

TeSys Active

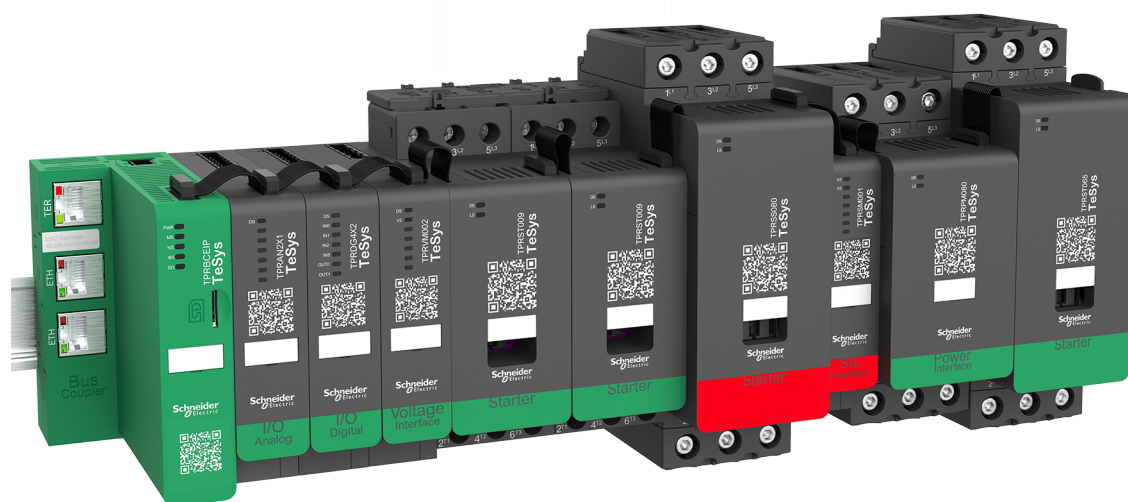
TeSys island – Digital Motor Management Solution

For EtherNet/IP™ Applications

Quick Start and Function Block Library Guide

TeSys offers innovative and connected solutions for motor starters.

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02/2023



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As part of a group of responsible, inclusive companies, we are updating our communications that contain non-inclusive terminology. Until we complete this process, however, our content may still contain standardized industry terms that may be deemed inappropriate by our customers.

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Safety Information

Important Information

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



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



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

⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

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

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

About the Book

Document Scope

This user guide provides:

- instructions for configuring a TeSys™ island device within the Rockwell Software® Studio 5000® environment.
- add-on instructions for TeSys island and is valid for use with Studio 5000 environment version 30.0 or greater.
- add-on instructions, referred to as function blocks for the Studio 5000 environment, control the Avatar and device modules of a TeSys island.

Library Compatibility: L5X files exported from SoMove software are compatible with Studio 5000 major version 30 or higher. Refer to the Product Compatibility and 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 TeSys island.

For product compliance with environmental directives such as RoHS, REACH, PEP, and EOL, 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, Installation, and Operation Guide	Describes main functions, mechanical installation, wiring, commissioning of the TeSys island, and how to operate and maintain TeSys island.	DOCA0270EN
TeSys island – PROFINET and PROFIBUS – Quick Start and Function Block Library Guide	Describes how to integrate the TeSys island and the information of TeSys island library used in the Siemens™ TIA Portal environment.	DOCA0272EN
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 – 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 – 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.	ENVEOL1904009
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 personnel 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 personnel must be able to detect possible hazards that may arise from modifying parameter values and generally from mechanical, electrical, or electronic equipment. The qualified personnel 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

Introduction

Cybersecurity is a branch of network administration that addresses attacks on or by PCs and through PC networks that can result in accidental or intentional disruptions. The objective of cybersecurity is to help provide increased levels of protection for information and physical assets from theft, corruption, misuse, or accidents while maintaining access for their intended users.

No single cybersecurity approach is adequate. Schneider Electric recommends a defense-in-depth approach. Conceived by the National Security Agency (NSA), this approach layers the network with security features, appliances, and processes. The basic components of this approach are:

- Risk assessment
- Security plan built on the results of the risk assessment
- Multi-phase training campaign
- Physical separation of the industrial networks from enterprise networks using a demilitarized zone (DMZ) and the use of firewalls and routing to establish other security zones
- System access control
- Device hardening
- Network monitoring and maintenance

This section defines elements that help you configure a system that is less susceptible to cyber attacks. For detailed information on the defense-in-depth approach, refer to the *Recommended Cybersecurity Best Practices* on the Schneider Electric website.

Schneider Electric's Approach on Cybersecurity

Schneider Electric adheres to industries best practice 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 OPERATION

- Evaluate whether your equipment or complete environment 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.

Cyber Threats

Cyber threats are deliberate actions or accidents that can disrupt the normal operations of PCs and PC networks. These actions can be initiated from within the physical facility or from an external location. Security challenges for the control environment include:

- Diverse physical and logical boundaries
- Multiple sites and large geographic spans
- Adverse effects of security implementation on process availability
- Increased exposure to worms and viruses migrating from business systems to control systems as business-control communications become more open

- Increased exposure to malicious software from USB devices, vendor and service technician laptops, and the enterprise network
- Direct impact of control systems on physical and mechanical systems

Sources of Cyber Attacks

Implement a cybersecurity plan that accounts for various potential sources of cyber attacks and accidents, including:

Source	Description
Internal	<ul style="list-style-type: none"> • Inappropriate employee or contractor behavior • Disgruntled employee or contractor
External opportunistic (non-directed)	<ul style="list-style-type: none"> • Script kiddies⁽¹⁾ • Recreational hackers • Virus writers
External deliberate (directed)	<ul style="list-style-type: none"> • Criminal groups • Activists • Terrorists • Agencies of foreign states
Accidental	
<p>⁽¹⁾ Slang term for hackers who use malicious scripts written by others without necessarily possessing a comprehensive understanding of how the script works or its potential impact on a system.</p>	

A deliberate cyber attack on a control system may be launched to achieve a number of malicious results, including:

- Disrupt the production process by blocking or delaying the flow of information.
- Damage, disable, or shut down equipment to negatively impact production or the environment.
- Modify or disable safety systems to cause intentional harm.

How Attackers Gain Access

A cyber attacker bypasses the perimeter defenses to gain access to the control system network. Common points of access include:

- Dial-up access to remote terminal unit (RTU) devices
- Supplier access points (such as technical support access points)
- IT-controlled network products
- Corporate virtual private network (VPN)
- Database links
- Poorly configured firewalls
- Peer utilities

Reporting and Management

To submit a cybersecurity question, report security issues, or to get the latest news from Schneider Electric, visit our [Schneider Electric website](#).

Introduction to TeSys island

TeSys island Concept

TeSys island is a modular, multifunctional system providing integrated functions inside an automation architecture, primarily for the direct control and management of low-voltage loads. TeSys island can switch, help protect, and manage motors and other electrical loads up to 80 A (AC1) installed in an electrical control panel.

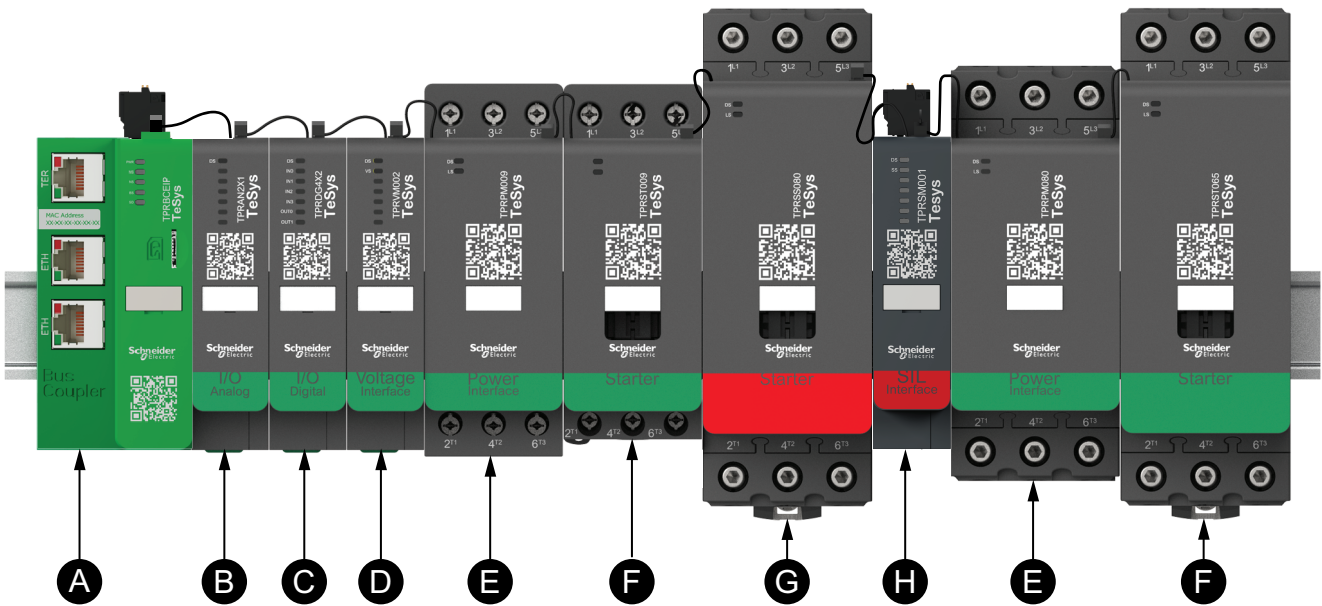
This system is designed around the concept of TeSys avatars. These avatars:

- Represent both the logical and physical aspects of the automation functions
- Determine the configuration of the TeSys island

The logical aspects of the TeSys island are managed with software tools, covering all phases of product and application lifecycle: design, engineering, commissioning, operation, and maintenance.

The physical TeSys island consists of a set of devices installed on a single DIN rail and connected together with flat cables providing the internal communication between modules. The external communication with the automation environment is made through a single bus coupler module, and the TeSys island is seen as a single node on the network. The other modules include starters, power interface modules, analog and digital I/O modules, voltage interface modules, and SIL (Safety Integrity Level according to standard IEC 61508) interface modules, covering a wide range of operational functions.

TeSys island Overview



A	Bus Coupler	E	Power Interface Module
B	Analog I/O Module	F	Standard Starter
C	Digital I/O Module	G	SIL Starter
D	Voltage Interface Module	H	SIL Interface Module

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.

General Information

TeSys island add-on instructions provide function blocks to support developing applications and to control avatar modules. Avatar modules are digital function objects managed by the TeSys island system. The system interacts with power devices and accessories such as the analog I/O devices. The avatar modules are configured on the TeSys island, and the bus coupler (via the System avatar) manages fieldbus communication with the controller.

The configuration of the TeSys island modules is managed by the TeSys island Device Type Manager (DTM). For further information, refer to the TeSys island DTM Library Online Help.

Avatar Definition

TeSys avatars bring ready-to-use functions through their predefined logic and associated physical devices. The avatar logic is executed in the bus coupler. The bus coupler manages data exchanges internally within the TeSys island, and also externally with the PLC.

There are four types of TeSys avatars:

System avatar

Represents the whole island as a system. The System avatar allows setting the network configuration and computes TeSys island level data.

Device avatars

Represent functions performed by switches and I/O modules.

Load avatars

Represent functions related to specific loads, such as a forward-reverse motor. Load avatars include the appropriate modules and operating characteristics to serve the load type. For example, a Motor Two Directions avatar includes two starter modules, accessories, pre-programmed control logic, and a pre-configuration of the available protection functions.

Standard (non-SIL²) Load avatars provide the following:

- Local control
NOTE: Local control is applicable for all Load avatars (except PIM avatar).
- Local trip reset (to allow an operator to use a local input to trigger the local trip reset on rising edge of the input. When the input changes from 0 to 1, then the trip reset of avatar is executed)
NOTE: Local trip reset is applicable for all Load avatars (except PIM avatar).
- Bypass (to allow an operator to use a local command to temporarily bypass a trip condition and continue the operation of the avatar)
- Process variable monitoring

2. Safety Integrity Level according to standard IEC 61508.

Application avatars

Represent functions related to specific user applications, such as a pump or conveyor. Application avatars provide the following:

- Local control
- Local trip reset (to allow an operator to use a local input to trigger the local trip reset on rising edge of the input. When the input changes from 0 to 1, then the trip reset of avatar is executed)
- Bypass (to allow an operator to use a local command to temporarily bypass a trip condition and continue the operation of the avatar)
- Manual mode override (to allow an operator to use a local input to override the configured control mode and control the avatar from a local command source)
- Process variable monitoring

For example, a Pump avatar includes the following:

- One starter module
- One or more digital I/O modules for local control, local trip, and process variable (PV) switches
- Configurable control logic
- Pre-configuration of the load and electrical functions

PV inputs receive analog values from sensors such as a pressure meter, a flow meter, or a vibration meter. PV switches receive discrete signals from switches such as a flow switch or a pressure switch.

Operational control (Run and Stop command) of the avatar in autonomous mode is configurable for up to two PV inputs or PV switches. It includes settings for the threshold and hysteresis for analog inputs, and positive or negative logic for both analog and digital inputs for the Pump avatar.



The avatars installed on the TeSys island are controlled by the TeSys island bus coupler. Each avatar includes predefined logic for managing its physical modules, while also providing easy data exchange with PLCs through function blocks. Avatars include pre-configuration of the available protection functions.

Information accessible through the avatar includes the following:



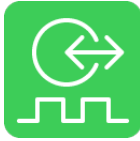






- Control data
- Advanced diagnostics data
- Asset management data
- Energy data

List of TeSys Avatars

TeSys Avatars

Name	Icon	Description
System avatar		A required avatar that enables a single point of communication to the TeSys island.
Device		
Switch		To make or break a power line in an electrical circuit

TeSys Avatars (Continued)

Name	Icon	Description
Switch - SIL Stop, W. Cat 1/2 ³		To make or break a power line in an electrical circuit with Stop Category 0 or Stop Category 1 ⁴ function compliance for Wiring Category 1 and Category 2.
Switch - SIL Stop, W. Cat 3/4 ⁵		To make or break a power line in an electrical circuit with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 3 and Category 4.
Digital I/O		To provide control of 2 digital outputs and status of 4 digital inputs
Analog I/O		To provide control of 1 analog output and status of 2 analog inputs
Load		
Power Interface without I/O (measure)		To monitor current supplied to an external device, such as a solid-state relay, soft starter, or variable speed drive
Power Interface with I/O (control)		To monitor current supplied to and to control an external device, such as a solid-state relay, soft starter, or variable speed drive
Motor One Direction		To manage ⁶ a motor in one direction
Motor One Direction - SIL Stop, W. Cat 1/2		To manage a motor in one direction, with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 1 and Category 2.
Motor One Direction - SIL Stop, W. Cat 3/4		To manage a motor in one direction, with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 3 and Category 4.

3. Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

4. Stop category according to EN/IEC 60204-1.










5. Safety Integrity Level according to standard IEC 61508. Wiring Category 3 and Category 4 according to ISO 13849.

6. "Manage" in this context encompasses energizing, controlling, monitoring, diagnosing, and protecting the load.

TeSys Avatars (Continued)

Name	Icon	Description
Motor Two Directions		To manage a motor in two directions (forward and reverse)
Motor Two Directions - SIL Stop, W. Cat 1/2		To manage a motor in two directions (forward and reverse), with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 1 and Category 2
Motor Two Directions - SIL Stop, W. Cat 3/4		To manage a motor in two directions (forward and reverse), with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 3 and Category 4
Motor Y/D One Direction		To manage a wye-delta (star-delta) motor in one direction
Motor Y/D Two Directions		To manage a wye-delta (star-delta) motor in two directions (forward and reverse)
Motor Two Speeds		To manage a two-speed motor and two-speed motor with Dahlander option
Motor Two Speeds - SIL Stop, W. Cat 1/2		To manage a two-speed motor, with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 1 and Category 2
Motor Two Speeds - SIL Stop, W. Cat 3/4		To manage a two-speed motor, with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 3 and Category 4
Motor Two Speeds Two Directions		To manage a two-speed motor in two directions (forward and reverse)
Motor Two Speeds Two Directions - SIL Stop, W. Cat 1/2		To manage a two-speed motor in two directions (forward and reverse), with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 1 and Category 2

TeSys Avatars (Continued)

Name	Icon	Description
Motor Two Speeds Two Directions - SIL Stop, W. Cat 3/4		To manage a two-speed motor in two directions (forward and reverse), with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 3 and Category 4
Resistor		To manage a resistive load
Power Supply		To manage a power supply
Transformer		To manage a transformer
Application		
Pump		To manage a pump
Conveyor One Direction		To manage a conveyor in one direction
Conveyor One Direction - SIL Stop, W. Cat 1/2		To manage a conveyor in one direction, with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 1 and Category 2
Conveyor Two Directions		To manage a conveyor in two directions (forward and reverse)
Conveyor Two Directions - SIL Stop, W. Cat 1/2		To manage a conveyor in two directions (forward and reverse), with Stop Category 0 or Stop Category 1 function compliance for Wiring Category 1 and Category 2

NOTE: For two speed two direction avatar disable current phase reversal trip.

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 transmissionIt uses the following naming convention: *{DeviceName}_Acyclic.L5X*.
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 a TeSys island configuration does not have acyclic data, this file is not generated.

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 105.

Obtain the L5X Files

Configure the island in the TeSys™ island DTM according to the TeSys island – System, Installation, and Operation Guide. 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

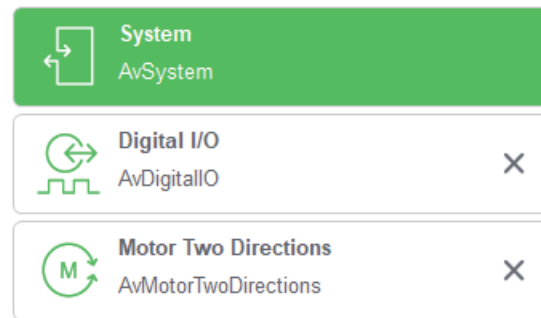
The integration procedure assumes that you have done the following:

- 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.

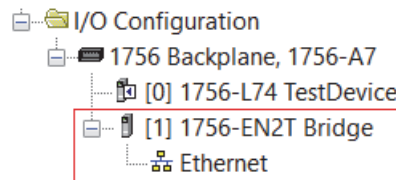
- Digital I/O module named *TeSysIslandDevice*
- Motor Two Directions avatar



Add an Ethernet Bridge

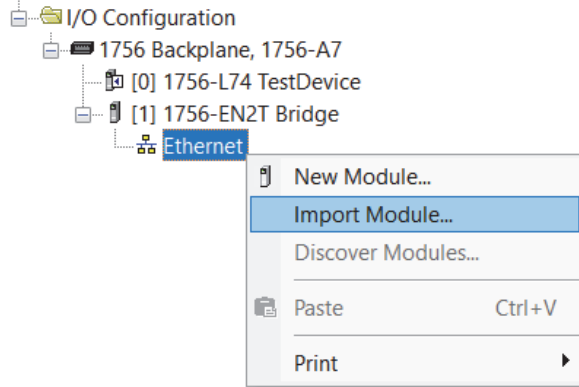
To add an Ethernet bridge:

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.

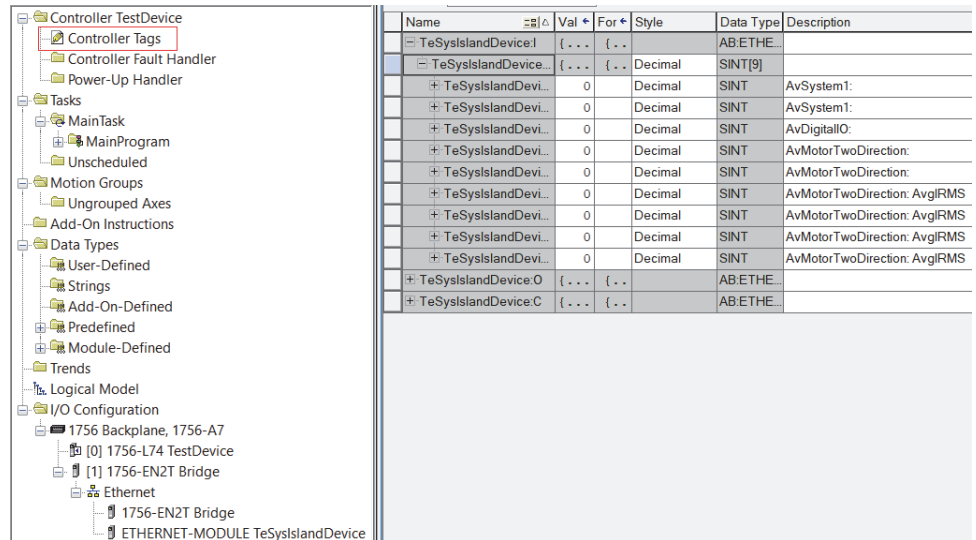


Import the TeSys™ island Module

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



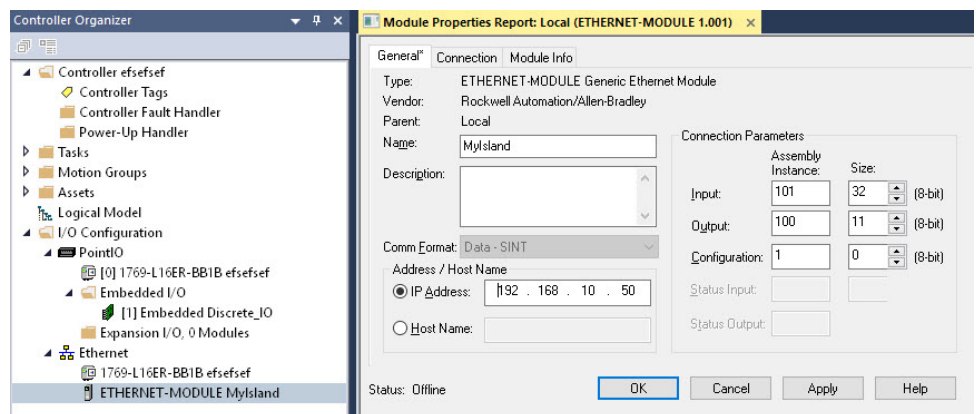
After import, the device shows up in the I/O configuration tree and the Controller Tags section of the project.



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

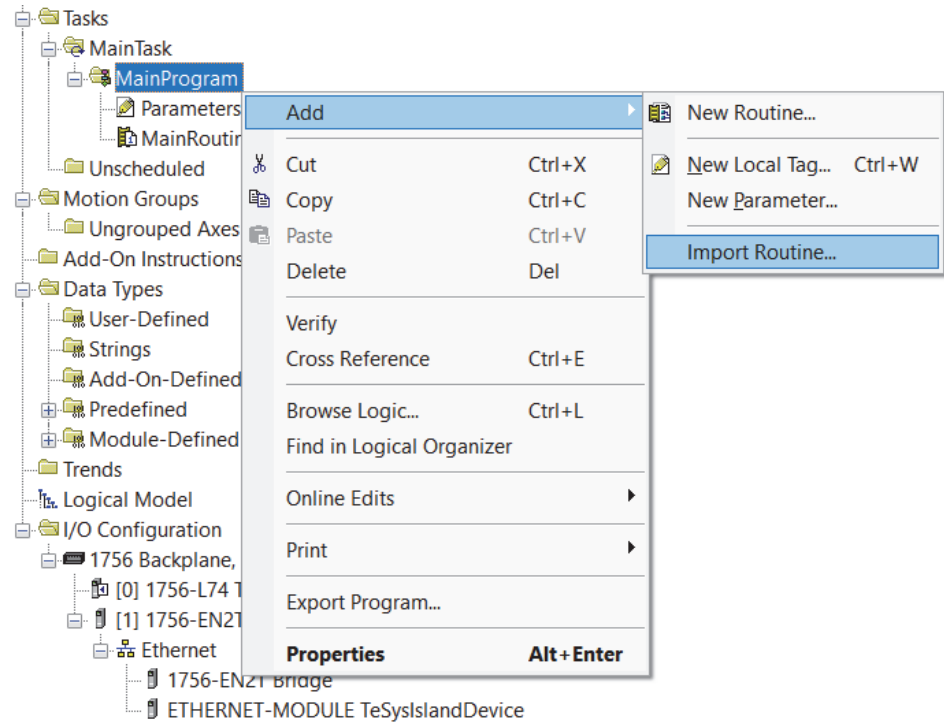
NOTE: If you skip this step before importing the Subroutine and AOI, you will be required to manually set the target communication path for each Acyclic function block.

Define the IP Address



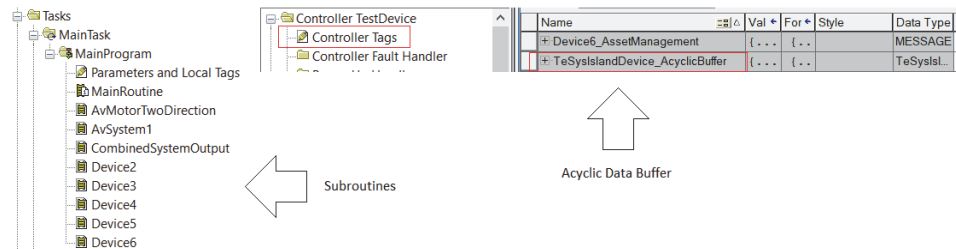
Import the Subroutine

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



After import:

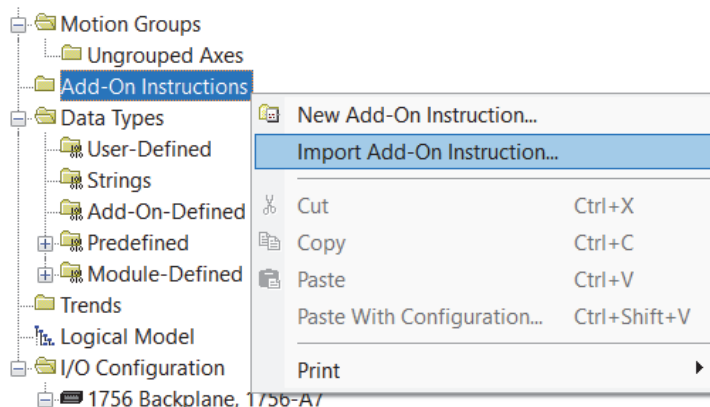
- the subroutines are visible in the Tasks tree
- the acyclic data buffer is visible in the Controller Tags section



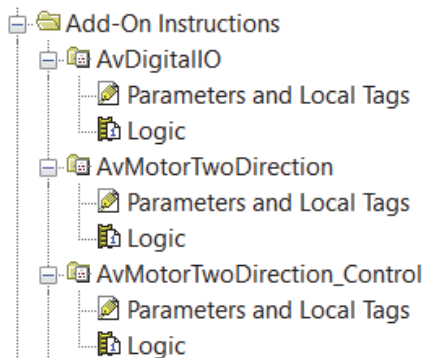
For more information on accessing the device data, see [Data Access Example](#), page 26.

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.



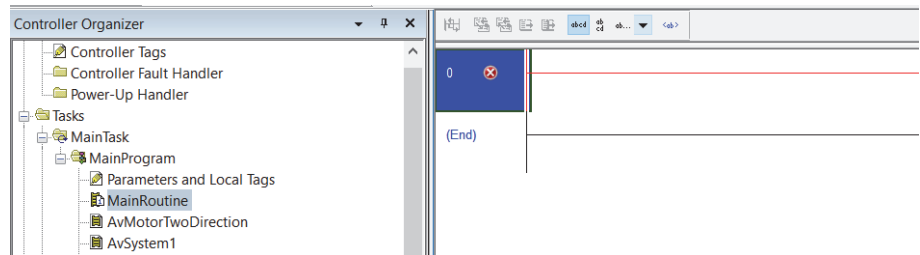
Each AOI contains either cyclic or acyclic data, which is indicated by the following naming convention:

- 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.

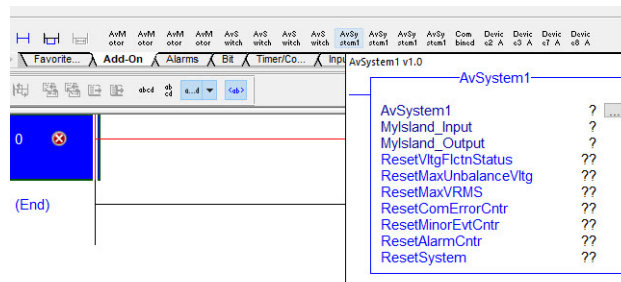
Create Instances of the AOIs

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.

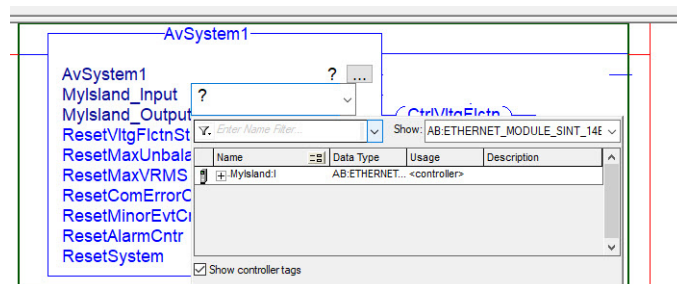
1. Enter the Main Routine by double-clicking it within the Tasks tree.



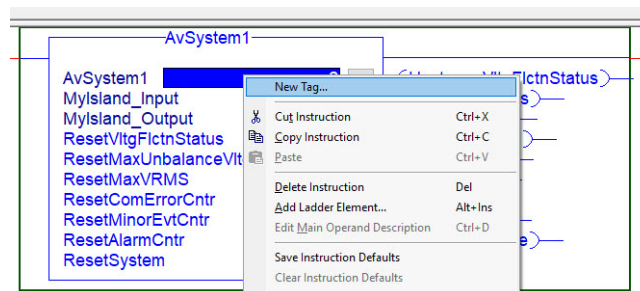
2. Add an AOI from the add-on list.



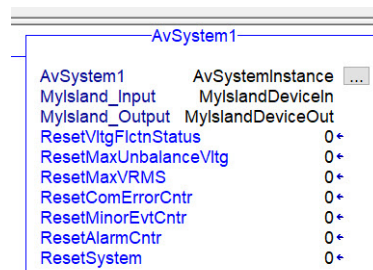
3. Fill in the reference tags for each In/Out parameter. These tags are in the Controller Tags list with names matching the In/Out Parameters.



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

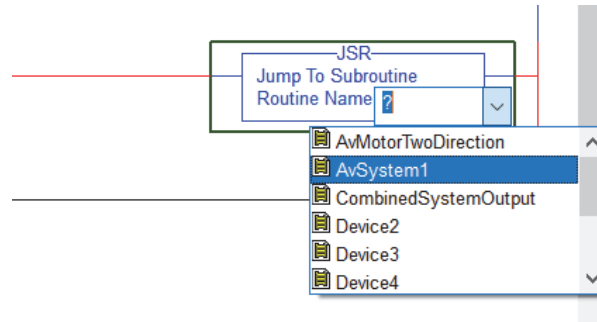


The AOI is now fully configured and ready for use.



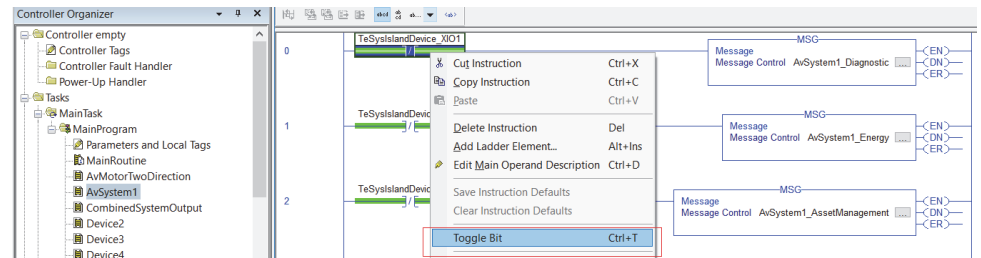
Calling Acyclic Data

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

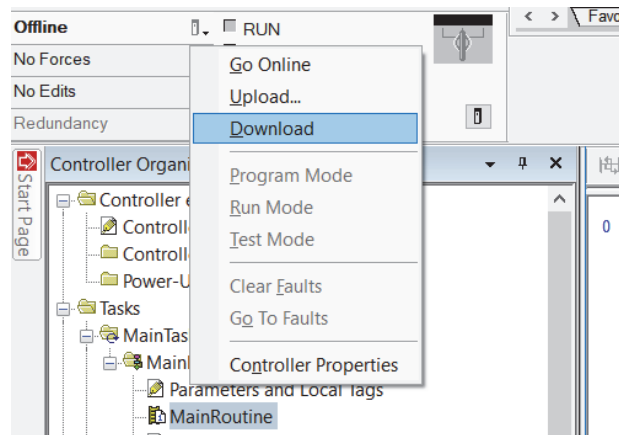
The following section provides an example of how to access data on the TeSys Island. These example AOIs:

- 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)

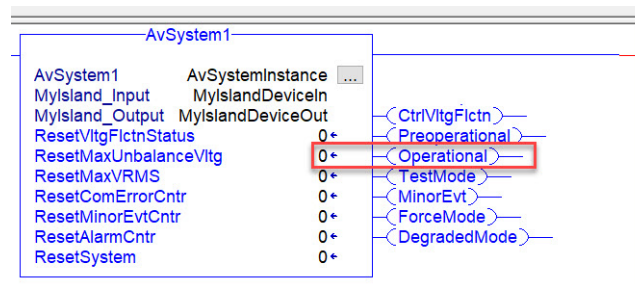
Accessing Data via AOI

After setting up the AOIs you plan to use:

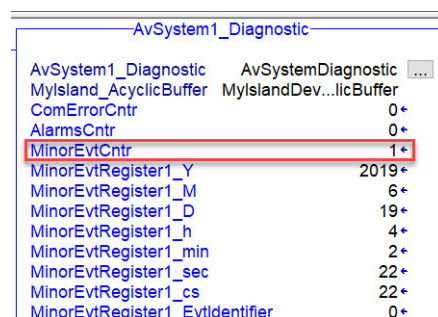
1. Download the program.
2. Set the PLC to Run mode.



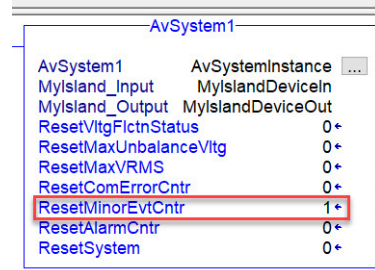
If the device is properly set up, and does not have any trips or other events, the cyclic system AOI should indicate that the system is operational.



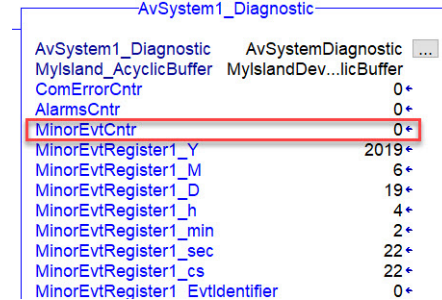
To view acyclic data, the appropriate explicit message must be accessed. See Calling Acyclic Data, page 25. As shown here, the device currently has one Minor Event logged via the System Minor Event Counter within the acyclic system diagnostic AOI.



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 25), the counter returns to 0.

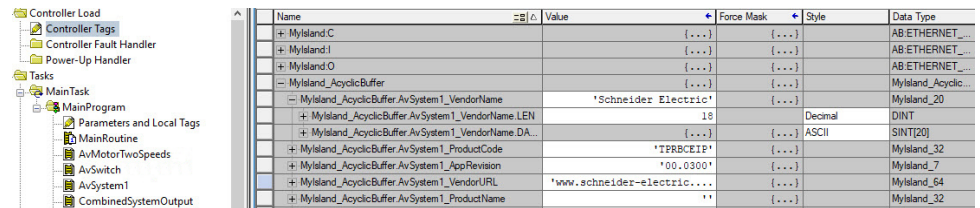


Accessing Data via the Acyclic Buffer

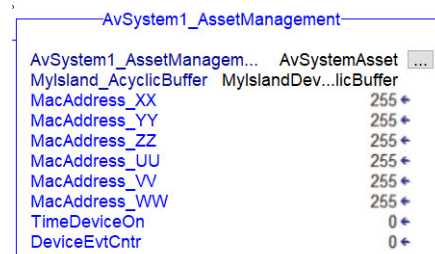
AOIs are capable of exposing only SINT, INT, DINT, REAL, and BOOL data types as Input/Output parameters. Due to this constraint, STRING registers are placed within the acyclic data buffer and can be accessed there.

After you toggle the bit to access the acyclic system asset management data (see Calling Acyclic Data, page 25), 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.



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.

Data Refresh Rates

Data	Maximum update interval
Input and output status of power devices, digital I/O modules, and SIL ⁷ interface modules <i>for example, Run commands, contactor status (RunFwd, Tripped), digital input (DI0, DI1...)</i>	10 ms
Analog measurements of power devices, analog I/O modules, and voltage interface modules <i>for example, phase current (AvgIRMS, PhaseXIRMS), phase voltage (VRMSPhaseX, AvgVRMS), power (InstActivePower, InstReactivePower, PowerFactor), energy (ActiveEnergy, ReactiveEnergy), analog inputs (MotorTemperature, AI0, AI1)</i>	100 ms
Other data <i>for example, asset data: ContactorCycleCntr, TimeModuleOn, AvgIRMS (lifetime)</i>	10 ms

7. Safety Integrity Level according to standard IEC 61508.

Function Blocks

TeSys™ island function blocks integrated with Studio 5000® are fieldbus independent and have no logic instructions. The inputs and outputs of the function blocks are linked to the process image (cyclic data) without any modifications. Inputs and outputs, which are not part of the process image, are exchanged via acyclic communication methods.

Data Types

The following data types are supported by Studio 5000® software. A data type is a definition of the size and layout of the memory allocated for the created tag. Data types define how many bits, bytes, or words of data a tag uses.

Data Types

Data Type	Abbreviation	Memory Bits	Range
Boolean	BOOL	1	0–1
Short Integer	SINT	8	–128 to 127
Integer	INT	16	–32,768 to 32,767
Double Integer	DINT	32	–2,147,483,648 to 2,147,483,647
Real Number	REAL	32	±3.402823E38 to ±1.1754944E-38

TeSys™ island supports unsigned data types. However, Studio 5000 software supports only signed data types. These data types use a bit to indicate that the 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 (add-on instructions) 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 data type BOOL with the naming convention *{TagName}_O*.

Overflow Example

AvgIRMS	DINT
AvgIRMS_O	DINT

Timestamps

Some outputs that are part of a function block—including registers, timestamps, start dates, and stop dates—provide timestamp information such as the date and time when the value was recorded. The function block includes a unique output for each criteria to present the date and timestamp data as shown below:

- **cs**: centisecond
- **D**: day
- **h**: hour
- **M**: month
- **min**: minute
- **sec**: second
- **Y**: year

Example: The following outputs are available for the Voltage DipStartDate1 timestamp:

- VoltageDipStartDate1_cs
- VoltageDipStartDate1_D
- VoltageDipStartDate1_h
- VoltageDipStartDate1_M
- VoltageDipStartDate1_min
- VoltageDipStartDate1_sec
- VoltageDipStartDate1_Y

Registers, timestamps, start dates, and stop dates that provide timestamp information that end in **1** indicate the most recent output and, depending on the number of available outputs, the output with the higher number indicates the least recent entry. So, in the case of the outputs shown as VoltageDipStartDate1 and VoltageDipStartDate5, **1** indicates the most recent entry and **5** indicates the least recent entry.

Avatar Function Blocks

General Description

There are two basic types of function blocks:

- System avatar function blocks
- Standard avatar function blocks

System Avatar Function Blocks

The System avatar is unique in the TeSys island and supported by specific function block implementations, indicated by the string **System** in the function block name.

Standard Avatar Function Blocks

The Standard avatars are supported by two types of function blocks:

- Avatar Cyclic function blocks
- Avatar Acyclic function blocks (read/write)

Each Avatar cyclic function block is supported by its own function block implementation, which can be instantiated for multiple usages of the same avatar type in one TeSys island. Create one function block instance for each avatar in your application.

There is only one implementation for the Avatar acyclic function blocks (read/write). The same set of Diagnostic and Energy acyclic data is available for all avatars, not including the System avatar, Analog I/O, and the Digital I/O. The same set of Asset acyclic data is available for each device on the island. Executing the function block for a non-supported avatar stops the function block with a detected error. For multiple usages of the same function block with different avatars, you have to create an instance of the function block for each avatar. You will need to create an instance of the Asset Management function block for each device on the island.

The function blocks have no logic operations and do not modify or interpret the avatar data. The function blocks copy the values of their inputs into the cyclic output data frame and copy the data of the cyclic input frame to their outputs. If the function block requires acyclic data exchange, the read and write requests are managed by the function block.

The system provides one acyclic connection per TeSys™ island bus coupler. For this reason, the acyclic communication requests must be handled sequentially. A new request can only be sent if the response to the previous request was received.

If a detected error occurs during the execution, the function block stops and provides the detected error information. You cannot stop the function block by the application (for example, cancel input).

Some function blocks provide inputs to reset or preset parameters of the function block. When executing the function block, if one of these inputs is TRUE, the update of the outputs is delayed until the reset or preset command is executed in the avatar.

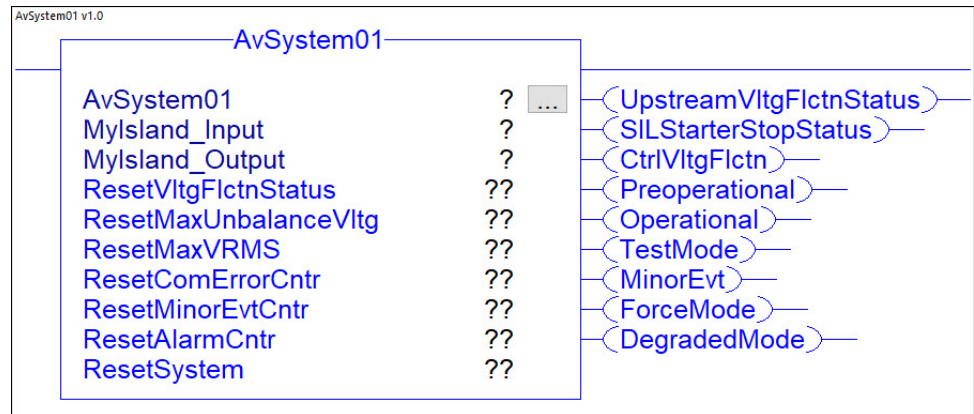
All the data exposed by an AOI exists within the main body, except for data exposed with output parameters of type BOOL. This data exists on the right side of the AOI.

System Function Blocks

System

The **AvSystem** function block returns the status and resets the cyclic diagnostic and energy data of the System avatar.

AvSystem Function Block



AvSystem Input Interface

Input	Data Type	Description
ResetVltgFlctnStatus	BOOL	If this input is set to TRUE, the value of the parameter ResetVltgFlctnStatus is reset.
ResetMaxUnbalanceVltg	BOOL	If this input is set to TRUE, the value of the parameter ResetMaxUnbalanceVltg is reset.
ResetMaxVRMS	BOOL	If this input is set to TRUE, the value of the parameter ResetMaxVRMS is reset.
ResetComErrorCntr	BOOL	If this input is set to TRUE, the counter of detected errors for the fieldbus communication is set to 0.
ResetMinorEvtCntr	BOOL	If this input is set to TRUE, the counter of detected minor events for the system is set to 0.
ResetAlarmCntr	BOOL	If this input is set to TRUE, the counter of detected alarms for the system is set to 0.
ResetSystem	BOOL	If this input is set to TRUE, the system is reset.

AvSystem Output Interface

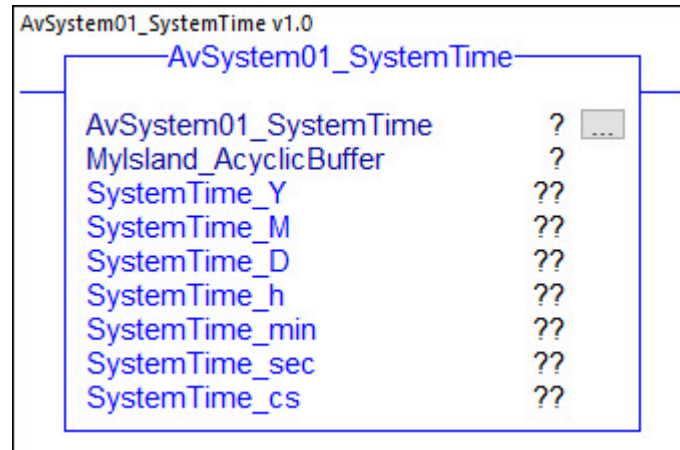
Output	Data Type	Description
UpstreamVltgFlctnStatus	BOOL	If this output is set to TRUE, a voltage dip or swell is detected. Can be reset with ResetVltgFlctnStatus.
SILStarterStopStatus	BOOL	Status of SIL ⁸ Starter Stop 0 function. If this output is set to FALSE, no SIL group has received a SIL Starter Stop command.
CtrlVltgFlctn	BOOL	If this output is set to TRUE, a control voltage fluctuation is detected.
Preoperational	BOOL	If this output is set to TRUE, the System avatar is in Preoperational mode.
Operational	BOOL	If this output is set to TRUE, the System avatar is in Operational mode. For detailed information on machine states, refer to the TeSys island – System, Installation, and Operation Guide.
TestMode	BOOL	If this output is set to TRUE, the System avatar is in Test mode.
MinorEvt	BOOL	If this output is set to TRUE, the System avatar is in Minor Event mode.
ForceMode	BOOL	If this output is set to TRUE, the System avatar is in Force mode.
DegradedMode	BOOL	If this output is set to TRUE, the System avatar is in Degraded mode.

8. Safety Integrity Level according to standard IEC 61508.

System Time

The AvSystem1_SystemTime function block returns the status of the acyclic system time of the system. The System Time function block only reads the system time—it does not write.

AvSystem1_SystemTime Function Block



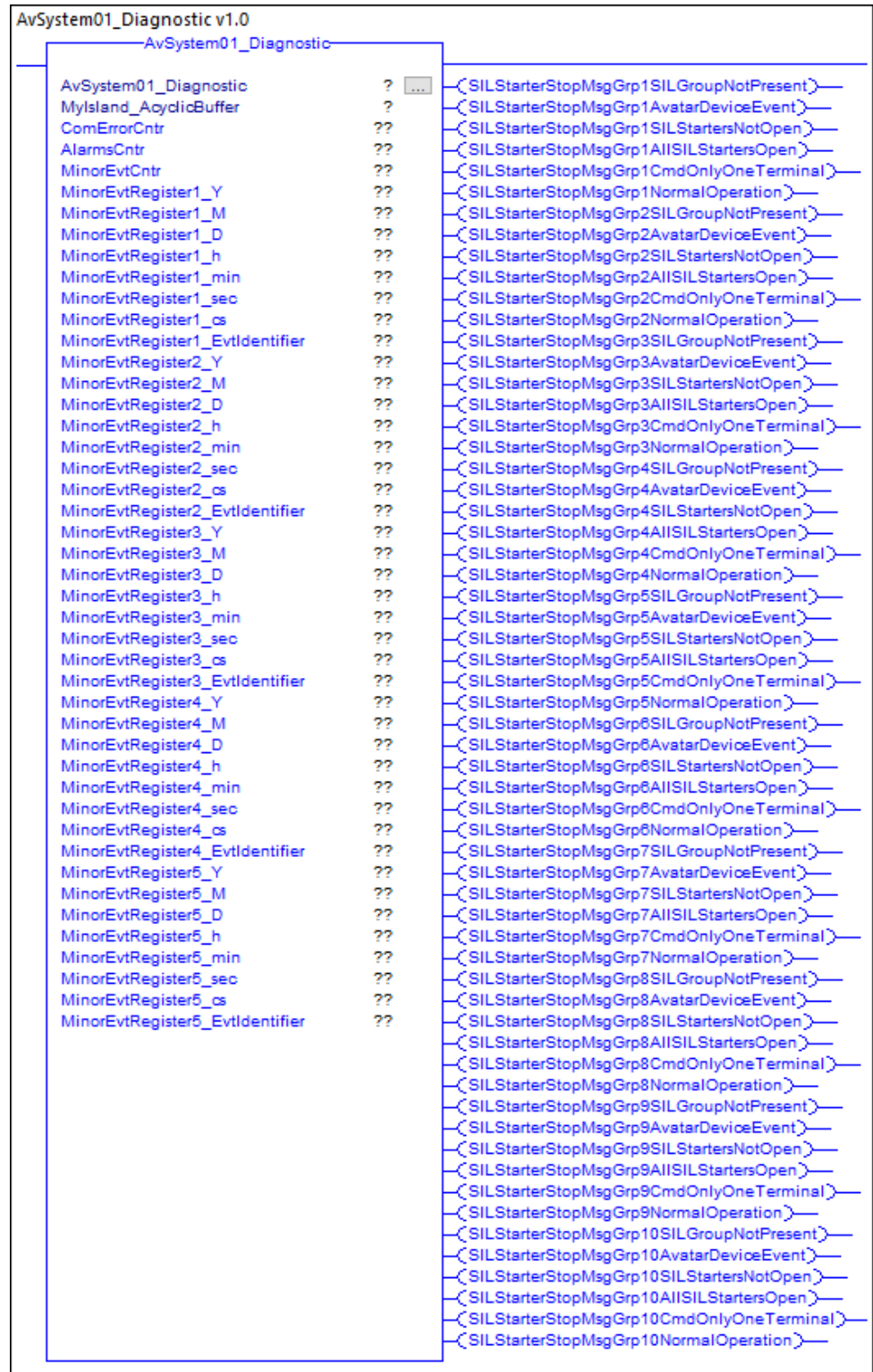
AvSystem1_System Time Output Interface

Output	Data Type	Description
SystemTime_Y	DINT	Date and time of the system (read only)
SystemTime_M	SINT	
SystemTime_D	SINT	
SystemTime_h	SINT	
SystemTime_min	SINT	
SystemTime_sec	SINT	
SystemTime_cs	SINT	

System Diagnostic

The **AvSystem1_Diagnostic** function block returns the status of the acyclic diagnostic data of the System avatar.

AvSystem1_Diagnostic Function Block



AvSystem1_Diagnostic Output Interface

Output	Data Type	Description	
ComErrorCntr	DINT	Number of detected errors for the fieldbus communication.	
AlarmsCntr	DINT	Number of detected alarms for the system.	
MinorEvtCntr	DINT	Number of detected minor events for the system.	
MinorEvtRegister1_Y	DINT	Information on a detected minor event. MinorEvtRegister1_ = most recent.	
MinorEvtRegister1_M	SINT		
MinorEvtRegister1_D	SINT		
MinorEvtRegister1_h	SINT		
MinorEvtRegister1_min	SINT		
MinorEvtRegister1_sec	SINT		
MinorEvtRegister1_cs	SINT		
MinorEvtRegister1_EventIdentifier	DINT		
...
MinorEvtRegister5_Y	DINT		Information on a detected minor event.
MinorEvtRegister5_M	SINT		
MinorEvtRegister5_D	SINT		
MinorEvtRegister5_h	SINT		
MinorEvtRegister5_min	SINT		
MinorEvtRegister5_sec	SINT		
MinorEvtRegister5_cs	SINT		
MinorEvtRegister5_EventIdentifier	DINT		
SILStarterStopMsgGrp1SILGroupNotPresent	BOOL	Status for SIL ⁹ Groups 1– 10: <ul style="list-style-type: none"> • NotPresent = SIL Group not present in system configuration • AvatarDeviceEvent = SIL Group impacted by avatar device event • SILStartersNotOpen = SIL Group Stop command received; SIL starters not open yet • AllStartersNotOpen = SIL Group Stop command successfully issued; all SIL starters are open • CmdIssuedOneTerminal = SIL Group Stop command issued to only one SIM input channel (jumper or SIM input wiring is causing an issue), but SIL starters did successfully open • NormalOperation = Normal operation; SIL starters can be open or closed 	
SILStarterStopMsgGrp1AvatarDeviceEvent	BOOL		
SILStarterStopMsgGrp1SILStartersNotOpen	BOOL		
SILStarterStopMsgGrp1AllSILStartersOpen	BOOL		
SILStarterStopMsgGrp1CmdOnlyOneTerminal	BOOL		
SILStarterStopMsgGrp1NormalOperation	BOOL		
...	...		
SILStarterStopMsgGrp10SILGroupNotPresent	BOOL		
SILStarterStopMsgGrp10AvatarDeviceEvent	BOOL		
SILStarterStopMsgGrp10SILStartersNotOpen	BOOL		
SILStarterStopMsgGrp10AllSILStartersOpen	BOOL		
SILStarterStopMsgGrp10CmdOnlyOneTerminal	BOOL		
SILStarterStopMsgGrp10NormalOperation	BOOL		

9. Safety Integrity Level according to standard IEC 61508.

System Energy Management

The **AvSystem1_Energy** function block returns the status of the acyclic energy data of the System avatar.

AvSystem1_Energy Function Block



AvSystem1_Energy Output Interface

Output	Data Type	Description
ActiveEnergyChannel1	DINT	Channel 1: ToU (Time of Use) total active energy value.
ActiveEnergyChannel1_O	BOOL	Channel 1: ToU (Time of Use) total active energy overflow value.
ActiveEnergyChannel2	DINT	Channel 2 :ToU (Time of Use) total active energy value.
ActiveEnergyChannel2_O	BOOL	Channel 2: ToU (Time of Use) total active energy overflow value.
ActiveEnergyChannel3	DINT	Channel 3: ToU (Time of Use) total active energy value.
ActiveEnergyChannel3_O	BOOL	Channel 3: ToU (Time of Use) total active energy overflow value.
ActiveEnergyChannel4	DINT	Channel 4: ToU (Time of Use) total active energy value.
ActiveEnergyChannel4_O	BOOL	Channel 4: ToU (Time of Use) total active energy overflow value.
AvgVRMS	INT	Average Vrms voltage on three phases (Unit: V)
Frequency	INT	Main power voltage frequency (line frequency as measured on phase 1). (Unit: Hz)
InstActivePower	DINT	Total active power for the system. (Unit: W)
InstReactivePower	DINT	Total reactive power for the system. (Unit: VAR)
MaxActivePower	DINT	Maximum value of the active power for the system. (Unit: W)

AvSystem1_Energy Output Interface (Continued)

Output	Data Type	Description
MaxActivePowerTimestamp_cs	SINT	Date and time when the maximum active power value was recorded.
MaxActivePowerTimestamp_D	SINT	
MaxActivePowerTimestamp_h	SINT	
MaxActivePowerTimestamp_M	SINT	
MaxActivePowerTimestamp_min	SINT	
MaxActivePowerTimestamp_sec	SINT	
MaxActivePowerTimestamp_Y	DINT	
MaxAvgVRMS	DINT	Maximum voltage the system measured. (Unit: V)
MaxAvgVRMSTimestamp_cs	SINT	Date and time when maximum average voltage value was recorded.
MaxAvgVRMSTimestamp_D	SINT	
MaxAvgVRMSTimestamp_h	SINT	
MaxAvgVRMSTimestamp_M	SINT	
MaxAvgVRMSTimestamp_min	SINT	
MaxAvgVRMSTimestamp_sec	SINT	
MaxAvgVRMSTimestamp_Y	DINT	
MaxPowerFactor	SINT	True maximum power factor value.
MaxPowerFactorTimestamp_cs	SINT	Date and time when the maximum power factor value was recorded.
MaxPowerFactorTimestamp_D	SINT	
MaxPowerFactorTimestamp_h	SINT	
MaxPowerFactorTimestamp_M	SINT	
MaxPowerFactorTimestamp_min	SINT	
MaxPowerFactorTimestamp_sec	SINT	
MaxPowerFactorTimestamp_Y	DINT	
MaxReactivePower	DINT	Maximum value of the reactive power for the system. (Unit: VAR)
MaxReactivePowerTimestamp_cs	SINT	Date and time when the maximum reactive power value was recorded.
MaxReactivePowerTimestamp_D	SINT	
MaxReactivePowerTimestamp_h	SINT	
MaxReactivePowerTimestamp_M	SINT	
MaxReactivePowerTimestamp_min	SINT	
MaxReactivePowerTimestamp_sec	SINT	
MaxReactivePowerTimestamp_Y	DINT	
MaxUnbalancedVltg	SINT	Maximum unbalance voltage in percent (%).
MaxUnbalancedVltgTimestamp_cs	SINT	Date and time of maximum unbalance voltage.
MaxUnbalancedVltgTimestamp_D	SINT	
MaxUnbalancedVltgTimestamp_h	SINT	
MaxUnbalancedVltgTimestamp_M	SINT	
MaxUnbalancedVltgTimestamp_min	SINT	
MaxUnbalancedVltgTimestamp_sec	SINT	
MaxUnbalancedVltgTimestamp_Y	DINT	
MinPowerFactor	SINT	True minimum power factor value.

AvSystem1_Energy Output Interface (Continued)

Output	Data Type	Description
MinPowerFactorTimestamp_cs	SINT	Date and time when the minimum power factor value was recorded.
MinPowerFactorTimestamp_D	SINT	
MinPowerFactorTimestamp_h	SINT	
MinPowerFactorTimestamp_M	SINT	
MinPowerFactorTimestamp_min	SINT	
MinPowerFactorTimestamp_sec	SINT	
MinPowerFactorTimestamp_Y	DINT	
PowerFactor	SINT	True power factor value.
TotalActiveEnergy	DINT	Total active energy value for all avatars in the system with Energy Monitoring Enabled. (Unit: Watt-hours)
TotalActiveEnergy_O	BOOL	Total active energy overflow value for all avatars in the system with Energy Monitoring Enabled.
TotalReactiveEnergy	DINT	Total reactive energy value for all avatars in the system with Energy Monitoring Enabled. (Unit: VAR-hours)
TotalReactiveEnergy_O	BOOL	Total reactive energy overflow value for all avatars in the system with Energy Monitoring Enabled.
UnbalancedVltg	SINT	Unbalance voltage in percent (%).
VltgDipCntr	DINT	Voltage dip counter
VltgPhaseOrderACB	BOOL	If this output is set to TRUE, the phase order is ACB (FALSE = phase order ABC).
VltgSwellCntr	DINT	Voltage swell counter
VoltageDipMagnitude1	DINT	Maximum voltage magnitude for a voltage dip. (Unit: V)
...
VoltageDipMagnitude5	DINT	Maximum voltage magnitude for a voltage dip. (Unit: V)
VoltageDipStartDate1_cs	SINT	Start time stamp of the voltage dip.
VoltageDipStartDate1_D	SINT	
VoltageDipStartDate1_h	SINT	
VoltageDipStartDate1_M	SINT	
VoltageDipStartDate1_min	SINT	
VoltageDipStartDate1_sec	SINT	
VoltageDipStartDate1_Y	DINT	
...
VoltageDipStartDate5_cs	SINT	Start time stamp of the voltage dip.
VoltageDipStartDate5_D	SINT	
VoltageDipStartDate5_h	SINT	
VoltageDipStartDate5_M	SINT	
VoltageDipStartDate5_min	SINT	
VoltageDipStartDate5_sec	SINT	
VoltageDipStartDate5_Y	DINT	

AvSystem1_Energy Output Interface (Continued)

Output	Data Type	Description
VoltageDipStopDate1_cs	SINT	Stop time stamp of the voltage dip.
VoltageDipStopDate1_D	SINT	
VoltageDipStopDate1_h	SINT	
VoltageDipStopDate1_M	SINT	
VoltageDipStopDate1_min	SINT	
VoltageDipStopDate1_sec	SINT	
VoltageDipStopDate1_Y	DINT	
...
VoltageDipStopDate5_cs	SINT	Stop time stamp of the voltage dip.
VoltageDipStopDate5_D	SINT	
VoltageDipStopDate5_h	SINT	
VoltageDipStopDate5_M	SINT	
VoltageDipStopDate5_min	SINT	
VoltageDipStopDate5_sec	SINT	
VoltageDipStopDate5_Y	DINT	
VoltageSwellMagnitude1	DINT	Maximum voltage magnitude for a voltage swell. (Unit: V)
...	...	
VoltageSwellMagnitude5	DINT	
VoltageSwellStartDate1_cs	SINT	Start time stamp of the voltage swell.
VoltageSwellStartDate1_D	SINT	
VoltageSwellStartDate1_h	SINT	
VoltageSwellStartDate1_M	SINT	
VoltageSwellStartDate1_min	SINT	
VoltageSwellStartDate1_sec	SINT	
VoltageSwellStartDate1_Y	DINT	
...	...	
VoltageSwellStartDate5_cs	SINT	
VoltageSwellStartDate5_D	SINT	
VoltageSwellStartDate5_h	SINT	
VoltageSwellStartDate5_M	SINT	
VoltageSwellStartDate5_min	SINT	
VoltageSwellStartDate5_sec	SINT	
VoltageSwellStartDate5_Y	DINT	

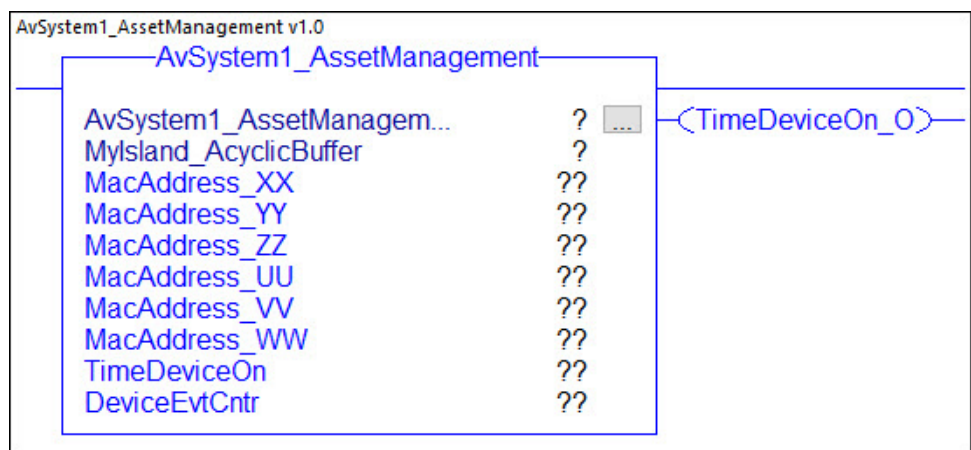
AvSystem1_Energy Output Interface (Continued)

Output	Data Type	Description
VoltageSwellStopDate1_cs	SINT	Stop time stamp of the voltage swell.
VoltageSwellStopDate1_D	SINT	
VoltageSwellStopDate1_h	SINT	
VoltageSwellStopDate1_M	SINT	
VoltageSwellStopDate1_min	SINT	
VoltageSwellStopDate1_sec	SINT	
VoltageSwellStopDate1_Y	DINT	
...	...	
VoltageSwellStopDate5_cs	SINT	
VoltageSwellStopDate5_D	SINT	
VoltageSwellStopDate5_h	SINT	
VoltageSwellStopDate5_M	SINT	
VoltageSwellStopDate5_min	SINT	
VoltageSwellStopDate5_sec	SINT	
VoltageSwellStopDate5_Y	DINT	
VRMSPhase1	DINT	
VRMSPhase2	DINT	Average Vrms voltage between L2 and neutral. (Unit: V)
VRMSPhase3	DINT	Average Vrms voltage between L3 and neutral. (Unit: V)

System Asset Management

The **AvSystem1_AssetManagement** function block returns the status of the acyclic asset management data of the System avatar.

AvSystem1_AssetManagement Function Block



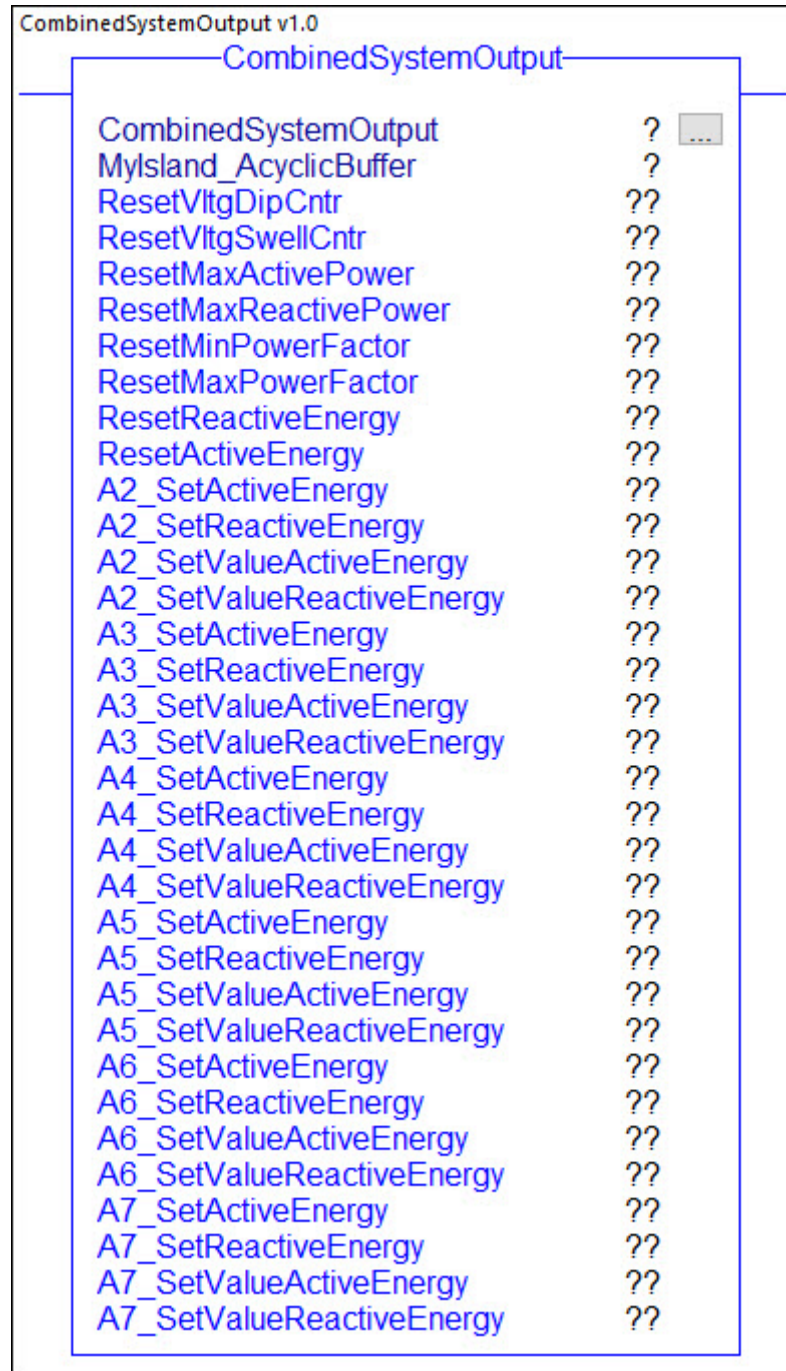
AvSystem1_AssetManagement Output Interface

Output	Data Type	Description
MacAddress_XX	INT	MAC address of the device XX.
MacAddress_YY	INT	MAC address of the device YY.
MacAddress_ZZ	INT	MAC address of the device ZZ.
MacAddress_UU	INT	MAC address of the device UU.
MacAddress_VV	INT	MAC address of the device VV.
MacAddress_WW	INT	MAC address of the device WW.
TimeModuleOn	DINT	This register indicates the time that the module has been powered on in its lifetime (Unit: h).
TimeModuleOn_O	BOOL	This register indicates the overflow time that the module has been powered on in its lifetime.
EventCntr	DINT	This register indicates number of times this module has experienced a detected device error (Unit: h). This value does not include detected device events which corrupt or prevent the saving of the non-volatile memory.

System Combined Output

The **CombinedSystemOutput** function block returns the energy information of the System avatar, resets the energy registers of the System avatar, and sets the energy preset values of the avatars (A2, A3, etc.).

CombinedSystemOutput Function Block



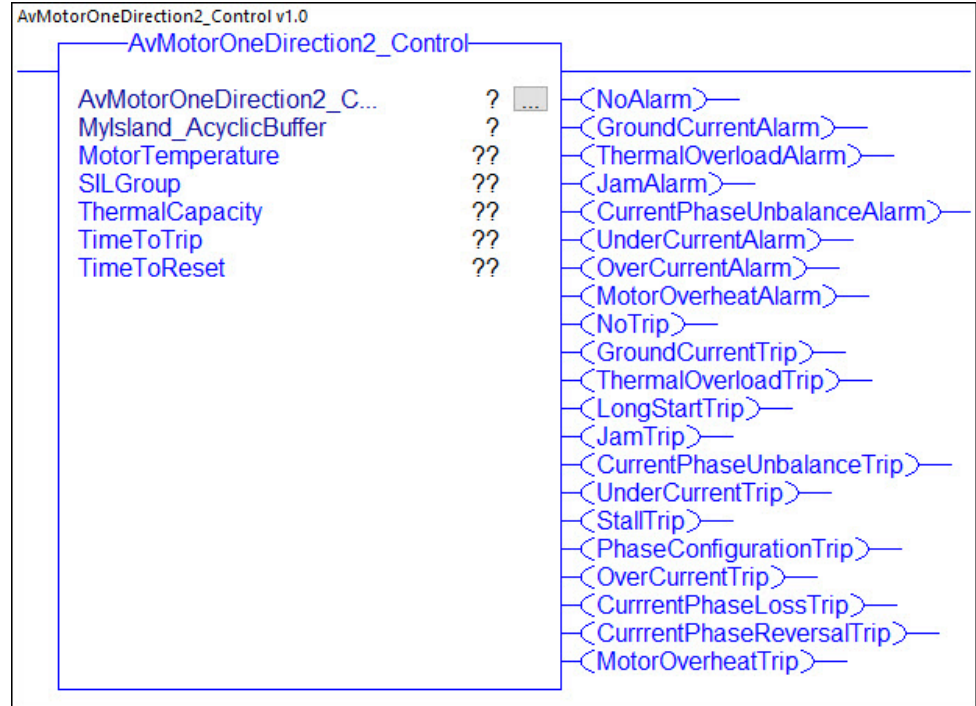
CombinedSystemOutput Input Interface

Input	Data Type	Description
ResetVltgDipCntr	BOOL	If this input is set to TRUE, the value of the parameter ResetVltgDipCntr is reset.
ResetVltgSwellCntr	BOOL	If this input is set to TRUE, the value of the parameter ResetVltgSwellCntr is reset.
ResetMaxActivePower	BOOL	If this input is set to TRUE, the value of the parameter MaxActivePower and the associated time stamp MaxActivePowerTimestamp are reset.
ResetMaxReactivePower	BOOL	If this input is set to TRUE, the value of the parameter MaxReactivePower and the associated time stamp MaxReactivePowerTimestamp are reset.
ResetMinPowerFactor	BOOL	If this input is set to TRUE: <ul style="list-style-type: none"> The true value of the parameter MinPowerFactor is reset to 1. The associated time stamp MinPowerFactorTimestamp is reset.
ResetMaxPowerFactor	BOOL	If this input is set to TRUE: <ul style="list-style-type: none"> The true value of the parameter MaxPowerFactor is reset to 0. The associated time stamp MaxPowerFactorTimestamp is reset.
ResetReactiveEnergy	BOOL	If this input is set to TRUE, the value of the parameter ReactiveEnergy is reset.
ResetActiveEnergy	BOOL	If this input is set to TRUE, the value of the parameter ActiveEnergy is reset.
A2_SetActiveEnergy	BOOL	Command to set the TotalActiveEnergy value to TotalActiveEnergyPreset value.
A2_SetReactiveEnergy	BOOL	Command to set the TotalReactiveEnergy value to TotalReactiveEnergyPreset value.
A2_SetValueActiveEnergy	DINT	Value to preset the TotalActiveEnergy, will take effect on a TRUE command to SetActiveEnergy (Unit: Watt-hours)
A2_SetValueReactiveEnergy	DINT	Value to preset the TotalReactiveEnergy, will take effect on a TRUE command to SetReactiveEnergy (Unit: VAR-hours)
...
A7_SetActiveEnergy	BOOL	Command to set the TotalActiveEnergy value to TotalActiveEnergyPreset value.
A7_SetReactiveEnergy	BOOL	Command to set the TotalReactiveEnergy value to TotalReactiveEnergyPreset value.
A7_SetValueActiveEnergy	DINT	Value to preset the TotalActiveEnergy, will take effect on a TRUE command to SetActiveEnergy (Unit: Watt-hours)
A7_SetValueReactiveEnergy	DINT	Value to preset the TotalReactiveEnergy, will take effect on a TRUE command to SetReactiveEnergy (Unit: VAR-hours)

Avatar Acyclic Function Blocks

The **Avatar_Control** function block returns the status of the acyclic data for the individual avatar. In the example below, the **AvMotorOneDirection_Control** function block is displayed. The same set of acyclic data is available for all avatars, not including the System avatar, analog I/O, and the digital I/O.

AvMotorOneDirection_Control Function Block



Avatar Control Output Interface

Output	Data Type	Description
CurrentPhaseUnbalanceTrip	BOOL	The avatar has detected the conditions to cause a current phase unbalance trip event.
CurrentPhaseUnbalanceAlarm	BOOL	The avatar has detected the conditions to cause a current phase unbalance event.
CurrentPhaseLossTrip	BOOL	The avatar has detected the conditions to cause a current phase loss trip event.
CurrentPhaseReversalTrip	BOOL	The avatar has detected the conditions to cause a current phase reversal trip event.
GroundCurrentTrip	BOOL	The avatar has detected the conditions to cause a ground current trip event.
GroundCurrentAlarm	BOOL	The avatar has detected the conditions to cause a ground current event.
JamTrip	BOOL	The avatar has detected the conditions to cause a jam trip event.
JamAlarm	BOOL	The avatar has detected the conditions to cause a jam event.
LongStartTrip	BOOL	The avatar has detected the conditions to cause a long start trip event.
MotorOverheatTrip	BOOL	The motor temperature has increased above the motor overheat trip level.
MotorOverheatAlarm	BOOL	The motor temperature has increased above the motor overheat level.
MotorTemperature	INT	Indicates the temperature of the motor in 0.1 °C scaling unit. Depending on temperature sensor type, the range is: <ul style="list-style-type: none"> • -200 to +850°C (-328 to +1562°F) (for PT100) • -200 to +600°C (-328 to +1112°F) (for PT1000) • -60 to +180°C (-76 to +356°F) (for NI 100/1000)
NoTrip	BOOL	No trip has been detected.
NoAlarm	BOOL	No advisory condition has been detected.
OverCurrentTrip	BOOL	The avatar has detected the conditions to cause an overcurrent trip event.
OverCurrentAlarm	BOOL	The avatar has detected the conditions to cause an overcurrent event.
PhaseConfigurationTrip	BOOL	The avatar has detected the conditions to cause a phase configuration trip event.
SILGroup	SINT	Indicates the number of the SIL ¹⁰ group.
StallTrip	BOOL	The avatar has detected the conditions to cause a stall trip event.
ThermalCapacity	INT	Provides the percentage (%) of the thermal capacity of the motor which has been used.
ThermalOverloadTrip	BOOL	The avatar thermal capacity has increased above 100%.
ThermalOverloadAlarm	BOOL	The avatar thermal capacity has increased above the thermal overload level.
TimeToReset	DINT	Estimated time to wait before being able to reset a thermal overload trip. (Unit: s)
TimeToTrip	DINT	Estimated time before a thermal overload trip will occur given the current conditions. (Unit: s)
UnderCurrentTrip	BOOL	The avatar has detected the conditions to cause an undercurrent trip event.
UnderCurrentAlarm	BOOL	The avatar has detected the conditions to cause an undercurrent event.

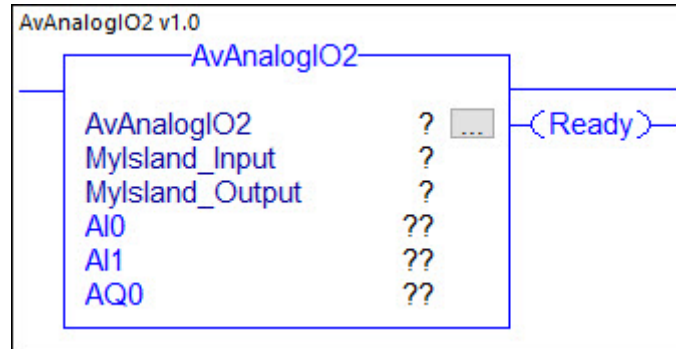
10. Safety Integrity Level according to standard IEC 61508.

Avatar Cyclic Function Blocks

Analog I/O

The **AvAnalogIO** function block provides information about the Analog I/O avatar with two inputs and one output.

AvAnalogIO Function Block



AvAnalogIO Input Interface

Input	Data Type	Description
AQ0	INT	Value to be written to analog output 0. Unit and scaling depends on the analog output type configured. <ul style="list-style-type: none"> • Type 0 (Unit: mV) • Type 1 (Unit: mV) • Type 2 (Unit: μA) • Type 3 (Unit: μA)

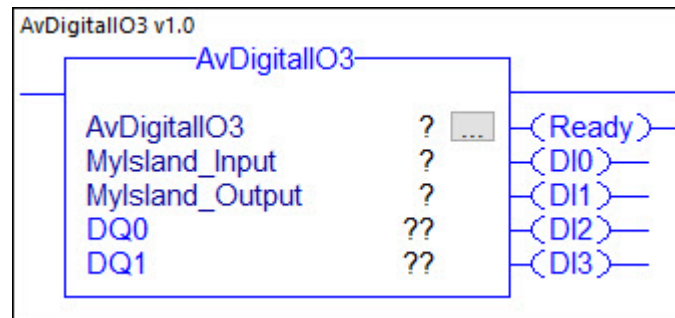
AvAnalogIO Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
AI0	INT	Indicates the value read from the analog input 0. Unit and scaling depends on the analog output type configured. <ul style="list-style-type: none"> • Type 0 to 12 (Unit: 0.1 °C) • Type 13 (Unit: mV) • Type 14 (Unit: mV) • Type 15 (Unit: μA) • Type 16 (Unit: μA)
AI1	INT	Indicates the value read from the analog input 1.

Digital I/O

The **AvDigitalIO** function block provides information about the Digital I/O avatar with four inputs and two outputs.

AvDigitalIO Function Block



AvDigitalIO Input Interface

Input	Data Type	Description
DQ0	BOOL	If this input is set to TRUE, the digital output 0 is set to TRUE.
DQ1	BOOL	If this input is set to TRUE, the digital output 1 is set to TRUE.

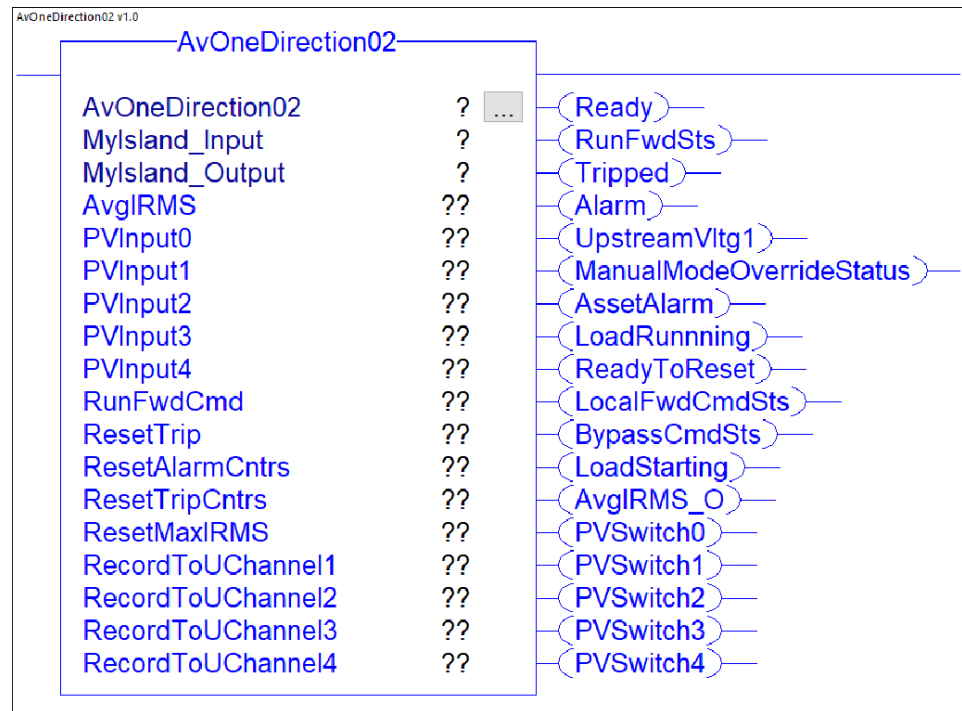
AvDigitalIO Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
DI0	BOOL	If this output is set to TRUE, the digital input 0 of the Digital I/O avatar is set to TRUE.
DI1	BOOL	If this output is set to TRUE, the digital input 1 of the Digital I/O avatar is set to TRUE.
DI2	BOOL	If this output is set to TRUE, the digital input 2 of the Digital I/O avatar is set to TRUE.
DI3	BOOL	If this output is set to TRUE, the digital input 3 of the Digital I/O avatar is set to TRUE.

Motor One Direction

The **AvMotorOneDirection** function block is used to manage a motor in one direction.

AvMotorOneDirection Function Block



AvMotorOneDirection Input Interface

Input	Data Type	Description
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetTripCntrs	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetAlarmCntrs	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.

AvMotorOneDirection Output Interface

Output	Data Type	Description
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ¹¹ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
BypassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
ManualModeOverrideStatus	BOOL	If this output is set to TRUE, the avatar is controlled by local command and PV control when in manual mode.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PVInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

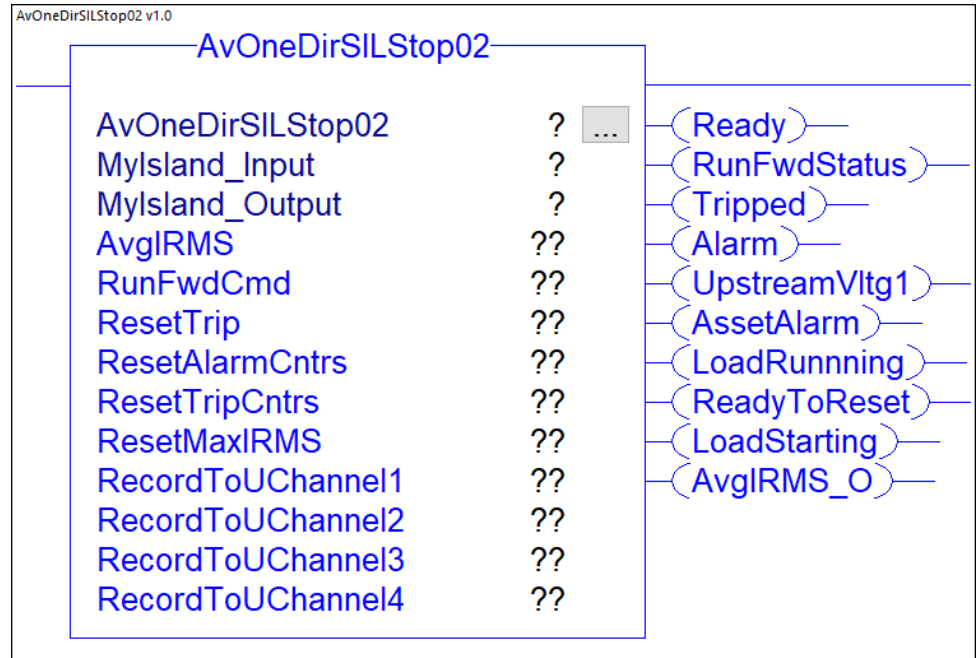
11. Safety Integrity Level according to standard IEC 61508

Motor One Direction - SIL Stop, W. Cat 1/2

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

The **AvMotorOneDirectionSILStop** function block is used to manage a motor in one direction with Stop Category 0 or Stop Category 1¹² function compliance for Wiring Category 1 and Category 2.

AvMotorOneDirectionSILStop Function Block



AvMotorOneDirectionSILStop Input Interface

Input	Data Type	Description
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.

12. Stop categories according to EN/IEC 60204–1.

AvMotorOneDirectionSILStop Output Interface

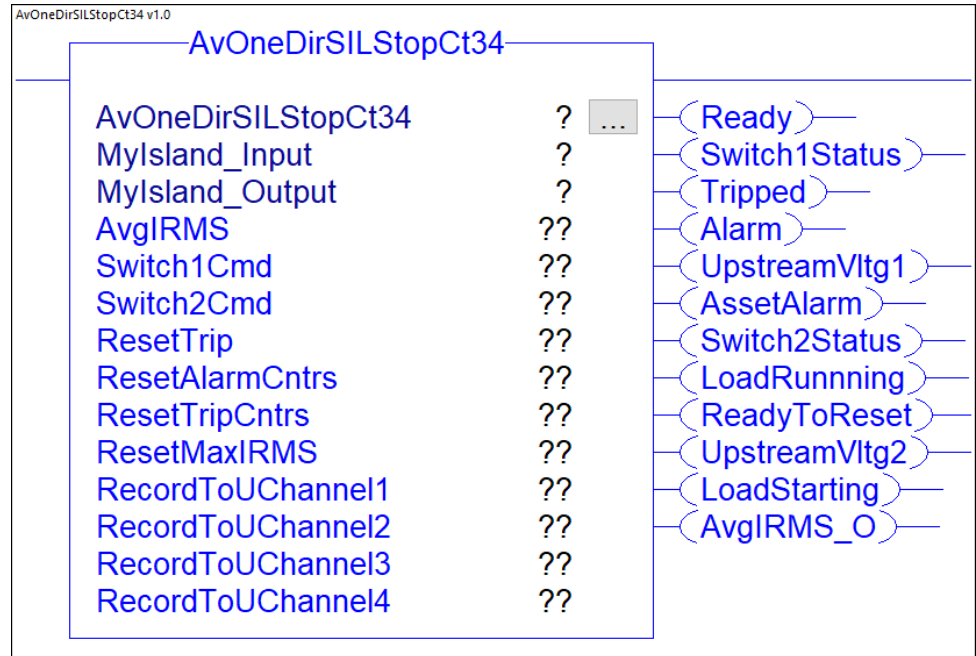
Output	Data Type	Description
AssetAlarm	BOOL	If this output is set to TRUE, a power device within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.

Motor One Direction - SIL Stop, W. Cat 3/4

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 3 and Category 4 according to ISO 13849.

The **AvMotorOneDirectionSILStopCat34** function block is used to manage a motor in one direction with Stop Category 0 or Stop Category 1¹³ function compliance for Wiring Category 3 and Category 4.

AvMotorOneDirectionSILStopCat34 Function Block



AvMotorOneDirectionSILStopCat34 Input Interface

Input	Data Type	Description
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
Switch1Cmd	BOOL	If this input is set to TRUE, the avatar forward primary switch is closed.
Switch2Cmd	BOOL	If this input is set to TRUE, the avatar forward redundant switch is closed.

13. Stop categories according to EN/IEC 60204-1.

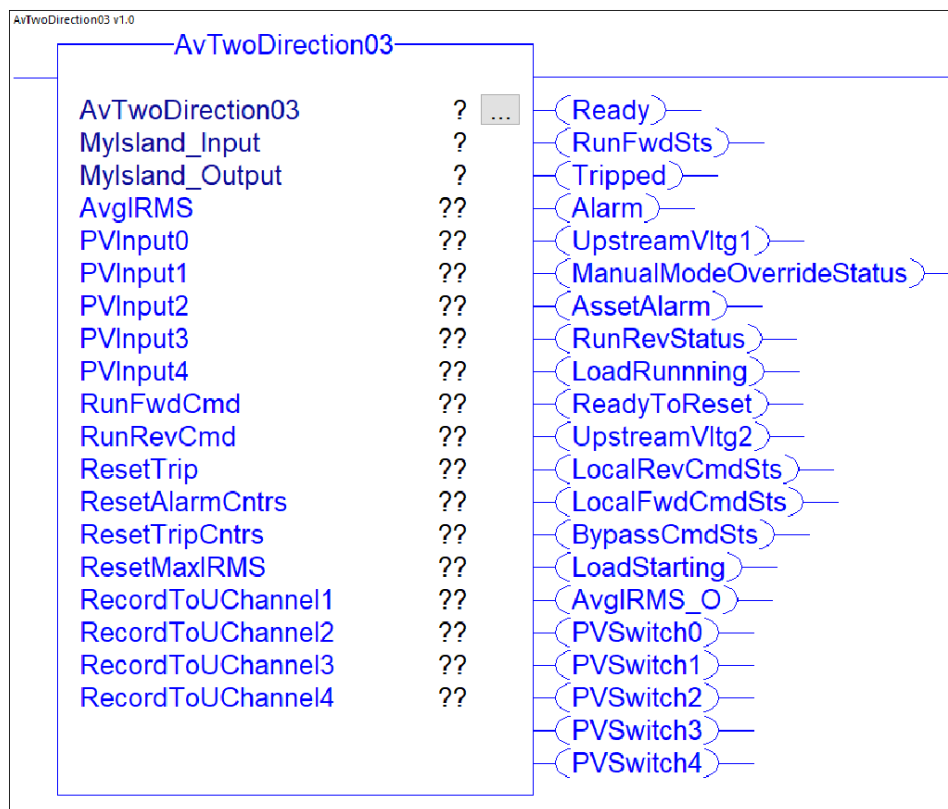
AvMotorOneDirectionSILStopCat34 Output Interface

Output	Data Type	Description
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values.(Unit: mA)
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
Switch1Status	BOOL	If this output is set to TRUE, the avatar forward primary switch is closed.
Switch2Status	BOOL	If this output is set to TRUE, the avatar forward redundant switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar (breaker closed).
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.

Motor Two Directions

The **AvMotorTwoDirection** function block is used to manage a motor in two directions (forward and reverse).

AvMotorTwoDirection Function Block



AvMotorTwoDirection Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
RunRevCmd	BOOL	If this input is set to TRUE, the avatar reverse switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvMotorTwoDirection Output Interface

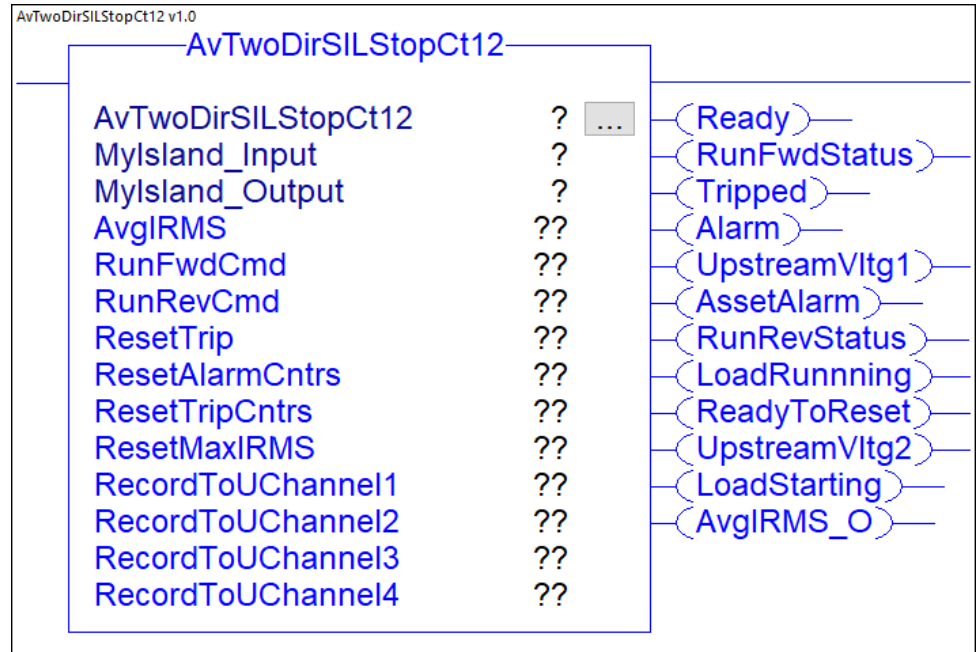
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunRevStatus	BOOL	If this output is set to TRUE, the avatar reverse switch is closed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LocalRevCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
ByPassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
ManualModeOverrideStatus	BOOL	If this output is set to TRUE, the avatar is controlled by local command and PV control when in manual mode.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the starter/power device in this avatar.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PVInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

Motor Two Directions - SIL Stop, W. Cat 1/2

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

The **AvMotorTwoDirectionSILStop** function block is used to manage a motor in two directions (forward and reverse) with Stop Category 0 or Stop Category 1¹⁴ function compliance for Wiring Category 1 and Category 2.

AvMotorTwoDirectionSILStop Function Block



AvMotorTwoDirectionSILStop Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
RunRevCmd	BOOL	If this input is set to TRUE, the avatar reverse switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

14. Stop categories according to EN/IEC 60204-1.

AvMotorTwoDirectionSILStop Output Interface

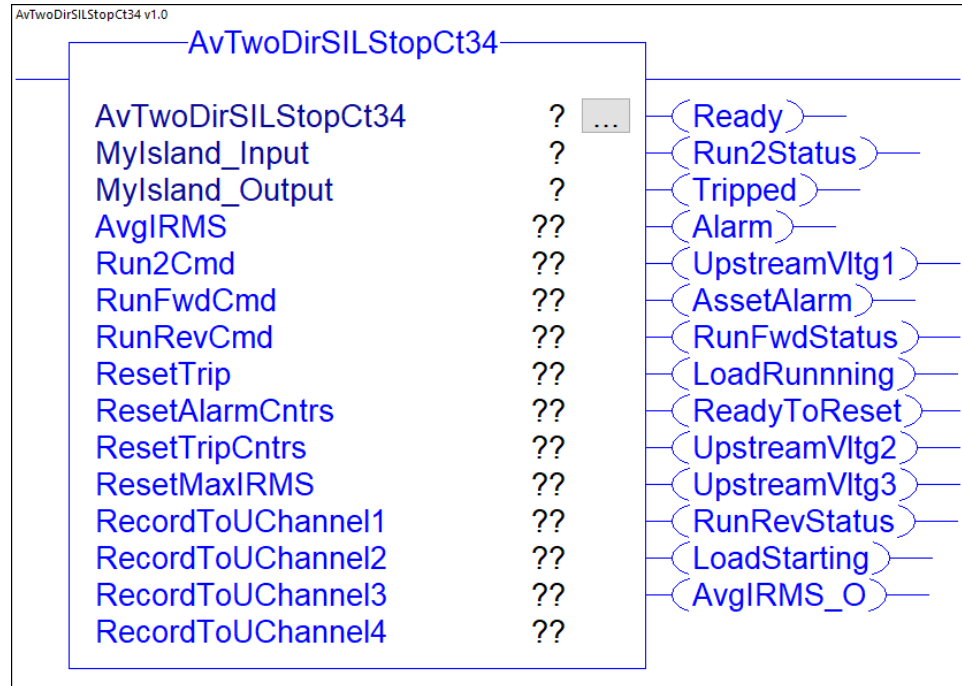
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunRevStatus	BOOL	If this output is set to TRUE, the avatar reverse switch is closed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

Motor Two Directions - SIL Stop, W. Cat 3/4

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 3 and Category 4 according to ISO 13849.

The **AvMotorTwoDirectionsSILStopCat34** function block is used to manage a motor in two directions (forward and reverse) with Stop Category 0 or Stop Category 1¹⁵ function compliance for Wiring Category 3 and Category 4.

AvMotorTwoDirectionsSILStopCat34 Function Block



AvMotorTwoDirectionsSILStopCat34 Input Interface

Input	Data Type	Description
Run2Cmd	BOOL	If this input is set to TRUE, the avatar forward redundant switch is closed.
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
RunRevCmd	BOOL	If this input is set to TRUE, the avatar reverse switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

15. Stop categories according to EN/IEC 60204-1.

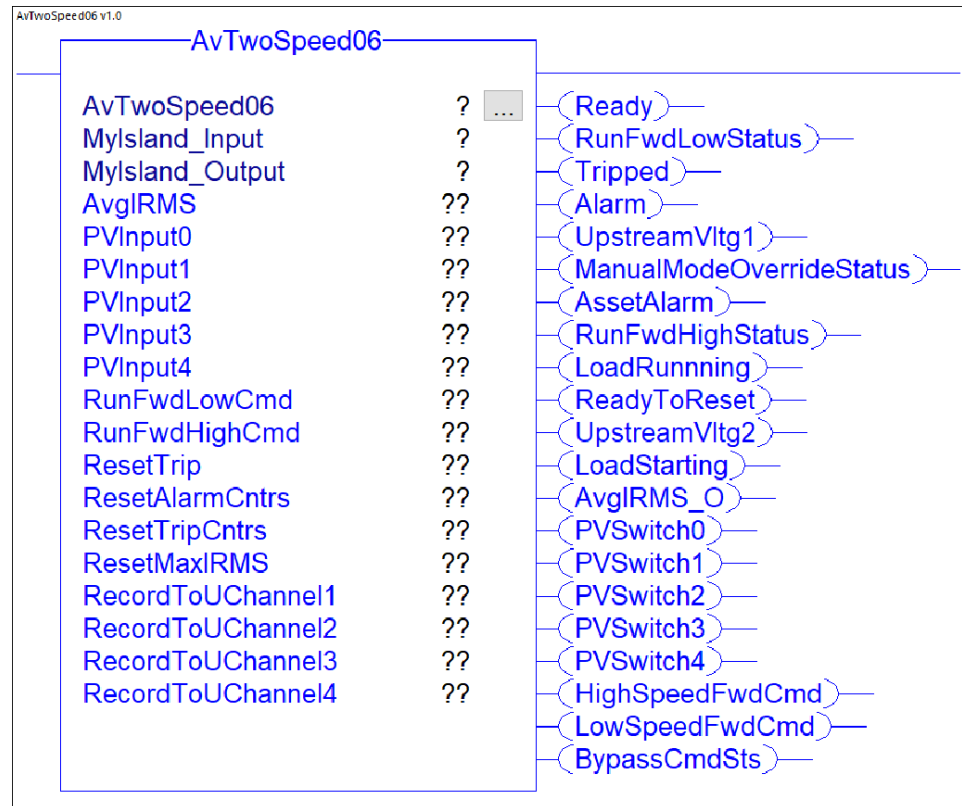
AvMotorTwoDirectionsSILStopCat34 Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
Run2Status	BOOL	If this output is set to TRUE, the avatar forward redundant switch is closed.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunRevStatus	BOOL	If this output is set to TRUE, the avatar reverse switch is closed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar (breaker closed).
UpstreamVltg3	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the third starter/power device in this avatar.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values.(Unit: mA)

Motor Two Speeds

The **AvMotorTwoSpeeds** function block is used to manage a two speed motor.

AvMotorTwoSpeeds Function Block



AvMotorTwoSpeeds Input Interface

Input	Data Type	Description
RunFwdLowCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with low speed.
RunFwdHighCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with high speed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvMotorTwoSpeeds Output Interface

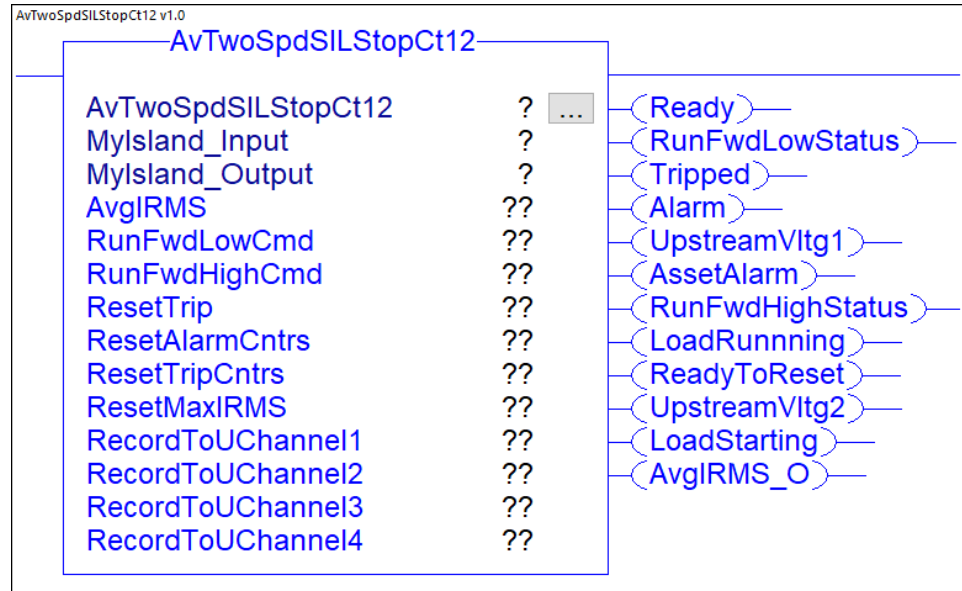
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunFwdHighStatus	BOOL	If this output is set to TRUE, the motor is running in high speed. If this output is set to FALSE, the motor is stopped or is running in low speed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
LocalFwdLowCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalFwdHighCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
ByPassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
ManualModeOverrideStatus	BOOL	If this output is set to TRUE, the avatar is controlled by local command and PV control when in manual mode.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PVInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

Motor Two Speeds - SIL Stop, W. Cat 1/2

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

The **AvMotorTwoSpeedsSILStop** function block is used to manage a two speed motor with Stop Category 0 or Stop Category 1¹⁶ function compliance for Wiring Category 1 and Category 2.

AvMotorTwoSpeedsSILStop Function Block



AvMotorTwoSpeedsSILStop Input Interface

Input	Data Type	Description
RunFwdLowCmd	BOOL	If this input is set to TRUE, the motor starts in the forward direction with low speed.
RunFwdHighCmd	BOOL	If this input is set to TRUE, the motor starts in the forward direction with high speed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

16. Stop categories according to EN/IEC 60204–1.

AvMotorTwoSpeedsSILStop Output Interface

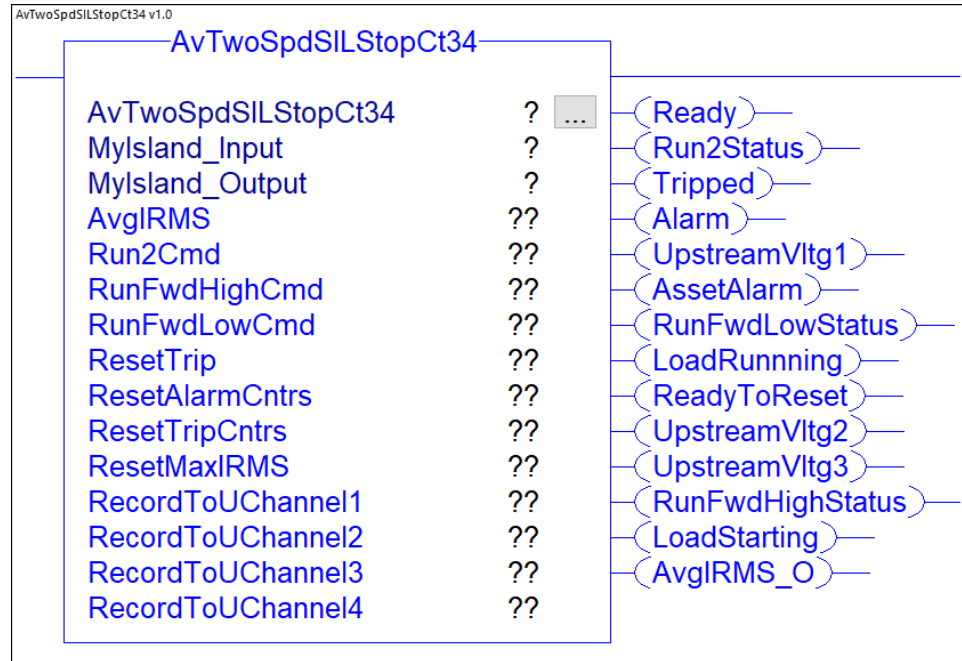
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdHighStatus	BOOL	If this output is set to TRUE, the motor is running in high speed. If this output is set to FALSE, the motor is stopped or is running in low speed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

Motor Two Speeds - SIL Stop, W. Cat 3/4

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 3 and Category 4 according to ISO 13849.

The **AvMotorTwoSpeedsSILStopCat34** function block is used to manage a two speed motor with Stop Category 0 or Stop Category 1¹⁷ function compliance for Wiring Category 3 and Category 4.

AvMotorTwoSpeedsSILStopCat34 Function Block



AvMotorTwoSpeedsSILStopCat34 Input Interface

Input	Data Type	Description
Run2Cmd	BOOL	If this input is set to TRUE, the avatar forward redundant switch is closed.
RunFwdLowCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with low speed.
RunFwdHighCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with high speed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

17. Stop categories according to EN/IEC 60204-1.

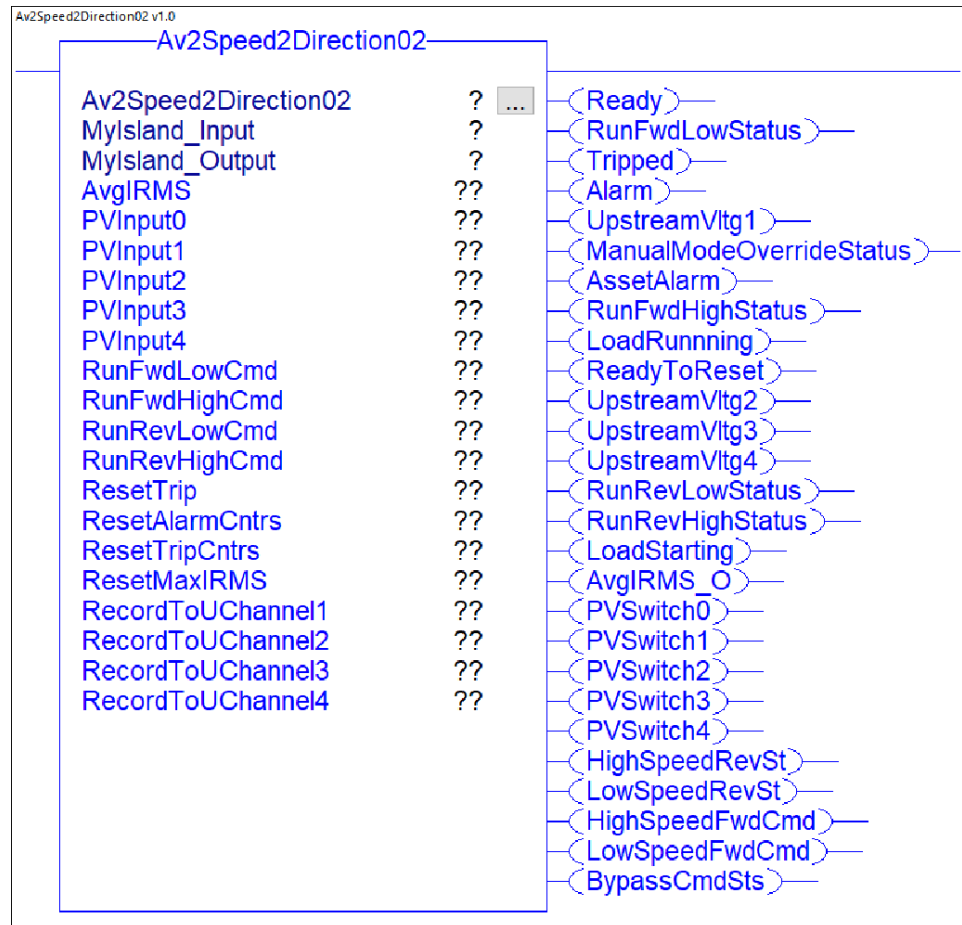
AvMotorTwoSpeedsSILStopCat34 Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
Run2Status	BOOL	If this output is set to TRUE, the avatar forward redundant switch is closed.
RunFwdHighStatus	BOOL	If this output is set to TRUE, the motor is running in high speed. If this output is set to FALSE, the motor is stopped or is running in low speed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
UpstreamVltg3	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the third starter/power device in this avatar.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

Motor Two Speeds Two Directions

The **AvMotorTwoSpeedsTwo** function block is used to manage a two speed motor in two directions (forward and reverse).

AvMotorTwoSpeedsTwo Function Block



AvMotorTwoSpeedsTwo Input Interface

Input	Data Type	Description
RunFwdLowCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with low speed.
RunFwdHighCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with high speed.
RunRevLowCmd	BOOL	If this input is set to TRUE, the motor starts in reverse direction with low speed.
RunRevHighCmd	BOOL	If this input is set to TRUE, the motor starts in reverse direction with high speed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvMotorTwoSpeedsTwo Output Interface

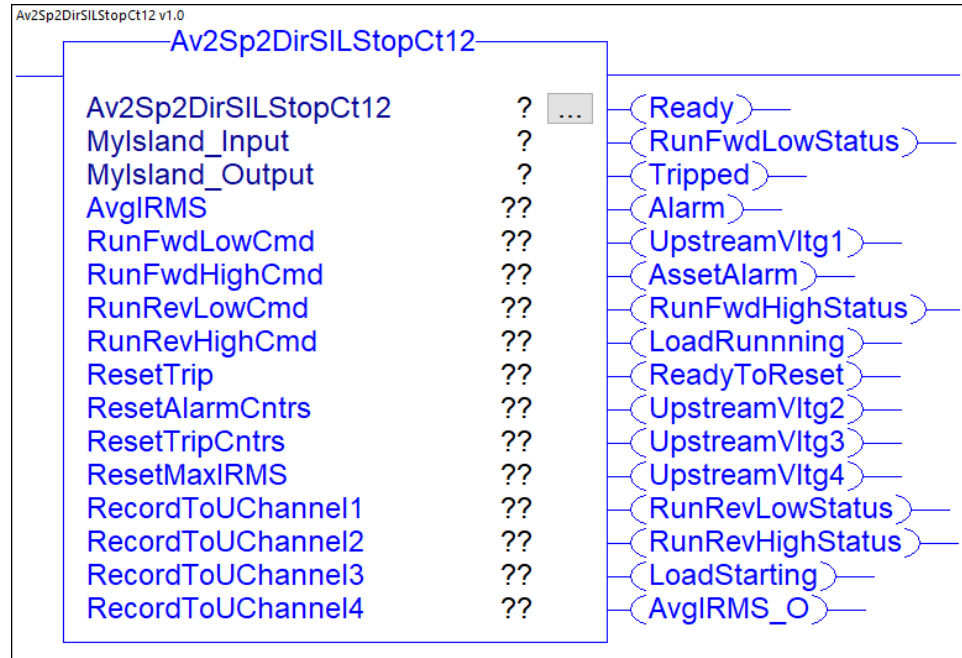
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunFwdHighStatus	BOOL	If this output is set to TRUE, the motor is running in high speed. If this output is set to FALSE, the motor is stopped or is running in low speed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
UpstreamVltg3	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the third starter/power device in this avatar.
UpstreamVltg4	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the fourth starter/power device in this avatar.
RunRevLowStatus	BOOL	If this output is set to TRUE, the low speed reverser switch is closed.
RunRevHighStatus	BOOL	If this output is set to TRUE, the high speed reverser switch is closed.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
LocalFwdLowCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalFwdHighCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalRevLowCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalRevHighCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
ByPassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
ManualModeOverrideStatus	BOOL	If this output is set to TRUE, the avatar is controlled by local command and PV control when in manual mode.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PVInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

Motor Two Speeds Two Directions - SIL Stop, W. Cat 1/2

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

The **AvMotorTwoSpeedsTwoSILStop** function block is used to manage a two speed motor in two directions (forward and reverse) with Stop Category 0 or Stop Category 1¹⁸ function compliance for Wiring Category 1 and Category 2.

AvMotorTwoSpeedsTwoSILStop Function Block



AvMotorTwoSpeedsTwoSILStop Input Interface

Input	Data Type	Description
RunFwdLowCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with low speed.
RunFwdHighCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with high speed.
RunRevLowCmd	BOOL	If this input is set to TRUE, the motor starts in reverse direction with low speed.
RunRevHighCmd	BOOL	If this input is set to TRUE, the motor starts in reverse direction with high speed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

18. Stop categories according to EN/IEC 60204–1.

AvMotorTwoSpeedsTwoSILStop Output Interface

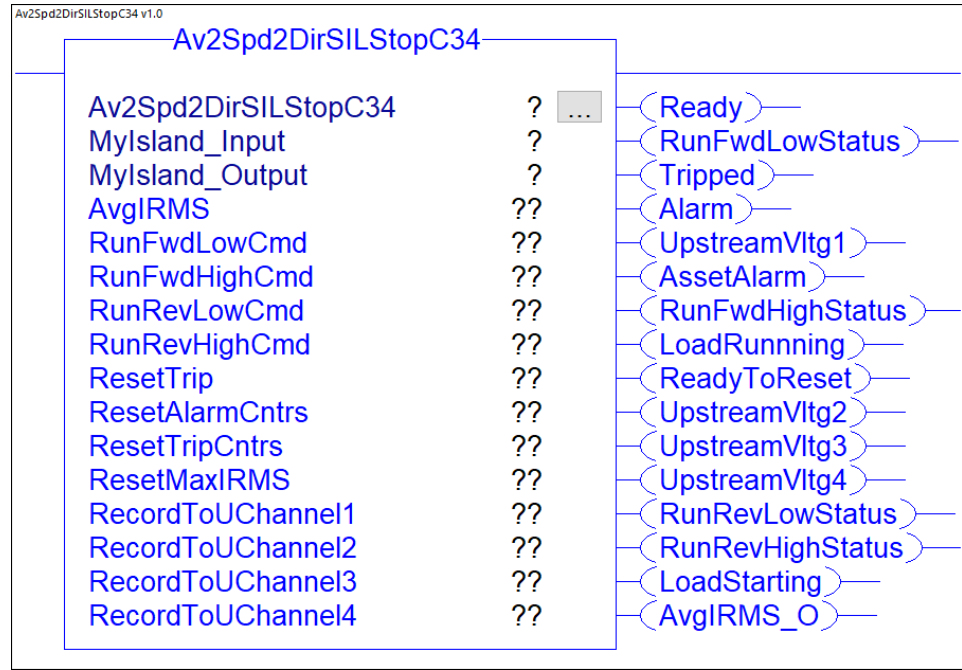
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunFwdHighStatus	BOOL	If this output is set to TRUE, the motor is running in high speed. If this output is set to FALSE, the motor is stopped or is running in low speed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
UpstreamVltg3	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the third starter/power device in this avatar.
UpstreamVltg4	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the fourth starter/power device in this avatar.
RunRevLowStatus	BOOL	If this output is set to TRUE, the low speed reverser switch is closed.
RunRevHighStatus	BOOL	If this output is set to TRUE, the high speed reverser switch is closed.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values.(Unit: mA)

Motor Two Speeds Two Directions - SIL Stop, W. Cat 3/4

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 3 and Category 4 according to ISO 13849.

The **AvMotorTwoSpeedsTwoSILStop** function block is used to manage a two speed motor in two directions (forward and reverse) with Stop Category 0 or Stop Category 1¹⁹ function compliance for Wiring Category 3 and Category 4.

AvMotorTwoSpeedsTwoSILStopCat34 Function Block



AvMotorTwoSpeedsTwoSILStopCat34 Input Interface

Input	Data Type	Description
RunFwdLowCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with low speed.
RunFwdHighCmd	BOOL	If this input is set to TRUE, the motor starts in forward direction with high speed.
RunRevLowCmd	BOOL	If this input is set to TRUE, the motor starts in reverse direction with low speed.
RunRevHighCmd	BOOL	If this input is set to TRUE, the motor starts in reverse direction with high speed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

19. Stop categories according to EN/IEC 60204-1.

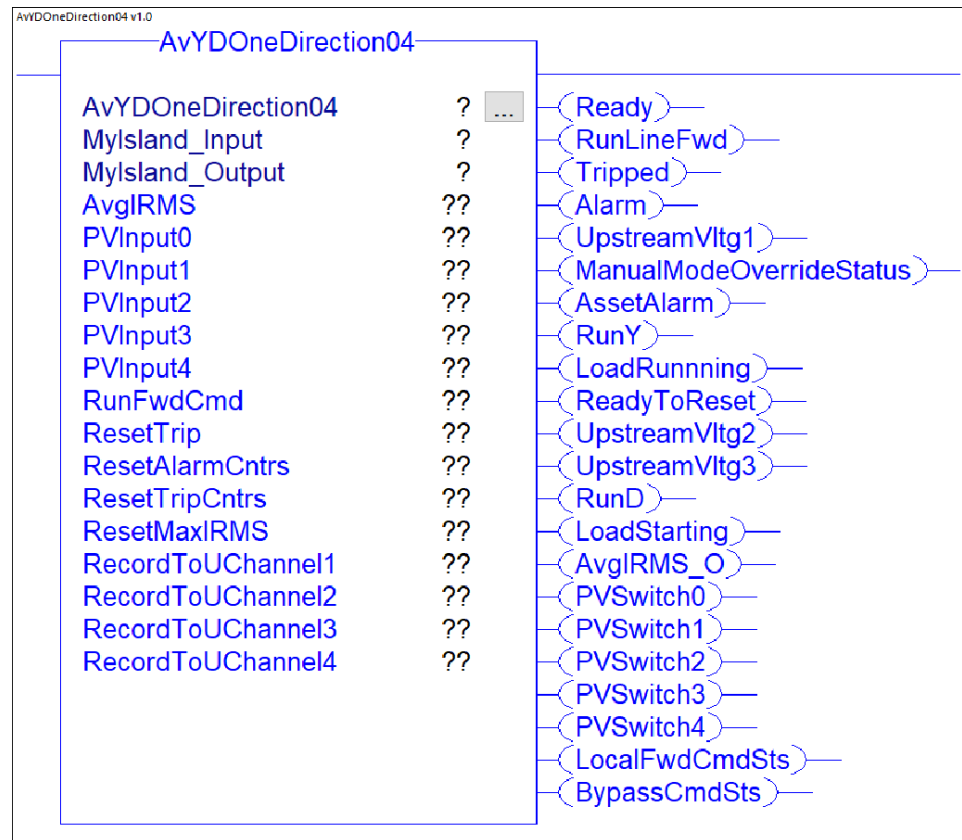
AvMotorTwoSpeedsTwoSILStopCat34 Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunFwdHighStatus	BOOL	If this output is set to TRUE, the motor is running in high speed. If this output is set to FALSE, the motor is stopped or is running in low speed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
UpstreamVltg3	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the third starter/power device in this avatar.
UpstreamVltg4	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the fourth starter/power device in this avatar.
RunRevLowStatus	BOOL	If this output is set to TRUE, the low speed reverser switch is closed.
RunRevHighStatus	BOOL	If this output is set to TRUE, the high speed reverser switch is closed.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

Motor Y/D One Direction

The **AvMotorYDOneDirection** function block is used to manage a wye/delta (star/triangle) motor in one direction.

AvMotorYDOneDirection Function Block



AvMotorYDOneDirection Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvMotorYDOneDirection Output Interface

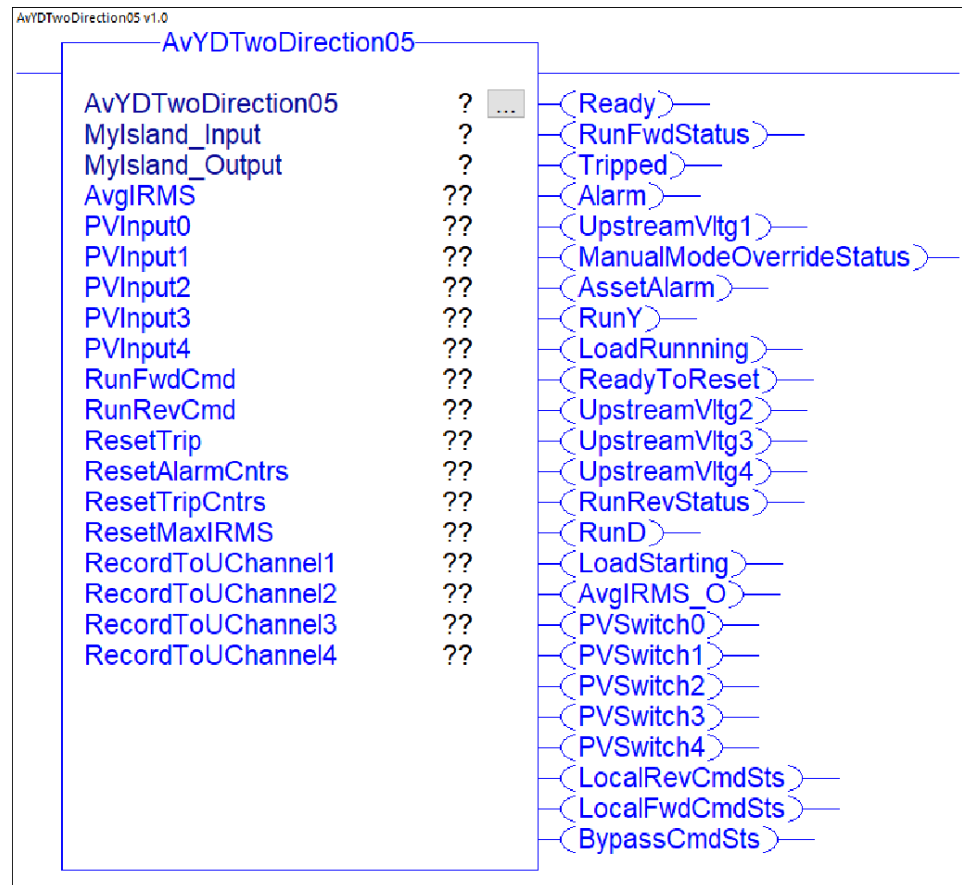
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunLineFwd	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²⁰ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunY	BOOL	If this output is set to TRUE, the Y switch for Motor Y/D avatar is closed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
UpstreamVltg3	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the third starter/power device in this avatar.
RunD	BOOL	If this output is set to TRUE, the D switch for Motor Y/D avatar is closed.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
ByPassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
ManualModeOverrideStatus	BOOL	If this output is set to TRUE, the avatar is controlled by local command and PV control when in manual mode.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PVInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

20. Safety Integrity Level according to standard IEC 61508.

Motor Y/D Two Directions

The **AvMotorYDTwoDirection** function block is used to manage a wye/delta (star/triangle) motor in two directions (forward and reverse).

AvMotorYDTwoDirection Function Block



AvMotorYDTwoDirection Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
RunRevCmd	BOOL	If this input is set to TRUE, the avatar reverse switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvMotorYDTwoDirection Output Interface

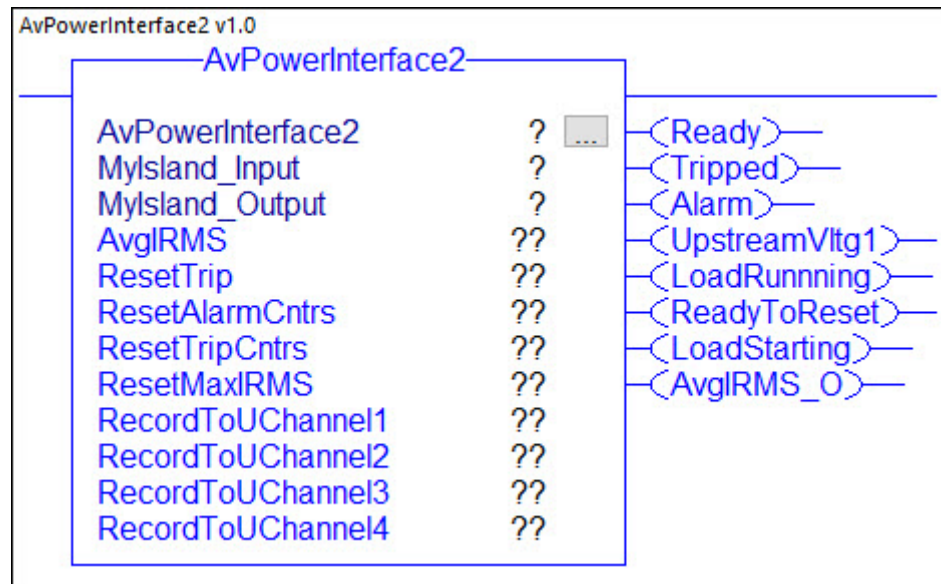
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²¹ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunY	BOOL	If this output is set to TRUE, the Y switch for Motor Y/D avatars is closed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar.
UpstreamVltg3	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the third starter/power device in this avatar.
UpstreamVltg4	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the fourth starter/power device in this avatar.
RunRevStatus	BOOL	If this output is set to TRUE, the avatar reverse switch is closed.
RunD	BOOL	If this output is set to TRUE, the D switch for Motor Y/D avatars is closed.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalRevCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
ByPassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
ManualModeOverrideStatus	BOOL	If this output is set to TRUE, the avatar is controlled by local command and PV control when in manual mode.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PVInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

21. Safety Integrity Level according to standard IEC 61508.

Power Interface without I/O (Measure)

The **AvPowerInterface** function block is used to monitor current on an external power device, such as a solid-state relay, soft starter, or variable speed drive.

AvPowerInterface Function Block



AvPowerInterface Input Interface

Input	Data Type	Description
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

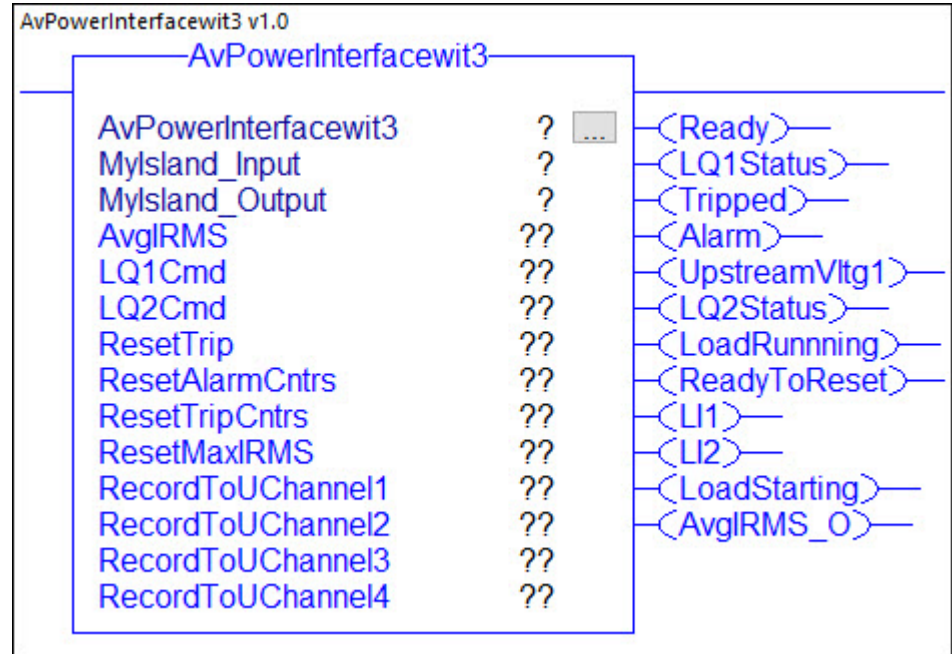
AvPowerInterface Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

Power Interface with I/O (Control)

The **AvPowerInterfacewit** function block is used to monitor current and control an external power device, such as a solid-state relay, soft starter, or variable speed drive.

AvPowerInterfacewit Function Block



AvPowerInterfacewit Input Interface

Input	Data Type	Description
LQ1Cmd	BOOL	If this input is set to TRUE, the logical output 1 is set to TRUE.
LQ2Cmd	BOOL	If this input is set to TRUE, the logical output 2 is set to TRUE.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

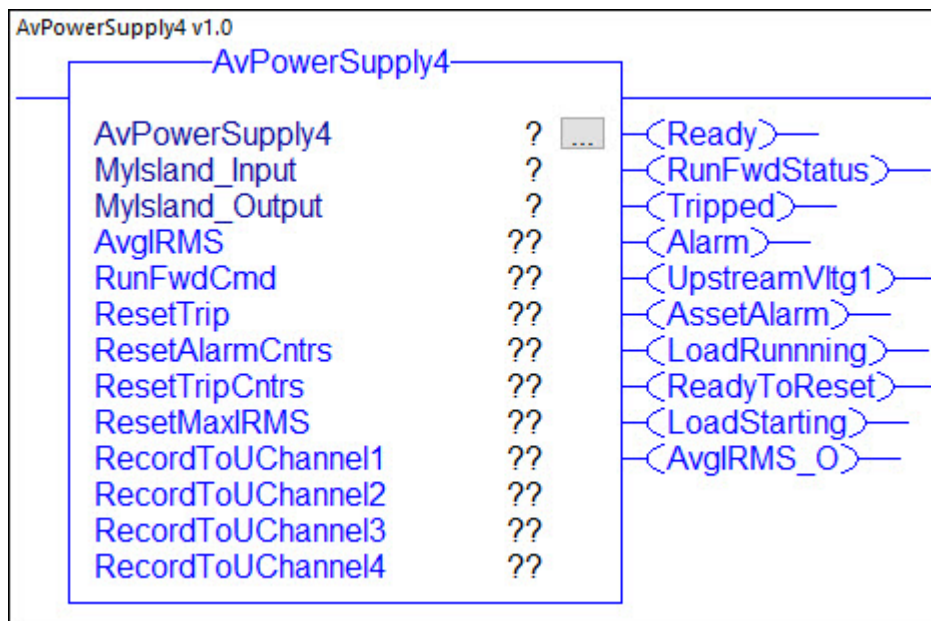
AvPowerInterfacewit Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
LQ1Status	BOOL	If this output is set to TRUE, the logical output 1 is set to TRUE.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
LQ2Status	BOOL	If this output is set to TRUE, the logical output 2 is set to TRUE.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LI1	BOOL	If this output is set to TRUE, the logical input 1 of the avatar is set to TRUE.
LI2	BOOL	If this output is set to TRUE, the logical input 2 of the avatar is set to TRUE.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values.(Unit: mA)

Power Supply

The **AvPowerSupply** function block is used to manage a power supply.

AvPowerSupply Function Block



AvPowerSupply Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

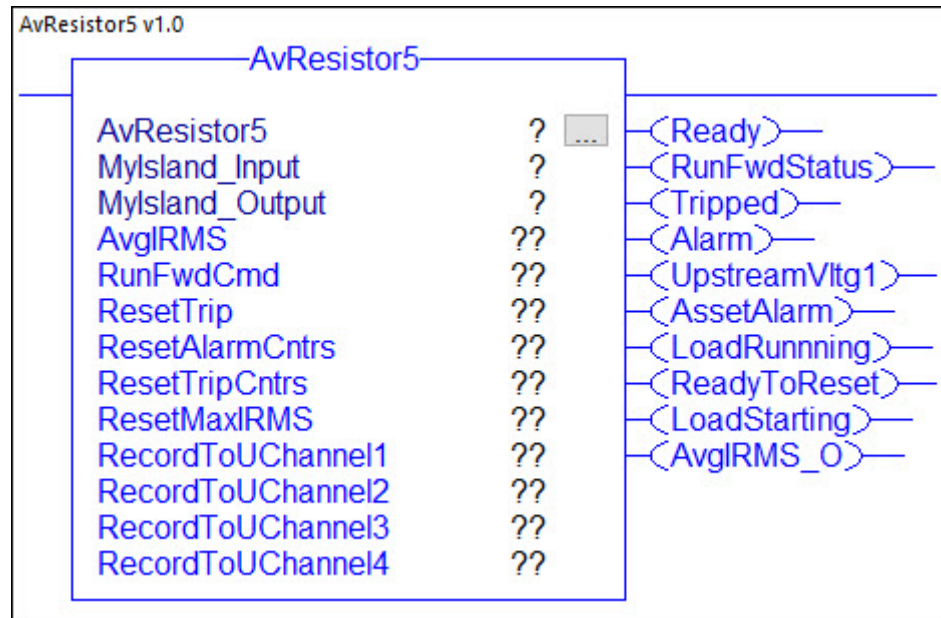
AvPowerSupply Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²² starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values.(Unit: mA)

Resistor

The **AvResistor** function block is used to manage a resistive load.

AvResistor Function Block



22. Safety Integrity Level according to standard IEC 61508.

AvResistor Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvResistor Output Interface

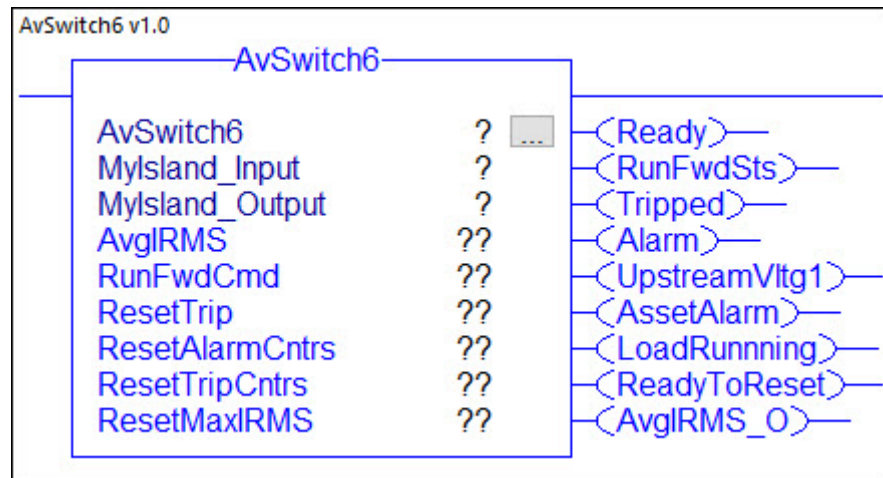
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²³ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

23. Safety Integrity Level according to standard IEC 61508.

Switch

The **AvSwitch** function block establishes or interrupts a power line in an electric circuit.

AvSwitch Function Block



AvSwitch Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.

AvSwitch Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²⁴ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

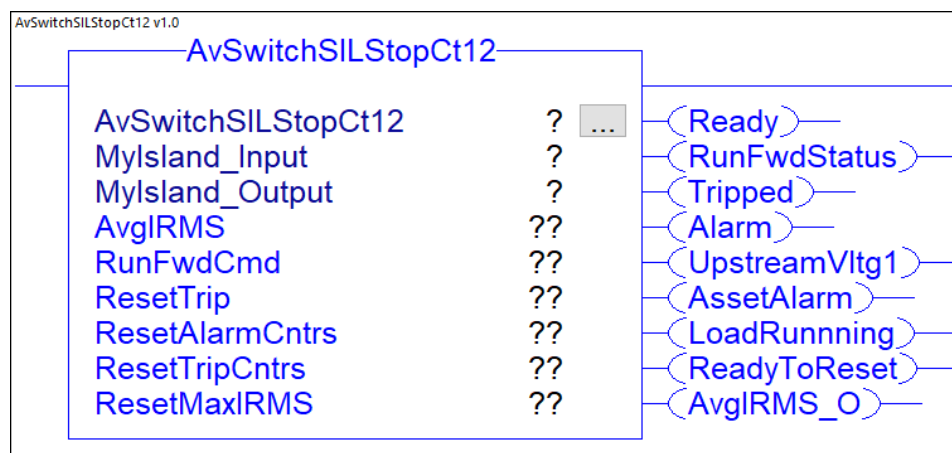
24. Safety Integrity Level according to standard IEC 61508.

Switch - SIL Stop, W. Cat 1/2

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

The **AvSwitchSILStopCat** function block establishes or interrupts a power line in an electric circuit with Stop Category 0 or Stop Category 1²⁵ function compliance for Wiring Category 1 and Category 2.

AvSwitchSILStopCat Function Block



AvSwitchSILStopCat Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.

AvSwitchSILStopCat Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

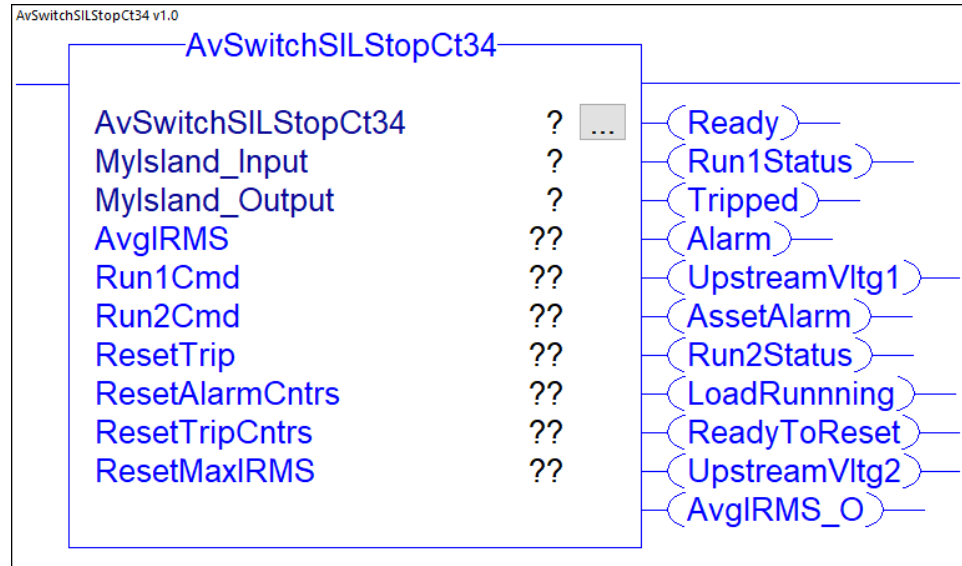
25. Stop categories according to EN/IEC 60204–1.

Switch - SIL Stop, W. Cat 3/4

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 3 and Category 4 according to ISO 13849.

The **AvSwitchSILStopCat34** function block establishes or interrupts a power line in an electric circuit with Stop Category 0 or Stop Category 1²⁶ function compliance for Wiring Category 3 and Category 4.

AvSwitchSILStopCat34 Function Block



AvSwitchSILStopCat34 Input Interface

Input	Data Type	Description
Run1Cmd	BOOL	If this input is set to TRUE, the avatar forward primary switch is closed.
Run2Cmd	BOOL	If this input is set to TRUE, the avatar forward redundant switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.

26. Stop categories according to EN/IEC 60204–1.

AvSwitchSILStopCat34 Output Interface

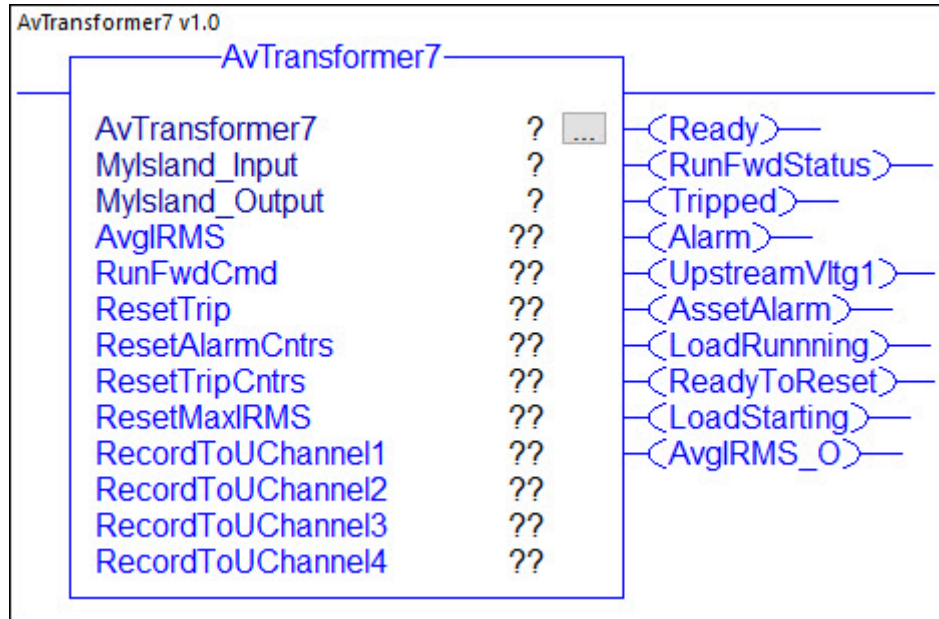
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
Run1Status	BOOL	If this output is set to TRUE, the avatar forward primary switch is closed.
Run2Status	BOOL	If this output is set to TRUE, the avatar forward redundant switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²⁷ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

27. Safety Integrity Level according to standard IEC 61508.

Transformer

The **AvTransformer** function block is used to manage a transformer.

AvTransformer Function Block



AvTransformer Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

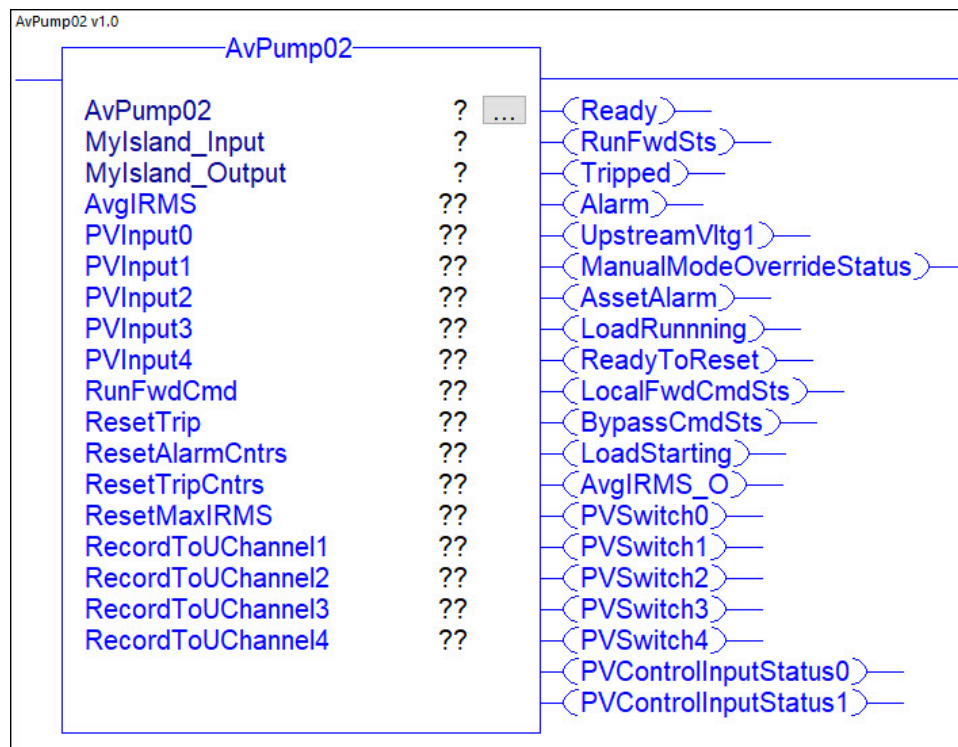
AvTransformer Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²⁸ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)

Pump

The **AvPump** function block is used to manage a pump.

AvPump Function Block



28. Safety Integrity Level according to standard IEC 61508.

AvPump Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvPump Output Interface

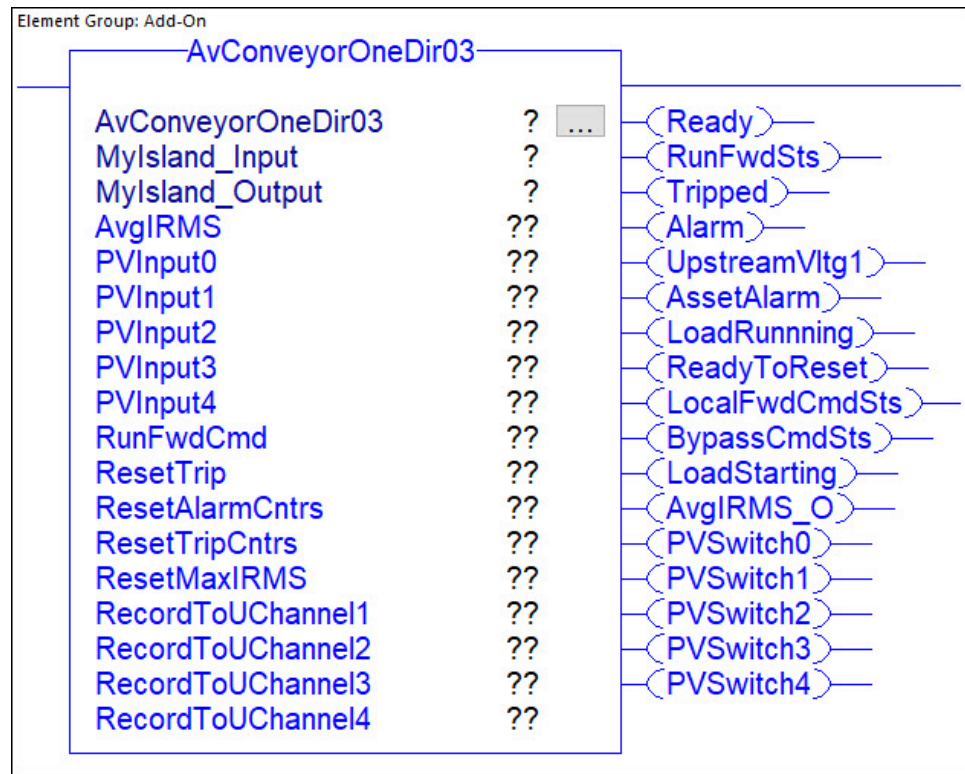
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ²⁹ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
BypassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
ManualModeOverrideStatus	BOOL	If this output is set to TRUE, the avatar is controlled by local command and PV control when in manual mode.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PvInput4	INT	
PVSwitch0	BOOL	Positive Logic - A PV Switch input ON or a PV Input above the PV Control Level represents an ON command. Negative Logic - A PV Switch input OFF or a PV Input below the PV Control Level represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	
PVControlInputStatus0	BOOL	If this output is set to TRUE, a command has been sent to the avatar from a PV Control Input.
PVControlInputStatus1	BOOL	If this output is set to TRUE, a command has been sent to the avatar from a PV Control Input.

29. Safety Integrity Level according to standard IEC 61508.

Conveyor One Direction

The **AvConveyorOneDir** function block is used to manage a conveyor in one direction.

AvConveyorOneDir Function Block



AvConveyorOneDir Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvConveyorOneDir Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ³⁰ starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
BypassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PvInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

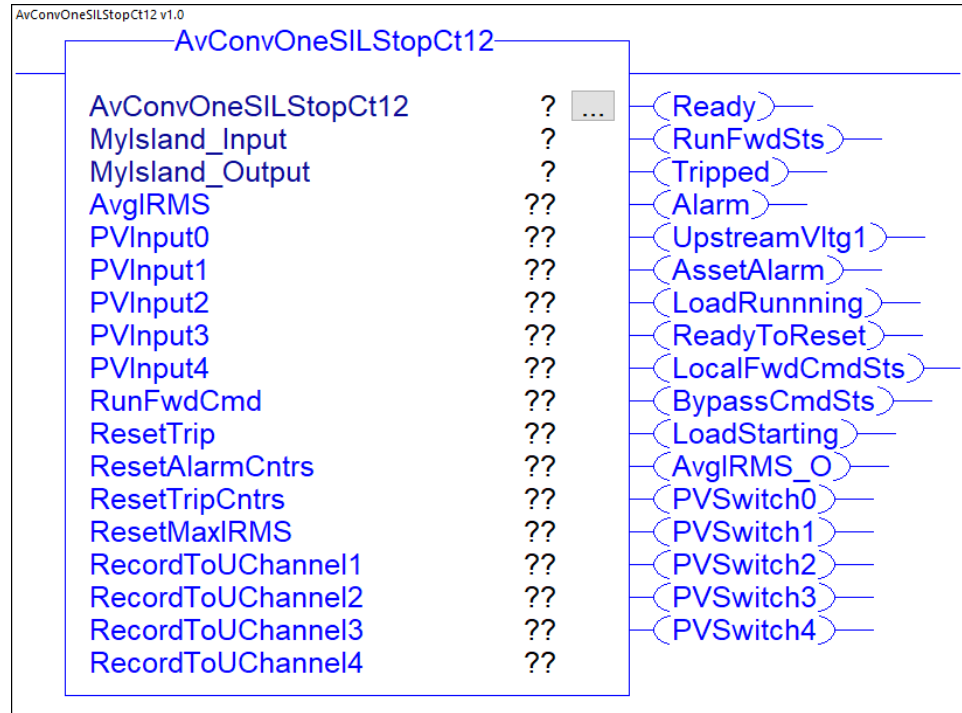
30. Safety Integrity Level according to standard IEC 61508.

Conveyor One Direction - SIL Stop, W. Cat 1/2

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

The **AvSILStopConveyorOne** function block is used to manage a conveyor in one direction with Stop Category 0 or Stop Category 1³¹ function compliance for Wiring Category 1 and Category 2.

AvSILStopConveyorOne Function Block



AvSILStopConveyorOneDir Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

31. Stop categories according to EN/IEC 60204-1.

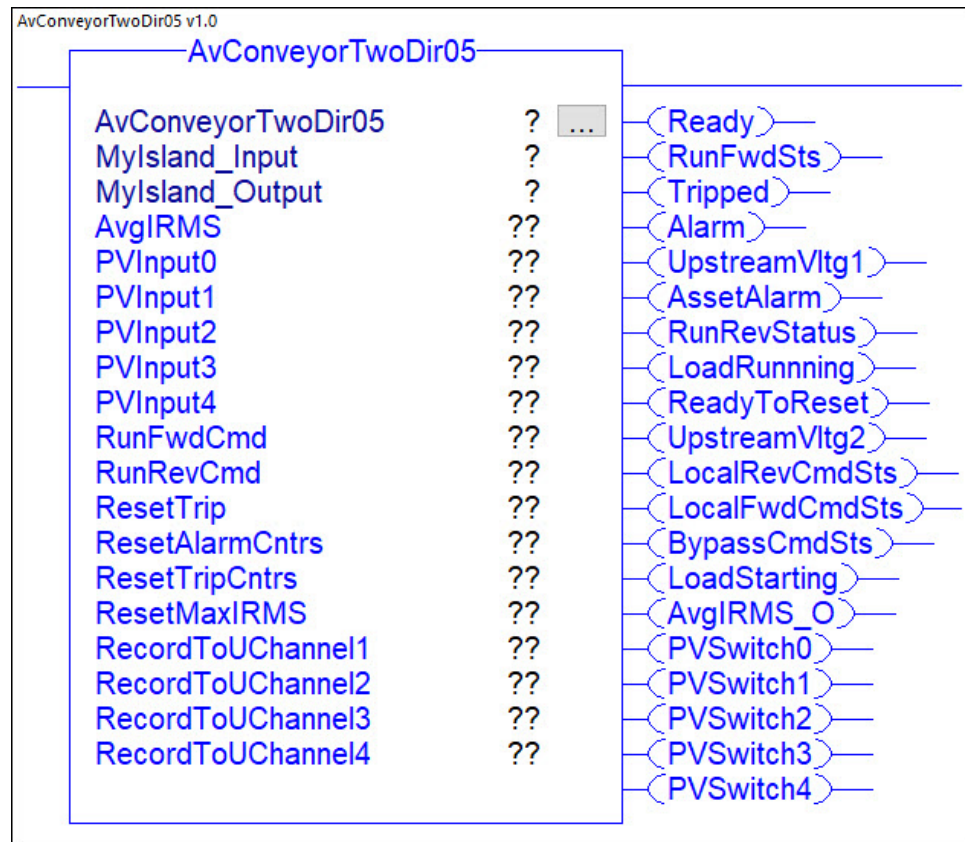
AvSILStopConveyorOneDir Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
BypassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PvInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

Conveyor Two Directions

The **AvConveyorTwoDir** function block is used to manage a conveyor in two directions (forward and reverse).

AvConveyorTwoDir Function Block



AvConveyorTwoDir Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
RunRevCmd	BOOL	If this input is set to TRUE, the avatar reverse switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

AvConveyorTwoDir Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL ³² starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunRevStatus	BOOL	If this output is set to TRUE, the avatar reverse switch is closed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar (breaker closed).
LocalRevCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
BypassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PvInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

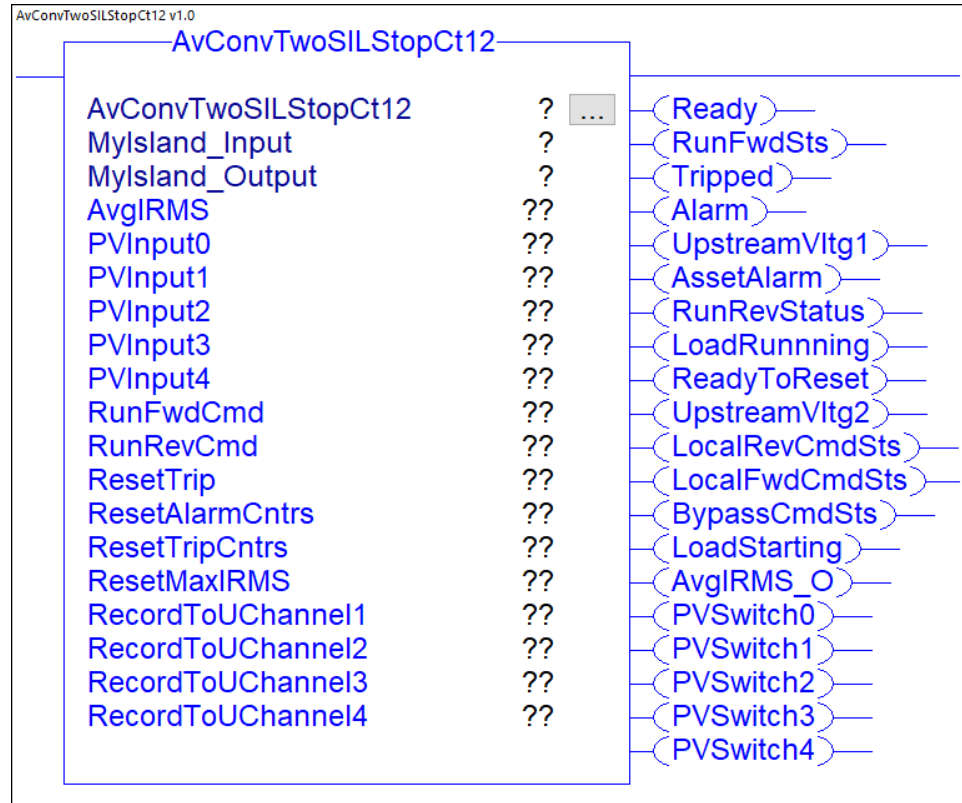
32. Safety Integrity Level according to standard IEC 61508.

Conveyor Two Directions - SIL Stop, W. Cat 1/2

NOTE: Safety Integrity Level according to standard IEC 61508. Wiring Category 1 and Category 2 according to ISO 13849.

The **AvSILStopConveyorTwoDir** function block is used to manage a conveyor in two directions (forward and reverse) with Stop Category 0 or Stop Category 1³³ function compliance for Wiring Category 1 and Category 2.

AvSILStopConveyorTwoDir Function Block



AvSILStopConveyorTwoDir Input Interface

Input	Data Type	Description
RunFwdCmd	BOOL	If this input is set to TRUE, the avatar forward switch is closed.
RunRevCmd	BOOL	If this input is set to TRUE, the avatar reverse switch is closed.
ResetTrip	BOOL	If this input is set to TRUE, detected trips whose trip reset conditions have been met will reset for this avatar.
ResetAlarmCnts	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCnts	BOOL	If this input is set to TRUE, all trip counters are reset for this avatar.
ResetMaxIRMS	BOOL	If this input is set to TRUE, the maximum average Irms current value and the timestamp are reset.
RecordToUChannel1	BOOL	If this input is set to TRUE, the corresponding Time of Use Channel increments, based on measured energy for the selected avatar. This ToU recording continues for the enabled channels until they are disabled.
RecordToUChannel2	BOOL	
RecordToUChannel3	BOOL	
RecordToUChannel4	BOOL	

33. Stop categories according to EN/IEC 60204–1.

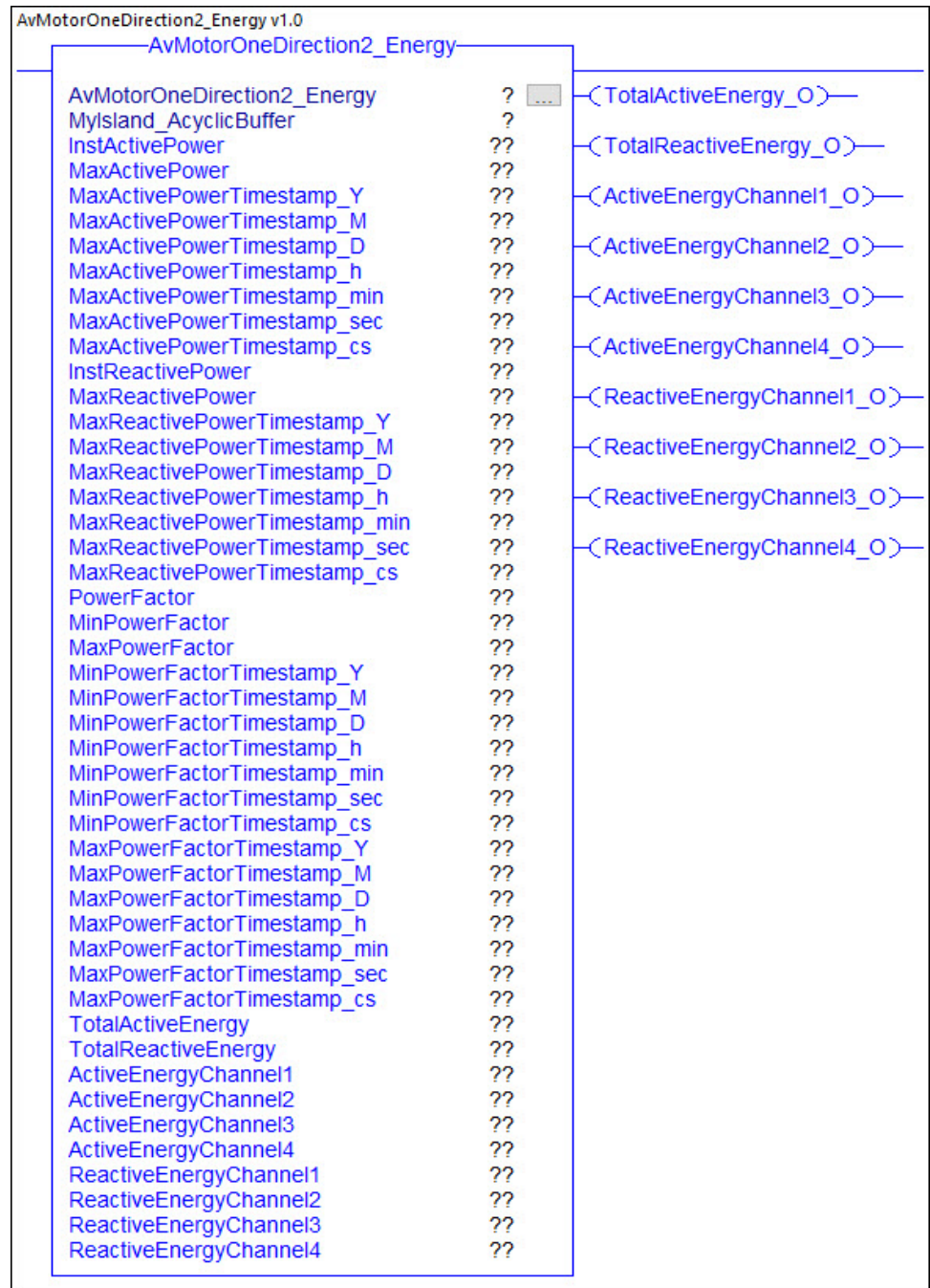
AvSILStopConveyorTwoDir Output Interface

Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
Alarm	BOOL	If this output is set to TRUE, a protection alarm has been detected by the avatar.
UpstreamVltg1	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the first starter/power device in this avatar (breaker closed).
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL starter within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
RunRevStatus	BOOL	If this output is set to TRUE, the avatar reverse switch is closed.
LoadRunning	BOOL	If this output is set to TRUE, a Run or Close command has been executed, and current is flowing in the poles (equivalent to motor running but also for non-motor avatars).
ReadyToReset	BOOL	If this output is set to TRUE, the avatar meets the trip reset conditions and can be reset with a trip reset command.
UpstreamVltg2	BOOL	If this output is set to TRUE, the avatar has detected that upstream main power is present for the second starter/power device in this avatar (breaker closed).
LocalRevCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
LocalFwdCmdSts	BOOL	If this output is set to TRUE, the avatar logic is controlled by commands received on digital inputs, and PLC commands are ignored.
BypassCmdSts	BOOL	If this output is set to TRUE, the avatar will continue operation and not stop due to a trip.
LoadStarting	BOOL	If this output is set to TRUE, the motor is in start phase.
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms overflow values. (Unit: mA)
PVInput0	INT	Returns the measured value of the PV Input.
PVInput1	INT	
PVInput2	INT	
PVInput3	INT	
PvInput4	INT	
PVSwitch0	BOOL	If this output is set to TRUE, the PV Switch represents an ON command.
PVSwitch1	BOOL	
PVSwitch2	BOOL	
PVSwitch3	BOOL	
PVSwitch4	BOOL	

Energy

The **Avatar_Energy** function block returns the status of the acyclic energy data of the specified avatar.

Avatar_Energy Function Block



Avatar_Energy Output Interface

Output	Data Type	Description
InstActivePower	DINT	Total active power for the avatar. (Unit: W)
MaxActivePower	DINT	Maximum value of the active power for the avatar. (Unit: W)

Avatar_Energy Output Interface (Continued)

Output	Data Type	Description
MaxActivePowerTimestamp_Y	DINT	Date and time when the maximum active power value was recorded.
MaxActivePowerTimestamp_M	SINT	
MaxActivePowerTimestamp_D	SINT	
MaxActivePowerTimestamp_h	SINT	
MaxActivePowerTimestamp_min	SINT	
MaxActivePowerTimestamp_sec	SINT	
MaxActivePowerTimestamp_cs	SINT	
InstReactivePower	DINT	Total reactive power for the avatar. (Unit: VAR)
MaxReactivePower	DINT	Maximum value of the reactive power for the avatar. (Unit: VAR)
MaxReactivePowerTimestamp_Y	DINT	Date and time when the maximum reactive power value was recorded.
MaxReactivePowerTimestamp_M	SINT	
MaxReactivePowerTimestamp_D	SINT	
MaxReactivePowerTimestamp_h	SINT	
MaxReactivePowerTimestamp_min	SINT	
MaxReactivePowerTimestamp_sec	SINT	
MaxReactivePowerTimestamp_cs	SINT	
PowerFactor	SINT	True power factor value.
MinPowerFactor	SINT	True minimum power factor value.
MaxPowerFactor	SINT	True maximum power factor value.
MinPowerFactorTimestamp_Y	DINT	Date and time when the minimum power factor value was recorded.
MinPowerFactorTimestamp_M	SINT	
MinPowerFactorTimestamp_D	SINT	
MinPowerFactorTimestamp_h	SINT	
MinPowerFactorTimestamp_min	SINT	
MinPowerFactorTimestamp_sec	SINT	
MinPowerFactorTimestamp_cs	SINT	
MaxPowerFactorTimestamp_Y	DINT	Date and time when the maximum power factor value was recorded.
MaxPowerFactorTimestamp_M	SINT	
MaxPowerFactorTimestamp_D	SINT	
MaxPowerFactorTimestamp_h	SINT	
MaxPowerFactorTimestamp_min	SINT	
MaxPowerFactorTimestamp_sec	SINT	
MaxPowerFactorTimestamp_cs	SINT	
TotalActiveEnergy	DINT	Total active energy value for all avatars in the system with Energy Monitoring Enabled. (Unit: Watt-hours)
TotalActiveEnergy_O	BOOL	Total active energy overflow value for all avatars in the system with Energy Monitoring Enabled.
TotalReactiveEnergy	DINT	Total reactive energy value for all avatars in the system with Energy Monitoring Enabled. (Unit: VAR-hours)
TotalReactiveEnergy_O	BOOL	Total reactive energy overflow value for all avatars in the system with Energy Monitoring Enabled.
ActiveEnergyChannel1	DINT	Channel 1: ToU (Time of Use) total active energy value.
ActiveEnergyChannel1_O	BOOL	Channel 1: ToU (Time of Use) total active energy overflow value.

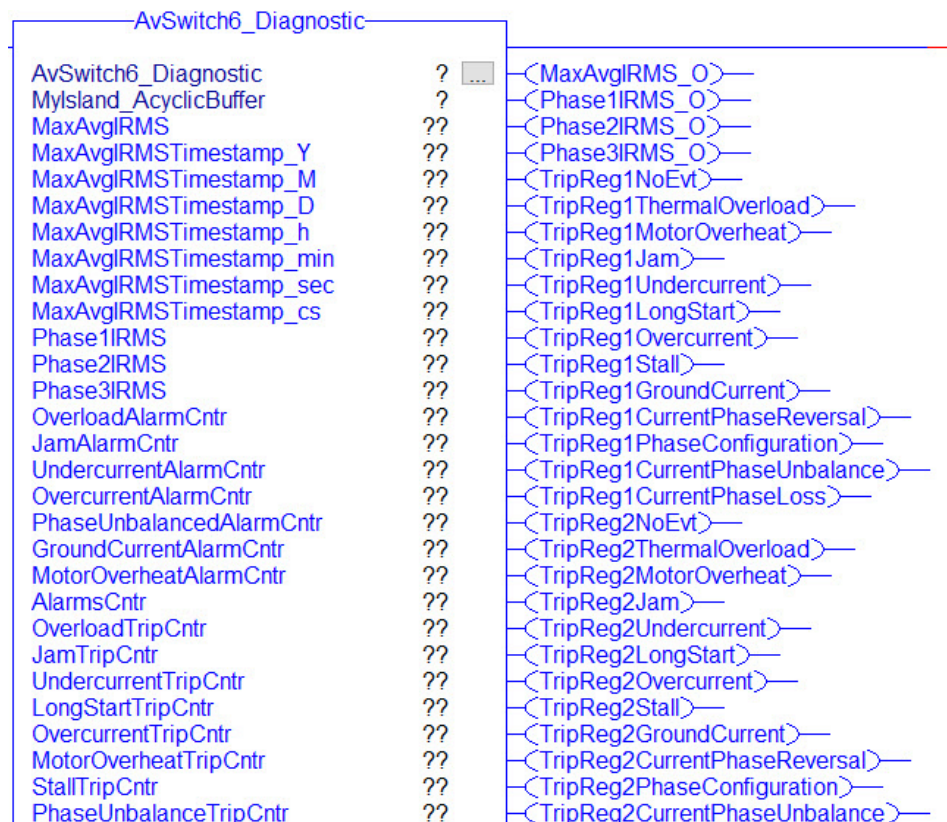
Avatar_Energy Output Interface (Continued)

Output	Data Type	Description
ActiveEnergyChannel2	DINT	Channel 2: ToU (Time of Use) total active energy value.
ActiveEnergyChannel2_O	BOOL	Channel 2: ToU (Time of Use) total active energy overflow value.
ActiveEnergyChannel3	DINT	Channel 3: ToU (Time of Use) total active energy value.
ActiveEnergyChannel3_O	BOOL	Channel 3: ToU (Time of Use) total active energy overflow value.
ActiveEnergyChannel4	DINT	Channel 4: ToU (Time of Use) total active energy value.
ActiveEnergyChannel4_O	BOOL	Channel 4: ToU (Time of Use) total active energy overflow value.
ReactiveEnergyChannel1	DINT	Channel 1: ToU (Time of Use) total reactive energy value.
ReactiveEnergyChannel1_O	BOOL	Channel 1: ToU (Time of Use) total reactive energy overflow value.
ReactiveEnergyChannel2	DINT	Channel 2: ToU (Time of Use) total reactive energy value.
ReactiveEnergyChannel2_O	BOOL	Channel 2: ToU (Time of Use) total reactive energy overflow value.
ReactiveEnergyChannel3	DINT	Channel 3: ToU (Time of Use) total reactive energy value.
ReactiveEnergyChannel3_O	BOOL	Channel 3: ToU (Time of Use) total reactive energy overflow value.
ReactiveEnergyChannel4	DINT	Channel 4: ToU (Time of Use) total reactive energy value.
ReactiveEnergyChannel4_O	BOOL	Channel 4: ToU (Time of Use) total reactive energy overflow value.

Diagnostic

The **Avatar_Diagnostic** function block returns the status of the acyclic diagnostic data of the specified avatar.

Avatar_Diagnostic Function Block



NOTE: Not all the outputs listed in the following table are captured in the screen shot above.

Avatar_Diagnostic Output Interface

Output	Data Type	Description
MaxAvgIRMS	DINT	Maximum average Irms current value.
MaxAvgIRMS_O	DINT	Maximum average Irms current overflow value.
MaxAvgIRMSTimestamp_Y	DINT	Date and time when the maximum average Irms current value was recorded.
MaxAvgIRMSTimestamp_M	SINT	
MaxAvgIRMSTimestamp_D	SINT	
MaxAvgIRMSTimestamp_h	SINT	
MaxAvgIRMSTimestamp_min	SINT	
MaxAvgIRMSTimestamp_sec	SINT	
MaxAvgIRMSTimestamp_cs	SINT	
Phase1IRMS	DINT	Value of the phase L1 Irms. (Unit: mA)
Phase1IRMS_O	DINT	Overflow value of the phase L1 Irms.
Phase2IRMS	DINT	Value of the phase L2 Irms. (Unit: mA)
Phase2IRMS_O	DINT	Overflow value of the phase L2 Irms.
Phase3IRMS	DINT	Value of the phase L3 Irms. (Unit: mA)
Phase3IRMS_O	DINT	Overflow value of the phase L3 Irms.
OverloadAlarmCntr	DINT	Counter of advisories related to thermal overload protection.

Avatar_Diagnostic Output Interface (Continued)

Output	Data Type	Description
JamAlarmCntr	DINT	Counter of advisories related to jam protection.
UndercurrentAlarmCntr	DINT	Counter of advisories related to undercurrent protection.
OvercurrentAlarmCntr	DINT	Counter of advisories related to overcurrent protection.
PhaseUnbalancedAlarmCntr	DINT	Counter of advisories related to phase unbalance protection.
GroundCurrentAlarmCntr	DINT	Counter of advisories related to ground current protection.
MotorOverheatAlarmCntr	DINT	Counter of motor overheat events.
AlarmsCntr	DINT	Counter of advisories related to protections.
OverloadTripCntr	DINT	Counter of trips related to thermal overload protection.
JamTripCntr	DINT	Counter of trips related to jam protection.
UndercurrentTripCntr	DINT	Counter of trips related to undercurrent protection.
LongStartTripCntr	DINT	Counter of trips related to long start protection.
OvercurrentTripCntr	DINT	Counter of trips related to overcurrent protection.
MotorOverheatTripCntr	DINT	Counter of motor overheat trip events.
StallTripCntr	DINT	Counter of trips related to stall protection.
PhaseUnbalanceTripCntr	DINT	Counter of trips related to phase unbalance protection.
PhaseConfigTripCntr	DINT	Counter of trips related to phase configuration protection.
GroundCurrentTripCntr	DINT	Counter of trips related to ground current protection.
PhaseReversalTripCntr	DINT	Counter of trips related to phase reversal protection.
PhaseLossTripCntr	DINT	Counter of trips related to phase loss protection.
TripsCntr	DINT	Counter of trips related to protections.
TripReg1_Y	DINT	Date and trip reason register 1.
TripReg1_M	SINT	
TripReg1_D	SINT	
TripReg1_h	SINT	
TripReg1_min	SINT	
TripReg1_sec	SINT	
TripReg1_cs	SINT	
TripReg1NoEvent	BOOL	Identifier of the detected trip event.
TripReg1ThermalOverload	BOOL	
TripReg1MotorOverheat	BOOL	
TripReg1Jam	BOOL	
TripReg1Undercurrent	BOOL	
TripReg1LongStart	BOOL	
TripReg1Overcurrent	BOOL	
TripReg1Stall	BOOL	
TripReg1GroundCurrent	BOOL	
TripReg1CurrentPhaseReversal	BOOL	
TripReg1PhaseConfiguration	BOOL	
TripReg1CurrentPhaseUnbalance	BOOL	
TripReg1CurrentPhaseLoss	BOOL	
...

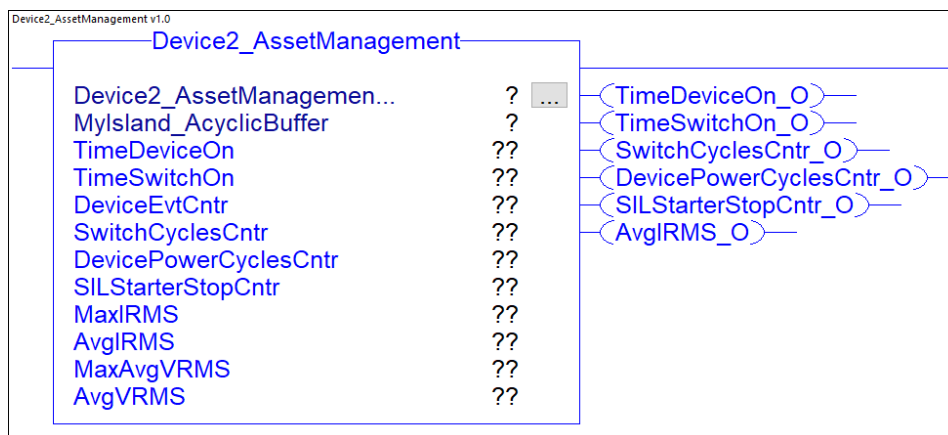
Avatar_Diagnostic Output Interface (Continued)

Output	Data Type	Description
TripReg5_Y	DINT	Date and trip reason register 5.
TripReg5_M	SINT	
TripReg5_D	SINT	
TripReg5_h	SINT	
TripReg5_min	SINT	
TripReg5_sec	SINT	
TripReg5_cs	SINT	
TripReg5NoEvent	BOOL	Identifier of the detected trip event.
TripReg5ThermalOverload	BOOL	
TripReg5MotorOverheat	BOOL	
TripReg5Jam	BOOL	
TripReg5Undercurrent	BOOL	
TripReg5LongStart	BOOL	
TripReg5Overcurrent	BOOL	
TripReg5Stall	BOOL	
TripReg5GroundCurrent	BOOL	
TripReg5CurrentPhaseReversal	BOOL	
TripReg5PhaseConfiguration	BOOL	
TripReg5CurrentPhaseUnbalance	BOOL	
TripReg5CurrentPhaseLoss	BOOL	

Asset Management

The **DeviceX_AssetManagement** function block returns the status of the acyclic asset management data of the specified device.

DeviceX_AssetManagement Function Block



DeviceX_AssetManagement Output Interface

Output	Data Type	Description
TimeDeviceOn	DINT	This register indicates the time that the module has been powered on in its lifetime. (Unit: h)
TimeDeviceOn_O	BOOL	This register indicates the overflow time that the module has been powered on in its lifetime.
TimeSwitchOn	DINT	This register indicates the time the contactor has been in the closed state. (Unit: h)
TimeSwitchOn_O	BOOL	This register indicates the overflow time the contactor has been in the closed state.
EventCntr	DINT	This register indicates number of times this module has experienced a detected device error. This value does not include detected device errors which prevent the saving or corruption of the non-volatile memory.
ContactorCycleCntr	DINT	This register indicates the number of times the contactor has been commanded to the closed state from the open state.
ContactorCycleCntr_O	BOOL	This register indicates the overflow number of times the contactor has been commanded to the closed state from the open state.
DevicePowerCycleCntr	DINT	This register indicates the number of times the device has been powered on.
DevicePowerCycleCntr_O	BOOL	This register indicates the overflow number of times the device has been powered on.
SILStopCntr	DINT	This value indicates the number of mirror relay operations.
SILStopCntr_O	BOOL	This value indicates the overflow number of mirror relay operations.
MaxIRMS	DINT	This register indicates the maximum current the device has measured in its lifetime. (Unit: 100 mA)
AvgIRMS	DINT	Lifetime average current measured by the device (Total Current/Time Current ON). (Unit: mA)
AvgIRMS_O	DINT	Lifetime average current measured by the device (Total Current/Time Current ON) overflow value. (Unit: mA)
MaxAvgVRMS	DINT	This register indicates the maximum voltage the device has measured in its lifetime. (Unit: V)
AvgVRMS	DINT	Average Vrms voltage on three phases. (Unit: V)

Appendix

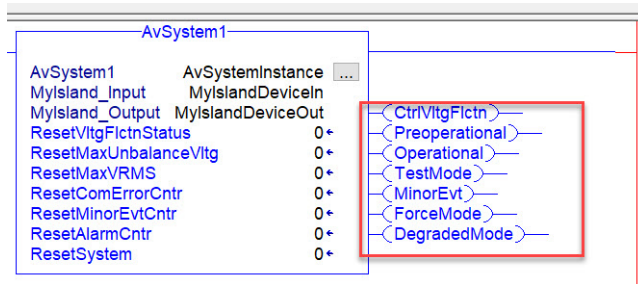
Frequently Asked Questions (FAQs)

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 27 for instructions on accessing STRING data.

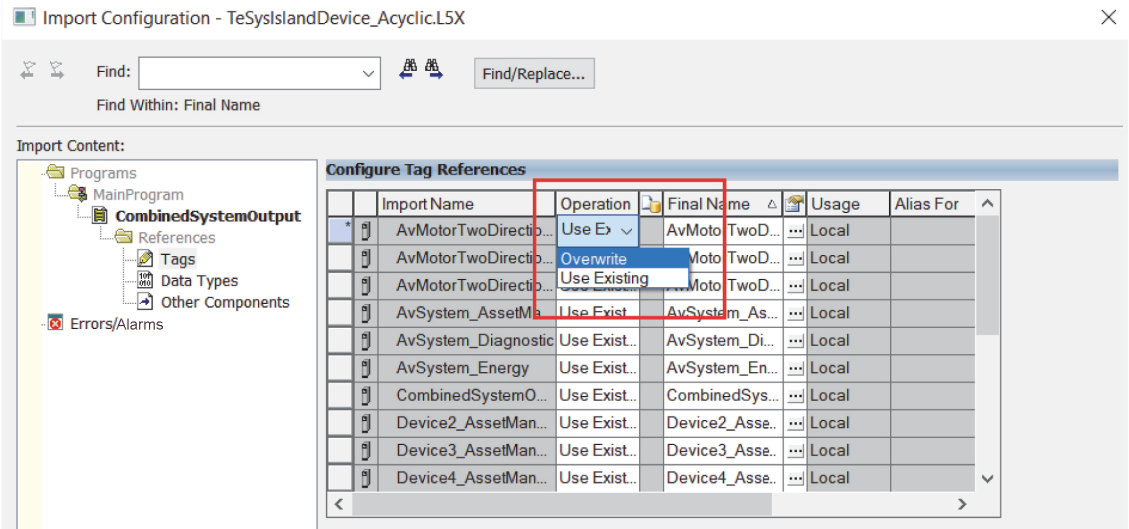
What are the lines attached to the right side of the AOI?

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.

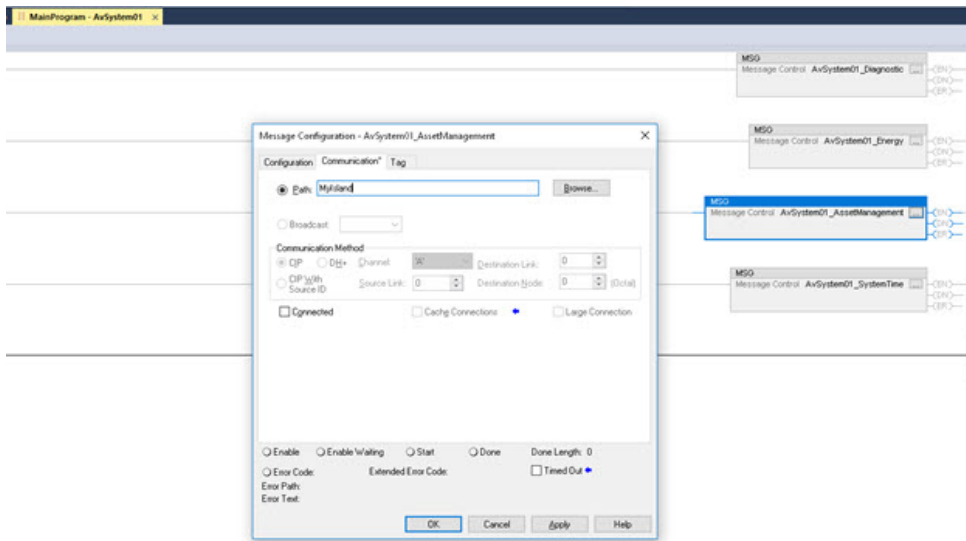


Why do 32-bit unsigned integers have a maximum displayed value of 2,147,483,647?

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.



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