EcoStruxure Machine Expert

Introduction

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www.se.com

Legal Information

The information provided in this document contains general descriptions, technical characteristics and/or recommendations related to products/solutions.

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Safety Information

Important Information

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

Document Scope

This document provides general information about EcoStruxure Machine Expert software.

Validity Note

For more information on the validity of the present document, see the online help for the product.

The characteristics that are described in the present document, as well as those described in the documents included in the Related Documents section below, can be found online. To access the information online, go to the Schneider Electric home page www.se.com/ww/en/download/.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Available Languages of the Document

The document is available in these languages:

- English (EIO0000002836)
- French (EIO0000002837)
- German (EIO0000002838)
- Italian (EIO0000002839)
- Spanish (EIO0000002840)
- Chinese (EIO0000002841)

Related Documents

Title of Documentation	Reference Number
Cybersecurity Best Practices	CS-Best-Practices-2019-340
Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment	EIO0000004242
EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide	EIO0000002854 (ENG); EIO0000002855 (FRE); EIO0000002856 (GER); EIO0000002857 (ITA); EIO0000002858 (SPA); EIO0000002859 (CHS);
EcoStruxure Machine Expert Release Notes	RN0000000035 (ENG)

To find documents online, visit the Schneider Electric download center (www.se.com/ww/en/download/).

Product Related Information

⚠WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.[1]
- Test each implementation of a system for proper operation before placing it 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.

Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, Schneider Electric is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in the information contained herein, 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
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2023	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2020	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
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2021	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 61784-3:2021	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive

Standard	Description
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.

General Introduction

What’s in This Part

General Introduction

What's in This Chapter

Overview

This chapter provides an overview of the specific elements, features and functions provided by EcoStruxure Machine Expert.

Presentation

Overview

EcoStruxure Machine Expert 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, and related network automation functions).

EcoStruxure Machine Expert allows you to program and commission the 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. EcoStruxure Machine Expert includes the following elements:

- Two hardware control platform types
  - logic controller
  - motion controller
- And many other devices
  - HMI
  - speed drives, servo drives, motor drives, Lexium™ MC multi carrier
  - sensors and actuators
  - local and distributed I/O Expansion Modules
  - industrial PCs (iPCs)
  - Edge I/O NTS

Depending on the version, EcoStruxure Machine Expert integrates:

- Logic controllers
  - Harmony SCU HMI Controller
  - Modicon M241
  - Modicon M251
  - Modicon M258
  - Modicon M262
- Motion controllers
  - Modicon LMC058
  - Modicon M262
  - PacDrive LMC Eco
  - PacDrive LMC Pro/Pro2
- HMI Harmony graphic panels
  - Harmony XBTGH
  - Harmony GK
  - Harmony GTO
  - Harmony GTU
  - Harmony GTUX
  - Harmony STU
  - Harmony iPC

  Other HMI graphic panels are supported via the Modbus connection that do not support the Machine Expert protocol.

Main Features and Functions

EcoStruxure Machine Expert provides the following main features and functions:

- entire range of IEC 61131-3 languages
- integrated fieldbus configurators
- integrated Axis editor
- expert diagnostics and debugging
- upgrading software and online help via the Schneider Electric Software Installer
- integrated **Functional Tree** to group and display the content of a controller according to your individual requirements
- integrated OPC DA and OPC UA server and client
- optional installation of the HMI application development tool Vijeo-Designer
- optional installation of EcoStruxure Machine Expert - Safety to configure safety controller
- configuration of a Lexium™ MC multi carrier transport system
- simulation of mechatronic objects with EcoStruxure Machine Expert Twin
- optional installation of the Controller Assistant to manage firmware and application download
- application and function templates
- machine code analysis
- smart template integrated in standard projects
- create and configure controller certificates
- enable project file encryption
- integrity check for the project and the software
- Script hooks: Execute a Python script upon executing a menu command or detecting an event.
- recipe management
- ETEST: test management
- creating and parameterizing cam diagrams
- SVN source control system
- managing a project with a repository
- project and device user management
- FDT/DTM support
- database access from controllers via SQL Gateway
- Diagnostics and Device Assistant service tools
- project comparison via Diff Viewer tool

Dedicated OEM Libraries

EcoStruxure Machine Expert 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.

For more information, refer to the Libraries Overview.

Overview

Visual Graphic User Interface

Navigation within the software 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 or clutter

Projects Management

You can create new projects with or without the following aids:

- the provided examples
- the provided application templates

Quick access to the most recently-used projects is provided.

Project Properties

EcoStruxure Machine Expert 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

EcoStruxure Machine Expert can keep a history of your project by creating an automatic backup.

Configuration

You can 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. You can 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

Help Files

You can access your personal help files: Either by executing a command or as context-sensitive help by pressing the **F1** key.

Project Information

Right-clicking the EcoStruxure Machine Expert *.project file and executing the **Properties** command allows you to access information concerning not only the **Author**, **Title** and **Version** of the file but also providing information about the controller(s) that are used in the project. Further, you can compare the **Code ID** and **Data ID** information displayed in the file **Properties** with the information provided by the Controller Assistant when connected to the controller, or by the stand-alone Diagnostics tool. Thus, you can see whether this project is suitable to connect to a specific controller in the field without having to open the project itself.

NOTE: The information displayed in the **Properties** dialog box of the *.project file is updated when the project file is saved.

Machine Transparency

Machine Expert Protocol

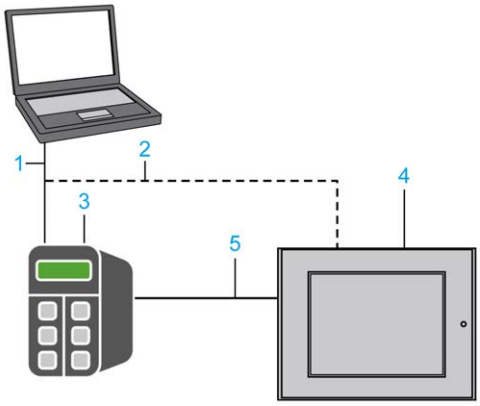
The Machine Expert protocol is the preferred protocol providing a transparent access to your controllers and HMIs.

The Machine Expert protocol is used for any data exchange

- between the EcoStruxure Machine Expert software (PC) and the runtime systems (controller, HMI) configured by Vijeo-Designer
- between controllers and integrated HMIs supporting Machine Expert 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 controller and HMI configured by Vijeo-Designer.



1 connection between EcoStruxure Machine Expert PC and controller

2 alternative connection between EcoStruxure Machine Expert PC and HMI

3 controller

4 HMI

5 connection between controller and HMI

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

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

One-Shot Variable Definition

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

The publisher-subscriber mechanism affords the following advantages:

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

Cybersecurity

Overview

Cybersecurity best practices and solutions are in constant evolution as a function of the latest information available. As a design criteria, Schneider Electric incorporates up-to-date knowledge and techniques to help make products more resilient to cyberattacks. The security by design approach results in the implementation of mechanisms to mitigate threats, reduce exploitable weaknesses, and defend against avoidable data breaches and cyberattacks.

> **NOTE:** To help keep your Schneider Electric products secure and protected, it is in your best interest that you implement the cybersecurity best practices as indicated in the *Cybersecurity Best Practices* document provided on the Schneider Electric website.

Due to the rapid rise of networking of machines and plants, potential threats are also quickly rising. Therefore, you must carefully consider all possible security measures.

Security measures are necessary to help protect data and communication channels from unauthorized access.

For information about cybersecurity topics related to the software and the controllers, refer to the *Cybersecurity* chapter of the EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide.

For general information about cybersecurity topics related to Schneider Electric products, refer to the *Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment*.

Installation and Product Offer

What’s in This Part

Installation of EcoStruxure Machine Expert

What's in This Chapter

Installation

Overview

Before you install EcoStruxure Machine Expert, you need to install the Schneider Electric Software Installer.

The Schneider Electric Software Installer provides the following features:

- install and uninstall
- download a full software version for later installation
- customize your installation, including the preferred installation type
- manage licensing
- download the complete online help per language
- open the help management tool to download single online help guides
- check for updates for the Schneider Electric Software Installer
- export / import from the installation configuration
- display the remaining time for installation

For more information, refer to the online help (see Schneider Electric Software Installer, User Guide).

Product Offer

What's in This Chapter

Product Offer Contents

Overview

The following product offers are available:

- Standard software with general-purpose functions
- EcoStruxure Machine Expert can be extended with additional options.

The table provides an overview of supported devices and libraries, depending on the specific version of the software.

NOTE: Refer to the Release Notes for details on the software versions and their compatibility with various devices.

Device / Library type	Reference name
Modicon M241 Logic Controllers	• M241 ◦ TM241C24R ◦ TM241C24T/U ◦ TM241C40R ◦ TM241C40T/U ◦ TM241CE24R ◦ TM241CE24T/U ◦ TM241CE40R ◦ TM241CE40T/U ◦ TM241CEC24R ◦ TM241CEC24T/U
Modicon M251 Logic Controllers	• M251 ◦ TM251MESC ◦ TM251MESE
Modicon M258 Logic Controllers	• M258 ◦ TM258LD42DT ◦ TM258LD42DT4L ◦ TM258LF42DT ◦ TM258LF42DT4L ◦ TM258LF66DT4L ◦ TM258LF42DR
Modicon M262 Logic Controllers	• M262 ◦ TM262L10MESE8T ◦ TM262L20MESE8T
Modicon LMC058 Motion Controllers	• LMC058 ◦ LMC058LF42 ◦ LMC058LF424
Modicon M262 Motion Controllers	• M262 ◦ TM262M05MESS8T ◦ TM262M15MESS8T ◦ TM262M25MESS8T ◦ TM262M35MESS8T
PacDrive LMC Eco motion controllers	• PacDrive LMC Eco ◦ PacDrive LMC100C ◦ PacDrive LMC101C ◦ PacDrive LMC106C ◦ PacDrive LMC201C ◦ PacDrive LMC212C ◦ PacDrive LMC216C

Device / Library type	Reference name
PacDrive LMC Pro/Pro2 motion controllers	• PacDrive LMC Pro/Pro2 ◦ PacDrive LMC300C ◦ PacDrive LMC400C ◦ PacDrive LMC402C ◦ PacDrive LMC600C ◦ PacDrive LMC802C
Industrial PC (iPC)	• Box iPC modular ◦ HMIBMU ◦ HMIBMP • Rack iPC ◦ HMIRSP ◦ HMIRSU ◦ HMIRXO-RSO • S-Panel iPC ◦ HMIPSP ◦ HMIPSO
HMI small terminal	• HMIS5T
HMIGK terminal	• HMIGK2310 • HMIGK5310
HMIGTO terminal	• HMIGTO1300 • HMIGTO1310 • HMIGTO2300 • HMIGTO2310/2315 • HMIGTO3510 • HMIGTO4310 • HMIGTO5310/5315 • HMIGTO6310/6315
HMIGTU terminal	• HMIG3U, HMIG5U2 ◦ HMIDT642 ◦ HMIDT643 ◦ HMIDT732 ◦ HMIDT351 ◦ HMIDT551 ◦ HMIDT651 ◦ HMIDT542
HMIGTUX terminal	• HMIG3X ◦ HMIDT35X ◦ HMIDT65X ◦ HMIDT75X
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
Libraries	Refer to the Libraries Overview online help.

Device / Library type	Reference name
Function template libraries	• CANopen Device Modules • Communication Functions • EtherNetIP Device Modules • Hardwired Device Modules • ModbusSL Device Modules • ModbusTCP Device Modules
Device template libraries	• Altivar Device Templates

NOTE: The projects listed below provide application examples which are part of the default installation.

The table lists the available projects and the associated Example Guides:

Name	Associated Example Guide
Altivar PLCopen CANopen Example	*Altivar / PLCopen / CANopen Example Guide*
Altivar PLCopen EtherNet/IP Example	*Altivar / PLCopen / EtherNetIP Example Guide*
CNCExtension Example	*n/a*
Crank Module	*n/a*
CSV File Handling Example	*CSV File Handling Example Guide*
Email Handling Example	*EMail Handling Example Guide*
Lexium PLCopen CANopen Example	*Lexium / PLCopen / CANopen Example Guide*
Lexium PLCopen EtherNet/IP Example	*Lexium / PLCopen / EtherNetIP Example Guide*
Multi Belt Module	*n/a*
Multicarrier Example	*Multicarrier Example Guide*
MQTT Handling Example	*Mqtt Handling Example Guide*
OpcUa Client Example	*OpcUa Client Example Guide*
PacDrive Migration Example	*PacDrive Migration - Example Guide*
PackML Example	*n/a*
Print Mark Control	*n/a*
QuickMotionProgramming	*n/a*
Robotic Module	*n/a*
RTC Control / Timezone & Daylight Saving Time / SNTP Client - Example	*RTC Control / Daylight Saving Time / SNTP Client Example Guide*
SLC Remote Controller	*n/a*
Smart Infeed Module	*n/a*
So Motion Generator Add-on Module	*n/a*
SQL Remote Access Example	*SQL Remote Access Example Guide*
TCP & UDP Communication Example	*TcpUdpCommunication Example Guide*
Template Full	*n/a*
Template Pilot	*n/a*
TopLoader Example	*n/a*
Unwinder Module	*n/a*
XML File Handling Example	*XML File Handling Example Guide*

Supported Devices

What's in This Part

Introduction

This part provides information about the devices that can be configured and programmed.

Logic Controllers

What's in This Chapter

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
- 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 software described in the EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide.

Programming Languages

The M241 Logic Controller is configured and programmed with the 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

The 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
TM241C24R	6 regular inputs (1) 8 fast inputs (counters) (2)	6 2A relay outputs 4 source fast outputs (pulse generators) (3)	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE24R	6 regular inputs (1) 8 fast inputs (counters) (2)	6 2A relay outputs 4 source fast outputs (pulse generators) (3)	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks
TM241CEC24R	6 regular inputs (1) 8 fast inputs (counters) (2)	6 2A relay outputs 4 source fast outputs (pulse generators)(3)	2 serial line ports 1 Ethernet port 1 CANopen master port 1 USB programming port	Removable screw terminal blocks
TM241C24T	6 regular inputs (1) 8 fast inputs (counters) (2)	Source outputs 6 regular transistor outputs 4 fast outputs (pulse generators)(3)	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE24T	6 regular inputs (1) 8 fast inputs (counters) (2)	Source outputs 6 regular transistor outputs 4 fast outputs (pulse generators)(3)	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks
TM241CEC24T	6 regular inputs (1) 8 fast inputs (counters) (2)	Source outputs 6 regular transistor outputs 4 fast outputs (pulse generators)(3)	2 serial line ports 1 USB programming port 1 Ethernet port 1 CANopen Master port	Removable screw terminal blocks
TM241C24U	6 regular inputs (1) 8 fast inputs (counters) (2)	Sink outputs 6 regular transistor outputs 4 fast outputs (pulse generators)(3)	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE24U	6 regular inputs (1) 8 fast inputs (counters) (2)	Sink outputs 6 regular transistor outputs 4 fast outputs (pulse generators)(3)	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks
TM241CEC24U	6 regular inputs (1) 8 fast inputs (counters) (2)	Sink outputs 6 regular transistor outputs 4 fast outputs (pulse generators)(3)	2 serial line ports 1 USB programming port 1 Ethernet port 1 CANopen Master port	Removable screw terminal blocks
TM241C40R	16 regular inputs (1) 8 fast inputs (counters) (2)	12 2A relay outputs 4 source fast outputs (pulse generators) (3)	2 serial line ports 1 USB programming port	Removable screw terminal blocks
TM241CE40R	16 regular inputs (1) 8 fast inputs (counters) (2)	12 2A relay outputs 4 source fast outputs (pulse generators) (3)	2 serial line ports 1 USB programming port 1 Ethernet port	Removable screw terminal blocks
TM241C40T	16 regular inputs (1) 8 fast inputs (counters) (2)	Source outputs 12 regular transistor outputs 4 fast outputs (pulse generators)(3)	2 serial line ports 1 USB programming port	Removable screw terminal blocks

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

(1) The regular inputs have a maximum frequency of 1 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, as reflex outputs for counting function (HSC), or as fast transistor outputs for pulse generator functions (FreqGen / PTO / PWM).

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
- 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 software described in the EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide.

Programming Languages

The M251 Logic Controller is configured and programmed with the 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

The 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

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 EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide.

Key Features

The EcoStruxure Machine Expert 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

EcoStruxure Machine Expert 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

Modicon M262 Logic Controller

Modicon M262 Logic Controller

Overview

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

- Modicon M262 Logic/Motion Controller - Programming Guide (see Modicon M262 Logic/Motion Controller, Programming Guide)
- Modicon M262 Logic/Motion Controller - Hardware Guide (see Modicon M262 Logic/Motion Controller, Hardware Guide)
- Industrial Ethernet - User Guide

The M262 Logic Controller has various powerful features and can service a wide range of applications.

Software configuration, programming, and commissioning are accomplished with the EcoStruxure Machine Expert software described in the EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide and the M262 Logic/Motion Controller Programming Guide.

Programming Languages

The M262 Logic Controller is configured and programmed with the 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

The EcoStruxure Machine Expert 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:

- Fast inputs
- Fast source outputs

Embedded Communication Features

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

- Ethernet
- USB
- Serial Line

M262 Logic Controller Range

The following table shows the M262 Logic Controller range and features:

Reference	Performance	Digital I/O	Power supply	Communication Ports	Terminal Type
TM262L01MESE8T TM262L10MESE8T	5 µs / 1 K instructions	4 fast digital inputs 4 fast digital outputs (source)	24 Vdc	1 serial line port 1 USB programming port 2 Ethernet switched ports 1 Ethernet port	Removable screw terminal blocks
TM262L20MESE8T	3 µs / 1 K instructions	4 fast digital inputs 4 fast digital outputs (source)	24 Vdc	1 serial line port 1 USB programming port 2 Ethernet switched ports 1 Ethernet port	Removable screw terminal blocks

Motion Controllers

What's in This Chapter

Modicon 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 (see Modicon LMC058, Motion Controller, Hardware Guide)

The Schneider Electric Modicon LMC058 Motion Controller is a controller with a variety of powerful features. This controller is the optimized solution for axis positioning thanks to software with embedded automation functions and an ergonomic interface for axis configuration (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 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

The 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•• (see Modicon LMC058, Motion Controller, Hardware Guide)	0	2	1	1	1	1	1
LMC058LF424•• (see Modicon LMC058, Motion Controller, Hardware Guide)	2	2	1	1	1	1	1

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

Modicon M262 Motion Controller

Modicon M262 Motion Controller

Overview

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

- Modicon M262 Logic/Motion Controller - Programming Guide (see Modicon M262 Logic/Motion Controller, Programming Guide)
- Modicon M262 Logic/Motion Controller - Hardware Guide (see Modicon M262 Logic/Motion Controller, Hardware Guide)
- Industrial Ethernet User Guide

For more information, refer to the M262 Logic Controller, page 32.

Programming Languages

The M262 Motion Controller is configured and programmed with the 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

The 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:

- Fast inputs
- Fast source outputs

Encoder

The following encoder modes are available:

- Incremental mode
- SSI mode

Embedded Communication Features

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

- Ethernet
- USB
- Serial Line

M262 Motion Controller Range

The following table shows the M262 Motion Controller range and features:

Reference	Number of Axis	Digital I/O	Encoder	Power supply	Communication Ports	Terminal Type	Maximum Sercos devices
TM262M05MESS8T	4	4 fast digital inputs 4 fast digital outputs (source)	Encoder interface (SSI/ incremental)	24 Vdc	1 serial line port 1 USB programming port 2 Ethernet switched ports 1 Ethernet port for fieldbus with Sercos interface	Removable screw terminal blocks	12
TM262M15MESS8T	4	4 fast digital inputs 4 fast digital outputs (source)	Encoder interface (SSI/ incremental)	24 Vdc	1 serial line port 1 USB programming port 2 Ethernet switched ports 1 Ethernet port for fieldbus with Sercos interface	Removable screw terminal blocks	16
TM262M25MESS8T	8	4 fast digital inputs 4 fast digital outputs (source)	Encoder interface (SSI/ incremental)	24 Vdc	1 serial line port 1 USB programming port 2 Ethernet switched ports 1 Ethernet port for fieldbus with Sercos interface	Removable screw terminal blocks	24
TM262M35MESS8T	24	4 fast digital inputs 4 fast digital outputs (source)	Encoder interface (SSI/ incremental)	24 Vdc	1 serial line port 1 USB programming port 2 Ethernet switched ports 1 Ethernet port for fieldbus with Sercos interface	Removable screw terminal blocks	40

PacDrive LMC Eco Motion Controllers

PacDrive LMC Eco

Overview

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

- PacDrive LMC Eco Device Objects and Parameters (see LMC Eco, Device Objects and Parameters)
- PacDrive LMC Eco Motion Controller - Hardware Guide (see PacDrive Logic Motion Controller, LMC Eco, Hardware Guide)

The Schneider Electric PacDrive LMC Eco is a controller with various powerful features. It can control a wide range of applications. The PacDrive LMC Eco combines both logic controller and motion functions.

PacDrive LMC Eco controllers synchronize, coordinate, and create the motion functions of a machine for a maximum of:

- 0 Sercos servo drives for the controller PacDrive LMC100C
- 4 Sercos servo drives for the controller PacDrive LMC101C
- 6 Sercos servo drives for the controller PacDrive LMC106C
- 8 Sercos servo drives for the controller PacDrive LMC201C
- 12 Sercos servo drives for the controller PacDrive LMC212C
- 16 Sercos servo drives for the controller PacDrive LMC216C

Key Features

The 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

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

The PacDrive LMC Eco supports the following fieldbuses:

- Integrated automation bus Sercos (master)
- Integrated additional fieldbus CAN (master / slave)
- Optional slot for additional fieldbus

The PacDrive LMC Eco supports the following I/O types:

- Master encoder input
- Embedded I/Os:
  - Digital I/Os
  - Advanced digital inputs (touch probe and interrupt inputs)
- Distributed I/O modules on Sercos automation bus (TM5 modules)

PacDrive LMC Pro/Pro2 Motion Controllers

PacDrive LMC Pro/Pro2

Overview

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

- PacDrive LMC Pro/Pro2 Device Objects and Parameters (see LMC Pro, Device Objects and Parameters)
- PacDrive LMC Pro/Pro2 Motion Controller - Hardware Guide (see PacDrive Logic Motion Controller, LMC Pro/Pro2, Hardware Guide)

The Schneider Electric PacDrive LMC Pro/Pro2 is a controller with various powerful features. It can control a wide range of applications. The PacDrive LMC Pro/Pro2 combines both logic controller and motion functions.

PacDrive LMC Pro/Pro2 controllers synchronize, coordinate, and create the motion functions of a machine for a maximum of:

- 8 Sercos servo drives for the controller LMC300C
- 16 Sercos servo drives for the controller LMC400C, LMC402C
- 99 Sercos servo drives for the controller LMC600C
- 130 Sercos servo drives for the controller LMC802C, LMC902C

Key Features

The 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

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

The PacDrive LMC Pro/Pro2 supports the following fieldbuses:

- Integrated automation bus Sercos (master)
- Integrated additional fieldbus connection (configuration 1):
  - PROFIBUS DP (master/slave)
  - CAN (2.0 B)
- Integrated additional fieldbus connection (configuration 2):
  - Realtime Ethernet (2 ports)
  - PROFIBUS DP (master/slave) or CAN (2.0 B)
- PacNet interface
- Optional slots for additional fieldbuses

The PacDrive LMC Pro/Pro2 supports the following I/O types:

- Master encoder input
- Embedded I/Os:
  - Digital I/Os
  - Advanced digital inputs (touch probe and interrupt inputs)
  - Analog I/Os

HMI Controllers

What's in This Chapter

SCU HMI Controller

Harmony SCU HMI Controller

Overview

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

- Harmony SCU HMI Controller Hardware Guide (see Harmony SCU, HMI Controller, Hardware Guide)
- Harmony SCU HMI Controller Programming Guide (see Harmony SCU, HMI Controller, Programming Guide)

Key Features

The Harmony 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

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

The Harmony 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

Harmony SCU HMI Controller Range

This table describes the Harmony 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 tempera-ture	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

Expansion Modules

What's in This Chapter

TM2 Expansion Modules

TM2 Digital Input and Output Expansion Modules

Introduction

The following table lists the TM2 digital I/O modules with their catalog reference.

NOTE: To add a digital module, refer to Adding Expansion Modules chapter in the Modicon TM2 Modules Configuration Programming Guide (see Modicon TM2, Modules Configuration, Programming Guide).

TM2 Digital 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
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 table lists the analog I/O modules with their catalog reference.

NOTE: To add an analog module, refer to Adding Expansion Modules chapter in the Modicon TM2 Modules Configuration Programming Guide (see Modicon TM2, Modules Configuration, Programming Guide).

TM2 Analog 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

TM3 Expansion Modules

TM3 Digital I/O Expansion Modules

Introduction

The following tables list the digital I/O modules with their 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 (see Modicon TM3, Digital I/O Modules, Hardware Guide), with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DI8A (see Modicon TM3, Digital I/O Modules, Hardware Guide)	8	Regular inputs	120 Vac 7.5 mA	Removable screw terminal block / 5.08 mm
TM3DI8 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	8	Regular inputs	24 Vdc 7 mA	Removable screw terminal block / 5.08 mm
TM3DI8G (see Modicon TM3, Digital I/O Modules, Hardware Guide)	8	Regular inputs	24 Vdc 7 mA	Removable spring terminal block / 5.08 mm
TM3DI16 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	16	Regular inputs	24 Vdc 7 mA	Removable screw terminal blocks / 3.81 mm
TM3DI16G (see Modicon TM3, Digital I/O Modules, Hardware Guide)	16	Regular inputs	24 Vdc 7 mA	Removable spring terminal blocks / 3.81 mm
TM3DI16K (see Modicon TM3, Digital I/O Modules, Hardware Guide)	16	Regular inputs	24 Vdc 5 mA	HE10 (MIL 20) connector
TM3DI32K (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide), with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DQ8R (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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
TM3DQ16U (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DQ16TK (see Modicon TM3, Digital I/O Modules, Hardware Guide)	16	Regular transistor outputs (source)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector
TM3DQ16UK (see Modicon TM3, Digital I/O Modules, Hardware Guide)	16	Regular transistor outputs (sink)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector
TM3DQ32TK (see Modicon TM3, Digital I/O Modules, Hardware Guide)	32	Regular transistor outputs (source)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connectors
TM3DQ32UK (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see *Modicon TM3 Digital I/O Modules Hardware Guide*), with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DM8R (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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 (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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	
TM3DM16R (see Modicon TM3, Digital I/O Modules, Hardware Guide)(1)	8	Regular inputs	24 Vdc 5 mA	Removable screw terminal block / 3.81 mm
	8	Relay outputs	24 Vdc / 240 Vac 4 A maximum per common line / 2 A maximum per output	
TM3DM24R (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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	

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DM24RG (see Modicon TM3, Digital I/O Modules, Hardware Guide)	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	
TM3DM32R (see Modicon TM3, Digital I/O Modules, Hardware Guide)(1)	16	Regular inputs	24 Vdc 5 mA	Removable screw terminal block / 3.81 mm
	16	Relay outputs	24 Vdc / 240 Vac 4 A maximum per common line / 2 A maximum per output	
(1) This expansion module is available only in selected countries.				

TM3 Analog I/O Expansion Modules

Introduction

The following tables list the analog I/O modules with their 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 (see Modicon TM3, Analog I/O Modules, Hardware Guide), with corresponding resolution, channel type, nominal voltage/current, and terminal type:

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AI2H (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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
TM3TI4 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3TI4G (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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
TM3TI4D (see Modicon TM3, Analog I/O Modules, Hardware Guide)	16 bit, or 15 bit + sign	4	inputs	Thermocouple	Removable screw terminal block / 3.81 mm
TM3TI4DG (see Modicon TM3, Analog I/O Modules, Hardware Guide)	16 bit, or 15 bit + sign	4	inputs	Thermocouple	Removable spring terminal blocks / 3.81 mm
TM3TI8T (see Modicon TM3, Analog I/O Modules, Hardware Guide)	16 bit, or 15 bit + sign	8	inputs	Thermocouple NTC/PTC Ohmmeter	Removable screw terminal block / 3.81 mm
TM3TI8TG (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide), with corresponding resolution, channel type, nominal voltage/current, and terminal type:

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AQ2 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide), with corresponding resolution, channel type, nominal voltage/current, and terminal type:

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AM6 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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
		2	outputs		
TM3AM6G (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 (see Modicon TM3, Analog I/O Modules, Hardware Guide)	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 Safety Expansion Modules

Introduction

The following table 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 (see Modicon TM3, Safety Modules, Hardware Guide)	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 (see Modicon TM3, Safety Modules, Hardware Guide)	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 (see Modicon TM3, Safety Modules, Hardware Guide)	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 (see Modicon TM3, Safety Modules, Hardware Guide)	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 (see Modicon TM3, Safety Modules, Hardware Guide)	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	
TM3SAFL5RG (see Modicon TM3, Safety Modules, Hardware Guide)	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 (see Modicon TM3, Safety Modules, Hardware Guide)	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 (see Modicon TM3, Safety Modules, Hardware Guide)	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 Expert Expansion Modules

Introduction

The following table lists the expert modules with their catalog references.

See Modicon TM3 Expert Modules Hardware Guide.

TM3 Expert Modules

The following table shows the TM3 expert expansion modules (see Modicon TM3, Digital I/O Modules, Hardware Guide), with corresponding terminal types:

Reference	Description	Terminal Type / Pitch
TM3XTYS4 (see Modicon TM3, Expert I/O Modules, Hardware Guide)	TeSys module	4 front connectors RJ-45 1 removable power supply connector / 5.08 mm
TM3XFHSC202 (see Modicon TM3, Expert I/O Modules, Hardware Guide)	High Speed Counting (HSC) module with events	Removable screw terminal blocks / 3.81 mm
TM3XFHSC202G (see Modicon TM3, Expert I/O Modules, Hardware Guide)	High Speed Counting (HSC) module with events	Removable spring terminal blocks / 3.81 mm
TM3XHSC202 (see Modicon TM3, Expert I/O Modules, Hardware Guide)	High Speed Counting (HSC) module	Removable screw terminal blocks / 3.81 mm
TM3XHSC202G (see Modicon TM3, Expert I/O Modules, Hardware Guide)	High Speed Counting (HSC) module	Removable spring terminal blocks / 3.81 mm

TM3 Transmitter and Receiver Modules

Introduction

The following table lists the Transmitter and Receiver modules with their 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 (see Modicon TM3, Transmitter and Receiver Modules, Hardware Guide):

Reference	Description	Terminal Type / Pitch
TM3XTRA1 (see Modicon TM3, Transmitter and Receiver Modules, Hardware Guide)	Data transmitter module for remote I/O	1 front connector RJ-45 1 screw for functional ground connection
TM3XREC1 (see Modicon TM3, Transmitter and Receiver Modules, Hardware Guide)	Data receiver module for remote I/O	1 front connector RJ-45 Power supply connector / 5.08 mm

TMC4 Cartridges

TMC4 Cartridges

Overview

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

See TMC4 Cartridges - Hardware Guide.

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

TM4 Expansion Module

TM4 Expansion Modules

Introduction

The following table lists the expansion modules of your Modicon M241 Logic Controller with their 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 (see Modicon TM4, Expansion Modules, Hardware Guide)	Ethernet communication	4 RJ45 connectors 1 screw for functional ground connection
TM4PDPS1 (see Modicon TM4, Expansion Modules, Hardware Guide)	PROFIBUS DP slave communication	1 SUB-D 9 pins female connector 1 screw for functional ground connection
NOTE: The TM4ES4 module has two applications: expansion or standalone. For more information, refer to TM4 Compatibility (see Modicon TM4, Expansion Modules, Hardware Guide).		

TM5 Expansion Modules

TM5 Compact I/O Expansion Modules

Introduction

The following tables list the TM5 Compact I/O modules with their catalog references.

See Modicon TM5 Compact I/O Hardware Guide.

TM5 Compact 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

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

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 table lists the digital I/O modules with their catalog references.

See Modicon TM5 Digital I/O Modules Hardware Guide.

TM5 Digital 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
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 tables list the analog I/O modules with their references.

See Modicon TM5 Analog I/O Modules Hardware Guide.

TM5 Analog 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

TM5 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 table lists the expert (for high-speed counting) modules with their description.

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

TM5 Expert (HSC) 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 table lists the transmitter and receiver expansion modules with their descriptions.

The transmitter and receiver modules are described in the Modicon TM5 Transmitter and Receiver Modules Hardware Guide.

TM5 Transmitter and Receiver Modules

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 table lists the power distribution modules with their descriptions.

The power distribution modules are described in the Modicon TM5 System Planning and Installation Guide.

TM5 Power Distribution Modules

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 table lists the common distribution modules with their descriptions.

The common distribution modules are described in the TM5/TM7 System Planning and Installation Guide.

TM5 Common Distribution Modules

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

TM5 IO-Link Modules

Introduction

The following tables list the characteristics of the TM5SE4IOL electronic module.

⚠DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

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

General Characteristics

General Characteristics	
Rated power supply voltage	24 Vdc
Power supply source	Connected to the 24 Vdc I/O power segment
Power supply range	20.4...28.8 Vdc
24 Vdc I/O segment current draw	29.6 mA
TM5 Bus 5 Vdc current draw	2 mA
Weight	25 g (0.9 oz)
ID code for firmware update	CAC0 hex = 51904 dec

Characteristics in IO-Link Master Mode

Characteristics in IO-Link Master Mode	
Transfer rates	• COM1: 4.8 kbaud • COM2: 38.4 kbaud • COM3: 230.4 kbaud
Limit values for COM3	• Maximum connection capacity 22 nF (cable + IO-Link device) • Maximum load 96 Ω / 250 mA
Data format	1 start bit, 8 data bits, 1 parity bit (even), 1 stop bit
Bus level	24 Vdc (active), 0 Vdc (resting voltage)

Characteristics in IO-Link Master Mode or in Digital Output Mode

Characteristics in IO-Link Master Mode or in Digital Output Mode	
IO-Link channels	Up to four outputs
Wiring type	3 wires
Variant	Bipolar, positive, and negative switching
Short-circuit output peak current	< 1.3 A
Residual voltage	< 0.7 Vdc at rated current 0.25 A
Switching voltage	I/O power supply minus voltage drop for short circuit protection and semiconductor switch
Voltage drop	< 0.5 V at 0.25 A rated current
Switching frequency	25 kHz (300 kHz in IO-Link master mode)
Turn on time	< 10 µs
Turn off time	< 10 µs
Isolation between IO-Link and bus	500 Vac RMS [1]

[1] The isolation of the electronic module is 500 Vac RMS between the electronics powered by the TM5 bus and those powered by 24 Vdc I/O power segment connected to the module. In practice, the TM5 electronic module is installed in the bus base, and there is a bridge between the TM5 power bus and the 24 Vdc I/O power segment. The two power circuits reference the same functional ground (FE) through specific components designed to reduce effects of electromagnetic interference. These components are rated at 30 Vdc or 60 Vdc. This effectively reduces isolation of the entire system from the 500 Vac RMS.

Characteristics in IO-Link Digital Output Mode

Characteristics in IO-Link Digital Output Mode	
Output channels	Up to four outputs
Wiring type	3 wires
Maximum continuous output current	0.25 A per output
Maximum over-current threshold	0.5 A per output
Total output current	1 A maximum
Output voltage	24 Vdc
Output voltage range	20.4...28.8 Vdc
Output circuit	Source
Switching frequency (resistive load)	500 Hz maximum
Output protection [1)]	• Thermal cutoff for over-current and short-circuit • Integrated protection for switching inductances
[1)] Interrupting current during over-current: Between 0.3 A and 0.8 A.	

Characteristics in IO-Link Digital Input Mode

Characteristics in IO-Link Digital Input Mode		
Number of input channels		Up to four inputs
Wiring type		3 wires
Rated input voltage		24 Vdc
Input voltage range		20.4...28.8 Vdc
Rated input current at 24 Vdc		4 mA
Input impedance		6 kΩ
OFF state		< 5 Vdc
ON state		> 15 Vdc
Input circuit		Sink
Input filter	Hardware	300 ns
	Software	-
Isolation	Between IO-Link and bus	See note [1].
	Between IO-Links	Not isolated

[1] The isolation of the electronic module is 500 Vac RMS between the electronics powered by the TM5 bus and those powered by 24 Vdc I/O power segment connected to the module. In practice, the TM5 electronic module is installed in the bus base, and there is a bridge between the TM5 power bus and the 24 Vdc I/O power segment. The two power circuits reference the same functional ground (FE) through specific components designed to reduce effects of electromagnetic interference. These components are rated at 30 Vdc or 60 Vdc. This effectively reduces isolation of the entire system from the 500 Vac RMS.

TM7 Expansion Blocks

TM7 Digital I/O Blocks

Introduction

The following table lists the TM7 digital I/O blocks with their catalog references.

See Modicon TM7 Digital I/O Blocks Hardware Guide.

TM7 Digital 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 tables list the TM7 analog I/O blocks with their references.

See Modicon TM7 Analog I/O Blocks Hardware Guide.

TM7 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				

Reference	Number of Channels	Digital Converter Resolution	Voltage/Current	Sensor/ Actuator Connectors
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

TM7 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

TMS Expansion Modules

TMS Expansion Modules

Introduction

The following table lists the TMS expansion modules of your Modicon M262 Logic/ Motion Controller with their catalog references.

TMS Expansion Modules

The following table describes the TMS expansion module features:

Module reference	Type	Terminal type
TMSES4	Ethernet communication	RJ45
TMSCO1	CANopen master module	SUB-D 9 pin male

NOTE: The TMSES4 is not a standalone Ethernet switch.

For more information, refer to the Modicon TMS Expansion Module - Hardware Guide (see Modicon TMS, Expansion Module, Hardware Guide).

Modicon Edge I/O NTS Modules

The following sections describe the Modicon Edge I/O NTS modules.

NOTE: References exist that terminate with a 'K' that are kits which include the base with the module. Those references are not mentioned in the following sections.

Modicon Edge I/O NTS Discrete Modules

Introduction

The following tables list the discrete I/O modules with their catalog references.

For more information, refer to the Modicon Edge I/O NTS Discrete Modules User Guide.

Modicon Edge I/O NTS Discrete Input Modules

The following table shows the Modicon Edge I/O NTS discrete input modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Number of Channels	Channel Type	Voltage	Terminal Type / Pitch
NTSDDI0602	6	Sink inputs	24 Vdc	Removable screw/spring terminal block / 3.81 mm
NTSDDI0802X	8	Sink inputs	24 Vdc	Removable screw/spring terminal block / 5 mm
NTSDDI1602	16	Sink inputs	24 Vdc	Removable screw/spring terminal block / 3.81 mm
NTSDDI1602X / NTSDDI1602XH	16	Sink inputs	24 Vdc	Removable screw/spring terminal block / 5 mm

Modicon Edge I/O NTS Discrete Output Modules

The following table shows the Modicon Edge I/O NTS discrete output modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Number of Channels	Channel Type	Voltage Current	Terminal Type / Pitch
NTSDDO0212H	2	Isolated source outputs	24 Vdc 2 A / channel	Removable screw/spring terminal block / 5 mm
NTSDDO0802	8	Source outputs	24 Vdc, external supply 2 A / channel, 8 A / module	Removable screw/spring terminal block / 5 mm
NTSDDO0802X	8	Source outputs	24 Vdc 500 mA / channel	Removable screw/spring terminal block / 5 mm
NTSDRA0615	6	Isolated normally open relay outputs	5...125 Vdc 24...240 Vac 2 A / channel	Removable screw/spring terminal block / 5 mm

Modicon Edge I/O NTS Analog Modules

Introduction

The following tables list the analog I/O modules with their catalog references.

For more information, refer to Modicon Edge I/O NTS Analog Modules User Guide.

Modicon Edge I/O NTS Analog Input Modules

The following table shows the Modicon Edge I/O NTS analog input modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Number of Channels	Channel Type	Accuracy at 25 °C (77 °F)	Mode	Terminal Type / Pitch
NTSAMI0210	2	Isolated inputs with loop power	0.05 %	± 10 Vdc 0...10 Vdc ± 5 Vdc 0...5 Vdc 1...5 Vdc ± 20 mA 0...20 mA 4...20 mA	Removable screw/spring terminal block / 5 mm
NTSAMI0210H	2	Isolated inputs with loop power	0.05 %	± 10 Vdc 0...10 Vdc ± 5 Vdc 0...5 Vdc 1...5 Vdc ± 20 mA 0...20 mA 4...20 mA	Removable screw/spring terminal block / 5 mm
NTSAMI0400	4	Inputs	0.3 %	± 10 Vdc 0...10 Vdc ± 5 Vdc 0...5 Vdc 1...5 Vdc ± 20 mA 0...20 mA 4...20 mA	Removable screw/spring terminal block / 5 mm
NTSACI0802X	8	Inputs with loop power	0.1 %	± 20 mA 0...20 mA 4...20 mA	Removable screw/spring terminal block / 5 mm
NTSACI0802XH	8	Inputs with loop power	0.1 %	± 20 mA 0...20 mA 4...20 mA	Removable screw/spring terminal block / 5 mm

Modicon Edge I/O NTS Analog Output Modules

The following table shows the Modicon Edge I/O NTS analog output modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Number of Channels	Channel Type	Accuracy at 25 °C (77 °F)	Mode	Terminal Type / Pitch
NTSAMO0400	4	Outputs	0.1 %	± 10 Vdc 0...10 Vdc ± 5 Vdc 0...5 Vdc 1...5 Vdc 0...20 mA 4...20 mA	Removable screw/spring terminal block / 5 mm
NTSAMO0400H	4	Outputs	0.1 %	± 10 Vdc 0...10 Vdc ± 5 Vdc 0...5 Vdc 1...5 Vdc 0...20 mA 4...20 mA	Removable screw/spring terminal block / 5 mm

Modicon Edge I/O NTS Counting Modules

Introduction

The following tables list the counting I/O modules with their catalog references.

For more information, refer to the Modicon Edge I/O NTS Counting Modules User Guide.

Modicon Edge I/O NTS Counting Input Modules

The following table shows the Modicon Edge I/O NTS counting input modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Number of Channels	Expert Function	Discrete Inputs	Discrete Outputs	Voltage	Terminal Type / Pitch
NTSEHC0100	1	Simple counting Frequency meter Period meter Ratio meter Single phase counting Single phase event counting Dual phase counting	6	-	24 Vdc	Removable screw/spring terminal block / 5 mm

Modicon Edge I/O NTS Counting Mixed Input/Output Modules

The following table shows the Modicon Edge I/O NTS counting mixed input/output modules, with corresponding channel type, nominal voltage/current, and terminal type:

Reference	Number of Channels	Expert Function	Discrete Inputs	Discrete Outputs	Voltage	Terminal Type / Pitch
NTSEHC0120H	1	Simple counting Frequency meter Period meter Ratio meter Single phase counting Single phase event counting Dual phase counting PWM output Reflex output sub-function	6	4	24 Vdc	Removable screw/spring terminal block / 5 mm
NTSEHC0220	2	Simple counting Frequency meter Period meter Ratio meter Single phase counting Single phase event counting Dual phase counting PWM output Reflex output sub-function	12	8	24 Vdc	Removable screw/spring terminal block / 3.81 mm

Modicon Edge I/O NTS Field Device Master Modules

Introduction

The following table lists the field device master modules with their catalog references.

For more information, refer to the Modicon Edge I/O NTS Field Device Master Modules User Guide.

Modicon Edge I/O NTS Field Device Master Module

The following table shows the Modicon Edge I/O NTS field device master module, with corresponding channel type, wiring, and terminal type:

Reference	Number of Channels	Function	Wiring	Terminal Type / Pitch
NTSFIO0400	Up to 4	IO-Link Master	Class A: 3-wire or 4-wire	Removable screw/spring terminal block / 3.81 mm

Modicon Edge I/O NTS Power Supply Modules

Introduction

The following table lists the power supply modules with their catalog references.

For more information, refer to Modicon Edge I/O System Planning and Installation Guide.

Modicon Edge I/O NTS Power Supply Modules

The following table shows the Modicon Edge I/O NTS power supply modules, with corresponding channel type, nominal voltage, and terminal type:

Reference	Voltage	Function	Terminal Type / Pitch
NTSPFB1002H	24 Vdc	Field and Bus power supply	Removable screw/spring terminal block / 5 mm
NTSPFD1002H	24 Vdc	Field power supply	Removable screw/spring terminal block / 5 mm

Modicon Edge I/O NTS Common Distribution Modules

Introduction

The following table lists the common distribution modules with their catalog references.

For more information, refer to Modicon Edge I/O System Planning and Installation Guide.

Modicon Edge I/O NTS Common Distribution Modules

The following table shows the Modicon Edge I/O NTS common distribution modules, with corresponding function and terminal type:

Reference	Function	Terminal Type / Pitch
NTSPCM0016H	0 Vdc connexion points: 16	Removable screw/spring terminal block / 3.81 mm
NTSPCM0808H	0 Vdc connexion points: 8 24 Vdc connexion points: 8	Removable screw/spring terminal block / 3.81 mm
NTSPCM1600H	24 Vdc connexion points: 16	Removable screw/spring terminal block / 3.81 mm

Modicon Edge I/O NTS Dummy Module

Introduction

The following table lists the dummy module with its catalog reference.

For more information, refer to Modicon Edge I/O System Planning and Installation Guide.

Modicon Edge I/O NTS Dummy Module

The following table shows the Modicon Edge I/O NTS dummy module, with corresponding function and terminal type:

Reference	Function	Terminal Type / Pitch
NTSDMY0100H	Dummy Module, Single Slot, Hardened	–

HMI

What's in This Chapter

HMIGK Terminals

Introduction

The following table lists the HMIGK terminal families supported by EcoStruxure Machine Expert.

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

Harmony HMIGK (see Harmony GK User Manual).

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 table lists the HMIGTO terminal families supported by EcoStruxure Machine Expert.

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

Harmony HMIGTO (see Harmony, HMI GTO for Vijeo Designer, User Manual).

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 tables list the HMIGTU terminal families supported by EcoStruxure Machine Expert.

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

Harmony HMIGTU (see Harmony GTU User Manual).

HMIGTU Touch-Panel Terminal Range

Series	Model Names	Part Numbers
Harmony GTU	Premium Box	HMIG3U
	Open Box	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	HMIG5U2
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)	

HMIGTUX Terminals

Introduction

The following table lists the HMIGTUX terminal families supported by EcoStruxure Machine Expert.

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

Harmony HMIGTUX (see Harmony GTUX User Manual).

HMIGTUX Touch-Panel Terminal Range

Series		Model Names	Part Numbers
Harmony GTUX	eXtreme Box	HMIG3X	HMIG3X
	eXtreme Display	HMIDT35X	HMIDT35X
		HMIDT65X	HMIDT65X
		HMIDT75X	HMIDT75X

NOTE: You can connect any eXtreme Display to the eXtreme Box.

Box Module

	HMIG3X
Serial interface COM1	
Asynchronous transmission	RS-485 (isolation)
Data length	7 or 8 bits
Stop bit	1 or 2 bits
Parity	None, odd, or even
Data transmission speed	2,400...115,200 bps
Connector	Modular jack (RJ-45)
Serial interface COM2	
Asynchronous transmission	RS-232C/422/485
Data length	7 or 8 bits
Stop bit	1 or 2 bits
Parity	None, odd, or even
Data transmission speed	2,400...115,200 bps, 187,500 bps (MPI)
Connector	D-Sub 9 pin (plug)
USB (Type A) interface	
Connector	USB 2.0 (Type A) x 2
Power supply voltage	5 Vdc ±5%
Maximum current supplied	500 mA/port
Maximum transmission distance	5 m (16.4 ft)
USB (mini-B) interface	
Connector	USB 2.0 (mini-B) x 1
Maximum transmission distance	5 m (16.4 ft)
Ethernet interface	
Standard	IEEE802.3i / IEEE802.3u / IEEE802.3ab, 10BASE-T / 100BASE-TX / 1000BASE-T[1)]
Connector	Modular jack (RJ-45) x 1
SD Card interface	
SD Card	SD Card slot (System) x 1 SD Card slot (Storage) x 1
Expansion unit interface	
Expansion unit	Fieldbus unit x 1
Sound output interface	
Speaker output	70 mW (Rated Load: 8 Ω, Frequency: 1 kHz)
LINE output	Rated load: 10 kΩ or more
Connector	2-piece terminal block (AUX) x 1
AUX output interface	
AUX output	Alarm output / Buzzer output
Rated voltage	24 Vdc
Rated current	50 mA
Connector	2-piece terminal block (AUX) x 1

[1)] For 1000BASE-T communication, use twisted pair Ethernet cables with a rating of category 5e or higher.

Display Modules

	HMIDT35X	HMIDT65X	HMIDT75X
Display Type	TFT Color LCD (high brightness)		
Display Size	7”	12.1”	15.6”
Resolution	800 x 480 pixels (WVGA)	1,280 x 800 pixels (WXGA)	1,366 x 768 pixels (FWXGA)
Effective display area (W x H)	152.4 x 91.4 mm (6.00 x 3.60 in)	261.1 x 163.2 mm (10.28 x 6.43 in)	344.2 x 193.5 mm (13.55 x 7.62 in)
Display colors	262,144 colors		
Backlight	White LED (Not user replaceable. When replacement is required, contact your local distributor.)		
Backlight service life	50,000 hours or more (continous operation at 25 °C (77 °F) before backlight brightness decreases to 50%)		
Brightness control	0...100 (Adjusted with touch panel or software)		
Brightness (LCD panel)	1000 cd/m^2 (Typ.)		

HMIGXO Terminals

Introduction

The following table lists the HMIGXO terminal families supported by EcoStruxure Machine Expert.

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

Harmony 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

XBTGH Terminal

Introduction

The following table lists the XBTGH terminal families supported by EcoStruxure Machine Expert.

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

Harmony XBTGH (see Magelis XBTGT, XBTGK, XBTGH, Hardware Guide).

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]
[1] RS232/RS422/RS485 serial interface SUB-D 9-pin connector							

iPC

What's in This Chapter

Harmony Industrial PC

Overview

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

- Harmony 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.
- Harmony Rack iPC (Optimized, Universal, and Performance) for 19" enclosures in control rooms and labs.

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

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

HMIRSP / HMIRSU / HMIRXO-RSO Rack iPC

Introduction

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

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

Software configuration, programming, and commissioning is accomplished with the EcoStruxure Machine Expert software described in the EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert 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	Ether-net 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.

HMIPSP / HMIPSO S-Panel iPC

Introduction

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

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

Software configuration, programming, and commissioning is accomplished with the EcoStruxure Machine Expert software described in the EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide.

S-Panel iPC

The **HMIPSP** is the Performance S-Panel iPC 15” and 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.
HMIPSO	Atom E3827 1.75 GHz	10" WSVGA 15" FWXGA Touch screen	2	2		CFast slot, HDD/SSD slots PCIe slot, Optional interface.

HMIBMU / HMIBMP Box iPC Modular and Display iPC

Introduction

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

HMIBMU and **HMIBMP**: Harmony 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 EcoStruxure Machine Expert software described in the EcoStruxure Automation Expert - Motion, EcoStruxure Machine Expert Programming Guide.

Box iPC Modular and Display

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 following table describes the Universal and Performance Box iPCs modular:

Reference	Processor	USB	Serial Port	Ether-net Port	Other Interface
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

Distributed Devices

What's in This Chapter

Overview

EcoStruxure Machine Expert 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.

Modicon TM3 Bus Couplers

Introduction

The TM3 bus couplers are devices designed to manage EtherNet/IP, Modbus TCP, Modbus Serial Line or CANopen communications, depending on the reference, in association with TM3 / TM2 I/O expansion modules in a distributed architecture.

For more details, see Modicon TM3 Bus Couplers - Hardware Guide (see Modicon TM3 Bus Coupler, Hardware Guide).

Modicon TM3 Bus Couplers

The following table shows the TM3 bus couplers supported by EcoStruxure Machine Expert:

Reference	Port	Communication type	Terminal type
TM3BCEIP (see Modicon TM3 Bus Coupler, Programming Guide)	2 isolated switched Ethernet ports	Ethernet/IP Modbus TCP	RJ45
	1 USB port	USB 2.0	mini-B
TM3BCSL (see Modicon TM3 Bus Coupler, Programming Guide)	2 isolated RS-485 ports (daisy-chained)	Modbus Serial Line	RJ45
	1 USB port	USB 2.0	mini-B
TM3BCCO (see Modicon TM3 Bus Coupler, Programming Guide)	2 isolated CANopen ports (daisy-chained)	CANopen	RJ45
	1 USB port	USB 2.0	mini-B

Modicon TM5 Fieldbus Interfaces

Introduction

The Modicon TM5 fieldbus interfaces is a device designed to manage the fieldbus communication when using TM5 and TM7 expansion modules in a distributed architecture.

The following table lists the Modicon TM5 fieldbus interfaces supported by EcoStruxure Machine Expert with their catalog references.

For more information, refer to the Modicon TM5 Fieldbus Interface - Hardware Guide (see Modicon TM5 EtherNet/IP Fieldbus Interface, Hardware Guide).

TM5 Fieldbus Interfaces

The following table shows the TM5 fieldbus interfaces:

Reference	Port	Communication type	Terminal type
TM5NCO1	1 CANopen port	CANopen	SUB-D 9
TM5NEIP1	2 Ethernet switched ports	Ethernet/IP	RJ45
TM5NS31	2 Sercos III ports	Sercos III	RJ45

Modicon Edge I/O NTS Network Interface Modules (NIM)

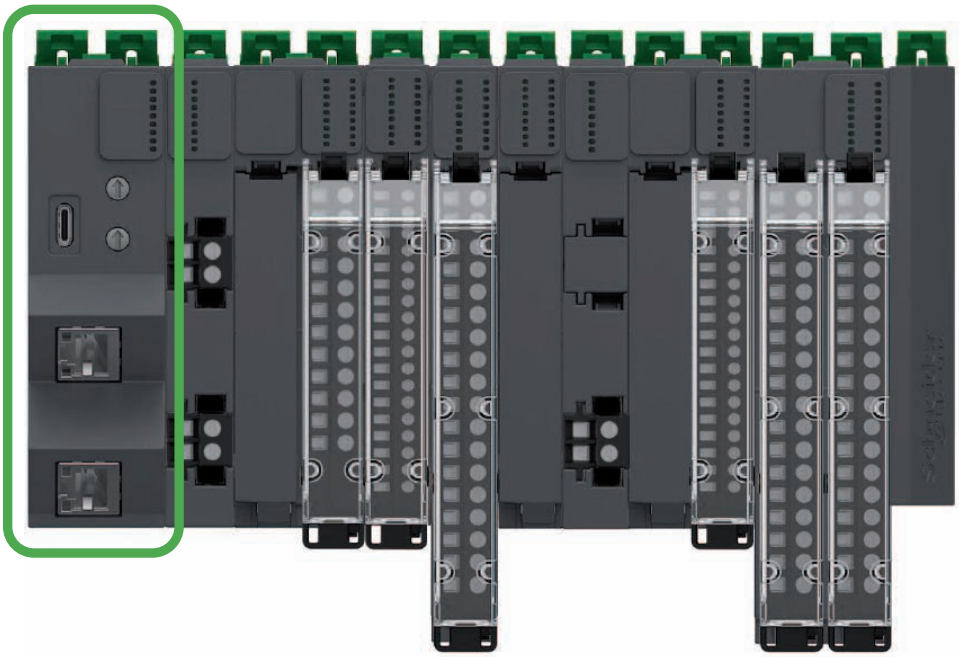
Introduction

The first component of a Modicon Edge I/O NTS configuration, on a distributed I/O main cluster, is a network interface module.

This module is the interface between the I/O modules and the fieldbus master. It is the only module on the main cluster that is fieldbus-dependent, different network interface modules are available for each fieldbus.

NOTE: References exist that terminate with a 'K' that are kits which include the base, and in the case of the network interface modules, the cluster termination, with the module. Those references are not mentioned in the following table of references.

The following figure shows the location of the network interface module in a distributed I/O main cluster:



NOTE: References ending with a H are for hardened products, suitable for harsh environments.

For more details, see Modicon Edge I/O NTS Network Interface Modules User Guide.

Modicon Edge I/O NTS Network Interface Modules

The following table shows the Network Interface Modules supported by EcoStruxure Machine Expert:

Reference	Port	Communication type	Terminal type
NTSNEC1200	2 isolated switched Ethernet ports	EtherNet/IP Modbus TCP	RJ45
	1 USB port	USB 2.0	USB Type-C
NTSNEC1200H	2 isolated switched Ethernet ports	EtherNet/IP Modbus TCP	RJ45
	1 USB port	USB 2.0	USB Type-C

Motor Control

TeSys island

TeSys island is an innovative digital load management system for loads up to 80 A / 37 kW and direct on line starter (DOL) that comprises:

- full access to the relevant data for digital management and advanced analytics, for example:
  - current
  - power
  - energy
  - switching cycles
  - power factor, and more
- full connectivity over fieldbuses such as EtherNet/IP, Modbus TCP, PROFIBUS DP and PROFINET
- engineering with an online configuration and integration into EcoStruxure Machine Expert with device type manager DTM
- innovative and new object oriented approach for configuration - engineering and operation with the TeSys island avatar concept
- availability of function libraries for EcoStruxure Machine Expert and for third party controller systems
- simple operation and maintenance with the integrated Operation and Maintenance Tool (OMT) to reduce machine stoppages and machine downtime:
  - cyber security with Achilles 2 certification
  - reduce auxiliary wiring

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
ATV320	Synchronous and asynchronous	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
ATV6••		0.75...160 kW	Compact	X	Option	X	Option
ATV6••		90...800 kW	Floor standing	X	Option	X	Option
ATV9••		0.75...315 kW	Compact	X	Option	X	Option
ATV9••		110...800 kW	Floor standing	X	Option	X	Option

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
  - LXM32A: advanced servo drive from 0.15 to 7 kW
  - LXM32i integrated drives: a modular range with Lexium BMi servo motors and integrated drives to cover power ratings from 400 W to 2.1 kW.
  - LXM32M: modular servo drive from 0.15 to 7 kW
- Lexium 52: stand-alone servo drives for servo motors from 0.4 and 7 kW
- Lexium 62: multi axis servo drives for servo motors from 0.95 to 24 kW

Lexium™ MC12 multi carrier

The Lexium™ MC12 multi carrier is a transport system for moving, positioning or grouping objects in machines using linear motion.

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

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

The Safety Controller XPSMC provides 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
- Non-safety-related communication to controllers via Modbus, CANopen, or PROFIBUS.

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

Modular Safety Controller XPSMCM

The 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
- 10 different fieldbus expansion modules for non-safety-related communication with logic controllers

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

NOTE: The preconfigured EtherNet/IP device XPSMCM provided in the software 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

C

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.

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.

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.

DOL:

(*direct on line starter*) The direct on line starter is the simplest kind of starter that connects the motor directly to the power supply through a three-phase contactor. The direct on line starter usually consists of a contactor, circuit breakter and an overload relay for protection against any damage.

DTM:

(*device type manager*) Classified into 2 categories:

- Device DTMs connect to the field device configuration components.
- CommDTMs connect to the software communication components.

The DTM provides a unified structure for accessing device parameters and configuring, operating, and diagnosing the devices. DTMs can range from a simple graphical user interface for setting device parameters to a highly sophisticated application capable of performing complex real-time calculations for diagnosis and maintenance purposes.

E

element:

The short name of the ARRAY element.

equipment:

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

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.

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*.

H

HE10:

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

I

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).

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*.

N

network:

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

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).

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.

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.

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.

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.)

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.

T

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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