	
Alarm Setpoint	ASP1 - ASP512	
Alarm Setpoint High Limit	ASPH1 - ASPH512	
Alarm Setpoint Low Limit	ASPL1 - ASPL512	
Alarm V-Flags	AVF1 - AVF512	
Alarm Yellow Deviation Alarm Limit	AYDA1 - AYDA512	

[1] Read-only.

[2] 16-bit data, High and Low, refer to data as defined in the following example.
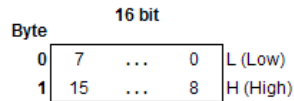

Category = Analog Alarm (Float)

Device	Address
Alarm Process Variable	APV1 - APV512
Alarm Process Variable High Limit	APVH1 - APVH512
Alarm Process Variable Low Limit	APVL1 - APVL512
Alarm Rate-of-Change Alarm Limit	ARCA1 - ARCA512
Alarm Sample Rate (seconds)	ATS1 - ATS512

Category = Loop (16 bit)

Device	Address	16 bit
Loop Acknowledge Flag	LADB1 - LADB512	
Loop Bias	LMX1 - LMX512	
Loop C-Flags High Word	LCFH1 - LCFH512	
Loop C-Flags Low Word	LCFL1 - LCFL512	
Loop Error	LERR1 - LERR512[1]	
Loop High Alarm Limit	LHA1 - LHA512	
Loop High-High Alarm Limit	LHHA1 - LHHA512	
Loop Low Alarm Limit	LLA1 - LLA512	
Loop Low-Low Alarm Limit	LLLA1 - LLLA512	
Loop Orange Deviation Alarm Limit	LODA1 - LODA512	L/H[2]
Loop Output (percent)	LMN1 - LMN512	
Loop Ramp/Soak Status Flags	LRSF1 - LRSF512	
Loop Ramp/Soak Step Number	LRSN1 - LRSN512	
Loop Setpoint	LSP1 - LSP512	
Loop Setpoint High Limit	LSPH1 - LSPH512	
Loop Setpoint Low Limit	LSPL1 - LSPL512	
Loop V-Flags	LVF1 - LVF512	
Loop Yellow Deviation Alarm Limit	LYDA1 - LYDA512	

[1] Read-only.

[2] 16-bit data, High and Low, refer to data as defined in the following example.
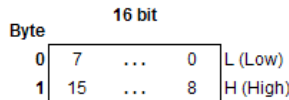
Category = Loop (Float)

Device	Address
Loop Derivative Gain Limiting Coefficient	LKD1 - LKD512
Loop Gain	LKC1 - LKC512
Loop Process Variable	LPV1 - LPV512
Loop Process Variable High Limit	LPVH1 - LPVH512
Loop Process Variable Low Limit	LPVL1 - LPVL512
Loop Rate Time (minutes)	LTD1 - LTD512
Loop Reset Time (minutes)	LTI1 - LTI512
Loop Sample Rate (seconds)	LTS1 - LTS512
Loop Rate-of-Change Alarm Limit	LRCA1 - LRCA512

Consecutive Equipment Addresses

Overview

The following tables list the maximum number of consecutive addresses that can be read by each PLC. Refer to these tables 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 register/device types are used.

NITP

Operation	Max. Consecutive Addresses	Gap Span
Read Word Memory Random (Monitor)	up to 30 words[1]	--
Write Block	up to 30 words[1]	28 words
Read Block		

[1] Device Address encoding is variable in length. In some cases, this number can be halved.

TBP

Operation	Max. Consecutive Addresses	Gap Span
Read Word Memory Random (Monitor)	60 words	--
Write Block	60 words[1]	58 words
Read Block		

[1] Device Address encoding is variable in length. In some cases, this number can be halved.

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 tables list the communication settings, recommended by Schneider Electric, for the target machine and Siemens PLCs.

For details, see *Driver Configuration*.

NITP

	Target Machine Settings		PLC Settings	
Driver	Serial Interface	RS-232C	—	
	Flow Control	None	—	
	Transmission Speed	19,200	Baud Rate	19,200
	Retry Count	2	—	
	Parity Bit	Odd	—	
	Stop Bit	1 bit	—	
	Data Length	7 bits	—	
	Rcv Time Out	3 sec	—	
	TX Wait Time	0 msec	—	

TBP

Target Machine Settings			PLC Settings	
Driver	Serial Interface	RS-232C	—	
	Flow Control	None	—	
	Transmission Speed	19,200	Baud Rate	19,200
	Retry Count	2	—	
	Parity Bit	None	—	
	Stop Bit	1 bit	—	
	Data Length	8 bits	—	
	Rcv Time Out	3 sec	—	
	TX Wait Time	0 msec	—	

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 NITP I/O Manager Configuration
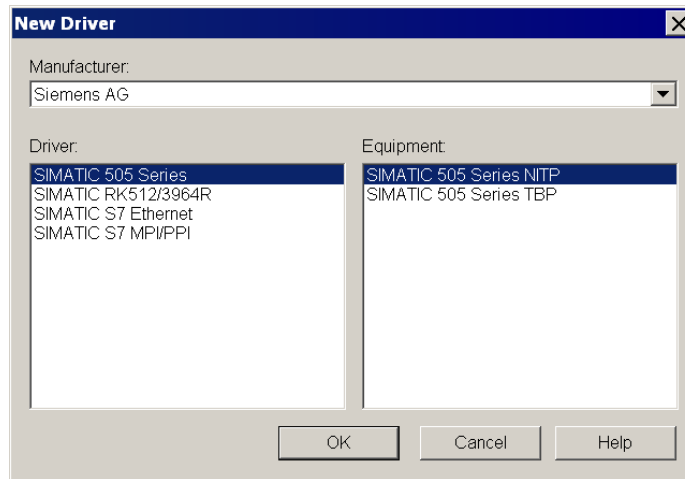
Screen example of TBP I/O Manager Configuration
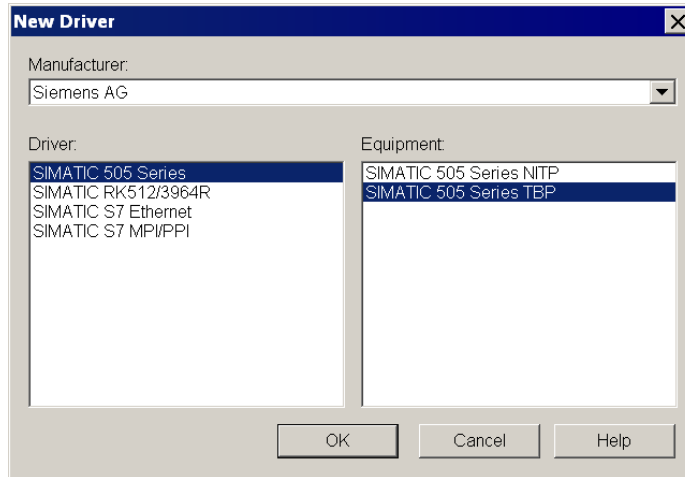
Driver Configuration

Overview

<div style="border: 1px solid black; padding: 10px;">

⚠️**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.**

</div>

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
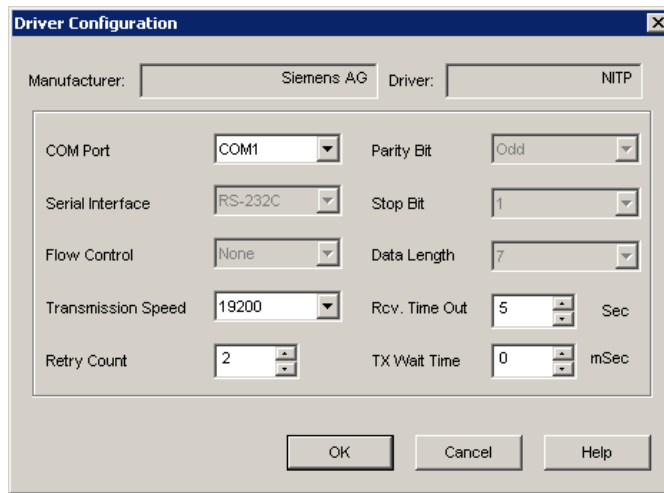
Screen Description

Area	Description
Manufacturer	Displays the name of the PLC manufacturer.
Driver	Displays the driver (NITP or TBP) 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 *Cable Diagrams*.
Flow Control	Defines the flow control as none.
Transmission Speed	Sets the communication speed in bits per second. You can select speeds of 2400, 4800, 9600, 19200, and 38400 bits per second.
Retry Count	Defines the number of times the driver tries to send or receive data when an error has been detected.
Parity Bit	For NITP, defines the parity as odd. For TBP, defines the parity as none.
Stop Bit	Defines the stop bit as 1.
Data Length	For NITP, defines the length of each unit of data as 7 bits. For TBP, defines the length of each unit of data as 8 bits.
Rcv. Timeout	Defines the length of time (1 to 127 seconds) 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 (0 to 255 milliseconds) that the target machine waits, after receiving a communication packet, before sending a response.

Device Address Configuration

Overview

<table>
<tr><td colspan="2" align="center">⚠ WARNING</td></tr>
<tr><td colspan="2">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.</td></tr>
</table>

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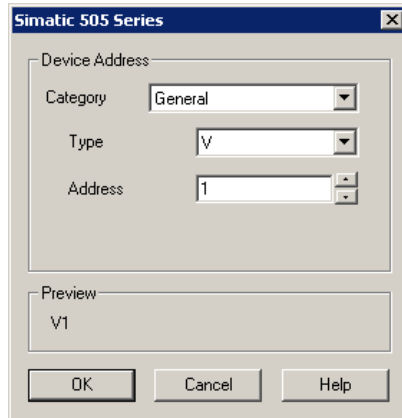
See *Supported Device Addresses*.

Note:

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

Screen examples of Device Address Configuration

Category = General

Category = General, Type = G

Category = General, Type = DCP

Category = Analog Alarm

Category = Loop

Screen Description

Area	Description
Category	Lists the address categories: General, Analog Alarm, and Loop.
Type	When the Category is set to General, this field lists the address types. When the Category is set to Analog Alarm, this field lists the alarm property types. When the Category is set to Loop, this field lists the loop property types.

Area	Description
Address	Defines the memory address you want to read and write.
Bit	When associating discrete variables with a word address, bit defines the bit number.
Drum	When the Category is General and the Type is DCP (Drum Counter Preset), Drum is used to define the Drum number.
Step	When the Category is General and the Type is DCP, Step is used to define the step nubmer word address.
Alarm Number	Defines the alarm number to read and write.
Loop Number	Defines the loop number to read and write.