Modicon TMH2GDB

Remote Graphic Display
User Guide

12/2018

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Schneider Electric

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

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

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

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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

About the Book

At a Glance

Document Scope

Use this document to learn how to:

- Connect your Remote Graphic Display to your controller.
- Commission and maintain your Remote Graphic Display.
- Operate your Remote Graphic Display interface with EcoStruxure Machine Expert - Basic.

NOTE: Read and understand this document and all related documents before installing, operating, or maintaining your Remote Graphic Display.

Validity Note

This document has been updated for the release of EcoStruxure™ Machine Expert - Basic V1.0.

For product compliance and environmental information (RoHS, REACH, PEP, EOLI, etc.), go to *www.schneider-electric.com/green-premium*.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented 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.

Related Documents

Title of Documentation	Reference Number
EcoStruxure Machine Expert - Basic - Operating Guide	*EIO0000003281 (ENG)* *EIO0000003282 (FRE)* *EIO0000003283 (GER)* *EIO0000003284 (SPA)* *EIO0000003285 (ITA)* *EIO0000003286 (CHS)* *EIO0000003287 (POR)* *EIO0000003288 (TUR)*
EcoStruxure Machine Expert - Basic Generic Functions - Library Guide	*EIO0000003289 (ENG)* *EIO0000003290 (FRE)* *EIO0000003291 (GER)* *EIO0000003292 (SPA)* *EIO0000003293 (ITA)* *EIO0000003294 (CHS)* *EIO0000003295 (POR)* *EIO0000003296 (TUR)*

You can download these technical publications and other technical information from our website at https://www.schneider-electric.com/en/download

Product Related Information

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

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

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

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

⚠ WARNING

LOSS OF CONTROL

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

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

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

Terminology Derived from Standards

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

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

Among others, these standards include:

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

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

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

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

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

Chapter 1
Presentation

Introduction

This chapter provides information related to the description, technical presentation, certifications and standards of the Remote Graphic Display.

What Is in This Chapter?

This chapter contains the following topics:

Description

Overview

The Remote Graphic Display is a local control unit. It is used in conjunction with the Modicon M221 Logic Controller for monitoring, commissioning, operating, and maintenance activities.

System Description

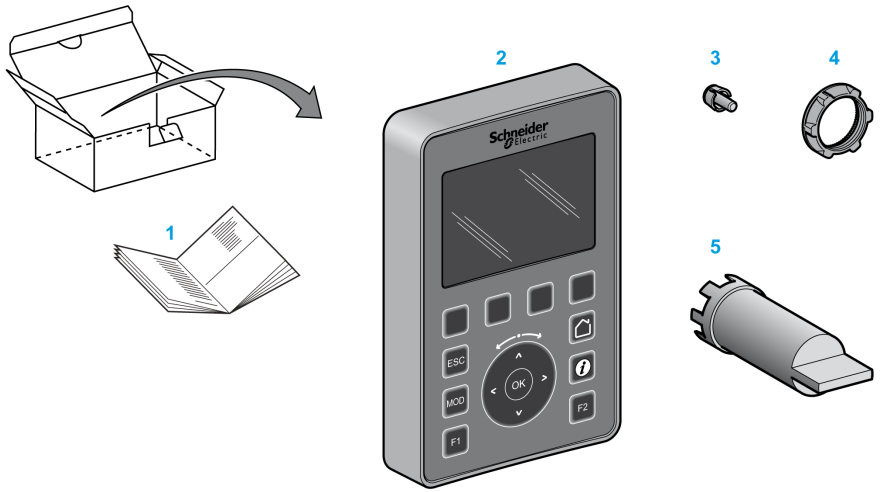
When connecting the Remote Graphic Display to your logic controller, you can access the **Setup menu** *(see page 45)* page.

You can also define customized pages *(see page 57)* with EcoStruxure Machine Expert - Basic.

The Remote Graphic Display can be connected to your logic controller by the serial line (**Serial** or **Serial 1**). For more information, refer to Connecting the Remote Graphic Display *(see page 31)*.

Physical Description

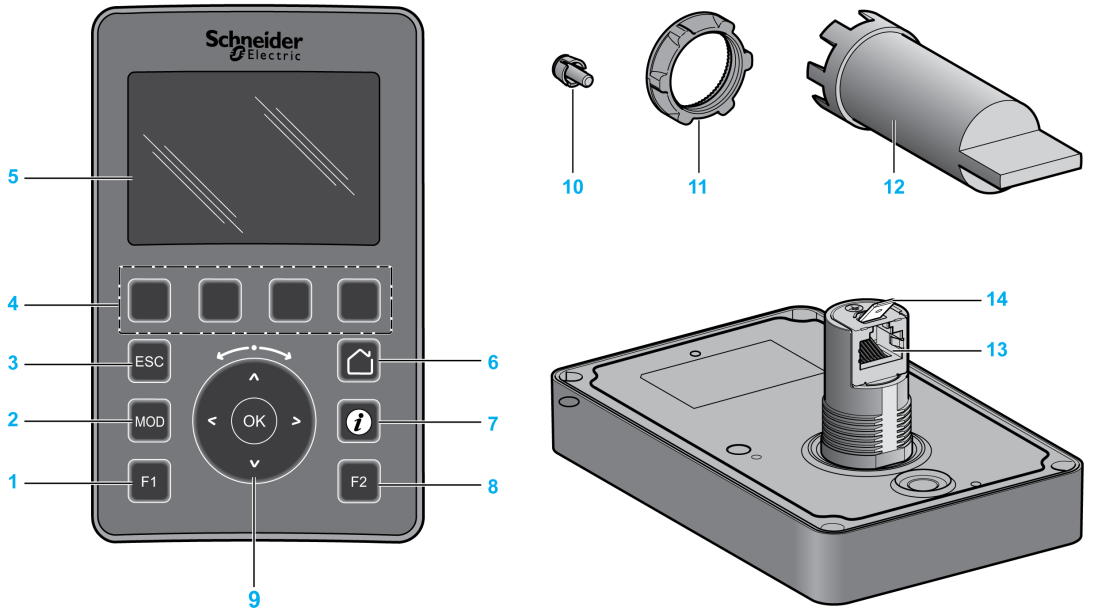
This illustration presents the delivery content for a Remote Graphic Display:



1 Remote Graphic Display Instruction Sheet
2 Remote Graphic Display
3 Anti-rotation tee
4 Installation nut
5 Socket wrench (ZB5AZ905), tightening tool for the installation nut

Remote Graphic Display Description

This illustration presents the Remote Graphic Display:



1 **F1** key
2 **MOD** key
3 **ESC** key
4 **R1** to **R4** keys
5 **Graphic screen**
6 **Home** key
7 **Information** key
8 **F2** key
9 Touch wheel/**OK**/Arrows
10 Anti-rotation tee
11 Installation nut
12 Socket wrench (ZB5AZ905)
13 RJ45 serial line (RS-485)
14 Connector for functional ground (earth)

Technical Presentation

Enclosure Requirements

The Remote Graphic Display components are designed as Zone B, Class A industrial equipment according to IEC/CISPR Publication 11. If they are used in environments other than those described in these standards, or in environments that do not meet the specifications in this manual, the ability to meet electromagnetic compatibility requirements in the presence of conducted and/or radiated interference may be reduced.

All Remote Graphic Display components meet European Community (CE) requirements for open equipment as defined by IEC/EN 61131-2.

Environmental Characteristics

This equipment meets CE requirements as indicated in the table below. This equipment is intended for use in a pollution degree 2 industrial environment.

⚠ 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.

Characteristic		Specification
Standard compliance	IEC/EN 61131-2 IEC/EN 61010-2-201	
Ambient operating temperature		-15...50 °C (5...122 °F)
Storage temperature		-40...70 °C (-40...158 °F)
Relative humidity	Transport and storage	95 % (non-condensing)
	Operation	
Pollution degree	IEC/EN 60664-1	2
Protection degree	IEC/EN 61131-2	Front face: IP65 (when properly installed as instructed) Back face: IP20
Corrosion immunity		Atmosphere free from corrosive gases
Operating altitude		0...2000 m (0...6560 ft)
Storage altitude		0...2000 m (0...6560 ft)
Vibration resistance		2 g 3...150 hz maximum 1.5 mm
Mechanical shock resistance		147 m/s^2 (482.285 ft/s^2), 15 g for 11 ms duration

Electromagnetic Susceptibility

The Remote Graphic Display components meet electromagnetic susceptibility specifications as indicated in this table:

Characteristic	Designed to specification	Range	
Electrostatic discharge	IEC/EN 61000-4-2	8 kV (air discharge) 4 kV (contact discharge)	
Radiated electromagnetic field	IEC/EN 61000-4-3	10 V/m (80 MHz...1 GHz) 3 V/m (1.4 GHz...2 GHz) 1 V/m (2...3 GHz)	
Magnetic field	IEC/EN 61000-4-8	30 A/m 50 Hz, 60 Hz	
Fast transient burst	IEC/EN 61000-4-4	1 kV	
Surge immunity	IEC/EN 61000-4-5 IEC/EN 61131-2	CM(1)	DM(2)
		0.5 kV	0.5 kV
Induced electromagnetic field	IEC/EN 61000-4-6	10 Vrms (0.15...80 MHz)	
Conducted emission	IEC/EN 55011 (IEC/CISPR Publication 11)	DC power line: • 10...150 kHz: 120...69 dBµV/m QP • 150...1500 kHz: 79...63 dBµV/m QP • 1.5...30 MHz: 63 dBµV/m QP	
Radiated emission	IEC/EN 55011 (IEC/CISPR Publication 11)	Class A, 10 m distance: • 30...230 MHz: 40 dBµV/m QP • 230 MHz...1 GHz: 47 dBµV/m QP	

(1) Common mode
(2) Differential mode

Certifications and Standards

Introduction

The Remote Graphic Display is designed to conform to the main national and international standards concerning electronic industrial control devices:

- IEC/EN 61131-2
- UL 508C

The Remote Graphic Display has obtained the following conformity marks:

- CE
- UL

Compatibility of The Remote Graphic Display

Overview

Before using the Remote Graphic Display, verify the compatibility of the Remote Graphic Display with the version of EcoStruxure Machine Expert - Basic, the controller firmware version, and the functional level of the application.

Compatibility With EcoStruxure Machine Expert - Basic

The installed version of EcoStruxure Machine Expert - Basic must be equal to or greater than 1.0.

NOTE: To display the installed version of EcoStruxure Machine Expert - Basic, click **About** on the **Start Menu**.

Compatibility with the Controller Firmware

The firmware version of the M221 Logic Controller must be equal to or greater than 1.3.x.y.

NOTE: To display the firmware version, click **Commissioning → Connect**, select **M221 Logic Controller**, and click **Login**. Under **Selected Controller**, the firmware version and controller are identified.

You can update the firmware using one of the following methods:

- Controller Updates *(see EcoStruxure Machine Expert - Basic, Operating Guide)* in EcoStruxure Machine Expert - Basic
- ExecLoader (Updating Firmware using Executive Loader Wizard *(see Modicon M221, Logic Controller, Programming Guide)*)
- SD card (Firmware Management *(see Modicon M221, Logic Controller, Programming Guide)*)

Compatibility with the Functional Level of the Application

The functional level of the application must be equal to or greater than level 3.0.

NOTE: For more information, refer to functional level *(see EcoStruxure Machine Expert - Basic, Operating Guide)*.

Incompatibility Detection

If an incompatibility is detected between Remote Graphic Display and the functional level of the application, the following use cases occur:

Logic Controller Firmware Version	Remote Graphic Display Firmware Version	Consequence	System Object Updates
>= V1.4.x.y	• **V1.1IE40 for M221** is displayed on TMH2GDB at power-up • %SW185 = 0100 hex	• The Remote Graphic Display shows the **Incompatible device or incompatible application level** screen. • %SW182 = 4: Remote Graphic Display firmware update required(1) • %SW183 = 2: Incompatible version of the display(1)	Update of the Remote Graphic Display firmware is not possible with this Remote Graphic Display firmware version.
>=V1.4.x.y	• **V1.3IEx for M221** is displayed on TMH2GDB at power-up • %SW185 = 0103 hex	• The Remote Graphic Display shows the **Incompatible device or incompatible application level** screen. • %SW182 = 4: Remote Graphic Display firmware update required(1) • %SW183 = 2: Incompatible version of the display(1)	Updating the Remote Graphic Display firmware is possible by using an SD card script.
(1) Refer to %SW182 and %SW183 for more details.			

Chapter 2
Installation

Introduction

This chapter provides information related to the installation of the Remote Graphic Display.

What Is in This Chapter?

This chapter contains the following topics:

Installation and Maintenance Requirements

Before Starting

Read and understand this chapter before beginning the installation of your system.

The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only you, the user, machine builder or integrator, can be aware of all the conditions and factors present during installation and setup, operation, and maintenance of the machine or process, and can therefore determine the automation and associated equipment and the related safeties and interlocks which can be effectively and properly used. When selecting automation and control equipment, and any other related equipment or software, for a particular application, you must also consider any applicable local, regional, or national standards and/or regulations.

Pay particular attention in conforming to any safety information, different electrical requirements, and normative standards that would apply to your machine or process in the use of this equipment.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.

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

Programming Considerations

⚠ 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.

Operating Environment

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Install and operate this equipment according to the conditions described in the section Technical Presentation.

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

Installation Considerations

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- Do not use this equipment in safety-critical machine functions unless the equipment is otherwise designated as functional safety equipment and conforming to applicable regulations and standards.
- Do not disassemble, repair, or modify this equipment.
- Do not connect any wiring to reserved, unused connections, or to connections designated as No Connection (N.C.).

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

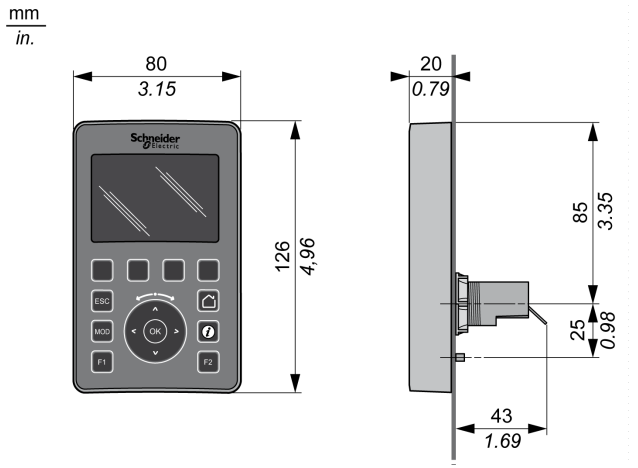
Dimensions and Clearances

Introduction

This section describes the dimensions and the mounting clearances for the Remote Graphic Display.

Dimensions

This illustration describes the external dimensions of the Remote Graphic Display:



Minimum Clearances

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Place devices dissipating the most heat at the top of the cabinet and ensure adequate ventilation.
- Avoid placing this equipment next to or above devices that might cause overheating.
- Install the equipment in a location providing the minimum clearances from all adjacent structures and equipment as directed in this document.
- Install all equipment in accordance with the specifications in the related documentation.

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

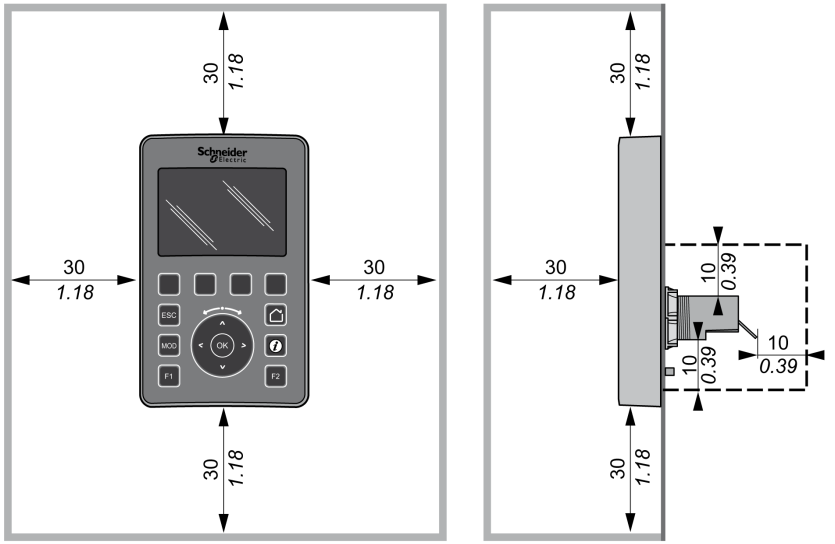
The Remote Graphic Display has been designed as an IP65 product when properly installed, excluding the RJ45 connector. The Remote Graphic Display must be installed on the front panel of the cabinet or enclosure to achieve the IP65 rating. Clearances must be respected when installing the product.

There are four types of clearances between:

- The Remote Graphic Display and all sides of the cabinet (including the panel door).
- The Remote Graphic Display connector and the wiring ducts. This distance reduces electromagnetic interference between the Remote Graphic Display and the wiring ducts.
- The Remote Graphic Display and other heat generating devices installed in the same cabinet.
- The Remote Graphic Display and other Remote Graphic Display on the same panel door.

This illustration describes the minimum clearances:

mm
in.



NOTE: Keep adequate spacing for proper ventilation and to maintain the operating temperature specified in the Environmental Characteristics *(see page 16)*.

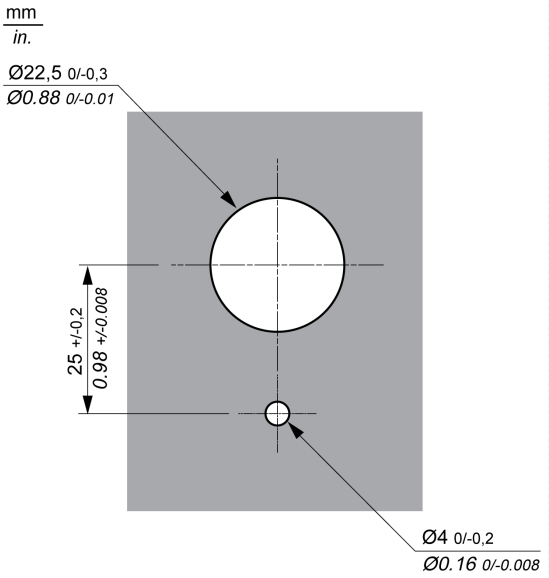
Mounting

Overview

This section presents how to install the Remote Graphic Display on the cabinet panel.

Mounting Hole Layout

This diagram presents the drilling template for the Remote Graphic Display:



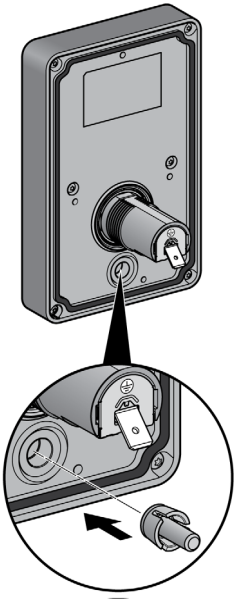
Prerequisites Before Installing the Remote Graphic Display

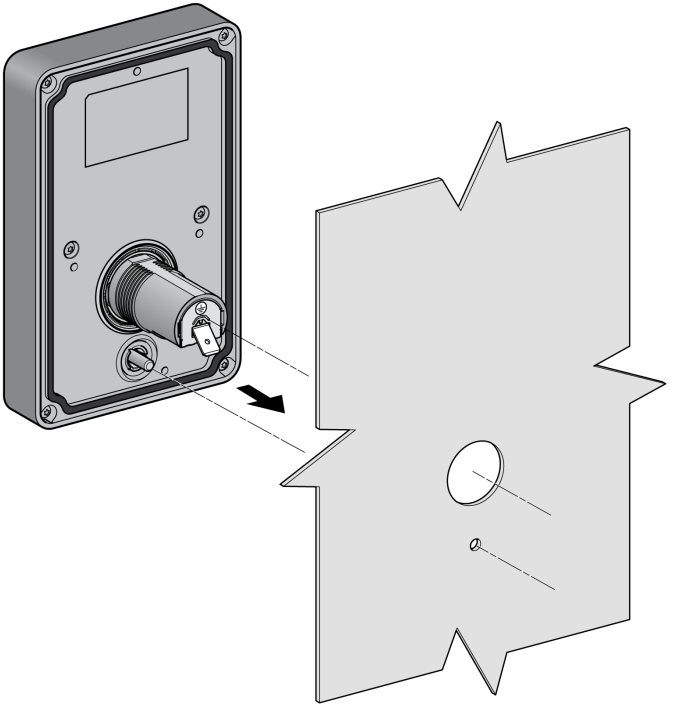
Before installing the Remote Graphic Display, verify that:

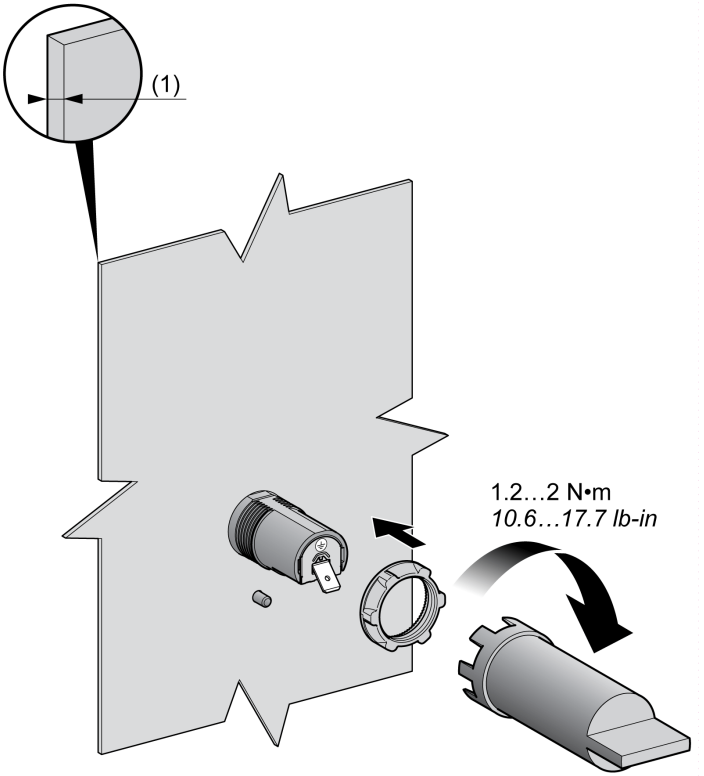
- The gasket must be uniform and undamaged.
- The installation panel or cabinet surface must be flat and smooth, with a tolerance of 0.5 mm (0.019 in).
- The panel thickness must be between 1.5 mm and 6 mm if the cabinet panel is steel sheeting, or between 3 mm and 6 mm if the cabinet panel is glass fiber reinforced plastic.

Installing the Remote Graphic Display

This procedure describes how to install the Remote Graphic Display:

Step	Action
1	Insert the anti-rotation tee into the Remote Graphic Display.  **NOTE:** The rotating torque that can be supported by the Remote Graphic Display is 6 N.m (53.10 in-lb).

Step	Action
2	Insert the Remote Graphic Display on the cabinet panel. 

Step	Action
3	Install the nut and tighten it with the socket wrench (ZB5AZ905).  **(1)** 1,5...6 mm (0.06...0.24 in) if steel sheet or 3...6 mm (0.12...0.24 in) if glass fiber reinforced plastic (minimum GF30)

Cleaning the Remote Graphic Display

When the front panel of the Remote Graphic Display needs cleaning, wipe it with a soft cloth. If necessary, use a neutral detergent.

NOTICE
INOPERABLE EQUIPMENT Do not use any liquids containing acids, organic solvents, alcohol, or abrasive materials to clean the unit. **Failure to follow these instructions can result in equipment damage.**

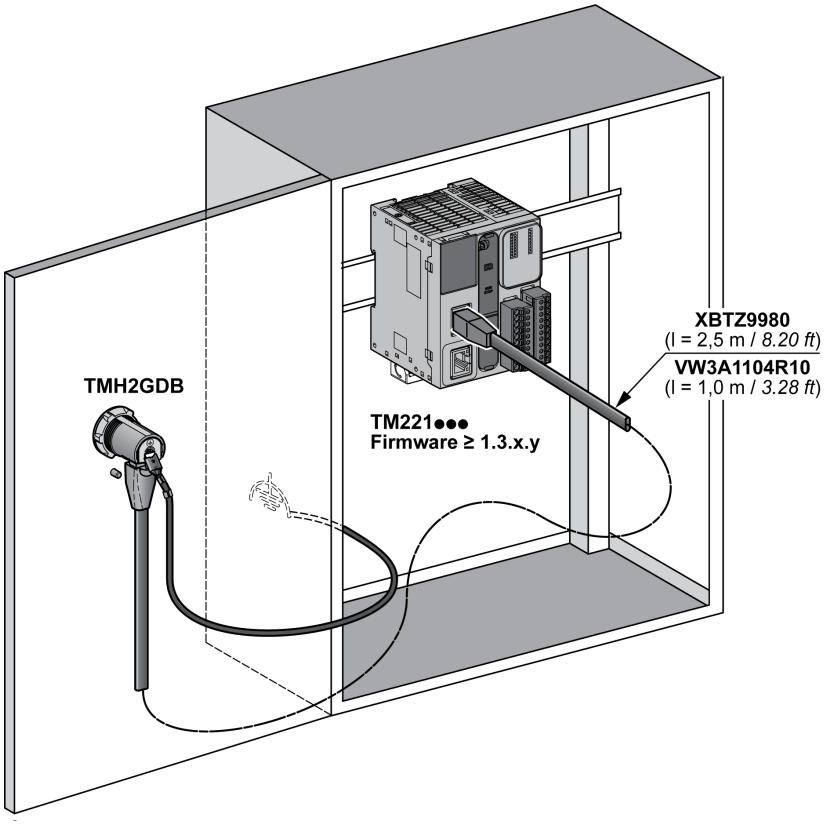
Care must be taken when wiping the surface of the Remote Graphic Display. Inadvertently pressing the keys while doing so may unintendedly engage programmed machine operations.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Do not press any of the keys while cleaning the surface of the equipment.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Connecting the Remote Graphic Display

Overview

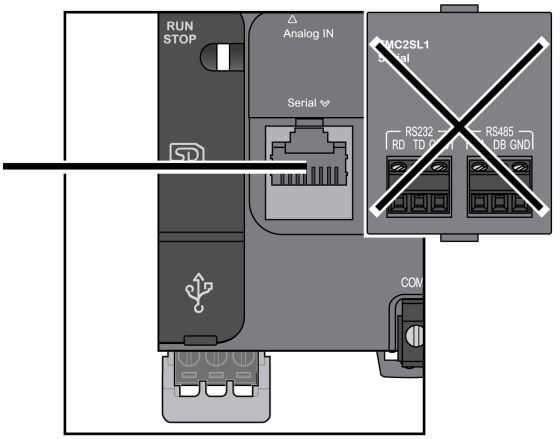
The Remote Graphic Display must be connected only to the **Serial** or **Serial 1** port of the logic controller. These serial ports of the logic controllers provide the 5 Vdc power supply of the Remote Graphic Display. The Remote Graphic Display must be the only device connected to these serial ports (do not use a Tap-off box). The connection between the Remote Graphic Display and the logic controller is RS-485 (Modbus protocol).



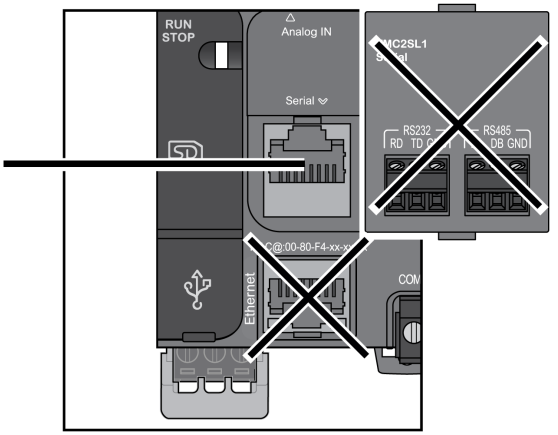
Logic Controller Connection

The following graphics present the location of the **Serial** or **Serial 1** port, depending on the logic controller reference:

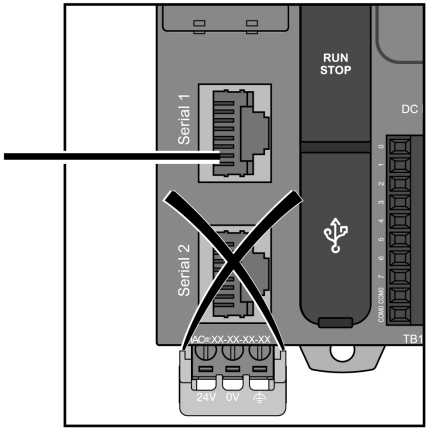
TM221C●●R
TM221C●●T



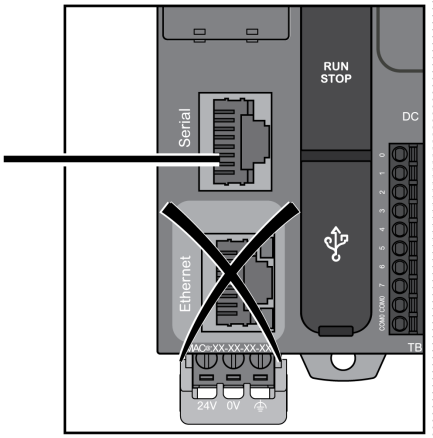
TM221CE●●R
TM221CE●●T



TM221M16●/G
TM221M32TK

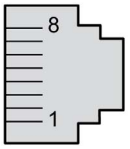


TM221ME16●/G
TM221ME32TK



Pin Assignment

This illustration presents the pin assignment of the RJ45 connector:



Pin	Signal	Description
1	N.C.	No connection
2	N.C.	No connection
3	N.C.	No connection
4	D1	Modbus SL: D1 (+/B) RS-485 2-wire
5	D0	Modbus SL: D0 (-/A) RS-485 2-wire
6	N.C.	No connection
7	5 Vdc	Power delivered by the logic controller
8	0 Vdc	-

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

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

Grounding

The grounding lug of the Remote Graphic Display must be connected to the ground terminal screw of the cabinet.

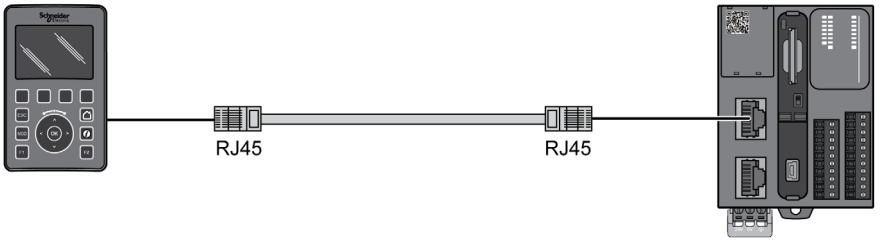
This table presents the characteristics of the grounding connection:

Characteristic	Description
Minimum wire gauge	2.5 mm² (AWG 14)
Lug size	6.35 x 0.81 mm (0.25 x 0.032 in)
Connection	Female spade terminal (AMP 6392-1 or similar)

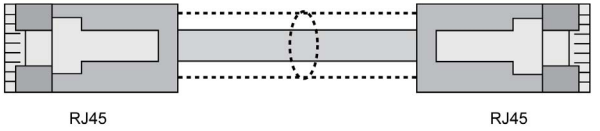
Connecting Cables

You can use the following cable for connecting the Remote Graphic Display to the logic controller:

Reference	Description	Length
XBTZ9980	Modbus serial link cable (2 RJ45 male connectors)	2.5 m (8.20 ft)
VW3A1104R10	Modbus serial link cable (2 RJ45 male connectors)	1.0 m (3.28 ft)



This illustration presents the internal wiring of the RJ45 connection:



1	No connection	1
2	No connection	2
3	No connection	3
4	D1	4
5	D0	5
6	No connection	6
7	5 Vdc	7
8	0 Vdc	8
Shielding	Shield	Shielding

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

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

Updating the Firmware

Presentation

Firmware updates can be downloaded to the Remote Graphic Display from the PC that is running EcoStruxure Machine Expert - Basic.

For details, refer to Downloading Firmware to the Remote Graphic Display *(see Modicon M221, Logic Controller, Programming Guide)*.

Chapter 3
How to Use the Remote Graphic Display

Introduction

This chapter provides information related to the graphic screen presentations, the navigation, and the password protection of the Remote Graphic Display.

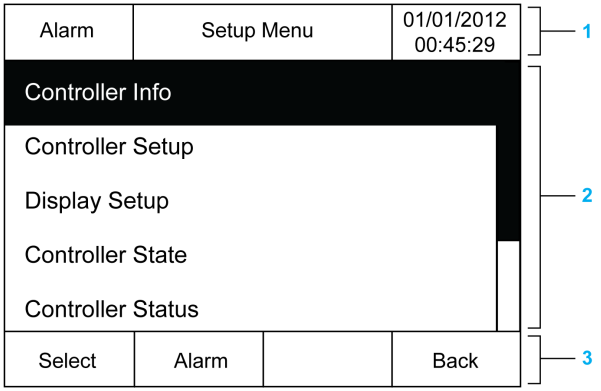
What Is in This Chapter?

This chapter contains the following topics:

Description

Graphic Screen Description

This is a graphic screen example of the Remote Graphic Display:



This table describes the areas of the graphic screen:

Item	Name	Label	Description
1	Header	Alarm	Informs you that at least 1 alarm is active on the Alarm View page *(see page 51)*. **NOTE:** This field is empty if no alarm is active or if no Alarm View *(see page 80)* page has been defined.
		Page title	–
		Date and time	–
2	Menus or Pages	–	Menus, submenus, parameters, values, or other content are displayed in scrolling window format on five displayed lines.
3	Footer	**R1** to **R4**	Labels corresponding to actions if configured at a page level. For more information, refer to Actions *(see page 77)*.

Home Page

After connecting the Remote Graphic Display, it displays the home page that has been chosen in EcoStruxure Machine Expert - Basic *(see page 57)*.

The default home page is the **Setup Menu** that allows you to configure and monitor the general parameters of your logic controller *(see page 45)*.

Navigation

Overview

This table describes the navigation controls of the Remote Graphic Display:

Name	Function	Comment
F1 key	Executes actions defined with EcoStruxure Machine Expert - Basic for that key.	For more information, refer to Actions *(see page 77)*.
MOD key	Moves to the next selectable object.	In a page with a scroll bar, this key is disabled.
ESC key	Goes back to the previous page.	You can go back up to 12 pages.
R1 to **R4** keys	Execute an action.	The actions are either fixed, such as those found in **Setup** pages, or defined/assigned with EcoStruxure Machine Expert - Basic for **Operator Interface** pages. For more information, refer to Actions *(see page 77)*.
Home key	Goes back to the Home page.	For more information, refer to Home Page *(see page 40)*.
Information key	Displays a contextual help page.	The help pages are either fixed, such as those found in **Setup** pages, or defined/assigned with EcoStruxure Machine Expert - Basic for **Operator Interface** pages. For more information on help pages, refer to the Template Pages *(see page 64)*.
F2 key	Executes actions defined with EcoStruxure Machine Expert - Basic for that key.	For more information, refer to Actions *(see page 77)*.
Touch wheel Up/down arrows	Depending on the page, it can either: ● Select the next/previous elements displayed ● Increment/decrement the selected object	–
Right/left arrows	Select the next/previous selectable object.	In a page with a scroll bar, right/left arrows are disabled.
OK	● Opens a menu, submenu, or page. ● Enables modification for the numerical value of a parameter.	For more information, refer to Edit Pages *(see page 48)*.

NOTICE

INOPERABLE EQUIPMENT

Do not use hard or pointed objects to operate the device.

Failure to follow these instructions can result in equipment damage.

Access Protection

The access to some pages can be restricted by a password. For more information, refer to Password Protection *(see page 43)*.

Password Protection

Overview

You can use EcoStruxure Machine Expert - Basic software to define a password. If enabled, this unique password helps to protect:

- the selected page(s) of the **Operator Interface**
- The **Setup** pages that can perform an action on the logic controller:
  - **Controller Setup**
  - **Controller State**
  - **Data Table**
  - **Alarm Reset**

For more information, refer to Set General Parameters *(see page 62)*.

Password Management in the Remote Graphic Display

When you try to access a protected page on the Remote Graphic Display, you need to enter the password:

If...	Then ...	Comment
The entered password is correct	You can consult the pages.	The password is valid for 10 minutes or until you press the **Home** key.
The entered password is incorrect	An error message appears.	When leaving the error page, you can enter the password again. If you cancel, the Home page is displayed.

Chapter 4
Setup Menu Functionality

Introduction

This chapter provides information related to the menus present in the **Setup** of the Remote Graphic Display.

What Is in This Chapter?

This chapter contains the following topics:

Setup Menu Presentation

Menu Structure

This table lists the menu and submenus present in the **Setup Menu** of the Remote Graphic Display:

Menu	Submenu	Comment
Controller Information	**Device Name** **Firmware Version** **Last MAST cycle** **Min. MAST cycle** **Max. MAST cycle**	–
Controller Setup	**Date and Time** **Serial 2** **Ethernet**	For more information, refer to the **Controller Setup** Menu *(see page 47)*.
Display Setup	**Language** **Contrast** **Backlight timeout**	The language, the contrast and backlight timeout values are saved inside the Remote Graphic Display. The default backlight timeout is 10 minutes, it can be set from 0 (no timeout) to 10 minutes maximum.
Controller State	–	For more information, refer to the **Controller State** Menu *(see page 49)*.
Controller Status	**Application** **Boot App** **IO Bus** **Cartridge**	Each status can have these values: ● OK ● Not OK
Alarm Menu	**View** **History** **Delete History**	For more information, refer to the **Alarm Menu** *(see page 51)*.
Data Table	–	For more information, refer to the **Data Table** Menu *(see page 53)*.
SD Card Information	–	It is a help page that explains how to transfer firmware, application, and post configuration from: ● The logic controller to the SD card ● The SD card to the logic controller

NOTE: Keeping the backlight ON continuously reduces the lifetime of the device.

NOTICE
INOPERABLE EQUIPMENT Set the Backlight timeout of the device between 1 and 10 minutes. **Failure to follow these instructions can result in equipment damage.**

Controller Setup Menu

Overview

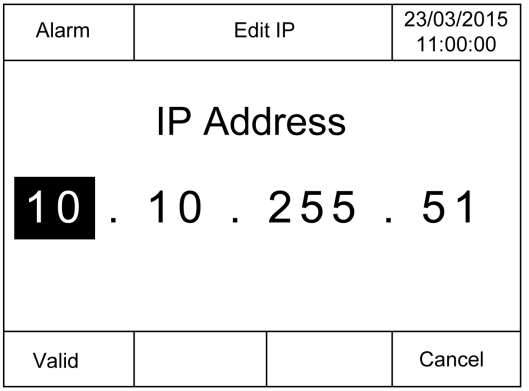
This table lists the submenus that are present in the **Controller Setup** menu of the **Setup**:

Submenu	Function	Comment
Date and Time	Allows you to set the logic controller internal date and time.	The format of date and time can only be configured in EcoStruxure Machine Expert - Basic. Refer to Set the General Parameters *(see page 62)*.
Serial 2 (depending on the logic controller reference)	Allows you to configure the **Serial 2** parameters (1): • **Physical Medium** • **Baud rate** • **Parity** • **Format** • **Stop Bits** • **Modbus Address** • **Polarization**	**Serial 1** cannot be configured as it interrupts the ongoing communication with the Remote Graphic Display.
Ethernet (depending on the logic controller reference)	Allows you to configure the Ethernet parameter (1): • **IP Mode** • **IP Address** • **Mask** • **Gateway** • **Device Name**	If the **IP Address** and **Mask** are incorrect, your logic controller is automatically configured with the default values.
(1) The entered parameters are saved into the Post Configuration file. The parameters are retained after a power cycle.		

NOTE: For more information on how to modify the **Serial 2** or **Ethernet** parameters, refer to Edit Pages *(see page 48)*.

Edit Pages

This graphic presents the **Edit IP** page:



This procedure explains how to modify selected parameters in the **Serial 2** and **Ethernet** submenus:

Step	Action
1	Select **Setup** → **Controller Setup**.
2	Select **Serial 2** or **Ethernet**. **Result**: The **Serial 2** or **Ethernet** page is displayed.
3	Select the parameter with the touch wheel and press **OK** to modify it. **Result**: One of these pages is displayed: • **Edit Parameter** • **Edit IP** • **Edit Name**
4	Select the digit using the **MOD** key or right/left arrows.
5	Increment or decrement the selected digit using the touch wheel or up/down arrows. Turn the touch wheel in the same direction for more than 2 seconds to accelerate the scrolling of digits.
6	Press: • **R1** (**Valid**) to apply the modification. • **R4** (**Cancel**) to discard the modification. **NOTE:** Press the **ESC** key to discard the modification and go back to the previous page.

Controller State Menu

Overview

The **Controller State** menu allows you to see the present state of your logic controller and perform commands in the logic controller.

Remote Control Considerations

Care must be taken and provisions made for use of this product as a control device to avoid inadvertent consequences of commanded machine operation, state changes, or alteration of data memory or machine operating parameters.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Place operator devices of the control system near the machine or in a place where you have full view of the machine.
- Protect operator commands against unauthorized access.
- If remote control is a necessary design aspect of the application, ensure that there is a local, competent, and qualified observer present when operating from a remote location.
- Configure and install the Run/Stop input, if so equipped, or, other external means within the application, so that local control over the starting or stopping of the device can be maintained regardless of the remote commands sent to it.

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

⚠ WARNING

UNINTENDED MACHINE OR PROCESS START-UP

- Verify the state of security of your machine or process environment before applying power to the Run/Stop input.
- Use the Run/Stop input to help prevent the unintentional start-up from a remote location.

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

Logic Controller Commands

This procedure explains how to perform the logic controller commands:

Step	Action
1	Select **Setup** → **Controller State**.
2	Press: • **R1** (**Run**) to start the logic controller • **R2** (**Stop**) to stop the logic controller • **R3** (**Init**) to initialize the logic controller
3	When a confirmation page is displayed, select **Yes** or **No**.
4	Press: • **R1** (**Valid**) • **R4** (**Cancel**)

For more information, refer to the Controller States and Behaviors part of your logic controller programming guide.

Alarm Menu

Overview

The **Alarm Menu** contains these submenus:

- **View**
- **History**
- **Delete History**

Alarm View

The **Alarm View** page displays the active alarms. Alarm messages are configured in EcoStruxure Machine Expert - Basic. For more information, refer to the alarm definition *(see page 80)*.

Alarms are associated with specific memory bits within the logic controller. Those bits are monitored and, when `TRUE`, are included in the **Alarm View**.

When system bit %S122 is set to 1, the **Alarm View** page is displayed automatically when a rising edge is detected on an alarm bit.

When system bit %S123 is set to 1, the backlight on the Remote Graphic Display turns red when an alarm is active. For more information, refer to system bit (%S122 and %S123) description *(see Modicon M221, Logic Controller, Programming Guide)*.

NOTE: Alarm bit must be ON for at least 50 ms before it is included in the **Alarm View** .

Alarm History

	Alarm History	09/03/2015 10:01:11
Power is OFF	▼	09/03/2015 09:54:24
Power is OFF	▲	09/03/2015 09:54:22
Machine door open	▼	09/03/2015 09:54:19
Machine door open	▲	09/03/2015 09:54:15
Alarm	Delete		Back

The **History** page displays a maximum of 40 alarm messages with the date and time when the alarm either became active or was resolved, along with an up arrow to indicate when the alarm became active and a down arrow when it is resolved. The most recent alarm is at the top of the list.

Alarm Reset

The **Alarm Reset** page is used to clear the alarm history:

Step	Action
1	Select **Setup** → **Alarm Menu** → **Delete History**. **Result**: The **Alarm Reset** page is opened.
2	Press **R1** (**Delete**) to clear the alarm history. **Result**: The **Alarm History** page is empty.

Data Table Menu

Overview

In the **Data Table** page, you can add/delete or modify the value of a variable:

- Memory objects
- System objects
- I/O objects

A maximum of 20 entries is displayed in this page.

NOTE: This table is not saved after a power cycle of your logic controller.

Remote Control Considerations

Care must be taken and provisions made for use of this product as a control device to avoid inadvertent consequences of commanded machine operation, state changes, or alteration of data memory or machine operating parameters.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Place operator devices of the control system near the machine or in a place where you have full view of the machine.
- Protect operator commands against unauthorized access.
- If remote control is a necessary design aspect of the application, ensure that there is a local, competent, and qualified observer present when operating from a remote location.
- Configure and install the Run/Stop input, if so equipped, or, other external means within the application, so that local control over the starting or stopping of the device can be maintained regardless of the remote commands sent to it.

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

Object Types

These memory objects are available:

- System bit (%S)
- System word (%SW)
- Memory bit (%M)
- Memory word (%MW)
- Constant word (%KW)
- Memory double word (%MD)

These I/O objects are available:
- Input bit (%I)
- Output bit (%Q)
- Input word (%IW)
- Output word (%QW)
- Input status word (%IWS)
- Output status word (%QWS)

Add/Delete a Variable

This procedure explains how to add a variable in the **Data Table** page:

Step	Action
1	Select **Setup** → **Data Table**.
2	Press **R1** (**Add**). **Result**: The **Object Type** page is displayed.
3	Select the object types. For more information on object types, refer to the list *(see page 53)*.
4	Press **R1** (**Select**).
5	Enter: ● The address for a memory object. ● The module and channel values for an I/O object.
6	Press **R3** (**Edit**) or use the touch wheel.
7	Select the displayed representation (Decimal or hexadecimal).
8	Press **R1** (**Add**) to add the variable in the data table.
9	Repeat steps 2 to 8 to add another variable to your monitoring list.

NOTE: You can delete a variable from the table by pressing **R2** (**Delete**).

Edit a Variable

You can modify the value of an existing variable.

NOTE: Editing a variable is not allowed when the logic controller state is `EMPTY`.

Follow the procedures below when editing:
- A word or double word variable
- A memory bit variable
- An I/O bit variable

Edit a Word or a Double Word Variable

This procedure explains how to modify the value of a word or a double word variable in the **Data Table** page:

Step	Action
1	Select **Setup** → **Data Table**.
2	Select the word or double word variable to modify.
3	Press **R3** (**Edit**) to modify the variable. **Result**: The **Edit Word** or **Edit DWord** page is displayed.
4	Select the digit using the **MOD** key or right/left arrows.
5	Increment or decrement the selected digit using the touch wheel or up/down arrows.
6	Press: • **R1** (**Apply**) to apply the modification. • **R4** (**Cancel**) to discard the modification. **NOTE:** Press the **ESC** key to discard the modification and go back to the previous page.
7	Repeat steps 2 to 6 to modify another word or double word variable.

Edit a Memory Bit Variable

This procedure explains how to modify the value of a memory bit variable in the **Data Table** page:

Step	Action
1	Select **Setup** → **Data Table**.
2	Select the memory bit variable to modify.
3	Press **R3** (**Edit**) to modify the variable. **Result**: The **Edit bit** page is displayed.
4	Select **Off** or **On** using the touch wheel or up/down arrows.
5	Press: • **R1** (**Apply**) to apply the modification. • **R4** (**Cancel**) to discard the modification. **NOTE:** Press the **ESC** key to discard the modification and go back to the previous page.
6	Repeat steps 2 to 5 to modify another memory bit variable.

Edit an I/O Bit Variable

Forcing input and output values in a running logic controller can have serious consequences to the operation of a machine or process. Only those who understand the implications in the controlling logic, and who understand the consequences of forced I/O on the machine or process, should attempt to use this function.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

You must have prior knowledge of the process and the controlled equipment before attempting to force logic controller physical inputs/outputs, or writing values to logic controller memory locations.

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

This procedure explains how to modify the value of an I/O bit variable in the **Data Table** page:

Step	Action
1	Select **Setup** → **Data Table**.
2	Select the I/O bit variable to modify.
3	Press **R3** (**Edit**) to modify the variable. **Result**: The **Edit I/O** bit page is displayed.
4	Select **Off** or **On** using the touch wheel or up/down arrows.
5	Press: • **R1** (**Apply**) to apply the modification. • **R2** (**Force**) to force the I/O value. • **R3** (**Unforce**) to unforce the I/O value. • **R4** (**Cancel**) to discard the modification. **NOTE:** Press the **ESC** key to discard the modification and go back to the previous page.
6	Repeat steps 2 to 5 to modify another I/O bit variable.

Chapter 5
Creating an Operator Interface with EcoStruxure Machine Expert - Basic

Introduction

This chapter provides information on how to build an **Operator Interface** in the **Display** tab of EcoStruxure Machine Expert - Basic.

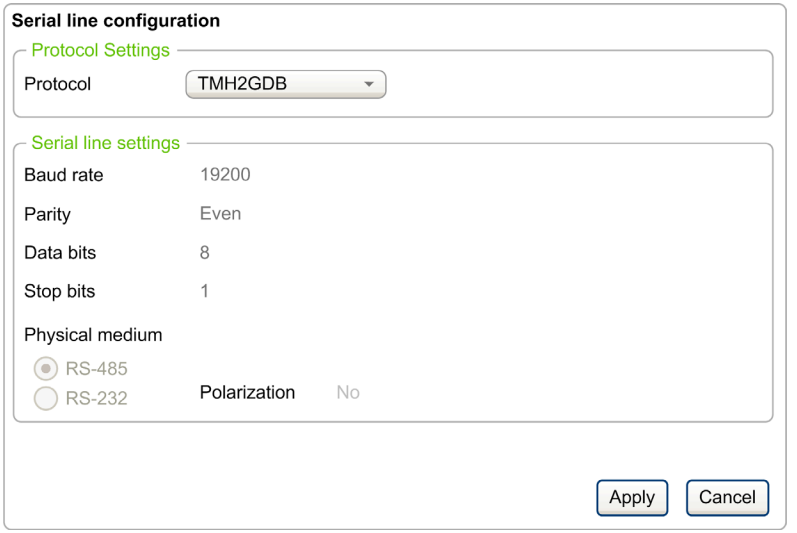
What Is in This Chapter?

This chapter contains the following topics:

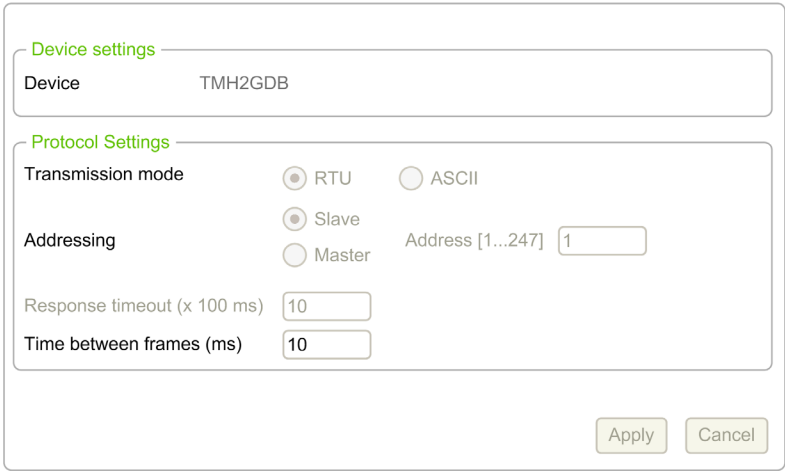
Prerequisite

Serial Line Configuration

To configure the **Serial/Serial 1** line in EcoStruxure Machine Expert - Basic:

Step	Action
1	Select the **Configuration** tab.
2	Click the **SL1 (Serial Line)** node in the hardware tree.
3	Select **TMH2GDB** in the **Protocol** field. The Remote Graphic Display uses fixed serial line communication parameters: 
4	Click **Apply**. **Result**: The serial line is configured to communicate with your Remote Graphic Display and the **Display** tab is activated.
5	Click the **Display** node that appears below the **SL1 (Serial Line)** node in the hardware tree to display device settings.

This graphic presents the **Device settings** in the **Configuration** tab of EcoStruxure Machine Expert - Basic:



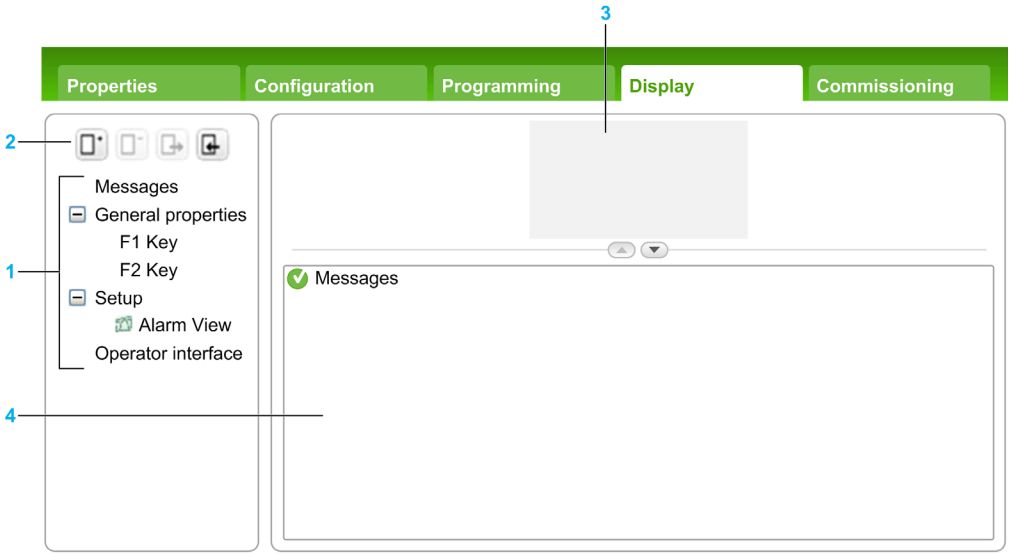
EcoStruxure Machine Expert - Basic Display Tab

Overview

The **Operator Interface** is a component of the application.

- For more information on creating projects, refer to Creating Projects With EcoStruxure Machine Expert - Basic *(see EcoStruxure Machine Expert - Basic, Operating Guide)*.
- For more information on transferring applications, refer to Downloading and Uploading Applications *(see EcoStruxure Machine Expert - Basic, Operating Guide)*.

The **Operator Interface** is built with the **Display** tab in EcoStruxure Machine Expert - Basic:



1 Tree
2 Buttons
3 Visualization area
4 Editable area

Button Description

The buttons apply to the pages of the **Operator Interface**:

Button	Menu	Function
	**AddPage**	Add a page *(see page 64)*.
	**DeletePage**	Delete a customized page *(see page 72)*.
	**ExportPage**	Export a page *(see page 76)*.
	**ImportPage**	Import a page *(see page 76)*.

Tree Description

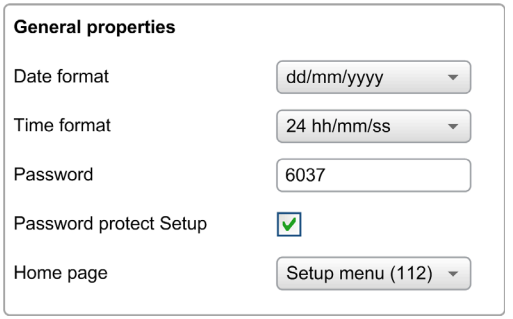
This table lists the menus and submenus present in the tree in the **Display** tab:

Menu	Submenu	Comment
Messages	–	If there is an error detected, a message is displayed.
General Properties	**F1 Key** **F2 Key**	To set the general parameters *(see page 62)*.
Setup	**Alarm View**	To define a set of alarms *(see page 80)*.
Operator Interface	–	To create customized menus, submenus and pages with the predefined templates *(see page 64)*.

General Properties

Overview

The **General Properties** node allows you to set the general parameters of the Remote Graphic Display.



You may select time and date formats, the home page for the Operator Interface that you have defined, and the password used for the Remote Graphic Display. The password is effective in helping to protect the Operator pages that you have selected to be protected, and, if you choose, the Setup pages that affect the logic controller state and data.

NOTE: The page defined as the home page cannot be protected by password. Setting a page protected by password as the home page automatically removes its password protection.
A password, randomly selected, is automatically assigned as a default every time you create a new application. In addition, the **Password protect Setup** option is selected by default.

Set General Properties

This procedure explains how to set the general properties of the **Display** tab:

Step	Action	Comments
1	Select the **General Properties** node in the tree.	–
2	Select the date format in the **Date format** field.	The date and time formats are used in the standard header and in the alarm history.
3	Select the time format in the **Time format** field.	
4	Enter a password to protect the selected **Operator Interface** pages and, optionally, the **Setup**.	**NOTE:** You may change the default password, or unselect the optional Setup protection. For more information, refer to Password Protection *(see page 43)*.
5	Activate the **Password protect Setup** check box to use the password to protect the **Setup**.	
6	Select the home page. The home page is the first page displayed once your application has been downloaded into the controller and also when you press the **Home** button on the Remote Graphic Display.	The **Setup menu** page is selected by default. Any other operator interface pages you have created can also be selected. For more information, refer to Add a page *(see page 64)*.

F1 and F2 Key Assignments

This procedure explains how to assign actions to **F1 Key** and **F2 Key**:

Step	Action
1	Select the **F1 Key** or **F2 Key** node in the tree.
2	Select the **Action type** that you want to associate with the key. For more information, refer to Action *(see page 77)*.

Add/Delete a Page

Overview

To build your **Operator Interface**, you need to create pages in the **Display** tab by using templates.

Add a Page

This table explains how to add a page in the **Operator Interface**:

Step	Action
1	Click the  (**AddPage**) button. **Result**: The **Select a page template** window is displayed.
2	Select the template page: • **Menu template** *(see page 64)* • **Monitor template** *(see page 65)* • **Control table template** *(see page 66)* • **Bargraph template** *(see page 67)* • **Double bargraph template** *(see page 68)* • **VU meter template** *(see page 70)* • **Toggle control table template** *(see page 71)*
3	Click **Ok** to validate. **Result**: The page is added in the tree *(see page 61)*.
4	Configure the properties of the page as described in Configure a page *(see page 73)*.
5	Repeat steps 1 to 3 to add another page in your **Operator Interface**.

Menu Template

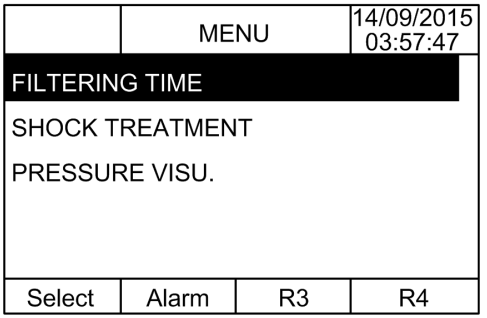
A menu page allows the user to navigate between several pages.

The user can press Select (**R1**) button to display the selected page.

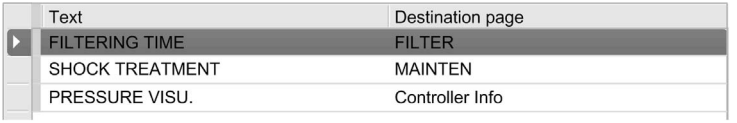
To configure a menu page:

Step	Action
1	Select the **Elements** node in the tree.
2	Enter the text to display.
3	Select a **Destination page**.
4	Click **Add**.
5	Repeat steps 2 to 4 to configure other destination pages. You can add a maximum of 30 elements to the page.
6	Configure the R2, R3, and R4 Key assignments *(see page 75)*.

TMH2GDB example:



Elements node in EcoStruxure Machine Expert - Basic example:



Monitor Template

A monitor page allows the user to monitor memory or I/O variables.

If the **Write access** is activated, the user can press Edit (**R1**) button to modify the selected variable value.

To configure the monitor page:

Step	Action
1	Select the **Elements** node in the tree.
2	Enter the text to display.
3	Enter the variable to monitor. Refer to the available variable type *(see page 74)* or refer to the text that is displayed when the pointer is on **Variable.**
4	Click **Add**.
5	On the created line, activate the **Write access** check box to allow the user to modify the variable value.
6	Repeat steps 2 to 5 to configure other variables to monitor. You can add a maximum of 30 elements to the page.
7	Configure the R2, R3, and R4 Key assignments *(see page 75)*.

TMH2GDB view:

	TEMPERATURE		14/09/2015 23:45:22
ENTRY			19
CORRIDOR			18
MEETING ROOM 1			20
MEETING ROOM 2			16
LOCKER ROOM			22
Edit	Alarm	+20°C	+17°C

Elements node in EcoStruxure Machine Expert - Basic example:

	Text	Variable:	Write access
▶	ENTRY	%MW0	☑
	CORRIDOR	%MW1	☑
	MEETING ROOM 1	%MW2	☑
	MEETING ROOM 2	%MW3	☑
	LOCKER ROOM	%MW4	☑

Control Table Template

A control page allows the user to control memory or I/O bit values.

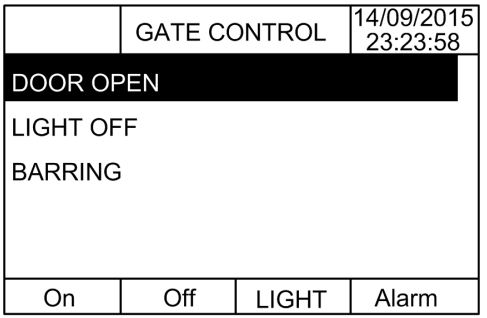
This page allows you to associate a text string to each bit value.

If the **Write access** is activated, the user can press On (**R1**) or Off (**R2**) buttons to change the selected bit value.

To configure the control page:

Step	Action
1	Select the **Elements** node in the tree.
2	Enter the variable to control. Refer to the available variable type *(see page 74)* or refer to the text that is displayed when the pointer is on **Variable.**
3	Enter the **Text when value is TRUE**.
4	Enter the **Text when value is FALSE**.
5	Click **Add**.
6	On the created line, activate the **Write access** check box to allow the user to modify the variable value.
7	Repeat steps 2 to 6 to configure other variables to monitor. You can add a maximum of 30 elements to the page.
8	Configure the R3 and R4 Key assignments *(see page 75)*.

TMH2GDB view:



Elements node in EcoStruxure Machine Expert - Basic example:

Variable:	Text when value is TRUE	Text when value is FALSE	Write access
%M0	DOOR OPEN	DOOR CLOSED	☑
%M1	LIGHT ON	LIGHT OFF	☑
%M2	BARRING		☑
%M3	OVERCAPACITY		☑

Bargraph Template

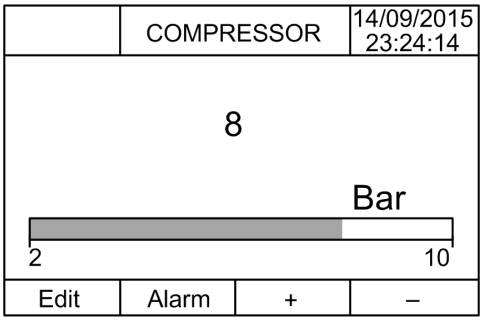
A bargraph page allows the user to control a memory or I/O variable value with a bargraph representation of the variable value.

If the **Write access** is activated, the user can press Edit (**R1**) button to change the value.

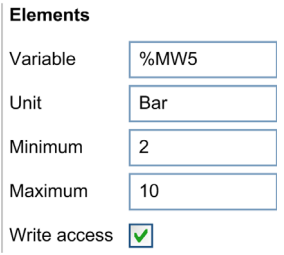
To configure the bargraph page:

Step	Action
1	Select the **Elements** node in the tree.
2	Enter the variable to control. Refer to the available variable type *(see page 74)* or refer to the text that is displayed when the pointer is on **Variable.**
3	Enter the **Unit**.
4	Enter the **Minimum** scale value.
5	Enter the **Maximum** scale value.
6	Activate the **Write access** check box to allow the user to modify the variable value.
7	Configure the R2, R3, and R4 Key assignments *(see page 75)*.

TMH2GDB view:



Elements node in EcoStruxure Machine Expert - Basic example:



Double Bargraph Template

A double bargraph page allows the user to control 2 memory or I/O variables value with a bar graph representation for each variable value.

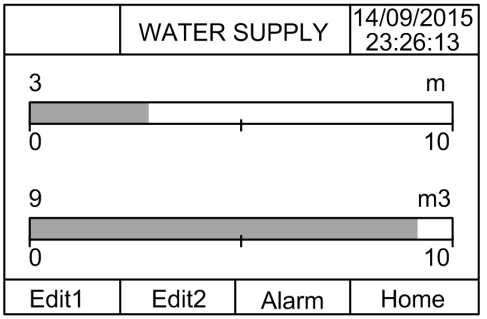
If the **Write access** is activated, the user can edit the BarGraph1 variable with the Edit.1 (**R1**) button and the BarGraph2 variable with Edit.2 (**R2**)

To configure the double bargraph page:

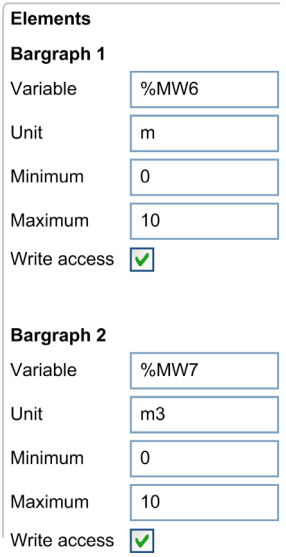
Step	Action
1	Select the **Elements** node in the tree.
2	Enter the variable to control. Refer to the available variable type *(see page 74)* or refer to the text that is displayed when the pointer is on **Variable.**
3	Enter the **Unit**.
4	Enter the **Minimum** scale value.
5	Enter the **Maximum** scale value.
6	Activate the **Write access** check box to allow the user to modify the variable value.

Step	Action
7	Repeat steps 2 to 6 to configure the second variable. You can add a maximum of 30 elements to the page.
8	Configure the R3 and R4 Key assignments *(see page 75)*.

TMH2GDB view:



Elements node in EcoStruxure Machine Expert - Basic example:



VU Meter Template

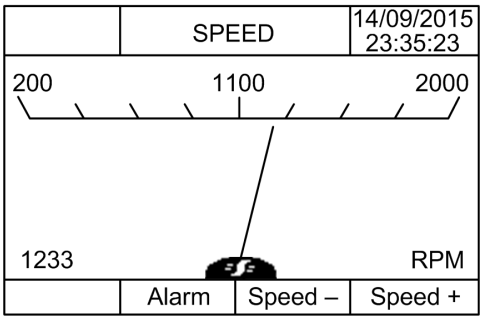
A VU meter page allows the user to control a memory or I/O variable value with a VU meter representation of the variable value.

If the **Write access** is activated, the user can press Edit (**R1**) button to change the value.

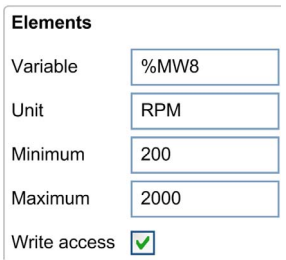
To configure the VU meter page:

Step	Action
1	Select the **Elements** node in the tree.
2	Enter the variable to control. Refer to the available variable type *(see page 74)* or refer to the text that is displayed when the pointer is on **Variable.**
3	Enter the **Unit**.
4	Enter the **Minimum** scale value.
5	Enter the **Maximum** scale value.
6	Activate the **Write access** check box to allow the user to modify the variable value.
7	Configure the R2, R3, and R4 Key assignments *(see page 75)*.

TMH2GDB view:



Elements node in EcoStruxure Machine Expert - Basic example:



Toggle Control Table Template

A toggle control page allows the user to control memory or I/O bit value.

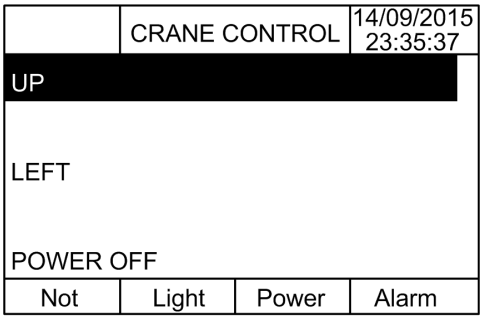
This page allows you to associate a text string to each bit value.

If the **Write access** is activated, the user can press Not (**R1**) button to toggle the selected bit (TRUE to FALSE or FALSE to TRUE).

To configure the toggle control page:

Step	Action
1	Select the **Elements** node in the tree.
2	Enter the variable to control. Refer to the available variable type *(see page 74)* or refer to the text that is displayed when the pointer is on **Variable.**
3	Enter the **Text when value is TRUE**.
4	Enter the **Text when value is FALSE**.
5	Click **Add**.
6	On the created line, activate the **Write access** check box to allow the user to modify the variable value.
7	Repeat steps 2 to 6 to configure other variables to control. You can add a maximum of 30 elements to the page.
8	Configure the R2, R3, and R4 Key assignments *(see page 75)*.

TMH2GDB view:



Elements node in EcoStruxure Machine Expert - Basic example:

Variable:	Text when value is TRUE	Text when value is FALSE	Write access
%Q0.5	UP		☑
%Q0.6	DOWN		☑
%Q0.7	LEFT		☑
%Q0.4	RIGHT		☑
%I0.0	POWER ON	POWER OFF	☐

Delete a Page

This table explains how to delete a page in the **Display** tab:

Step	Action
1	Click the page that you want to delete under the **Operator Interface** node in the tree.
2	Click the  (**Delete Page**) button, or right-click and choose **Delete page**. **Result**: A confirmation window appears.
3	Click **Yes**. **Result**: The page is deleted.

Configure a Page

Overview

In the tree, the added page is represented as follows:

- Page ID
  - **Elements**
  - **R1** key (if available)
  - **R2** key (if available)
  - **R3** key
  - **R4** key (if available)

Page Properties

This procedure explains how to define the **Page properties**:

Step	Action	Comment
1	Click the page ID node in the tree. **Result**: The **Page properties** appear.	You can rename the page ID by double-clicking or right-clicking and choosing **Rename page**.
2	Enter a page title in the **Title** field.	–
3	Enter a help text in the **Help text** field if needed.	The help text is displayed when pressing the **Information** key on the Remote Graphic Display. (1)
4	Activate/deactivate the **Password protect** check box to protect this page with the password or to exclude this page from the protection.	For more information, refer to Password Protection *(see page 43)*.
(1) If no text is entered, the **Information** key has no effect on this page.		

The **Page index** displayed is automatically generated by EcoStruxure Machine Expert - Basic and can be written in a user program to display the page, or read in a user program to detect the page currently being displayed.

For more information, refer to system word (%SW184) description *(see Modicon M221, Logic Controller, Programming Guide)*.

Elements

The configuration of elements depends on the template.

Enter customized text and/or appropriate values according to each template. For more information, refer to Template Pages *(see page 64)*.

You can add a maximum of 30 elements to a page.

This table describes the object types that can be entered in the **Variable**, **Unit**, **Minimum**, and **Maximum** fields for the template:

	%I	%Q	%IW	%QW	%IWS	%QWS	%M or %MWi.Xk	%S	%MW	%KW	%MD	%SW	Numeric value	Text
Variable/Variable1														
Monitor	x	x	x	x	x	x	x	x	x	x	x	x	–	–
Control table	x	x	–	–	–	–	x	x	–	–	–	–	–	–
Toggle Control table	x	x	–	–	–	–	x	x	–	–	–	–	–	–
Bargraph	–	–	x	x	–	–	–	–	x	–	x	x	–	–
Double Bargraph	–	–	x	x	–	–	–	–	x	–	x	x	–	–
VU meter	–	–	x	x	–	–	–	–	x	–	x	x	–	–
Variable/Variable2														
Double Bargraph	–	–	x	x	–	–	–	–	x	–	x	x	–	–
Unit														
Bargraph	–	–	–	–	–	–	–	–	–	–	–	–	–	x
Double Bargraph	–	–	–	–	–	–	–	–	–	–	–	–	–	x
VU meter	–	–	–	–	–	–	–	–	–	–	–	–	–	x
Minimum/Maximum														
Bargraph	–	–	–	–	–	–	–	–	–	–	–	–	x	–
Double Bargraph	–	–	–	–	–	–	–	–	–	–	–	–	x	–
VU meter	–	–	–	–	–	–	–	–	–	–	–	–	x	–

Fill in the fields following the rules described in Language Objects *(see EcoStruxure Machine Expert - Basic, Generic Functions Library Guide)*.

R1, R2, R3, and R4 Key Assignments

When a key appears in the tree, you can assign an action and a label to it:

Step	Action
1	Select the key node in the tree.
2	Select the **Action type** that you want to associate with the key. For more information, refer to action *(see page 77)*.
3	You can optionally rename the default label that is displayed above the corresponding key of the Remote Graphic Display. To do so, double-click the node or right-click and choose **Rename**.

NOTE: The templates have a key configured by default to go to the **Alarm View** page. You can choose to change the default action and the label of this key.

Export/Import a Page

Overview

Any page of the **Operator Interface** can be:

- Exported to the PC
- Imported from the PC

Export a Page

To export a page, click the  (**ExportPage**) button.

The page is saved in a specific format on your PC.

Import a Page

To import a page, click the  (**ImportPage**) button.

The page can then be imported in the same application, or in another application, with EcoStruxure Machine Expert - Basic.

Actions

Overview

An action can be associated to some keys:

- **R1**, **R2**, **R3**, or **R4** Key (when available) for each page. Refer to R1, R2, R3, and R4 Key Assignments *(see page 75)*.
- **F1 Key** or **F2 Key** for all the pages. Refer to F1 and F2 Key Assignments *(see page 63)*.

The action is executed when pressing the keys.

Defining Actions

There are two types of actions:

- **Function**
- **Navigation**

Function

Forcing input and output values in a running logic controller can have serious consequences to the operation of a machine or process. Only those who understand the implications in the controlling logic, and who understand the consequences of forced I/O on the machine or process, should attempt to use this function.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

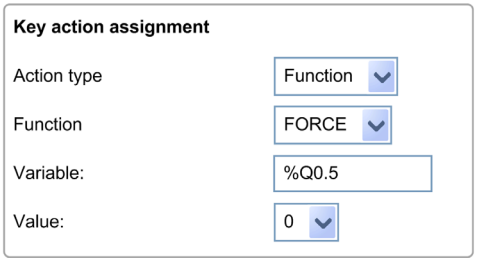
You must have prior knowledge of the process and the controlled equipment before attempting to force logic controller physical inputs/outputs, or writing values to logic controller memory locations.

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

These functions are available:

- **WRITE_VALUE**
- **FORCE**
- **UNFORCE**
- **INCREMENT**
- **NOT**

This graphic presents an example of a function in the **Display** tab:



Function Object Types

This table describes the object types that can be entered in the **Variable**, **Value**, **Increment Step**, **Minimum** and **Maximum** fields for the functions, when appropriate:

	%I	%Q	%IW	%QW	%IWS	%QWS	%M or %MWi.Xk	%S	%MW	%KW	%MD	%SW	Numeric value	Text
Variable														
WRITE_ VALUE	–	x	–	x	–	–	x	x	x	–	x	x	–	–
FORCE	x	x	–	–	–	–	–	–	–	–	–	–	–	–
UN-FORCE	x	x	–	–	–	–	–	–	–	–	–	–	–	–
INCRE-MENT	–	–	–	x	–	–	–	–	x	–	x	–	–	–
NOT	–	x	–	–	–	–	x	x	–	–	–	–	–	–
Value														
WRITE_ VALUE	x	x	x	x	x	x	x	x	x	x	x	x	x	–
Increment Step														
INCRE-MENT	–	–	–	–	–	–	–	–	x	–	–	–	x	–
Minimum/Maximum														
INCRE-MENT	–	–	–	–	–	–	–	–	–	–	–	–	x	–

Fill in the fields following the rules described in the part Language Objects *(see EcoStruxure Machine Expert - Basic, Generic Functions Library Guide)*.

Navigation

The **Navigation** action allows you to go to another page.

In a dropdown list, you can choose a **Destination page** that corresponds to:

- Any page defined in your **Operator Interface**
- A page from the **Setup**

Alarm Definition

Overview

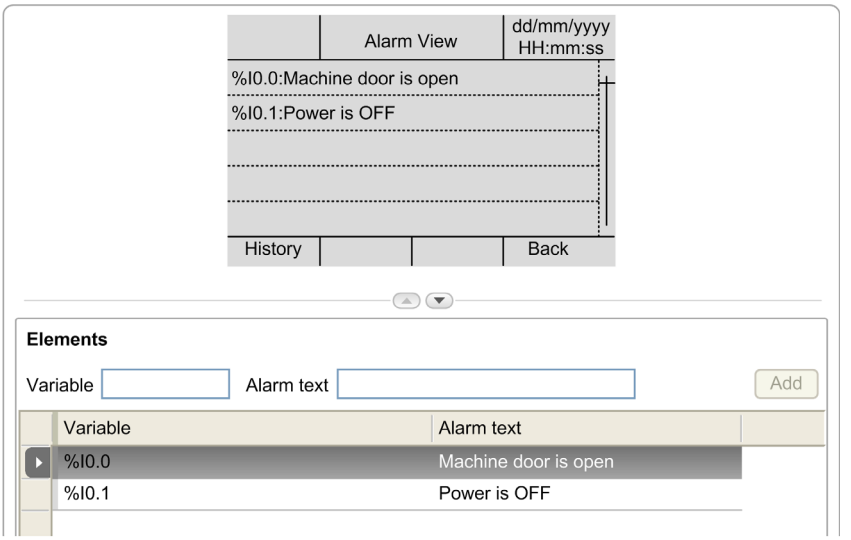
The **Alarm View** page allows you to define a customized set of alarm messages associated with memory or I/O bits. The text of the alarm is then displayed on the Remote Graphic Display when a rising edge of the associated bit is detected. You can define a maximum of 20 alarm messages.

For more information on the alarm in the Remote Graphic Display, refer to the Alarm Menu *(see page 51)*.

Alarms have to be first configured in the **Alarm View > Elements** page of the **Display** tab in EcoStruxure Machine Expert - Basic.

Alarm Configuration

This graphic presents the **Alarm View > Elements** page of the **Display** tab:



Enter customized **Alarm text** and **Variable** values.

The object types that can be entered in the **Variable** field are:

- %I
- %Q
- %M
- %S
- %MWi.Xk

Fill in the field following the rules described in the part Language Objects *(see EcoStruxure Machine Expert - Basic, Generic Functions Library Guide)*.

Glossary

!

%I

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

%IW

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

%KW

According to the IEC standard, %KW represents a constant word.

%MW

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

%Q

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

%QW

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

%S

According to the IEC standard, %S represents a system bit.

%SW

According to the IEC standard, %SW represents a system word.

B

Boot application

(*boot application*) The binary file that contains the application. Usually, it is stored in the controller and allows the controller to boot on the application that the user has generated.

D

DWORD

(*double word*) Encoded in 32-bit format.

E

EN

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

Ethernet

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

I

I/O

(*input/output*)

ID

(*identifier/identification*)

IEC

(*international electrotechnical commission*) A non-profit and non-governmental international standards organization that prepares and publishes international standards for electrical, electronic, and related technologies.

IP

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

M

master task

A processor task that is run through its programming software. The master task has 2 sections:

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

ms

(*millisecond*)

R

RJ45

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

RS-485

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

W

WORD

A type encoded in a 16-bit format.

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