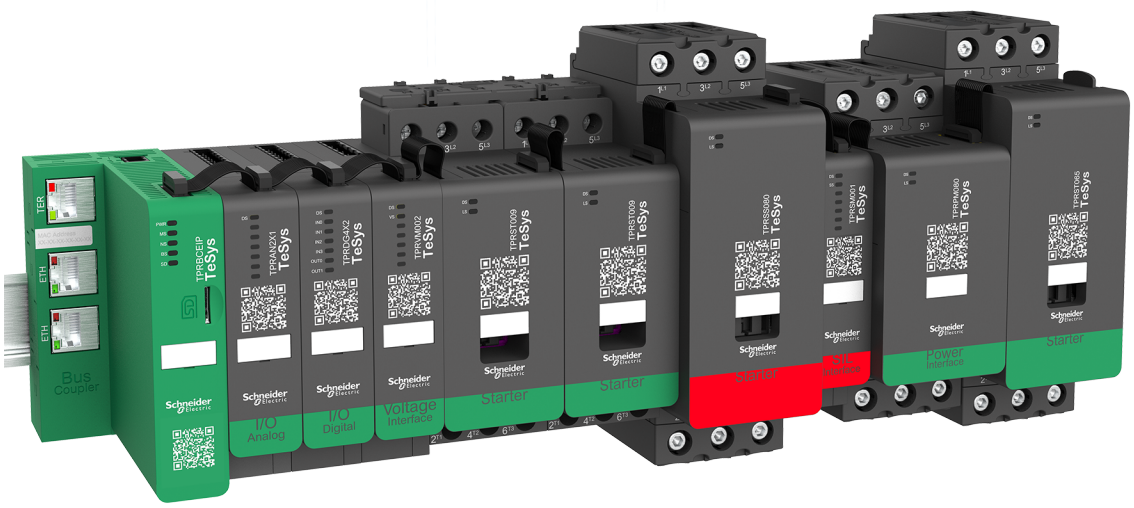
TeSys Active

TeSys™ island – Digital Motor Management Solution

Quick Start Guide for EtherNet/IP™ Applications

TeSys offers innovative and connected solutions for motor starters.

8536IB1906EN-03
09/2021



Legal Information

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Safety Information

Important Information

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

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

Please Note

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

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

About the Book

Master Range: TeSys

TeSys™ is an innovative motor control and management solution from the global market leader. TeSys offers connected, efficient products and solutions for switching and protection of motors and electrical loads in compliance with all major global electrical standards.

Scope

This user guide provides instructions for configuring a TeSys™ island device within the Rockwell Software® Studio 5000® environment. For further information regarding the TeSys island devices, refer to Related Documentation, page 7.

Library Compatibility: L5X files exported from SoMove software are compatible with Studio 5000 major version 30 or higher. Refer to the Product Compatibility & Downloads page on the Rockwell Automation website to verify that the PLC firmware is compatible with the Studio 5000 version being used. As of the time of publication, this information can be found at https://compatibility.rockwellautomation.com.

Validity Note

This guide is valid for all TeSys island configurations. The availability of some functions described in this guide depends on the communication protocol used and the physical modules installed on the island.

For product compliance with environmental directives such as RoHS, REACH, PEP, and EOLI, go to www.se.com/green-premium.

For technical characteristics of the physical modules described in this guide, go to www.se.com.

The technical characteristics presented in this guide should be the same as those that appear online. We may revise content over time to improve clarity and accuracy. If you see a difference between the information contained in this guide and online information, use the online information.

Related Documentation

Document title	Description	Document number
TeSys island – System Guide	Introduces and describes the main functions of TeSys island	8536IB1901
TeSys island – Installation Guide	Describes the mechanical installation, wiring, and commissioning of TeSys island	8536IB1902
TeSys island – Operating Guide	Describes how to operate and maintain TeSys island	8536IB1903
TeSys island – Functional Safety Guide	Describes the Functional Safety features of TeSys island	8536IB1904
TeSys island – Third Party Function Block Guide	Contains the information needed to create function blocks for third party hardware	8536IB1905
TeSys island – EtherNet/IP™ Function Block Library Guide	Describes the TeSys island library used in the Rockwell Software® Studio 5000® EtherNet/IP environment	8536IB1914
TeSys island – EtherNet/IP™ Quick Start Guide	Describes how to quickly integrate TeSys island into the Rockwell Software Studio 5000 EtherNet/IP environment	8536IB1906
TeSys island – DTM Online Help Guide	Describes how to install and use various functions of TeSys island configuration software and how to configure the parameters of TeSys island	8536IB1907
TeSys island – PROFINET and PROFIBUS Function Block Library Guide	Describes the TeSys island library used in the Siemens™ TIA Portal environment	8536IB1917
TeSys island – Quick Start Guide for PROFINET and PROFIBUS Applications	Describes how to quickly integrate TeSys island into the Siemens™ TIA Portal environment	8536IB1916
TeSys island – Product Environmental Profile	Describes constituent materials, recyclability potential, and environmental impact information for the TeSys island	ENVPEP1904009
TeSys island – Product End of Life Instructions	Contains end of life instructions for the TeSys island	ENVEOLI1904009
TeSys island – Instruction Sheet, Bus Coupler, TPRBCEIP	Describes how to install the TeSys island Ethernet/IP bus coupler	MFR44097
TeSys island – Instruction Sheet, Bus Coupler, TPRBCPFN	Describes how to install the TeSys island PROFINET bus coupler	MFR44098
TeSys island – Instruction Sheet, Bus Coupler, TPRBCPFB	Describes how to install the TeSys island PROFIBUS DP bus coupler	GDE55148
TeSys island – Instruction Sheet, Starters and Power Interface Modules, Size 1 and 2	Describes how to install size 1 and 2 TeSys island starters and power interface modules	MFR77070
TeSys island – Instruction Sheet, Starters and Power Interface Modules, Size 3	Describes how to install size 3 TeSys island starters and power interface modules	MFR77085
TeSys island – Instruction Sheet: Input/Output Modules	Describes how to install the TeSys island analog and digital I/O modules	MFR44099
TeSys island – Instruction Sheet: SIL Interface and Voltage Interface Modules	Describes how to install the TeSys island voltage interface modules and SIL[1] interface modules	MFR44100

1. Safety Integrity Level according to standard IEC 61508.

Precautions

Read and understand the following precautions before performing any procedures in this guide.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside this equipment.
- Use only the specified voltage when operating this equipment and any associated products.
- Always use a properly rated voltage sensing device to confirm power is off.
- Use appropriate interlocks where personnel and/or equipment hazards exist.
- Power line circuits must be wired and protected in compliance with local and national regulatory requirements.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices per NFPA 70E, NOM-029-STPS, or CSA Z462 or local equivalent.

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

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- For complete instructions about functional safety, refer to the TeSys™ island Functional Safety Guide, 8536IB1904.
- Do not disassemble, repair, or modify this equipment. There are no user serviceable parts.
- Install and operate this equipment in an enclosure appropriately rated for its intended application environment.
- 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.

⚠ **WARNING:** This product can expose you to chemicals including Antimony oxide (Antimony trioxide), which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Qualified Personnel

Only appropriately trained persons who are familiar with and understand the content of this guide and all other related product documentation are authorized to work on and with this product.

The qualified person must be able to detect possible hazards that may arise from modifying parameter values and generally from mechanical, electrical, or electronic equipment. The qualified person must be familiar with the standards, provisions, and regulations for the prevention of industrial accidents, which they must observe when designing and implementing the system.

The use and application of the information contained in this guide requires 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, 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 applicable local, regional, or national standards and/or regulations.

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

Intended Use

The products described in this guide, together with software, accessories, and options, are starters for low-voltage electrical loads, intended for industrial use according to the instructions, directions, examples, and safety information contained in the present document and other supporting documentation.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements, and the technical data.

Before using the product, you must perform a risk assessment of the planned application. Based on the results, appropriate safety-related measures must be implemented.

Since the product is used as a component of a machine or process, you must ensure the safety of persons by means of the overall system design.

Operate the product only with the specified cables and accessories. Use only genuine accessories and spare parts.

Any use other than the use explicitly permitted is prohibited and can result in unanticipated hazards.

Cybersecurity

Schneider Electric adheres to industry best practices in the development and implementation of control systems. This includes a “Defense-in-Depth” approach to secure an industrial Control System. This approach places the controllers behind one or more firewalls to restrict access to authorized personnel and protocols only.

⚠WARNING

UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION

- Evaluate whether your environment or your machines are connected to your critical infrastructure and, if so, take appropriate steps in terms of prevention, based on Defense-in-Depth, before connecting the automation system to any network.
- Limit the number of devices connected to a network inside your company.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.
- Monitor activities within your systems.
- Prevent subject devices from direct access or direct link by unauthorized parties or unauthenticated actions.
- Prepare a recovery plan including backup of your system and process information.

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

Methodology

A TeSys™ island device can be integrated into the Rockwell Software® Studio 5000® environment using the L5X import feature. Based on the TeSys island configuration, SoMove™ software provides L5X files that can be imported into the Studio 5000 environment, exposing the device data via add-on instructions.

NOTE: Due to data referencing, the L5X files must be imported in the order listed below. Follow the instructions provided in this manual.

The following files are generated by SoMove software:

1. Generic Ethernet Module: This file contains a Generic Ethernet AOP representing the TeSys island configuration. It includes comments in the Controller Tag section indicating what each piece of data is referencing. It uses the following naming convention: *{DeviceName}Module.L5X*.
2. Explicit Messages (if acyclic data exists): This file contains the following:
   - subroutines containing explicit messages for calling acyclic data
   - a data buffer used to hold the acyclic data before and after transmission

   It uses the following naming convention: *{DeviceName}_Acyclic.L5X*.

   NOTE: If a TeSys island configuration does not have acyclic data, this file is not generated.
3. Add-on Instructions (AOI): This file contains the AOIs used for generating function blocks. It must be imported last because the AOIs' reference tags are contained in the other two files. It uses the following naming convention: *{DeviceName}_Aoi.L5X*.

   NOTE: If you alter the naming convention for a TeSys island or for pre-existing avatars, then when you integrate configuration changes into a project, all the imported Studio 5000 software entities (tags, AOIs, and generic Ethernet module) must be deleted and the import process repeated for the new configuration. See Frequently Asked Questions (FAQs), page 20.

Obtain the L5X Files

Configure the island in the TeSys™ island DTM according to the *TeSys™ island Operating Guide*, 8536IB1903. Then, export the L5X files from the TeSys island DTM according to the following procedure.

1. In the TeSys island DTM, open the TeSys island project you wish to export.
2. From the drop-down menu, click Device.
3. Select Export > EDS to L5X File Format.
4. Click Save.

   The file is saved as a zip file in the following format: *island_name.zip*.
5. A notification appears, saying that the L5X files have been created.

   Click OK.

Integration Procedure

Prerequisites

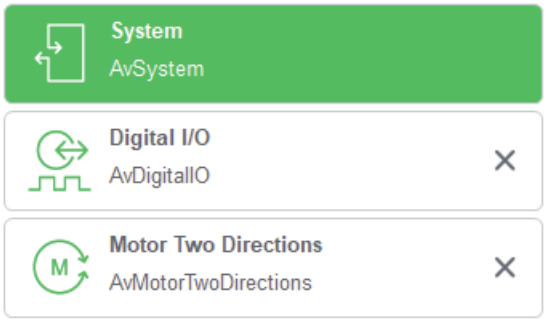
The integration procedure assumes that you have done the following:

- Set up a TeSys™ island device using SoMove™ software
- Obtained the L5X files needed for integration with the Rockwell Software® environment

Example Items

The TeSys island configuration used in this example includes the following items, as shown in the figure below.

- Digital I/O module named *TeSysIslandDevice*
- Motor Two Directions avatar



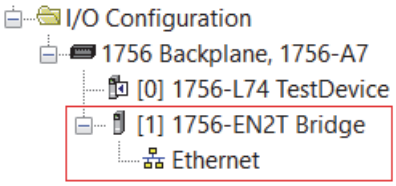
Add an Ethernet Bridge

To add an Ethernet bridge:

1. Launch the Studio 5000® software.
2. Click Create > New Project.

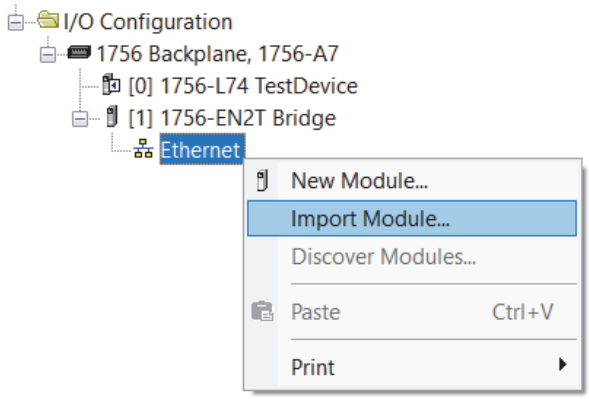
   A new project opens.
3. Select your PLC from the list of available PLCs.
4. Enter a Name for the PLC. Click Next.
5. Make any changes necessary for the PLC. Click Finish.

   Your PLC module is added to the I/O Configuration tree.
6. Add an Ethernet bridge to its backplane.

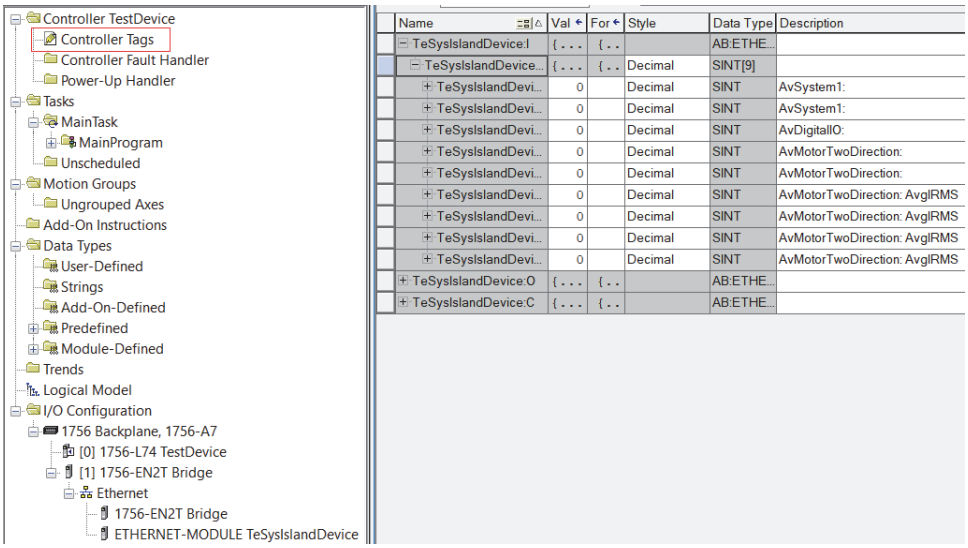


Import the TeSys™ island Module

Import the TeSys island module to the Ethernet bridge. This file uses the following naming convention: *{DeviceName}Module.L5X*.



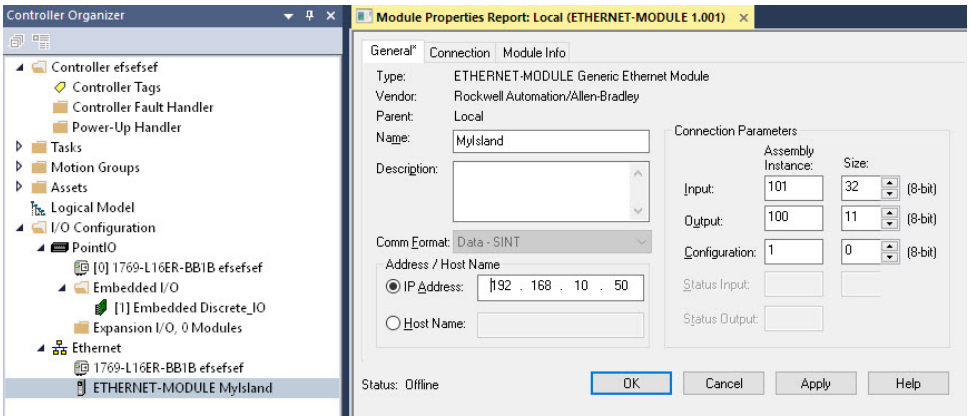
After import, the device shows up in the I/O configuration tree and the Controller Tags section of the project.



Once the module exists, define the target IP address of the device.

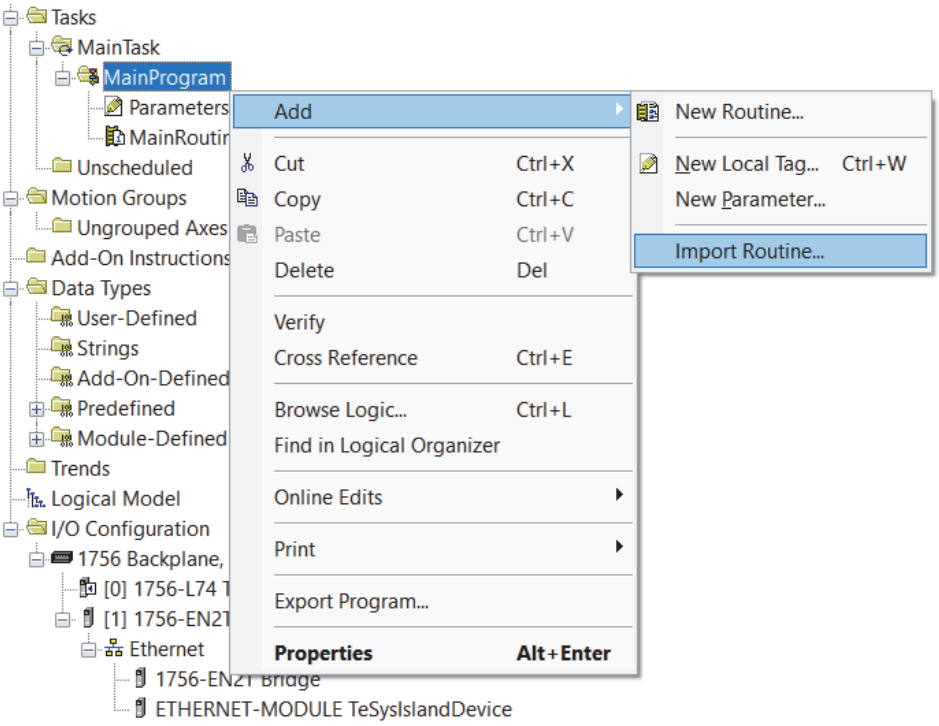
NOTE: If you skip this step before importing the Subroutine and AOI, you will be required to manually set the target communication path for each Acyclic function block.

Figure 1 - Define the IP Address



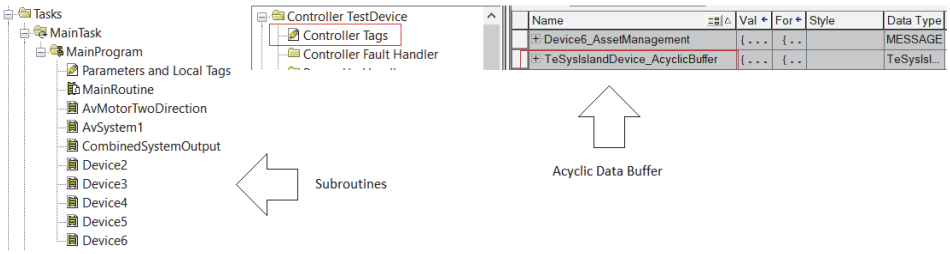
Import the Subroutine

Import the subroutine L5X file containing the acyclic data, if present. This file uses the following naming convention: *{DeviceName}_Acyclic.L5X*.



After import:

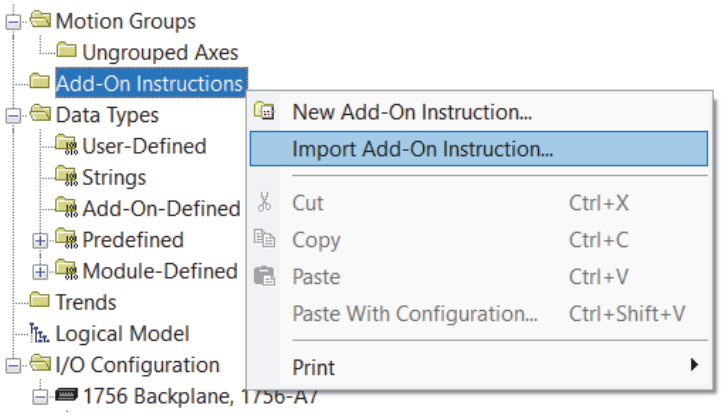
- the subroutines are visible in the Tasks tree
- the acyclic data buffer is visible in the Controller Tags section



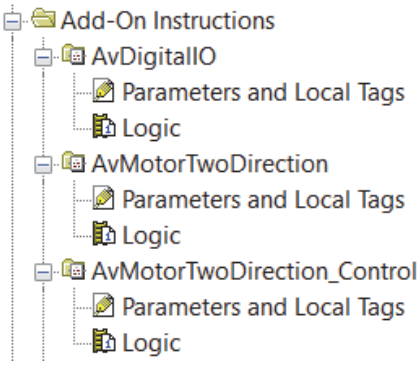
For more information on accessing the device data, see Data Access Example, page 17.

Import the Add-on Instructions

Import the add-on instructions (AOIs) as shown below. This file uses the following naming conventions: *{DeviceName}_Aoi.L5X*



After import, the AOIs are visible in the project tree.



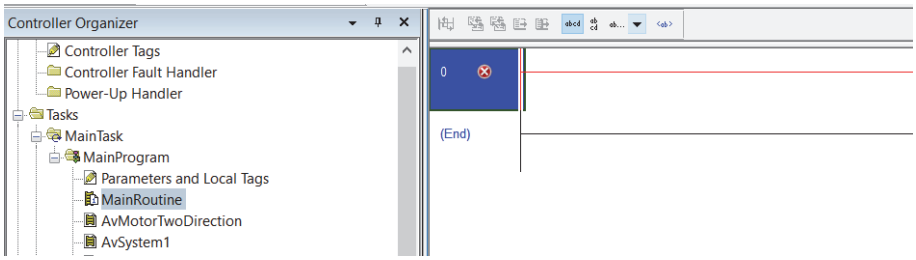
Each AOI contains either cyclic or acyclic data, which is indicated by the following naming convention:

- Cyclic data contains only the name of the avatar.
- Acyclic data contains the name of the avatar followed by an underscore (_) and the name of the acyclic data object.

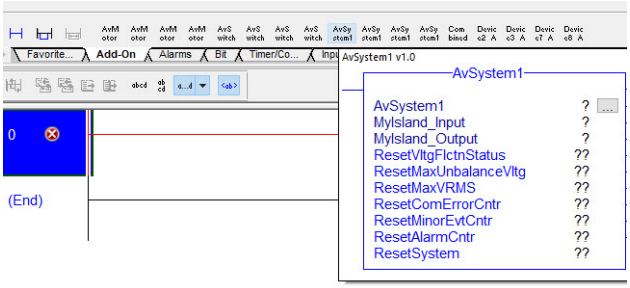
Create Instances of the AOIs

When creating an instance of an AOI, you must reference the module and the acyclic data buffer. Depending on the data present in the AOI (cyclic or acyclic), there are one or two tags to reference.

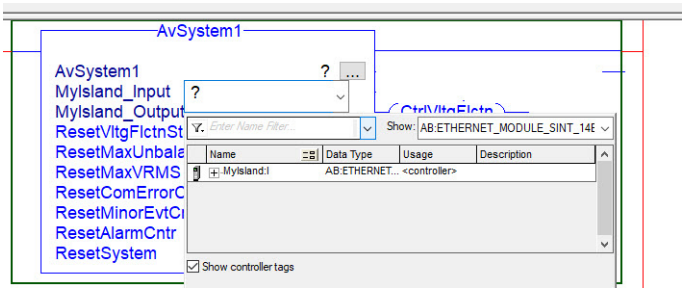
1. Enter the Main Routine by double-clicking it within the Tasks tree.



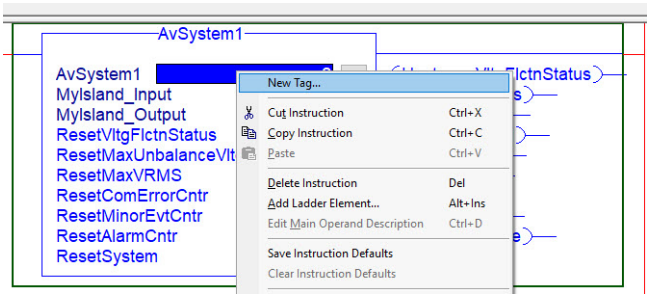
2. Add an AOI from the add-on list.



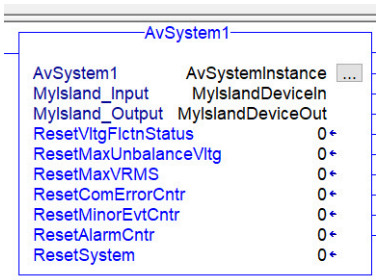
3. Fill in the reference tags for each In/Out parameter. These tags are in the Controller Tags list with names matching the In/Out Parameters.



4. Create an instance of the AOI and name it.

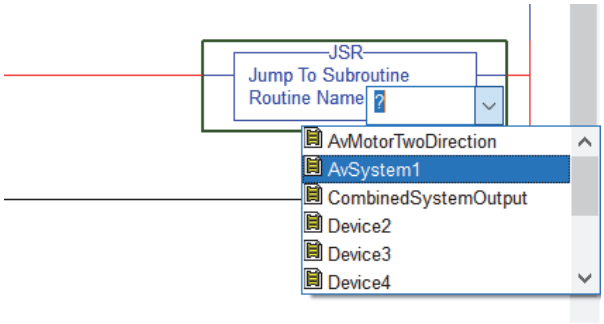


The AOI is now fully configured and ready for use.



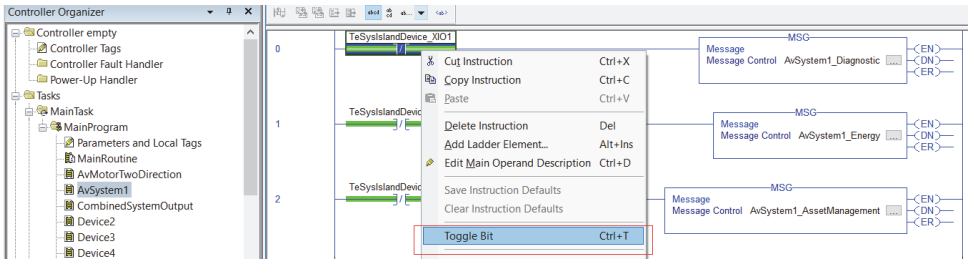
Calling Acyclic Data

When calling acyclic data, you must add a Jump To Subroutine operation to the Main Routine. The subroutine needed for the target AOI matches the associated avatar.



This action pushes or pulls data, depending on the type of data the explicit message is accessing.

1. Open the subroutine.
2. Toggle the Examine If Open bit on the rung containing the message associated with the target AOI.



Data Access Example

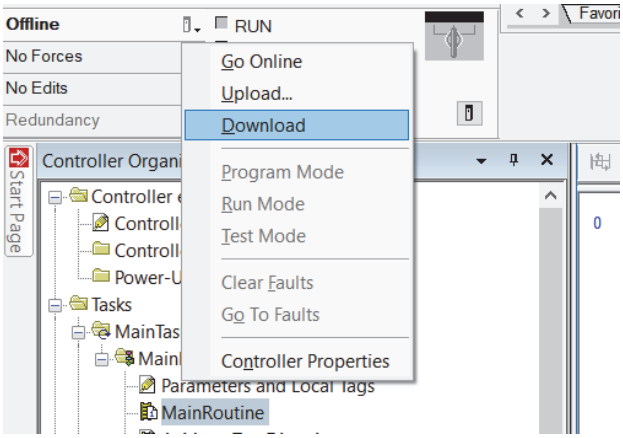
The following section provides an example of how to access data on the TeSys Island. These example AOIs:

- were added to the project using the same process described above
- are the for cyclic system data (AvSystem1), acyclic system diagnostic (AvSystem1_Diagnostic), and acyclic system asset management (AvSystem1_AssetManagement)

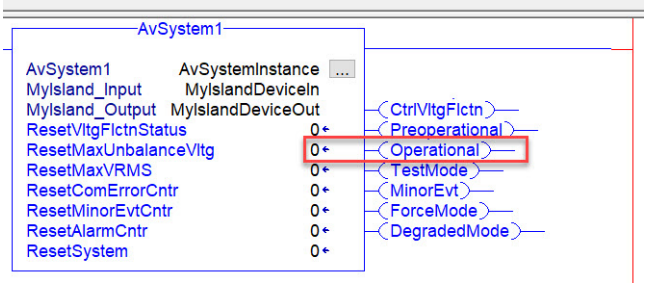
Accessing Data via AOI

After setting up the AOIs you plan to use:

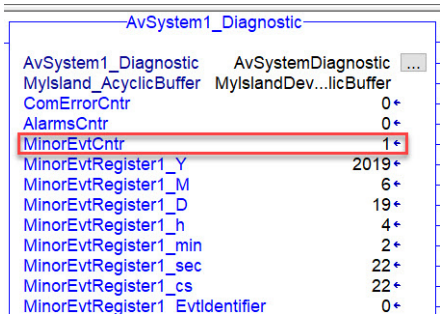
1. Download the program.
2. Set the PLC to Run mode.



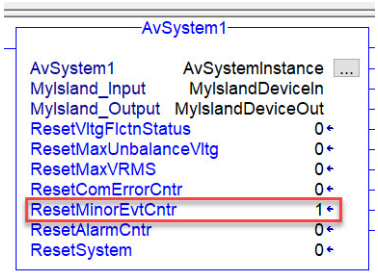
If the device is properly set up, and does not have any trips or other events, the cyclic system AOI should indicate that the system is operational.



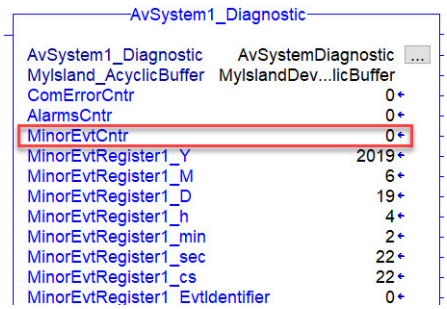
To view acyclic data, the appropriate explicit message must be accessed. See Calling Acyclic Data, page 16. As shown here, the device currently has one Minor Event logged via the System Minor Event Counter within the acyclic system diagnostic AOI.



This value can be reset by flipping the Minor Event Reset bit within the cyclic system AOI.



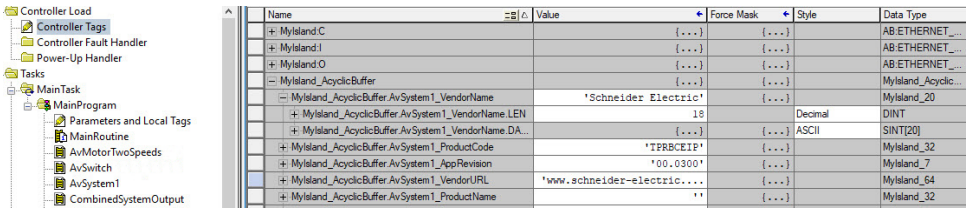
After a refresh of the acyclic system diagnostic data (see Calling Acyclic Data, page 16), the counter returns to 0.



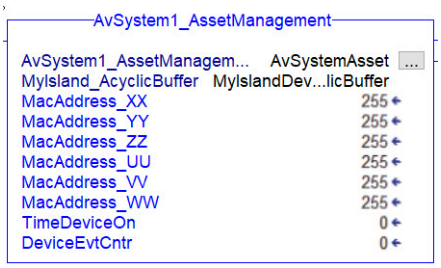
Accessing Data via the Acyclic Buffer

AOIs are capable of exposing only SINT, INT, DINT, REAL, and BOOL data types as Input/Output parameters. Due to this constraint, STRING registers are placed within the acyclic data buffer and can be accessed there.

After you toggle the bit to access the acyclic system asset management data (see Calling Acyclic Data, page 16), the STRING data does not appear in the AOI. Instead, it appears within the acyclic data buffer. This buffer can be found in the Controller Tags list with naming convention *{DeviceName}_AcyclicBuffer*.



The remaining data is accessible within the AOI.



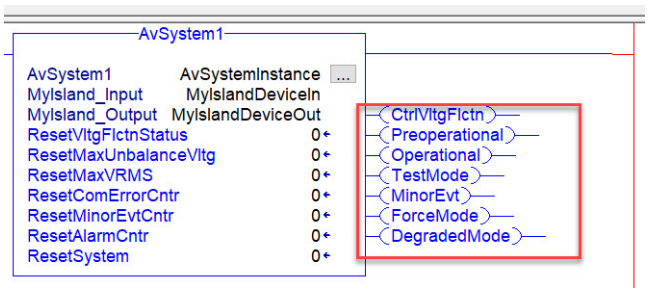
Frequently Asked Questions (FAQs)

Where can STRING data be accessed?

Due to AOI constraints, complex data types cannot be exposed as Input/Output parameters. Refer to Accessing Data via the Acyclic Buffer, page 19 for instructions on accessing STRING data.

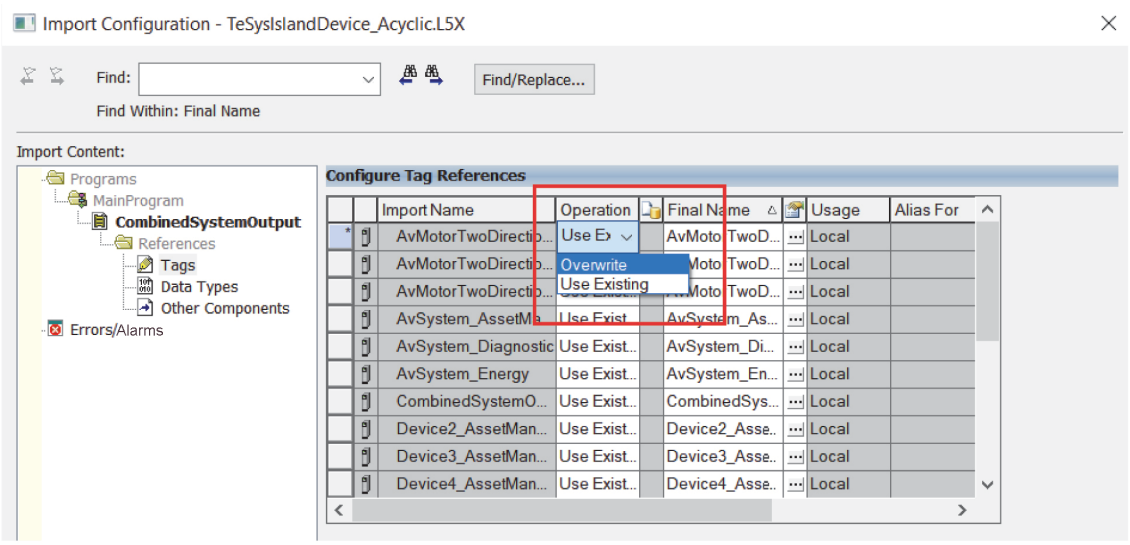
What are the lines attached to the right side of the AOI?

All the data exposed by an AOI exists within the main body, except for data exposed with Output parameters of type BOOL. This data exists on the right side of the AOI, as outlined with the red box in the screenshot below.



How are TeSys™ Island configuration changes integrated into a project?

- If the naming convention has been altered for a TeSys island or pre-existing avatars, all the imported Studio 5000® software entities (tags, AOIs, and generic Ethernet module) must be deleted and the import process repeated for the new configuration.
- If the naming convention has not changed for pre-existing entities, the import process can be repeated without deleting previously imported entities. Change the import Operation from *Use Existing* to *Overwrite*, as shown in the image below.

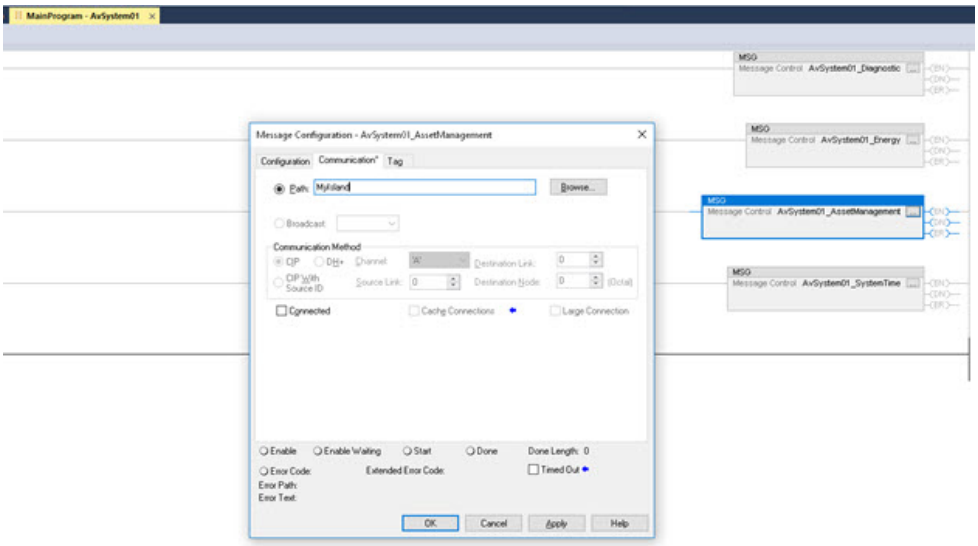


Why do 32-bit unsigned integers have a maximum displayed value of 2,147,483,647?

Rockwell Software® Studio 5000 software only handles signed integers. For this reason, the maximum positive value that can be displayed for 32-bit unsigned integers is 2,147,483,647. To enforce this, logic exists within AOIs to max out UDINT registers if the sign bit is used. For these TeSys island registers, a flag exists as an exposed parameter to indicate overflow. These flags are of type BOOL with the naming convention *{TagName}_O*.

What happens if the Acyclic function blocks return extended error code 0312 "Link address not available"?

This error code will occur if the communication path in the Message Configuration for the function block is not configured. This can happen if the Subroutine and AOI are imported prior to the IP address of the TeSys island instance being defined (see section "Import the TeSys island Module"). To fix this, browse for the TeSys island device in the "Path" setting in the Message Configuration window for *each* Acyclic function block.



Data Refresh Rates

When choosing the frequency of your fieldbus protocol (such as RPI or repetition rate) or the frequency of updating acyclic data in your PLC program, it is important to understand the frequency of the data updates on the island itself.

For instance, Active Energy data is updated every 100 ms. So it is not useful for the PLC program to update this acyclic data every 10 ms. However, all outputs (starters, digital outputs, analog outputs, trip resets, and other resets or presets) are updated at a frequency of <10 ms. Inputs are updated at various frequencies depending on their importance.

See the table below for more information.

Table 1 - Data Refresh Rates

Data	Maximum update interval
Input and output status of power devices, digital I/O modules, and SIL[2] interface modules *for example, Run commands, contactor status (RunFwd, Tripped), digital input (DI0, DI1…)*	10 ms
Analog measurements of power devices, analog I/O modules, and voltage interface modules *for example, phase current (AvgIRMS, PhaseXIRMS), phase voltage (VRMSPhaseX, AvgVRMS), power (InstActivePower, InstReactivePower, PowerFactor), energy (ActiveEnergy, ReactiveEnergy), analog inputs (MotorTemperature, AI0, AI1)*	100 ms
Other data *for example, asset data: ContactorCycleCntr, TimeModuleOn, AvgIRMS (lifetime)*	10 ms

2. Safety Integrity Level according to standard IEC 61508.

Schneider Electric
800 Federal Street
Andover, MA 01810
USA

https://www.se.com/ww/en/work/support/

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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