



M221 RTC synchronisation with HMI

Programming Example





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Introduction

Overview

This chapter gives the introduction.

Contents of this chapter

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Before You Begin

General

The products specified in this document have been tested under actual service conditions. Of course, your specific application requirements may be different from those assumed for this and any related examples described herein. In that case, you will have to adapt the information provided in this and other related documents to your particular needs. To do so, you will need to consult the specific product documentation of the hardware and/or software components that you may add or substitute for any examples specified in this documentation. Pay particular attention and conform to any safety information, different electrical requirements and normative standards that would apply to your adaptation.

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WARNING

REGULATORY INCOMPATIBILITY

Be sure that all equipment applied and systems designed comply with all applicable local, regional and national regulations and standards

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

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



The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only the user 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, the user or integrator must also consider any applicable local, regional or national standards and/or regulations.

Some of the major software functions and/or hardware components used in the proposed architectures and examples described in this document cannot be substituted without significantly compromising the performance of your application. Further, any such substitutions or alterations may completely invalidate any proposed architectures, descriptions, examples, instructions, wiring diagrams and/or compatibilities between the various hardware components and software functions specified herein and in related documentation. You must be aware of the consequences of any modifications, additions or substitutions.

A residual risk, as defined by EN/ISO 12100-1, Article 5, will remain if

- it is necessary to modify the recommended logic and if the added or modified components are not properly integrated in the control circuit.
- you do not follow the required standards applicable to the operation of the machine, or if the adjustments to and the maintenance of the machine are not properly made (it is essential to strictly follow the prescribed machine maintenance schedule).
- the devices connected to any safety outputs do not have mechanically-linked contacts.

CAUTION

EQUIPMENT INCOMPATIBILITY

Read and thoroughly understand all device and software documentation before attempting any component substitutions or other changes related to the application examples provided in the document

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



Start-Up and Test

Before using electrical control and automation equipment after design and installation, the application and associated functional safety system must be subjected to a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such testing be made and that enough time is allowed to perform complete and satisfactory testing.

CAUTION

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices
- Remove tools, meters, and debris from equipment.

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

Verify that the completed system, including the functional safety system, is free from all short circuits and grounds, except those grounds installed according to local regulations. If high-potential voltage testing is necessary, follow the recommendations in equipment documentation to help prevent injury or equipment damage.



Operations and Adjustments

General

Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly installed and operated.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the hands and other parts of the body are free to enter the pinch points or other hazardous areas where serious injury can occur. Software products alone cannot protect an operator from injury. For this reason, the software cannot be substituted for or take the place of point-of-operation protection.

WARNING

UNGUARDED MACHINERY CAN CAUSE SERIOUS INJURY

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

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

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the examples and implementations suggested herein. It is sometimes possible to adjust the equipment incorrectly and this produce unsatisfactory or unsafe operation. Always use the manufacturer instructions as a guide to functional adjustments. Personnel who have access to these adjustments must be familiar with the equipment manufacturer instructions and the machinery used with the electrical equipment. Only those operational adjustments actually required by the machine operator should be accessible to the operator. Access to other controls should be restricted to help prevent unauthorized changes in operating characteristics.

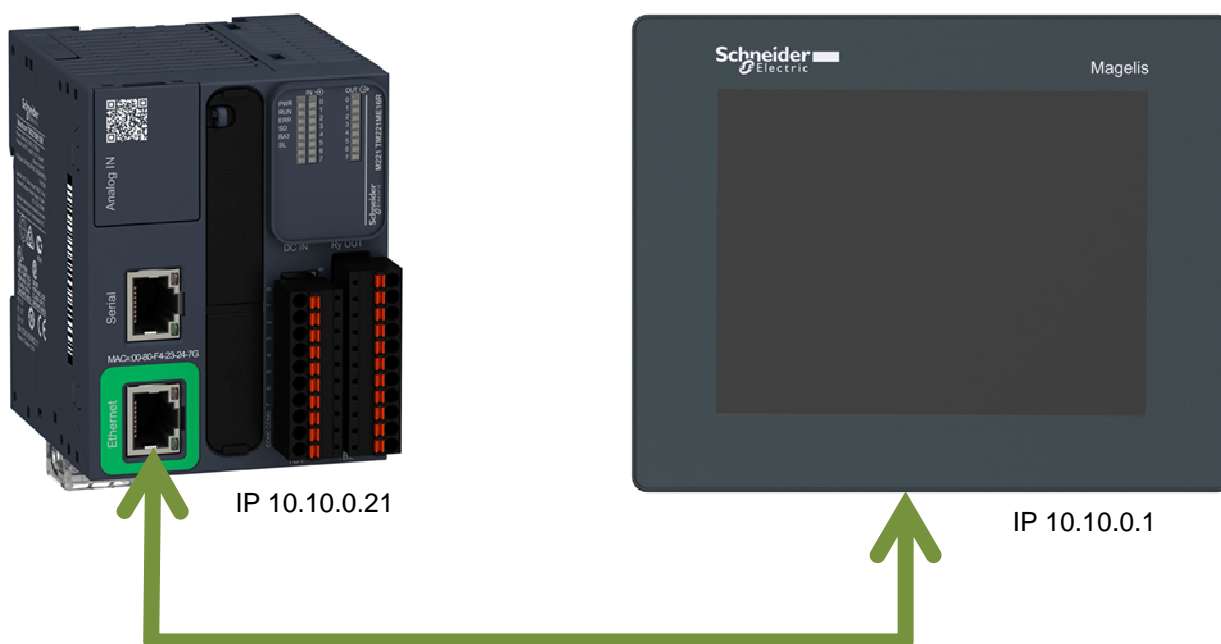


Technical Information

General Description

M221 integrates an RTC (Real Time Clock) backed up by a battery.
When connected to an HMI, it is possible to synchronize the HMI time and the M221 time.
In this example the M221 time will be copied to the HMI RTC.

M221 and the HMI are linked by an Ethernet cable.
Protocol is Modbus TCP.





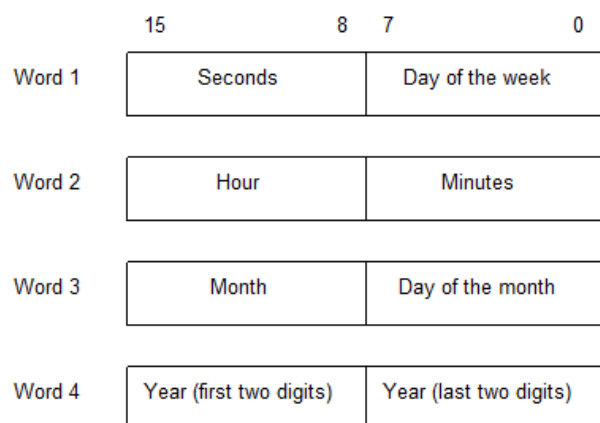
In M221 current time and date are stored in 5 system words in BCD format:

RTC functions: words containing current date and time values (in BCD):	
%SW49	xN Day of the week (N=1 for Monday)
%SW50	00SS Seconds
%SW51	HHMM: hour and minute
%SW52	MMDD: month and day
%SW53	CCYY: century and year

On HMI side 4 words are used:

5.6.2.17 Set terminal clock

This function is a block of four 16 bit words that stores the target machine time and date. The following illustration shows the structure:



The target machine ignores the values in the Day of the Week and derives this value from calculating of the date information.

In the target machine Dialog Table, the Day of the Week is determined by the following values:

Value	Day
1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday
7	Sunday

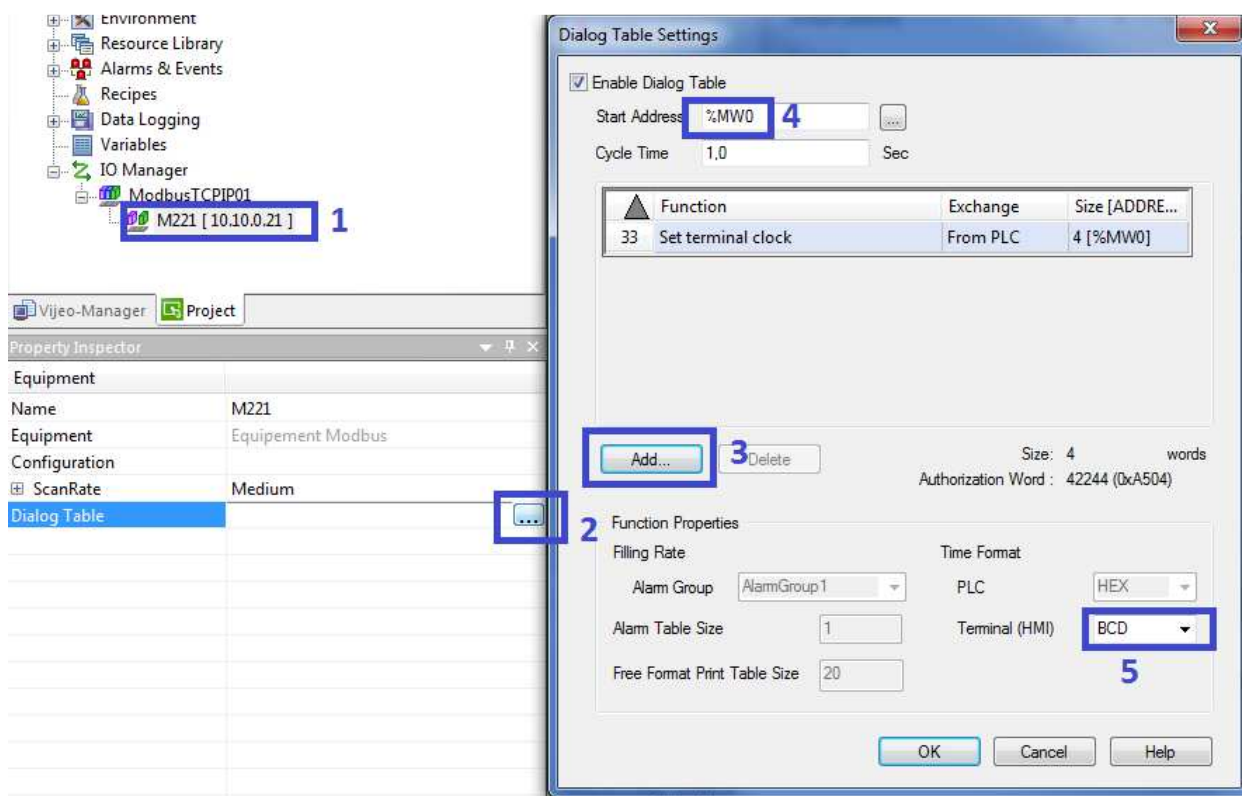


HMI configuration with Vijeo Designer

Some configuration has to be done to successfully link M221 and the HMI.

This example has been created using an XBTGT2330 Magelis HMI.

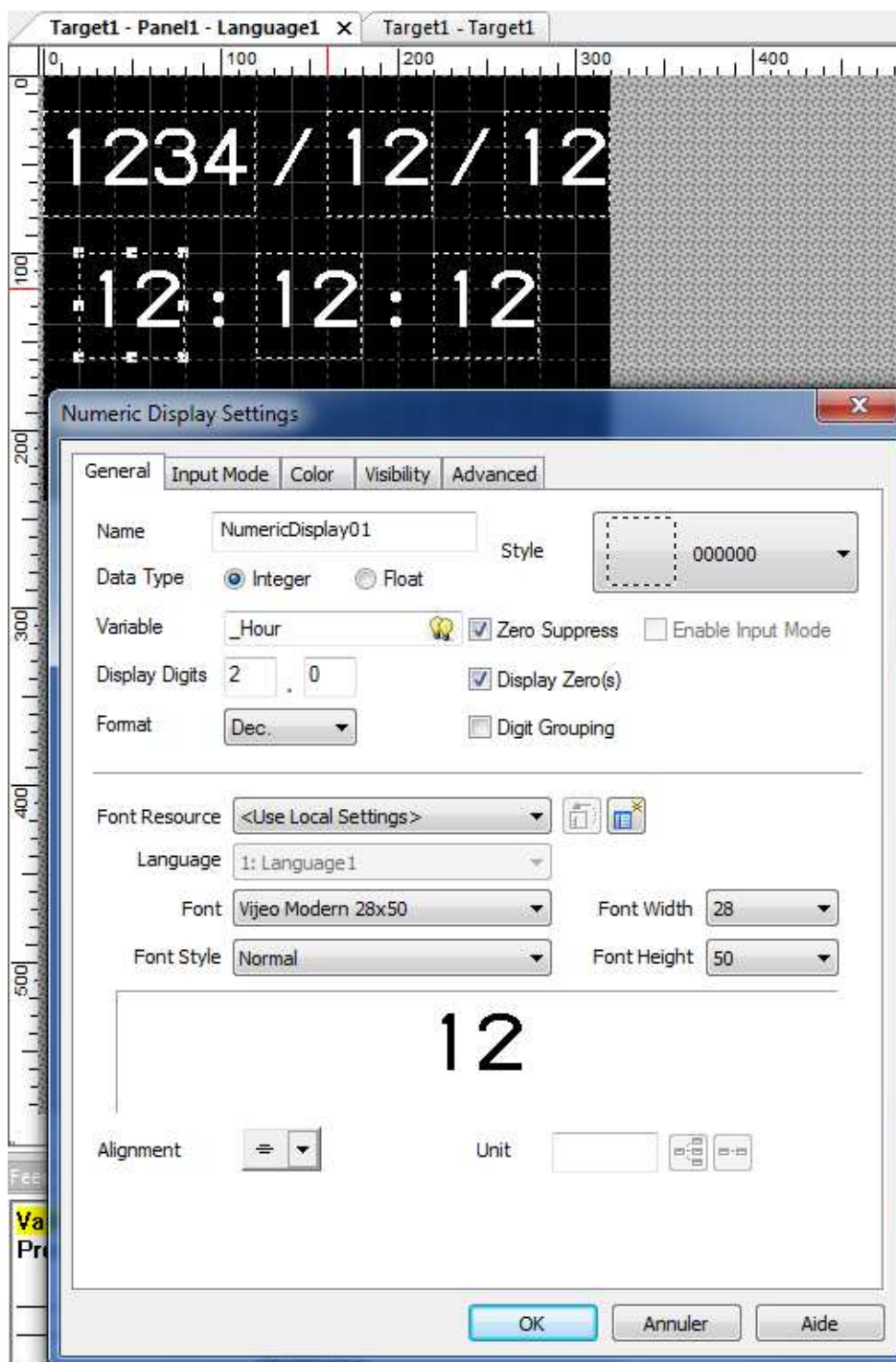
The HMI must be configured using Vijeo Designer.



1. The first step is to add the Modbus TCP driver to the target and to attach a slave (in this case M221 acts as a server, i.e. as a slave).
2. Then a "dialog table" is necessary to synchronize time. This dialog table is added by selecting the M221 in the tree view
3. Function 33 "Set terminal clock" has to be added.
4. "Start address" has to be configured: here %MW0 is used.
5. Format has to be changed: here "BCD" because M221 uses BCD too.



A simple panel is created to display the current date and time:





M221 confirugation with SoMachine Basic

Now on M221 side some work is also necessary:

The 4 system words get a symbol for better understanding:

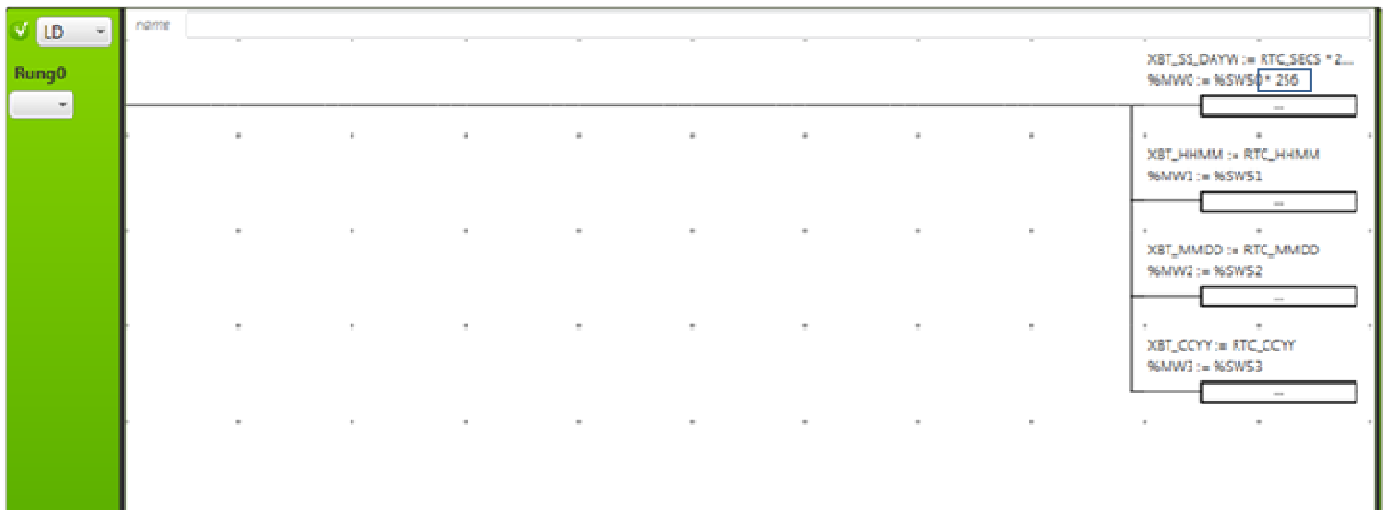
System Word properties				
Used	Address	Symbol	Comment	
<input checked="" type="checkbox"/>	%SW50	RTC_SECS	Real time clock seconds	
<input checked="" type="checkbox"/>	%SW51	RTC_HHMM	Real time clock hours and minutes	
<input checked="" type="checkbox"/>	%SW52	RTC_MMDD	Real time clock month and day	
<input checked="" type="checkbox"/>	%SW53	RTC_CCYY	Real time clock century and year	

These are the 4 words to be read by the HMI:

Memory word properties				
Used	Equ Used	Address	Symbol	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	%MW0	XBT_SS_DAYW	HMI seconds and day of the week
<input checked="" type="checkbox"/>	<input type="checkbox"/>	%MW1	XBT_HHMM	HMI hours and minutes
<input checked="" type="checkbox"/>	<input type="checkbox"/>	%MW2	XBT_MMDD	HMI minutes and days
<input checked="" type="checkbox"/>	<input type="checkbox"/>	%MW3	XBT_CCYY	HMI century and year

The main task of the POU is to transfer the 4 RTC-related words to the 4 memory words to be read by the HMI.

Only %SW50 has to be shifted to fit HMI format. The 8 right-shift is done by multiplying by 256:



The 3 other words remain unchanged and are just copied.

Note that “Day of the week” is not transferred because it is not needed by the HMI.

The HMI calculates itself the day of the week according to the current date.



If everything is configured correctly the following screen should be displayed on the HMI:

