



# Legal Information

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# Hazard Categories and Special Symbols

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 bulletin or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either 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 personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

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

**NOTE:** Provides additional information to clarify or simplify a procedure.

## 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, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

# About the Book

## Master Range: TeSys

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

## Document Scope

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

## Validity Note

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

For product compliance with environmental directives such as RoHS, REACH, PEP, and EOL, go to [www.se.com/green-premium](http://www.se.com/green-premium).

For technical characteristics of the physical modules described in this bulletin, go to [www.se.com](http://www.se.com).

The technical characteristics presented in this bulletin 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 bulletin and online information, use the online information.

## Related Documentation

**Table 1 - Related Documentation**

Document Title	Description	Document Number
<i>TeSys™ island System Guide</i>	Introduces and describes the main functions of TeSys island	8536IB1901
<i>TeSys™ island Installation Guide</i>	Describes the mechanical installation, wiring, and commissioning of TeSys island	8536IB1902
<i>TeSys™ island Operating Guide</i>	Describes how to operate and maintain TeSys island	8536IB1903
<i>TeSys™ island Functional Safety Guide</i>	Describes the Functional Safety features of TeSys island	8536IB1904
<i>TeSys™ island Third Party Function Block Guide</i>	Contains the information needed to create function blocks for third party hardware	8536IB1905
<i>TeSys™ island EtherNet/IP™ Function Block Library Guide</i>	Describes the TeSys island library used in the Rockwell Software® Studio 5000® EtherNet/IP™ environment	8536IB1914
<i>TeSys™ island EtherNet/IP™ Quick Start Guide</i>	Describes how to quickly integrate TeSys island into the Rockwell Software Studio 5000 EtherNet/IP environment	8536IB1906
<i>TeSys™ island DTM Online Help Guide</i>	Describes how to install and use various functions of TeSys island configuration software and how to configure the parameters of TeSys island	8536IB1907
<i>TeSys™ island PROFINET and PROFIBUS Function Block Library Guide</i>	Describes the TeSys island library used in the Siemens™ TIA Portal environment	8536IB1917
<i>TeSys™ island Quick Start Guide for PROFINET and PROFIBUS Applications</i>	Describes how to quickly integrate TeSys island into the Siemens™ TIA Portal environment	8536IB1916
<i>TeSys™ island Product Environmental Profile</i>	Describes constituent materials, recyclability potential, and environmental impact information for the TeSys island	ENVPEP1904009
<i>TeSys™ island Product End of Life Instructions</i>	Contains end of life instructions for the TeSys island	ENVEOLI1904009
<i>TeSys™ island Instruction Sheet, Bus Coupler, TPRBCEIP</i>	Describes how to install the TeSys island Ethernet/IP bus coupler	MFR44097
<i>TeSys™ island Instruction Sheet, Bus Coupler, TPRBCPFN</i>	Describes how to install the TeSys island PROFINET bus coupler	MFR44098
<i>TeSys™ island Instruction Sheet, Bus Coupler, TPRBCPFB</i>	Describes how to install the TeSys island PROFIBUS DP bus coupler	GDE55148
<i>TeSys™ island Instruction Sheet, Starters and Power Interface Modules, Size 1 and 2</i>	Describes how to install size 1 and 2 TeSys island starters and power interface modules	MFR77070
<i>TeSys™ island Instruction Sheet, Starters and Power Interface Modules, Size 3</i>	Describes how to install size 3 TeSys island starters and power interface modules	MFR77085
<i>TeSys™ island Instruction Sheet: Input/Output Modules</i>	Describes how to install the TeSys island analog and digital I/O modules	MFR44099
<i>TeSys™ island Instruction Sheet: SIL Interface and Voltage Interface Modules</i>	Describes how to install the TeSys island voltage interface modules and SIL <sup>1</sup> 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](http://www.P65Warnings.ca.gov).



## Qualified Personnel

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

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

The use and application of the information contained in this guide requires expertise in the design and programming of automated control systems. Only you, the user, the machine builder, or the 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 adhere to 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 instruction bulletin, 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 this 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 hazard analysis and 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

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

### **⚠ WARNING**

#### **UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION**

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

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

# 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.

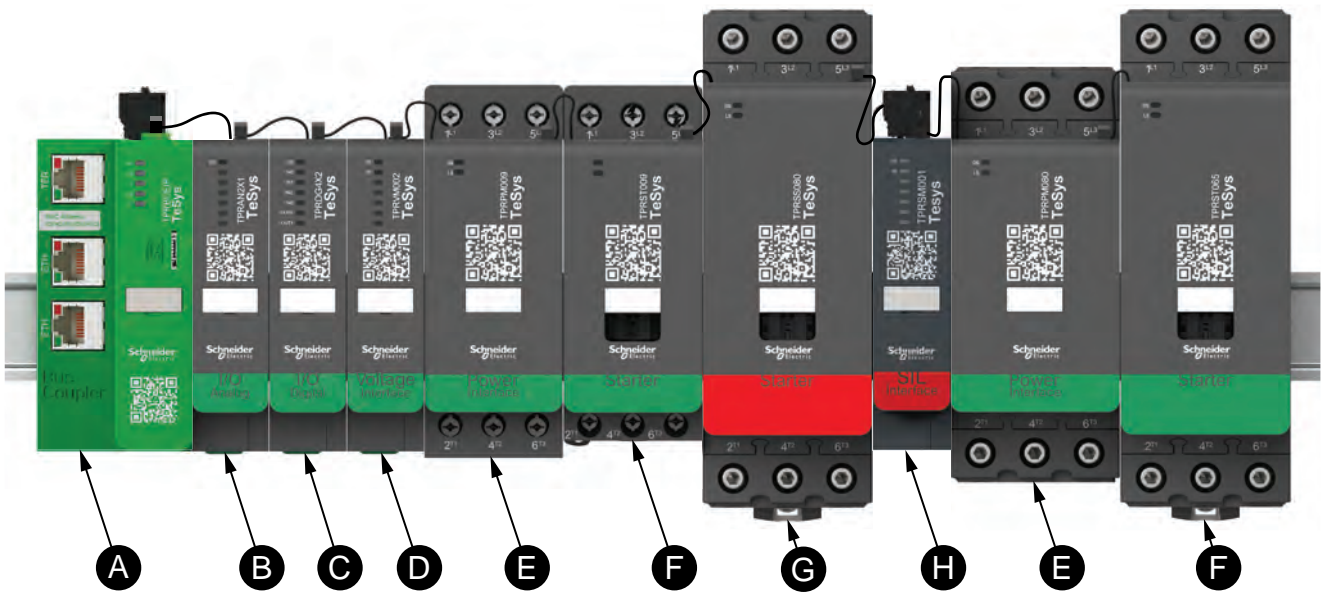
This system is designed around the concept of TeSys avatars. These avatars

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

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

The physical 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 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.

Figure 1 - TeSys island Overview



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

## 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 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 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-SIL<sup>2</sup>) Load avatars provide the following:

- Local control
- 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

### Application avatars

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

- Local control
- 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)

**NOTE:** Manual mode override only applies to the Pump avatar.

- Process variable monitoring

---

2. Safety Integrity Level according to standard IEC 61508.

For example, a Pump avatar includes the following:

- one starter module
- one or more digital I/O modules for local control and Process Variable (PV) switches
- one or more analog I/O modules for PV inputs
- 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 island’s 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

**Table 2 - TeSys Avatars**

Name	Icon	Description
System avatar		A required avatar that enables a single point of communication to the island.
<b>Device</b>		
Switch		To make or break a power line in an electrical circuit
Switch - SIL Stop, W. Cat 1/2 <sup>3</sup>		To make or break a power line in an electrical circuit with Stop Category 0 or Stop Category 1 <sup>4</sup> function compliance for Wiring Category 1 and Category 2.
Switch - SIL Stop, W. Cat 3/4 <sup>5</sup>		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.

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.

**Table 2 - TeSys Avatars (Continued)**








Name	Icon	Description
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
<b>Load</b>		
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 <sup>6</sup> 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.
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

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

**Table 2 - TeSys Avatars (Continued)**

Name	Icon	Description
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
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
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

**Table 2 - TeSys Avatars (Continued)**

Name	Icon	Description
Power Supply		To manage a power supply
Transformer		To manage a transformer
<b>Application</b>		
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



# 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.

**Table 3 - 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*.

**Table 4 - 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.

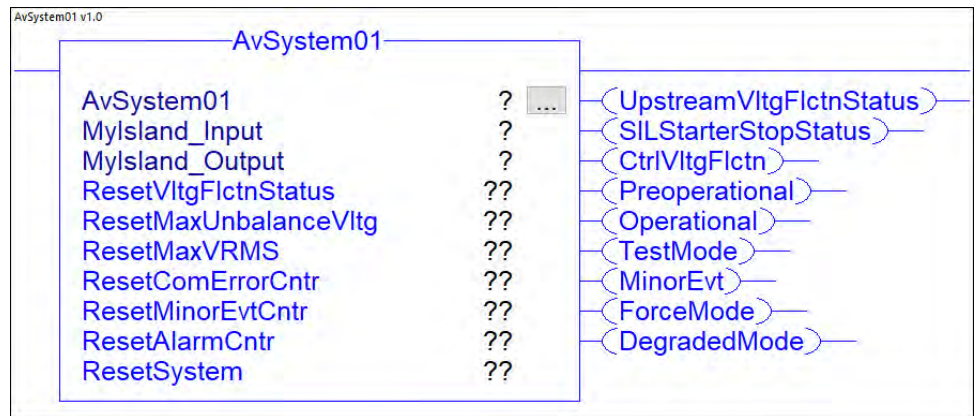
All the data exposed by an AOI exists within the main body, except for data exposed with output parameters of type BOOL. This data exists on the right side of the AOI.

## System Function Blocks

### System

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

**Figure 2 - AvSystem Function Block**



**Table 5 - 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.

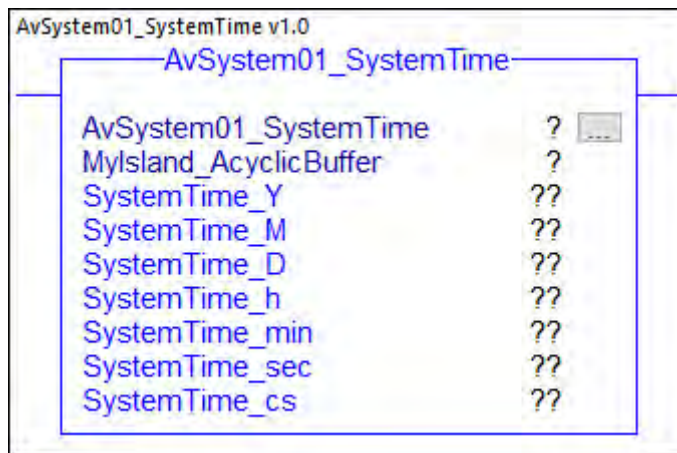
**Table 6 - AvSystem Output Interface**

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 <sup>7</sup> 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 <i>TeSys island Operating Guide (document no. 8536/B1903)</i> .
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.

## 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.

**Figure 3 - AvSystem1\_SystemTime Function Block**



**Table 7 - AvSystem1\_System Time Output Interface**

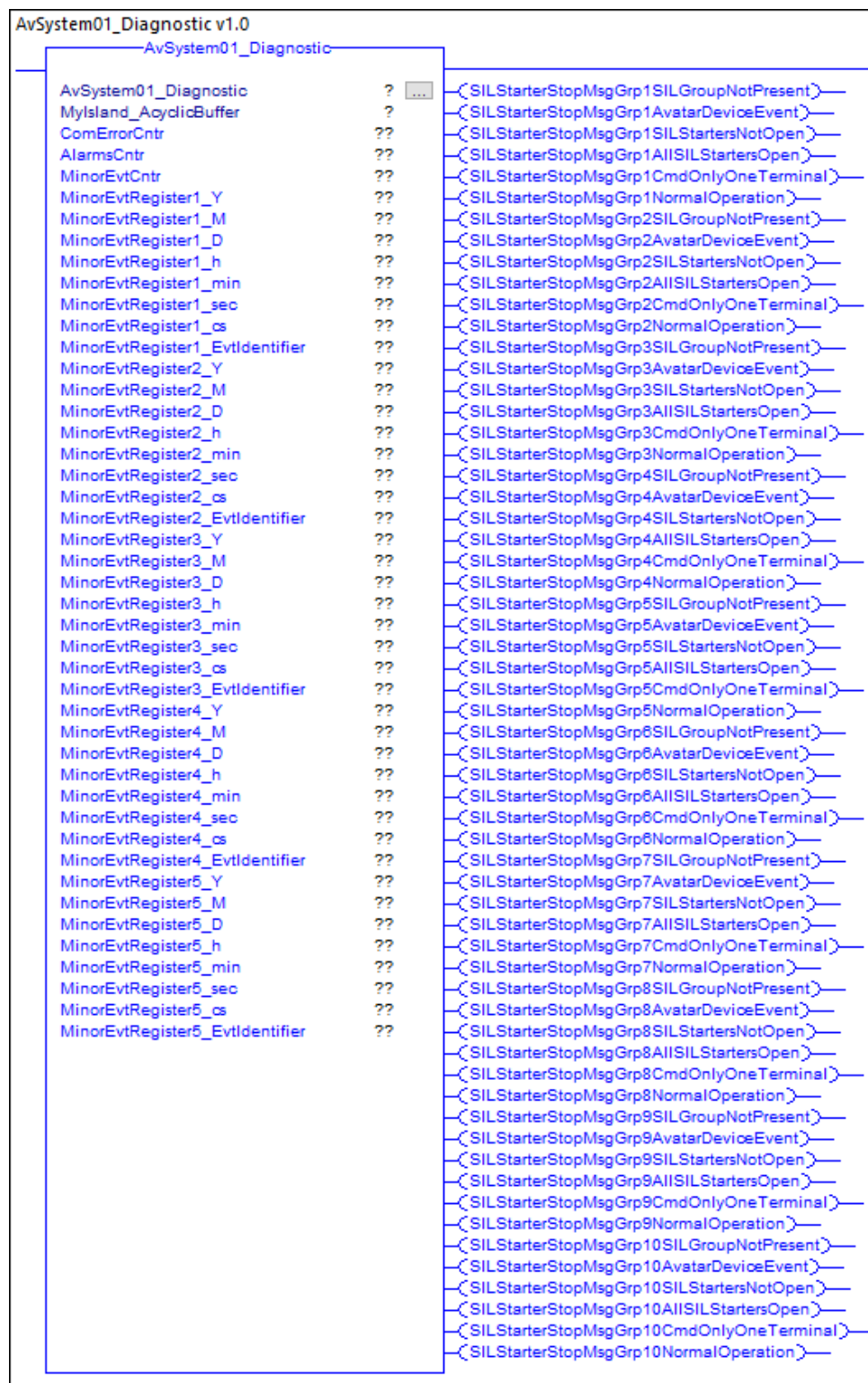
Output	Data Type	Description
SystemTime_Y	DINT	Date and time of the system (read only)
SystemTime_M	SINT	
SystemTime_D	SINT	
SystemTime_h	SINT	
SystemTime_min	SINT	
SystemTime_sec	SINT	
SystemTime_cs	SINT	

7. Safety Integrity Level according to standard IEC 61508.

## System Diagnostic

The **AvSystem1\_Diagnostic** function block returns the status of the acyclic diagnostic data of the System avatar.

**Figure 4 - AvSystem1\_Diagnostic Function Block**



**Table 8 - AvSystem1\_Diagnostic Output Interface**

Output	Data Type	Description	
ComErrorCnt	DINT	Number of detected errors for the fieldbus communication.	
AlarmsCnt	DINT	Number of detected alarms for the system.	
MinorEvtCnt	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 <sup>8</sup> Groups 1– 10: <ul style="list-style-type: none"> <li>• NotPresent = SIL Group not present in system configuration</li> <li>• AvatarDeviceEvent = SIL Group impacted by avatar device event</li> <li>• SILStartersNotOpen = SIL Group Stop command received; SIL starters not open yet</li> <li>• AllStartersNotOpen = SIL Group Stop command successfully issued; all SIL starters are open</li> <li>• 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</li> <li>• NormalOperation = Normal operation; SIL starters can be open or closed</li> </ul>	
SILStarterStopMsgGrp1AvatarDeviceEvent	BOOL		
SILStarterStopMsgGrp1SILStartersNotOpen	BOOL		
SILStarterStopMsgGrp1AllSILStartersOpen	BOOL		
SILStarterStopMsgGrp1CmdOnlyOneTerminal	BOOL		
SILStarterStopMsgGrp1NormalOperation	BOOL		
...	...		
SILStarterStopMsgGrp10SILGroupNotPresent	BOOL		
SILStarterStopMsgGrp10AvatarDeviceEvent	BOOL		
SILStarterStopMsgGrp10SILStartersNotOpen	BOOL		
SILStarterStopMsgGrp10AllSILStartersOpen	BOOL		
SILStarterStopMsgGrp10CmdOnlyOneTerminal	BOOL		
SILStarterStopMsgGrp10NormalOperation	BOOL		

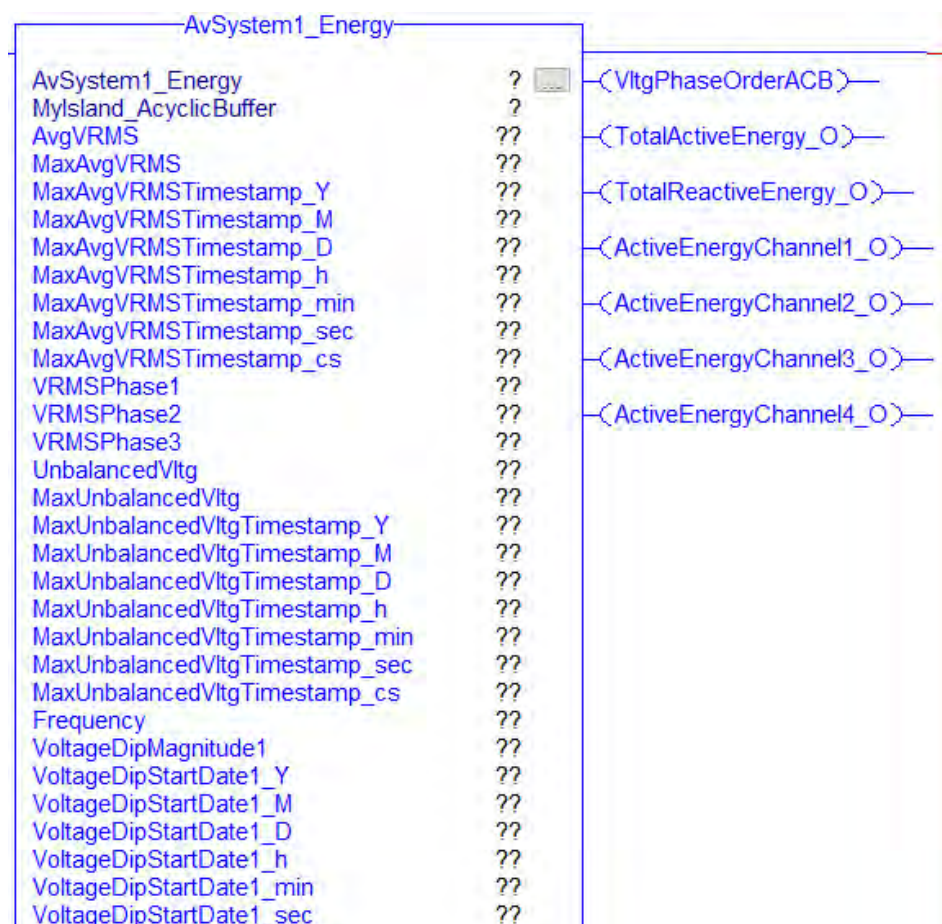
8. Safety Integrity Level according to standard IEC 61508.



## System Energy Management

The **AvSystem1\_Energy** function block returns the status of the acyclic energy data of the System avatar.

**Figure 5 - AvSystem1\_Energy Function Block**



**Table 9 - 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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)

**Table 9 - 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.



**Table 9 - 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 <b>overflow</b> 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 <b>overflow</b> 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	

**Table 9 - 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	

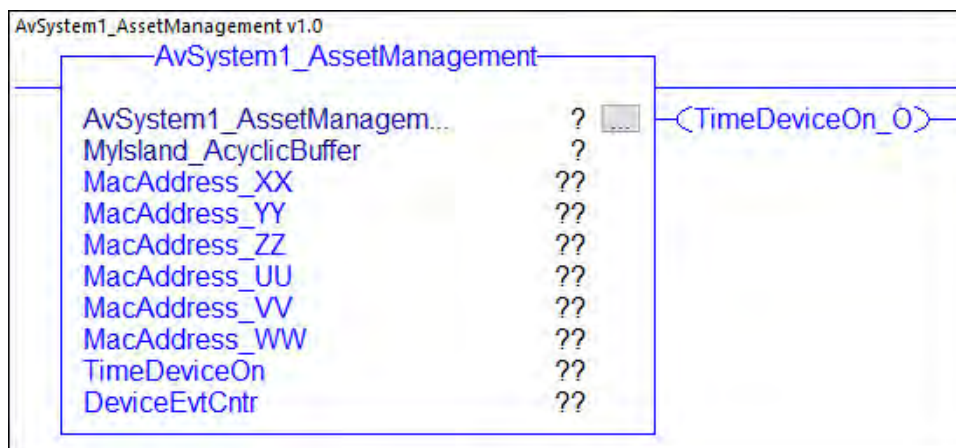
**Table 9 - AvSystem1\_Energy Output Interface (Continued)**

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.

**Figure 6 - AvSystem1\_AssetManagement Function Block**



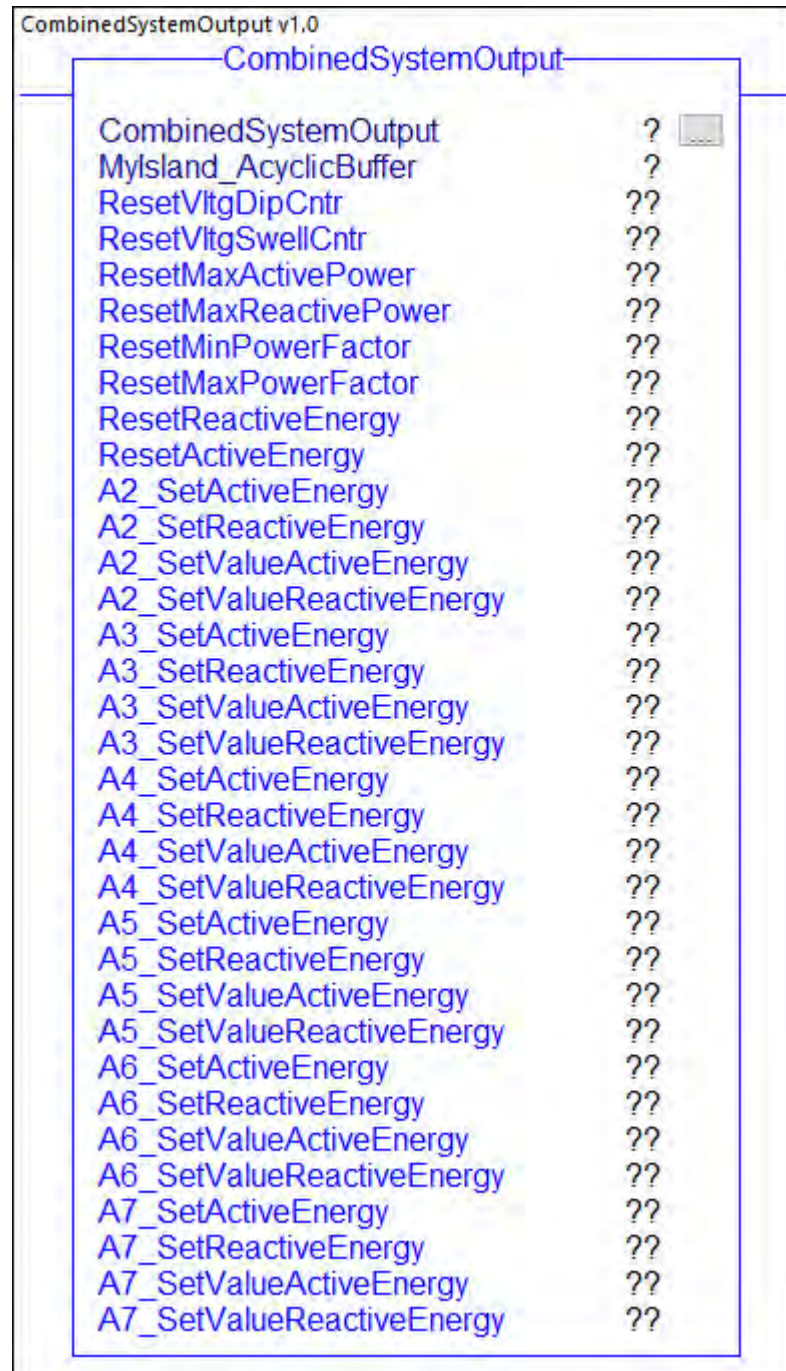
**Table 10 - AvSystem1\_AssetManagement Output Interface**

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 <b>overflow</b> 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.).

**Figure 7 - CombinedSystemOutput Function Block**



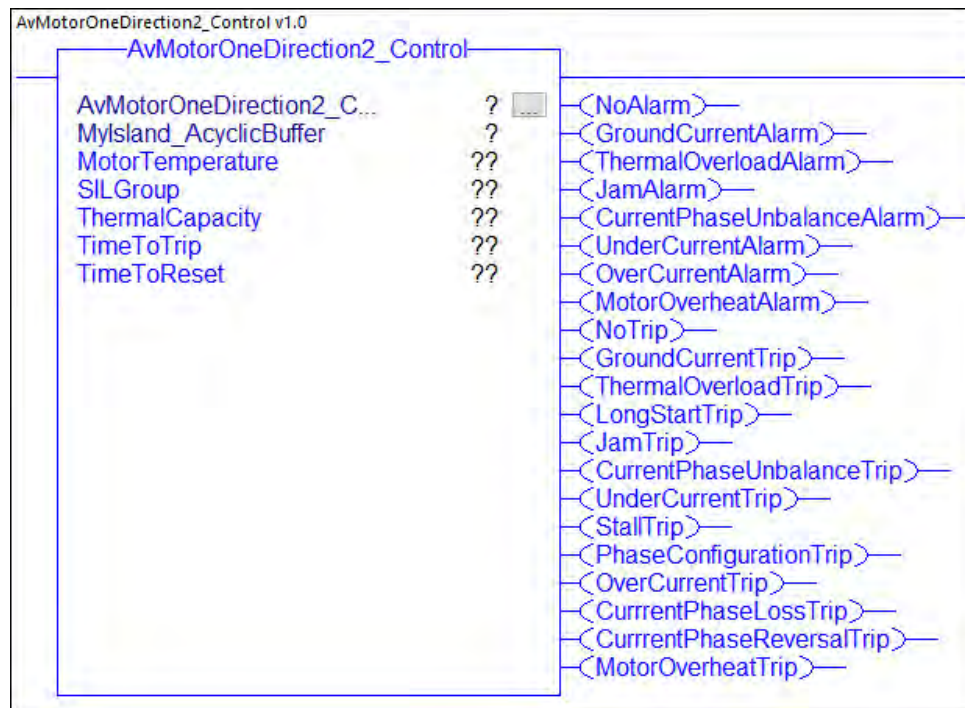
**Table 11 - CombinedSystemOutput Input Interface**

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"> <li>The true value of the parameter MinPowerFactor is reset to 1.</li> <li>The associated time stamp MinPowerFactorTimestamp is reset.</li> </ul>
ResetMaxPowerFactor	BOOL	If this input is set to TRUE: <ul style="list-style-type: none"> <li>The true value of the parameter MaxPowerFactor is reset to 0.</li> <li>The associated time stamp MaxPowerFactorTimestamp is reset.</li> </ul>
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.

**Figure 8 - AvMotorOneDirection\_Control Function Block**



**Table 12 - 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"> <li>• -200 to +850°C (-328 to +1562°F) (for PT100)</li> <li>• -200 to +600°C (-328 to +1112°F) (for PT1000)</li> <li>• -60 to +180°C (-76 to +356°F) (for NI 100/1000)</li> </ul>
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 <sup>9</sup> 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.

9. Safety Integrity Level according to standard IEC 61508.

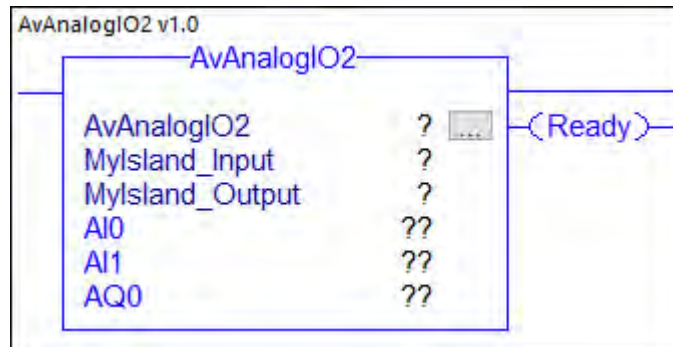


# Avatar Cyclic Function Blocks

## Analog I/O

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

**Figure 9 - AvAnalogIO Function Block**



**Table 13 - 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"> <li>Type 0 (Unit: mV)</li> <li>Type 1 (Unit: mV)</li> <li>Type 2 (Unit: μA)</li> <li>Type 3 (Unit: μA)</li> </ul>

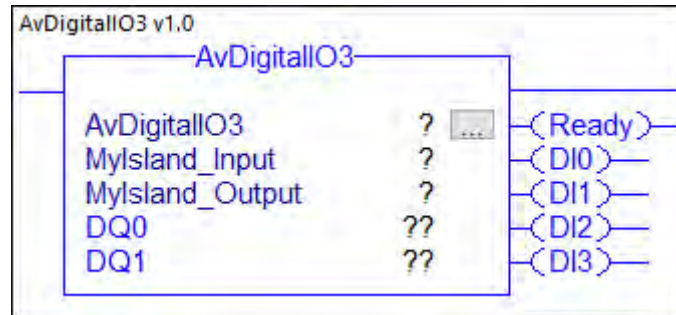
**Table 14 - AvAnalogIO Output Interface**

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"> <li>Type 0 to 12 (Unit: 0.1 °C)</li> <li>Type 13 (Unit: mV)</li> <li>Type 14 (Unit: mV)</li> <li>Type 15 (Unit: μA)</li> <li>Type 16 (Unit: μA)</li> </ul>
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.

**Figure 10 - AvDigitalIO Function Block**



**Table 15 - 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.

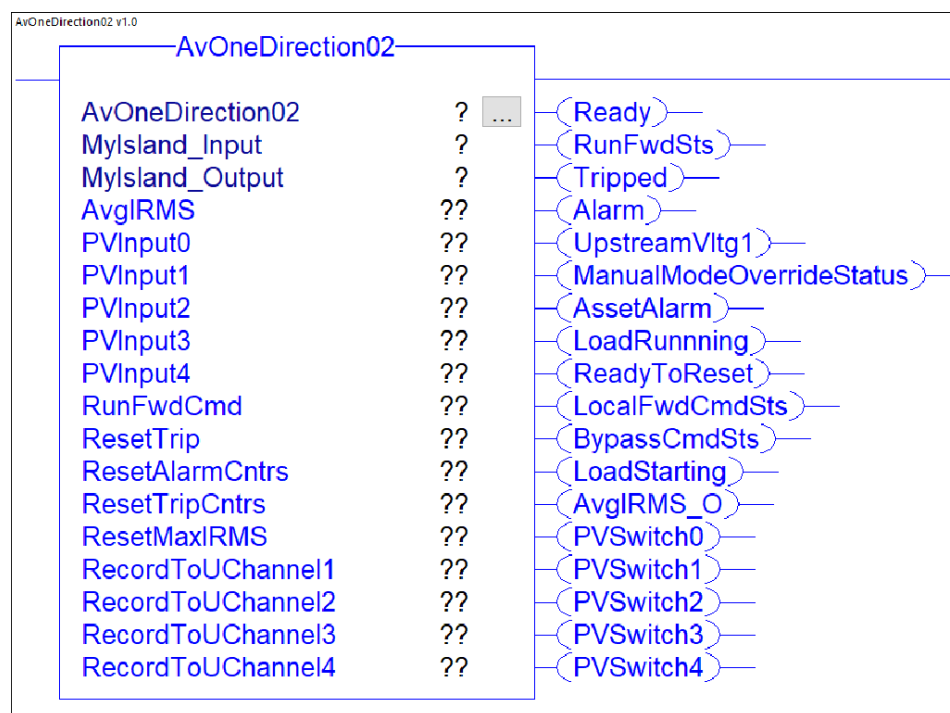
**Table 16 - AvDigitalIO Output Interface**

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.

**Figure 11 - AvMotorOneDirection Function Block**



**Table 17 - 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 I rms 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.

**Table 18 - AvMotorOneDirection Output Interface**

Output	Data Type	Description
AssetAlarm	BOOL	If this output is set to TRUE, a power device or SIL <sup>10</sup> 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 <b>overflow</b> 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	

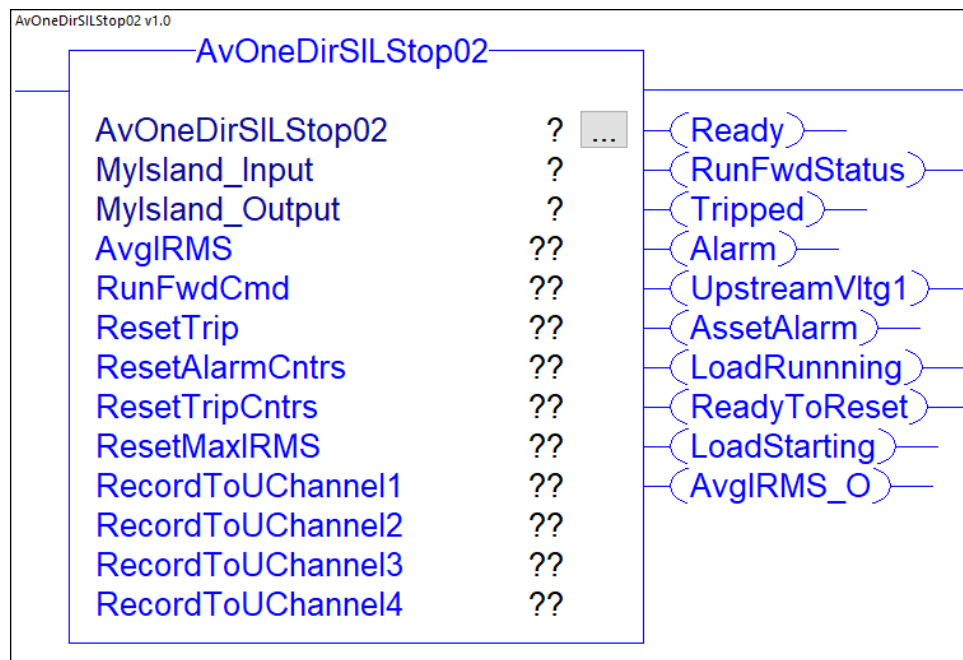
10. Safety Integrity Level according to standard IEC 61508

## 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 1<sup>11</sup> function compliance for Wiring Category 1 and Category 2.

**Figure 12 - AvMotorOneDirectionSILStop Function Block**



**Table 19 - 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.

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

**Table 20 - AvMotorOneDirectionSILStop Output Interface**

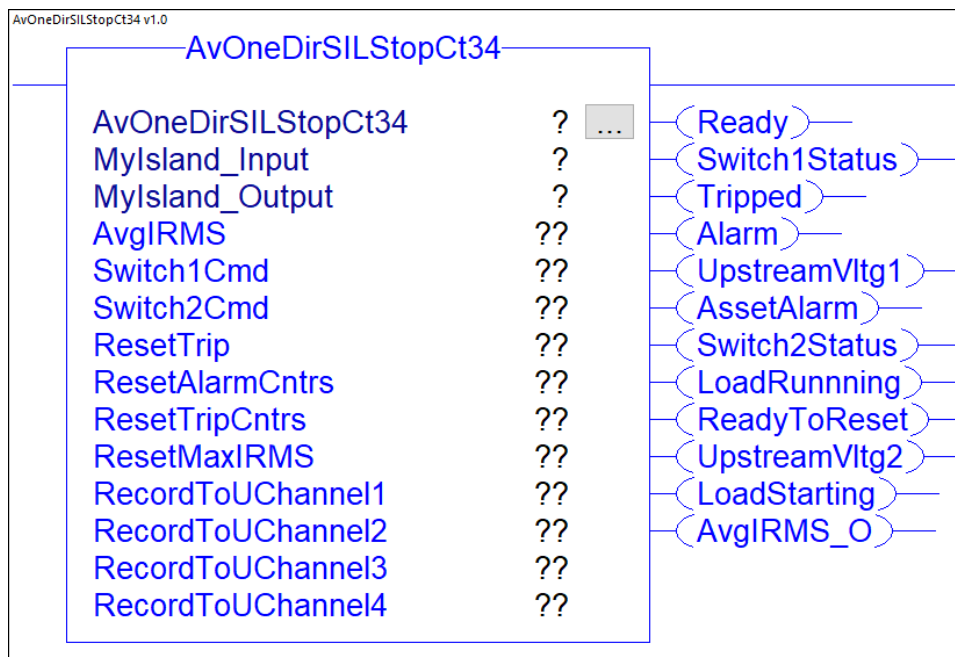
Output	Data Type	Description
AssetAlarm	BOOL	If this output is set to TRUE, a power device within the avatar has reached or exceeded 90% of the expected durability (per avatar parameter).
AvgIRMS	DINT	Indicates the average of the most recent phase current Irms values. (Unit: mA)
AvgIRMS_O	DINT	Indicates the average of the most recent phase current Irms <b>overflow</b> 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 1<sup>12</sup> function compliance for Wiring Category 3 and Category 4.

**Figure 13 - AvMotorOneDirectionSILStopCat34 Function Block**



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

**Table 21 - 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.

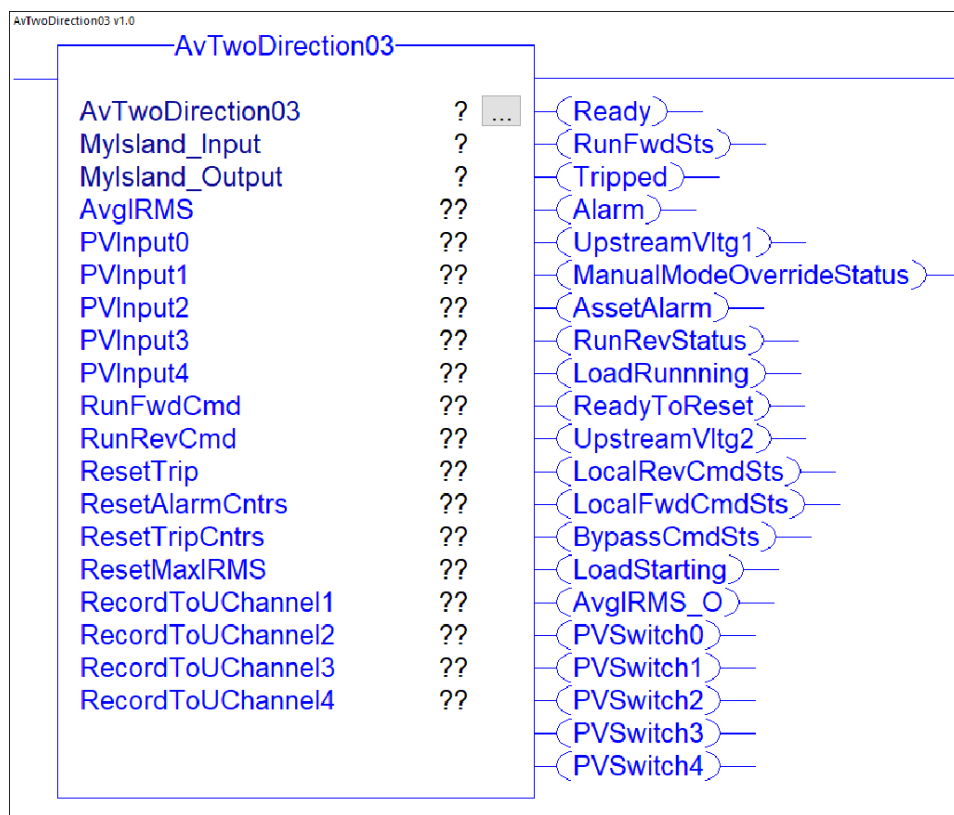
**Table 22 - AvMotorOneDirectionSILStopCat34 Output Interface**

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).

**Figure 14 - AvMotorTwoDirection Function Block**



**Table 23 - 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.
ResetAlarmCntrs	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCntrs	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	



**Table 24 - AvMotorTwoDirection Output Interface**

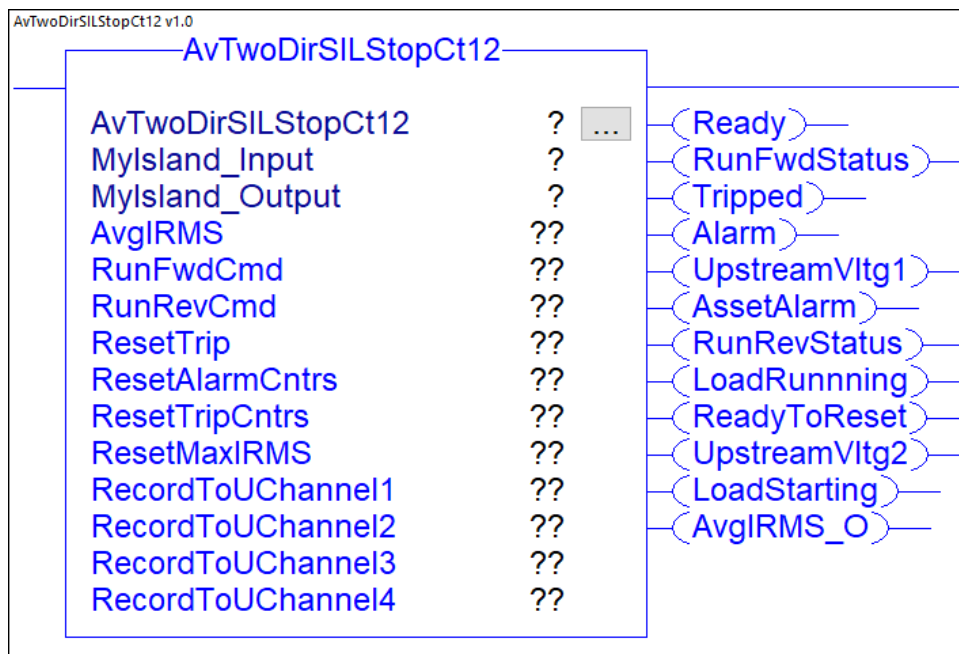
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
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 <b>overflow</b> 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 1<sup>13</sup> function compliance for Wiring Category 1 and Category 2.

**Figure 15 - AvMotorTwoDirectionSILStop Function Block**



**Table 25 - 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	

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

**Table 26 - AvMotorTwoDirectionSILStop Output Interface**

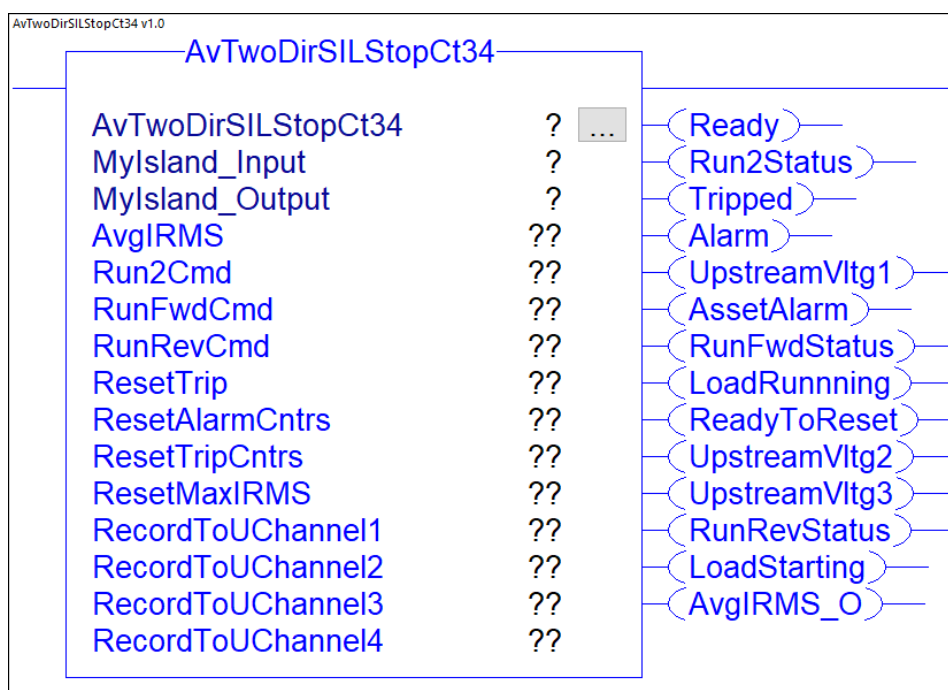
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
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 <b>overflow</b> 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 **AvMotorTwoDirectionSILStopCat34** function block is used to manage a motor in two directions (forward and reverse) with Stop Category 0 or Stop Category 1<sup>14</sup> function compliance for Wiring Category 3 and Category 4.

**Figure 16 - AvMotorTwoDirectionsSILStopCat34 Function Block**



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

**Table 27 - 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	

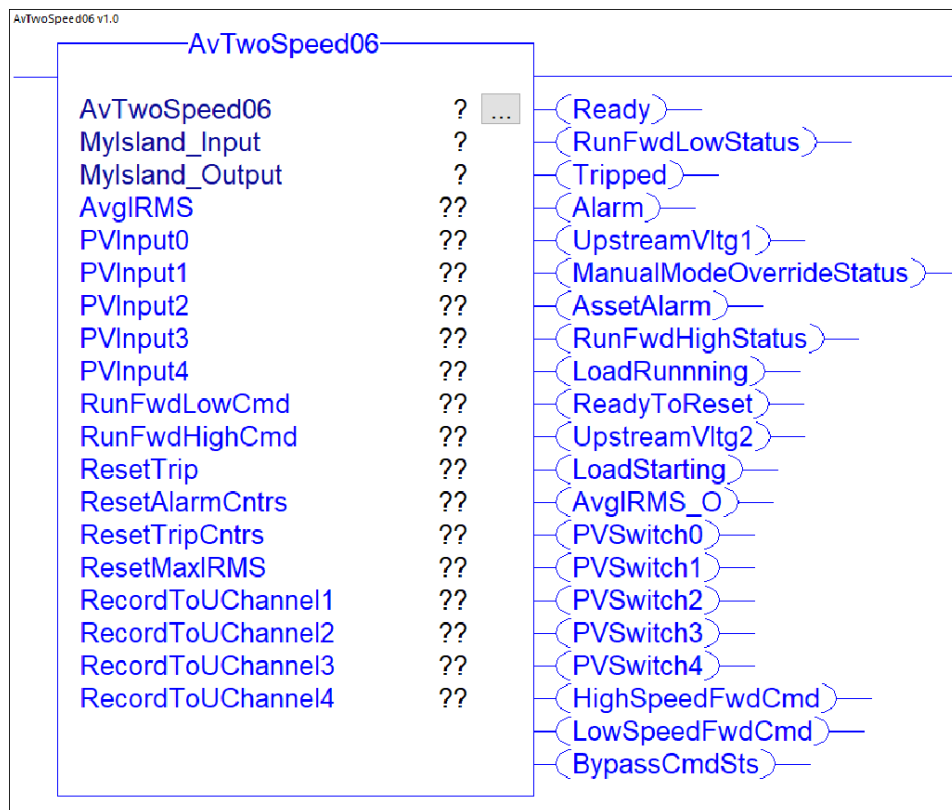
**Table 28 - AvMotorTwoDirectionsSILStopCat34 Output Interface**

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.

**Figure 17 - AvMotorTwoSpeeds Function Block**



**Table 29 - 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	

**Table 30 - AvMotorTwoSpeeds Output Interface**

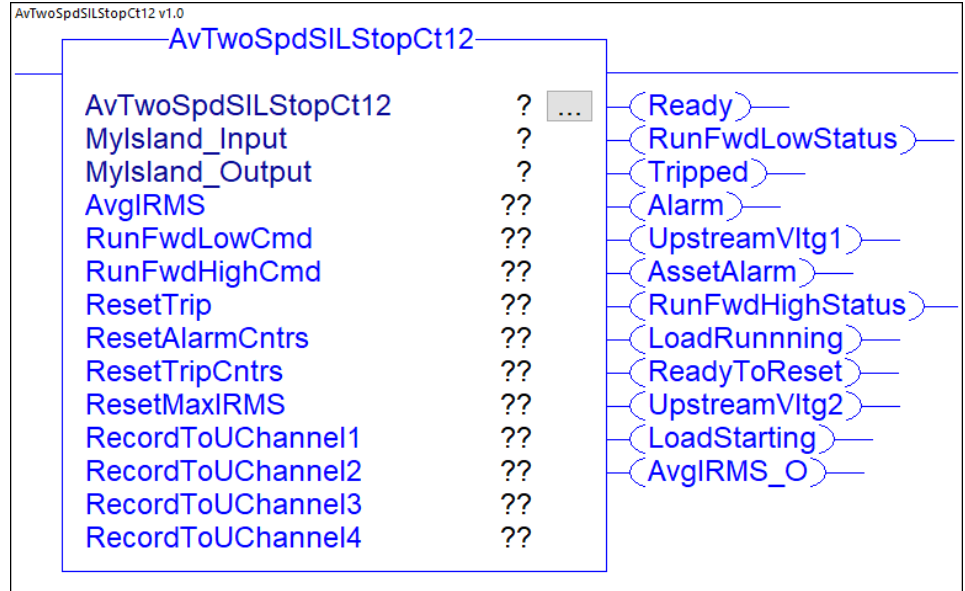
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If 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 <b>overflow</b> 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 1<sup>15</sup> function compliance for Wiring Category 1 and Category 2.

**Figure 18 - AvMotorTwoSpeedsSILStop Function Block**



**Table 31 - 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	

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

**Table 32 - 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 <b>overflow</b> values.(Unit: mA)

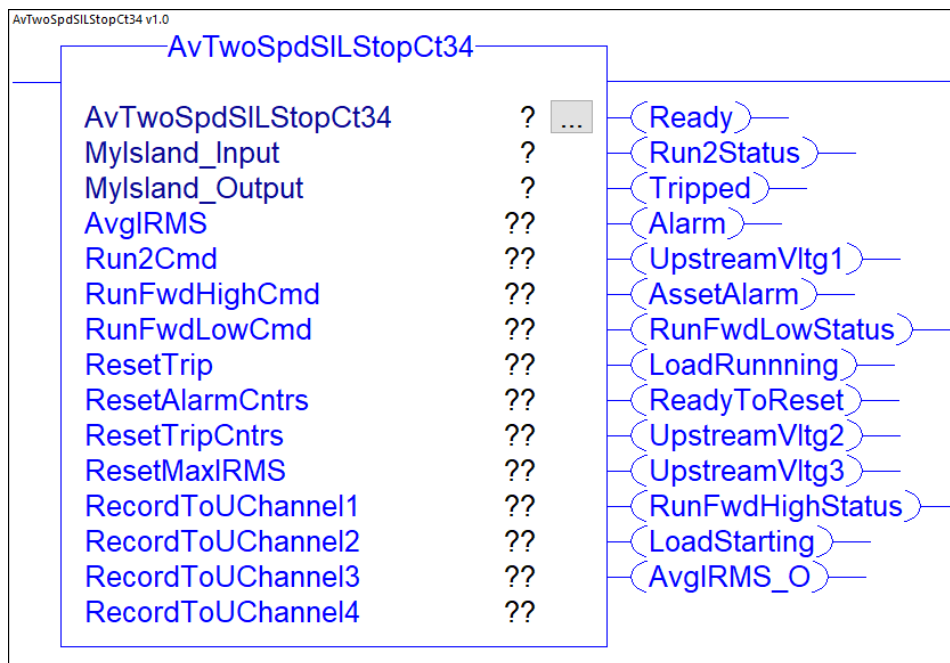


## Motor Two Speeds - SIL Stop, W. Cat 3/4

**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 1<sup>16</sup> function compliance for Wiring Category 3 and Category 4.

**Figure 19 - AvMotorTwoSpeedsSILStopCat34 Function Block**



**Table 33 - 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	

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

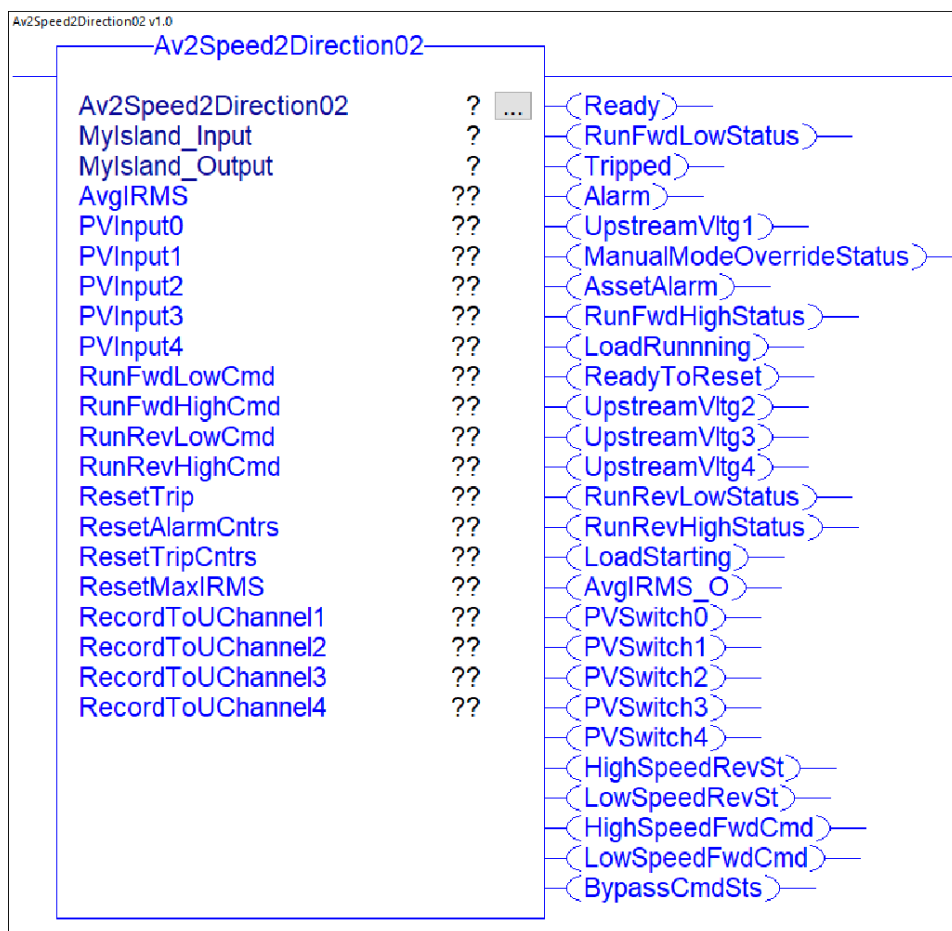
**Table 34 - AvMotorTwoSpeedsSILStopCat34 Output Interface**

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).

**Figure 20 - AvMotorTwoSpeedsTwo Function Block**



**Table 35 - 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	

**Table 36 - AvMotorTwoSpeedsTwo Output Interface**

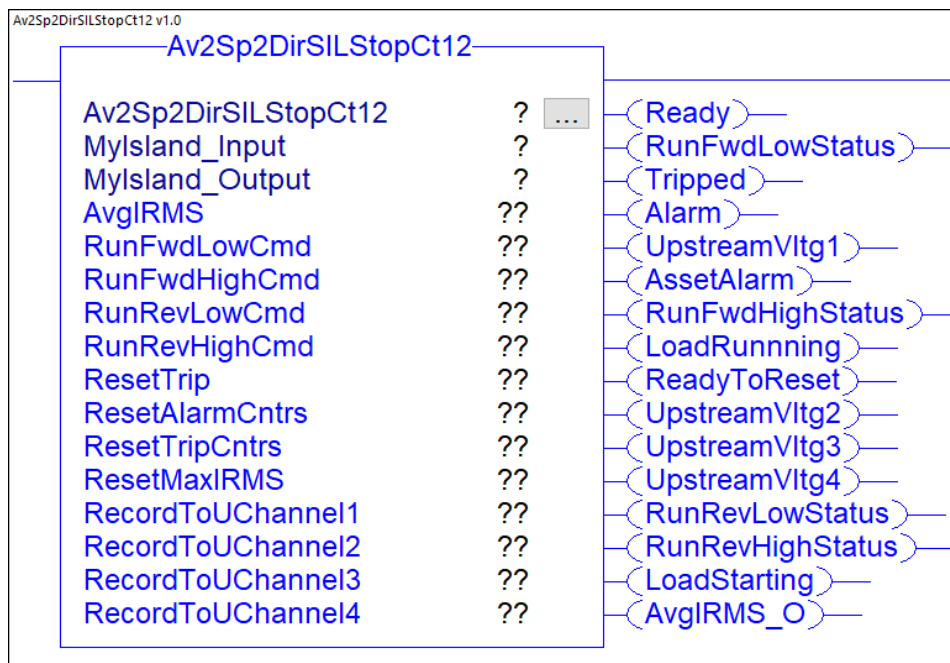
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If 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 <b>overflow</b> 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 1<sup>17</sup> function compliance for Wiring Category 1 and Category 2.

**Figure 21 - AvMotorTwoSpeedsTwoSILStop Function Block**



**Table 37 - 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 I rms 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	

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

**Table 38 - AvMotorTwoSpeedsTwoSILStop Output Interface**

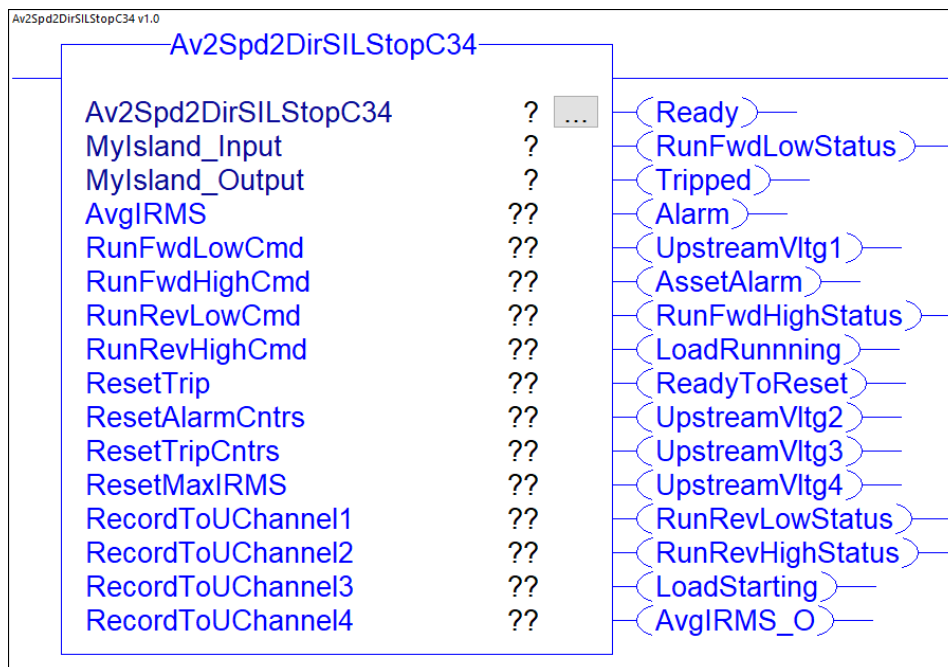
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If 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 <b>overflow</b> 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 1<sup>18</sup> function compliance for Wiring Category 3 and Category 4.

**Figure 22 - AvMotorTwoSpeedsTwoSILStopCat34 Function Block**



**Table 39 - 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	

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

**Table 40 - AvMotorTwoSpeedsTwoSILStopCat34 Output Interface**

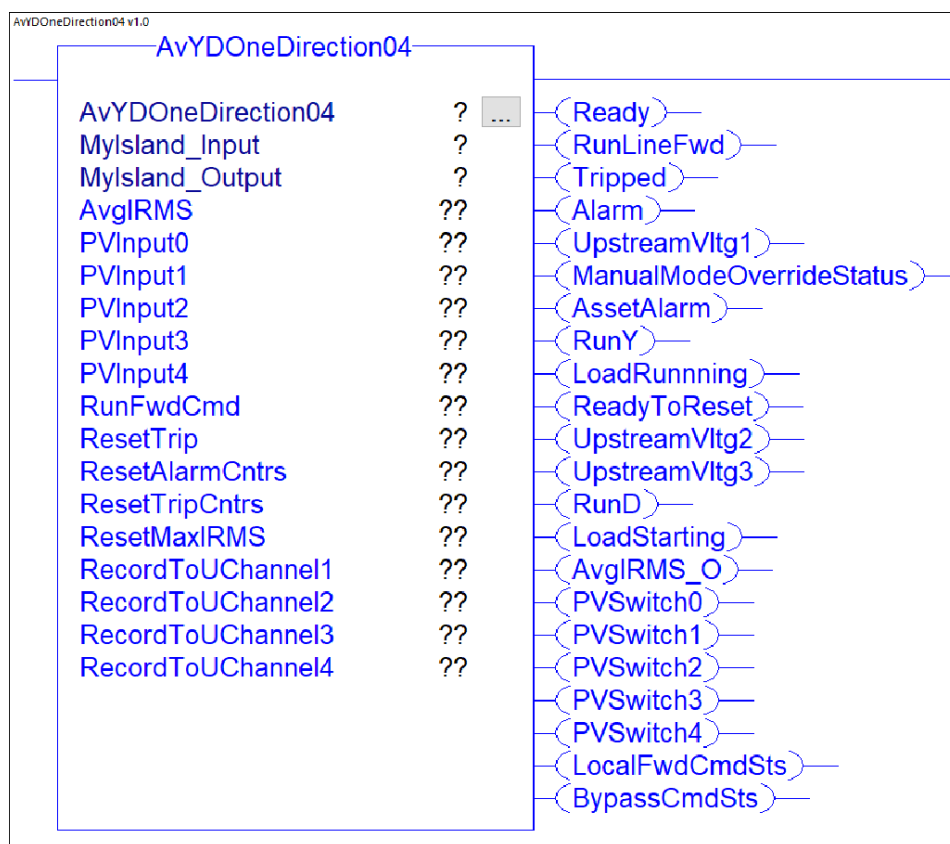
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdLowStatus	BOOL	If this output is set to TRUE, the motor is running in low speed. If this output is set to FALSE, the motor is stopped or is running in high speed.
Tripped	BOOL	If 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.

**Figure 23 - AvMotorYDOneDirection Function Block**



**Table 41 - 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	

**Table 42 - AvMotorYDOneDirection Output Interface**

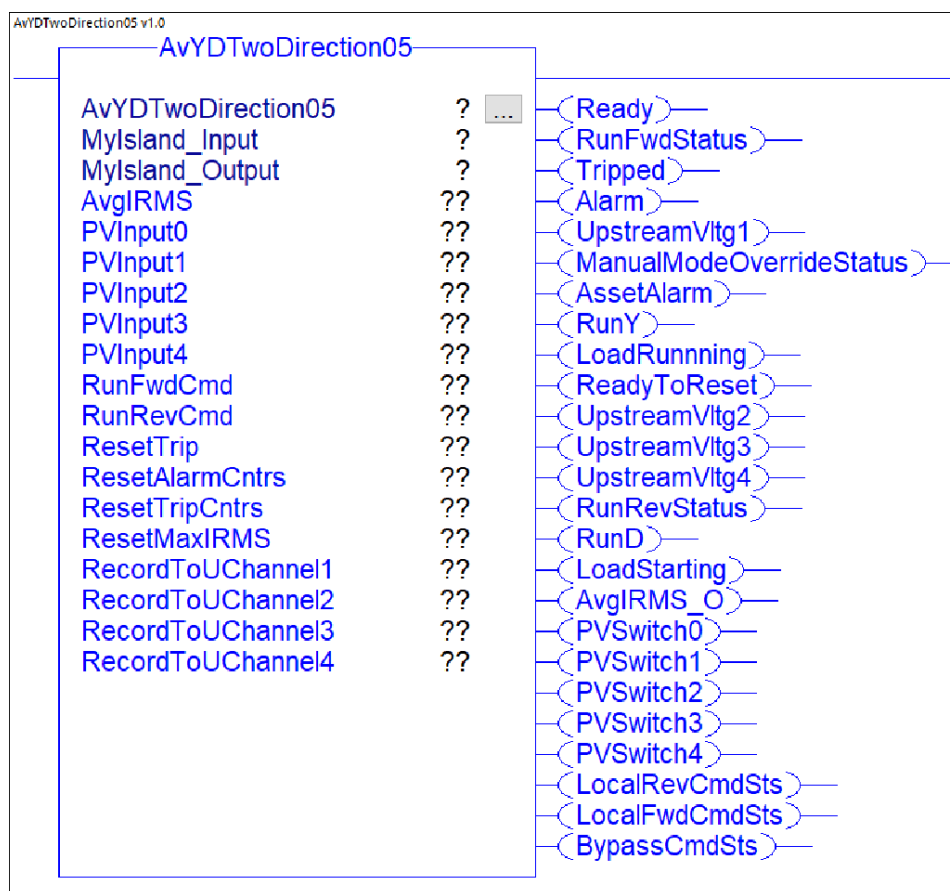
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunLineFwd	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
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 <sup>19</sup> 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 <b>overflow</b> 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	

19. 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).

**Figure 24 - AvMotorYDTwoDirection Function Block**



**Table 43 - 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 I rms 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	

**Table 44 - AvMotorYDTwoDirection Output Interface**

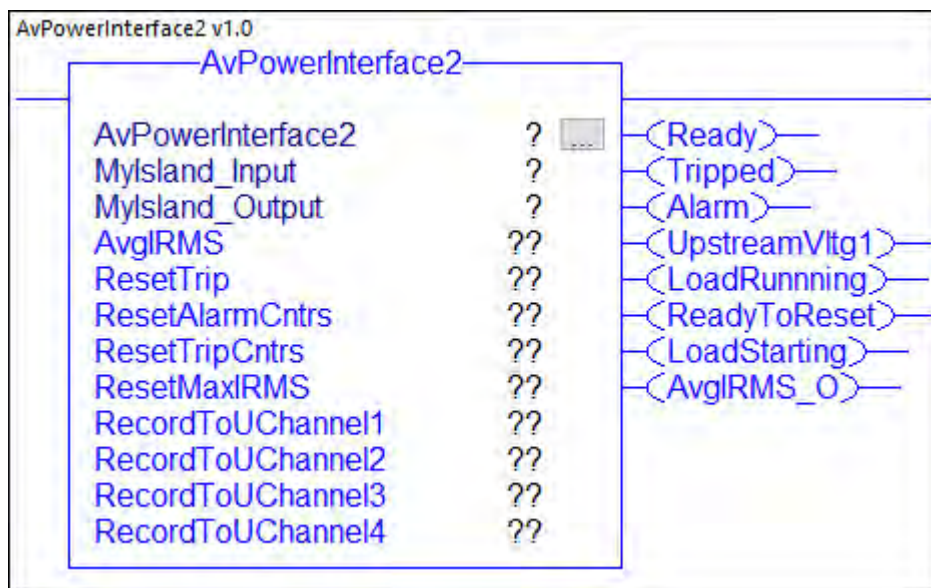
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
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 <sup>20</sup> 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 <b>overflow</b> 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.

## 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.

**Figure 25 - AvPowerInterface Function Block**



**Table 45 - 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	

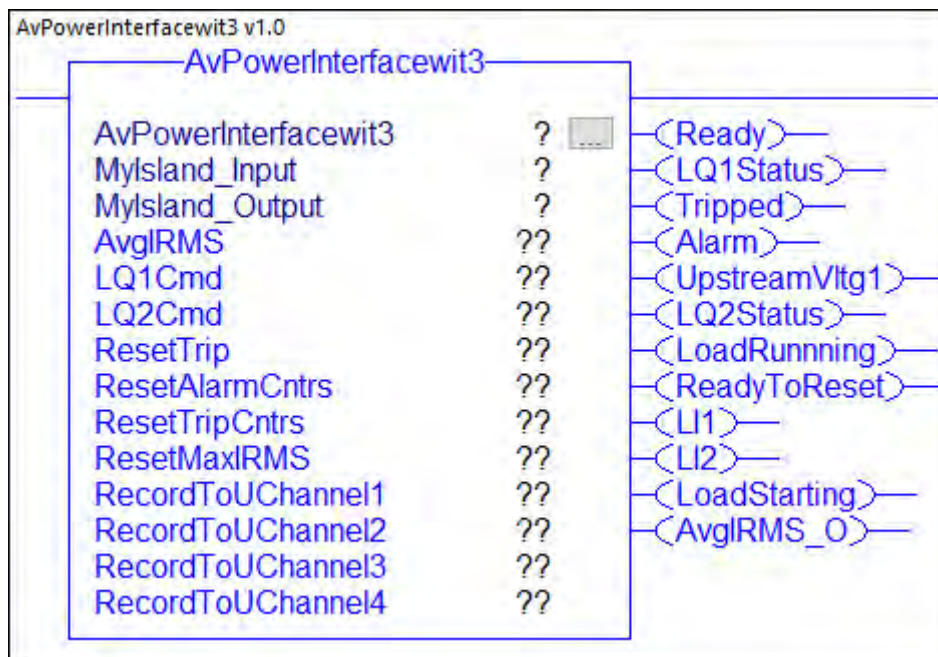
**Table 46 - AvPowerInterface Output Interface**

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 <b>overflow</b> 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.

**Figure 26 - AvPowerInterfacewit Function Block**



**Table 47 - 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	

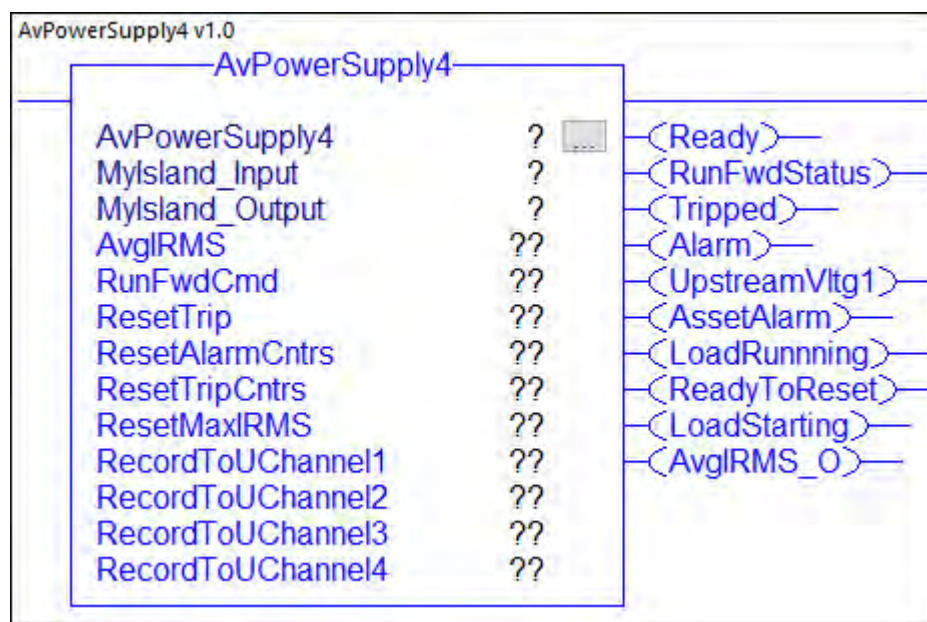
**Table 48 - AvPowerInterfacewit Output Interface**

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 <b>overflow</b> values. (Unit: mA)

## Power Supply

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

**Figure 27 - AvPowerSupply Function Block**



**Table 49 - 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	

**Table 50 - 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 <sup>21</sup> 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 <b>overflow</b> values. (Unit: mA)

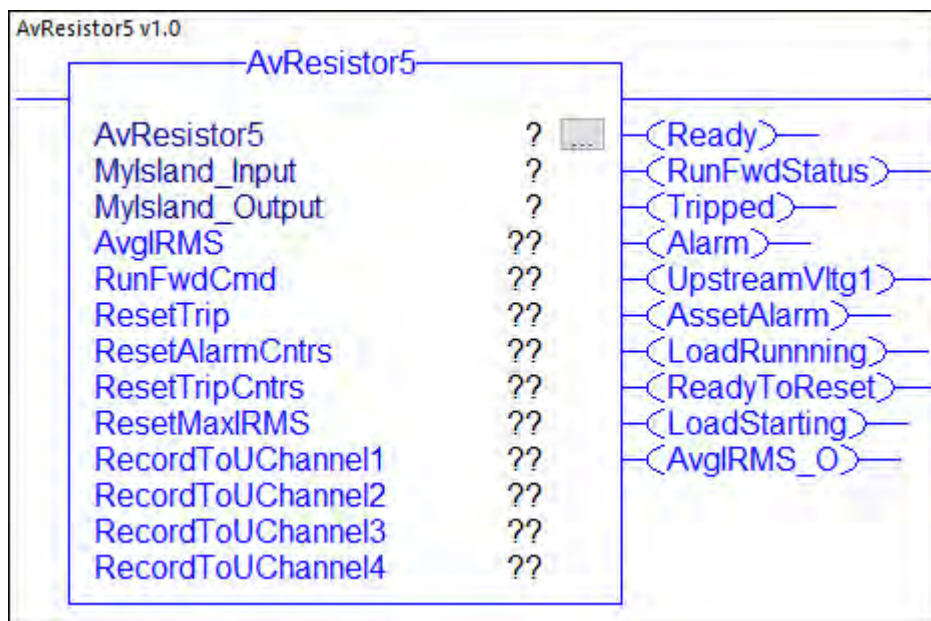
21. Safety Integrity Level according to standard IEC 61508.



## Resistor

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

**Figure 28 - AvResistor Function Block**



**Table 51 - 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	

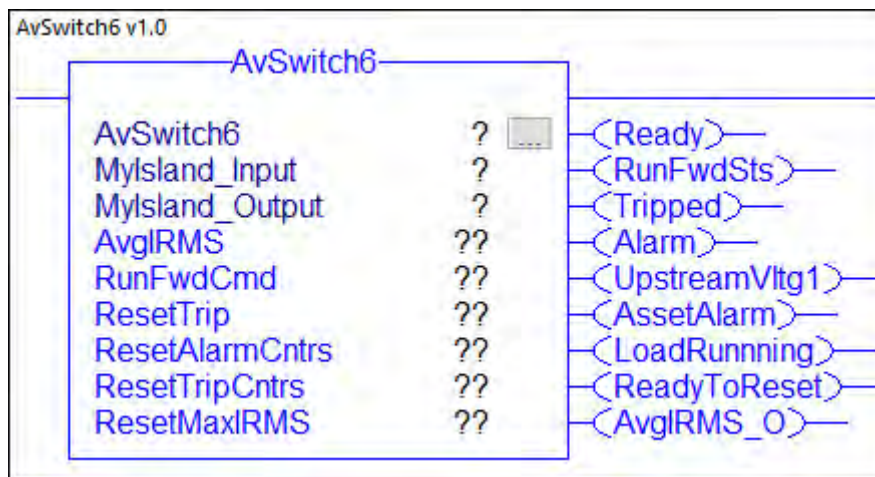
**Table 52 - AvResistor Output Interface**

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 <sup>22</sup> 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 <b>overflow</b> values.(Unit: mA)

## Switch

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

**Figure 29 - AvSwitch Function Block**



**Table 53 - 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.

22. Safety Integrity Level according to standard IEC 61508.

**Table 54 - AvSwitch Output Interface**

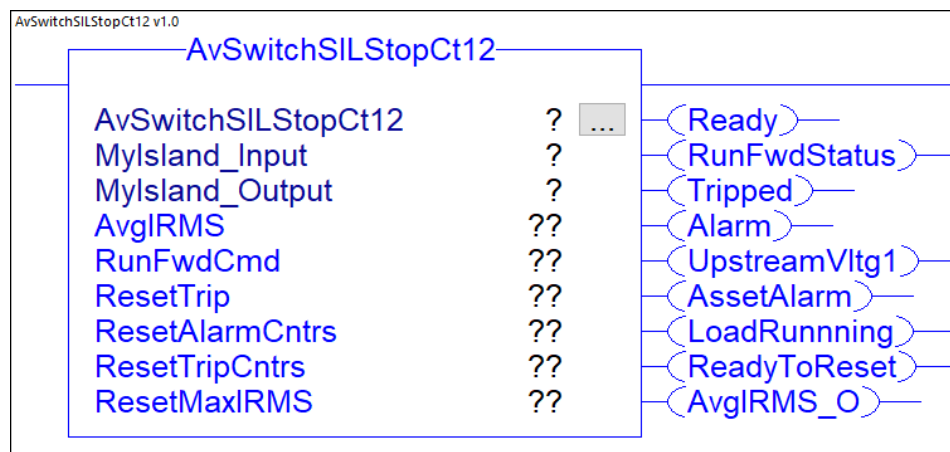
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
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 <sup>23</sup> 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 <b>overflow</b> values.(Unit: mA)

### 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 1<sup>24</sup> function compliance for Wiring Category 1 and Category 2.

**Figure 30 - AvSwitchSILStopCat Function Block**



23. Safety Integrity Level according to standard IEC 61508.  
 24. Stop categories according to EN/IEC 60204-1.

**Table 55 - 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.

**Table 56 - AvSwitchSILStopCat Output Interface**

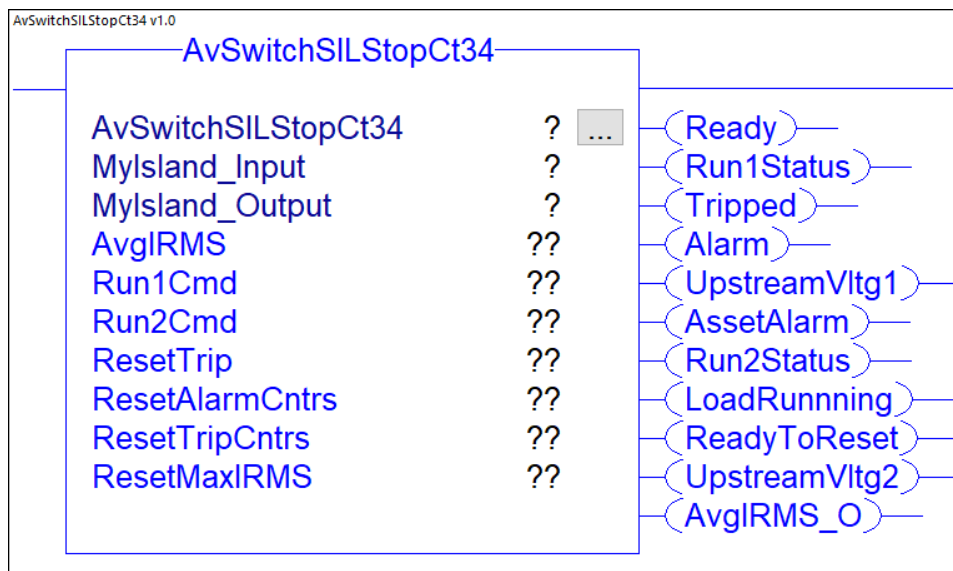
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
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 <b>overflow</b> values.(Unit: mA)

### 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 1<sup>25</sup> function compliance for Wiring Category 3 and Category 4.

**Figure 31 - AvSwitchSILStopCat34 Function Block**



**Table 57 - 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.
ResetAlarmCntrs	BOOL	If this input is set to TRUE, all alarm counters are reset for this avatar.
ResetTripCntrs	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.

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

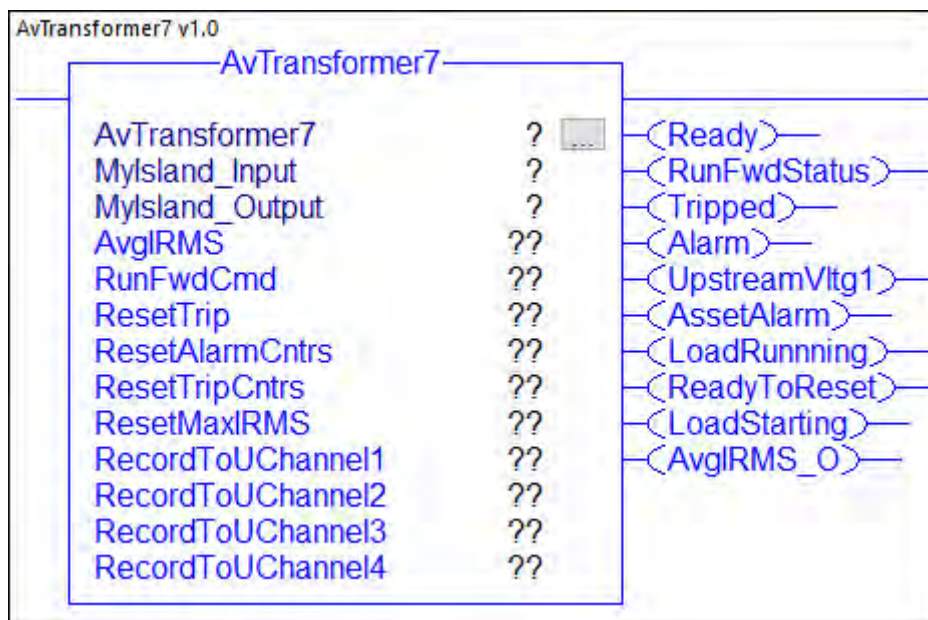
**Table 58 - AvSwitchSILStopCat34 Output Interface**

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 <sup>26</sup> 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)

## Transformer

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

**Figure 32 - AvTransformer Function Block**



26. Safety Integrity Level according to standard IEC 61508.

**Table 59 - 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	

**Table 60 - 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 <sup>27</sup> 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 <b>overflow</b> values. (Unit: mA)

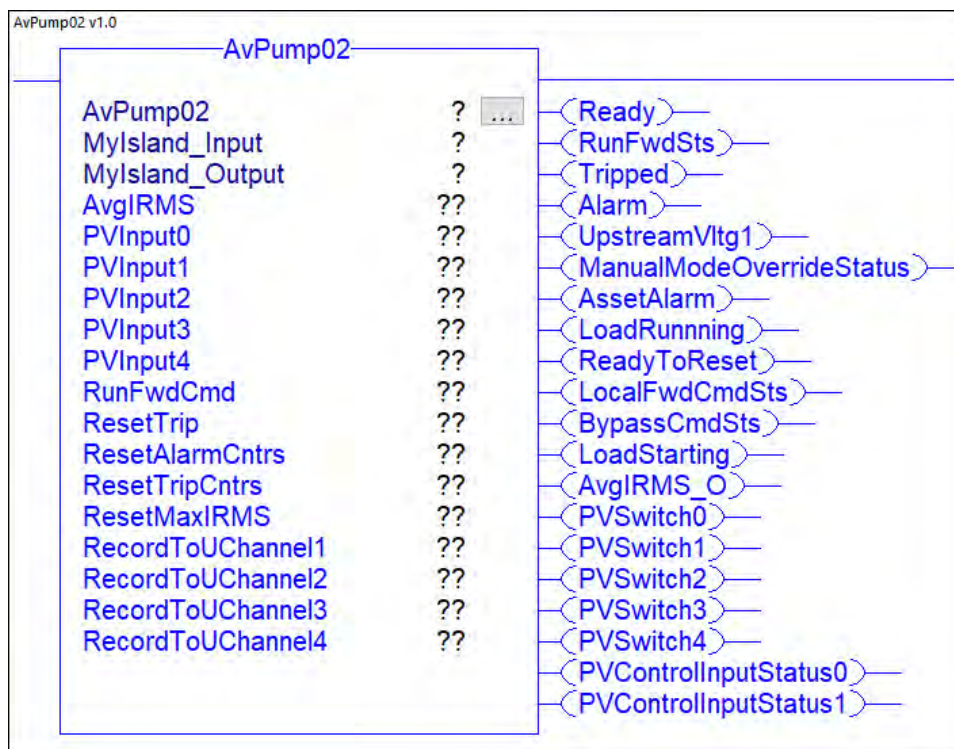
27. Safety Integrity Level according to standard IEC 61508.



## Pump

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

**Figure 33 - AvPump Function Block**



**Table 61 - 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	



**Table 62 - AvPump Output Interface**

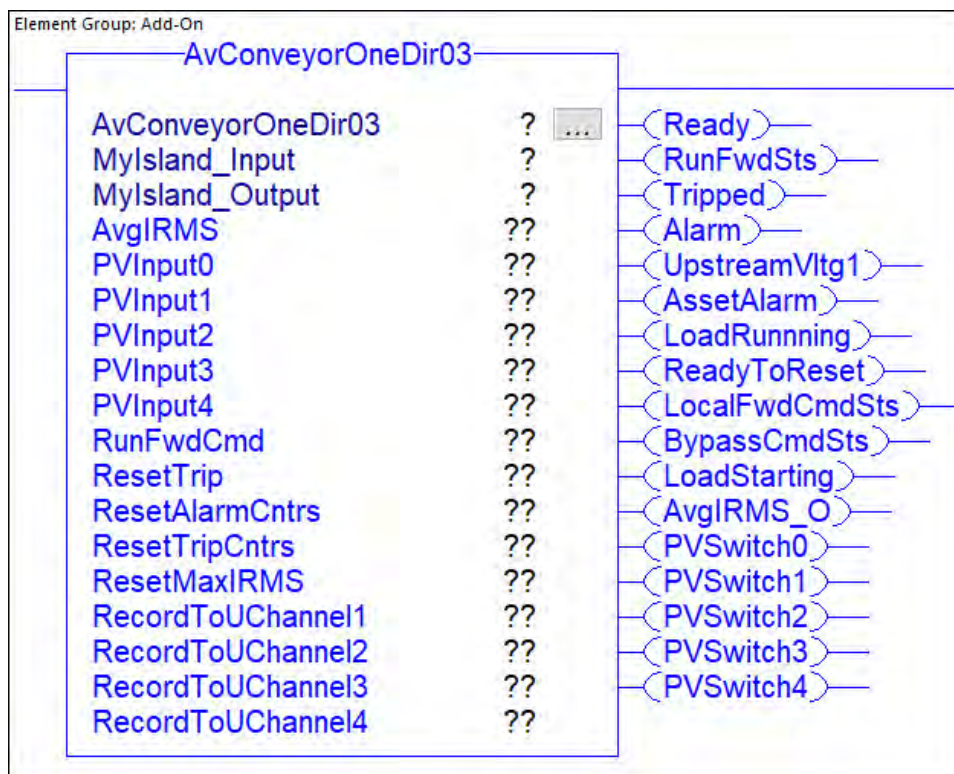
Output	Data Type	Description
Ready	BOOL	Indicates TRUE if the function block is ready to receive an execute command.
RunFwdStatus	BOOL	If this output is set to TRUE, the avatar forward switch is closed.
Tripped	BOOL	If this output is set to TRUE, a protection trip event has been detected by the avatar.
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 <sup>28</sup> 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.

28. Safety Integrity Level according to standard IEC 61508.

## Conveyor One Direction

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

**Figure 34 - AvConveyorOneDir Function Block**



**Table 63 - 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	

**Table 64 - 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 <sup>29</sup> 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	

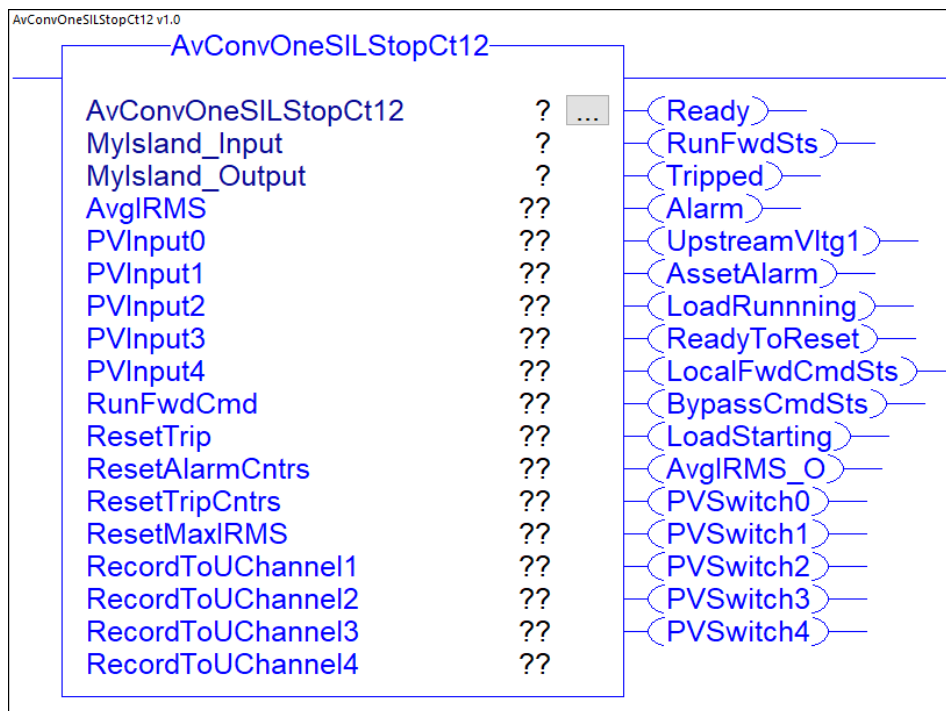
29. Safety Integrity Level according to standard IEC 61508.

## 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 1<sup>30</sup> function compliance for Wiring Category 1 and Category 2.

**Figure 35 - AvSILStopConveyorOne Function Block**



**Table 65 - 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	

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

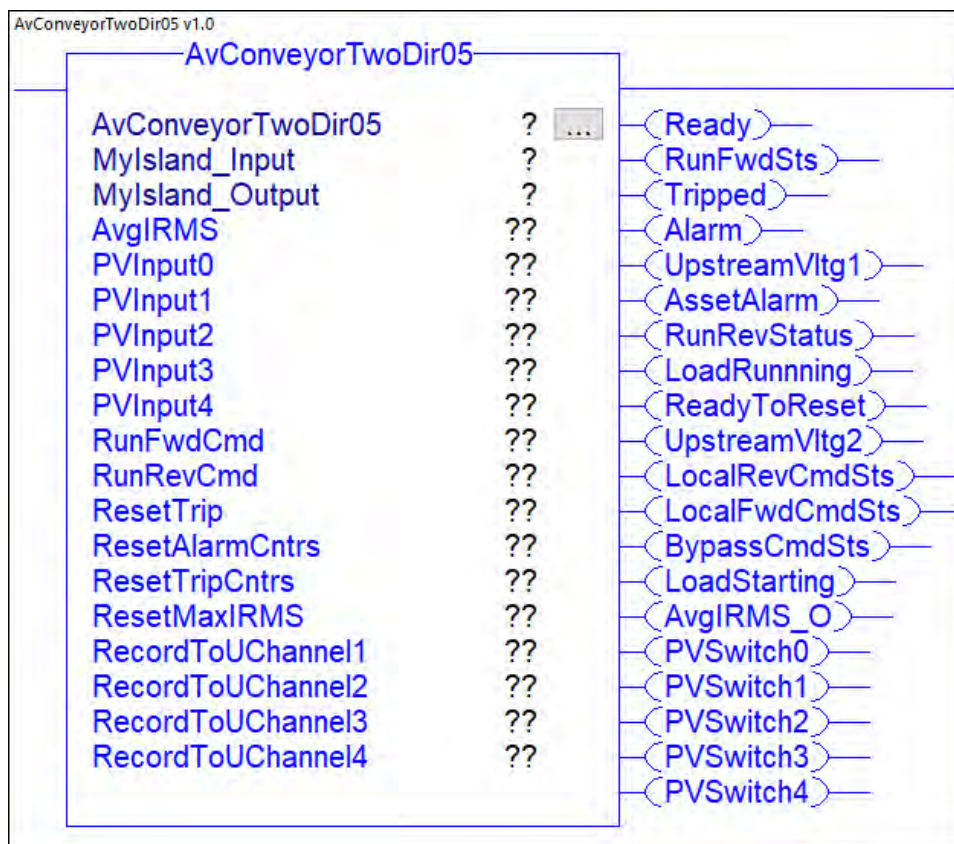
**Table 66 - AvSILStopConveyorOneDir Output Interface**

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).

**Figure 36 - AvConveyorTwoDir Function Block**



**Table 67 - 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	

**Table 68 - 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 <sup>31</sup> 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	

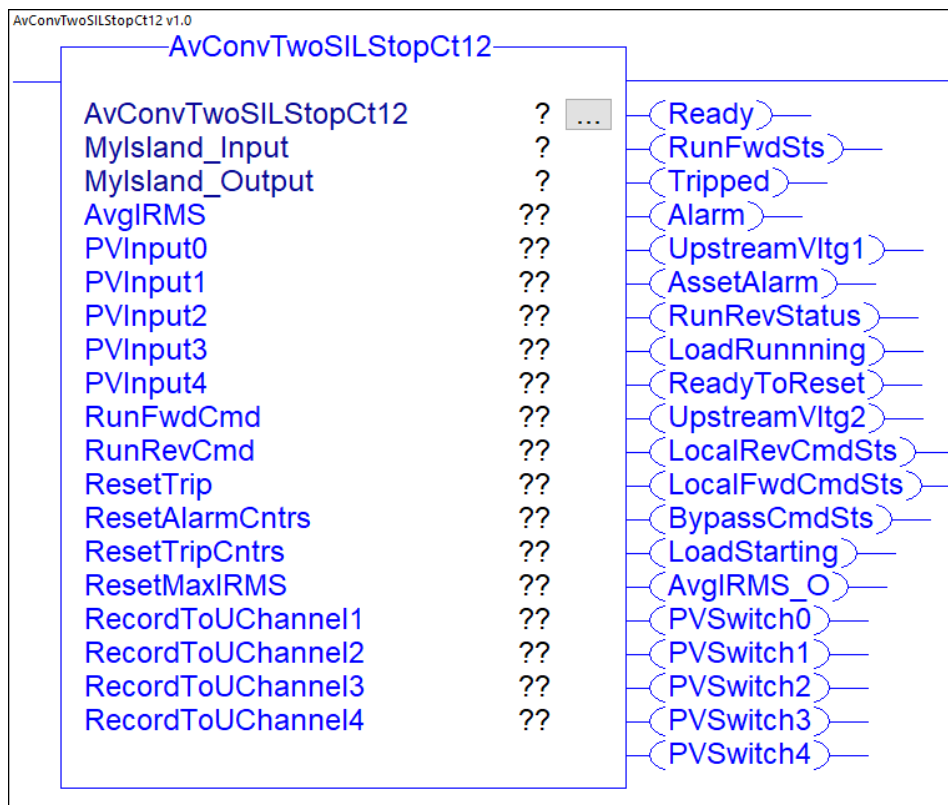
31. Safety Integrity Level according to standard IEC 61508.

## 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 1<sup>32</sup> function compliance for Wiring Category 1 and Category 2.

**Figure 37 - AvSILStopConveyorTwoDir Function Block**



**Table 69 - 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	

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



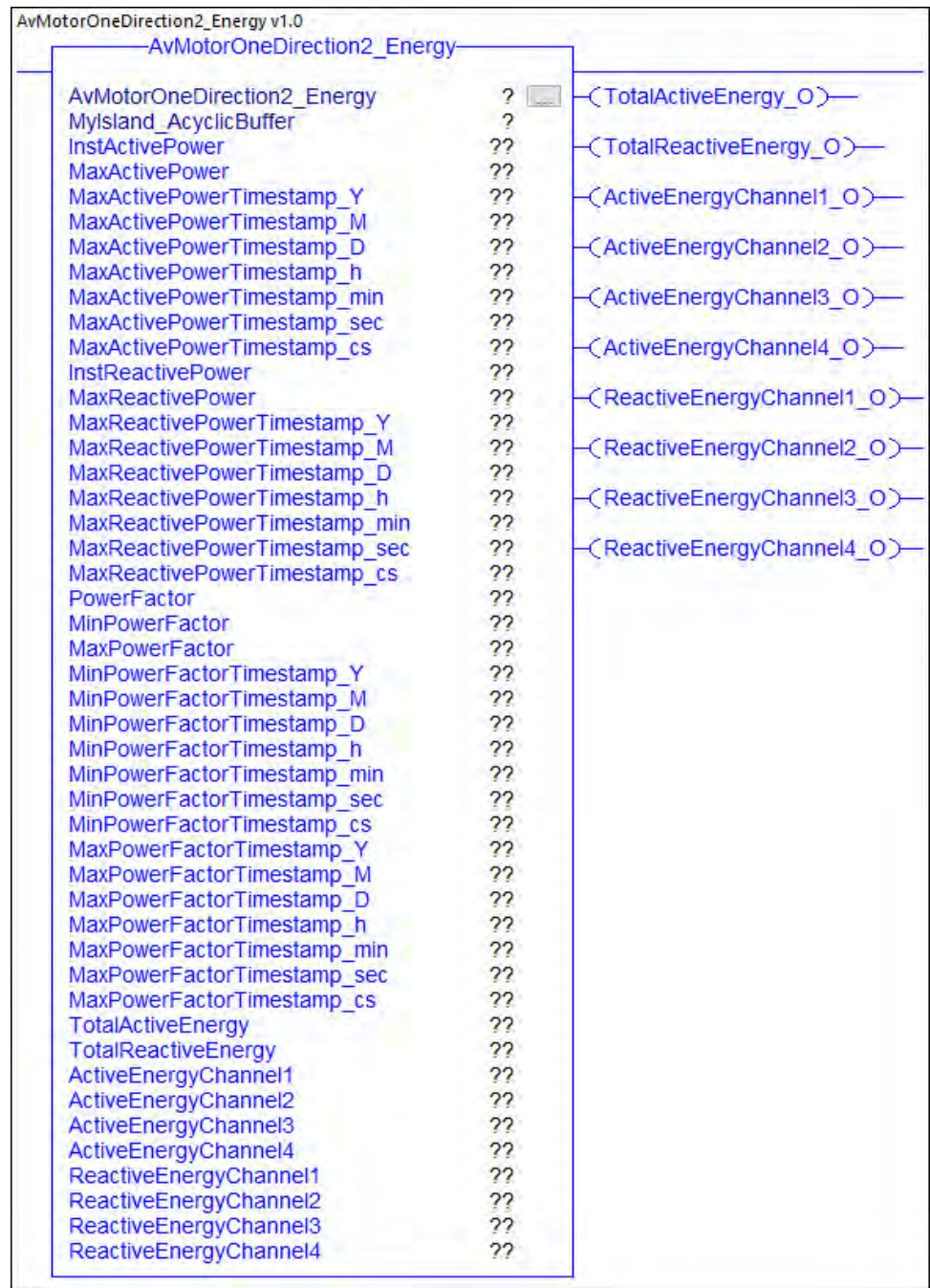
**Table 70 - AvSILStopConveyorTwoDir Output Interface**

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.

**Figure 38 - Avatar\_Energy Function Block**



**Table 71 - 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)

**Table 71 - 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> value.

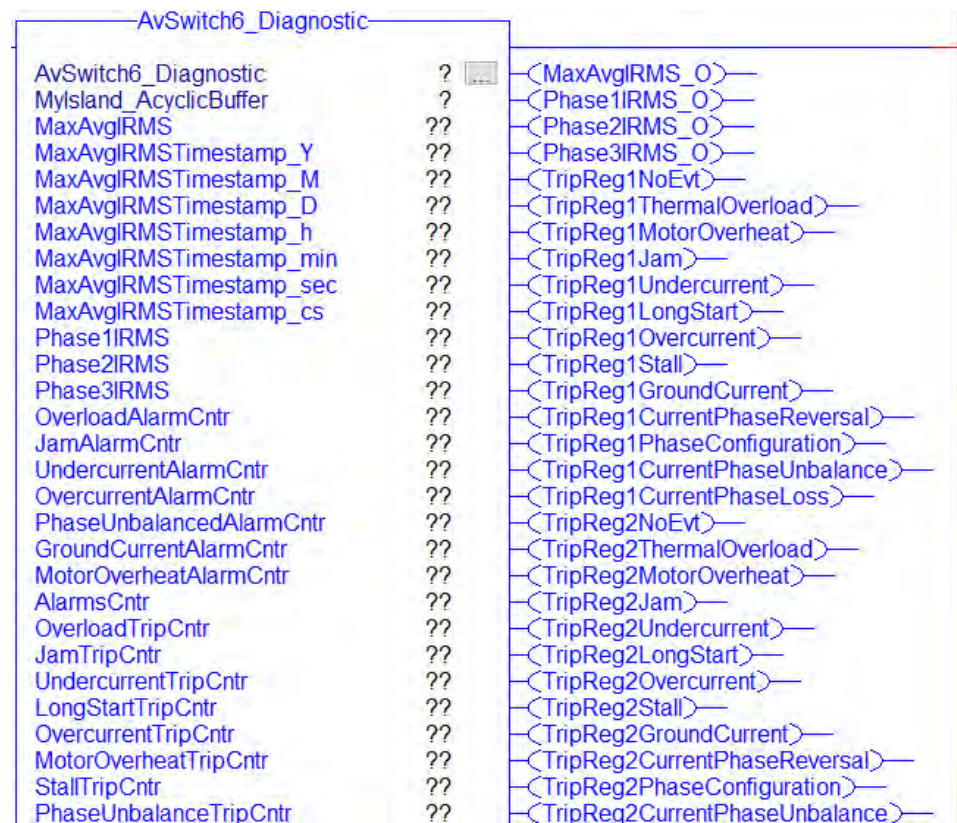
**Table 71 - Avatar\_Energy Output Interface (Continued)**

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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> value.

## Diagnostic

The **Avatar\_Diagnostic** function block returns the status of the acyclic diagnostic data of the specified avatar.

**Figure 39 - Avatar\_Diagnostic Function Block**



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

**Table 72 - Avatar\_Diagnostic Output Interface**

Output	Data Type	Description
MaxAvgIRMS	DINT	Maximum average Irms current value.
MaxAvgIRMS_O	DINT	Maximum average Irms current <b>overflow</b> 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	
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.
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.

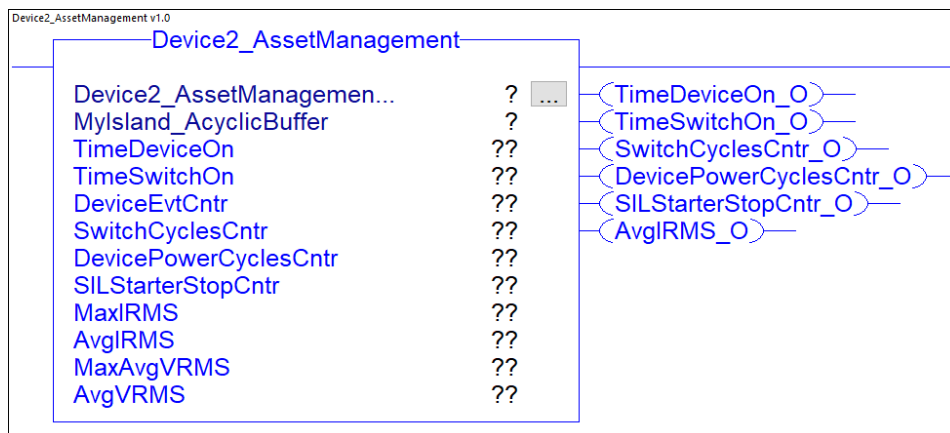
**Table 72 - Avatar\_Diagnostic Output Interface (Continued)**

Output	Data Type	Description
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	
...	...	...
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.

**Figure 40 - DeviceX\_AssetManagement Function Block**



**Table 73 - 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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 <b>overflow</b> 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) <b>overflow</b> 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)







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