SoMachine
Introduction

04/2012

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Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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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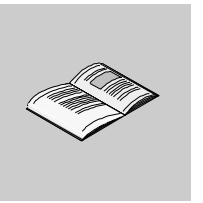
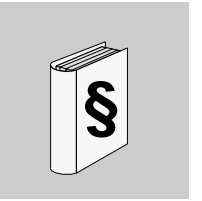


Safety Information



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 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.

NOTICE

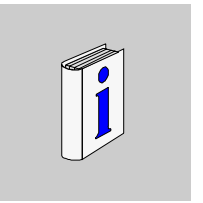
NOTICE is used to address practices not related to physical injury.

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.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

This document provides general information about SoMachine software.

Validity Note

This document has been updated with the release of SoMachine V3.1.

User Comments

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

General Introduction

I

General Introduction to SoMachine

1

Overview

This chapter provides an overview of the specific functions provided by SoMachine.

What's in this Chapter?

This chapter contains the following topics:

What is SoMachine

Presentation

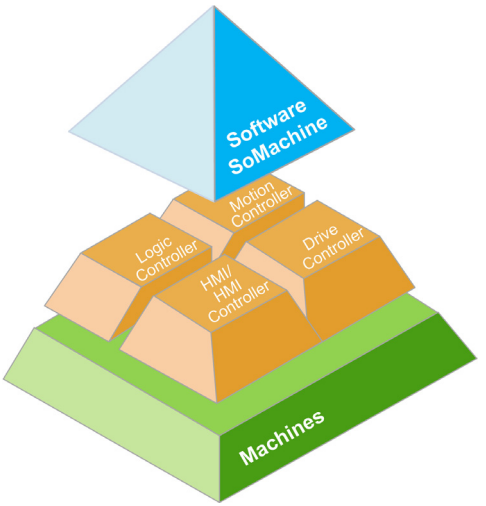
SoMachine is a professional, efficient and open Original Equipment Manufacturers (OEM) software solution that aides you in the developing, configuring and commissioning of the entire machine in a single environment (including logic, motor control, HMI and related network automation functions).

SoMachine allows you to program and commission the entire range of elements in the Schneider Electric Flexible Machine Control offer, and helps you to achieve the most optimized control solution for most machine requirements.

Schneider Electric Flexible Machine Control

Schneider Electric Flexible Machine Control is the comprehensive solution-oriented offer for OEMs that includes the following elements:

- 1 software environment
  - SoMachine
- 4 hardware control platform types
  - HMI controller
  - logic controller
  - motion controller
  - drive controller
- other devices
  - HMI
  - speed drives
  - distributed I/O modules, etc.



SoMachine version 3.1 integrates:

- HMI controllers
  - Magelis XBTGC HMI controller
  - Magelis XBTGT/GK CANopen HMI controller
- Logic controllers
  - Modicon M238
  - Modicon M258
- Motion controllers
  - Modicon LMC058
- Drive controllers
  - Altivar ATV IMC
- HMI Magelis graphic panels
  - Magelis XBTGT
  - Magelis XBTGK
  - Magelis XBTGH
  - Magelis GTO
  - Magelis STU
  - Magelis STO (HMI STO 511 / 512 / 531 / 532)

  Other HMI graphic panels are supported via the Modbus connection which do not support the SoMachine protocol.

Features and Functions

SoMachine provides the following features and functions:

- entire range of IEC 61131-3 languages
- integrated fieldbus configurators
- expert diagnostics and debugging
- visualization screen
- upgrading software via the website *www.schneider-electric.com*
- integrated function block finder to simplify programming
- integrated OPC server
- optional installation of the HMI application development tool Vijeo-Designer

Simplifying the User Workflow

With SoMachine you can design a complete solution with just:

- 1 software
- 1 project file
- 1 cable connection
- 1 download

Dedicated OEM Libraries

SoMachine integrates tested, validated, documented and supported expert application libraries dedicated to many OEM applications. A simple configuration methodology speeds up design, commissioning, installation and troubleshooting.

The following libraries are provided by SoMachine version 3.1:

- Motion & Drives libraries for motion & drives devices control via CANopen
- Toolbox library that offers a set of functions for programming, remote devices control and automation functions (for example closed loop control)

The SoMachine Solution Extension provides additional libraries for the following applications running with S-type controllers:

- Packaging
- Hoisting
- Conveying

For further information on differences between SoMachine version 3.1 and the SoMachine Solution Extension, refer to the SoMachine Product Offer chapter *(see page 37)*.

Overview

Visual Graphic User Interface

Navigation within SoMachine is intuitive and highly visual.

Presentation is optimized in such a way that selecting the development stage of the desired project makes the appropriate tools available.

The user interface provides the following advantages:
- it helps to ensure that nothing is omitted
- it suggests the tasks to be performed throughout the project development cycle
- its workspace has been streamlined so that only those items necessary and relevant to the current task are featured, avoiding any superfluous information

Learning Centre

The **Home** menu includes a **Learning Centre** that provides the following tools to get started with SoMachine.
- An animated file briefly explains the SoMachine interface and concept.
- An e-learning, interactive with the user, allows to run a self-training about SoMachine.
- A third section gives access to several documented SoMachine programming examples.

Projects Management

The implemented project management principle allows you to browse the existing projects without the need to open them before selection.

You can create new projects either from scratch or on the following bases:
- using tested validated and documented architectures
- using the provided examples
- using an existing project

SoMachine provides quick access to the most recently-used projects.

Project Properties

SoMachine provides the possibility to add the following items to each project:
- additional textual information
- attach documents
- attach your individual customer picture
- attach a configuration picture

Configuration

The SoMachine graphical user interface allows you to easily build your architecture and configure the devices of your architecture.

Programming

Programming is an essential step. It must be carried out carefully to be as efficient as possible.

Advanced control and HMI functions cover the needs of an OEM engineer in terms of creating the control and visualization system. Design and functional tests are possible at any moment by quickly simulating the control or HMI system.

Commissioning

SoMachine provides a **Commissioning** screen for easy and fast diagnostics.

It presents the online state of the architecture in a graphical configuration editor that indicates whether you are logged into the displayed devices, as well as if they are in run or stop mode.

Documentation

Because a printed file of the project is an important element, SoMachine lets you build and customize a project report by executing the following steps:

- select the items to be included in the report
- organize the sections
- define the page layout
- launch the printing process

Machine Transparency

SoMachine Protocol

The SoMachine protocol is the preferred protocol providing a transparent access to your machine's controllers and HMIs.

The SoMachine protocol is used for any data exchange

- between the SoMachine software (PC) and the runtime systems (controller, HMI)
- between controllers and integrated HMIs supporting SoMachine protocol

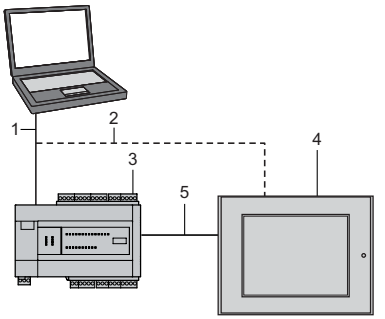
This leads to the following advantages that will be described below:

- a single cable connection to 1 HMI or controller of your machine provides access to any other HMI or controller of the machine
- variables defined once are available to any other HMI or controller in the machine

Single Cable Connection

The transparent SoMachine protocol allows you to access any HMI or controller that is part of your machine by connecting your SoMachine PC to only 1 device on your machine. The connection will then be routed through any connected device.

This single connection to the machine provides a gain in simplicity by transferring data using the same cable from the PC to the machine.



1 connection between SoMachine PC and controller
2 alternative connection between SoMachine PC and HMI
3 logic controller
4 HMI
5 serial line connection between controller and HMI

The above figure illustrates the equivalent access. This means that downloading and commissioning to the controller can be performed in 2 different ways:

- directly connecting the SoMachine PC to the controller which, in turn, routes the information to the HMI
  or
- connecting the SoMachine PC to the HMI which, in turn, routes the information to the controller.

One-Shot Variable Definition

The transparent SoMachine protocol allows you to define variables only once in the project and to make them available to any other HMI or controller by a publish-subscriber mechanism based on symbolic names. Once the variables have been published, they may be subscribed by other HMIs or controllers without the need to re-enter the variable definition.

This provides you the following key advantages:

- single definition of variables shared between the controller and the HMI
- publishing and subscribing variables by simple selection
- variable exchange definition independent of the medium (serial line, etc.)

Transparent Access to Fieldbus Devices

The single connection between the PC and the controller provides pure transparent access to each device connected on CANopen. From the SoMachine unique user interface you can set-up remote devices offline and tune them online.

System Requirements and Installation

II

What's in this Part?

This part contains the following chapters:

System Requirements

2

System Requirements

Overview

The following paragraphs describe the hardware and software requirements of the PC for SoMachine installation should meet.

Hardware Requirements

The PC for SoMachine installation must meet the following hardware requirements:

Equipment	Minimum	Recommended
processor	Pentium V, 1.8 GHz, Pentium M, 1.0 GHz or equivalent	Pentium V, 3.0 GHz, Pentium M, 1.5 GHz or equivalent
RAM	2 GB	3 GB
free hard drive space	3.5 GB including the memory space for the software installation, temporary space for execution and space for saving applications	4 GB
drive	DVD reader	–
display	resolution: 1024 x 786 pixel	resolution: 1280 x 1024 pixel
peripherals	• mouse or compatible pointing device • USB interface	–
Internet access	no Internet access	to register your software by web and to retrieve update notifications via the Schneider Electric Software Update (SESU) client

Software Requirements

The SoMachine software supports the following operating systems:

- Microsoft Windows XP Professional Edition 32 Bits Service Pack 3
- Microsoft Windows 7 Professional Edition 32 Bits
- Microsoft Windows 7 Professional Edition 64 Bits

SoMachine literature contains PDF-formatted documents that require the installation of the Adobe Reader ™. This reader is not part of the SoMachine installation but can be downloaded from *http://www.adobe.com/go/getreader*.

Installation and Registration of SoMachine

3

What's in this Chapter?

This chapter contains the following sections:

3.1 Basic Installation and Registration of SoMachine

Basic Installation and Registration of SoMachine

Overview

The following paragraphs describe how to install SoMachine and how to execute the registration.

General Recommendation

Before you start the SoMachine installation, be sure to first remove (uninstall) any existing version of SoMachine and its various parts on your PC. For more information refer to *Uninstalling SoMachine (see page 29)*.

SoMachine Installation Types

The following installation types are available for SoMachine:

- **Typical**: A standard set of SoMachine components will be installed that serves typical needs.
- **Complete**: All SoMachine components will be installed.
- **Compact**: A minimum set of SoMachine components will be installed.
- **Custom**: You can select the SoMachine components to create an installation adapted to your individual requirements.

The table below lists the SoMachine components that will be installed with the different SoMachine installation types:

SoMachine Component		**Installation Types**			
		Complete	**Typical**	**Compact**	**Customized**
Core components, controllers		yes	yes	yes	yes
Vijeo-Designer and HMIs		yes	yes	no	optional
Gateway		yes	yes	yes	optional
Online help and documentation	English	yes	yes	yes	yes
	user language	yes	yes	no	optional
	other languages	yes	no	no	optional
Legacy support, libraries and devices	previous version	yes	yes	no	optional
	all versions [1]	no	no	no	optional
Learning Center		yes	yes	no	optional
TVD Architectures		yes	yes	no	optional
DTMs		yes	no	no	optional

SoMachine Component	Installation Types			
	Complete	Typical	Compact	Customized
OPC Server	yes	no	no	optional
Schneider Electric Software Update (SESU) client	yes	yes	no	optional

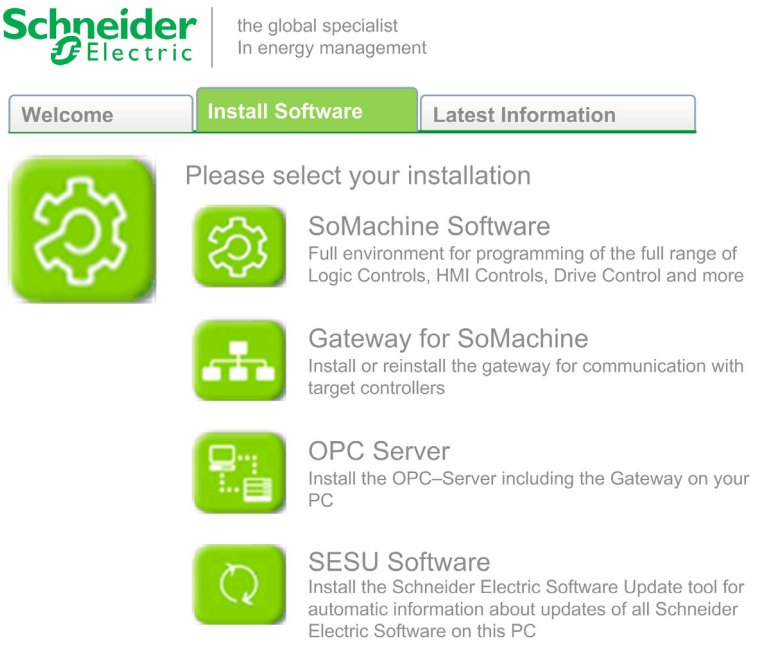
[1] For further details please see chapter *Compatibility and Migration* in the Windows **Start** menu **Schneider Electric** →**SoMachine** →**Documentation**.

Installing SoMachine

To install the SoMachine software with its basic functions, insert the SoMachine Standard Software DVD in the DVD drive of your PC.

If you have enabled the *Autorun* function, the SoMachine Media Menu opens automatically. To open it manually, double-click the *MediaMenu.exe* file in the root folder of the SoMachine Standard Software DVD.

The Media Menu allows you to select the installation of the desired software components. Additionally, you can access information and documentation provided on the DVD in a comfortable way prior to the installation.



In the **Install Software** tab of the Media Menu select the **SoMachine Software** item to install the SoMachine software. The remaining software components in this list are part of the SoMachine installation (see the table above for the installation type you have to select to install them). But they are also provided here as individual installations in order to be able to install them on different computers, independent of the SoMachine installation.

The SoMachine setup starts an installation wizard that will guide you through the installation process.

In order to use SoMachine functions dedicated to specific solutions, you must additionally install the SoMachine Solution Extension after successful installation of the SoMachine standard software. To achieve this, insert the SoMachine Solution Extension DVD into the DVD drive of your PC. The setup will start automatically if you have enabled the *Autorun* function. Otherwise start the setup manually by double-clicking the *Setup.exe* file.

The setup starts an installation wizard that will guide you through the installation process.

For further information on the functions covered by the standard and solution SoMachine products refer to the SoMachine Product Offer chapter *(see page 37)*.

Firewall Installed on SoMachine PC

You can install SoMachine on a PC equipped with a firewall that does not block the ports that SoMachine uses for communicating with the controllers.

If a firewall is running on the SoMachine PC, it must allow incoming connections on the following UDP ports:

- 1740
- 1741
- 1742
- 1743

Registration

In order to convert your installation from the trial mode into an unlimited, licensed installation, restart the setup process and enter the reference number and serial number provided on your SoMachine license document. Registration of your SoMachine software is highly recommended and even mandatory in some countries. You can register your installation via the SoMachine dialog box, tab **License Agreement**, by clicking the button **Registration Wizard**.

You can open this dialog box in different ways:

- from the general functions menu *(see SoMachine, Programming Guide)* by executing the **About** task
- from the **Program** tab via the **Help** →**About** menu

You can also start the **Registration Wizard** directly via **Start** →**Programs** → **Schneider Electric** →**SoMachine** →**License Manager**.

SoMachine Update via Schneider Electric Software Update (SESU) Client

With SoMachine 3.0 and later versions the Schneider Electric Software Update (SESU) client is automatically installed. It searches for updates of the SoMachine software on the web.

The SESU client is not started automatically. To make it search for available SoMachine updates, start it manually by double-clicking the Schneider Electric Software Update icon on the desktop of your computer or via **Start** →**Programs** → **Schneider Electric** →**Schneider Electric Software Update**.

You can also configure regular search intervals via the SESU **Settings**. For further information refer to the Schneider Electric Software Update online help.

To see which updates of SoMachine are installed on your local computer, go to **Start** →**Control Panel** →**Add or Remove Programs** and select the option **Show Updates**.

Uninstalling SoMachine

Uninstall SoMachine from your computer via **Start** →**Control Panel** →**Add or Remove Programs**.

3.2 Additional Standalone Installations

Overview

This section describes the additional standalone installations of software components that are provided on the SoMachine DVD related to the offer.

What's in this Section?

This section contains the following topics:

Installation of the Gateway for SoMachine

General Information

In case you need to provide a single dedicated PC access to the controllers with SoMachine and / or the OPC server, you can install the gateway independently of the SoMachine software.

Installation Procedure

To install the gateway, select the item **Gateway for SoMachine** in the SoMachine Media Menu *(see page 27)*. This will install the gateway automatically.

NOTE: In case the current installation of the gateway is not working or has been corrupted by other software, for example third party software, execute this procedure again to reinstall the gateway.

Installation of the CoDeSys OPC Server

Overview

You can install the CoDeSys OPC server in 2 different ways on different platforms:

- in the course of the SoMachine installation on the SoMachine PC
- by starting an individual CoDeSys OPC server installation for installation on a separate PC that is not running SoMachine

Installation on the SoMachine PC

The OPC server installation is part of the SoMachine installation.

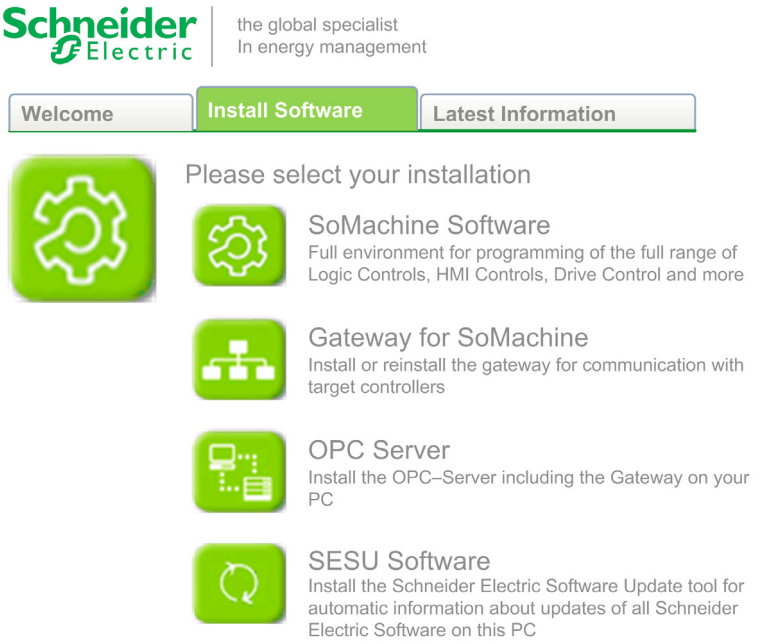
You can install it with the following SoMachine installation types *(see page 26)* on the SoMachine PC:

- **Complete**: automatically installs the OPC server
- **Custom**: Select the item **OPC Server** in the list of program features to be installed.

To install the OPC server on a different PC, that is not running SoMachine, in order to fulfill the requirements of high-availability, proceed as described in the next section.

Separate Installation on a Different PC

To be able to install the OPC server independent of the SoMachine installation on another PC, a separate OPC server installation is provided in the SoMachine Media Menu.



Select the entry **OPC Server** from the SoMachine Media Menu and follow the instructions given on screen to install the OPC server.

The installation of the OPC server automatically installs the stand-alone SoMachine gateway. It provides access to remote controllers via the OPC server. You can manually remove the gateway later if you want to use a remote gateway instead.

Troubleshooting

The installation introduces the OPC server as a COM server on the PC that can be started from any local or remote client. In practice, the start of a remotely running OPC server, the browsing of its address space and the transfer of data is often affected by incorrect or incomplete DCOM permission settings on the server and / or client machine. For further information refer to the relevant literature provided by Microsoft.

Accessing the CoDeSys OPC Server

After successful installation of the OPC server, it can be accessed by an OPC client.

To connect to the OPC server, use the browse function of your OPC client or explicitly enter the server name **CoDeSys.OPC.DA**.

As soon as a client establishes a connection, the OPC server is started automatically by the operating system. It can interact with multiple clients in parallel. As soon as the last client disconnects, the OPC server is automatically shut down.

Installation and Registration

Execute the command **WinCoDeSysOPC/RegServer** to register the server as COM server. The current position of the **WinCoDeSysOPC.exe** file will be used as location path. Thus the call only may be done from a local path.

Registration as Service

Execute the command **WinCoDeSysOPC/Service** to install **WinCoDeSysOPC.exe** as system service. Started once, the service will run until the system is shut down. The communication to the configured controllers survives. The service is also installed in the directory where the **WinCoDeSysOPC.exe** file is saved.

Uninstalling the CoDeSys OPC Server

Execute the command **WinCoDeSysOPC/UnRegServer** to remove the entries of the OPC server from the registry. The installed files will not be removed.

Installation of the SESU Client

General Information

In case you want to use a separate PC to check the Schneider Electric servers for software updates for SoMachine and / or other Schneider Electric software, you can install the Schneider Electric Software Update (SESU) client as standalone product.

Once installed and started, the SESU client will notify you about available updates and other relevant information. You can download the files provided by Schneider Electric to your PC using the SESU client. You can then transfer the updates and files to other PCs.This feature my be useful for centralized management of updates by the IT department in bigger organizations.

Installation Procedure

To install the SESU client, select the item **SESU Software** from the SoMachine Media Menu *(see page 27)* and follow the instructions given on screen.

SoMachine Product Offer

4

SoMachine Product Offer Contents

Overview

The following SoMachine product offers are available:

- SoMachine Standard Software with basic functions
- SoMachine Solution Extension with additional SoMachine functions dedicated to specific solutions

Differences Between the Standard Software and the Solution Extension

The following table lists the differences between the 2 product offers:

	SoMachine Version 3.1	**SoMachine Version 3.1 Solution Extension**
		The Solution Extension is installed additionally on the PC where SoMachine is already installed.
M238 Controllers	Generic devices ● M238 ● TM238LDA24DR ● TM238LDD24DT ● TM238LFAC24DR ● TM238LFDC24DT	Adds the S-type devices: ● M238 ● TM238LFAC24DRS0 ● TM238LFDC24DTS0
M258 Controllers	Generic devices ● M258 ● TM258LD42DT ● TM258LD42DT4L ● TM258LF42DR ● TM258LF42DT ● TM258LF42DT4L ● TM258LF66DT4L	Adds the S-type devices: ● M258 ● TM258LF42DRS0 ● TM258LF42DT4LS0 ● TM258LF42DTS0 ● TM258LF66DT4LS0

	SoMachine Version 3.1	**SoMachine Version 3.1 Solution Extension**
HMI Small Terminal	Generic devices ● HMISTU655, HMISTU855 ● HMISTO511, HMISTO512, HMISTO531, HMISTO532	–

XBTGC Controllers	Generic devices
	● XBTGC
	  ● XBTGC1100
	  ● XBTGC2120
	  ● XBTGC2230
	● CANopen Master Module for XBTGC
	  ● XBTZGCCAN
		Adds the S-type devices:
		● CANopen Master Module S-Type for XBTGC
		  ● XBTZGCCANS0

XBTGT/GK Controllers	Generic devices
	● XBTGT/GK with control
	  ● XBTGK2120 with Control
	  ● XBTGK2330 with Control
	  ● XBTGK5330 with Control
	  ● XBTGT2110 with Control
	  ● XBTGT2120 with Control
	  ● XBTGT2130 with Control
	  ● XBTGT2220 with Control
	  ● XBTGT2330 with Control
	  ● XBTGT2430 with Control
	  ● XBTGT2930 with Control
	  ● XBTGT4230 with Control
	  ● XBTGT4330 with Control
	  ● XBTGT5230 with Control
	  ● XBTGT5330 with Control
	  ● XBTGT5340 with Control
	  ● XBTGT5430 with Control
	  ● XBTGT6330 with Control
	  ● XBTGT6340 with Control
	  ● XBTGT7340 with Control
	● CANopen Master Module for XBTGT/GK
	  ● XBTZGCANM
		Adds the S-type devices:
		● CANopen Master Module S-Type for XBTGT/GK
		  ● XBTZGCANMS0

LMC058 Controllers	Generic devices
	● LMC058
	  ● LMC058LF424
	  ● LMC058LF42
		Adds the following LMC058 S-Type controllers:
		● LMC058
		  ● LMC058LF424S0
		  ● LMC058LF42S0

	SoMachine Version 3.1	**SoMachine Version 3.1 Solution Extension**

ATV IMC Controllers	Generic devices:
	• ATV IMC
	  • VW3A3521
		Adds the following ATV IMC S-Type controller:
		• ATV IMC
		  • VW3A3521S0

Application Libraries	• Energy Efficiency Toolbox Library • Modbus Energy Efficiency Toolbox Library • Machine Energy Dashboard Library	Adds the application libraries: • Packaging Library • Conveying Library • Hoisting Library
Communication Libraries	• PLC Communication Library • Modem Library	–
Generic Libraries	• Toolbox Library • DataLogging Library • SE_NetVarUdp Library • SysTime Library • Toolbox_Advanced Library	–
Devices Libraries	• TeSys Library • Altivar Library • Integrated Lexium Library • Lexium Library • CANmotion Lexium Library • M238 PLCSystem Library • M238 HSC Library • M238 PTOPWM Library • XBT PLCSystem Library • XBTGC HSC Library • XBTGC PTOPWM Library • ATV IMC PLCSystem Library • ATV IMC HSC Library • ATV IMC UserLib Library • M258 PLCSystem Library • M258 HSC Expert I/O Library • M258 PWM Expert I/O Library • LMC058 PLC System Library • LMC058 HSC Expert I/O Library • LMC058 PWM Expert I/O Library • TM5 Expert Modules PTOLib Library • TM5 Expansion Modules StrainedGaugeLib Library	–

The following table lists the different System User Guides and Project Templates of Tested, Validated and Documented Architecture (TVDA) between the 2 product offers:

SoMachine Version 3.1		**SoMachine Version 3.1 Solution Extension**	
The following generic TVDAs are provided:		Adds the following application TVDAs:	
TVDA	**TVDA U.S.**	**TVDA**	**TVDA U.S.**
Optimized HW XBTGC	Optimized HW XBTGC (U.S.)	Hoisting Optimized CANopen ATV IMC (project template only)	Hoisting Optimized CANopen ATV IMC (U.S.) (project template only)
Optimized CANopen XBTGC	Optimized CANopen XBTGC (U.S.)	Packaging Optimized CANopen M238 (project template only)	Packaging Optimized CANopen M238 (U.S.) (project template only)
Optimized HW M238	Optimized HW M238 (U.S.)	Packaging Performance CANopen M258 (project template only)	Packaging Performance CANopen M258 (U.S.) (project template only)
Optimized CANopen M238	Optimized CANopen M238 (U.S.)	Packaging Performance CANmotion LMC058 (project template only)	Packaging Performance CANmotion LMC058 (U.S.) (project template only)
Performance HW M258	Performance HW M258 (U.S.)	Conveying Performance CANopen LMC058	Conveying Performance CANopen LMC058 (U.S.)
Performance CANopen M258	Performance CANopen M258 (U.S.)	Hoisting Optimized CANopen M238	Hoisting Optimized CANopen M238 (U.S.)
Performance CANmotion LMC058	Performance CANmotion LMC058 (U.S.)	–	–
Optimized CANopen ATV IMC	Optimized CANopen ATV IMC (U.S.)	–	–

Compatibility and Migration

III

Overview

This part provides information to help you to deal with the updates of the different elements of your system as SoMachine application, SoMachine project, device firmware, Vijeo-Designer application, device description and others.

What's in this Part?

This part contains the following chapters:

General Information

5

General Information

Overview

SoMachine and the devices supported by SoMachine are continuously improved. Therefore, new updates of SoMachine and its associated devices are released on a regular basis.

SoMachine Software provides in most cases a simple and straight forward way to migrate projects created with previous versions of SoMachine to the current version.

NOTE:

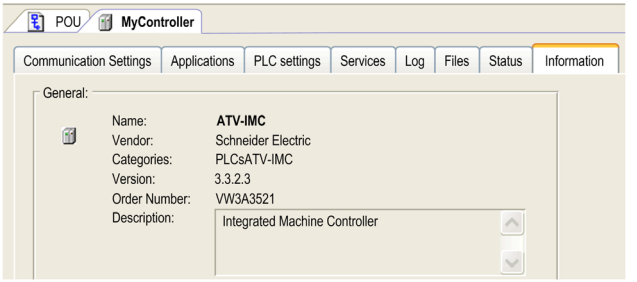
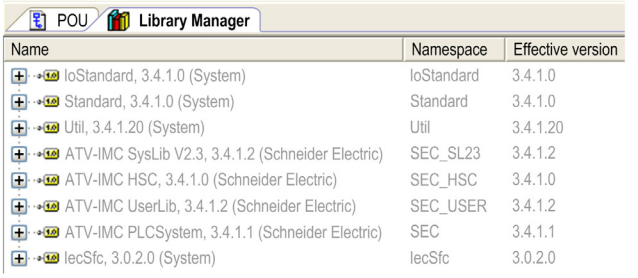
- Schneider Electric recommends to regularly launch the Schneider Electric Software Update (SESU) software *(see page 29)* to obtain the latest SoMachine updates.
- Schneider Electric recommends that you visit the Schneider Electric website *www.schneider-electric.com* to download the latest device firmwares available.

In specific scenarios, it is possible that you encounter compatibility issues regarding these updates, and actions are required to establish consistency with your existing systems and project files for the following elements:

- SoMachine files created with a previous SoMachine version (projects, archives, exports)
- device firmware versions (controllers, HMI terminals)
- related software (Vijeo-Designer)

SoMachine Software

When installing a new version of SoMachine *(see page 26)*, components of SoMachine are updated with the latest version available, which includes:

Component	Description
Compiler version	The compiler is the software that converts your project into the binary code that is downloaded and executed on the controller. It is executed when you execute a **Build**, **Build All**, **Rebuild** or **Generate Code** action in SoMachine. The version of the compiler used is independent to your SoMachine version and can be defined by selecting: **Project** →**Project Settings** →**Compile options** By default, the latest compiler version is selected and we highly recommend that you keep this default.
Device description version	The device description defines the properties of a device such as configurability, programmability and possible connections to other devices. When you insert a device inside a project, SoMachine uses the device description to define the properties of the device. The device description version is displayed in the **Information** tab of the device of your project: 
Library version	A library is a container of variable lists, data structures (DUTs), functions and function blocks (POU) that can be used in your projects.The versions of libraries used in an application are visible in the **Library Manager**: 

There are 2 types of project files which are created by SoMachine:

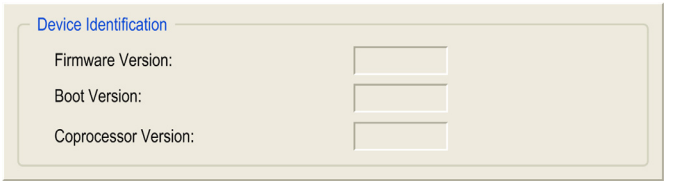
File Type	Description
**.project*	The version of a SoMachine project file is determined by the application file version and the application profile. **application file version:** The version of the application file is defined by the version of SoMachine that saved this application file. It acts as a container that specifies the storage format for the content of the application. **application profile:** The application profile contains the versions of device descriptions and the versions of the libraries used, the compiler version and the visualization profile. The application profile applies to all the applications of the project. When a SoMachine project has a Vijeo-Designer application, it is saved in the **.project* file.
**.projectarchive*	A project archive can be created by using SoMachine and be saved on your PC as a **.projectarchive* file. This file contains one project and can contain download information files, referenced devices and referenced libraries. You can also do a Source download to create an archive as an *Archive.prj* file in your controller.

The following elements can have compatibility issues between SoMachine versions:
- Project files *(see page 49)*
- Archives files *(see page 49)*
- Device firmwares *(see page 53)*
- Vijeo-Designer software *(see page 120)*

Device Firmware

The firmware is the software embedded in the controller.

The firmware version is displayed in the **Services** tab that you can find by double-clicking on your controller in the **Commissioning** tab window:



Vijeo-Designer Software

The Vijeo-Designer software is a Windows application that allows you to create your HMI applications.

The SoMachine installation includes the installation of Vijeo-Designer but this software is independent to SoMachine and can be installed or updated without the SoMachine software.

For compatibility information with Vijeo-Designer, refer to Compatibility of SoMachine and Vijeo-Designer versions *(see page 120)*

Compatibility Use Cases

6

Overview

This chapter provides information on compatibility situations you can encounter when you install a new version of the SoMachine software, acquire a new device or a new version of Vijeo-Designer software.

What's in this Chapter?

This chapter contains the following sections:

6.1 Using a New Version of SoMachine Software

Overview

This section describes the compatibility use cases you can encounter when installing a new version of SoMachine.

Refer to Installation and Registration of SoMachine for information about installation procedure *(see page 26)*.

What's in this Section?

This section contains the following topics:

Using Existing SoMachine Projects

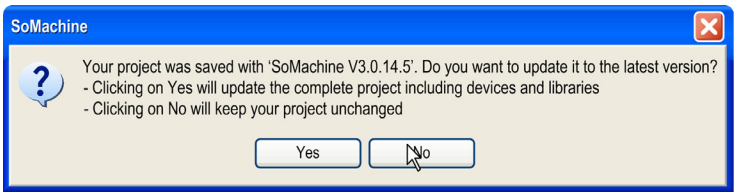
Overview

You can use existing projects created with a previous SoMachine version by different ways:

- **Open** a **.project* file
- **Extract Archive** a **.projectarchive* file
- **Source Upload** a **.prj* file from a controller

NOTICE
LOSS OF DATA Always make a backup of your project file before you use it with a new SoMachine version. **Failure to follow these instructions can result in equipment damage.**

When you open a project that was created with an earlier SoMachine version than the version you are using, the following message is displayed:



Using your SoMachine Projects With Update

If you wish to take advantage of the latest features and functions of the new version of SoMachine, you will want to update your projects.

Click **Yes** to update your project to the new version of SoMachine.

The following elements are updated:

- the project file version when saving the project,
- the application profile (device descriptions and libraries), and
- the visualization profile.

A build and a download of the project to the controller is necessary after the update.

NOTE:

After the update of the project,

- you can encounter device firmware compatibility issues *(see page 53)*,
- you cannot open the project in an earlier SoMachine version.

Using your SoMachine Projects Without Update

Click **No** if you have a new version of SoMachine but you do not want to make any changes to your project.

NOTE: If you do not update your project, the latest functionalities of SoMachine are not available.

If you selected the **Support of earlier versions** option during installation procedure, it is possible to build and download the old application into the controller.

NOTE: The option **Support of earlier versions** is automatically selected in typical and complete installation *(see page 26)*.

You can login to your controller without building and downloading the project only if a **Download Information Files** file (**.compileinfo*) was created in the same directory as the project on your PC.

In any case, if your project was modified, or if the compiler version in your project was manually selected a rebuild of the project is necessary.

Refer to the migration recommendations *(see page 57)* for more information on how to reduce the effect of a new version of SoMachine on your projects.

NOTE: If your projects include or are based on HMI, the HMI runtime is updated during the download of the project *(see page 119)*.

Projects Using HMI Controllers

The Vijeo-Designer software has its own rules which are defined in the Vijeo-Designer Documentation: **3.0 Before you begin →3.2 Compatibility**

Vijeo-Designer can open an application created by an earlier version and automatically convert this application into the new version.

NOTE: The converted application can no longer be opened with an earlier version of Vijeo-Designer.

By downloading the HMI application part with SoMachine V3.1 (or with Vijeo-Designer), the HMI Runtime on the device is updated.

NOTE: Access to this HMI controller with an earlier SoMachine version is no longer possible.

Projects with External Elements

If you did not follow the migration recommendations *(see page 57)* when using your previous SoMachine versions, you can encounter the following issues with external elements:

- a project that contains a device description installed from an EDS file, the device can not be recognized by the new SoMachine version. You must install the device in the **Device Repository**,
- a project that contains a library that is not part of the SoMachine installation, the library can not be recognized by the new SoMachine version. You must add the library in the **Library Manager**.

Creating a Project in a New SoMachine Version

Overview

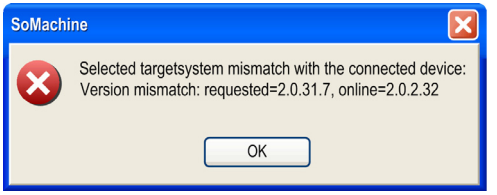
When you create a project in SoMachine,

- you can encounter a device firmware compatibility *(see page 53)* issues.
- you cannot open the project in an earlier SoMachine version.

Using a Device with an Earlier Firmware Version

Overview

When login or downloading a new or an updated project with a new version of SoMachine, you can encounter a compatibility problem with your current controller firmware:



In this popup, the requested version is the device description version of the active application; the online version is the firmware version of the controller.

In this case, updating the device firmware is necessary. Device firmwares are provided inside SoMachine installation or can be found on the Schneider Electric website: www.schneider-electric.com.

Refer to the migration recommendations *(see page 57)* to understand how to avoid this situation in future versions of SoMachine.

6.2 Using a New Version of Vijeo-Designer Software

Using a New Version of Vijeo-Designer Software

Overview

SoMachine is shipped with a specific version of Vijeo-Designer. You should not use a different version of Vijeo-Designer software.

For more information refer to the chapter *Compatibility of SoMachine and Vijeo-Designer Versions* in the Appendix *(see page 120)*.

6.3 Using a New Controller

Using a New Controller

Overview

We update the controller frequently providing new features and functions. Therefore there may be a difference between the version you receive as a new product, the current version being put into stock from the factory, and the version of your SoMachine installation.

Basically, you can encounter 2 situations:

You received a controller with a firmware version older than the one of the device description in your SoMachine project: In this case, updating the controller firmware is necessary. Controller firmwares are provided inside the SoMachine installation or can be found on the Schneider Electric website: *www.schneider-electric.com*.

If you do not update your controller, you will be able to login to your controller only if the compatibility rule is respected *(see page 118)*.

You received a controller with a firmware version newer than the one of the device description in your SoMachine project: No update is required. You can directly download the application into the new controller.

Migration Considerations

7

Creating an Archive

Overview

Before you install a new version of SoMachine software or when your project is finalized, you should create an archive of your project.

Creating an archive can help reduce compatibility issues with later versions of SoMachine.

Create an Archive on your Local Computer

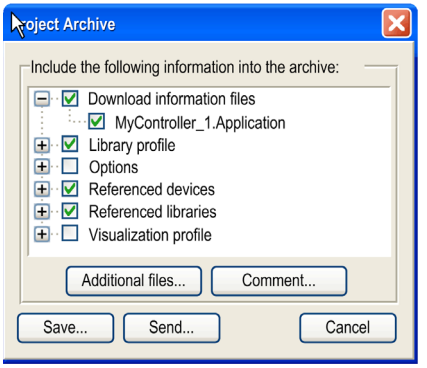
When you create an archive, you can save additional information that would not normally be kept in a **.project* file:

- Download Information file
- third party libraries
- EDS files

When you extract your archive in SoMachine, all the files contained in your archive are automatically installed in your current SoMachine version.

To create an archive on your local computer select **File →Project Archive → Save/Send Archive...**

The following window is displayed:



The following topics can affect compatibility and therefore you must select them:

Information	Description
Download Information Files	When this is selected, all the compile information (the **.compileinfo* file) is saved with your project file. This allows you to login to the controllers with the archived project without rebuilding the project.
Referenced devices	When this is selected, all the devices in the **Device Repository** of your project are saved into the archive with their current versions. Devices installed with EDS files are included.
Referenced libraries	When this is selected, all the libraries in the **Library Repository** of your project are saved into the archive with their current versions. Third party libraries are included.

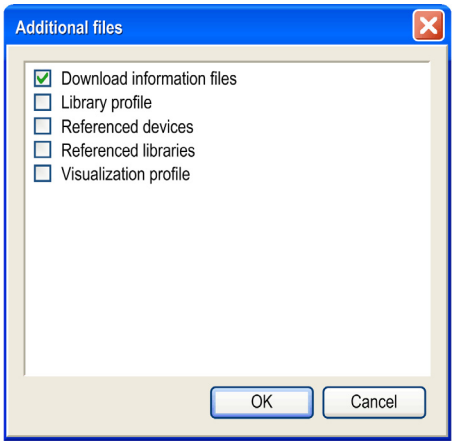
NOTE: For more information, refer to the CoDeSys part of the SoMachine online help.

Create an Archive on your Controller

You can archive your project on your controller by using the command: **Online** → **Source download to connected device**

To define what you want to add to the archive, select **Project** →**Project Settings** →**Source Download** →**Additional Files**

The following window is displayed:



See the previous table for more information.

Supported Devices

IV

Introduction

This part provides information about the devices that SoMachine can configure and program.

What's in this Part?

This part contains the following chapters:

Optimized Controllers

8

What's in this Chapter?

This chapter contains the following sections:

8.1 M238 Logic Controllers

What's in this Section?

This section contains the following topics:

Modicon M238 Logic Controller Devices Overview

Overview

The Schneider Electric Modicon M238 Logic Controller has a variety of powerful features. This controller can service a wide range of applications.

Key Features

The Modicon M238 Logic Controller is supported and programmed with the SoMachine Programming Software, which provides the following IEC61131-3 programming languages:

- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram
- CFC: Continuous Function Chart

The Modicon M238 Logic Controller can manage up to 7 tasks (1 MAST task and up to 6 other tasks).

The power supply of Modicon M238 Logic Controller is either:

- 24 Vdc
- 100...240 Vac

The Modicon M238 Logic Controller with DC power supply includes the following features:

- 14 digital inputs, including 8 fast inputs
- 10 digital outputs, including 4 fast outputs

The Modicon M238 Logic Controller with AC power supply includes the following features:

- 14 digital inputs, including 8 fast inputs
- 10 digital outputs, including 6 relay outputs

Modicon M238 Logic Controller Range

The following table describes the M238 range *(see M238 Logic Controller, Hardware Guide)* and features:

Reference	Power Supply	Serial Ports	CANopen Master	Digital Inputs	Digital Outputs	Memory size
M238 DC Range						
TM238LFDC24DT••	24 Vdc	SL1: RS232/RS485 SL2: RS485	Yes	8 fast inputs(1) + 6 regular inputs	4 transistor fast outputs(2) + 6 transistor regular outputs	2 MB
TM238LDD24DT	24 Vdc	SL1: RS232/RS485	No			1 MB
M238 AC Range						
TM238LFAC24DR••	100...240 Vac	SL1: RS232/RS485 SL2: RS485	Yes	8 fast inputs(1) + 6 regular inputs	4 transistor outputs + 6 relay outputs	2 MB
TM238LDA24DR	100...240 Vac	SL1: RS232/RS485	No			1 MB

(1) The fast inputs can be used either as regular inputs or as fast inputs for counting or event functions.

(2) The fast outputs can be used either as regular outputs or as fast outputs for PTO (Pulse Train Output), HSC (High Speed Counter), PWM (Pulse Width Modulation), or FG (Frequency Generator) functions.

AS-Interface Master Module for the M238 Controller

Introduction

The following paragraph lists the AS-Interface Master Module for M238 supported by SoMachine with its description.

AS-Interface Master Module for the M238 Controller

The following AS-Interface Master Module is available for the M238 controller:

Reference	Description
TWDNOI10M3	The AS-Interface Master Module manages all exchange of data on the AS-Interface network.

The AS-Interface Master Module is described in the Modicon TWDNOI10M3 AS-Interface Master Module Hardware Guide *(see Modicon TWDNOI10M3, AS-Interface Master Module, Hardware Guide)*.

Each M238 controller supports a maximum of 2 AS-Interface Master Modules.

Ethernet Gateway for Modicon M238 Logic Controller

Introduction

The following paragraph lists the Ethernet Gateway supported by SoMachine with their descriptions.

NOTE: For further information refer to Connection and Configuration of the Ethernet Gateway *(see Modicon M238 Logic Controller, Programming Guide)*.

Ethernet Gateway for Modicon M238 Logic Controller

The following Ethernet Gateway module is available for Modicon M238 Logic Controller.

Reference	Description
499TWD01100	Ethernet/Modbus gateway to be used with the Modicon M238 Logic Controller. The gateway is used to connect a single controller Modbus/RTU (RS485) device and the physical layer of Modbus/TCP networks.The gateway module supports slave mode only.

The Ethernet Gateway module is described in the 499TWD01100 Ethernet/Modbus Gateway for M238 Hardware Guide

8.2 TM2 Expansion Modules

What's in this Section?

This section contains the following topics:

TM2 Digital Input and Output Expansion Modules

Introduction

The following paragraph lists the TM2 digital I/O modules for Modicon M238 Logic Controller and XBTGC HMI Controller that are supported by SoMachine with their complete name and catalog reference.

NOTE: To add a digital module, refer to Adding Expansion Modules *(see Modicon M238 Logic Controller, Programming Guide)*.

Supported Modules

The Modicon M238 Logic Controller and the XBTGC HMI Controller support the following I/O modules:

Module Reference	Channels	Channel Type	Voltage/Current	Terminal Block
Input Modules				
TM2DAI8DT	8	inputs	120 Vac 7.5 mA	removable with screw
TM2DDI8DT	8	inputs	24 Vdc 7 mA	removable with screw
TM2DDI16DT	16	inputs	24 Vdc 7 mA	removable with screw
TM2DDI16DK	16	inputs	24 Vdc 5 mA	HE10 connector
TM2DDI32DK	32	inputs	24 Vdc 5 mA	HE10 connector
Output Modules				
TM2DRA8RT	8	outputs relay	30 Vdc/230 Vac 2 A max	removable with screw
TM2DRA16RT	16	outputs relay	30 Vdc/230 Vac 2 A max	removable with screw
TM2DD08UT	8	outputs transistor sink	24 Vdc 0.3 A max per output	removable with screw
TM2DD08TT	8	outputs transistor source	24 Vdc 0.5 A max per output	removable with screw
TM2DDO16UK	16	outputs transistor sink	24 Vdc 0.1 A max per output	HE10 connector

Module Reference	Channels	Channel Type	Voltage/Current	Terminal Block
TM2DDO16TK	16	outputs transistor source	24 Vdc 0.4 A max per output	HE10 connector
TM2DDO32UK	32	outputs transistor sink	24 Vdc 0.1 A max per output	HE10 connector
TM2DDO32TK	32	outputs transistor source	24 Vdc 0.4 A max per output	HE10 connector
Mixed Modules				
TM2DMM8DRT	4 4	inputs outputs relay	24 Vdc/7 mA 30 Vdc/230Vac 2 A max	removable with screw
TM2DMM24DRF	16 8	inputs outputs relay	24 Vdc/7 mA 30 Vdc/230Vac 2 A max	non-removable spring

TM2 Analog Input and Output Expansion Modules

Introduction

The following paragraph lists the analog I/O modules for Modicon M238 Logic Controller and XBTGC HMI Controller that are supported by SoMachine with their complete name and catalog reference.

NOTE: To add an analog module, refer to Adding Expansion Modules chapter in the SoMachine Programming Guide *(see Modicon M238 Logic Controller, Programming Guide)*.

Supported Modules

The Modicon M238 Logic Controller and the XBTGC HMI Controller support the following I/O modules:

Module Reference	Channels	Channel Type	Voltage/Current	Terminal Block
Input Modules				
TM2AMI2HT	2	high-level inputs	0...10 Vdc 4...20 mA	removable with screw
TM2AMI2LT	2	low-level inputs	Thermocouple type J,K,T	removable with screw
TM2AMI4LT	4	inputs	0...10 Vdc 0...20 mA PT100/1000 Ni100/1000	removable with screw
TM2AMI8HT	8	inputs	0...20 mA 0...10 Vdc	removable with screw
TM2ARI8HT	8	inputs	NTC / PTC	removable with screw
TM2ARI8LRJ	8	inputs	PT100/1000	RJ11 connector
TM2ARI8LT	8	inputs	PT100/1000	removable with screw
Output Modules				
TM2AMO1HT	1	output	0...10 Vdc 4...20 mA	removable with screw
TM2AVO2HT	2	outputs	+/- 10 Vdc	removable with screw

Module Reference	Channels	Channel Type	Voltage/Current	Terminal Block
Mixed Modules				
TM2AMM3HT	2 1	inputs output	0...10 Vdc 4...20 mA 0...10 Vdc 4...20 mA	removable with screw
TM2AMM6HT	4 2	inputs outputs	0...10 Vdc 4...20 mA 0...10 Vdc 4...20 mA	removable with screw
TM2ALM3LT	2 1	low-level inputs output	Thermo J,K,T, PT100 0...10 Vdc 4...20 mA	removable with screw

TM2 High-Speed Counting I/O Expansion Modules

Introduction

The following paragraph lists the HSC expansion modules for Modicon M238 Logic Controller that are supported by SoMachine with their description.

NOTE: To add an expansion module, refer to Adding Expansion Modules *(see Modicon M238 Logic Controller, Programming Guide)*.

Supported Modules

The HSC modules are only available with the Modicon M238 Logic Controller.

Reference	Description
TM200HSC206DT	2 High Speed Counters, Frequency 60 kHz, Expansion Module, Removable screw terminal block (supplied)
TM200HSC206DF	2 High Speed Counters, Frequency 60 kHz, Expansion Module, Removable spring terminal block (supplied)

Each Modicon M238 Logic Controller supports a maximum of 3 HSC expansion modules.

8.3 XBTGC, XBTGT, XBTGK HMI Controllers

What's in this Section?

This section contains the following topics:

XBTGC HMI Controller

Introduction

Software configuration and hardware description can be found in the following manuals:

- XBTGC HMI Controller Hardware Guide *(see Magelis XBTGC HMI Controller, Hardware Guide)*
- XBTGC HMI Controller Programming Guide *(see Magelis XBTGC HMI Controller, Programming Guide)*

Key Features

The XBTGC HMI Controllers support the following IEC61131-3 programming languages:

- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram
- CFC: Continuous Function Chart

The XBTGC HMI Controllers can manage up to 3 tasks:

- 1 unique and mandatory MAST task can be configured in 'Freewheeling *(see Magelis XBTGC HMI Controller, Programming Guide)*' or 'Cyclic *(see Magelis XBTGC HMI Controller, Programming Guide)*' mode.
- 2 other tasks can be configured in 'Freewheeling' (only if the MAST task is not configured in Freewheeling), 'Cyclic' or 'Event *(see Magelis XBTGC HMI Controller, Programming Guide)*' mode.

XBTGC HMI Controller Range

The following table describes the XBTGC HMI Controller

	XBTGC 1100	**XBTGC 2120**	**XBTGC 2230**
Embedded inputs	12	16	16
Embedded outputs	6	16	16
Display type	Monochrome Amber/Red LCD	Monochrome LCD	STN Color LCD
Expansion modules	2 max.	3 max.	3 max.
Ethernet interface	Not available	Not available	Available
Serial interface (COM1)	Not available	RS232/RS422/RS485 serial interface. SUB-D 9-pin plug connector.	RS232/RS422/RS485 serial interface. SUB-D 9-pin plug connector.
USB Interface	Available	Available	Available

XBTGT/GK HMI Controllers

Introduction

XBTGT/GK HMI terminals *(see page 101)* become controllers when a CANopen module *(see page 76)* is attached to them.

Software configuration and hardware description can be found in the following manuals:

- Magelis XBTGT, XBTGK, XBTGH Hardware Guide
- Magelis XBTGT, XBTGK HMI Controller Programming Guide

XBTGT/GK Key Features

The XBTGT/GK HMI controllers support the following IEC61131-3 programming languages:

- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram
- CFC: Continuous Function Chart

The XBTGT/GK HMI controllers can manage up to 3 tasks:

- 1 unique and mandatory MAST task can be configured in 'Freewheeling *(see Magelis XBT GT, HMI Controller, Programming Guide)*' or 'Cyclic *(see Magelis XBT GT, HMI Controller, Programming Guide)*' mode.
- 2 other tasks can be configured in 'Freewheeling' (only if the MAST task is not configured in Freewheeling), 'Cyclic' or 'Event *(see Magelis XBT GT, HMI Controller, Programming Guide)*' mode.

XBTGT/GK Terminal Range

For key features as well as a list of the range of XBTGT/GK HMI terminals refer to the HMI Terminals chapter of this document *(see page 101)*.

CANopen Master Modules for XBTGC, XBTGT and XBTGK HMI Controllers

Introduction

The following paragraph lists the CANopen Master / CANopen Master S-type modules supported by SoMachine with their description.

CANopen Master Module for the XBTGC HMI Controller

The following CANopen Master modules (XBTZGCCAN and XBTZGCCANS0) are available for the XBTGC HMI Controller:

Reference	Description
XBTZGCCAN XBTZGCCANS0 (to be used if S-type controller is requested)	CANopen Master Module conforms to EN61000-6-2 Standard, 5 Vdc, 2.4 W max, communication module, extension connector, multi-drop connection, half duplex serial transmission.

NOTE: For more information refer to the Magelis XBTGC HMI Controller Programming Guide.

CANopen Master Module for the XBTGT/GK HMI Controller

The following CANopen Master modules (XBTZGCANM and XBTZGCANMS0) are available for the XBTGT/GK HMI Controller:

Reference	Description
XBTZGCANM XBTZGCANMS0 (to be used if S-type controller is requested)	CANopen Master Module conforms to EN61000-6-2 Standard, 5 Vdc, 2.4 W max, communication module, extension connector, multi-drop connection, half duplex serial transmission.

NOTE: For more information refer to the Magelis XBTGT, XBTGK HMI Controller Programming Guide.

8.4 ATV IMC Drive Controllers

ATV IMC Drive Controller

Introduction

The ATV IMC Drive Controller (ATV IMC: Altivar Integrated Machine Controller) is an option card which can be installed in the Altivar 61 or the Altivar 71 drive. It can be combined with another option card (I/O extension or communication).

NOTE: The ATV IMC is compatible with drives containing a firmware version greater than or equal to V3.3ie43.

Only one ATV IMC Drive Controller option card can be installed on a drive.

The ATV IMC Drive Controller is used to adapt the variable speed drive to specific applications by integrating control system functions.

Key Features

The ATV IMC Drive Controller supports the following IEC61131-3 programming languages using the SoMachine software:

- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram
- CFC: Continuous Function Chart

The ATV IMC Drive Controller can manage up to 9 tasks.

The ATV IMC Drive Controller includes the following features using the SoMachine software:

- 10 digital inputs (2 inputs can be used for 2 counters or 2 inputs can be used for 2 incremental encoders)
- 2 analog inputs
- 6 digital outputs
- 2 analog outputs
- A master port for the CANopen bus
- A mini-USB B port for programming with SoMachine software
- An Ethernet port to be used for programming with SoMachine software or Modbus TCP communication.

The ATV IMC Drive Controller can also use:
- The drive I/O
- The I/O extension card (I/O basic and I/O extended)
- The encoder interface card points counter
- The drive parameters (speed, current, torque, etc.)
- The drive remote keypad (as application HMI).

Compatible Option Cards

The following table provides the references of the ATV 61/71 option cards compatible with the ATV IMC Drive Controller:

Reference	Option Card Description
VW3A3201	Logic I/O card
VW3A3202	Extended I/O card
VW3A3303	Modbus ASCII communication card
VW3A3310D	Modbus TCP/IP Daisy-Chain Ethernet card
VW3A3304	Interbus communication card
VW3A3316	Ethernet IP communication card
VW3A3309	DeviceNet communication card
VW3A3307	Profibus DP communication card
VW3A3307S371	Profibus DP V1 communication card

Features of the ATV IMC Drive Controller

The following table lists the features of the ATV IMC drive controller:

Reference	Power Supply	Ethernet Interface	CANopen Master	Digital Inputs	Digital Outputs	Analog Inputs	Analog Outputs	Memory Size
VW3A3521••	24 Vdc	yes	yes	10	6	2	2	3 MB

Performance Controllers

9

What's in this Chapter?

This chapter contains the following sections:

9.1 M258 Logic Controllers

Modicon M258 Logic Controller

Overview

Software configuration and hardware description can be found in the following manuals:

- Modicon M258 Logic Controller programming guide *(see Modicon M258 Logic Controller, Programming Guide)*
- Modicon M258 Logic Controller hardware guide *(see Modicon M258, Logic Controller, Hardware Guide)*

The Schneider Electric Modicon M258 Logic Controller is a controller with a variety of powerful features. It can control a wide range of applications.

The Software configuration is described in the SoMachine Programming Guide *(see Modicon M258 Logic Controller, Programming Guide)*.

Key Features

The SoMachine software compatible with Modicon M258 Logic Controller provides the following IEC61131-3 programming languages:

- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram
- CFC: Continuous Function Chart

All controllers include:

- CANopen Master
- Ethernet
- Serial Line
- Expert functions (counting, reflex outputs...)
- Embedded I/Os

All controllers support up to 20 tasks with the following limits:

- 4 cyclic tasks: one is configured by default (Mast)
- 1 freewheeling task
- 8 software event driven tasks
- 8 hardware event driven tasks

Controller Range

	PCI	CAN	USB A	USB Pgr	Eth	SL
TM258LD42DT *(see Modicon M258, Logic Controller, Hardware Guide)*	0	0	1	1	1	1
TM258LD42DT4L *(see Modicon M258, Logic Controller, Hardware Guide)*	2	0	1	1	1	1
TM258LF42DT•• *(see Modicon M258, Logic Controller, Hardware Guide)*	0	1	1	1	1	1
TM258LF42DT4L•• *(see Modicon M258, Logic Controller, Hardware Guide)*	2	1	1	1	1	1
TM258LF66DT4L•• *(see Modicon M258, Logic Controller, Hardware Guide)*	2	1	1	1	1	1
TM258LF42DR•• *(see Modicon M258, Logic Controller, Hardware Guide)*	2	1	1	1	1	1

	Embedded expert I/O				Embedded regular I/O			
		Fast Inputs	Fast Outputs	Regular Inputs		Digital Inputs	Digital Outputs	Analog Inputs
TM258LD42DT *(see Modicon M258, Logic Controller, Hardware Guide)*	2x	5	2	2	1x	12	12	0
TM258LD42DT4L *(see Modicon M258, Logic Controller, Hardware Guide)*	2x	5	2	2	1x	12	12	4
TM258LF42DT•• *(see Modicon M258, Logic Controller, Hardware Guide)*	2x	5	2	2	1x	12	12	0
TM258LF42DT4L•• *(see Modicon M258, Logic Controller, Hardware Guide)*	2x	5	2	2	1x	12	12	4

	Embedded expert I/O				Embedded regular I/O			
		Fast Inputs	**Fast Outputs**	**Regular Inputs**		**Digital Inputs**	**Digital Outputs**	**Analog Inputs**
TM258LF66DT4L•• *(see Modicon M258, Logic Controller, Hardware Guide)*	2x	5	2	2	2x	12	12	4
TM258LF42DR•• *(see Modicon M258, Logic Controller, Hardware Guide)*	2x	5	2	2	2x	6	6 Relays	0

9.2 LMC058 Motion Controllers

Modicon LMC058 Motion Controller

Introduction

Overview

Software configuration and hardware description can be found in the following manuals:

- Modicon LMC058 Motion Controller programming guide *(see Modicon LMC058 Motion Controller, Programming Guide)*
- Modicon LMC058 Motion Controller hardware guide *(see Modicon LMC058, Motion Controller, Hardware Guide)*

The Schneider Electric Modicon LMC058 Motion Controller is a controller with a variety of powerful features. This controller is the optimized solution for axis positioning thanks to software with embedded automation functions and an ergonomic interface for axis configuration (SoMachine software). It can control a wide range of applications. Combined with Lexium servo drives or Lexium SD3 Stepper drives, this lets you easily design and commission your applications.

Key Features

The SoMachine software compatible with the controller provides the following IEC61131-3 programming languages:

- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram
- CFC: Continuous Function Chart

All controllers include:

- CANopen Master
- Encoder Master
- Ethernet
- Serial Line
- Expert functions (counting, reflex outputs...)
- Embedded I/Os

All controllers support up to 21 tasks with the following limits:

- 1 motion task synchronized with the CANmotion Master
- 4 cyclic tasks: one is configured by default (Mast)
- 1 freewheeling task
- 8 software event driven tasks
- 8 hardware event driven tasks
- 1 hardware event driven task CANmotion Master dedicated to motion device synchronization

Controller Range

	PCI	CAN	USB A	USB Pgr	Eth	SL	ENC
LMC058LF42•• *(see Modicon LMC058, Motion Controller, Hardware Guide)*	0	2	1	1	1	1	1
LMC058LF424•• *(see Modicon LMC058, Motion Controller, Hardware Guide)*	2	2	1	1	1	1	1

	Embedded expert I/O				Embedded regular I/O			
		Fast Inputs	Fast Outputs	Regular Inputs		Digital Inputs	Digital Outputs	Analog Inputs
LMC058LF42•• *(see Modicon LMC058, Motion Controller, Hardware Guide)*	2x	5	2	2	1x	12	12	0
LMC058LF424•• *(see Modicon LMC058, Motion Controller, Hardware Guide)*	2x	5	2	2	1x	12	12	4

9.3 TM5 PCI Modules

TM5 PCI Communication Modules

Introduction

The following paragraph lists the communication modules that are supported by SoMachine with their description.

See Modicon TM5 PCI Communication Modules Hardware Guide *(see Modicon TM5, PCI Modules, Hardware Guide)*.

Supported Modules

The following table shows the communication module features available with the Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller:

Reference	Description
TM5PCRS2 *(see Modicon TM5, PCI Modules, Hardware Guide)*	TM5 interface module, 1 Serial Line RS232, electrically isolated
TM5PCRS4 *(see Modicon TM5, PCI Modules, Hardware Guide)*	TM5 interface module, 1 Serial Line RS485, electrically isolated
TM5PCDPS	TM5 interface module, 1 Profibus DP slave RS485, electrically isolated

NOTE:

For information on compatibility rules between PCI modules and controllers, refer to:

- Modicon M258 Logic Controller Hardware Guide
- Modicon LMC058 Motion Controller Hardware Guide

9.4 TM5 Expansion Modules

What's in this Section?

This section contains the following topics:

TM5 Compact I/O Expansion Modules

Introduction

The following paragraph lists the TM5 Compact I/O modules supported by SoMachine with their complete names and catalog references.

See Modicon TM5 Compact I/O Hardware Guide *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*.

Supported Modules

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following I/O modules:

Reference	Number and Channel Type							
	Digital Inputs		Digital Outputs		Analog Inputs		Analog Outputs	
TM5C24D18T *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	2x12In	24	3x6Out	18	–	0	–	0
TM5C12D8T *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	3x4In	12	2x4Out	8	–	0	–	0
TM5C24D12R *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	2x12In	24	2x6Rel	12 Relays	–	0	–	0
TM5CAI8O8VL *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	-	0	-	0	2x4AI ±10 V	8	2x4AO ±10 V	8
TM5CAI8O8CL *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	-	0	-	0	2x4AI 0-20 mA / 4-20 mA	8	2x4AO 0-20 mA	8
TM5CAI8O8CVL	-	0	-	0	1x4AI ±10 V	4	1x4AO ±10 V	4
					1x4AI 0-20 mA / 4-20 mA	4	1x4AO 0-20 mA	4
TM5C12D6T6L *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	2x6In	12	1x6Out	6	1x 4AI ±10 V / 0-20 mA / 4-20 mA	4	1x2AO ±10 V / 0-20 mA	2

Digital Input and Output Electronic Modules Features

The following table shows the digital input and output electronic modules features, with corresponding channel type and voltage/current

Reference	Number of Channels	Voltage/Current	Wiring	Signal Type
Digital Input Electronic Modules				
4In *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	4	24 Vdc / 3.75 mA	3 wires	sink
6In *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	6	24 Vdc / 3.75 mA	2 wires	sink
12In *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	12	24 Vdc / 3.75 mA	1 wire	sink
Digital Output Electronic Modules				
4Out *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	4	24 Vdc / 0.5 A	3 wires	source
6Out *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	6	24 Vdc / 0.5 A	2 wires	source
Digital Output Relay Electronic Modules				
6Rel *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	6	30 Vdc / 2 A 240 Vac / 2 A	6 normally open contacts relays	sink/source

Analog Input and Output Electronic Modules Features

The following table shows the analog input and output electronic modules features:

Reference	Number of Channels	Digital Converter Resolution	Voltage/Current
Analog Input Electronic Module			
4AI ±10 V *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	4	12 bit	0...10 Vdc
4AI 0-20 mA / 4-20 mA *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	4	12 bit	0...20 mA
4AI ±10 V / 0-20 mA / 4-20 mA *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	4	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA/4...20 mA
Analog Output Electronic Module			
4AO ±10 V *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	4	12 bit	0...10 Vdc
4AO 0-20 mA *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	4	12 bit	0...20 mA
2AO ±10 V / 0-20 mA *(see Modicon TM5, Compact I/O Modules, Hardware Guide)*	2	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA

TM5 Digital I/O Expansion Modules

Introduction

The following paragraph lists the digital I/O modules supported by SoMachine with their complete names and catalog references.

See Modicon TM5 Digital I/O Modules Hardware Guide *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*.

Supported Modules

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following I/O modules:

Reference	Number of Channels	Voltage/Current
Input Modules		
TM5SDI2D	2	24 Vdc / 3.75 mA
TM5SDI4D *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	4	24 Vdc / 3.75 mA
TM5SDI6D *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	6	24 Vdc / 3.75 mA
TM5SDI12D *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	12	24 Vdc / 3.75 mA
TM5SDI2A *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	2	100...240 Vac
TM5SDI4A *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	4	100...240 Vac
TM5SDI6U *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	6	100...120 Vac
Output Modules		
TM5SDO2T *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	2	24 Vdc / 0.5 A
TM5SDO4T *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	4	24 Vdc / 0.5 A
TM5SDO4TA *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	4	24 Vdc / 2 A
TM5SDO6T *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	6	24 Vdc / 0.5 A
TM5SDO8TA *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	8	24 Vdc / 2 A

Reference	Number of Channels	Voltage/Current
TM5SDO12T *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	12	24 Vdc / 0.5 A
TM5SDO2R *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	2	30 Vdc / 230 Vac 5 A C/O
TM5SDO4R *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	4	30 Vdc 1 A / 230 Vac 5 A N/O
TM5SDO2S *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	2	230 Vac / 1 A
Mixed Modules		
TM5SDM12DT *(see Modicon TM5, Digital I/O Modules, Hardware Guide)*	8 4	24 Vdc / 3.75 mA 24 Vdc / 0.5 A
TM5SMM6D2L	4 digital inputs	24 Vdc / 3.3 mA
	2 digital outputs	24 Vdc / 0.5 A
	1 analog input	-10...+10 Vdc 0...20 mA/4...20 mA
	1 analog output	-10...+10 Vdc 0...20 mA

TM5 Analog I/O Expansion Modules

Introduction

The following paragraphs list the analog I/O modules supported by SoMachine with their complete names and references.

See Modicon TM5 Analog I/O Modules Hardware Guide *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*.

Supported Modules

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following analog I/O modules:

Reference	Number of Channels	Digital Converter Resolution	Voltage/Current
Input Modules			
TM5SAI2L *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	2	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA/4...20 mA
TM5SAI4L *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	4	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA/4...20 mA
TM5SAI2H *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	2	15 bit + sign 15 bit	-10...+10 Vdc 4...20 mA
TM5SAI4H *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	4	15 bit + sign 15 bit	-10...+10 Vdc 4...20 mA
TM5SEAISG	1	24 bit	1 full bridge strain gauge
Output Modules			
TM5SAO2L *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	2	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA
TM5SAO4L *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	4	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA
TM5SAO2H *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	2	15 bit + sign 15 bit	-10...+10 Vdc 0...20 mA
TM5SAO4H *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	4	15 bit + sign 15 bit	-10...+10 Vdc 0...20 mA

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following analog temperature modules:

Reference	Number of Channels	Digital Converter Resolution	Sonde Type
TM5SAI2PH *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	2	16 bit	PT100/1000
TM5SAI4PH *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	4	16 bit	PT100/1000
TM5SAI2TH *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	2	16 bit	Thermocouple J, K, N, S
TM5SAI6TH *(see Modicon TM5, Analog I/O Modules, Hardware Guide)*	6	16 bit	Thermocouple J, K, N, S

TM5 Expert (HSC) Expansion Modules

Introduction

The following paragraph lists the expert (for high-speed counting) modules that are supported by SoMachine with their description.

See Modicon TM5 Expert (HSC) Modules Hardware Guide *(see Modicon TM5, Expert (High Speed Counter) Modules, Hardware Guide)*.

Supported Modules

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following I/O modules:

Reference	Number Channels	Encoder Type	Encoder Inputs	Counter Resolution	Input Frequency
TM5SE1IC02505 *(see Modicon TM5, Expert (High Speed Counter) Modules, Hardware Guide)*	1	Incremental	5 Vdc Symmetrical	16/32 bit	250 kHz
TM5SE1IC01024 *(see Modicon TM5, Expert (High Speed Counter) Modules, Hardware Guide)*	1	Incremental	24 Vdc Asymmetrical	16/32 bit	100 kHz
TM5SE2IC01024 *(see Modicon TM5, Expert (High Speed Counter) Modules, Hardware Guide)*	2	Incremental	24 Vdc Asymmetrical	16/32 bit	100 kHz
TM5SE1SC10005 *(see Modicon TM5, Expert (High Speed Counter) Modules, Hardware Guide)*	1	SSI Absolute	5 Vdc Symmetrical	32 bit	1 MHz
TM5SDI2DF *(see Modicon TM5, Expert (High Speed Counter) Modules, Hardware Guide)*	2	–	Gate measurement event counter	–	–

TM5 Transmitter and Receiver Modules

Introduction

The following paragraph lists the transmitter and receiver expansion modules that are supported by SoMachine with their descriptions.

The transmitter and receiver modules are described in the Modicon TM5 Transmitter and Receiver Modules Hardware Guide *(see Modicon TM5, Transmitter and Receiver Modules, Hardware Guide)*.

Supported Modules

The following table shows the TM5 transmitter and receiver modules features available with the Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller:

Module	Module Description
TM5SBET1 *(see Modicon TM5, Transmitter and Receiver Modules, Hardware Guide)*	Transmits the TM5 data bus.
TM5SBET7 *(see Modicon TM5, Transmitter and Receiver Modules, Hardware Guide)*	Transmits the TM7 data bus and provides the TM7 power bus to the TM7 expansion I/O blocks.
TM5SBER2 *(see Modicon TM5, Transmitter and Receiver Modules, Hardware Guide)*	Receives the TM5 data bus, provides power to the 24 Vdc I/O power segment and provides the TM5 power bus to the TM5 expansion I/O modules.

TM5 Power Distribution Modules (PDM)

Introduction

The following paragraph lists the power distribution modules that are supported by SoMachine with their descriptions.

The power distribution modules are described in the Modicon TM5 System Planning and Installation Guide *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*.

Supported Modules

The following table shows the TM5 Power Distribution Modules (PDM) features available with the Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller:

Reference	Rated Power Supply Source	Maximum Current Provided on the 24 Vdc I/O Power Segment	TM5 power Bus Current Generated
TM5 Power Distribution Modules			
TM5SPS1 *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*	24 Vdc	10 A	No
TM5SPS1F *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*	24 Vdc	6.3 A	No
TM5SPS2 *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*	24 Vdc	10 A	1.136 A
TM5SPS2F *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*	24 Vdc	6.3 A	1.136 A

TM5 Common Distribution Modules (CDM)

Introduction

The following paragraph lists the common distribution modules that are supported by SoMachine with their descriptions.

The common distribution modules are described in the Modicon TM5 System Planning and Installation Guide *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*.

Supported Modules

The following table shows the TM5 Common Distribution Modules (CDM) features available with the Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller:

Reference	Rated 24 Vdc	Rated 0 Vdc	Power Supply Source
TM5 Common Distribution Modules			
TM5SPDG12F	0	12	24 Vdc I/O power segment
TM5SPDD12F *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*	12	0	24 Vdc I/O power segment
TM5SPDG5D4F *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*	5	5	External 24 Vdc power source
TM5SPDG6D6F	6	6	24 Vdc I/O power segment

9.5 TM7 Expansion Blocks

What's in this Section?

This section contains the following topics:

TM7 Digital I/O Blocks

Introduction

The following paragraph lists the TM7 digital I/O blocks supported by SoMachine with their complete names and catalog references.

See Modicon TM7 Digital I/O Blocks Hardware Guide *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*.

Supported Blocks

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following I/O blocks:

Reference	Number of Channels	Voltage/Current	Wiring
Input Blocks			
TM7BDI8B *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*	8	24 Vdc / 7 mA	M8 connectors
TM7BDI16A *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*	16	24 Vdc / 7 mA	M12 connectors
TM7BDI16B *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*	16	24 Vdc / 7 mA	M8 connectors
Output Block			
TM7BDO8TAB *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*	8	24 Vdc / 2 A max.	M8 connector
Mixed Input/Output Blocks			
TM7BDM8B *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*	8 configurable I/O, any mix	24 Vdc / 4.4 mA	M8 connector
		24 Vdc / 0.5 A max.	M8 connector
TM7BDM16A *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*	16 inputs	24 Vdc / 4.4 mA	M12 connector
	16 outputs	24 Vdc / 0.5 A max.	M12 connector
TM7BDM16B *(see Modicon TM7, Digital I/O Blocks, Hardware Guide)*	16 inputs	24 Vdc / 4.4 mA	M8 connector
	16 outputs	24 Vdc / 0.5 A max.	M8 connector

TM7 Analog I/O Blocks

Introduction

The following paragraphs list the TM7 analog I/O blocks supported by SoMachine with their complete names and references.

See Modicon TM7 Analog I/O Blocks Hardware Guide *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*.

Supported Blocks

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following analog I/O blocks:

Reference	Number of Channels	Digital Converter Resolution	Voltage/Current	Sensor/Actuator Connectors
Input Blocks				
TM7BAI4VLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	4	11 bit + sign	-10...+10 Vdc	M12
TM7BAI4CLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	4	12 bit	0...20 mA	M12
Output Blocks				
TM7BAO4VLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	4	11 bit + sign	-10...+10 Vdc	M12
TM7BAO4CLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	4	12 bit	0...20 mA	M12
Mixed Input/Output Blocks				
TM7BAM4VLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	2 inputs	11 bit + sign	-10...+10 Vdc	M12
	2 outputs	11 bit + sign	-10...+10 Vdc	M12
TM7BAM4CLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	2 inputs	12 bit	0...20 mA	M12
	2 outputs	12 bit	0...20 mA	M12

The Modicon M258 Logic Controller and the Modicon LMC058 Motion Controller support the following analog temperature blocks:

Reference	Number of Channels	Digital Converter Resolution	Sonde Type	Sensor Connectors
TM7BAI4TLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	4	16 bit	PT100 / 1000 KTY10 / KTY84 (Silicon sensor)	M12
TM7BAI4PLA *(see Modicon TM7, Analog I/O Blocks, Hardware Guide)*	4	16 bit	Thermocouple J, K, S	M12

HMI Terminals

10

10.1 HMI Terminal Range

What's in this Section?

This section contains the following topics:

XBTGT HMI Terminals

Introduction

The following paragraph lists the XBTGT HMI terminal families supported by SoMachine.

The XBTGT HMI terminals can be configured as a controller when a CANopen unit (XBTZGCANM) is connected to it.

The XBTZGCANM unit is compatible with:

- XBTGT 2•••
- XBTGT 4•••
- XBTGT 5•••
- XBTGT 6•••
- XBTGT 7•••

NOTE: The XBTGT 1••• is not compatible with the XBTZGCANM unit.

For detailed information see the Vijeo-Designer online help.

XBTGT HMI Touch Panel Terminal Range

The following table describes the XBTGT HMI HMI terminals:

HMI Terminals	Display Type	Screen Size	Video Port	Ethernet Interface	Serial Interface	USB Interface	CF Card Interface
XBTGT1100	QVGA/STN Amber	9,6 cm (3.8 in)	No	No	Yes (1)	No	No
XBTGT 1105	QVGA/STN Amber	9,6 cm (3.8 in)	No	No	Yes (1)	Yes	No
XBTGT1130	QVGA/STN Amber	9,6 cm (3.8 in)	No	Yes	Yes (1)	No	No
XBTGT 1135	QVGA/STN Amber	9,6 cm (3.8 in)	No	Yes	Yes (1)	Yes	No
XBTGT 1335	QVGA/STN Amber	9,6 cm (3.8 in)	No	Yes	Yes (1)	Yes	No
XBTGT 2110	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	No	Yes (2)	Yes	No
XBTGT 2120	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	No	Yes (2)	Yes	Yes
XBTGT 2130	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	Yes	Yes (2)	Yes	Yes
XBTGT 2220	QVGA/STN Color	14,4 cm (5.7 in)	No	No	Yes (2)	Yes	Yes
XBTGT 2330	QVGA/TFT Color	14,4 cm (5.7 in)	No	Yes	Yes (2)	Yes	Yes
XBTGT 4230	VGA/STN Color	14,4 cm (5.7 in)	No	Yes	Yes (2)	Yes	Yes
XBTGT 4330	VGA/TFT Color	14,4 cm (5.7 in)	No	Yes	Yes (2)	Yes	Yes

HMI Terminals	Display Type	Screen Size	Video Port	Ethernet Interface	Serial Interface	USB Interface	CF Card Interface
XBTGT 4340	VGA/TFT Color	19,1 cm (7.5 in)	No	Yes	Yes (2)	Yes	Yes
XBTGT 5230	VGA/STN Color	19,1 cm (7.5 in)	No	Yes	Yes (2)	Yes	Yes
XBTGT 5330	VGA/TFT Color	19,1 cm (7.5 in)	Yes	Yes	Yes (2)	Yes	Yes
XBTGT 5340	VGA/TFT Color	26,4 cm (10.4 in)	No	Yes	Yes (2)	Yes	Yes
XBT GT 6330	SVGA/TFT Color	26,4 cm (10.4 in)	No	Yes	Yes (2)	Yes	Yes
XBTGT 6340	SVGA/TFT Color	26,4 cm (10.4 in)	Yes	Yes	Yes (2)	Yes	Yes
XBTGT 7340	XGA/TFT Color	26,4 cm (10.4 in)	No	Yes	Yes (2)	Yes	Yes
Legend							
1	RS232/RS485 serial interface RJ45 connector						
2	RS232/RS422/RS485 serial interface SUB-D 9-pin connector and RS485 serial interface RJ45 pin connector						

XBTGK HMI Terminals

Introduction

The following paragraph lists the XBTGK HMI terminal families supported by SoMachine.

The XBTGK HMI terminal can be configured as a controller when a CANopen unit (XBTZGCANM) is connected to it.

The XBTZGCANM unit is compatible with:
- XBTGK 2•••
- XBTGK 5•••

For detailed information see the Vijeo-Designer online help.

XBTGK HMI Touch and Keyboard Terminal Range

The following table describes the XBTGK HMI HMI terminals:

HMI Terminals	Display Type	Screen Size	Video Port	Ethernet Interface	Serial Interface	USB Interface	CF Card Interface
XBTGK 2120	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	No	Yes (1)	Yes	Yes
XBTGK 2330	QVGA/TFT Color	14,4 cm (5.7 in)	No	Yes	Yes (1)	Yes	Yes
XBTGK 5330	VGA/TFT Color	26,4 cm (10.4 in)	No	Yes	Yes (1)	Yes	Yes
Legend							
1	RS232/RS422/RS485 serial interface. SUB-D 9-pin connector and RS485 RJ45 connector						

XBTGH HMI Terminal

Introduction

The following paragraph lists the XBTGH HMI terminal families supported by SoMachine.

XBTGH HMI Terminal

The following table presents the different XBTGH HMI terminal:

HMI Terminal	Screen Size	Pixel Resolution	Mono/Color	Screen Technology	Video Port	Ethernet Port	Serial Interface
XBTGH2460	14,4 cm (5.7 in)	VGA	Color	TFT	No	Yes	Yes (1)
Legend							
1	RS232/RS422/RS485 serial interface SUB-D 9-pin connector						

HMI Small Terminals

HMI STU 655 / 855 Series of Panels

The HMI STU 655 / 855 is a Human Machine Interface product that has an operating voltage of 24 Vdc.

The following table describes the HMI STU 655 / 855 characteristics:

Part Number	Screen Size	Screen (Pixel) Resolution	Mono / Color	Screen Technology	Serial Port	Ethernet Port
HMI STU 655	8.9 cm (3.5 in.)	320x240 (QVGA)	65 K colors and LED's backlight	TFT	yes	yes
HMI STU 855	14.48 cm (5.7 in.)	320x240 (QVGA)	65 K colors and LED's backlight	TFT	yes	yes
TFT: Thin-film Transistor Technology						

HMI STO 5•• Series of Panels

The following presents the HMI STO 5•• series of HMI (Human Machine Interface) products. These products have an operating voltage of 24 Vdc.

The products offered in this series have various features and benefits listed below:

- screen size
- screen resolution
- screen technology and color
- communication ports

The following table describes the different HMI STO products:

Part Number	Screen Size	Screen (Pixel) Resolution	Mono / Color	Screen Technology	Serial Port	Ethernet Port
HMI STO 511/531	8.9 cm (3.5 in.)	200x80	monochrome with green / orange / red backlight	STN	yes	no for 511 yes for 531
HMI STO 512/532	8.9 cm (3.5 in.)	200x80	monochrome with white / pink / red backlight	STN	yes	no for 512 yes for 532
STN: scan twisted neumatic, also known as passive matrix						

NOTE: The HMI STO 501 is not included in the list of devices of SoMachine.

Magelis GTO Terminals

Introduction

The following paragraph lists the Magelis GTO terminal families supported by SoMachine.

For detailed information see the Vijeo-Designer online help.

Magelis GTO Touch Panel Terminal Range

The following table describes the Magelis GTO HMI terminals:

HMI Terminals	Display Type	Screen Size	Ethernet Interface	Serial Interface	USB Interface	SD Card Interface
HMI GTO1300	TFT Color LCD	8,9 cm (3.5 in)	No	Yes	Yes	No
HMI GTO1310	TFT Color LCD	8,9 cm (3.5 in)	Yes	Yes	Yes	No
HMI GTO 2300	TFT Color LCD	14,4 cm (5.7 in)	No	Yes	Yes	No
HMI GTO 2310/2315	TFT Color LCD	14,4 cm (5.7 in)	No	Yes	Yes	Yes
HMI GTO 3510	TFT Color LCD	19,1 cm (7.5 in)	Yes	Yes	Yes	Yes
HMI GTO 4310	TFT Color LCD	17,8 cm (7 in)	Yes	Yes	Yes	Yes
HMI GTO 5310/5315	TFT Color LCD	26,4 cm (10.4 in)	Yes	Yes	Yes	Yes
HMI GTO 6310/6315	TFT Color LCD	30,7 cm (12.1 in)	Yes	Yes	Yes	Yes

Distributed Devices

11

Overview

SoMachine offers a list of various devices ready to be connected to the controllers through a fieldbus. This list can be extended with other devices using the **Device Repository** editor.

What's in this Chapter?

This chapter contains the following topics:

Motor Control

TeSys U

TeSys U is a range of motor controller-starter up to 32 A / 15 kW that consists of:
- one 45 mm power base: 2 ratings, reversing or non-reversing, circuit-breaker functions and built-in interference suppression
- one clip-on control unit (CU), from a choice of 3
  - Standard CU (protections against overloads and short-circuits)
  - Expandable CU (with additional alarm and fault differentiation)
  - Multifunction CU (realtime control of motor load, local or remote diagnostics and parameter setting)
- one clip-on automation control module for fieldbus connection: Modbus, CANopen, AS-Interface, etc.
- two optional 45 mm power functions
  - limiter-isolator
  - changeover relay

TeSys T

TeSys T is a Motor Management System that comprises:
- a controller providing main protection and control functions
- an extension module that completes the functions of the controller by the voltage protection and monitoring
- an operator control unit for reading, diagnostics and modification of the parameters monitored

TeSys T incorporates a communication interface for remote supervision and control of the motor on Modbus, CANopen, etc.

Altivar

Altivar is the range of variable speed drives for motor control.

Altivar drives offer Modbus and CANopen embedded communication.
- ATV31 and ATV312: 3-phase asynchronous motors 0.18 to 15 kW
- ATV71: 3-phase synchronous and asynchronous motors from 0.37 to 630 kW

Lexium

Lexium is the range of drives for motion control that can be connected to CANopen and other fieldbusses.

- Lexium SD3: drives for stepper motor control
- Integrated Lexium: integrated drives for motion control, with servo-(ILA range), stepper- (ILS range) or brushless DC (ILE range) motor
- Lexium05: optimized servo drives for servo motors from 0.4 to 6 kW
- Lexium32: high-performance book-size servo drives for servo motors from 0.15 to 7 kW

Distributed I/O Modules

Advantys OTB

The Advantys OTB solution is an optimized and economical IP20 I/O system. The OTB network interface module with built-in inputs and outputs connects to the CANopen fieldbus and accepts up to 7 TM2 I/O expansion modules.

Reference	Channel	Type of Channel	Input/Output Type	Power Supply
OTB1C0DM9LP	12	inputs	24 VDC	24 VDC
	6	outputs	relay	24 VDC
	2	outputs	24 VDC source transistor	24 VDC

NOTE:

Advantys OTB offers 2 other references with the same I/O characteristics:
- OTB1E0DM9LP: Ethernet Modbus TCP network interface module
- OTB1S0DM9LP: Modbus Serial network interface module

Advantys FTB

Advantys FTB is an IP67 distributed monoblock I/O modules offering a large selection of 16 channels compositions (8 M12 connectors) that connect to CANopen.

Reference	Type	Input Channels	Output Channels	In/Out Channels
FTB1CN08E08SP0	Plastic	8	8	–
FTB1CN12E04SP0	Plastic	12	4	–
FTB1CN16EP0	Plastic	16	–	–
FTB1CN16EM0	Metal	16	–	–
FTB1CN16CP0	Plastic	–	–	16
FTB1CN16CM0	Metal	–	–	16
FTB1CN08E08CM0	Metal	8	–	8

AS-Interface Devices

A complete set of devices can be connected to AS-Interface:

- IP20 distributed I/Os Advantys interface ASI 20M range
- IP67 distributed I/Os Advantys interface ASI 67F range
- TeSys U motor controller-starter ASI LUF range
- Direct Motor Starter LF range
- Control station Harmony XALS range
- Illuminated indicator bank XVBC range
- Safety Monitors ASI SAFEMON••
- Safety Interfaces ASI S••••

Other Distributed Devices

Encoder

OsiCoder (OsiSense XCC offer) is a range of rotary encoders.

Absolute multiturn encoders can be connected to CANopen for absolute position and speed reading.

Safety Controller

Preventa XPSMC is a range of configurable safety controllers:

- Category 4 conforming to IEC 947-1 and SIL3 conforming to EN 61508
- 16 and 32 input versions
- 4 (2 x 2 NO) relay outputs and 6 solid-state outputs
- 30 certified safety functions in order to respond to specific application requirements
- communication to logic controllers via Modbus, CANopen etc.

Appendices

Compatibility Annexe

A

Overview

This section provides the annexes regarding the compatibility between SoMachine versions.

What's in this Chapter?

This chapter contains the following topics:

Compatibility of Controller and Device Description Versions

Overview

Logic controller firmware and device description versions are made of 4 digits: X.Y.Z.T.

A compatible controller firmware with a device description means an Application.app file can be downloaded to controller.

Compatilibity Rule

The controller firmware and the device description are compatible if the following rules are respected:

- X.Y digits must be identical
- The Z digit of the controller must be greater or equal to the Z digit from the device description.
- T digit is irrelevant

Example

a device description version 2.0.20.30 of an M238 controller is compatible with the following controller firmware versions:

- 2.0.20.11
- 2.0.20.14
- 2.0.20.30
- 2.0.30.13
- 2.0.31.3

But it is not compatible with the firmware versions 2.0.10.8.

Compatibility of HMI and Controller Versions

Overview

When building a solution with some HMI and controllers communicating to each other, we recommend controllers and HMI devices to be at the same firmware / runtime compatibility level.

These firmware versions should be the ones used in the SoMachine version in which you built and download into controllers and HMI.

When you download an application with an HMI from SoMachine, the HMI runtime is automatically updated to the latest version.

NOTICE
COMMUNICATION INTERRUPTION Do not use a different controller firmware version or a different HMI runtime other than that which is specified in the table below for the given SoMachine version. **Failure to follow these instructions can result in equipment damage.**

The following table provides the relation between the SoMachine version, the controller firmware and the HMI runtime:

SoMachine version used	**V2.0 RL1**	**V2.0 RL2**	**V2.0 RL2**	**V3.0**
HMI runtime	**V5.1.1.1179**	**V5.1.11.1200**	**V5.1.20.1404**	**V6.0.0.212**
M238 firmware version	V2.0.20.11	V2.0.20.14	V2.0.20.30	V2.0.30.13
M258 firmware version	V2.0.1.2	V2.0.1.14	V2.0.1.36	V2.0.2.32
LMC058 firmware version	V2.0.1.2	V2.0.1.14	V2.0.1.36	V2.0.2.32
ATV IMC firmware version	V1.1ie01	V1.1ie01	V1.1ie03	V1.1ie19 patch 2

Compatibility of SoMachine and Vijeo-Designer Versions

Overview

If you want to use Vijeo-Designer with SoMachine, you should not use a different version from the one provided with SoMachine.

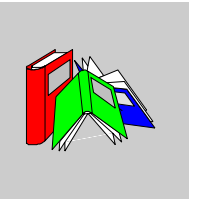
The following table gives the Vijeo-Designer for each SoMachine version:

SoMachine Version	**V1.0**	**V1.1**	**V2.0 RL1**	**V2.0 RL2**	**V3.0**
Vijeo-Designer Version	5.0.1	5.0.2	5.1 S20R8	5.1 S20R9	6.0

If you have a standalone installation of Vijeo-Designer on your computer prior to the one provided with SoMachine V3.1 installation, SoMachine installation will automatically upgrade your Vijeo-Designer version by uninstalling your previous version of Vijeo-Designer and installing the new one.

NOTE: Vijeo-Designer service pack can be installed without creating compatibility issue with SoMachine.

Glossary



0-9

%I

According to the IEC standard, %I represents an input bit (for example a language object of type digital IN).

%IW

According to the IEC standard, %IW represents an input word register (for example a language object of type analog IN).

%MW

According to the IEC standard, %MW represents a memory word register (for example a language object of type memory word).

%Q

According to the IEC standard, %Q represents an output bit (for example a language object of type digital OUT).

%QW

According to the IEC standard, %QW represents an output word register (for example a language object of type analog OUT).

1-phase counter

A *1-phase counter* uses 1 hardware input as counter input. It usually counts up or counts down when there is pulse signal in the input.

2-phase counter

A *2-phase counter* uses the phase difference between 2 input counter signals to count up or count down.

A

ADC

analog/digital converter

AFB

application function block

AMOA

An *address of modbus of option application board* installed on the drive.

analog input

An *analog input* module contains circuits that convert an analog DC input signal to a digital value that can be manipulated by the processor. By implication, the analog input is usually direct. That means a data table value directly reflects the analog signal value.

analog output

An *analog output* module contains circuits that transmit an analog DC signal proportional to a digital value input to the module from the processor. By implication, these analog outputs are usually direct. That means a data table value directly controls the analog signal value.

application source

The *application source* file can be uploaded to the PC to reopen a SoMachine project. This source file can support a full SoMachine project (for example, one that includes HMI application).

ARP

The *address resolution protocol* is the IP network layer protocol for Ethernet that maps an IP address to a MAC (hardware) address.

ARRAY

An ARRAY is a table containing elements of a single type. The syntax is as follows: ARRAY [<limits>] OF <Type>

Example 1: ARRAY [1..2] OF BOOL is a 1-dimensional table with 2 elements of type BOOL.

Example 2: ARRAY [1..10, 1..20] OF INT is a 2-dimensional table with 10x20 elements of type INT.

ARW

anti-reset windup

ASCII

The *american standard code for information interchange* is a communication protocol for representing alphanumeric characters (letters, numbers, and certain graphic and control characters).

assigned variable

A variable is "assigned" if its location in controller memory can be known. For example, the Water_pressure variable is said to be assigned through its association with memory location %MW102.Water_pressure.

ATC

analog tension control

ATV

ATV is the model prefix for Altivar drives. (For example, “ATV312” refers to the Altivar 312 variable speed drive.)

AWG

The *american wire gauge* standard specifies wire gauges in North America.

B

BCD

The *binary coded decimal format* represents decimal numbers between 0 and 9 with a set of 4 bits (a nybble/nibble, also titled as Halfbyte). In this format, the 4 bits used to encode decimal numbers have an unused range of combinations. For example, the number 2,450 is encoded as 0010 0100 0101 0000

BOOL

A *Boolean* type is the basic data type in computing. A `BOOL` variable can have one of these values: 0 (`FALSE`), 1 (`TRUE`). A bit that is extracted from a word is of type `BOOL`, for example: `%MW10.4` is a fifth bit a memory word number 10.

Boot application

Files that contain machine dependent parameters:
- machine name
- device name or IP address
- Modbus Serial Line address
- Routing table

BOOTP

The *bootstrap protocol* is a UDP network protocol that can be used by a network client to automatically obtain an IP address (and possibly other data) from a server. The client identifies itself to the server using the client MAC address. The server—which maintains a pre-configured table of client device MAC addresses and associated IP addresses—sends the client its pre-configured IP address. BOOTP was originally used as a method that enabled diskless hosts to be remotely booted over a network. The BOOTP process assigns an infinite lease of an IP address. The BOOTP service utilizes UDP ports 67 and 68.

bps

bit per second as a definition of transmission rate, also given in conjunction with multiplicator kilo (kbps) and mega (mbps).

BSH

BSH is a Lexium servo motor from Schneider Electric.

bus base

A *bus base* is a mounting device that is designed to seat an electronic module on a DIN rail and connect it to the TM5 bus for M258 and LMC058 controllers. Each base bus extends the TM5 data and to the power buses and the 24 Vdc I/O power segment. The electronic modules are added to the TM5 system through their insertion on the base bus. The base bus also supplies the articulation point for the terminal blocks.

BYTE

When 8 bits are grouped together, they are called a `BYTE`. You can enter a `BYTE` either in binary mode or in base 8. The `BYTE` type is encoded in an 8-bit format that ranges from `16#00` to `16#FF` (in hexadecimal format).

C

calibration

Graduates a piece of measuring apparatus.

CAN

The *controller area network* protocol (ISO 11898) for serial bus networks is designed for the interconnection of smart devices (from multiple manufacturers) in smart systems for real-time industrial applications. Originally developed for use in automobiles, CAN is now used in a variety of industrial automation control environments.

CANmotion

CANmotion is a CANopen-based motion bus with an additional mechanism that provides synchronization between the motion controller and the drives.

CANopen

CANopen is an open industry-standard communication protocol and device profile specification.

CFC

The *continuous function chart* (an extension of the IEC61131-3 standard) is a graphical programming language that works like a flowchart. By adding simple logic blocks (AND, OR, etc.), each function or function block in the program is represented in this graphical format. For each block, the inputs are on the left and the outputs on the right. Block outputs can be linked to inputs of other blocks in order to create complex expressions.

CiA

CAN in automation is a non-profit group of manufacturers and users dedicated to developing and supporting CAN-based higher layer protocols.

CIP

When the *common industrial protocol* is implemented in a network application layer, it can communicate seamlessly with other CIP-based networks without regard to the protocol. For example, the implementation of CIP in the application layer of an Ethernet TCP/IP network creates an EtherNet/IP environment. Similarly, CIP in the application layer of a CAN network creates a DeviceNet environment. In that case, devices on the EtherNet/IP network can communicate with devices on the DeviceNet network through CIP bridges or routers.

CMU

The *current measurement unit* is used to convert the relative current value (%) provided by TeSys into a real ISO value (A).

configuration

The *configuration* includes the arrangement and interconnection of hardware components within a system and the hardware and software selections that determine the operating characteristics of the system.

controller

A *controller* (or “programmable logic controller,” or “programmable controller”) is used to automate industrial processes.

controller status output

The *controller status output* is a special function used in circuits that are external to the controller that control the power supply to the output devices or the controller power supply.

CPDM

controller power distribution module

CRC

A network message’s *cyclic redundancy check* field contains a small number of bits that produce a checksum. The message is calculated by the transmitter according to the message’s content. Receiving nodes then recalculate the field. Any discrepancy in the two CRC fields indicates that the transmitted message and the received message are different.

CSA

The *canadian standards association* defines and maintains standards for industrial electronic equipment in hazardous environments.

CTS

Clear to send is a data transmission signal and acknowledges the RDS signal from the transmitting station.

cyclic task

The cyclic scan time has a fixed duration (interval) specified by the user. If the current scan time is shorter than the cyclic scan time, the controller waits until the cyclic scan time has elapsed before starting a new scan.

D

data log

The controller logs events relative to the user application in a data log.

DCE

Data communications equipment describes devices (often modems) that start, stop, and sustain network sessions.

Derating

Derating describes a reduction in an operating specification. For devices in general it is usually a specified reduction in nominal power to facilitate operation at increased ambient conditions like higher temperatures or higher altitudes.

DHCP

The *dynamic host configuration protocol* is an advanced extension of BOOTP. DHCP is a more advanced, but both DHCP and BOOTP are common. (DHCP can handle BOOTP client requests.)

digital I/O

A *digital input* or *output* has an individual circuit connection at the electronic module that corresponds directly to a data table bit that holds the value of the signal at that I/O circuit. It gives the control logic digital access to I/O values.

DIN

Deutsches Institut für Normung is a German institution that sets engineering and dimensional standards.

DINT

A *double integer* type is encoded in a 32-bit format.

DNS

The *domain name system* is the naming system for computers and devices connected to a LAN or the Internet.

drop cable

A *drop cable* is the unterminated derivation cord used to connect a TAP to a device.

DSR

Data set ready is a data transmission signal.

DTM

With *device type managers* representing the field device in SoMachine, direct communications are possible to every single field device via SoMachine, the controller and the field bus, thus avoiding the need for individual cable connections.

DWORD

A *double word* type is encoded in a 32-bit format.

E

EDS

Electronic data sheet contains for example the properties of a device e.g. parameters and settings of a drive.

EEPROM

Electrically erasable programmable read-only memory is a type of non-volatile memory used to store data that must be saved when power is removed.

EIA

The *electronic industries alliance* is the trade organization for establishing electrical/electronic and data communication standards (including RS-232 and RS-485) in the United States.

EIA rack

An *electronic industries alliance rack* is a standardized (EIA 310-D, IEC 60297 and DIN 41494 SC48D) system for mounting various electronic modules in a stack or rack that is 19 inches (482.6 mm) wide.

electronic module

In a programmable controller system, most electronic modules directly interface to the sensors, actuators, and external devices of the machine/process. This electronic module is the component that mounts in a bus base and provides electrical connections between the controller and the field devices. Electronic modules are offered in a variety of signal levels and capacities. (Some electronic modules are not I/O interfaces, including power distribution modules and transmitter/receiver modules.)

EN

EN identifies one of many European standards maintained by CEN (*European Committee for Standardization*), CENELEC (*European Committee for Electrotechnical Standardization*), or ETSI (*European Telecommunications Standards Institute*).

encoder

An *encoder* is a device for length or angular measurement (linear or rotary encoders).

Equipment

An *Equipment* is a part of the *Machine*.

ERC

eccentric roller conveyor

ESD

electrostatic discharge

Ethernet

Ethernet is a physical and data link layer technology for LANs, also known as IEE 802.3.

EtherNet/IP

The *ethernet industrial protocol* is an open communications protocol for manufacturing automation solutions in industrial systems. EtherNet/IP is in a family of networks that implements Common Industrial Protocol at its upper layers. The supporting organization (ODVA) specifies EtherNet/IP to accomplish global adaptability and media independence.

expansion bus

The *expansion bus* is an electronic communication bus between expansion modules and a CPU.

expansion I/O module

An *expansion input or output module* is either a digital or analog module that adds additional I/O to the base controller.

expert I/O

*Expert I/O*s are dedicated modules or channels for advanced features. These features are generally embedded in the module in order to not use the resources of the PLC Controller and to allow a fast response time, depending of the feature. Regarding the function, it could be considered as a “stand alone” module, because the function is independent of the Controller processing cycle, it just exchanges some information with the Controller CPU.

F

FAST I/O

*FAST I/O*s are specific I/Os with some electrical features (response time, for example) but the treatment of these channels is done by the Controller CPU.

FAST task

The *FAST task* is a periodic, high-priority task of a short duration that is run on a processor through its programming software. The task fast speed keeps it from interfering with the execution of lower priority master (MAST) tasks. A FAST task is useful when fast periodic changes in discrete inputs need to be monitored.

FB

A *function block* performs a specific automation function, such as speed control, interval control, or counting. A function block comprises configuration data and a set of operating parameters.

FBD

A *function block diagram* is a graphically oriented programming language, compliant with IEC 61131-3. It works with a list of networks whereby each network contains a graphical structure of boxes and connection lines which represents either a logical or arithmetic expression, the call of a function block, a jump, or a return instruction.

FDT

Field device tool for standardized communications between field devices and SoMachine.

FE

Functional ground is the point of a system or device that must be grounded to help prevent equipment damage.

FG

frequency generator

firmware

The *firmware* represents the operating system on a controller.

Flash memory

Flash memory is nonvolatile memory that can be overwritten. It is stored on a special EEPROM that can be erased and reprogrammed.

FTP

File transfer protocol is a standard network protocol (built on a client-server architecture), to exchange and manipulate files over TCP/IP based networks.

function

A *function*:
- is a POU that returns 1 immediate result
- is directly called with its name (as opposed to through an instance)
- has no persistent state from one call to the next
- can be used as an operand in expressions

Examples: boolean (AND) operators, calculations, conversions (BYTE_TO_INT)

function block (FB)

See *FB*.

function block diagram (FBD)

See *FBD*.

FWD

forward

G

gross weight

Indication of the load weight on an instrument when no tare or predefining device has been used.

GVL

The *global variable list* manages global variables that are available in every application POU.

H

HE10

Rectangular connector for electrical signals with frequencies below 3MHz, complying with IEC60807-2.

HMI

A *human-machine interface* is an operator interface (usually graphical) for industrial equipment.

hot swapping

Hot swapping is the replacement of a component with a like component while the system remains operational. The replacement component begins to function automatically after it is installed.

HSC

high-speed counter

HVAC

Heating ventilation and air conditioning applications monitor and control indoor environments.

I

I/O

input/output

I/O scan

An *input/output scan* continuously polls I/O modules to collect data bits and status, error, and diagnostics information. This process monitors inputs and controls outputs.

I/O terminal

An *input/output terminal* on the front of an expansion I/O module connects input and output signals.

ICMP

The *internet control message protocol* reports errors and provides information related to datagram processing.

IEC

The *international electrotechnical commission* is a non-profit and non-governmental international standards organization that prepares and publishes international standards for all electrical, electronic, and related technologies.

IEC 61131-3

The IEC 61131-3 is an *international electrotechnical commission* standard for industrial automation equipment (like controllers). IEC 61131-3 deals with controller programming languages and defines 2 graphical and 2 textual programming language standards:

- **graphical:** ladder diagram, function block diagram
- **textual:** structured text, instruction list

IEEE

The *institute of electrical and electronics engineers* is a non-profit international standards and conformity assessment body for advances in all fields of electrotechnology.

IEEE 802.3

IEEE 802.3 is a collection of IEEE standards defining the physical layer, and the media access control (MAC) sublayer of the data link layer, of wired Ethernet.

IL

A program written in the *instruction list* language is composed of a series of instructions executed sequentially by the controller. Each instruction includes a line number, an instruction code, and an operand. (IL is IEC 61131-3 compliant.)

immediate addressing

The direct method of addressing memory objects, including physical inputs and outputs, used in programming instructions as operands and parameters by using their direct address (for example, `%Iwx` or `%QWx`).

The use of immediate addressing in your program may avoid the need to create symbols for these objects, but there are also disadvantages. For example, if you change the program configuration by adding or deleting devices or I/O modules or slices, the immediate addresses used as programming instruction operands and/or parameters are not updated and must be corrected manually, which may cause extensive program modifications and lead to incorrect programming instructions. (See *symbolic addressing*.)

input filter

An *input filter* is a special function that rejects input noises. It is useful for eliminating input noises and chatter in limit switches. All inputs provide a level of input filtering using the hardware. Additional filtering with software is also configurable through the programing or the configuration software.

input terminal

An *input terminal* on the front of an expansion I/O module connects input signals from input devices (such as sensors, push buttons, and limit switches). For some modules, input terminals accept both sink and source DC input signals.

instruction list language (IL)

Refer to IL.

INT

A single *integer* is encoded in 16 bits.

IP

The *internet protocol* is part of the TCP/IP protocol family that tracks the Internet addresses of devices, routes outgoing messages, and recognizes incoming messages.

IP 20

Ingress protection rating according to IEC 60529. IP20 modules are protected against ingress and contact of objects larger than 12.5 mm. The module is not protected against harmful ingress of water.

IP 67

Ingress protection rating according to IEC 60529. IP67 modules are completely protected against ingress of dust and contact. Ingress of water in harmful quantity is not possible when the enclosure is immersed in water up to 1m.

K

Kd

derivative gain

Ki

integral gain

Kp

proportional gain

L

Ladder Diagram language

See *LD*.

LAN

A *local area network* local area network is a short-distance communications network that is implemented in a home, office, or institutional environment.

latching input

A *latching input* module interfaces with devices that transmit messages in short pulses. Incoming pulses are captured and recorded for later examination by the application.

LCD

liquid crystal display

LD

A program in the *ladder diagram* language includes a graphical representation of instructions of a controller program with symbols for contacts, coils, and blocks in a series of rungs executed sequentially by a controller. IEC 61131-3 compliant.

LED

A *light emitting diode* is an indicator that lights up when electricity passes through it.

LINT

Long integer is a 64-bit variable (4 times INT or two times DINT).

LMC

lexium motion control

load receiver device

Part of instrument that will receive the load.

located variable

A *located variable* has an address. (See *unlocated variable*.)

LRC

longitudinal redundancy checking

LREAL

Long real is a 64-bit variable.

LSB

The *least significant bit* (or *least significant byte*) is the part of a number, address, or field that is written as the right-most single value in conventional hexadecimal or binary notation.

LWORD

A *long word* type is encoded in a 64-bit format.

M

MAC address

The *media access control address* is a unique 48-bit number associated with a specific piece of hardware. The MAC address is programmed into each network card or device when it is manufactured.

Machine

A *Machine* consists of several *functions* and/or *equipments* which build the machine.

Magelis

Magelis is the commercial name for Schneider Electric's range of HMI terminals.

MAST

A master (MAST) task is a processor task that is run through its programming software. The MAST task has two sections:

- **IN:** Inputs are copied to the IN section before execution of the MAST task.
- **OUT:** Outputs are copied to the OUT section after execution of the MAST task.

master/slave

The single direction of control in a network that implements the master/slave model is always from a master device or process to one or more slave devices.

maximum weight

Maximum measuring capacity, not taking account of the additive capacity of the tare.

MIB

The *management information base* is an object database that is monitored by a network management system like SNMP. SNMP monitors devices that are defined by their MIBs. Schneider has obtained a private MIB, groupeschneider (3833).

minimum I/O update time

The *minimum I/O update time* is the minimum time it takes for the bus cycle to shut down to force an I/O update at each cycle.

minimum weight

Load value under which measuring results can be marred by a relative detected error that is too large.

Modbus

The Modbus communication protocol allows communications between many devices connected to the same network.

Modbus SL

Modbus serial line

MSB

The *most significant bit* (or *most significant byte*) is the part of a number, address, or field that is written as the left-most single value in conventional hexadecimal or binary notation.

N

NAK

negative acknowledge

NC

A *normally closed* contact is a contact pair that is closed when the actuator is de-energized (no power is applied) and open when the actuator is energized (power is applied).

NEC

The *national electric code* dictates the safe installation of electrical wiring and equipment.

NEMA

The *national electrical manufacturers association* publishes standards for the performance of various classes of electrical enclosures. The NEMA standards cover corrosion resistance, ability to protect from rain and submersion, etc. For IEC member countries, the IEC 60529 standard classifies the ingress protection rating for enclosures.

net weight (net)

Weight indication of a load placed on an instrument after a tare device has been used.

Net weight = Gross weight - Tare weight

network

A network includes interconnected devices that share a common data path and protocol for communications.

Nibble

A *Nibble* is a half-byte (representing 4 bits of a byte).

NMT

Network management protocols provide services for network initialization, error control, and device status control.

NMT state machine

A *network management state machine* defines the communication behavior of any CANopen device. The CANopen NMT state machine consists of an initialization state, a pre-operational state, an Operational state, and a stopped state. After power-on or reset, the device enters the initialization state. After the device initialization is finished, the device automatically enters the pre-operational state and announces the state transition by sending the boot-up message. In this manner, the device indicates that it is ready to work. A device that stays in pre-operational state may start to transmit SYNC-, Time Stamp-, or Heartbeat message. In this state, the device can not communicate through a PDO; it must do so with an SDO. In the operational state, the device can use all supported communication objects.

NO

A *normally open* contact is a contact pair that is open when the actuator is de-energized (no power is applied) and closed when the actuator is energized (power is applied).

node

A *node* is an addressable device on a communication network.

O

ODVA

The *open deviceNet vendors association* supports the family of network technologies that are built on CIP (EtherNet/IP, DeviceNet, and CompoNet).

OS

Operating system. Can be used for Firmware that can be uploaded/downloaded by the user.

OSI

The *open system interconnection* reference model is a 7-layer model that describes network protocol communications. Each abstract layer receives services from the layer below it and provides services to the layer above.

OTB

Optimized terminal block, used in the context of Advantys I/O distributed module

output terminal

An *output terminal* connects output signals to output devices (such as electromechanical relays and solenoid valves).

P

pallet

A *pallet* is a portable platform, which is used for storing or moving goods.

PCI

A *peripheral component interconnect* is an industry-standard bus for attaching peripherals.

PDM

A *power distribution module* distributes either AC or DC field power to a cluster of I/O modules.

PDO

A *process data object* is transmitted as an unconfirmed broadcast message or sent from a producer device to a consumer device in a CAN-based network. The transmit PDO from the producer device has a specific identifier that corresponds to the receive PDO of the consumer devices.

PDU

protocol data unit

PE

Protective ground is a return line across the bus for fault currents generated at a sensor or actuator device in the control system.

periodic execution

The master task is executed either cyclically or periodically. In periodic mode, you determine a specific time (period) in which the master task must be executed. If it is executed under this time, a waiting time is generated before the next cycle. If it is executed over this time, a control system indicates the overrun. If the overrun is too high, the controller is stopped.

persistent data

Value of persistent data that will be used at next application change or cold start. Only get re-initialized at a reboot of the controller or reset origin. Especially they maintain their values after a download.

PI

proportional integral

PID

proportional, integral and derivative control

PLC

The *programmable logic controller* is the “brain” of an industrial manufacturing process. It automates a process, used instead of relay control systems. PLCs are computers suited to survive the harsh conditions of the industrial environment.

PLCopen

The PLCopen standard brings efficiency, flexibility, and manufacturer independence to the automation and control industry through the standardization of tools, libraries, and modular approaches to software programming.

PLI

pulse latch input

post-configuration

Post-configuration files contain machine-independent parameters, including:

- machine name
- device name or IP address
- Modbus serial line address
- routing table

POU

A *program organization unit* includes a variable declaration in source code and the corresponding instruction set. POUs facilitate the modular reuse of software programs, functions, and function blocks. Once declared, POUs are available to one another. SoMachine programming requires the utilization of POUs.

POU FB

Program organization unit function block types are user programs that can be defined by the user in the ST, IL, LD, or FBD languages. You can use POU FB types in an application to:

- simplify the design and entry of the program
- make the program easier to read
- simplify debugging
- reduce the amount of generated code

power supply terminals

The power supply is connected to these terminals to provide power to the controller.

Profibus DP

Profibus Decentralized Peripheral

An open bus system that uses an electrical network based on a shielded 2-wire line or an optical network based on a fiber-optic cable. DP transmission allows for high-speed, cyclic exchange of data between the controller CPU and the distributed I/O devices.

protocol

A *protocol* is a convention or standard that controls or enables the connection, communication, and data transfer between two computing endpoints.

Pt100/Pt1000

Platinum resistance thermometer are characterized by their nominal resistance R0 at a temperature of 0° C.

- Pt100 (R0 = 100 Ohm)
- Pt1000 (R0 = 1 kOhm)

PTO

Pulse train outputs are used to control for instance stepper motors in open loop.

PWM

Pulse width modulation is used for regulation processes (e.g. actuators for temperature control) where a pulse signal is modulated in its length. For these kind of signals, transistor outputs are used.

R

RAM

random access memory

REAL

Real is a numeric data type. The REAL type is encoded in a 32-bit format.

real-time clock (RTC)

See RTC

reflex output

In a counting mode, the high speed counter current value is measured against its configured thresholds to determine the state of these dedicated outputs.

retained data

A *retained data* value is used in the next power-on or warm start. The value is retained even after an uncontrolled shutdown of the controller or a normal switch-off of the controller.

RFID

Radio-frequency identification is an automatic identification method that relies on the storage and remote retrieval of data using RFID tags or transponders.

RJ-45

This *registered jack* is a modular connector that is commonly implemented in communication networks.

RPDO

A *receive PDO* sends data to a device in a CAN-based network.

RPM

revolutions per minute

RPS

revolutions per second

RS-232

RS-232 (also known as EIA RS-232C or V.24) is a standard type of serial communication bus, based on three wires.

RS-485

RS-485 (also known as EIA RS-485) is a standard type of serial communication bus, based on two wires.

RTC

The *real-time clock* option keeps the time for a limited amount of time even when the controller is not powered.

RTS

Request to send is a data transmission signal and will be acknowledged by the CTS signal from the destination node.

RTU

A *remote terminal unit* is a device that interfaces with objects in the physical world to a distributed control system or SCADA system by transmitting telemetry data to the system and/or altering the state of connected objects based on control messages received from the system.

RxD

receiving data (data transmission signal)

S

SCADA

A *supervisory control and data acquisition* system monitors, manages, and controls industrial applications or processes.

scale division

Value in mass units, expressing the difference between two consecutive indications for one numerical indication.

scan

A controller scanning program performs 3 basic functions: [1] It reads inputs and places these values in memory; [2] it executes the application program 1 instruction at a time and stores results in memory; [3] It uses the results to update outputs.

SDO

A *service data object* message is used by the field bus master to access (read/write) the object directories of network nodes in CAN-based networks. SDO types include service SDOs (SSDOs) and client SDOs (CSDOs).

SEL-V

A system that follows IEC 61140 guidelines for *safety extra low voltage* is protected in such a way that voltage between any 2 accessible parts (or between 1 accessible part and the PE terminal for Class 1 equipment) does not exceed a specified value under normal conditions or under single-fault conditions.

Sequential Function Chart

See *SFC*.

SFC

A program written in the *sequential function chart* language can be used for processes that can be split into steps. SFC is composed of steps with associated actions, transitions with associated logic condition, and directed links between steps and transitions. (The SFC standard is defined in IEC 848. It is IEC 61131-3 compliant.)

sink input

A *sink input* is a wiring arrangement in which the device provides current to the input electronic module. A sink input is referenced to 0 Vdc.

SINT

Signed integer is a 16-bit value.

SL

serial line

SMS

The *short message service* is a standard communication service for telephones (or other devices) that send short text messages over the mobile communications system.

SNMP

The *simple network management protocol* can control a network remotely by polling the devices for their status, performing security tests, and viewing information relating to data transmission. It can also be used to manage software and databases remotely. The protocol also permits active management tasks, such as modifying and applying a new configuration

source output

A *source output* is a wiring arrangement in which the output electronic module provides current to the device. A source output is referenced to +24 Vdc.

SSI

Serial synchronous interface is a common interface for relative and absolute measurement systems like encoders.

ST

See *structured text*.

STN

Scan Twisted Nematic (also known as passive matrix)

STRING

A `STRING` variable is a series of ASCII characters.

Structured Text

A program written in the *structured text* (ST) language includes complex statements and nested instructions (such as iteration loops, conditional executions, or functions). ST is compliant with IEC 61131-3.

symbol

A *symbol* is a string of a maximum of 32 alphanumeric characters, of which the first character is alphabetic. It allows you to personalize a controller object to facilitate the maintainability of the application.

symbolic addressing

The indirect method of addressing memory objects, including physical inputs and outputs, used in programming instructions as operands and parameters by first defining symbols for them using these symbols in association with the programming instructions.

In contrast to immediate addressing, this is the recommended method because if the program configuration changes, symbols are automatically updated with their new immediate address associations, whereas any immediate addresses used as operands or parameters are not. (See *immediate addressing*.)

system time

An internal clock provides a device with the system time.

system variable

A system variable structure provides controller data and diagnostic information and allows sending commands to the controller.

T

TAP

A *terminal access point* is a junction box connected to the trunk cable that allows you to plug in drop cables.

tare

Load placed on the load receiver along with the product to be weighed.

tare device

Device allowing the instrument indication to be moved to zero when a load is positioned on the load receiver:

tare predefining device

Device allowing a predefined tare value to be subtracted from a gross weight value and indicating the result of the calculation. The load range is consequently reduced.

Tare Value

Weight value of a load, determined by a tare full-bridge strain gauge electronic module.

taring

Action allowing the instrument indication to be moved to zero when a load is positioned on the load receiver.

task

A group of sections and subroutines, executed cyclically or periodically for the MAST task, or periodically for the FAST task.

A task possesses a level of priority and is linked to inputs and outputs of the controller. These I/O are refreshed in consequence.

A controller can have several tasks.

TCP

A *transmission control protocol* is a connection-based transport layer protocol that provides a reliable simultaneous bi-directional transmission of data. TCP is part of the TCP/IP protocol suite.

terminal block

The *terminal block* is the component that mounts in an electronic module and provides electrical connections between the controller and the field devices.

TFT

thin film transmission (also known as active matrix)

threshold output

Threshold outputs are controlled directly by the HSC according to the settings established during configuration.

TP

A *touch probe* is a position capture that is triggered by a fast input signal (quick sensor). On the rising edge of the touch probe input the position of an encoder is captured. Example: This is used for packaging machines to capture the position of a printmark on a film to cut always on the same position.

TPDO

A *transmit PDO* reads data from a device in a CAN-based system.

trunk cable

A *trunk cable* is the main cable that is terminated at both physical ends with line termination resistors.

TVDA

tested validated documented architectures

TxD

TxD represents a transmit signal.

U

UDINT

An *unsigned double integer* is encoded in 32 bits.

UDP

The *user datagram protocol* is a connectionless mode protocol (defined by IETF RFC 768) in which messages are delivered in a datagram (data telegram) to a destination computer on an IP network. The UDP protocol is typically bundled with the Internet Protocol. UDP/IP messages do not expect a response, and are therefore ideal for applications in which dropped packets do not require retransmission (such as streaming video and networks that demand real-time performance).

UINT

An *unsigned integer* is encoded in 16 bits.

UL

Underwriters Laboratories, US organization for product testing and safety certification.

unlocated variable

An *unlocated variable* does not have an address. (See *located variable*.)

UTC

coordinated universal time

V

VSD

variable speed drive

W

WORD

The *WORD* type is encoded in a 16-bit format.

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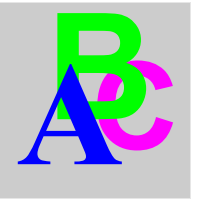

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