SoMachine
Introduction

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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, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could 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 for the release of SoMachine V4.3.

Product Related Information

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

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

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

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

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
EN 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2008	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 1088:2008 ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2006	Safety of machinery - Emergency stop - Principles for design
EN/IEC 62061:2005	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2008	Digital data communication for measurement and control: Functional safety field buses.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive* (*2006/42/EC*) and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Part I
General Introduction

Chapter 1
General Introduction to SoMachine

Overview

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

What Is in This Chapter?

This chapter contains the following topics:

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Machine Transparency	21

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.
  - industrial PCs (iPCs)

SoMachine integrates:

- HMI controllers
  - Magelis XBTGC HMI Controller
  - Magelis XBTGT/GK CANopen HMI Controller
  - Magelis SCU HMI Controller
- Logic controllers
  - Modicon M238
  - Modicon M241
  - Modicon M251
  - Modicon M258
- Motion controllers
  - Modicon LMC058
  - Modicon LMC078

- Drive controllers
  - Altivar ATV IMC
- HMI Magelis graphic panels
  - Magelis XBTGT
  - Magelis XBTGK
  - Magelis XBTGH
  - Magelis GK
  - Magelis GTO
  - Magelis GTU
  - Magelis STU
  - Magelis STO

  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 Schneider Electric Software Update (SESU)
- integrated function block finder to simplify programming
- integrated OPC server
- optional installation of the HMI application development tool Vijeo-Designer
- optional installation of SoMachine Basic to configure and program the M221 Logic controller
- optional installation of the Controller Assistant to manage firmware and application download
- application and function templates
- improved user interface

Simplifying the User Workflow

With SoMachine you can design a complete solution with just:

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

Dedicated OEM Libraries

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

The following libraries are provided by SoMachine:

- 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)
- Energy Efficiency libraries for monitoring of electrical parameters of devices or information concerning the efficiency of machine energy consumption

SoMachine provides additional libraries for the following applications:

- Packaging
- Hoisting
- Conveying
- Pumping

Overview

Visual Graphic User Interface

Navigation within SoMachine is intuitive and visually oriented.

Presentation is optimized so that selecting the development stage of the desired project makes the appropriate tools available.

The user interface affords 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 task are featured, avoiding any superfluous information

Learning Center

SoMachine includes a **Learning Center** with animations, documents, and programming examples for self-education.

Projects Management

You can create new projects with or without the following aids:
- tested validated and documented architectures
- the provided examples
- the provided application templates

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

Project Properties

SoMachine provides the possibility of adding the following items to your projects:
- additional textual information
- attach documents
- attach your individual logo
- attach a configuration picture

Project Versioning

SoMachine can keep a history of your project by creating an automatic backup.

Configuration

SoMachine allows you to easily build your architecture and configure the devices of your architecture.

Programming

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.

Documentation

Printed documentation is an important element of any project. SoMachine enables you to 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

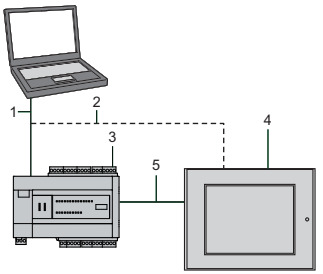
The SoMachine protocol is the preferred protocol providing a transparent access to your logic controllers and HMIs.

The SoMachine protocol is used for any data exchange

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

Single Cable Connection

The single connection to the machine provides a gain in simplicity by transferring data using the same cable from the PC to the logic controller and HMI.



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

The above figure illustrates the equivalent access. Downloading and commissioning to the logic controller can be performed in two different ways:

- direct connection: directly connecting the SoMachine PC to the logic controller which, in turn, routes the information to the HMI
- alternative connection: connecting the SoMachine PC to the HMI which, in turn, routes the information to the logic controller. In this way, the SoMachine PC is connected directly to the HMI (**2**) and, via the HMI, to the logic controller (**5**).

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 logic controller by a publisher-subscriber mechanism predicated on symbolic names. Once the variables have been published, they may be subscribed by other HMIs or logic controllers without the need to re-enter the variable definition.

The publisher-subscriber mechanism affords the following advantages:

- single definition of variables shared between the logic 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 logic controller provides near-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.

Part II
System Requirements and Installation

What Is in This Part?

This part contains the following chapters:

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4	SoMachine Product Offer	29
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Chapter 2
System Requirements

System Requirements

Overview

The following paragraphs describe the hardware and software requirements that must be met for a PC to be installed with SoMachine.

Hardware Requirements

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

Equipment	Minimum	Recommended
Processor	Intel® Core(TM) 2 Duo (or equivalent)	Intel® Core(TM) I7 (or equivalent)
RAM	3 GB	8 GB
Free hard drive space	8 GB including the memory space for the software installation, temporary space for execution and space for saving applications	15 GB for the full software installation, temporary space for execution and space for saving applications
Drive	DVD reader	
Display	resolution: 1280 x 1024 pixel	resolution: 1680 x 1050 pixel
Peripherals	mouse or compatible pointing device	
	USB interface	
Web access	Web registration requires Internet access system.	

Software Requirements

The SoMachine software supports the following operating systems:

- Microsoft Windows® 7 Professional Edition 32 bits
- Microsoft Windows® 7 Professional Edition 64 bits
- Microsoft Windows® 8.1 Professional Edition 32 bits
- Microsoft Windows® 8.1 Professional Edition 64 bits
- Microsoft Windows® 10 Professional Edition 32 bits
- Microsoft Windows® 10 Professional Edition 64 bits
- Microsoft .NET Framework 3.5
- Microsoft .NET Framework 4.0
- Microsoft .NET Framework 4.6

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*.

Chapter 3
Installation of SoMachine

Installation of SoMachine

Overview

Before you install SoMachine, you need to install the SoMachine Configuration Manager.

The SoMachine Configuration Manager provides the following features:

- install and uninstall SoMachine
- customize your SoMachine installation, including the preferred installation type
- manage SoMachine licensing.

For more information, refer to the online help of SoMachine Configuration Manager.

Chapter 4
SoMachine Product Offer

SoMachine Product Offer Contents

Overview

The following SoMachine product offers are available:

- SoMachine Standard software with general-purpose functions
- SoMachine can be extended with additional options

The table provides an overview of supported devices and libraries:

Device / Library type	Reference / Library name
M238 logic controllers	● M238 ❍ TM238LDA24DR ❍ TM238LDD24DT ❍ TM238LFAC24DR ❍ TM238LFDC24DT
M241 logic controllers	● M241 ❍ TM241C24T ❍ TM241C40T ❍ TM241CE24T ❍ TM241CE40T ❍ TM241CEC24T
M251 logic controllers	● M251 ❍ TM251MESC ❍ TM251MESE
M258 logic controllers	● M258 ❍ TM258LD42DT ❍ TM258LD42DT4L ❍ TM258LF42DR ❍ TM258LF42DT ❍ TM258LF42DT4L ❍ TM258LF66DT4L

Device / Library type	Reference / Library name
Industrial PC (iPC)	• Box iPC ❍ HMIBUxxx1/xxx2 ❍ HMIBPxxx2/xxx5 ❍ HMIBSO ❍ HMIBSU • Box iPC modular ❍ HMIBMO ❍ HMIBMU ❍ HMIBMP • Box iPC display for HMIBMx ❍ HMIDM742 ❍ HMIDM7521 ❍ HMIDM9521 ❍ HMIDMA521 • Rack iPC ❍ HMIRSP ❍ HMIRSU ❍ HMIRXO-RSO • Open and optimum panel iPC ❍ HMIGTW5354/PWC5 ❍ HMIPWC7/PVC7 • S-Panel iPC ❍ HMIPSP ❍ HMIPEP ❍ HMIPSO • Panel iPC ❍ HMIPPx6 ❍ HMIPPx7/PRx7 ❍ HMIPPx9 ❍ HMIPUx6 ❍ HMIPUx7/PTx7 ❍ HMIPUx9
HMI small terminal	• HMISTU ❍ HMISTU655 ❍ HMISTU855 • HMISTO ❍ HMISTO511 ❍ HMISTO512 ❍ HMISTO531 ❍ HMISTO532

Device / Library type	Reference / Library name
HMIGK terminal	● HMIGK2310 ● HMIGK5310
HMIGTO terminal	● HMIGTO1300 ● HMIGTO1310 ● HMIGTO2300 ● HMIGTO2310/2315 ● HMIGTO3510 ● HMIGTO4310 ● HMIGTO5310/5315 ● HMIGTO6310/6315
HMIGTU terminal	● HMIG3U ● HMIG5U ● HMIG5U2 ● HMIDT542 ● HMIDT642 ● HMIDT643 ● HMIDT732 ● HMIDT351 ● HMIDT551 ● HMIDT651
HMISCU controllers and HMI small terminal	● HMISCU controllers and HMI small terminal ❍ HMISCU6A5 ❍ HMISCU8A5 ❍ HMISCU6B5 ❍ HMISCU8B5 ● HMISCU controllers ❍ HMISAC ❍ HMISBC ● HMISCU small terminal ❍ HMIS65 ❍ HMIS85
XBTGC HMI controllers	● XBTGC ❍ XBTGC1100 ❍ XBTGC2120 ❍ XBTGC2230 ❍ XBTGC2330 ● CANopen Master module for XBTGC ❍ XBTZGCCAN

Device / Library type	Reference / Library name
XBTGT/GK HMI controllers	● XBTGK with control ❍ XBTGK2120 ❍ XBTGK2330 ❍ XBTGK5330 ● XBTGT with control ❍ XBTGT2110 ❍ XBTGT2120 ❍ XBTGT2130 ❍ XBTGT2220 ❍ XBTGT2330 ❍ XBTGT2430 ❍ XBTGT2930 ❍ XBTGT4230 ❍ XBTGT4330 ❍ XBTGT4340 ❍ XBTGT5230 ❍ XBTGT5330 ❍ XBTGT5340 ❍ XBTGT5430 ❍ XBTGT6330 ❍ XBTGT6340 ❍ XBTGT7340 ● CANopen Master module for XBTGT/GK ❍ XBTZGCANM
LMC058 motion controllers	● LMC058 ❍ LMC058 LF424 ❍ LMC058 LF42
LMC078 motion controllers	● LMC078 ❍ LMC078CECS20T
ATV IMC drive controllers	● ATV IMC ❍ VW3A3521
Application libraries	● EnergyEfficiencyToolbox Library ● MachineEnergyDashboard Library ● ModbusEnergyEfficiencyToolbox Library ● SE_LMC_Utility

Device / Library type	Reference / Library name
Solution libraries	The following SoMachine library add-ons are available: ● Conveying Library ● Hoisting Library ● Hoisting_Basic Library ● Packaging Library ● PackML Library ● Pumping Library **NOTE:** The SoMachine Standard software includes the general-purpose versions of the Solution Libraries. The advanced versions of the Solution Libraries must be purchased apart from the SoMachine Standard software. Both versions of the libraries must be registered.
Communication libraries	● EMailHandling Library ● FtpRemoteFileHandling Library ● IoDrvASI Library ● IoDrvDistributedIo Library ● IoDrvTM4PDPS1 Library ● IoDrvTM5PCDPS Library ● M2xxCommunication Library ● ModbusTCPIOScanner Library ● Modem Library ● PLCCommunication Library ● SE_NetVarUdp Library ● SnmpManager Library ● SqlRemoteAccess Library ● TcpUdpCommunication Library ● TimeSync Library
Generic libraries	● DataLogging Library ● FileFormatUtility Library ● Toolbox Library ● Toolbox_Advanced Library ● TwidoEmulationSupport Library ● SysTimeCore Library ● SysTimeRtc Library

Device / Library type	Reference / Library name
Devices libraries	• Altivar Library • CANmotion Lexium Library • FieldBusDevicesModbusTcp Library • FieldBusDevicesPlcOpen Library • GMC Independent Altivar • GMC Independent Lexium • GMC Independent PLCopen MC • Harmony ZBRN Library • Integrated Lexium Library • Lexium Library • Lexium 23 Library • Lexium 28 Library • Lexium 32i Library • TeSys Library • TM3Safety Library • TM3TesysU Library
M238 libraries	• M238 ASi Interface Library • M238 HSC Library • M238 PLCSystem Library • M238 PTOPWM Library • M238 Relocation Table Library
M241 libraries	• M241 HSC • M241 PLCSystem • M241 PTOPWM
M251 libraries	• M251 PLCSystem Library
XBT libraries	• XBT PLCSystem Library • XBTGC HSC Library • XBTGC PTOPWM Library
ATV IMC libraries	• ATV IMC PLCSystem Library • ATV IMC HSC Library • ATV IMC UserLib Library • ATV IMC SysLib V2.3 Library
M258 libraries	• M258 Ethernet Util Library • M258 IoDrvTM5SEAISG Library • M258 HSC Expert I/O Library • M258 PLCSystem Library • M258 PWM Expert I/O Library • M258 Relocation Table Library

Device / Library type	Reference / Library name
LMC058 libraries	• LMC058 Ethernet Util Library • LMC058 HSC Expert I/O Library • LMC058 IoDrvTM5SEAISG Library • LMC058 Motion Library • LMC058 PLCSystem Library • LMC058 PWM Expert I/O Library • LMC058 Relocation Table Library
LMC078 libraries	• LMC078 PLCSystem Library
HMISCU libraries	• HMISCU HSC • HMISCU PLCSystem • HMISCU PTOPWM • SE_ModbusTCP_Slave
TM5 libraries	• TM5 IoDrvTM5SEAISG Library
Function template libraries	• TVDA Device Module Library • Conveying Function Templates
Device template libraries	• Altivar Device Templates • CANmotion Lexium Device Templates • Conveying Device Templates • Lexium Device Templates

NOTE: The TVDAs listed below are part of the default SoMachine installation.

The table lists the available Project Templates and the associated System User Guides of Tested, Validated and Documented Architectures (TVDAs):

Type of TVDA	Associated System User Guide
TVDA - Project Template	*Compact / Modbus SL / Logic Controller M221 Book*
	Compact / Modbus SL / HMI Controller SCU
	Compact / CANopen / Logic Controller M241
	Distributed / EtherNet/IP / Logic Controller M251
	Distributed / Modbus TCP / Logic Controller M251
	Compact / Hardwired / Logic Controller M258
	Distributed / CANopen / Logic Controller M258
	Distributed / CANmotion / Motion Controller LMC058
	Compact / CANopen / Drive Controller ATV IMC
	Compact / Sercos / Motion Controller LMC078
[1] The .pdf files are located in *...\Documents and Settings\All Users\Documents\SoMachine Software\Vx\Project Templates\TVDA\System User Guides*.	

Type of TVDA	Associated System User Guide
TVDA - System User Guide (multistandard)	*Compact / Modbus SL / Logic Controller M221 Book / System User Guide*
	Compact / Modbus SL / HMI Controller SCU / System User Guide
	Compact / CANopen / Logic Controller M241 / System User Guide
	Distributed / EtherNet/IP / Logic Controller M251 / System User Guide
	Distributed / Modbus TCP / Logic Controller M251 / System User Guide
	Distributed / CANopen / Logic Controller M258 / System User Guide
	Compact / Hardwired / Logic Controller M258 / System User Guide
	Distributed / CANmotion / Motion Controller LMC058 / System User Guide
	Compact / Sercos / Motion Controller LMC078 / System User Guide
TVDA - System User Guide (European version)[1]	*Compact_CANopen_ATV IMC_SUG_ENG_03_10.pdf*
TVDA - System User Guide (U.S. version)[1]	*Compact_CANopen_ATV IMC_SUG_ENG_03_10 -US VERSION.pdf*

[1] The .pdf files are located in *...\Documents and Settings\All Users\Documents\SoMachine Software\Vx\Project Templates\TVDA\System User Guides*.

Chapter 5
Log File

Log File

Overview

SoMachine automatically creates a log file. It provides information that is useful for debugging purposes. The size of the file is not restricted and there is no automatic removal or overwriting procedure.

The file is deleted only when SoMachine is uninstalled.

NOTE: Delete the file manually in suitable time intervals so that it does not use a large amount of disk space on your PC. The file is found in the temporary folder of Windows, defined by the variable %TEMP%.

Part III
Supported Devices

Introduction

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

What Is in This Part?

This part contains the following chapters:

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Chapter 6
Logic Controllers

What Is in This Chapter?

This chapter contains the following sections:

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Section 6.1
Modicon M238 Logic Controller

Modicon M238 Logic Controller

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

SoMachine software can also be used to program the controller using CFC (Continuous Function Chart) language.

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 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.

Section 6.2
Modicon M241 Logic Controller

Modicon M241 Logic Controller

Overview

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

- Modicon M241 Logic Controller - Programming Guide
- Modicon M241 Logic Controller - Hardware Guide
- SoMachine Industrial Ethernet User Guide *(see SoMachine Industrial Ethernet, User Guide)*

The Modicon M241 Logic Controller has various powerful features and can service a wide range of applications.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide.

Programming Languages

The M241 Logic Controller is configured and programmed with the SoMachine software, which supports the following IEC 61131-3 programming languages:

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

SoMachine software can also be used to program these controllers using CFC (Continuous Function Chart) language.

Embedded Inputs/Outputs

The following embedded I/O types are available, depending on the controller reference:

- Regular inputs
- Fast inputs associated with counters
- Regular sink/source transistor outputs
- Fast sink/source transistor outputs associated with pulse generators

Embedded Communication Features

The following types of communication ports are available on the front panel of the controller, depending on the controller reference:

- CANopen Master
- Ethernet
- USB Mini-B
- SD Card
- Serial Line 1
- Serial Line 2

M241 Logic Controller Range

The following table shows the M241 Logic Controller range and features:

Reference	Digital Inputs	Digital Outputs	Communication Ports	Terminal Type
TM241C24T	8 fast inputs (counters) 6 regular inputs(1)	Source outputs 4 fast outputs (pulse generators)(3) 6 regular transistor outputs	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE24T	8 fast inputs (counters) 6 regular inputs(1)	Source outputs 4 fast outputs (pulse generators)(3) 6 regular transistor outputs	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks
TM241CEC24T	8 fast inputs (counters) 6 regular inputs(1)	Source outputs 4 fast outputs (pulse generators)(3) 6 regular transistor outputs	2 serial line ports 1 USB programming port 1 Ethernet port 1 CANopen Master port	Removable screw terminal blocks
TM241C24U	8 fast inputs (counters) 6 regular inputs(1)	Sink outputs 4 fast outputs (pulse generators)(3) 6 regular transistor outputs	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE24U	8 fast inputs (counters) 6 regular inputs(1)	Sink outputs 4 fast outputs (pulse generators)(3) 6 regular transistor outputs	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks

(1) The regular inputs have a maximum frequency of 5 kHz.
(2) The fast inputs can be used either as regular inputs or as fast inputs for counting or event functions.
(3) The fast transistor outputs can be used either as regular transistor outputs, or as fast outputs for pulse generator (FG/PWM/PTO) or counting (HSC) functions.

Reference	Digital Inputs	Digital Outputs	Communication Ports	Terminal Type
TM241CEC24U	8 fast inputs (counters) 6 regular inputs(1)	Sink outputs 4 fast outputs (pulse generators)(3) 6 regular transistor outputs	2 serial line ports 1 USB programming port 1 Ethernet port 1 CANopen Master port	Removable screw terminal blocks
TM241C40T	8 fast inputs (counters)(2) 16 regular inputs(1)	Source outputs 4 fast outputs (pulse generators)(3) 12 regular transistor outputs	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE40T	8 fast inputs (counters)(2) 16 regular inputs(1)	Source outputs 4 fast outputs (pulse generators)(3) 12 regular transistor outputs	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks
TM241C40U	8 fast inputs (counters)(2) 16 regular inputs(1)	Sink outputs 4 fast outputs (pulse generators)(3) 12 regular transistor outputs	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE40U	8 fast inputs (counters)(2) 16 regular inputs(1)	Sink outputs 4 fast outputs (pulse generators)(3) 12 regular transistor outputs	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks

(1) The regular inputs have a maximum frequency of 5 kHz.
(2) The fast inputs can be used either as regular inputs or as fast inputs for counting or event functions.
(3) The fast transistor outputs can be used either as regular transistor outputs, or as fast outputs for pulse generator (FG/PWM/PTO) or counting (HSC) functions.

Section 6.3
Modicon M251 Logic Controller

Modicon M251 Logic Controller

Overview

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

- Modicon M251 Logic Controller - Programming Guide
- Modicon M251 Logic Controller - Hardware Guide
- SoMachine Industrial Ethernet User Guide

The Modicon M251 Logic Controller has various powerful features and can service a wide range of applications.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide.

Programming Languages

The M251 Logic Controller is configured and programmed with the SoMachine software, which supports the following IEC 61131-3 programming languages:

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

SoMachine software can also be used to program these controllers using CFC (Continuous Function Chart) language.

Embedded Communication Features

The following types of communication ports are available on the front panel of the controller, depending on the controller reference:

- CANopen Master
- Ethernet
- USB Mini-B
- Serial Line

M251 Logic Controller Range

This table shows the M251 Logic Controller range and features:

Reference	Digital Inputs	Digital Outputs	Communication Ports
TM251MESC	0	0	1 serial line port 1 USB mini-B programming port 1 dual port Ethernet switch 1 CANopen port
TM251MESE	0	0	1 serial line port 1 USB mini-B programming port 1 dual port Ethernet switch 1 Ethernet port for fieldbus

Section 6.4
Modicon M258 Logic Controller

Modicon M258 Logic Controller

Overview

Software configuration and hardware description can be found in the following manuals:
- Modicon M258 Logic Controller programming guide
- 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.

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

SoMachine software can also be used to program the controller using CFC (Continuous Function Chart) language.

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	0	0	1	1	1	1
TM258LD42DT4L	2	0	1	1	1	1
TM258LF42DT••	0	1	1	1	1	1
TM258LF42DT4L••	2	1	1	1	1	1
TM258LF66DT4L••	2	1	1	1	1	1
TM258LF42DR••	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	2x	5	2	2	1x	12	12	0
TM258LD42DT4L	2x	5	2	2	1x	12	12	4
TM258LF42DT••	2x	5	2	2	1x	12	12	0
TM258LF42DT4L••	2x	5	2	2	1x	12	12	4
TM258LF66DT4L••	2x	5	2	2	2x	12	12	4
TM258LF42DR••	2x	5	2	2	2x	6	6 Relays	0

Chapter 7
Drive Controllers

Section 7.1
Altivar ATV IMC Drive Controllers

Altivar ATV IMC Drive Controller

Introduction

The Altivar 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 Altivar ATV IMC Drive Controller option card can be installed on a drive.

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

Key Features

The Altivar 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

SoMachine software can also be used to program the controller using CFC (Continuous Function Chart) language.

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

The Altivar 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 Altivar 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

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

Reference	Option Card Description
VW3A3201	Logic (digital) 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 Altivar ATV IMC Drive Controller

This table lists the features of the Altivar ATV IMC Drive Controller 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

Chapter 8
Motion Controllers

What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
8.1	LMC058 Motion Controllers	56
8.2	LMC078 Motion Controllers	58

Section 8.1
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
- 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

SoMachine software can also be used to program the controller using CFC (Continuous Function Chart) language.

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••	0	2	1	1	1	1	1
LMC058LF424••	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••	2x	5	2	2	1x	12	12	0
LMC058LF424••	2x	5	2	2	1x	12	12	4

Section 8.2
LMC078 Motion Controllers

Modicon LMC078 Motion Controller

Overview

Software configuration and hardware description can be found in the following manuals:
- Modicon LMC078 Motion Controller Programming Guide
- Modicon LMC078 Motion Controller Hardware Guide

The Schneider Electric Modicon LMC078 Motion Controller (LMC078CECS20T) is a controller with various powerful features. It can control a wide range of applications. The Modicon LMC078 Motion Controller incorporates both logic controller and motion functions. A Modicon LMC078 Motion Controller synchronizes, coordinates, and creates the motion functions of a machine for a maximum of 24 axes (synchronized in as little as 4 ms).

This controller is the optimized solution for axis positioning thanks to the SoMachine software platform, which includes embedded automation functions and an ergonomic interface for axis configuration. Combined with Lexium 32S servo drives, this lets you easily design and commission your applications.

Key Features

The SoMachine software compatible with the controller provides the following IEC 61131-3 programming languages:
- IL: Instruction List
- ST: Structured Text
- FBD: Function Block Diagram
- SFC: Sequential Function Chart
- LD: Ladder Diagram

SoMachine software can also be used to program the controller using CFC (Continuous Function Chart) language.

The Modicon LMC078 Motion Controller supports the following fieldbusses:
- With embedded communication interfaces:
  - CANopen master/slave
  - Sercos III
  - Ethernet TCP/IP
  - Serial line
- With optional communication modules:

- PROFIBUS DP slave
- EtherNet/IP adapter
- EtherNet/IP scanner

The Modicon LMC078 Motion Controller supports the following I/O types:

- Master encoder input
- Embedded I/Os:
  - Digital I/Os
  - Advanced digital inputs (touchprobe and interrupt inputs)
- Distributed I/Os on CANopen and Sercos fieldbusses (TM5/TM7 modules)

Controller Range

	Digital inputs	Digital outputs	Encoder inputs	Communication ports
LMC078CECS20T	8 digital inputs 4 advanced digital outputs	8 digital outputs	1	1 Ethernet port 1 CAN port I USB Mini-B programming port 1 USB host port 2 Sercos ports 1 serial line port

Chapter 9
HMI Controllers

What Is in This Chapter?

This chapter contains the following sections:

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9.2	XBTGT, XBTGK HMI Controller	65
9.3	SCU HMI Controller	66

Section 9.1
XBTGC HMI Controller

What Is in This Section?

This section contains the following topics:

Topic	Page
XBTGC HMI Controller	63
CANopen Master Modules for XBTGC/GT/GK HMI Controller	64

XBTGC HMI Controller

Introduction

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

- XBTGC HMI Controller Hardware Guide
- 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

SoMachine software can also be used to program these controllers using CFC (Continuous Function Chart) language.

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

CANopen Master Modules for XBTGC/GT/GK HMI Controller

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 XBTGC HMI Controller Programming Guide.

CANopen Master Module for the XBT GT/GK HMI Controller

The following CANopen Master modules (XBTZGCANM and XBTZGCANMS0) are available for the XBT GT/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 XBT GT, XBT GK HMI Controller Programming Guide.

Section 9.2
XBTGT, XBTGK HMI Controller

XBT GT/GK HMI Controllers

Introduction

XBT GT/GK HMI terminals *(see page 61)* become controllers when a CANopen module *(see page 64)* is attached to them.

Software configuration and hardware description can be found in the following manuals:
- Magelis XBT GT, XBT GK, XBT GH Hardware Guide
- Magelis XBT GT, XBT GK HMI Controller Programming Guide

XBT GT/GK Key Features

The XBT GT/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

SoMachine software can also be used to program these controllers using CFC (Continuous Function Chart) language.

The XBT GT/GK HMI controllers can manage up to 3 tasks:
- 1 unique and mandatory MAST task can be configured in 'Freewheeling *(see Magelis XBTGT, XBTGK HMI Controller, Programming Guide)*' or 'Cyclic *(see Magelis XBTGT, XBTGK 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 XBTGT, XBTGK HMI Controller, Programming Guide)*' mode.

XBT GT/GK Terminal Range

For key features as well as a list of the range of XBT GT/GK HMI terminals refer to the HMI Terminals chapter of this document *(see page 61)*.

Section 9.3
SCU HMI Controller

Magelis SCU HMI Controller

Overview

Software configuration and hardware description can be found in the following manuals:
- Magelis SCU HMI Controller Hardware Guide
- Magelis SCU HMI Controller Programming Guide

Key Features

The Magelis SCU 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

SoMachine software can also be used to program these controllers using CFC (Continuous Function Chart) language.

The Magelis SCU HMI Controllers can manage up to 3 tasks:
- 1 unique and mandatory **MAST** task can be configured in Freewheeling or Cyclic mode.
- 2 other tasks can be configured in **Freewheeling** (only if the **MAST** task is not configured in **Freewheeling**), **Cyclic** or **Event** mode.

Embedded Input/Output

The following embedded I/O types are available, depending on the controller reference:
- Regular input
- Fast input (HSC)
- Regular output
- Fast output (PTO/PWM)
- Analog input
- Temperature input
- Analog output

NOTE: Frequency Generator (FG) is not supported.

Embedded communication features

4 types of communication ports are available on the rear panel:
- Ethernet port
- USB port

- Serial link port
- CANopen port

Magelis SCU HMI Controller Range

This table describes the Magelis SCU HMI Controller

Reference	Digital Input	Digital Output	Analog Input	Analog Output	Screen Size
HMISCU6A5	14 regular inputs and 2 fast inputs (HSC)	8 regular outputs and 2 fast outputs (PTO)(1)	No	No	8.9 cm (3.5 in.)
HMISCU8A5					14.48 cm (5.7 in.)
HMISAC					No
HMISCU6B5	6 regular inputs and 2 fast inputs (HSC)	6 regular outputs and 2 fast outputs (PTO)(1)	2 analog inputs (12-bit plus sign SAR ADC) and 2 analog inputs (16-bit), for temperature	2 analog outputs (12-bit)	8.9 cm (3.5 in.)
HMISCU8B5					14.48 cm (5.7 in.)
HMISBC					No
HMIS65	No				8.9 cm (3.5 in.)
HMIS85	No				14.48 cm (5.7 in.)

1 The fast outputs can be used either as regular outputs or as fast outputs for Pulse Train Output (PTO), Pulse Width Modulation (PWM) functions, or reflex output for high speed counter (HSC).

The HMISAC and HMISBC are replacement rear modules. The HMIS65 and HMIS85 are screen replacement modules. The table shows for equivalence:

Replacement Rear Module		Replacement Screen		Equivalent Full Module
HMISAC	+	HMIS65 (3.5 inch)	=	HMISCU6A5
HMISAC	+	HMIS85 (5.7 inch)	=	HMISCU8A5
HMISBC	+	HMIS65 (3.5 inch)	=	HMISCU6B5
HMISBC	+	HMIS85 (5.7 inch)	=	HMISCU8B5

Chapter 10
Expansion Modules

What Is in This Chapter?

This chapter contains the following sections:

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10.1	TM2 Expansion Modules	70
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10.6	TM5 Expansion Modules	91
10.7	TM7 Expansion Blocks	102
10.8	Communication Modules	105

Section 10.1
TM2 Expansion Modules

What Is in This Section?

This section contains the following topics:

Topic	Page
TM2 Digital Input and Output Expansion Modules	71
TM2 Analog Input and Output Expansion Modules	73
TM2 High-Speed Counting I/O Expansion Modules	75

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.

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
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.

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.

Section 10.2
TM3 Expansion Modules

What Is in This Section?

This section contains the following topics:

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TM3 Safety Expansion Modules	85
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TM3 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 TM3 Digital I/O Modules Hardware Guide.

TM3 Digital Input Modules

The following table shows the TM3 digital input expansion modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DI8A	8	Regular inputs	120 Vac 7.5 mA	Removable screw terminal block / 5.08 mm
TM3DI8	8	Regular inputs	24 Vdc 7 mA	Removable screw terminal block / 5.08 mm
TM3DI8G	8	Regular inputs	24 Vdc 7 mA	Removable spring terminal block / 5.08 mm
TM3DI16	16	Regular inputs	24 Vdc 7 mA	Removable screw terminal blocks / 3.81 mm
TM3DI16G	16	Regular inputs	24 Vdc 7 mA	Removable spring terminal blocks / 3.81 mm
TM3DI16K	16	Regular inputs	24 Vdc 5 mA	HE10 (MIL 20) connector
TM3DI32K	32	Regular inputs	24 Vdc 5 mA	HE10 (MIL 20) connector

TM3 Digital Output Modules

The following table shows the TM3 digital output expansion modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DQ8R	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	Removable screw terminal block / 5.08 mm
TM3DQ8RG	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	Removable spring terminal block / 5.08 mm
TM3DQ8T	8	Regular transistor outputs (source)	24 Vdc 4 A maximum per common line/0.5 A maximum per output	Removable screw terminal block / 5.08 mm
TM3DQ8TG	8	Regular transistor outputs (source)	24 Vdc 4 A maximum per common line/0.5 A maximum per output	Removable spring terminal block / 5.08 mm
TM3DQ8U	8	Regular transistor outputs (sink)	24 Vdc 4 A maximum per common line/0.5 A maximum per output	Removable screw terminal block / 5.08 mm
TM3DQ8UG	8	Regular transistor outputs (sink)	24 Vdc 4 A maximum per common line/0.5 A maximum per output	Removable spring terminal block / 5.08 mm
TM3DQ16R	16	Relay outputs	24 Vdc / 240 Vac 8 A maximum per common line / 2 A maximum per output	Removable screw terminal blocks / 3.81 mm
TM3DQ16RG	16	Relay outputs	24 Vdc / 240 Vac 8 A maximum per common line / 2 A maximum per output	Removable spring terminal blocks / 3.81 mm
TM3DQ16T	16	Regular transistor outputs (source)	24 Vdc 8 A maximum per common line / 0.5 A maximum per output	Removable screw terminal blocks / 3.81 mm
TM3DQ16TG	16	Regular transistor outputs (source)	24 Vdc 8 A maximum per common line / 0.5 A maximum per output	Removable spring terminal blocks / 3.81 mm

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DQ16U	16	Regular transistor outputs (sink)	24 Vdc 8 A maximum per common line / 0.5 A maximum per output	Removable screw terminal blocks / 3.81 mm
TM3DQ16UG	16	Regular transistor outputs (sink)	24 Vdc 8 A maximum per common line / 0.5 A maximum per output	Removable spring terminal blocks / 3.81 mm
TM3DQ16TK	16	Regular transistor outputs (source)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector
TM3DQ16UK	16	Regular transistor outputs (sink)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector
TM3DQ32TK	32	Regular transistor outputs (source)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connectors
TM3DQ32UK	32	Regular transistor outputs (sink)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connectors

TM3 Digital Mixed Input/Output Modules

This following table shows the TM3 mixed I/O modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DM8R	4	Regular inputs	24 Vdc 7 mA	Removable screw terminal block / 5.08 mm
	4	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	
TM3DM8RG	4	Regular inputs	24 Vdc 7 mA	Removable spring terminal block /5.08 mm
	4	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	
TM3DM24R	16	Regular inputs	24 Vdc 7 mA	Removable screw terminal blocks / 3.81 mm
	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	
TM3DM24RG	16	Regular inputs	24 Vdc 7 mA	Removable spring terminal blocks / 3.81 mm
	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	

TM3 Analog I/O Expansion Modules

Introduction

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

See Modicon TM3 Analog I/O Modules Hardware Guide.

TM3 Analog Input Modules

The following table shows the TM3 analog input expansion modules, with corresponding resolution, channel type, nominal voltage/current, and terminal type:

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AI2H	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 5.08 mm
TM3AI2HG	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 5.08 mm
TM3AI4	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 3.81 mm
TM3AI4G	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal blocks / 3.81 mm
TM3AI8	12 bit, or 11 bit + sign	8	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA 0...20 mA extended 4...20 mA extended	Removable screw terminal block / 3.81 mm
TM3AI8G	12 bit, or 11 bit + sign	8	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA 0...20 mA extended 4...20 mA extended	Removable spring terminal blocks / 3.81 mm

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3TI4	16 bit, or 15 bit + sign	4	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA Thermocouple PT100/1000 NI100/1000	Removable screw terminal block / 3.81 mm
TM3TI4G	16 bit, or 15 bit + sign	4	inputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA Thermocouple PT100/1000 NI100/1000	Removable spring terminal blocks / 3.81 mm
TM3TI8T	16 bit, or 15 bit + sign	8	inputs	Thermocouple NTC/PTC Ohmmeter	Removable screw terminal block / 3.81 mm
TM3TI8TG	16 bit, or 15 bit + sign	8	inputs	Thermocouple NTC/PTC Ohmmeter	Removable spring terminal blocks / 3.81 mm

TM3 Analog Output Modules

The following table shows the TM3 analog output modules, with corresponding resolution, channel type, nominal voltage/current, and terminal type:

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AQ2	12 bit, or 11 bit + sign	2	outputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 5.08 mm
TM3AQ2G	12 bit, or 11 bit + sign	2	outputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 5.08 mm
TM3AQ4	12 bit, or 11 bit + sign	4	outputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 5.08 mm
TM3AQ4G	12 bit, or 11 bit + sign	4	outputs	0...10 Vdc -10…+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 5.08 mm

TM3 Analog Mixed Input/Output Modules

This following table shows the TM3 analog mixed I/O modules, with corresponding resolution, channel type, nominal voltage/current, and terminal type:

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AM6	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 3.81 mm
		2	outputs		
TM3AM6G	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 3.81 mm
		2	outputs		
TM3TM3	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA Thermocouple PT100/1000 NI100/1000	Removable screw terminal block / 5.08 mm
	12 bit, or 11 bit + sign	1	outputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	
TM3TM3G	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA Thermocouple PT100/1000 NI100/1000	Removable spring terminal block / 5.08 mm
	12 bit, or 11 bit + sign	1	outputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	

TM3 Expert Expansion Modules

Introduction

The following paragraph lists the expert modules supported by SoMachine with their complete names and catalog references.

See Modicon TM3 Expert Modules Hardware Guide.

TM3 Expert Modules

The following table shows the TM3 expert expansion module, with corresponding terminal type:

Reference	Description	Terminal Type / Pitch
TM3XTYS4	TeSys module	4 front connectors RJ-45 1 power supply connector / 5.08 mm

TM3 Safety Expansion Modules

Introduction

The following paragraph lists the modules supported by your controller.

For more details, refer to TM3 Safety Expansion Modules - Hardware Guide.

TM3 Safety Modules

This table contains the TM3 safety modules *(see Modicon TM3, Safety Modules, Hardware Guide)*, with the corresponding channel type, nominal voltage/current, and terminal type:

Reference	Function Category	Channels	Channel type	Voltage Current	Terminal type
TM3SAC5R	1 function, up to category 3	1 or 2 (1)	Safety input	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start (2)	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAC5RG	1 function, up to category 3	1 or 2 (1)	Safety input	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start (2)	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAF5R	1 function, up to category 4	2 (1)	Safety inputs	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAF5RG	1 function, up to category 4	2 (1)	Safety inputs	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAFL5R	2 functions, up to category 3	2 (1)	Safety inputs	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	

(1) Depending on external wiring

(2) Non-monitored start

Reference	Function Category	Channels	Channel type	Voltage Current	Terminal type
TM3SAFL5RG	2 functions, up to category 3	2 (1)	Safety inputs	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAK6R	3 functions, up to category 4	1 or 2 (1)	Safety inputs	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAK6RG	3 functions, up to category 4	1 or 2 (1)	Safety inputs	24 Vdc 100 mA maximum	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start	Input		
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	

(1) Depending on external wiring
(2) Non-monitored start

TM3 Transmitter and Receiver Modules

Introduction

The following paragraph lists the Transmitter and Receiver modules supported by SoMachine with their complete names and catalog references.

See Modicon TM3 Transmitter and Receiver Hardware Guide.

TM3 Transmitter and Receiver Modules

The following table shows the TM3 transmitter and receiver expansion modules:

Reference	Description	Terminal Type / Pitch
TM3XTRA1	Data transmitter module for remote I/O	1 front connector RJ-45 1 screw for functional ground connection
TM3XREC1	Data receiver module for remote I/O	1 front connector RJ-45 Power supply connector / 5.08 mm

Section 10.3
TMC4 Cartridges

TMC4 Cartridges

Overview

You can expand the number of I/Os of your Modicon M241 Logic Controller by adding TMC4 cartridges.

TMC4 Standard Cartridges

The following table presents the general-purpose TMC4 cartridges with the corresponding channel type, voltage/current range, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type
TMC4AI2	2	Analog inputs (voltage or current)	0...10 Vdc 0...20 mA or 4...20 mA	3.81 mm (0.15 in.) pitch, removable spring terminal block
TMC4TI2	2	Analog temperature inputs	Thermocouple type K, J, R, S, B, E, T, N,C 3 wires RTD type Pt100, Pt1000, Ni100, Ni1000	3.81 mm (0.15 in.) pitch, removable spring terminal block
TMC4AQ2	2	Analog outputs (voltage or current)	0...10 Vdc 4...20 mA	3.81 mm (0.15 in.) pitch, removable spring terminal block

TMC4 Application Cartridges

The following table presents the applicative TMC4 cartridges with the corresponding channel type, voltage/current range, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type
TMC4HOIS01	2	Analog inputs (voltage or current)	0...10 Vdc 0...20 mA or 4...20 mA	3.81 mm (0.15 in.) pitch, removable spring terminal block
TMC4PACK01	2	Analog inputs (voltage or current)	0...10 Vdc 0...20 mA or 4...20 mA	3.81 mm (0.15 in.) pitch, removable spring terminal block

Section 10.4
TM4 Expansion Module

TM4 Expansion Modules

Introduction

The following paragraph lists the expansion modules supported by SoMachine with their complete names and catalog references.

See Modicon TM4 Modules Hardware Guide.

TM4 Expansion Modules

The following table shows the TM4 expansion module features:

Module reference	Type	Terminal type
TM4ES4	Ethernet communication	4 RJ45 connectors 1 screw for functional ground connection
TM4PDPS1	PROFIBUS DP slave communication	1 SUB-D 9 pins female connector 1 screw for functional ground connection
NOTE: If the controller has more than one embedded Ethernet port, the module works as a standalone Ethernet switch.		

Section 10.5
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 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	TM5 interface module, 1 Serial Line RS232, electrically isolated
TM5PCRS4	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

Section 10.6
TM5 Expansion Modules

What Is in This Section?

This section contains the following topics:

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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.

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	2x12In	24	3x6Out	18	–	0	–	0
TM5C12D8T	3x4In	12	2x4Out	8	–	0	–	0
TM5C24D12R	2x12In	24	2x6Rel	12 Relays	–	0	–	0
TM5CAI8O8VL	-	0	-	0	2x4AI ±10 V	8	2x4AO ±10 V	8
TM5CAI8O8CL	-	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	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	4	24 Vdc / 3.75 mA	3 wires	sink
6In	6	24 Vdc / 3.75 mA	2 wires	sink
12In	12	24 Vdc / 3.75 mA	1 wire	sink
Digital Output Electronic Modules				
4Out	4	24 Vdc / 0.5 A	3 wires	source
6Out	6	24 Vdc / 0.5 A	2 wires	source
Digital Output Relay Electronic Modules				
6Rel	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	4	12 bit	0...10 Vdc
4AI 0-20 mA / 4-20 mA	4	12 bit	0...20 mA
4AI ±10 V / 0-20 mA / 4-20 mA	4	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA/4...20 mA
Analog Output Electronic Module			
4AO ±10 V	4	12 bit	0...10 Vdc
4AO 0-20 mA	4	12 bit	0...20 mA
2AO ±10 V / 0-20 mA	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.

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	4	24 Vdc / 3.75 mA
TM5SDI6D	6	24 Vdc / 3.75 mA
TM5SDI12D	12	24 Vdc / 3.75 mA
TM5SDI16D	16	24 Vdc / 2.68 mA
TM5SDI2A	2	100...240 Vac
TM5SDI4A	4	100...240 Vac
TM5SDI6U	6	100...120 Vac
Output Modules		
TM5SDO2T	2	24 Vdc / 0.5 A
TM5SDO4T	4	24 Vdc / 0.5 A
TM5SDO4TA	4	24 Vdc / 2 A
TM5SDO6T	6	24 Vdc / 0.5 A
TM5SDO8TA	8	24 Vdc / 2 A
TM5SDO12T	12	24 Vdc / 0.5 A
TM5SDO16T	16	24 Vdc / 0.5 A
TM5SDO2R	2	30 Vdc / 230 Vac 5 A C/O
TM5SDO4R	4	30 Vdc 1 A / 230 Vac 5 A N/O
TM5SDO2S	2	230 Vac / 1 A
Mixed Modules		
TM5SDM12DT	8 4	24 Vdc / 3.75 mA 24 Vdc / 0.5 A

Reference	Number of Channels	Voltage/Current
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.

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	2	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA/4...20 mA
TM5SAI4L	4	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA/4...20 mA
TM5SAI2H	2	15 bit + sign 15 bit	-10...+10 Vdc 4...20 mA
TM5SAI4H	4	15 bit + sign 15 bit	-10...+10 Vdc 4...20 mA
TM5SEAISG	1	24 bit	1 full bridge strain gauge
Output Modules			
TM5SAO2L	2	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA
TM5SAO4L	4	12 bit + sign 12 bit	-10...+10 Vdc 0...20 mA
TM5SAO2H	2	15 bit + sign 15 bit	-10...+10 Vdc 0...20 mA
TM5SAO4H	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	2	16 bit	PT100/1000
TM5SAI4PH	4	16 bit	PT100/1000
TM5SAI2TH	2	16 bit	Thermocouple J, K, N, S
TM5SAI6TH	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 Modules (High Speed Counter) , 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	1	Incremental	5 Vdc Symmetrical	16/32 bit	250 kHz
TM5SE1IC01024	1	Incremental	24 Vdc Asymmetrical	16/32 bit	100 kHz
TM5SE2IC01024	2	Incremental	24 Vdc Asymmetrical	16/32 bit	100 kHz
TM5SE1SC10005	1	SSI Absolute	5 Vdc Symmetrical	32 bit	1 MHz
TM5SDI2DF	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.

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	Transmits the TM5 data bus.
TM5SBET7	Transmits the TM7 data bus and provides the TM7 power bus to the TM7 expansion I/O blocks.
TM5SBER2	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	24 Vdc	10 A	No
TM5SPS1F	24 Vdc	6.3 A	No
TM5SPS2	24 Vdc	10 A	1.136 A
TM5SPS2F	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	12	0	24 Vdc I/O power segment
TM5SPDG5D4F	5	5	External 24 Vdc power source
TM5SPDG6D6F	6	6	24 Vdc I/O power segment

Section 10.7
TM7 Expansion Blocks

What Is in This Section?

This section contains the following topics:

Topic	Page
TM7 Digital I/O Blocks	103
TM7 Analog I/O Blocks	104

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.

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	8	24 Vdc / 7 mA	M8 connectors
TM7BDI16A	16	24 Vdc / 7 mA	M12 connectors
TM7BDI16B	16	24 Vdc / 7 mA	M8 connectors
Output Block			
TM7BDO8TAB	8	24 Vdc / 2 A max.	M8 connector
Mixed Input/Output Blocks			
TM7BDM8B	8 configurable I/O, any mix	24 Vdc / 4.4 mA	M8 connector
		24 Vdc / 0.5 A max.	M8 connector
TM7BDM16A	16 inputs	24 Vdc / 4.4 mA	M12 connector
	16 outputs	24 Vdc / 0.5 A max.	M12 connector
TM7BDM16B	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.

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	4	11 bit + sign	-10...+10 Vdc	M12
TM7BAI4CLA	4	12 bit	0...20 mA	M12
Output Blocks				
TM7BAO4VLA	4	11 bit + sign	-10...+10 Vdc	M12
TM7BAO4CLA	4	12 bit	0...20 mA	M12
Mixed Input/Output Blocks				
TM7BAM4VLA	2 inputs	11 bit + sign	-10...+10 Vdc	M12
	2 outputs	11 bit + sign	-10...+10 Vdc	M12
TM7BAM4CLA	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	4	16 bit	PT100 / 1000 KTY10 / KTY84 (Silicon sensor)	M12
TM7BAI4PLA	4	16 bit	Thermocouple J, K, S	M12

Section 10.8
Communication Modules

What Is in This Section?

This section contains the following topics:

Topic	Page
Modicon TWDNOI10M3 AS-Interface Master Module	106
Ethernet/Modbus Gateway	107

Modicon TWDNOI10M3 AS-Interface Master Module

Introduction

The following paragraph lists the Modicon TWDNOI10M3 AS-Interface Master Module for M238 supported by SoMachine with its description.

Modicon TWDNOI10M3 AS-Interface Master Module for the M238 Controller

The following Modicon TWDNOI10M3 AS-Interface Master Module is available for the M238 controller:

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

The Modicon TWDNOI10M3 AS-Interface Master Module is described in the Modicon TWDNOI10M3 AS-Interface Master Module Hardware Guide.

Each M238 controller supports a maximum of 2 Modicon TWDNOI10M3 AS-Interface Master Modules.

Ethernet/Modbus Gateway

Introduction

The following describes the Ethernet/Modbus Gateway supported by SoMachine.

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

Ethernet/Modbus Gateway for Modicon M238 Logic Controller

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

Chapter 11
HMI

Section 11.1
HMI Terminal Range

What Is in This Section?

This section contains the following topics:

Topic	Page
HMIGK Terminals	111
HMIGTO Terminals	112
HMIGTU Terminals	113
HMIGXO Terminals	115
HMISTO / HMISTU Small Terminals	116
XBTGH Terminal	117
XBTGK Terminals	118
XBTGT Terminals	119

HMIGK Terminals

Introduction

The following paragraph lists the HMIGK terminal families supported by SoMachine.

Software configuration and hardware description can be found in the following manual: Magelis HMIGK.

HMIGK Touch and Keyboard Terminal Range

The following table describes the HMIGK terminals:

HMI Terminals	Display Type	Screen Size	Ethernet Interface	Serial Interface	USB (Type A) Interface	USB (mini-B) Interface	SD Card
HMIGK2310	QVGA/TFT Color	14,4 cm (5.7 in)	Yes	Yes (1)	USB 2.0	USB 2.0	Yes
HMIGK5310	VGA/TFT Color	26,4 cm (10.4 in)					
1 RS-232 serial interface. SUB-D 9-pin connector and RS-485 RJ45 connector							

HMIGTO Terminals

Introduction

The following paragraph lists the HMIGTO terminal families supported by SoMachine.

Software configuration and hardware description can be found in the following manual: Magelis HMIGTO.

For detailed information, see the Vijeo-Designer or Vijeo XD online help.

HMIGTO Touch-Panel Terminal Range

The following table describes the HMIGTO terminals:

HMI Terminals	Display Type	Screen Size	Ethernet Interface	Serial Interface	USB Interface	SD Card Interface
HMIGTO1300	TFT Color LCD	8,9 cm (3.5 in)	No	Yes	Yes	No
HMIGTO1310	TFT Color LCD	8,9 cm (3.5 in)	Yes	Yes	Yes	No
HMIGTO2300	TFT Color LCD	14,4 cm (5.7 in)	No	Yes	Yes	No
HMIGTO2310/2315	TFT Color LCD	14,4 cm (5.7 in)	Yes	Yes	Yes	Yes
HMIGTO3510	TFT Color LCD	17,8 cm (7 in)	Yes	Yes	Yes	Yes
HMIGTO4310	TFT Color LCD	19,1 cm (7.5 in)	Yes	Yes	Yes	Yes
HMIGTO5310/5315	TFT Color LCD	26,4 cm (10.4 in)	Yes	Yes	Yes	Yes
HMIGTO6310/6315	TFT Color LCD	30,7 cm (12.1 in)	Yes	Yes	Yes	Yes

HMIGTU Terminals

Introduction

The following paragraph lists the HMIGTU terminal families supported by SoMachine.

Software configuration and hardware description can be found in the following manual: Magelis HMIGTU.

HMIGTU Touch-Panel Terminal Range

Series	Model Names	Part Numbers
Magelis GTU	Premium Box	HMIG3U
	Open Box	HMIG5U
		HMIG5U2
	Smart Display	HMIDT542
		HMIDT642
		HMIDT643
		HMIDT732
	Advanced Display	HMIDT351
		HMIDT551
		HMIDT651

NOTE: You can connect any Display Module to any Box Module.

The following table describes the HMIGTU terminals:

	HMIG3U	HMIG5U
Serial Interface COM1	RS-485 (isolation)	
Serial Interface COM2	RS-232C/422/485	
USB (Type A) Interface	USB 2.0 (Type A) x 2	USB 2.0 (Type A) x 3
USB (mini-B) Interface	USB 2.0 (mini-B) x 1	
Ethernet Interface	IEEE802.3i/IEEE802.3u/IEEE802.3ab, 10BASE-T/ 100BASE-TX/ 1000BASE-T	
SD Card Interface	SD Card Slot (System) x 1 SD Card Slot (Storage) x 1	SD Card Slot (Storage) x 1
CFast Card Interface	-	CFast Card Slot (System) x 1 CFast Card Slot (Storage) x 1
Expansion Unit Interface	Fieldbus Unit x 1	
Video Interface	-	DVI-D OUT
		DVI-D 24 pin (socket) x 1

Smart Display

	HMIDT542	HMIDT642 HMIDT643	HMIDT732
Display Type	TFT Color LCD		
Display Size	10.4”	12.1”	15”
Resolution	800 x 600 pixels (SVGA)	1,024 x 768 pixels (XGA)	

Advanced Display

	HMIDT351	HMIDT551	HMIDT651
Display Type	TFT Color LCD		
Display Size	7”	10.1”	12.1”
Resolution	800 x 480 pixels (WVGA)	1,280 x 800 pixels (WXGA)	

HMIGXO Terminals

Introduction

The following paragraph lists the HMIGXO terminal families supported by SoMachine.

Software configuration and hardware description can be found in the following manual: Magelis HMIGXO *(see Magelis Advanced Panels, HMI GXO, User Manual)*.

HMIGXO Touch-Panel Terminal Range

The following table describes the HMIGXO terminals:

HMI Terminals	Display Type	Screen Size	Ethernet Interface	Serial Interface	USB Interface type A	USB Interface type B
HMIGXO3501	TFT Color LCD	17.78 cm (7 in)	No	Yes	No	Yes
HMIGXO3502	TFT Color LCD	17.78 cm (7 in)	No	Yes	Yes	Yes
HMIGXO5502	TFT Color LCD	25.65 cm (10.1 in)	No	Yes	Yes	Yes

HMISTO / HMISTU Small Terminals

HMISTO5•• Series of Panels

The following presents the HMISTO5•• series of HMI (Human Machine Interface) products. These products have an operating voltage of 24 Vdc.

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

Magelis HMISTO and Magelis HMISTU.

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 HMISTO products:

Part Number	Screen Size	Screen (Pixel) Resolution	Mono / Color	Screen Technology	Serial Port	Ethernet Port
HMISTO511/531	8.9 cm (3.5 in.)	200x80	monochrome with green / orange / red backlight	STN	yes	no for 511 yes for 531
HMISTO512/532	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 HMISTO501 is not supported in SoMachine.

HMISTU655 / 855 Series of Panels

The HMISTU655 / 855 is a Human Machine Interface product that has an operating voltage of 24 Vdc.

The following table describes the HMISTU655 / 855 characteristics:

Part Number	Screen Size	Screen (Pixel) Resolution	Mono / Color	Screen Technology	Serial Port	Ethernet Port
HMISTU655	8.9 cm (3.5 in.)	320x240 (QVGA)	65 K colors and LED's backlight	TFT	yes	yes
HMISTU855	14.48 cm (5.7 in.)	320x240 (QVGA)	65 K colors and LED's backlight	TFT	yes	yes
TFT: Thin-film Transistor Technology						

XBTGH Terminal

Introduction

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

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

Magelis XBTGH.

XBTGH Terminal

The following table presents the different XBTGH 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						

XBTGK Terminals

Introduction

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

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

Magelis XBTGK.

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

The XBTZGCANM unit is compatible with:

- XBTGK2•••
- XBTGK5•••

For detailed information see the Vijeo-Designer online help.

XBTGK Touch and Keyboard Terminal Range

The following table describes the XBTGK terminals:

HMI Terminals	Display Type	Screen Size	Video Port	Ethernet Interface	Serial Interface	USB Interface	CF Card Interface
XBTGK2120	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	No	Yes (1)	Yes	Yes
XBTGK2330	QVGA/TFT Color	14,4 cm (5.7 in)	No	Yes	Yes (1)	Yes	Yes
XBTGK5330	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						

XBTGT Terminals

Introduction

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

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

Magelis XBTGT.

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

The XBTZGCANM unit is compatible with:

- XBTGT2•••
- XBTGT4•••
- XBTGT5•••
- XBTGT6•••
- XBTGT7•••

NOTE: The XBTGT1••• is not compatible with the XBTZGCANM unit.

For detailed information, see the Vijeo-Designer online help.

XBTGT Touch-Panel Terminal Range

The following table describes the XBTGT terminals:

HMI Terminals	Display Type	Screen Size	Video Port	Ethernet Interface	Serial Interface	USB Interface	CF Card Interface
XBTGT2110	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	No	Yes (1)	Yes	No
XBTGT2120	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	No	Yes (1)	Yes	Yes
XBTGT2130	QVGA/STN Monochrome	14,4 cm (5.7 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT2220	QVGA/STN Color	14,4 cm (5.7 in)	No	No	Yes (1)	Yes	Yes
XBTGT2330	QVGA/TFT Color	14,4 cm (5.7 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT2430	VGA/TFT Color	14,4 cm (5.7 in)	No	Yes	Yes (1)	Yes	Yes
Legend							
1	RS232/RS422/RS485 serial interface SUB-D 9-pin connector and RS485 serial interface RJ45 pin connector						

HMI Terminals	Display Type	Screen Size	Video Port	Ethernet Interface	Serial Interface	USB Interface	CF Card Interface
XBTGT2930	QVGA/TFT Color	14,4 cm (5.7 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT4230	VGA/STN Color	19,1 cm (7.5 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT4330	VGA/TFT Color	19,1 cm (7.5 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT4340	VGA/TFT Color	19,1 cm (7.5 in)	Yes	Yes	Yes (1)	Yes	Yes
XBTGT5230	VGA/STN Color	26,4 cm (10.4 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT5330	VGA/TFT Color	26,4 cm (10.4 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT5340	VGA/TFT Color	26,4 cm (10.4 in)	Yes	Yes	Yes (1)	Yes	Yes
XBTGT5430	SVGA/TFT Color	26,4 cm (10.4 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT6330	SVGA/TFT Color	30,7 cm (12.1 in)	No	Yes	Yes (1)	Yes	Yes
XBTGT6340	SVGA/TFT Color	30,7 cm (12.1 in)	Yes	Yes	Yes (1)	Yes	Yes
XBTGT7340	XGA/TFT Color	38,1 cm (15 in)	Yes	Yes	Yes (1)	Yes	Yes
Legend							
1	RS232/RS422/RS485 serial interface SUB-D 9-pin connector and RS485 serial interface RJ45 pin connector						

Chapter 12
iPC

Section 12.1
iPC Range

What Is in This Section?

This section contains the following topics:

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Magelis Industrial PC	123
HMIBU / HMIBP / HMIBSO / HMIBSU Box iPC	124
HMIRSP / HMIRSU / HMIRXO-RSO Rack iPC	125
HMIGTW / HMIPWC / HMIPV Open and Optimum Panel iPC	126
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HMIPSP / HMIPEP / HMIPSO S-Panel iPC	128
HMIBMO / HMIBMU / HMIBMP Box iPC Modular and Display iPC	129

Magelis Industrial PC

Overview

The range of Magelis industrial PC (iPC) is designed to operate in an industrial environment:

- Magelis Panel iPC (Optimum, Universal, and Performance) and Box iPC (Universal and Performance) for plants and performance machines. Magelis Panel iPC has an optional stainless steel bezel for demanding applications.
- Magelis S-Box iPC (Optimized and Universal), Box iPC Modular (Optimized, Universal and Performance) and S-Panel iPC (Performance and Optimized) for repetitive machines and infrastructures.
- Magelis Rack iPC (Optimized, Universal, and Performance) for 19" enclosures in control rooms and labs.

Depending on the reference, Magelis iPC products offer various options that can be used in maintenance-free, harsh, and standard industrial environments.

Magelis iPCs run on Microsoft operating systems for seamless integration into IT structures. They support Schneider Electric Plant StruXture software.

HMIBU / HMIBP / HMIBSO / HMIBSU Box iPC

Introduction

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

HMIBUxxx1/xxx2 and **HMIBPxxx2/xxx5**: Magelis iBox PC *(see Magelis Box PC, User Manual)*.

HMIBSO and **HMIBSU**: Magelis S-Box iPC Optimized and Universal *(see Magelis S-Box iPC, Optimized and Universal, User Manual)*.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide *(see SoMachine, Programming Guide)*.

Box iPC

The **HMIBUxxx1/xxx2** are the Universal Box iPC.

The **HMIBPxxx2/xxx5** are the Performance Box iPC.

The **HMIBSO** is the Optimized Box iPC.

The **HMIBSU** is the Universal Box iPC.

These products have an operating voltage of 24 Vdc.

The following table describes the Performance, Universal, and Optimized Box iPCs:

Reference	Processor	USB	Serial Port	Ethernet Port	Other Interface
HMIBUxxx1/xxx2	Atom 1.6 GHz	4	2	2	DVI connector, Audio port, CompactFlash slot, Slide-in compact slot, 2 x PCI/PCie slots, 1 x Front USB.
HMIBPxxx2/xxx5	Core 2 Duo 2.26 GHz	4	2	2	DVI connector, Audio port, CompactFlash slot, Slide-in compact slot, 5 x PCI/PCie slots, 1 x Front USB.
HMIBSO	Atom N270 1.6 GHz	2	2	1	1 x Expansion PCI/PCie slot, 2 x Front USB.
HMIBSU	Atom dual core N2600 1.6 GHz	5	6	3	HDMI connector, VGA connector, Audio port, 1 x Front USB.

HMIRSP / HMIRSU / HMIRXO-RSO Rack iPC

Introduction

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

HMIRSP, **HMIRSU**, and **HMIRXO-RSO**: Magelis Rack iPC Optimized, Universal, and Performance *(see Magelis Rack iPC, Optimized, Universal and Performance, User Manual)*.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide *(see SoMachine, Programming Guide)*.

Rack iPC

The **HMIRSP** is the Performance Rack iPC.

The **HMIRSU** is the Universal Rack iPC.

The **HMIRXO-RSO** are the Optimized Rack iPC.

These products have an operating voltage of 100...240 Vac.

The following table describes the Performance, Universal, and Optimized Rack iPCs:

Reference	Processor	USB	Serial Port	Ethernet Port	Other Interface
HMIRSP	Xeon E3-1225 3.2 GHz	6	1	2	DVI connector, VGA connector, Audio port, Display port, 4 x Hot swap hard disk tray 3.5", Slim optical drive, 7 x Expansion PCI/PCie slots, 2 x Front USB.
HMIRSU	i3-2120 dual core 3.3 GHz				
HMIRXO-RSO	HMIRXO: Celeron G540 HMIRSO: Celeron G8500 2.5 GHz	4			DVI connector, VGA connector, Audio port, Display port, 2 x Hot swap hard disk tray 3.5", 2 x Expansion PCI/PCie slots, Slim optical drive, 2 x Front USB.

HMIGTW / HMIPWC / HMIPV Open and Optimum Panel iPC

Introduction

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

HMIGTW5354, **HMIPWC5**, and **HMIPWC7/PVC7** Magelis Panel iPC GTW and Optimum *(see Magelis Panel PC, GTW and Optimum, User Manual)*.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide *(see SoMachine, Programming Guide)*.

Open and Optimum Panel iPC

The **HMIGTW5354** is the Open Panel iPC 10”.

The **HMIPWC5** are the Optimum Panel iPC 10”.

The **HMIPWC7/PVC7** are the Optimum Panel iPC 15”.

These products have an operating voltage of 24 Vdc.

The following table describes the Open and Optimum Panel iPCs:

Reference	Processor	Screen (Pixel) Resolution	USB	Serial Port	Ethernet Port	Other Interface
HMIGTW5354/PWC5	Atom 1.1 GHz	10.4" SVGA Touch screen	3	1	2	CompactFlash slot, SD Memory card slot, 1 x Front USB.
HMIPWC7/PVC7	Atom 1.1 GHz	15" XGA Touch screen				

HMIPP / HMIPU / HMIPT Panel iPC

Introduction

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

HMIPPx6 and **HMIPUx6**: Magelis Panel iPC 12” Universal and Performance *(see Magelis Panel PC 12”, Universal and Performance, User Manual)*.

HMIPPx7/PRx7, **HMIPPx9**, **HMIPUx7/PTx7**, and **HMIPUx9**: Magelis Panel iPC 15” and 19” Universal and Performance *(see Magelis Panel PC 15” and 19 “, Universal and Performance, User Manual)*.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide *(see SoMachine, Programming Guide)*.

Panel iPC

The **HMIPPx6** are the Performance Panel iPC 12”.

The **HMIPPx7/PRx7** are the Performance Panel iPC 15”.

The **HMIPPx9** are the Performance Panel iPC 19”.

The **HMIPUx6** are the Universal Panel iPC 12”.

The **HMIPUx7/PTx7** are the Universal Panel iPC 15”.

The **HMIPUx9** are the Universal Panel iPC 19”.

These products have an operating voltage of 24 Vdc or 100...240 Vac (depending on references).

The following table describes the Performance and Universal Panel iPCs:

Reference	Processor	Screen (Pixel) Resolution	USB	Serial Port	Ethernet Port	Other Interface
HMIPPx6	i3 3217UE 1.6 GHz	12" XGA Touch screen	5	2	2	DVI connector, Audio port, Compact Flash slot, Slide-in compact slot, 2 x Expansion PCI/PCie slots, 1 x Front USB.
HMIPPx7/PRx7	Core 2 duo 2.26 GHz	15" XGA Touch screen				
HMIPPx9	Core 2 duo 2.26 GHz	19" SXGA Touch screen				
HMIPUx6	Celeron 827E 1.4 GHz	12" XGA Touch screen				
HMIPUx7/PTx7	Atom 1.6 GHz	15" XGA Touch screen				
HMIPUx9	Atom 1.6 GHz	19" SXGA Touch screen				

HMIPSP / HMIPEP / HMIPSO S-Panel iPC

Introduction

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

HMIPSP, **HMIPEP**, and **HMIPSO**: Magelis S-Panel iPC Performance *(see Magelis S-Panel PC and Enclosed PC Performance, User Manual)* and S-Panel iPC Optimized *(see Magelis S-Panel PC, Optimized, User Manual)*.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide *(see SoMachine, Programming Guide)*.

S-Panel iPC

The **HMIPSP** is the Performance S-Panel iPC 15” and 19”.

The **HMIPEP** is the Performance Enclosed iPC 19”.

The **HMIPSO** is the Optimized S-Panel iPC 10” and 15”.

These products have an operating voltage of 24 Vdc (optional AC/DC power supply available separately).

The following table describes the Performance and Optimized S-Panel iPC:

Reference	Processor	Screen (Pixel) Resolution	USB	Serial Port	Ethernet Port	Other Interface
HMIPSP	i3-4010U 1.7 GHz	15" FWXGA 19" FWXGA Touch screen	2	2	2	HDMI connector, Audio port, CFast slot, HDD/SSD slots PCIe slot, Optional interface.
HMIPEP			1	1		Enclosed iPC
HMIPSO	Atom E3827 1.75 GHz	10" WSVGA 15" FWXGA Touch screen	2	2		CFast slot, HDD/SSD slots PCIe slot, Optional interface.

HMIBMO / HMIBMU / HMIBMP Box iPC Modular and Display iPC

Introduction

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

HMIBMU and **HMIBMP**: Magelis Box iPC Modular and Display Universal and Performance *(see Magelis Box iPC Modular and Display, Optimized, Universal and Performance, User Manual)*.

Software configuration, programming, and commissioning is accomplished with the SoMachine software described in the SoMachine Programming Guide *(see SoMachine, Programming Guide)*.

Box iPC Modular and Display

The **HMIBMO** is the Optimized Box iPC modular.

The **HMIBMU** is the Universal Box iPC modular.

The **HMIBMP** is the Performance Box iPC modular.

The **HMIBMU/BMP** have an operating voltage of 24 Vdc. The **HMIBMO** has an operating voltage of 12...24 Vdc.

The following table describes the Universal and Performance Box iPCs modular:

Reference	Processor	USB	Serial Port	Ethernet Port	Other Interface
HMIBMO	Atom-E3930 1.8 GHz	4	2	2	2 x Display ports, 1 x HDD/SSD slot, 1 x PCI/PCie slot, 2 x Optional interfaces.
HMIBMU	Celeron-2980U 1.6 GHz	4	1	2	2 x Display ports, 2 x HDD/SSD slots, CFast slot, Slide-in compact slot, 2 x PCI/PCie slots, 2 x Optional interfaces.
HMIBMP	i7-4650U 1.7 GHz	4	1	2	

Display for **HMIBMx**:

- **HMIDM6422** - Display 4:3 12” single touch
- **HMIDM6522** - Display W12” multi-touch
- **HMIDM7421** - Display 4:3 15” single touch
- **HMIDM7521** - Display W15” multi-touch
- **HMIDM9521** - Display W19” multi-touch
- **HMIDMA521** - Display W22” multi-touch

Chapter 13
Distributed Devices

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 Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Motor Control	132
Distributed I/O Modules	134
Other Distributed Devices	136

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 (real-time 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, and so on.

Altivar

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

Altivar family	3-phases motor type	Power range	Format	Embedded protocols			
				Modbus	CANopen	Modbus TCP	EtherNet/IP
ATV12	Asynchronous	0.18...4 kW	Compact	X	X	–	–
ATV31		0.18...15 kW	Compact	X	X	–	–
ATV312		0.18...15 kW	Compact	X	X	–	–
ATV32	Synchronous and asynchronous	0.18...15 kW	Book	X	X	Option	Option
ATV320		0.18...4 kW	Compact	X	X	Option	Option
		0.18...15 kW	Book	X	X	Option	Option
ATV340		0.75...75 kW	Compact	Option	Option	X	X
ATV61		0.75...800 kW	Compact	X	X	Option	Option
ATV6••		0.75...160 kW	Compact	X	Option	X	Option
ATV6••		90...800 kW	Floor standing	X	Option	X	Option
ATV71		0.37...630 kW	Compact	X	X	Option	Option
ATV9••		0.75...315 kW	Compact	X	Option	X	Option
ATV9••		110...800 kW	Floor standing	X	Option	X	Option

Altistart

Altistart is the range of soft start/soft stop units for 3-phase asynchronous motors.

- ATS22: 3-phase asynchronous motors 4 to 400 kW
- ATS48: 3-phase asynchronous motors 4 to 1200 kW

Lexium

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

- Integrated Lexium: integrated drives for motion control, with servo-(ILA range), stepper- (ILS range) or brushless DC (ILE range) motor
- Lexium SD3: drives for stepper motor control
- Lexium 28: bundles composed of servo drives and motors to cover power ratings from 50 W to 4.5 kW
- Lexium 32: high-performance book-size servo drives for servo motors from 0.15 to 7 kW
- Lexium 32i integrated drives: a modular range with Lexium BMi servo motors and integrated drives to cover power ratings from 400 W to 2.1 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.

Radio Frequency Identification Devices (RFID) Station

OsiSense XG Ethernet smart antenna is a compact RFID station offering the following advantages:

- read/write operations on most 13.56 MHz RFID tags on the market, such as ISO 14443 and ISO 15693 standard tags
- dual Ethernet port for daisy chaining up to 32 smart antennas
- An embedded web server allowing:
  - setup
  - diagnostic
  - monitoring
- communication to logic controllers via Modbus TCP or EtherNet/IP
- protection degrees IP65 and IK02

Vision Sensor

The OsiSense XUW vision sensor allows checking of high rate production operations with a high repeat accuracy. It can be used to manage object flows.

It covers the following application for manufactured parts:

- quality control
- presence
- position, orientation, sorting, integrity
- checking markings
- guiding and gripping

The OsiSense XUW vision sensor offers the following advantages:

- resolution: 736 x 480 pixels (WVGA)
- 4 to 10 outputs / 2 to 6 inputs, PNP or NPN
- communication to logic controllers via EtherNet/IP
- protection degree IP65 or IP67 depending on connection

Safety Controller XPSMC

Preventa XPSMC is a range of configurable safety controllers:

- 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.

The XPSMC configurable safety controllers are certified by TÜV Süd meeting the industrial safety standards of category 4, PL e according to EN/ISO 13849-1 and SILCL 3 according to IEC/EN 61508 and IEC/EN 60261.

Modular Safety Controller XPSMCM

The Preventa XPSMCM Modular Safety Controller system is composed of

- a logic controller which can be configured using the SoSafe Configurable software
- Safety-related I/O expansion modules
- Safety-related speed monitoring modules
- Safety-related communication expansion modules for island creation
- Non-safety-related communication modules with fieldbus interface

The XPSMCM system provides flexibility and scalability

- up to 14 expansion modules and therefore up to 128 safety-related inputs and 16 safety-related outputs
- up to 6 decentralized safety-related I/O island with a distance of 50 meters (164 ft.) per island on one controller
- fieldbus expansion modules for EtherNet/IP and Modbus TCP for non-safety-related communication with a logic controller

The XPSMCM system is certified by TÜV Süd meeting the industrial safety standards of category 4, PL e according to EN/ISO 13849-1 and SILCL 3 according to IEC/EN 61508 and IEC/EN 60261.

NOTE: The preconfigured EtherNet/IP device Preventa XPSMCM provided in the SoMachine device repository is compatible with the default configuration of the fieldbus expansion module XPSMCMCO000•EI with firmware ≥ V1.8. In case you use an earlier version, contact your local Schneider Electric representative.

Push Button

Harmony XB5R wireless and batteryless push buttons are used for remote control with an access point.

Glossary

A

analog input

Converts received voltage or current levels into numerical values. You can store and process these values within the logic controller.

analog output

Converts numerical values within the logic controller and sends out proportional voltage or current levels.

application

A program including configuration data, symbols, and documentation.

ASCII

(*American standard code for Information Interchange*) A protocol for representing alphanumeric characters (letters, numbers, certain graphics, and control characters).

ATV

The model prefix for Altivar drives (for example, ATV312 refers to the Altivar 312 variable speed drive).

C

CANopen

An open industry-standard communication protocol and device profile specification (EN 50325-4).

CFC

(*continuous function chart*) A graphical programming language (an extension of the IEC 61131-3 standard) based on the function block diagram language that works like a flowchart. However, no networks are used and free positioning of graphic elements is possible, which allows feedback loops. For each block, the inputs are on the left and the outputs on the right. You can link the block outputs to the inputs of other blocks to create complex expressions.

closed loop

A closed loop control is a motion control system that used both positional feedback and velocity feedback to generate a correction signal. It does this by comparing its position and velocity to the values of specified parameters. The devices providing the feedback are typically encoders, resolvers, LVTDs, and tachometers.

See also: *open loop*

compact I/O module

An inseparable group of 5 analog and/or digital I/O electronic modules in a single reference.

configuration

The arrangement and interconnection of hardware components within a system and the hardware and software parameters that determine the operating characteristics of the system.

continuous function chart language

A graphical programming language (an extension of the IEC61131-3 standard) based on the function block diagram language that works like a flowchart. However, no networks are used and free positioning of graphic elements is possible, which allows feedback loops. For each block, the inputs are on the left and the outputs on the right. You can link the block outputs to inputs of other blocks to create complex expressions.

control network

A network containing logic controllers, SCADA systems, PCs, HMI, switches, ...

Two kinds of topologies are supported:

- flat: all modules and devices in this network belong to same subnet.
- 2 levels: the network is split into an operation network and an inter-controller network.

These two networks can be physically independent, but are generally linked by a routing device.

controller

Automates industrial processes (also known as programmable logic controller or programmable controller).

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

digital I/O

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

E

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.)

element
The short name of the ARRAY element.

encoder
A device for length or angular measurement (linear or rotary encoders).

equipment
A part of a machine including sub-assemblies such as conveyors, turntables, and so on.

Ethernet
A physical and data link layer technology for LANs, also known as IEEE 802.3.

expansion bus
An electronic communication bus between expansion I/O modules and a controller.

expansion I/O module
(*expansion input/output module*) Either a digital or analog module that adds additional I/O to the base controller.

F

FBD
(*function block diagram*) One of 5 languages for logic or control supported by the standard IEC 61131-3 for control systems. Function block diagram is a graphically oriented programming language. It works with a list of networks, where 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.

FG
(*frequency generator*) A function that generates a square wave signal with programmable frequency.

firmware
Represents the BIOS, data parameters, and programming instructions that constitute the operating system on a controller. The firmware is stored in non-volatile memory within the controller.

freewheeling
When a logic controller is in freewheeling scan mode, a new task scan starts as soon as the previous scan has been completed. Contrast with *periodic scan mode*.

function
A programming unit that has 1 input and returns 1 immediate result. However, unlike FBs, it is directly called with its name (as opposed to through an instance), has no persistent state from one call to the next and can be used as an operand in other programming expressions.

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

H

HE10

Rectangular connector for electrical signals with frequencies below 3 MHz, complying with IEC 60807-2.

HMI

(*human machine interface*) An operator interface (usually graphical) for human control over industrial equipment.

HSC

(*high-speed counter*) A function that counts pulses on the controller or on expansion module inputs.

I

I/O

(*input/output*)

IEC 61131-3

Part 3 of a 3-part IEC standard for industrial automation equipment. IEC 61131-3 is concerned with controller programming languages and defines 2 graphical and 2 textual programming language standards. The graphical programming languages are ladder diagram and function block diagram. The textual programming languages include structured text and instruction list.

IEEE 802.3

A collection of IEEE standards defining the physical layer, and the media access control sublayer of the data link layer, of wired Ethernet.

IL

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

instruction list language

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

IP

(*Internet protocol*) Part of the TCP/IP protocol family that tracks the Internet addresses of devices, routes outgoing messages, and recognizes incoming messages.

L

ladder diagram language

A graphical representation of the instructions of a controller program with symbols for contacts, coils, and blocks in a series of rungs executed sequentially by a controller (see IEC 61131-3).

LCD

(*liquid crystal display* Used in many HMI devices to display menus and messages to machine operators.

LD

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

LED

(*light emitting diode*) An indicator that illuminates under a low-level electrical charge.

M

machine

Consists of several *functions* and/or *equipment*.

Magelis

The commercial name for Schneider Electric's range of HMI terminals.

MAST

A processor task that is run through its programming software. The MAST task has 2 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.

Modbus

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

N

N/O

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

network

A system of interconnected devices that share a common data path and protocol for communications.

O

OTB

(*optimized terminal block*) Used in the context of STB I/O distributed modules.

P

PCI

(*peripheral component interconnect*) An industry-standard bus for attaching peripherals.

PDM

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

Profibus DP

(*Profibus decentralized peripheral*) An open bus system 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.

program

The component of an application that consists of compiled source code capable of being installed in the memory of a logic controller.

project file

A project file contains information about the developer and purpose of a project, the configuration of the targeted logic controller and associated expansion modules, the source code of a program, symbols, comments, and all other related information.

protocol

A convention or standard definition that controls or enables the connection, communication, and data transfer between 2 computing system and devices.

PTO

(*pulse train outputs*) A fast output that oscillates between off and on in a fixed 50-50 duty cycle, producing a square wave form. PTO is especially well suited for applications such as stepper motors, frequency converters, and servo motor control, among others.

R

reflex output

Among the outputs of HSC are the reflex outputs associated to a threshold value that is compared to the counter value depending on the configuration of the HSC. The reflex outputs switch to either on or off depending on the configured relationship with the threshold.

RJ45

A standard type of 8-pin connector for network cables defined for Ethernet.

RS-232

A standard type of serial communication bus, based on 3 wires (also known as EIA RS-232C or V.24).

RS-485

A standard type of serial communication bus, based on 2 wires (also known as EIA RS-485).

RTU

(*remote terminal unit*) 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.

S

scan

A function that includes:

- reading inputs and placing the values in memory
- executing the application program 1 instruction at a time and storing the results in memory
- using the results to update outputs

SFC

(*sequential function chart*) A language that 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.)

SL

(*serial line*)

SoMachine

A comprehensive controller development system software tool for configuring and programming the Modicon logic controller and devices compliant with IEC 61131-3.

SSI

(*serial synchronous interface*) A common interface for relative and absolute measurement systems like encoders.

ST

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

STN

(*super-twisted nematic* A display technology (type of monochrome passive-matrix liquid crystal display).

T

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 relation to the task.

A controller can have several tasks.

TCP

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

terminal block

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

TFT

(*thin film transmission*) A technology used in many HMI display devices (also known as active matrix).

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