SoMachine Basic Example Guide

Harmony XB5R Serial Usage “xSample_Modbus SL_Wireless Push Button_Read ID.smbe” and “xSample_-Modbus SL_Wireless PushButton_ReadStatus.smbe”

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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.

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Safety Information

Important Information

NOTICE

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

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

PLEASE NOTE

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

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

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED EQUIPMENT

- 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.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and 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.

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 Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

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 death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- 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 operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

At a Glance

Document Scope

This document describes a SoMachine Basic example application that allows you to manage a Harmony ZBRN.

The examples described here are intended for learning purposes only. In general, they are intended to help you understand how to develop, test, commission, and integrate application logic and/or the device wiring of the equipment associated with your own design in your control systems. The examples are not intended to be used directly on products that are part of a machine or process.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not include any wiring information, programming or configuration logic, or parameter values from any of the examples in your machine or process without thoroughly testing your entire application.

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

This document and its related SoMachine Basic project file focus on specific instructions and function blocks provided with SoMachine Basic, and on specific features available in SoMachine Basic. They are intended to help you understand how to develop, test, commission, and integrate applicative software of your own design in your control systems.

The example is intended for new SoMachine Basic users who already have some degree of expertise in the design and programming of control systems.

Validity Note

This document has been updated for the release of SoMachine Basic V1.6.

Related Documents

Title of Documentation	Reference Number
Harmony XB5R ZBRN1/ZBRN2 User Manual	*EIO0000001177 (ENG)* *EIO0000001178 (FRE)* *EIO0000001181 (GER)* *EIO0000001179 (SPA)* *EIO0000001180 (ITA)* *EIO0000001182 (CHS)*
SoMachine Basic Example Guide Harmony XB5R TCP usage	*EIO0000001864 (ENG)*

Product Related Information

⚠ WARNING

LOSS OF CONTROL

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

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

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not include any wiring information, programming or configuration logic, or parameter values from any of the examples in your machine or process without thoroughly testing your entire application.

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Chapter 1
Example Description

What Is in This Chapter?

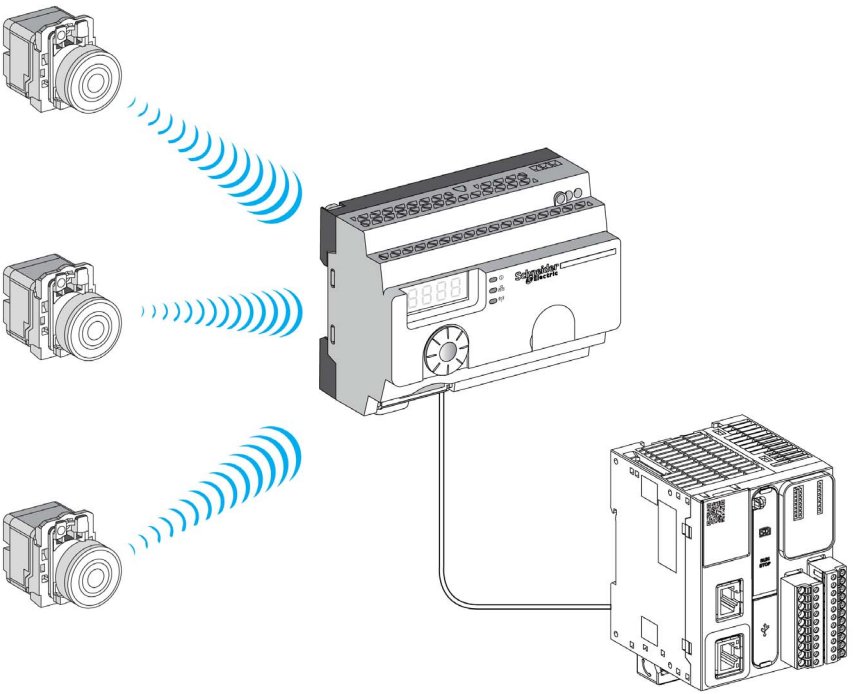
This chapter contains the following topics:

Description

Main Features

This example guide explains how to configure and use ZBRN2 modules with SoMachine Basic.

Harmony XB5R push-buttons are both wireless and batteryless. They are used with ZBRN access points, providing flexibility and simplicity to the installation. The access point converts radio frequency inputs from the Harmony XB5R push-buttons into various communication protocols to communicate with a controller.



This document helps you to use the project templates based on Modbus Serial Line (ZBRN2).

This document assumes the ZBRN2 is able to read the status of a push-button, and focuses on the application part of the project:

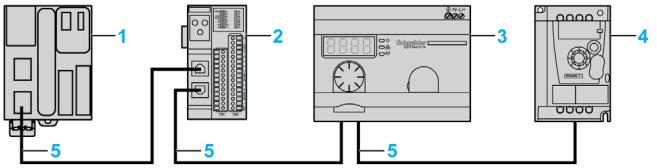
- A typical application to identify buttons linked to the ZBRN2
- A typical application to read the status of buttons linked to the ZBRN2

Targeted Hardware System

Architecture

The M221 Logic Controller acts as a master on the access point. You can adapt this example to implement other architectures.

The following illustration shows an access point used to control an ATV drive from a logic controller:



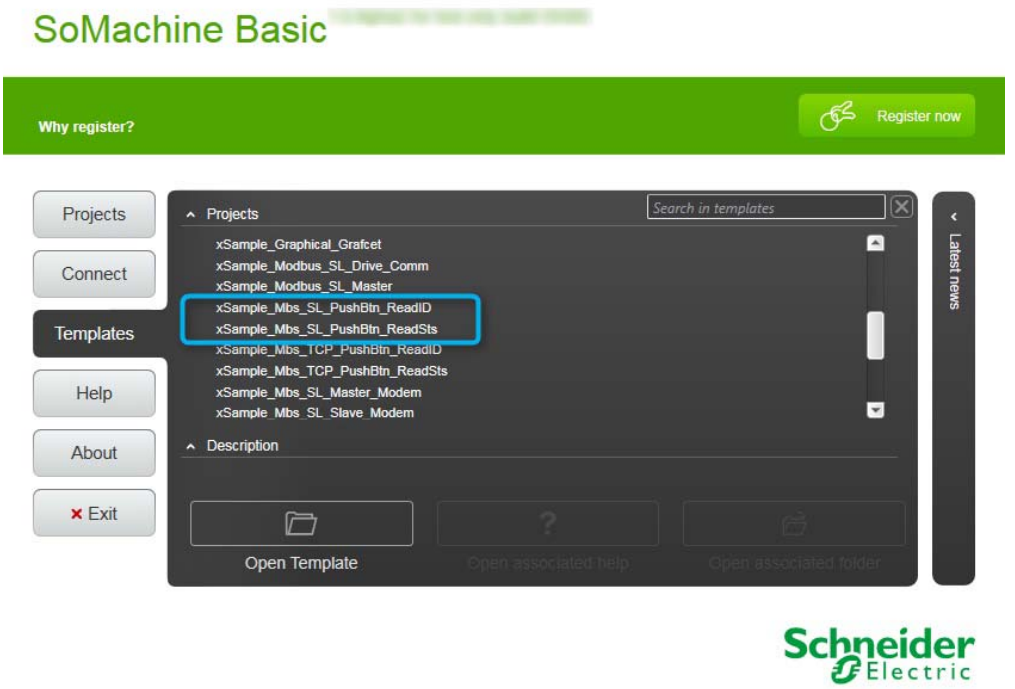
1	M221 Logic Controller as master
2	Modbus Advantys OTB network interface module
3	ZBRN2 access point
4	ATV drive
5	Modbus serial line

Project Templates

The following templates provided with SoMachine Basic are dedicated to Harmony products:

- `xSample_Mbs_SL_PushBtn_ReadID`: reads the recorded transmitter IDs in the Modbus serial Harmony
- `xSample_Mbs_SL_PushBtn_ReadSts`: reads the status of the recorded transmitters in the Modbus serial Harmony
- `xSample_Mbs_TCP_PushBtn_ReadID`: reads the recorded transmitters IDs in the Modbus TCP Harmony
- `xSample_Mbs_TCP_PushBtn_ReadSts`: reads the status of the recorded transmitters in the Modbus TCP Harmony

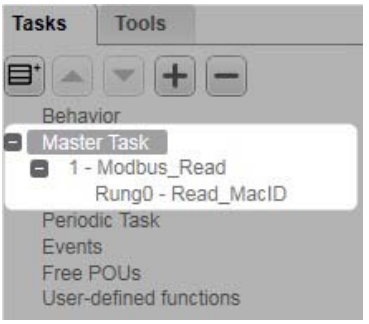
The following illustration shows the template files delivered with SoMachine Basic:



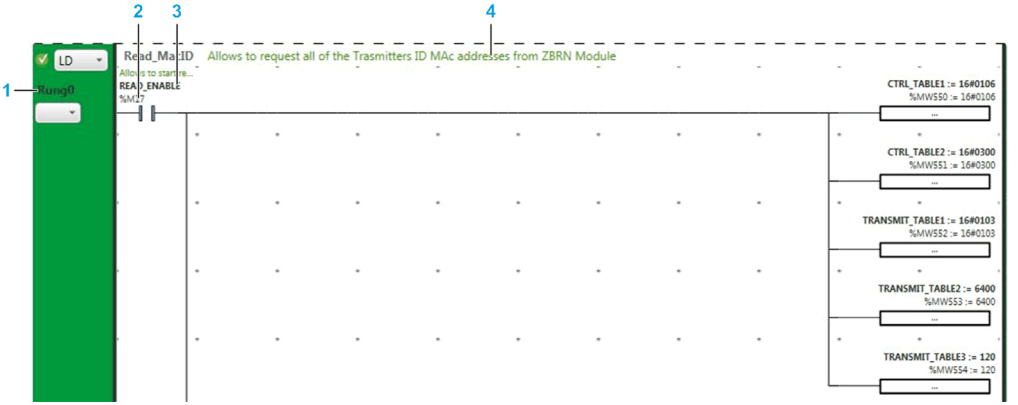
Example Template Program Structure

Task Structure

The following illustration shows the task structure in the **Tasks** tab:



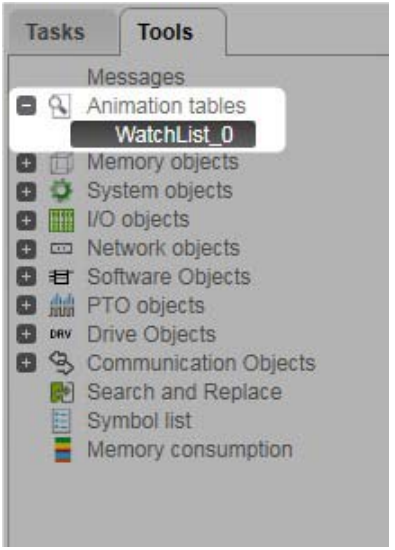
The following illustration shows one of the tasks open in the **Programming** tab of SoMachine Basic:



1	The rung name
2	The memory bit used in the operation
3	The symbol associated with the memory bit
4	An optional rung comment

Animation Table Structure

The following illustration shows the Animation table provided with the templates in the **Tools** tab:



Use the animation table with the example tasks. When the program is running, you can set values in the animation table and view output values change as inputs change.

Template Description

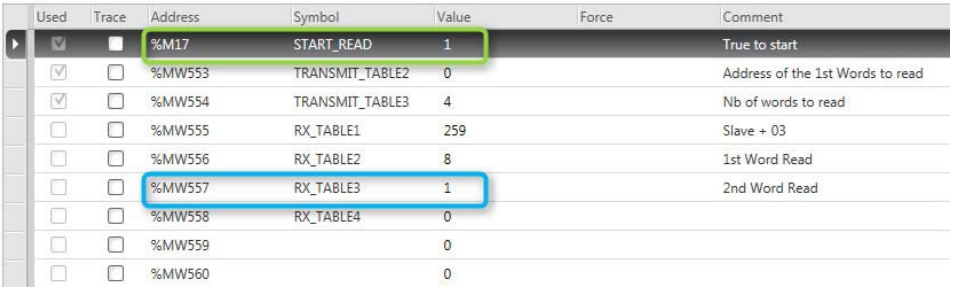
Using the Example Templates

To use the example templates:

Step	Action
1	Open the template in SoMachine Basic.
2	Run the example program.
3	Press a transmitter button on the ZBRN.

Retrieving the Transmitter Status

The following illustration shows variables used to retrieve the transmitter status, together with associated symbols and values, in the animation table that is provided with the template.



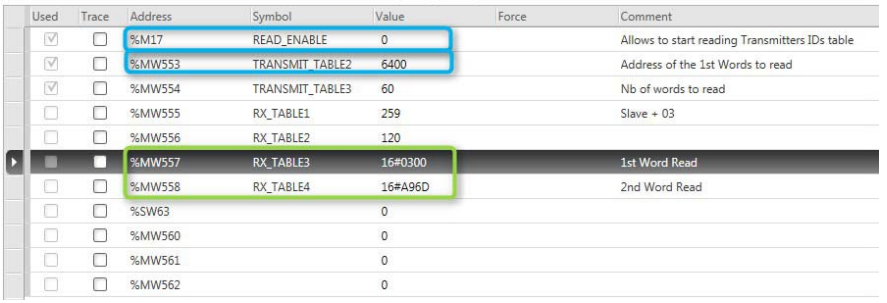
Used	Trace	Address	Symbol	Value	Force	Comment
☑	☐	%M17	START_READ	1		True to start
☑	☐	%MW553	TRANSMIT_TABLE2	0		Address of the 1st Words to read
☑	☐	%MW554	TRANSMIT_TABLE3	4		Nb of words to read
☐	☐	%MW555	RX_TABLE1	259		Slave + 03
☐	☐	%MW556	RX_TABLE2	8		1st Word Read
☐	☐	%MW557	RX_TABLE3	1		2nd Word Read
☐	☐	%MW558	RX_TABLE4	0		
☐	☐	%MW559		0		
☐	☐	%MW560		0		

Memory bit `%M17` is set to 1 to regularly retrieve the transmitter status.

`%MW557` is set to 1 for a time defined in the **Holding time** field of the channel configuration in the Harmony ZBRN.

Reading the Transmitter ID

The following illustration shows the variables in the animation table used to read the transmitter ID of the Harmony ZBRN:



Used	Trace	Address	Symbol	Value	Force	Comment
☑	☐	%M17	READ_ENABLE	0		Allows to start reading Transmitters IDs table
☑	☐	%MW553	TRANSMIT_TABLE2	6400		Address of the 1st Words to read
☑	☐	%MW554	TRANSMIT_TABLE3	60		Nb of words to read
☐	☐	%MW555	RX_TABLE1	259		Slave + 03
☐	☐	%MW556	RX_TABLE2	120		
☐	☐	%MW557	RX_TABLE3	16#0300		1st Word Read
☐	☐	%MW558	RX_TABLE4	16#A96D		2nd Word Read
☐	☐	%SW63		0		
☐	☐	%MW560		0		
☐	☐	%MW561		0		
☐	☐	%MW562		0		

After you set %M17 to 1, a request is sent to retrieve data from the ZBRN, which is identified by %MW553. %MW553 is mapped to register 6400 of the ZBRN, which is the register address for the first transmitter ID as defined in the Harmony XB5R ZBRN1/ZBRN2 User Manual *(see page 10)*.

If you configure a different transmitter on another channel, modify %MW553 accordingly.

In this example, the transmitter ID 300A96D hex is read and stored in memory words %MW557 and %MW558.

Appendices

Appendix A
Memory Mapping

Memory Mapping

Introduction

The following addresses are indicated according to the IEC %MW standard format.

For access to Modbus registers, add 1 to each address.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not write to or read from register addresses that are not mentioned in this document.

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

NOTE: The registers used are 16 bits.

Input Channels

Register Address	Name	Access Type	Input Channel	Channel Status	Description
0	Input register 1	R	0...15	0: Off 1: On	Stores the status (0 or 1) of input channels from 0 to 15.
1	Input register 2	R	16...31	0: Off 1: On	Stores the status (0 or 1) of input channels from 16 to 31.
2	Input register 3	R	32...47	0: Off 1: On	Stores the status (0 or 1) of input channels from 32 to 47.
3	Input register 4	R	48...59	0: Off 1: On	Stores the status (0 or 1) of input channels from 48 to 59.
R: Read only.					

Input register 1:

A 16-bit register stores the status of channels from 0...15. One bit is assigned for one input channel to store the input status as 0 or 1.

Input register 2:

A 16-bit register stores the status of channels from 16...31. One bit is assigned for one input channel to store the input status as 0 or 1.

Input register 3:

A 16-bit register stores the status of channels from 32... 47. One bit is assigned for one input channel to store the input status as 0 or 1.

Input register 4:

A 16-bit register to store the status of channels from 48...59. One bit is assigned for one input channel to store the input status as 0 or 1.

NOTE: Out of the 16 bits of the register, 12 bits are used to store the status of the input channel.

Channel Configuration

Register Address	Name	Access Type	Input Channel	Channel Status	Description
6400...6519	Transmitter ID/MAC addresses	RW	0...59	srcID0: First byte of the MAC address. srcID1: Second byte of the MAC address. srcID2: Third byte of the MAC address. srcID3: Fourth byte of the MAC address.	Stores the MAC addresses of the transmitters. 2 registers are used to store MAC address of 1 transmitter. Example: Transmitter ID (written on the transmitter label) = 030079B1 hex. Registers 6410...6411, input channel 5. 6410: stores 0300 hex (2 bytes of the transmitter ID). 6411: stores 79B1 hex (2 bytes of the transmitter ID).
RW: Read and write.					

Transmitter/MAC addresses:

Two registers of 16 bits store the MAC address of the transmitters.

The first byte of the MAC address is stored in 8 bits of register 1.

The second byte of the MAC address is stored in 8 bits of register 1.

The third byte of the MAC address is stored in 8 bits of register 2.

The fourth byte of the MAC address is stored in 8 bits of register 2.