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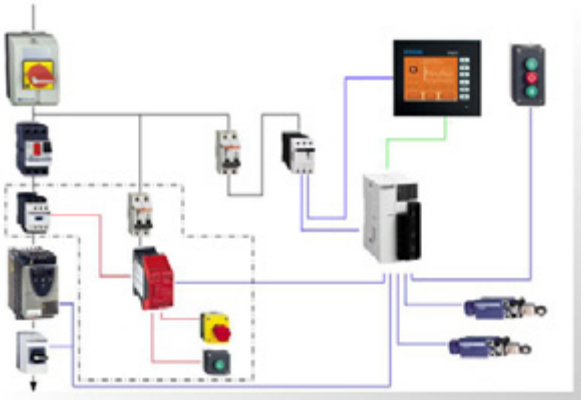
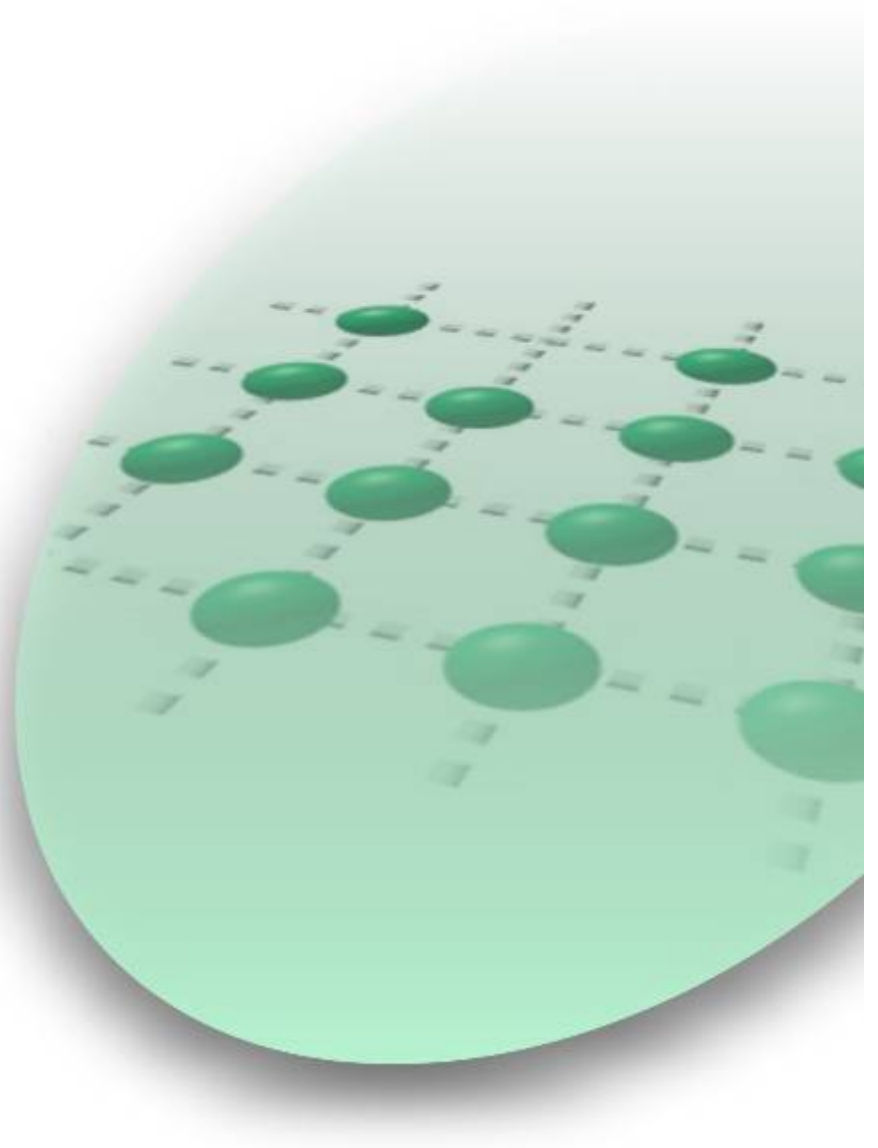
# Twido and Altivar Magelis XBT-GT1100 and Preventa with Osiswitch

## *System User Guide*

[source code]





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Schneider Electric
Building a New Electric World

Mar 2006

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## Introduction

This document is intended to provide a quick introduction to the described System.
It is **not** intended to replace any specific product documentation. On the contrary, it offers additional information to the product documentation, for installing, configuring and starting up the system.

A detailed functional description or the specification for a specific user application is **not** part of this document. Nevertheless, the document outlines some typical applications where the system might be implemented.

# Abbreviations

| Word / Expression | Signification |
|---|---|
| **AC** | Alternating Current |
| **Advantys** | SE product name for a family of I/O modules |
| **Altivar (ATV)** | SE product name for a family of VSDs |
| **CANopen** | Name for a communications maschine bus system |
| **CB** | Circuit Breaker |
| **CoDeSys** | Hardware-independant IEC 61131-3 programming software |
| **ConneXium** | SE product name for a Family of Transparent Factory devices |
| **DC** | Direct Current |
| **EDS** | Electronic Data Sheet |
| **E-STOP** | Emergency Off switch |
| **Harmony** | SE product name for a family of switches and indicators |
| **HMI** | Human Machine Interface |
| **I/O** | Input/Output |
| **IclA (ICLA)** | SE product name for a compact drive |
| **Lexium/Lexium05/LXM** | SE product name for a family of servo-drives |
| **Magelis** | SE product name for a family of HMI-Devices |
| **MB - SL** | SE name for a serial Modbus communications protocol |
| **Micro** | SE product name for a middle range family of PLCs |
| **NIM** | SE product name for a Network Interface Module |
| **PC** | Personal Computer |
| **Phaseo** | SE product name for a family of power supplies |
| **PLC** | Programmable Logic Computer |
| **Powersuite** | An SE software product for configuring ALTIVAR drives |
| **Premium** | SE product name for a middle range family of PLCs |
| **Preventa** | SE product name for a family of safety devices |
| **PS1131 (CoDeSys)** | SE Product name for PLC programming software with CoDeSys |
| **PS** | Power Supply |
| **SE** | Schneider Electric |
| **Sycon** | SE product name of a Field bus programming software |
| **Telefast** | SE product name for a series of distributed I/O devices |
| **Tesys U** | SE product name for a de-centralised I/O System |
| **Twido** | SE product name of a middle range family of PLCs |
| **TwidoSoft** | SE product name for a PLC programming software |
| **Unity (Pro)** | SE product name for a PLC programming software |
| **Vijeo Designer** | An SE software product for programming Magelis HMI devices |
| **VSD** | Variable Speed Drive |
| **WxHxD** | Dimensions : Width, Height and Depth |
| **XBT-L1000** | An SE software product for programming Magelis HMI devices |

# Application Source Code

## Introduction

Examples of the source code used to attain the system function as described in this document can be downloaded from our „Village“ website under **this** link.

The example source code is in the form of configuration, application and import files. Use the appropriate software tool to either open or import the files.

| Extension | File Type | Software Tool Required |
|---|---|---|
| **AIW** | Configuration File | Advantys |
| **CNF** | Configuration File | Sycon |
| **CO** | CANopen definitions file | Sycon |
| **CSV** | Comma Seperated Values, Spreadsheet | Twidosoft |
| **CTX** | | Unity |
| **DCF** | Device Configuration File | Advantys |
| **DIB** | Device Independent Bitmap | Sycon |
| **DOC** | Document file | Microsoft Word |
| **DOP** | Project File | Magelis XBTL |
| **EDS** | Electronic Data Sheet – Device Definition | Industrial standard |
| **FEF** | Export file | PL7 |
| **GSD** | EDS file (Geraete Stamm Datei) | Profibus |
| **ISL** | Island file, project file | Advantys |
| **PB** | Profibus definitions file | Sycon |
| **PDF** | Portable Document Format - document | Adobe Acrobat |
| **PS2** | Export file | Powersuite export file |
| **RTF** | Rich Text File - document | Microsoft Word |
| **STU** | Project file | Unity studio |
| **STX** | Project file | PL7 |
| **TLX** | Project file | Twinline control tool |
| **TWD** | Project file | TwidoSoft |
| **VDZ** | Project file | Vijeo Designer |
| **XEF** | Export file | Unity Pro |
| **ZM2** | Project File | Zeliosoft |

# Typical applications

## Introduction

Here you will find a list of the typical applications, and their market segments, where this system or subsystem can be applied:

**Industry**

- Small automated machine or plant components.
- Remote automation systems used to supplement large and medium-sized machines.

**Buildings/Services**

- Goods elevators, e.g., for use in cafeterias or hospitals.
- Climate management in greenhouses.

| Application | Description | Image |
|---|---|---|
| Freight or goods elevators | This application is used in the implementation of goods elevators, which are for example, used in canteens and hospitals. | |
| Greenhouses | This application is used to open/close greenhouse windows and shutters to regulate the climate in the greenhouse. | |

# System

**Introduction**

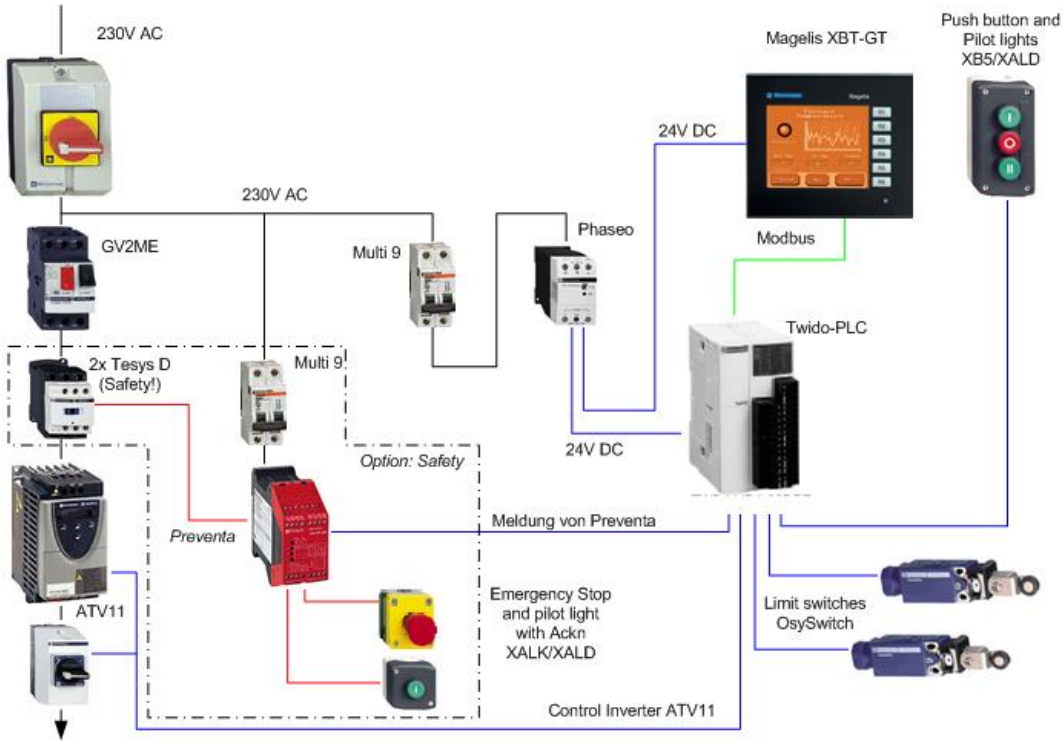
The system chapter describes the architecture, the dimensions, the quantities and different types of components used within this system.

# Architecture

**General**

The control section of this application consists of a PLC, which can be controlled via push buttons or a Magelis panel. The load section is implemented using an Altivar VSD, which also controls changes of direction, and an additional lockable maintenance switch, which is located between the drive and the motor.
In this case, an emergency stop switch is used to initiate shut down and ensure the (optional) safety. The emergency stop switch activates a Preventa analyzing unit and, in the event of an emergency, shuts down the redundant conductors before the drive (safety category 3).
The system also has two limit switches, which limit the motor's path of travel.
An additional sensor, which can be used to implement approximate position control via the pulse rate, can be included as an option.

**Layout**



## Components

**Hardware:**

- Vario VCD master switch (with red and yellow knob)
- Vario VBF master switch (as maintenance switch with black knob)
- GV2ME motor circuit breaker
- Altivar ATV11 variable speed drive
- XALK locking-type emergency stop switch with rotary unlocking (tamper-proof)
- Phaseo ABL7 power supply unit
- TWIDO modular PLC
- Magelis XBT GT1100 operator terminal
- XB5 selector switches, push buttons and indicator lamps, from the Harmony Style 5 range
- XCK OsySwitch roller limit switches
- Standard AC motor

**Software:**

- Twidosoft 3.2
- PowerSuite 1.5 (option)
- Vijeo-Designer 4.3.0

## Quantities of components

Only one unit is needed per system component to fulfill the requirements of the specified task (with the exception of roller limit switches, contactors and buttons/indicator lamps).
A detailed list of the required components, including quantities and part numbers, can be found in the Appendix to this document.

## Degree of Protection

Not all of the components used within this configuration have been designed to withstand the full range of environmental conditions in the field. These components will, therefore, require additional protection and are only suitable for installation in a control cabinet. For information about which components are suitable for direct installation on site, please refer to the list provided in the Appendix (column headed “In the field, on site”, which also indicates the relevant IP protection class).

## Technical data

| | |
|---|---|
| Supply voltage | 230 V AC |
| Total supply output | ~ 3.5 kW |
| Motor output | ≤ 0.75 kW |
| Motor brake | No |
| Connector cross-section | 3x 2.5mm² (L, N, PE) |
| Safety category | Cat. 3 (optional) |

## Safety notice

In this application example, Category 3 (according to EN 954-1) has been selected for the purpose of ensuring safety. The issue of whether a safety category (1-4) is to be adopted and, if so, which one, will be determined by the system’s design and the overall extent to which this system represents a hazard to people and machinery. Safety category 3, based on EN 954-1, is the second highest category there is.

## Size/ Dimensions

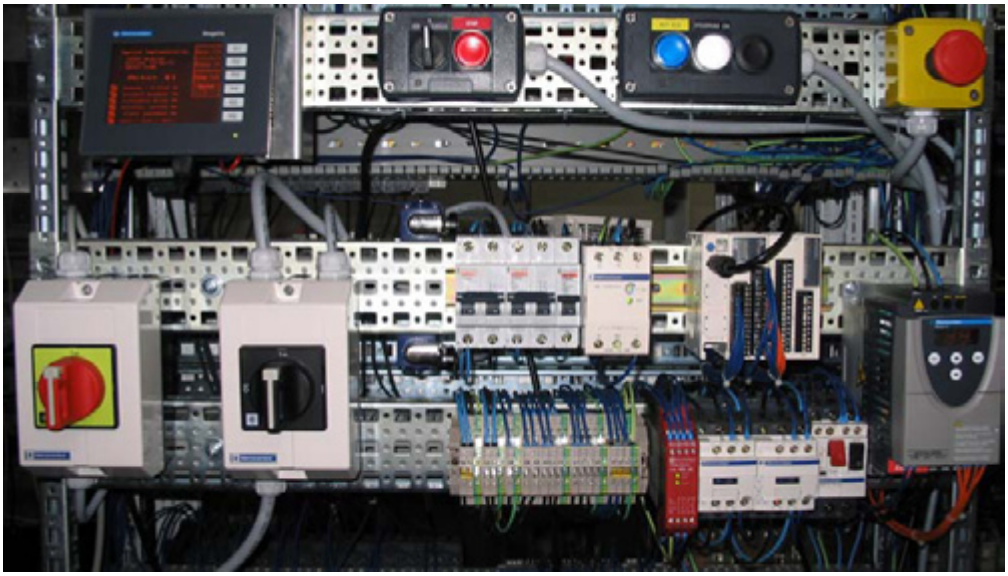
The compact dimensions of the devices used, e.g., the PLC and PS, mean that the components can be installed in a small control cabinet with the following external dimensions: 350 x 350 x 210 mm (WxHxD).
Furthermore, the display elements used to indicate a “group error” and “no protection” can be built into the door of the control cabinet along with the system master switch and emergency stop master switch.

# Installation

**Introduction**

This chapter describes the steps necessary to set up the hardware and configure the software required to fulfil the described function of the application.

**Assembly**



**Notes**

This application was configured to control the amount of light and climate control in a greenhouse.

The components and I/O points listed below represent a cross-section of the components and signals that are the essential minimum for control and display purposes and a select number of optional inputs and outputs which can be used in conjunction with most typical applications (safety/maintenance switches).

This document does not claim to be comprehensive and **does not absolve users** of their duty to check the safety requirements of their equipment and to ensure compliance with the relevant national or international rules and regulations in this respect.

Safety category 3, which is suggested here as one possible option, is not necessarily required or adequate for every application. A risk analysis normally defines the safety category to be used. A risk analysis, in accordance with the national and/or international standards and regulations in force, must be drawn up and verified for each individual system.

## PLC wiring

| Twido PLC inputs | Description |
|---|---|
| DC In 0 | Not used, reserved for high-speed counters |
| DC In 1 | Not used, reserved for high-speed counters |
| DC In 2 | Open selector switch |
| DC In 3 | Close selector switch |
| DC In 4 | Stop button |
| DC In 5 | Limit switch open |
| DC In 6 | Limit switch closed |
| DC In 7 | Motor circuit breaker OK |
| DC In 8 | Variable speed drive OK (RC terminal) |
| DC In 9 | Maintenance switch OK (option) |
| DC In 10 | Safety present (option) |
| DC In 11 | Spare |

| Twido PLC outputs | Description |
|---|---|
| Trans. Out Q0 | PLC ON (24 V) |
| Trans. Out Q1 | Group fault (24 V) |
| Relay Out Q2 | Input LI1 ATV11 (clockwise rotation, close) |
| Relay Out Q3 | Input LI2 ATV11 (counterclockwise rotation, open) |
| Relay Out Q4 | Input LI3 ATV11 (select bit 0, JOG frequency) |
| Relay Out Q5 | Spare (24 V) |
| Relay Out Q6 | Spare (24 V) |
| Relay Out Q7 | Input LI3 ATV11 (select bit 1, JOG frequency) |

| Twido 24 V supply | Description |
|---|---|
| Com (inputs) | 0 V DC reference voltage |
| -V | 0 V DC reference voltage |
| Com (+) | +24 V DC |
| Com 1 | +15 V DC (ATV11 potential) |
| Com 2 | +24 V DC |
| Com 3 | +15 V DC (ATV11 potential) |

## VSD control circuit wiring

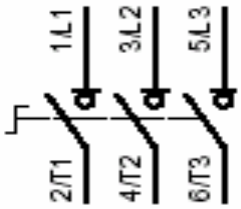
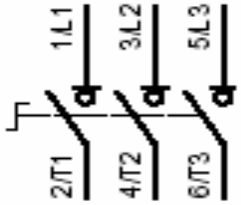
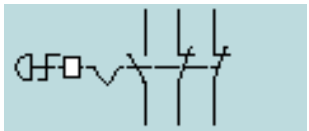
| ATV11 | Description |
|---|---|
| LI1 | Twido relay Out Q2 |
| LI2 | Twido relay Out Q3 |
| LI3 | Twido relay Out Q4 |
| LI4 | Twido relay Out Q7 |
| RA | +24 V DC |
| RC | Twido In 8 |
| +15 V | Twido Com 1 and Com 3 |

# Hardware

## General

- The components designed for installation in a control cabinet, i.e., Twido PLC, Phaseo power supply unit, emergency stop switching device, line circuit breaker, contactors and motor circuit breaker, can be snapped onto a 35 mm top-hat rail.
- The Altivar variable speed drive can also be installed in a control cabinet, but requires an adapter bracket.
- Emergency stop, master and maintenance switches are designed for backplane assembly in the field; all switches can also be installed directly in a control cabinet (e.g., on control cabinet door) without their enclosing housings.
- There are two options available for mounting XB5 push buttons and indicator lamps:
  1. option: Using a 22 mm hole drilled into the front door of the control cabinet in the appropriate position.
  2. option: Using an XALD housing, which can house up to 5 push buttons or indicator lamps. This XALD is designed for backplane assembly or direct wall mounting.
- 230 V AC wiring between mains switch, emergency stop switch and relay, 24 V supply (primary), as well as motor circuit breaker, load relay and VSD.
- 24 V DC wiring between power supply unit, PLC, push buttons, indicator lamps and VSD control circuit.
- Drive wiring via relay contacts with potential voltage from the drive (neither 24 V DC nor 230/400 V AC).

## Components

| | | |
|---|---|---|
| **Mains switch**<br>**VCF-02GE**<br>**(red/yellow switch)** | |  |
| **Maintenance switch**<br>**VBF-02GE**<br>**(black switch)** | |  |
| **EMERGENCY STOP switch**<br>**XALK178G** | |  |

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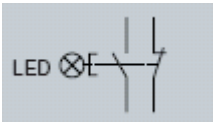
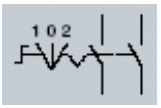
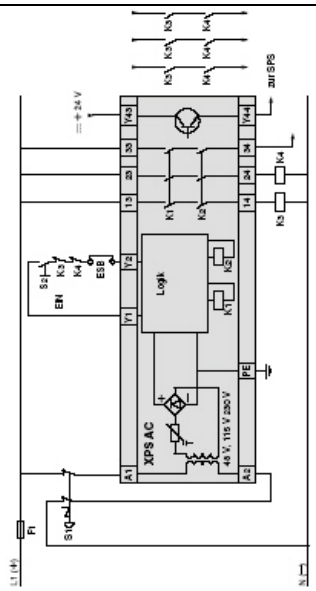
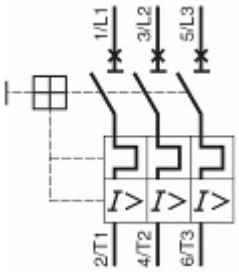
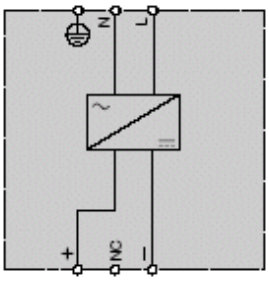
**Components**
Contd.

| | | |
|---|---|---|
| **Harmony Style 5 selector and push button switch with indicator lamp**<br><br>**XB5** | <br> |  <br>  |
| **EMERGENCY STOP fault relay**<br><br>**XPS AC3721** | |  |
| **Motor circuit breaker**<br><br>**Circuit breaker GV2-ME16** | |  |
| **Phaseo power supply unit**<br><br>**ABL7CEM24012** | |  |

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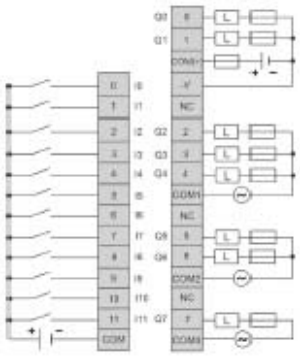
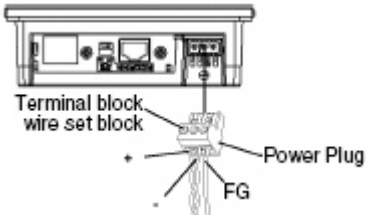
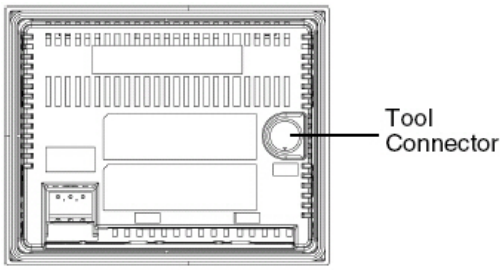
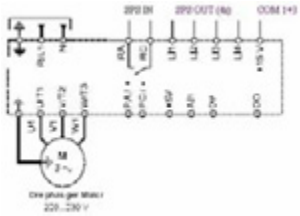
**Components**
Contd.

| | | |
|---|---|---|
| **Twido PLC**<br><br>**TWDLMDA 20DRT** | <br>*TWD LMDA 20DRT* |  |
| **Magelis operator terminal 3,8”**<br><br>**XBT-GT1100** | |  <br>  <br>**(rear view)** |
| **Osiris roller limit switch**<br><br>**XCD2118P16** | | |
| **Altivar ATV11 variable speed drive**<br><br>**ATV11PU18M2E** | |  |

# Software

## General

Software is primarily used for programming the Twido, including creating the configuration for communication and assigning inputs and outputs. The **Twidosoft** programming tool is used for programming.

The HMI application on the Magelis operator terminal is configured using **Vijeo-Designer** software.

The Altivar 11 variable speed drive can be parameterized using the front operator panel. However, the **PowerSuite** software is a more user-friendly option and can be used for configuring the drive, saving data and quickly restoring existing data/configurations for maintenance purposes.

Powersuite can be used to optimize the parameters online.

To use the software packages, your PC must have the appropriate Microsoft Windows operating system installed:

- Windows 2000 *or*
- Windows XP

The software tools have the following default install paths:

- Twidosoft *C:\Program Files\Schneider Electric\TwidoSoft*
- Vijeo-Designer *C:\Program Files\Schneider Electric\Vijeo-Designer*
- PowerSuite *C:\Program Files\Schneider Electric\PowerSuite*

Twidosoft 3.2

Vijeo-Designer 4.3.0

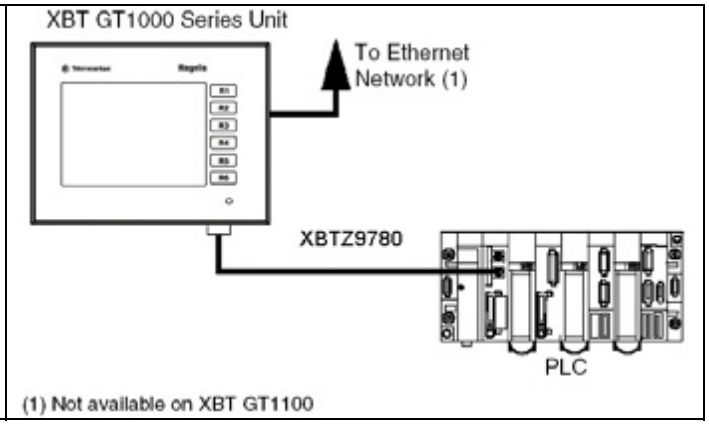
Powersuite V1.5

# Communication

## General

A Modbus connection is used to exchange data between the Magelis XBT GT1100 terminal and the Twido PLC. The XBTZ9780 communication cable shown below is needed to connect these two devices. The software driver required for Modbus communication is already contained in the software packages for the Magelis panel and the Twido.

## Magelis

| Communication cable | |
|---|---|
| XBTZ9780 |  |

# Implementation

## Introduction

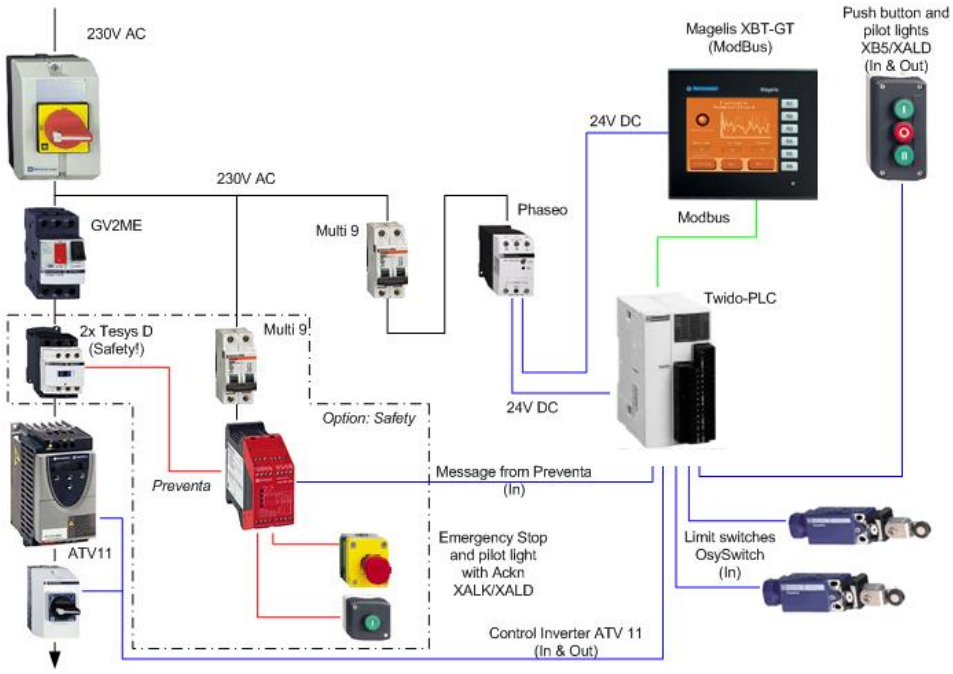
The implementation chapter describes all the steps necessary to initialise, to configure, to program and start-up the system to achieve the application functions as listed below.

## Function

### Functional description

1. All the conditions required to clear the group error lamp must be met, i.e., motor circuit breaker and maintenance switch switched on and safety circuit on. The group error message disappears and the Magelis panel is visible on the main screen.
2. The motor can only be controlled in the “open”/”close” direction if the associated limit switch has not been pressed and no errors are pending.
3. Push buttons: The selection for opening and closing can be activated via the selector switch. Invoking the motion function starts motion in the selected direction. Motion can be stopped by pressing the stop button, selecting the opposite direction or reaching the limit switch. It will also stop if an error occurs. Although operation is always possible via the push button housing, when this function is used, motion is always made at the lowest speed (1).
4. Motion can also be activated by entering a “1” in the “open” or “close” parameter, as appropriate. Motion control via the Magelis panel is ignored if the push button housing selector switch is not in the centre position (priority circuit). Entering “0” in the parameter stops the drive, just as if the hardware stop button had been pressed.
5. Speed pre-selection: The speed for the variable speed drive can be pre-defined via the Magelis terminal. A number from 0 to 3 can be entered (0 = lowest speed). The default setting is 0 and will also return to default when an error occurs.
6. Faults: Faults are displayed as group errors via a fault indicator lamp or as individual fault messages on the Magelis panel.

## Layout

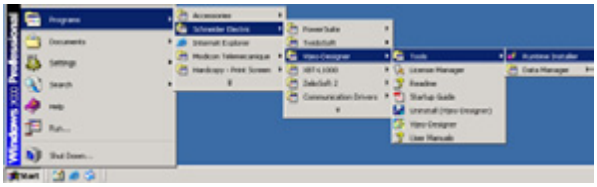
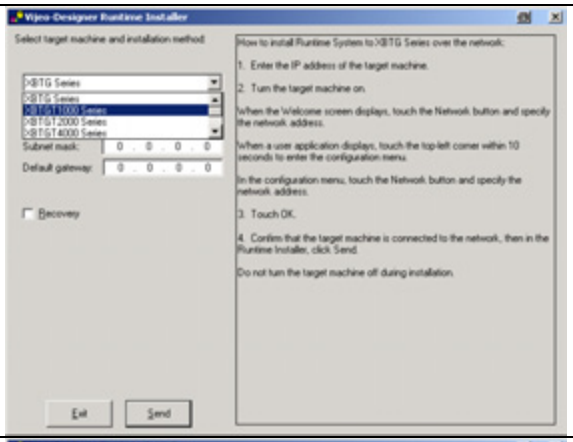
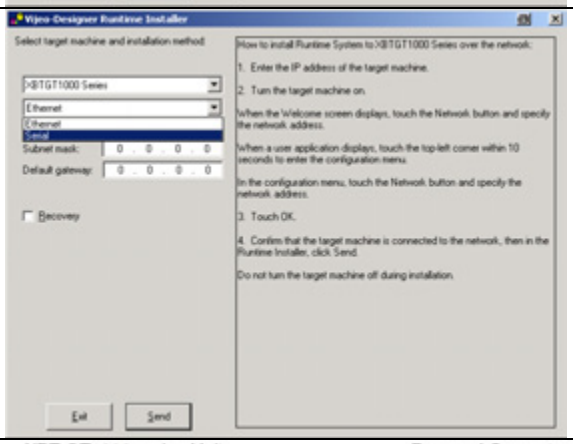
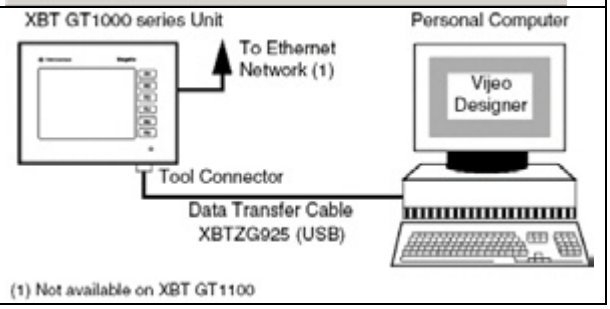


# HMI

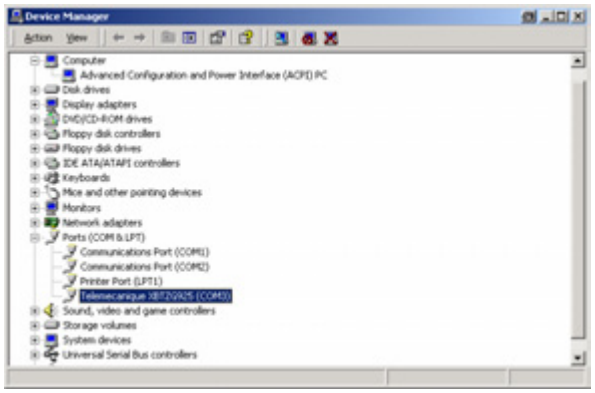
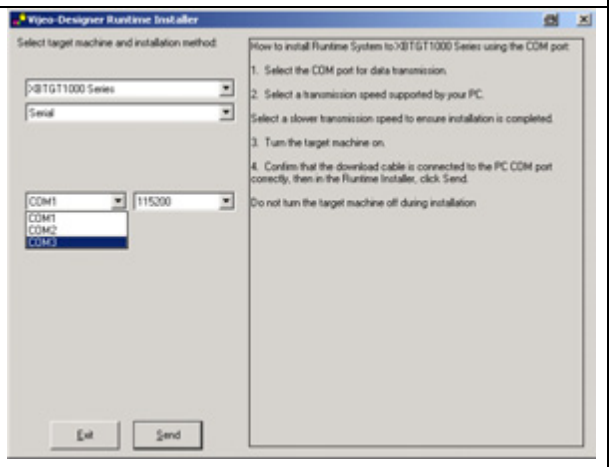
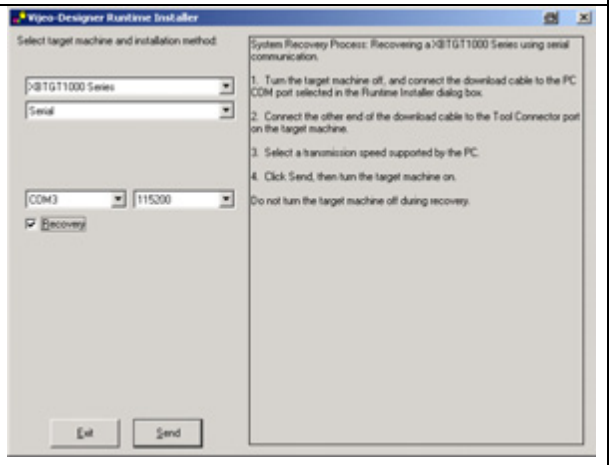
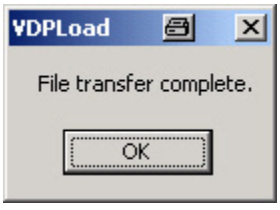
## Introduction

This application features a Magelis XBT GT1100 HMI, which is interfaced with the PLC via the Modbus protocol. To configure the Magelis, Vijeo-Designer software is used. The procedure is explained in the following pages.

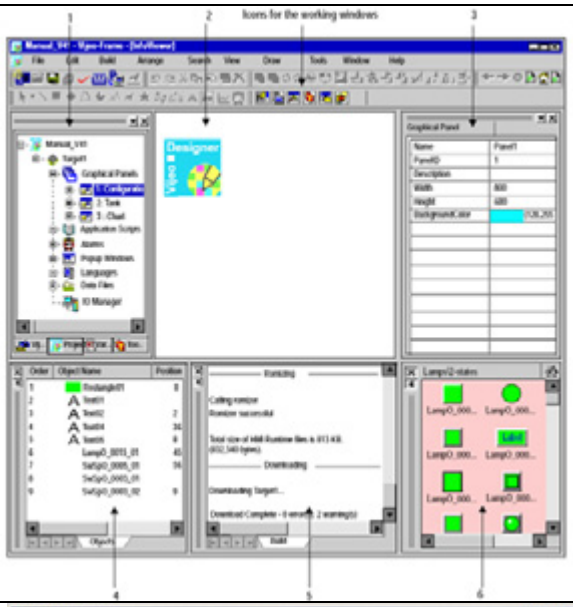
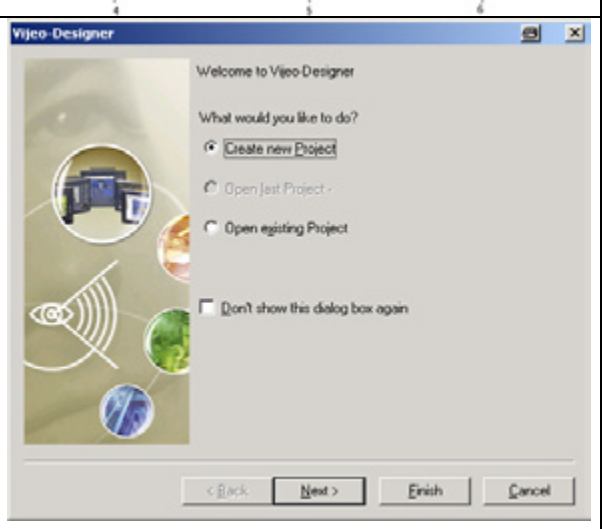
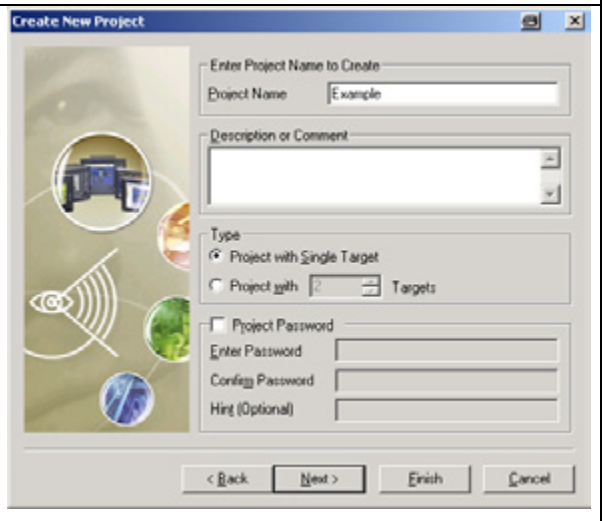
## Updating Runtime

| | | |
|---|---|---|
| **1** | Depending on the firmware that is delivered within the XBT GT, the runtime of the device might be updated to the version 4.3. To do this, start the **Runtime Installer** which can be invoked by:<br>**- Start**<br>**- Programs**<br>**- Schneider Electric**<br>**- Vijeo-Designer**<br>**- Runtime Installer** |  |
| **2** | The destination device must be inserted In the top box.<br><br>Please select the **XBTGT1000 Series** entry. |  |
| **3** | The XBT GT1100 does not provide an Ethernet port, so you must select **Serial**. |  |
| **4** | Now you need to connect the PC and the operator panel by using the cable **XBTZG925**. |  |

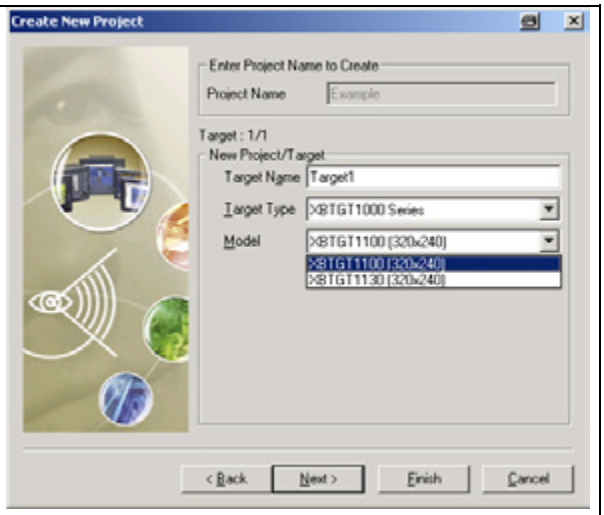
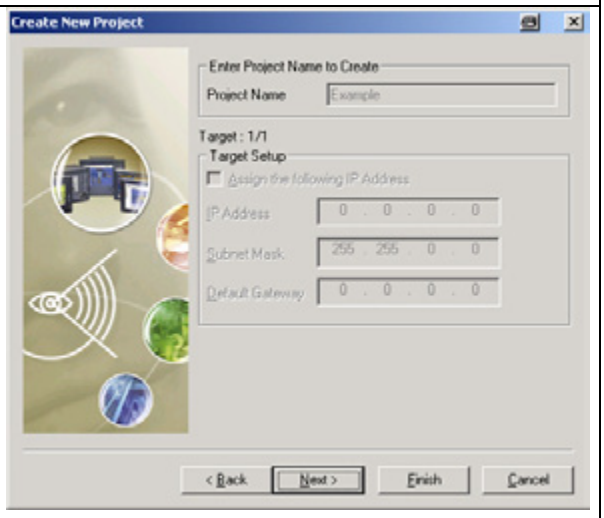
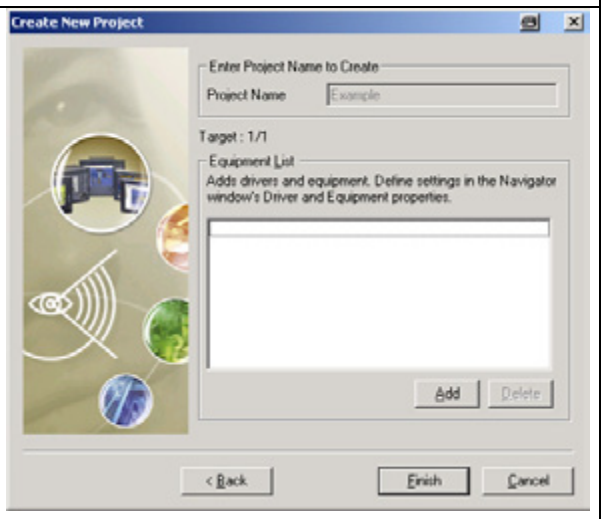
**Updating Runtime**
*Contd.*

| | | |
|---|---|---|
| **5** | Windows assigns the USB cable to a specific port - in this case it is mapped to **COM3.** To check what port it has been mapped to, view the settings by clicking<br>- **Start**<br>**- Control panel**<br>**- System**<br>**- Hardware [Tab]**<br>**- Device Manager**<br>**- Ports (COM & LPT) [Folder]** |  |
| **6** | Back to the configuration screen for the runtime installer you select the COM port assigned to the USB cable. In this example it is **COM3**.<br><br>The setting for the baud rate remains at **115200**. |  |
| **7** | Check the **Recovery** option for downloading the runtime. Now follow the steps below:<br><br>1. Turn off the power supply for the device.<br>2. Click **Send** at the bottom of the dialog<br>3. Turn on the power supply for the device.<br>4. Do not break the connection between Magelis panel and PC and do not turn off the power supply while the transfer is active |  |
| **8** | When the transfer has been successfully finished you will have to acknowledge the message with **OK**.<br><br>Please note that no application has been transferred to the HMI device yet.<br><br>A runtime download normally only needs to be done once. |  |

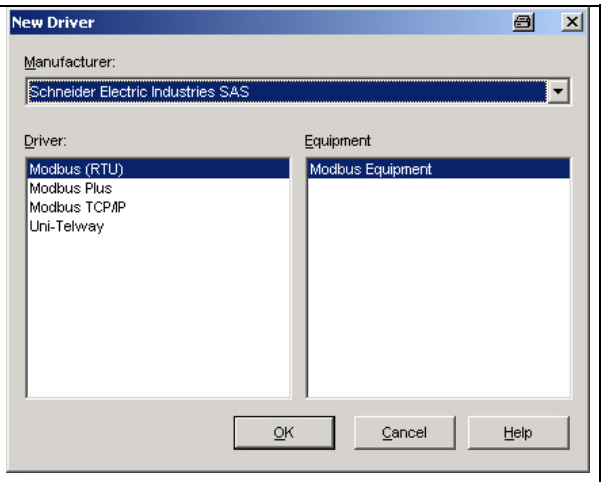
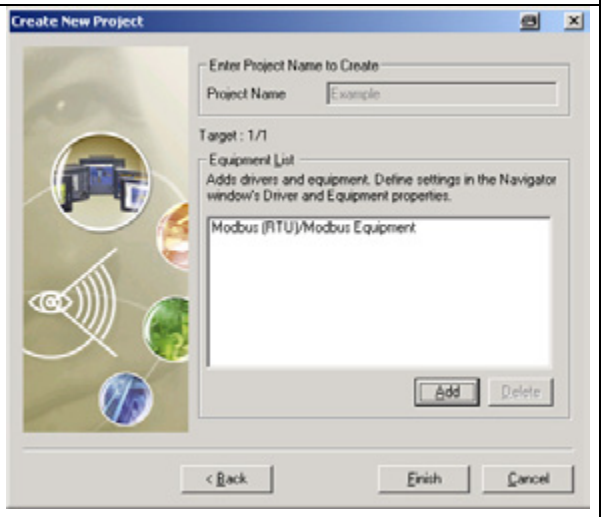
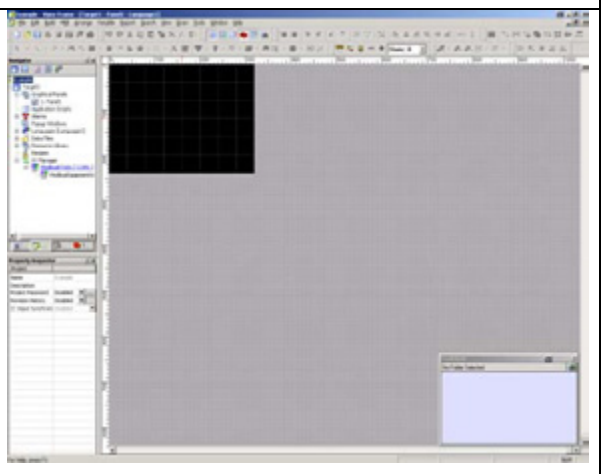
**Programming/ Configuration**

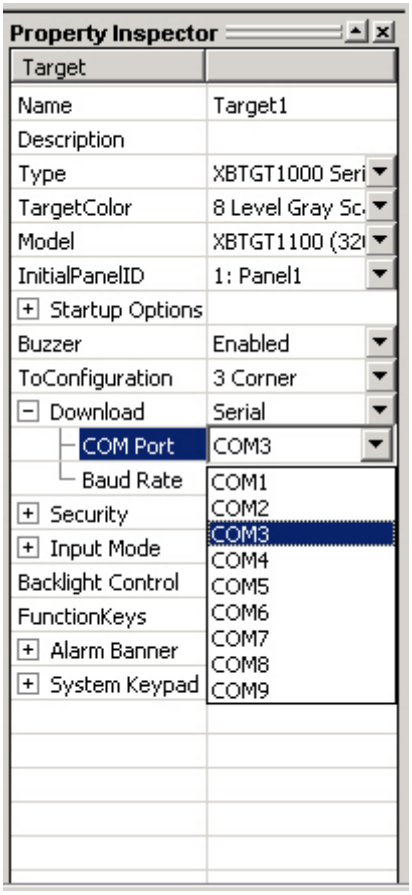
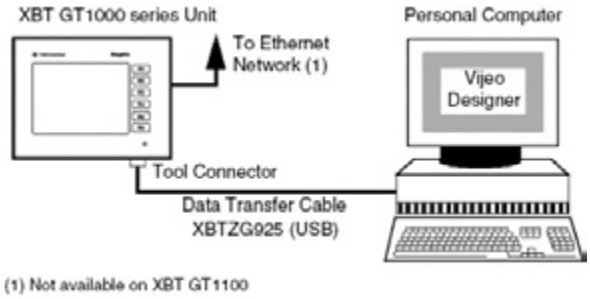
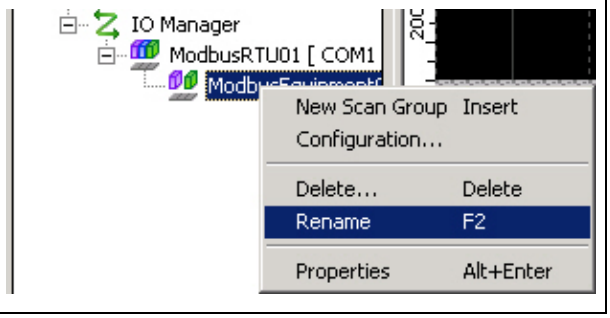
| | | |
|---|---|---|
| **1** | Vijeo Designer has the following components:<br><br>1 - Navigator<br>2 - Info-Display<br>3 - Inspector<br>4 - Data list<br>5 - Feedback Zone<br>6 - Toolbox |  |
| **2** | After starting Vijeo Designer, select **Create New Project** and press **Next.** |  |
| **3** | Input a **Project Name**<br><br>e.g. “Example”<br><br>and select:<br><br>**Project with Single Target**<br><br>Press **Next.** |  |

**Programming/ Configuration**
*Contd.*

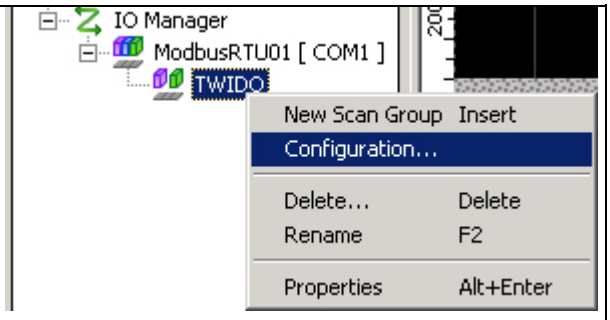
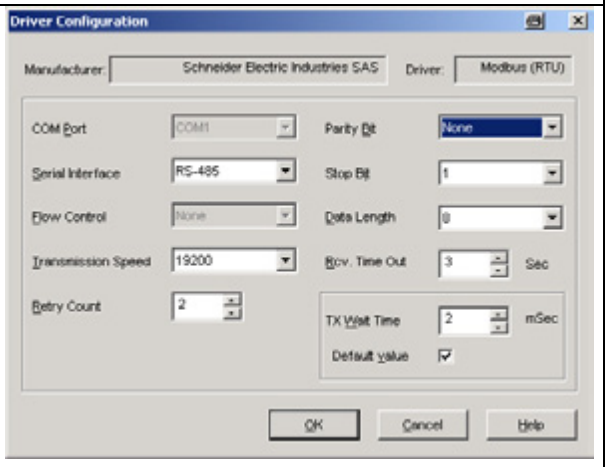
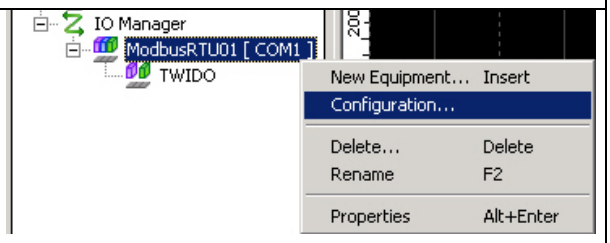
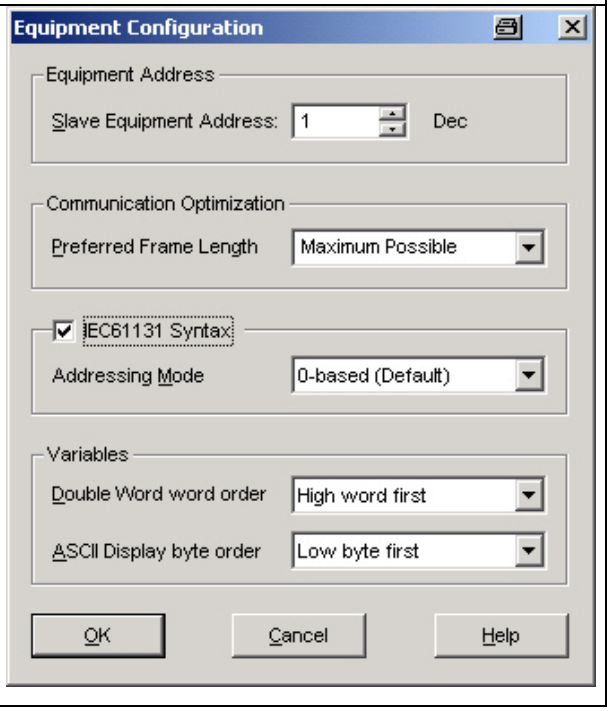
| | | |
|---|---|---|
| **4** | **Select the target device**<br><br>**Target Name**:<br>"Target1"<br>**Target Type**:<br>"XBTGT 1000 Series"<br>**XBTG Model**:<br>"XBTGT1100" |  |
| **5** | **The device has no Ethernet interface, so it requires no IP address.**<br><br>Here simply press **Next** and go to the next dialog**.** |  |
| **6** | The Magelis needs the correct type of driver to exchange data with the PLC.<br><br>Use **Add** to go to the driver selection dialog and select a new driver. |  |

**Programming/ Configuration**
*Contd.*

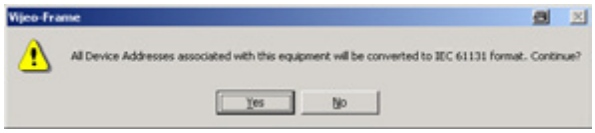
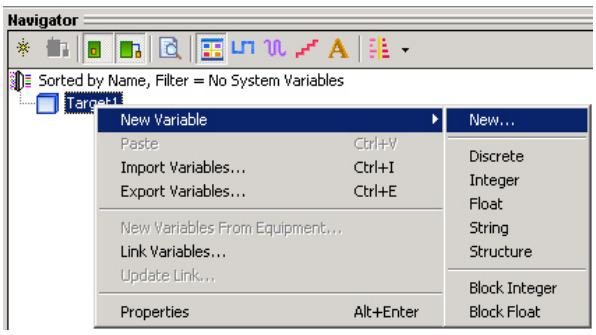
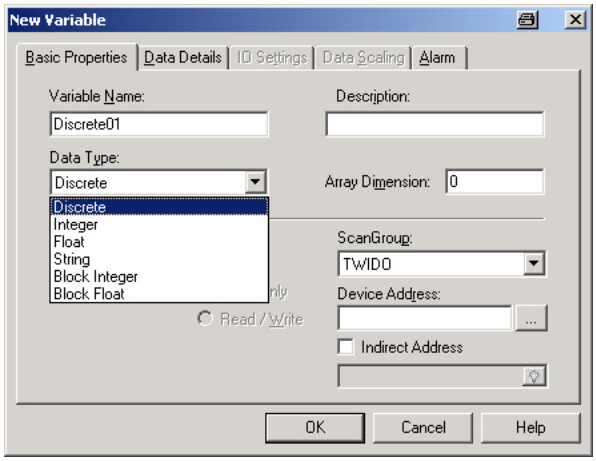
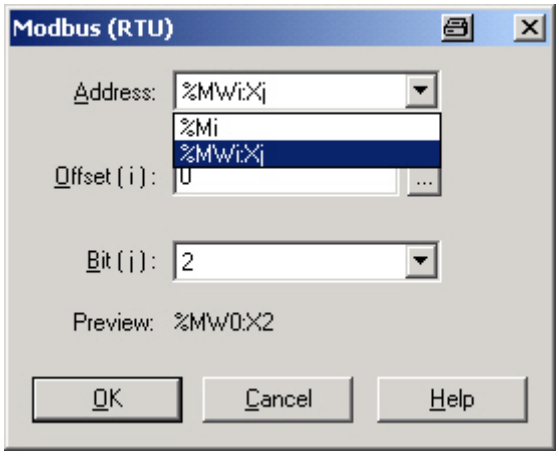
| | | |
|---|---|---|
| **7** | In the **New Driver** dialog<br><br>Select:<br><br>**Manufacturer**:<br>“Schneider Electric Industries SAS”<br><br>**Driver**: “Modbus(RTU)”<br><br>**Equipment**:<br>„Modbus Device”<br><br>confirm with **OK**. |  |
| **8** | After setting up the driver you can exit the dialog with **Finish.** |  |
| **9** | Vijeo-Designer now returns you to its work top, with an empty display and the project navigator<br><br>A mouseclick on **Target1** in the navigator brings up the **properties inspector**<br><br>(or if the properties inspector is closed right mouseclick on **Target1** and selecting **Properties** opens up the **properties inspector)** |  |

| | | | |
|---|---|---|---|
| **Programming/ Configuration** *Contd.* | **10** | Check the properties of the project and in particular the properties of the **COM-port**. It must be set to **serial** for the connection to work properly.<br><br>Ensure that the COM port settings are correct.<br><br>*In this example the USB cable has been assigned to port COM 3. In doubt please check the hardware settings of your systems according step 5 of the runtime installer description.* |  |
| | **11** | Although downloading to the Magelis will not actually be performed now, you must connect the **COM** port of the PC with the **Tool** port on the Magelis to perform the download.<br><br>Use the USB cable **XBTZG925** to make the connection. |  |
| **Communication Setup** | **12** | In the Navigator, with a right mouseclick on the name, you can **Rename** the configuration to „TWIDO“. |  |

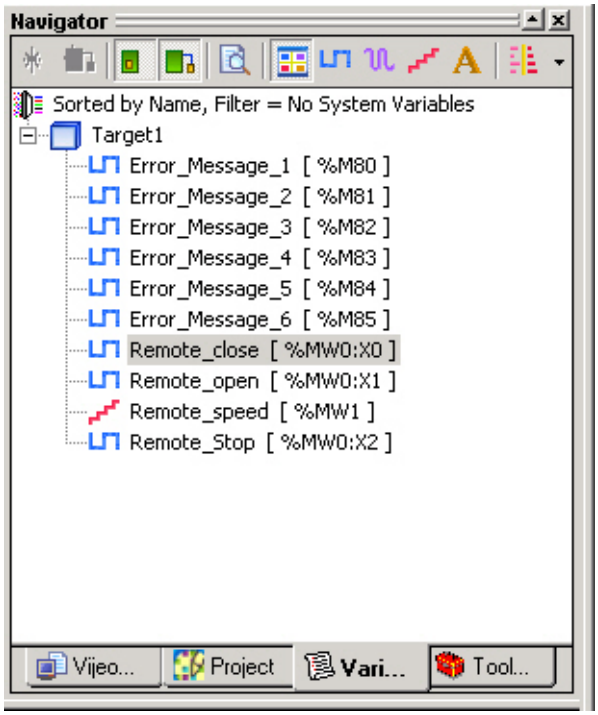
**Programming/ Configuration**
*Contd.*

| | | |
|---|---|---|
| **13** | To edit the configuration, right mouseclick on TWIDO in the **navigator** and select:<br><br>**configuration**. |  |
| **14** | In the **Driver Configuration** dialog, input:<br><br>- RS-485<br>- 19200 Baud<br>- 8 Data bits<br>- 1 Stop bit<br>- No Parity<br>- 2 Retry Counts<br><br>Exit the dialog with **OK.**<br><br>The configuration must match the port definition on the Twido. |  |
| **15** | For the communications to work you must set up the parameters in the Modbus RTU-Driver<br><br>For this, right mouseclick on **ModbusRTU01** in the Navigator and select **Configuration...** |  |
| **16** | In this screen retain all the default settings. Click and set the checkbox for **IEC61131 Syntax**.<br><br>*Following the IEC 61131 syntax addressing with Twido is easier.* |  |

**Programming/ Configuration**
*Contd.*

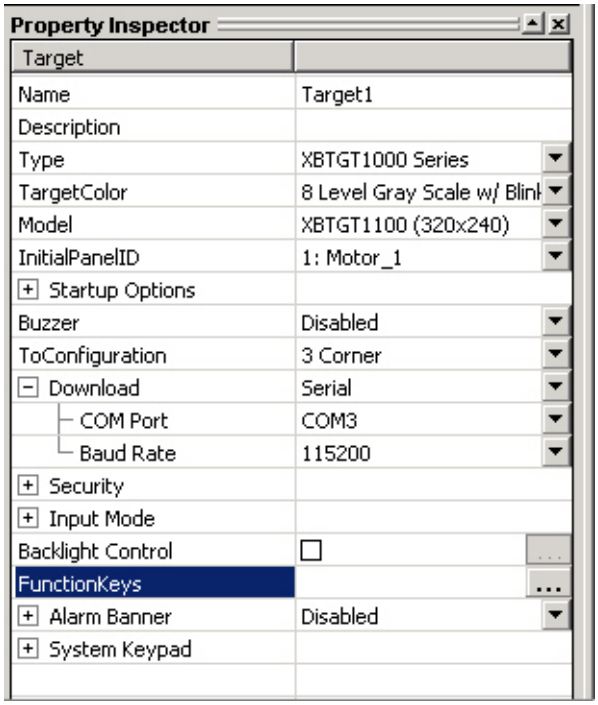
| | | |
|---|---|---|
| **17** | After setting the checkbox you have to confirm the action with **Yes**. |  |
| **18** | To create variables, first click on the Tab **variable** in the **navigator.**<br><br>A right mouse click on **Target1** in the **navigator** opens up the pop-up menu to go to **New Variable -> New…** and the variable definition dialog. |  |
| **19** | To create a variable you must input a:<br><br>• Variable name<br>• Data type<br>• Data Source (External)<br>• Device (Scan Group)<br>• Address in the PLC<br><br>Here you can address<br>• bits (%M.. & %MW...:X..)<br>• memory words (%MW..)<br>in the PLC.<br><br>PLC internal formats such as counters muss first be transferred to memory words before the Magelis can display them. |  |
| **20** | Integers and Reals :<br><br>%MW** (e.g. MW 2)<br><br>Discretes:<br><br>%M** (e.g. %M2)<br>%MW**:X** (e.g. %MW2:X5)<br><br>where „X**“ represents the bit number or word number i.e. address them with the appropriate offset. |  |

**Programming/ Configuration** *Contd.*

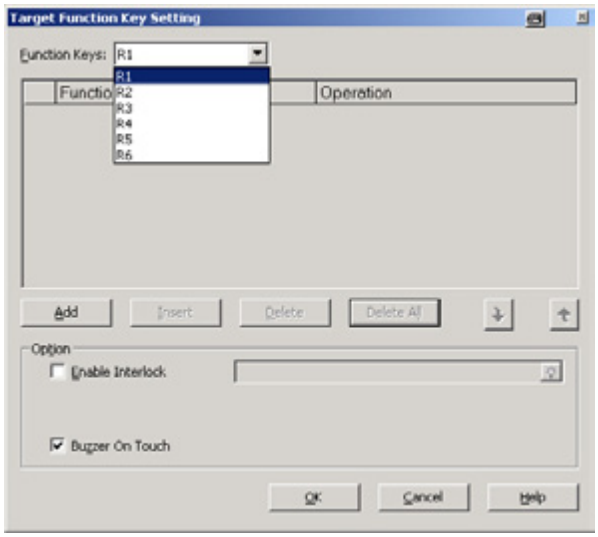
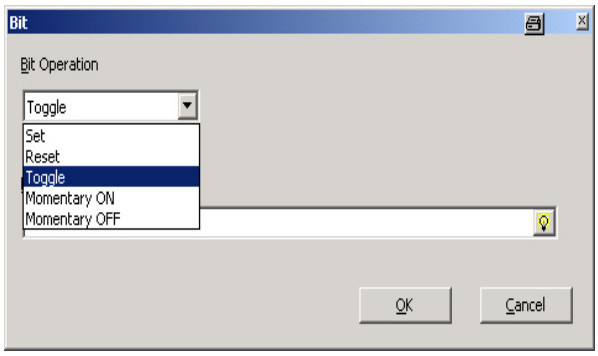
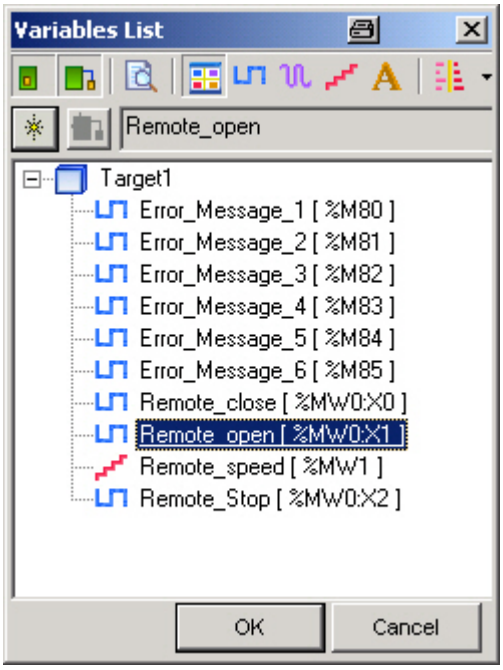
| | | |
|---|---|---|
| **21** | In the example code - with the exception of Remote_speed - only Discretes are used for the communication. |  |



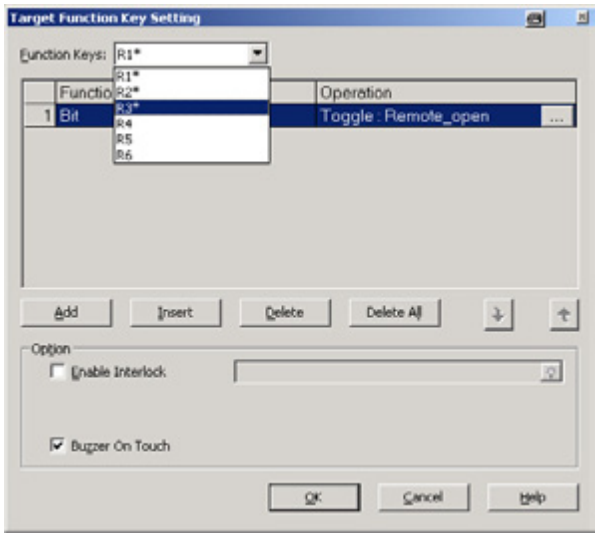
**Configuration Function keys** (R1..R6)

| | | |
|---|---|---|
| **1** | For configuring/programming the R1..R6 function keys on the right hand side of the panel there are three possibilities:<br><br>- ***general*** function keys (action does not ***depend*** on the actual screen)<br>- ***screen orientated*** function keys (action ***depends*** on the actual screen)<br>- ***mixed function*** keys (general and screen oriented keys within one action)<br><br>In this example only general function keys are used.<br><br>To define general function keys the select **FunctionKeys** in the property inspector and click on **[...]**. |  |

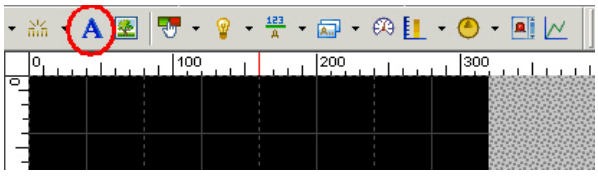
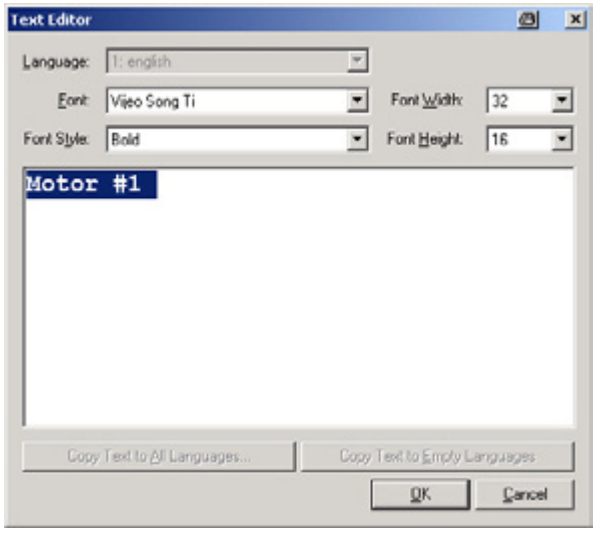
**Configuration**
**Function keys**
(R1..R6)
*Contd.*

| | | |
|---|---|---|
| **2** | At the top of the screen you can select the function key you would like to configure, for instance **R1**.<br><br>Click on the **Add** button to create a new action that will be invoked when you press this function key. |  |
| **3** | In the following screen you can decide in which way the variable should be influenced. In this example the action is a toggle.<br><br>To select the affected variable, click on the **lightbulb icon** on the right hand side of the edit box. |  |
| **4** | A list of the available variables is now opened.<br><br>Select one with a double click or by marking it and clicking **OK**.<br><br>On clicking **OK**, you return immediately to the previous screen.<br><br>To confirm the action you have to click again on **OK**. |  |

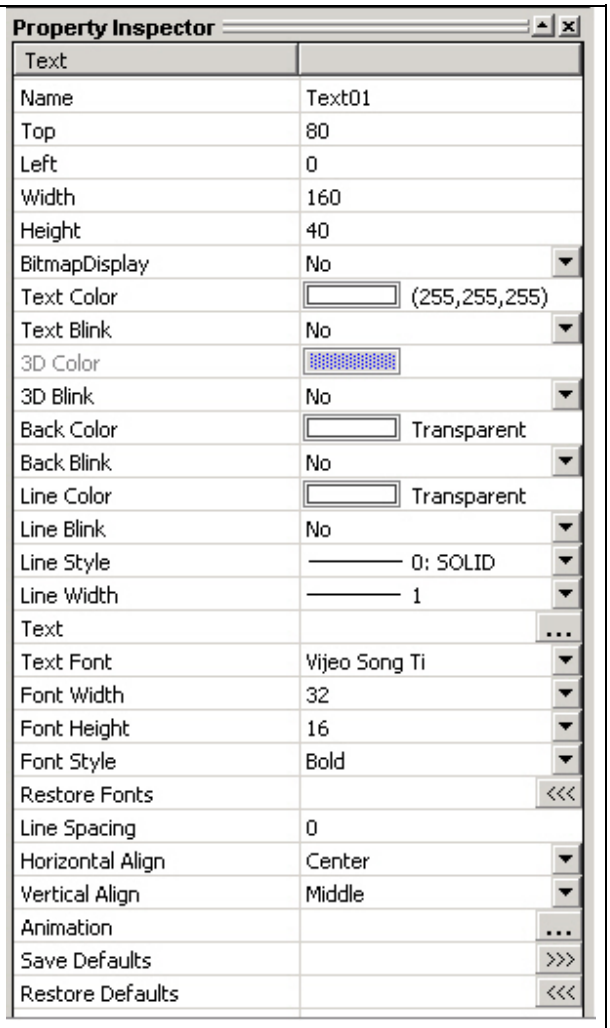
**Configuration**
**Function keys**
(R1..R6)
*Contd.*

| | | |
|---|---|---|
| **5** | Already configured function keys are indicated with an asterisk, for example **R3*** |  |

**Example**
**Insert text**

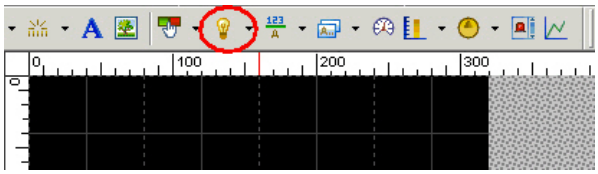
| | | |
|---|---|---|
| **1** | **Example: Insert Text**<br><br>Select the text icon in the tool bar.<br><br>The toolbar displays the toolbox with tools for editing the display. |  |
| **2** | **Example: Create Text**<br><br>With the text tool you can position the text box on the display. You can adjust its size by „pulling“ on the box or by inserting the **width** and **height** in the **text editor** dialog.<br><br>To got to the **text editor** dialog, double click on the text box. In the text editor dialog, you can input the actual text to be displayed and define its size, font, etc. |  |

**Example**
**Insert text**
*Contd.*

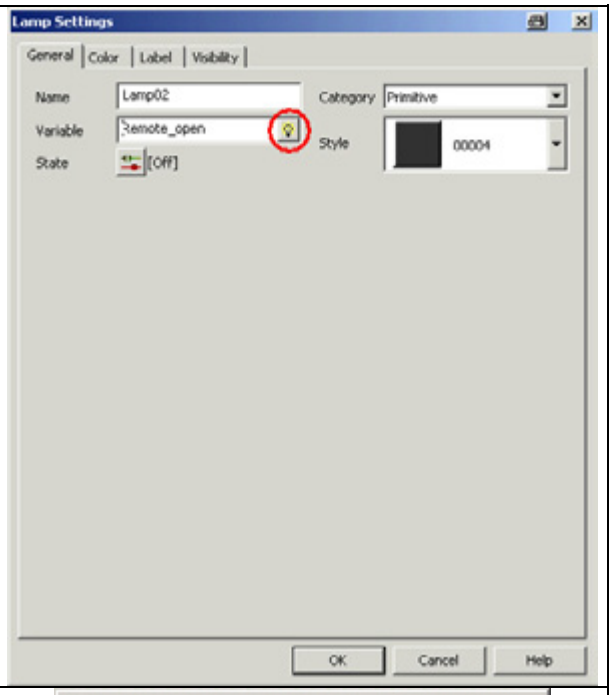
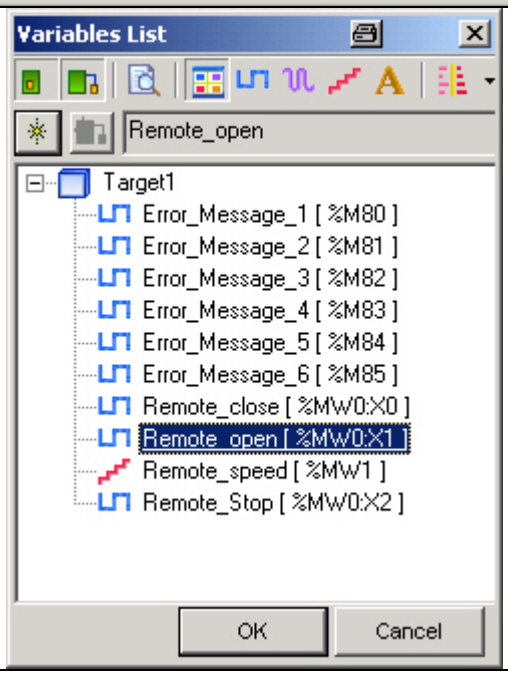
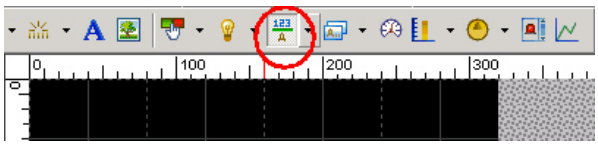
| | | |
|---|---|---|
| **3** | After inputting the text you can define/change the text characteristics in the **Property Inspector** |  |



**Example**
**Insert lamp**

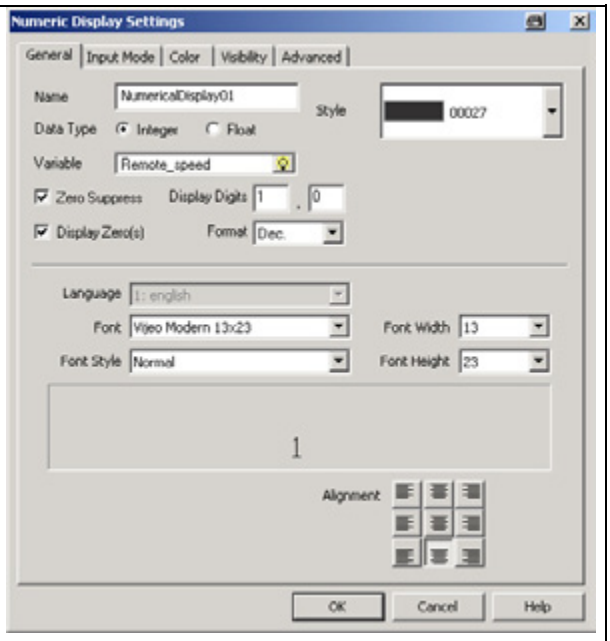
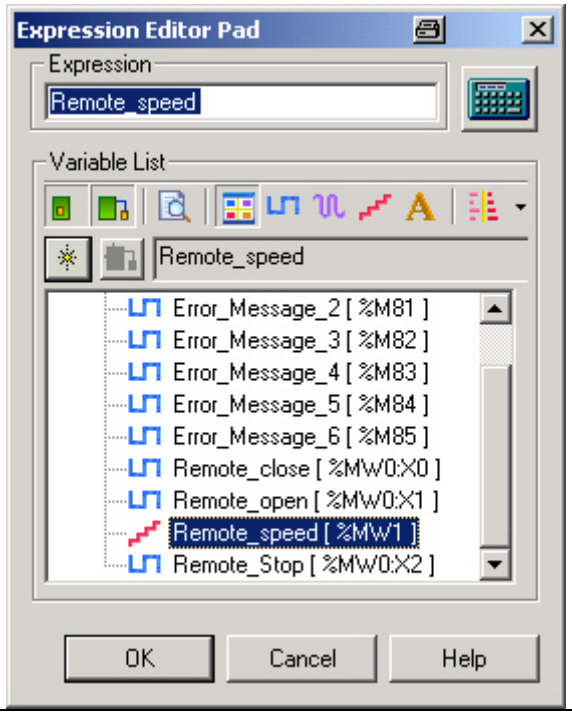
| | | |
|---|---|---|
| **4** | **Example: Insert Lamp**<br><br>Select the lamp tool in the tool bar.<br><br>With this tool, position the lamp on the display. You can adjust its size by „pulling“ the sides. |  |

**Example**
**Insert lamp**
*continued*

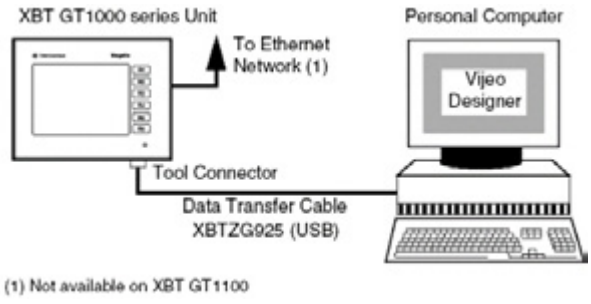
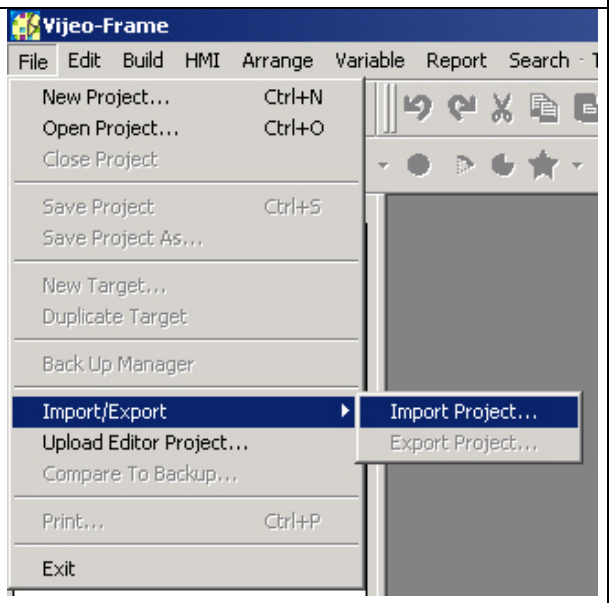
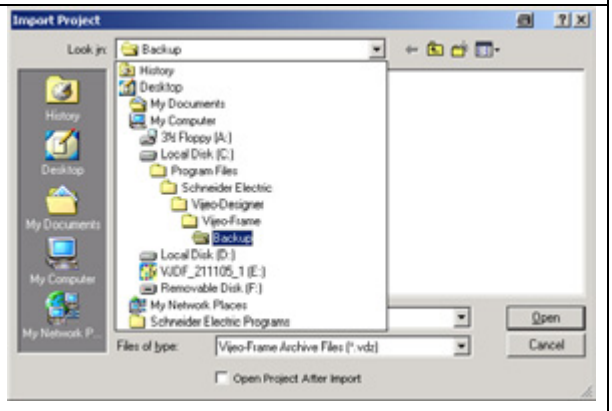
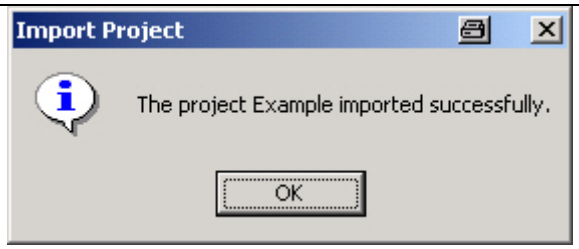
| | | |
|---|---|---|
| **5** | A right mouse click on the lamp object in the display invokes the **Lamp Settings** dialog.<br><br>**To assign a variable to the lamp click on the light bulb.** |  |
| **6** | A list of existing variables will be displayed. Select the variable you need to animate your lamp by double clicking on the specific variable or by marking it and finally confirming the action with **OK**. |  |
| **7** | **Example: Insert numerical display**<br><br>Select the numerical display tool in the tool bar.<br><br>With this tool, position the field on the display. You can adjust the size of the field by „pulling“ on the sides/corners. |  |

**Example**
**Numerical Display**

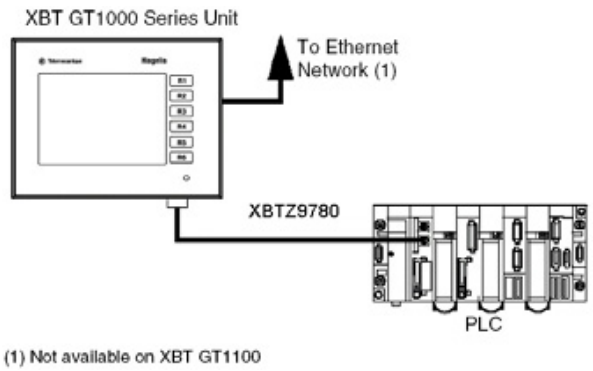
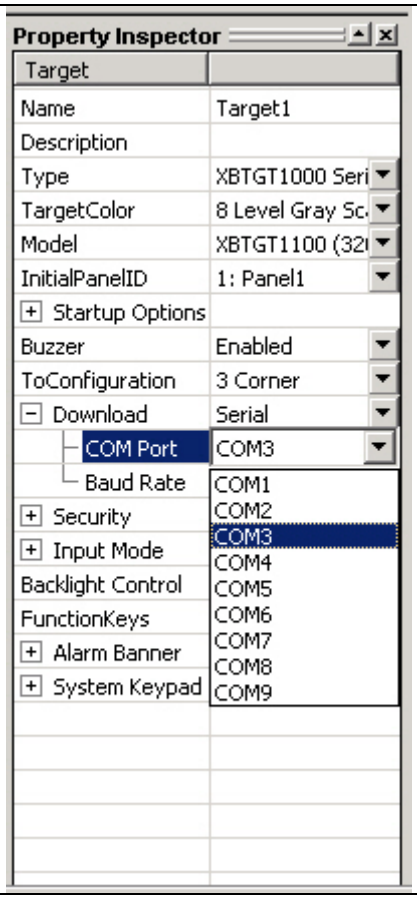
**Example**
**Numerical display**
*Contd.*

| | | |
|---|---|---|
| **8** | Ifor the numerical displays you can define:<br><br>• style of the display<br>• data type (integer/float9<br>• zero suppress<br>• number of display digits<br>• display/not display zero<br>• Format e.g. hex., dec.<br>• font style<br>• font size<br>• text alignment<br><br>For the variable used to animate the object shown, you can either manually input the variable name or click on the lightbulb icon to browse the variable list and select one.<br><br>If you input an unknown variable it is shown in red – the variable has yet to be defined.<br><br>Once activated variables can be selected and their display format defined.<br><br>If the value requires further processing before use, such as trigonomic functions, you can select these via the calculator icon. |  <br>  |

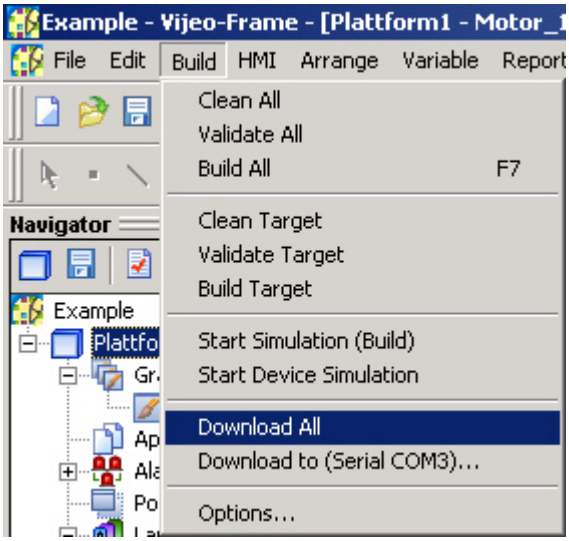
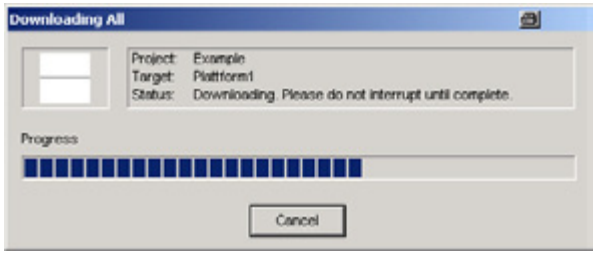
**Import and transfer an existing program**

| | | |
|---|---|---|
| **1** | In order to transfer the program from the PC to the terminal, the two must be connected to each other using the XBTZG925 communication cable. |  |
| **2** | To be able to import a project you have to close the active project first.<br><br>In the **File** menu, select **Import/Export ->Import Project...**<br><br>The **Import Project** dialog opens. |  |
| **3** | Vijeo-Designer import/export files are normally stored in the folder **backup**.<br><br>Select the file named “Example.vdz” and import it into Vijeo-Designer by double-clicking on it or clicking **Open**. |  |
| **4** | After finishing the import successfully, you will receive a message that you must acknowledge with **OK**. |  |

**Import and transfer an existing program**
*Contd.*

| | | |
|---|---|---|
| **5** | To communicate with the Twido please connect the XBT GT's RJ45 jack with the Mini-Din connector on port 1 of the Twido using the cable **XBTZ9780**. |  |
| **6** | Before you download the application to the HMI device please check for the correct COM port settings in the **Property Inspector**.<br><br>*If in doubt, please check the hardware settings of your systems according to step 5 of the runtime installer description.* |  |

**Import and transfer an existing program**
*Contd.*

| | | |
|---|---|---|
| **7** | To check or validate the application, select:<br><br>**Build->Download All**<br><br>Once validated, you can transfer it to the target device. |  |
| **8** | During the download a progress bar will be displayed. |  |
| **9** | Once the download is finished, the Magelis XBT GT1100 automatically establishes a connection with the Twido.<br><br>By using the R1, R2 and R3 keys on the front of the display you can control the application.<br><br>By touching the field **Speed** you can change the speed of the motor(s) | |

# PLC

**Introduction**

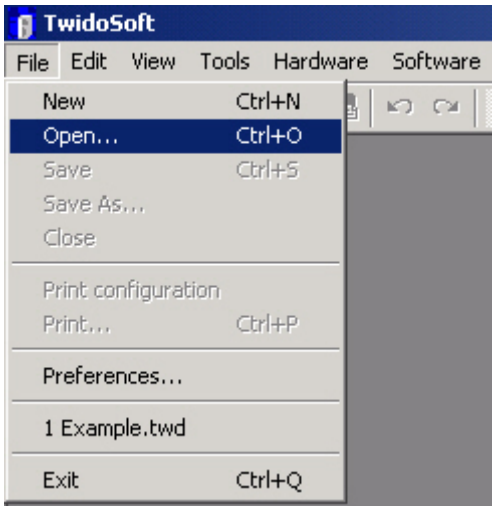
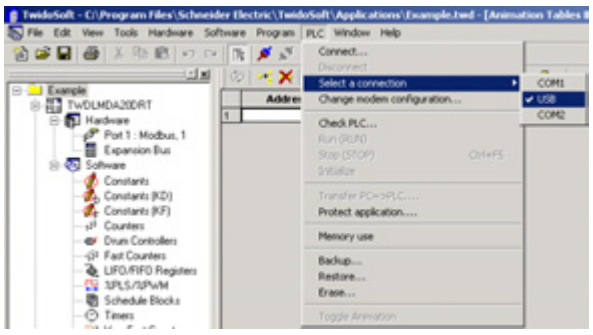
The PLC chapter describes how to initialize, parameterize and load the program to the PLC in order to implement the functional description described above. The PLC program is created with Twidosoft.

**Pre-conditions**

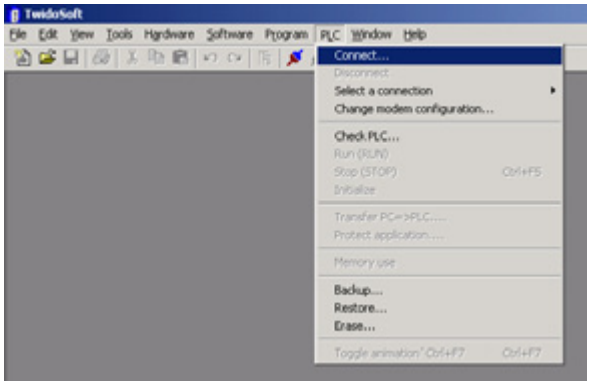
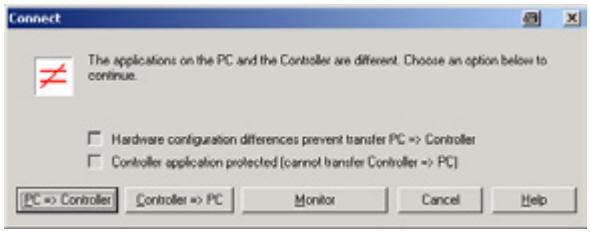
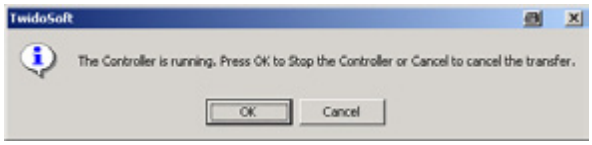
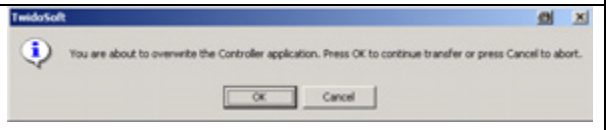
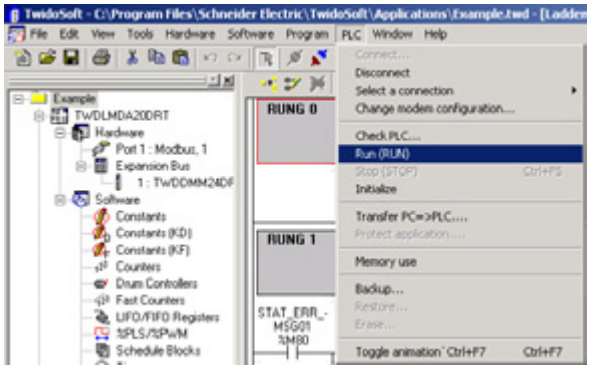
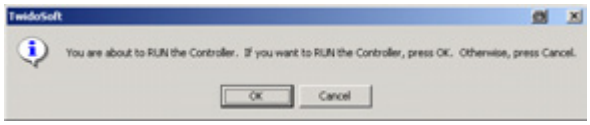
The following conditions must be met in order to carry out the steps described below:

- The Twidosoft programming tool is installed on your PC
- The “Example.twd“ Twidosoft project is available in the default directory that has been set up (C:\Program Files\Schneider Electric\TwidoSoft\Applications)
- The Twido PLC is switched on and supplied with power
- The PLC and the PC are linked to one another via the PC <> Twido programming cable (TSXPCX3031).

**Setting up communi-cation**

| | | |
|---|---|---|
| **1** | Once the Twido programming software has been launched, start by calling up the "Example.twd" PLC program.<br><br>To do this, select:<br><br>**File->Open**<br><br>The application default directory in which the file should be located is displayed. |  |
| **2** | Once the program has been loaded, communication with the PLC must be set up. Select:<br><br>**PLC->Select a connection**<br><br>to invoke the dialog for the port definition; in this case, USB. |  |

## Transferring and running a program

| | | |
|---|---|---|
| **1** | To transfer the program, the PLC and the PC must remain connected to each other via the communication cable.<br><br>Connect the devices and select<br><br>**PLC->Connect**<br><br>to create an online link to the PLC so that you can download the program. |  |
| **2** | Before a program is downloaded to the PLC for the first time, Twidosoft informs you that the program and the PLC content are different. In this case, click on<br><br>**PC-> Controller**<br><br>to transfer the program to the PLC. |  |
| **3** | If an application is already running on the controller, Twidosoft asks if it may stop the PLC and overwrite the existing application. Press **OK** to stop the controller and download the application. |  |
| **4** | Now click on **OK** to overwrite the existing application in the controller. |  |
| **5** | When the transfer is completely finished the controller needs to be started.<br><br>Select<br><br>**PLC->Run**<br><br>or click on the run icon in the toolbar. |  |
| **6** | To confirm the run action on the controller click the **OK** button. |  |

# Data exchange

## Introduction

In this chapter, the individual points between which data is transferred via a bus system, (e.g., Modbus, Modbus Plus or TCP/IP) and that are not linked to digital or analog hardware interfaces, are listed.

This list defines:

- The devices concerned in each case
- The direction of transfer
- The symbolic name *and*
- The direct bus address on the device concerned.

## Read and write data direction

| **Device 1**<br>**XBT GT1100** *(Modbus master)* | | **Device 2**<br>**Twido** *(Modbus slave)* | |
|---|---|---|---|
| **Address** | **Designation** | **Address** | **Designation** |
| %MW0:X0 | Open | %MW0:X0 | RMT_CMD_OPEN |
| %MW0:X1 | Close | %MW0:X1 | RMT_CMD_CLOSE |
| %MW0:X2 | Stop | %MW0:X2 | RMT_CMD_STOP |
| %MW1 | Speed | %MW1 | RMT_SPEED |

## Data direction (device 1 reads from device 2)

| **Device 1**<br>**XBT GT1100** *(Modbus master)* | | **Device 2**<br>**Twido** *(Modbus slave)* | |
|---|---|---|---|
| **Address** | **Designation** | **Address** | **Designation** |
| %M80 | Safety not OK | %M80 | ERR_STAT_MESS01 |
| %M81 | Motor protection off | %M81 | ERR_STAT_MESS02 |
| %M82 | Variable speed drive error | %M82 | ERR_STAT_MESS03 |
| %M83 | Maintenance switch off | %M83 | ERR_STAT_MESS04 |
| %M84 | Limit switch error | %M84 | ERR_STAT_MESS05 |
| %M85 | Spare error | %M85 | ERR_STAT_MESS06 |

# Devices

## Introduction

This chapter describes the steps required to initialise and configure the devices to attain the described system function.

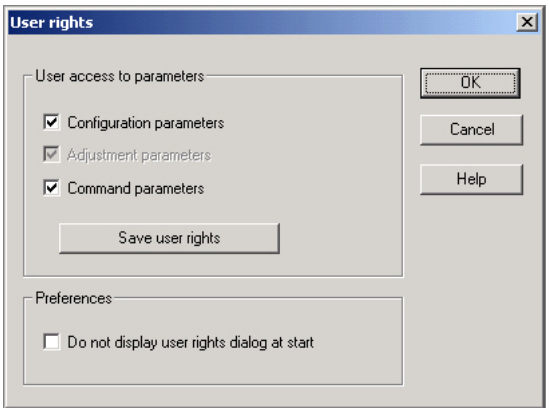
PowerSuite software is used to initialize and parameterize the devices.

## General

The ATV11 parameters can be entered via the front panel on the device itself. However, using PowerSuite allows you to:

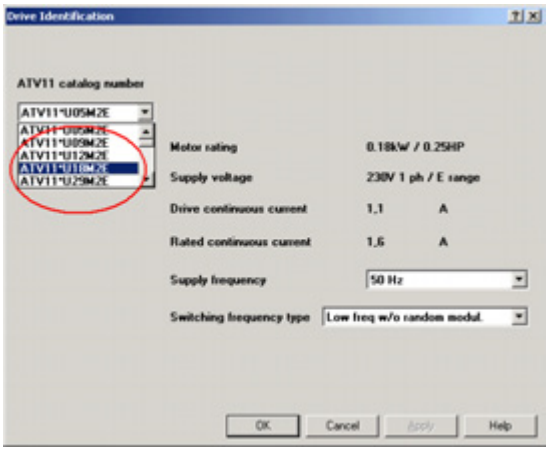
- save the data on your PC
- print out the documentation *and*
- optimize the parameters online.

## Configuration

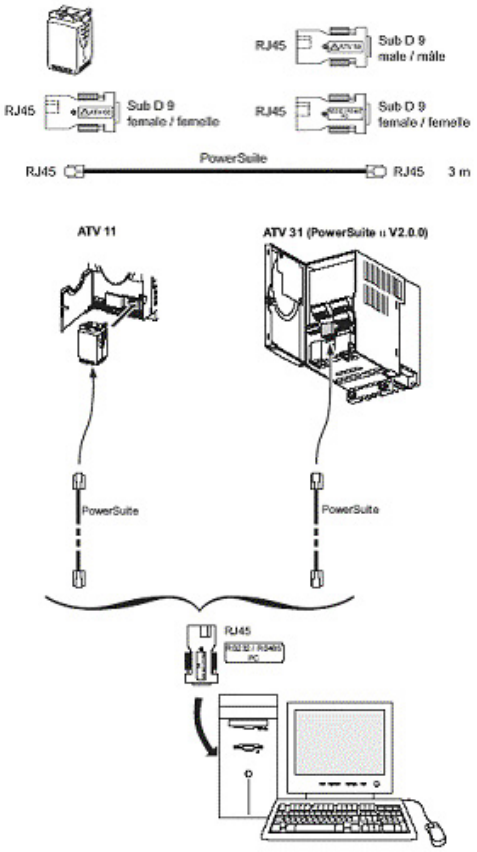
| | | |
|---|---|---|
| **1** | The window opposite appears once the program has started up.<br><br>Once you have read the warning message, advance to the next screen using the shortcut **Alt+F**. | |
| **2** | The next dialog allows you to define general user rights. You do not have to make any changes in this dialog.<br><br>Proceed to the selection of the type of VSD by clicking **OK**. |  |
| **3** | Select the device type in this window.<br><br>In this example, we select ATV 11. | |

*Continued on next page*

**Configuration**
Contd.

| | | |
|---|---|---|
| **4** | The models available in the ATV11 series are displayed in the drop-down list on the left of the dialog (circled in red). Select the appropriate variable speed drive by clicking on its part number.<br><br>The values assigned to the device are displayed on the right-hand side; only the frequency should be set here in accordance with the actual conditions. Next, select **Apply** and **OK** in order to transfer the configuration. |  |
| **5** | Here you could make further settings; however, in this example we use the default values. | |
| **6** | Once this procedure has been completed, you can store the parameters on the PC. Use the diskette icon in the toolbar (or the corresponding menu item). | |

**Transferring parameters**

| | | |
|---|---|---|
| **1** | Check the connection between the PC and the Altivar. |  |
| **2** | You can now transfer the parameters to the ATV by selecting:<br><br>**Link->Transfer File**<br><br>and then<br><br>**PC to device**. | |

# Appendix

## Detailed components list

**Hardware components**

| Item | No. | Description | Part no. | Rev./ Vers. |
|---|---|---|---|---|
| 1.1 | 1 | Master switch | VCF02GE | |
| 1.2 | 1 | Emergency stop switch housing | XALK178G | |
| 1.3 | 1 | Preventa emergency stop relay, cat. 3 | XPSAC3721 | |
| 1.4 | 2 | Contactor, 9 A, 24 V DC operated, 3-pole, AC3, 1x NO + 1x NC | LC1D09BD | |
| 1.5 | 1 | 2-button push button housing, empty | XALD02 | |
| 1.6 | 1 | Selector switch, 3 positions, locking-type | XB5AD33 | |
| 1.7 | 1 | Label holder 30x40 “forward-0-back” | ZBY2384 | |
| 1.8 | 1 | Illuminated button red, flat | ZB5AW343 | |
| 1.9 | 1 | Auxiliary switch module with red LED + 1 auxiliary switch (1x NO) | ZB5AW0B42 | |
| 1.10 | 1 | Label holder 30x40 “stop” | ZBY2304 | |
| 1.11 | 1 | 3-button push button housing empty | XALD03 | |
| 1.12 | 1 | Illuminated button blue, flat | ZB5AW363 | |
| 1.13 | 1 | Auxiliary switch module with blue LED + 1 auxiliary switch (1x NO) | ZB5AW0B61 | |
| 1.14 | 1 | Label holder 30x40 “emergency stop” | ZBY2330 | |
| 1.15 | 1 | Indicator lamp white, flat | XB5AVB1 | |
| 1.16 | 1 | Label holder 30x40 “on“ | ZBY2311 | |
| 1.17 | 2 | Position switch Universal (final positions) | XCKP2118P16 | |
| 1.18 | 2 | Miniature circuit breaker C60N 1P 2A C | 23726 | |
| 1.19 | 1 | Miniature circuit breaker C60N 1P+N 1A C | 24183 | |
| 1.20 | 1 | Phaseo power supply 24 V DC/1.2 A | ABL7CEM24012 | |
| 1.21 | 1 | Twido PLC modular device with 20 I/Os | TWDLMDA20DRT | V3.2 |
| 1.22 | 1 | XBT GT 3,8” Magelis operator terminal | XBTGT1100 | |
| 1.23 | 1 | Magelis/PLC connection cable | XBTZ9780 | |
| 1.24 | 1 | Motor circuit breaker, 9 to 14 A, adjustable | GV2ME16 | |
| 1.25 | 1 | Maintenance switch | VBF02GE | |
| 1.26 | 1 | Auxiliary contact block for maintenance switch | VZ7 | |
| 1.27 | 1 | Altivar ATV11 variable speed drive | ATV11PU18M2E | |
| *1.28* | *1* | *Altivar adapter for 35mm mounting rail* | *VW3A11851* | *option* |

**Software components**

| Item | No. | Description | Part no. | Rev./ Vers. |
|---|---|---|---|---|
| 2.1 | 1 | Twidosoft programming software incl. USB cable | TWDSPU1003V10M | 3.2 |
| 2.1a | 1 | Twidosoft programming software | TWDSPU1002V10M | 3.2 |
| 2.1b | 1 | Twido programming USB cable | TSXPCX3031 | |
| 2.2 | 1 | Vijeo-Designer configuration software for Magelis XBT G/XBT GT incl. USB cable | VJDSUDTGSV43M | 4.3.0 |
| 2.2a | 1 | Vijeo-Designer configuration software for Magelis XBT G/XBT GT | VJDSUDTGSV43M | 4.3.0 |
| 2.2b | 1 | XBT GT programming USB cable | XBTZG925 | |
| 2.3 | 1 | PowerSuite parameterization software | VW3A8104 | 1.5 |
| 2.4 | 1 | Altivar set of connection accessories | VW3A8106 | |

# Component protection classes

**Recommended installation locations/ Protection class**

| Components | In the field, on site IP 55/IP 65 | Front IP 65 | Control Cabinet IP 20 |
|---|---|---|---|
| Master and maintenance switch | X | | |
| Emergency stop switch housing | X | | |
| Contactor, 9 A, 24 V DC operated, 3-pole AC 3, 1x NO + 1x NC | | | X |
| 2-button/3-button push button housing, empty | X | | |
| Selector switch, 3 positions | | X | |
| Illuminated buttons, all colors, flat | | X | |
| Auxiliary switch module with LED + 1 auxiliary switch (1x NO), all colors | | | X |
| Label holder 30x40, all texts | X | | |
| Position switch Universal | X | | |
| Miniature circuit breaker, all types and ratings | | | X |
| Motor protection switch, all types and ratings | | | X |
| Phaseo power supply 24 V DC/1.2 A | | | X |
| Preventa emergency stop relay | | | |
| Twido PLC | | | X |
| Magelis XBT GT1100 | | X | |

# Characteristics of the system

## General

The data listed below relates to the system and its features as described and specified in this document. The values represented are determined by:

- The number of I/O points
- The number of bus nodes (if present)
- The number of instructions/operations
- Memory usage

## Scan time and cycle time

A cycle time of 2 ms was not exceeded with the present configuration including the required application code. The memory usage of the Twido PLC specified and used in this document was 18% for system/configuration data and 2% for the logic component.

Trials with additionally integrated extension modules (a digital I/O module with 16 inputs and 8 relay outputs as well as an analog module with 1 output and 2 inputs, which was used as the I/O level for 2 PID controllers) showed that the cycle time could increase to a maximum of 6 ms. When using the aforementioned two additional extension modules, memory usage for system data rose to 22% but, as expected, memory usage of the logic components did not change.

# Component Features

## Twido PLC

TWD LMDA 20DRT

The PLC used in this example comprises the power base of a Twido modular PLC and a programming set comprising software and a programming cable (TWDLMDA20DRT + TWDSPU1001V10M):

- 24 V DC
- 12 digital inputs
- 8 digital relay outputs
  - Can be extended up to a maximum of 7 modules (analog and communication modules are also possible)

3 programming languages:

- Ladder Language (LD)
- Instruction List (IL)
- Sequential Function Chart/Grafcet (SFC)

Predefined functions:

- Drum controller
- High-speed counter up to 5 kHz
- Very high-speed counter up to 20 kHz
- Frequency meter 1 to 20 kHz
- Register areas for LIFO/FIFO execution
- PWM/PCS output
- External PLC start
- PID controller

## Phaseo power supply unit

**ABL7CEM24012**

- 100 to 240 V AC/24 V DC
- 1.2 A secondary
- Short-circuit-proof

## Altivar VSD

**ATV11 HU18M2E**

- 0.75 kW, 230 V AC, single-phase
- Integrated class B EMC filter

- Temperature range: -10 to + 50°C

- Speed range from 1 to 20 (0 to 200 Hz)
- Speed control with flow vector check
- Protection of drive and motor
- Compact design, side-by-side installation also possible on a top-hat rail

## Circuit breaker

**GV2ME16**

- 9 to 14 A

- Thermal and magnetic (170 A) activation

- Lockable

# Contact

| Author | Phone | E-mail |
|---|---|---|
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As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.