EcoStruxure™ Hybrid DCS

Foundation Control Services User Guide

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

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

Table of Contents

Safety Information

Important Information

NOTICE

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

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

PLEASE NOTE

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

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

BEFORE YOU BEGIN

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

⚠ WARNING

UNGUARDED EQUIPMENT

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

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

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

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

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

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

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

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

⚠ WARNING

EQUIPMENT OPERATION HAZARD

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

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

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

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

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

Before energizing equipment:

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

OPERATION AND ADJUSTMENTS

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

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

At a Glance

Document Scope

This document describes the elementary function blocks (EFBs), derived function blocks (DFBs), and variables that are encapsulated in the application templates of the EcoStruxure Hybrid DCS Foundation library to provide Control services.

For a list of templates and the services that they provide, refer to the user guides mentioned in this document.

This document does not cover any development procedures and internal functionality details of EcoStruxure Hybrid DCS.

This document is for users with knowledge of EcoStruxure Hybrid DCS and its Control Participant.

Validity Note

This document is valid for EcoStruxure Hybrid DCS 2018 or later. It supersedes any previous version.

Related Documents

Title of documentation	Reference number
EcoStruxure Hybrid DCS Foundation Application Templates User Guide	EIO0000002403 (eng)
EcoStruxure Hybrid DCS User Guide	EIO0000001114 (eng)

You can download these technical publications at *app.schneider-electric.com/ecostruxure-hybrid-dcs*, *Document Downloads* section.

Registration required.

EcoStruxure Hybrid DCS Support Portal

Visit *app.schneider-electric.com/ecostruxure-hybrid-dcs* for support, software updates, and latest information on EcoStruxure Hybrid DCS.

Registration required.

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Product Related Information

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate.
- Review the implications of communication link interruptions and take actions to mitigate.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and fault conditions) according to the safety analysis and applicable codes, and regulations.
- Apply local accident prevention and safety regulations and guidelines. [1]
- Test each implementation of this library for proper operation before placing it into service.

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

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

Examples described in this manual are provided for information only.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Adapt examples that are given in this manual to the specific functions and requirements of your industrial application before you implement them.

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

Part I
Hardware Abstraction Layer (HAL)

Overview

This part provides the detailed description, pin layout and pin description of the control blocks of the generic and HART EFBs and DFBs of the HAL family.

Generic HAL function blocks are:

- `AISignalCond1` and `AISignalCondReal1`
- `AOSignalCond` and `AOSignalMove`
- `CounterSignalCondUInt` and `CounterSignalCondUDInt`
- `DISignalCond1`
- `DOSignalCond` and `SignalMove`

HART function blocks are:

- `AHISIGNAL`
- `AISignalHart1`

These function blocks do not reflect any specific installation.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
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What Is in This Part?

This part contains the following chapters:

Chapter 1
Introduction

List of Function Blocks

List of Families

The function blocks described in this document are grouped by family.

Each function block is assigned to the same family as the control module template that references it.

The table lists the control module templates of each family:

Family name	Function blocks	Description
Signal conditioning - Hardware Abstraction Layer (HAL)	`AISignalCond1` and `AISignalCondReal1` *(see page 19)*	Analog input signal conditioning
	`AOSignalCond` *(see page 27)*	Analog output signal conditioning
	`CounterSignalCondUDInt` and `CounterSignalCondUInt` *(see page 33)*	Counter signal conditioning
	`DISignalCond1` *(see page 39)*	Digital input signal conditioning
	`DOSignalCond` *(see page 45)*	Digital output signal conditioning
	`AHISIGNAL` *(see page 51)*	HART Input Signal Conditioning (Advantys)
	`AISignalHart1` *(see page 59)*	HART Input Signal Conditioning (M580)
Unity Peer to Peer	`Peer to Peer` *(see page 67)*	Peer to Peer communication

Family name	Function blocks	Description
STAHL	STAHLAI8CH *(see page 119)*	For STAHL 8-channel analog input modules
	STAHLAO8CH *(see page 124)*	For STAHL 8-channel analog output modules
	STAHLDI16CH *(see page 129)*	For STAHL 16-channel digital input modules
	STAHLDO8CH *(see page 134)*	For STAHL 8-channel digital output modules
	STAHLHARTVal4 *(see page 139)*	Processing of four STAHL values
	STAHLHARTVal8 *(see page 144)*	Processing of eight STAHL values
Special cards	Quantum *(see page 151)*	For Quantum
	M340 *(see page 165)*	For M340
	STB *(see page 181)*	For STB
	M580 and X80 *(see page 197)*	For M580 and X80

Chapter 2
AISignalCond1 and AISignalCondReal1 - Analog Input Signal Conditioning

Overview

This chapter describes the AISignalCond1 and AISignalCondReal1 EFBs.

What Is in This Chapter?

This chapter contains the following topics:

Description

General

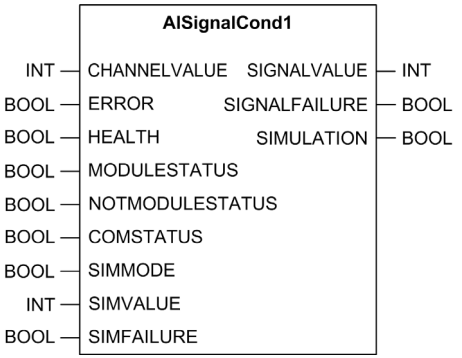
EcoStruxure Hybrid DCS uses the hardware abstraction layer for signal objects coming from the field to controllers.

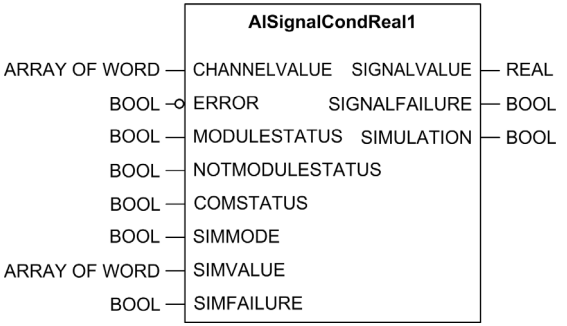
The EFB allows processing the signal value and signal quality data. Depending on the data type of the signal, this is either `AISignalCond1` (for `Int` data type) or `AISignalCondReal1` (for `Real` data type).

EFB Representation

Representation

These EFBs have been specifically designed for use with the FBD language of the controller.





Inputs

Input Parameter Description

Parameter	Type	EFB	Description
CHANNELVALUE	INT	AISignalCond1	Channel value from an analog input module.
	ARRAY [0..1] OF WORD	AISignalCondReal1	
ERROR	BOOL	AISignalCond1	Detected channel error signal from an analog input module. 1 = Detected channel error.
		AISignalCondReal1	
HEALTH	BOOL	AISignalCond1	Inverted detected channel error signal from module. 0 = Detected channel error.
MODULESTATUS	BOOL	AISignalCond1	Module status. 0 = Module not healthy. Refer to Obtaining the Module Status When Mapped to X80 I/O Module *(see page 24)* for obtaining the module status when mapped to x80.
		AISignalCondReal1	
NOTMODULESTATUS	BOOL	AISignalCond1	Module status. 1 = Module not healthy.
		AISignalCondReal1	
COMSTATUS	BOOL	AISignalCond1	Communication status with module. 0 = Communication status not healthy.
		AISignalCondReal1	
SIMMODE	BOOL	AISignalCond1	Simulation mode. 1 = Enable simulation.
		AISignalCondReal1	
SIMVALUE	INT	AISignalCond1	Simulation mode channel value. When simulation is ON, SIGNALVALUE = SIMVALUE.
	ARRAY [0..1] OF WORD	AISignalCondReal1	
SIMFAILURE	BOOL	AISignalCond1	Simulation mode channel detected failure value. When simulation is ON, SIGNALFAILURE = SIMFAILURE.
		AISignalCondReal1	

Outputs

Output Parameter Description

Parameter	Type	EFB	Description
SIGNALVALUE	INT	AISignalCond1	Signal value after quality check of channel, module and communication.
	REAL	AISignalCondReal1	
SIGNALFAILURE	BOOL	AISignalCond1	Detected signal failure due to a detected channel or module or simulated channel error.
		AISignalCondReal1	
SIMULATION	BOOL	AISignalCond1	Simulation status. 1 = Simulation ON.
		AISignalCondReal1	

Obtaining the Module Status When Mapped to X80 I/O Module

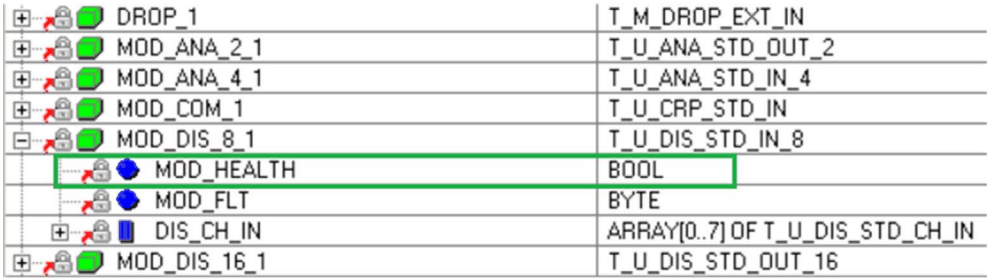
Overview

The `SignalFailure` parameter indicates the health of each channel signal. When the signal is mapped to an X80 I/O module, the value of the variable that is connected to the `ModuleStatus` input of the signal conditioning EFB is true by default (the value is REF (`PES_CONST_TRUE`)). You need to modify the generated logic to use the value of the `MOD_HEALTH` variable of the DDDT that is created instead. This applies to the digital and analog input and output signal conditioning EFBs. If you want to obtain the module status using module health, follow this procedure.

Module Status

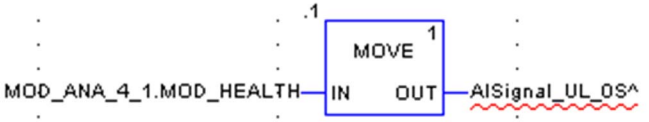
After refine online of the control project, update the control project from the topological manager. Use the module health provided by DDDT (Device Derived Data Types) variables for obtaining the module status.

You can locate the `MOD_HEALTH` as shown in the following figure:

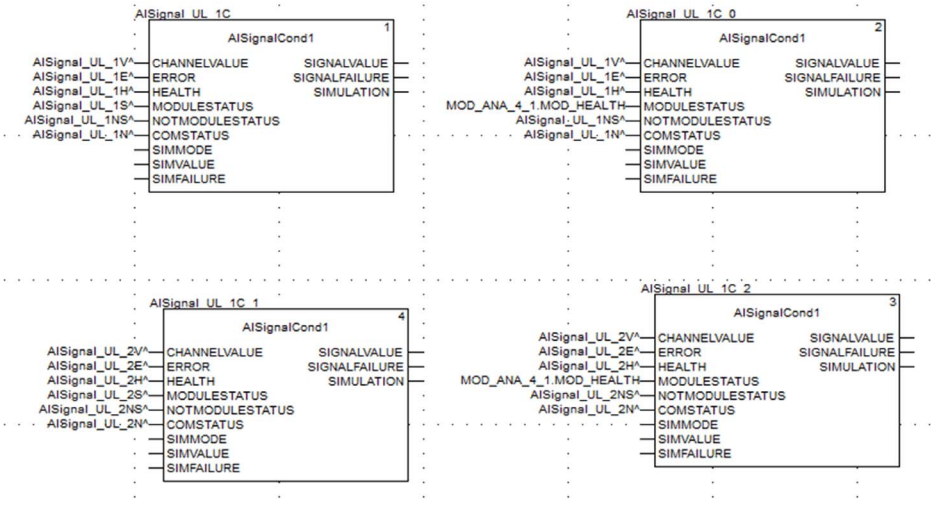


You can map the module health variable (`MOD_HEALTH`) in the following ways:

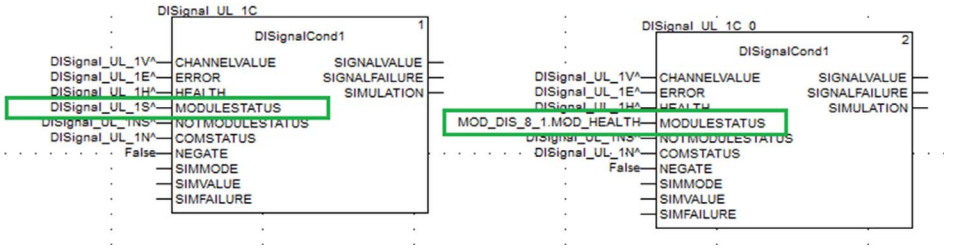
- Recommended method: By using the variable connected to the `ModuleStatus` pin of the signal conditioning EFB. You can use the `MOVE` EFB to move the value of the `MOD_HEALTH` variable to the variable that holds the module status (variable with S suffix)..



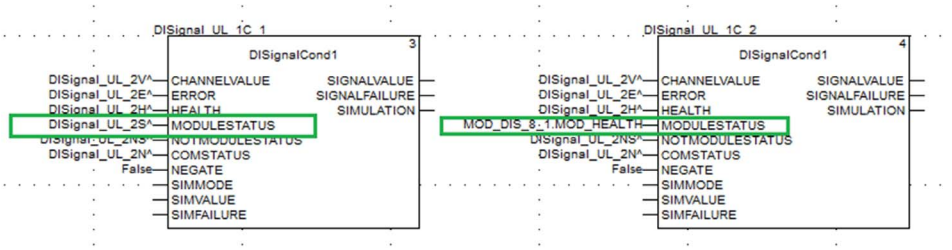
- By replacing the variable holding the module status, which is connected to the `ModuleStatus` pin of the signal conditioning EFB with the module health variable of the DDDT.



The following figure shows the `ModuleStatus` of channel 10:



The following figure shows the `ModuleStatus` of channel 11:



Chapter 3
AOSignalCond - Analog Output Signal conditioning

Overview

This chapter describes the AOSignalCond DFB.

What Is in This Chapter?

This chapter contains the following topics:

Description

General

EcoStruxure Hybrid DCS uses the hardware abstraction layer for signal objects coming from the field to controllers.

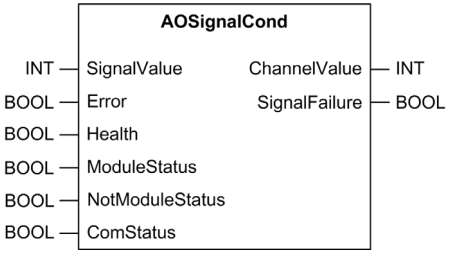
The `AOSignalCond` DFB allows processing the analog (`Int` data type) signal value and signal quality data.

The `AOSignalMove` DFB allows processing the signal value only.

DFB Representation

Representation

These DFBs have been specifically designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	DFB	Description
SIGNALVALUE	INT	AOSignalCond	The SIGNALVALUE is the analog value coming from the logic.
ERROR	BOOL		1 = Channel detected error information from the card in local rack.
HEALTH	BOOL		1 = Channel health information from the card in X80 drop.
MODULESTATUS	BOOL		1 = Module status information. Refer to Obtaining the Module Status When Mapped to X80 I/O Module *(see page 24)* for obtaining the module status when mapped to x80.
NOTMODULESTATUS	BOOL		1 = Negated status of the module is obtained (for example, Advantys module).
COMSTATUS	BOOL		1 = Communication status of the module.
IN	INT	AOSignalMove	Signal value received from the logic.

Outputs

Output Parameter Description

Parameter	Type	DFB	Description
CHANNELVALUE	INT	AOSignalCond	Channel value after the module and communication channel are checked for quality.
SIGNALFAILURE	BOOL		1 = The signal is not working properly due to a non-operational channel, module, or a communication interruption.
OUT	INT	AOSignalMove	Processed signal value.

Chapter 4

CounterSignalCondUInt and CounterSignalCondUDInt - Counter Signal Conditioning

Overview

This chapter describes the CounterSignalCondUInt and CounterSignalCondUDInt EFBs.

What Is in This Chapter?

This chapter contains the following topics:

Description

General

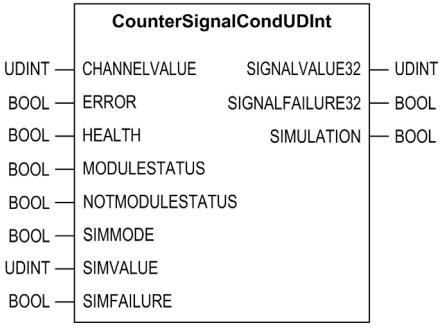
PlantStruxure General Purpose library for Unity uses the hardware abstraction layer for signal objects coming from the field to controllers.

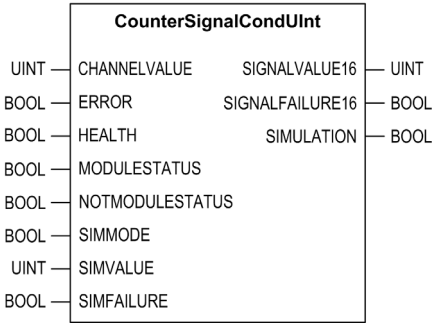
The EFB allows processing the signal value and signal quality data. Depending on the counter channel data type of the signal, this is either `CounterSignalCondUDInt` (for `UDINT` data type) or `CounterSignalCondUInt` (for `UINT` data type).

EFB Representation

Representation

These EFBs have been specifically designed for use with the FBD language of the controller.





Inputs

Input Parameter Description

Parameter	Type	EFB	Description
CHANNELVALUE	UDINT	CounterSignalCondUDInt	Channel value from a counter module.
	UINT	CounterSignalCondUInt	
ERROR	BOOL	CounterSignalCondUDInt	Detected channel error signal from an analog input module. 1 = Detected channel error.
		CounterSignalCondUInt	
HEALTH	BOOL	CounterSignalCondUDInt	Inverted detected channel error signal from module. 0 = Detected channel error.
		CounterSignalCondUInt	
MODULESTATUS	BOOL	CounterSignalCondUDInt	Module status. 0 = Module not healthy.
		CounterSignalCondUInt	
NOTMODULESTATUS	BOOL	CounterSignalCondUDInt	Module status. 1 = Module not healthy.
		CounterSignalCondUInt	
SIMMODE	BOOL	CounterSignalCondUDInt	Simulation mode. 1 = Enable simulation.
		CounterSignalCondUInt	
SIMVALUE	UDINT	CounterSignalCondUDInt	Simulation mode channel value. When simulation is ON, SIGNALVALUE = SIMVALUE.
	UINT	CounterSignalCondUInt	
SIMFAILURE	BOOL	CounterSignalCondUDInt	Simulation mode channel detected failure value. When simulation is ON, SIGNALFAILURE = SIMFAILURE.
		CounterSignalCondUInt	

Outputs

Output Parameter Description

Parameter	Type	EFB	Description
SIGNALVALUE32	UDINT	CounterSignalCondUDInt	Signal value after quality check of channel, module and communication.
SIGNALVALUE16	UINT	CounterSignalCondUInt	
SIGNALFAILURE32	BOOL	CounterSignalCondUDInt	Detected signal failure due to a detected channel or module or simulated channel error.
SIGNALFAILURE16		CounterSignalCondUInt	
SIMULATION	BOOL	CounterSignalCondUDInt	Simulation status. 1 = Simulation ON.
		CounterSignalCondUInt	

Chapter 5
DISignalCond1 - Digital Input Signal Conditioning

Overview

This chapter describes the DISignalCond1 EFB.

What Is in This Chapter?

This chapter contains the following topics:

Description

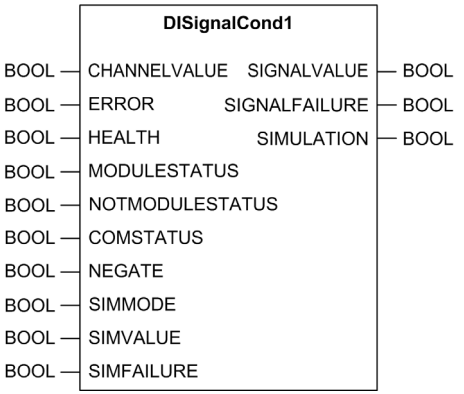
General

EcoStruxure Hybrid DCS uses the hardware abstraction layer for signal objects coming from the field to controllers.

The `DISignalCond1` EFB allows processing the digital signal value and signal quality data.

EFB Representation

Representation



Inputs

Input Parameter Description

Parameter	Type	EFB	Description
CHANNELVALUE	BOOL	DISignalCond1	1 = Channel value from a digital input module.
ERROR	BOOL	DISignalCond1	Detected channel error signal from an analog input module. 1 = Detected channel error.
HEALTH	BOOL	DISignalCond1	Inverted detected channel error signal from module. 0 = Detected channel error.
MODULESTATUS	BOOL	DISignalCond1	Module status. 0 = Module not healthy. Refer to Obtaining the Module Status When Mapped to X80 I/O Module *(see page 24)*for obtaining the module status when mapped to x80.
NOTMODULESTATUS	BOOL	DISignalCond1	Module status. 1 = Module not healthy.
COMSTATUS	BOOL	DISignalCond1	Communication status with module. 0 = Communication status not healthy.
NEGATE	BOOL	DISignalCond1	Negates the channel value. 1 = SIGNALVALUE = Not CHANNELVALUE
SIMMODE	BOOL	DISignalCond1	Simulation mode. 1 = Enable simulation.
SIMVALUE	BOOL	DISignalCond1	Simulation mode channel value. When simulation is ON, SIGNALVALUE = SIMVALUE.
SIMFAILURE	BOOL	DISignalCond1	Simulation mode channel detected failure value. When simulation is ON, SIGNALFAILURE = SIMFAILURE.

Outputs

Output Parameter Description

Parameter	Type	EFB	Description
SIGNALVALUE	BOOL	DISignalCond1	Signal value after quality check of channel, module and communication.
SIGNALFAILURE	BOOL	DISignalCond1	Detected signal failure due to a detected channel or module or simulated channel error.
SIMULATION	BOOL	DISignalCond1	Simulation status. 1 = Simulation ON.

Chapter 6
DOSignalCond - Digital Output Signal Conditioning

Overview

This chapter describes the DOSignalCond DFB.

What Is in This Chapter?

This chapter contains the following topics:

Description

General

EcoStruxure Hybrid DCS uses the hardware abstraction layer for signal objects coming from the field to controllers.

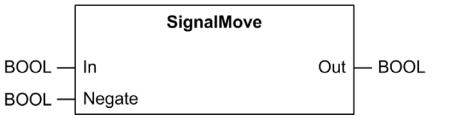
The `DOSignalCond` DFB allows processing the digital signal value and signal quality data.

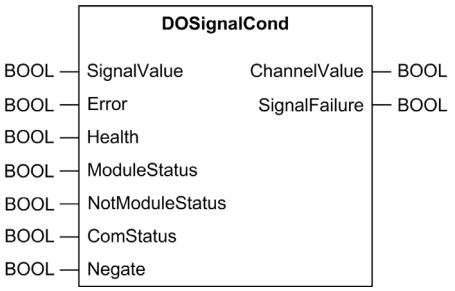
The `SignalMove` DFB allows processing the digital signal value only.

DFB Representation

Representation

These DFBs have been specifically designed for use with the FBD language of the controller.





Inputs

Input Parameter Description

Parameter	Type	DFB	Description
SIGNALVALUE	BOOL	DOSignalCond	1 = Signal value coming from the logic.
ERROR	BOOL		1 = Channel detected error information from the card in local rack.
HEALTH	BOOL		1 = Channel health information from the card in X80 drop.
MODULESTATUS	BOOL		1 = Module status information. Refer to Obtaining the Module Status When Mapped to X80 I/O Module *(see page 24)* for obtaining the module status when mapped to x80.
NOTMODULESTATUS	BOOL		1 = Negated status of the module is obtained (for example, Advantys module).
COMSTATUS	BOOL		1 = Communication status of the module.
NEGATE	BOOL	SignalMove DOSignalCond	1 = Negates the signal value.
IN	BOOL	SignalMove	1 = Input.

Outputs

Output Parameter Description

Parameter	Type	DFB	Description
CHANNELVALUE	BOOL	DOSignalCond	1 = Channel value after the module and communication channel are checked for quality.
SIGNALFAILURE	BOOL		1 = The signal is not working properly due to a non-operational channel, module, or a communication interruption.
OUT	BOOL	SignalMove	1 = Output.

Chapter 7
AHISIGNAL - HART Input Signal Conditioning (Advantys)

Overview

This chapter describes the AHISIGNAL DFB.

What Is in This Chapter?

This chapter contains the following topics:

Description

Overview

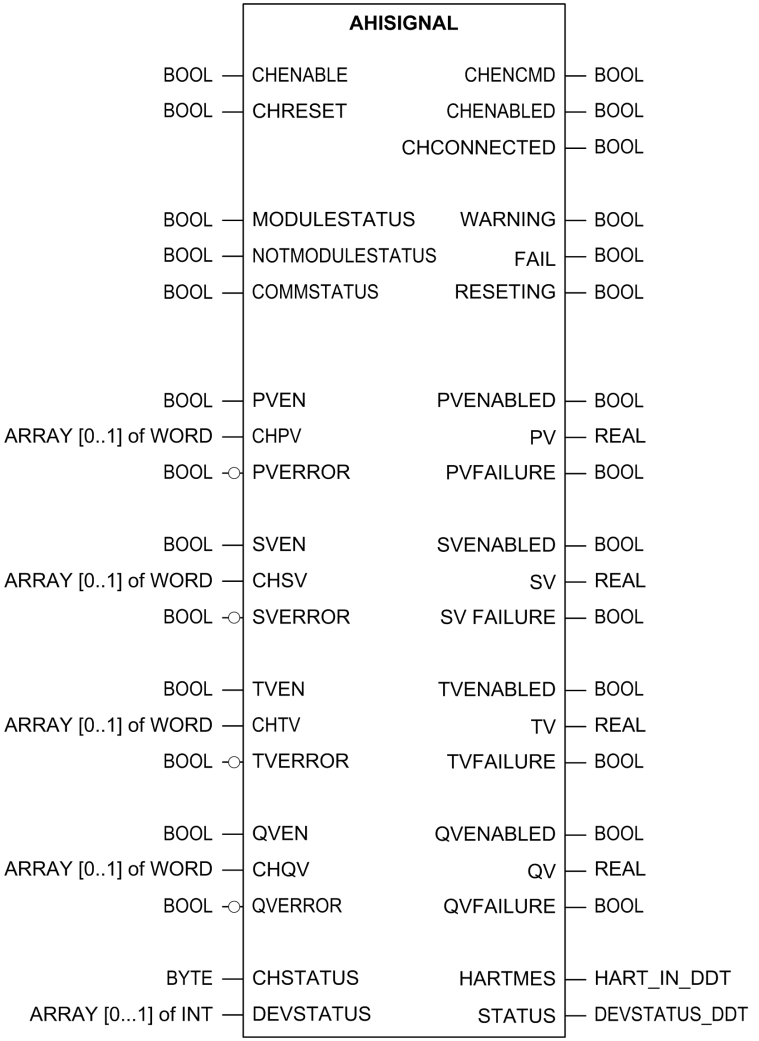
The `AHISIGNAL` DFB is used for HART devices that communicate with the controller through the STB Island.

The function block maps the channel information from the STB to the device if the channel is enabled and connected.

DFB Representation

Representation

The DFB is designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
CHENABLE	BOOL	1 = Allows you to enable the channel.
CHRESET	BOOL	1 = Resets the channel in case of minor/major differences.
MODULESTATUS	BOOL	1 = Status of the controller modules.
NOTMODULESTATUS	BOOL	1 = Status of the Advantys module.
COMMSTATUS	BOOL	1 = Communication status of the modules.
PVEN	BOOL	1 = Enables PV in the channel.
CHPV	ARRAY [0..1] of WORD	Primary variable value.
PVERROR	BOOL	1 = Indicates a detected error. The pin is negated.
SVEN	BOOL	1 = Enables SV in the channel.
CHSV	ARRAY [0..1] of WORD	Secondary variable value.
SVERROR	BOOL	1 = Indicates a detected error. The pin is negated.
TVEN	BOOL	1 = Enables TV in the channel.
CHTV	ARRAY [0..1] of WORD	Tertiary variable value.
TVERROR	BOOL	1 = Indicates a detected error. The pin is negated.
QVEN	BOOL	1 = Enables QV in the channel.
CHQV	ARRAY [0..1] OF WORD	Quaternary variable value.
QVERROR	BOOL	1 = Indicates a detected error. The pin is negated.
CHSTATUS	BYTE	Provides the channel status of each STBAHI 8321 module.
DEVSTATUS	ARRAY [0...1] of INT	Represents the status of the instrument connected to the specified channel. Refer to the STATUS output pin *(see page 55)*.

Outputs

Output Parameter Description

Parameter	Type	Description
CHENCMD	BOOL	1 = maps the input pin CHENABLE on the output side.
CHENABLED	BOOL	1 = Enabled when the HART channel is enabled through the Advantys.
CHCONNECTED	BOOL	1 = Indicates whether the channel is enabled and connected to the HART instrument. Use this signal in each input module to know whether the physical node is present on the bus. This variable is found in HART communication.
WARNING	BOOL	1 = Enabled when either parameter of the DEVSTATUS input is set: • PVOUTOFLIM • NONPVOUTOFLIM • FIELDDEVICEMALFUNCTION
FAIL	BOOL	1 = Enabled when either parameter of the DEVSTATUS input is set: • BUFFEROVERFLOW • LONGITUDINALPARITYERROR • FRAMINGERROR • OVERRUNERROR • VERTICALPARITYERROR • COMMERROR
RESETING	BOOL	1 = Resets detected error. For more information, refer to the timing diagram *(see page 58)*.
PVENABLED	BOOL	1 = PV is enabled in the channel.
PV	REAL	Primary variable value.
PVFAILURE	BOOL	1 = Indicates PVERROR is reset.
SVENABLED	BOOL	1 = SV is enabled in the channel.
SV	REAL	Secondary variable value.
SVFAILURE	BOOL	1 = Indicates SVERROR is reset.
TVENABLED	BOOL	1 = TV is enabled in the channel.
TV	REAL	Tertiary variable value.
TVFAILURE	BOOL	1 = Indicates TVERROR is reset.
QVENABLED	BOOL	1 = QV is enabled in the channel.
QV	REAL	Quaternary variable value.

Parameter	Type	Description	
QVFAILURE	BOOL	1 = Indicates QVERROR is reset.	
HARTMES	HART_IN_DDT	Given as input to the INPUTS pin of HART device only if the channel is connected and enabled. The table describes the HART_IN_DDT structure:	
	Parameter	**Type**	**Description**
	PV	REAL	Primary variable.
	SV	REAL	Secondary variable.
	TV	REAL	Tertiary variable.
	QV	REAL	Quaternary variable.
	CHANNELSTATUS	WORD	Channel status of each STBAHI 8321 HART interface module.
	DEVICESTATUS	WORD	Status of the instrument connected to the specified channel.

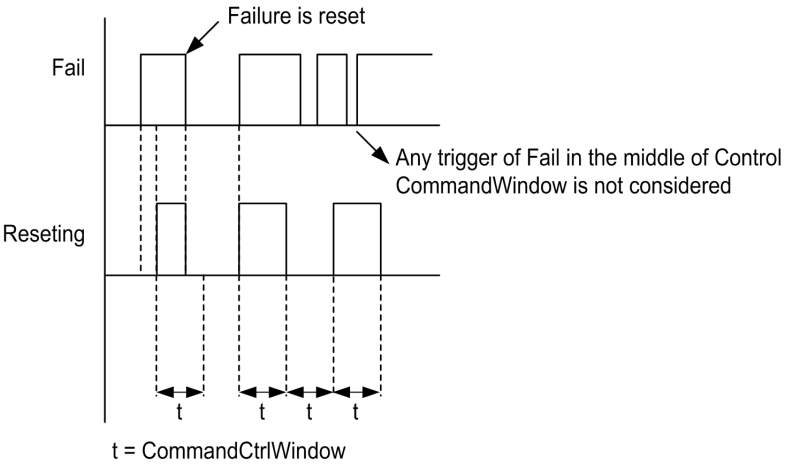
Parameter	Type	Description	
STATUS	DEVSTATUS_DDT	This pin contains the structure of the device/instrument status data of the Advantys HART channel. The table describes the DEVSTATUS_DDT structure:	
	Parameter	**Type**	**Description**
	BUFFEROVERFLOW	BOOL	1 = Buffer overflow.
	LONGITUDINALPARITYERROR	BOOL	1 = Longitudinal parity diagnostic information.
	FRAMINGERROR	BOOL	1 = Framing diagnostic information.
	OVERRUNERROR	BOOL	1 = Overrun diagnostic information.
	VERTICALPARITYERROR	BOOL	1 = Vertical parity diagnostic information.
	COMMERROR	BOOL	1 = Communication diagnostic information.
	PVOUTOFLIM	BOOL	1 = PV out of limits.
	NONPVOUTOFLIM	BOOL	1 = Non PV out of limits.
	OUTCURRENTSATURATED	BOOL	1 = Output current saturated.
	OUTCURRENTFIXED	BOOL	1 = Output current fixed.
	MORESTATUSAVAILABLE	BOOL	1 = More status available.
	COLDSTART	BOOL	1 = Cold start.
	CONFIGCHANGED	BOOL	1 = Configuration changed.
	FIELDDEVICEMALFUNCTION	BOOL	1 = Inoperable field device.

Public Variables

Public Variable Description

Parameter	Type	Description
COMMANDCTRLWINDOW	TIME	Control time for operations. The block waits for the device to carry out the operations during this time. When CHRESET is set (TRUE) or channel reset is carried out during the time of major/minor differences in the channel, RESETING pin resets to TRUE. If the abnormal condition (only valid for major/minor differences on the Advantys island AHI8321 channels) continues after the period specified by COMMANDCTRLWINDOW has elapsed, the RESETING output resets (FALSE). When the period specified by COMMANDCTRLWINDOW has started, any reset in the minor/major differences in the channel is not considered until the period ends.

Timing diagram:



Chapter 8
AISignalHart1 - HART Input Signal Conditioning (M580)

Overview

This chapter describes the AISignalHart1 EFB.

What Is in This Chapter?

This chapter contains the following topics:

Description

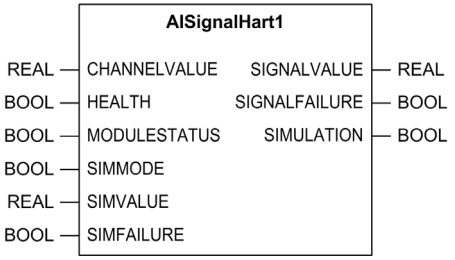
General

The `AISignalHart1` EFB is used to read DTM generated extended HART data from BMEAHI and BMEAHO modules.

EFB Representation

Representation

The EFB is designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
CHANNELVALUE	REAL	Channel Value in REAL from HART module.
HEALTH	BOOL	Inverted channel detected error signal from module. 1 = Channel in detected error.
MODULESTATUS	BOOL	Module status. 0 = Module not healthy.
SIMMODE	BOOL	Simulation mode. 1 = Enable simulation.
SIMVALUE	BOOL	Simulation mode channel value. When simulation is ON, SIGNALVALUE = SIMVALUE.
SIMFAILURE	BOOL	Simulation mode channel detected failure value. When simulation is ON, SIGNALFAILURE = SIMFAILURE.

Outputs

Output Parameter Description

Parameter	Type	Description
SIGNALVALUE	REAL	Signal value after quality check of channel, module and communication.
SIGNALFAILURE	BOOL	Detected signal failure due to a detected channel or module or simulated channel error.
SIMULATION	BOOL	Simulation status. 1 = Simulation ON.

Part II
Peer to Peer Communication

Chapter 9
Peer to Peer Communication DFBs

Overview

This chapter describes the peer to peer communication DFBs, which allow you to share scattered or sets of data between two or more Control projects.

These function blocks do not reflect any specific installation.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate.
- Review the implications of communication link interruptions and take actions to mitigate.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and fault conditions) according to the safety analysis and applicable codes, and regulations.
- Apply local accident prevention and safety regulations and guidelines. [1]
- Test each implementation of this library for proper operation before placing it into service.

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

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

What Is in This Chapter?

This chapter contains the following sections:

Section 9.1
BOOL16IN_O

Overview

This section describes the BOOL16IN_O DFB, which allows you to share sets of up to 16 boolean input signals belonging to the owner project with one or more consumer projects.

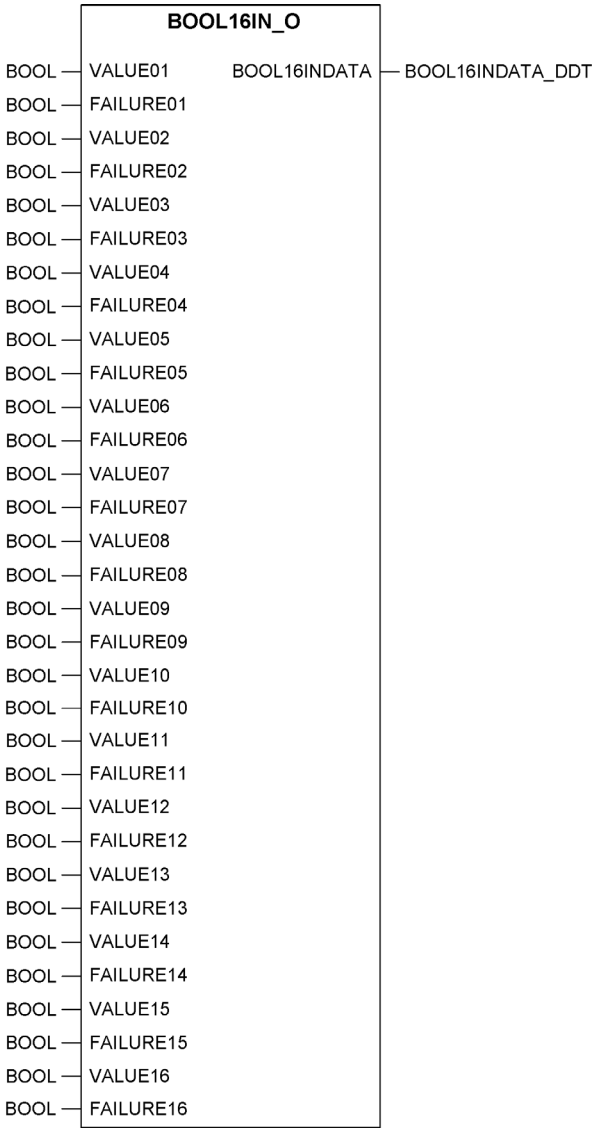
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
VALUEx (x: 01...16)	BOOL	1 = Digital input signal value x.
FAILUREx (x: 01...16)	BOOL	1 = Detected failure signal value x.

Outputs

Output Parameter Description

Parameter	Type	Description
BOOL16INDATA	BOOL16INDATA_DDT	The structure is shown in the below table.

BOOL16INDATA_DDT Type

Parameter	Type	Description
VALUEWORD	WORD	Contains the values of the 16 digital input signals.
FAILUREWORD	WORD	Contains the detected failure status of the 16 digital input signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Public Variables

N/A

Section 9.2
BOOL16IN_C

Overview

This section describes the BOOL16IN_C DFB, which allows you to process sets of up to 16 boolean input signals belonging to the owner project in one or more consumer projects.

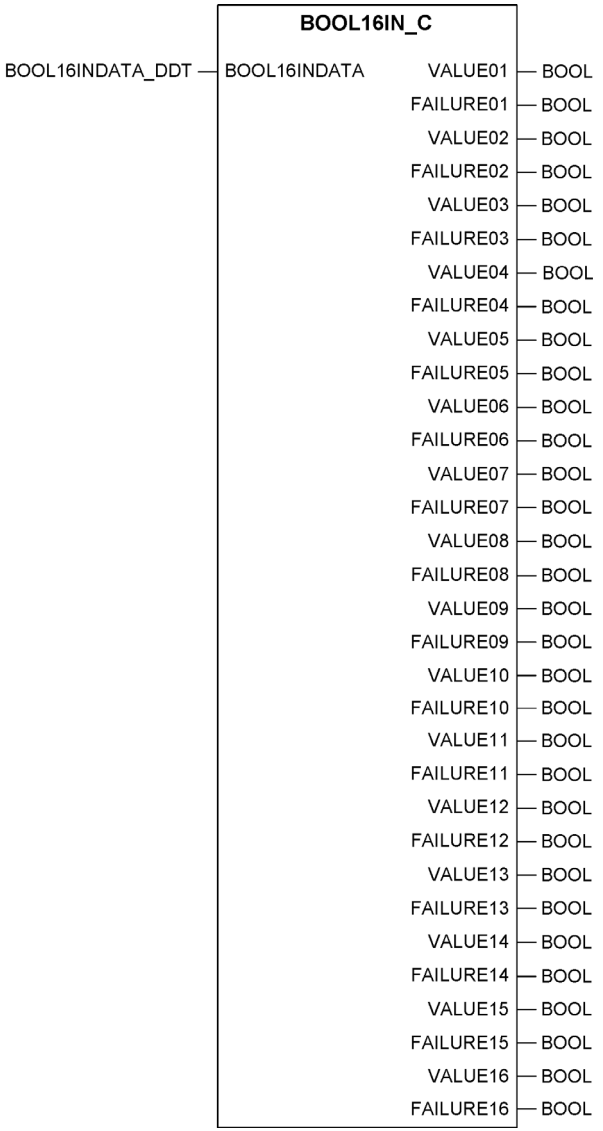
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
BOOL16INDATA	BOOL16INDATA_DDT	The structure is shown in the below table.

BOOL16INDATA_DDT Type

Parameter	Type	Description
VALUEWORD	WORD	Contains the values of 16 digital input signals.
FAILUREWORD	WORD	Contains the detected failure status of the 16 digital input signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Outputs

Output Parameter Description

Parameter	Type	Description
VALUEx (x: 01...16)	BOOL	1 = Digital input signal value x.
FAILUREx (x: 01...16)	BOOL	1 = Detected failure signal value x.

Public Variables

Public Variable Description

Variable	Type	Description
ERROR	BOOL	1 = Detected error in communication.
TIMEOUT	TIME	Communication timeout.

Section 9.3
BOOL16OUT_O

Overview

This section describes the BOOL16OUT_O DFB, which allows you to share sets of up to 16 boolean output signals belonging to the owner project with one or more consumer projects.

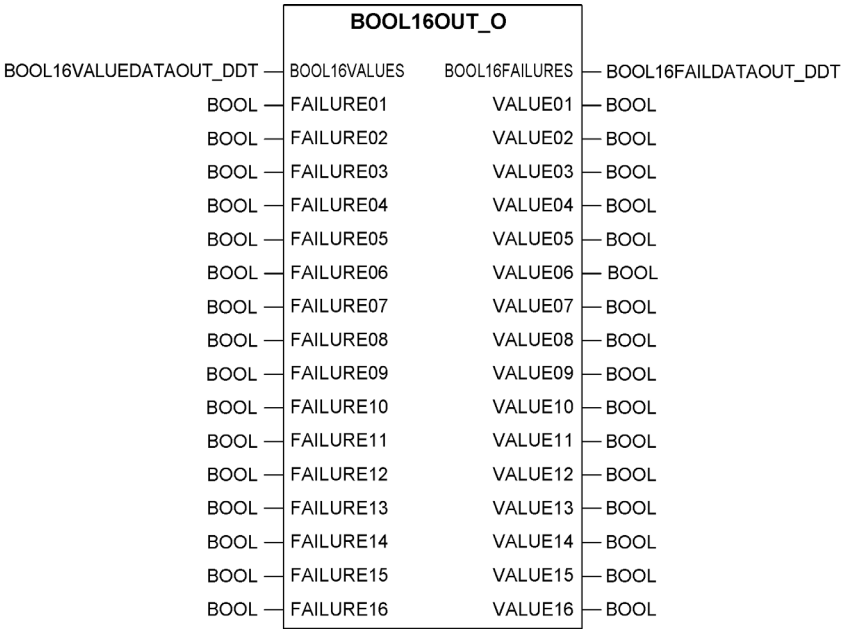
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
BOOL16VALUES	BOOL16VALUEDATAOUT_DDT	The structure is shown in the below table.
FAILUREx (x: 01...16)	BOOL	1 = Detected failure signal value x.

BOOL16VALUEDATAOUT_DDT Type

Parameter	Type	Description
VALUEWORD	WORD	Contains the values of 16 digital output signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Outputs

Output Parameter Description

Parameter	Type	Description
BOOL16FAILURES	BOOL16FAILDATAOUT_DDT	The structure is shown in the below table.
VALUEx (x: 01...16)	BOOL	1 = Digital output signal value x.

BOOL16FAILDATAOUT_DDT Type

Parameter	Type	Description
FAILUREWORD	WORD	Contains the values of the FAILUREx parameter of the 16 digital output signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Public Variables

Public Variable Description

Variable	Type	Description
ERROR	BOOL	1 = Detected error in communication.
TIMEOUT	TIME	Communication timeout.

Section 9.4
BOOL16OUT_C

Overview

This section describes the BOOL16OUT_C DFB, which allows you to process sets of up to 16 boolean ouput signals belonging to the owner project in one or more consumer projects.

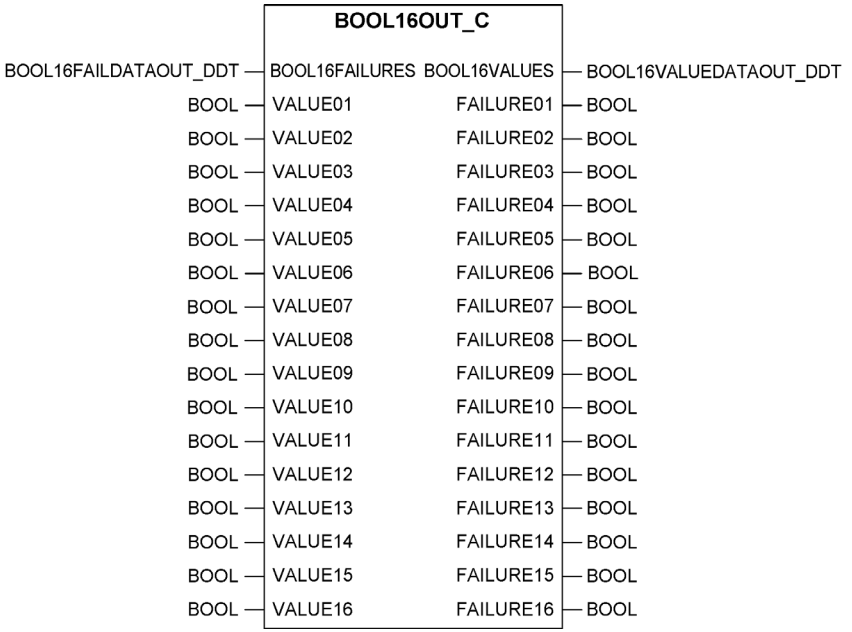
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
BOOL16FAILURES	BOOL16FAILDATAOUT_DDT	The structure is shown in the below table.
VALUEx (x: 01...16)	BOOL	1 = Digital output signal value x.

BOOL16FAILDATAOUT_DDT Type

Parameter	Type	Description
FAILUREWORD	WORD	Contains the detected failure status of the 16 digital input signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Outputs

Output Parameter Description

Parameter	Type	Description
BOOL16VALUES	BOOL16VALUEDATAOUT_DDT	The structure is shown in the below table.
FAILUREx (x: 01...16)	BOOL	1 = Detected failure signal value x.

BOOL16VALUEDATAOUT_DDT Type

Parameter	Type	Description
VALUEWORD	WORD	Contains the values of 16 digital output signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Public Variables

Public Variable Description

Variable	Type	Description
ERROR	BOOL	1 = Detected error in communication.
TIMEOUT	TIME	Communication timeout.

Section 9.5
INT8IN_O

Overview

This section describes the INT8IN_O DFB, which allows you to share sets of up to eight integer input signals belonging to the owner project with one or more consumer projects.

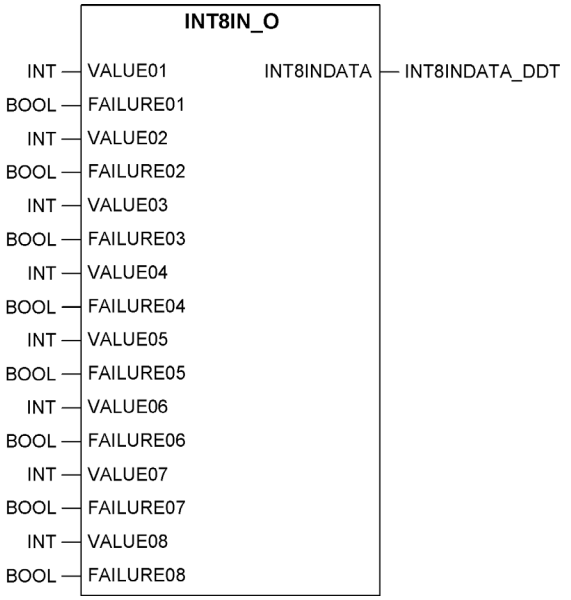
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
VALUEx (x: 1...8)	INT	Analog input signal value x.
FAILUREx (x: 1...8)	BOOL	1 = Detected failure signal value x.

Outputs

Output Parameter Description

Parameter	Type	Description
INT8INDATA	INT8INDATA_DDT	The structure is shown in the below table.

INT8INDATA_DDT Type

Parameter	Type	Description
VALUEARRAY	ARRAY [0...7] of INT	Contains the values of the eight analog input signals.
FAILUREWORD	WORD	Contains the detected failure status of the eight analog input signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Public Variables

N/A

Section 9.6
INT8IN_C

Overview

This section describes the INT8IN_C DFB, which allows you to process sets of up to eight integer input signals belonging to the owner project in one or more consumer projects.

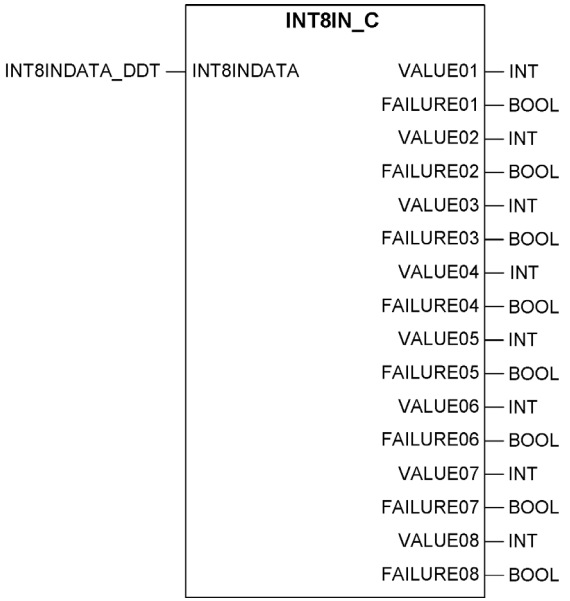
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
INT8INDATA	INT8INDATA_DDT	The structure is shown in the below table.

INT8INDATA_DDT Type

Parameter	Type	Description
VALUEARRAY	ARRAY [0...7] of INT	Contains the values of the eight analog input signals.
FAILUREWORD	WORD	Contains the detected failure status of the eight analog input signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Outputs

Output Parameter Description

Parameter	Type	Description
VALUEx (x: 1...8)	INT	Analog input signal value x.
FAILUREx (x: 1...8)	BOOL	1 = Detected failure signal value x.

Public Variables

Public Variable Description

Variable	Type	Description
ERROR	BOOL	1 = Detected error in communication.
TIMEOUT	TIME	Communication timeout.

Section 9.7
INT8OUT_O

Overview

This section describes the INT8OUT_O DFB, which allows you to share sets of up to eight integer output signals belonging to the owner project with one or more consumer projects.

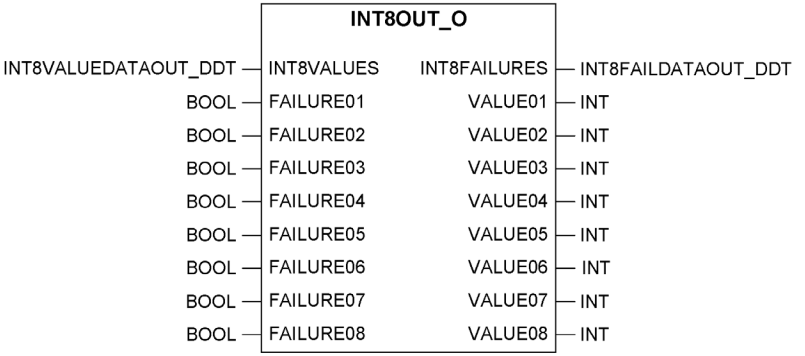
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
INT8VALUES	INT8VALUEDATAOUT_DDT	The structure is shown in the below table.
FAILUREx (x: 1...8)	BOOL	1 = Detected failure signal value x.

INT8VALUEDATAOUT_DDT Type

Parameter	Type	Description
VALUEARRAY	ARRAY [0...7] of INT	Contains the values of 8 analog output signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Outputs

Output Parameter Description

Parameter	Type	Description
INT8FAILURES	INT8FAILDATAOUT_DDT	The structure is shown in the below table.
VALUEx (x: 1...8)	INT	Analog output signal value x.

INT8FAILDATAOUT_DDT Type

Parameter	Type	Description
FAILUREWORD	WORD	Contains the detected failure status of the eight analog output signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Public Variables

Public Variable Description

Variable	Type	Description
ERROR	BOOL	1 = Detected error in communication.
TIMEOUT	TIME	Communication timeout.

Section 9.8
INT8OUT_C

Overview

This section describes the INT8OUT_C DFB, which allows you to process sets of up to eight integer output signals belonging to the owner project in one or more consumer projects.

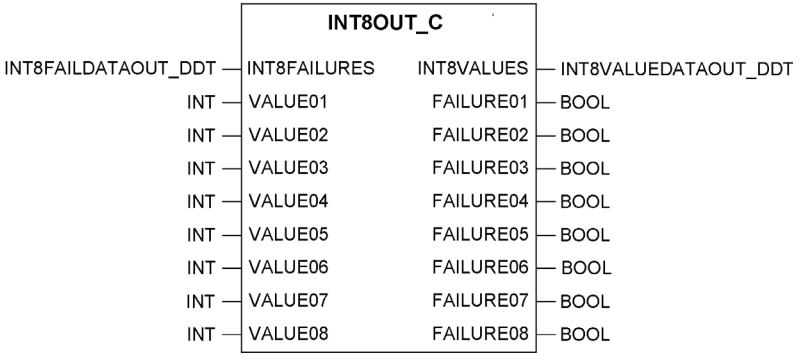
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
INT8FAILURES	INT8FAILDATAOUT_DDT	The structure is shown in the table below.
VALUEx (x: 1...8)	INT	Analog output signal value x.

INT8FAILDATAOUT_DDT Type

Parameter	Type	Description
FAILUREWORD	WORD	Contains the detected failure status of the eight analog output signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Outputs

Output Parameter Description

Parameter	Type	Description
INT8VALUES	INT8VALUEDATAOUT_DDT	The structure is shown in the below table.
FAILUREx (x: 1...8)	BOOL	1 = Detected failure signal value x.

INT8VALUEDATAOUT_DDT Type

Parameter	Type	Description
VALUEARRAY	ARRAY [0...7] of INT	Contains the values of 8 analog output signals.
HEALTHWORD	INT	Contains the health status exchanged between owner and consumer controller.

Public Variables

Public Variable Description

Variable	Type	Description
ERROR	BOOL	1 = Detected error in communication.
TIMEOUT	TIME	Communication timeout.

Section 9.9
MOVE_<type> DFBs

Overview

This section describes the DFBs of type MOVE_<type> by using the MOVE_INT DFB as an example.

This type of DFB allows you to share scattered data between an owner Control project and two or more consumer Control projects.

Use a DFB that corresponds to the data type of the variable that you want to share.

The description is similar for the otherDFBs that are designed to process other datatypes, such as BOOL, DINT, REAL, WORD, ARRAY OF INT[8], ARRAY OF INT[100], ARRAY OF INT[125], ARRAY OF REAL[8], ARRAY OF REAL[50], and ARRAY OF REAL[62].

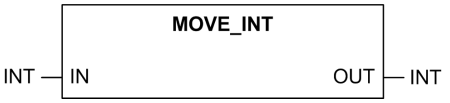
What Is in This Section?

This section contains the following topics:

DFB Representation

Representation

This DFB has been designed for use with the FBD language of the controller.



Inputs

Input Parameter Description

Parameter	Type	Description
IN	INT	Input data received from peer controller.

Outputs

Output Parameter Description

Parameter	Type	Description
OUT	INT	Output data

Public Variables

N/A

Part III
STAHL

Chapter 10
STAHL

Overview

This chapter describes the DFBs to process data of modules of the STAHL IS1 Remote I/O system.

These function blocks do not reflect any specific installation.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate.
- Review the implications of communication link interruptions and take actions to mitigate.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and fault conditions) according to the safety analysis and applicable codes, and regulations.
- Apply local accident prevention and safety regulations and guidelines. [1]
- Test each implementation of this library for proper operation before placing it into service.

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

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

What Is in This Chapter?

This chapter contains the following sections:

Section 10.1
STAHLAI8CH for STAHL 8-Channel Analog Input Modules

Overview

This section describes the STAHLAI8CH DFB.

What Is in This Section?

This section contains the following topics:

Description

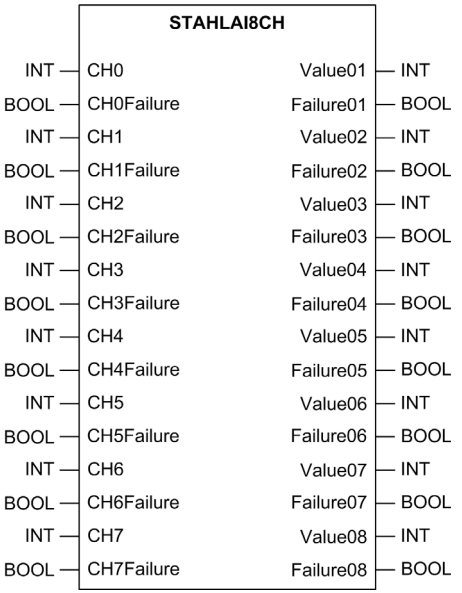
General

The `STAHLAI8CH` DFB allows reading analog input signal values and signal quality data of STAHL 8-channel analog input modules.

DFB Representation

Representation

The following figure shows the STAHLAI8CH DFB as it appears in an FBD section:



Inputs

Input Parameter Description

Parameter	Type	Description
CHx	INT	Signal value of channel x from the STAHL analog input module.
CHxFailure	BOOL	1 = Healthy Diagnostic information of channel x from the STAHL analog input module. **NOTE:** Refer to the operating instructions of the STAHL module for troubleshooting information.
x represents the channel number (0 to 7).		

Outputs

Output Parameter Description

Parameter	Type	Description
`Valuexx...ValueXX`	INT	Signal value of channels 01 to 08.
`Failurexx...Failurexx`	BOOL	0 = Healthy Status of channels 01 to 08.
xx represents the channel number (01 to 08).		

Section 10.2
STAHLAO8CH for STAHL 8-Channel Analog Output Modules

Overview

This section describes the STAHLAO8CH DFB.

What Is in This Section?

This section contains the following topics:

Description

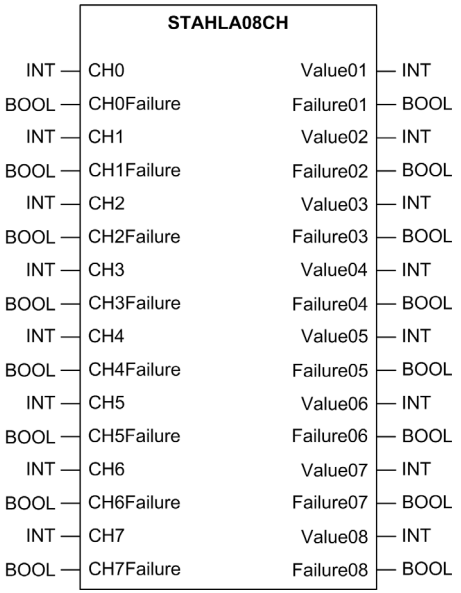
General

The `STAHLAO8CH` DFB allows writing the analog output signal value to STAHL 8-channel analog output modules. It also reads the signal quality data from each channel.

DFB Representation

Representation

The following figure shows the `STAHLAO8CH` DFB as it appears in an FBD section:



Inputs

Input Parameter Description

Parameter	Type	Description
CHx	INT	Signal value for channel x.
CHxFailure	BOOL	1 = Healthy Diagnostic information of channel x from the STAHL analog output module. **NOTE:** Refer to the operating instructions of the STAHL module for troubleshooting information.
x represents the channel number (0 to 7).		

Outputs

Output Parameter Description

Parameter	Type	Description
`Valuexx...Valuexx`	INT	Provides signal value to channels 0 to 7 of the STAHL analog output module.
`Failurexx...Failurexx`	BOOL	0 = Healthy Status of channels 0 to 7.
xx represents the channel number (01 to 08).		

Section 10.3
STAHLDI16CH for STAHL 16-Channel Digital Input Modules

Overview

This section describes the STAHLDI16CH DFB.

What Is in This Section?

This section contains the following topics:

Description

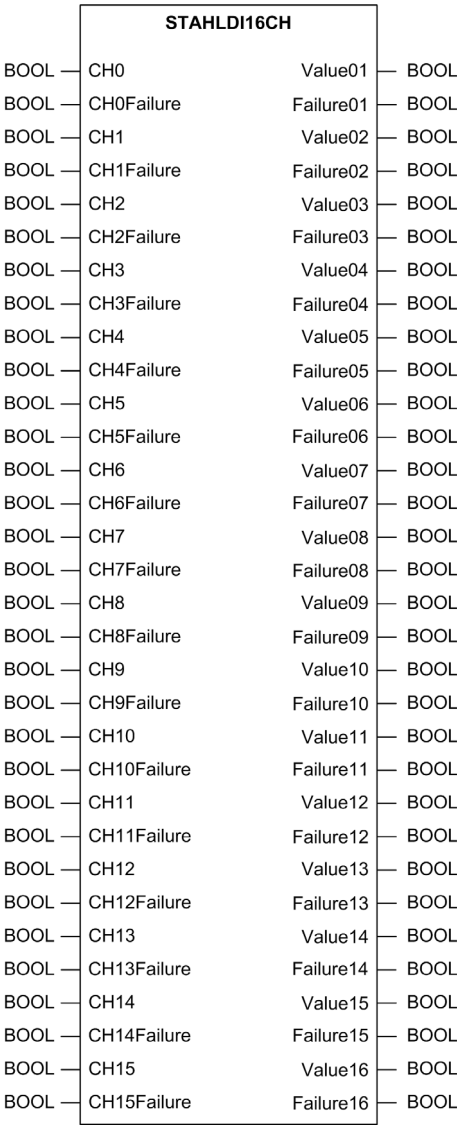
General

The `STAHLDI16CH` DFB allows reading the digital input signal value and signal quality data of STAHL 16-channel digital input modules.

DFB Representation

Representation

The following figure shows the `STAHLDI16CH` DFB as it appears in an FBD section:



Inputs

Input Parameter Description

Parameter	Type	Description
CHx	BOOL	1 = Signal value of channel x from the STAHL digital input module.
CHxFailure	BOOL	1 = Healthy Diagnostic information of channel x from the STAHL digital input module **NOTE:** Refer to the operating instructions of the STAHL module for troubleshooting information.
x represents the channel number (0 to 15).		

Outputs

Output Parameter Description

Parameter	Type	Description
`Valuexx...Valuexx`	BOOL	Signal value of channels 0 to 15.
`Failurexx...Failurexx`	BOOL	0 = Healthy Status of channels 0 to 15.
xx represents the channel number (01 to 16).		

Section 10.4
STAHLDO8 for STAHL 8-Channel Digital Output Modules

Overview

This section describes the STAHLDO8CH DFB.

What Is in This Section?

This section contains the following topics:

Description

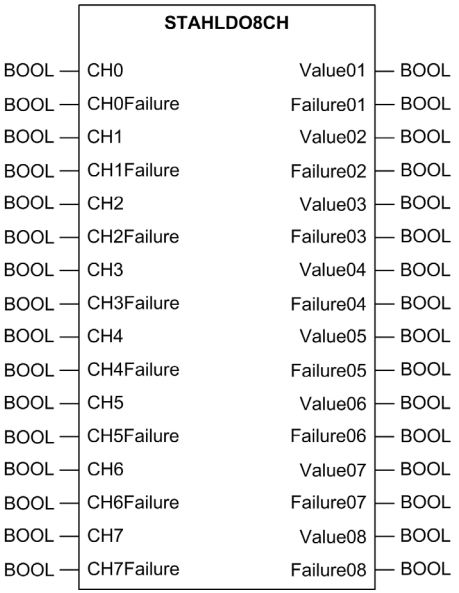
General

The `STAHLDO8CH` DFB allows writing digital output signal values to STAHL 8-channel digital output modules. It also reads the signal quality data from each channel.

DFB Representation

Representation

The following figure shows the `STAHLDO8CH` DFB as it appears in an FBD section:



Inputs

Input Parameter Description

Parameter	Type	Description
CHx	BOOL	1 = Signal value for channel x.
CHxFailure	BOOL	1 = Healthy Diagnostic information of channel x from the STAHL digital output module. **NOTE:** Refer to the operating instructions of the STAHL module for troubleshooting information.
x represents the channel number (0 to 7).		

Outputs

Output Parameter Description

Parameter	Type	Description
`Valuexx...Valuexx`	BOOL	1 = Provides signal value to channels 0 to 7 of the STAHL digital output module.
`Failurexx...Failurexx`	BOOL	0 = Healthy Status of channels 0 to 7.
xx represents the channel number (01 to 08).		

Section 10.5
STAHLHARTVal4 - Processing of Four HART Values

Overview

This section describes the STAHLHARTVal4 DFB.

What Is in This Section?

This section contains the following topics:

Description

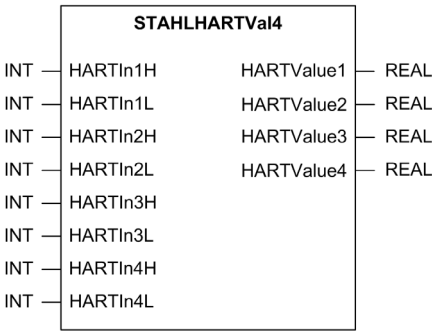
General

The `STAHLHARTVal4` DFB allows processing four HART values through a STAHL 8-channel analog input module HART. For each HART value, the DFB converts the high and low register values into one output value of data type Real.

DFB Representation

Representation

The following figure shows the `STAHLHARTVal4` DFB as it appears in an FBD section:



Inputs

Input Parameter Description

Parameter	Type	Description
HARTIn*x*H	INT	Receives the high register value of HART value x from the STAHL module.
HARTIn*x*L	INT	Receives the low register value HART value x from STAHL module.
[x] is used to identify the HART values (1...4).		

Outputs

Output Parameter Description

Parameter	Type	Description
HARTValue*x*	REAL	Result of the conversion of inputs x into HART value x.
[x] is used to identify the HART values (1...4).		

Section 10.6
STAHLHARTVal8 - Processing of Eight HART Values

Overview

This section describes the STAHLHARTVal8 DFB.

What Is in This Section?

This section contains the following topics:

Description

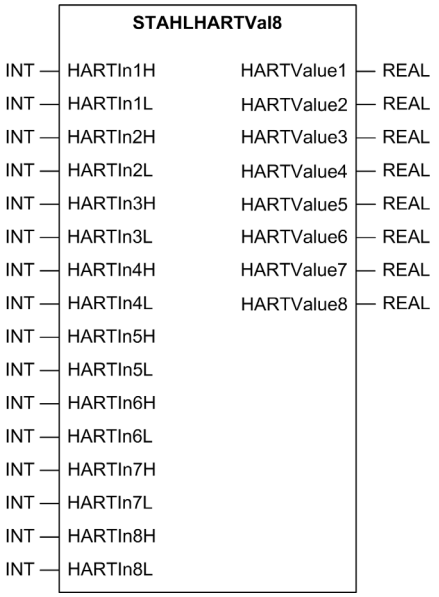
General

The `STAHLHARTVal8` DFB allows processing eight HART values through a STAHL 8-channel analog input module HART. For each HART value, the DFB converts the high and low register values into one output value of data type Real.

DFB Representation

Representation

The following figure shows the `STAHLHARTVal8` DFB as it appears in an FBD section:



Inputs

Input Parameter Description

Parameter	Type	Description
HARTIn*x*H	INT	Receives the high register value of HART value x from the STAHL module.
HARTIn*x*L	INT	Receives the low register value HART value x from STAHL module.
[x] is used to identify the HART values (1...8).		

Outputs

Output Parameter Description

Parameter	Type	Description
HARTValue*x*	REAL	Result of the conversion of inputs *x* into HART value *x*.
[x] is used to identify the HART values (1...4).		

Part IV
Special Cards

Overview

This part provides the detailed description, pin layout, pin description of the device control blocks of the Special Cards family.

These function blocks do not reflect any specific installation.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate.
- Review the implications of communication link interruptions and take actions to mitigate.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and fault conditions) according to the safety analysis and applicable codes, and regulations.
- Apply local accident prevention and safety regulations and guidelines. [1]
- Test each implementation of this library for proper operation before placing it into service.

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

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

What Is in This Part?

This part contains the following chapters:

Chapter 11
Special Cards - Quantum

Overview

This chapter describes the quantum special cards.

What Is in This Chapter?

This chapter contains the following sections:

Section 11.1
EHC Counter Module

Overview

This section provides the information about the Q140EHC10500 and Q140EHC20200 DFBs.

What Is in This Section?

This section contains the following topics:

Description

General

The `Q140EHC10500` special inrack card DFB is the control block to manage a high speed counter with 5 channels. It uses 5 equivalent, independently usable counters. The mapping value is 12 %IW-3X and 12 %MW-4X

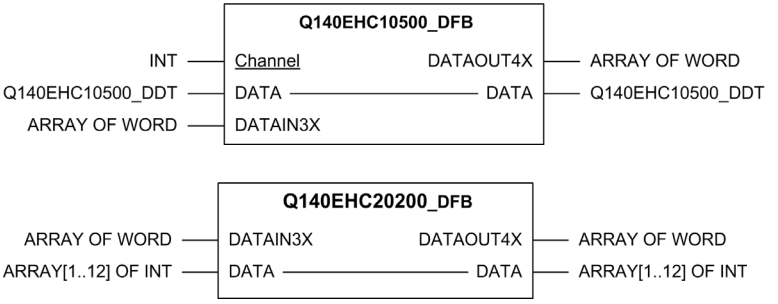
The `Q140EHC20200` special inrack card DFB is the control block to manage a high speed counter with 2 channels. It is a two-channel module suited for high-speed counting applications up to 500 kHz or for applications that require a quadrature counter interface. The mapping value is 6 %IW-3X and 6 %MW-4X.

These DFBs are specific for the particular special card model to handle the data transfer and conditioning. These DFBs receive the initial addresses of the configured STATE RAM memory areas plus the mapping model (1X versus 3X) to transfer the data from/to the special card.

DFB Representation

Representation

The following figure represents functional modules of special card Quantum:



NOTE: The underlined parameters are specific for some components.

The table shows the parameter available for specific DFBs:

Parameter		Components	
		Q140EHC10500	Q140EHC20200
Input	Channel	X	–

Inputs

Input Parameter Description

Parameter	Type	Description
Channel*	INT	This input is used to select a channel.
DATAIN3X	ARRAY OF WORD	The DFB receives the initial addresses of the configured STATE RAM memory areas from this input to transfer the data from the special card.
*: Parameter is available for specific components.		

Outputs

Output Parameter Description

Parameter	Type	Description
DATAOUT4X	ARRAY OF WORD	This output is used to transfer the data to the special card.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
DATA	ARRAY OF INT	Harmonized values from the special card for application usage.

Section 11.2
ERT Time Stamp Module

Overview

This section provides the information about the Q140ERT85410_DFB and Q140ERT85420_DFB DFBs.

What Is in This Section?

This section contains the following topics:

Description

General

The 140 ERT85410 and 140 ERT85420 DFBs are intelligent 32 point input modules for Quantum that allow full configuration of inputs and evaluate the input signal status every 1 millisecond.

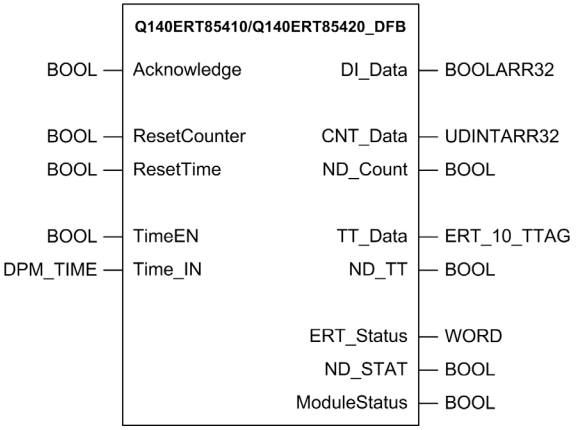
DFB Representation

Representation

This DFB is designed using the EFB ERT_854_10/ERT_854_20 which allows simple access of the functions such as binary value, counting, time stamp, status or time synchronization.

This DFB contains within itself the EFs QUANTUM and DROP, which are used to generate the appropriate slot number for the EFB ERT_854_10/ERT_854_20.

The figure shows Q140ERT85410/ERT_854_20 DFB in Control:



Inputs

Input Parameter Description

Parameter	Type	Description
Acknowledge	BOOL	1 = Acknowledges the signals to indicate that the user is ready to receive the next result and deletes the TT_DATA marker. Used for confirmation of an event.
ResetCounter	BOOL	1 = Deletes all ERT counters by setting CL_COUNT. Counting is interrupted until CL_COUNT is reset to 0.
ResetTime	BOOL	1 = Deletes the ERT event FIFO buffer by setting ResetTime. Saving of event is blocked until the ResetTime is reset to 0.
TimeEN	BOOL	1 = Enables a Time transfer. For example, from Time_IN if set.
Time_IN	DPM_Time	Structure of the ESI. For example, gets the input time through time synchronization of the ERT (carries the edge controlled time synchronization in the sync element).

Outputs

Output Parameter Description

Parameter	Type	Description
DI_Data	BOOLArr32	Digital input values for 32 channels.
CNT_Data	UDIntArr32	Counter values for 32 channels.
ND_COUNT	BOOL	1 = Sets every time CNT_DATA structure receives new data. The value is set to 1 for only one cycle and is not recorded.
TT_DATA	ERT_10_TTag	Event message output structure with time stamp. A user has to write an external application logic to use this module as a time stamping module.
ND_TT	BOOL	1= Sets every time TT_DATA structure receives new data. Remains set until user confirmation with Acknowledge.
ERT_Status	WORD	Provides diagnostics information for ERT module.
ND_STAT	BOOL	1 = Sets every time ERT_STATUS word receives new status data. The value is set to 1 for only one cycle and is not acknowledged.
ModuleStatus	BOOL	Module health status information: ● 0= Module is in healthy state ● 1= Module is in unhealthy state

NOTE: For more information regarding EFB ERT_854_10, refer to Unity Pro help file.

Public Variables

Public Variables Parameter Description

Parameter	Type	Description
ERTSlotAddress	INT	Slot number where the ERT module is placed.
CRPSlotAddress	INT	Slot number where the CRP module is placed.
ERTDropNo	DINT	RIO/DIO drop number in which the ERT module is placed.

NOTE: For `ERTDrop Number`, 1 is reserved for the local rack. Hence, any drop has to be configured accordingly.

Chapter 12
Special Cards - M340

Overview

This chapter describes the M340 special cards.

What Is in This Chapter?

This chapter contains the following sections:

Section 12.1
T_SIGN_CPT_BMX_DFB and T_UNSIGN_CPT_BMX_DFB DFBs

What Is in This Section?

This section contains the following topics:

Description

General

The T_SIGN_CPT_BMX_DFB and T_UNSIGN_CPT_BMX_DFB DFBs are used to manage both BMXEHC0200 and BMXEHC0800 high speed counter modules of the M340 platform.

Function Description

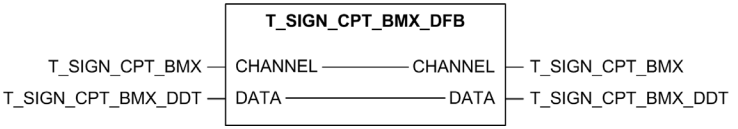
Each DFB supports a specific IODDT that is required by the high speed counter card depending on the mode that is configured for the channel of the card.

For example, configuring a channel to ratio mode 1 requires the T_SIGN_CPT_BMX IODDT. The T_SIGN_CPT_BMX_DFB supports this IODDT.

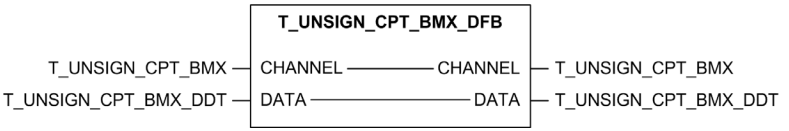
DFB Representation

Representation

This figure represents `T_SIGN_CPT_BMX_DFB` DFB in Control.



This figure represents `T_UNSIGN_CPT_BMX_DFB` DFB in Control.



Inputs

N/A

Outputs

N/A

Inputs/Outputs

Input/Output Parameter Description

This table describes the input/output parameters:

Parameter	Type	Description
CHANNEL	T_SIGN_CPT_BMX/T_UNSIGN_CPT_BMX	This pin resembles the standard Unity Pro I/O DDT of the special card
DATA	T_SIGN_CPT_BMX_DDT/T_UNSIGN_CPT_BMX_DDT	This pin stores information in an organized structure.

For structure of DDT, refer to standard *UnityPro Help* file.

Public Variables

N/A

Section 12.2
T_CPT_FLM_IN2_DFB DFB

What Is in This Section?

This section contains the following topics:

Description

General

The T_CPT_FLM_IN2_DFB DFB is used to manage the BMXETM0200 turbo machinery frequency module of the M340 platform.

Function Description

The DFB supports a specific IODDT that is required by the turbo machinery frequency module.

For example, configuring a channel to frequency requires the T_CPT_FLM_IN2 IODDT. The T_CPT_FLM_IN2_DFB supports this IODDT.

DFB Representation

Representation

This figure represents `T_CPT_FLM_IN2_DFB` DFB in the FBD language of Unity Pro .

Inputs

N/A

Outputs

N/A

Inputs/Outputs

Input/Output Parameter Description

This table describes the input/output parameters:

Parameter	Type	Description
CHANNEL	T_CPT_FLM_IN2	Has the same structure and contains the same data as the T_CPT_FLM_IN2 I/O DDT of the module in Unity Pro .
DATA	T_CPT_FLM_IN2_DDT	Stores information in an organized structure.

For information on the structure of the DDT, refer to help of Unity Pro .

Public Variables

N/A

Chapter 13
Special Card - STB

Overview

This chapter describes the STB special card.

What Is in This Chapter?

This chapter contains the following topics:

Description

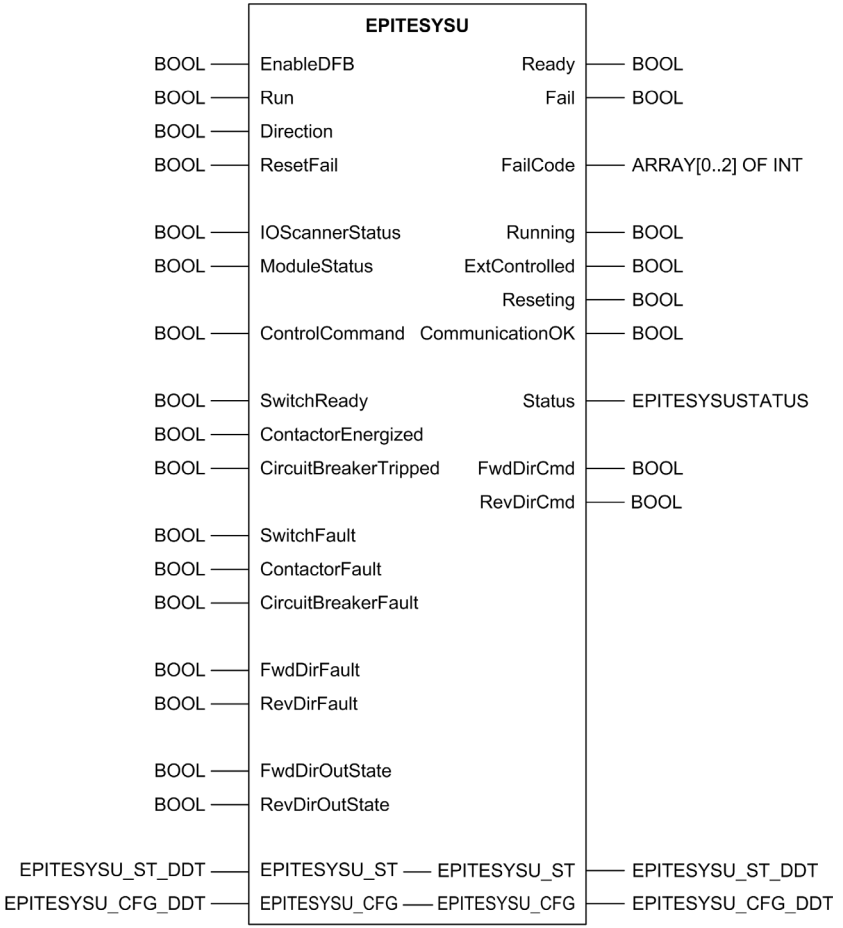
General

The `EPITESYSU` DFB is a special purpose control block on STB island. This DFB handles the digital input data from the actuator bus and sends the digital output data to the control unit of the TeSys U module. It also handles the status information from the outputs.

DFB Representation

Representation

The following figure represents `EPITESYSU` special card DFB:



Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	This input enables the normal execution of the control block. ● 0 = The entire DFB is restarted (states, output values, counters are lost) and output values are set to 0. ● 1 = Enables communications with the devices for their operation. Public variable values are loaded during the first enabling cycle.

If the device is reset and Run pin is active, then the device will auto start. If manual start of the device is required, then reset the Run pin followed by device.

NOTICE
UNINTENDED EQUIPMENT OPERATION Reset the Run variable before resuming operation. **Failure to follow these instructions can result in equipment damage.**

Parameter	Type	Description
Run	BOOL	1 = Starts the motor run in the direction selected with the Direction input variable.
Direction	BOOL	Direction of rotation of the motor. ● 0 = Activates the reverse direction drive. ● 1 = Activates the forward direction drive.
ResetFail	BOOL	1 = Resets the Fail output parameter to 0 or in case of inoperable device, sends a reset command to the device if ControlCommand is 1. You can reset automatically using ResetMode public variable.
IOScannerStatus	BOOL	1 = The communication between PLC Ethernet port and Advantys NIM is ok.
ModuleStatus	BOOL	1 = The EPI module status is ok.
ControlCommand	BOOL	Indicates to the DFB whether the EPI is being controlled locally or from a source external to the DFB. ● 0 = Performs only read operations to monitor the status of the device and does not perform any control functions. ● 1 = Performs read operations and performs control operations not conflicting with control commands coming from an external control source.
SwitchReady	BOOL	1 = The motor starter switch is ready.

Parameter	Type	Description
ContactorEnergized	BOOL	1 = The motor starter contactor is energized.
CircuitBreakerTripped	BOOL	1 = The motor starter circuit breaker is tripped.
SwitchFault	BOOL	1 = The motor starter switch is inoperable.
ContactorFault	BOOL	1 = The motor starter contactor is inoperable.
CircuitBreakerFault	BOOL	1 = The motor starter circuit breaker is inoperable.
FwdDirFault	BOOL	1 = The motor starter is inoperable in forward direction.
RevDirFault	BOOL	1 = The motor starter is inoperable in reverse direction.
FwdDirOutState	BOOL	1 = The output state of motor starter in forward direction.
RevDirOutState	BOOL	1 = The output state of motor starter in reverse direction.

Outputs

Output Parameter Description

Parameter	Type	Description
`Ready`	`BOOL`	1 = The block is ready. The DFB is enabled and there is no interruption in communication status or module status.

⚠ WARNING

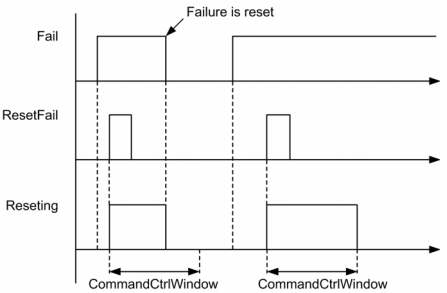
LOSS OF CONTROL

- Perform an FMEA (Failure Mode and Effects Analysis) of your application, and apply preventive and detective controls before implementation.
- Provide separate or redundant control paths wherever required.
- Ensure that the status of the `READY` pin is included in the application control logic.
- Apply local accident prevention and safety regulations and guidelines.[1]
- Test each implementation of this library for proper operation before placing it into service.

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

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

Output	Type	Description
`Fail`	`BOOL`	1 = The block or module is in unresponsive state. Refer to the truth table *(see page 189)* for `Fail` status.
`FailCode`	`ARRAY [0..2] OF INT`	When `Fail` output is 1, it holds the code for the detected error. If `Fail` output is 0, it indicates the last detected error that occurred. The detected error source is specified by a 3-level structure. Refer to the Diagnostics Information Management *(see EcoStruxure™ Hybrid DCS, Device Control Services User Guide)* for more details.
`Running`	`BOOL`	1 = The starter is running.

Output	Type	Description
ExtControlled	BOOL	1 = The device is being controlled from an external source (for example, from the console, from a push-button panel, or from the monitoring system) to the system. Provides information for programming. **NOTE:** The ControlCommand signal, the Owner variable, and the ForcedLocalMode status are used to activate this signal. You cannot use this signal as a ControlCommand input.
Reseting	BOOL	1 = A reset is being carried out. The CommandCtrlWindow variable indicates the maximum time for resetting the detected failure. When a device or communication reset is carried out with ResetFail, the DFB tries to reset the detected failure within the time period defined in CommandCtrlWindow. If the detected failure is reset, the Fail and Reseting output variables are reset (set to FALSE). If the detected failure is not reset, the Reseting variable is set to FALSE and the Fail variable remains TRUE. The ResetFail is edge-based. Timing diagram: 
CommunicationOk	BOOL	1 = The communication is ok for the device present in the IO scanner.

Output	Type	Description	
Status	EPITESYSUSTATUS	This structure holds the starter information.	
	Parameter	**Type**	**Description**
	SwitchReady	BOOL	1 = The motor starter switch is ready.
	ContactorEnergized	BOOL	1 = The motor starter contactor is energized.
	CircuitBreakerTripped	BOOL	1 = The motor starter circuit breaker is tripped.
	SwitchFault	BOOL	1 = The motor starter switch is inoperable.
	ContactorFault	BOOL	1 = The motor starter contactor is inoperable.
	CircuitBreakerFault	BOOL	1 = The motor starter circuit breaker is inoperable.
	FwdDirFault	BOOL	1 = The motor starter is inoperable in forward direction.
	RevDirFault	BOOL	1 = The motor starter is inoperable in reverse direction.
	FwdDirOutState	BOOL	1 = The output state of motor starter in forward direction.
	State *(see page 190)*	INT	Contains the numerical code corresponding to the state of the starter.
	Info *(see page 190)*	INT	Contains the numerical code with the information on statuses and actions required.
FwdDirCmd	BOOL	1 = Forward direction command for starter.	
RevDirCmd	BOOL	1 = Reverse direction command for starter.	

Truth Table

IOScannerStatus	ModuleStatus	CommunicationOK is calculated as
OFF	OFF	OFF
ON	OFF	ON
ON	ON	ON

EnableDFB	SwitchFault	CircuitBreakerTripped	CircuitBreakerFault	ContactorFault	FwdDirFault	RevDirFault	CommunicationOK	Fail is calculated as
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
ON	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
ON	OFF	ON	OFF	OFF	OFF	OFF	ON	ON
ON	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
ON	OFF	OFF	OFF	ON	OFF	OFF	ON	ON
ON	OFF	OFF	OFF	OFF	ON	OFF	ON	ON
ON	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

EnableDFB	SwitchReady	Fail	CommunicationOK	Ready is calculated as
OFF	OFF	OFF	OFF	OFF
ON	OFF	OFF	ON	OFF
ON	OFF	ON	ON	OFF
ON	ON	ON	ON	OFF
ON	ON	OFF	ON	ON

EnableDFB	Run	Direction	Ready	FwdDirCmd is calculated as	RevDirCmd is calculated as
OFF	OFF	OFF	OFF	OFF	OFF
ON	ON	OFF	OFF	OFF	OFF
ON	ON	OFF	ON	OFF	ON
ON	ON	ON	ON	ON	OFF

EnableDFB	Run	Ready	FwdDirCmd	RevDirCmd	FwdDirOutState is calculated as	RevDirOutState is calculated as
OFF	OFF	OFF	OFF	OFF	OFF	OFF
ON	ON	OFF	OFF	OFF	OFF	OFF
ON	ON	ON	ON	OFF	ON	OFF
ON	ON	ON	OFF	ON	OFF	ON

EnableDFB	ControlCommand	ExtControlled is calculated as
OFF	OFF	OFF
ON	OFF	ON
ON	ON	OFF

State

The following table describes the `State` variable:

Variable value	Description
-2	Device has detected error.
-1	Not initialized. Waiting for data.
0	Disabled.
5	Starter is ready to switch on.
8	Inoperable device.
9	Inoperable module.
10	Inoperable channels.

Info

NOTE: This variable is for informational purposes only. You should not use it for program switching operations.

The following table describes the `Info` variable:

Variable value	Description
2	Requires physical reset of the device.
3	Wait for start.
11	Missing `EnableDFB`.
12	Communication interruption.
13	Status word value is 0.

Variable value	Description
24	`ResetFail` = 0.
30	The switch channel is inoperable.
31	The contactor channel is inoperable.
32	The circuit breaker is inoperable.
33	Detected fault in forward direction channel.
34	Detected fault in reverse direction channel.
35	Feedback interruption.
51	Idle.
53	Running.
81	Missing `ResetFail`. Inoperable device.
82	Requires reset of the device.
99	Unknown status.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
EPITESYSU_ST	EPITESYSU_ST_DDT	Refer to EPITESYSU_ST_DDT *(see page 192)* Type.
EPITESYSU_CFG	EPITESYSU_CFG_DDT	Refer to EPITESYSU_CFG_DDT *(see page 193)* Type.

EPITESYSU_ST_DDT Type

EPITESYSU_ST is a device data structure that holds the minimum information required for performing control and monitoring functions. The information used by the operator screen is readable/writable from the HMI/SCADA system.

Name	Type	Description
STW *(see page 192)*	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW *(see page 193)*	WORD	Device control. Provides the means to control the device from the monitoring subsystem or from the operator screen if Owner (1), or only from the monitoring subsystem if Owner (0). If Owner is 0, it takes the input variables of the DFB as a value for reading from the HMI/SCADA system.

EPITESYSU_ST.STW Word Structure

Bit	Description
0	Unknown technological module status. No variable refreshing.
1	Not ready.
2	Technological module is running.
3	Inoperable device.
4	Alarm on the device or repetitive detected fault alarm requires resetting.
5	Communication interruption.
6	Requires resetting. ResetFail is required.
7	Refer to the ExtControlled output pin *(see page 186)*.
8	Refer to the Reseting output pin *(see page 186)*.
9	Refer to the EnableDFB input pin *(see page 184)*.

EPITESYSU_ST.CFGW Word Structure

Bit	Description
0	Refer to the ResetFail input pin *(see page 184)*.
1	Owner.
3	Refer to the Direction input pin *(see page 184)*.
6	Refer to the Run input pin *(see page 184)*.
7	Refer to the ControlCommand input pin *(see page 184)*.
11	Refer to the LowFastSpeed input pin *(see page 184)*.
12	Refer to the ThermalTest input pin *(see page 184)*.

NOTE: The Owner bit enables to control the block from the EPITESYSU_ST_DDT input/output structure ignoring the input signals of the block. It enables control from a monitoring system (HMI, SCADA, operator screen) in the Manual mode without using the programmed switching operation.

EPITESYSU_CFG_DDT Type

EPITESYSU_CFG is a data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.

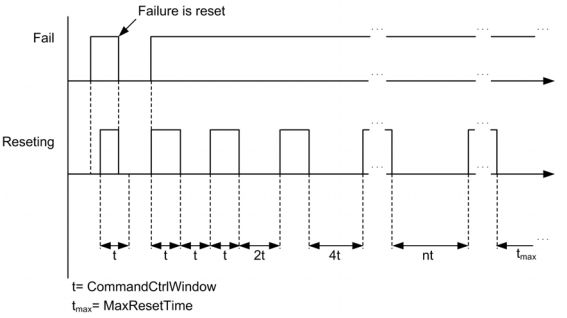
Name	Type	Description
DataStatus *(see page 194)*	WORD	Information on the device status (Status structure).
State *(see page 190)*	INT	Contains the numerical code corresponding to the state of the starter.
Info	INT	Contains the motor starter information. Its value is Info status.
FailCode0	INT	Code of last level 0 detected error. Indicates which detected error has occurred, FailCode[0].
FailCode1	INT	Code of last level 1 detected error. Indicates which detected error has occurred, FailCode[1].
FailCode2	INT	Code of last level 2 detected error. Indicates which detected error has occurred, FailCode[2].

`EPITESYSU_CFG.DataStatus` Word Structure

Bit	Description
0	Refer to the `SwitchReady` status in the `Status` output pin *(see page 186)*.
1	Refer to the `ContactorEnergized` status in the `Status` output pin *(see page 186)*.
2	Refer to the `CircuitBreakerTripped` status in the `Status` output pin *(see page 186)*.
3	Refer to the `SwitchFault` status in the `Status` output pin *(see page 186)*.
4	Refer to the `ComtactorFault` status in the `Status` output pin *(see page 186)*.
5	Refer to the `CircuitBreakerFault` in the `Status` output pin *(see page 186)*.
6	Refer to the `FwdDirFault` status in the `Status` output pin *(see page 186)*.
7	Refer to the `RevDirFault` status in the `Status` output pin *(see page 186)*.
8	Refer to the `FwdDirOutState` status in the `Status` output pin *(see page 186)*.
9	Refer to the `RevDirOutState` status in the `Status` output pin *(see page 186)*.

Public Variables

Public Variable Description

Variable	Type	Description
CommandCtrlWindow	TIME	Control time for operations. This is the time that the block waits for the operations to be carried out by the device. If a command has been sent and the command is not executed within the time indicated by this variable, a follow-up alarm is issued. The command that is controlled is Run. In the event of ResetFail, this is not interpreted as an alarm. Instead, the detected failure continues, and you have to reset the Reseting output.
ResetMode	BOOL	Enables to configure the type of reset. This type of reset is used for communication interruption and inoperable device. The time defined in CommandCtrlWindow is used to define the interval after which a reset has to be carried out. The first reset is carried out after the time defined in CommandCtrlWindow elapses. The second reset is carried out after CommandCtrlWindow * 2 elapses, and so on. If the value of CommandCtrlWindow is 0 s, its value is not used and is instead replaced with a value of 1 s. The following table describes the type of the reset:
	Variable value	**Description**
	FALSE	Communications with the device is reset with the ResetFail variable.
	TRUE	Communications with the device is reset automatically.
MaxResetTime	TIME	When in automatic ResetMode, this variable is used to define the maximum time that can elapse between 2 consecutive resets. Timing diagram: 

Chapter 14
Special Cards - M580 and X80

Overview

This chapter describes the DFBs that are encapsulated in M580 and X80 special card templates.

What Is in This Chapter?

This chapter contains the following sections:

Section 14.1
BMXEHC DFB

What Is in This Section?

This section contains the following topics:

Description

General

The special in-rack cards that are used for high speed counting are available for M580 controllers and X80 remote drops.

There are 2 control modules supporting 2 and 8 channels respectively, which can be configured to perform different functions:

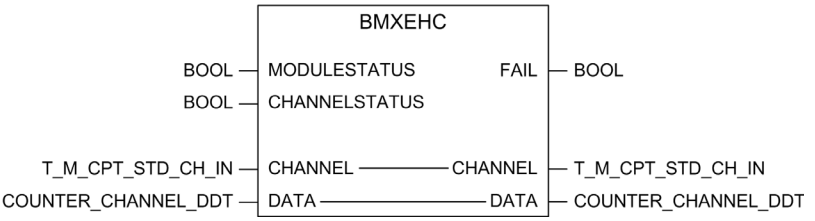
- BMXEHC0200: This high-speed control module supports 2 channels. Each of these high speed counter channels supports up to 9 functions.
- BMXEHC0800: This high-speed control module supports 8 channels. Each of these high speed counter channels supports up to 6 functions.

DFB Representation

Representation

This DFB is designed for the use of packaging data from the `T_M_CPT_STD_IN` DDDT.

This figure represents `BMXEHC` DFB in Control.



Inputs

Input Parameter Description

Parameter	Type	Description
MODULESTATUS	BOOL	Provides information to the DFB about the health of the module. 0 = Module is in unhealthy state 1 = Module is in healthy state
CHANNELSTATUS	BOOL	Provides information to the DFB about the health of the channel. 0 = Channel is in unhealthy state 1 = Channel is in healthy state

Outputs

Output Parameter Description

Parameter	Type	Description
FAIL	BOOL	Provides status information to the user regarding detected failure of the module. 0 = Module is in healthy state 1 = Module is in unhealthy state

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
CHANNEL	T_M_CPT_STD_CH_IN	Has the same structure and contains the same data as the T_M_CPT_STD_IN Device DDT of the module in Unity Pro.
DATA	COUNTER_CHANNEL_DDT	Stores information in an organized structure.

Public Variables

N/A

Section 14.2
BMXETM DFB

What Is in This Section?

This section contains the following topics:

Description

General

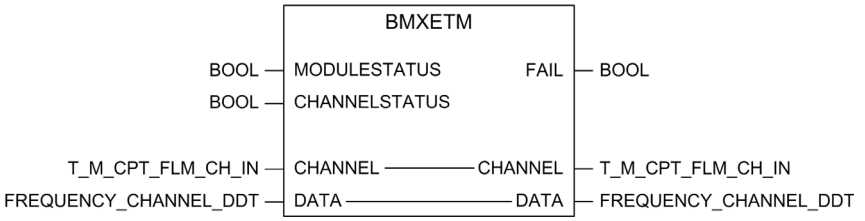
The special in-rack card BMXETM0200 that is used for turbo machinery frequency measuring is available for M580 controllers and X80 remote drops. It supports 2 channels.

DFB Representation

Representation

This DFB is designed to package data from the `T_M_CPT_FLM_IN2` DDDT of the module.

This figure represents the `BMXETM` DFB in the FBD language of Unity Pro.



Inputs

Input Parameter Description

Parameter	Type	Description
MODULESTATUS	BOOL	Provides information to the DFB about the health of the module. 0 = Module is in unhealthy state 1 = Module is in healthy state
CHANNELSTATUS	BOOL	Provides information to the DFB about the health of the channel. 0 = Channel is in unhealthy state 1 = Channel is in healthy state

Outputs

Output Parameter Description

Parameter	Type	Description
FAIL	BOOL	Provides status information to the user regarding detected failure of the module. 0 = Module is in healthy state 1 = Module is in unhealthy state

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
CHANNEL	T_M_CPT_FLM_CH_IN	Has the same structure and contains the same data as the T_M_CPT_FLM_IN2 Device DDT of the module in Unity Pro.
DATA	FREQUENCY_CHANNEL_DDT	Stores information in an organized structure.

Public Variables

N/A

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