# Schneider Electric

## Zelio 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.

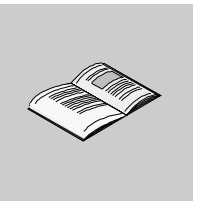
When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

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.

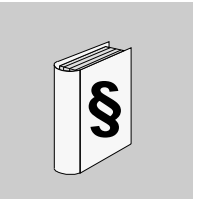
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# Safety Information




## 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.

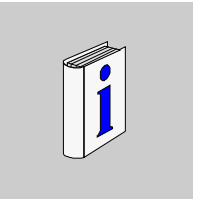
| ⚠ CAUTION |
| --- |
| **CAUTION** indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury. |

| 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 Zelio 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.

#### Registered Trademarks

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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

The XBT N/R/RT terminals are not designed to pilot or control functional safety process, for example, emergency stop. 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.

Failure to use Schneider Electric software or software approved by Schneider Electric may result in improper operation, injury or harm.

## 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 Zelio protocol available for XBT terminals can be used to communicate with the Zelio Logic (a Schneider Electric logic controller).

# Operating Principle

# 2

## Overview

This chapter describes the operating principle of XBT terminals in applications using the Zelio 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 Zelio Logic controller | 14 |

## General Information on Bus Communications

### Overview

The XBT terminals can communicate to PLCs using different protocols. This document describes the communication using the Zelio protocol with the XBT terminal acting as the master (see Master / Slave Communication Principle *(see page 13)*.

### 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 independently 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 Field Bus

A Field Bus system provides the possibility to connect different devices via a specific cable.

### Roles of Protocols

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

# Master / Slave Communication Principle

## Overview

Communication with a Zelio Logic controller is performed according to the master / slave principle.

## Characteristics of the Master / Slave Principle

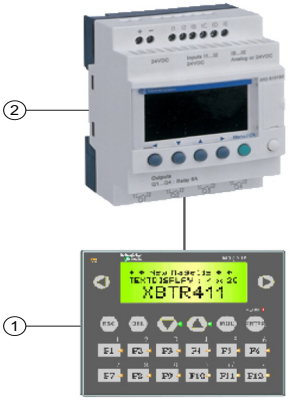
The master / slave principle is characterized as follows:

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

## Terminals acting as Master

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

Application example of XBT R411:




**1** XBT R411 (master)
**2** Zelio Logic controller (slave)

## Communication of XBT Terminals with a Zelio Logic controller

### Overview

In communications with a Zelio Logic controller, the XBT is defined as the master. The XBT is connected in point-to-point mode to a Zelio Logic controller.

# Software Configuration

# 3

## Overview

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

**⚠ 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.**

## What's in this Chapter?

This chapter contains the following topics:


| Topic | Page |
|---|---|
| Vijeo-Designer Lite | 16 |
| Protocol Zelio Dialog Box | 18 |
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## Vijeo-Designer Lite

### Overview

Use the Vijeo-Designer Lite software VJDS•DTM•V••M to configure your XBT terminal for Zelio protocol applications.

**⚠ WARNING**

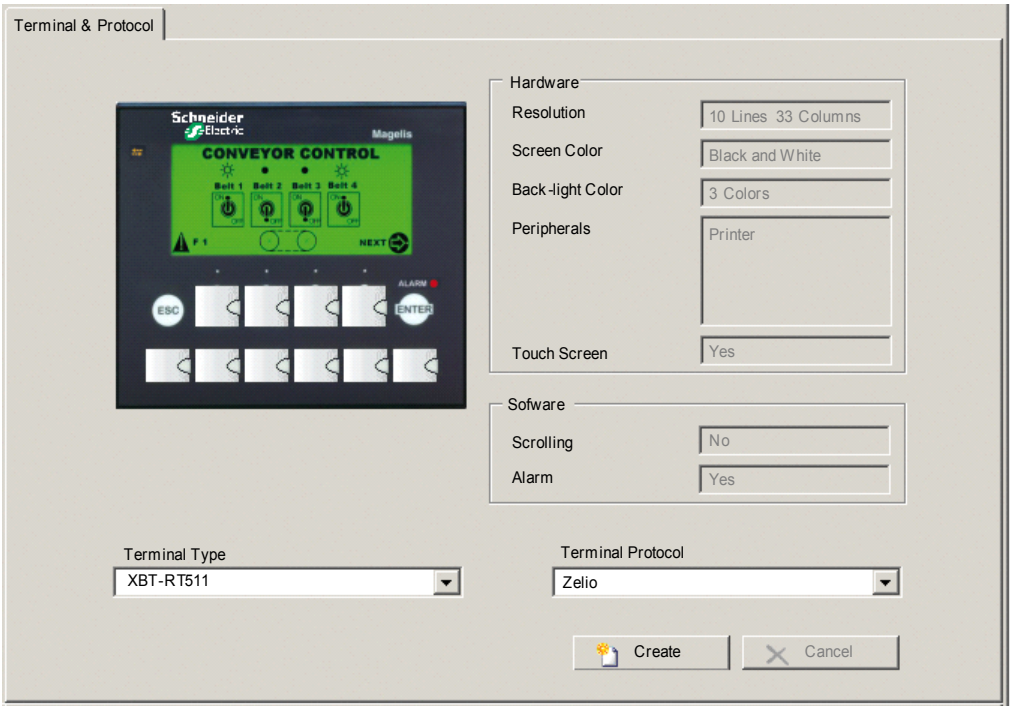
**UNINTENDED EQUIPMENT OPERATION**

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 Zelio Protocol Dialog Box

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

| Step | Action |
|---|---|
| 1 | Start-Vijeo-Designer or click on the menu **File** →**New** .<br>Once an application has been created with Zelio protocol, you can't change the protocol to another one; if you have created your application with another protocol, you can't get it for using Zelio protocol. |
| 2 | From the **Terminal & Protocol** list in the lower right corner, select the item **Zelio**.<br> |
| 3 | From the **Terminal Type** list in the lower left corner, select the **Terminal reference** you want to use and click **Create**. |

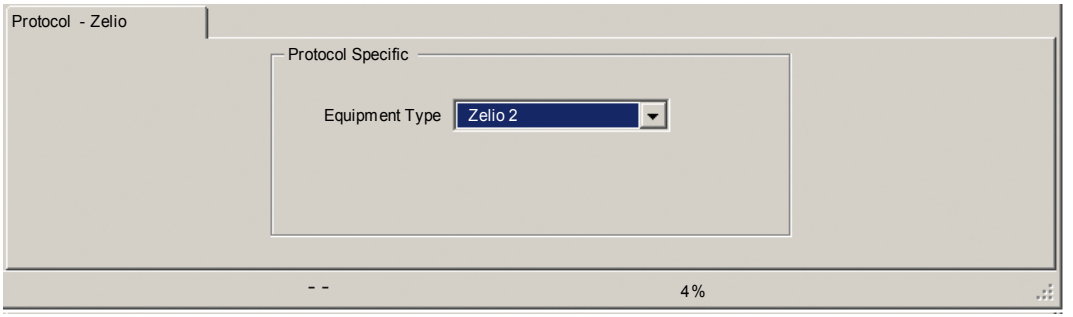
# Protocol Zelio Dialog Box

## Purpose

Use this dialog box to check the Equipment Type.

## Representation

From the application browser on the left-hand side of the Vijeo-Designer Lite window select the item **Protocol-Zelio**, the following dialog box will be displayed on the right-hand side of the Vijeo-Designer Lite window.




Elements of the dialog box:

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

# Configuring Equipment Name

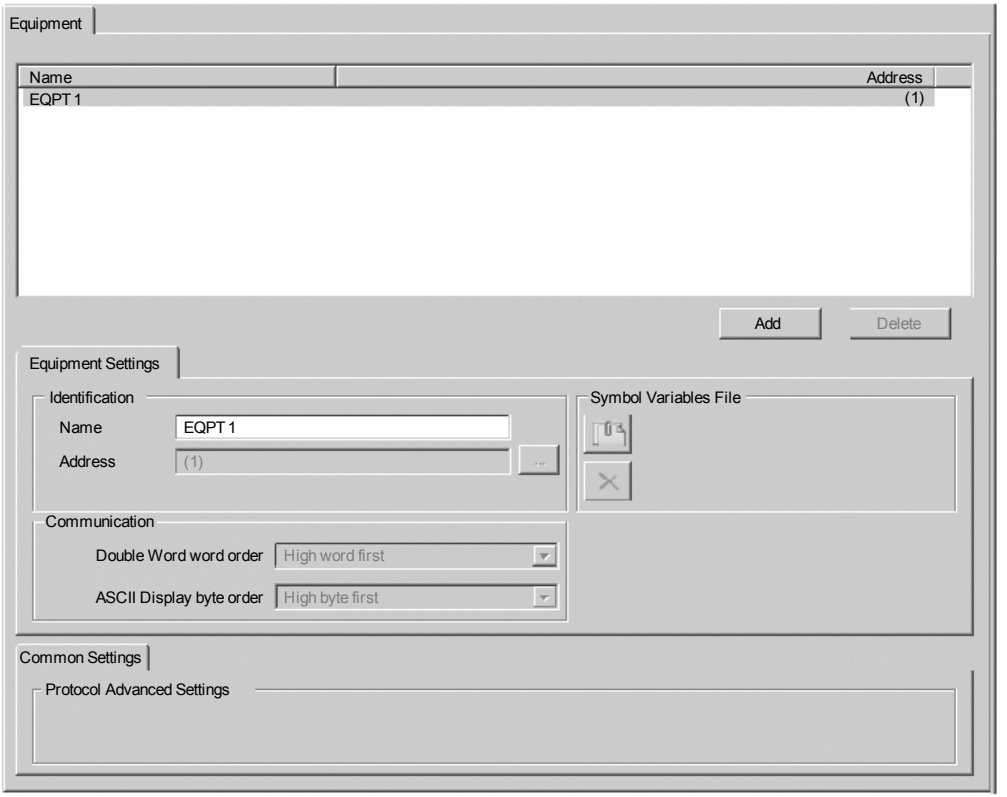
## Overview

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 | Open your application. |

| Step | Action |
|---|---|
| 3 | From the application browser on the left-hand side of the Vijeo-Designer Lite window select the item **Equipments**.<br>**Result**: The following dialog box will be displayed on the right-hand side of the Vijeo-Designer Lite window.<br> |
| 4 | 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 Zelio Logic variables accessible by XBT terminals.

| Variable Type Supported | Zelio Logic 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 | SL IN i |
| Floating | SL IN i |
| String | SL IN i |

Identifiers

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

# Cables and Connectors

# 5

## Cables

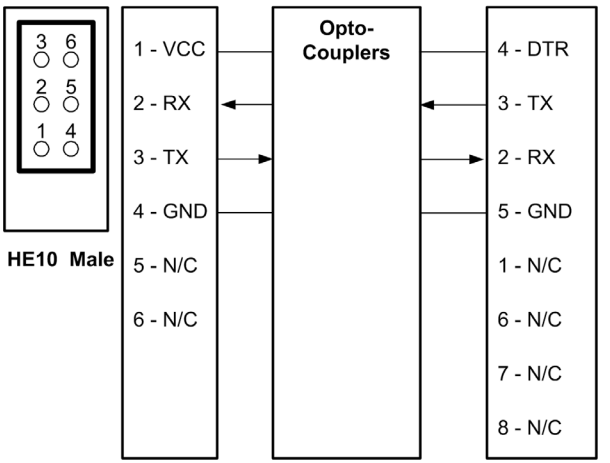
### Technical Data

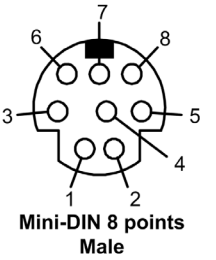
The following table lists the cables required to connect XBT terminals to the Zelio Logic controller.

| Cable References | Equipment Type | Terminal Type | Length and Type |
|---|---|---|---|
| SR2CBL08 | Zelio Logic | XBT N401<br>XBT R411<br>XBT RT511 | 2.5 m (98.45 in.)<br>Mini-DIN 8 ↔ HE10 |

### Cables Wiring Diagrams

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




N/C: Not connected.

# 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 "#" in alphanumerical fields
- by blinking alphanumerical fields
- by displaying system messages

The following paragraphs describe these detected errors and their possible causes.

### Question Marks and Crosses

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

| If... | Then ... |
|---|---|
| Question marks or crosses are displayed | Verify that all cables are correctly connected. |
| | The XBT terminal may have received no response from the logic controller.<br>Verify configuration and communication parameters. |

### 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 fewer digits or characters 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+n. 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 to use this word.) To correct this verify that:<br>● you are connected to the right PLC<br>● the memory of your PLC is not corrupted<br>● the correct authorization value is in the PLC |
| message `202: DIALOG TABLE WRITING IMPOSSIBLE` is displayed | the write cycle to the dialog table of the PLC could not be terminated successfully. This condition may have the following causes:<br>● too much load on the Field Bus<br>● EMC disturbances on the Field Bus |
| message `203: DIALOG TABLE READING IMPOSSIBLE` is displayed | the read cycle from the dialog table of the PLC could not be terminated successfully. This condition may have the following causes:<br>● too much load on the Field Bus<br>● EMC disturbances on the Field Bus |

### Messages Caused by Input at the Terminal

Messages 241 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 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:<br>● too much load on the Field Bus<br>● EMC disturbances on the Field 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:<br>● too much load on the Field Bus<br>● EMC disturbances on the Field Bus<br>● 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 and 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. |

## Diagnostic Counters

5 diagnostic 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

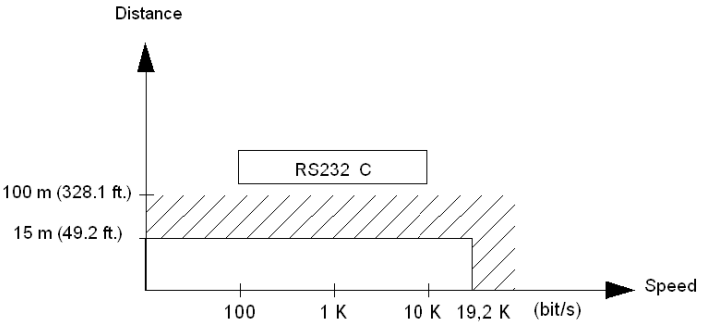
# A

## RS232 Recommendations

### Diagrams for RS232C Link

The following information is general to the entire line of XBT terminals.

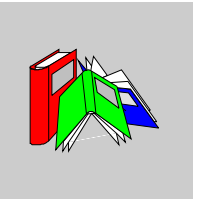
RS232C link




- 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 Zelio Logic.

## 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 Schneider Electric HMI terminal (when it is not necessary to make a distinction).

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