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Introduction

The System Manual Document is intended to be a "Quickstart Manual for a System". It's intention is not to replace any product documentation. Instead it will deliver all the information needed on top of the product documentation to install, parameterize and start-up the outlined system. The functional description or specification of a specific user application is not part of this manual. Nevertheless the document outlines some typical applications where the system might be used.
## Abbreviations

<table>
<thead>
<tr>
<th>Word / Expression</th>
<th>Signification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC</td>
<td>Programmable Logic Controller</td>
</tr>
<tr>
<td>HMI</td>
<td>Human Machine Interface</td>
</tr>
<tr>
<td>VVD</td>
<td>Variable Velocity Drive</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>AC</td>
<td>Alternating current</td>
</tr>
<tr>
<td>DC</td>
<td>Direct current</td>
</tr>
<tr>
<td>PS</td>
<td>Power supply</td>
</tr>
<tr>
<td>I/O</td>
<td>Input / Output</td>
</tr>
<tr>
<td>CB</td>
<td>Circuit Breaker</td>
</tr>
<tr>
<td>ESTOP</td>
<td>Emergency Stop</td>
</tr>
<tr>
<td>Twido</td>
<td>The generic range name for a Schneider midrange PLC</td>
</tr>
<tr>
<td>Phaseo</td>
<td>The generic range name for the Schneider power supply devices</td>
</tr>
<tr>
<td>Magelis</td>
<td>The generic range name for all the Schneider HMI devices</td>
</tr>
<tr>
<td>Altivar</td>
<td>The generic range name for all the Schneider VVD devices</td>
</tr>
<tr>
<td>Telefast</td>
<td>The generic range name for the Schneider distributed I/O devices</td>
</tr>
</tbody>
</table>

## Application Example - Source Code

**Introduction**

The attached file(s) contain example code, that is related to the above described system function. Using Adobe Acrobat Reader V6.0 you are able to click on the Icon below and extract the file to your PC.
Typical Applications

Introduction

Typical applications or sub-applications which use systems as outlined in the following chapters are seen in the following market sectors:

Industry
- Small machinery automation systems
- Decentralized automation systems supplementary to large and medium size machinery

Buildings/Services
- Lighting management
- Access, control and surveillance management
- Heating and air conditioning management

<table>
<thead>
<tr>
<th>Application</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer machine</td>
<td>The application allowed to move and positioning conveyor with variable speed</td>
<td></td>
</tr>
<tr>
<td>Control of ventilator</td>
<td>Start / Stop of variable air condition in dependence of sensors</td>
<td></td>
</tr>
<tr>
<td>Pump control</td>
<td>Variable speed pump control for a fountain dependence of water level sensors</td>
<td></td>
</tr>
</tbody>
</table>
System

Introduction
The system chapter describes the architecture, the components, the dimension and the amount of components used within this system.

Architecture

Overview
The system is built up with a low end PLC with pushbutton control and visualization via pilot lights and illuminated beacon to control a connected VVD – AC motor unit. Safety protection is realized in form of emergency stop and main switch. All application variables (time, speed or control logic) can be changed by the integrated PLC or VVD panel.

Layout

Components
Hardware:
- Twido Modular (PLC)
- Phaseo power supply (PS)
- Altivar ATV 58 (VVD)
- Magelis XBT-G (HMI)
- Telefast I/O (I/O)
- Vario switch-disconnect VCF
- Emergency Stop (ESTOP)
- Circuit breaker (CB)
- Standard AC-Motor

Software:
- TwidoSoft Version 2.0
- Vijeo Designer V4.10
- PowerSuite Version 1.5

Amount of Components
For this stand alone application every product is needed only one time.

Dimension
The small form factor of the PLC, power supply, and VVD allows to implement the parts into one cabinet with a size of 300x300x200mm (l, w, d). In the front door of the cabinet the HMI could be integrated.
Installation

Introduction

This chapter describes the step necessary to install the hardware and to setup the software to fulfill the following application architecture.

Layout

![Diagram of hardware and software setup]
Hardware

General

- All devices can be mounted on the surface of the cabinet.
- Mainly need of M5*18mm screws and nuts and 35mm DIN rail for fixing
- 230VAC wiring between main switch, and VVD
- 24VDC wiring between power supply, PLC, and HMI and control circuit of the VVD

<table>
<thead>
<tr>
<th>Main switch VCF-02GE</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Main switch VCF-02GE" /></td>
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<table>
<thead>
<tr>
<th>Power supply ABL7RE2403</th>
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</thead>
<tbody>
<tr>
<td><img src="image2" alt="Power supply ABL7RE2403" /></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PLC Twido Modular TWDLMDA20DRT</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="PLC Twido Modular TWDLMDA20DRT" /></td>
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</table>

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hinged lid</td>
</tr>
<tr>
<td>2</td>
<td>Expansion connector</td>
</tr>
<tr>
<td>3</td>
<td>Analog potentiometer</td>
</tr>
<tr>
<td>4</td>
<td>Serial port 1</td>
</tr>
<tr>
<td>5</td>
<td>Cartridge cover</td>
</tr>
<tr>
<td>6</td>
<td>24 VDC power supply terminals</td>
</tr>
<tr>
<td>7</td>
<td>Analog voltage input connector</td>
</tr>
<tr>
<td>8</td>
<td>LEDs</td>
</tr>
<tr>
<td>9</td>
<td>I/O terminals</td>
</tr>
<tr>
<td>10</td>
<td>Communication connector</td>
</tr>
<tr>
<td>VVD</td>
<td>Altivar</td>
</tr>
<tr>
<td>-----</td>
<td>---------</td>
</tr>
</tbody>
</table>

(1) Line choke if fitted (ATV-59U20M2 to D12M2 and U10N4 to D23N4).
(2) Fault relay contacts for remote signalling of speed controller status.
(3) +24 V internal. If using with an +24 V external supply, connect its 0 V to the COM terminal - do not use the speed controller +24 terminal - and connect the LI inputs common to the +24 V of the external supply.
(4) R2 reassignable relay.

<table>
<thead>
<tr>
<th>HMI</th>
<th>Magelis XBT-G2330</th>
</tr>
</thead>
</table>

---

**DC- Power cable**  
Comm cable to PLC  
Comm cable to PC  

---

(1) not available on XBT-G2110/2120/2220/4320  
(2) not available on XBT-G2110  
(3) not available on XBT-G2110/2120/2130/2220/2320/4320
Distributed I/O
Twido Telefast Kit
TWDFST20DRT10 (ABE7R08S111+A BE7H20E000)

The following illustration shows the Twido TeleFast cable system kits.

This schematic is for the ABE7R08S111 TeleFast base.

This schematic is for the ABE7H20E000 TeleFast base.
Software

General

It is necessary to install the software for the Twido Modular CPU and the HMI Magelis XBT-G. The VVD Altivar 58 could be started-up or programmed by using the front panel on devices. To get more comfort and the possibility of data storage, simulation and multiple usage of this application it is necessary to install PowerSuite for the VVD. Your PC need to have a Microsoft Windows operating system installed - either Windows 98, Windows 2000, or Windows NT. To start the installation place the CDs in the CD or DVD drive of your PC. The CDs typically starts automatically due to the "Auto-Start" functionality of the PC. Please follow the installation routine. In case of trouble please check the installation guideline delivered with the product.

The Software installation path on your PC is by default:

- TwidoSoft \Program Files \Schneider Electric \TwidoSoft
- Vijeo Designer \Program Files \Schneider Electric \Vijeo-Designer
- PowerSuite \Program Files \Schneider Electric \PowerSuite

Communication

General

This is a hardwired configuration without communication via bus systems. The Magelis HMI is connected to the PLC via Modbus protocol, only.
Implementation

Introduction
The implementation chapter describes all steps necessary to initialize, parameterize, program and to Start-Up the system.

Function
Functional description
The Screen contains picture from a pump station with buttons and lights for Mode AUTO/MANUAL, FAULT and Controls RUN/STOP, LEFT/RIGHT/QUIT. The Commands on the left side the lights on the right side.

1. Select the Operation Mode Manual or Auto on screen. In MANUAL the Motor could Start/Stop, in AUTO the Motor RUN in an interval of 1 minute and after then STOP for 1 minute an RUN again.

2. FAULT: NO/YES blinking, when Fault is comes, and illuminate when the Fault is present. When the ATV Alarm is present the fault indication blinks and illuminate, when the Quit button is pressed.

3. With the LEFT/RIGHT Button/Lights you can select the rotation of the motor.
Introduction

The HMI section describes the different steps needed to initialize, parameterize, design of HMI screens to fulfill the former description of the system functionality. The user application is written with the Vijeo Designer tool.

The HMI implementation is realized in following steps:

- Create new project
- Project Naming
- Specifying the Target Hardware
- New Driver Interface
- New project screen
- Target Download Setup
- Configure the Modbus Connection
- Driver Configuration / Equipment Configuration
- Create new Variable
- New graphic Panel
- Example Toolchest lamps
- Example Toolchest Numeric Display
- Smart Part
- Animation
- Build All
- Download of application to the HMI

Explanation of the Vijeo Designer window screens

Pop up when you start Vijeo Designer: “Create new project”

Project Naming: Pump station
Specifying the Target Hardware
Target Name: “Target1”
Target Type: “XBT –G Series”
XBT-G Model: “XBT-G2330”

New Driver Interface
“Add PLC”
Manufacture: “Schneider Electric Industries SAS”
Driver: “Modbus RTU”
Protocol: “Modbus Equipment”

New project screen

“Target Download Setup”
Configure the Modbus Connection

“I/O Manager – ModbusRTU01 -Configuration”

“Driver Configuration”

“Equipment Configuration–Slave Equipment Address”

“Create new Variable”
List of variables:

- Type
- Naming
- Source
- Device address

“New graphic Panel”

Blank Graphic Panel

Example Toolchest lamps
Example Toolchest Numeric Display

“Smart Part” of Numeric field where you can select the Width, Height, Text color, Display format etc.

Selection on Numeric field and open with left mouse click “Animation”
Properties of animation:
• Color
• Position
• Rotate
• Touch
• Visibility
• Smart Part

The Toolchest Objects
Text, Text fields, graphics

Finished Graphic Panel with all properties for animation and actions

“Build” - Analyzing the project
“Building All” with “Feedback Zone” for success

Download of application to the HMI:
Select the Project Navigator the project. Press left mouse button to open the selection box and choice “Download” to transfer the application into the Connected HMI. There use the serial communication cable, which is deliver within the Vijeo-Designer package.
PLC

Introduction

The PLC section describes the different steps needed to initialize, parameterize, program the PLC logic to fulfill the former description of the system functionality. The user application is written with the TwidoSoft tool.

The PLC implementation is realized in following steps

- When you start the TwidoSoft software 1st time
- At first save the application and give the PLC name (*.twd)
- Change Base Controller
- Controller communication Setup
- Add option
- Choose the programming language editor
- Insert Application Program
- List Editor screen
- List Editor screen
- Analyze program
- Select Connection
- Download PLC- Connect – PC to Controller”.

When you start the TwidoSoft software 1st time, you get the welcome screen with choices to generate a new program or to work on a present program. For a new PLC application select “new”. You get the screen with the project browser and the edit window.

The default Base controller is TWDLMDA40DUK. At first save the application and give the PLC name (*.twd)

Please select yours/your preference, then select the correct module type reference shown below in the window.

The default Base controller is TWDLMDA40DUK.

At first save the application and give the PLC name (*.twd)
Change Base Controller
Please select yours/your preference, then select the correct module type reference shown below in the window.

The default hardware module listed in the browser screen is the TWDLMDA40DUK. In our application we are using the TWDLMDA20DRT. So select the default module, open with the left mouse button a new windows “Change Base Controller” and select the right module TWDLMDA20DRT.

Controller communication Setup
Communication Port, Address and Protocol

The next step is to configure the communication port. Select the “Port 1” icon in the project browser and open the “Controller Communication Setup” window with the left mouse button. Select under “Protocol” the Modbus protocol, which is used for the Magelis HMI communication.

After choosing Modbus and the MB-Address 1 in our application you can accept the standard communication parameters (19200,8,1,N) by clicking on “OK”.

---

[Image of Emma Text Box]
**Add option**: additional Com port TWDNOZ485D for the HMI Modbus communication

Select Hardware item in the project browser and open it with the left mouse click.

Add the TWDNOZ485D shown in the “add option” dialog

Select Port2: Modbus1 in the project browser

And with left mouse click you have to open the Editor for the communication setup

In this dialog you can setup the Modbus port for the HMI communication. The parameters must be synchronized in both devices (HMI and PLC)
Insert Application Program

The PLC program (the TwidoSoft source) for this application can be found in a file accompanying this document. The following steps explain how to input the user logic:

First you choose the programming language editor:

- List Editor (IL, AWL)
- Ladder Editor (LD, KOP)

List Editor screen:
Use the toolbar to select the List editor functions: e.g. LD for Load or SR for set register ......

List Editor screen

With the click on second icon Edit you select the Ladder editor functions: e.g. Contact, Set coil or Timer
If you have finished inputting your program, click on Program in the project browser with the left mouse button and select “analyze program”. TwidoSoft checks the source in case of faults and gives warnings.

Select Connection
Before you can transfer the application to the PLC you must configure the communication port of the PC. After you have connected the Twido controller to your PC using the Twido connecting cable TSXPCU1030, you can test the connection with the “Check PLC” selection in the “PLC” menu. If the test is successful choose the menu “Connect” to load the program into the controller.

The logic program can be transferred to the controller now.
Use the toolbar “PLC- Connect – PC to Controller”.

![TwidoSoft software interface](image)
After successfully transferring your program to the controller you can start it by selecting “RUN” in the “PLC” menu.

!!Before you start the PLC (i.e. before selecting “RUN”) in running mode refer to the safety instructions of the application !!!!
Devices

Introduction

The Devices section describes the different steps needed to initialize, parameterize the device logic/behavior to fulfill the former description of the system functionality. The devices are initialized, parameterized using the Powersuite tool.

General

The ATV 58 parameter could be given by the ATV front panel also. The advantage to use the PowerSuite software tool is to have the data storage on PC and the possibility to print out the documentation. Also the tool can help for online optimization of the parameter.

The VVD implementation is realized in following steps

- Program start
- Alt+F to continue
- Select the device ATV58
- Select exactly the device type
- Parameterizing the AC-Motor
- Store the settings
- Connection the PC to the Altivar
- Transfer of the settings

1st PowerSuite screen after program start:

After reading the instructions press "Alt+F" to continue.

Select the device ATV58 for our application example.

Select exactly the device type of ATV 58 according the catalog number for our application example.
| Parameterizing the AC-Motor, for our example use the default settings. | ![Image](image1.png)  
**Altivar 58**

After this procedure you can **store the settings** on the PC. Use the Menu button with the disk symbol.

Check and establish the **connection between the PC and the Altivar**

![Diagram](image2.png)

**Transfer of the settings** to the ATV58. Select in the toolbar "Link - Transfer File – PC to device".  
![Diagram](image3.png)
Addendum

Detailed Component list

<table>
<thead>
<tr>
<th>Type / Software</th>
<th>Revision/Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phaseo power supply - ABL7RM2401 (PS)</td>
<td></td>
</tr>
<tr>
<td>Twido Modular Base Unit – TWDLMDA40DTK (PLC)</td>
<td></td>
</tr>
<tr>
<td>Twido Expansion Comm – TWDNOZ485D</td>
<td></td>
</tr>
<tr>
<td>Altivar ATV58 - ATV58HU009M2 (VVD)</td>
<td></td>
</tr>
<tr>
<td>Magelis XBT-G2330 (HMI)</td>
<td></td>
</tr>
<tr>
<td>Magelis Comm Cable - XTBZ968</td>
<td></td>
</tr>
<tr>
<td>Magelis Cable Adapter - XTBZG999</td>
<td></td>
</tr>
<tr>
<td>ATV Connection Kit - VW3A8106 (cable)</td>
<td></td>
</tr>
<tr>
<td>Vario switch- disconnector VCF02GE – main switch</td>
<td></td>
</tr>
<tr>
<td>Harmony Style 5 emergency stop XALK174G (ESTOP)</td>
<td></td>
</tr>
<tr>
<td>Tesys circuit breaker GV2ME08 (CB)</td>
<td></td>
</tr>
<tr>
<td>Standard AC-Motor – ALTEUM0040001 - 0.75Kw, 4-pol Form TE80 230VAC single phase</td>
<td></td>
</tr>
<tr>
<td>Optional:</td>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td>TwidoSoft Version 2.0-TWDSPU1001V10M</td>
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</tr>
<tr>
<td>Vijeo Designer V4.10 – VJDSPULFUCDV10M</td>
<td>V4.10</td>
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<tr>
<td>PowerSuite Version 1.5 - VW3A8104</td>
<td>V1.5</td>
</tr>
<tr>
<td>Altivar 58</td>
<td></td>
</tr>
</tbody>
</table>
## Component Performance

### Performance

**PLC Twido Modular TWDLMDA40DTK:**

The Twido controller is available in two models:
- Compact
- Modular

The Modular controller is available with:
- 20 I/Os
- 40 I/Os

Additional I/O can be added to the controllers using expansion I/O modules.

They are:
- 15 expansion modules of the digital I/O or relay type
- 4 expansion modules of the analogue I/O type

Connecting to an AS-Interface bus interface module also allows you to manage up to 62 slave devices. Use the following module:
- AS-Interface V2 bus interface master module: TWDNOI10M3.

There are also several options that can be added to the base controllers:
- Memory cartridges
- Real-Time Clock (RTC) cartridge
- Communication adapters
- Communication expansion modules (Modular controller only)
- Operator display expansion module (Modular controller only)
- Input simulators
- Programming cables
- Digital I/O cables
- Telefast cable system kits with I/O interfaces

### TwidoSoft:

- Windows 98SE, Windows 2000 and Windows XP compatible
- Browser for immediate access to all the application objects
- List and Ladder, reversible, Grafcet languages
- Symbolic programming
- PL7-07 compatible via ASCII import
- Specialised editors (configuration, cross-references, …)
- Duplication of application programs.

On site (online mode), TwidoSoft provides the following main functions:
- Real-time animation of program and/or data elements.
- Diagnostics on programmable controller operation.
- Monitoring of the application's use of memory.
- Downloading and uploading of controller programs.
- Backup of controller programs to the optional EEPROM memory modules.
- TwidoSoft on a PC is able to connected to Twido using a serial port, modem or USB port (Windows 2000 and Windows XP)
Performance

Integrated TwidoSoft functions:

Ladder Editor:

List Editor:
Performance ctd.

**HMI Magelis**: XBT-G2330
- Graphic terminals with touch-sensitive screens
- TFT LCD 256 color, 5.7 Inch
- High level of communication: onboard Ethernet, 2 * serial
- External data storage medium: compact flash card
- Multimedia data with integrated image and sound management
- Windows-based Vijeo Designer software
- Compliance with IEC, UL, CSA standards
- CE marking
- IP65 protection, NEMA 4

**VVD Altivar**: ATV58HU009M2
- 0.37KW, 230VAC single phase
- Standard heat sink mounted range ATV58H (Heat sink)
- Temperature range: -10 ... + 50°C
- Speed range from 1 to 50 (0...500 Hz)
- Protection of drive and of motor
- Compact, side by side mounting
- Integrated class B EMC filter

**Power supply Phaseo**: ABL7RM2401
- 240VAC / 24 VDC
- 3 A
<table>
<thead>
<tr>
<th>Author</th>
<th>Telephone</th>
<th>e-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schneider Electric GmbH</td>
<td>+49 6182 81 0</td>
<td><a href="mailto:Ads@de.schneider-electric.com">Ads@de.schneider-electric.com</a></td>
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</tbody>
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