Telemecanique

Siemens PPI Protocol
XBT N/R/RT

03/2009

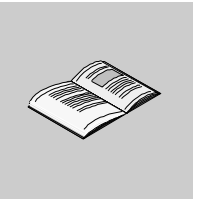
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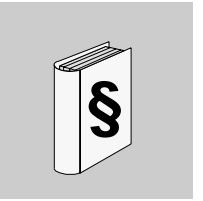
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Safety Information



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 or Warning 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, serious injury, or equipment damage.

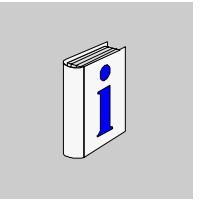
⚠ CAUTION
CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

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.

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About the Book



At a Glance

Document Scope

This document describes the connection to and the communication with the Siemens PPI protocol for the XBT N/R/RT product range.

Validity Note

The data and illustrations found in this document 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.

Related Documents

Title of Documentation	Reference Number
XBT N/R/RT Instruction sheet	W916810140111 A07
XBT N/R/RT User Manual	33003962
Vijeo-Designer Lite	Online help

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

Product Related Information

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All pertinent state, regional and local safety regulations must be observed when installing and using this product. For reasons of safety and to ensure compliance with documented system data, only the manufacturer should perform repairs to components.

Since the XBT N/R/RT terminals are not designed to pilot safety critical processes, no specific instructions apply in this context.

User Comments

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

Operating Principle

1

Overview

This chapter describes the operating principle of XBT terminals in applications using the Siemens PPI protocol.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical 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 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 XBT N/R/RT 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*

What's in this Chapter?

This chapter contains the following topics:

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General Information on Bus Communications	10
Operating Principle	11

General Information on Bus Communications

Overview

The XBT terminals can be connected to PLCs using different protocols. This document describes the communication using the Siemens PPI protocol with the XBT terminal acting as client.

Roles of XBT Terminals

The terminals are usually connected to a communication equipment (PLC or other) via a field bus. The XBT and the PLCs work autonomously of each other.

XBT terminals perform the following functions:

- monitoring function: XBT terminals visualize the processes that are active in the PLCs and indicate alarm states
- command function: XBT terminals send information to the PLC upon user request

Roles of Buses

A bus system provides the possibility to connect different devices via a unique cabling.

Roles of Protocols

The protocol defines the language that is spoken by all the equipment connected to the bus.

Operating Principle

Overview

The PPI protocol is one of the console link protocols for Siemens Simatic S7 and S7-S200.

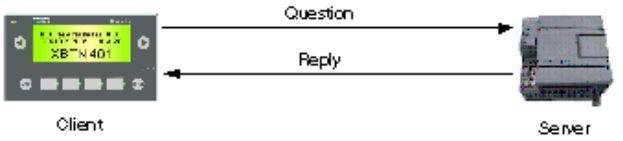
This protocol is compatible with XBT N/R/RT terminals.

Communications between a process controller's (or a computer's) processor and the XBT terminal using the PPI protocol are performed by exchanging messages in the directions point-to-point by means of an asynchronous serial link coupler.

The dialog between the higher processing levels and the XBT terminal is of the question/reply type. The requester (client station) transmits the messages to be executed to the server.

NOTE: The maximum number of bytes for an exchange is 218 (109 words). With the PPI protocol, the terminal communicates in RTU (Remote Terminal Unit) mode.

Example: operation with an XBT N401



The XBT has the status of client.

⚠ WARNING

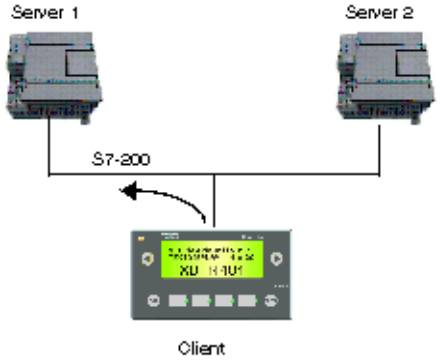
UNINTENDEND EQUIPMENT OPERATION

The protocol must be installed and used by authorized and properly trained peronnel.

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

A server's memory zone is accessed by means of the server's address.

Example: operation with an XBT N401



Software Configuration

2

Overview

This chapter contains the protocol parameters you must configure in the Vijeo-Designer Lite software for operating XBT terminals in Siemens PPI protocol applications.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Vijeo-Designer Lite	14
Protocol - Siemens S7 PPI Dialog Box	16
Configuring Equipment Addresses	17
Equipment Address Dialog Box	19

Vijeo-Designer Lite

Overview

Use the Vijeo-Designer Lite software to configure your XBT terminal for Siemens PPI protocol applications.

⚠ WARNING

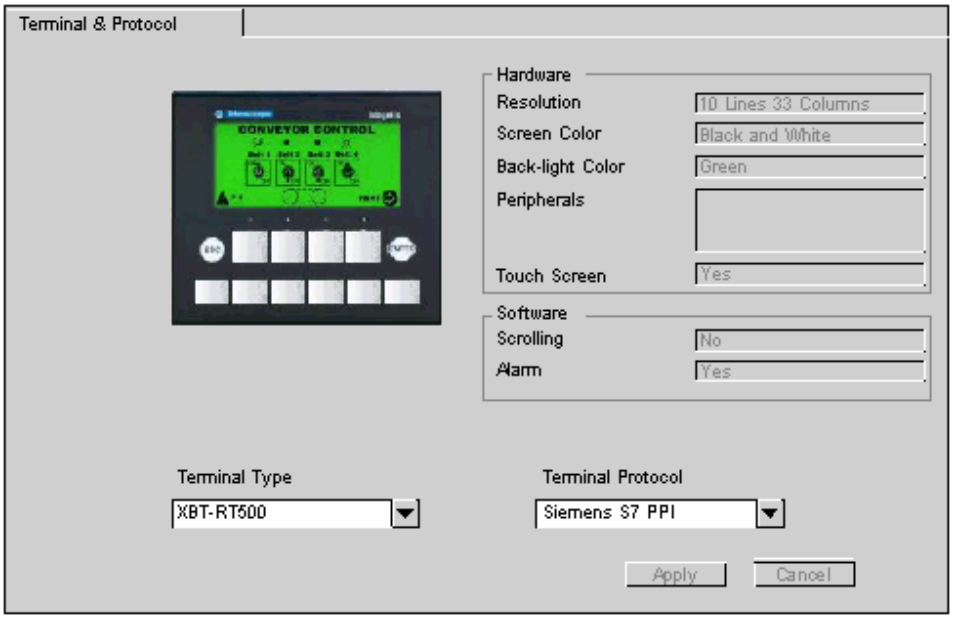
INCOMPATIBLE SOFTWARE

Use only Schneider Electric manufactured or approved software to program hardware.

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

Opening the Protocol - Siemens S7 PPI Dialog Box

To open the **Protocol - Siemens S7 PPI** dialog box in Vijeo-Designer Lite for setting the protocol parameters, proceed as follows:

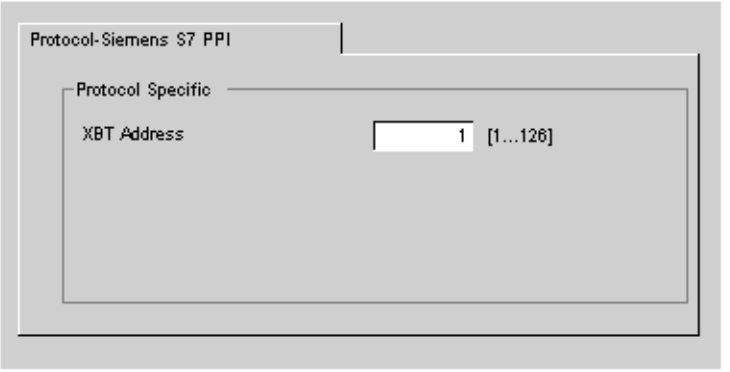
Step	Action
1	Start Vijeo-Designer Lite. To create a new application, continue with step 2, if you have already created a Siemens PPI application, skip steps 2 and 3 and execute step 4.
2	From the application browser on the left-hand side of the Vijeo-Designer Lite window select the item **Configuration** → **Terminal & Protocol**. **Result**: The following dialog box will be displayed on the right-hand side of the Vijeo-Designer Lite window. 
3	From the **Terminal Protocol** list in the lower right corner select the item **Siemens S7 PPI** and click **Apply**.
4	Select from the application browser the item **Protocol - Siemens S7 PPI**. **Result**: The dialog box **Protocol - Siemens S7 PPI** will be displayed on the right-hand side of the Vijeo-Designer Lite window where you can configure the protocol parameters for Siemens PPI communication.

Protocol - Siemens S7 PPI Dialog Box

Purpose

Use this dialog box to configure the protocol parameters for Siemens PPI communication.

Representation



Elements of the dialog box

Element	Description
Protocol Specific	
XBT Address	Enter a unique address between 0 and 126 for the XBT terminal.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

The address of the XBT terminal must be unique.

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

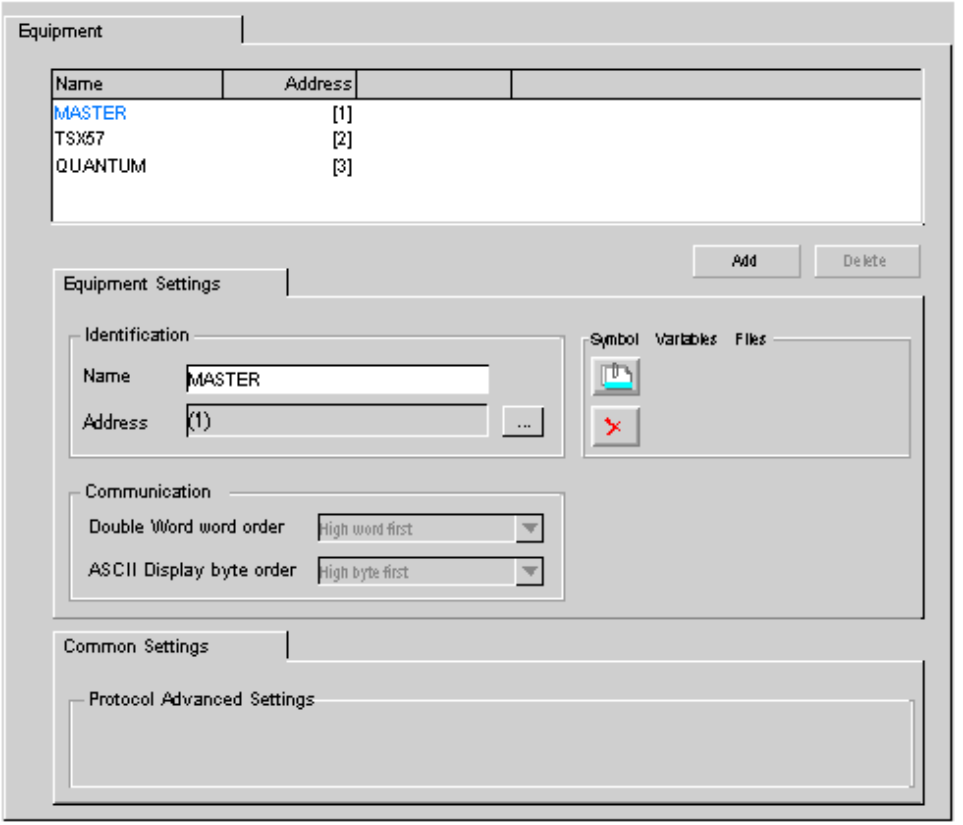
Configuring Equipment Addresses

Overview

Use the Vijeo-Designer Lite software to configure addresses for the equipment your XBT terminal should communicate with.

Opening the Equipment Address Dialog Box

To open the **Equipment Address** dialog box in Vijeo-Designer Lite for configuring equipment addresses, proceed as follows:

Step	Action
1	Start Vijeo-Designer Lite.
2	From the application browser on the left-hand side of the Vijeo-Designer Lite window select the item **Equipments**. **Result**: The following dialog box will be displayed on the right-hand side of the Vijeo-Designer Lite window. 
3	In the **Equipments** dialog box select a device from the list.
4	In the **Equipment Settings** → **Identification** box below click the **...** button right to the **Address** text box. **Result**: The dialog box **Equipment Address** will be displayed where you can configure an address for the selected equipment.

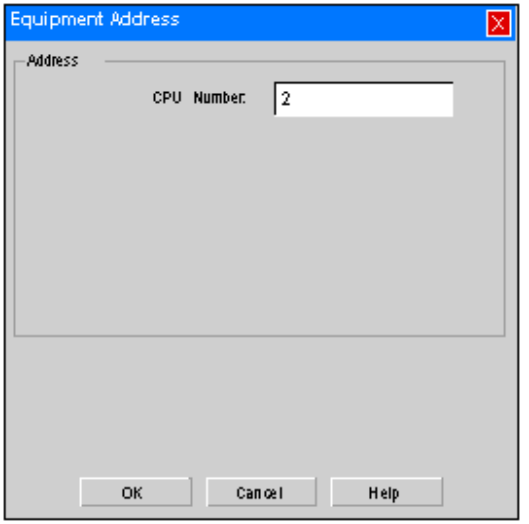
Equipment Address Dialog Box

Purpose

Use this dialog box to configure the address of equipments connected to the network.

Representation

PPI equipment address



Elements of the dialog

Element	Description
CPU Number	Enter the CPU number (between 0 and 126) for the selected equipment.
OK button	Click the **OK** button to assign the entered address to the selected equipment.
Cancel button	Click the **Cancel** button to discard the changes and to close the dialog box.
Help button	Click the **Help** button to open the Vijeo-Designer Lite online help.

Variable Types Supported

3

Variable Types Supported

Table of Variable Types Supported by the XBT

The following table lists all Siemens PPI variables XBT terminals can access:

Variable Type Supported	PPI Syntax	Identifiers
Bit	%Vi.j	• i: (0...131070) • j: (0...7)
String	%VBi	i: (0...131070)
Word	%VWi	i: (0...131070)
Double Word	%VDi	i: (0...131070)
Floating Point	%VDi	i: (0...131070)

NOTE: The objects' addresses must belong to accessible memory zones which are specific to each type of process controller. The *i* indexes, which are always even, correspond to byte addresses in conformity with the Siemens MicroWin operating software convention.

Cables and Connectors

4

Overview

This chapter specifies the cables and connectors required for XBT terminals in Siemens PPI applications.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Cables	24
SUB-D25 Pin Connections	25

Cables

Technical Data

The following table lists the cables required to connect XBT terminals to Siemens S7 PG PLCs.

Connected Device	XBT Terminal	Physical Link	Cable Reference	Length
Siemens S7 PG	XBT N401/N410 XBT R410/R411	RS232	XBT Z9721	2.5 m (8.2 ft.) (SUB-D25 <--> SUBD9)
	XBT RT500/RT511	RS485	XBT ZG9721*	2.5 m (8.2 ft.) (RJ45 <--> SUBD9)

* **XBT RT 500**: you must add a XBT ZRTPW cable adapter for power supply.

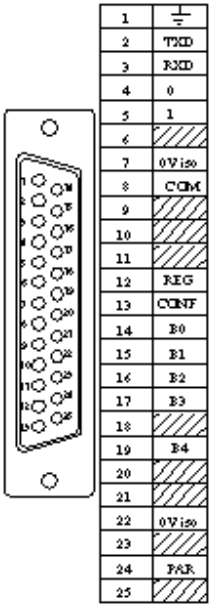
SUB-D25 Pin Connections

Overview

The following XBT terminals provide a SUB-D25 connector on their rear panels:

- XBT N401
- XBT N410
- XBT R410
- XBT R411

The SUB-D25 connector supports RS232 as well as RS485 lines. The pin assignment is shown in the following figure.

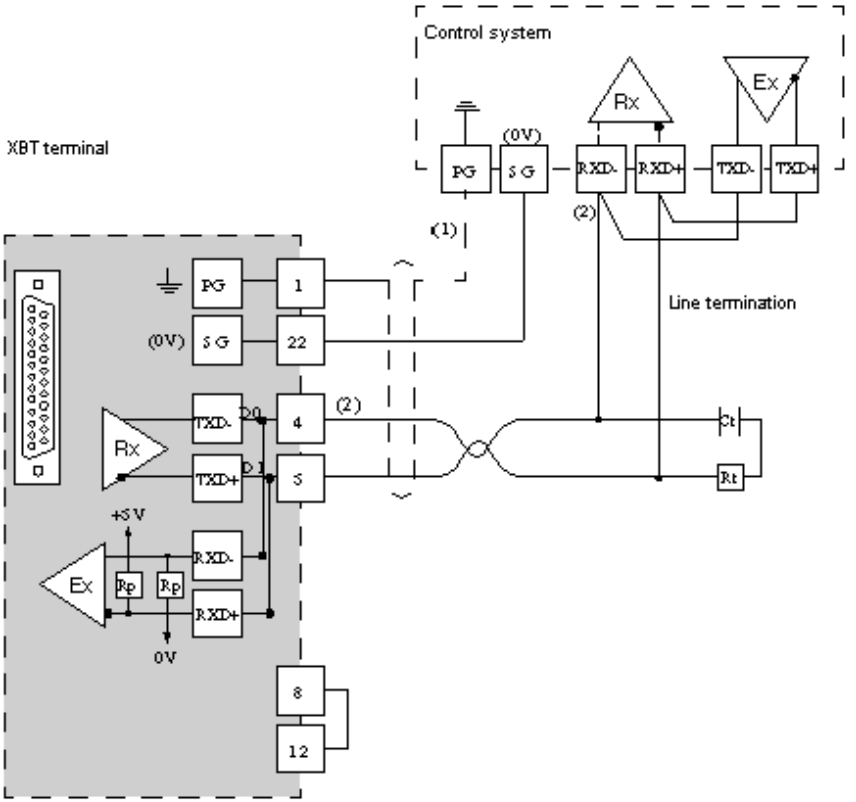


1	⏚
2	TXD
3	RXD
4	0
5	1
6	
7	0Viso
8	COM
9	
10	
11	
12	REG
13	CONF
14	B0
15	B1
16	B2
17	B3
18	
19	B4
20	
21	
22	0Viso
23	
24	PAR
25	

Technical Data

The illustration below shows the cabling for RS485 equipment.

RS485 link example



Legend

(1)	Connection of the shielding at both ends depends on any electrical restrictions affecting the installation.
(2)	Rt: Line impedance resistor (typically 110 Ω). It is recommended to install the line impedance resistor with a RC circuit (R = 120 Ω/0.25 W and C = 1 nF/10 V min). Make sure that only one line impedance resistor is installed.

NOTE: RP resistors are integrated into the XBT and feature:

- 4.7 kΩ for XBT N
- 470 Ω for XBT R
- 600 Ω for XBT RT

Diagnostics

5

XBT Detected Error Indication

Overview

XBT terminals indicate detected errors in different ways

- by displaying question marks `??????` on alphanumerical fields
- by displaying crosses for graphic objects
- by displaying hash characters in alphanumerical fields
- by blinking alphanumerical fields
- by issuing system error messages

The following paragraphs list these three detected errors and their possible reasons.

Question Marks and Crosses

When question marks `??????` and crosses `XXXXXX` are displayed on the display of your XBT terminal, a transmission error has occurred. To correct this, check the following:

If...	Then ...
question marks are displayed	verify that all cables are correctly connected.
question marks are displayed	the XBT terminal may have received no response from the PLC.

Hash Characters

Hash characters displayed in alphanumerical fields on your XBT terminal indicate that the value to be displayed is too long for this alphanumerical field and cannot completely be displayed. The value `100` can, for example, not be displayed in a 2-digit alphanumerical field. To correct this, enter a shorter value or adapt the size of the alphanumerical field so that it can display any of the possible values of the PLC variable.

Blinking Alphanumerical Fields

Blinking alphanumerical fields on your XBT terminal indicate that the value of this field has exceeded or fallen below a user-defined threshold.

System Error Messages

A variety of system error messages is by default configured for the terminals. All these standard system messages are assigned a panel number 200+x. A distinction is made between system error messages indicating communication interruptions and status messages provoked by inputs at the terminal.

These 2 message types differ by the numbers they are assigned and by the way they are displayed at the terminal as shown in the list below:

System Error Message Caused by:	System Error Message Numbers	Display Mode
Communication Interruptions	201– 204	To indicate that a communication interruption has occurred, the message is displayed in a popup dialog box every 10 seconds.
Input at Terminal	241 – 258	The status message is displayed as a response to user input at the terminal.

System Error Messages Caused by Communication Interruptions

Messages 201 to 204 are issued by the terminal to indicate that a communication interruption has occurred. They are displayed in a popup dialog every 10 seconds.

If...	Then ...
message `201: DIALOG TABLE AUTHORIZATION INCORRECT` is displayed	the authorization word in the dialog table does not have the expected value. (Refer to the Vijeo-Designer Lite online help for information on how this word is working.) To correct this, verify that: • you are connected to the right PLC • the memory of your PLC is not corrupted • the correct value is saved on the PLC
message `202: DIALOG TABLE WRITING IMPOSSIBLE` is displayed	the write cycle to the dialog table of the PLC could not be ended. This condition may have the following causes: • too much load on the communication bus • EMC disturbances on the communication bus
message `203: DIALOG TABLE READING IMPOSSIBLE` is displayed	the read cycle from the dialog table of the PLC could not be ended. This condition may have the following causes: • too much load on the communication bus • EMC disturbances on the communication bus

Messages Caused by Input at the Terminal

Messages 242 to 254 are issued by the XBT terminal as a response to user input at the terminal. These messages are displayed directly after the operator has sent an incorrect command to the terminal and will persist until the user has corrected the entered command or value. Messages 255 to 258 are status messages displayed after the user has initiated an operation at the terminal to indicate that it has (or has not) been accepted and is in progress.

If...	Then ...
message `241: IMPOSSIBLE TO READ VARIABLE` is displayed	the terminal has attempted to read a variable and could not get its value. This condition may have the following causes: • too much load on the communication bus • EMC disturbances on the communication bus
message `242: IMPOSSIBLE TO WRITE VARIABLE` is displayed	the terminal has attempted to write in a memory area of the equipment and has received a negative acknowledgement or no acknowledgement at all. This condition may have the following causes: • too much load on the communication bus • EMC disturbances on the communication bus
messages `243` to `249` are displayed	correct the value or command you have entered as indicated by the message.
message `250: LANGUAGE IMPOSED BY PLC` is displayed	the PLC forces the terminal to use a language. This language cannot be changed by the operator. For more information see the Vijeo-Designer Lite online help, functions of the dialog table.
messages `251` or `252` are displayed	correct the value or command you have entered as indicated by the message.
message `253: PASSWORD IMPOSED BY PLC` is displayed	you cannot change the password at the terminal because it is forced by the PLC. For more information see the Vijeo-Designer Lite online help, functions of the dialog table.
message `254: PROTECTED ACCESS PAGE` is displayed	you are trying to access a page that is password protected but you do not have the required authorization level.
messages `255` to `258` are displayed	the commands you entered at the terminal are executed or not executed, as indicated in these status messages.

Diagnosis Counters

3 diagnosis counters can be displayed on the protocol's system panel (line parameters):

Counter	Meaning
1	number of responses received without any FCS error
2	number of responses received with an FCS error
3	number of requests that have not been answered

NOTE: The counters no. 4...8 are not used.

Appendices



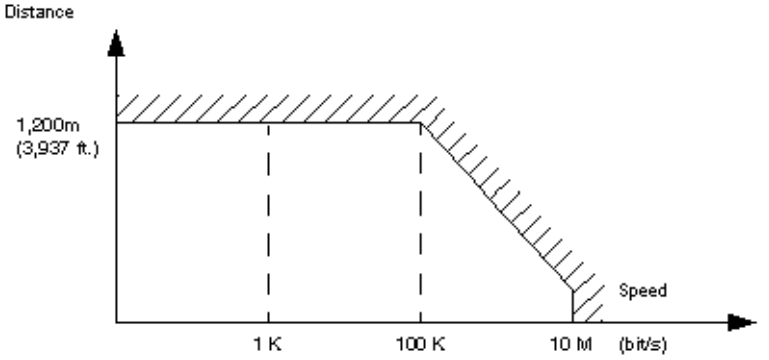
RS485 Recommendations

A

RS485 Recommendations

Diagrams for RS485 Link

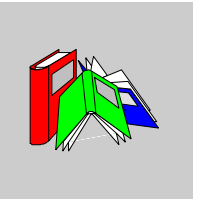
RS485 link



- Maximum length for the link is 1,200 m (3,937 ft.).
- Wiring = 2 shielded twisted wires with a minimum cross-section of 0.6 mm^2 (AWG22) and one 0 V wire

NOTE: The maximum length including the RS485 link is 1,200 m (3,937 ft.), provided that the equipment connected to the XBT terminal is not subject to more stringent restrictions (refer to connected devices instruction sheet) and for XBT RT500 provided that the length of the cable is below 10 m (32.8 ft.) (because power is also supplied by this cable).

Glossary



A

AWG

American wire gauge (wire diameter)

F

FCS

frame check sequence

M

Magelis

Generic commercial name of the range of Schneider HMI terminals.

P

PLC

programmable logic controller

R

RS485

recommended standard for connecting serial devices = EIA/TIA 485

V

Vijeo-Designer Lite

Configuration software for the low end Magelis range. It replaces the XBT-L1000 software.

X

XBT

Any HMI terminal (when it is not necessary to make a distinction).

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