Schneider Electric

Millenium Protocol
XBT N/R/RT

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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 help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

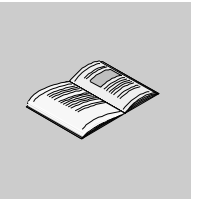
When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

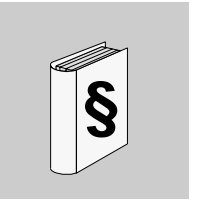
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Safety Information



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 or serious injury.

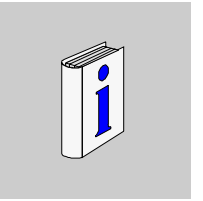
⚠ CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

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

About the Book



At a Glance

Document Scope

This document describes communication between a Millenium 3 logic controller and the XBT N/R/RT product range.

Validity Note

The present documentation is intended for qualified technical personnel responsible for the implementation, operation and maintenance of the products described. It contains information necessary for the proper use of the products. However, those who wish to make a more "advanced" use of our products may find it necessary to consult our nearest distributor in order to obtain additional information.

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Related Documents

Title of Documentation	Reference Number
XBT N/R/RT Instruction sheet	W916810140111
XBT N/R/RT User Manual	33003962
Vijeo-Designer Lite Online Help	33003968

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

Product Related Information

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

User Comments

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

Compatibility

1

Compatibility

Overview

The Millenium protocol available for XBT terminals can be used to communicate with the Millenium 3 (a Crouzet logic controller).

Operating Principle

2

Overview

This chapter describes the operating principle of XBT terminals in applications using the Millenium 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 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.

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

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

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General Information on Bus Communications	12
Master / Slave Communication Principle	13
Communication of XBT Terminals with a Millenium 3 logic controller	14

General Information on Bus Communications

Overview

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

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.

Master / Slave Communication Principle

Overview

Communication with a Millenium 3 logic controller is performed according to the master / slave principle that is described in the following.

Characteristics of the Master / Slave Principle

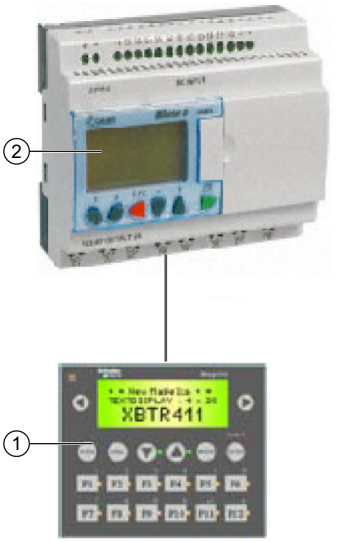
The master / slave principle is characterized as follows:

- Only one master is connected to the bus at a time.
- Only one slave is connected to the same serial bus.
- Only the master is allowed to initiate communication, i.e. to send requests to the slave.
- The master can only initiate one transaction at the same time.
- The slave can only answer requests they received from the master.
- The slave is not allowed to initiate communication to the master.

Terminals acting as Master

The XBT terminal acts as master device, i.e. it provides the client role, whereas the slave device acts as server.

Application example of XBT R411:



1 XBT R411 (master)
2 Millenium 3 logic controller (slave)

Communication of XBT Terminals with a Millenium 3 logic controller

Overview

In communications with a Millenium 3 logic controller, the XBT terminal has the status of master.

The XBT is connected in point-to-point mode to a Millenium 3 logic controller.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

The protocol should only be used by authorized and properly trained personnel.

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

Software Configuration

3

Overview

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

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Vijeo-Designer Lite	16
Protocol Millenium Dialog Box	18
Configuring Equipment Name	19

Vijeo-Designer Lite

Overview

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

⚠ WARNING

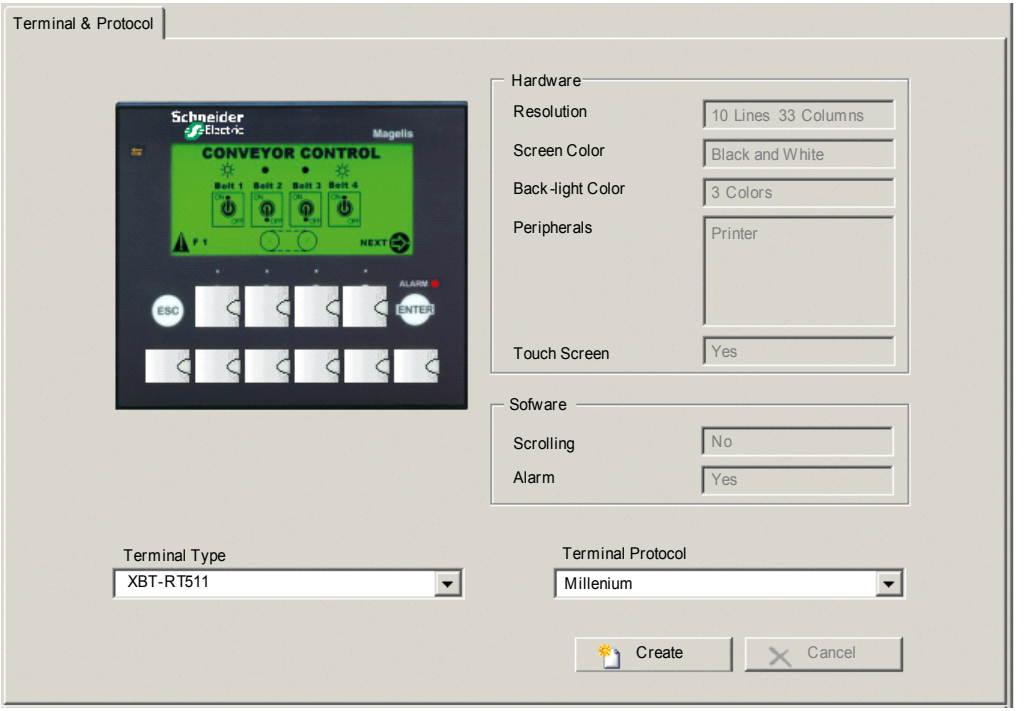
INCOMPATIBLE SOFTWARE

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 Millenium Dialog Box

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

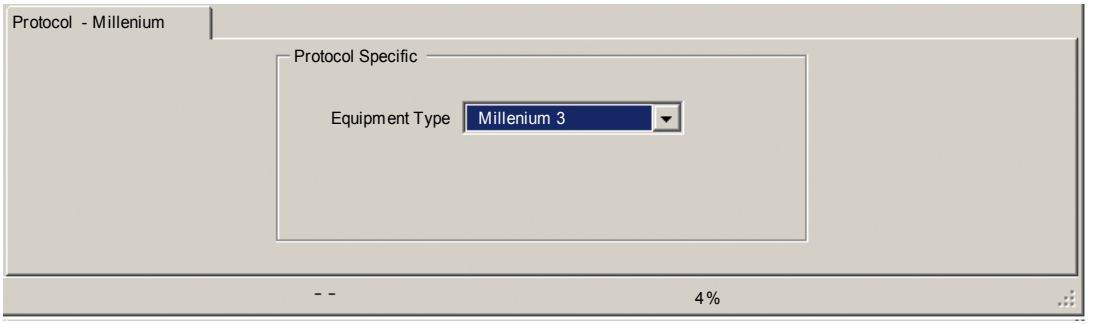
Step	Action
1	Start Vijeo-Designer Lite. To create a new application, continue with step 2, if you have already created a Millenium application, skip steps 2 and 3 and execute step 4.
2	From the application browser on the left-hand side of the Vijeo-Designer Lite window select the item **Configuration →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 **Millenium** and click **Apply**.

Protocol Millenium Dialog Box

Purpose

Use this dialog box to check the Equipment Type.

Representation



Elements of the dialog box:

Element	Description
Equipment Type	Displays the type of the Logic controller connected to the XBT.

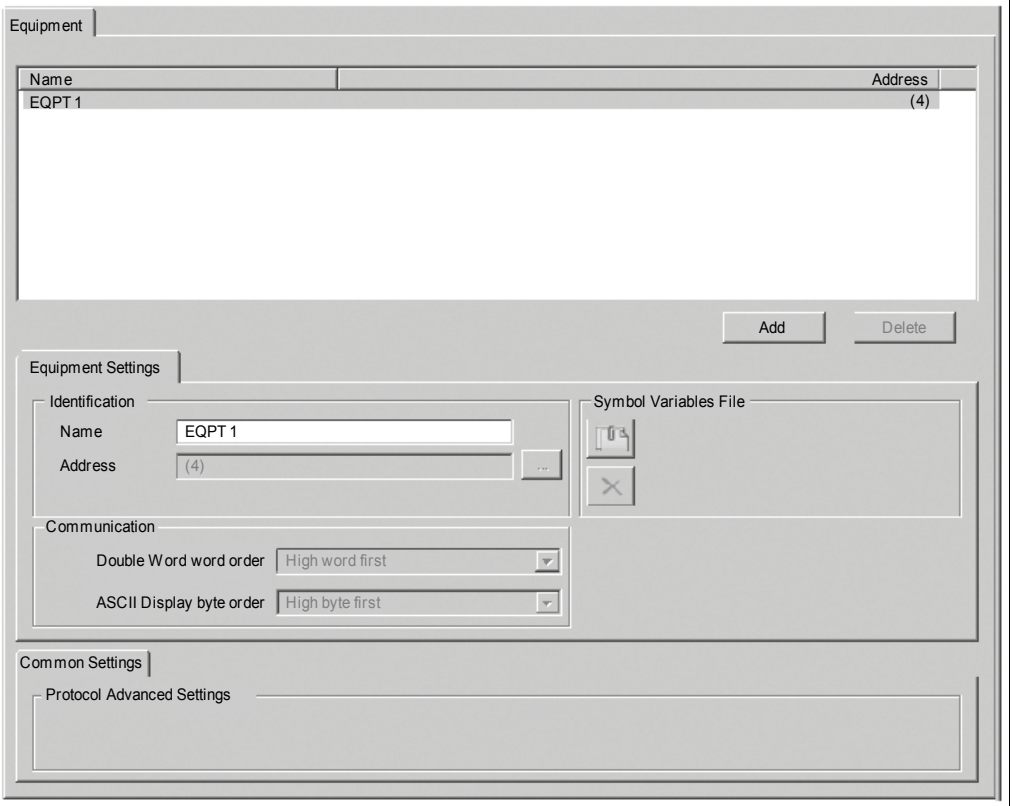
Configuring Equipment Name

Overview

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

Opening the Equipment Name Dialog Box

To open the **Equipment Name** dialog box in Vijeo-Designer Lite for configuring equipment name, 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	Type your Equipment name in the “Name” field.

Variable Types Supported

4

Variable Types Supported

Table of Variable Types Supported by the XBT

The following table lists all Millenium 3 variables XBT terminals can access.

Variable Type Supported	Millenium 3 Syntax
Bit of Input Word	SL IN i - Bit j
Bit of Ouput Word	SL OUT k - Bit j
Input Word	SL IN i
Output Word	SL OUT k
Double Word	= Input Word : SL IN i
Floating	= Input Word : SL IN i
String	= Input Word : SL IN i

Identifiers

- i : 1...24
- j : 1...16
- k : 25...48

Cables and Connectors

5

Cables

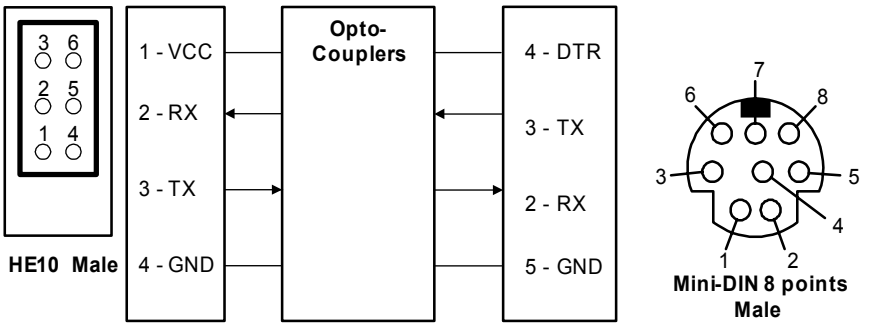
Technical Data

The following table lists the cables required to connect XBT terminals to the Millenium 3 logic controller.

Cable References	Equipment Type	Terminal Type	Length and Type
See Crouzet company	Millenium 3	XBT N401 XBT R411 XBT RT511	2.5 m (98.45 in.) Mini-DIN 8 ↔ HE10

Cables Wiring Diagrams

The cables used to connect XBT terminals to a Millenium 3 Logic Controller include opto-couplers on the RX and TX lines.



Diagnostics

6

Detected Error Indication

Overview

XBT terminals indicate detected errors in different ways

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

The following paragraphs list these 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 anomaly 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 logic controller.

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 logic controller 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 Messages

A variety of system 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 detected 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:

Message Caused by:	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.

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 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 but could not retrieve 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 • attempt to write into a read-only variable
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

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

Counter	Meaning
1	Number of frames received normally (link layer)
2	Number of responses received normally (application layer)
3	Number of responses received with a checksum detected error
4	Number of characters received with a detected error (parity, overrun, framing)
5	Number of requests that have not been answered

NOTE: Counters 6...8 are not used and remain at 0.

Appendices



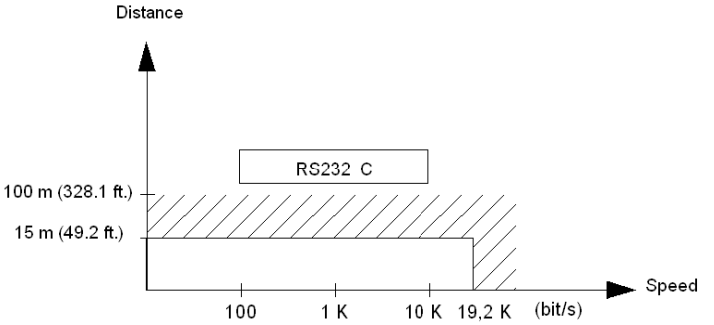
RS232 Recommendations

A

RS232 Recommendations

Diagrams for RS232C Link

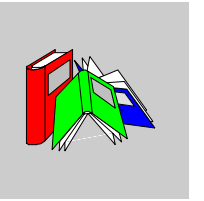
RS232C link



- Maximum length for the link is 15 m (49.2 ft.).
- Wiring = 3 shielded wires with a minimum cross-section of 0.6 mm^2 (AWG22)

NOTE: The maximum length including the RS232 link is 15 m (49.21 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)

E

EMC

Electromagnetic compliance

M

Magelis

Generic commercial name of the range of Schneider HMI terminals.

P

PLC

Programmable logic controller Millenium 3.

R

RS232

Recommended standard for connecting serial devices = EIA/TIA 232

V

Vijeo-Designer Lite

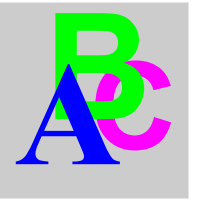
Configuration software for the low end Magelis range. It replaces the XBT-L1000 software.

X

XBT

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

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