



Process Expert - General Purpose Library

Device Templates Reference Manual

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Safety Information

Important Information

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



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



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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Please Note

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

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

Qualification of Personnel

A qualified person is one who has the following qualifications:

- Skills and knowledge related to the construction and operation of electrical equipment and the installation.
- Knowledge and experience in industrial control programming.
- Received safety-related training to recognize and avoid the hazards involved.

The qualified person must be able to detect possible hazards that may arise from parameterization, 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.

Proper Use

This product is a library to be used together with the automation control systems and is intended solely for the purposes described in the present documentation as applied in the industrial sector.

Always observe the applicable safety-related instructions, the specified conditions, and the technical data.

Perform a risk evaluation concerning the specific use before using the product. Take protective measures according to the result.

Since the product is used as a part of an overall system, you must ensure the safety of the personnel by means of the concept of this overall system (for example, machine concept).

Any other use is not intended and may be hazardous.

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 are 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:

(In case of divergence or contradiction between any translation and the English original, the original text in the English language will prevail.)

- 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 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

Document Scope

This document describes the functionality and features of the control services, Supervision services, and device templates.

For a list of device templates, refer to the user guides mentioned in this document.

This document covers the functional aspects of templates, control, and Supervision services when engineering a system, using EcoStruxure™ Process Expert, and describes the dynamic objects visible from the runtime. It does not cover any operational aspects, nor does it provide information on how to use the Supervision services to monitor and operate control systems.

To use device templates, you need to have knowledge of EcoStruxure™ Process Expert, Supervision, and Control Participants.

Validity Note

This document has been updated for the release of EcoStruxure™ Process Expert 2023.

Related Documents

The characteristics that are described in the present document, as well as those described in the documents included in the Related Documents section below, can be found online. To access the information online, go to the Schneider Electric home page www.se.com/ww/en/download/.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Title of Documentation	Reference Number
EcoStruxure™ Process Expert - General Purpose Library User Guide	EIO0000004045

Technical Support

Visit <https://www.se.com/myschneider/> for support, software updates, and latest information.

Product Related Information

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

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.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as safety, safety function, safe state, fault, fault reset, malfunction, failure, error, error message, dangerous, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2015	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment.

Standard	Description
	Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction.
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements.
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection.
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design.
IEC 62061:2015	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems.
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2016	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term zone of operation may be used in conjunction with the description of specific hazards, and is defined as it is for a hazard zone or danger zone in the Machinery Directive (2006/42/EC) and ISO 12100:2010.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Overview

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Overview

This part gives an overview of EcoStruxure Process Expert device library and describes the concept that are implemented for controlling devices.

List of Device Templates

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List of Device Families

The following table lists the device templates of each family:

Family name	Templates
Circuit Breakers	Compact, page 51
	Masterpact/MasterpactC, page 77
	Hardwired Compact/Masterpact, page 106
Digital Protective Relays	RL1001 - Sepam 80, page 128
	EasergyP5, page 179
Motor Controller and Starters	TesysT Motor Management Controller, page 199
	TesysU Motor Management Controller, page 233
Power Monitoring Devices	PM53xx/82xx and PM5350, page 260
Progressive Starters	ATS22 and ATS48, page 288
	ATS480, page 314
Variable Speed Drives	ATV6xx/ATV9xx/ATV6xxx - Altivar Process Drive, page 341
	ATV320-Altivar Process Drive, page 389
	ATV340-Altivar Process Drive, page 412

Template

What's in This Chapter

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Overview

This chapter describes the basic concepts of the device template.

Template

Description

The EcoStruxure Process Expert General Purpose library provides resources:

- That have been pre-configured and tested by Schneider Electric.
- That are designed for automating a large variety of processes.

They are used to implement the Control and Supervision services that are provided by the software participants, streamlining the engineering of systems.

The resources providing these services are encapsulated in dedicated facet references, which are then organized in composite references.

At the highest level, the device template represents the control module.

You can customize the services that are provided by device templates to fulfill your specific requirements. Using interfaces, you can also link Device templates with other compatible device and communication templates.

Template Services

A facet template is a sub template which can consist of control, supervision, or genie components. It can be used to group properties and data that are related to the template. The facet editor allows you to view and/or edit the parameters, elements, or interfaces.

Facet templates referenced by EPE for ASP MMM Library templates provide the following services:

Control	Includes core services plus additional, optional services, which you can activate if needed. Function blocks and variables are the resources that are encapsulated in these facet templates to provide such services.
Supervision	Supervision services complement the Control services. Supervision services are optional and those corresponding to selected Control services are enabled by default. Tags, alarms, and genies are the resources that are encapsulated in these facet template to provide such services. Data is provided by the associated Control resources.

Also, for both Control and Supervision services, you can configure parameters during instantiation to meet the requirements of your application.

Composition Strategy for Application Templates

General

Control and supervision facet templates encapsulate the respective participant capabilities:

- For control
 - Logic facet templates: Implement a specific functionality. For example, discrete motor management.
- For supervision
 - Data facet templates: Define tags and user interface messages that are required for acquiring runtime data.
 - Genie facet templates: Represent runtime data by using an animated graphic.

The templates are composed of two participants (control and supervision).

Based on a combination of control and supervision, application control module templates have been created, which allow you to model the application of a system.

The templates are composed of two participants (control and supervision).

The following general rules are applied when designing application library templates:

- Decoupling between participants
- Composition approach
- Exposed interfaces

Decoupling Between Participants

Maximum decoupling between facets from different participants is expected. One participant does not need to know the internal implementation of the other one to be able to collaborate.

For instance, the Control logic facets expose the OPC (Controller - HMI variable) items to be required for the Plant SCADA data facets in order that the Plant SCADA data facets are not altered as a result of any change in the Control logic facet data structures (DDT field names). So, the interfaces between participants only contain as many items as necessary to respect this rule.

Coupling into the Participant

To minimize the data to be exchanged between facets from the same participant, the library designer can assume the details of the data structure that is shared between the facets by means of the interfaces.

For instance, the Plant SCADA Genie facets can assume which is the naming convention being implemented for Plant SCADA tags into the Plant SCADA data facets. That means that, by sharing the name of the object being implemented through the interface, the genie can assume the name of tags involved.

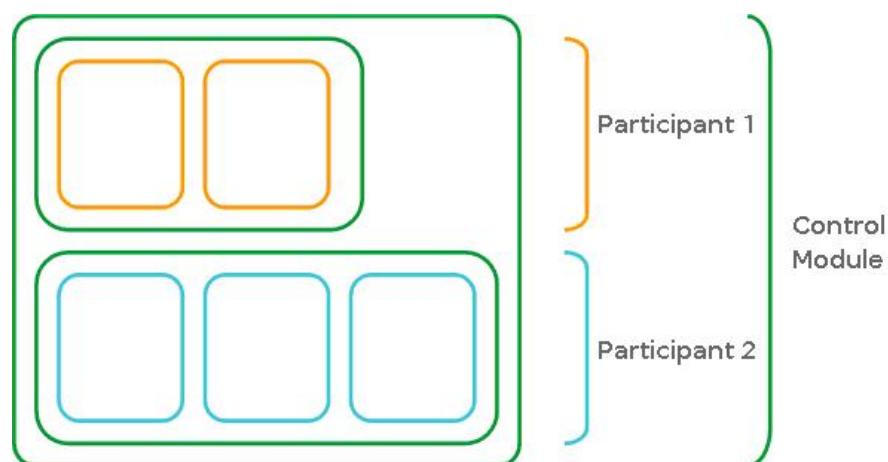
But, if the templates being designed could be used directly from the system application and linked by means of interface links, you need to provide the right connectivity between them (the user making the system application can only make interface links for establishing the relationship between different instances; whereas, the library designer has the opportunity to access the elements into the interfaces).

Composition Approach

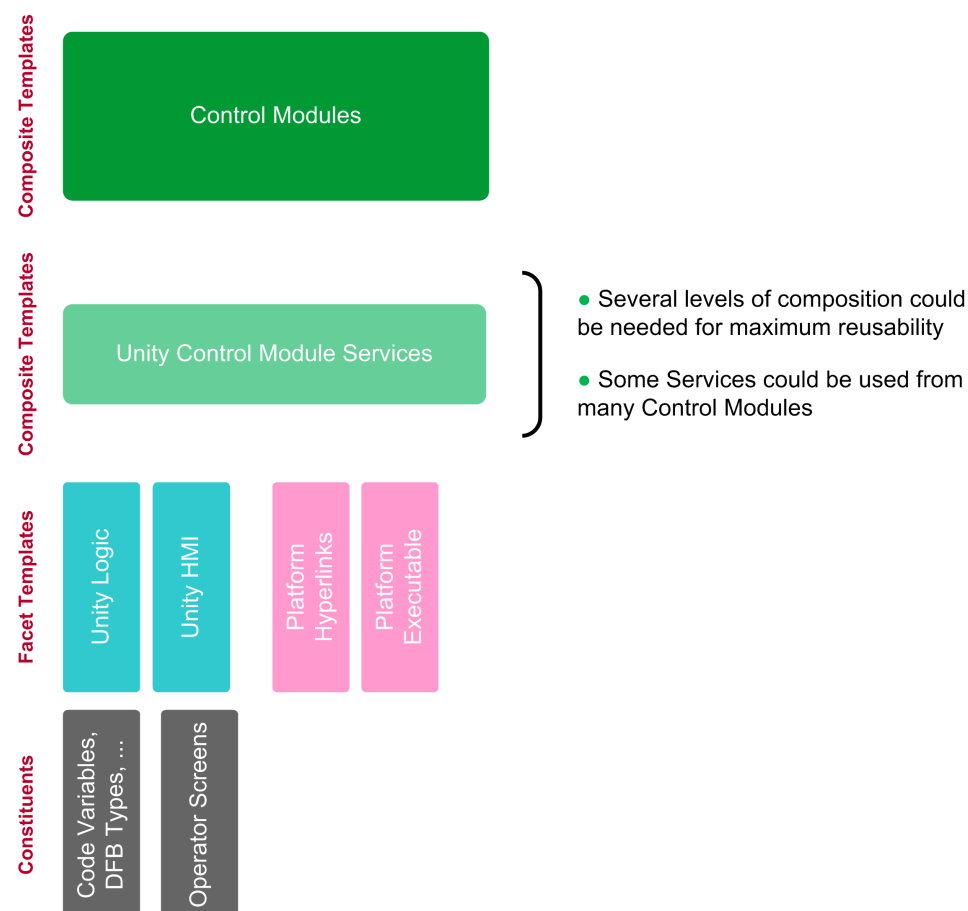
The objective is to provide composite templates which bring the features required for a control module (as defined in ISA-S88) that involves one or more participants when needed. Avoid the use of design composite templates with too many nested levels to avoid big changes propagation and to facilitate their maintainability. The libraries provide facet and composite templates which could be used to create instances or as part of other composite templates. This modular design allows the user to instantiate such templates in a consistent way for creating the application, independent of the participants involved and the required services (optional elements in the composite templates).

The first level of encapsulation is by participant. So, a horizontal approach is implemented. Composite templates offer the functionality from a concrete participant that can be combined for providing the complete functionality expected for a type of control module (that is, Compact).

The following figure shows general composition approach.



The following figure shows resources for application templates.



Exposed Interfaces

The templates expose interfaces that allow you to make the following types of connections:

- To topological instances (mapping interfaces): When the application template requires some data provided by the topological instances (that is, I/O addresses), they are exposed through the mapping interfaces. Such types of interfaces can be used only from facet templates (not from composite templates) as the mapping device is executed from facets assigned to projects.
- To other application instances (application interfaces): The templates offer at least the capability to make the more usual connections between them (that is, Analog Input -> PID -> Analog Output) at the system level when such connections are complex (large amount of data to be shared). This means that you could create some logical connections between instances created directly at the system application.

The General Purpose Library does not offer low level services which enable the user to do the following:

- Make any connection between application instances.
- Replace the services offered by the participants themselves (that is, FBD capabilities to define control logics for implementing Interlocks).

The interface names help you to understand the concrete meaning of the interfaces in their specific scope.

So, even when the interface definition name and the chosen role are determining the data to be exchanged, the name of the interface allows the user to do the following:

- Determines its specific purpose.
- Distinguish between interfaces exposed by the same template which were created from the same interface definition.

Naming Convention

General

A key point for harmonization of the templates is to use a standard naming convention.

The general rules are applied depending on the following type of template being defined:

- Templates
- Application interface models
- Application facet templates
- Application composite templates

Any Types of Templates

The following rules are applied to any type of template:

- Prefix: The character \$ is used as a prefix for templates made by Schneider Electric (Device templates including interface models). This is avoiding any overlap with templates created by other users.

- **Aliases:** The objects model is bringing the possibility to use aliases to hide the origin of the deferred selections, parameters and interfaces. In the General Purpose Library, we are not using such capability. So the user creating references (Definition time) or instances (Instantiation time) will see the real name of the related selections, parameters, and interfaces.
- **Documentation:** Templates need to include references for enabling the access to their related engineering documentation (that is, user manuals). Such documentation needs to be attached to the related function (that is, `ATV6xx` explanation as part of the composite where the Control Logic and the Control HMI facets are encapsulated).
Even when such facets are not explicitly in some of the drawings included in this document, they are considered implicitly as included.
- **Constituent names:** To allow using multiple instances of the same template into the same participant project, it is commonly required to generate unique identifiers. The strategy to be applied is to add suffixes as in EcoStruxure Process Expert (for instance, `P1001_ATV6xx`). That is also confirming the compatibility with previously created resources (that is, Smart Genies for representing the motor implemented through the Control function `ATV6xx`).

NOTE: You can use up to 18 characters while naming.

Verify that the templates are establishing similar suffixes for avoiding the names conflicts. The designed templates force the user to use the same naming convention when creating new composite templates. The designed templates are created by recombining the ones coming from the standard libraries. This device increases their reusability even for the standard templates.

So, the constituents names are calculated by means of bindings by the following rules:

- The root of the constituent names is generated by using the name of the instance entered by the user.
- The suffixes need to be added only when the fact of not using them is creating a name conflict at the template level that is being defined. This means that establishing suffixes need to be delayed as much as possible to the top composition levels.
- The suffixes should follow the naming convention applied in EcoStruxure Process Expert and need to be useful for understanding the role of the constituents in the concrete scenario.

For instance:

- The user creates an instance of the composite template `$ATV6xx` and enters the name `P1001` for it. This is reducing (but not avoiding) names conflicts (in fact, they can be only avoided by the participant in generation time regardless the chosen naming convention).

NOTE: You can use up to 18 characters while naming.

- This name is propagated to encapsulated templates through bindings without any suffixes up to the level where that is causing a conflict (see the example in the next point).
- When combining the Control functionality for controlling the motor (`ATV6xx`) and the **Failures** management (`CONDSUMGP`), it is required to concatenate the related suffixes (`P1001_ATV6xx` and `P1001_CONDSUMGP`) to avoid creation of 2 DFBs with the same name, which is not allowed in Control projects.
- When the facet defines the required constituents for implementing the control part of the object (`ATV6xx`), it is required to concatenate additional suffixes (`P1001_ATV6xx_ST` for the status data, `P1001_ATV6xx_CFG` for the configuration data) for avoiding to create duplicate names.
- In such case, if the user decides to instantiate directly the last mentioned facet template, it provides that no generated objects have duplicate names (into the scope of the instance). The template does not force the user to use the complete naming convention. For instance, `P1001 (ATV6xx)`, `P1001_ST` and `P1001_CFG`; rather than `P1001_ATV6xx`, `P1001_ATV6xx_ST` and `P1001_ATV6xx_CFG` generated when instantiating the template `$ATV6xx`.

Application Interface Models

The objective of Application Interface Modules is to implement the collaboration between participants. As the same interface models can be used for several purposes, their names need to be as generic as possible.

The naming convention is conditioned by the nature of the interface models.

The following types of interface models are considered for the General Purpose Library:

- Elementary interface models: The more elementary interface models are for exchanging just one element of an elementary type (not a nested Interface). These interfaces are for a generic usage as the interface name (the unique identifier) determines the type of the transported data.
- Single element interface models: Interfaces that contain just one element for a specific usage are named as the constituent type from the participant.
- Multiple elements interface models: Interfaces that contain several elements with a common objective. Instead of having several elementary interface models, one new interface model is created with many elements as needed.

The following rules are applied depending on the types as:

- Interface models
- Elementary interface models
- Single element interface models
- Multiple element interface models

Any Types of Interface Models

The following general rules are applied to any interface models:

- Interface model name: Use upper and lowercase for better readability. The exception is when we use names that are directly used by the participant. In such case, the exact name is used.
- Role names:

Definition and references: For example, a template is used for defining some constituents (that is, definition of Control variables) that could be used by one or more similar participants which need to access to such constituents (that is, references to Control variables).

In such case, the role names to be used are:

- Definition: Is for the role in charge of defining the constituents. This role is represented graphically as socket.
- Reference: Is for the role in charge of accessing (it does not matter for which kind of access: read, write, read/write, and so on) to such constituents. This role is represented graphically as plug.

Elementary Interface Models

- Interface model name: The name of the real-time data type being exchanged is directly used for identifying the interface model (that is, \$Bool for exchanging the name of a boolean constituent). It is required to limit the usage of the data being exchanged.

For instance, to a concrete participant, they could be added some suffixes for avoiding. Such interface models could be used outside of its expected scope.

- Element name: The element is identified as name.

Single Element Interface Models

- Interface model name: The name needs to be identical to the type of the data being exchanged as defined in the participant (that is, `CompactGP` for exchanging the name of a Control variable of type `$ATV6xx`).
- Element name: The element is identified as name.

Multiple Element Interface Models

- Interface definition name: The name should reflect the meaning of the set of elements (that is, **CompactGP** for exchanging the names of the OPC items in the Control Logic which are needed for accessing from Supervision).

Application Facet Templates

As much as possible, the name of the facet templates needs to be closer to the name of the encapsulated constituents or elements. As there could be several facet templates addressing the same functionality but from different points of view (for instance, different facet types) of the participant, consider the possibility to add some suffixes for distinguishing them.

- Suffixes: The following suffixes are used for identifying the templates:
 - `_UL` for Control logic facet templates.
 - `_UH` for Control HMI facet templates.
 - `_CD` for Plant SCADA data facet templates.
 - `_CG` for Plant SCADA genie facet templates.
 - `_CR` for Plant SCADA server event facet templates.
 - `_CC` for Plant SCADA client event facet templates.
 - `_PH` for platform Hyper link facet templates.

Application Composite Templates

As the composite templates are used to combine functionality provided by other facet or composite templates, it should reflect the complete functionality being encapsulated.

Basically, there are two use cases:

- Control module: Typically the composite template combines functionality from several participants for representing the complete functionality required for a type of control module (that is, motor 1 speed 1 direction). In such case, the type of control module is abbreviated to determine the name of the template. Use upper and lowercase for maximizing readability (that is, `$ATV6xx`).

- Control module services: The contained functionality is provided by the same participant for covering some services required for implementing one or more types of control modules. In such case, a suffix is added for expressing their scope (that is, the suffix `_UC` for the template `$ATV6xx_UC` is expressing that it encapsulates functionality required from the perspective of the Control control for implementing a Compact).

Suffixes: The following suffixes are used for identifying the templates:

- `_UC` for Control logic composite templates.
- `_UH` for Control HMI composite templates.
- `_CS` for Plant SCADA data composite templates.
- `_CG` for Plant SCADA genie composite templates.
- `_CR` for Plant SCADA server event composite templates.
- `_CC` for Plant SCADA client event composite templates.
- `_CS` for Plant SCADA (data and genie) composite templates.

Common Parameters

Asset and Display

The table describes the asset and display parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Asset	Asset Priority	Enum	Normal (4)	Priority of the asset on a scale of 1 to 5 and 9 where 1 is the highest priority.
	Physical location	String	—	Asset location and properties have no specific impact on the library operation as delivered but are instead available for user or system data.
	Custom 1 (alarm filter)	String	—	User defined properties for the asset as well as each of its alarms. The asset filters allow the asset type to be used to enable rapid filtering of alarm and event data.
	Custom 2 (alarm filter)			
	Custom 3 (alarm filter)			
	Custom 4 (user defined)			User defined Properties for the asset.
	Custom 5 (user defined)			
	Custom 6 (user defined)			
	Custom 6 (user defined)			
Display	Process page name	String	—	Process graphic page name where equipment genie is available.
	Other page names (optional list)			Overview graphic page associated with the equipment.

Inputs (Digital Input)

The table describes the digital input:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Negate signal	Boolean	FALSE	True = Negates the input signal.

Section	Parameter description	Data type	Default value	Additional remarks
	User defined signal conditioning name	String	–	Name used for the generated EFB/DFB and variables.

Outputs (Digital Output)

The table describes the digital output:

Section	Parameter description	Data type	Default value	Additional remarks
Configura-tion	Negate signal	Boolean	<i>FALSE</i>	True = Negates the output signal.
	User defined signal conditioning name	String	–	Name used for the generated EFB/DFB and variables.

Alarm

The table describes the alarm parameters that are applicable to the selected template:

Section	Parameter description	Data type	Default value	Additional remarks
Alarm	Failure description	String	@(<i>Alarm failure</i>)	A detail description for alarms.
	Device failure description	String	@ (<i>device failure alarm</i>)	
	Communication failure description	String	@ (<i>Communica-tion failure alarm</i>)	
	Failure alarm severity	Enum	<i>Low (4000)</i>	It allows to set the criticality of alarm.
	Device failure severity			
	Communication failure severity			
	Failure alarm group	String	<i>Failure</i>	Group name for rapid alarm filtering.
	Device failure group			
	Channel failure group			

Trend

The table describes the local panel that are applicable to the selected template:

Section	Parameter description	Data type	Default value	Additional remarks
Trend	Sample period	Duration	<i>00:00:05</i>	–
	History length (weeks)	Integer	<i>5</i>	–
	History rollover time	Duration	<i>12:00:00</i>	–
	History rollover day	String	<i>Tuesday</i>	–
	Storage type	String	<i>TRN_PERIODIC</i>	–
	Data location (optional)	String	<i>[Data]:</i>	–

Section	Parameter description	Data type	Default value	Additional remarks
	Disable local setpoint value trend	Boolean	FALSE	–
	Disable output value trend			–

Hyperlink Services

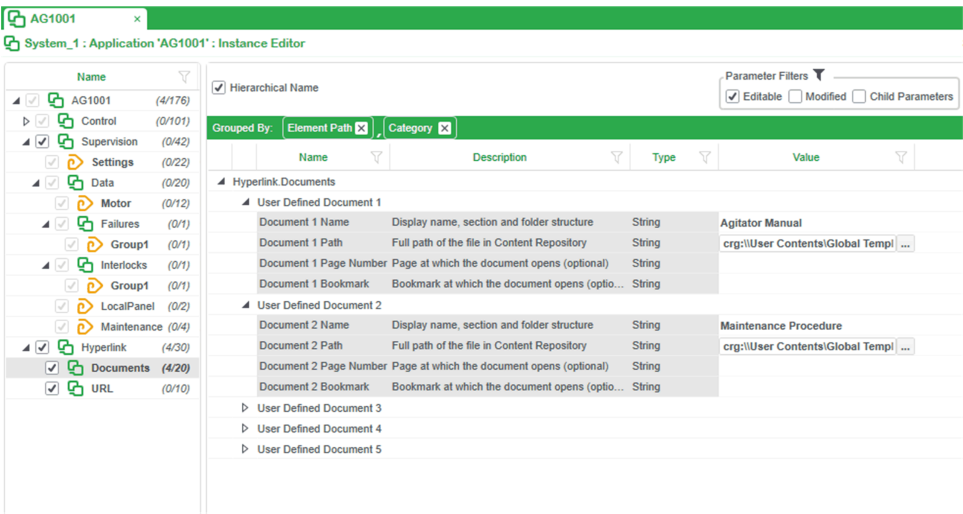
Hyperlink

EcoStruxure Process Expert provides the user links to access documents associated with an asset through the operations client (runtime navigation services). Hyperlinks are defined within the library to provide access to elements configured by the library.

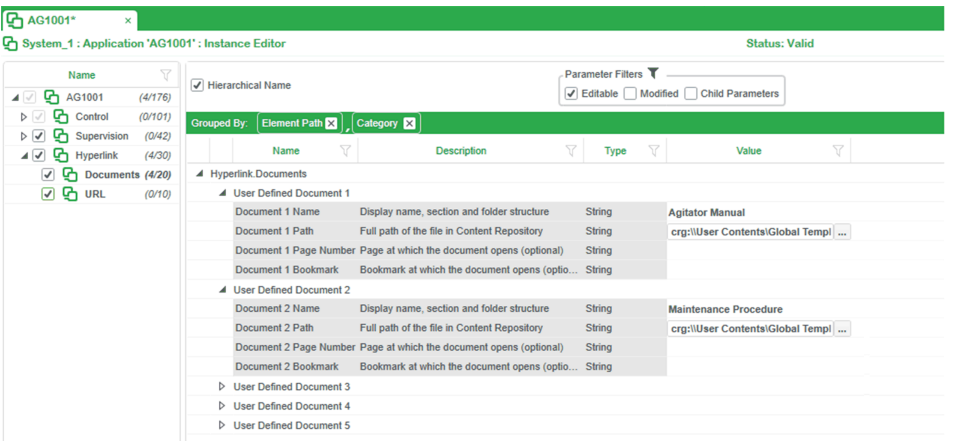
Hyperlinks are also available as a configurable parameters for the user to provide their own links to the documents and web pages such as:

- Equipment Manuals
- Process and Instrumentation Diagrams
- Maintenance Procedures
- Maintenance Requests
- Reports

The following figure depicts the HyperLink configuration to the documentation and web pages:

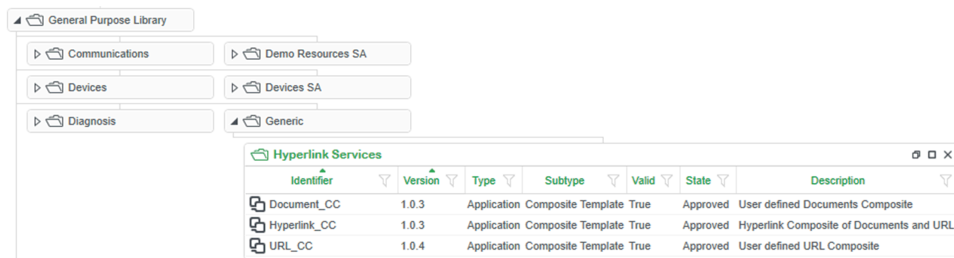


This figure shows the Runtime Navigation to the documentation and web pages:



Hyperlink composites are stored in *Hyperlink* Services folder under *Generic* folder:

This figure shows the Hyperlink services folder:



The screenshot shows a software interface with a left-hand navigation pane and a main content area. The navigation pane has a tree structure with folders: 'General Purpose Library' (expanded), 'Communications', 'Demo Resources SA', 'Devices', 'Devices SA', 'Diagnosis', and 'Generic'. The 'Generic' folder is selected, and its contents are displayed in the main area. The 'Hyperlink Services' folder is expanded, showing a table of services.

Identifier	Version	Type	Subtype	Valid	State	Description
Document_CC	1.0.3	Application	Composite Template	True	Approved	User defined Documents Composite
Hyperlink_CC	1.0.3	Application	Composite Template	True	Approved	Hyperlink Composite of Documents and URL
URL_CC	1.0.4	Application	Composite Template	True	Approved	User defined URL Composite

Control

What's in This Chapter

Function Blocks (DFB) Interface	32
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Overview

The EcoStruxure software provides the resources that have been pre-configured and tested by Schneider Electric and that were specifically designed for automating a large variety of processes.

The control resources for device control provide the common required functions, facilitating the development of control systems.

To automate and simplify the implementation device of control systems, you can use these resources together with tools for code generation and for the synchronization of control and monitoring subsystems.

This document describes the basic concepts and details behind each one of the function blocks (DFBs) for implementing the common cross-device and cross-market EcoStruxure control functions.

Function Blocks (DFB) Interface

Overview

The Control function blocks for devices provide an interface that allows the DFBs to be configured, monitored, and controlled both from the monitoring subsystem and from the control subsystem itself.

The following interfaces are provided:

- Basic Configuration
- Control
- States and Monitoring
- Variables

Basic Configuration

DFB public variables for static and identified data are in engineering time (for example, range for an input channel, refreshing communication variables and so on).

Control

DFB input and output pins:

- enable issuing commands from other program blocks or sections.
- provide the DFB status to allow implementing switching operations (for example, device controlled from HMI/SCADA system, `ExtControlled` output pin), detected error (for example, communication interruption), alarm (for example, thermal trip alarm), and so on.

States and Monitoring

Depending on their types, the DFBs have several input/output pins that need to be connected to variables used to hold either the states of the pins or data. In addition, these variables allow commands and parameters received from the monitoring subsystem to be managed.

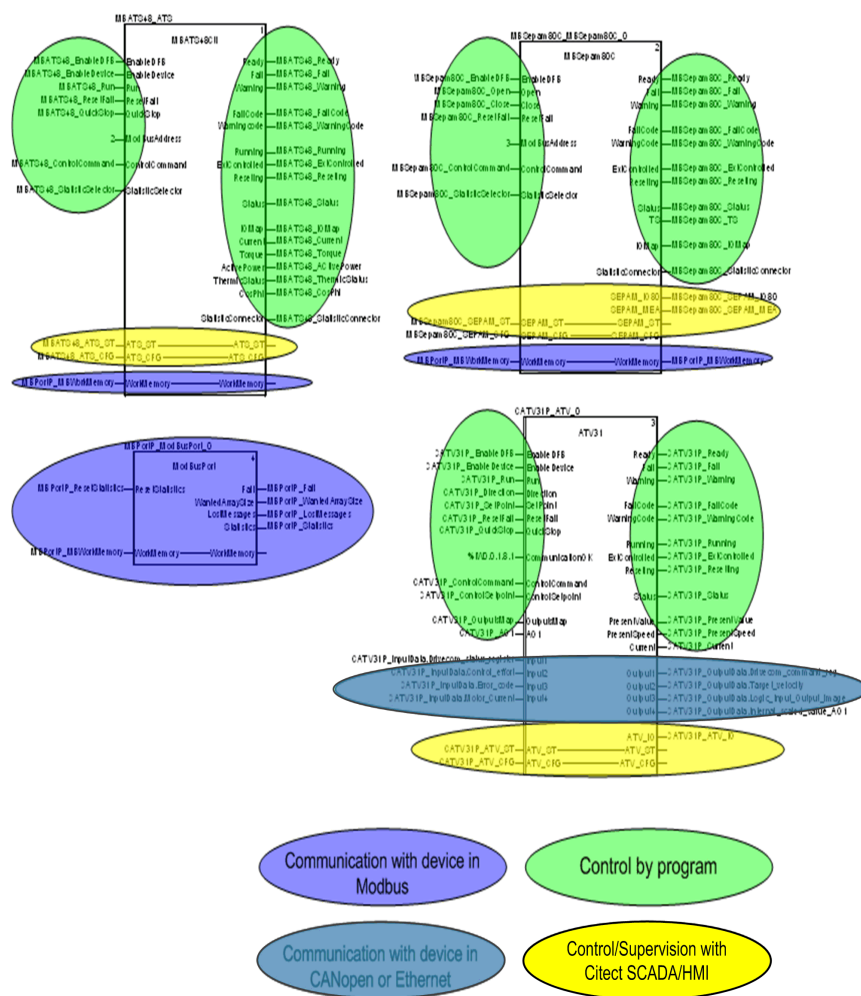
The following variables are considered:

State and control (identified by means of the <code>_ST</code> suffix):	These variables hold the state and control used from the first monitoring subsystem level (dynamic symbols in flowcharts). This variable is an input/output variable.
Configuration and information (identified with the <code>_CFG</code> suffix):	These variables hold second-level information for configuring device control or information parameters (device status and so on). This information is usually accessible from the faceplates of the monitoring subsystem. This variable is an input/output variable.
Status/state of measurements or of device inputs/outputs (identified with <code>_IO</code> , <code>_MEA</code> , or other suffixes):	This information is usually accessible from the faceplates of the monitoring subsystem for digital or analog values. This variable is an output variable and is available depending on the device information and on the communications system (Modbus or Ethernet) being used.

Variables

Variables communicate with devices. If you use components with or Ethernet-based communications, the DFBs have an `Inputs` input DDT and an `Outputs` output DDT to communicate with the actual physical device. Allocate these variables (`%MWX`) to the memory segment reserved for communications so that the device control mechanisms work correctly. When you use Modbus-based communications, use a Modbus port that serializes the requests sent to the devices on the bus (messaging).

Function Block Illustration



Supervision Services

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Supervision Resource Structure	35
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Overview

This chapter describes how the Supervision services of the device control module templates are made available to you through EcoStruxure Process Expert and the embedded Supervision Participant.

Supervision Resource Structure

Types of Resources

The GP_SA_Include project contains the following Supervision resources grouped in libraries:

Symbols	Static graphical elements are supplied as symbol libraries so that you can easily redefine the appearance of Supervision components.
Genies	Dynamic objects are supplied as Supervision genies (in turn, these can be made up of other genies) to represent the dynamic elements that are commonly used in monitoring flowcharts.
Faceplates	Genies are linked to faceplates that allow you to access parameters such as operation, configuration, or maintenance parameters, depending on the function. Faceplates are implemented by using Supervision pages featuring supergenie syntax (refer to the Supervision Participant help for details).
Templates	Template types with various resolutions featuring the standard EcoStruxure Process Expert format.
Cicode	The functions that allow genies and their faceplates to work properly are implemented by using the proprietary Supervision Participant programming language.

Deploying Supervision Resources

When you edit pages, EcoStruxure Process Expert adds the GP_SA_Include project to the Supervision Participant project so that the resources it contains are deployed with the master project.

Access Control

What's in This Chapter

Privilege Levels	36
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Overview

This chapter describes access control functions that are managed by Supervision components.

Privilege Levels

Overview

Supervision components feature access control so that only users having access to the configured area and the required privilege level execute actions on dynamic objects and/or faceplate during operation.

You need to assign privilege levels and areas to users to configure their access permissions depending on the specific requirements of each application.

An Area is configured for each instance. Based on the roles, privilege is assigned to the area. User assigned with the privilege to an area within a role has the view access to that area. However, the user can only operate the system elements in that area who has appropriate privilege. For more detail, refer to Citect SCADA 2018.

The privilege levels are mentioned in the custom 8 fields of the item. It is either a single digit or a two digit number. If it is a single digit number, then the privilege is equivalent to the Citect philosophy, refer to Citect SCADA 2018.

The double-digit privilege level is applicable for write command confirmation.

Default Privilege Levels

By default, the following general criteria are defined to assign privilege levels in Supervision components:

Privilege	Role
0	Viewer
1	Operator
2	Supervisor
3	Maintenance
4	Not used
5	Engineer
6	Not used
7	Administrator
8	Not used

Confirmation

Confirmation operation is applicable to write the command. Write operation is confirmed by adding the second digit to the privilege.

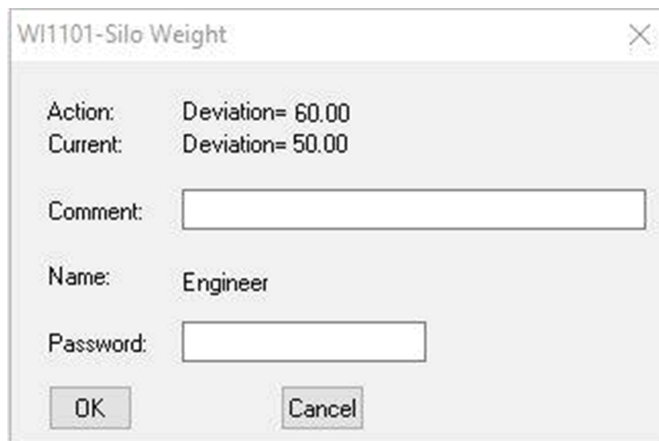
Following are two types of confirmation based on the privilege number:

- Single confirmation
- Double confirmation

Single Confirmation

Confirmation from the currently logged-in user is required. The user has to perform the confirmation operation if the second digit of privilege level is 0. For example, if the privilege level is set to 50 for the item, then the engineer confirmation (5 + 0) are required to perform an operation. This is termed as Engineer (Confirmed), Operator (Confirmed), and so on, based on the privilege level.

Example:



WI1101-Silo Weight

Action: Deviation= 60.00
Current: Deviation= 50.00

Comment:

Name: Engineer

Password:

OK Cancel

In earlier example, a login user is Engineer. when the Engineer changes the deviation limit from 50 to 60 of silo weight, with a popup appears and the Engineer must have to enter the password again to confirm the operation.

Double Confirmation

Confirmation from currently logged-in user and verifier user who has privilege equal to the second digit is required. The user has to perform the confirmation and verify the operation if the second digit of privilege level is not 0. If the privilege level is set to 15 for the item, then the Operator and Engineer (1 + 5) are required to perform operation. This is termed as Operator + Engineer, Operator + Supervisor, and so on, based on the privilege level.

Example:

PIDGP_1-

×

Action: Interlock 1 Condition 1 Bypass=Bypass

Current: Interlock 1 Condition 1 Bypass=Normal

Comment:

Operator

Name: a

Password:

Engineer

Name:

Password:

OK

Cancel

In earlier example, a login user is `Operator`. When the `Operator` changes the deviation limit from `50` to `60` of silo weight, with a popup appears and the `Operator` enters the password again to confirm the operation and `Verifier` needs to enter the password to verify the operation.

Calculated Variable

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Calculated Variable

Overview

A calculated variable allows you to generate an item value at runtime that is the result of a Cicode address and call an internal Cicode function as a variable item.

Operating Owner

Following are the operating owner:

- **Operator:** Control module is operated by the supervision operator.
- **Program:** Control module is operated by the sequential control/equipment module/InBatch.

Owner symbol shows the abnormal operating owner on the genie. Owner symbol displays, if the owner is abnormal.

The table describes the owner calculation:

Owner Enumeration	Owner Symbol	Owner Value	Program Owner = 1	Operator Owner = 1
Operator	O	1	–	Yes
Program	P	2	Yes	–

Owner Function

The table describes the Cicode function to be used based on the available owner (represented by x) in the control module:

Function	Program	Operator
<i>GPL_OwnerBasic</i>	X	X
NOTE: This function is generated based on the instance configuration level.		

Representation of Supervision Data

What's in This Chapter

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Color Codes.....	44

Overview

Genies and faceplates use icons, animations, and other graphic elements to convey information related to control modules, such as values, setpoints, status, or conditions. In particular, color is used to distinguish between types of information or to highlight changes or situations that require action.

This chapter describes the user interface of Supervision components and the color code that is used to represent Supervision data.

Genies

Overview

This section provides general information about the representation of genies that are part of the SGC_Include2 project .

Using Genies

Genie Availability

The SGC_Include2 resource contains a number of genies grouped in libraries that correspond to Supervision functions. For example, the `gpl_devices` library contains nine genies for circuit breakers.

These genies allow monitoring and interact with control modules during operation.

Genies become visible in runtime once you assign them to a Supervision page.

Assigning Genies

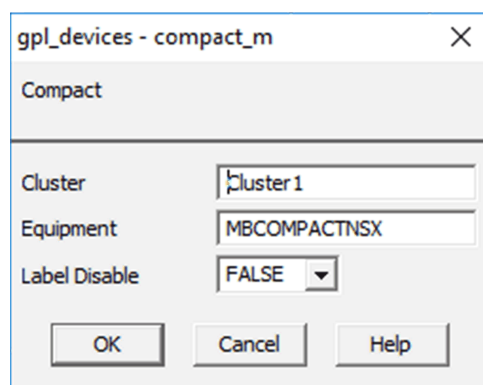
You can assign the genies that are referenced a template to a Supervision page by editing the page, using the **Edit** command.

Genie Properties

Once you have assigned a genie to a page, double-click it to display its properties.

Genies of the GP_SA_Include project have the **Cluster**, **Equipment**, and **Label Disable** properties.

The figure shows an example of the properties dialog box of the `compact` genie:



The table describes the properties of the `compact` genie:

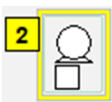

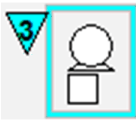

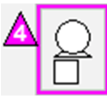







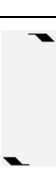




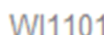
Genie properties	Description
Cluster	Cluster name of the equipment.
Equipment	Equipment name
Label Disable	By default, Label Disable is False, select True if you need to hide the label of an object.

Genie Icons

Description

The table describes the icons that are displayed during an operation:

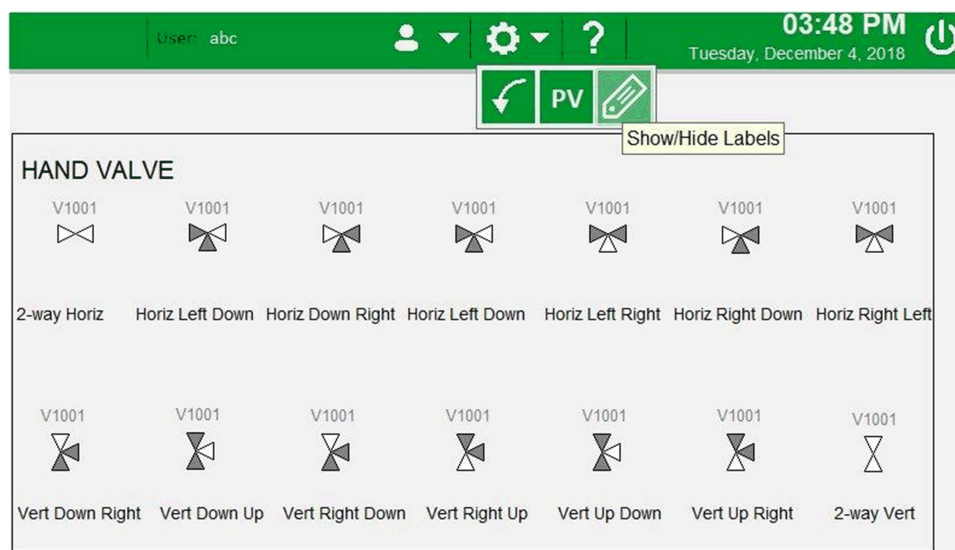
Function	Icon	Meaning	Examples of use	Comment
Displaying owner selection		Program	Valve in Program Owner mode (the program sets the setpoint).	The icon is displayed only if it is not the normal mode.
		Operator	Valve in Operator Owner mode (the operator sets the setpoint).	–
Transitioning		Transitioning state	Valve opening	Active transitioning
			Valve closing	Passive transitioning
Informing of abnormal configuration		The control module is in abnormal configuration.	The control module is in simulation.	Represented on the element that is in .
Requesting operator action		The control module is waiting for an operator action.	A motor needs a reset to start again.	Flashing of the icon if any action required
Error Icon		Inoperable status of the equipment	When motor is inoperable.	The icon is displayed when the motor is in inoperable state.
Displaying alarms		Alarm of priority 1	Very high temperature alarm.	<i>Critical alarm ON unacknowledge</i>
		Alarm of priority 1 returns to normal	–	<i>Critical alarm OFF unacknowledge</i>

Function	Icon	Meaning	Examples of use	Comment
		Alarm of priority 2	High temperature alarm	<i>AlarmBorder high unacknowledge</i>
		Alarm of priority 2 returns to normal	–	<i>AlarmBorder high unacknowledge</i>
		Alarm of priority 3	Function check (Namur status).	<i>AlarmBorder medium unacknowledge</i>
		Alarm of priority 3 returns to normal	–	<i>AlarmBorder medium unacknowledge</i>
		Alarm of priority 4	–	<i>AlarmBorder low unacknowledge</i>
		Alarm of priority 4 returns to normal	–	<i>AlarmBorder low unacknowledge</i>
Indicating alarm level setpoints		Very high	Very high temperature	–
		High	High temperature	–
		Setpoint	Temperature outside of setpoint	–
		Deviation	Temperature outside of deviation	Set-point used as a reference for deviation of alarm evaluation.
		Low	Low temperature	–
		Very low	Very low temperature	–
		End limit	Device value outside of the practical range	–
Displaying trend pens		Present value	–	–
		Output value	–	–
		Setpoint	–	–
		Deviation	–	–
Displaying labels		Label of symbols	–	Only if labels are made visible.

Displaying Genies

Overview

The label that identifies each dynamic object inserted in a page can be shown or hidden during runtime.



NOTE: To hide or show the labels, click **Show/Hide Labels** option on the header of the runtime, when the **Label/Disable** is entered as **FALSE** in the property dialog box of the genie.

Faceplate

Overview

This section provides general information about the representation of faceplate linked to genies.

You can access a faceplate by clicking the genie during operation.

Faceplate allow viewing and controlling the corresponding Control block.

Faceplate Tab Icons

Overview

Faceplate consists of tabs that are grouped according to their functionalities provided by the associated Control block during operation.





Each tab is represented by an icon that you can click to display the information related to it.

Certain tabs are optional, page 45 and become available if the control module features the corresponding element and the element is selected.

NOTE: The order of the tabs in a faceplate can be adapted to suit the application without impact on functionality. The tabs order shown in documentation images may differ from that displayed at runtime to the operator.

Description

The table describes the functions that are available in each tab:


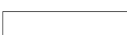

Tab	Icon	Functions	Examples of use
Operation		<ul style="list-style-type: none"> Current status (present value, setpoint, output value) Owner change Operating mode change Resetting Configuration of alarms at control level Local panel monitoring 	<ul style="list-style-type: none"> Operator/program Manual/automatic PID controller setpoint (SP) change in auto mode and output change in manual mode.
Alarm		<ul style="list-style-type: none"> Acknowledgment of alarms Configuration of alarms at supervision level. Navigate to the equipment of the alarm condition. 	Acknowledge alarm
Failure		<ul style="list-style-type: none"> Status of Failures conditions. Bypassing of Failures conditions. Navigate to the equipment of the Failures condition. 	Failures condition of the control module.
Event		Logs the sequence of events	Change of owner

Color Codes

Dynamic Variable Status

Description

The table describes the possible statuses of dynamic variables and the colors that are used to represent them in elements of Supervision components:

Function	Color	Status	Example of use
Discrete module	Grey 	Active	Active running order Active running confirmation Active open valve order Open valve
	White 	Passive	Idle running order Idle running confirmation Active close valve order Closed valve
	Black 	Inconsistency	Open-valve and closed-valve limit switches are active simultaneously
Numeric indicators	400.0	Present value	Current temperature value
	400.0	Setpoint value	Target temperature value
	100.0	Output value	Control valve position

Common Faceplate Tabs

What's in This Chapter

Trend Tab45

Measures Tab46

Alarm Tab47

Event Tab48

Overview

This chapter describes the various tabs that are common to the faceplates of master templates of the library.

Trend Tab

Overview

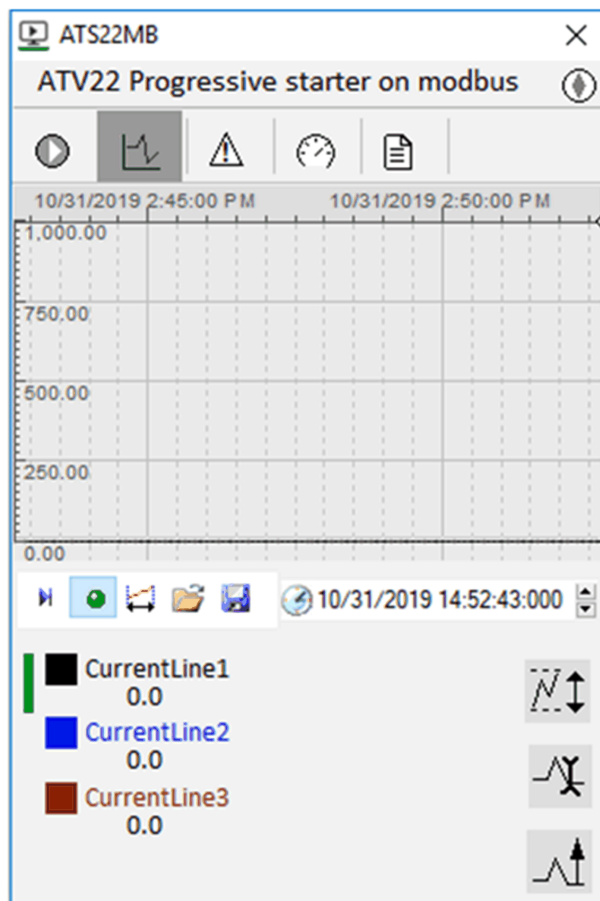
The optional trend tab is available on certain faceplates and provides the following functions depending on the configuration from the EcoStruxure Process Expert:

- Viewing and resetting of individual trend conditions.
- Bypassing of a trend condition.
- Navigation, if configured in the control block.

NOTE: The trend tab is enabled from the EcoStruxure Process Expert at the instance level.

Trend Tab Representation

The figure shows an example of the trend tab with group:



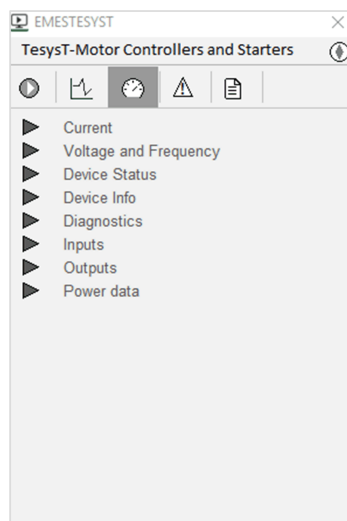
Measures Tab

Overview

The measures tab allows you to observe the status and monitor the current values of parameter groups (such as current, voltage, frequency, device status, diagnostics, etc) from the device.

Measures Tab Representation

The figure shows an example of the Measures tab:



For more details about parameter groups, refer to the **Measures Tab** section in respective supervision chapter.

Alarm Tab

Overview

The alarm tab is available in each faceplate. It shows all the configured and active alarms that are associated with the control module and its children.

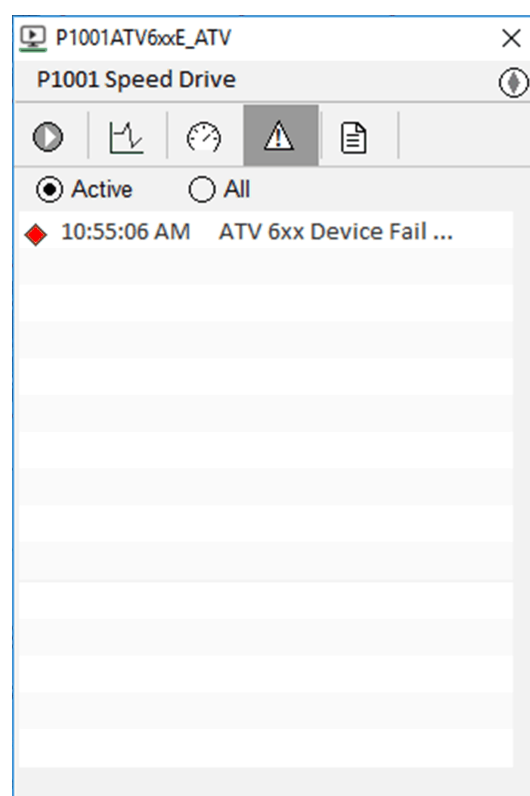
Following are the possible actions:

- Alarm acknowledgment
- Alarm shelving
- Alarm restore
- Navigation to the equipment link with the alarm.

NOTE: Navigate option is available for associated children alarms.

Alarm Tab Representation

The figure shows an example of the alarm tab:



You can select one of the following alarms:

- **Active:** Active alarms associated control module.
- **All:** Configured alarms of the control module.

Alarm Order

The alarms in the alarm tab are sorted based on the following order:

- Alarm Unacknowledged + Active
- Alarm Unacknowledged + Inactive
- Alarm Acknowledged + Active

NOTE:

- The order of displaying an alarm in each state is based on the priority (critical to low).
- The same priority and same state alarms are sorted based on the descending time order.

Abnormal condition

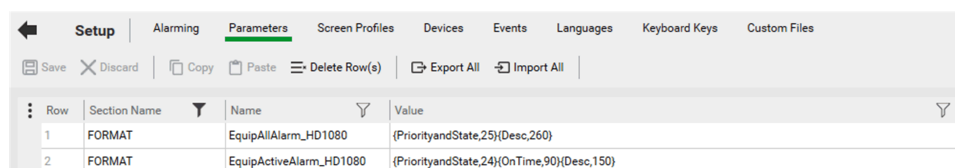
If any alarm of the control module is in a shelved state, then the abnormal condition is displayed on the alarm tab with the orange abnormal indication.

Action Required Condition

If any alarm of the control module is in an unacknowledged state, then action required condition is displayed on the alarm tab with flashing orange abnormal indication.

Adding a Priority and State Column to an Alarms List

You can manage the display format of an alarm list details by changing the **Value** field in **Parameters** tab in the **Setup** of Citect project, as shown in the figure.



Row	Section Name	Name	Value
1	FORMAT	EquipAllAlarm_HD1080	{PriorityandState,25}{Desc,260}
2	FORMAT	EquipActiveAlarm_HD1080	{PriorityandState,24}{OnTime,90}{Desc,150}

To add a priority and state to an alarms list, you need to add the `{PriorityAndState}` in the **Value** field of **Parameters** of Citect project.

For example, to display the priority and state symbol in the first column, alarm generated time in the second, and description of alarm in the third column of alarm list for Active alarm, the `FORMAT` and `DefaultGPLEquipActiveAlarm_HD1080` are used as a project database parameter and the Active alarm list format (**Value**) is `{PriorityandState,24}{OnTime,90}{Desc,150}`.

Similarly, to display the priority and state symbol in the first column and description of alarm in the second column of alarm lists for All alarm, the `FORMAT` and `DefaultGPLEquipAllAlarm_HD1080` are used as a project database parameter and the All alarm list format (**Value**) is `PriorityandState,25}{Desc,260}`.

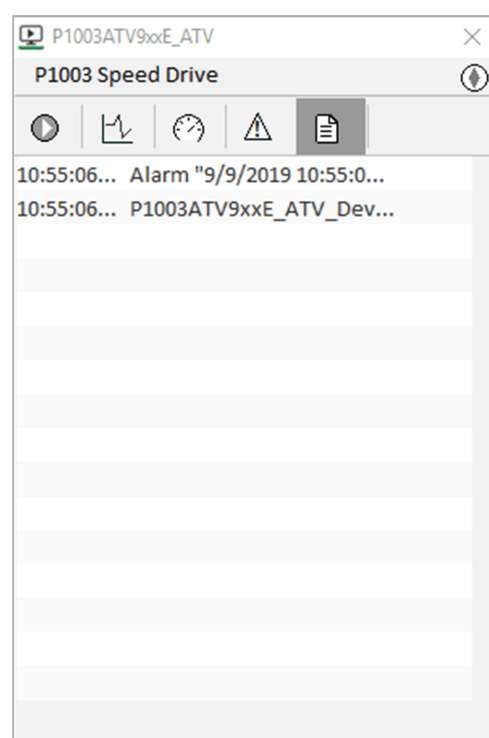
Event Tab

Overview

The event tab is available in each faceplate. It logs the sequence of events associated to each alarm.

Event Tab Representation

The figure shows an example of the event tab:



Circuit Breakers


What's in This Part

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Overview

This part provides the functionality of the templates, a detailed description of the control (functions,pins, pin layout, and variables of the function blocks), and the supervision functions of circuit breakers.

These components do not reflect any specific installation.

 **WARNING**

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

Compact

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Overview

This chapter describes the components that provide the functionality of template, control services, and Supervision functions of the circuit breakers.

Template

Overview

This section describes functionality of the `$CompactNSXMBUGP` template.

Description

General Description

The `$CompactNSXMBUGP` control module template allows you to manage CompactNSX circuit breakers on a modbus network.

Function Description

The main functions of the template are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Open/close	Allows circuit breaker to open and close.
Monitoring	Allows the device measurement data to be monitored.

Parameters

Parameters

The `$CompactNSXMBUGP` template is the control function to manage compact electrical protection circuit breakers.

Control

The following table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	False - Manual reset, True - Automatic reset	Boolean	FALSE	It allows you to reset detected error in both modes (auto and manual). By default, selection mode is manual mode.
	IFM modbus address	Short	0	Address of modbus device.
	Password for command execution	String	—	Password required to access template.
Time	Time window for the device to execute orders	Duration	00:00:05	Time the device takes to execute commands.
	Minimum time to maintain the warning signal		00:00:03	The time duration for which the alert pin signal remains 1.
	Maximum time between two auto reset of the DFB.		00:01:00	The maximum time between two automatic resets of the template.
	Time to refresh the cyclic data.		00:00:00-.5	Time the device takes to refresh the cyclic data.

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	Program (1)	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	Operator (1)	Privilege to change override mode. This parameter is used in operator tab, page 71.
	Set rearm		Operator (Confirmed) (10)	Privilege to change reset. This parameter is used in operator tab, page 71.
	Set acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Trend	Sample period	Duration	00:00:05	—
	History length (weeks)	Integer	5	—
	History rollover time	Duration	12:00:00	—
	History rollover day	String	Tuesday	—
	Storage type		TRN_PERIODIC	—
	Data location (optional)		[Data];	—

Data

The following table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional remarks
CompactNSXBasic				
Alarm	Alarm failure description/ Device failure alarm description/Communication failure alarm description	String	@(Alarm Failure)/@(Device Failure Alarm)/@(Communication Failure Alarm)	—
	Alarm failure alarm severity/ Device failure alarm severity/ Communication failure alarm severity	Enum	Low(4000)	—
	Alarm failure alarm group/ Device failure alarm group/ Communication failure alarm group	String	Failure	—
Historize	Enable historize data word	Boolean	FALSE	—
	Enable historize warning code			—
	Enable historize warning order code			—
	Enable historize fail code			—
	Enable historize info word			—
CompactNSXMEA				
Variable Tag Disable	Disable currentL1, currentL2 and currentL3	Boolean	FALSE	—
	Disabled residual current			—
	Disabled trip counter			—
	Disabled trip cause			—
Historize	Enable historize current line 1, current line 2 and current line 3	Boolean	FALSE	—
	Enable historize residual current			—
	Enable historize trip counter			—
	Enable historize tripping cause			—
CompactNSXMEAExt				
Configuration	Frequency deadband value	Integer	0	—
	Voltage 1 deadband value			—
	Voltage 2 deadband value			—
	Voltage 3 deadband value			—
	Voltage U21 deadband value			—
	Voltage U32 deadband value			—
	Voltage U13 deadband value			—
	Active power deadband value			—
	Reactive power deadband value			—
	Apparent power deadband value			—
	Active power line 1 deadband value			—
	Active power line 2 deadband value			—

Section	Parameter description	Data type	Default value	Additional remarks
	Active power line 3 deadband value			–
	Reactive power line 1 deadband value			–
	Reactive power line 2 deadband value			–
	Reactive power line 3 deadband value			–
	Apparent power line 1 deadband value			–
	Apparent power line 2 deadband value			–
	Apparent power line 3 deadband value	Integer	0	–
	CosPhi deadband value			–
	Active energy deadband value			–
	Positive active energy deadband value			–
	Negative active energy deadband value			–
	Reactive energy deadband value			–
	Positive reactive energy deadband value			–
	Negative reactive energy deadband value			–
	Apparent energy deadband value			–
Variable Tag Disable	Disable frequency	Boolean	FALSE	–
	Disable voltage U21			–
	Disable voltage U32			–
	Disable voltage U13			–
	Disable voltage V1			–
	Disable voltage V2			–
	Disable voltage V3			–
	Disable total active power			–
	Disable total reactive power			–
	Disable total apparent power			–
	Disable active power L1			–
	Disable active power L2			–
	Disable active power L3			–
	Disable reactive power L1			–
	Disable reactive power L2			–
	Disable reactive power L3			–
	Disable apparent power L1			–
	Disable apparent power L2	Boolean	FALSE	–
	Disable apparent power L3			–
	Disable CosPhi variable			–
	Disable active energy			–

Section	Parameter description	Data type	Default value	Additional remarks
	Disable reactive energy			—
	Disable apparent energy			—
	Disable positive active energy			—
	Disable negative active energy			—
	Disable positive reactive energy			—
	Disable negative reactive energy			—
Historize	Enable historize voltage U21	Boolean	FALSE	—
	Enable historize voltage U32			—
	Enable historize voltage U13			—
	Enable historize voltage 1			—
	Enable historize voltage 2			—
	Enable historize voltage 3			—
	Enable historize frequency			—
	Enable historize total active power			—
	Enable historize total reactive power			—
	Enable historize total apparent power			—
	Enable historize active power line 1			—
	Enable historize active power line 2			—
	Enable historize active power line 3			—
	Enable historize reactive power line 1			—
	Enable historize reactive power line 2			—
	Enable historize reactive power line 3			—
	Enable historize apparent power line 1			—
	Enable historize apparent power line 2			—
	Enable historize apparent power line 3			—
	Enable historize CosPhi			—
	Enable historize active energy			—
	Enable historize positive active energy			—
	Enable historize negative active energy			—
	Enable historize reactive energy			—
	Enable historize positive reactive energy			—

Section	Parameter description	Data type	Default value	Additional remarks
	Enable historize negative reactive energy			—
	Enable historize apparent energy			—
CompactNSXMEAExt1				
Configuration	Threshold voltage line 1 to line 2 deadband value	Integer	0	—
	Threshold voltage line 2 to line 3 deadband value			—
	Threshold voltage line 1 to line 3 deadband value			—
	Threshold voltage line 1 to neutral deadband value			—
	Threshold voltage line 2 to neutral deadband value			—
	Threshold voltage line 3 to neutral deadband value			—
	Threshold current line 1 deadband value			—
	Threshold current line 2 deadband value			—
	Threshold current line 3 deadband value			—
Variable Tag Disable	Disable threshold voltage L1 to L2	Boolean	FALSE	—
	Disable threshold voltage L2 to L3			—
	Disable threshold voltage L1 to L3			—
	Disable threshold voltage L1 to neutral			—
	Disable threshold voltage L2 to neutral			—
	Disable threshold voltage L3 to neutral			—
	Disable threshold current L1			—
	Disable threshold current L2			—
	Disable threshold current L3			—
Historize	Enable historize threshold voltage line 2 to line 1	Boolean	FALSE	—
	Enable historize threshold voltage line 2 to line 3			—
	Enable historize threshold voltage line 1 to line 3			—
	Enable historize threshold voltage line 1 to neutral			—
	Enable historize threshold voltage line 2 to neutral			—
	Enable historize threshold voltage line 3 to neutral			—
	Enable historize threshold current line 1			—
	Enable historize threshold current line 2			—
	Enable historize threshold current line 3			—

Asset and Display Parameters

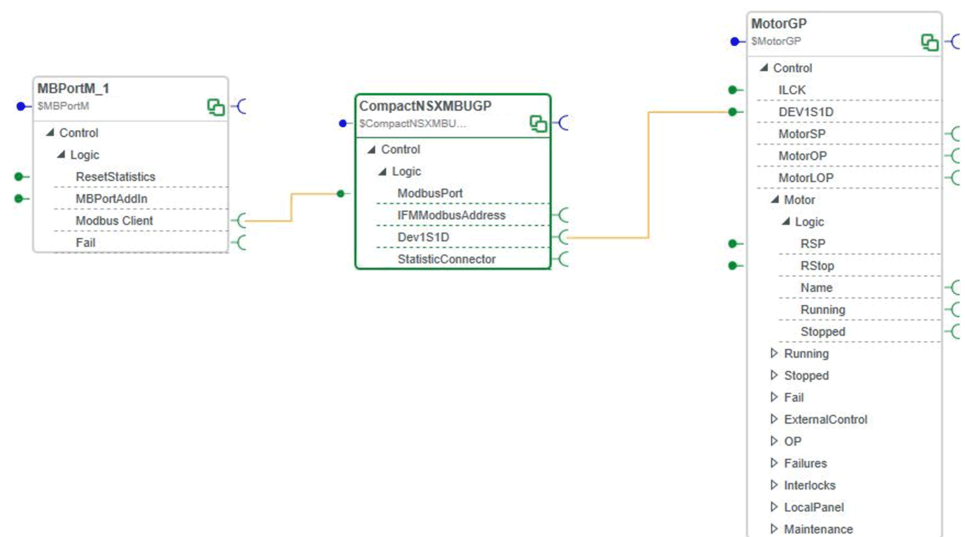
For more details, refer to the topic describing the parameters of asset and display, page 28.

Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

This figure shows the compact template (also applicable for \$CompactNSXMBUCE) as it appears in Links Editor and an example of other templates connected to it:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
ModbusPort	<i>\$MBWorkMemory/Client</i>	An input interface from MBPortM to define the memory area to talk with the modbus port	Connect MBPortM
IFMMModbusAddress	<i>\$UInt/Def</i>	An output interface to other template	—
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control
StatisticConnector	<i>\$StatisticConnector-NameGP/Def</i>	An output interface to other template provides the Information used with modbus communication to obtain statistics on the modbus network	—

Control

Overview

This section describes the COMPACT DFB.

Description

General

The COMPACTNSX profile is the control function to manage Compact NSX electrical protection circuit breakers.

NOTE: EMCOMPACTNSX and MBCOMPACTNSX are deprecated control functions.

Function Description

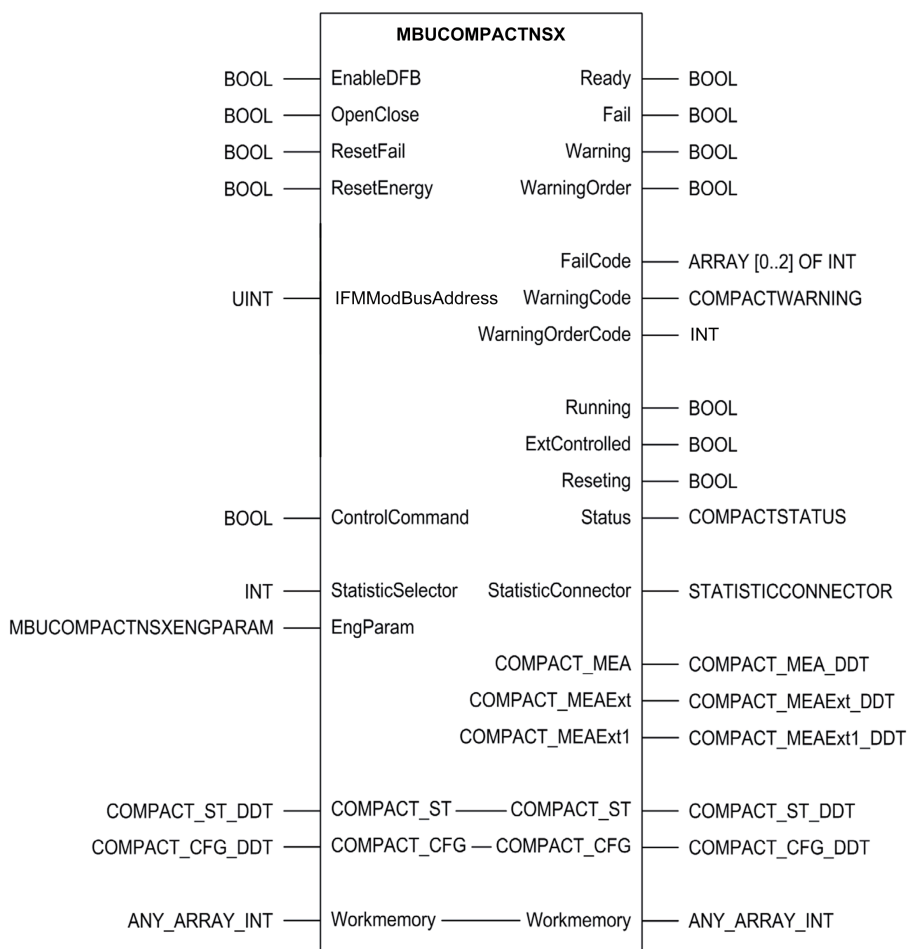
The main functions of the DFB are described in the following table:

Function	Description
Remote Resetting	Allows resetting of the device.
Open/Close	Allows circuit breaker to open and close.
Monitoring	Allows the device measurement data to be monitored.

DFB Representation

Representation

The following figure represents the function module of MBUCOMPACTNSX profile:



NOTE:

- If `IFModbusAddress` is not configured then default value of 255 is considered.
- For how to create project using CompactNSX circuit breakers, refer to Communication technologies, page 446.

Inputs

Input Parameter Description

Name	Data type	Description
EnableDFB	BOOL	<p>This input enables the normal execution of the control block.</p> <ul style="list-style-type: none"> • 0 = The entire DFB is restarted (statuses, output values, counters are lost) and output values are set to 0. • 1 = Enables communications with the devices for their operation. <p>Public variable values are loaded during the first enabling cycle.</p>
OpenClose	BOOL	<p>This input controls the circuit breaker.</p> <ul style="list-style-type: none"> • Rising edge on pin = Closes the circuit breaker. • Falling edge on pin = Opens the circuit breaker.
ResetFail	BOOL	<p>1 = Resets the detected <code>Fail</code> output parameter to 0 or in case of inoperable device, sends a reset command to the device if <code>ControlCommand</code> is 1.</p>
ResetEnergy	BOOL	<p>Rising edge resets energy registers to default values on CompactNSX.</p>
ModbusAddress ¹	INT	<p>Device address within the modbus network.</p> <p>You can find this variable in modbus communications.</p>
IFModbusAddress ²	UINT	<p>Modbus address of the IFM Module.</p>
DeviceAddress ³	Platform	IP Addressing DeviceAddress (variable)
	M340	'{IP}ID'
	M580	'{IP}ID'
	Quantum	'{IP}ID'
	NOTE: ID is 255	
ControlCommand	BOOL	<p>Indicates to the DFB whether the Compact NSX is being controlled locally or from a source external to the DFB.</p> <ul style="list-style-type: none"> • 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. <p>NOTE: This pin configuration does not impact the Compact unit.</p>
StatisticSelector	INT	<p>Variable used to obtain statistics for the modbus network (requests carried out, time between requests, and so on). This data provides information for using <code>StatisticConnector</code> pin within the <code>StatisticCounter</code> DFB in General Purpose library for communication.</p> <p>The following table displays the <code>StatisticSelector</code> value:</p>

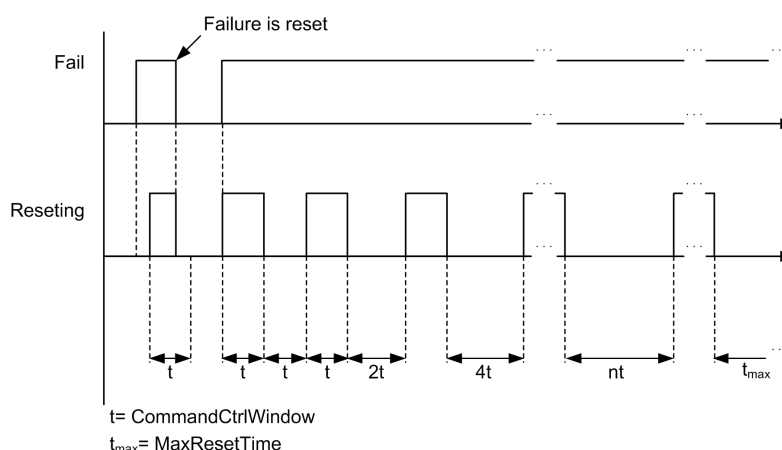
Name	Data type	Description
	Variable Value	Description
	1	Read statistics, client.
	2	Write statistics, client.
EngParam ²	MBUCOMPACTNS-XENGPARAM	Engineering parameters.
¹ : Parameter available only for <i>MBCompactNSX</i> . ² : Parameter available only for <i>MBUCompactNSX</i> . ³ : Parameter available only for <i>EMCompactNSX</i> .		

EngParam

Name	Data type	Description
CommandCtrlWindow	TIME	<p>Control time for operations. This is the time that the block waits for the operations to be carried out by the device.</p> <p>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.</p> <p>The commands controlled are <code>Open</code> and <code>Close</code>. In the event of a <code>ResetFail</code>, this is not interpreted as an alarm. Instead, the detected failure continues, and you have to reset the <code>Resetting</code> output (to <code>FALSE</code>).</p>
Refresh	TIME	<p>Refresh time for device data on serial modbus communications.</p> <p>NOTE: This refresh operation is carried out on read variables. Write requests are carried out when required and have maximum priority.</p>
ScanTime	TIME	<p>Allows you to configure the time for which the alarm signals are kept active.</p> <p>Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset.</p>
Password	STRING	<p>Password is made up of 4 ASCII bytes and is sent internally before executing certain commands. If the password is incorrect, it returns <code>WarningOrder</code> to point this out.</p>
ResetMode	BOOL	<p>Enables to configure the type of reset. This type of reset is used for communication interruption and inoperable device.</p> <p>The time defined in <code>CommandCtrlWindow</code> is used to define the interval after which a reset needs to be carried out. The first reset is carried out after the time defined in <code>CommandCtrlWindow</code> elapses. The second reset is carried out after <code>CommandCtrlWindow * 2</code> elapses, so on. If the value of <code>CommandCtrlWindow</code> is 0 s, its value is not used and is instead replaced with a value of 1 s.</p> <p>The following table describes the type of the reset:</p>
	Variable Value	Description
	FALSE	Communications are/the device is reset with the <code>ResetFail</code> variable.
	TRUE	Communications are/the device is reset automatically.
ResetMinMax	INT	Resets registers to its minimum/maximum values.

Name	Data type	Description
MaxResetTime	TIME	When in automatic ResetMode, this variable is used to define the maximum time that can elapse between 2 consecutive resets. Refer to the Timing diagram below.
Scalefactor	REAL	Scale factor for Masterpact NT/NW and Compact NS Micrologix 5.0, 6.0 Or 7.0 trip units is 1. Scale factor for Compact NSX Micrologix 5.2, 5.3, 6.2, 7.2 or 7.3 trip units is 10.

Timing diagram:



Outputs

Output Parameter Description

Name	Data type	Description
Ready	BOOL	1 = The device is enabled and free of detected errors. This variable is TRUE as long as there are no communication interruptions and the device has not tripped.
Fail	BOOL	1 = A detected error in the control block or in the device or communication interruption. To reset the detected Fail output pin, the ResetFail input has to be activated. The last detected error code is shown on FailCode. NOTE: If a communication interruption occurs, the variables being read from the device ceases to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.
Warning	BOOL	1 = An alarm has been activated for the device. It does not affect the block operation and does not need to be reset. This signal remains active until the cause of the alarm disappears.
WarningOrder	BOOL	1 = The device has returned an alarm condition as the result of having executed a command. It does not affect the block operation and does not need to be reset. This signal remains active until a different command that ends without an alarm condition is executed.
FailCode	ARRAY [0..2] OF INT	When the detected Fail output is 1, it holds the code for the detected error. If the detected Fail bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3-level structure. Refer to Diagnostic Information Management, page 69 for more details.
WarningCode	COMPACTNSXWARNING	Variable holds the alarm code. The following table describes the WarningCode information:

Name	Data type	Description	
	Parameter	Type	Description
	Alarm201	BOOL	1 = User-defined alarm 201.
	Alarm202	BOOL	1 = User-defined alarm 202.
	Alarm203	BOOL	1 = User-defined alarm 203.
	Alarm204	BOOL	1 = User-defined alarm 204.
	Alarm205	BOOL	1 = User-defined alarm 205.
	Alarm206	BOOL	1 = User-defined alarm 206.
	Alarm207	BOOL	1 = User-defined alarm 207.
	Alarm208	BOOL	1 = User-defined alarm 208.
	Alarm209	BOOL	1 = User-defined alarm 209.
	Alarm210	BOOL	1 = User-defined alarm 210.
	LongTimeProtection	BOOL	1 = Long delay protection prealarm (PAL Ir).
	EarthLeakage	BOOL	1 = Differential protection prealarm (Vigi) (PAL lΔn).
	GroundFault	BOOL	1 = Ground fault protection prealarm (PAL Ig).
	LongTimePickup	BOOL	1 = Protection prealarm.
	Reserved	BOOL	—
	Reserved2	BOOL	—
WarningOrderCode ¹	COMPACTNSXWARNINGORDER	<p>Variable holds the alarm code returned as the result of executing a command. Commands can generate the following diagnostic codes. These codes are returned in word 8020.</p> <p>The following table describes the WarningOrderCode information:</p>	
	Parameter	Type	Description
	Order	BOOL	1 = A follow-up alarm. The device is not responding to the control command within the time specified in CommandCtrlWindow.
	WrongPassword	BOOL	1 = Insufficient user permissions (incorrect password).
WarningOrderCode ¹	MbPadLocked	BOOL	1 = Access violation (the padlock for the modbus communications interface module is locked).
	InternalWarning	BOOL	1 = Any other positive detected error code represents an internal detected error.
	OutOfOrder	BOOL	1 = The BSCM module is out of service.
	NeedReset	BOOL	1 = The circuit breaker has tripped. It has to reset before the command.
	AlreadyClosed	BOOL	1 = The circuit breaker is already closed.
	AlreadyOpen	BOOL	1 = The circuit breaker is already open.
	AlreadyReset	BOOL	1 = The circuit breaker is already reset.
	ManualMode	BOOL	1 = The control is in Manual mode. Remote commands are not permitted.
	NotPresent	BOOL	1 = No control present.
	InProgress	BOOL	1 = A previous command is still being executed.
	ResetForbidden	BOOL	1 = The reset command is prohibited when SDE has been established.
WarningOrderCode ²	INT	Detected alert order register for Compact circuit breakers.	
	Parameter	Value	Description
	OrderUnsuccessful	1	Order unsuccessful
	WrongPassword	2	Insufficient user rights (incorrect password)

Name	Data type	Description	
	ManualMode	4	Manual mode
	AlreadyClosed	13	Already closed
	AlreadyOpen	14	Already open
	AlreadyReset	15	Already reset
	ResourceNotPresent	16	Actuator not present
	InhibitModeOn	17	Inhibit mode on
	OutOfOrder	18	Resource is out of order
	NeedReset	19	Need reset
	InProgress	20	In progress
	ResetForbidden	21	Reset forbidden
	IFMPadlocked	22	IFM locking pad is locked
Running	BOOL	1 = The Compact unit is closed.	
ExtControlled	BOOL	<p>1 = The device is being controlled from a source external (for example, from the console, from a push button panel, or from the monitoring system) to the system.</p> <p>NOTE: To calculate the state of this signal, use the <code>ControlCommand</code> signal and the <code>Owner</code> variable. You cannot use this signal as a <code>ControlCommand</code> input.</p>	
Reseting	BOOL	<p>1 = A reset is being carried out.</p> <p>The <code>CommandCtrlWindow</code> variable indicates the maximum time for resetting the detected error.</p> <p>When a device or communication reset is carried out with <code>ResetFail</code>, the DFB tries to reset the detected error within the time period defined in <code>CommandCtrlWindow</code>.</p> <p>If the detected error is reset, the detected <code>Fail</code> and <code>Reseting</code> output variables are reset (set to FALSE). On the other hand, if the detected error is not reset, the <code>Reseting</code> variable is set to FALSE and the detected <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based.</p> <p>Refer to the Timing diagram below.</p>	
Status	COMPACTSTATUS	<p>The structure holds data containing the information that the block extracts from the status variable of the circuit breaker and communicating electrical drive.</p> <p>The following table describes the status information:</p>	
	Parameter	Type	Description
	Open	BOOL	<p>OFF state.</p> <p>1 = The circuit breaker is open.</p>
	Closed	BOOL	<p>ON state.</p> <p>1 = The circuit breaker is closed.</p>
	Trip	BOOL	<p>SD trip signal.</p> <p>0 = Not tripped.</p> <p>1 = The circuit breaker has tripped due to an inappropriate electrical condition or a leakage-caused trip.</p>
	TripElec	BOOL	<p>Detected fault trip signal - SDE.</p> <p>0 = Not tripped.</p> <p>1 = The circuit breaker has tripped due to an inappropriate electrical condition.</p>
	NotAvailable	BOOL	<p>Availability of device status value.</p> <p>0 = Status available</p> <p>1 = Status not available due to device internal detected error.</p>

Name	Data type	Description		
	Info	INT	Device status. Refer to Info table.	
	MotorAvailable	BOOL	Availability of motor mechanism. 0 = Not available 1 = Available	
	MotorMode	BOOL	Motor operating mode. 0 = Manual 1 = Auto	
	Reserved	BOOL	–	
	Reserved2	BOOL	–	
	Reserved3	BOOL	–	
StatisticConnector	STATISTICCONNECTOR	Information used with modbus communication to obtain statistics on the modbus network (requests carried out, time between requests, and so on). This structure has been created to use together with the StatisticCounter DFB in General Purpose library for communication. The following table describes the StatisticConnector:		
	Parameter	Type	Description	
	Start	BOOL	1 = Operation has started.	
	EndOk	BOOL	1 = Operation has ended correctly.	
	EndNOk	BOOL	1 = Operation has ended with a detected error.	
	PartialTime	DINT	Partial time.	
COMPACT_MEA	COMPACT_MEA_DDT	Data structure with measurement information. Whether this data is available depending on the specific Micrologic model: A= Ammeter, E=Energy, M=Motor, 30/31/40/41=Type of system (W3313; refer to the <i>Communication Manual</i> for the Compact unit). The following table describes the COMPACT_MEA_DDT type:		
	Parameter	Availability	Type	Description
	CurrentI1	A/E/M	REAL	Current, instantaneous, phase 1.
	CurrentI2	A/E/M	REAL	Current, instantaneous, phase 2.
	CurrentI3	A/E/M	REAL	Current, instantaneous, phase 3.
	ResidualCurrentIN	A/E, 30/41	REAL	Current, instantaneous, N.
	TrippingCause	–	INT	–
	OverrunAlarms	–	INT	–
	PreAlarms	–	INT	–
	UserAlarms	–	INT	–
	TripCounter	–	INT	–
COMPACT_MEExt	COMPACT_MEExt_DDT	Data structure with extended measurement information. Whether this data is available depending on the specific Micrologic model: E, P, H. The following table describes the COMPACT_MEExt_DDT type:		
	VoltageU21	E/M	REAL	Voltage, phases 1-2.
	VoltageU32	E/M	REAL	Voltage, phases 2-3.
	VoltageU13	E/M	REAL	Voltage, phases 1-3.
	VoltageV1	E, 40/41	REAL	Voltage, phase 1-N.
	VoltageV2	E, 40/41	REAL	Voltage, phase 2-N.
	VoltageV3	E, 40/41	REAL	Voltage, phase 3-N.

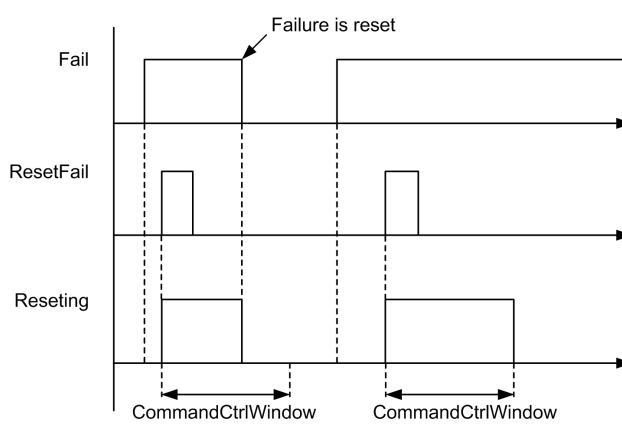
Name	Data type	Description		
	Frequency	E/M	REAL	Frequency (derived from phase 1).
	TotalActivePower	E/M	REAL	Total real power.
	TotalReactivePower	E/M	REAL	Total reactive power.
	TotalApparentPower	E/M	REAL	Total apparent power.
	ActivePowerL1	E, 30/41	REAL	Real power, phase 1.
	ActivePowerL2	E, 30/41	REAL	Real power, phase 2.
	ActivePowerL3	E, 30/41	REAL	Real power, phase 3.
	ReactivePowerL1	E, 30/41	REAL	Reactive power, phase 1.
	ReactivePowerL2	E, 30/41	REAL	Reactive power, phase 2.
	ReactivePowerL3	E, 30/41	REAL	Reactive power, phase 3.
	ApparentPowerL1	E, 30/41	REAL	Apparent power, phase 1.
	ApparentPowerL2	E, 30/41	REAL	Apparent power, phase 2.
	ApparentPowerL3	E, 30/41	REAL	Apparent power, phase 3.
	CosPhi	E/M	REAL	Cos phi power factor.
	ActiveEnergy	E/M	REAL	Real power consumption.
	ReactiveEnergy	E/M	REAL	Reactive power consumption.
	ApparentEnergyTotal	E/M	REAL	Total apparent power consumption.
	PositiveActiveEnergy	E/M	REAL	Positive real power Ea+ (kWh).
	NegativeActiveEnergy	E/M	REAL	Negative real power Ea- (kWh).
	PositiveReactiveEnergy	E/M	REAL	Positive reactive power Er+ (kVARh).
	NegativeReactiveEnergy	E/M	REAL	Negative reactive power Er- (kVARh).
COMPACT_MEAEExt1	COMPACT_MEAEExt1_DDT	Data structure with extended measurement information. Whether this data is available depending on the specific Micrologic model: P, H. The following table describes the COMPACT_MEAEExt1_DDT type:		
	THDVoltageL1ToL2	E/M	REAL	THD, voltage, 1-2.
	THDVoltageL2ToL3	E/M	REAL	THD, voltage, 2-3.
	THDVoltageL1ToL3	E/M	REAL	THD, voltage, 1-3.
	THDVoltageL1ToNeutral	E, 40/41	REAL	THD, voltage, 1-N.
	THDVoltageL2ToNeutral	E, 40/41	REAL	THD, voltage, 2-N.
	THDVoltageL3ToNeutral	E, 40/41	REAL	THD, voltage, 3-N.
	THDCurrentL1	E/M	REAL	THD, current, phase 1.
	THDCurrentL2	E/M	REAL	THD, current, phase 2.
	THDCurrentL3	E/M	REAL	THD, current, phase 3.
1: These parameters are available only with MBCompactNSX.				
2: These parameters are available only with MBUCompactNSX.				

Info Structure

Code with the information shown on the Control operator screen. The following table describes the Info structure:

Variable value	Status
2	Waiting for Ready signal.
6	Compact unit open.
7	Compact unit closed.
10	Waiting <code>ControlCommand</code> . It needs to be set to 1.
11	Missing <code>EnableDFB</code> .
12	Missing <code>CommunicationOK</code> . communication interruption.
13	The status register is not available.
24	Remove <code>ResetFail</code> . Needs to be reset again.
81	Missing <code>ResetFail</code> . Inoperable device.
82	A reset is required.

Timing diagram:



Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
COMPACT_ST	COMPACT_ST_DDT	Device data structure holds the minimum information required for performing control and monitoring functions. The information used by the operator screen is usable from the HMI/SCADA system.
COMPACT_CFG	COMPACT_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.
WorkMemory	ANY_ARRAY_INT	Array used for modbus communications. This variable is to be used with a modbus port that serializes modbus requests in an optimum manner.

COMPACT_ST_DDT Type

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

COMPACT_CFG_DDT Type

Name	Type	Description
DataStatus	WORD	Information on the device status. Information on the <code>Status</code> output structure.
Info	INT	Code with information on statuses and required actions.
WarningCode	WORD	Information on the alarm code. Takes the values from the <code>WarningCode</code> output.
WarningCodeOrder	WORD	Information on the command alarm code. Takes the values from the <code>WarningCodeOrder</code> output.
FailCode0	INT	Code of last level 0 detected error. Indicates which detected error has occurred, <code>FailCode[0]</code> .
FailCode1	INT	Code of last level 1 detected error. Indicates which detected error has occurred, <code>FailCode[1]</code> .
FailCode2	INT	Code of last level 2 detected error. Indicates which detected error has occurred, <code>FailCode[2]</code> .
Reserved	INT	—

COMPACT_ST . STW Word Structure

Bit	Description
0	Unknown device status or communication interruption. No variable refreshing.
1	Not ready.
2	Refer to the <code>Closed</code> status in the <code>Status</code> output pin, page 61.
3	Inoperable device.
4	Alarm on device or repetitive detected fault alarm requires resetting.
5	communication interruption.
6	Requires resetting. A <code>ResetFail</code> is required.
7	Externally controlled.
8	Refer to the <code>Resetting</code> output pin, page 61.
9	Refer to the <code>EnableDFB</code> input pin, page 59.

COMPACT_ST.CFGW Word Structure

Bit	Description
0	Refer to the <code>ResetFail</code> input pin, page 59.
1	<code>Owner</code> .
3	Refer to the <code>Closed</code> status in the <code>Status</code> output pin, page 61.
6	Refer to the <code>Open</code> status in the <code>Status</code> output pin, page 61.
7	Refer to the <code>ControlCommand</code> input pin, page 59.

COMPACT_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the <code>Open</code> status in the <code>Status</code> output pin, page 61.
1	Refer to the <code>Closed</code> status in the <code>Status</code> output pin, page 61.
2	Refer to the <code>Trip</code> status in the <code>Status</code> output pin, page 61.
3	Refer to the <code>TripElec</code> status in the <code>Status</code> output pin, page 61.
4	Refer to the <code>NotAvailable</code> status in the <code>Status</code> output pin, page 61.
5	Refer to the <code>MotorAvailable</code> status in the <code>Status</code> output pin, page 61.
6	Refer to the <code>MotorMode</code> status in the <code>Status</code> output pin, page 61.

COMPACT_CFG.WarningCode Word Structure

Bit	Description
0	Refer to the <code>Alarm201</code> code in the <code>WarningCode</code> output pin, page 61.
1	Refer to the <code>Alarm202</code> code in the <code>WarningCode</code> output pin, page 61.
2	Refer to the <code>Alarm203</code> code in the <code>WarningCode</code> output pin, page 61.
3	Refer to the <code>Alarm204</code> code in the <code>WarningCode</code> output pin, page 61.
4	Refer to the <code>Alarm205</code> code in the <code>WarningCode</code> output pin, page 61.
5	Refer to the <code>Alarm206</code> code in the <code>WarningCode</code> output pin, page 61.
6	Refer to the <code>Alarm207</code> code in the <code>WarningCode</code> output pin, page 61.
7	Refer to the <code>Alarm208</code> code in the <code>WarningCode</code> output pin, page 61.
8	Refer to the <code>Alarm209</code> code in the <code>WarningCode</code> output pin, page 61.
9	Refer to the <code>Alarm210</code> code in the <code>WarningCode</code> output pin, page 61.
10	Refer to the <code>LongTimeProtection</code> code in the <code>WarningCode</code> output pin, page 61.
11	Refer to the <code>EarthLeakage</code> code in the <code>WarningCode</code> output pin, page 61.
12	Refer to the <code>GroundFault</code> code in the <code>WarningCode</code> output pin, page 61.

COMPACT_CFG.WarningOrderCode Word Structure for MBCompactNSX

Bit	Description
0	Refer to the <code>Order</code> code in the <code>WarningOrderCode</code> output pin, page 61.
1	Refer to the <code>WrongPassword</code> code in the <code>WarningOrderCode</code> output pin, page 61.
2	Refer to the <code>MbPadLocked</code> code in the <code>WarningOrderCode</code> output pin, page 61.

Bit	Description
3	Refer to the <code>InternalWarning</code> code in the <code>WarningOrderCode</code> output pin, page 61.
4	Refer to the <code>OutOfOrder</code> code in the <code>WarningOrderCode</code> output pin, page 61.
5	Refer to the <code>NeedReset</code> code in the <code>WarningOrderCode</code> output pin, page 61.
6	Refer to the <code>AlreadyClosed</code> code in the <code>WarningOrderCode</code> output pin, page 61.
7	Refer to the <code>AlreadyOpen</code> code in the <code>WarningOrderCode</code> output pin, page 61.
8	Refer to the <code>AlreadyReset</code> code in the <code>WarningOrderCode</code> output pin, page 61.
9	Refer to the <code>ManualMode</code> code in the <code>WarningOrderCode</code> output pin, page 61.
10	Refer to the <code>NotPresent</code> code in the <code>WarningOrderCode</code> output pin, page 61.
11	Refer to the <code>InProgress</code> code in the <code>WarningOrderCode</code> output pin, page 61.
12	Refer to the <code>ResetForbidden</code> code in the <code>WarningOrderCode</code> output pin, page 61.

COMPACT_CFG.WarningOrderCode Word Structure for MBUCompactNSX

Bit	Description
0	Refer to the <code>OrderUnsuccessful</code> code in the <code>WarningOrderCode</code> ² output pin, page 61.
1	Refer to the <code>WrongPassword</code> code in the <code>WarningOrderCode</code> output pin, page 61.
2	Refer to the <code>ManualMode</code> code in the <code>WarningOrderCode</code> output pin, page 61.
3	Refer to the <code>AlreadyClosed</code> code in the <code>WarningOrderCode</code> output pin, page 61.
4	Refer to the <code>AlreadyOpen</code> code in the <code>WarningOrderCode</code> output pin, page 61.
5	Refer to the <code>AlreadyReset</code> code in the <code>WarningOrderCode</code> output pin, page 61.
6	Refer to the <code>ResourceNotPresent</code> code in the <code>WarningOrderCode</code> output pin, page 61.
7	Refer to the <code>InhibitModeOn</code> code in the <code>WarningOrderCode</code> output pin, page 61.
8	Refer to the <code>OutOfOrder</code> code in the <code>WarningOrderCode</code> output pin, page 61.
9	Refer to the <code>NeedReset</code> code in the <code>WarningOrderCode</code> output pin, page 61.
10	Refer to the <code>InProgress</code> code in the <code>WarningOrderCode</code> output pin, page 61.
11	Refer to the <code>ResetForbidden</code> code in the <code>WarningOrderCode</code> output pin, page 61.
12	Refer to the <code>IFMPadlocked</code> code in the <code>WarningOrderCode</code> output pin, page 61.

Diagnostics Information Management

Overview

The diagnostic codes that the device can return are read on the `FailCode` output variable.

Modbus Communication Diagnostics Codes

This code indicates that communications have not been established and can be reset:

- `FailCode[0]: 16#0002`
- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0004`

This code indicates that communications have not been established between IFE and TRIP UNIT and can be reset:

- FailCode[0]: 16#0004
- FailCode[1]: 16#0000
- FailCode[2]: 16#0004

or

- FailCode[0]: 16#0007
- FailCode[1]: 16#0200
- FailCode[2]: 16#0001

or

- FailCode[0]: 16#01FF
- FailCode[1]: 16#0200
- FailCode[2]: 16#0001

After the communications have been established, check modbus client diagnostic codes for FailCode [0] and FailCode [1]. The components make a distinction between detected read request problems and write request problems:

- FailCode[2]: 16#0001 Read
- FailCode[2]: 16#0002 Write

Diagnostics Code Example

For a detected error, the code is:

- FailCode[1]: 16#0000
- FailCode[2]: 16#0005

The field status can be reset.

The FailCode[0] can have one of the following codes:

Bit	Value	FailCode[0]—Cause of Trip Operation
0	1	Long-time protection Ir.
1	2	Short-time protection Isd.
2	4	Instantaneous protection Ii.
3	8	Ground-fault protection Ig.
4	16	Earth leakage (Vigi) protection IΔn.
5	32	Integrated instantaneous protection.
6	64	Internal detected failure (Stop).
9	512	Instantaneous protection with earth leakage (Vigi) trip unit.
10	1024	Unbalanced motor protection.
11	2048	Motor jam protection.
12	4096	Underload motor protection.
13	8192	Longstart motor protection.
14	16384	Reflex tripping protection.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the compact.

Genies

Genie Properties

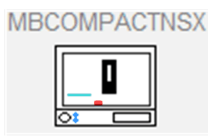
Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	COMPACT	Compact NSX protection unit.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a general description, page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking an `COMPACT` genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 52
Equipment Status	Closed	Equipment status of compact.	–
Failure	LastFailure, DeviceFailActive	Current detected error status of compact.	
Warning	AlarmActive, CurrentWarning	Current alert status of compact.	
Owner	OwnerSelect	Owner of compact.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm

Measures Tab

The table lists the items of each groups from group number 1 to 4 of measures tab:

Group Order Number	1	2	3	4
Group name	Owner	Current	Voltage and Frequency	Power
Items	ManualMode	CurrentLine1	VoltageU21	TotalActivePower
		CurrentLine2	VoltageU32	TotalReactivePower
		CurrentLine3	VoltageU13	TotalApparentPower

Group Order Number	1	2	3	4
Group name	Owner	Current	Voltage and Frequency	Power
		ResidualCurrent	Voltage1	ActivePowerLine1
		THDCurrentLine1	Voltage2	ActivePowerLine2
		THDCurrentLine2	Voltage3	ActivePowerLine3
		THDCurrentLine3	THDVoltageLine1ToLine2	ReactivePowerLine1
			THDVoltageLine2ToLine3	ReactivePowerLine2
			THDVoltageLine1ToLine3	ReactivePowerLine3
			THDVoltageLine1ToNeutral	ApparentPowerLine1
			THDVoltageLine2ToNeutral	ApparentPowerLine2
			THDVoltageLine3ToNeutral	ApparentPowerLine3
			Frequency	Cosphi

The table lists the items of each groups from group number 5 to 9 of measures tab:

Group Order Number	5	6	7	8	9
Group name	Energy	Communica-tion	Device status	Maintenance	Diagnostics
Items	ActiveEnergy	OrderStatus	InformationCode	TripCounter	WarningCode
	ReactiveEnergy		Closed	AlarmActive	FailCode0
	ApparentEnergyTotal		Open	OutOfOrder	WarningOrderCode
	PositiveActiveEnergy		Trip	LongTimeProtection	FailCode1
	NegativeActiveEnergy		ElectricalConditionTrip	EarthLeakage	FailCode2
	PositiveReactiveEnergy		StatusNotAvailable	GroundFault	
	NegativeReactiveEnergy		MotorAvailable	LongTimePickUp	
				WrongPassword	
				ModbusPadlocked	
				NeedReset	
				AlreadyClosed	
				AlreadyOpen	
				AlreadyReset	
				ControlNotPresent	
				CommandInProgress	
				ResetForbidden	
				Alarm201Active	
				Alarm202Active	
				Alarm203Active	
				Alarm204Active	
				Alarm205Active	
				Alarm206Active	
				Alarm207Active	
				Alarm208Active	
				Alarm209Active	

Group Order Number	5	6	7	8	9
Group name	Energy	Communication	Device status	Maintenance	Diagnostics
				Alarm210Active	

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of *Compact*.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Closed	Circuit breaker is closed	Closed/Not Closed	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/Inactive	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Fail resetting required	Required/Not Required	Bit6
OwnerExternal	Device is externally controlled	External/Not External	Bit7
Resetting	Normal execution of control block	–	Bit8
EnableFunctional-Block	Normal execution of control block	–	Bit9
Bit items derived from DataStatusWord.			
Open	Circuit breaker is open	Open/Not Open	Bit0
Trip	Circuit breaker is tripped	–	Bit2
ElectricalConditionTrip	Circuit breaker is tripped due to inappropriate electrical condition	–	Bit3
StatusNotAvailable	Availability of device	–	Bit4
MotorAvailable	Availability of motor mechanism	–	Bit5
MotorMode	Operating mode of motor	–	Bit6
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected fail	Active/Inactive	Bit0

Item name	Description	Enumeration	Address
OwnerSelect	Owner of control module	Operator/Program	<i>Bit1</i>
Close	Command to close	–	<i>Bit3</i>
OpenCommand	Command to open	–	<i>Bit6</i>
ControlCommand	Indicates mode of control	–	<i>Bit7</i>
IO Items			
StatusWord	Status word	–	COMPACT_ST.STW
ConfigurationWord	Configuration word		COMPACT_ST.CFGW
DataStatusWord	Data Status word		COMPACT_CFG. DataStatus

Abnormal Conditions

The table describes the abnormal conditions of COMPACT:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	<i>Bit0</i>
AbnormalOperatorTab	Abnormal status of operator tab.	<i>Bit8</i>

Action Required Conditions

The table describes the action required conditions of COMPACT:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	<i>Bit8</i>

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
AlarmFailure	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the motor state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

No trend item is used by Supervision components for COMPACT.

Masterpact

What's in This Chapter

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Overview

The MASTERPACT profile is used to manage the Masterpact and Masterpact draw-out/chassis electrical protection circuit breakers.

Template

Overview

This section describes functionality of the following templates:

- \$MasterpactNxMBUGP
- \$MasterpactNxCMBUGP
- \$MasterpactMTZMBUGP
- \$MasterpactMTZCMBUGP

Description

General Description

The \$MasterpactGP control module template allows you to manage masterpact fixed circuit breakers on a modbus network.

Function Description

The main functions of the template are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Open/close	Allows circuit breaker to open and close.
Monitoring	Allows the device measurement data to be monitored.

Parameters

Parameters

The \$MasterpactGP templates provides different control and supervision parameters to the user to control the functions as per the requirement

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	False - Manual reset, True - Automatic reset	Boolean	FALSE	–
	IFM modbus address	Short	0	–
	Password for command execution	String	–	–
Time	Time window for the device to execute orders	Duration	00:00:05	–
	Minimum time to maintain the warning signal		00:00:03	–
	Maximum time between two auto reset of the template.		00:01:00	–
	Time to refresh the cyclic data.		00:00:01	–

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	Program (1)	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	Operator (1)	Privilege to change override mode. This parameter is used in operator tab, page 101.
	Set rearm		Operator (Confirmed) (10)	Privilege to change reset. This parameter is used in perator tab, page 101.
	Set acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Trend	Sample period	Duration	00:00:05	–
	History length (weeks)	Integer	5	–
	History rollover time	Duration	12:00:00	–
	History rollover day	String	Tuesday	–
	Storage type		TRN PERIODIC	–
	Data location (optional)		[Data];	–

Data

The table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional re- marks
MasterpactNxBasic				
Alarm	Alarm failure description/Device failure alarm description/ Communication failure alarm description	String	@(Alarm Failure)/@ (Device Failure Alarm)/ @(Communication Failure Alarm)	—
	Alarm failure alarm severity/ Device failure alarm severity/ Communication failure alarm severity	Enum	Low(4000)	—
	Alarm failure alarm group/Device failure alarm group/ Communication failure alarm group	String	Failure	—
Variable Tag Disable	Disabled tripping cause	Boolean	FALSE	—
	Disabled tripping cause extended			—
	Disabled info code NOTE: This parameter is applicable only for MasterpactMTZCMBUGP and MasterpactNxCMBUGP.			—
Historize	Enable historize fail code	Boolean	FALSE	—
	Enable historize warning code			—
	Enable historize warning code extended			—
	Enable historize warning order code			—
	Enable historize tripping cause			—
	Enable historize tripping cause extended			—
	Enable historize data word			—
	Enable historize info word			—
Optional tag: MasterpactMTZCMEA				
Variable Tag Disable	Disable current line 1, current line 2, current line 3	Boolean	FALSE	—
	Disabled residual current			—
	Disabled trip counter			—
Historize	Enable historize current line 1	Boolean	FALSE	—
	Enable historize current line 2			—
	Enable historize current line 3			—
	Enable historize residual current			—
	Enable historize trip counter			—
Optional tab: MasterpactMTZCMEAExt				
Configuration	Frequency deadband value	Integer	0	—
	Voltage U21 deadband value			—
	Voltage U32 deadband value			—
	Voltage U13 deadband value			—
	Voltage 1 deadband value			—
	Voltage 2 deadband value			—
	Voltage 3 deadband value			—
	Active power deadband value			—

Section	Parameter description	Data type	Default value	Additional remarks
	Reactive power deadband value			–
	Apparent power deadband value			–
	Active power line 1 deadband value	Integer	0	–
	Active power line 2 deadband value			–
	Active power line 3 deadband value			–
	Reactive power line 1 deadband value			–
	Reactive power line 2 deadband value			–
	Reactive power line 3 deadband value			–
	Apparent power line 1 deadband value			–
	Apparent power line 2 deadband value			–
	Apparent power line 3 deadband value			–
	CosPhi deadband value			–
	Active energy deadband value			–
	Positive active energy deadband value			–
	Negative active energy deadband value			–
	Reactive energy deadband value			–
	Positive reactive energy deadband value			–
	Negative reactive energy deadband value			–
	Apparent energy deadband value			–
Variable Tag Disable	Disable frequency	Boolean	FALSE	–
	Disable voltage U21			–
	Disable voltage U32			–
	Disable voltage U13			–
	Disable voltage V1			–
	Disable voltage V2			–
	Disable voltage V3			–
	Disable total active power			–
	Disable total reactive power			–
	Disable total apparent power			–
	Disable active power L1			–
	Disable active power L2			–
	Disable active power L3			–
	Disable reactive power L1			–
	Disable reactive power L2			–
	Disable reactive power L3			–

Section	Parameter description	Data type	Default value	Additional remarks
	Disable apparent power L1			—
	Disable apparent power L2			—
	Disable apparent power L3			—
	Disable CosPhi parameter			—
	Disable active energy			—
	Disable reactive energy			—
	Disable apparent energy			—
	Disable positive active energy			—
	Disable negative active energy			—
	Disable positive reactive energy			—
	Disable negative reactive energy			—
Historize	Enable historize voltage U21	Boolean	FLASE	—
	Enable historize voltage U32			—
	Enable historize voltage U13			—
	Enable historize voltage V1			—
	Enable historize voltage V2			—
	Enable historize voltage V3			—
	Enable historize frequency			—
	Enable historize total active power			—
	Enable historize total reactive power			—
	Enable historize total apparent power			—
	Enable historize active power line 1			—
	Enable historize active power line 2			—
	Enable historize active power line 3			—
	Enable historize reactive power line 1			—
	Enable historize reactive power line 2			—
	Enable historize reactive power line 3			—
	Enable historize apparent power line 1			—
	Enable historize apparent power line 2			—
	Enable historize apparent power line 3			—
	Enable historize CosPhi			—
	Enable historize active energy			—
	Enable historize positive active energy			—
	Enable historize negative active energy			—

Section	Parameter description	Data type	Default value	Additional re- marks
	Enable historize reactive energy			—
	Enable historize positive reactive energy			—
	Enable historize negative reactive energy			—
	Enable historize apparent energy			—
MasterpactMTZCMEAExt1				
Config- uration	Threshold voltage line 1 to line 2 deadband value	Integer	0	—
	Threshold voltage line 2 to line 3 deadband value			—
	Threshold voltage line 1 to line 3 deadband value			—
	Threshold voltage line 1 to neutral deadband value			—
	Threshold voltage line 2 to neutral deadband value			—
	Threshold voltage line 3 to neutral deadband value			—
	Threshold current line 1 deadband value			—
	Threshold current line 2 deadband value			—
	Threshold current line 3 deadband value			—
	Average of 3 phase current THD			—
Varia- ble Tag Disable	Disable THDVoltage L1 to L2	Boolean	FALSE	—
	Disable THDVoltage L2 to L3			—
	Disable THDVoltage L1 to L3			—
	Disable THDVoltage L1 to neutral			—
	Disable THDVoltage L2 to neutral			—
	Disable THDVoltage L3 to neutral			—
	Disable THDCurrent L1			—
	Disable THDCurrent L2			—
	Disable THDCurrent L3			—
	Disable average of 3 phase current THD			—
Histor- ize	Enable historize threshold voltage line 1 to line 2	Boolean	FALSE	—
	Enable historize threshold voltage line 2 to line 3			—
	Enable historize threshold voltage line 1 to line 3			—
	Enable historize threshold voltage line 1 to neutral			—
	Enable historize threshold voltage line 2 to neutral			—
	Enable historize threshold voltage line 3 to neutral			—
	Enable historize threshold current line 1			—

Section	Parameter description	Data type	Default value	Additional re- marks
	Enable historize threshold current line 2			—
	Enable historize threshold current line 3			—
	Enable historize average of 3 phase current THD.			—

Asset and Display Parameters

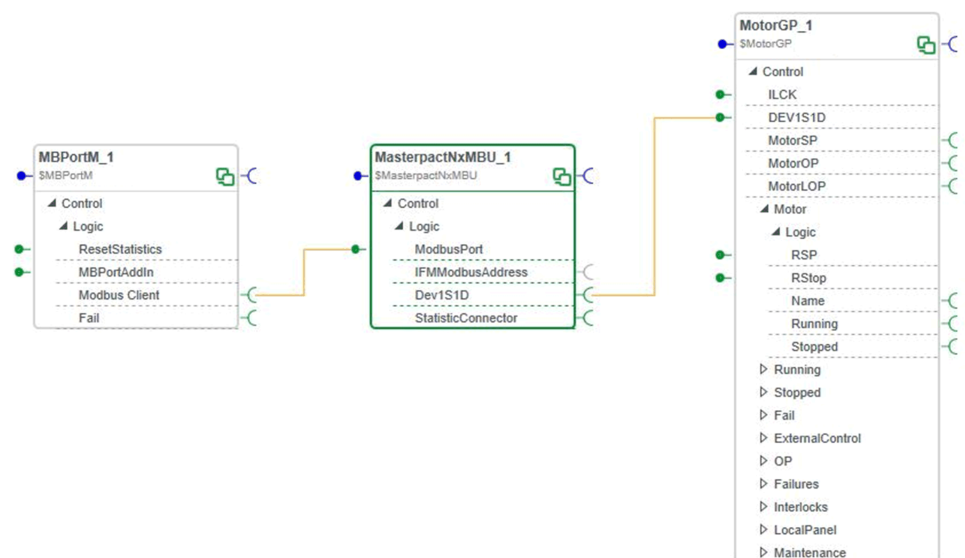
For more details, refer to the topic describing the parameters of asset and display, page 28.

Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

This figure shows the masterpact template (also applicable for \$MasterpacNxMBCE) as it appears in Links Editor and an example of other templates connected to it:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
ModbusPort	<i>\$MBWorkMemory/Client</i>	An input interface from MBPortM to define the memory area to talk with the modbus port	Connect MBPortM
IFMModbusAddress	<i>\$UInt/Def</i>	An output interface to other template	—
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control
StatisticConnector	<i>\$StatisticConnector-NameGP/Def</i>	An output interface to other template provides the Information used with modbus communication to obtain statistics on the modbus network	—

Control

Overview

This chapter describes the masterpact DFBs.

Description

General

The MASTERPACT profile is used to manage the Masterpact and Masterpact draw-out/chassis electrical protection circuit breakers.

NOTE: MBMASTERPACT, MBMASTERPACTC, EMMASTERPACT and EMMASTERPACTC are deprecated functions.

Function Description

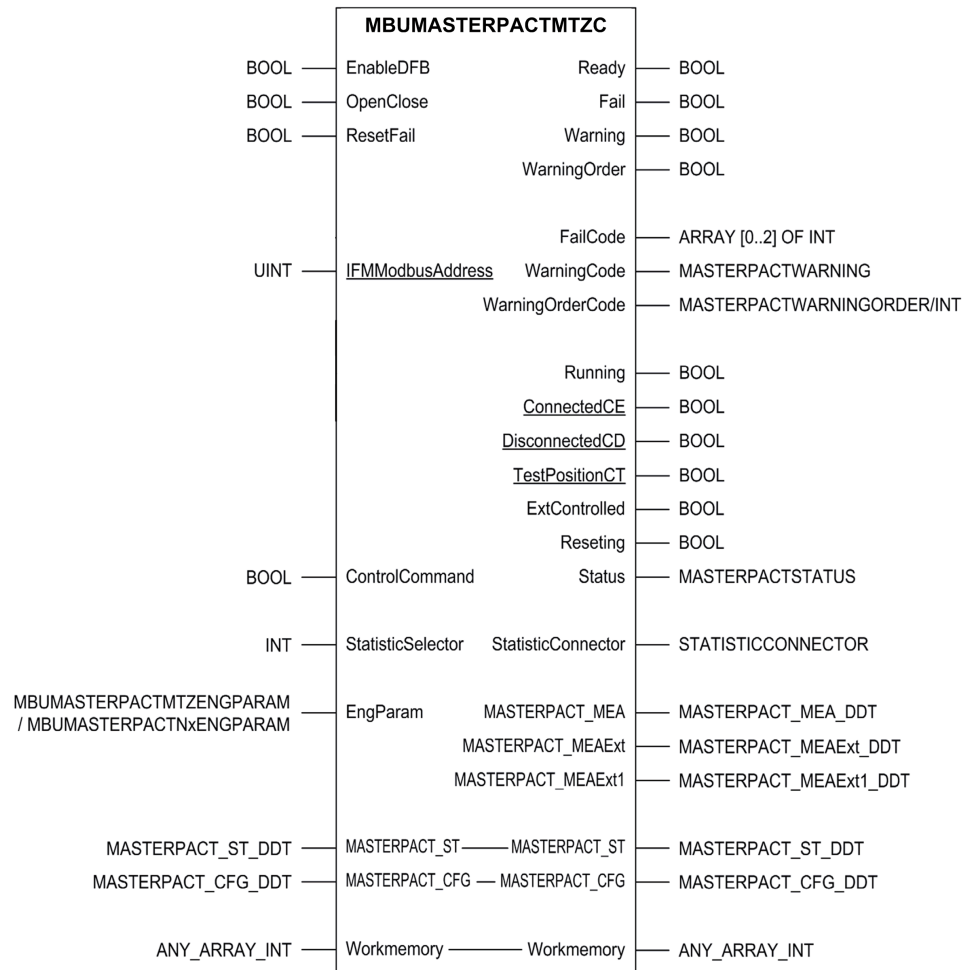
The main functions of the DFB are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Open/Close	Allows circuit breaker to open and close.
Monitoring	Allows the device measurement data to be monitored.

DFB Representation

Representation

The following figure represents the function module of Masterpact profile:

**NOTE:**

- The underlined parameters are specific to profiles supported by DFB.
- Datatype of WarningOrderCode output pin for MBMASTERPACT and MBMASTERPACTC is MASTERPACTSTATUS. Similarly, for MBUMASTERPACTMTZ, MBUMASTERPACTMTZC, MBUMASTERPACTNx and MBUMASTERPACTNxC the datatype is INT

The table shows the parameters available for specific DFBs:

Parameters		Components							
		Modbus		Modbus over ULP				Ethernet	
		MBMASTERPACT (Depreciated)	MBMASTERPACTC (Depreciated)	MBUMASTERPACTMTZ	MBUMASTERPACTMTZC	MBUMASTERPACTNx	MBUMASTERPACTNxC	EMMASTERPACT (Depreciated)	EMMASTERPACTC (Depreciated)
In-puts	ModBusAddress	X	X	—	—	—	—	—	—
	IFMModBusAddress	—	—	X	X	X	X	—	—
	DeviceAddress	—	—	—	—	—	—	X	X
Out-puts	ConnectedCE	—	X	—	X	—	X	—	X
	DisconnectedCD	—	X	—	X	—	X	—	X
	TestPositionCT	—	X	—	X	—	X	—	X
X : Parameter is available									
— : Parameter is not available									

NOTICE

COMMUNICATION INTERRUPTION

Provide possible combination of communication interruptions between Masterpact chassis and Controller. Otherwise, it leads to loss of data.

Failure to follow these instructions can result in equipment damage.

The IO module rotary position has to be set to have Cradle Management for Masterpact BCM-ULP.

Function	User Defined Applications	Predefined Application Selected									
		1	2	3	4	5	6	7	8	9(IO1)	9(IO2)
Monitoring	Cradle management	X	–	–	–	–	–	–	–	–	X

X : User defined application available
– : User defined application not available

NOTE:

- If a configuration of IO module is changed the *EnableDFB* pin has to be reset.
- *EMMasterPactC* and *MBMasterPactC* has to be used only if IO module is configured for cradle management application.
- *MBMasterPactC*, *MBUMasterPactMTZC* and *MBUMasterPactNxC* has to be used only if IO module is configured for cradle management application.
- Cradle management is always IO1 for EIFE.
- For how to create project using Masterpact MTZ/Masterpact Nx circuit breakers, refer [Communication technologies](#), page 446.
- If *IFMModbusAddress* is not configured then default value of 255 is considered.
- IFM v2 and above hardware supports these control functions.

Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	This input enables the normal execution of the control block. <ul style="list-style-type: none"> • 0 = The entire DFB is restarted (statuses, 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.
OpenClose	BOOL	This input controls the circuit breaker. <ul style="list-style-type: none"> • Rising edge on pin = Closes the circuit breaker. • Falling edge on pin = Opens the circuit breaker.
ResetFail	BOOL	1 = Resets the detected <i>Fail</i> output parameter to 0 or in case of inoperable device, sends a reset command to the device if <i>ControlCommand</i> is 1.
ResetEnergy	BOOL	Rising edge resets energy registers to default values on <i>ComapctNSX</i> .
ModbusAddress ¹	INT	Device address within the modbus network. You can find this variable in modbus communications.
IFMModbusAddress ²	UINT	Modbus address of the IFM Module.

Parameter	Type	Description
DeviceAddress ³	String[26]	Device address within the Ethernet network. Depending on the platform, the following definitions apply:
	Platform	IP Addressing DeviceAddress (variable)
	M340	'{IP}ID'
	M580	'{IP}ID'
	Quantum	'{IP}ID'
	NOTE: ID is 255.	
ControlCommand	BOOL	<p>Indicates to the DFB whether the Masterpact is being controlled locally or from a source external to the DFB.</p> <ul style="list-style-type: none"> 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. <p>NOTE: This pin configuration does not impact the Masterpact unit.</p>
StatisticSelector	INT	<p>Variable used to obtain statistics for the modbus network (requests carried out, time between requests, and so on). This data provides information for using <code>StatisticConnector</code> pin within the <code>StatisticCounter</code> DFB in General Purpose library for communication.</p> <p>The following list displays the <code>StatisticSelector</code> value:</p> <ul style="list-style-type: none"> 1 = Statistics of read request. 2 = Statistics of write request.
EngParam ²	MBUMASTERPACTMTZENGPARAM/ MBUMASTERPACTNxENGPARAM	Engineering Parameters., page 87
<p>¹: Parameter available only for <i>MBMASTERPACT</i> and <i>MBMASTERPACTC</i>.</p> <p>²: Parameter available only for <i>MBUMASTERPACTMTZ</i>, <i>MBUMASTERPACTMTZC</i>, <i>MBUMASTERPACTNx</i> and <i>MBUMASTERPACTNxC</i>.</p>		

EngParam

Variable	Type	Description
CommandCtrlWindow	TIME	<p>Control time for operations. This is the time that the block waits for the operations to be carried out by the device.</p> <p>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.</p> <p>The commands controlled are <code>Open</code> and <code>Close</code>. In the event of a <code>ResetFail</code>, this is not interpreted as an alarm. Instead, the detected error continues, and you have to reset the <code>Reseting</code> output (to <code>FALSE</code>).</p>
Refresh	TIME	<p>Refresh time for device data on serial modbus communications.</p> <p>NOTE: This refresh operation is carried out on read variables. Write requests are carried out when needed.</p>
ScanTime	TIME	<p>Allows you to configure the time for which the alarm signals are kept active.</p> <p>Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset.</p>
Password	STRING	<p>Password is made up of 4 ASCII bytes. This password is sent internally before executing certain commands. If the password is incorrect, it returns <code>WarningOrder</code> to point this out.</p>
ResetMode	BOOL	<p>Enables to configure the type of reset. This type of reset is used for communication interruption and inoperable device.</p> <p>The time defined in <code>CommandCtrlWindow</code> 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 <code>CommandCtrlWindow</code> elapses. The second reset is carried</p>

Variable	Type	Description
		out after <code>CommandCtrlWindow * 2</code> elapses, so on. If the value of <code>CommandCtrlWindow</code> 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 are/the device is reset with the <code>ResetFail</code> variable.
	TRUE	Communications are/the device is reset automatically.
<code>MaxResetTime</code>	TIME	<p>When in automatic <code>ResetMode</code>, this variable is used to define the maximum time that can elapse between 2 consecutive resets.</p> <p>Timing diagram:</p> <p>$t = \text{CommandCtrlWindow}$ $t_{\max} = \text{MaxResetTime}$</p>
<code>Scalefactor</code>	REAL	<p>Scale factor for Masterpact NT/NW and Compact NSX Micrologix 5.0, 6.0 Or 7.0 trip units is 1.</p> <p>Scale factor for Compact NSX Micrologix 5.2, 5.3, 6.2, 7.2 or 7.3 trip units is 10.</p>

Outputs

Output Parameter Description

Parameter	Type	Description
<code>Ready</code>	BOOL	<p>1 = The device is enabled and free of detected errors.</p> <p>This variable is TRUE as long as there is chassis connected (CE), no communication interruption, no device resetting, and the device is not tripped.</p>
<code>Fail</code>	BOOL	<p>1 = A detected error in the control block or in the device or communication interruption. To reset the detected <code>Fail</code> output pin, the <code>ResetFail</code> input has to be activated. The last detected error code is shown on <code>FailCode</code>.</p> <p>NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.</p>
<code>Warning</code>	BOOL	<p>1 = An alarm has been activated for the device. It does not affect the block operation and does not need to be reset.</p> <p>This signal remains active until the configured scan time.</p>
<code>WarningOrder</code>	BOOL	<p>1 = The device has returned an alarm condition as the result of executing a command. It does not affect the block operation and does not need to be reset.</p> <p>This signal remains active until the configured scan time.</p>
<code>FailCode</code>	ARRAY [0..2] OF INT	<p>When the detected <code>Fail</code> output is 1, it holds the code for the detected error.</p> <p>If the detected <code>Fail</code> bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3-level structure.</p> <p>For more details, refer to <i>Diagnostics Information Management</i>, page 98.</p>
<code>WarningCode</code>	MASTERPACTWARNING	Variable holds the alarm code.

Parameter	Type	Description	
		The following table describes the <code>WarningCode</code> information:	
	Parameter	Type	Description
	<code>LongTimePickUp</code>	BOOL	1 = Long-delay trip threshold.
	<code>CurrentUnbalance</code>	BOOL	1 = Current unbalance.
	<code>MaxCurrentPhase1</code>	BOOL	1 = Maximum current on phase 1.
	<code>MaxCurrentPhase2</code>	BOOL	1 = Maximum current on phase 2.
	<code>MaxCurrentPhase3</code>	BOOL	1 = Maximum current on phase 3.
	<code>MaxCurrentNeutral</code>	BOOL	1 = Maximum current on neutral.
	<code>MinVoltage</code>	BOOL	1 = Minimum voltage.
	<code>MaxVoltage</code>	BOOL	1 = Maximum voltage.
	<code>VoltageUnbalance</code>	BOOL	1 = Voltage unbalance.
	<code>MaxPower</code>	BOOL	1 = Maximum power.
	<code>ReversePower</code>	BOOL	1 = Reverse power.
	<code>MinFrequency</code>	BOOL	1 = Minimum frequency.
	<code>MaxFrequency</code>	BOOL	1 = Maximum frequency.
	<code>PhaseRotation</code>	BOOL	1 = Phase rotation.
	<code>LoadSheddingCurrent</code>	BOOL	1 = Current-based load shedding.
	<code>LoadSheddingPower</code>	BOOL	1 = Power-based load shedding.
	<code>GroundFault</code>	BOOL	1 = Ground detected fault notification.
	<code>EarthLeakage</code>	BOOL	1 = Differential alarm (Vigi).
	<code>Discordance</code>	BOOL	1 = Chassis status discordance.
	<code>UnknownIOConfiguration</code>	BOOL	1 = Unknown IO configuration.
WarningOrderCode ¹	MASTERPACTWARNING-ORDER	Variable holds the alarm code returned as the result of executing a command. Commands can generate the following diagnostic codes. The following table describes the <code>WarningOrderCode</code> information for MBMASTERPACT and MBMASTERPACTC:	
	Parameter	Type	Description
	<code>Order</code>	BOOL	1 = Follow-up alarm. The device is not responding to the control command within the time specified in <code>CommandCtrlWindow</code> .
	<code>WrongPassword</code>	BOOL	1 = Insufficient user permissions (incorrect password).
	<code>InternalWarning</code>	BOOL	1 = Any other positive diagnostic codes represent an internal detected error.
	<code>ManualMode</code>	BOOL	1 = The control is in Manual mode. Remote commands are not permitted.
	<code>IncorrectCoilValue</code>	BOOL	1 = The DFB has an internal detected error. An invalid number of windings are requested during a write operation.
	<code>IncorrectNbrOfParam</code>	BOOL	1 = The DFB has an internal detected error. An invalid number of parameters are sent for a 57400 command.
WarningOrderCode ²	INT	Variable holds the alarm code returned as the result of executing a command. Commands can generate the following diagnostic codes. The following table describes the <code>WarningOrderCode</code> information for MBUMASTERPACTMTZ, MBUMASTERPACTMTZC, MBUMASTERPACTNx and MBUMASTERPACTNx C:	
	Parameter	Value	Description
	<code>Order</code>	1	1 = Follow-up alarm. The device is not responding to the control command within the time specified in <code>CommandCtrlWindow</code> .
	<code>WrongPassword</code>	2	1 = Insufficient user permissions (incorrect password).

Parameter	Type	Description	
	InternalWarning	3	1 = Any other positive diagnostic codes represent an internal detected error.
	ManualMode	4	1 = The control is in Manual mode. Remote commands are not permitted.
	IncorrectCoilValue	5	1 = The DFB has an internal detected error. An invalid number of windings are requested during a write operation.
	IncorrectNumberOfParam	6	1 = The DFB has an internal detected error. An invalid number of parameters are sent for a 57400 command.
	InProgress	7	Command in progress.
	IFEPadlocked	8	Access violation (IFE locking pad locked or EIFE intrusive command mode is locked).
	IFMPadlocked	9	Unable execute service (IFM locking pad locked).
	ResourceNotExist	10	Resource does not exist.
	TimeoutDuringCommand	11	Timeout during command.
	ResetBeforeCommand	12	Circuit breaker tripped, rests before commands.
	AlreadyClosed	13	Circuit breaker already closed.
	AlreadyOpen	14	Circuit breaker already open.
	AlreadyReset	15	Circuit breaker already reset.
	NotPresent	16	Actuator not present.
	InhibitModeOn	17	Inhibit mode on.
Running	BOOL	1 = The Masterpact unit is closed.	
ConnectedCE ³	BOOL	1 = In case of Masterpact units with draw-out/chassis enclosures, a value of 1 signal that the Masterpact unit is mounted and connected for normal operation.	
DisconnectedCD ³	BOOL	1 = In case of Masterpact units with draw-out/chassis enclosures, a value of 1 signal that the Masterpact unit is disconnected and cannot be actuated.	
TestPositionCT ³	BOOL	1 = In case of Masterpact units with draw-out/chassis enclosures, a value of 1 signal that the Masterpact unit is in its Test position and can be actuated. Although, it does not actually close the contact.	
ExtControlled	BOOL	<p>1 = The device is being controlled from a source external (for example, from the console, from a push-button panel, or from the monitoring system) to the program.</p> <p>NOTE: To calculate the state of this signal, use the <code>ControlCommand</code> signal and the <code>Owner</code> variable. You cannot use this signal as a <code>ControlCommand</code> input.</p>	
Reseting	BOOL	<p>1 = A reset is being carried out.</p> <p>The <code>CommandCtrlWindow</code> variable indicates the maximum time for resetting the detected error.</p> <p>When a device or communication reset is carried out with <code>ResetFail</code>, the DFB tries to reset the detected error within the time period defined in <code>CommandCtrlWindow</code>.</p> <p>If the detected error is reset, the detected <code>Fail</code> and <code>Reseting</code> output variables are reset (set to FALSE). If the detected error is not reset, the <code>Reseting</code> variable is FALSE and the detected <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based.</p> <p>Refer to the Timing diagram below.</p>	
Status	MASTERPACTSTATUS	<p>The structure holds data containing the information that the block extracts from the status variable of the circuit breaker and communicating electrical drive.</p> <p>The following table describes the status information:</p>	
	Parameter	Type	Description
	Open	BOOL	<p>OFF state.</p> <p>0 = The circuit breaker is open.</p>
	Closed	BOOL	ON state.

Parameter	Type	Description		
			1 = The circuit breaker is closed.	
	TripSD	BOOL	SD trip indication contact 0 = Not tripped. 1 = Circuit breaker is tripped due to electrical detected fault, shunt trip, or push-to-trip.	
	TripSDE	BOOL	SDE detected fault trip indication contact 0 = Circuit breaker is not tripped on electrical detected fault. 1 = Circuit breaker is tripped due to electrical detected fault (including ground-detected fault test and earth-leakage test).	
	Discharged	BOOL	1 = Discharged springs in motor-equipped devices.	
	Charged	BOOL	1 = Charged springs in motor-equipped devices.	
	NotReadyToClose	BOOL	1 = Not ready to close.	
	ReadyToClose	BOOL	1 = Ready to close.	
	NotAvailable	BOOL	1 = The status of the circuit breaker is unavailable.	
	Info	INT	Indicates device status.	
	TrippingCause	INT	Cause of trip operation.	
	TrippingCauseExt	INT	Cause of trip operation extended.	
StatisticConnector	STATISTICCONNECTOR	Information used with modbus communication to obtain statistics on the modbus network (requests carried out, time between requests, and so on). This structure has been created to use together with the <code>StatisticCounter</code> DFB in General Purpose library for communication. The following table describes the <code>StatisticConnector</code> :		
	Parameter	Type	Description	
	Start	BOOL	1 = Operation has started.	
	EndOk	BOOL	1 = Operation has ended correctly.	
	EndNOk	BOOL	1 = Operation has ended with a detected error.	
	PartialTime	DINT	Partial time.	
MASTERPACT_MEA	MASTERPACT_MEA_DDT	Data structure with measurement information. Whether this data is available depends on the specific Micrologic model: A=Ammeter, P=Power meter, H=Harmonics, 30/31/40/41=Type of system. The following table describes the <code>MASTERPACT_MEA_DDT</code> type:		
	Parameter	Availability	Type	Description
	CurrentI1	A/P/H	REAL	Current, instantaneous, phase 1.
	CurrentI2	A/P/H	REAL	Current, instantaneous, phase 2.
	CurrentI3	A/P/H	REAL	Current, instantaneous, phase 3.
	ResidualCurrentIN	A/P/H, 41	REAL	Current, instantaneous, N.
	OverrunAlarms	–	INT	Overrun alarms.
	OverrunAlarmsExt	–	INT	Overrun alarms extended.
	OverrunAlarmsExt2	–	INT	Overrun alarms extended 2.
	TripCounter	–	DINT	Trip counter.
MASTERPACT_MEAEExt	MASTERPACT_MEAEExt_DDT	Data structure with measurement information. Whether this data is available depends on the specific Micrologic model: A, E, P, H. The following table describes the <code>MASTERPACT_MEAEExt_DDT</code> type:		
	Parameter	Availability	Type	Description
	VoltageU21	P/H	REAL	Voltage, phases 1-2.
	VoltageU32	P/H	REAL	Voltage, phases 2-3.

Parameter	Type	Description		
	VoltageU13	P/H	REAL	Voltage, phases 1-3.
	VoltageV1	P/H, 40/41	REAL	Voltage, phase 1-N.
	VoltageV2	P/H, 40/41	REAL	Voltage, phase 2-N.
	VoltageV3	P/H, 40/41	REAL	Voltage, phase 3-N.
	Frequency	P/H	REAL	Frequency (derived from phase 1).
	TotalActivePower	P/H	REAL	Total real power.
	TotalReactivePower	P/H	REAL	Total reactive power.
	TotalApparentPower	P/H	REAL	Total apparent power.
	ActivePowerL1	P/H, 40/41	REAL	Real power, phase 1.
	ActivePowerL2	P/H, 40/41	REAL	Real power, phase 2.
	ActivePowerL3	P/H, 40/41	REAL	Real power, phase 3.
	ReactivePowerL1	P/H, 40/41	REAL	Reactive power, phase 1.
	ReactivePowerL2	P/H, 40/41	REAL	Reactive power, phase 2.
	ReactivePowerL3	P/H, 40/41	REAL	Reactive power, phase 3.
	ApparentPowerL1	P/H, 40/41	REAL	Apparent power, phase 1.
	ApparentPowerL2	P/H, 40/41	REAL	Apparent power, phase 2.
	ApparentPowerL3	P/H, 40/41	REAL	Apparent power, phase 3.
	CosPhi	H	REAL	Cos phi power factor.
	ActiveEnergy	P/H	REAL	Real power consumption.
	ReactiveEnergy	P/H	REAL	Reactive power consumption.
	ApparentEnergyTotal	P/H	REAL	Total apparent power consumption.
	PositiveActiveEnergy	P/H	REAL	Positive real power Ea+ (kWh).
	NegativeActiveEnergy	P/H	REAL	Negative real power Ea- (kWh).
	PositiveReactiveEnergy	P/H	REAL	Positive reactive power Er+ (kVarh).
	NegativeReactiveEnergy	P/H	REAL	Negative reactive power Er- (kVarh).

Parameter	Type	Description		
MASTERPACT_MEAEExt1	MASTERPACT_MEAEExt1_DDT	Data structure with measurement information. Whether this data is available depends on the specific Micrologic model: P, H. The following table describes the MASTERPACT_MEAEExt1_DDT type:		
	Parameter	Availability	Type	Description
	THDVoltageL1ToL2	H	REAL	THD, voltage, 1-2.
	THDVoltageL2ToL3	H	REAL	THD, voltage, 2-3.
	THDVoltageL1ToL3	H	REAL	THD, voltage, 1-3.
	THDVoltageL1ToNeutral	H	REAL	THD, voltage, 1-N.
	THDVoltageL2ToNeutral	H	REAL	THD, voltage, 2-N.
	THDVoltageL3ToNeutral	H	REAL	THD, voltage, 3-N.
	THDCurrentL1	H	REAL	THD, current, phase 1.
	THDCurrentL2	H	REAL	THD, current, phase 2.
	THDCurrentL3	H	REAL	THD, current, phase 3.
	THDCurrentAvg	H	REAL	Average of 3 phase current THD.
<p>1: These parameters are available only with <i>MBMASTERPACT</i> and <i>MBMASTERPACTC</i>.</p> <p>2: These parameters are available only with <i>MBUMASTERPACTMTZ</i>, <i>MBUMASTERPACTMTZC</i>, <i>MBUMASTERPACTNx</i> and <i>MBUMASTERPACTNxC</i></p> <p>3: These parameters are available only with <i>MBMASTERPACTC</i>, <i>MBUMASTERPACTNxC</i>, <i>MBUMASTERPACTMTZC</i> and <i>EMMASTERPACTC</i>.</p>				

Info

Code with the information shown on the Control operator screen. The following table describes the **Info** structure:

Variable value	Status
2	Waiting for ready signal.
6	Masterpact unit open.
7	Masterpact unit closed.
10	Waiting <code>ControlCommand</code> . It has to be set to 1.
11	Missing <code>EnabledDFB</code> .
12	Missing <code>CommunicationOK</code> . Communication interruption.
13	The status register is not available.
24	Remove <code>ResetFail</code> . Needs to be reset again.
81	Missing <code>ResetFail</code> . Inoperable device.
82	A reset is required.

TrippingCause

The register used to record the cause of a trip operation gives information regarding the cause of a trip operation for basic protective functions. If a bit is set in this register, it means that the device has tripped. The following table describes the reasons for tripping:

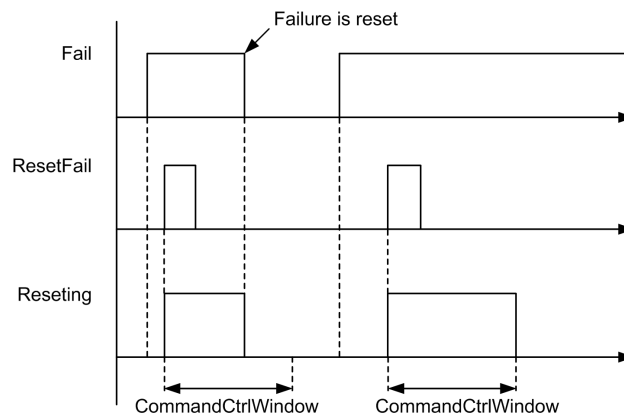
Bit	Variable Value	TrippingCause
0	1	Long-time protection Ir.
1	2	Short-time protection Isd.
2	4	Instantaneous protection Ii.
3	8	Ground-detected fault protection Ig.
4	16	Earth leakage (Vigi) protection IΔn.
5	32	Integrated instantaneous protection.
6	64	Internal detected error (Stop).
7	128	Excessively high temperature.
8	256	Other protection (check TrippingCauseExt).
9	512	Instantaneous with earth-leakage protection (Vigi module) on the trip unit.
10	1024	Unbalance motor protection.
11	2048	Jam motor protection.
12	4096	Underload motor protection.
13	8192	Long-start motor protection.
14	16384	Reflex tripping protection.

TrippingCauseExt

If bit 8 of `TrippingCause` is active, the following table describes the reasons for trip operation:

Bit	TrippingCauseExt
0	Current imbalance.
1	Overcurrent, phase 1.
2	Overcurrent, phase 2.
3	Overcurrent, phase 3.
4	Overcurrent on neutral.
5	Undervoltage.
6	Overvoltage.
7	Voltage imbalance.
8	Excessive power.
9	Reverse power.
10	Underfrequency.
11	Overfrequency.
12	Phase rotation.
13	Load shedding based on current.
14	Load shedding based on power.

Timing diagram:



Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
MASTERPACT_ST	MASTERPSACT_ST_DDT	Device data structure holds the minimum information required for performing control and monitoring functions. The information used by the operator screen is usable from the HMI/SCADA system.
MASTERPACT_CFG	MASTERPACT_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.
WorkMemory	ANY_ARRAY_INT	Array used for modbus communications. This variable is used with a modbus port that serializes modbus requests in an optimum manner.

MASTERPACT_ST_DDT Type

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

MASTERPACT_CFG_DDT Type

Name	Type	Description
DataStatus	WORD	Device status
Info	INT	Code with information on statuses and required actions.
WarningCode	WORD	Information on the alarm code. Takes the values from the <i>WarningCode</i> output.
WarningCodeExt	WORD	Extra information on the alarm code. Takes the values from the <i>WarningCode</i> output.

Name	Type	Description
WarningOrder-Code	WORD	Information on the command alarm code. Takes the values from the <code>WarningOrderCode</code> output.
FailCode0	INT	Code of last level 0 detected error. Indicates which detected error has occurred, <code>FailCode[0]</code> .
FailCode1	INT	Code of last level 1 detected error. Indicates which detected error has occurred, <code>FailCode[1]</code> .
FailCode2	INT	Code of last level 2 detected error. Indicates which detected error has occurred, <code>FailCode[2]</code> .
TrippingCause	INT	Information about what caused the device trip.
TrippingCauseExt	INT	Extended information about what caused the device trip. Active when <code>TrippingCause</code> bit 8 is active.

MASTERPACT_ST.STW Word Structure

Bit	Description
0	Unknown device status or communication interruption. No variable refreshing.
1	Not ready.
2	Refer to the <code>Closed</code> status in the <code>Status</code> output pin, page 88.
3	Inoperable device.
4	Alarm on the device or repetitive detected fault alarm requires resetting.
5	Communication interruption.
6	Requires resetting. A <code>ResetFail</code> is required.
7	Externally controlled.
8	Refer to the <code>Resetting</code> output pin, page 88.
9	Refer to the <code>EnabledDFB</code> input pin, page 86.
10	<code>TestPositionCT</code> .
11	Charged.
12	Refer to the <code>ReadyToClose</code> status in the <code>Status</code> output pin, page 88.
13	<code>ConnectedCE</code> .
14	Refer to the <code>Open</code> status in the <code>Status</code> output pin, page 88.
15	Refer to the <code>Trip</code> status in the <code>Status</code> output pin, page 88.

MASTERPACT_ST.CFGW Word Structure

Bit	Description
0	Refer to the <code>ResetFail</code> input pin, page 86.
1	Owner.
3	Refer to the <code>Closed</code> status in the <code>Status</code> output pin, page 88.
6	Refer to the <code>Open</code> status in the <code>Status</code> output pin, page 88.
7	Refer to the <code>ControlCommand</code> input pin, page 86.

MASTERPACT_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the <code>Open</code> status in the Status output pin, page 88.
1	Refer to the <code>Closed</code> status in the Status output pin, page 88.
2*	Refer to the <code>TestPositionCT</code> status in the output pin, page 88.
3	Refer to the <code>TripSD</code> status in the Status output pin, page 88.
4	Refer to the <code>TripSDE</code> status in the Status output pin, page 88.
5	Refer to the <code>Discharged</code> status in the Status output pin, page 88.
6	Refer to the <code>Charged</code> status in the Status output pin, page 88.
7	Refer to the <code>NotReadyToClose</code> status in the Status output pin, page 88.
8	Refer to the <code>ReadyToClose</code> status in the Status output pin, page 88.
9	Refer to the <code>NotAvailable</code> status in the Status output pin, page 88.
10*	Refer to the <code>ConnectedCE</code> status in the output pin, page 88.
11*	Refer to the <code>DisconnectedCD</code> status in the output pin, page 88.
*: Available only for <i>MBMASTERPACTC</i> , <i>MBUMASTERPACTMTZC</i> , <i>MBUMASTERPACTNx</i> and <i>MBUMASTERPACTNxC</i> .	

MASTERPACT_CFG.WarningCode Word Structure

Bit	Description
0	Refer to the <code>LongTimePickUp</code> code in the WarningCode output pin, page 88.
1	Refer to the <code>CurrentUnbalance</code> code in the WarningCode output pin, page 88.
2	Refer to the <code>MaxCurrentPhase1</code> code in the WarningCode output pin, page 88.
3	Refer to the <code>MaxCurrentPhase2</code> code in the WarningCode output pin, page 88.
4	Refer to the <code>MaxCurrentPhase3</code> code in the WarningCode output pin, page 88.
5	Refer to the <code>MaxCurrentNeutral</code> code in the WarningCode output pin, page 88.
6	Refer to the <code>MinVoltage</code> code in the WarningCode output pin, page 88.
7	Refer to the <code>MaxVoltage</code> code in the WarningCode output pin, page 88.
8	Refer to the <code>VoltageUnbalance</code> code in the WarningCode output pin, page 88.
9	Refer to the <code>MaxPower</code> code in the WarningCode output pin, page 88.
10	Refer to the <code>ReversePower</code> code in the WarningCode output pin, page 88.
11	Refer to the <code>MinFrequency</code> code in the WarningCode output pin, page 88.
12	Refer to the <code>MaxFrequency</code> code in the WarningCode output pin, page 88.
13	Refer to the <code>PhaseRotation</code> code in the WarningCode output pin, page 88.
14	Refer to the <code>LoadSheddingCurrent</code> code in the WarningCode output pin, page 88.
15	Refer to the <code>LoadSheddingPower</code> code in the WarningCode output pin, page 88.

MASTERPACT_CFG.WarningCodeExt Word Structure

Bit	Description
0	Refer to the <code>GroundFault</code> code in the WarningCode output pin, page 88.
1	Refer to the <code>EarthLeakage</code> code in the WarningCode output pin, page 88.

MASTERPACT_CFG.WarningOrderCode Word Structure

This table describes the WarningOrderCode for MBMASTERPACT and MBMASTERPACTC only.

Bit	Description
0	Refer to the Order code in the WarningOrderCode output pin, page 88.
1	Refer to the WrongPassword code in the WarningOrderCode output pin, page 88.
2	Refer to the InternalWarning code in the WarningOrderCode output pin, page 88.
3	Refer to the ManualMode code in the WarningOrderCode output pin, page 88.
4	Refer to the IncorrectCoilValue code in the WarningOrderCode output pin, page 88.
5	Refer to the IncorrectNbrOfParam code in the WarningOrderCode output pin, page 88.

MASTERPACT_CFG.WarningOrderCode Word Structure

This table describes the WarningOrderCode for MBUMASTERPACTMTZ, MBUMASTERPACTMTZC, MBUMASTERPACTN_x and MBUMASTERPACTN_xC only.

Bit	Description
0	Refer to the Order code in the WarningOrderCode output pin, page 88.
1	Refer to the WrongPassword code in the WarningOrderCode output pin, page 88.
2	Refer to the IFEPadLocked code in the WarningOrderCode output pin, page 88.
3	Refer to the IFMPadLocked code in the WarningOrderCode output pin, page 88.
4	Refer to the ResourceNotExist code in the WarningOrderCode output pin, page 88.
5	Refer to the TimeoutDuringCommand code in the WarningOrderCode output pin, page 88.
6	Refer to the ResetBeforeCommand code in the WarningOrderCode output pin, page 88.
7	Refer to the InProgress code in the WarningOrderCode output pin, page 88.
8	Refer to the AlreadyOpen code in the WarningOrderCode output pin, page 88.
9	Refer to the AlreadyReset code in the WarningOrderCode output pin, page 88.
10	Refer to the ManualMode code in the WarningOrderCode output pin, page 88.
11	Refer to the NotPresent code in the WarningOrderCode output pin, page 88.
12	Refer to the InhibitModeOn code in the WarningOrderCode output pin, page 88.

Diagnostics Information Management

Overview

The diagnostic codes that the device can return are read on the FailCode output variable.

Modbus Communication Diagnostics Codes

This code indicates that communications have not been established and can be reset:

- FailCode[0]: 16#0002

- FailCode[1]: 16#0000
- FailCode[2]: 16#0004

This code indicates that communications have not been established between IFE and TRIP UNIT and can be reset:

- FailCode[0]: 16#0004
- FailCode[1]: 16#0000
- FailCode[2]: 16#0004

or

- FailCode[0]: 16#0007
- FailCode[1]: 16#0200
- FailCode[2]: 16#0001

or

- FailCode[0]: 16#01FF
- FailCode[1]: 16#0200
- FailCode[2]: 16#0001

This code indicates that communications have not been established between IFE and IO modules and can be reset:

- FailCode[0]: 16#0005
- FailCode[1]: 16#0000
- FailCode[2]: 16#0004

After the communications have been established, check modbus client diagnostic codes for FailCode [0] and FailCode [1]. Components make a distinction between detected read request problem and write request problem:

- FailCode[2]: 16#0001 Read
- FailCode[2]: 16#0002 Write

Diagnostics Code Example

For a detected error, the code is:

- FailCode[1]: 16#0000
- FailCode[2]: 16#0005

The diagnostic code is found in the TrippingCause status or TrippingCauseExt field.

The FailCode[0] can have one of the following codes:

Bit	Value	FailCode[0]—Cause of Trip Operation
0	1	Long-time protection Ir.
1	2	Short-time protection Isd.
2	4	Instantaneous protection Ii.
3	8	Ground-fault protection Ig.
4	16	Earth leakage (Vigi) protection IΔn.
5	32	Integrated instantaneous protection.
6	64	Internal detected error (Stop).
9	512	Instantaneous protection with earth leakage (Vigi) trip unit.
10	1024	Unbalanced motor protection.
11	2048	Motor jam protection.
12	4096	Underload motor protection.

Bit	Value	FailCode[0]–Cause of Trip Operation
13	8192	Longstart motor protection.
14	16384	Reflex tripping protection.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the masterpact.

Genies

Genie Properties



Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	Masterpact	MasterPACT protection unit with chassis or without chassis.
	Masterpactmtz	MasterpactMTZ protection unit with chassis or without chassis.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a [general description](#), page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking an masterpact genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45

- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:

The screenshot shows a software window titled "MBMASTERPACT" with a sub-tab "MasterPACT/C - Protection Unit". The interface includes a toolbar with icons for play, status, warning, and document. Below the toolbar, there are three input fields: "Equipment Status" set to "Off", "Failure" set to "-", and "Warning" set to "-". At the bottom, there is an "Owner" dropdown menu set to "Operator" and a "Reset" button.

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 78
Equipment Status	Closed	Equipment status of MasterPACT/C.	–
Failure	LastFailure, DeviceFailActive	Detected error status of MasterPACT/C.	
Warning	AlarmActive, CurrentWarning	Alert status of MasterPACT/C.	
Owner	OwnerSelect	Owner of MasterPACT/C.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm

Measures Tab

The table lists the items of each groups from group number 1 to 4 of measures tab:

Group Order Number	1	2	3	4
Group name	Owner	Current	Voltage and Frequency	Power
Items	ManualMode	CurrentLine1	VoltageU21	TotalActivePower
		CurrentLine2	VoltageU32	TotalReactivePower
		CurrentLine3	VoltageU13	TotalApparentPower
		ResidualCurrent	Voltage1	ActivePowerLine1
		THDCurrentLine1	Voltage2	ActivePowerLine2
		THDCurrentLine2	Voltage3	ActivePowerLine3
		THDCurrentLine3	THDVoltageLine1ToLine2	ReactivePowerLine1
		THDCurrentAverage	THDVoltageLine2ToLine3	ReactivePowerLine2
			THDVoltageLine1ToLine3	ReactivePowerLine3
			THDVoltageLine1ToNeutral	ApparentPowerLine1
			THDVoltageLine2ToNeutral	ApparentPowerLine2
			THDVoltageLine3ToNeutral	ApparentPowerLine3
			Frequency	Cosphi

The table lists the items of each groups from group number 5 to 9 of measures tab:

Group Order Number	5	6	7	8	9
Group name	Energy	Communica-tion	Device status	Maintenance	Diagnostics
Items	ActiveEnergy	OrderStatus	InformationCode	TripCounter	WarningCode
	ReactiveEnergy		Closed	TrippingCause	WarningOr-derCode
	ApparentEnergyTotal		Open	TrippingCauseExtended	FailCode0
	PositiveActiveEnergy		ElectricalConditionTrip	WarningCodeExtended	FailCode2
	NegativeActiveEnergy		Discharged	LongTimePickUp	FailCode1
	PositiveReactiveEnergy		Charged	GroundFault	
	NegativeReactiveEnergy		NotReadyToClose	EarthLeakage	
			ReadyToClose	WrongPassword	
			NotAvailable	InternalWarning	
				IncorrectCoilValue	
				IncorrectNbrOfParam	
				UnknownConfiguration	

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of masterpact.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Closed	Circuit breaker is closed	Closed/Not Closed	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/Inactive	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Detected error resetting required	Required/Not Required	Bit6
OwnerExternal	Device is externally controlled	External/Not External	Bit7
Resetting	Normal execution of control block	–	Bit8
EnableFunctional-Block	Normal execution of control block	–	Bit9
TestPosition	Unit is in its test position and can be actuated	–	Bit10
Charged	Springs are charged	–	Bit11
ReadyToClose	Ready to close	–	Bit12
ConnectedCE	Unit is mounted and connected for normal operation	–	Bit13
Open	Circuit breaker is open	Open/Not Open	Bit14
Trip	Circuit breaker is tripped	–	Bit15
Bit items derived from DataStatusWord for MASTERPACT/MASTERPACTC.			
ElectricalConditionTrip	Circuit breaker is tripped due to inappropriate electrical condition	–	Bit2
Discharged	Springs are discharged	–	Bit3
NotReadyToClose	Not ready to close	–	Bit5
NotAvailable	Status of circuit breaker is unavailable	–	Bit7
Disconnected	Unit is disconnected and cannot be actuated	–	Bit11
Reserved NOTE: This parameter is available only in \$MasterpactMTZCMBUGP.	Reserved	–	Bit8
Bit items derived from DataStatusWord for MASTERPACTMTZ/MASTERPACTMTZC.			
ElectricalConditionTrip	Circuit breaker is tripped due to inappropriate electrical condition	–	Bit2

Item name	Description	Enumeration	Address
Discharged	Springs are discharged	–	Bit4
NotReadyToClose	Not ready to close	–	Bit5
Disconnected	Unit is disconnected and cannot be actuated	–	Bit10
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected error	–	Bit0
OwnerSelect	Owner of control module	Operator/Program	Bit1
Close	Command to close	–	Bit3
OpenCommand	Command to open	–	Bit6
ControlCommand	Indicates mode of control	–	Bit7
IO Items			
StatusWord	Status word	–	MASTERPACT_ST. STW
ConfigurationWord	Configuration word		MASTERPACT_ST. CFGW
DataStatusWord	Data Status word		MASTERPACT_CFG. DataStatus
Calculated Items			
CurrentWarning	Current warning	–	GPL_MasterpactCurrent-Warning
LastFailure	Last detected error		GPL_MasterpactLastFailure
Owner	Current owner of the masterpact Refer to Calculated variable, page 39.		GPL_OwnerBasic
Abnormal	Shows abnormal condition of the masterpact Refer to Abnormal conditions, page 104.		GPL_DeviceAbnormal
ActionRequired	Shows action required condition of the masterpact Refer to Action required conditions, page 105.		GPL_DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of masterpact:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	Bit0

Action Required Conditions

The table describes the abnormal conditions of masterpact:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	Bit8

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
AlarmFailure	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

No trend item is used by Supervision components for masterpact.

Hardwired Compact/Masterpact

What's in This Chapter

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Overview

This chapter describes the components that provide the functionality of template, control services, and Supervision functions of the hardwired compact/masterpact circuit breakers.

Template

Overview

This section describes functionality of the `$CompactHWGP` and `$MasterpactHWGP` templates.

Description

General Description

The `$CompactHWGP` and `$MasterpactHWGP` template allows you to manage hardwired compact and masterpact circuit breaker.

Function Description

The main functions of the template are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Open/close	Allows circuit breaker to open and close.
Monitoring	Allows the device measurement data to be monitored.

Parameters

Parameters

The `$CompactHWGP` and `$MasterpactHWGP` template is the control function to manage compactHW and masterpactHW electrical protection circuit breakers.

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	False - Manual reset, True - Automatic reset	Boolean	FALSE	It allows you to reset detected error in both modes (auto and manual). By default, selection mode is manual mode.
Time	Time window for the device to execute orders	Duration	00:00:05	Time the device takes to execute commands.
	Minimum time to maintain the warning signal		00:00:03	The time duration for which the alert pin signal remains 1.
	Maximum time between two auto reset of the DFB.		00:01:00	The maximum time between two automatic resets of the template.
OperationLimit				
Configuration	Within this time interval, the maximum number of command possible is > = retries configured	Duration	00:01:00	–
	Number of command retries	UnsignedInt	3	–

Inputs (Digital Input)

The table describes the digital input:

Name	Description
OFSignal	It allows you to connect open/close status.
SDSignal	It allows you to connect tripped status.
SDESignal	It allows you to connect electrical tripped status.
CESignal ¹	It allows you to connect chassis connected status.
CDSignal ¹	It allows you to connect chassis disconnected status.
CTSignal ¹	It allows you to connect chassis test position status.
CHSignal ¹	It allows you to connect spring charged status.
PFSignal	It allows you to connect ready to close status.
¹ Not applicable for \$CompactHWGP template.	

For more details, refer to the topic describing the parameters of digital inputs, page 28.

Outputs (Digital Output)

The table describes the digital output:

Name	Description
XFSignal	It allows you to connect close output signal to output channel.
MXSignal	It allows you to connect open output signal to output channel.
ResSignal	It allows you to connect reset output signal to output channel.

For more details, refer to the topic describing the parameters of digital outputs, page 29.

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	<i>Program (1)</i>	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	<i>Operator (1)</i>	Privilege to change override mode. This parameter is used in operator tab, page 72.
	Set rearm		<i>Operator (Confirmed) (10)</i>	Privilege to change reset. This parameter is used in operator tab, page 72.
	Set acknowledge		<i>Operator (1)</i>	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.

Data

The table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Alarm	Alarm failure description/ Device failure alarm description	String	<i>@(Alarm Failure)/@ (Device Failure Alarm)</i>	–
	Alarm failure alarm severity/ Device failure alarm severity	Enum	<i>Low(4000)</i>	–
	Alarm failure alarm group/ Device failure alarm group	String	<i>Failure</i>	–
Variable Tag Disable	Disable info code	Boolean	<i>FALSE</i>	–
Historize	Enable historize fail code	Boolean	<i>FALSE</i>	–
	Enable historize data word			–
	Enable historize info code			–

Asset and Display Parameters

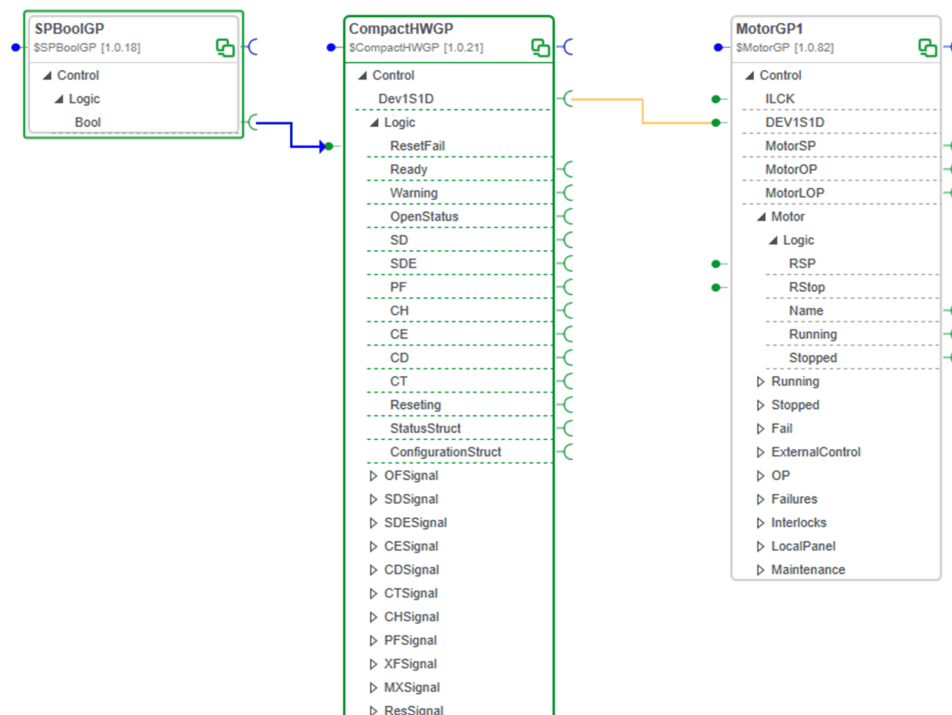
For more details, refer to the topic describing the parameters of asset and display, page 28.

Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

This figure shows the \$CompactHWGP (also applicable for \$CompactHWCE) template as it appears in Links Editor and an example of other templates connected to it:



NOTE: Same interface link is applicable for \$MasterpactHWGP.

The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
Dev1S1D	<i>\$DEV1S1D/DO</i>	Links to a process object.	Connect to a one direction motor to control.
ResetFail	<i>\$BOOL</i>	An input interface from other template.	A boolean type of interface can be connected.
Ready	<i>\$BOOL</i>	An output interface to other template.	Link this interface to boolean variable to enable/disable device.
Warning			
OpenStatus			
SD			
SDE			
PF			
CH			
CE			
CD			
CT			
Reseting			

Control - HWCIRCUITBREAKER

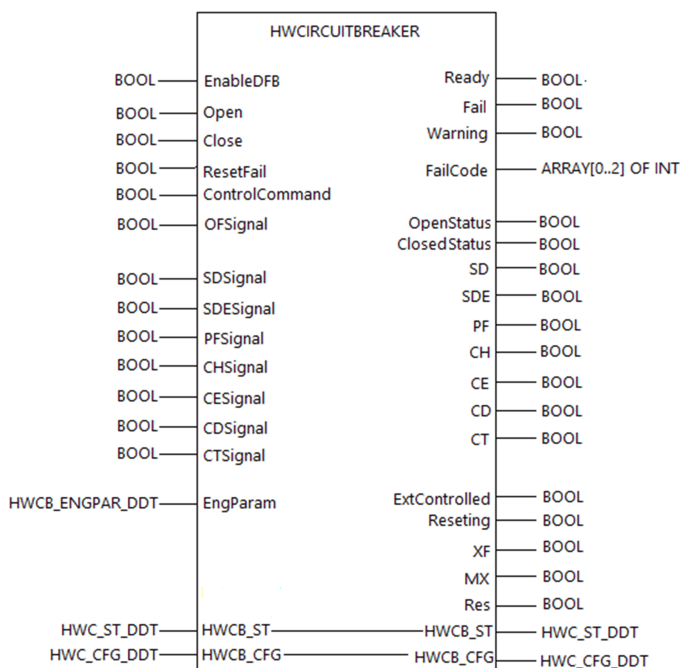
Overview

This section describes the HWCIRCUITBREAKER DFB.

DFB Representation

Representation

The following figure represents the function module of Hardwired circuit breaker.



Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	Enables the control function.
Open	BOOL	Command to open the circuit breaker (Rising edge opens the breaker).
Close	BOOL	Command to close the circuit breaker (Rising edge closes the breaker).
ResetFail	BOOL	Reset the detected error of the DFB and the circuit breaker.
ControlCommand	BOOL	Enables or disables the command sending to the circuit breaker.
OFSignal	BOOL	Open or closed status. <ul style="list-style-type: none"> 1 = Close 0 = Open
SDSignal	BOOL	1=Tripped (Push to trip).
SDESignal	BOOL	1= Electrically tripped.
PFSignal	BOOL	1= Breaker is ready to close.

Parameter	Type		Description
CHSignal	BOOL		1= Spring charged.
CESignal	BOOL		1= Chassis connected.
CDSignal	BOOL		1= Chassis disconnected.
CTSignal	BOOL		1= Chassis in test position.
EngParam	HWCB_ENGPAR_DDT		Engineering parameters
	Parameter	Type	Description
	CommandCtrl-Window	TIME	Time window for the device to execute orders.
	ScanTime	TIME	Minimum time to maintain Warning signals.
	MaxResetTime	TIME	Maximum time between two resets.
	ResetMode	BOOL	<ul style="list-style-type: none"> 0 = Manual Reset 1 = Automatic reset

Outputs

Output Parameter Description

Parameter	Type	Description
Ready	BOOL	Device ready for operation.
Fail	BOOL	Inoperable device.
Warning	BOOL	Device alert
FailCode	ARRAY [0..2] OF INT	Stores the last active FailCode.
OpenStatus	BOOL	Circuit breaker in open position.
ClosedStatus	BOOL	Circuit breaker in closed position.
SD	BOOL	Tripped (for example, push to trip).
SDE	BOOL	Electrically tripped.
PF	BOOL	Ready to close.
CH	BOOL	Spring charged.
CE	BOOL	Chassis connected.
CD	BOOL	Chassis disconnected.
CT	BOOL	Chassis in test position.
ExtControlled	BOOL	Circuit breaker is not controlled by the DFB.
Resetting	BOOL	Resetting the detected error .
XF	BOOL	Close command pulse for 500 milliseconds.
MX	BOOL	Open Command pulse for 500 milliseconds.
Res	BOOL	Reset Command pulse for 500 milliseconds.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
HWCB_ST	HWCB_ST_DDT	Device data structure holds the minimum information required for performing control and monitoring functions. The information used by the operator screen is usable from the HMI/SCADA system.
HWCB_CFG	HWCB_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.

HWCB_ST_DDT

Parameter	Type	Description
STW	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW	WORD	Provides the data status and FailCode.

HWCB_CFG_DDT

Parameter	Type	Description
DataStatus	WORD	Device status
FailCode0	INT	Code of last level 1 detected error. Indicates which detected error has occurred, FailCode [0].
FailCode1	INT	Code of last level 2 detected error. Indicates which detected error has occurred, FailCode [1].
FailCode2	INT	Code of last level 3 detected error. Indicates which detected error has occurred, FailCode [2].
Info	INT	Provides device status information.

HWCB_ST.STW Word Structure

Bit	Description
1	Control Function is not ready to send command.
2	Circuit breaker is in closed state.
3	Control Function is in <code>Fail</code> state due to trip.
4	Control Function is in <code>Warning</code> state due to feedback not obtained after command is sent.
6	Reset is required as control function is in <code>Fail</code> state.
7	Control function is externally controlled.
8	Resetting is in progress.
9	<code>EnableDFB</code> pin status.
10	Test position.
11	Spring is charged.
12	Breaker is ready to close.

Bit	Description
13	Chassis is connected to breaker.
14	Circuit breaker is in opened state.
15	Trip status (SD as well as SDE).

HWCB_ST.CFGW Word Structure

Bit	Description
0	ResetFail command obtained from HMI.
1	Owner
3	Close command
6	Open command
7	Control command

HWCB_CFG.DataStatus Word Structure

Bit	Description
0	Circuit breaker is in opened state.
1	Circuit breaker is in closed state.
2	SD trip status.
3	SDE trip status.
4	Chassis connected status.
5	Chassis disconnected status.
6	Chassis test position status
7	Spring charged status.
8	Ready to close status

Diagnostics Information Management

Overview

Diagnostic information describes the type of detected fail, by displaying diagnostic codes on the `FailCode` output variable.

Modbus Communication Diagnostics Codes

This code indicates that the device has SD Electrical Trip:

- `FailCode[0]: 16#0001`
- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0005`

This code indicates that the device has SDE Electrical Trip:

- `FailCode[0]: 16#0002`
- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0005`

Control - OperationLimit

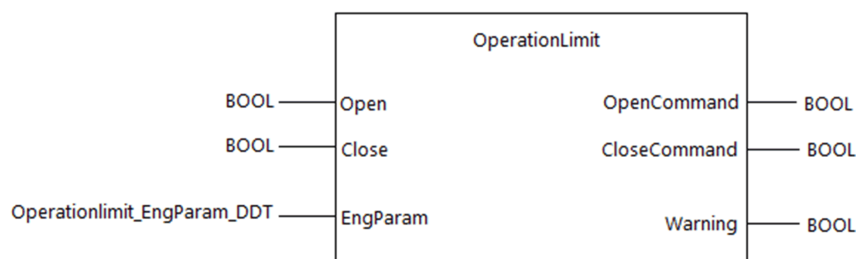
Overview

This section describes the `OperationLimit` DFB.

DFB Representation

Representation

The following figure represents the function module of Operation limit.



Inputs

Input Parameter Description

Parameter	Type		Description
Open	BOOL		Open command.
Close	BOOL		Close command.
EngParam	OperationLimit_ENGPAR_DDT		Engineering parameters
	Parameter	Type	Description
	WatchTime	TIME	Within this time interval, the maximum number of commands possible is less than or equal to <code>Retries</code> configured.
	Retries	TIME	Number of command retries.

NOTE:

- If `EngParam` is not connected then a default value of 60 seconds as `WatchTime` and 3 `Retries` are considered.
- If `EngParam` is connected and `WatchTime` is 0 seconds, then there are no restrictions on commands.

Outputs

Output Parameter Description

Parameter	Type	Description
OpenCommand	BOOL	Open command within retry.
CloseCommand	BOOL	Close command within retry.
<i>Warning</i>	BOOL	Retries exceeded for open and close command combined. NOTE: <i>Warning</i> is reset automatically after the <i>WatchTime</i> is expired.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the compact.

Genies

Genie Properties

Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

COMPACTHW and MASTERPACTHW uses the genie of COMPACT, page 71 and MASTERPACT, page 100 respectively.

Faceplate

Faceplate

COMPACTHW and MASTERPACTHW uses the faceplate of COMPACT, page 71 and MASTERPACT, page 100 respectively.

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of CompactHW and MasterpactHW.

Variables

The table describes the variable items that are used by Supervision components of CompactHW and MasterpactHW:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
NotReady	Module not ready	–	Bit1
Closed	Circuit breaker is closed	Closed/Not Closed	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/Inactive	Bit4
RequireRearm	Fail resetting required	Required/Not Required	Bit6
OwnerExternal	Device is externally controlled	External/Not External	Bit7
Resetting	Normal execution of control block	–	Bit8
EnableFunctional-Block	Normal execution of control block		Bit9
TestPosition	Unit is in its test position and can be actuated		Bit10
Charged	Springs are charged		Bit11
ReadyToClose	Ready to close		Bit12
ConnectedCE	Unit is mounted and connected for normal operation		Bit13
Open	Circuit breaker is open	Open/Not Open	Bit14
Trip	Circuit breaker is tripped	–	Bit15
Bit items derived from DataStatusWord.			
Trip	Circuit breaker is tripped	–	Bit2
SDConditionTrip	Circuit breaker is tripped due to inappropriate electrical condition		Bit3
Disconnected	Unit is disconnected and cannot be actuated		Bit7
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected fail	Active/Inactive	Bit0
OwnerSelect	Owner of control module	Operator/Program	Bit1
Close	Command to close	–	Bit3
OpenCommand	Command to open		Bit6
ControlCommand	Indicates mode of control		Bit7
IO Items			
StatusWord	Status word	–	HWCB_ST.STW
ConfigurationWord	Configuration word		HWCB_ST.CFGW
DataStatusWord	Data status word		HWCB_CFG.DataStatus
Calculated Items			

Item name	Description	Enumeration	Address
CurrentWarning	Current warning	–	GPL_HWCBCurrentWarning
LastFailure	Last detected error		GPL_HWCBLastFailure
Abnormal	Shows abnormal condition of the CompactHW and MasterpactHW, Refer to Abnormal Conditions, page 117		GPL_DeviceAbnormal
ActionRequired	Shows action required condition of the CompactHW and MasterpactHW, Refer to Action Required Conditions, page 117		GPL_DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of COMPACTHW and MASTERPACTHW:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	Bit0
AbnormalOperatorTab	Abnormal status of operator tab.	Bit8

Action Required Conditions

The table describes the action required conditions of COMPACTHW and MASTERPACTHW:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	Bit8

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
DeviceFailure	Device failure alarm	GPL_BitValueCheck(StatusWord, 3)
AlarmFailure	Alarm failure	GPL_BitValueCheck(StatusWord, 4)

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
ActionAlarm	All actions by the operator.

Trends

No trend item is used by Supervision components for COMPACTHW and MASTERPACTHW.

Generic Device


What's in This Part

Generic Device	120
GenNOCDevice	122

Overview

This part provides the functionality of the templates, a detailed description of the control (functions,pins, pin layout, and variables of the function blocks), and the supervision functions of generic device.

These components do not reflect any specific installation.

 **WARNING**

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

Generic Device

What's in This Chapter

Template	120
----------------	-----

Overview

This chapter describes the functionality of generic device.

Template

Overview

This section describes functionality of the `$GenericDeviceGP` template.

Description

General Description

The `$GenericDeviceGP` control module template allows you to create either a variable or an array of variable of required length and a datatype which is defined at the application level. The datatypes supported are namely BOOL, BYTE, DINT, DWORD, EBOOL, INT, REAL, UDINT, UINT and WORD.

NOTE: You cannot use the `$GenericDeviceGP` template when the device communicates with the controller through a NOC communication module. To use a NOC module to communicate with a device for which no specific template exists, use the `$GenNOCDevice` template, page 122.

Parameters

Parameters

The `$GenericDeviceGP` template is the configuration parameters of the element of the generic device.

Logic

The table describes the logic parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Length of the input data variable	Short	2	–
	Length of the output data variable	Short	2	–
	Datatype of the element to be created	Enum	BYTE (0)	–

Hyperlink

For more details, refer to the topic describing the parameters of [hyperlink](#), page 30.

Interfaces

The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
VarName	VarName/A	–	–

GenNOCDevice

What's in This Chapter

Template	122
----------------	-----

Overview

This chapter describes the functionality of `$GenNOCDeviceGP`.

Template

Overview

This section describes functionality of the `$GenNOCDeviceGP` template.

`$GenNOCDeviceGP`

General Description

`$GenNOCDeviceGP` template is a reference template and not a ready-to-use template. This template can be used to create an user defined template to support any third party device DTM behind BMENOC/BMECPU with communication capability.

This reference template is pre-configured with `Input`, `Output` and `IOScannerStatus` variables with correct addresses mapped to these variables in terms of DDDT addressing.

NOTE: They differ from the regular generic application template in terms of the way the addressing is handled. Here the variables are `REF_TO` a predefined array of length 2 which can be altered as needed. Another difference is that the address is passed not to the address column but to the Initial value column. These variables can get addresses of IODDT and DDDT besides the regular topological and flat addresses.

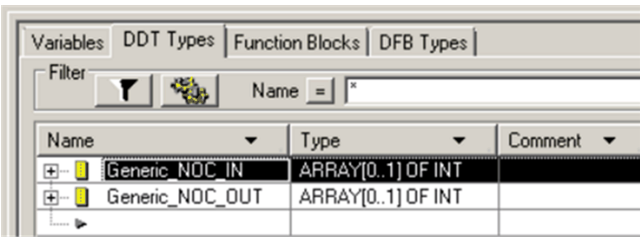
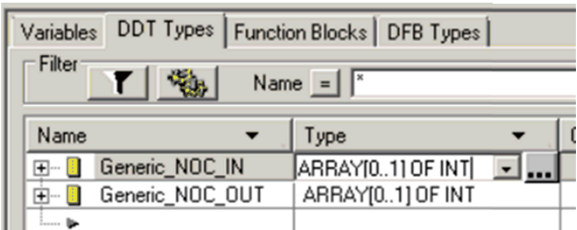
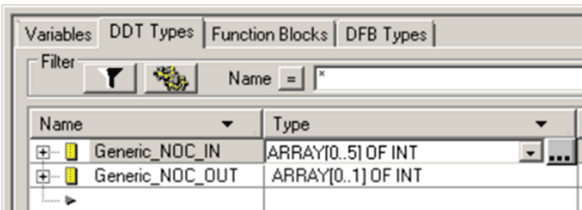
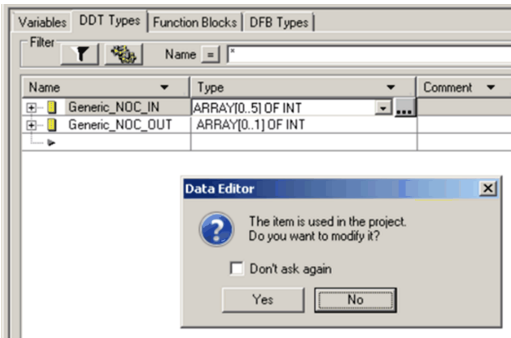
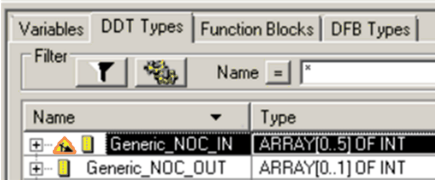
There are two methods to support any third party device DTM behind BMENOC/BMECPU.

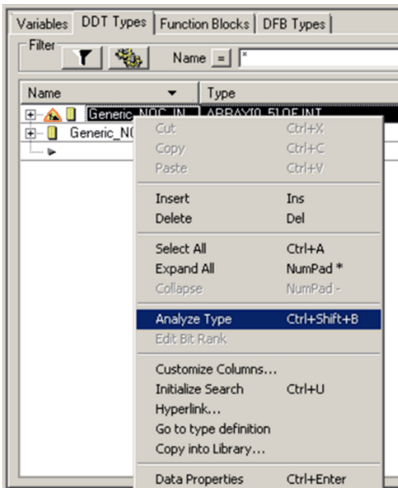
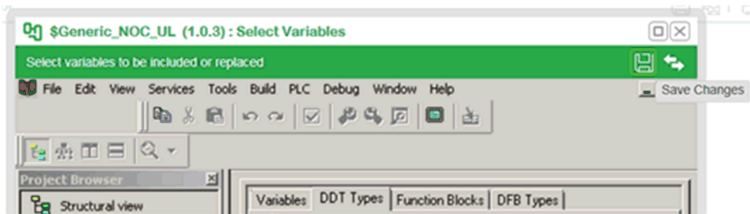
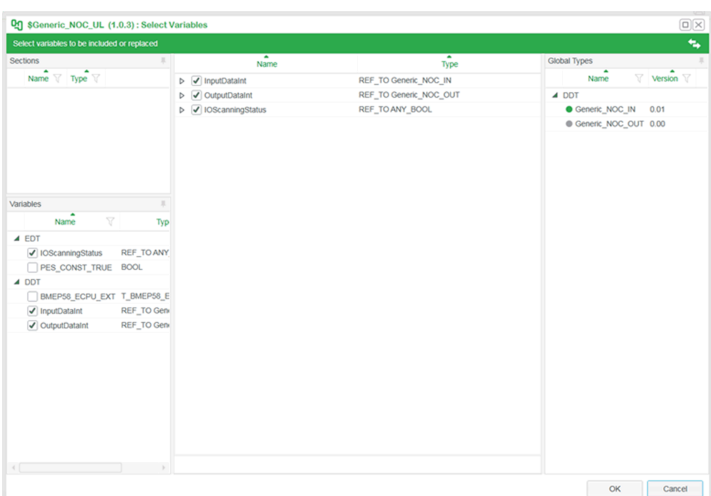
- Creating a user defined template using a reference template.
- Using reference template as it is, however modifying the array size during project refinement.

Procedure to Create User Defined Template using `$GenNOCDeviceGP`

The below table explains how to create an user defined template using `$GenNOCDeviceGP`:

Step	Action				
1	<p>Navigate to the control module template \$GenNOCDeviceGP, Edit and Save As the template (preferably with a new name as per your requirement and version) without the \$ prefix (For example, GenNOCUser).</p>				
2	<p>Navigate to the template facet \$GenericNOC_UL of the saved control module template GenNOCUser, Edit and Save As \$GenericNOC_UL without the \$ prefix (For example, GenericNOCUser_UL).</p>				
3	<p>Replace the \$GenericNOC_UL template facet in the control module template GenNOCUser with the newly saved template facet GenericNOCUser_UL.</p>				
4	<p>Edit the GenNOCUser template and click on the Templatizer icon.</p>				
5	<p>Select Show Templatizer Tool icon to get the constituent file definition.</p> <p>The two variables relevant to the user are:</p> <table border="1"> <tr> <td>a</td><td><i>InputDataInt</i> of type REF_TO Generic_NOC_IN</td></tr> <tr> <td>b</td><td><i>OutputDataInt</i> of type REF_TO Generic_NOC_OUT</td></tr> </table> <p>NOTE: <i>IOScanningStatus</i> of type REF_TO ANYBOOL provides IOScanning health status.</p>	a	<i>InputDataInt</i> of type REF_TO Generic_NOC_IN	b	<i>OutputDataInt</i> of type REF_TO Generic_NOC_OUT
a	<i>InputDataInt</i> of type REF_TO Generic_NOC_IN				
b	<i>OutputDataInt</i> of type REF_TO Generic_NOC_OUT				

Step	Action
6	<p>Select the tab DDT Types.</p>  <p>These are the DDT's that the variables mentioned above refer to for type definition. Both <i>IN</i> and <i>OUT</i> DDTs are of type ARRAY[0...1] OF INT by default. The length of the array that needs to be generated can be changed here.</p>
7	<p>To change the length of the array.</p> <p>Double click on the DDT Types tab. Edit the array length in the Type column.</p> 
8	<p>In the highlighted window, change the length of the array as needed by altering the last item name.</p> 
9	<p>Press Enter.</p> <p>Result: The following message appear</p>  <p>Select Yes.</p>
10	<p>The DDT definition exits the analyzed state.</p> 
11	<p>Right click on the DDT and select the Analyze Type option.</p>

Step	Action
	 <p>This can be done for both IN and OUT DDT definitions.</p> <p>NOTE: To create your own customized template, change the name of the DDT as well, so that there are no two DDT's with the same name and different definition present in a project, even if the reference and customized templates are used in the same project simultaneously. The name can be edited by following the same steps as type, by double clicking the name column. This method is useful to create custom templates for various devices (Since array length requirements may be different for each).</p>
12	<p>Once analyzed, with no detected errors present, proceed to save the project.</p> 
13	<p>Select OK.</p> 
14	<p>Save the template. The template definition contains the new sized element suited to the needs of your application.</p>

Procedure to use \$GenNOCDeviceGP Template without any modification

The following steps explain how to use \$GenNOCDeviceGP template without any modification, however modifying the array size during project refinement:

Step	Action
1	Instantiate the template in Application Explorer .
2	Assign to a project of your choice and generate it.
3	Right click on the project and select Refine .
4	<p>Repeat steps 6 to 11 of the previous procedure to change the array size definition (see EcoStruxure™ Process Expert, Device Templates User Guide).</p> <p>NOTE: This type definition is common for all the instance of variables created using this template and thus will reflect everywhere. This particular method is useful when creating multiple instance of same kind of device since the length requirements are same but instances are more than one.</p>

Digital Protective Relays

What's in This Part

Sepam Controller (Modbus and I/O Scanning).....	128
EasergyP3.....	160
EasergyP5	179

Overview

This part provides the functionality of the templates, a detailed description of the control (functions,pins, pin layout, and variables of the function blocks), and the supervision functions of digital protective relays.

These components do not reflect any specific installation.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

Sepam Controller (Modbus and I/O Scanning)

What's in This Chapter

Template 128

Control 135

Supervision..... 154

Overview

This chapter describes the functionality of template, control services and Supervision functions of the Sepam.

Template

Overview

This section describes functionality of the \$Sepam80MBGP and \$Sepam80EGP template.

Description

General Description

The \$Sepam80MBGP and \$Sepam80EGP control module template allows you to manage Sepam80 digital protection devices on a modbus network.

The SEPAM range of protection relays is designed for applications on medium-voltage public and industrial distribution networks.

Function Description

The main functions of the template are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Opening/Closing	Allows the element controlled by the Sepam to be opened or closed.
Monitoring	Allows the required parameter devices to be monitored.

Parameters

Parameters

The \$Sepam80MBGP template defines operation of Sepam80. Alternative Sepam80 facets enable the modification of the Sepam80 that are available.

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	False - Manual reset	Boolean	FALSE	–
	True - Automatic reset			
	Device modbus address NOTE: These parameters are available only for \$Sepam80MBGP.	Short	0	–
Time	Time window for the device to execute orders	Duration	00:00:05	–
	Minimum time to maintain the warning signals		00:00:03	–
	Maximum time between two auto reset of the DFB		00:01:00	–
	Time to refresh the cyclic data		00:00:00.5	–

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	Program (1)	–
Security	Set owner	Enum	Operator (1)	Privilege to change override mode. This parameter is used in operator tab, page 155.
	Set rearm		Operator (Confirmed) (10)	Privilege to change reset. This parameter is used in operator tab, page 155.
	Set acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Trend	Sample period	Duration	00:00:05	–
	History length (weeks)	Integer	5	–
	History rollover time	Duration	12:00:00	–
	History rollover day	String	Tuesday	–
	Storage type		TRN_PERIODIC	–
	Data location (optional)		[Data];	–

Asset and Display Parameters

For more details, refer to the topic describing the parameters of asset and display, page 28.

Data

The table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Alarm	Sepam80Basic NOTE: These parameters are available only for \$Sepam80EGP and \$Sepam80MBGP			

Section	Parameter description	Data type	Default value	Additional remarks
	Alarm failure description/ Device failure alarm description/Communication failure alarm description	String	@(Alarm Failure)/@(Device Failure Alarm)/@(Communication Failure Alarm)	—
	Alarm failure alarm severity/ Device failure alarm severity/ Communication failure alarm severity	Enum	Low(4000)	—
	Alarm failure alarm group/ Device failure alarm group/ Communication failure alarm group	String	Failure	—
Configuration	SepamMEA NOTE: These parameters are available only for \$Sepam80EGP.			
	Current I deadband value	Integer	0	—
	Residual current sum deadband value			—
	Residual current measured deadband value			—
	Residual voltage deadband value			—
	Positive voltage deadband value			—
	Negative voltage deadband value			—
	Frequency deadband value			—
	Active power deadband value			—
	Reactive power deadband value			—
	Apparent power deadband value			—
	Peak active power deadband value			—
	Positive active energy deadband value			—
	CosPhi deadband value			—
	Peak reactive power deadband value			—
	Negative active energy deadband value			—
	Positive reactive energy deadband value			—
	Negative reactive energy deadband value			—
	SepamMEA NOTE: These parameters are available only for Sepam80MBGP.			
	Average current 1 deadband value	Integer	0	—
	Average current 2 deadband value			—
	Average current 3 deadband value			—
	Current I deadband value			—
	Residual current sum deadband value			—

Section	Parameter description	Data type	Default value	Additional remarks
	Residual current measured deadband value			—
	Peak current 1, current 2 and current 3 deadband value			—
	Voltage U21, U32, U13 deadband value			—
	Voltage 1, Voltage 2 and Voltage 3 deadband value			—
	Residual voltage deadband value			—
	Positive voltage deadband value			—
	Negative voltage deadband value			—
	Frequency deadband value			—
	Reactive power deadband value			—
	Apparent power deadband value			—
	Peak active power deadband value			—
	Positive active energy deadband value			—
	CosPhi deadband value			—
	Peak reactive energy deadband value			—
	Negative active energy deadband value			—
	Positive reactive energy deadband value			—
	Negative reactive energy deadband value			—
Historize	Sepam80Basic NOTE: These parameters are applicable only for \$Sepam80EGP and \$Sepam80MBGP .			
	Enable historize fail codes	Boolean	FALSE	—
	Enable historize warning code			—
	Enable historize information word			—
	Enable historize data word			—
	Optional tab: SepamIO80 NOTE: These parameters are applicable only for \$Sepam80EGP and \$Sepam80MBGP .			
	Enable historize TS1-TS16	Boolean	FALSE	—
	Enable historize TS17-TS32			—
	Enable historize TS33-TS48			—
	Enable historize TS1-TS6			—
Enable historize input map	—			
Enable historize outputs map	—			
	Optional tab: SepamMEA NOTE: These parameters are available for \$Sepam80EGP .			
	Enable historize residual voltage	Boolean	FALSE	—

Section	Parameter description	Data type	Default value	Additional remarks
	Enable historize positive voltage			—
	Enable historize negative voltage			—
	Enable historize frequency			—
	Enable historize active power			—
	Enable historize reactive power			—
	Enable historize apparent power			—
	Enable historize peak active power			—
	Enable historize peak reactive power			—
	Enable historize CosPhi			—
	Enable historize positive active energy			—
	Enable historize negative active energy			—
	Enable historize positive reactive energy			—
	Enable historize negative reactive energy			—
				Optional tab: SepamMEA NOTE: These parameters are available for \$Sepam80MBGP.
Enable historize current 1, current 2 and current 3		Boolean	FALSE	—
Enable historize residual current sum				—
Enable historize average current 1, current 2 and current 3				—
Enable historize peak current 1, current 2 and current 3				—
Enable historize voltages U21, U32 and U13				—
Enable historize voltage 1, voltage 2 and voltage 3				—
Enable historize residual voltage				—
Enable historize positive voltage				—
Enable historize negative voltage				—
Enable historize frequency				—
Enable historize active power				—
Enable historize reactive power				—
Enable historize apparent power				—
Enable historize peak active power				—
Enable historize peak reactive power				—

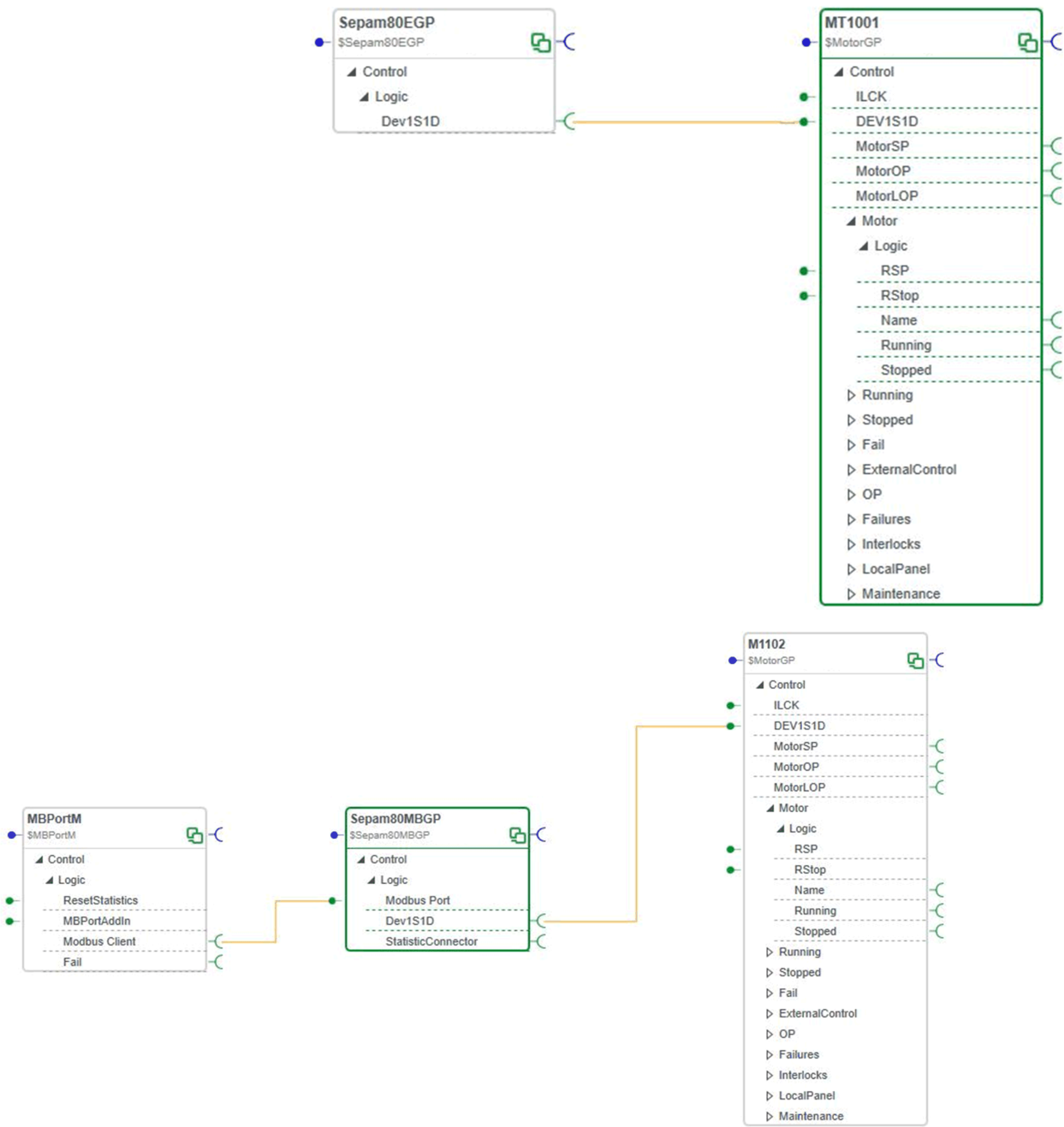
Section	Parameter description	Data type	Default value	Additional remarks
	Enable historize CosPhi			—
	Enable historize positive active energy			—
	Enable historize negative active energy			—
	Enable historize positive reactive energy			—
	Enable historize negative reactive energy			—
	Enable historize residual current measured			—
Variable tag disable	Optional tab: SepamIO80 NOTE: These parameters are available for \$Sepam80EGP and \$Sepam80MBGP .			
	Disable TS1-TS16	Boolean	FALSE	—
	Disable TS17-TS32			—
	Disable TS33-TS48			—
	Disable TS1-TS6			—
	Optional tab: SepamMEA NOTE: These parameters are applicable only for \$Sepam80EGP and \$Sepam80MBGP .			
	Disable current line 1, line 2 and line 3	Boolean	FALSE	—
	Disable residual current sum			—
	Disable residual current measured			—
	Disable average current Im1, Im2 and Im3			—
	Disable peak current Im1, Im2 and Im3			—
	Disable voltage U21, U32, U13, V1, V2 and V3			—
	Disable residual voltage			—
	Disable positive voltage			—
	Disable negative voltage			—
	Disable frequency			—
	Disable active power			—
	Disable reactive power			—
	Disable apparent power			—
	Disable peak active power			—
	Disable peak reactive power			—
	Disable CosPhi			—
	Disable positive active energy			—
	Disable negative active energy			—
	Disable positive reactive energy			—
	Disable negative reactive energy	—		

Hyperlink

For more details, refer to the topic describing the parameters of [hyperlink](#), page 30.

Interfaces

This figure shows the \$Sepam80MBGP/\$Sepam80EGP (also applicable for \$Sepam80MBCE/\$Sepam80ECE) template as it appears in Links Editor and an example of other templates connected to it:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
StatisticSelector	<i>\$Int/Ref</i>	An output interface to other template provides the Information used with modbus communication to obtain statistics on the modbus network.	–
Modbus Port	<i>\$MBWorkMemory/Client</i>	An input interface from MBPortM to define the memory area to talk with the modbus port.	Connect MBPortM
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control

Control

Overview

This chapter describes the Sepam DFB.

Description

General

The SEPAM profile is used to manage Sepam 20, 40, and 80 digital protection devices in a communications-based manner.

The Sepam20MB is classified into two variants:

- The MBSEPAM20CSTM DFB is the control block to manage the Sepam 20 digital protection devices on a modbus network for S (Substation), T (Transformer), M (Motor) variants of the product.
- The MBSEPAM20CB DFB is the control block to manage the Sepam 20 digital protection devices on a modbus network for B (Busbar) variant of the product.

Function Description

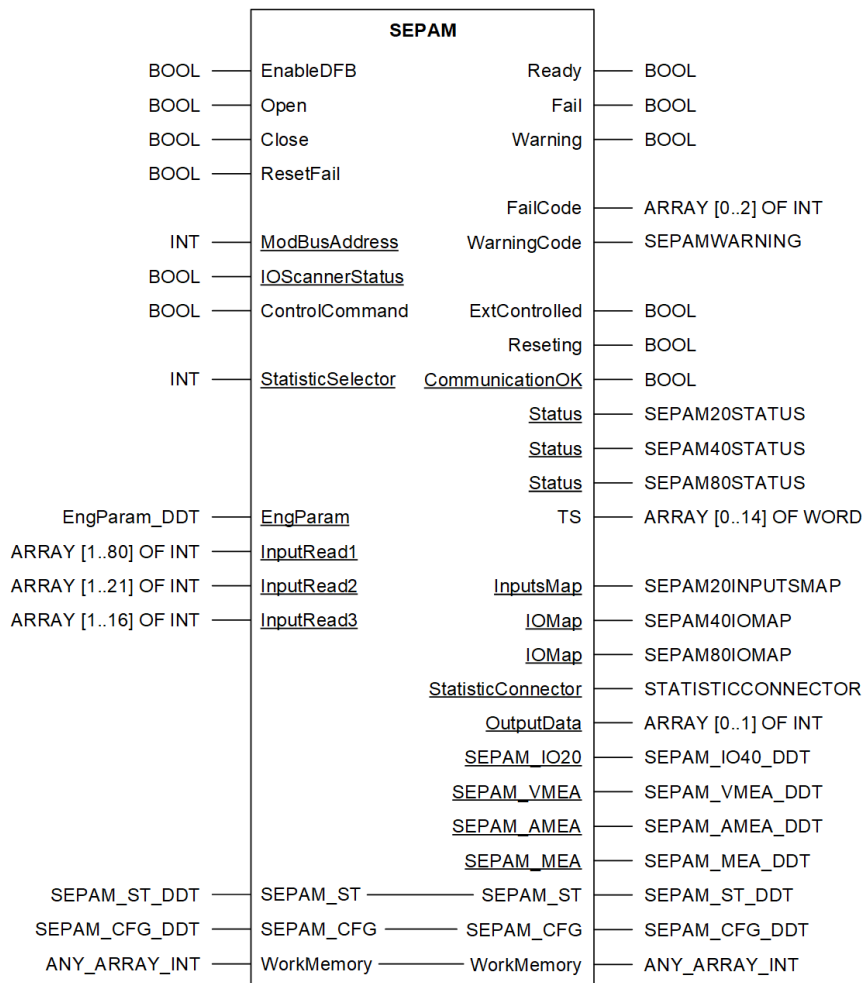
The main functions of the DFB are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Opening/Closing	Allows the element controlled by the Sepam to be opened or closed.
Monitoring	Allows the required parameter devices to be monitored.

DFB Representation

Representation

The following figure represents the functional module of Sepam profile:



NOTE: The underlined parameters are specific for some components.

For DFBs communicating by I/O scanning, variables read from the device retain their last value when a communication interruption occurs. For details, refer to the description of the corresponding output parameter, page 139.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

When you configure the *Last value* parameter of the I/O scanner line, take into consideration the behavior of the DFB when a communication interruption occurs.

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

The table shows the parameters available for specific components:

Parameters		Components				
		SEPAM 20		SEPAM 40	SEPAM 80	
		MBSE-PAM20CB	MBSE-PAM20CST-M	MBSEPAM40C	MBSE-PAM80C	ESEPAM80C
Inputs	ModBusAddress	X	X	X	X	—
	IOScannerStatus	—	—	—	—	X

Parameters		Components				
		SEPAM 20		SEPAM 40	SEPAM 80	
		MBSE-PAM20CB	MBSE-PAM20CSTM	MBSEPAM40C	MBSE-PAM80C	ESEPAM80C
	EngParam	X	X	X	X	–
	StatisticSelector	X	X	X	X	–
	InputRead1	–	–	–	–	X
	InputRead2	–	–	–	–	X
	InputRead3	–	–	–	–	X
Out-puts	Status (SEPAM20STATUS)	X	X	–	–	–
	Status (SEPAM40STATUS)	–	–	X	–	–
	Status (SEPAM80STATUS)	–	–	–	X	X
	InputsMap	X	X	–	–	–
	IOMap (SEPAM40IOMAP)	–	–	X	–	–
	IOMap (SEPAM80IOMAP)	–	–	–	X	X
	StatisticConnector	X	X	X	X	–
	SEPAM_IO20	X	X	–	–	–
	SEPAM_IO40	–	–	X	–	–
	SEPAM_IO80	–	–	–	X	X
	SEPAM_AMEA	–	X	–	–	–
	SEPAM_VMEA	X	–	–	–	–
	SEPAM_MEAS	–	–	X	X	X
	CommunicationOK	–	–	–	–	X
	OutputData	–	–	–	–	X
X: Parameter is available. –: Parameter is not available.						

Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	This input enables the normal execution of the control block. <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, 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.
Open	BOOL	1 = Opens the element controlled by the Sepam.
Close	BOOL	1 = Closes the element controlled by the Sepam.
ResetFail	BOOL	1 = Resets the detected Fail output parameter to 0 or in case of inoperable device, sends a reset command to the device if ControlCommand is 1.
ModBusAddress*	INT	Device address within the modbus network.

Parameter	Type	Description
IOScannerStatus*	BOOL	1 = The node is present on the bus. You can find this variable in Ethernet communications.
ControlCommand	BOOL	Indicates to the DFB whether the Sepam is being controlled locally or from a source external to the DFB. <ul style="list-style-type: none"> 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. NOTE: This input does not configure the Sepam.
InputRead1*	ARRAY [1..80] of INT	An array contains the read information obtained from the SEPAM80 unit through the IOScan. For the block to work properly, allocate the structure (%MWx).
InputRead2*	ARRAY [1..21] of INT	
InputRead3*	ARRAY [1..16] of INT	
StatisticSelector*	INT	This variable is used to obtain statistics for the modbus network (requests carried out, time between requests, so on). This data provides information for using StatisticConnector pin within the StatisticCounter DFB in General Purpose library for communication. The following table displays the StatisticSelector value:
	Variable value	Description
	1	Read statistics, client.
	2	Write statistics, client.
EngParam	EngParam_DDT, page 138* EngParamSEPAM20CB/ EngParamSEPAM40C EngParamSEPAM80C/ EngParamSEPAM20CS	Engineering parameters.

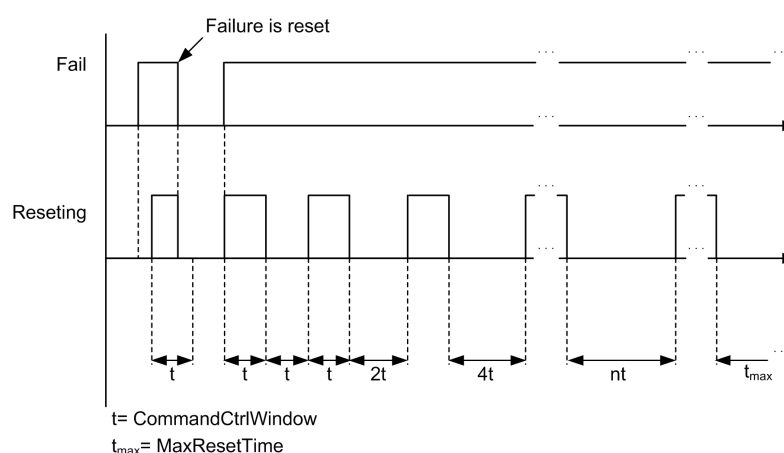
*: Parameter is available for specific components.

EngParam_DDT

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 commands controlled are <code>Open</code> and <code>Close</code> . In the event of a <code>ResetFail</code> , this is not interpreted as an alarm. Instead, the detected error continues, and you have to reset the <code>Resetting</code> output (to <code>FALSE</code>).
Refresh	TIME	Refresh time for device data on serial modbus communications. NOTE: This refresh operation is carried out on read variables. Write requests are carried out when needed.
ScanTime	TIME	Allows you to configure the time for which the alarm signals are kept active. Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset.

Variable	Type	Description
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 <code>CommandCtrlWindow</code> 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 <code>CommandCtrlWindow</code> elapses. The second reset is carried out after <code>CommandCtrlWindow * 2</code> elapses, so on. If the value of <code>CommandCtrlWindow</code> 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 are/the device is reset with the <code>ResetFail</code> variable.
	TRUE	Communications are/the device is reset automatically.
MaxResetTime	TIME	When in automatic <code>ResetMode</code> , this variable is used to define the maximum time that can elapse between 2 consecutive resets. Refer to the Timing diagram below.

Timing diagram:



Outputs

Output Parameter Description

Parameter	Type	Description
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Open or Close command.
Fail	BOOL	1 = A detected error in the control block or in the device or communication interruption. To reset the detected <code>Fail</code> output pin, the <code>ResetFail</code> input has to be activated. The last detected error code is shown on <code>FailCode</code> . NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables retain their last value.
Warning	BOOL	1 = An alarm has been activated for the device. It does not affect the block operation and does not need to be reset. This signal remains active until the cause of the alarm disappears.
FailCode	ARRAY [0..2] OF INT	When the detected <code>Fail</code> output is 1, it holds the code for the detected error.

Parameter	Type	Description	
		If the detected <code>Fail</code> bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3-level structure. Refer to the <i>Diagnostics Information Management</i> , page 153 for more details.	
WarningCode	SEPAMWARNING	Holds a data structure with information on the alarm currently on the Sepam unit. The following table describes the code for the <code>WarningCode</code> :	
	Parameter	Type	Description
	Order	BOOL	1 = Follow-up alarm. The device is not responding to the control command within the time specified in <code>CommandCtrlWindow</code> .
ExtControlled	BOOL	1 = The Sepam is being controlled from a source external (from the HMI/SCADA monitoring system) to the system. It does not consider local control through inputs because the parameters of the local forcing input can be configured with positive or negative logic.	
Reseting	BOOL	1 = A reset is being carried out. The <code>CommandCtrlWindow</code> variable indicates the maximum time for resetting the detected error. When a device or communication reset is carried out with <code>ResetFail</code> , the DFB tries to reset the detected error within the time period defined in <code>CommandCtrlWindow</code> . If the detected error is reset, the detected <code>Fail</code> and <code>Reseting</code> output variables are reset (set to FALSE). If the detected error is not reset, the <code>Reseting</code> variable is FALSE and the detected <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based. Refer to the Timing diagram below.	
CommunicationOK	BOOL	1 = Communication is OK.	
Status*	SEPAM20STATUS	The structure holds data containing the information that the block extracts from the status variable of the Sepam 20C unit (W16#0100). NOTE: You can use the <code>LocalRemote</code> status variable as an input for <code>ControlCommand</code> with positive or negative logic depending on how parameters are configured on the Sepam unit. The following table describes the status information:	
	Parameter	Type	Description
	Opened	BOOL	1 = The element controlled by the Sepam unit is opened.
	Closed	BOOL	1 = The element controlled by the Sepam unit is closed.
	Trip	BOOL	1 = The Sepam unit is in tripped status.
	Fault	BOOL	1 = The Sepam unit requires resetting after detected fault.
	LocalRemote	BOOL	1 = Remote control (to be configured through an input).
	SettingAActive	BOOL	1 = Setting group A active.
	SettingBActive	BOOL	1 = Setting group B active.
	TimeOutdated	BOOL	1 = The Sepam unit does not have the correct time.
	PartialFault	BOOL	1 = Partial detected error on the Sepam unit.
	MajorFault	BOOL	1 = Major detected error on the Sepam unit.
	SettingMode	BOOL	1 = The Sepam unit is in Local settings mode.
	SynchronizationLost	BOOL	1 = The Sepam unit is not synchronized.
	DataLoss1Event	BOOL	1 = Event detected in first zone.

Parameter	Type	Description	
	Event1Zone	BOOL	1 = Event occurrence in the first event zone.
	Info	INT	Numerical code with the information on statuses and required actions. Refer to the <code>Info</code> table below.
Status*	SEPAM40STATUS	<p>The structure holds data containing the information that the block extracts from the status variable of the Sepam 40C unit (W16#0100).</p> <p>The following table describes the status information:</p>	
	Parameter	Type	Description
	Opened	BOOL	1 = The element controlled by the Sepam unit is opened.
	Closed	BOOL	1 = The element controlled by the Sepam unit is closed.
	Trip	BOOL	1 = The Sepam unit is in tripped status.
	Fault	BOOL	1 = The Sepam unit requires resetting after detected fault.
	LocalRemote	BOOL	1 = Remote control (to be configured through an input).
	DataLoss2Event	BOOL	1 = Event detected in second zone.
	SettingAActive	BOOL	1 = Setting group A active.
	Event2Zone	BOOL	1 = Event occurrence in second event zone.
	SettingBActive	BOOL	1 = Setting group A active.
	TimeOutdated	BOOL	1 = The Sepam unit does not have the correct time.
	PartialFault	BOOL	1 = Partial detected error on the Sepam unit.
	MajorFault	BOOL	1 = Major detected error on the Sepam unit.
	SettingMode	BOOL	1 = The Sepam unit is in Local settings mode.
	SynchronizationLost	BOOL	1 = The Sepam unit is not synchronized.
	DataLoss1Event	BOOL	1 = Event detected in first zone.
	Event1Zone	BOOL	1 = Event occurrence in the first event zone.
	Info	INT	Numerical code with the information on statuses and required actions. Refer to the <code>Info</code> table below.
Status*	SEPAM80STATUS	<p>The structure holds data containing the information that the block extracts from the status variable of the Sepam 80 unit.</p> <p>The following table describes the status information:</p>	
	Parameter	Type	Description
	Opened	BOOL	1 = The element controlled by the Sepam unit is opened.
	Closed	BOOL	1 = The element controlled by the Sepam unit is closed.
	Trip	BOOL	1 = The Sepam unit in tripped status.
	Fault	BOOL	1 = The Sepam unit requires resetting after detected fault.
	LocalRemote	BOOL	1 = Remote control (to be configured through an input).
	ModbusSecurity	BOOL	1 = The function is enabled.
	DataLoss2Event	BOOL	1 = Event detected in second zone.
	SettingAActive	BOOL	1 = Setting group A active.
	Event2Zone	BOOL	1 = Event occurrence in second event zone.

Parameter	Type	Description	
	SettingBActive	BOOL	1 = Setting group B active.
	TimeOutdated	BOOL	1 = The Sepam unit does not have the correct time.
	PartialFault	BOOL	1 = Partial detected error on the Sepam unit.
	MajorFault	BOOL	1 = Major detected error on the Sepam unit.
	SettingMode	BOOL	1 = The Sepam unit is in Local settings mode.
	RemoteSetting	BOOL	1 = Remote setting is disabled.
	CapacitiveInductive	BOOL	<ul style="list-style-type: none"> 0 = Capacitive network. 1 = Inductive network.
	SynchronizationLost	BOOL	1 = The Sepam unit is not synchronized.
	DataLoss1Event	BOOL	1 = Event detected in first zone.
	Event1Zone	BOOL	1 = Event occurrence in the first event zone.
	Info	INT	Numerical code with the information on statuses and required actions. Refer to the <code>Info</code> table below.
TS ¹	ARRAY OF WORD		Array that holds remote indications (TS). Remote indications are pre-assigned to protection or control functions depending on the type of the Sepam unit being used. The following table describes the TS:
	Parameter	Type	Description
	TS0	WORD	TS1–TS16. Remote indications (TS) from TS1 to 16.
	TS1	WORD	TS17–TS32. Remote indications (TS) from TS17 to 32.
	TS2	WORD	TS33–TS48. Remote indications (TS) from TS33 to 48.
	TS3	WORD	TS49–TS64. Remote indications (TS) from TS49 to 64.
	TS4	WORD	TS65–TS80. Remote indications (TS) from TS65 to 80.
	TS5	WORD	TS81–TS96. Remote indications (TS) from TS81 to 96.
	TS6	WORD	TS97–TS112. Remote indications (TS) from TS97 to 112.
	TS7	WORD	TS113–TS128. Remote indications (TS) from TS113 to 128.
	TS8	WORD	TS129–TS144. Remote indications (TS) from TS129 to 144.
	TS9	WORD	TS145–TS160. Remote indications (TS) from TS145 to 160.
	TS10	WORD	TS161–TS176. Remote indications (TS) from TS161 to 176.
	TS11	WORD	TS177–TS192. Remote indications (TS) from TS177 to 192.
	TS12	WORD	TS193–TS208. Remote indications (TS) from TS193 to 208.
	TS13	WORD	TS209–TS224. Remote indications (TS) from TS209 to 224.
	TS14	WORD	TS225–TS240. Remote indications (TS) from TS225 to 240.
InputsMap*	SEPAM20INPUTSMAP		Holds a data structure with the information on the state of the inputs of the Sepam 20 unit. The following table describes the <code>InputsMap</code> :
	Parameter	Type	Description

Parameter	Type	Description	
	I11	BOOL	1 = The state of the input I11.
	I12	BOOL	1 = The state of the input I12.
	I13	BOOL	1 = The state of the input I13.
	I14	BOOL	1 = The state of the input I14.
	I21	BOOL	1 = The state of the input I21.
	I22	BOOL	1 = The state of the input I22.
	I23	BOOL	1 = The state of the input I23.
	I24	BOOL	1 = The state of the input I24.
	I25	BOOL	1 = The state of the input I25.
	I26	BOOL	1 = The state of the input I26.
IOMap*	SEPAM40IOMAP	Holds a data structure with the information on the state of the inputs and outputs of the Sepam 40 unit. The following table describes the IOMap:	
	Parameter	Type	Description
	I11	BOOL	1 = The state of the input I11.
	I12	BOOL	1 = The state of the input I12.
	I13	BOOL	1 = The state of the input I13.
	I14	BOOL	1 = The state of the input I14.
	I21	BOOL	1 = The state of the input I21.
	I22	BOOL	1 = The state of the input I22.
	I23	BOOL	1 = The state of the input I23.
	I24	BOOL	1 = The state of the input I24.
	I25	BOOL	1 = The state of the input I25.
	I26	BOOL	1 = The state of the input I26.
	O1	BOOL	1 = The state of the output O1.
	O2	BOOL	1 = The state of the output O2.
	O3	BOOL	1 = The state of the output O3.
	O4	BOOL	1 = The state of the output O4.
	O11	BOOL	1 = The state of the output O11.
	O12	BOOL	1 = The state of the output O12.
	O13	BOOL	1 = The state of the output O13.
	O14	BOOL	1 = The state of the output O14.
	Led1	BOOL	1 = The state of the LED 1.
	Led2	BOOL	1 = The state of the LED 2.
	Led3	BOOL	1 = The state of the LED 3.
	Led4	BOOL	1 = The state of the LED 4.
	Led5	BOOL	1 = The state of the LED 5.
	Led6	BOOL	1 = The state of the LED 6.
	Led7	BOOL	1 = The state of the LED 7.
	Led8	BOOL	1 = The state of the LED 8.
	Led9	BOOL	1 = The state of the LED 9.
IOMap*	SEPAM80IOMAP	Holds a data structure with the information on the state of the inputs and outputs of the Sepam 80 unit. The following table describes the IOMap:	

Parameter	Type	Description	
	Parameter	Type	Description
	I101	BOOL	1 = The state of the input I101.
	I102	BOOL	1 = The state of the input I102.
	I103	BOOL	1 = The state of the input I103.
	I104	BOOL	1 = The state of the input I104.
	I105	BOOL	1 = The state of the input I105.
	I106	BOOL	1 = The state of the input I106.
	I107	BOOL	1 = The state of the input I107.
	I108	BOOL	1 = The state of the input I108.
	I109	BOOL	1 = The state of the input I109.
	I110	BOOL	1 = The state of the input I110.
	I111	BOOL	1 = The state of the input I111.
	I112	BOOL	1 = The state of the input I112.
	I113	BOOL	1 = The state of the input I113.
	I114	BOOL	1 = The state of the input I114.
	O1	BOOL	1 = The state of the output O1.
	O2	BOOL	1 = The state of the output O2.
	O3	BOOL	1 = The state of the output O3.
	O4	BOOL	1 = The state of the output O4.
	O5	BOOL	1 = The state of the output O5.
	O101	BOOL	1 = The state of the output O101.
	O102	BOOL	1 = The state of the output O102.
	O103	BOOL	1 = The state of the output O103.
	O104	BOOL	1 = The state of the output O104.
	O105	BOOL	1 = The state of the output O105.
	O106	BOOL	1 = The state of the output O106.
	Led1	BOOL	1 = The state of the LED 1.
	Led2	BOOL	1 = The state of the LED 2.
	Led3	BOOL	1 = The state of the LED 3.
	Led4	BOOL	1 = The state of the LED 4.
StatisticConnector*	STATISTICCONNECTOR	<p>Information data is used with modbus communication to obtain statistics on the modbus network (requests carried out, time between requests, so on). This structure has been created for its use together with the <code>StatisticCounter</code> DFB in General Purpose library for communication.</p> <p>The following table describes the <code>StatisticConnector</code>:</p>	
	Parameter	Type	Description
	Start	BOOL	1 = Operation has started.
	EndOk	BOOL	1 = Operation has ended correctly.
	EndNOk	BOOL	1 = Operation has ended with a detected error.
	PartialTime	DINT	Partial time.
OutputData*	ARRAY [0...2] OF INT	Remote control order.	
SEPAM_IO20*	SEPAM_IO20_DDT	<p>Device data structure holds the information for performing monitoring. The information used by operator screen is usable from the HMI/SCADA system.</p> <p>The following table describes the <code>SEPAM_IO20_DDT</code> type:</p>	

Parameter	Type	Description	
	Parameter	Type	Description
	InputsMap	WORD	Data with inputs. Provides the states for the Sepam 20 inputs. Refer to the InputsMap table below.
	TS0	WORD	TS1–TS16. Remote indications (TS) from TS1 to 16.
	TS1	WORD	TS17–TS32. Remote indications (TS) from TS17 to 32.
	TS2	WORD	TS33–TS48. Remote indications (TS) from TS33 to 48.
	TS3	WORD	TS49–TS64. Remote indications (TS) from TS49 to 64.
SEPAM_IO40*	SEPAM_IO40_DDT	Device data structure holds the information for performing monitoring. The information used by operator screen is usable from the HMI/SCADA system. The following table describes the SEPAM_IO40_DDT type:	
	Parameter	Type	Description
	InputsMap	WORD	Data with inputs. Provides the status for the Sepam 40 inputs. Refer to the InputsMap table below.
	OutputsMap	WORD	Data with outputs. Provides the status for the Sepam 40 outputs. Refer to the OutputsMap table below.
	LedStatus	WORD	Data with LEDs. Provides the status for the Sepam 40 LEDs. Refer to the LedStatus table below.
	TS0	WORD	TS1–TS16. Remote indications (TS) from TS1 to 16.
	TS1	WORD	TS17–TS32. Remote indications (TS) from TS17 to 32.
	TS2	WORD	TS33–TS48. Remote indications (TS) from TS33 to 48.
	TS3	WORD	TS49–TS64. Remote indications (TS) from TS49 to 64.
	TS4	WORD	TS65–TS80. Remote indications (TS) from TS65 to 80.
	TS5	WORD	TS81–TS96. Remote indications (TS) from TS81 to 96.
	TS6	WORD	TS97–TS112. Remote indications (TS) from TS97 to 112.
	TS7	WORD	TS113–TS128. Remote indications (TS) from TS113 to 128.
	TS8	WORD	TS129–TS144. Remote indications (TS) from TS129 to 144.
SEPAM_IO80*	SEPAM_IO80_DDT	Device data structure holds the information for performing functions. The information used by operator screen is usable from the HMI/SCADA system. The following table describes the SEPAM_IO80_DDT type:	
	Parameter	Type	Description
	DataStatusExt	WORD	Device status extended for the Sepam 80. Refer to the DataStatusExt table below.
	InputsMap	WORD	Digital inputs. Provides the status for the Sepam 80 inputs. Refer to the InputsMap table below.

Parameter	Type	Description	
	OutputsMap	WORD	Digital outputs. Provides the status for the Sepam 80 outputs. Refer to the <code>OutputsMap</code> table below.
	LedStatus	WORD	Data with LEDs. Provides the status for the Sepam 80 LEDs. Refer to the <code>LedStatus</code> table below.
	TS0	WORD	TS1–TS16. Remote indications (TS) from TS1 to 16.
	TS1	WORD	TS17–TS32. Remote indications (TS) from TS17 to 32.
	TS2	WORD	TS33–TS48. Remote indications (TS) from TS33 to 48.
	TS3	WORD	TS49–TS64. Remote indications (TS) from TS49 to 64.
	TS4	WORD	TS65–TS80. Remote indications (TS) from TS65 to 80.
	TS5	WORD	TS81–TS96. Remote indications (TS) from TS81 to 96.
	TS6	WORD	TS97–TS112. Remote indications (TS) from TS97 to 112.
	TS7	WORD	TS113–TS128. Remote indications (TS) from TS113 to 128.
	TS8	WORD	TS129–TS144. Remote indications (TS) from TS129 to 144.
	TS9	WORD	TS145–TS160. Remote indications (TS) from TS145 to 160.
	TS10	WORD	TS161–TS176. Remote indications (TS) from TS161 to 176.
	TS11	WORD	TS177–TS192. Remote indications (TS) from TS177 to 192.
	TS12	WORD	TS193–TS208. Remote indications (TS) from TS193 to 208.
	TS13	WORD	TS209–TS224. Remote indications (TS) from TS209 to 224.
	TS14	WORD	TS225–TS240. Remote indications (TS) from TS225 to 240.
	Reserved	INT	Reserved.
SEPAM_MEA*	SEPAM_MEA_DDT	Data structure with the device measurement information. The following table describes the <code>SEPAM_MEA_DDT</code> :	
	Parameter	Type	Description
	CurrentI1	REAL	Phase current I1 (A).
	CurrentI2	REAL	Phase current I2 (A).
	CurrentI3	REAL	Phase current I3 (A).
	ResidualCurrentSum	REAL	Total residual current I _o (A).
	ResidualCurrentMeasured	REAL	Measured residual current (A).
	AverageCurrentIm1	REAL	Average phase current Im1 (A).
	AverageCurrentIm2	REAL	Average phase current Im2 (A).
	AverageCurrentIm3	REAL	Average phase current Im3 (A).
	PeakCurrentIM1	REAL	Peak demand phase current IM1 (A).
	PeakCurrentIM2	REAL	Peak demand phase current IM2 (A).
	PeakCurrentIM3	REAL	Peak demand phase current IM3 (A).
	VoltageU21	REAL	Line-to-line voltage U21 (V).

Parameter	Type	Description	
	VoltageU32	REAL	Line-to-line voltage U ₃₂ (V).
	VoltageU13	REAL	Line-to-line voltage U ₁₃ (V).
	VoltageV1	REAL	Line-to-neutral voltage V ₁ (V).
	VoltageV2	REAL	Line-to-neutral voltage V ₂ (V).
	VoltageV3	REAL	Line-to-neutral voltage V ₃ (V).
	ResidualVoltage	REAL	Residual voltage V ₀ (V).
	PositiveVoltage	REAL	Forward voltage V _d (V).
	NegativeVoltage	REAL	Inverse voltage V _i (V).
	Frequency	REAL	Frequency (Hz).
	ActivePower	REAL	Real power p(kW).
	ReactivePower	REAL	Reactive power Q(kVar).
	AparentPower	REAL	Apparent power S(kVA).
	PeakActivePower	REAL	Peak demand real power P _m (kW).
	CosPhi	REAL	Cos Phi power factor.
	PositiveActiveEnergy	DINT	Positive real power Ea+(kWh).
	NegativeActiveEnergy	DINT	Negative real power Ea-(kWh).
	PositiveReactiveEnergy	DINT	Positive reactive power Er+(kVarh).
	NegativeReactiveEnergy	DINT	Negative reactive power Er-(kVarh).
*: Parameter is available only for specific components.			
†: From TS0 to TS8 is applicable for MBSEPAM40C. From TS0 to TS14 is applicable for MBSEPAM80C and ESEPAM80C.			

SEPAM_VMEA_DDT for MBSEPAM20CB DFB

Parameter	Type	Description	
SEPAM_VMEA*	SEPAM_VMEA_DDT	Voltage measurements for the Sepam B20, B21, and B22.	
	Parameter	Type	Description
	VoltageU13	REAL	Phase-to-phase voltage U ₁₃ (in Volts).
	VoltageU21	REAL	Phase-to-phase voltage U ₂₁ (in Volts).
	VoltageU32	REAL	Phase-to-phase voltage U ₃₂ (in Volts).
	VoltageV1	REAL	Phase-to-neutral voltage V ₁ (in Volts).
	VoltageV2	REAL	Phase-to-neutral voltage V ₂ (in Volts).
	VoltageV3	REAL	Phase-to-neutral voltage V ₃ (in Volts).
	ResidualVoltage	REAL	Residual voltage V ₀ (in Volts).
	PositiveVoltage	REAL	Positive sequence voltage V _d (in Volts).
	Frequency	REAL	Frequency (in Hertz).

SEPAM_AMEA_DDT for MBSEPAM20CSTM DFB

Parameter	Type	Description	
SEPAM_AMEA*	SEPAM_AMEA_DDT	Current measurements for the Sepam B20, B21, and B22.	
	Parameter	Type	Description
	CurrentI1	REAL	Phase current I1 (in Amps).
	CurrentI2	REAL	Phase current I2 (in Amps).
	CurrentI3	REAL	Phase current I3 (in Amps).
	ResidualCurrent	REAL	Residual current I0 (in Amps).
	ResidualCurrent-Mea	REAL	Residual current measured (in Amps).
	AverageCurrentI1	REAL	Average phase current I1 (in Amps).
	AverageCurrentI2	REAL	Average phase current I2 (in Amps).
	AverageCurrentI3	REAL	Average phase current I3 (in Amps).
	PeakCurrentIM1	REAL	Peak demand phase current IM1 (in Amps).
	PeakCurrentIM2	REAL	Peak demand phase current IM2 (in Amps).
	PeakCurrentIM3	REAL	Peak demand phase current IM3 (in Amps).

Info

The code with the information is shown on the Control Expert operator screen. The following table describes the Info:

Variable value	Description
1	Incorrect configuration of DFB parameter.
2	Waiting for Ready.
6	The Sepam unit is open.
7	The Sepam unit is closed.
10	Waiting ControlCommand. It has to be 1.
11	Missing EnableDFB.
12	Missing Communication OK.Communication interruption.
13	Status register value is 0.
23	Remove Open. It has to be 0.
24	Remove ResetFail. Reset again.
81	Missing ResetFail. Inoperable device.
82	A reset is needed.

DataStatusExt Word Structure

The following table describes the DataStatusExt Word structure:

Bit	Description
0	Refer to the <code>ModbusSecurity</code> status in the <code>Status</code> output pin.
1	Refer to the <code>RemoteSettings</code> status in the <code>Status</code> output pin.
2	Refer to the <code>CapacitiveInductive</code> status in the <code>Status</code> output pin.

OutputsMap Word Structure

The following table describes the `OutputsMap` Word structure:

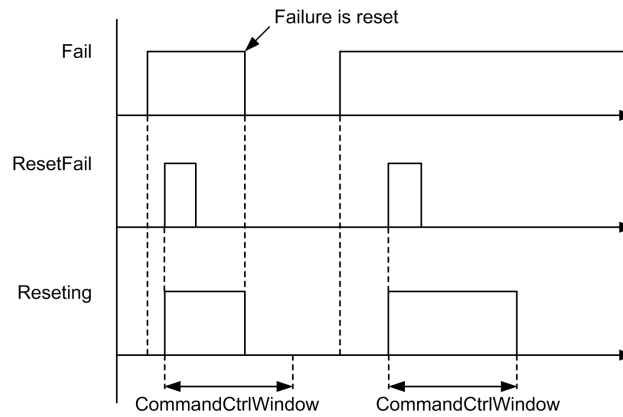
Bit	Description
0	Shows the state of the output 01.
1	Shows the state of the output 02.
2	Shows the state of the output 03.
3	Shows the state of the output 04.
4	Shows the state of the output 05.
5	Shows the state of the output 0101.
6	Shows the state of the output 0102.
7	Shows the state of the output 0103.
8	Shows the state of the output 0104.
9	Shows the state of the output 0105.
10	Shows the state of the output 0106.

InputsMap Word Structure (SEPAM 20 and SEPAM 40)

The following table describes the `InputsMap` Word structure:

Bit	Description
0	Shows the state of the digital input 11.
1	Shows the state of the digital input 12.
2	Shows the state of the digital input 13.
3	Shows the state of the digital input 14.
4	Shows the state of the digital input 21.
5	Shows the state of the digital input 22.
6	Shows the state of the digital input 23.
7	Shows the state of the digital input 24.
8	Shows the state of the digital input 25.
9	Shows the state of the digital input 26.

Timing diagram:



InputsMap Word Structure (SEPAM 80)

The following table describes the `InputsMap` Word structure:

Bit	Description
0	Shows the state of the digital input I101.
1	Shows the state of the digital input I102.
2	Shows the state of the digital input I103.
3	Shows the state of the digital input I104.
4	Shows the state of the digital input I105.
5	Shows the state of the digital input I106.
6	Shows the state of the digital input I107.
7	Shows the state of the digital input I108.
8	Shows the state of the digital input I109.
9	Shows the state of the digital input I110.
10	Shows the state of the digital input I111.
11	Shows the state of the digital input I112.
12	Shows the state of the digital input I113.
13	Shows the state of the digital input I114.

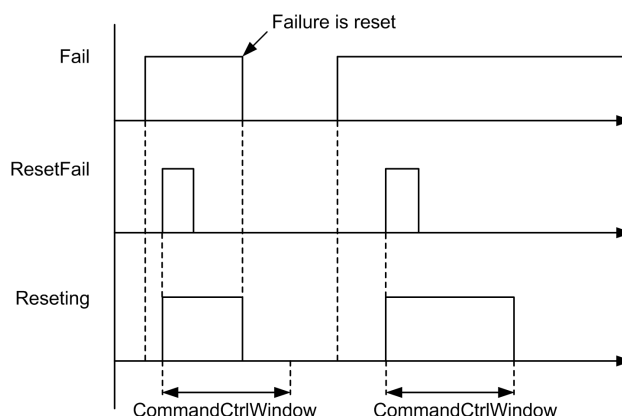
LEDStatus Word Structure

The following table describes the `LEDStatus` Word structure:

Bit	Description
0	Shows the state of the LED 1.
1	Shows the state of the LED 2.
2	Shows the state of the LED 3.
3	Shows the state of the LED 4.
4	Shows the state of the LED 5.
5	Shows the state of the LED 6.
6	Shows the state of the LED 7.
7	Shows the state of the LED 8.

Bit	Description
8	Shows the state of the LED 9.
9	Shows the state of the LED 10.

Timing diagram:



Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
SEPAM_ST	SEPAM_ST_DDT	Device data structure 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.
SEPAM_CFG	SEPAM_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.
WorkMemory	ANY_ARRAY_INT	Array is used for modbus communications. This variable is meant to be used with a modbus port that serializes modbus requests in an optimum manner.

SEPAM_ST_DDT Type

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

SEPAM_CFG_DDT Type

Name	Type	Description
DataStatus	WORD	Information on the device status. Information on the Status output structure.
Info	INT	Device information. Its value is Info status.
WarningCode	WORD	Sepam alarm code information. Takes the values from the WarningCode output pin.
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred FailCode[0].
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred FailCode[1].
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred FailCode[2].

SEPAM_ST.STW Word Structure

Bit	Description
0	Unknown device status or communication interruption. No variable refreshing.
1	Not ready.
2	Module is running.
3	Inoperable device problem.
4	Alarm on the device or DFB (follow-up or screw terminal-based control).
5	Communication interruption.
6	Requires resetting. ResetFail is required.
8	Refer to the Resetting output pin, page 139.
9	Refer to the EnabledDFB input pin, page 137.

SEPAM_ST.CFGW Word Structure

Bit	Description
0	Refer to the ResetFail input pin, page 137.
1	Owner.
3	Refer to the Close input pin, page 137.
6	Refer to the Open input pin, page 137.
7	Refer to the ControlCommand input pin, page 137.

SEPAM_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the Fault status in the Status output pin, page 139.
1	Refer to the Opened status in the Status output pin, page 139.
2	Refer to the Closed status in the Status output pin, page 139.
3	Refer to the Trip status in the Status output pin, page 139.
4	Refer to the LocalRemote status in the Status output pin, page 139.
5	Refer to the SettingAActive status in the Status output pin, page 139.

Bit	Description
6	Refer to the <code>SettingBActive</code> status in the Status output pin, page 139.
7	Refer to the <code>TimeOutdated</code> status in the Status output pin, page 139.
8	Refer to the <code>SettingMode</code> status in the Status output pin, page 139.
9	Refer to the <code>SynchronizationLost</code> status in the Status output pin, page 139.
10	Refer to the <code>DataLoss1Event</code> status in the Status output pin, page 139.
11	Refer to the <code>Event1Zone</code> status in the Status output pin, page 139.
12	Refer to the <code>PartialFault</code> status in the Status output pin, page 139.
13	Refer to the <code>MajorFault</code> status in the Status output pin, page 139.
14	Refer to the <code>DataLoss2Event</code> status in the Status output pin, page 139.
15	Refer to the <code>Event2Zone</code> status in the Status output pin, page 139.

SEPAM_CFG.WarningCode Word Structure

Bit	Description
0	Refer to the <code>Order</code> in the WarningCode output pin, page 139.

Diagnostics Information Management

Overview

The diagnostic codes that the device can return are read on the `FailCode` output variable.

Parameter Configuration Diagnostics Codes

This detected error indicates that a public variable parameter contains a value that is not allowed.

To load new values, a rising edge is required on the `EnableDFB` input:

- `FailCode[0]`: 16#0003
- `FailCode[1]`: 16#0000
- `FailCode[2]`: 16#0004

Modbus Communication Diagnostics Codes

This code indicates that communications have not been established and can be reset:

- `FailCode[0]`: 16#0002
- `FailCode[1]`: 16#0000
- `FailCode[2]`: 16#0004

After the communications have been established, check modbus client diagnostic codes for `FailCode[0]` and `FailCode[1]`. The components make a distinction between detected read request problem and write request problem:

- `FailCode[2]`: 16#0001 Read
- `FailCode[2]`: 16#0002 Write

Diagnostics Code Example

For a detected error, the code is:

- FailCode[1]: 16#0000
- FailCode[2]: 16#0005

It can be reset.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the management of Sepam.

Genies

Genie Properties


Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	Sepam80	Sepam 80 controller

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a [general description](#), page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking an Sepam 80 genie opens a faceplate with the following tabs:

- Operation
- Measures, page 46
- Alarm, page 47

- Event, page 48

Operator Tab

The figure shows an operator tab:

The screenshot shows a software window titled "RL1001" with a subtitle "Digital protection relay for D10". Below the title bar is a toolbar with icons for play, warning, clock, and document. The main area displays "Equipment Status: Closed" in a dark box. Below this, "Failure:" is followed by a text box containing "Read Client Failure". "Warning:" is followed by a text box containing "-". At the bottom, "Owner:" is followed by a dropdown menu showing "Program" and a "Reset" button.

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 129
Equipment Status	Running	Equipment status of Sepam 80.	–
Failure	LastFailure, DeviceFailActive	Detected error status of Sepam 80.	
Warning	AlarmActive, CurrentWarning	Alert status of Sepam 80.	
Owner	OwnerSelect	Owner of Sepam 80.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm

Measures Tab

The table lists the items of each groups from group number 1 to 4 of measures tab:

Group Order Number	1	2	3	4
Group name	Current	Voltage and Frequency	Device Status	Miscellaneous Device Information
Items	CurrentI1	VoltageU21	Fault	InformationCode
	CurrentI2	VoltageU32	Opened	RemoteIndication0Word
	CurrentI3	VoltageU13	Closed	RemoteIndication1Word
	ResidualCurrentSum	Voltage1	Trip	RemoteIndication2Word
	ResidualCurrentMeasured	Voltage2	LocalRemote	RemoteIndication3Word
	PeakCurrent1	Voltage3	SettingMode	
	PeakCurrent2	ResidualVoltage	SynchronizationLost	
	PeakCurrent3	PositiveVoltage	DataLoss1Event	
		NegativeVoltage	Event1Zone	
		Frequency	PartialFault	
			MajorFault	
			DataLoss2Event	
			Event2Zone	

The table lists the items of each groups from group number 5 to 8 of measures tab:

Group Order Number	5	6	7	8
Group name	Diagnostics	Inputs	Outputs	Power Data
Items	WarningCode	DigitalInput101	DigitalOutput1	ActivePower
	FailCode0	DigitalInput102	DigitalOutput2	ReactivePower
	FailCode2	DigitalInput103	DigitalOutput3	ApparentPower
	FailCode1	DigitalInput104	DigitalOutput4	PeakActivePower
		DigitalInput105	DigitalOutput5	PeakReactivePower
		DigitalInput106	DigitalOutput101	Cosphi
		DigitalInput107	DigitalOutput102	PositiveActiveEnergy
		DigitalInput108	DigitalOutput103	NegativeActiveEnergy
		DigitalInput109	DigitalOutput104	PositiveReactiveEnergy
		DigitalInput110	DigitalOutput105	NegativeReactiveEnergy
		DigitalInput111	DigitalOutput106	
		DigitalInput112		
		DigitalInput113		
		DigitalInput114		

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of Sepam 80.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumera- tion	Address	
Bit items derived from StatusWord.				
UnknownState	Unknown module status	–	Bit0	
NotReady	Module not ready	–	Bit1	
Running	Module is running	On/Off	Bit2	
DeviceFailActive	Device is inoperable	–	Bit3	
AlarmActive	Alarm on the device	Active/ Inactive	Bit4	
CommunicationFailActive	Communication interruption	–	Bit5	
RequireRearm	Detected fail resetting required	Required/Not Required	Bit6	
EnableFunctional-Block	Normal execution of control block	–	Bit9	
Bit items derived from DataStatusWord.				
Fault	Element controlled by the sepam unit is in inoperable status	–	Bit0	
Opened	Element controlled by the sepam unit is open		Bit1	
Closed	Element controlled by the sepam unit is closed		Bit2	
Trip	Sepam unit is in tripped status		Bit3	
LocalRemote	Controlled remotely		Bit4	
SettingAActive	Setting group A is active		Bit5	
SettingBActive	Setting group B is active		Bit6	
TimeOutDated	Sepam unit does not have correct time		Bit7	
SettingMode	Sepam unit in local setting mode		Bit8	
SynchronizationLost	Sepam unit is not synchronized		Bit9	
DataLoss1Event	Event detected in first zone	–	Bit10	
Event1Zone	Event occurrence in the first event zone		Bit11	
PartialFault	Partial detected error in the sepam unit		Bit12	
MajorFault	Major detected error in the sepam unit		Bit13	
DataLoss2Event	Event detected in second zone		Bit14	
Event2Zone	Event occurrence in second event zone		Bit15	
Bit items derived from ExtendedDataStatusWord.				
ModbusSecurity	Function is enabled		–	Bit0
RemoteSetting	Remote setting is disabled			Bit1
CapacitiveInductive	Inductive or capacitive network			Bit2

Item name	Description	Enumeration	Address
Bit items derived from ConfigurationWord.			
Reset	Resets the detected fail	Active/ Inactive	<i>Bit0</i>
OwnerSelect	Owner of control module	Operator/ Program	<i>Bit1</i>
Close	Command to close	Forward/ Reverse	<i>Bit3</i>
OpenCommand	Command to open	–	<i>Bit6</i>
ControlCommand	Indicates mode of control	–	<i>Bit7</i>
Calculated Items			
CurrentWarning	Current alert	–	<i>GPL_SepamCurrentWarning</i>
LastFailure	Last Detected error		<i>GPL_SepamLastFailure</i>
Owner	Current owner of the Sepam 80 Refer to Calculated Variable, page 39.		<i>GPL_OwnerBasic</i>
Abnormal	Shows abnormal condition of the Sepam 80 Refer to Abnormal Conditions, page 158.		<i>GPL_DeviceAbnormal</i>
ActionRequired	Shows abnormal condition of the Sepam 80 Refer to Action Required Conditions, page 158.		<i>GPL_DeviceActionRequired</i>

Abnormal Conditions

The table describes the abnormal conditions of Sepam 80:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	<i>Bit0</i>
AbnormalOperatorTab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	<i>Bit8</i>

Action Required Conditions

The table describes the abnormal conditions of Sepam 80:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	<i>Bit8</i>

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
AlarmFailure	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

No trend item is used by Supervision components for Sepam 80.

EasergyP3

What's in This Chapter

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Overview

This chapter describes the functionality of template, control services, and Supervision functions of the EasergyP3.

Template

Overview

This section describes the functionality, parameters, and interfaces of the `$EasergyP3EMGP` template.

Description

General Description

The `$EasergyP3EMGP` control module template allows you to control and monitor the EasergyP3.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Open and Close of control object.
Device status indication	Displays the status of the device.
Remote resetting	Reset the detected communication error of device.
Control or Monitoring	Enables you to monitor the device. You can control the open and close of control object.
Owner	Manages the owner of the equipment (Operator or Program).

Parameters

The `$EasergyP3EMGP` template provides different control parameters to the user to control the functions as per the requirement.

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Automatic reset	Boolean	FALSE	It allows you to reset detected error in both modes (auto and manual). By default, selection mode is manual mode.
Time	Command timeout	Duration	00:00:05	Time the device takes to execute commands.
	Maintain warning signal		00:00:03	The time duration for which the alert pin signal remains 1.
	Time between two consecutive reset		00:01:00	The maximum time between two automatic resets of the template.
	Refresh cycle data		00:00:00.5	Time the device takes to refresh the cyclic data.
ControlObject	Selection of control object1	Boolean	TRUE	Rising edge for open or close command of control objects.
	Selection of control object{x} NOTE: {x} represents from 2 to 8.	Boolean	FALSE	

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	(Operator & Program)	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	Operator (1)	Privilege to change reset. This parameter is used in operator tab.
	Set rearm		Operator (Confirmed) (10)	Privilege to change override mode. This parameter is used in operator tab.
	Set acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Asset and Display	For more details, refer to the topic describing the parameters of asset and display, page 28.			

Data

The table describes the data parameters:

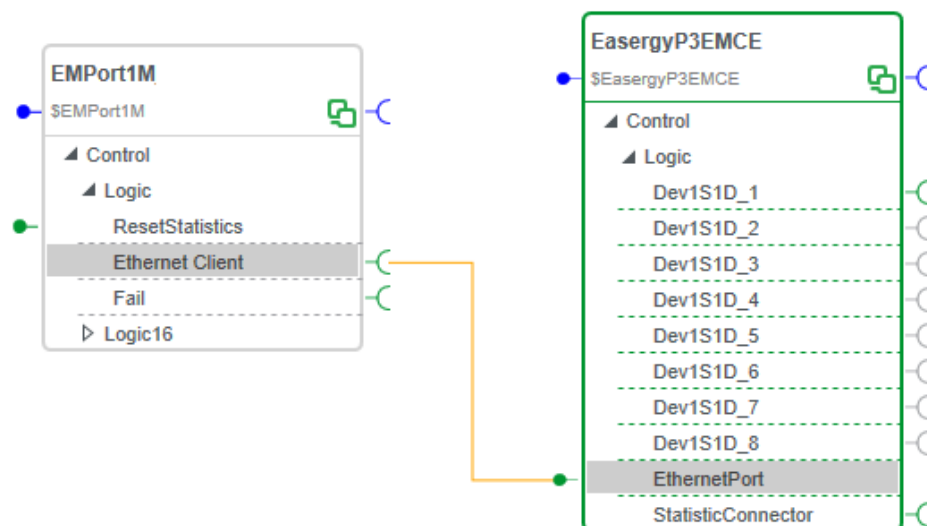
Section	Parameter description	Data type	Default value	Additional remarks
EasergyP5Basic				
Alarm	Operational failure description	String	@ (Operational failure)	–

Section	Parameter description	Data type	Default value	Additional remarks
	Alarm failure alarm severity	Enum	Low (4000)	It allows to set the criticality of alarm.
	Alarm failure alarm group	String	Failure	Group name for rapid alarm filtering.
	Device failure alarm description	String	@ (device failure alarm)	A detail description for alarms.
	Device failure alarm severity	Enum	Low (4000)	It allows to set the criticality of alarm.
	Device failure alarm group	String	Failure	Group name for rapid alarm filtering.
	Communication failure alarm description	String	@ (Communication failure alarm)	A detail description for alarms.
	Communication failure alarm severity	Enum	Low (4000)	It allows to set the criticality of alarm.
	Communication failure alarm group	String	Failure	Group name for rapid alarm filtering.
Historize	Fail codes	Boolean	FALSE	—
	Arc stage enable			—
	Arc sensor status			—
EasergyP5IO				
Historize	Inputs map	Boolean	FALSE	—
	Outputs map			—
EasergyP5MEA				
Historize	Current	Boolean	FALSE	—
	Demand			—
	Voltage			—
	Power			—
Disable	Voltage and Frequency	Boolean	FALSE	—
	Power			—
	Current			—
	Power demand			—

Interfaces

Interfaces

This figure shows the \$EasergyP3EMCE as it appears in the Links Editor (which is also applicable for \$EasergyP3EMGP:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
Dev1S1D_{x} NOTE: {x} represents from 1 to 8.	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control.
EthernetPort	<i>\$EMWorkMemory1</i>	A communication interface which allows the device to communicate to controller	Connect to \$EMPort1M template
StatisticCon- nector	<i>\$StatisticConnectorNa- meGP/Def</i>	An output interface to other template provides the Information used with modbus communication to obtain statistics on the modbus network.	–

Control

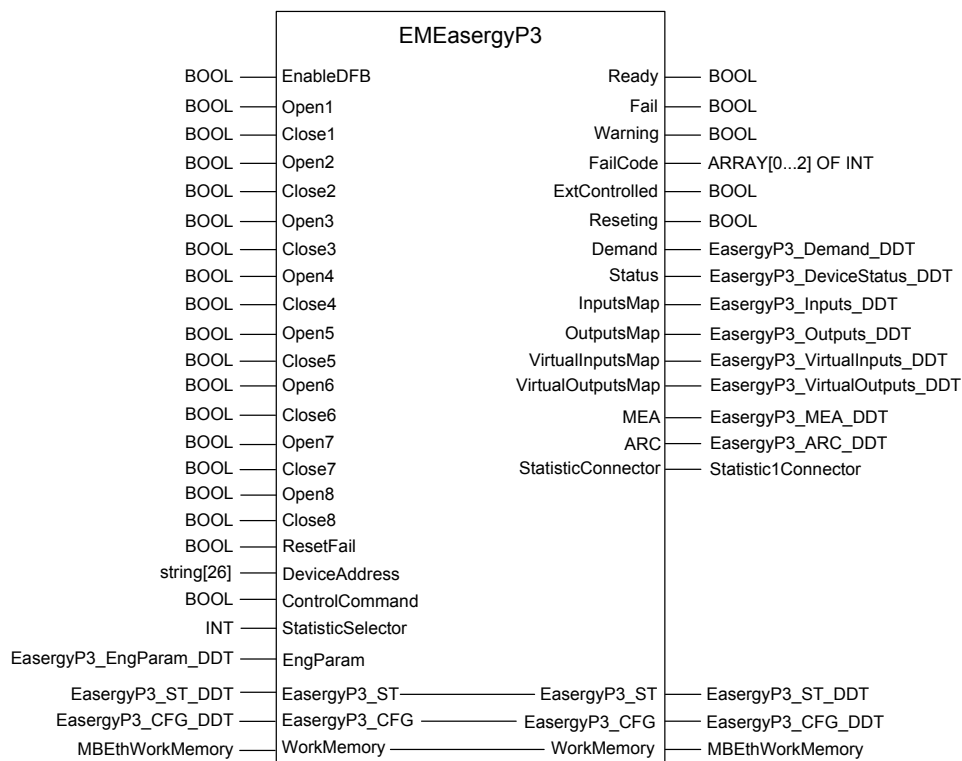
Overview

This section describes the EMEasergyP3 DFB.

DFB Representation

Representation

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



Inputs

Input Parameter Description

Name	Type	Description
EnableDFB	BOOL	If a rising edge is detected on this input, the internal timers of the block are reset and detected alarms are set to 0.
Open1(*)	BOOL	Rising edge for open command of control object 1...8.
Close1(**)	BOOL	Rising edge for close command of control object 1...8.
ResetFail	BOOL	Resets detected fail on the DFB.
DeviceAddress	STRING[26]	IP address of device in format '{IP1.IP2.IP3.IP4}'
ControlCommand	BOOL	Enables the command sent to the EasergyP3.
StatisticSelector	INT	Data to statistic connector input of StatisticCounter DFB.
EngParam	EasergyP3_EngParam_DDT	Engineering parameters
* The parameters are available from Open1...Open8.		
** The parameters are available from Close1...Close8.		

EasergyP3_EngParam_DDT Type

Name	Type	Description
Refresh	TIME	Time to refresh the cyclic data.
CommandCtrlWindow	TIME	Time window for the device to execute orders.
ScanTime	TIME	The minimum time for which the detected alarm signals are kept active. <i>ScanTime</i> confirms that the supervision system acquires the data for detected alarms that are automatically reset.
MaxResetTime	TIME	Minimum time between two resets.
ResetMode	BOOL	Enables auto reset
Reserved	BOOL	–
Reserved1	INT	–
DisableObject1 (*)	BOOL	Disable command for control object 1...8.
<p>* The parameters are available from DisableObject1...DisableObject8.</p> <p>NOTE: These parameters support online changes only in Refine Online in Topology Explorer of respective controller.</p>		

Outputs

Output Parameter Description

Name	Type	Description	
Ready	BOOL	Ready to send command to device.	
Fail	BOOL	Detected error to communicate with device.	
Warning	BOOL	Device in Local mode.	
Fail-code	ARRAY[0...2] OF INT	detected Failcode	
	Parameter name	Type	Description
	Failcode[0] NOTE: Failcode[0] parameters are available from Failcode[0]... Failcode[2].	BOOL	–
ExtControlled	BOOL	Device command from DFB is disabled	
Resetting	BOOL	Resetting of communication with device in progress	
Demand	EasergyP3_Demand_DDT	Power and demand values	
	Parameter name	Type	Description
	Phase1CurrentDemand NOTE: Phase1CurrentDemand parameters are available from Phase1CurrentDemand... Phase3CurrentDemand.	REAL	Phase 1 Current Demand
	Phase1CurrentRMSDemand NOTE: Phase1CurrentRMSDemand parameters are available from Phase1CurrentRMSDemand... Phase3CurrentRMSDemand.	REAL	Phase 1 Current RMS Demand
	ActivePowerDemand	REAL	Active power demand

Name	Type	Description	
	ReactivePowerDemand	REAL	Reactive power demand
	ApparentPowerDemand	REAL	Apparent power demand
	PowerFactorDemand	REAL	Power factor demand
	ActivePowerDemandRMS	REAL	Active power demand RMS
	ReactivePowerDemandRMS	REAL	Reactive power demand RMS
	ApparentPowerDemandRMS	REAL	Apparent power demand RMS
Status	EasergyP3_DeviceStatus_DDT	Device Status	
	Parameter name	Type	Description
	RemoteControlEnabled	INT	Remote control enabled
	ControllableObject1 NOTE: ControllableObject1 parameters are available from ControllableObject1... ControllableObject8.	INT	Status of control object
	NumberProtectionTrips	INT	Number protection trips
	Reserved3	INT	Reserved3
	RunningHoursCounter	INT	Running hour counter
	Temperature	INT	Temperature
	EngineRunningTime	INT	Engine running time
	EngineStartCount	INT	Engine start count
	PowerAngle	INT	Power angle
	VoltagePhaseSequence	INT	Voltage phase sequence
	VoltageInterrupt	INT	Voltage interrupt
	VoltageStatus	INT	Voltage status
	CurrentPhaseSequence	INT	Current phase sequence
	Reserved1	INT	Reserved1
	OpenClose1	BOOL	Status of respective control object 1
	OpenClose2	BOOL	Status of respective control object 2
	Info	INT	Information code
	Fault	BOOL	Detected fault
	OpenClose3	BOOL	Status of respective control object 3
	OpenClose4	BOOL	Status of respective control object 4
	OpenClose5	BOOL	Status of respective control object 5
	OpenClose6	BOOL	Status of respective control object 6
	OpenClose7	BOOL	Status of respective control object 7
	OpenClose8	BOOL	Status of respective control object 8
	Reserved	BOOL	Reserved
	LastFaultCurrent	REAL	Last detected fault current
	UnderVoltage	UINT	Under voltage
	UnderLoad	INT	Under load
Inputs-Map	EasergyP3_Inputs_DDT	Status of digital inputs	
	Parameter name	Type	Description
	DigitalInputs NOTE: DigitalInputs parameters are available	WORD	Digital input 1...16 status

Name	Type	Description	
	from DigitalInput1... DigitalInput16.		
	DigitalInputsExt NOTE: DigitalInputsExt parameters are available from DigitalInput17... DigitalInput32.	WORD	Digital input 17...32 status
	DigitalInputsExt2 NOTE: DigitalInputsExt2 parameters are available from DigitalInput33... DigitalInput40.	WORD	Digital input 33...40 status
Out- putsMap	EasergyP3_Outputs_DDT	Status of digital outputs	
	Parameter name	Type	Description
	DigitalOutputs NOTE: DigitalOutputs parameters are available from DigitalInput1... DigitalInput16.	WORD	Digital Output 1...16 status
	DigitalOutputsExt NOTE: DigitalOutputsExt parameters are available from DigitalInput17... DigitalInput32.	WORD	Digital Output 17...32 status
Virtua- lIn- putsMap	EasergyP3_VirtualInputs_ DDT	Status of virtual inputs	
	Parameter name	Type	Description
	VirtualInputs NOTE: VirtualInputs parameters are available from VirtualInputs1... VirtualInputs16.	WORD	Virtual Inputs 1...16 status
	VirtualInputsExt NOTE: VirtualInputsExt parameters are available from VirtualInputsExt17... VirtualInputsExt20.	WORD	Virtual Inputs ext 17...20 status
Virtua- lOut- putsMap	EasergyP3_ VirtualOutputs_DDT	Status of virtual outputs	
	Parameter name	Type	Description
	VirtualOutputs NOTE: VirtualOutputs parameters are available from VirtualOutputs1... VirtualOutputs16.	WORD	Virtual outputs 1...16 status
	VirtuaOutputsExt NOTE: VirtuaOutputsExt parameters are available from VirtuaOutputsExt17... VirtuaOutputsExt20.	WORD	Virtual outputs ext 17...20 status
MEA	EasergyP3_MEA_DDT	Current, voltage and frequency parameters	
	Parameter name	Type	Description
	PhaseCurrentIL1	REAL	Phase Current IL1
	PhaseCurrentIL2	REAL	Phase Current IL2
	PhaseCurrentIL3	REAL	Phase Current IL3

Name	Type	Description	
	AveragePhaseCurrentIL	REAL	Average Phase Current IL
	PhaseCurrentIL1RMS	REAL	Phase Current IL1 RMS
	PhaseCurrentIL2RMS	REAL	Phase Current IL2 RMS
	PhaseCurrentIL3RMS	REAL	Phase Current IL3 RMS
	AveragePhaseCurrentILRMS	REAL	Average Phase Current IL RMS
	IoResidualCurrent	REAL	Standard residual current
	IoVsResidualCurrent	REAL	Very sensitive residual current
	PositiveSequenceCurrent	REAL	Positive Sequence Current
	NegativeSequenceCurrent	REAL	Negative Sequence Current
	PhaseCurrentTHD	REAL	Current total harmonic distortion
	VoltageU12	REAL	Phase to phase voltage U12
	VoltageU23	REAL	Phase to phase voltage U23
	VoltageU31	REAL	Phase to phase voltage U31
	AveragePhaseToPhaseVoltage	REAL	Average Phase To Phase Voltage
	VoltageV1	REAL	Phase to earth voltage V1
	VoltageV2	REAL	Phase to earth voltage V2
	VoltageV3	REAL	Phase to earth voltage V3
	AveragePhaseToEarthVoltage	REAL	Average Phase To Earth Voltage
	PhaseVoltage1RMS	REAL	Phase voltage V1 RMS
	PhaseVoltage2RMS	REAL	Phase voltage V2 RMS
	PhaseVoltage3RMS	REAL	Phase to earth voltage V3 RMS
	AverageRMSVoltage	REAL	Average phase to earth voltage RMS
	ResidualVoltage	REAL	Residual voltage V0
	PositiveVoltage	REAL	Positive sequence voltage Vd
	NegativeVoltage	REAL	Negative sequence voltage Vi
	VoltageTHD	REAL	Voltage total harmonic distortion
	Frequency	REAL	Frequency
	ActivePower	REAL	ActivePower
	ReactivePower	REAL	ReactivePower
	ApparentPower	REAL	ApparentPower
	PowerFactor	REAL	PowerFactor
	ExportedActiveEnergy	REAL	Exported Active Energy
	ImportedActiveEnergy	REAL	Imported Active Energy
	ExportedReactiveEnergy	REAL	Exported Reactive Energy
	ImportedReactiveEnergy	REAL	Imported Reactive Energy
	ActivePowerRMS	REAL	Active Power RMS
	ReactivePowerRMS	REAL	Reactive Power RMS
	ApparentPowerRMS	REAL	Apparent Power RMS
	Reserved	REAL	Power Factor RMS
ARC	EasergyP3_ARC_DDT	Arc sensor status	
	Parameter name	Type	Description

Name	Type	Description	
	ArcSensor1Status NOTE: ArcSensor1Status parameters are available from ArcSensor1Status... ArcSensor6Status.	WORD	ArcSensor1Status... ArcSensor6Status
	ArcProtectionEnabled	BOOL	Arc protection enabled status
StatisticConnector	Statistic1Connector	-	
	Parameter name	Type	Description
	Start	BOOL	Ready to create request
	EndOK	BOOL	Request is successful
	EndNOK	BOOL	Detected request fail
	TotalTime	DINT	Total time taken for the current request

Inputs/Outputs

Input/Output Parameter Description

Name	Type	Description
EasergyP3_ST	EasergyP3_ST_DDT	Status Structure
EasergyP3_CFG	EasergyP3_CFG_DDT	Configuration Structure
WorkMemory	MBEthWorkMemory	Memory area to talk with the ModBus port.

EasergyP3_ST_DDT Type

Name	Type	Description
STW	WORD	Provides the device status usually used from the monitoring subsystem, and allows data to be kept in the memory. Read-write access to the data contained in this word.
UnknownState	BOOL	Unknown state.
NotReady	BOOL	Not ready.
Running	BOOL	Atleast one control object is closed.
DeviceFail	BOOL	Detected device fail.
Warning	BOOL	Device in local mode.
CommunicationFail	BOOL	No communication with device.
NecessaryResetting	BOOL	Communication reset required.
Resetting	BOOL	Communication reset with device in progress.
EnableDFB	BOOL	DFB Enabled.
ExtControlled	BOOL	Enable to send command to device.
CFGW	WORD	Provides the means to control the device from the monitoring subsystem. Read-only access to the data contained in this word.
ResetFail	BOOL	Reset detected communication error.
Owner	BOOL	Enable to operate DFB in operator mode.
Close1	BOOL	Close command to control object 1.

Name	Type	Description
NOTE: Close parameters are available from Close1... Close8.		
Open1 NOTE: Open parameters are available from Open1... Open8.	BOOL	Open command to control object 1.
ControlCommand	BOOL	Control command

EasergyP3_CFG_DDT Type

Name	Type	Description
Current	REAL	Current
Voltage	REAL	Voltage
Power	REAL	Power
DataStatus	WORD	Device status (bit 0 - Fault, bit 1 - Opened, bit 2 - Closed, bit 3 - Trip, bit 4 - LocalRemote, bit 5 - SettingAActive, bit 6 - SettingBActive, bit 7 - TimeOutdated, bit 8 - SettingMode, bit 9 - SynchronizationLost, bit 10 - DataLoss1Event, bit 11 - Event1Zone, bit 12 - PartialFault, bit 13 - MajorFault, bit 14 - DataLoss2Event, bit 15 - Event2Zone)
Fault	BOOL	Detected fault
LocalRemote	BOOL	Local remote
Info	INT	Info
Failcode0 NOTE: Failcode parameters are available from Failcode0... Failcode2.	INT	–
DisableControlObject	WORD	Disable command to control object status.
ControlObject1 NOTE: ControlObject parameters are available from ControlObject1... ControlObject8.	BOOL	Disable command to control object 1...8.
Reserved	WORD	Reserved

MBEthWorkMemory DDT Structure

Parameter	Type	Description
Header	ARRAY [0..15] OF INT	Common data.
	Parameter name	Type
	Header[0]	INT
	Header[1]	INT
	Header[2]	INT
	Header[3]	INT
		Description
	Header[0]	Number of Ethernet client.
	Header[1]	No of request.
	Header[2]	Simultaneous send.
	Header[3]	3.0:Initialization Started ; 3.1:Port Ready; 3.2:Take statistics info.

Parameter	Type	Description	
	Header[4]	INT	Least priority.
	Header[5]	INT	Last order number.
	Header[6]	INT	Socket number occupied by the client with least priority.
	Header[7]	INT	Low Word of Min total time.
	Header[8]	INT	High Word Of Min total time.
	Header[9]	INT	Low Word of Avg total time.
	Header[10]	INT	High Word Of Avg total time.
	Header[11]	INT	Low Word Max total time.
	Header[12]	INT	High Word Of Max total time.
	Header[13]	INT	Low Word for total request.
	Header[14]	INT	High Word for total request.
	Header[15]	INT	Reserved.
ClientDataReference	ARRAY[0..3] OF MBEthSocketData	Array of client references.	

MBEthSocketData DDT Structure

Parameter	Type	Description	
<i>ClientDataReference[0]</i> NOTE: ClientDataReference parameters are available from ClientDataReference [0]... ClientDataReference [3].	MBEthSocketData	Reference of the client data.	
	Parameter name.	Type.	Description.
	<i>ClientRef</i>	REF_TO MBEthClient1Data	MBTCP Client Data.
	Status	WORD	Status of the socket(00 - Idle, 01- Client has sent data, 11 -Port has processed, 10 - Port is processing the request).

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the management of \$EasergyP3EMGP

Genies

Genie Properties


Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	<i>Easergyp3</i>	Easergyp3

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a general description, page 40 of the graphic elements that are used in the faceplate.

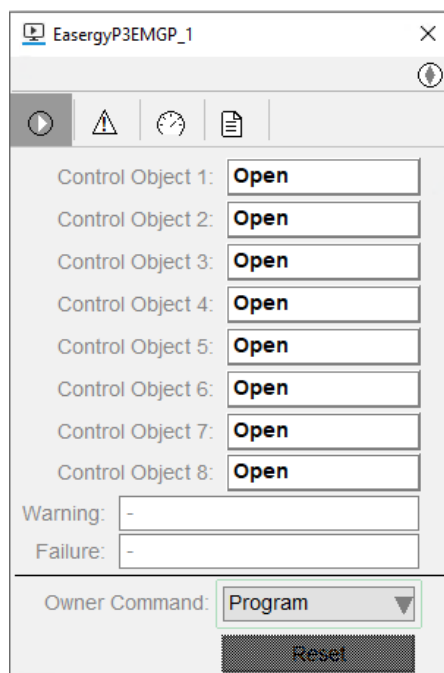
Available Tabs

During operation, clicking an *EasergyP3* genie opens a faceplate with the following tabs:

- Operation
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:



The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 52
Control object1	Closed	Status of control object - Open, Close, Undefined.	–
Warning	AlarmActive, CurrentWarning	Device in local mode.	–
Owner Command	OwnerCommand	Owner of Easergy	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. Note: <ul style="list-style-type: none"> When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset, a dialog box opens to confirm. After deploying the built project, the first time reset will take time to establish communication with the device due to timeout while obtaining socket connection. 	Set rearm

Measures Tab

The table lists the items of each groups from group number 1 to 4 of **Measures** tab:

Group Order Number	1	2	3	4
Group name	Current	Voltage and Frequency	Power	Demand
Items	Current1	Frequency	ActivePower	Phase1CurrentDemand
	Current2	VoltageU21	ReactivePower	Phase2CurrentDemand
	Current3	VoltageU32	ApparentPower	Phase3CurrentDemand
	AverageCurrent	VoltageU13	PowerFactor	Phase1CurrentDemandRMS
	Current1RMS	AveragePhasetoPhase-Voltage	ExportedActiveEnergy	Phase2CurrentDemandRMS
	Current2RMS	Voltage1	ImportedActiveEnergy	Phase3CurrentDemandRMS
	Current3RMS	Voltage2	ExportedReactiveEnergy	ActivePowerDemand
	AverageCurrentRMS	Voltage3	ImportedReactiveEnergy	ReactivePowerDemand
	IoResidualCurrent	AveragePhase-EarthVoltage	ActivePowerRMS	ApparentPowerDemand
	IovsResidualCurrent	Voltage1RMS	ReactivePowerRMS	PowerFactorDemand
	PositiveSensitiveCurrent	Voltage2RMS	ApparentPowerRMS	ActivePowerDemandRMS
	NegativeSensitiveCurrent	Voltage3RMS	–	ReactivePowerDemandRMS
	PhaseCurrentTHD	AveragePhasetoPhaseRMSVoltage	–	ApparentPowerDemandRMS
	–	ResidualVoltage	–	–
	–	PositiveSequenceVoltageVd	–	–
	–	NegativeSequenceVoltageVi	–	–
	–	VoltageTHD	–	–

The table lists the items of each groups from group number 5 to 9 of **Measures** tab:

Group Order Number	5	6	7	8
Group name	Device Status	Diagnostics	Inputs	Outputs
Items	VoltageInterrupt	LastFaultCurrent	DigitalInput1 NOTE: These items are available from DigitalInput01... DigitalInput31	DigitalOutput1 NOTE: These items are available from DigitalOutput01... DigitalOutput20
	RemoteControlEnable	UnderVoltage	–	–
	ControlObject1 NOTE: These items are available from ControlObject1... ControlObject8	UnderLoad	–	–
	ProtectionTrips	FailCode0	–	–
	RunningHrsCounter	FailCode1	–	–
	Temp	FailCode2	–	–
	EngineRunHrs	–	–	–
	EngineStartCount	–	–	–
	PowerAngle	–	–	–
	VoltagePhaseSequence	–	–	–
	VoltageStatus	–	–	–
	CurrentPhaseSequence	–	–	–

The table lists the items of each groups from group number 9 to 12 of **Measures** tab:

Group Order Number	9	10	11
Group name	Virtual Inputs	Virtual Outputs	Arc Sensors
Items	Input01 NOTE: These items are available from Input01... Input20	Output01 NOTE: These items are available from Output01... Output20	ArcSensor1
	–	–	Arc Protection Enabled
	–	–	ArcSensor2
	–	–	ArcSensor3
	–	–	ArcSensor4
	–	–	ArcSensor5
	–	–	ArcSensor6

Items

Overview

This section describes the variables IO, alarm items, events, and trends item of EasergyP3.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	–	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Reset required	Required/Not Required	Bit6
ExtControlled	External controlled	–	Bit7
Resetting	Reset in progress	–	Bit8
EnableFunctional-Block	Normal execution of control block	–	Bit9
Bit items derived from ConfigurationWord			
Rearm	Resets the detected fail	Active/Inactive	Bit0
OwnerSelect	Owner of control module	Operator/Program	Bit1
Close1	Command to close1	–	Bit2
OpenCommand1	Command to open1	–	Bit3
ControlCommand	Indicates mode of control	–	Bit4
Close2	Command to close2	–	Bit5
OpenCommand2	Command to open2	–	Bit6
Close3	Command to close3	–	Bit7
OpenCommand3	Command to open3	–	Bit8
Close4	Command to close4	–	Bit9
OpenCommand4	Command to open4	–	Bit10
Close5	Command to close5	–	Bit11
OpenCommand5	Command to open5	–	Bit12
Close6	Command to close6	–	Bit13
OpenCommand6	Command to open6	–	Bit14
Close7	Command to close7	–	Bit0
OpenCommand7	Command to open7	–	Bit1
Close8	Command to close8	–	Bit2
OpenCommand8	Command to open8	–	Bit3
Bit items derived from DeviceStatus			
VoltageInterrupt	Voltage interrupt status	Ok/Low	EasergyP3_VoltageInterrupt
RemoteControlEnabled	Remote/local selection	Ok/Low	EasergyP3_VoltageInterrupt
ControlObject{x} NOTE: {x} represents from 1 to 8.	Command to close{x}	–	EasergyP3_ControllableObject{x}

Item name	Description	Enumeration	Address
ProtectionTrips	Protection trips	–	<i>EasergyP3_ProtectionTrips</i>
RunningHrsCounter	Running hours counter in Hours	–	<i>EasergyP3_RunningHrsCounter</i>
Temp	Temperature in DegCelsius	–	<i>EasergyP3_Temp</i>
EngineRunHrs	Engine running time in Sec	–	<i>EasergyP3_EngineRunHrs</i>
EngineStartCount	Engine start count	–	<i>EasergyP3_EngineStartCount</i>
PowerAngle	Power angle in degree	–	<i>EasergyP3_PowerAngle</i>
PhaseAngleDifference	Phase angle difference in Deg	–	<i>EasergyP3_PhaseAngleDifference</i>
VoltagePhaseSequence	Voltage phase sequence	–	<i>EasergyP3_VoltagePhaseSequence</i>
VoltageStatus	Voltage status	(Low/High)/ (High)/(Low)/ (Low/High)/ (High)/(Low)/ Ok	<i>EasergyP3_VoltageStatus</i>
CurrentPhaseSequence	Current phase sequence	–	<i>EasergyP3_CurrentPhaseSequence</i>
Bit items derived from ArcSensor			
ArcSensor1{x} NOTE: {x} represents from 1 to 8.	Arc sensor {x} status	–	<i>EasergyP3_ArcSensor{x}</i>
Actual Items			
FailCode0	Code of last level 0 detected error	–	<i>EasergyP3_CFG.FailCode0</i>
FailCode1	Code of last level 1 detected error	–	<i>EasergyP3_CFG.FailCode1</i>
FailCode2	Code of last level 2 detected error	–	<i>EasergyP3_CFG.FailCode2</i>
LastFaultCurrent	Last detected fault current in xln	–	<i>EasergyP3_CFG.LastFaultCurrent</i>
UnderLoad	Underload in A	–	<i>EasergyP3_CFG.UnderLoad</i>
UnderVoltage	Undervoltage in V	–	<i>EasergyP3_CFG.UnderVoltage</i>
StatusWord	Status word bit array	–	<i>EasergyP3_ST.STW</i>
ConfigurationWord	Configuration word bit array	–	<i>EasergyP3_ST.CFGW</i>
DataStatusWord	Data Status word bit array	–	<i>EasergyP3_CFG.DataStatus</i>
VirInputsMapWord1	Data status word bit array	–	<i>EasergyP3.InputsMap</i>
VirInputsMapWord2		–	<i>EasergyP3.InputsMap</i>
VirOutputsMapWord1		–	<i>EasergyP3.OutputsMap</i>
VirOutputsMapWord2		–	<i>EasergyP3.OutputsMap</i>
InputsMapWord1		–	<i>EasergyP3.InputsMap</i>
InputsMapWord2		–	<i>EasergyP3.InputsMap</i>

Item name	Description	Enumeration	Address
InputsMapWord3		–	EasergyP3.InputsMap
OutputsMapWord1		–	EasergyP3.OutputsMap
OutputsMapWord2		–	EasergyP3.OutputsMap
ArcStageWord	Arc stage word	–	EasergyP3.ArcStageWord
EnableControlObject	Enable control object word	–	EasergyP3.EnableControlObject
Calculated Items			
LastFailure	Last Detected error	–	<i>EasergyP3_LastFailure</i>
Abnormal	Shows abnormal condition of the EasergyP3 Refer to Abnormal Conditions, page 387.	–	<i>EasergyP3_Abnormal</i>
ActionRequired	Shows action required condition of the EasergyP3 Refer to Action Required Conditions, page 387.	–	<i>EasergyP3_ActionRequired</i>

Abnormal Conditions

The table describes the abnormal conditions of EasergyP3:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	<i>Bit0</i>
AbnormalOperator-Tab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	<i>Bit8</i>

Action Required Conditions

The table describes the abnormal conditions of EasergyP3:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	<i>Bit8</i>

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>
AlarmFailure	Operation failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

EasergyP5

What's in This Chapter

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Overview

This chapter describes the functionality of template, control services, and Supervision functions of the EasergyP5.

Template

Overview

This section describes the functionality, parameters, and interfaces of the `$EasergyP5EMGP` template.

Description

General Description

The `$EasergyP5EMGP` control module template allows you to control and monitor the EasergyP5.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Open and Close of control object.
Device status indication	Displays the status of the device.
Remote resetting	Reset the detected communication error of device.
Control or Monitoring	Enables you to monitor the device. You can control the open and close of control object.
Owner	Manages the owner of the equipment (Operator or Program).

Parameters

Parameters

The `$EasergyP5EMGP` template provides different control and supervision parameters to the user to control the functions as per the requirement.

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Automatic reset	Boolean	FALSE	It allows you to reset detected error in both modes (auto and manual). By default, selection mode is manual mode.
Time	Command timeout	Duration	00:00:05	Time the device takes to execute commands.
	Maintain warning signal		00:00:03	The time duration for which the alert pin signal remains 1.
	Time between two consecutive reset		00:01:00	The maximum time between two automatic resets of the template.
	Refresh cycle data		00:00:00.-5	Time the device takes to refresh the cyclic data.
ControlObject	Selection of control object1	Boolean	TRUE	Rising edge for open or close command of control objects.
	Selection of control object{x} NOTE: {x} represents from 2 to 6.	Boolean	FALSE	

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	<i>(Operator & Program)</i>	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	<i>Operator (1)</i>	Privilege to change reset. This parameter is used in operator tab, page 191.
	Set rearm		<i>Operator (Confirmed) (10)</i>	Privilege to change override mode. This parameter is used in operator tab, page 191.
	Set acknowledge		<i>Operator (1)</i>	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Asset and Display	For more details, refer to the topic describing the parameters of asset and display, page 28.			

Data

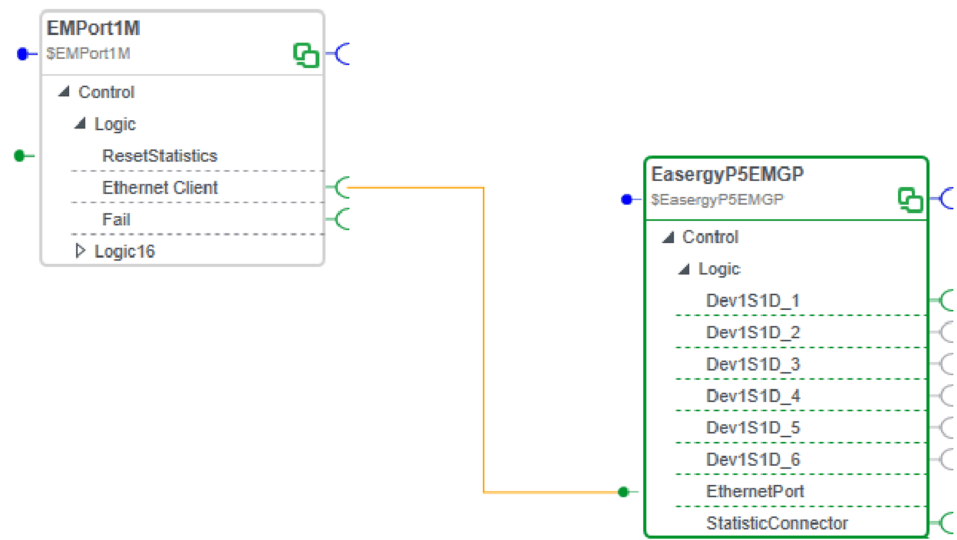
The table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional remarks
EasergyP5Basic				
Alarm	Operational failure description	String	@ (Operational failure)	–
	Alarm failure alarm severity	Enum	Low (4000)	It allows to set the criticality of alarm.
	Alarm failure alarm group	String	Failure	Group name for rapid alarm filtering.
	Device failure alarm description	String	@ (device failure alarm)	A detail description for alarms.
	Device failure alarm severity	Enum	Low (4000)	It allows to set the criticality of alarm.
	Device failure alarm group	String	Failure	Group name for rapid alarm filtering.
	Communication failure alarm description	String	@ (Communication failure alarm)	A detail description for alarms.
	Communication failure alarm severity	Enum	Low (4000)	It allows to set the criticality of alarm.
	Communication failure alarm group	String	Failure	Group name for rapid alarm filtering.
Historize	Fail codes	Boolean	FALSE	–
	Arc stage enable			–
	Arc sensor status			–
EasergyP5IO				
Historize	Inputs map	Boolean	FLASE	–
	Outputs map			–
EasergyP5MEA				
Historize	Current	Boolean	FALSE	–
	Demand			–
	Voltage			–
	Power			–
Disable	Voltage and Frequency	Boolean	FALSE	–
	Power			–
	Current			–
	Power demand			–

Interfaces

Interfaces

This figure shows the \$EasergyP5EMGP template as it appears in Links Editor:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
Dev1S1D_{x} NOTE: {x} represents from 1 to 6.	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control.
EthernetPort	<i>\$EMWorkMemory1</i>	A communication interface which allows the device to communicate to controller	Connect to \$EMPort1M template
StatisticCon- nector	<i>\$StatisticConnectorNa- meGP/Def</i>	An output interface to other template provides the Information used with modbus communication to obtain statistics on the modbus network.	–

Control

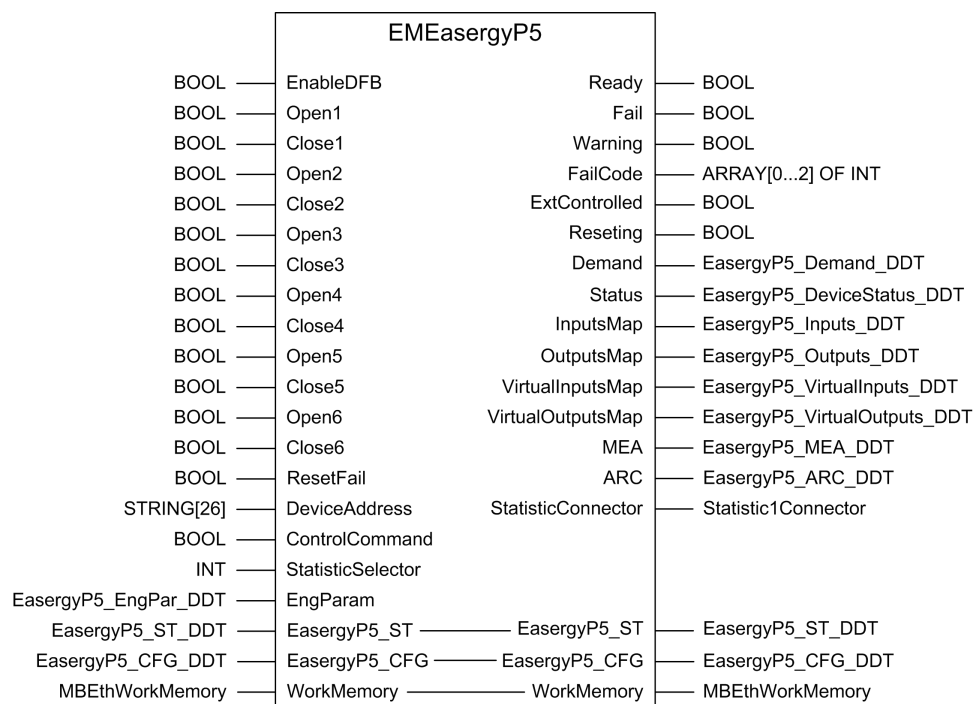
Overview

This section describes the EMEasergyP5 DFB.

DFB Representation

Representation

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



Inputs

Input Parameter Description

Name	Type	Description
EnableDFB	BOOL	If a rising edge is detected on this input, the internal timers of the block are reset and detected alarms are set to 0.
Open1(*)	BOOL	Rising edge for open command of control object 1...6.
Close1(**)	BOOL	Rising edge for close command of control object 1...6.
ResetFail	BOOL	Resets detected fail on the DFB.
DeviceAddress	STRING[26]	IP address of device in format '{IP1.IP2.IP3.IP4}'
ControlCommand	BOOL	Enables the command sent to the EasergyP5.
StatisticSelector	INT	Data to statistic connector input of StatisticCounter DFB.
EngParam	EasergyP5_EngPar_DDT	Engineering parameters
* The parameters are available from Open1...Open6.		
** The parameters are available from Close1...Close6.		

EasergyP5_EngPar_DDT Type

Name	Type	Description
Refresh	TIME	Time to refresh the cyclic data.
CommandCtrlWindow	TIME	Time window for the device to execute orders.
ScanTime	TIME	The minimum time for which the detected alarm signals are kept active. <i>ScanTime</i> confirms that the supervision system acquires the data for detected alarms that are automatically reset.
MaxResetTime	TIME	Minimum time between two resets.
ResetMode	BOOL	Enables auto reset
Reserved	BOOL	–
Reserved1	INT	–
DisableObject1 (")	BOOL	Disable command for control object 1...6.
<p>* The parameters are available from DisableObject1...DisableObject6.</p> <p>NOTE: These parameters support online changes only in Refine Online in Topology Explorer of respective controller.</p>		

Outputs

Output Parameter Description

Name	Type	Description	
Ready	BOOL	Ready to send command to device.	
Fail	BOOL	Detected error to communicate with device.	
Warning	BOOL	Device in Local mode.	
Fail-code	ARRAY[0...2] OF INT		detected Failcode
	Parameter name	Type	Description
	Failcode[0] NOTE: Failcode[0] parameters are available from Failcode[0]... Failcode[2].	BOOL	–
ExtControlled	BOOL	Device command from DFB is disabled	
Resetting	BOOL	Resetting of communication with device in progress	
Demand	EasergyP5_Demand_DDT		Power and demand values
	Parameter name	Type	Description
	Phase1CurrentDemand NOTE: Phase1CurrentDemand parameters are available from Phase1CurrentDemand... Phase3CurrentDemand.	REAL	Phase 1 Current Demand
	Phase1CurrentRMSDemand NOTE: Phase1CurrentRMSDemand parameters are available from Phase1CurrentRMSDemand... Phase3CurrentRMSDemand.	REAL	Phase 1 Current RMS Demand
	ActivePowerDemand	REAL	Active power demand

Name	Type	Description	
	ReactivePowerDemand	REAL	Reactive power demand
	ApparentPowerDemand	REAL	Apparent power demand
	PowerFactorDemand	REAL	Power factor demand
	ActivePowerDemandRMS	REAL	Active power demand RMS
	ReactivePowerDemandRMS	REAL	Reactive power demand RMS
	ApparentPowerDemandRMS	REAL	Apparent power demand RMS
Status	EasergyP5_DeviceStatus_DDT	Device Status	
	Parameter name	Type	Description
	RemoteControlEnabled	INT	Remote control enabled
	ControllableObject1 NOTE: ControllableObject1 parameters are available from ControllableObject1... ControllableObject8.	INT	Status of control object
	SwitchOnToFault	INT	SwitchOn to detected fault enable
	NumberProtectionTrips	INT	Number protection trips
	Reserved3	INT	Reserved3
	RunningHoursCounter	INT	Running hour counter
	Temperature	INT	Temperature
	EngineRunningTime	INT	Engine running time
	EngineStartCount	INT	Engine start count
	PowerAngle	INT	Power angle
	PhaseAngleDifference	INT	Phase angle difference
	VoltagePhaseSequence	INT	Voltage phase sequence
	VoltageInterrupt	INT	Voltage interrupt
	VoltageStatus	INT	Voltage status
	CurrentPhaseSequence	INT	Current phase sequence
	Reserved1	INT	Reserved1
	OpenClose1	BOOL	Status of respective control object 1
	OpenClose2	BOOL	Status of respective control object 2
	Info	INT	Information code
	Fault	BOOL	Detected fault
	OpenClose3	BOOL	Status of respective control object 3
	OpenClose4	BOOL	Status of respective control object 4
	OpenClose5	BOOL	Status of respective control object 5
	OpenClose6	BOOL	Status of respective control object 6
	Reserved	BOOL	Reserved
	LastFaultCurrent	REAL	Last detected error current
	UnderVoltage	UINT	Under voltage
	UnderLoad	INT	Under load
Inputs-Map	EasergyP5_Inputs_DDT	Status of digital inputs	
	Parameter name	Type	Description
	DigitalInputs NOTE: DigitalInputs parameters are available	WORD	Digital input 1...16 status

Name	Type	Description	
	from DigitalInput1... DigitalInput16.		
	DigitalInputsExt NOTE: DigitalInputsExt parameters are available from DigitalInput17... DigitalInput32.	WORD	Digital input 17...32 status
	DigitalInputsExt2 NOTE: DigitalInputsExt2 parameters are available from DigitalInput33... DigitalInput40.	WORD	Digital input 33...40 status
Out- putsMap	EasergyP5_Outputs_DDT	Status of digital outputs	
	Parameter name	Type	Description
	DigitalOutputs NOTE: DigitalOutputs parameters are available from DigitalInput1... DigitalInput16.	WORD	Digital Output 1...16 status
	DigitalOutputsExt NOTE: DigitalOutputsExt parameters are available from DigitalInput17... DigitalInput32.	WORD	Digital Output 17...32 status
Virtua- lIn- putsMap	EasergyP5_VirtualInputs_ DDT	Status of virtual inputs	
	Parameter name	Type	Description
	VirtualInputs NOTE: VirtualInputs parameters are available from VirtualInputs1... VirtualInputs16.	WORD	Virtual Inputs 1...16 status
	VirtualInputsExt NOTE: VirtualInputsExt parameters are available from VirtualInputsExt17... VirtualInputsExt20.	WORD	Virtual Inputs ext 17...20 status
Virtua- lOut- putsMap	EasergyP5_VirtualOutputs_ DDT	Status of virtual outputs	
	Parameter name	Type	Description
	VirtualOutputs NOTE: VirtualOutputs parameters are available from VirtualOutputs1... VirtualOutputs16.	WORD	Virtual outputs 1...16 status
	VirtualOutputsExt NOTE: VirtualOutputsExt parameters are available from VirtualOutputsExt17... VirtualOutputsExt20.	WORD	Virtual outputs ext 17...20 status
MEA	EasergyP5_MEA_DDT	Current, voltage and frequency parameters	
	Parameter name	Type	Description
	PhaseCurrentIL1	REAL	Phase Current IL1
	PhaseCurrentIL2	REAL	Phase Current IL2
	PhaseCurrentIL3	REAL	Phase Current IL3

Name	Type	Description	
	AveragePhaseCurrentIL	REAL	Average Phase Current IL
	PhaseCurrentIL1RMS	REAL	Phase Current IL1 RMS
	PhaseCurrentIL2RMS	REAL	Phase Current IL2 RMS
	PhaseCurrentIL3RMS	REAL	Phase Current IL3 RMS
	AveragePhaseCurrentILRMS	REAL	Average Phase Current IL RMS
	IoResidualCurrent	REAL	Standard residual current
	IovsResidualCurrent	REAL	Very sensitive residual current
	PositiveSequenceCurrent	REAL	Positive Sequence Current
	NegativeSequenceCurrent	REAL	Negative Sequence Current
	PhaseCurrentTHD	REAL	Phase Current THD
	VoltageU12	REAL	Voltage U12
	VoltageU23	REAL	Voltage U23
	VoltageU31	REAL	Voltage U31
	AveragePhaseToPhaseVoltage	REAL	Average Phase To Phase Voltage
	VoltageV1	REAL	Phase to earth voltage V1
	VoltageV2	REAL	Phase to earth voltage V2
	VoltageV3	REAL	Phase to earth voltage V3
	AveragePhaseToEarthVoltage	REAL	Average Phase To Earth Voltage
	PhaseVoltage1RMS	REAL	Phase voltage V1 RMS
	PhaseVoltage2RMS	REAL	Phase voltage V2 RMS
	PhaseVoltage3RMS	REAL	Phase to earth voltage V3 RMS
	AverageRMSVoltage	REAL	Average phase to earth voltage RMS
	ResidualVoltage	REAL	Residual voltage V0
	PositiveVoltage	REAL	Positive sequence voltage Vd
	NegativeVoltage	REAL	Negative sequence voltage Vi
	VoltageTHD	REAL	Voltage total harmonic distortion
	Frequency	REAL	Frequency
	ActivePower	REAL	ActivePower
	ReactivePower	REAL	ReactivePower
	ApparentPower	REAL	ApparentPower
	PowerFactor	REAL	PowerFactor
	ExportedActiveEnergy	REAL	Exported Active Energy
	ImportedActiveEnergy	REAL	Imported Active Energy
	ExportedReactiveEnergy	REAL	Exported Reactive Energy
	ImportedReactiveEnergy	REAL	Imported Reactive Energy
	ActivePowerRMS	REAL	Active Power RMS
	ReactivePowerRMS	REAL	Reactive Power RMS
	ApparentPowerRMS	REAL	Apparent Power RMS
	Reserved	REAL	Power Factor RMS
ARC	EasergyP5_ARC_DDT	Status of Arc stage enable and Arc sensor status	
	Parameter name	Type	Description
	ArcStages	WORD	Arc stages enable status

Name	Type	Description	
	NOTE: ArcStages parameters are available from ArcStage1Enabled1... ArcStage1Enabled8.		
	ArcSensor1Status NOTE: ArcSensor1Status parameters are available from ArcSensor1Status... ArcSensor6Status.	WORD	ArcSensor1Status... ArcSensor6Status
StatisticConnector	Statistic1Connector	-	
	Parameter name	Type	Description
	Start	BOOL	Ready to create request
	EndOK	BOOL	Request is successful
	EndNOK	BOOL	Request is detected fail
	TotalTime	DINT	Total time taken for the current request

Inputs/Outputs

Input/Output Parameter Description

Name	Type	Description
EasergyP5_ST	EasergyP5_ST_DDT	Status Structure
EasergyP5_CFG	EasergyP5_CFG_DDT	Configuration Structure
WorkMemory	MBethWorkMemory	Memory area to talk with the ModBus port.

EasergyP5_ST_DDT Type

Name	Type	Description
STW	WORD	Provides the device status usually used from the monitoring subsystem, and allows data to be kept in the memory. Read-write access to the data contained in this word.
UnknownState	BOOL	Unknown state.
NotReady	BOOL	Not ready.
Running	BOOL	Atleast one control object is closed.
DeviceFail	BOOL	Device fail.
Warning	BOOL	Device in local mode.
CommunicationFail	BOOL	No communication with device.
NecessaryResetting	BOOL	Communication reset required.
Resetting	BOOL	Communication reset with device in progress.
EnableDFB	BOOL	DFB Enabled.
ExtControlled	BOOL	Enable to send command to device.
CFGW	WORD	Provides the means to control the device from the monitoring subsystem. Read-only access to the data contained in this word.
ResetFail	BOOL	Reset communication detected fail required.

Name	Type	Description
Owner	BOOL	Enable to operate DFB in operator mode.
Close1 NOTE: Close parameters are available from Close1... Close6.	BOOL	Close command to control object 1.
Open1 NOTE: Open parameters are available from Open1... Open6.	BOOL	Open command to control object 1.
ControlCommand	BOOL	Control command

EasergyP5_CFG_DDT Type

Name	Type	Description
Current	REAL	Current
Voltage	REAL	Voltage
Power	REAL	Power
DataStatus	WORD	Device status (bit 0 - Fault, bit 1 - Opened, bit 2 - Closed, bit 3 - Trip, bit 4 - LocalRemote, bit 5 - SettingAActive, bit 6 - SettingBActive, bit 7 - TimeOutdated, bit 8 - SettingMode, bit 9 - SynchronizationLost, bit 10 - DataLoss1Event, bit 11 - Event1Zone, bit 12 - PartialFault, bit 13 - MajorFault, bit 14 - DataLoss2Event, bit 15 - Event2Zone)
Fault	BOOL	Detected fault
LocalRemote	BOOL	Local remote
Info	INT	Info
Failcode0 NOTE: Failcode parameters are available from Failcode0... Failcode2.	INT	–
DisableControlObject	WORD	Disable command to control object status.
ControlObject1 NOTE: ControlObject parameters are available from ControlObject1... ControlObject8.	BOOL	Disable command to control object 1...8.
Reserved	WORD	Reserved

MBEthWorkMemory DDT Structure

Parameter	Type	Description
Header	ARRAY [0..15] OF INT	Common data.
	Parameter name	Type Description
	Header[0]	INT Number of Ethernet client.
	Header[1]	INT No of request.
	Header[2]	INT Simultaneous send.

Parameter	Type	Description	
	Header[3]	INT	3.0:Initialization Started ; 3.1:Port Ready; 3.2:Take statistics info.
	Header[4]	INT	Least priority.
	Header[5]	INT	Last order number.
	Header[6]	INT	Socket number occupied by the client with least priority.
	Header[7]	INT	Low Word of Min total time.
	Header[8]	INT	High Word Of Min total time.
	Header[9]	INT	Low Word of Avg total time.
	Header[10]	INT	High Word Of Avg total time.
	Header[11]	INT	Low Word Max total time.
	Header[12]	INT	High Word Of Max total time.
	Header[13]	INT	Low Word for total request.
	Header[14]	INT	High Word for total request.
	Header[15]	INT	Reserved.
ClientDataReference	ARRAY[0..3] OF MBEthSocketData	Array of client references.	

MBEthSocketData DDT Structure

Parameter	Type	Description	
<i>ClientDataReference[0]</i> NOTE: ClientDataReference parameters are available from ClientDataReference [0]... ClientDataReference [3].	MBEthSocketData	Reference of the client data.	
	Parameter name.	Type.	Description.
	<i>ClientRef</i>	REF_TO MBEthClient1Data	MBTCP Client Data.
	Status	WORD	Status of the socket(00 - Idle, 01- Client has sent data, 11 -Port has processed, 10 - Port is processing the request).

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the management of \$EasergyP5EMGP

Genies

Genie Properties


Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
<div>EasergyP5EMGP</div>	<i>Easergyp5</i>	Easergyp5

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a general description, page 40 of the graphic elements that are used in the faceplate.

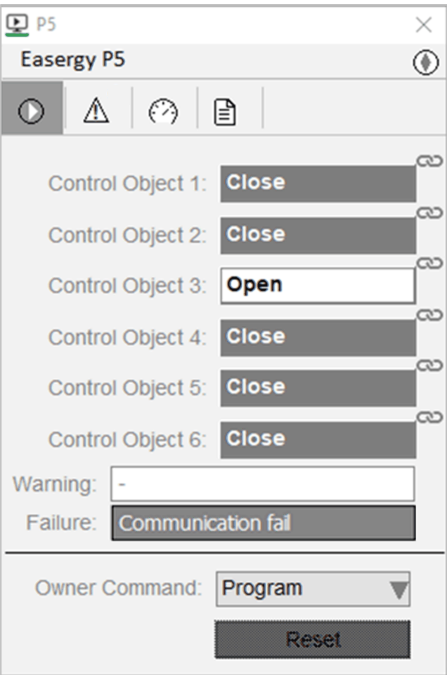
Available Tabs

During operation, clicking an `EasergyP5` genie opens a faceplate with the following tabs:

- Operation
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:



The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 52
Control object1	Closed	Status of control object - Open, Close, Undefined.	–
Warning	AlarmActive, CurrentWarning	Device in local mode.	–
Owner Command	OwnerCommand	Owner of Easergy	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. Note: <ul style="list-style-type: none"> When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset, a dialog box opens to confirm. After deploying the built project, the first time reset will take time to establish communication with the device due to timeout while obtaining socket connection. 	Set rearm

Measures Tab

The table lists the items of each groups from group number 1 to 4 of **Measures** tab:

Group Order Number	1	2	3	4
Group name	Current	Voltage and Frequency	Power	Demand
Items	Current1	Frequency	ActivePower	Phase1CurrentDemand
	Current2	VoltageU21	ReactivePower	Phase2CurrentDemand
	Current3	VoltageU32	ApparentPower	Phase3CurrentDemand
	AverageCurrent	VoltageU13	PowerFactor	Phase1CurrentDemandRMS
	Current1RMS	AveragePhaseToPhaseVoltage	ExportedActiveEnergy	Phase2CurrentDemandRMS
	Current2RMS	Voltage1	ImportedActiveEnergy	Phase3CurrentDemandRMS
	Current3RMS	Voltage2	ExportedReactiveEnergy	ActivePowerDemand
	AverageCurrentRMS	Voltage3	ImportedReactiveEnergy	ReactivePowerDemand
	IoResidualCurrent	AveragePhase-EarthVoltage	ActivePowerRMS	ApparentPowerDemand
	IovsResidualCurrent	Voltage1RMS	ReactivePowerRMS	PowerFactorDemand
	PositiveSensitiveCurrent	Voltage2RMS	ApparentPowerRMS	ActivePowerDemandRMS
	NegativeSensitiveCurrent	Voltage3RMS	–	ReactivePowerDemandRMS
	PhaseCurrentTHD	AveragePhaseToPhaseRMSVoltage	–	ApparentPowerDemandRMS
	–	ResidualVoltage	–	–
	–	PositiveSequenceVoltageVd	–	–
	–	NegativeSequenceVoltageVi	–	–
	–	VoltageTHD	–	–

The table lists the items of each groups from group number 5 to 9 of **Measures** tab:

Group Order Number	5	6	7	8	9
Group name	Device Status	Diagnostics	Inputs	Outputs	Arc Stage
Items	SOTF Enable	LastFaultCurrent	DigitalInput1 NOTE: These items are available from DigitalInput01... DigitalInput31	DigitalOutput1 NOTE: These items are available from DigitalOutput01... DigitalOutput20	Stage1Enabled NOTE: These items are available from Stage1Enabled... Stage8Enabled
	VoltageInterrupt	UnderVoltage	–	–	–
	RemoteControlEnable	UnderLoad	–	–	–
	ControlObject1 NOTE: These items are available from ControlObject1... ControlObject8	FailCode0	–	–	–
	ProtectionTrips	FailCode1	–	–	–
	RunningHrsCounter	FailCode2	–	–	–
	Temp	–	–	–	–
	EngineRunHrs	–	–	–	–
	EngineStartCount	–	–	–	–
	PowerAngle	–	–	–	–
	PhaseAngleDifference	–	–	–	–
	VoltagePhaseSequence	–	–	–	–
	VoltageStatus	–	–	–	–
	CurrentPhaseSequence	–	–	–	–

The table lists the items of each groups from group number 9 to 12 of **Measures** tab:

Group Order Number	10	11	12
Group name	Virtual Inputs	Virtual Outputs	Arc Sensors
Items	Input01 NOTE: These items are available from Input01... Input20	Output01 NOTE: These items are available from Output01... Output20	ArcSensor1
	–	–	ArcSensor2
	–	–	ArcSensor3
	–	–	ArcSensor4
	–	–	ArcSensor5
	–	–	ArcSensor6

Items

Overview

This section describes the variables IO, alarm items, events, and trends item of EasergyP5.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Forcedlocally/-	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Detected fail resetting required	Required/Not Required	Bit6
ExtControlled	External controlled	–	Bit7
Resetting	Detected fail resetting required	–	Bit8
EnableFunctionalBlock	Normal execution of control block	–	Bit9
Bit items derived from ConfigurationWord			
Rearm	Resets the detected fail	Active/Inactive	Bit0
OwnerSelect	Owner of control module	Operator/Program	Bit1
Close1	Command to close1	–	Bit2
OpenCommand1	Command to open1	–	Bit3
ControlCommand	Indicates mode of control	–	Bit4
Close2	Command to close2	–	Bit5
OpenCommand2	Command to open2	–	Bit6
Close3	Command to close3	–	Bit7
OpenCommand3	Command to open3	–	Bit8
Close4	Command to close4	–	Bit9
OpenCommand4	Command to open4	–	Bit10
Close5	Command to close5	–	Bit11
OpenCommand5	Command to open5	–	Bit12
Close6	Command to close6	–	Bit13
OpenCommand6	Command to open6	–	Bit14
Bit items derived from DeviceStatus			
SOTFEnable	Switch ON to detected fault enable	On/Off	EasergyP5_SOTFEnable
VoltageInterrupt	Owner of control module	Ok/Low	EasergyP5_VoltageInterrupt

Item name	Description	Enumeration	Address
ControlObject{x} NOTE: {x} represents from 1 to 8.	Command to close{x}	–	EasergyP5_ControllableObject{x}
ProtectionTrips	(Protection trips	–	EasergyP5_ProtectionTrips
RunningHrsCounter	Running hours counter in Hours	–	EasergyP5_RunningHrsCounter
Temp	Temperature in DegCelsius	–	EasergyP5_Temp
EngineRunHrs	Engine running time in Sec	–	EasergyP5_EngineRunHrs
EngineStartCount	Engine start count	–	EasergyP5_EngineStartCount
PowerAngle	Power angle in degree	–	EasergyP5_PowerAngle
PhaseAngleDifference	Phase angle difference in Deg	–	EasergyP5_PhaseAngleDifference
VoltagePhaseSequence	Voltage phase sequence	Reverse/Ok/??	EasergyP5_VoltagePhaseSequence
VoltageStatus	Voltage status	(Low/High)/(High)/(Low)/(Low/High)/(High)/(Low)/Ok	EasergyP5_VoltageStatus
CurrentPhaseSequence	Current phase sequence	Reverse/Ok/??	EasergyP5_CurrentPhaseSequence
Bit items derived from ArcStageWord			
ArcStage1{x} NOTE: {x} represents from 1 to 8. {y} represents from 0 to 7.	Arc stage {x} enabled	Notinstalled/Daylight/Shortcircuit/Notconnected/Active/Ok/Null	Bit {y}
IO Items			
FailCode0	Code of last level 0 detected error	–	EasergyP5_CFG.FailCode0
FailCode1	Code of last level 1 detected error	–	EasergyP5_CFG.FailCode1
FailCode2	Code of last level 2 detected error	–	EasergyP5_CFG.FailCode2
LastFaultCurrent	Last detected error current in xln	–	EasergyP5_CFG.LastFaultCurrent
UnderLoad	Underload in A	–	EasergyP5_CFG.UnderLoad
UnderVoltage	Undervoltage in V	–	EasergyP5_CFG.UnderVoltage
DataStatusWord	Data Status word	–	EasergyP5_CFG.DataStatus
StatusWord	Status word	–	EasergyP5_ST.STW
ConfigurationWord	Configuration word	–	EasergyP5_ST.CFGW
DataStatusWord	Data Status word	–	EasergyP5_CFG.DataStatus
VirInputsMapWord1	Data status word bit array	–	EasergyP5.InputsMap
VirInputsMapWord2		–	EasergyP5.InputsMap

Item name	Description	Enumeration	Address
VirOutputsMapWord1		–	EasergyP5.OutputsMap
VirOutputsMapWord2		–	EasergyP5.OutputsMap
InputsMapWord1		–	EasergyP5.InputsMap
InputsMapWord2		–	EasergyP5.InputsMap
InputsMapWord3		–	EasergyP5.InputsMap
OutputsMapWord1		–	EasergyP5.OutputsMap
OutputsMapWord2		–	EasergyP5.OutputsMap
ArcStageWord	Arc stage word	–	EasergyP5_ArcStageWord
EnableControlObject	Enable control object word	–	EasergyP5_EnableControlObject
Calculated Items			
LastFailure	Last detected error	–	<i>EasergyP5_LastFailure</i>
Abnormal	Shows abnormal condition of the EasergyP5 Refer to Abnormal Conditions, page 387.	–	<i>EasergyP5_Abnormal</i>
ActionRequired	Shows action required condition of the EasergyP5 Refer to Action Required Conditions, page 387.	–	<i>EasergyP5_ActionRequired</i>

Abnormal Conditions

The table describes the abnormal conditions of EasergyP5:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	<i>Bit0</i>
AbnormalOperator-Tab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	<i>Bit8</i>

Action Required Conditions

The table describes the abnormal conditions of EasergyP5:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	<i>Bit8</i>

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>
AlarmFailure	Operation failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Motor Controller and Starters


What's in This Part

Motor Controllers and Starters (TesyS T)	199
Motor Controllers and Starters (TesyS U)	233

Overview

This part provides the functionality of the templates, a detailed description of the control (functions,pins, pin layout, and variables of the function blocks), and the supervision functions of motor controller and starters.

These components do not reflect any specific installation.

 **WARNING**

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

Motor Controllers and Starters (Tesy T)

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Overview

This chapter describes the functionality of template, control services and Supervision functions of the `TESYST`.

Template

Overview

This section describes functionality of the following templates:

- `$TesyTEFastGP`
- `$TesyTEGP`
- `$TesyTMBGP`
- `$TesyTEMGP`
- `$TesyTPBGP`

Description

General Description

The control module templates allows you to manage a Tesys T motor management system on an Ethernet network using fast I/O scanning/Ethernet TCP/IP-based network using modbus explicit messaging/modbus network/profibus network.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Device operation.
Address	Forward/reverse direction of rotation.
Speed	This function enables the change of speed (fast or slow) if you are working with a 2-speed motor start (double winding).
Device status indication	Displays the status of the device.
Remote resetting	Allows resetting of the device.
Control or Monitoring	Enables you to control or monitor the device.
Owner	Manages the control system which is the owner (Operator or Program). Therefore, it is responsible for setting the control.

NOTE:

- DTM Inputs and DTM Outputs pins are not supported in EcoStruxure Hybrid DCS.
- For establishing the communication with TesysT devices through IOScanning or by using DTM, the device `Unit ID` for TesysT varies for different firmware versions. Hence default value is set to 1, as it supports most of the firmware versions. In case of unsuccessful communication, you may need to configure the correct device `Unit ID` in the configuration parameter.

Parameters

Parameters

These templates defines the operation and enables the modification of alternative facets.

- `$TesySTEFastGP`
- `$TesySTEGP`
- `$TesySTEMGP`
- `$TesySTMGBP`
- `$TesySTPGBP`

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	False - Manual reset True - Automatic reset	Boolean	<i>FALSE</i>	It allows you to reset detected error in auto and manual mode. By default mode is Manual Mode
	Device modbus address NOTE: This parameter is additional for <code>\$TesySTMGBP</code> only.	Short	<i>0</i>	–
	PRMPXMSelection NOTE: This parameter is additional for <code>\$TesySTPGBP</code> only.	Enum	<i>PRM</i>	It allows you to select PRM or PXM. NOTE: For more details about PMPX-M0100 module, refer to EcoStruxure process Expert Control Participant Services User Guide.
Time	Time window for the device to execute orders	Duration	<i>00:00:05</i>	–
	Minimum signals time to maintain alert		<i>00:00:03</i>	–
	Maximum time between two auto reset of the DFB.		<i>00:01:00</i>	–

Section	Parameter description	Data type	Default value	Additional remarks
	Time to refresh the cyclic data. NOTE: This parameter is additional for \$TesySTEMGPF/\$TesySTMBGP only.		00:00:00.-5	–
Variable Tag Disable NOTE: This parameter is additional for \$TesySTMBGP.	Disable extended device information1	Boolean	TRUE	–

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	Program (1)	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	Operator (1)	Privilege to change override mode. This parameter is used in operator tab, page 229.
	Set rearm		Operator (Confirmed) (10)	Privilege to change reset. This parameter is used in operator tab, page 229.
	Set acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Trend	Sample period	Duration	00:00:05	–
	History length (weeks)	Integer	5	–
	History rollover time	Duration	12:00:00	–
	History rollover day	String	Tuesday	–
	Storage type		TRN PERIODIC	–
	Data location (optional)		[Data];	–

Data

The table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	NOTE: These parameters are applicable TesysTBasic.			
	Average current engineering zero value	Integer	0	–
	Average current engineering full value		200	–

Section	Parameter description	Data type	Default value	Additional remarks
	Average current deadband value		0	–
	Optional tabs - TesysTMEA NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.			
	Full load current deadband value	Integer	0	–
	Thermal capacity deadband value			–
	Current phase deadband value			–
	Frequency deadband value			–
	Optional tabs - TesysTMEAExtended NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.			
	Full load current L deviation value	Integer	0	–
	Temperature deviation value			–
	Current deadband value			–
	Current line 1, line 2 and line 3 deadband value			–
	Ground current deadband value			–
	Motor temperature deadband value			–
	Optional tabs - TesysTMEA40 NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.			
	Average voltage deadband value	Integer	0	–
	Line 3 to Lin 1 voltage deadband value			–
	Line 1 to Lin 2 voltage deadband value			–
	Line 2 to Lin 3 voltage deadband value			–
	Voltage imbalance deadband value			–
	Active power deadband value			–
	Reactive power deadband value	–		
	Alarm	NOTE: These parameters are applicable TesysTBasic.		
Alarm failure description/ Device failure alarm description/ Communication failure alarm description		String	@(Alarm Failure)/@(Device Failure Alarm)/@(Communication Failure Alarm)	–
Alarm failure alarm severity/ Device failure alarm severity/ Communication failure alarm severity		Enum	Low(4000)	–
Alarm failure alarm group/ Device failure alarm		String	Failure	–

Section	Parameter description	Data type	Default value	Additional remarks	
	group/Communication failure alarm group				
Variable Tag Disable	NOTE: These parameters are applicable TesysTBasic.				
	Disable average current	Boolean	FALSE	—	
	Disable information code			—	
	Disable input map			—	
	Disable input/output map			—	
	Optional tabs - TesysTMEA				
	NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.				
	Disable start count	Boolean	FALSE	—	
	Disable current phase			—	
	Disable thermal capacity			—	
	Disable frequency			—	
	Disable FLC ground current			—	
		Optional tabs - TesysTMEAExtended			
		NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.			
Disable temperature		Boolean	FALSE	—	
Disable current				—	
Disable average current L1, L2 and L3				—	
Disable ground current				—	
Disable motor temperature				—	
Disable time trip				—	
Disable last start current				—	
Disable last start duration				—	
Disable current L1, L2 and L3				—	
Optional tabs - TMEA EV40					
NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.					
Disable L1, L2 voltage		Boolean	FALSE	—	
Disable L2, L3 voltage				—	
Disable voltage imbalance				—	
Disable active power				—	
Disable reactive power				—	
Disable power factor				—	
Disable average voltage				—	
Disable L1, L3 voltage	—				
Trend Tag Disable	TesysTEBasic and TesysTPBBasic				
	NOTE: These parameters are applicable only for \$TesysTEFastGP and \$TesysTPBGP.				
	Disable average current value	Boolean	FALSE	—	
Historize	NOTE: These parameters are applicable TesysTBasic.				

Section	Parameter description	Data type	Default value	Additional remarks	
	Enable historize average current	Boolean	FALSE	—	
	Enable historize word data			—	
	Enable historize information word			—	
	Enable historize fail codes			—	
	Enable historize warning code			—	
	Enable historize inputs map			—	
	Enable historize Input/Out map			—	
	Optional tabs - TesysTMEA NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.				
	Enable historize FLC ground current	Boolean	FALSE	—	
	Enable historize frequency			—	
	Enable historize thermal capacity			—	
	Enable historize current phase			—	
	Enable historize start count			—	
		Optional tabs - TesysTMEAExtended NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.			
		Enable historize FLC current line 1	Boolean	FALSE	—
Enable historize FLC current line 2		—			
Enable historize FLC current line 3		—			
Enable historize temperature		—			
Enable historize current line 1, line 2 and line 3		—			
Enable historize current		—			
Enable historize ground current		—			
Enable historize motor temperature				—	
Enable historize time trip				—	
Enable historize last start current				—	
Enable historize last start duration				—	
Optional tabs - TesysTMEA40 NOTE: These parameters are applicable only for \$TesysTEGP, \$TesysTEMGP and \$TesysTMBGP.					
Enable historize power factor		Boolean	FALSE	—	
Enable historize average voltage				—	
Enable historize line 3 and line 1 voltage				—	

Section	Parameter description	Data type	Default value	Additional remarks
	Enable historize line 1 and line 2 voltage			—
	Enable historize line 2 and line 3 voltage			—
	Enable historize active power			—
	Enable historize reactive power			—
	Enable historize voltage imbalance			—

Asset and Display Parameters

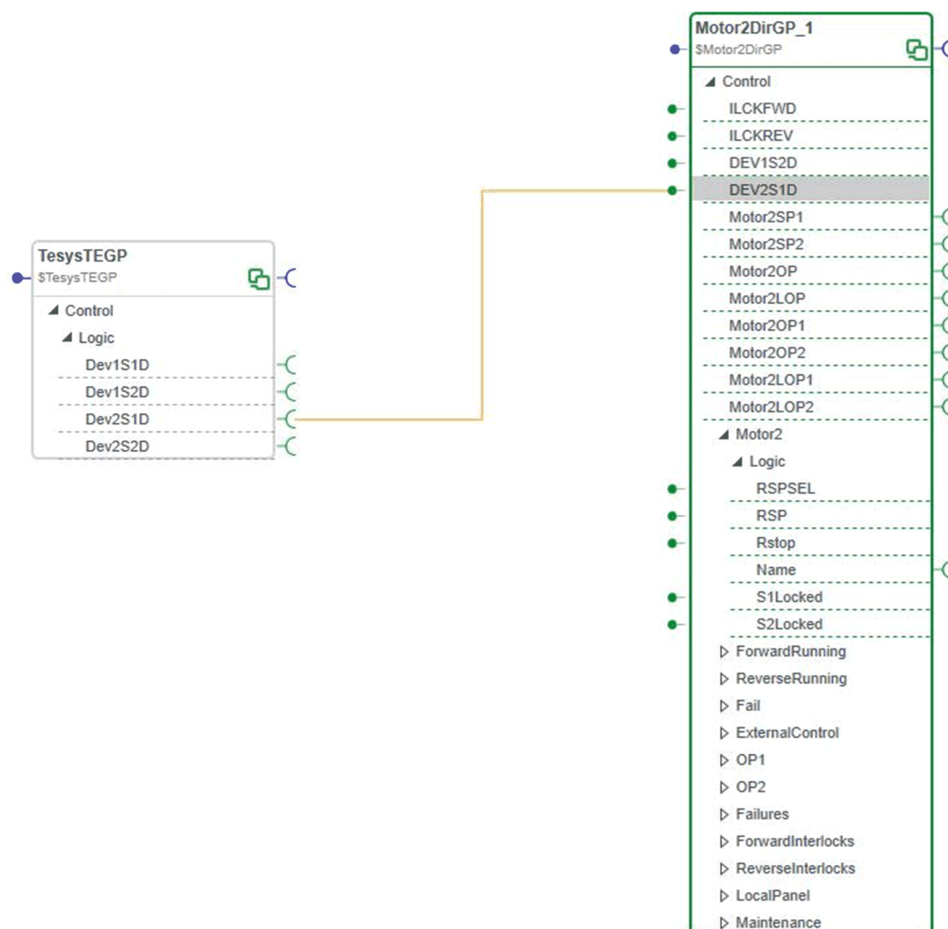
For more details, refer to the topic describing the parameters of asset and display, page 28.

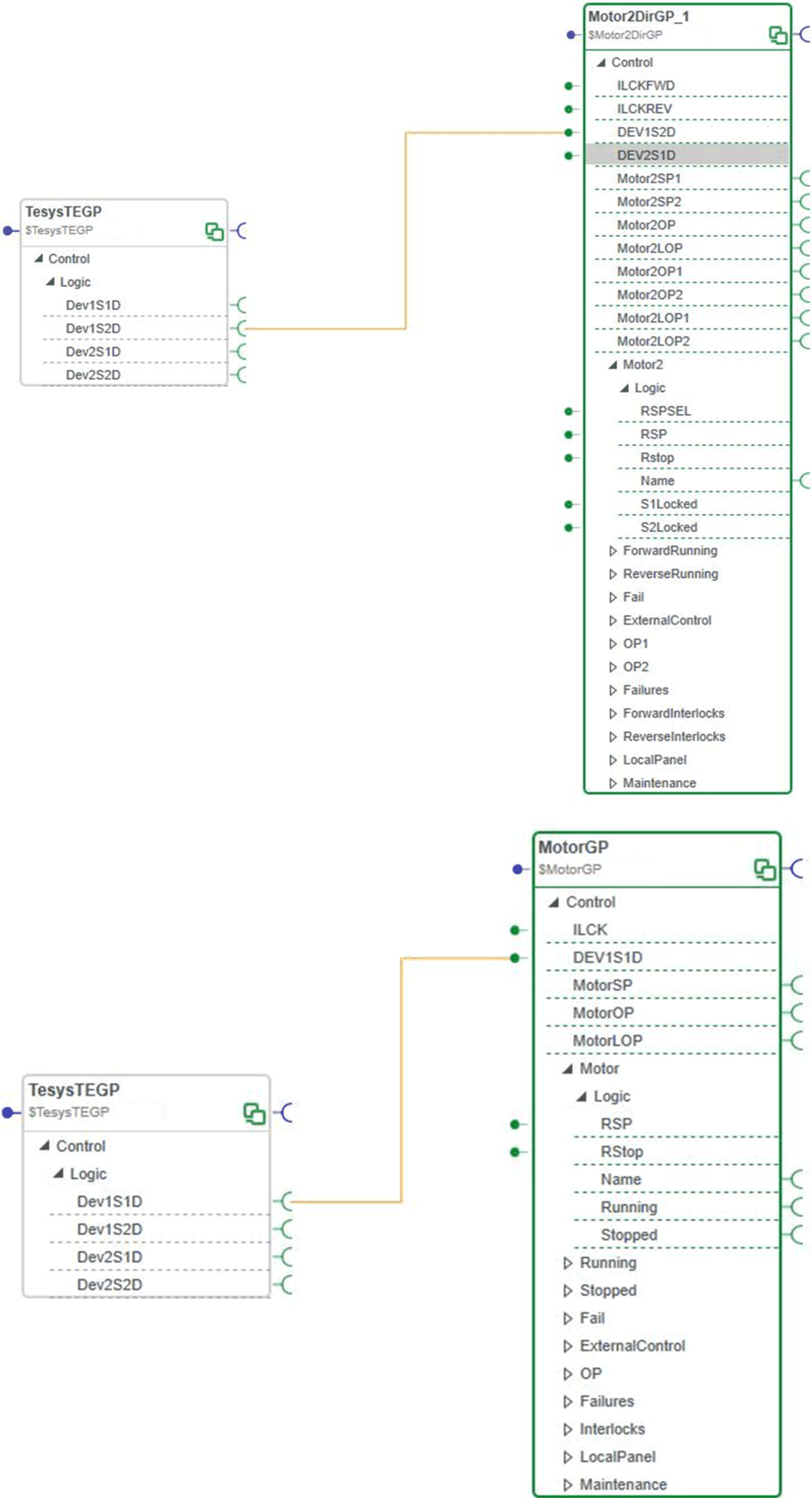
Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

These figures shows the \$TesyTEGP (also applicable for \$TesyTECE) template as it appears in Links Editor with example of other templates connected to it:





The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	–
Dev1S2D	<i>\$DEV1S2D/DO</i>	An output interface to other template	–
Dev2S1D	<i>\$DEV2S1D/DO</i>	An output interface to other template	–
Dev2S2D	<i>\$DEV2S2D/DO</i>	An output interface to other template	–

Control

Overview

This chapter describes the `TESYST` DFB.

Description

General

The TeSys T profile is used to manage TeSys T motor management system on different communication networks (Ethernet network based on IO scanning, Ethernet network using fast IO scanning, Ethernet network using messaging, modbus network, Advantys STB I/O island or Profibus using PRM gateway/PRM master).

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Device operation.
Address	Forward/reverse direction of rotation.
Speed	This function enables the change of speed (fast or slow) if you are working with a 2-speed motor start (double winding).
Device status indication	Displays the status of the device.
Remote resetting	Allows resetting of the device.
Control or Monitoring	Enables you to control or monitor the device.
Owner	Manages the control system which is the owner (Operator or Program). Therefore, it is responsible for setting the control.

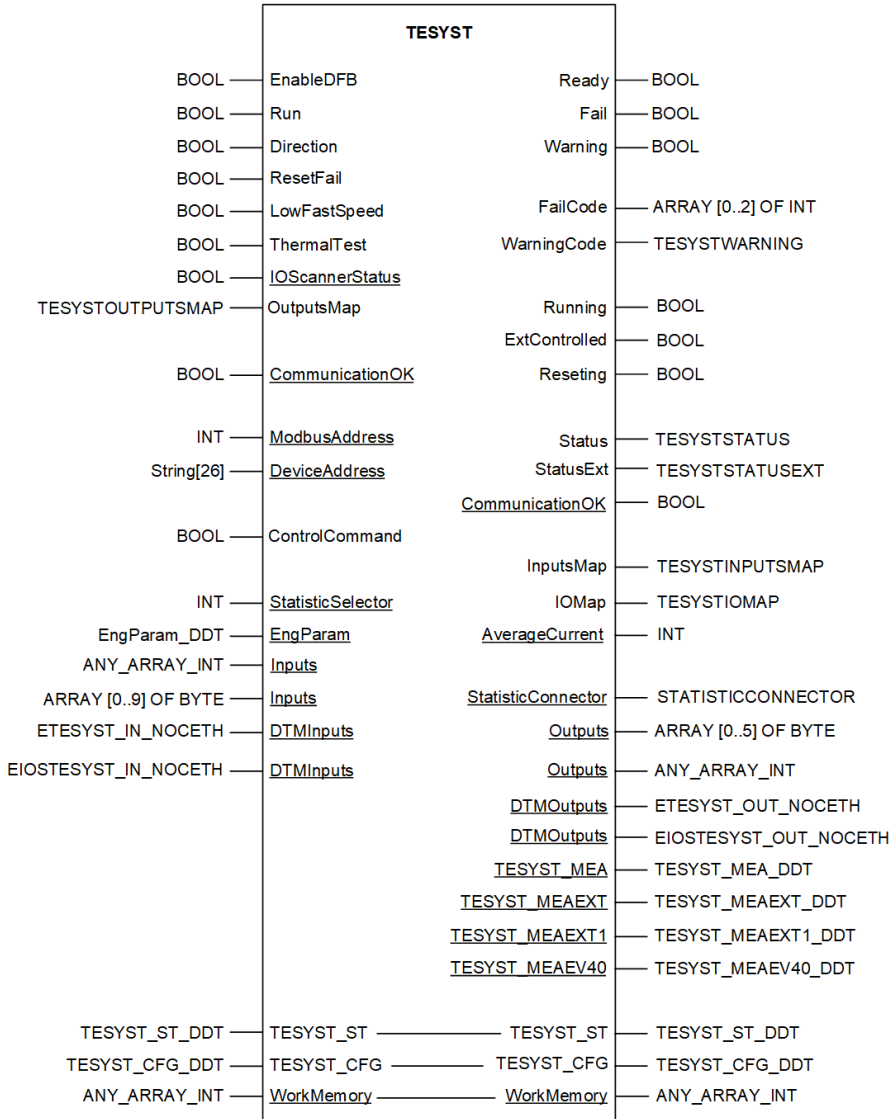
NOTE:

- DTM Inputs and DTM Outputs pins are not supported in EcoStruxure Hybrid DCS.
- For establishing the communication with TesysT devices through IOScanning or by using DTM, the device `Unit ID` for TesysT varies for different firmware versions. Hence default value is set to 1, as it supports most of the firmware versions. In case of unsuccessful communication, you may need to configure the correct device `Unit ID` in the configuration parameter.

DFB Representation

Representation

The following figure represents the functional module of TeSys T profile:



NOTE: The underlined parameters are specific for some components.

For DFBs communicating by I/O scanning, variables read from the device retain their last value when a communication interruption occurs. For details, refer to the description of the corresponding output parameter, page 216.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

When you configure the *Last value* parameter of the I/O scanner line, take into consideration the behavior of the DFB when a communication interruption occurs.

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

The table shows the parameters available for specific components:

Parameters		Components					
		Ethernet			Modbus (MBTE-SYST)	Advantys (TE-SYSTCTL)	Profibus (TESYSTPB)
		Normal IO scanning (EIOSTESYST)	Fast IO scanning (ETESYST)	Messaging (EMESTE-SYST)			
Inputs	<i>ModbusAddress</i>	–	–	–	X	–	–
	<i>DeviceAddress</i>	–	–	X	–	–	–
	<i>IOScannerStatus</i>	X	X	–	–	–	X
	<i>CommunicationOK</i>	–	–	–	–	X	–
	<i>StatisticSelector</i>	–	–	X	X	–	–
	<i>EngParam</i>	–	–	X	X	–	–
	<i>Inputs</i>	X	X	–	–	X	X
	<i>DTMInputs</i>	X	X	–	–	–	–
Outputs	<i>CommunicationOK</i>	X	X	–	–	–	X
	<i>StatusExt</i> (TESYSTSTATUSEXT)	X	X	X	X	X	X
	<i>AverageCurrent</i>	X	–	X	X	–	X
	<i>TESYST_MEA</i>	X	–	X	X	–	–
	<i>TESYST_MEAEXT</i>	X	–	X	X	–	–
	<i>TESYST_MEAEXT1</i>	–	–	–	X	–	–
	<i>TESYST_MEADEV40</i>	X	–	X	X	–	–
	<i>StatisticConnector</i>	–	–	X	X	–	–
	<i>Outputs</i>	X	X	–	–	X	X
	<i>DTMOutputs</i>	X	X	–	–	–	–
Inputs/ Outputs	<i>WorkMemory</i>	–	–	X	X	–	–
X: Parameter is available. –: Parameter is not available.							

Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	This input enables the normal execution of the control block. <ul style="list-style-type: none"> 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.


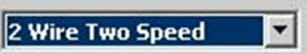
If the device is reset and *Run* pin is active, then the device will auto start. If manual start of the device is required, then reset the *Run* pin followed by device.

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 <i>Direction</i> input variable.
Direction	BOOL	<p>Direction of rotation of the motor.</p> <ul style="list-style-type: none"> 0 = Activates the forward direction drive. 1 = Activates the reverse direction drive. <p>Only used in 2/3 Wire Reverser mode configuration in TeSys T device. The device causes incorrect operation in other operating modes.</p> <p>Operating Mode </p>
ResetFail	BOOL	1 = Resets the <i>Fail</i> output parameter to 0 or in case of inoperable device, sends a reset command to the device if <i>ControlCommand</i> is 1.
LowFastSpeed	BOOL	<p>Slow/fast speed of rotation. For 2-speed motor start configuration in device, refer to the <i>TesysT user manual</i>.</p> <p>Only used in the 2/3 Wire two Speed mode configuration in TeSys T device. The device causes incorrect operation in other operating modes.</p> <p>Operating Mode </p>
ThermalTest	BOOL	1 = Checks the forced thermal detected error input on the TeSys T.
OutputsMap	TESYSTOUTPUTSMAP	<p>Holds a structure to control the Tesys outputs.</p> <p>These outputs hold an image of this structure values. (Memory in modbus 700).</p>
	Name	Type
	Output1	BOOL
	Output2	BOOL
	Output3	BOOL
	Output4	BOOL
ModbusAddress*	INT	<p>Device address within the modbus network.</p> <p>You can find this variable in modbus communications.</p>
DeviceAddress*	STRING[26]	<p>Device address within the Ethernet network.</p> <p>Depending on the platform, the following definitions apply:</p>
	Platform	IP Addressing DeviceAddress (variable)
	M340	'{IP}ID'
	Quantum	'{IP}ID'
	M580	'{IP}ID'
	NOTE: ID is 0.	
IOScannerStatus*	BOOL	<p>1 = Indicates that the node is present on the bus.</p> <p>You can find this variable in Ethernet communications.</p> <p>NOTE: <i>UnitID</i> for <i>EIOSTesysT</i> and <i>ETesysT</i> profile is 1.</p>
CommunicationOK*	BOOL	1 = The communication ok for the device present in the IO scanner.
StatisticSelector*	INT	Refer to <i>StatisticSelector</i> .
EngParam*	EngParam_DDT EngParamTESYST/EngParamEMESTESYST	Engineering parameters.
ControlCommand	BOOL	Indicates to the DFB whether the motor is being controlled locally or from a source external to the DFB.

Parameter	Type	Description	
		<ul style="list-style-type: none"> 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. <p>NOTE: This input does not configure the motor.</p>	
INPUTS ¹	ANY_ARRAY_INT	<p>Holds an array structure with data obtained from the device. You can control the starter/controller with this input variable. This input is reserved for the DFB, and you cannot use this input directly. For the control block to work properly, allocate the structure (%MWx). Refer to the Communication Technologies, page 446.</p> <p>The Inputs pin should not be connected when DTMInputs pin is connected, otherwise the function detects an incorrect configuration.</p> <p>The following table describes the INPUTSstructure:</p>	
	Parameter	Type	Description
	Inputs [0]	INT	Reserved.
	Inputs [1]	INT	Reserved.
	Inputs [2]	INT	Reserved.
	Inputs [3]	INT	Reserved.
	Inputs [4]	INT	Status register 1.
INPUTS ¹	Inputs [5]	INT	Status register 2.
	Inputs [6]	INT	Logic input status.
	Inputs [7]	INT	Logic output status.
	Inputs [8]	INT	Reserved.
	Inputs [9]	INT	Reserved.
	Inputs [10]	INT	Notification register.
	Inputs [11]	INT	Reserved.
	Inputs [12]	INT	Reserved.
	Inputs [13]	INT	Reserved.
	Inputs [14]	INT	Thermal capacity.
	Inputs [15]	INT	Average current.
	Inputs [16]	INT	FLC current L1.
	Inputs [17]	INT	FLC current L2.
	Inputs [18]	INT	FLC current L3.
	Inputs [19]	INT	FLC ground current.
	Inputs [20]	INT	Current phase.
	Inputs [21]	INT	Temperature.
	Inputs [22]	INT	Reserved.
	Inputs [23]	INT	Frequency.
	Inputs [24]	INT	Motor temperature.
	Inputs [25]	INT	Average voltage.
	Inputs [26]	INT	L3 to L1 voltage.
	Inputs [27]	INT	L1 to L2 voltage.
	Inputs [28]	INT	L2 to L3 voltage.
	Inputs [29]	INT	Voltage imbalance.
	Inputs [30]	INT	Power factor.

Parameter	Type	Description	
	Inputs [31]	INT	Real power.
	Inputs [32]	INT	Reactive power.
INPUTS ¹	Inputs [33]	INT	Reserved.
	Inputs [34]	INT	Reserved.
	Inputs [35]	INT	Reserved.
	Inputs [36]	INT	Reserved.
	Inputs [37]	INT	Reserved.
	Inputs [38]	INT	Reserved.
	Inputs [39]	INT	Reserved.
	Inputs [40]	INT	Reserved.
	Inputs [41]	INT	Reserved.
	Inputs [42]	INT	Reserved.
	Inputs [43]	INT	Reserved.
	Inputs [44]	INT	Reserved.
	Inputs [45]	INT	Reserved.
	Inputs [46]	INT	Reserved.
	Inputs [47]	INT	Reserved.
	Inputs [48]	INT	Reserved.
	Inputs [49]	INT	Average current.
	Inputs [50]	INT	Average current.
	Inputs [51]	INT	L1 current.
	Inputs [52]	INT	L1 current.
	Inputs [53]	INT	L2 current.
	Inputs [54]	INT	L2 current.
	Inputs [55]	INT	L3 current
	Inputs [56]	INT	L3 current.
	Inputs [57]	INT	Ground current.
	Inputs [58]	INT	Ground current.
	Inputs [59]	INT	Reserved.
	Inputs [60]	INT	Time trip.
	Inputs [61]	INT	Last start current.
	Inputs [62]	INT	Last start duration.
	Inputs [63]	INT	Number of starts.
INPUTS [*]	ANY_ARRAY_INT	<p>Holds an array structure with data obtained from the device. You can control the starter/controller with this input variable. This input is reserved for the DFB, and you cannot use this input directly. For the control block to work properly, allocate the structure (%MWX). Refer to the Communication Technologies, page 446.</p> <p>The Inputs pin should not be connected when DTMInputs pin is connected, otherwise the function detects an incorrect configuration.</p> <p>The following table describes the INPUTS structure:</p>	
	Parameter	Type	Description
	Inputs [0]	INT	Status register 1.
	Inputs [1]	INT	Status register 2.
	Inputs [2]	INT	Logic input status.

Parameter	Type	Description	
	Inputs [3]	INT	Logic output status.
INPUTS ⁴	ARRAY [0..9] OF BYTE	<p>Holds an array structure with data coming from the acuator. This variable is reserved for the DFB, and You cannot use this variable directly.</p> <p>The following table describes the <i>INPUTS</i> structure:</p>	
	Parameter	Type	Description
	Inputs [0]	BYTE	System status.
	Inputs [1]	BYTE	System status.
	Inputs [2]	BYTE	Average current MSB.
	Inputs [3]	BYTE	Average current LSB.
	Inputs [4]	BYTE	Logic input status MSB.
	Inputs [5]	BYTE	Logic input status LSB.
	Inputs [6]	BYTE	Logic output status MSB.
	Inputs [7]	BYTE	Logic output status LSB.
	Inputs [8]	BYTE	System status register 2 - MSB.
	Inputs [9]	BYTE	System status register 2 - LSB.
DTMINPUTS ¹	EIOSTESYST_IN_NOCETH	<p>Holds an input structure for the data to be obtained from device DTM. You can read device monitoring information with this input variables. This input pin has to be used with the device DTM.</p> <p>The <i>DTMInputs</i> pin should not be connected when <i>Inputs</i> pin is connected, otherwise the function detects an incorrect configuration</p> <p>The information available for <i>EIOSTESYST_IN_NOCETH</i> on Ethernet is shown in the following table:</p>	
	Parameter	Type	Description
	Fault_code	UINT	Code of detected fault
	Fault_register_1	WORD	Register 1 of detected fault
	Fault_register_2	WORD	Register 2 of detected fault
DTMINPUTS ¹	Fault_register_3	WORD	Register 3 of detected fault
	System_status_register_1	WORD	System status register 1
	System_status_register_2	WORD	System status register 2
	Logic_inputs_status	WORD	Logic input status
	Logic_outputs_status	WORD	Logic output status
	IO_status	WORD	I/O status
	Warning_code	UINT	Alert code
	Warning_register_1	WORD	Alert register 1
	Warning_register_2	WORD	Alert register 2
	Warning_register_3	WORD	Alert register 3
	Motor_temperature_sensor_degree	UINT	Motor temperature sensor
	Thermal_capacity_level	UINT	Thermal capacity level (% trip level)
	Average_current_ratio	UINT	Average current ratio (% FLC)
	L1_current_ratio	UINT	L1 current ratio (% FLC)
	L2_current_ratio	UINT	L2 current ratio (% FLC)
	L3_current_ratio	UINT	L3 current ratio (% FLC)
	Ground_current_ratio	UINT	Ground current ratio (x0.1% FLC Min)
	Current_phase_imbalance	UINT	Current phase imbalance (%)

Parameter	Type	Description
	Controller_internal_temperature	Controller Internal Temperature
	Controller_config_checksum	Controller configuration checksum
	Frequency	Frequency (x0.01Hz)
	Motor_temperature_sensor	Motor temperature sensor (x0.1 ohms)
	Average_voltage	Average voltage
	L3L1_voltage	L3 to L1 voltage
	L1L2_voltage	L1 to L2 voltage
	L2L3_voltage	L2 to L3 voltage
	Voltage_phase_imbalance	Voltage phase imbalance (%)
	Power_factor	Power factor (x0.01)
DTMINPUTS ¹	Active_power	Active power (x0.01kW)
	Reactive_power	Reactive power (x0.0kVAR)
	Auto_restart_status_register	Auto restart status register
	Controller_last_power_off_durati	Last power Off duration
	Not_significant	Not significant
	Not_significantA	Not significant
	Not_significantB	Not significant
	Not_significantC	Not significant
	Network_port_monitoring	Network port monitoring
	Network_port_baud_rate	Network port baud rate
	Not_significantD	Not significant
	Network_port_parity	Network port parity
	Not_significantE	Not significant
	Not_significantF	Not significant
	Not_significantG	Not significant
	Not_significantH	Not significant
	Not_significantI	Not significant
	Not_significantJ	Not significant
	Average_current	Average current (x0.01A)
	Average_current_1	Average current (x0.01A)
	L1_current	L1 current (x0.001A)
	L1_current_1	L1 current (x0.001A)
	L2_current	L2 current (x0.001A)
	L2_current_1	L2 current (x0.001A)
	L3_current	L3 current (x0.001A)
	L3_current_1	L3 current (x0.001A)
	Ground_current	Ground current (mA)
	Ground_current_1	Ground current (mA)
DTMINPUTS ¹	Controller_port_ID	Controller port ID
	Time_to_trip	Time to trip (x1s)
	Motor_last_start_current_ratio	Motor last start current ratio (%FLC)
	Motor_last_duration	Motor last duration (x0.1% FLC Min)

Parameter	Type	Description	
	Motor_last_duration	UINT	Motor starts per hour count
DTMINPUTS ²	ETESYST_IN_NOCETH	<p>Holds an input structure for the data to be obtained from device DTM. You can read device monitoring information with this input variables. This input pin has to be used with the device DTM.</p> <p>The <i>DTMInputs</i> pin should not be connected when <i>Inputs</i> pin is connected, otherwise the function detects an incorrect configuration</p> <p>The information available for ETESYST_IN_NOCETH on Ethernet is shown in the following table:</p>	
	Parameter	Type	Description
	Mirror_status_register	WORD	Mirror status register
	Reserved	WORD	Reserved
	Mirrors_System_Status_Register_1	WORD	Mirrors system status register 1
	Mirrors_System_Status_Register_2t	WORD	Mirrors system status register 2
	Mirrors_logic_inputs_status	WORD	Mirrors logic inputs status
	Logic_outputs_status	WORD	Logic outputs status
<p>*: Parameter is available for specific components.</p> <p>1: Parameter is available only for Ethernet normal IO scanning.</p> <p>2: Parameter is available for Ethernet fast IO scanning.</p> <p>3: Parameter is available for Advantys components.</p> <p>4: Parameter is available only for Profibus components.</p>			

StatisticSelector

Variable is used to obtain statistics for the modbus network (requests carried out, time between requests, so on). This data provides information for using `StatisticConnector` pin within the `StatisticCounter` DFB in General Purpose library for communication.

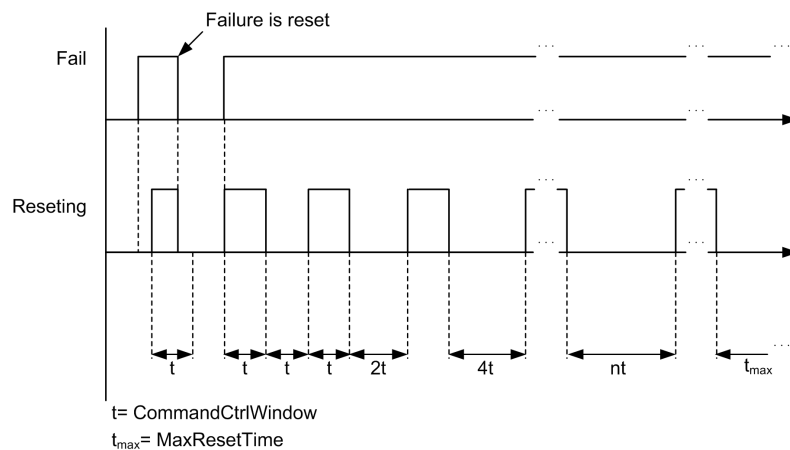
Variable value	Description
1	Read statistics, client.
2	Write statistics, client.

EngParam_DDT

Variable	Type	Description
CommandCtrlWind- ow	TIME	<p>Control time for operations. This is the time that the block waits for the operations to be carried out by the device.</p> <p>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.</p> <p>The command that is controlled is <code>Run</code>. In the event of <code>ResetFail</code>, this is not interpreted as an alarm. Instead, the detected failure continues, and you have to reset the <code>Reseting</code> output.</p>
Refresh	TIME	<p>Refresh time for device data on serial modbus communications.</p> <p>NOTE: This refresh operation is carried out on read variables. Write requests are carried out when needed and have maximum priority.</p>
ScanTime	TIME	Allows you to configure the time for which the alarm signals are kept active.

Variable	Type	Description
		Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset.
ResetMode	BOOL	<p>Enables to configure the type of reset. This type of reset is used for communication interruption and inoperable device.</p> <p>The time defined in <code>CommandCtrlWindow</code> 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 <code>CommandCtrlWindow</code> elapses. The second reset is carried out after <code>CommandCtrlWindow * 2</code> elapses, and so on. If the value of <code>CommandCtrlWindow</code> is 0 s, its value is not used and is instead replaced with a value of 1 s.</p> <p>The following table describes the type of the reset:</p>
	Variable value	Description
	FALSE	Communications are/the device is reset with the <code>ResetFail</code> variable.
	TRUE	Communications are/the device is reset automatically.
MaxResetTime	TIME	<p>When in automatic <code>ResetMode</code>, this variable is used to define the maximum time that can elapse between 2 consecutive resets.</p> <p>Refer to the Timing diagram below.</p>

Timing diagram:



Outputs

Output Parameter Description

Output	Type	Description
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command.
Fail	BOOL	1 = A detected error in the control block or in the device or communication interruption. To reset the <code>Fail</code> output pin, the <code>ResetFail</code> input has to be activated. The last detected error code is shown on <code>FailCode</code> . NOTE: If communication interruption occurs, the variables being read from the device ceases to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.
Warning	BOOL	1 = An alarm has been activated for the device. It cannot be reset because the signal remains active until the cause of the alarm is removed or until the maximum set <code>ScanTime</code> is reached.
FailCode	ARRAY [0..2] OF INT	When <code>Fail</code> output is 1, it holds the code for the detected error. If <code>Fail</code> output is 0, it indicates the last detected error that occurred.

Output	Type	Description
		<p>The detected error source is specified by a 3-level structure.</p> <p>Refer to the Diagnostics Information Management, page 225 for more details</p>
WarningCode	TESYSTWARNING	Holds a data structure with information about the alarm currently on the device.
	Name	Type Description
	Ground	BOOL 1 = Ground alarm.
	Thermal	BOOL 1 = Thermal alarm on the device.
	Jam	BOOL 1 = Mechanical jam alarm.
	Phase	BOOL 1 = Phase alarm.
	UnderCurrent	BOOL 1 = An undercurrent alarm.
	HMIPort	BOOL 1 = An HMI port communication interruption alarm.
	InternalTmp	BOOL 1 = Internal temperature alarm.
	Internal	BOOL 1 = An alarm for internal detected error.
	Network	BOOL 1 = Network port communication interruption alarm.
	Order	BOOL 1 = Follow-up alarm. The device is not responding to the control command within the time specified in <code>CommandCtrlWindow</code> .
	ForcedLocalMode	BOOL 1 = The device is forced locally in the <code>ForcedLocalMode</code> status. Is controlled through the screw terminal.
Running	BOOL	1 = The TeSys T is running. Current is higher than 10% of FLC.
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 <code>ControlCommand</code> signal, the <code>Owner</code> variable, and the <code>ForcedLocalMode</code> status are used to activate this signal. You cannot use this signal as a <code>ControlCommand</code> input.
Reseting	BOOL	1 = A reset is being carried out. The <code>CommandCtrlWindow</code> variable indicates the maximum time for resetting the detected error. When a device or communication reset is carried out with <code>ResetFail</code> , the DFB tries to reset the detected error within the time period defined in <code>CommandCtrlWindow</code> . If the detected error is reset, the <code>Fail</code> and <code>Reseting</code> output variables are reset (set to FALSE). If the detected error is not reset, the <code>Reseting</code> variable is set to FALSE and the <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based. Timing diagram:
CommunicationOk*	BOOL	1 = The communication is ok for the device present in the IO scanner.

Output	Type	Description	
Status	TESYSTSTATUS	<p>The structure holds data structure with the information that the module extracts from the status variable of the device.</p> <p>The following table describes the status information:</p>	
	Parameter	Type	Description
	Ready	BOOL	1 = Switch in ON position. Device is operational.
	Activated	BOOL	1 = The contact is activated. System on.
	Fail	BOOL	1 = TesysT is not operational.
	Warning	BOOL	1 = Alarm present on device.
	Trip	BOOL	1 = The Tesys protection has tripped.
	ResetAuth	BOOL	1 = Reset authorized detected error.
	ControllerPower	BOOL	1 = The system is powered.
	MotorRunning	BOOL	1 = Motor running with a current higher than 10% of full-load amperage.
	HMIControlled	BOOL	1 = HMI port is controlled.
	MotorStarting	BOOL	1 = The motor is starting.
	State, page 222	INT	<p>Numerical code corresponding to the device status.</p> <p>Refer to the <i>State</i> table below.</p>
	Info, page 222	INT	<p>Numerical code with the information on statuses and required actions.</p> <p>Refer to the <i>Info</i> table below.</p>
StatusExt*	TESYSTSTATUSEXT	<p>Holds a data structure with information that the module extracts from the state variable of the device.</p> <p>The following table describes the <i>StatusExt</i>:</p>	
	Parameter	Type	Description
	AutoResetActive	BOOL	1 = Auto-reset is active.
	FaultRequested	BOOL	1 = Detected error, restart (off/on) request.
	RestartTimeUnd	BOOL	1 = Motor restart time undefined.
	RapidCycleLockout	BOOL	1 = Rapid cycle lockout.
	LoadSheding	BOOL	1 = Load shedding.
	MotorSpeed	BOOL	1 = Motor speed.
	HMILostComms	BOOL	1 = Communication interruption with the HMI port.
	LostComms	BOOL	1 = Communication interruption with the network port.
	MotorTransitionLockout	BOOL	1 = Motor transition lockout.
InputsMap	TESYSTINPUTSMAP	<p>Holds a data structure with information on the state of the device inputs.</p> <p>The following table describes the <i>InputsMap</i>:</p>	
	Parameter	Type	Description
	Input1	BOOL	1 = The state of the logic input 1.
	Input2	BOOL	1 = The state of the logic input 2.
	Input3	BOOL	1 = The state of the logic input 3.
	Input4	BOOL	1 = The state of the logic input 4.
	Input5	BOOL	1 = The state of the logic input 5.
	Input6	BOOL	1 = The state of the logic input 6.
	Input7	BOOL	1 = The state of the logic input 7.
	Input8	BOOL	1 = The state of the logic input 8.
	Input9	BOOL	1 = The state of the logic input 9.

Output	Type	Description	
	Input10	BOOL	1 = The state of the logic input 10.
IOMap	TESYSTIOMAP	<p>Holds a data structure with information on the state of the device inputs and outputs.</p> <p>The following table describes the IOMap:</p>	
	Parameter	Type	Description
	Output1	BOOL	1 = The state of the digital output 1.
	Output2	BOOL	1 = The state of the digital output 2.
	Output3	BOOL	1 = The state of the digital output 3.
	Output4	BOOL	1 = The state of the digital output 4.
AverageCurrent*	INT	Average value of current ratio in %FLC.	
TESYST_MEA*	TESYST_MEA_DDT	Refer to <i>TESYST_MEA_DDT</i> Type.	
TESYST_MEAEXT*	TESYST_MEAEXT_DDT	Refer to <i>TESYST_MEAEXT_DDT</i> Type.	
TESYST_MEA40*	TESYST_MEA40_DDT	Refer to <i>TESYST_MEA40_DDT</i> Type.	
TESYST_MEAEXT1*	TESYST_MEAEXT1_DDT	Refer to <i>TESYST_MEAEXT1_DDT</i> Type.	
StatisticConnector	STATISTICCONNECTOR	Refer to <i>STATISTICCONNECTOR</i> .	
Outputs*	ANY_ARRAY_INT	<p>Holds an array structure with data sent to the device. You can control the starter/controller with this output variable. This variable is reserved for the DFB, and You cannot use this variable directly. For the control block to work properly, allocate the structure (%MWx). Refer to the <i>Communication Technologies</i>, page 446.</p> <p>The following table describes the <i>OUTPUTS</i>structure:</p>	
	Parameter	Type	Description
	Outputs [0]	INT	Output control.
	Outputs [1]	INT	System control.
	Outputs [2]	INT	Reserved.
Outputs ³	ANY_ARRAY_INT	Data sent to the actuator.	
Outputs ⁴	ARRAY [0..5] OF BYTE	<p>Holds an array structure with data sent to the acutuator. This variable is reserved for the DFB, and You cannot use this variable directly.</p> <p>The following table describes the <i>OUTPUTS</i>structure:</p>	
	Parameter	Type	Description
	Outputs [0]	BYTE	Control command.
	Outputs [1]	BYTE	Control command.
	Outputs [2]	BYTE	Reserved.
	Outputs [3]	BYTE	Reserved.
	Outputs [4]	BYTE	Logic output command.
	Outputs [5]	BYTE	Logic output command.
DTMOutputs ¹	EIOSTESYST_OUT_NOCETH	<p>Holds an output structure for the data to be written from controller to the device via Device DTM. This output pin has to be used when the device DTM is used.</p> <p>The following table describes the <i>EIOSTESYST_OUT_NOCETH</i> information available for <i>TeSysT</i> on Ethernet networks:</p>	
	Parameter	Type	Description
	Logic_outputs_command_register	WORD	Logic outputs command register of Tesys T
	Reserved	WORD	Reserved
	Reserved_1	WORD	Reserved 1
	Reserved_2	WORD	Reserved 2
	Control_register_1	WORD	Control register 1

Output	Type	Description	
DTMOutputs ²	ETESYST_OUT_NOCETH	Holds an output structure for the data to be written from controller to the device via Device DTM. This output pin has to be used when the device DTM is used. The following table describes the ETESYST_OUT_NOCETH information available for TeSysTFast on Ethernet networks:	
	Parameter	Type	Description
	Logic_Outputs_Command_Register	WORD	Logic outputs command register
	Control_Register_1	WORD	Control register 1
	Analog_Output_1_Command	WORD	Analog output 1 command
<p>*: Parameter is available only for specific components.</p> <p>1: Parameter is available only for Ethernet normal IO scanning.</p> <p>2: Parameter is available for Ethernet fast IO scanning.</p> <p>3: Parameter is available for Advantys components.</p> <p>4: Parameter is available only for Profibus components.</p>			

TESYST_MEA_DDT Type

TESYST_MEA is a data structure with device information. The following table describes the **TESYST_MEA_DDT**:

Parameter	Type	Description
FLCGroundCurrent	REAL	Ground current ratio (%FLC minimum).
Frequency	REAL	Frequency (Hz).
ThermalCapacity	INT	Thermal capacity level (% trip level).
CurrentPhase	INT	Phase current imbalance.
StartsCount	INT	Number of starts per hour.
Reserved	INT	Reserved.

TESYST_MEAEXT_DDT Type

TESYST_MEAEXT is a data structure with extended information about the device on modbus communications. The following table describes the **TESYST_MEAEXT_DDT**:

Parameter	Type	Description
FLCCLCurrentL1	INT	L1 current (%FLC).
FLCCLCurrentL2	INT	L2 current (%FLC).
FLCCLCurrentL3	INT	L3 current (%FLC).
Temperature	INT	Internal controller temperature (°C).
Current	REAL	Average current (A).
CurrentL1	REAL	L1 current (A).
CurrentL2	REAL	L2 current (A).
CurrentL3	REAL	L3 current (A).
GroundCurrent	REAL	Ground current (A).
MotorTemperature	INT	Motor temperature sensor (%).
TimeTrip	INT	Time to trip (x 1 s).

Parameter	Type	Description
LastStartCurrent	INT	Motor last start current ratio (%FLC).
LastStartDuration	INT	Motor last start duration (s).

TESYST_MEADEV40_DDT Type

TESYST_MEADEV40 is a data structure with information about the device with an EV40 expansion module on modbus communications. The following table describes the **TESYST_MEADEV40_DDT**:

Parameter	Type	Description
PowerFactor	REAL	Power factor.
AverageVoltage	INT	Average voltage (V).
L3L1Voltage	INT	L3-L1 voltage (V).
L1L2Voltage	INT	L1-L2 voltage (V).
L2L3Voltage	INT	L2-L3 voltage (V).
ActivePower	REAL	Active power consumption (kW).
ReactivePower	REAL	Active power consumption (kVAR).
VoltageImbalance	INT	Phase voltage imbalance (%).
Reserved	INT	Reserved.

TESYST_MEAEXT1_DDT Type

TESYST_MEAEXT1 is a data structure with extended information on the device with modbus communications.

Parameter	Type	Description
FltReg1	WORD	Detected fault register 1.
FltReg2	WORD	Detected fault register 2.
FltReg3	WORD	Detected fault register 3.
WarReg1	WORD	Notification register 1.
WarReg2	WORD	Notification register 2.
WarReg3	WORD	Notification register 3.
ActivePwrRecord	REAL	Active power consumption (kW).
ReactivePwrRecord	REAL	Reactive power consumption (kVAR).

STATISTICCONNECTOR

StatisticConnector is information data used with Ethernet communication to obtain statistics on the Ethernet network (requests carried out, time between requests, and so on). This structure has been created to be used with the **StatisticCounter** DFB in General Purpose for communication.

Parameter	Type	Description
Start	BOOL	1= The operation has started.
EndOk	BOOL	1 = The operation has ended correctly.
EndNOk	BOOL	1 = The operation has ended with a detected error.
PartialTime	DINT	1 = Partial time.

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	Ready.
8	Inoperable device.
9	Device notification.

Info

The following table describes the `Info` variable:

Variable value	Description
1	Incorrect configuration of DFB parameter.
2	Waiting Ready.
8	Tesy working OK.
10	Waiting for device information.
11	Missing <code>EnableDFB</code> .
12	Missing <code>Communication OK</code> Communication interruption.
13	Status word value is 0.
14	Local forcing has to be 0.
23	Remove <code>Run</code> has to be 0.
24	Remove <code>ResetFail</code> . Reset again.
25	Tesy T stopped.
81	Missing <code>ResetFail</code> . Inoperable device.
82	A reset is needed.
99	Unknown status.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
<code>TESYST_ST</code>	<code>TESYST_ST_DDT</code>	Refer to <code>TESYST_ST_DDT</code> Type.
<code>TESYST_CFG</code>	<code>TESYST_CFG_DDT</code>	Refer to <code>TESYST_CFG_DDT</code> Type.
<code>WorkMemory</code> *	<code>ANY_ARRAY_INT</code>	Array is used for Ethernet communications. This variable is meant for use with an Ethernet port that serializes Ethernet requests in an optimum manner.
*: Parameter is available only for specific components.		

TESYST_ST_DDT Type

TESYST_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, page 223	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW, page 223	WORD	Device control. Provides the means to control the device from the monitoring subsystem or from the operator screen if <i>Owner</i> (1), or only from the monitoring subsystem if <i>Owner</i> (0). If <i>Owner</i> is 0, it takes the input variables of the DFB as a value for reading from the HMI/SCADA system.
AverageCurrent	REAL	Actual current value in FLC%.

TESYST_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. <i>ResetFail</i> is required.
7	Refer to the <i>ExtControlled</i> output pin, page 216.
8	Refer to the <i>Reseting</i> output pin, page 216.
9	Refer to the <i>EnabledDFB</i> input pin, page 209.

TESYST_ST.CFGW Word Structure

Bit	Description
0	Refer to the <i>ResetFail</i> input pin, page 209.
1	<i>Owner</i> .
3	Refer to the <i>Direction</i> input pin, page 209.
6	Refer to the <i>Run</i> input pin, page 209.
7	Refer to the <i>ControlCommand</i> input pin, page 209.
11	Refer to the <i>LowFastSpeed</i> input pin, page 209.
12	Refer to the <i>ThermalTest</i> input pin, page 209.

NOTE: The *Owner* bit enables to control the block from the *TESYST_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.

TESYST_CFG_DDT Type

TESYST_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, page 224	WORD	Information on the device status.
InputsMap, page 225	WORD	Information on the digital input status.
IOMap, page 225	WORD	Information on the outputs command and status.
Info	INT	TeSys T information. Its value is <i>Info</i> status.
Warning-Code, page 224	WORD	TeSys T alarm code information. Takes the values from the <i>WarningCode</i> output pin.
FailCode0	INT	Code of last level 0 detected error. Indicates which detected error has occurred, <i>FailCode</i> [0].
FailCode1	INT	Code of last level 1 detected error. Indicates which detected error has occurred, <i>FailCode</i> [1].
FailCode2	INT	Code of last level 2 detected error. Indicates which detected error has occurred, <i>FailCode</i> [2].

TESYST_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the <i>Ready</i> status in the <i>Status</i> output pin, page 216.
1	Refer to the <i>Activated</i> status in the <i>Status</i> output pin, page 216.
2	Refer to the <i>Fail</i> status in the <i>Status</i> output pin, page 216.
3	Refer to the <i>Warning</i> status in the <i>Status</i> output pin, page 216.
4	Refer to the <i>Trip</i> status in the <i>Status</i> output pin, page 216.
5	Refer to the <i>ResetAuth</i> in the <i>Status</i> output pin, page 216.
6	Refer to the <i>ControlledPower</i> status in the <i>Status</i> output pin, page 216.
7	Refer to the <i>MotorRunning</i> status in the <i>Status</i> output pin, page 216.
8	Refer to the <i>HMIControlled</i> status in the <i>Status</i> output pin, page 216.
9	Refer to the <i>MotorStarting</i> status in the <i>Status</i> output pin, page 216.
10	Refer to the <i>AutoResetActive</i> status in the <i>StatusExt</i> output pin, page 216.
11	Refer to the <i>FaultRequested</i> status in the <i>StatusExt</i> output pin, page 216.
12	Refer to the <i>RapidCycleLockout</i> in the <i>StatusExt</i> output pin, page 216.
13	Refer to the <i>LoadSheding</i> in the <i>StatusExt</i> output pin, page 216.
14	Refer to the <i>HMILostComms</i> in the <i>StatusExt</i> output pin, page 216.
15	Refer to the <i>MotorTransitionLockout</i> in the <i>StatusExt</i> output pin, page 216.

TESYST_CFG.WarningCode Word Structure

Bit	Description
2	Refer to the <i>Ground</i> in the <i>WarningCode</i> output pin, page 216.
3	Refer to the <i>Thermal</i> in the <i>WarningCode</i> output pin, page 216.
5	Refer to the <i>Jam</i> in the <i>WarningCode</i> output pin, page 216.

Bit	Description
6	Refer to the <code>Phase</code> in the <code>WarningCode</code> output pin, page 216.
7	Refer to the <code>UnderCurrent</code> in the <code>WarningCode</code> output pin, page 216.
8	Refer to the <code>Order</code> in the <code>WarningCode</code> output pin, page 216.
9	Refer to the <code>ForcedLocalMode</code> in the <code>WarningCode</code> output pin, page 216.
10	Refer to the <code>HMIPort</code> in the <code>WarningCode</code> output pin, page 216.
11	Refer to the <code>InternalTmp</code> in the <code>WarningCode</code> output pin, page 216.
12	Refer to the <code>Internal</code> in the <code>WarningCode</code> output pin, page 216.
15	Refer to the <code>Network</code> in the <code>WarningCode</code> output pin, page 216.

TESYST_CFG.InputsMap Word Structure

Bit	Description
0	Status of the digital input <code>I1</code> on a controller base.
1	Status of the digital input <code>I2</code> on a controller base.
2	Status of the digital input <code>I3</code> on a controller base.
3	Status of the digital input <code>I4</code> on a controller base.
4	Status of the digital input <code>I5</code> on a controller base.
5	Status of the digital input <code>I6</code> on a controller base.
6	Status of the digital input <code>I7</code> on a controller base.
7	Status of the digital input <code>I8</code> on a controller base.
8	Status of the digital input <code>I9</code> on a controller base.
9	Status of the digital input <code>I10</code> on a controller base.

TESYST_CFG.IOMap Word Structure

Bit	Description
0	Status and command of the output <code>O1</code> on a controller base.
1	Status and command of the output <code>O2</code> on a controller base.
2	Status and command of the output <code>O3</code> on a controller base.
3	Status and command of the output <code>O4</code> on a controller base.

Diagnostics Information Management

Overview

The diagnostics codes the device can return are read from the `FailCode` output variable.

Parameter Configuration Diagnostic Codes

This diagnostic code indicates that the function block has incorrect configuration.

- `FailCode[0]`: 16#0003
- `FailCode[1]`: 16#0000

- `FailCode[2]: 16#0004`

This diagnostic code can occur for any of the below conditions:

- Wrong array size at `Inputs` or `Outputs` pins of the function block.
- Variables connected to both `DTMInputs` and `Inputs` pins of the function Block.

During the above detected `FailCode` the function block does not process any inputs and the function blocks output displays the last processed state.

This detected `FailCode` can be reset by a rising edge to the `EnableDFB` input pin after correcting the configuration of the function block.

Modbus Communications Diagnostics Codes

For modbus communications, this code is used to indicate that communications have not been established. It can be reset.

- `FailCode[0]: 16#0002`
- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0004`

After modbus communications have been established, check modbus client diagnostic codes for `FailCode [0]` and `FailCode [1]`. Components make a distinction between detected read request problems and write request problems:

- `FailCode[2]: 16#0001` - Read
- `FailCode[2]: 16#0002` - Write

Diagnostics Code Example

For a detected error, the code is:

- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0005`

The `Failcode[0]` variable can have the following codes:

Diagnostics codes	Meaning
0	No detected error.
3	Ground current.
4	Thermal overload.
5	Extended start.
6	Mechanical jam.
7	Phase current imbalance.
8	Undercurrent.
10	Test.
11	HMI port detected error.
12	Interruption of HMI port communications.
13	Internal network port detected error
16	External detected error assigned by PCODE.
18	Diagnosis.
19	Wiring.
20	Overcurrent.
21	Phase current dropout.
22	Phase currents inverted.
23	Motor temperature sensor.

Diagnostics codes	Meaning
24	Phase voltage imbalance.
25	Phase voltage dropout.
26	Control over voltage.
26	Phase voltages inverted.
27	Undervoltage.
28	Overvoltage.
29	Insufficient power.
30	Excessive power.
31	Insufficient power factor.
32	Excessive power factor.
33	Load shedding.
34	Incorrect temperature reading.
35	Open circuit in temperature sensor.
36	Inverted TC.
46	Startup test.
47	Run repeat test.
48	Stop test.
49	Stop repeat test.
51	Internal controller temperature detected error.
55	Internal controller detected error (stack overflow).
56	Internal controller detected error (RAM).
57	Internal controller detected error (RAM checksum).
58	Internal controller detected error (hardware monitoring problem).
60	L2 current detected in single-phase mode.
64	Inoperable non-volatile memory.
65	Communication interruption in expansion module.
66	Reset button jammed.
67	Logical function detected error.
100–104	Internal network port detected error.
109	Communication interruption in network port.
555	Incorrect network port configuration.

The inoperable device reset is sent to the device.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the `TesysT`.

Genies

Genie Properties



Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	<code>Tesyst</code>	Device controllers TesysT.
	<code>Tesyst_Current</code>	Current display of device controllers TesysT.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a [general description](#), page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking an `TesysT` genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 201
Equipment Status	Closed	Equipment status of <i>TesyS</i> T.	–
Failure	LastFailure, DeviceFailActive	Current detected error status of <i>TesyS</i> T.	
Warning	AlarmActive, CurrentWarning	Current alert status of <i>TesyS</i> T.	
Owner	OwnerSelect	Owner of <i>TesyS</i> T.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Average Current	AverageCurrent	Actual current value in %.	–

Measures Tab

The table lists the items of each groups from group number 1 to 4 of measures tab:

Group Order Number	1	2	3	4
Group name	Current	Voltage and Frequency	Device Status	Device Information
Items	AverageCurrent	Line3Line1Voltage	Running	InformationCode

Group Order Number	1	2	3	4
Group name	Current	Voltage and Frequency	Device Status	Device Information
	GroundCurrent	Line1Line2Voltage	AlarmActive	ThermalCapacity
	Current	Line2Line3Voltage	Ready	StartsCount
	CurrentLine1	Frequency	Activated	Temperature
	CurrentLine2	AverageVoltage	Fail	TimeTrip
	CurrentLine3	VoltageImbalance	Trip	LastStartDuration
	LastStartCurrent		ResetAuthorizedError	MotorTemperature
	CurrentPhase		HMIControlled	
	FLCCurrentLine1		MotorStarting	
	FLCCurrentLine2		AutoResetActive	
	FLCCurrentLine3		FaultRequested	
			RapidCycleLockOut	
			LoadShedding	
			LostCommunication	
			MotorTransitionLockOut	

The table lists the items of each groups from group number 5 to 8 of measures tab:

Group Order Number	5	6	7	8
Group name	Diagnostics	Inputs	Outputs	Power Data
Items	WarningCode	DigitalInput1	DigitalOutput1	ActivePower
	FailCode1	DigitalInput2	DigitalOutput2	ReactivePower
	FailCode2	DigitalInput3	DigitalOutput3	PowerFactor
	FailCode0	DigitalInput4	DigitalOutput4	
		DigitalInput5		
		DigitalInput6		
		DigitalInput7		
		DigitalInput8		
		DigitalInput9		
		DigitalInput10		

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of TesysT.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumera- tion	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/ Inactive	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Fail resetting required	Required/ Not Required	Bit6
EnableFunctional-Block	Normal execution of control block	–	Bit9
Bit items derived from ConfigurationWord.			
Rearm	Resets the fail	Active/ Inactive	Bit0
OwnerSelect	Owner of control module	Operator/ Program	Bit1
Direction	Decides direction of activation	–	Bit3
Run	Start the device in direction selected	–	Bit6
ControlCommand	Indicates mode of control	–	Bit7
LowPasses	Slow/Fast speed of rotation	–	Bit11
ThermalTest	Checks the thermal detected error	–	Bit12
IO Items			
StatusWord	Status word	–	TESYST_ST.STW
ConfigurationWord	Configuration word		TESYST_ST.CFGW
DataStatusWord	Data Status word		TESYST_CFG. DataStatus
Calculated Items			
CurrentWarning	Current alert	–	GPL_TesySTCurrentWarning
LastFailure	Last detected error		GPL_TesySTLastFailure
Owner	Current owner of the PM53XX/PM82XX and PM5350 Refer to Calculated Variable, page 39.		GPL_OwnerBasic
Abnormal	Shows abnormal condition of the PM53XX/PM82XX and PM5350 Refer to Abnormal Conditions, page 232.		GPL_DeviceAbnormal
ActionRequired	Shows action required condition of the PM53XX/PM82XX and PM5350 Refer to Action Required Conditions, page 232.		GPL_DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of `TesyST`:

Item name	Description	Address
<code>AbnormalOwner</code>	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	<i>Bit0</i>
<code>AbnormalOperatorTab</code>	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	<i>Bit8</i>

Action Required Conditions

The table describes the abnormal conditions of `TesyST`:

Item name	Description	Address
<code>ActionOperatorTab</code>	Action required status of operator tab.	<i>Bit8</i>

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
<code>AlarmFailure</code>	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
<code>CommunicationFailure</code>	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
<code>DeviceFailure</code>	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
<code>StateAlarm</code>	All changes in the device state and output.
<code>ModeAlarm</code>	All changes in the mode and owner.
<code>ActionAlarm</code>	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
<code>AverageCurrent</code>	Average current consumption in %FLA	<i>TesyST_AverageCurrent</i>

Motor Controllers and Starters (TesyS U)

What's in This Chapter

Template	233
Control	237
Supervision.....	253

Overview

This chapter describes the functionality of template, control services and Supervision functions of the `TESYSU`.

Template

Overview

This section describes functionality of the following templates:

- `$TesySUAAdvCtlASGP`
- `$TesySUAAdvCtlMBGP`
- `$TesySUAAdvStASGP`
- `$TesySUAAdvStMBGP`
- `$TesySUMfCtlASGP`
- `$TesySUMfCtlMBGP`
- `$TesySUMfStASGP`
- `$TesySUMfStMBGP`
- `$TesySUStdStASGP`
- `$TesySUStdStMBGP`

Description

General Description

The control module templates allows you to manage a Tesys U motor management system on an Ethernet network using fast I/O scanning/Ethernet TCP/IP-based network using modbus explicit messaging/modbus network/profibus network.

Function Description

The main functions of the template are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Device status indication	Displays the status of the device.
Remote resetting	Allows resetting of the device.
Control or Monitoring	Enables you to control and monitor the device.
Owner	Manages the control system which is the owner (Operator or Program). Therefore, it is responsible for setting the control.

NOTE:

- DTM Inputs and DTM Outputs pins are not supported in EcoStruxure Hybrid DCS.
- For establishing the communication with TesysU devices through IOScanning or by using DTM, the device `Unit ID` for TesysU varies for different firmware versions. Hence default value is set to 1, as it supports most of the firmware versions. In case of unsuccessful communication, you may need to configure the correct device `Unit ID` in the configuration parameter.

Parameters

Parameters

These templates defines the operation and enables the modification of alternative facets.

- `$TesySUAAdvCtlASGP`
- `$TesySUAAdvCtlMBGP`
- `$TesySUAAdvStASGP`
- `$TesySUAAdvStMBGP`
- `$TesySUMfCtlASGP`
- `$TesySUMfCtlMBGP`
- `$TesySUMfStASGP`
- `$TesySUMfStMBGP`
- `$TesySUSTdStASGP`
- `$TesySUSTdStMBGP`

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Auto Reset	Boolean	<i>FALSE</i>	It allows you to reset detected error in auto and manual mode. By default mode: Manual mode
	Device Modbus Address NOTE: This parameter is additional for <code>\$TesySUAAdvStMBGP</code> , <code>\$TesySUAAdvCtlMBGP</code> , <code>\$TesySUMfCtlMBGP</code> , <code>\$TesySUMfStMBGP</code> and <code>\$TesySUSTdStMBGP</code> only.	Short	0	A specific unit address from 1...247 is allocated to every slave in the network. The first byte it sends when the master requests data is the Slave address.
Time	Command Timeout	Duration	00:00:05	Time the device takes to execute commands.
	Maintain Alert Signal		00:00:03	The time duration for which the alert pin signal remains 1.
	Time between Two Consecutive Reset		00:01:00	The maximum time between two automatic resets of the template.

Section	Parameter description	Data type	Default value	Additional remarks
	Refresh Cyclic Data NOTE: This parameter is additional for \$TesySUAAdvStMBGP, \$TesySUAAdvCtiMBGP, \$TesySUMfCtiMBGP, \$TesySUMfStMBGP and \$TesySUStdStMBGP only.		00:00:00.5	Time the device takes to refresh the cyclic data.

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal Owner	Enum	Operator & Program (2)	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics. Select one of the owner below: <ul style="list-style-type: none">• Operator (0)• Program (1)• Operator & Program (2)
Security	Set Owner	Enum	Operator (1)	Privilege to change override mode. This parameter is used in operator tab, page 229.
	Set Rearm		Operator (Confirmed) (10)	Privilege to change reset. This parameter is used in operator tab, page 229.
	Set Acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Trend	For more details, refer to the topic describing the parameters of trend, page 29.			

Asset and Display Parameters

For more details, refer to the topic describing the parameters of asset and display, page 28.

Data

The table describes the data parameters:

Section	Parameter description	Data type	Default	Additional remarks
Configuration	Average Current Engineering Zero	Integer	0	–
	Average Current Engineering Full		200	–
	Item Name	String	Average-Current (case sensitive)	–
Alarm	For more details, refer to the topic describing the common parameters of Alarm, page 29.			
Trend	Disable Average Current	Boolean	FALSE	–
Historize	Average Current			–

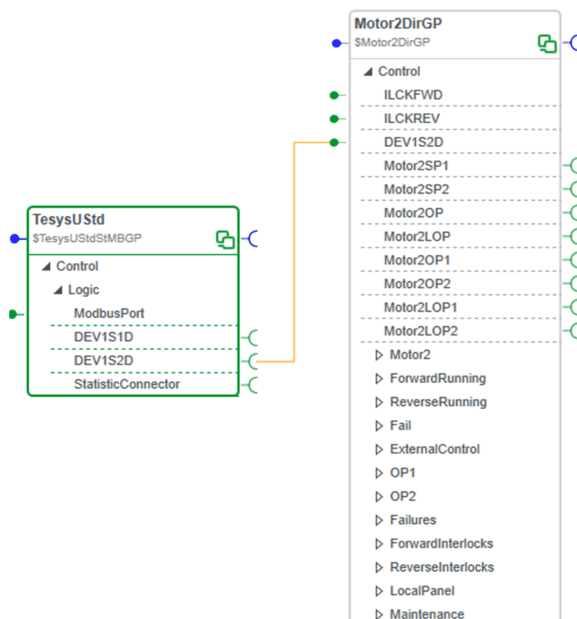
Section	Parameter description	Data type	Default	Additional remarks
	Information Word			—
	Detected Fail Code			—
	Mechanical Status NOTE: These parameters are applicable only for \$TesySUAAdvStMBGP , \$TesySUMfStASGP and \$TesySUMfStMBGP			—
	IOMap NOTE: These parameters are applicable only for TesySUAAdvCtIASGP , TesySUMfCtIASGP , TesySUMfCtIMBGP and \$TesySUAAdvCtIMBGP			—

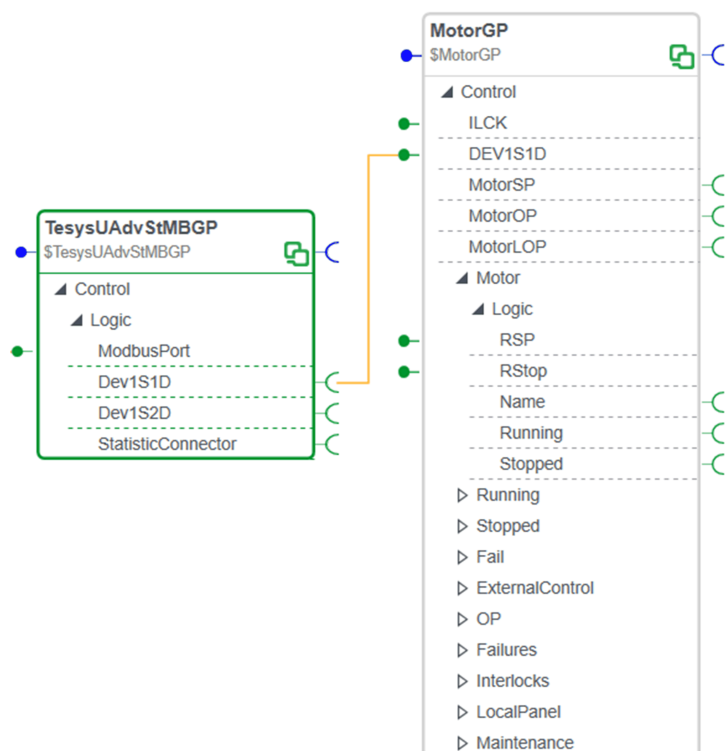
Hyperlink

For more details, refer to the topic describing the parameters of `hyperlink`, page 30.

Interfaces

These figures shows the `$TesySUStdStMBGP` (also applicable for `$TesySUStdStMBCE`) template as it appears in `Links Editor` with example of other templates connected to it:





The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
ModbusPort	<i>\$Int/Ref</i>	–	–
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	–
Dev1S2D	<i>\$DEV1S2D/DO</i>	An output interface to other template	–
StatisticConnector	<i>\$Int/Ref</i>	An output interface to other template provides the Information used with modbus communication to obtain statistics on the modbus network.	–

Control

Overview

This chapter describes the TESYSU DFB.

Description

General

The Tesys U profile is used to manage the TesysU family of devices on different communications networks (Modbus network or Advantys STB I/O island).

Function Description

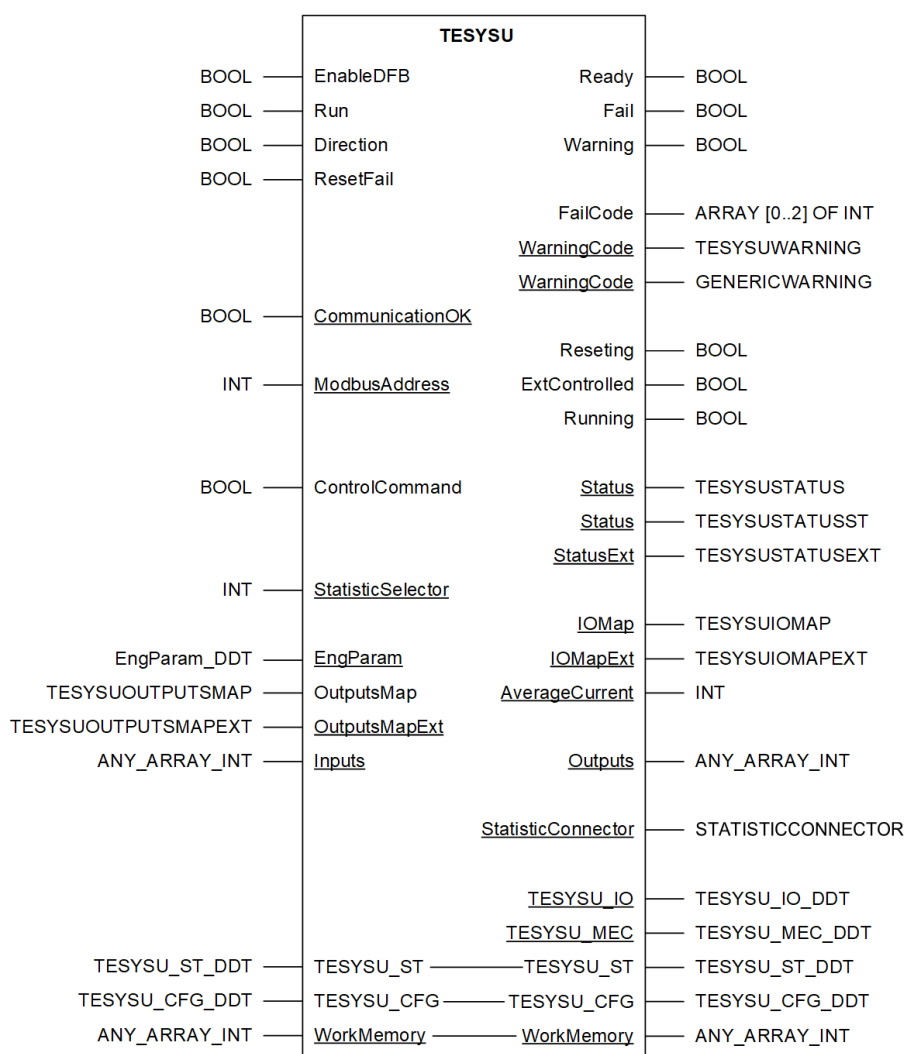
The main functions of the template are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Device status indication	Displays the status of the device.
Remote resetting	Allows resetting of the device.
Control or Monitoring	Enables you to control and monitor the device.
Owner	Manages the control system which is the owner (Operator or Program). Therefore, it is responsible for setting the control.

DFB Representation

Representation

The following figure represents the functional module of TESSYS U profile:



NOTE: The underlined parameters are specific for some components.

The table shows the parameters available for specific components:

Parameters		Starter components				
		Modbus		Advantys		
		Standard (MBTESYSUSCST)	Advanced and multifunction (MBTESYSUSC)	Standard (TESYSUSCST)	Advanced (TESYSUCTL)	Multifunction (TESYSUSC)
Inputs	<i>ModbusAddress</i>	X	X	–	–	–
	<i>CommunicationOK</i>	–	–	X	X	X
	<i>StatisticSelector</i>	X	X	–	–	–
	<i>EngParam</i>	X	X	–	–	–
	<i>Inputs</i>	–	–	X	X	X
Outputs	<i>WarningCode (GENERICWARNING)</i>	X	–	X	–	–
	<i>WarningCode (TESYSUWARNING)</i>	–	X	–	X	X
	<i>Status (TESYSUSTATUSST)</i>	X	–	X	–	–
	<i>Status (TESYSUSTATUS)</i>	–	X	–	X	X
	<i>StatusExt (TESYSUSTATUSEXT)</i>	–	X	–	–	X
	<i>AverageCurrent</i>	–	X	–	X	X
	<i>StatisticConnector</i>	X	X	–	–	–
	<i>Outputs</i>	–	–	X	X	X
	<i>TESYSU_MEC</i>	–	X	–	–	X
Input/Output	<i>WorkMemory</i>	X	X	–	–	–
X: Parameter is available. –: Parameter is not available.						

The table shows the parameters available for specific components:

Parameters		Controller components	
		Modbus	Advantys
		Advanced and multifunction (MBTESYSUC)	Advanced and multifunction (TESYSUC)
Inputs	<i>ModbusAddress</i>	X	–
	<i>CommunicationOK</i>	–	X
	<i>OutputsMapExt</i>	X	X
	<i>StatisticSelector</i>	X	–
	<i>EngParam</i>	X	–
	<i>Inputs</i>	–	X
Outputs	<i>WarningCode (GENERICWARNING)</i>	–	–
	<i>WarningCode (TESYSUWARNING)</i>	X	X
	<i>Status (TESYSUSTATUSST)</i>	–	–
	<i>Status (TESYSUSTATUS)</i>	X	X
	<i>StatusExt (TESYSUSTATUSEXT)</i>	X	–
	<i>AverageCurrent</i>	X	X

Parameters		Controller components	
		Modbus	Advantys
		Advanced and multifunction (MBTESYSUC)	Advanced and multifunction (TESYSUC)
	<i>IOMapExt</i>	X	X
	<i>StatisticConnector</i>	X	–
	<i>Outputs</i>	–	X
	<i>TESYSU_IO</i>	X	X
Input/ Output	<i>WorkMemory</i>	X	–
X: Parameter is available.			
–: Parameter is not available.			

Inputs

Input Parameter Description

Name	Type	Description
EnabledDFB	BOOL	<p>This input enables the normal execution of the control block.</p> <ul style="list-style-type: none"> 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. <p>Public variable values are loaded during the first enabling cycle.</p>

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.

Name	Type	Description
Run	BOOL	<p>1 = Starts the starter run in the direction selected with the <i>Direction</i> input variable.</p> <p>If the device is being enabled or reset, reset the inputs so that unexpected start does not occur. In these cases, first reset the input to resume the operation.</p>
Direction	BOOL	<p>Direction of rotation of the starter.</p> <ul style="list-style-type: none"> 0 = Activates the forward direction drive. 1 = Activates the reverse direction drive.
ResetFail	BOOL	<p>1 = Resets the <i>Fail</i> output parameter to 0 or in case of inoperable device, sends a reset command to the device if <i>ControlCommand</i> is 1.</p>
CommunicationOk*	BOOL	<p>1 = The node is present on the bus.</p> <p>You can find this variable in Ethernet communications.</p>
ModbusAddress*	INT	<p>Device address within the Modbus network.</p> <p>You can find this variable in Modbus communications.</p>
OutputsMapExt*	TESYSUOUTPUTS- MAPEXT	<p>Standard outputs of the controller.</p> <p>The following table describes <i>TESYSUOUTPUTSMAPEXT</i>:</p>
	Name	Type Description

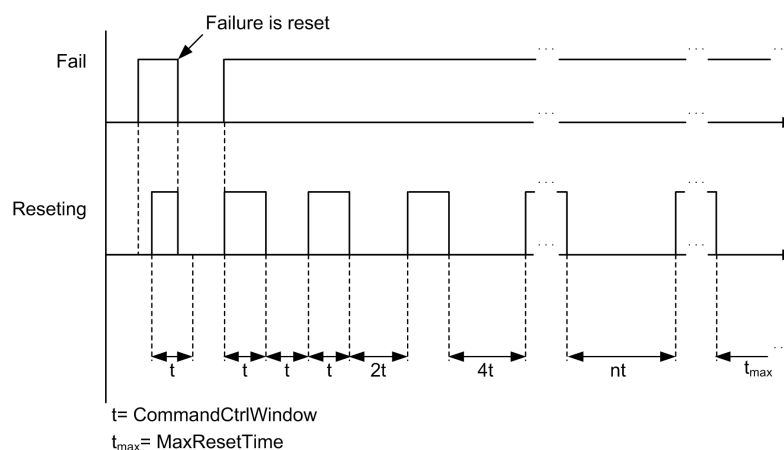
Name	Type	Description	
	O13	BOOL	1 = Enables O13 digital output (if 687 LSB = 2).
	O23	BOOL	1 = Enables O13 digital output (if 687 LSB = 2).
ControlCommand	BOOL	<p>Indicates to the DFB whether the motor is being controlled locally or from a source external to the DFB.</p> <ul style="list-style-type: none"> 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. <p>NOTE: This input does not configure the starter.</p>	
StatisticSelector*	INT	<p>Variable obtains statistics for the Modbus network (requests carried out, time between requests, so on). This data provides information for using <code>StatisticConnector</code> pin within the <code>StatisticCounter</code> DFB in General Purpose library for communication.</p> <p>The following table displays the <code>StatisticSelector</code> value:</p>	
	Variable value	Description	
	1	Read statistics, client.	
	2	Write statistics, client.	
EngParam*	EngParam_DDT, page 242 EngParamMBTESYSUC/ EngParamMBTESYSUSC/ EngParamMBSTESYSUSCST		Engineering parameters.
OutputsMap	TESYSUOUTPUTS-MAP	<p>Holds a structure used to control the Tesys outputs.</p> <p>If one of the variables is unavailable, a comment stating that the information cannot be accessed appears.</p>	
	Name	Type	Description
	OA1	BOOL	1 = Controls the state of the OA1 digital output.
	OA3	BOOL	1 = Controls the state of the OA3 digital output.
	LO1	BOOL	1 = Controls the state of the LO1 digital output.
Inputs ¹	ANY_ARRAY_INT	<p>Holds an array structure with data obtained from the device. You can control the starter/controller with this input variable. This variable is reserved for the DFB, and you cannot use this variable directly. For the control block to work properly, allocate the structure (%MWx). Refer to the Communications Technologies (see EcoStruxure™ Process Expert, Device Control Services User Guide).</p> <p>Based on the device and the relevant communications, one of the structures is used.</p> <p>The information available for starters with a standard control unit on an Advantys STB is shown in the following table:</p>	
	Parameter	Type	Description
	Inputs [0]	INT	Status register.
	Inputs [1]	INT	I/O module status register.

Name	Type	Description	
Inputs ²	ANY_ARRAY_INT	<p>Holds an array structure with data obtained from the device. You can control the starter/controller with this input variable. This input is reserved for the DFB, and you cannot use this input directly. For the control block to work properly, allocate the structure (%MWx). Refer to the Communications Technologies (see EcoStruxure™ Process Expert, Device Control Services User Guide).</p> <p>Based on the device and the relevant communications, the following structure is used.</p> <p>The information available for starters with an advanced control unit on an Advantys STB is shown in the following table:</p>	
	Parameter	Type	Description
	Inputs [0]	INT	Status register.
	Inputs [1]	INT	I/O module status register.
	Inputs [2]	INT	Notification register.
	Inputs [3]	INT	I/O status.
<p>*: Parameter is available for specific components.</p> <p>¹: Parameter is available only for <i>TESYSUSCST</i>.</p> <p>²: Parameter is available only for <i>TESYSUCTL</i> and <i>TESYSUSC</i>.</p>			

EngParam_DDT

Name	Type	Description
CommandCtrlWindow	TIME	<p>Control time for operations. This is the time that the block waits for the operations to be carried out by the device.</p> <p>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.</p> <p>The command that is controlled is <code>Run</code>. In case of <code>ResetFail</code>, this is not interpreted as an alarm. Instead, the detected failure continues, and you have to reset the <code>Resetting</code> output.</p>
Refresh	TIME	<p>Refresh time for device data on serial Modbus communications.</p> <p>NOTE: This refresh operation is carried out on read variables. Write requests are carried out when needed and have maximum priority.</p>
ScanTime	TIME	<p>Allows the time that the alarm signals are kept active to be configured.</p> <p>Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset.</p>
ResetMode	BOOL	<p>Enables to configure the type of reset. This type of reset is used for communication interruption and inoperable device.</p> <p>The time defined in <code>CommandCtrlWindow</code> is used to define the interval after which a reset needs to be carried out. The first reset is carried out after the time defined in <code>CommandCtrlWindow</code> elapses. The second reset is carried out after <code>CommandCtrlWindow * 2</code> elapses, so on. If the value of <code>CommandCtrlWindow</code> is 0 s, its value is not used and is instead replaced with a value of 1 s.</p> <p>The following table describes the type of the reset:</p>
		Value
		FALSE
		TRUE
MaxResetTime	TIME	<p>When in automatic <code>ResetMode</code>, this variable is used to define the maximum time that can elapse between 2 consecutive resets.</p>
		Refer to the Timing diagram below.

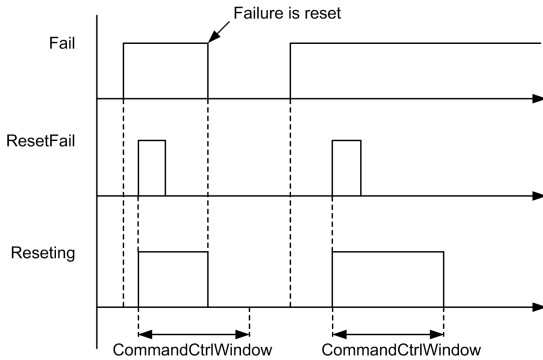
Timing diagram:



Outputs

Output Parameter Description

Output	Type	Description
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command.
Fail	BOOL	<p>1 = A detected error in the control block or in the device or communication interruption. To reset the Fail output pin, the ResetFail input has to be activated. The last diagnostic code is shown on FailCode.</p> <p>NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables retain their last value.</p>
Warning	BOOL	<p>1 = An alarm has been activated for the device. It does not affect the blocks operation and does not need to be reset.</p> <p>The signal remains active until the cause for the alarm disappears.</p>
FailCode	ARRAY [0..2] OF INT	<p>When Fail output is 1, it holds the code for the detected error.</p> <p>If Fail output is 0, it indicates the last detected error that occurred.</p> <p>The detected error source is specified by a 3-level structure. Refer to the Diagnostics Information Management (see EcoStruxure™ Process Expert, Device Control Services User Guide) for more details.</p>
WarningCode*	GENERICWARNING	
	Name	Description
	Order	1 = A follow-up alarm. The device is not responding to the control command (Run , so on) within the time specified in CommandCtrlWindow .
	Device	1 = An alarm on the device.
WarningCode*	TESYSUWARNING	
	Name	Description
	Ground	1 = A ground alarm.
	Thermal	1 = A thermal alarm on the device.
	LongStart	1 = The start has been delayed.
	Jam	1 = A mechanical jam alarm.
	Phase	1 = A phase alarm.

Output	Type	Description	
	UnderCurrent	BOOL	1 = An undercurrent alarm.
	Communication	BOOL	1 = Communication interruption alarm.
	InternalTmp	BOOL	1 = An internal temperature alarm.
	Internal	BOOL	1 = An alarm for internal detected error.
	Module	BOOL	1 = An alarm is present on device.
	Order	BOOL	1 = A follow-up alarm. The device is not responding to the control command within the time specified in <code>CommandCtrlWindow</code> .
	ForcedLocalMode	BOOL	1 = The device is forced locally; indicated by the device having the <code>ForcedLocalMode</code> status. Is controlled through the screw terminal.
Running	BOOL	1 = The Tesys is running. The current is higher than 10% of FLA for advanced and multifunction starters and controllers.	
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 <code>ControlCommand</code> signal, the <code>Owner</code> variable, and the <code>ForcedLocalMode</code> status are used to activate this signal. You cannot use this signal as a <code>ControlCommand</code> input.	
Reseting	BOOL	<p>1 = A reset is being carried out.</p> <p>The <code>CommandCtrlWindow</code> variable indicates the maximum time for resetting the detected error.</p> <p>When a device or communication reset is carried out with <code>ResetFail</code>, the DFB tries to reset the detected error within the time period defined in <code>CommandCtrlWindow</code>.</p> <p>If the detected error is reset, the <code>Fail</code> and <code>Reseting</code> output variables are reset (when set to FALSE). If the detected error is not reset, the <code>Reseting</code> variable is FALSE and the <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based.</p> <p>Timing diagram:</p> 	
Status*	TESYSSTATUSST	Holds data containing the information that the module extracts from the status variable of starters or controllers with advanced or multifunction control blocks. The following table describes the status information:	
	Parameter	Type	Description
	Ready	BOOL	1 = Switch in ON position. Device is operational.
	PoleClosed	BOOL	1 = Contacts are closed on power base.
	Fault	BOOL	1 = An inoperable device.
	Warning	BOOL	1 = An alarm is present on device.
	Trip	BOOL	1 = The Tesys protection has tripped.

Output	Type	Description	
	State	INT	Numerical code corresponding to the state of the starter.
	Info	INT	Numerical code with the information on statuses and required actions.
Status*	TESYSSTATUS	Holds data structure containing the information that the module extracts from the status variable of controllers with advanced and multifunction control modules. The following table describes the status information:	
	Parameter	Type	Description
	Ready	BOOL	1 = Switch in ON position. Device is operational.
	PoleClosed	BOOL	1 = The contacts are closed on power base.
	Fault	BOOL	1 = An inoperable device.
	Warning	BOOL	1 = An alarm is present on device.
	Trip	BOOL	1 = The Tesys protection has tripped.
	ResetAuth	BOOL	1 = Reset authorized detected error.
	PoweredUp	BOOL	1 = The A1/A2 contacts are powered with power base or powered L1 or L2 inputs.
	Running	BOOL	1 = The device is active with a current higher than 10% of full-load amperage or pole closed.
	ForcedLocalMode	BOOL	1 = Forced local mode on control unit.
	Start	BOOL	<ul style="list-style-type: none"> 1 = Rising current is higher than 10% of FLA. 0 = Falling current is lower than 10% of FLA.
	State (see EcoStruxure™ Process Expert, Device Control Services User Guide)	INT	Numerical code corresponding to the device status.
	Info (see EcoStruxure™ Process Expert, Device Control Services User Guide)	INT	Numerical code with the information on statuses and required actions.
StatusExt*	TESYSSTATUSSEXT	Holds a data structure with information on the mechanical status of advanced or multifunction starters on a Modbus network. The following table describes the StatusExt:	
	Parameter	Type	Description
	ButtonOn	BOOL	Indicates the button position: <ul style="list-style-type: none"> 0 = Off 1 = On
	ButtonTrip	BOOL	Indicates the button position: <ul style="list-style-type: none"> 0 = Not tripped 1 = Tripped
	VoltagePresent	BOOL	1 = 24 V dc power supply voltage is present on the outputs.
IOMap	TESYSUIOMAP	Holds a data structure that contains information on the state of the starter inputs and outputs. The following table describes the IOMap:	
	Parameter	Type	Description
	OA1	BOOL	1 = The state of the digital output OA1.
	OA3	BOOL	1 = The state of the digital output OA3.
	LO1	BOOL	1 = The state of the digital output LO1.
	LI1	BOOL	1 = The state of the digital input LI1.
	LI2	BOOL	1 = The state of the digital input LI2.

Output	Type	Description	
IOMapExt*	TESYSUIOMAPEXT	Standard inputs/outputs information of the controllers. The following table describes the IOMapExt:	
	Parameter	Type	Description
	I1	BOOL	1 = Output 13 locally controlled.
	I2	BOOL	1 = Output 23 locally controlled.
	I3	BOOL	1 = Contactor status healthy for output 13.
	I4	BOOL	1 = Contactor status healthy for output 23.
	I5	BOOL	1 = Input status (reset).
	I6	BOOL	1 = Input status (external detected fault)..
	I7	BOOL	1 = Input status (system ready).
	I8	BOOL	1 = Input status (free).
	I9	BOOL	1 = Input status (free).
	I10	BOOL	1 = Device is in local/remote mixed mode if 683=2.
	O13	BOOL	1 = Output 13 is closed.
	O23	BOOL	1 = Output 23 is closed.
	O95	BOOL	1 = Output 95, output 96 is closed and output 97 and output 98 is opened.
	O5	BOOL	1 = Output 5 and output 6 is closed.
AverageCurrent*	INT	Average value of device current in FLA%.	
StatisticConnector*	STATISTICCONNECTOR	Information data is used with Modbus communications to obtain statistics on the Modbus network. This data provides information for using the StatisticConnector pin within the StatisticCounter DFB in the General Purpose library for communication.	
	Parameter	Type	Description
	Start	BOOL	1 = The operation has started.
	EndOk	BOOL	1 = The operation has ended correctly.
	EndNok	BOOL	1 = The operation has ended with a detected error.
	PartialTime	DINT	Partial time.
Outputs*	ANY_ARRAY_INT	Holds an array structure with data sent to the device. You can control the starter/controller with this output variable. This variable is reserved for the DFB, and you cannot use this variable directly. For the control block to work properly, allocate the structure (%MWx). Refer to the Communications Technologies (see EcoStruxure™ Process Expert, Device Control Services User Guide). Based on the device and the relevant communications, the following structure is used. The information available for starters with a standard control unit on Advantys STB is shown in the following table:	
	Parameter	Type	Description
	Outputs [0]	INT	System control.
	Outputs [1]	INT	Module control.
	Outputs [2]	INT	Output control.
TESYSU_MEC*	TESYSU_MEC_DDT	Information on the mechanical status of advanced or multifunction starters. Information for SCADA/HMI system.	
	Parameter	Type	Description
	MecStatus	WORD	Provides information on the mechanical status of the device. Access to the data held in this bit word is read-only.

Output	Type	Description	
TESYSU_IO			Refer to the TESYSU_MEC table below.
	Reserved	INT	Reserved.
	TESYSU_IO_DDT	Standard inputs/outputs information of the controllers for the controller base (used by HMI/SCADA). The following table describes the TESYSU_IO:	
	Parameter	Type	Description
	IOMap	WORD	Input/output status on the controller base. Refer to the IOMap table below.
	Reserved	INT	Reserved.
*: Parameter is available for specific components.			

State

The following table describes the `State` variable:

Variable value	Description
-2	Device detected error.
-1	Not initialized. Waiting for data.
0	Disabled.
5	Ready.
8	Inoperable device.
9	Device notification.

Info

The following table describes the `Info` variable:

Variable value	Description
1	Incorrect configuration of DFB parameter.
2	Waiting Ready.
8	TesyS working OK.
10	Waiting for device information.
11	Missing <code>EnabledDFB</code> .
12	Missing <code>CommunicationOK</code> . Communication interruption.
13	Device not ready or status word value is 0.
23	Remove <code>Run</code> has to be 0.
24	Remove <code>ResetFail</code> . Reset again.
81	Missing <code>ResetFail</code> . Inoperable device.
82	A reset is required.
99	Unknown status.

TESYSU_MEC_DDT Word

The following table describes the TESYSU_MEC_DDT word structure:

Variable value	Description
0	ButtonOn
1	ButtonTrip
2	ContactorVoltagePresent

MecStatus Word

The following table describes the `MecStatus` word structure:

Variable value	Description
0	Switch: ON.
1	Switch: Trip.
2	Auxiliary voltage on current communicator.

IOMap

The following table describes the `IOMap` variable:

Variable value	Description
0	Status of the input <i>I1</i> on a controller base.
1	Status of the input <i>I2</i> on a controller base.
2	Status of the input <i>I3</i> on a controller base.
3	Status of the input <i>I4</i> on a controller base.
4	Status of the input <i>I5</i> on a controller base.
5	Status of the input <i>I6</i> on a controller base.
6	Status of the input <i>I7</i> on a controller base.
7	Status of the input <i>I8</i> on a controller base.
8	Status of the input <i>I9</i> on a controller base.
9	Status of the input <i>I10</i> on a controller base.
10	Status of the output <i>O13</i> on a controller base.
11	Status of the output <i>O95</i> on a controller base.
12	Status of the output <i>O23</i> on a controller base.
13	Status of the output <i>O5</i> on a controller base.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
TESYSU_ST	TESYSU_ST_DDT (see EcoStruxure™ Process Expert, Device Control Services User Guide)	Device data structure 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.
TESYSU_CFG	TESYSU_CFG_DDT (see EcoStruxure™)	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.

Parameter	Type	Description
	Process Expert, Device Control Services User Guide)	
WorkMemory*	ANY_ARRAY_INT	Array is used for Modbus communications. This variable is used with a Modbus port that serializes Modbus requests in an optimum manner.
*: Parameter is available for specific components.		

TESYSU_ST_DDT Type

Name	Type	Description
STW (see EcoStruxure™ Process Expert, Device Control Services User Guide)	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW (see EcoStruxure™ Process Expert, Device Control Services User Guide)	WORD	Device control. Enables to control the device from the monitoring subsystem or from the operator screen if <code>Owner</code> (1), or only from the monitoring subsystem if <code>Owner</code> (0). If <code>Owner</code> is 0, it takes the input variables of the DFB as a value for reading from the HMI/SCADA system.
AverageCurrent	REAL	Actual current value in FLA%.

TESYSU_CFG_DDT Type

Name	Type	Description
DataStatus (see EcoStruxure™ Process Expert, Device Control Services User Guide)	WORD	Provides the device status. Information on the <code>Status</code> output structure.
Info	INT	TesyS information. Its value is <code>Info</code> status in the <code>Status</code> output pin.
WarningCode (see EcoStruxure™ Process Expert, Device Control Services User Guide)	WORD	TesyS U alarm code information. It takes the value from the <code>WarningCode</code> output pin.
FailCode0	INT	Code of last level 0 detected error. Indicates which detected error has occurred.
FailCode1	INT	Code of last level 1 detected error. Indicates which detected error has occurred.
FailCode2	INT	Code of last level 2 detected error. Indicates which detected error has occurred.

TESYSU_ST.STW Word Structure

Bit	Description
0	Unknown device status or communication interruption. 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. <code>ResetFail</code> is required.
7	Refer to the <code>ExtControlled</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
8	Refer to the <code>Resetting</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
9	Refer to the <code>EnabledDFB</code> input pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).

TESYSU_ST.CFGW Word Structure

Bit	Description
0	Refer to the <code>ResetFail</code> input pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
1	<code>Owner</code> .
3	Refer to the <code>Direction</code> input pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
6	Refer to the <code>Run</code> input pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
7	Refer to the <code>ControlCommand</code> input pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).

NOTE: The `Owner` bit enables to control the block from the `TESYSU_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.

TESYSU_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the <code>Ready</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
1	Refer to the <code>PoleClosed</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
2	Refer to the <code>Fault</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
3	Refer to the <code>Warning</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
4	Refer to the <code>Tripped</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
5	Refer to the <code>ResetAuth</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
6	Refer to the <code>PoweredUp</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).

Bit	Description
7	Refer to the <code>Running</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
8	Refer to the <code>ForcedLocalMode</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
9	Refer to the <code>Start</code> status in the <code>Status</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
10	Refer to the <code>OA1</code> in the <code>IOMap</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
11	Refer to the <code>OA3</code> in the <code>IOMap</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
12	Refer to the <code>LO1</code> in the <code>IOMap</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
13	Refer to the <code>LI1</code> in the <code>IOMap</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
14	Refer to the <code>LI2</code> in the <code>IOMap</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).

TESYSU_CFG.WarningCode Word Structure

Bit	Description
2	Refer to the <code>Ground</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
3	Refer to the <code>Thermal</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
4	Refer to the <code>LongStart</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
5	Refer to the <code>Jam</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
6	Refer to the <code>Phase</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
7	Refer to the <code>UnderCurrent</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
8	Refer to the <code>Order</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
9	Refer to the <code>ForcedLocalMode</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
10	Refer to the <code>Communication</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
11	Refer to the <code>InternalTmp</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
12	Refer to the <code>Internal</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).
15	Refer to the <code>Module</code> in the <code>WarningCode</code> output pin (see EcoStruxure™ Process Expert, Device Control Services User Guide).

NOTE: All control blocks cannot show alarm codes. Check the device manual and the `WarningCode` output variable.

Diagnostics Information Management

Overview

The detected error codes the device can return are read from the `FailCode` output variable.

Parameter Configuration Diagnostics Codes

This detected error indicates that a public variable parameter contains a value that is not allowed.

To reload new values, a rising edge is required on the `EnableDFB` input:

- `FailCode[0]: 16#0003`
- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0004`

This diagnostic code can occur for any of the below conditions:

- Wrong array size at `Inputs` or `Outputs` pins of the function block.
- Variables connected to both `DTMInputs` and `Inputs` pins of the function Block.

During the above detected `FailCode` the function block does not process any inputs and the function blocks output displays the last processed state.

This detected `FailCode` can be reset by a rising edge to the `EnableDFB` input pin after correcting the configuration of the function block.

Modbus Communications Diagnostics Codes

For Modbus communications, this code is used to indicate that communications have not been established. It can be reset.

- `FailCode[0]: 16#0002`
- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0004`

After Modbus communications have been established, check Modbus client diagnostic codes for `FailCode [0]` and `FailCode [1]`. Components make a distinction between detected read and write request problem:

- `FailCode[2]: 16#0001 Read`
- `FailCode[2]: 16#0002 Write`

Diagnostics Code Example

For a detected error, the code is:

- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0005`

The `Failcode[0]` variable can have the following codes:

Diagnostic code	Meaning
0	No detected error.
1	Trip due to short-circuit (Trip).
2	Magnetic trip (Trip)
3	Ground detected error trip (Trip).
4	Thermal overload.

Diagnostic code	Meaning
5	Starting time too long.
6	Mechanical jam.
7	Phase imbalance.
8	Detected error due to load condition.
9	Detected error due to switching operation (Shunt trip).
10	Test trip (TRIP. Overheating simulation).
11	Interruption of communications on LUCM. Detected error in Modbus port (dropped out).
12	Interruption of communications on LUCM. Detected error in Modbus port (tripped).
13	Reserved.
14	Module identification detected error.
15	Module not installed or missing 24 V supply.
51	Internal detected error in LUCM; temperature or broken sensor.
52 - 58	Internal detected error.
59	Current flow with unpowered winding.
60	L2 current detected in single-phase mode.
61	Trip base not detected.
62	Control cabling.
63	Control over voltage.
100	Detected internal problem in communications module.
101	Communication interruption with LUCM multifunction control unit.
102	Detected internal problem in communications module.
104	Detected internal problem in communications module.
105	Communication interruption with LUCM control base.
300	Communication interruption.

The inoperable device can be reset as long as `ControlCommand` is `TRUE`. Otherwise, it can be reset only on the controllers through the screw terminal with the appropriate parameter configuration.

NOTE: The diagnostics codes of device are available for Tesys, except for those that communicate through the Advantys STB.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the `TesysU`.

Genies

Genie Properties


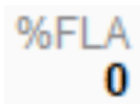
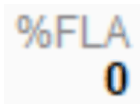
Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
TesysU 	TesysU	Device controllers TesysU.
	TesysU_Current	—.
	TesysU_Itemvalue	—.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a [general description](#), page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking an `TesysU` genie opens a faceplate with the following tabs:

- Operation, page 255
- Trend, page 45
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an **Operator** tab:

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 235
Equipment Status	Closed	Equipment status of <i>TesyS U</i> .	–
Command	Stop	Command status of <i>TesyS U</i> .	
Failure	LastFailure, DeviceFailActive	Current detected error status of <i>TesyS U</i> .	
Warning	AlarmActive, CurrentWarning	Current alert status of <i>TesyS U</i> .	
Owner	OwnerSelect	Owner of <i>TesyS U</i> .	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Average Current	AverageCurrent	Actual current value in %.	–

Measures Tab

The table lists the items of **Measures** tab:

Group Order Number	1	2	3	3	4
Group name	Device Status	Mechanical status	Current	Diagnostics	Device Info
Items	Equipment Status	Device ON Button	AverageCurrent	Last Diagnostic Code	Device Information
	Detected Alarm	Device Trip Button	–	Last Diagnostic Code 0	–
	Ready	Contractor Voltage Present	–	Last Diagnostic Code 1	–
	Pole Closed	–	–	Last Diagnostic Code 2	–
	Device In Fault State	–	–	–	–
	Trip	–	–	–	–
	Reset Authorized Detected Error	–	–	–	–
	Controlled by HMI	–	–	–	–
	Motor Starting	–	–	–	–
	Output OA1 Status	–	–	–	–
	Output OA3 Status	–	–	–	–
	Output LO1 Status	–	–	–	–
	Input LI1 Status	–	–	–	–
	Input LI1 Status	–	–	–	–

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of *TesysU*.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2
DeviceFail	Device is inoperable	–	Bit3
Warning	Alarm on the device	Active/ Inactive	Bit4
CommunicationFail	Communication interruption	–	Bit5
Necessary Resetting	Detected fail resetting required	Required/ Not Required	Bit6
Externally controlled	–	–	Bit7
Resetting	–	–	Bit8
EnableDFB	Normal execution of control block	–	Bit9

Item name	Description	Enumeration	Address
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected fail	Active/ Inactive	Bit0
OwnerSelect	Owner of control module	Operator/ Program	Bit1
Direction	Decides direction of activation	–	Bit3
Run	Device command	–	Bit6
ControlCommand	Indicates mode of control	–	Bit7
ConfigurationWord	Configuration word bit array	–	TesysU_CFGW
IO Items			
StatusWord	Status word	–	TESYSU_ST.STW
ConfigurationWord	Configuration word		TESYSU_ST.CFGW
DataStatusWord	Data Status word		TESYSU_CFG. DataStatus
Calculated Items			
CurrentWarning	Current alert	–	GPL_ TesysUCurrentWarn- ing
LastFailure	Last detected error		GPL_ TesysULastFailure
Owner	Current owner of the TesysU Refer to Calculated Variable, page 39.		GPL_OwnerBasic
Abnormal	Current owner of the TesysU Refer to Abnormal Conditions, page 232.		GPL_DeviceAbnormal
ActionRequired	Current owner of the TesysU Refer to Action Required Conditions, page 232.		GPL_ DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of TesysU:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	Bit0
AbnormalOperatorTab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	Bit8

Action Required Conditions

The table describes the abnormal conditions of TesysU:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	Bit8

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
Action	Action alarm	0
DeviceFailure	Device detected error alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>
CommunicationFailure	Communication detected error alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
AlarmFailure	Alarm detected error	<i>GPL_BitValueCheck(StatusWord, 4)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
Average-Current	Average current consumption in %FLA	<i>TesyS_U_AverageCurrent</i>

Power Monitoring Devices

What's in This Part

Power Meter 53xx/82xx Series (Ethernet Messaging) and PM5350 - Power Meter 5350 (Modbus) 260

Overview

This part provides the functionality of the templates, a detailed description of the control (functions,pins, pin layout, and variables of the function blocks), and the supervision functions of power monitoring devices.

These components do not reflect any specific installation.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

Power Meter 53xx/82xx Series (Ethernet Messaging) and PM5350 - Power Meter 5350 (Modbus)

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Overview

This chapter describes the functionality of template, control services and Supervision functions of the PM53xx, PM82xx and PM5350.

Template

Overview

This section describes functionality of the \$PM53xxEMGP, \$PM82xxEMGP and \$PM5350MBGP template.

Description

General Description

The \$PM53xxEMGP, \$PM82xxEMGP and \$PM5350MBGP control module template allows you to manage PM53xx, PM82xx and PM5350 family power meters on an Ethernet TCP/IP-based network using modbus explicit messaging.

The power meter is a multifunction, digital instrumentation, data acquisition, and control device. It can replace a variety of meters, relays, transducers, and other components. You can install the power meter at multiple locations within a facility.

Function Description

The main functions of the template are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Monitoring	Allows the device parameters to be monitored.

Parameters

Parameters

The \$PM53xxEMGP, \$PM82xxEMGP and \$PM5350MBGP template defines operation of power monitoring devices.

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	False - Manual reset	Boolean	<i>FALSE</i>	–
	True - Automatic reset			
	Modbus device address NOTE: This parameter is applicable only for \$PM5350MBGP	Short	0	–
Time	Time window for the device to execute orders	Duration	00:00:05	–
	Minimum time to maintain the warning signal NOTE: This parameter is available only for \$PM53xxEMGP and \$PM5350xxMBGP.		00:00:03	–
	Maximum time between two auto reset of the DFB.		00:01:00	–
	Time to refresh the cyclic data.		00:00:00.5	–

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	<i>Program (1)</i>	
Security	Set owner	Enum	<i>Operator (1)</i>	Privilege to change override mode. This parameter is used in operator tab, page 283.
	Set rearm		<i>Operator (Confirmed) (10)</i>	Privilege to change reset. This parameter is used in operator tab, page 283.
	Set acknowledge		<i>Operator (1)</i>	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Trend	Sample period	Duration	00:00:05	–
	History length (weeks)	Integer	5	–
	History rollover time	Duration	12:00:00	–
	History rollover day	String	<i>Tuesday</i>	–
	Storage type		<i>TRN_PERIODIC</i>	–
	Data location (optional)		<i>[Data];</i>	–

Data

The table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Average current deadband value	Integer	0	—
	Total power factor engineering zero value	Float	0.0	—
	Total power factor engineering full value		1.0	—
Alarm	Alarm failure description/ Device failure alarm description/ Communication failure alarm description	String	@(Alarm Failure)/@(Device Failure Alarm)/@(Communication Failure Alarm)	—
	Alarm failure alarm severity/ Device failure alarm severity/ Communication failure alarm severity	Enum	Low(4000)	—
	Alarm failure alarm group/ Device failure alarm group/ Communication failure alarm group	String	Failure	—
Variable Tag Disable	PM53xxEMBasic, PM82xxEMBasic and PM5350MBBasic			
	Disable average current	Boolean	FALSE	—
	Disable apparent energy			—
	Disable total apparent power			—
	Disable total power factor			—
	Optional tags: PM53xxMEA, PM82xxMEA and PM5350MEA			
	Disable active energy	Boolean	FALSE	—
	Disable reactive energy			—
	Disable total active power			—
	Disable total reactive power			—
	Disable average line to line voltage			—
	Disable average line to neutral voltage			—
	Disable frequency			—
	Disable current line 1			—
	Disable current line 2			—
	Disable current line 3			—
	Disable voltage line 1 to line 2			—
	Disable voltage line 2 to line 3			—
	Disable voltage line 1 to line 3			—
	Disable voltage line 1 to neutral NOTE: This is applicable only for PM82xxMEA and PM5350MEA			—
	Disable voltage line 2 to neutral NOTE: This is applicable only for			—

Section	Parameter description	Data type	Default value	Additional remarks
	PM82xxMEA and PM5350MEA			
	Disable voltage line 3 to neutral NOTE: This is applicable only for PM82xxMEA and PM5350MEA			—
	Disable active power line 1	Boolean	FALSE	—
	Disable active power line 2			—
	Disable active power line 3			—
	Disable apparent power line 1			—
	Disable apparent power line 2			—
	Disable apparent power line 3			—
	Disable reactive power line 1			—
	Disable reactive power line 2			—
	Disable reactive power line 3			—
	Disable unbalance voltage line to line worst			—
	Disable THD current L1 NOTE: This is applicable only for PM5350MEA			—
	Disable THD current L2 NOTE: This is applicable only for PM5350MEA			—
	Disable THD current L3 NOTE: This is applicable only for PM5350MEA			—
	Disable THD voltage L1 to N NOTE: This is applicable only for PM5350MEA			—
	Disable THD voltage L2 to N NOTE: This is applicable only for PM5350MEA			—
	Disable THD voltage L3 to N NOTE: This is applicable only for PM5350MEA			—
	Disable unbalance voltage line to neutral worst NOTE: This is applicable only for PM82xxMEA	Boolean	FALSE	—
	Disable active power			—
	Disable reactive power			—

Section	Parameter description	Data type	Default value	Additional remarks
	Disable apparent power			—
	Disable active power NOTE: This is applicable only for PM82xxMEA			—
	Disable reactive power total NOTE: This is applicable only for PM82xxMEA			—
	Disable apparent power NOTE: This is applicable only for PM82xxMEA			—
Trend Tag Disable	Disable average current	Boolean	FALSE	—
	Disable apparent energy			—
	Disable total apparent power			—
	Disable total power factor			—
Historize	PM53xxEMBasic, PM82xxEMBasic and PM5350MBBasic			
	Enable historize average current	Boolean	FALSE	—
	Enable historize apparent energy			—
	Enable historize total apparent power			—
	Enable historize total power factor			—
	Enable historize fail code 0, 1, 2 NOTE: This parameter is applicable only for PM53xxEMBasic and PM5350MBBasic			—
	Enable historize warning code NOTE: This parameter is applicable only for PM53xxEMBasic and PM5350MBBasic			—
	Enable historize data word			—
	Enable historize configuration code NOTE: This parameter is applicable only for PM5350MBBasic			—
	Optional tags: PM53xxMEA, PM82xxMEA			
	Enable historize active energy	Boolean	FALSE	—
	Enable historize reactive energy			—
	Enable historize total active power			—
	Enable historize total reactive power			—
	Enable historize average line to line voltage			—

Section	Parameter description	Data type	Default value	Additional remarks
	Enable historize average line to neutral voltage NOTE: This parameter is applicable only for PM53xxMEA and PM5350MEA	Boolean	FALSE	—
	Enable historize frequency			—
	Enable historize current line 1			—
	Enable historize current line 2			—
	Enable historize current line 3			—
	Enable historize voltage line 1 to line 2			—
	Enable historize voltage line 2 to line 3			—
	Enable historize voltage line 1 to line 3			—
	Enable historize voltage line 1 to neutral			—
	Enable historize voltage line 2 to neutral			—
	Enable historize voltage line 3 to neutral			—
	Enable historize active power line 1			—
	Enable historize active power line 2			—
	Enable historize active power line 3			—
	Enable historize apparent power line 1			—
	Enable historize apparent power line 2			—
	Enable historize apparent power line 3			—
	Enable historize apparent power NOTE: This parameter is applicable only for PM53xxMEA	Boolean	FALSE	—
	Enable historize reactive power line 1			—
	Enable historize reactive power line 2			—
	Enable historize reactive power line 3			—
	Enable threshold current line 1, line 2 and line 3 NOTE: This parameter is applicable only for PM5350MEA			—
	Enable threshold voltage line 1, line 2 and line 3 to neutral NOTE: This parameter is applicable only for PM5350MEA			—

Section	Parameter description	Data type	Default value	Additional remarks
	Enable historize unbalance voltage line to line worst NOTE: This parameter is applicable only for PM53xxMEA and PM82xxMEA			—
	Enable historize active power NOTE: This parameter is applicable only for PM53xxMEA			—
	Enable historize active power NOTE: This parameter is applicable only for PM82xxEMGP	Boolean	FALSE	—
	Enable historize reactive power total NOTE: This parameter is applicable only for PM82xxEMGP			—
	Enable historize apparent power NOTE: This parameter is applicable only for PM82xxEMGP			—
	Enable historize average line to neutral voltage NOTE: This parameter is applicable only for PM82xxEMGP and PM5350MEA			—
	Enable historize reactive power NOTE: This parameter is applicable only for PM853xEMGP			—

Asset and Display Parameters

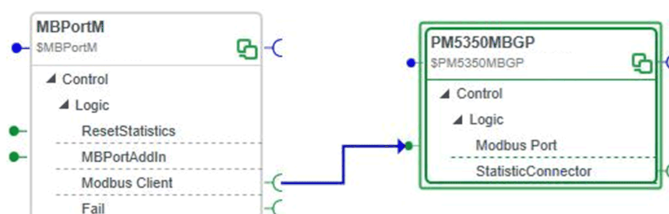
For more details, refer to the topic describing the parameters of asset and display, page 28.

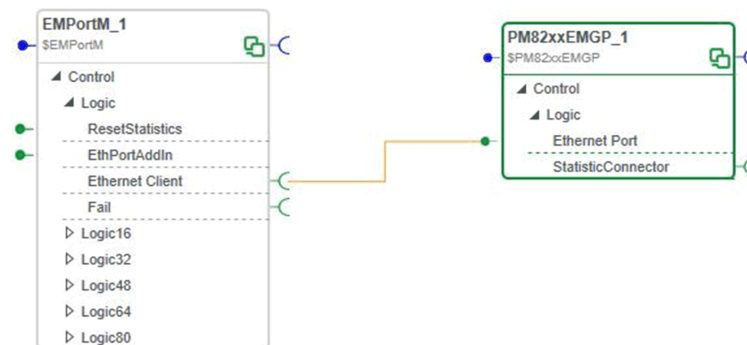
Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

This is an example of an instance of \$PM53xxEMGP (also applicable for \$PM53xxEMCE) template as it appears in Links Editor.





The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
StaticConnector	<i>\$StatisticConnectorNameGP/Ref</i>	An output interface to other template provides the Information used with modbus communication to obtain statistics on the modbus network.	–
Modbus Port	<i>\$MBWorkMemory/Client</i>	An input interface from MBPortM to define the memory area to talk with the modbus port.	Connect MBPortM
Ethernet Port	<i>\$EMWorkMemory/Client</i>	An input interface from EMPortM to define the memory area to talk with the Ethernet port	Connect EMPortM

Control Overview

This chapter describes the EMPM53XX/EMPM82XX and MBPM5350 DFB.

Description General

The PM profile is used to manage the Power logic series power meters on different communication networks (modbus or ethernet).

The power meter is a multifunction, digital instrumentation and data acquisition device. It can replace various meters, relays, transducers, and other components. You can install the power meter at multiple locations within a facility.

NOTE: MBPM710, MBPM800, EPM800, EMPM800 and MBPM9C are deprecated control functions.

Function Description

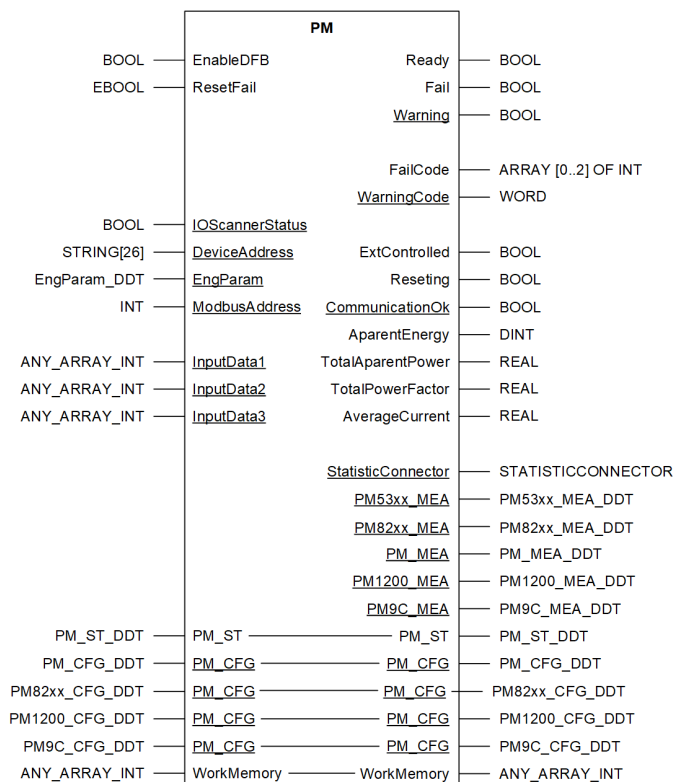
The main functions of the DFB are described in the following table:

Function	Description
Remote resetting	Allows resetting of the device.
Monitoring	Allows the device parameters to be monitored.

DFB Representation

Representation

The following figure represents the functional module of PM profile:



NOTE: The underlined parameters are specific for some components.

For DFBs communicating by I/O scanning, variables read from the device retain their last value when a communication interruption occurs. For details, refer to the description of the corresponding [output parameter](#), page 272.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

When you configure the *Last value* parameter of the I/O scanner line, take into consideration the behavior of the DFB when a communication interruption occurs.

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

The table shows the parameters available for specific components:

Parameters		Components								
		Modbus					Ethernet			
		MBP-M700 (Deprecated)	MBP-M800 (Deprecated)	MBP-M1200	MBP-M9C (Deprecated)	MBP-M53-50	EMP-M800 (Deprecated)	EMP-M53-xx	EMP-M82-xx	
In-puts	ModbusAddress	X	X	X	X	X	-	-	-	-

Parameters		Components								
		Modbus					Ethernet			
		MBP-M700 (Deprecated)	MBP-M800 (Deprecated)	MBP-M1200	MBP-M9C (Deprecated)	MBP-M5350	EMP-M800 (Deprecated)	EMP-M53xx	EMPM82xx	
	EngParam	-	-	X	-	X	-	-	X	X
	DEVI-CEAD-DRESS	-	-	-	-	-	-	X	X	X
	IOSCAN-NERSTATUS	-	-	-	-	-	X	-	-	-
	INPUT-DATA1	-	-	-	-	-	X	-	-	-
	INPUT-DATA2	-	-	-	-	-	X	-	-	-
	INPUT-DATA3	-	-	-	-	-	X	-	-	-
Out-puts	CommunicationOK	-	-	-	-	-	X	-	-	-
	Statistic-Connector	X	X	X	X	X	-	X	X	X
	Warning	X	X	-	-	X	X	X	X	-
	Warning-Code	X	X	-	-	X	X	X	X	-
	PM_MEA	X	X	-	-	X	X	X	-	-
	PM9C_MEA	-	-	-	X	-	-	-	-	-
	PM1200_MEA	-	-	X	X	-	-	-	-	-
	PM53xx_MEA	-	-	-	-	-	-	-	X	-
	PM82xx_MEA	-	-	-	-	-	-	-	-	X
In-puts/ Out-puts	WorkMemory	X	X	X	X	X	-	X	X	X
	PM_ST (PM_ST-DDT)	X	X	X	X	X	X	X	X	X
	PM_CFG (PM_CFG-DDT)	-	-	-	-	X	-	-	X	X
	PM_CFG (PM82xx_CFG-DDT)	-	-	-	-	X	-	-	X	X
	PM_CFG (P-M1200_CFG-DDT)	-	-	X	-	-	-	-	-	-

Parameters		Components								
		Modbus					Ethernet			
		MBP-M700 (Deprecated)	MB-P-M80-0 (Deprecated)	MB-P-M12-00	MBP-M9C (Deprecated)	MBP-M53-50	E-P-M-80-0 (Deprecated)	EMP-M800 (Deprecated)	EMP-M53-xx	EMPM82-xx
	PM_CFG (PM9C_CFG_DDT)	–	–	–	X	–	–	–	–	–
X: Parameter is available.										
–: Parameter is not available.										

Inputs

Input Parameter Description

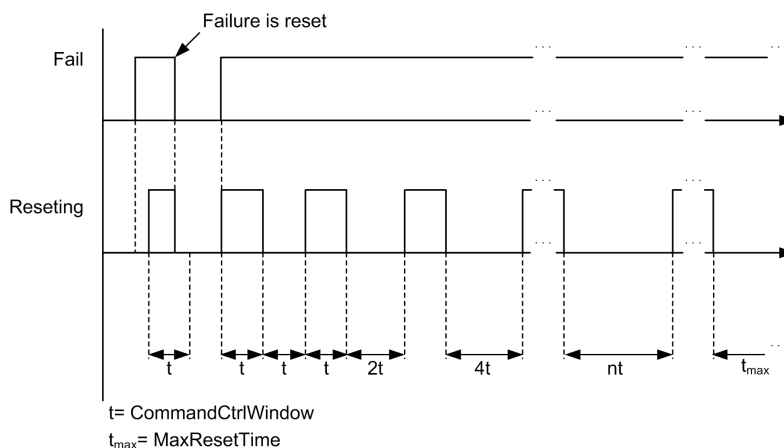
Parameter	Type	Description
EnableDFB	BOOL	This input enables the normal execution of the control block. <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, output values, counters are lost) and output values are set to 0. 1 = Enables communications with the devices for their operation. Public variable values are loaded during the first enabling cycle.
ResetFail	EBOOL	1 = Resets the detected Fail output parameter to 0 or in case of inoperable device, sends a reset command to the device if ControlCommand is 1.
ModbusAddress ¹	INT	Device address within the modbus network.
DeviceAddress ²	STRING[26]	PM Ethernet address.
	Platform	IP Addressing DeviceAddress (variable)
	M340	'{IP}ID'
	Quantum	'{IP}ID'
	M580	'{IP}ID'
	NOTE: ID is 255.	
EngParam	EngParam_DDT, page 271 EngParamEMPM53XX/ EngParamMBPM5350/ EngParamEMPM82XX/ EngParamMBPM1200	Engineering parameters.
IOScannerStatus ³	BOOL	1 = The node is present on the bus. You can find this variable in Ethernet communications.

Parameter	Type	Description
InputData1 ³	ANY_ARRAY_INT	These arrays contain the read information obtained from the PM 800 unit through the IOScan. For the block to work properly, allocate the structure (%MWx)
InputData2 ³	ANY_ARRAY_INT	
InputData3 ³	ANY_ARRAY_INT	
¹ Parameter available only for MBPM800, MBPM5350, MBPM9C, MBPM1200, MBPM710.		
² Parameter available only for EMPM800, EMPM53xx (PM5320, PM5340) and EMPM82xx (PM8240, PM8244)		
³ Parameter available only for EPM800		

EngParam_DDT

Variable	Type	Description
CommandCtrl-Window	TIME	<p>Control time for operations. This is the time that the block waits for the operations to be carried out by the device.</p> <p>The PM unit only allows using <code>ResetFail</code> for communications. If the detected failure continues after the period specified in <code>CommandCtrlWindow</code> has elapsed, <code>detected Fail</code> remains TRUE and the <code>Resetting</code> output resets (when set to FALSE).</p>
Refresh	TIME	<p>Refresh time for device data on modbus communications.</p> <p>NOTE: This refresh operation is carried out on read variables. Write requests are carried out when needed.</p>
ScanTime	TIME	<p>Allows you to configure the time for which the alarm signals are kept active.</p> <p>Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset. (Minimum time to maintain alarm signals).</p>
ResetMode	BOOL	<p>Enables to configure the type of reset. This type of reset is used for communication interruption and inoperable device.</p> <p>The time defined in <code>CommandCtrlWindow</code> is used to define the interval after which a reset needs to be carried out. The first reset is carried out after the time defined in <code>CommandCtrlWindow</code> elapses. The second reset is carried out after <code>CommandCtrlWindow * 2</code> elapses, so on. If the value of <code>CommandCtrlWindow</code> is 0 s, its value is not used and is instead replaced with a value of 1 s.</p> <p>The following table describes the type of the reset:</p>
	Variable value	Description
	FALSE	Communications are/the device is reset with the <code>ResetFail</code> variable.
	TRUE	Communications are/the device is reset automatically.
MaxResetTime	TIME	<p>When in automatic <code>ResetMode</code>, this variable is used to define the maximum time that can elapse between 2 consecutive resets.</p> <p>Refer to the Timing diagram below.</p>

Timing diagram:



Outputs

Output Parameter Description

Parameter	Type	Description
Ready	BOOL	1 = The device is active and free of detected errors. The device is ready to carry out or is carrying out any read operation.
Fail	BOOL	<p>1 = A detected error in the control block or in the device or communication interruption. To reset the detected Fail output pin, the ResetFail input has to be activated. The last detected error code is shown on FailCode.</p> <p>NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.</p>
Warning*	BOOL	<p>1 = An alarm has been activated for the device. It does not affect the block operation, and does not need to be reset.</p> <p>This signal remains active until the cause of the alarm disappears.</p>
FailCode	ARRAY [0..2] OF INT	<p>When the detected Fail output is 1, it holds the code for the detected error.</p> <p>If the detected Fail bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3-level structure. Refer to the Diagnostic Information Management, page 281 for more details.</p>
WarningCode*	WORD	Variable holds the alarm code.
		The following table describes the WarningCode for PM700 block:
	Bit	Description for PM700 (W1112)
	0	Phase 1 voltage out of range.
	1	Phase 2 voltage out of range.
	2	Phase 3 voltage out of range.
	3	Phase 1 current out of range.
	4	Phase 2 current out of range.
	5	Phase 3 current out of range.
	6	Frequency out of range, or phase 1 voltage insufficient to determine frequency.
	Bit	Description for MBPM800, EPM800, EMPM800, and MBPM5350 (W3254), EMPM53xx.

Parameter	Type	Description
	0	Summary bit (activated if any other bit is activated).
	1	Incorrect configuration.
	2	Incorrect scaling.
	3	Phase dropout.
	4	Incorrect cabling.
	5	Incremental energy could be incorrect due to the reset operation of the meter.
	6	External demand synchronous waiting time.
ExtControlled	BOOL	1 = Function block is controlled from the Supervision system (Operator mode).
Reseting	BOOL	<p>1 = A reset is being carried out.</p> <p>The <code>CommandCtrlWindow</code> variable indicates the maximum time for resetting the detected error.</p> <p>When a device or communication reset is carried out with <code>ResetFail</code>, the DFB tries to reset the detected error within the time period defined in <code>CommandCtrlWindow</code>.</p> <p>If the detected error is reset, the detected <code>Fail</code> and <code>Reseting</code> output variables are reset (when set to FALSE). If the detected error is not reset, the <code>Reseting</code> variable is FALSE and the detected <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based.</p> <p>Refer to the Timing diagram below.</p>
CommunicationOK*	BOOL	1 = The communication is OK.
ApparentEnergy	DINT	Apparent power consumption (kVAh).
TotalApparentPower	REAL	Total apparent power (kVA).
TotalPowerFactor	REAL	Total power factor.
AverageCurrent	REAL	Average current between the three phases (A).
StatisticConnector*	STATISTICCONNECTOR	
	<p>The information data is used with Ethernet communication to obtain statistics on the modbus network (requests carried out, time between requests, so on). This structure has been created for its use together with the <code>StatisticCounter</code> DFB in General Purpose updated for communication.</p> <p>The following table describes the <code>StatisticConnector</code>:</p>	
	Parameter	Type
	Start	BOOL
	EndOk	BOOL
	EndNOk	BOOL
	PartialTime	DINT
PM_MEA*	PM_MEA_DDT	
	<p>Data structure with the device measurement information.</p> <p>The following table describes the <code>PM_MEA_DDT</code>:</p>	
	Parameter	Description
	ActiveEnergy	Active energy consumption (kW).
	ReactiveEnergy	Reactive energy consumption (kVAR).
	TotalActivePower	Total real power (kW).
	TotalReactivePower	Total reactive power (kVAR).
	AverageLineToLineVoltage	Voltage, L-L, average between the 3 phases (V).

Parameter	Type	Description	
	AverageLineToNeutralVoltage	REAL	Voltage, L-N, average between the 3 phases (V).
	Frequency	REAL	Frequency (derived from phase 1) (Hz).
	ActualCurrentL1	REAL	Instantaneous current phase 1 (A).
	ActualCurrentL2	REAL	Instantaneous current phase 2 (A).
	ActualCurrentL3	REAL	Instantaneous current phase 3 (A).
	VoltageL1ToL2	REAL	Voltage, phases 1-2 (V).
	VoltageL2ToL3	REAL	Voltage, phases 2-3 (V).
	VoltageL1ToL3	REAL	Voltage, phases 1-3 (V).
	VoltageL1ToNeutral	REAL	Voltage, phase 1-N (V).
	VoltageL2ToNeutral	REAL	Voltage, phase 2-N (V).
	VoltageL3ToNeutral	REAL	Voltage, phase 3-N (V).
	ActivePowerL1	REAL	Real power, phase 1 (kW).
	ActivePowerL2	REAL	Real power, phase 2 (kW).
	ActivePowerL3	REAL	Real power, phase 3 (kW).
	ApparentPowerL1	REAL	Apparent power, phase 1 (kVA).
	ApparentPowerL2	REAL	Apparent power, phase 2 (kVA).
	ApparentPowerL3	REAL	Apparent power, phase 3 (kVA).
	ReactivePowerL1	REAL	Reactive power, phase 1 (kVAR).
	ReactivePowerL2	REAL	Reactive power, phase 2 (kVAR).
	ReactivePowerL3	REAL	Reactive power, phase 3 (kVAR).
	THDCurrentL1	REAL	THD, current, phase 1 (%).
	THDCurrentL2	REAL	THD, current, phase 2 (%).
	THDCurrentL3	REAL	THD, current, phase 3 (%).
	THDVoltageL1ToNeutral	REAL	THD, voltage, phase 1-N (%).
	THDVoltageL2ToNeutral	REAL	THD, voltage, phase 2-N (%).
	THDVoltageL3ToNeutral	REAL	THD, voltage, phase 3-N (%).
	THDVoltageL1ToL2	REAL	THD, voltage, phases 1-2 (%).
	THDVoltageL2ToL3	REAL	THD, voltage, phases 2-3 (%).
	THDVoltageL1ToL3	REAL	THD, voltage, phases 1-3 (%).
PM9C_MEA*	PM9C_MEA_DDT	Data structure with the device measurement information. The following table describes the PM1200_MEA_DDT:	
	Parameter	Type	Description
	ActiveEnergy	REAL	Active energy consumption (kWh).
	ReactiveEnergy	REAL	Reactive energy consumption (kVARh).
	TotalActivePower	REAL	Total real power (kW).
	TotalReactivePower	REAL	Total reactive power (kVAR).
	AverageLineToLineVoltage	REAL	Voltage, L-L, average between the 3 phases (V).
	AverageLineToNeutralVoltage	REAL	Voltage, L-N, average between the 3 phases (V).
	Frequency	REAL	Frequency (derived from phase 1) (Hz).

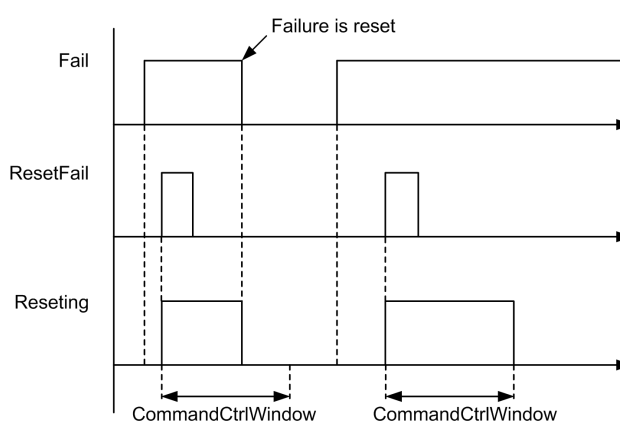
Parameter	Type	Description	
	<i>ActualCurrentL1</i>	REAL	Instantaneous current phase 1 (A).
	<i>ActualCurrentL2</i>	REAL	Instantaneous current phase 2 (A).
	<i>ActualCurrentL3</i>	REAL	Instantaneous current phase 3 (A).
	<i>VoltageL1ToL2</i>	REAL	Voltage, phases 1-2 (V).
	<i>VoltageL2ToL3</i>	REAL	Voltage, phases 2-3 (V).
	<i>VoltageL1ToL3</i>	REAL	Voltage, phases 1-3 (V).
	<i>VoltageL1ToNeutral</i>	REAL	Voltage, phase 1-N (V).
	<i>VoltageL2ToNeutral</i>	REAL	Voltage, phase 2-N (V).
	<i>VoltageL3ToNeutral</i>	REAL	Voltage, phase 3-N (V).
	<i>ActivePowerL1</i>	REAL	Real power, phase 1 (kW).
	<i>ActivePowerL2</i>	REAL	Real power, phase 2 (kW).
	<i>ActivePowerL3</i>	REAL	Real power, phase 3 (kW).
	<i>ReactivePowerL1</i>	REAL	Reactive power, phase 1 (kVAR).
	<i>ReactivePowerL2</i>	REAL	Reactive power, phase 2 (kVAR).
	<i>ReactivePowerL3</i>	REAL	Reactive power, phase 3 (kVAR).
PM1200_MEA*	PM1200_MEA_DDT	Data structure with the device measurement information. The following table describes the PM1200_MEA_DDT:	
	Parameter	Type	Description
	<i>ActiveEnergy</i>	REAL	Active energy consumption (kWh).
	<i>ReactiveInductiveEnergy</i>	REAL	Inductive reactive energy (kVARh)
	<i>ReactiveCapacitiveEnergy</i>	REAL	Capacitive reactive energy (kVARh)
	<i>TotalActivePower</i>	REAL	Total real power (kW).
	<i>TotalReactivePower</i>	REAL	Total reactive power (kVAR).
	<i>AverageLineToLineVoltage</i>	REAL	Voltage, L-L, average between the 3 phases (V).
	<i>AverageLineToNeutralVoltage</i>	REAL	Voltage, L-N, average between the 3 phases (V).
	Frequency	REAL	Frequency (derived from phase 1) (Hz).
	<i>ActualCurrentL1</i>	REAL	Instantaneous current phase 1 (A).
	<i>ActualCurrentL2</i>	REAL	Instantaneous current phase 2 (A).
	<i>ActualCurrentL3</i>	REAL	Instantaneous current phase 3 (A).
	<i>VoltageL1ToL2</i>	REAL	Voltage, phases 1-2 (V).
	<i>VoltageL2ToL3</i>	REAL	Voltage, phases 2-3 (V).
	<i>VoltageL1ToL3</i>	REAL	Voltage, phases 1-3 (V).
	<i>VoltageL1ToNeutral</i>	REAL	Voltage, phase 1-N (V).
PM1200_MEA	<i>VoltageL2ToNeutral</i>	REAL	Voltage, phase 2-N. (V)
	<i>VoltageL3ToNeutral</i>	REAL	Voltage, phase 3-N (V).
	<i>ActivePowerL1</i>	REAL	Real power, phase 1 (kW).
	<i>ActivePowerL2</i>	REAL	Real power, phase 2 (kW).
	<i>ActivePowerL3</i>	REAL	Real power, phase 3 (kW).
	<i>AparentPowerL1</i>	REAL	Apparent power, phase 1 (kVA).
	<i>AparentPowerL2</i>	REAL	Apparent power, phase 2 (kVA).

Parameter	Type	Description	
	AparentPowerL3	REAL	Apparent power, phase 3 (kVA).
	ReactivePowerL1	REAL	Reactive power, phase 1 (kVAR).
	ReactivePowerL2	REAL	Reactive power, phase 2 (kVAR).
	ReactivePowerL3	REAL	Reactive power, phase 3 (kVAR).
	THDCurrentL1	REAL	THD, current, phase 1 (%).
	THDCurrentL2	REAL	THD, current, phase 2 (%).
	THDCurrentL3	REAL	THD, current, phase 3 (%).
	THDVoltageL1ToNeutral	REAL	THD, voltage, phase 1-N (%).
	THDVoltageL2ToNeutral	REAL	THD, voltage, phase 2-N (%).
	THDVoltageL3ToNeutral	REAL	THD, voltage, phase 3-N (%).
PM53xx_MEA*	PM53xx_MEA_DDT	Data structure with the device measurement information. The following table describes the PM53xx_MEA_DDT:	
	Parameter	Type	Description
	<i>ActiveEnergy</i>	REAL	Active energy consumption (kWh).
	<i>Reactive Energy</i>	REAL	Reactive energy consumption (kVARh).
	<i>TotalActivePower</i>	REAL	Total active power detected (kW).
	<i>TotalReactivePower</i>	REAL	Total reactive power detected (kVAR).
	<i>AverageLineToLineVoltage</i>	REAL	Average voltage between lines (V).
	<i>AverageLineToNeutralVoltage</i>	REAL	Average voltage between line and ground (V).
	Frequency	REAL	Detected frequency from line 1 (Hz).
	<i>ActualCurrentL1</i>	REAL	Instant current from line 1(A).
	<i>ActualCurrentL2</i>	REAL	Instant current from line 2(A).
	<i>ActualCurrentL3</i>	REAL	Instant current from line 3(A).
	<i>VoltageL1ToL2</i>	REAL	Voltage between line 1 and 2(V).
	<i>VoltageL2ToL3</i>	REAL	Voltage between line 2 and 3(V).
	<i>VoltageL1ToL3</i>	REAL	Voltage between line 1 and 3(V).
	<i>VoltageL1ToNeutral</i>	REAL	Voltage between line 1 and ground (V).
	<i>VoltageL2ToNeutral</i>	REAL	Voltage between line 2 and ground (V).
	<i>VoltageL3ToNeutral</i>	REAL	Voltage between line 3 and ground (V).
	<i>ActivePowerL1</i>	REAL	Active power at line 1 (kW).
	<i>ActivePowerL2</i>	REAL	Active power at line 2 (kW).
	<i>ActivePowerL3</i>	REAL	Active power at line 3 (kW).
	<i>ApparentPowerL1</i>	REAL	Apparent power at line 1 (kVA).
	<i>ApparentPowerL2</i>	REAL	Apparent power at line 2 (kVA).
	<i>ApparentPowerL3</i>	REAL	Apparent power at line 3 (kVA).
	<i>ReactivePowerL1</i>	REAL	Reactive power at line 1 (kW).
	<i>ReactivePowerL2</i>	REAL	Reactive power at line 2 (kW).
	<i>ReactivePowerL3</i>	REAL	Reactive power at line 3 (kW).

Parameter	Type	Description	
	UnbalVoltageLinetoLine-Worst	REAL	Unbalanced voltage line to line worst (%).
	ActivePowerDemand	REAL	Active power demand - Present (kW)
	ReactivePowerDemand	REAL	Reactive power demand - Present (kVAR)
	ApparentPowerDemand	REAL	Apparent power demand - Present (kVA)
PM82xx_MEA*	PM82xx_MEA_DDT	Data structure with the device measurement information. The following table describes the PM82xx_MEA_DDT:	
	Parameter	Type	Description
	ActiveEnergy	REAL	Active energy consumption (kWh).
	ReactiveEnergy	REAL	Reactive energy consumption (kVARh).
	TotalActivePower	REAL	Total Active power (kW)
	TotalReactivePower	REAL	Total reactive power (kVAR).
	AverageLineToLineVoltage	REAL	Average L-L Voltage, between the 3 phases (V).
	AverageLineToNeutral Voltage	REAL	Average L-N Voltage, between the 3 phases (V).
	Frequency	REAL	Frequency (Hz)
	ActualCurrentL1	REAL	Instantaneous current from Phase 1 (A).
	ActualCurrentL2	REAL	Instantaneous current from Phase 2 (A).
	ActualCurrentL3	REAL	Instantaneous current from Phase 3 (A).
	VoltageL1ToL2	REAL	Voltage between line 1 and 2 (V).
	VoltageL2ToL3	REAL	Voltage between line 2 and 3 (V).
	VoltageL1ToL3	REAL	Voltage between line 1 and 3 (V).
	VoltageL1ToNeutral	REAL	Voltage between line 1 and ground (V).
	VoltageL2ToNeutral	REAL	Voltage between line 2 and ground (V).
	VoltageL3ToNeutral	REAL	Voltage between line 3 and ground (V).
	ActivePowerL1	REAL	Active power at line 1 (kW).
	ActivePowerL2	REAL	Active power at line 2 (kW).
	ActivePowerL3	REAL	Active power at line 3 (kW).
	ApparentPowerL1	REAL	Apparent power at line 1 (kVA).
	ApparentPowerL2	REAL	Apparent power at line 2 (kVA).
	ApparentPowerL3	REAL	Apparent power at line 3 (kVA).
	ReactivePowerL1	REAL	Reactive Power at Line 1 (kVAR).
	ReactivePowerL2	REAL	Reactive Power at Line 2 (kVAR).
	ReactivePowerL3	REAL	Reactive Power at Line 3 (kVAR).
	UnbalancedVoltageLtoNWorst	REAL	Unbalanced voltage Line to Neutral Worst(%).
	ActivePowerLastDemand	REAL	Active power last demand (kW).

Parameter	Type	Description
		(kW = Active power demand delivered - Active power demand received)
	<i>ReactivePowerTotalLastDemand</i>	REAL Reactive power total last demand (kVAR). (kVAR = Reactive power demand delivered + Reactive power demand received)
	<i>ApparentPowerLastDemand</i>	REAL Apparent power last demand (kVA). (kVA = Apparent power demand delivered - Apparent power demand received)
* These parameters are available only with specific components.		

Timing diagram:



Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
PM_ST	PM_ST_DDT	Device data structure holds the minimum information required for performing control and monitoring functions. The information used by the operator screen is usable from the HMI/SCADA system.
PM_CFG	PM_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.
<i>PM_CFG*</i>	PM82xx_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.
<i>PM_CFG*</i>	PM1200_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.
<i>PM_CFG*</i>	PM9C_CFG_DDT	Data structure with device information. The information used by the operator screen is readable from the HMI/SCADA system.
WorkMemory	ANY_ARRAY_INT	Array is used for modbus communications. This variable is to be used with a modbus port that serializes modbus requests in an optimum manner.
* These parameters are available only with specific components.		

PM_ST_DDT Type

Name	Type	Description
STW	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW	WORD	Device control. Enables to control the device from the monitoring subsystem or from the operator screen if <code>Owner</code> (1), or only from the monitoring subsystem if <code>Owner</code> (0). If <code>Owner</code> is 0, it takes the input variables of the DFB as a value for reading from the HMI/SCADA system.
AparentEnergy	DINT	Apparent power consumption (kVAh).
TotalAparentPower	REAL	Total apparent power (kVA).
TotalPowerFactor	REAL	Total power factor.
AverageCurrent	REAL	Average current between the 3 phases (A).

PM_CFG_DDT Type

Name	Type	Description
WarningCode	WORD	Alarm code. Detected <code>PM</code> alarm code information. Takes the values from the <code>WarningCode</code> output pin. NOTE: <code>WarningCode</code> is not applicable for EMPM82xx
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred <code>FailCode[0]</code> .
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred <code>FailCode[1]</code> .
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred <code>FailCode[2]</code> .

PM82xx_CFG_DDT

Name	Type	Description
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred <code>FailCode[0]</code> .
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred <code>FailCode[1]</code> .
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred <code>FailCode[2]</code> .

PM1200_CFG_DDT Type

Name	Type	Description
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred <code>FailCode[0]</code> .
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred <code>FailCode[1]</code> .
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred <code>FailCode[2]</code> .

PM9C_CFG_DDT Type

Name	Type	Description
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred <code>FailCode[0]</code> .
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred <code>FailCode[1]</code> .
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred <code>FailCode[2]</code> .

PM_ST.STW Word Structure

Bit	Description
0	Unknown device status or communication interruption. No variable refreshing.
1	Not ready.
2	Module is running.
3	Inoperable device.
4	Alarm on the device or repetitive detected fault alarm requires resetting. NOTE: Not applicable for EMPM82xx
5	Communication interruption.
6	Requires resetting. <code>ResetFail</code> is required.
8	Refer to the <code>Resetting</code> output pin, page 272.
9	Refer to the <code>EnabledDFB</code> input pin, page 270.

PM_ST.CFGW Word Structure

Bit	Description
0	Refer to the <code>ResetFail</code> input pin, page 270.
1	Owner.

PM_CFG.WarningCode Word Structure

Bit	Description for PM700
0	Phase 1 voltage out of range.
1	Phase 2 voltage out of range.
2	Phase 3 voltage out of range.

Bit	Description for PM700
3	Phase 1 current out of range.
4	Phase 2 current out of range.
5	Phase 3 current out of range.
6	Frequency out of range or phase 1 voltage is insufficient to determine frequency.

Bit	Description for PM800
0	Summary bit (activated if any other bit is activated).
1	Incorrect configuration
2	Incorrect scaling.
3	Phase dropout.
4	Incorrect cabling.
5	Incremental energy could be incorrect due to the reset operation of the meter.
6	External demand synchronous waiting time.

Diagnostic Information Management

Overview

The diagnostic codes the device can return are read from the `FailCode` output variable.

Parameter Configuration Diagnostic Codes

This detected error indicates that a public variable parameter contains a value that is not allowed.

To reload new values, a rising edge is required on the `EnableDFB` input:

- `FailCode[0]`: 16#0003
- `FailCode[1]`: 16#0000
- `FailCode[2]`: 16#0004

NOTE: The inoperable device reset is sent to the device.

Modbus Communications Diagnostic Codes

For modbus communications, this code is used to indicate that communications have not been established. It can be reset.

- `FailCode[0]`: 16#0002
- `FailCode[1]`: 16#0000
- `FailCode[2]`: 16#0004

After modbus communications have been established, check modbus client diagnostic codes for `FailCode[0]` and `FailCode[1]`. The components make a distinction between read request problems and write request problems:

- `FailCode[2]`: 16#0001 - Read
- `FailCode[2]`: 16#0002 - Write

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the PM5350/PM53xx/PM82xx.

Genies

Genie Properties



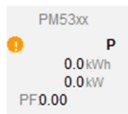
Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	PM53xx	Power meter PM53xx.
	PM82xx	Power meter PM82xx.
	PM_Power	Power display of power meter PM5350.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a [general description](#), page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking an PM53XX/PM82XX and PM5350 genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45
- Measures, page 46
- Alarm, page 47

- Event, page 48

Operator Tab

The figure shows an operator tab:

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 261
Failure	LastFailure, DeviceFailActive	Current detected failure status of PM5350.	–
Warning	AlarmActive, CurrentWarning	Current alert status of PM5350.	
Owner	OwnerSelect	Owner of PM5350.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Active Power	TotalActivePower	Total active power in kW.	–
Active Energy	ActiveEnergy	Active energy consumption in kWh.	
ApparentPower	TotalApparentPower	Total apparent power in kVA.	
ApparentEnergy	ApparentEnergy	Apparent power consumption in kVAh.	
Average L-L Voltage	AverageLineToLineVoltage	Average voltage between lines in V.	
Average L-N Voltage	AverageLineToNeutralVoltage	Average voltage between lines and ground in V.	
Average Current	AverageCurrent	Average current between 3 phases in A	

Label	Item name	Description	Security parameter, page 261
PF	TotalPowerFactor	Total power factor	

Measures Tab

The table lists the items of each groups of measures tab:

Group Order Number	1	2	3	4
Group Name	Current	Voltage and Frequency	Diagnostics	Power Data
Items	ActualCurrentLine1	VoltageLine1ToLine2	Owner	ApparentEnergy
	ActualCurrentLine2	VoltageLine2ToLine3	FailCode0	TotalApparentPower
	ActualCurrentLine3	VoltageLine1ToLine3	FailCode1	TotalPowerFactor
	AverageCurrent	VoltageLine1ToNeutral	FailCode2	ActiveEnergy
		VoltageLine2ToNeutral		ReactiveEnergy
		VoltageLine3ToNeutral		TotalReactivePower
		AverageLineToLineVoltage		ActivePowerLine1
		AverageLineToNeutralVoltage		ActivePowerLine2
		Frequency		ActivePowerLine3
				ReactivePowerLine1
				ReactivePowerLine2
				ReactivePowerLine3
				ApparentPowerLine1
				ApparentPowerLine2
				ApparentPowerLine3
				TotalActivePower
				ReactivePowerDemand
				ApparentPowerDemand

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of PM53XX/PM82XX and PM5350.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2

Item name	Description	Enumera- tion	Address
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/ Inactive	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Detected failure resetting required	Required/Not Required	Bit6
EnableFunctional-Block	Normal execution of control block	–	Bit9
Bit items derived from ConfigurationWord.			
Rearm	Resets the fail	–	Bit0
OwnerSelect	Owner of control module	Operator/ Program	Bit1
IO Items			
StatusWord	Status word	–	PM_ST.STW
ConfigurationWord	Configuration word		PM_ST.CFGW
Calculated Items			
CurrentWarning	Current fault	–	GPL_PMCCurrentWarning
LastFailure	Last failure		GPL_PMLastFailure
Owner	Current owner of the PM53XX/ PM82XX and MBPM5350 Refer to Calculated Variable, page 39.		GPL_OwnerBasic
Abnormal	Shows abnormal condition of the PM53XX/ PM82XX and MBPM5350 Refer to Abnormal Conditions, page 285.		GPL_DeviceAbnormal
ActionRequired	Shows action required condition of the PM53XX/ PM82XX and PM5350 Refer to Action Required Conditions, page 285.		GPL_DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of PM53XX/ PM82XX and PM5350:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	Bit0
AbnormalOperatorTab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	Bit8

Action Required Conditions

The table describes the abnormal conditions of PM53XX/ PM82XX and PM5350:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	Bit8

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
AlarmFailure	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
ApparentEnergy	Apparent energy	<i>PM_ApparentEnergy</i>
AverageCurrent	Average current	<i>PM_AverageCurrent</i>
TotalApparentPower	Total apparent power	<i>PM_TotalApparentPower</i>
TotalPowerFactor	Total power factor	<i>PM_TotalPowerFactor</i>

Progressive Starters

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MBTCPATS480– ATS480 (Modbus TCP/IP) and EIPATS480 – ATS480 (Ethernet IP) Soft Starter.....	314

Overview

This part provides the functionality of the templates, a detailed description of the control (functions,pins, pin layout, and variables of the function blocks), and the supervision functions of progressive starters.

These components do not reflect any specific installation.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

MBATS22 – ATS22 and MBATS48 – ATS48 Progressive Starter (Modbus)

What's in This Chapter

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Overview

The ATS progressive starter profile is used to manage ATS soft starters on a modbus network.

Template

Overview

This section describes functionality of the \$ATS22MBGP and \$ATS48MBGP template.

Description

General Description

The \$ATS22MBGP and \$ATS48MBGP control module template allows you to manage an ATS22 and ATS48 soft starter on a modbus network.

Function Description

The main functions of the template are described in the following table:

Function	Description
Control	Start/Stop command.
Inoperable device	Monitors the inoperable device.
Remote resetting	Allows resetting of the device.
Control	Enables you to monitor the device. You can control from the controller or with the wired inputs/ outputs of the speed driver.

Parameters

Parameters

The \$ATS22MBGP and \$ATS48MBGP templates provides different control and supervision parameters to the user to control the functions as per the requirement .

Control

The table describes the control \$ATS22MBGP and \$ATS48MBGP parameters:

Section	Parameter description	Type	Default value	Additional remarks
Configuration	False - Manual reset True - Automatic reset	Boolean	FALSE	It allows you to reset detected fail in both modes (Auto and Manual). By default, selection mode is manual mode.
	Device modbus address	Short	0	Address of modbus device.
	Enable the starter NOTE: This parameter is applicable only for \$ATS48MBGP.	Enum	True Value (2)	You can allow to use of Interface (0), Refinement (1), True value (2), False value (3)
Time	Time window for the device to execute orders	Duration	00:00:05	Time the device takes to execute commands.
	Minimum time to maintain the warning signal		00:00:03	The time duration for which the detected fault pin signal remains 1.
	Maximum time between two auto reset of the DFB.		00:01:00	The maximum time between two automatic resets of the template.
	Time to refresh the cyclic data.		00:00:00.5	Time the device takes to refresh the cyclic data.

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	Program (1)	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	Operator (1)	Privilege to change override mode. This parameter is used in operator tab, page 309.
	Set rearm		Operator (Confirmed) (10)	Privilege to change reset. This parameter is used in operator tab, page 309.
	Set acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.
Trend	Sample period	Duration	00:00:05	–
	History length (weeks)	Integer	5	–
	History rollover time	Duration	12:00:00	–

Section	Parameter description	Data type	Default value	Additional remarks
	History rollover day	String	Tuesday	–
	Storage type		TRN_PERIODIC	–
	Data location (optional)		[Data];	–

Data

The table describes the data parameters:

Section	Parameter description	DATA type	Default value	Additional remarks
Configuration	\$ATS22MBGP			
	Current deadband value	Integer	0	–
	Frequency deadband value		0	–
	Voltage deadband value		0	–
	Trip current deadband value		0	–
	Current line 1, line 2 and line 3 engineering zero value		0	–
	Current line 1, line 2 and line 3 engineering full value		1000	–
	\$ATS48MBGP			
	Current deadband value	Integer	0	–
	Frequency deadband value		0	–
	Active power deadband value		0	–
	Thermic status deadband value		0	–
	CosinePhi deadband value		0	–
	Current engineering zero value		0	–
	Current engineering full value		1000	–
Alarm	Alarm failure description/ Device failure alarm description/ Communication failure alarm description	String	@(Alarm Failure)/ @(Device Failure Alarm)/ @(Communication Failure Alarm)	–
	Alarm failure alarm severity/ Device failure alarm severity/ Communication failure alarm severity	Enum	Low(4000)	–
	Alarm failure alarm group/ Device failure alarm group/ Communication failure alarm group	String	Failure	–
Event	Enable log NOTE: This parameter is applicable only for \$ATS22MBGP	Bool	FALSE	Enable event logging for asset status.
Variable Tag Disable	\$ATS22MBGP			
	Disabled current line 1, line 2 and line 3	Boolean	FALSE	–
	\$ATS48MBGP			
	Disable current	Boolean	FALSE	–
	Disable torque			–
	Disable thermic status			–

Section	Parameter description	DATA type	Default value	Additional remarks
	Disable active power			–
	Disable cosine phi			–
Trend Tag Disable	\$ATS22MBGP			
	Disabled current line 1, line 2 and line 3 consumption	Boolean	FALSE	–
	\$ATS48MBGP			
	Disabled current consumption	Boolean	FALSE	–
Historize	\$ATS22MBGP			
	Enable historize current line 1, line 2 and line 3	Boolean	FALSE	–
	Enable historize voltage			–
	Enable historize frequency			–
	Enable historize trip current			–
	Enable historize fail code			–
	Enable historize total starts			–
	Enable historize total runtime			–
	Enable historize last start time			–
	Enable historize last start maximum current			–
	Enable historize info word			–
	Enable historize warning code			–
	Enable historize word data			–
	Enable historize IO map			–
	\$ATS48MBGP			
	Enable historize current	Boolean	FALSE	–
	Enable historize torque			–
	Enable historize thermic status			–
	Enable historize active power			–
	Enable historize cosphi			–
	Enable historize analog output			–
	Enable historize fail code			–
	Enable historize warning code			–
	Enable historize info word			–
	Enable historize data word			–
	Enable historize IO map			–
	Enable historize state			–

Asset and Display Parameters

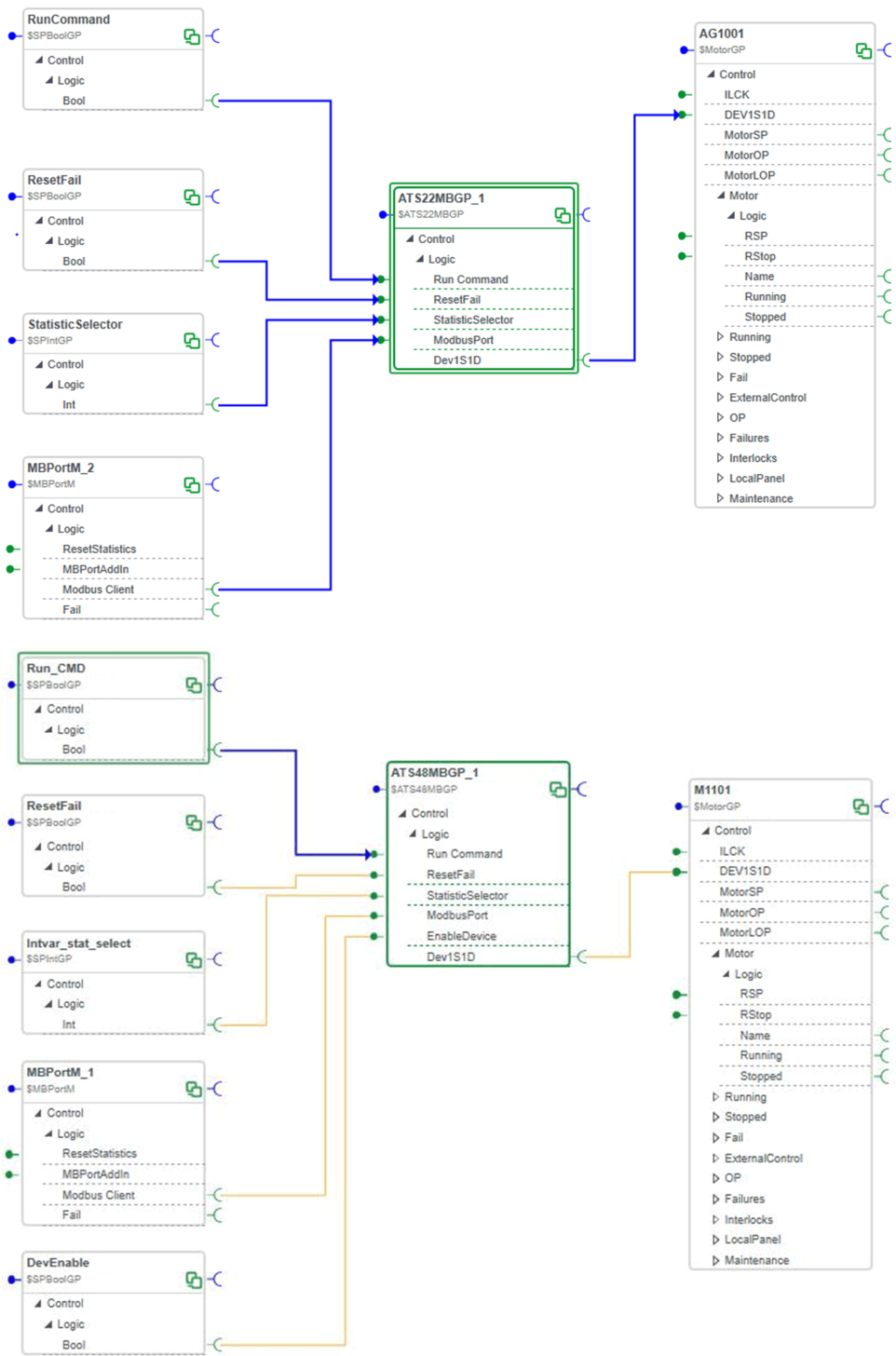
For more details, refer to the topic describing the parameters of asset and display, page 28.

Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

This figure shows the \$ATS22MBGP and \$ATS48MBGP (also applicable for and) template as it appears in Links Editor and an example of other templates connected to it:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
Run Command	\$Bool/Ref	An input interface from other template to run the starter.	A boolean variable can be assigned to give run command to the starter.
ResetFail	\$Bool/Ref	An input interface from other template to reset the detected fail.	A boolean variable can be assigned to reset detected fail of the starter.

Interface identifier	Type/Role	Description	Example
StatisticSelector	<i>\$Int/Ref</i>	An input interface from other template obtain statistics for the modbus network	An integer variable can be connected to obtain statistics for the modbus network. Refer DFB pin description for more details.
ModbusPort	<i>\$MBWorkMemory/Client</i>	An input interface from MBPortM to define the memory area to talk with the modbus port.	Connect MBPortM.
EnableDevice	<i>\$Bool/Ref</i>	An input interface from other template to enable device. This will be enabled only when enable device type parameter is selected as interface.	Connect a boolean variable to enable/disable device.
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control.

Control

Overview

This chapter describes the MBATS22 – ATS22 DFB.

Description

General

The ATS progressive starter profile is used to manage ATS soft starters on a modbus network.

Function Description

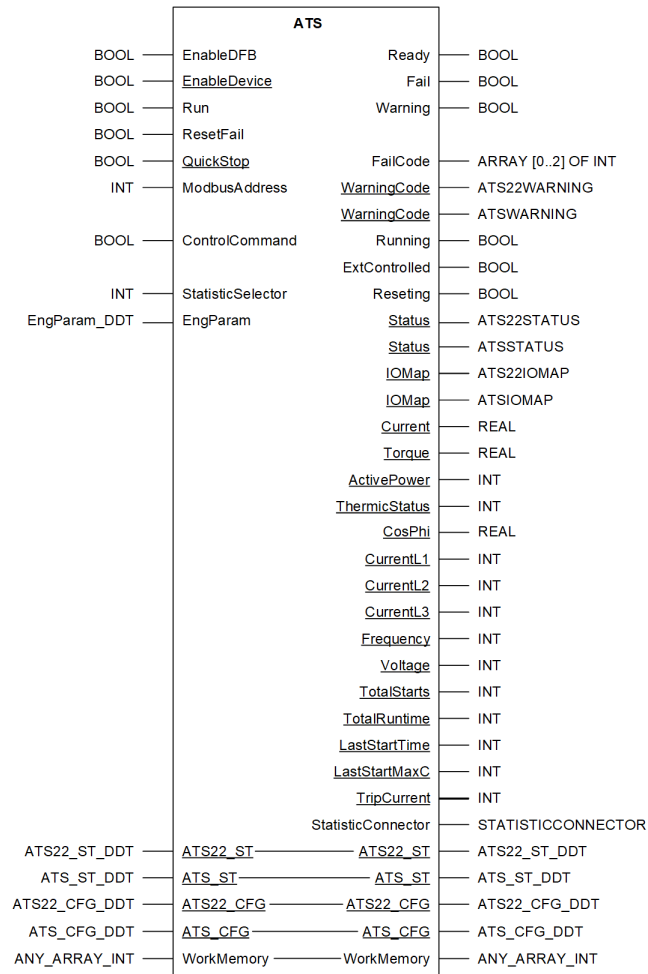
The main functions of the DFB are described in the following table:

Function	Description
Control	Start/Stop command.
Inoperable device	Monitors the inoperable device.
Remote resetting	Allows resetting of the device.
Control	Enables you to monitor the device. You can control from the controller or with the wired inputs/outputs of the speed driver.

DFB Representation

Representation

The following figure represents the functional module of ATS profile:



NOTE: The device can only work on serial modbus mode.

NOTE: The underlined parameters are specific for some components.

The table shows the parameters available for specific components:

Parameters		Components	
		Modbus	
		MBATS22	MBATS48
Inputs	EnableDevice	–	X
	QuickStop	–	X
Outputs	WarningCode (ATS22WARNING)	X	–
	WarningCode (ATSWARNING)	–	X
	Status (ATS22STATUS)	X	–
	Status (ATSSTATUS)	–	X
	IOMAP (ATS22IOMAP)	X	–
	IOMAP (ATSIOMAP)	–	X
	Current	–	X
	CurrentL1	X	–
	CurrentL2	X	–
	CurrentL3	X	–

Parameters		Components	
		Modbus	
		MBATS22	MBATS48
	<i>Torque</i>	–	X
	<i>ActivePower</i>	–	X
	<i>ThermicStatus</i>	–	X
	<i>CosPhi</i>	–	X
	<i>Frequency</i>	X	–
	<i>Voltage</i>	X	–
	<i>TotalStarts</i>	X	–
	<i>TotalRunTime</i>	X	–
	<i>LastStartTime</i>	X	–
	<i>LastStartMaxC</i>	X	–
	<i>TripCurrent</i>	X	–
Inputs/Outputs	<i>ATS22_ST</i>	X	–
	<i>ATS_ST</i>	–	X
	<i>ATS22_CFG</i>	X	–
	<i>ATS_CFG</i>	–	X

X: Parameter is available.
–: Parameter is not available.

Inputs

Input Parameter Description

Name	Type	Description
EnableDFB	BOOL	<p>This input enables the normal execution of the control block.</p> <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, output values, counters are lost) and output values are set to 0. 1 = Enables communications with the devices for their operation. <p>Public variable values are loaded during the first enabling cycle.</p>
EnableDevice*	BOOL	<p>1 = Valid if the EnableDFB variable is active.</p> <p>The starter has to be enabled in order to be controlled.</p>
* These parameters are available only with specific components.		

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
<p>UNINTENDED EQUIPMENT OPERATION</p> <p>Reset the <i>Run</i> variable before resuming operation.</p> <p>Failure to follow these instructions can result in equipment damage.</p>

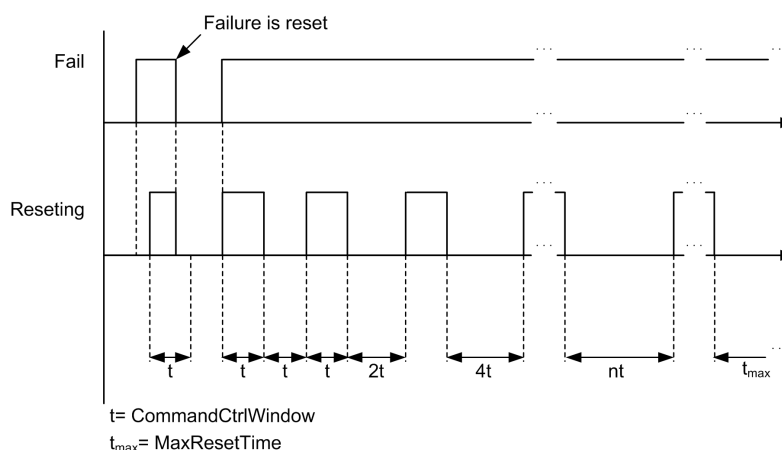
Name	Type	Description
Run	BOOL	1 = Starts the starter. If the device is being enabled or reset, reset the inputs so that unexpected starts do not occur. In these cases, first reset the input to resume the operation.
ResetFail	BOOL	1 = Resets the detected Fail output parameter to 0 or in case of inoperable device, sends a reset command to the device if ControlCommand is 1. You can carry out communication resets when required. To carry out an automatic reset, use the ResetMode public variable.
QuickStop*	BOOL	1 = Stops the starter quickly with fast stop ramp. It is state-based. If there is a QuickStop, the Run bit has to be reset to resume operation.
ModbusAddress	INT	Device address within the modbus network.
ControlCommand	BOOL	Indicates to the DFB whether the motor is being controlled locally or from a source external to the DFB. <ul style="list-style-type: none"> 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. NOTE: This input does not configure the starter.
StatisticSelector	INT	Variable is used to obtain statistics for the modbus network. This data provides information for using the StatisticConnector pin with the StatisticCounter DFB in General Purpose library for communication. The following table displays the StatisticSelector value:
	Variable value	Description
	1	Read statistics, client.
	2	Write statistics, client.
EngParam	EngParam_DDT, page 296* EngParamATS22/ EngParamATS48	Engineering parameters.
* These parameters are available only with specific components.		

EngParam_DDT

Name	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 sent. The command that is controlled is Run. In the event of a ResetFail, this is not interpreted as an alarm. Instead, the detected failure continues, and you have to reset the Resetting output.
Refresh	TIME	Refresh time for device data on modbus communications. NOTE: This refresh operation is carried out on read variables. Write requests are carried out when needed.

Name	Type	Description
ScanTime	TIME	Allows you to configure the time for which the alarm signals are kept active. Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset.
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 <code>CommandCtrlWindow</code> is used to define the interval after which a reset needs to be carried out. The first reset is carried out after the time defined in <code>CommandCtrlWindow</code> elapses. The second reset is carried out after <code>CommandCtrlWindow * 2</code> elapses, so on. If the value of <code>CommandCtrlWindow</code> 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 are/the device is reset with the <code>ResetFail</code> variable.
	TRUE	Communications are/the device is reset automatically.
MaxResetTime	TIME	When in automatic <code>ResetMode</code> , this variable is used to define the maximum time that can elapse between 2 consecutive resets. Refer to the Timing diagram below.

Timing diagram:



Outputs

Output Parameter Description

Output	Type	Description
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command.
Fail	BOOL	1 = A detected failure in the control block or in the device or a communication interruption. To reset the detected <code>Fail</code> output pin, the <code>ResetFail</code> input has to be activated. The last detected error code is shown on <code>FailCode</code> . NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.
Warning	BOOL	1 = An alarm has been activated for the device. It does not affect the block operation and does not need to be reset.

Output	Type	Description	
		This signal remains active until the cause of the alarm disappears.	
FailCode	ARRAY [0..2] OF INT	<p>When detected Fail output is 1, it holds the code for the detected error.</p> <p>If detected Fail output is 0, it indicates the last detected error that occurred.</p> <p>The detected error source is specified by a 3-level structure. Refer to the Diagnostic Information Management, page 306 section.</p>	
WarningCode*	ATS22WARNING	The WarningCode output is a data structure with information on the alarm currently on the starter.	
	Name	Type	Description
	Order	BOOL	1 = An alarm is present on the device.
	ForcedLocalMode	BOOL	1 = A follow-up alarm. The device is not responding to the control command (Run, QuickStop, so on) within the time specified in CommandCtrlWindow.
WarningCode*	Device	BOOL	1 = The device is forced locally. It is controlled through the screw terminals.
	ATSWARNING	Holds a data structure with information on the alarm currently on the starter.	
	Name	Type	Description
	Order	BOOL	1 = A follow-up alarm. The device is not responding to the control command (Run, QuickStop, so on) within the time specified in CommandCtrlWindow.
	ForcedLocalMode	BOOL	1 = The device is forced locally. It is controlled through the screw terminal.
	Device	BOOL	1 = An alarm on the device (w 458.7).
	Current	BOOL	1 = A detected current limit alarm (w 459.11).
	Torque	BOOL	1 = A detected torque limit alarm (w 459.12).
	Thermal	BOOL	1 = A detected thermal limit alarm (w 459.7).
Running	BOOL	1 = The starter is running.	
ExtControlled	BOOL	<p>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.</p> <p>Provides information for programming.</p> <p>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.</p>	
Reseting	BOOL	<p>1 = A reset is being carried out.</p> <p>The CommandCtrlWindow variable indicates the maximum time for resetting the detected failure.</p> <p>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.</p> <p>If the detected failure is reset, the detected Fail and Reseting output variables are reset (set to FALSE). On the other hand, if the detected failure is not reset, the Reseting variable is set to FALSE and the detected Fail variable remains TRUE. The ResetFail is edge-based.</p> <p>Refer to the Timing diagram below.</p>	
Status*	ATS22STATUS	<p>The structure holds data containing the information that the block extracts from the ETA variable (w256) of the starter.</p> <p>The following table describes the status information:</p>	
	Parameter	Type	Description
	Ready	BOOL	1 = The device is ready to start or stop (w256.0).
	Running	BOOL	<ul style="list-style-type: none"> 0 = The starter is not running (w256.1). 1 = The starter is running (w256.1).

Output	Type	Description	
	Trip	BOOL	1 = A trip condition has occurred (w256.2).
	Alarm	BOOL	1 = An alarm is present on device (w256.3).
	ForcedLocalMode	BOOL	1 = The device is controlled by physical inputs (w256.14).
	Ramping	BOOL	1 = The starter is accelerating or slowing down (w256.15).
	Info	INT	Numerical code with the information on statuses and required actions. Refer to the Info table below.
Status*	ATSSTATUS	<p>The structure holds data containing the information that the block extracts from the status variable of the starter.</p> <p>The following table describes the status information:</p>	
	Parameter	Type	Description
	ReadyToSwitchOn	BOOL	1 = The DSP402 device is ready to switch on (w458.0).
	SwitchedOn	BOOL	1 = The DSP402 device is switched on (w458.1).
	OperationEnabled	BOOL	1 = DSP402 device operation is enabled (w458.2).
	Malfunction	BOOL	1 = A detected failure on the device (w458.3).
	VoltageEnabled	BOOL	1 = Voltage at the device terminals (Not w458.4).
	QuickStop	BOOL	1 = Quick stop is activated (Not w458.5).
	SwitchOnDisabled	BOOL	1 = DSP402 device switch-on is disabled (w458.6).
	Alarm	BOOL	1 = An alarm is present on the device (w458.7).
	ForcedLocalMode	BOOL	1 = Device controlled by physical inputs (w458.9).
	LocalMode	BOOL	1 = Commands accepted through terminals for writing and reading. Drivecom disabled (w459.13 and w459.14).
	ResetAuthorization	BOOL	1 = Detected fault reset authorized (w459.0).
	Running	BOOL	1 = Motor running (w459.4).
	Accelerating	BOOL	Start accelerating 1 = Active (w459.9).
	Decelerating	BOOL	Start decelerating 1 = Active (w459.10).
	State	INT	Numerical code corresponding to the state of the starter. Refer to the State table below.
	Info	INT	Numerical code with the information on statuses and required actions. Refer to the Info table below.
IOMap*	ATS22IOMAP	<p>Holds a data structure that contains information on the state of the starter inputs and outputs (w262 and w263).</p> <p>The following table describes the IOMap:</p>	
	Parameter	Type	Description
	LI1	BOOL	1 = The state of the digital input LI1.
	LI2	BOOL	1 = The state of the digital input LI2.
	LI3	BOOL	1 = The state of the digital input LI3.
	R1	BOOL	1 = The state of the digital output R1.
	R2	BOOL	1 = The state of the digital output R2.

Output	Type	Description	
IOMap*	ATSIOMAP	<p>Holds a data structure that contains information on the state of the starter inputs and outputs.</p> <p>The following table describes the IOMap:</p>	
	Parameter	Type	Description
	LIRUN	BOOL	1 = The state of the digital input LIRUN.
	LISTOP	BOOL	1 = The state of the digital input LISTOP.
	LI3	BOOL	1 = The state of the digital input LI3.
	LI4	BOOL	1 = The state of the digital input LI4.
	LO1	BOOL	1 = The state of the digital output LO1.
	LO2	BOOL	1 = The state of the digital output LO2.
	R1	BOOL	1 = The state of the digital output R1.
	R2	BOOL	1 = The state of the digital output R2.
	R3	BOOL	1 = The state of the digital output R3.
	AO	INT	Range (0-10000). Shows the state of the analog output.
Current L1*	INT	Present current on starter line 1 in amperes (w 257).	
Current L2*	INT	Present current on starter line 2 in amperes (w 258).	
Current L3*	INT	Present current on starter line 3 in amperes (w 259).	
Current*	REAL	Motor current (A) (w 4062).	
Torque*	INT	Current motor torque in % (w 4063).	
ActivePower*	INT	Power currently consumed by the motor (w 4072).	
ThermicStatus*	INT	Motor thermic status in % (w 4064).	
CosPhi*	REAL	Current value of phi cosine (w4067).	
Frequency*	INT	Voltage frequency in Hertz (w 279).	
Voltage*	INT	Input voltage in volts (w 260).	
TotalStarts*	INT	Number of times that the ATS 22 has started (w 274).	
TotalRuntime*	INT	Total time (in hours) during which the ATS 22 has been operating (w 273).	
LastStartTime*	INT	Last starting time (w 275).	
LastStartMaxC*	INT	Maximum detected current during last start (w 276).	
TripCurrent*	INT	Current present when last tripping event occurred (w 280).	
StatisticConnector	STATISTICCONNECTOR	<p>Information data is used with modbus communications to obtain statistics on the modbus network (requests carried out, time between requests, so on).</p> <p>This structure has been created to be used within StatisticCounter DFB in General Purpose library for communication.</p>	
	Parameter	Type	Description
	Start	BOOL	1 = The operation has started.
	EndOk	BOOL	1 = The operation has ended correctly.
	EndNOk	BOOL	1 = The operation has ended with a detected error.
	PartialTime	DINT	Partial time.
* These parameters are available only with specific components.			

Info

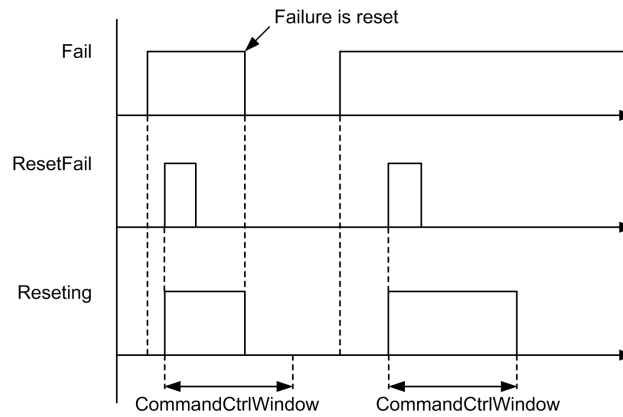
The following table describes the `Info` variable of *MBATS22*:

Variable value	Description
2	Waiting for Ready.
11	Missing EnabledDFB.
12	Communication interruption.
20	Remove local forcing needs to be 0.
21	Waiting Running.
22	Running.
23	Waiting stopped.
24	Stopped.
25	Remove ResetFail needs to be 0.
30	In forced local mode.
31	Waiting ForcedLocalMode.
40	Remove Run needs to be 0.
81	Missing ResetFail. Inoperable starter.
82	Do starter reset.

The following table describes the `Info` variable of *MBATS48*:

Variable value	Description
2	Waiting SwitchOnDisabled.
3	Waiting ReadyToSwitchOn.
4	Waiting SwitchOn.
5	Waiting OperationEnabled.
6	Waiting QuickStop active.
11	Missing EnabledDFB.
12	Communication Interruption.
13	ETA value is 0.
14	Remove local forcing needs to be 0.
21	Missing EnableDevice.
23	Remove Run needs to be 0.
24	Remove ResetFail. Reset again.
51	Starter stopped.
53	Run.
56	Waiting starter running
57	Waiting starter stop.
61	Remove QuickStop needs to be 0.
62	QuickStop is activated.
81	Missing ResetFail. Inoperable starter.
82	Do starter reset.
99	Unexpected state.

Timing diagram:



Inputs/Outputs

Input/Output Parameter Description

Name	Type	Description
ATS22_ST*	ATS22_ST_DDT, page 302	Device data structure holds the minimum information required for performing control and monitoring. The information is used by the operator screen and can be read from or written to HMI/SCADA system.
ATS_ST*	ATS_ST_DDT, page 303	Device data structure holds the minimum information required for performing control and monitoring functions. Information used by the operator screen is usable from the HMI or SCADA.
ATS22_CFG*	ATS22_CFG_DDT, page 303	Data structure with device information. Information used by the operator screen is readable from HMI/SCADA system.
ATS_CFG*	ATS_CFG_DDT, page 303	Device data structure with device information. Information used by the operator screen is readable from the HMI or SCADA system.
WorkMemory	ANY_ARRAY_INT	The array is used in modbus communications. This variable is meant for use with a modbus port that serializes modbus requests in an optimum manner.
* These parameters are available only with specific components.		

ATS22_ST_DDT Type

Name	Type	Description
STW, page 304	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW, page 304	WORD	Device control. Enables to control the device from the monitoring subsystem or from the operator screen if <i>Owner</i> (1), or only from the monitoring subsystem if <i>Owner</i> (0). If <i>Owner</i> is 0, it takes the input variables of the DFB as a value for reading from the HMI/SCADA system.
CurrentL1	REAL	Current consumed by the starter through line 1.
CurrentL2	REAL	Current consumed by the starter through line 2.
CurrentL3	REAL	Current consumed by the starter through line 3.

ATS_ST_DDT Type

Name	Type	Description
STW, page 304	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW, page 305	WORD	Device control. Provides the means to control the device from the monitoring subsystem or from the operator screen if <i>Owner</i> (1), or only from the monitoring subsystem if <i>Owner</i> (0). If <i>Owner</i> is 0, it takes the input variables of the DFB as a value for reading from the HMI/SCADA system.
Current	REAL	Active current (A).

ATS_CFG_DDT Type

Name	Type	Description
DataStatus, page 305	WORD	Information on the device status. Provides the information on the <i>Status</i> output structure.
IOMap	WORD	Provides information on the state of the digital inputs/outputs of the device. Information on the <i>IOMap</i> output structure.
Info	INT	Starter information. Its value is <i>Info</i> status.
State	INT	Starter status code information. Its value is <i>State</i> status.
Torque	INT	Active torque in %.
ThermicStatus	INT	Motor thermal capacity in %.
ActivePower	INT	Power consumed by the motor in %.
CosPhi	REAL	Current value of phi cosine.
AO	INT	Value of the analog output. Its value is in <i>AO IOMAP</i> .
WarningCode	INT	<i>WarningCode</i> register.
FailCode0	INT	Code of last level 0 detected error. Indicates which detected error has occurred, <i>FailCode</i> [0].
FailCode1	INT	Code of last level 1 detected error. Indicates which detected error has occurred, <i>FailCode</i> [1].
FailCode2	INT	Code of last level 2 detected error. Indicates which detected error has occurred, <i>FailCode</i> [2].

ATS22_CFG_DDT Type

Name	Type	Description
DataStatus, page 305	WORD	Provides the device status. Information on the <i>Status</i> output structure.
IOMap, page 306	WORD	Provides information on the state of the digital inputs/outputs of the device.
Info	INT	Provides device information.
WarningCode	INT	<i>WarningCode</i> register.
FailCode0	INT	Code of last level 0 detected error.
FailCode1	INT	Code of last level 1 detected error.
FailCode2	INT	Code of last level 2 detected error.
Frequency	INT	Voltage frequency in Hertz (w 279).
Voltage	INT	Input voltage in volts (w 260).

Name	Type	Description
TotalStarts	INT	Number of times that the ATS22 has started (w 274).
TotalRuntime	INT	Total time (in hours) during which the ATS22 has been operating (w 273).
LastStartTime	INT	Total time that the last start lasted (w 275).
LastStartMaxC	INT	Maximum detected current during last start (w 276).
TripCurrent	INT	Current present when last tripping event occurred (w 280).

ATS22_ST.STW Word Structure

Bit	Description
0	Unknown technological module status. No variable refreshing.
1	Not ready.
2	Device is running.
3	Inoperable device.
4	Alarm on the device (follow-up requires resetting).
5	Communication interruption.
6	Requires resetting. ResetFail is required.
7	Refer to the ExtControlled output pin, page 297.
8	Refer to the Reseting output pin, page 297.
9	Refer to the EnabledDFB input pin, page 295.

ATS_ST.STW Word Structure

Bit	Description
0	Unknown technological module status. No variable refreshing.
1	Not ready.
2	Device is running.
3	Inoperable device.
4	Alarm on the device or DFB (follow-up or screw terminal-based control).
5	Communication interruption.
6	Requires resetting. ResetFail is required.
7	Refer to the ExtControlled output pin, page 297.
8	Refer to the Reseting output pin, page 297.
9	Refer to the EnabledDFB input pin, page 295.

ATS22_ST.CFGW Word Structure

Bit	Description
0	Refer to the ResetFail input pin, page 295.
1	Owner.
6	Refer to the Run input pin, page 295.
7	Refer to the ControlCommand input pin, page 295.

NOTE: The `Owner` bit enables to control the block from the `***_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.

ATS_ST.CFGW Word Structure

Bit	Description
0	Refer to the <code>ResetFail</code> input pin, page 295.
1	<code>Owner</code> .
4	Refer to the <code>QuickStop</code> input pin, page 295
5	Refer to the <code>EnableDevice</code> input pin, page 295.
6	Refer to the <code>Run</code> input pin, page 295.
7	Refer to the <code>ControlCommand</code> input pin, page 295.

ATS22_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the <code>Ready</code> status in the <code>Status</code> output pin, page 297.
1	Refer to the <code>Running</code> status in the <code>Status</code> output pin, page 297.
2	Refer to the <code>Trip</code> status in the <code>Status</code> output pin, page 297.
3	Refer to the <code>Alarm</code> status in the <code>Status</code> output pin, page 297.
14	Refer to the <code>ForcedLocalMode</code> status in the <code>Status</code> output pin, page 297.
15	Refer to the <code>Ramping</code> status in the <code>Status</code> output pin, page 297.

ATS_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the <code>ReadyToSwitchOn</code> status in the <code>Status</code> output pin, page 297.
1	Refer to the <code>SwitchedOn</code> status in the <code>Status</code> output pin, page 297.
2	Refer to the <code>OperationEnabled</code> status in the <code>Status</code> output pin, page 297.
3	Refer to the <code>Malfunction</code> status in the <code>Status</code> output pin, page 297.
4	Refer to the <code>VoltageEnabled</code> status in the <code>Status</code> output pin, page 297.
5	Refer to the <code>QuickStop</code> status in the <code>Status</code> output pin, page 297
6	Refer to the <code>SwitchOnDisabled</code> status in the <code>Status</code> output pin, page 297.
7	Refer to the <code>Alarm</code> status in the <code>Status</code> output pin, page 297.
8	Refer to the <code>ForcedLocalMode</code> status in the <code>Status</code> output pin, page 297.
9	Refer to the <code>ResetAuthorization</code> status in the <code>Status</code> output pin, page 297.
10	Refer to the <code>Running</code> status in the <code>Status</code> output pin, page 297.
11	Refer to the <code>Accelerating</code> status in the <code>Status</code> output pin, page 297.
12	Refer to the <code>Decelarating</code> status in the <code>Status</code> output pin, page 297.

ATS22_CFG . IOMap Word Structure

Bit	Description
0	Refer to the LI1 output pin, page 297.
1	Refer to the LI2 output pin, page 297.
2	Refer to the LI3 output pin, page 297.
3	Refer to the R1 output pin, page 297.
4	Refer to the R2 output pin, page 297.

Diagnostic Information Management

Overview

The diagnostic codes the device can return are read from the `FailCode` output variable.

Parameter Configuration Diagnostic Codes

This detected error indicates that a public variable parameter contains a value that is not allowed.

To reload new values, a rising edge is required on the `EnableDFB` input.

- `FailCode[0]`: 16#0003
- `FailCode[1]`: 16#0000
- `FailCode[2]`: 16#0004

The `Failcode[0]` variable can have the following codes:

Diagnostic Code	Symbol	Meaning
0	NOF	No detected failure.
1	UCF	Motor current below minimum limit.
2	OCF	Motor current above maximum limit.
3	PHbd	Phase imbalance.
4	Grdf	Ground detected fault.
5	OLF	Motor overload.
6	OtF	Excessively high motor temperature.
7	OHF	Excessively high motor temperature detected.
8	PIF	Inverted phase detected fault.
9	PHF	Phase or line detected fault, or inoperable motor.
10	USF	No voltage or voltage too low.
11	OSF	Voltage too high.
12	StF	Excessive starting time.
13	Snbf	Too many starts.
14	SSCr	Connection or short-circuit detected fault in thyristor.
15	EtF	External detected fault.
16	InF	Internal detected fault.
17	SLF	Modbus timeout.
18	trAP	Trap code.

Diagnostic Code	Symbol	Meaning
19	SCF	Short-circuit.
20	bPF	Fault detected on bypass contactor.
21	CFE	Invalid configuration.

The inoperable device can be reset as long as `ControlCommand` is RUE. Otherwise, it can be reset on the starter through the screw terminal with the appropriate parameter configuration.

Modbus Communications Diagnostic Codes

For modbus communications, this code is used to indicate that communications have not been established. This code can be reset.

- `FailCode[0]: 16#0002`
- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0004`

After modbus communications have been established, check modbus client diagnostic codes for `FailCode [0]` and `FailCode [1]`. The components make a distinction between read requests problems and write requests problems:

- `FailCode[2]: 16#0001 Read`
- `FailCode[2]: 16#0002 Write`

Diagnostic Code Example

For a detected error, the code is:

- `FailCode[1]: 16#0000`
- `FailCode[2]: 16#0005`

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the ATS22 and ATS48.

Genies

Genie Properties

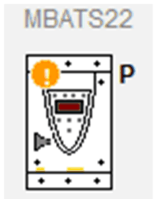
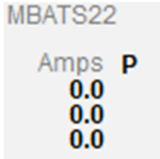

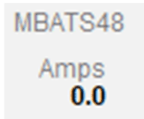
Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genres of the `gpl_devices` library:

Graphic symbol	Genie name	Description
ATS22		
	Ats22	Altistart 22 progressive starter.
	Ats22_Current	Current display of altistart 22 progressive starter.
ATS48		
	Ats48	Altistart 48 progressive starter.
	Ats48_Current	Current display of altistart 48 progressive starter.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a general description, page 40 of the graphic elements that are used in the faceplate.

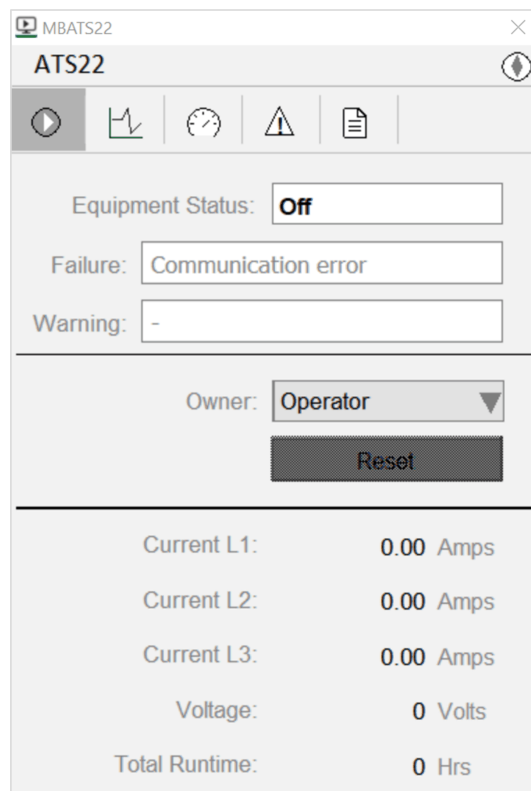
Available Tabs

During operation, clicking an ATS22 and ATS48 genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:



MBATS22

ATS22

Equipment Status:

Failure:

Warning:

Owner:

Current L1:	0.00 Amps
Current L2:	0.00 Amps
Current L3:	0.00 Amps
Voltage:	0 Volts
Total Runtime:	0 Hrs

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 289
Equipment Status	Closed	Equipment status of ATS22.	–
Failure	LastFailure, DeviceFailActive	Current detected failure status of ATS22.	
Warning	AlarmActive, CurrentWarning	Current alert status of ATS22.	
Owner	OwnerSelect	Owner of ATS22.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Current L1	CurrentL1	Active current at L1.	–
Current L2	CurrentL2	Active current at L2.	
Current L3	CurrentL3	Active current at L2.	
Voltage	Voltage	Input voltage in volts.	
Total Runtime	TotalRuntime	Total operating time in hours.	

Measures Tab

The table lists the items of each groups from group number 1 to 4 of measures tab of ATS22:

Group Order Number	1	2	3	4
Group Name	Owner	Current	Device Status	Maintenance
Items	ForcedLocalMode	CurrentLine1	Running	TotalStarts
		CurrentLine2	Ready	TotalRuntime
		CurrentLine3	Trip	LastStartTime
		Trip Current	Ramping	LastStartMaximumCurrent
			DeviceAlarmActive	

The table lists the items of each groups from group number 5 to 8 of measures tab of ATS22:

Group Order Number	5	6	7	8
Group Name	Diagnostics	Inputs	Outputs	Voltage and Ramp
Items	WarningCode	DigitalInput1	RelayOutput1	Voltage
	FailCode0	DigitalInput2	RelayOutput2	Frequency
	FailCode1	DigitalInput3		
	FailCode2			

The table lists the items of each groups of measures tab of ATS48:

Group Order Number	1	2	3	4	5	6
Group Name	Key Parameters	Owner	Device Status	Diagnostics	Inputs	Outputs
Items	Current	ForcedLocal-Mode	Running	WarningCode	DigitalInput1	AnalogOutput
	ThermicStatus		OperationEnabled	FailCode0	DigitalInput2	DigitalOutput1
	Torque		SwitchedONDisabled	FailCode1	DigitalInput3	DigitalOutput2
	CosPhi		ReadyToSwitchON	FailCode2	DigitalInput4	RelayOutput1
			SwitchedON			RelayOutput2
			Malfunction			RelayOutput3
			Decelerating			
			QuickStop			
			DeviceAlarmActive			
			Resetting			
			Accelerating			
			VoltageEnabled			

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of ATS22 and ATS48.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumera- tion	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/ Inactive	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Detected fail resetting required	Required/Not Required	Bit6
OwnerExternal	Device is externally controlled	External/Not External	Bit7
Resetting	Normal execution of control block	–	Bit8
EnableFunctional-Block	Normal execution of control block	–	Bit9
Bit items derived from DataStatusWord for ATS22.			
Ready	Device is ready to switch on	–	Bit0
Trip	Starter is tripped	–	Bit2
AlarmStatus	Alarm present on the device	–	Bit3
Ramping	Starter is accelerating or decelerating	–	Bit5
Bit items derived from DataStatusWord ATS48.			
ReadyToSwitchON	Device is ready to switch on	–	Bit0
SwitchedON	Device is ready to switch on	–	Bit1
OperationEnabled	Starter is tripped	–	Bit2
Malfunction	Starter is accelerating or decelerating	–	Bit3
QuickStop	Quick stop is activated	–	Bit5
SwitchedONDisabled	Switch on is disabled	–	Bit6
AlarmStatus	Alarm present on the device	–	Bit7
ResetAuthorization	Reset authorization	–	Bit9
Accelerating	Accelerating	–	Bit11
Decelerating	Decelerating	–	Bit12
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected fail	Active/ Inactive	Bit0
OwnerSelect	Owner of control module	Operator/ Program	Bit1
Run	Start the starter	–	Bit6
ControlCommand	Indicates mode of control	–	Bit7
IO Items			
StatusWord	Status word	–	ATS22_ST.STW and ATS48_ST.STW
ConfigurationWord	Configuration word		ATS22_ST.CFGW and ATS48_ST.CFGW

Item name	Description	Enumeration	Address
DataStatusWord	Data Status word		ATS22_CFG. DataStatus and ATS48_CFG. DataStatus
Calculated Items			
CurrentWarning	Current detected fault	–	GPL_ ATS22CurrentWarning and GPL_ ATS48CurrentWarning
LastFailure	Last detected error		GPL_ATS22LastFailure and GPL_ ATS48LastFailure
Owner	Current owner of the ATS22 and ATS48 Refer to Calculated Variable, page 39.		GPL_OwnerBasic
Abnormal	Shows abnormal condition of the ATS22 and ATS48 Refer to Abnormal Conditions, page 312.		GPL_DeviceAbnormal
ActionRequired	Shows action required condition of the ATS22 and ATS48 Refer to Action Required Conditions, page 312.		GPL_ DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of ATS22 and ATS48:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	Bit0
AbnormalOperatorTab	Abnormal status of operator tab.	Bit8

Action Required Conditions

The table describes the abnormal conditions of ATS22 and ATS48:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	Bit8

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
AlarmFailure	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
Current-Line1	Line 1 current consumption	<i>ATS_CurrentLine1</i>
Current-Line2	Line 2 current consumption	<i>ATS_CurrentLine2</i>
Current-Line3	Line 3 current consumption	<i>ATS_CurrentLine3</i>

MBTCPATS480- ATS480 (Modbus TCP/IP) and EIPATS480 - ATS480 (Ethernet IP) Soft Starter

What's in This Chapter

Template	314
Control	319
Supervision.....	334

Overview

The ATS progressive starter profile is used to manage ATS soft starters on a Modbus TCP/IP and Ethernet IP network.

Template

Overview

This section describes functionality of the \$ATS480MBTCPGP and \$ATS480EIPGP template.

Description

General Description

The \$ATS480MBTCPGP and \$ATS480EIPGP control module template allows you to manage an ATS480 soft starter on a modbus TCP/IP and Ethernet IP network.

NOTE: Hardware template EATS480HW is common for Both \$ATS480MBTCPGP and \$ATS480EIPGP templates. User can access EATS480HW template from location: **Create Device-IO> Modbus TCP**.

Function Description

The main functions of the template are described in the following table:

Function	Description
Control	Start/Stop command.
Inoperable device	Monitors the inoperable device.
Remote resetting	Allows resetting of the device.
Control	Enables you to monitor the device. You can control from the controller or with the wired inputs/ outputs of the soft starter.

Parameters

Parameters

The \$ATS480MBTCPGP and \$ATS480EIPGP templates provides different control and supervision parameters to the user to control the functions as per the requirement .

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Cyclic				
Configuration	Starter mode	Enum	True Value (2)	
	Automatic reset	Boolean	FALSE	
	Current scaling factor	Enum	10.0 (10)	
Time	Command timeout	Duration	00:00:05	Time the device takes to execute commands.
	Minimum time to maintain warning signals		00:00:03	The time duration for which the detected fault pin signal remains 1.
	Maximum time between auto resets		00:01:00	The maximum time between two automatic resets of the template.
Acyclic				
Configuration	Enable static selector	Boolean	00:01:00	
Time	Soft starter status update rate	Duration	00:00:00:05	

Supervision

The table describes the supervision parameters:

Section	Parameter description	Type	Default	Additional remarks
Settings				
Operation	Normal owner	Enum	<i>Operator & Program (2)</i>	It allows to define the normal owner groups and any other owner who has logged in indicates an abnormality in graphics.
Security	Set owner	Enum	<i>Operator (1)</i>	Privilege to change override mode. This parameter is used in operator tab, page 335.
	Set rearm		<i>Operator (Confirmed) (10)</i>	Privilege to change reset. This parameter is used in operator tab, page 335.
	Set acknowledge		<i>Operator (1)</i>	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 47.

Section	Parameter description	Type	Default	Additional remarks
Trend	Sample period	Duration	00:00:05	—
	History length (weeks)	Integer	5	—
	History rollover time	Duration	12:00:00	—
	History rollover day	String	Tuesday	—
	Data location (optional)		[Data];	—
Data				
Configu- ration	ATS480Basic			
	Current phase engineering zero value	Float	0.0	—
	Current phase engineering full value		1000.0	—
	Item name NOTE: This parameter is only applicable for \$ATS480MBTCP-GP and \$ATS480EIPGP	Enum	Current (0)	—
Dead-band	Current	Float	0.0	—
	Torque	Integer	0	—
	Power factor	Float	0.0	—
	Thermic status	Integer	0	—
	Operation time	Integer	0	—
	Power ON time	Integer	0	—
Alarm	Operation failure alarm description/ Device failure alarm description/ Communication failure alarm description	String	@(Operation Failure Alarm)/ @(Device Failure Alarm)/ @ (Communication Failure Alarm)	—
	Operation failure alarm severity/ Device failure alarm severity/ Communication failure alarm severity	Enum	Low(4000)	—
	Operation failure alarm group/Device failure alarm group/ Communication failure alarm group	String	Failure	—
Variable	Disable current	Boolean	FALSE	—
	Disable torque			—
	Disable thermic status			—
	Disable operation time			—
	Disable power factor			—
	Disable power ON time			—
	Disable number of starts			—

Section	Parameter description	Type	Default	Additional remarks
	Disable product status			—
Trend	Disable current	Boolean	FALSE	—
	Disable torque			—
	Disable thermic status			—
	Disable power factor			—
	Disable operation time			—
	Disable power ON time			—
	Disable number of starts			—
Historize	Current	Boolean	FALSE	—
	Torque			—
	Thermic status			—
	Operation time			—
	Power factor			—
	Power ON time			—
	Number of starts			—
	Product status			—
	Fail code			—
	Warning code			—
	Data			—
	Information			—
	Device state			—
	ATS480IO			
Variable	Disable output map	Boolean	FALSE	—
	Disable AQ1 analog output			—
Historize	Output map	Boolean	FALSE	—
	AQ1 analog output			—
ATS480IOEXT				
Dead-band	Energy consumed	Float	0.0	
Variable	Disable inputs map	Boolean	FALSE	—
	Disable energy consumed			—
Trend	Disable energy consumed	Boolean	FALSE	—
Historize	Inputs map	Boolean	FALSE	—
	Eenergy consumed			—

Asset and Display Parameters

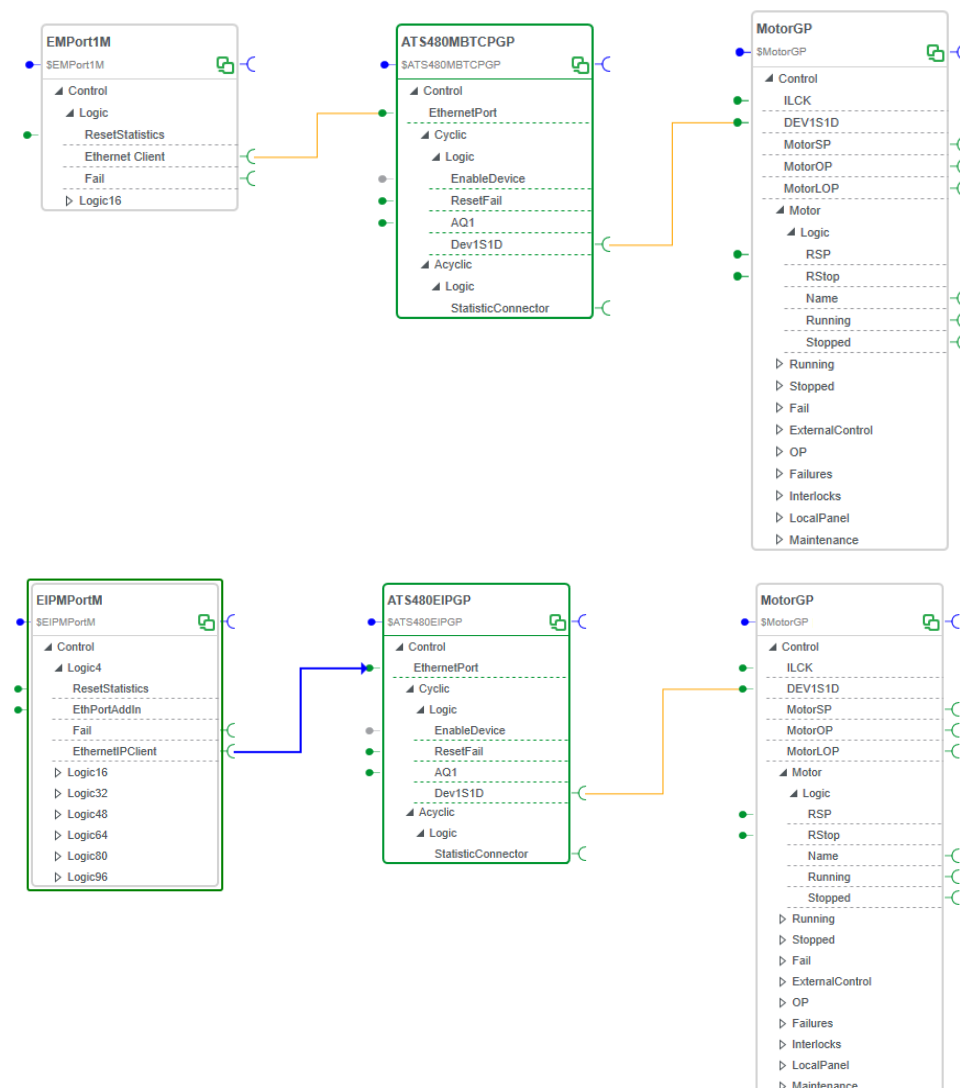
For more details, refer to the topic describing the parameters of asset and display, page 28.

Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

This figure shows the \$ATS480MBTCPGP (also applicable for \$ATS480MBTCPCE) and \$ATS480EIPGP (also applicable for \$ATS480EIPCE template as it appears in Links Editor and an example of other templates connected to it:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
Enable device	\$Bool/Ref	An input interface from other template to enable device. This will be enabled only when enable device type parameter is selected as interface.	Connect a boolean variable to enable/disable device.
ResetFail	\$Bool/Ref	An input interface from other template to reset the detected fail.	A boolean variable can be assigned to reset the starter.
AQ1	\$Int/Ref	An input interface from other template to connect Alanog Output value	—

Interface identifier	Type/Role	Description	Example
Dev1SlD	<i>\$Int/Ref</i>	An input interface from other template obtain statistics for the network	An integer variable can be connected to obtain statistics for the network. Refer DFB pin description for more details.
StatisticCon- nector	<i>\$StatisticConnector- NameGP/Ref</i>	provides the Information used with communication to obtain statistics on the network.	–

Control

Overview

This chapter describes the EIOSATS480, EMESATS480DATA, and EIPATS480DATA DFB.

EIOSATS480

Overview

This chapter describes the EIOSATS480 DFB.

Description

General

The ATS progressive starter profile is used to manage ATS soft starters on a Modbus TCP/IP and Ethernet IP network.

Function Description

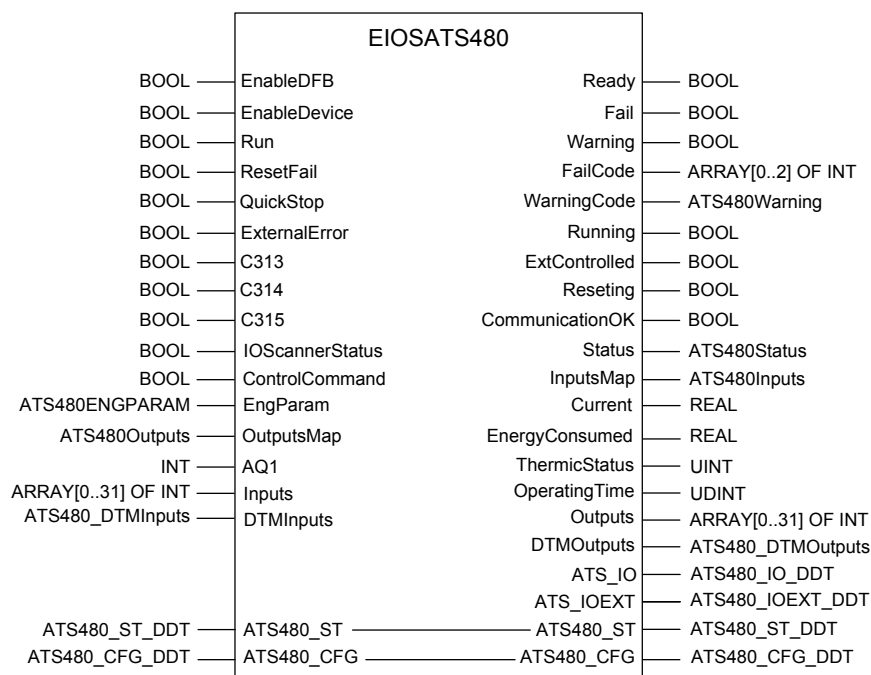
The main functions of the DFB are described in the following table:

Function	Description
Control	Start/Stop command.
Inoperable device	Monitors the inoperable device.
Remote resetting	Allows resetting of the device.
Control	Enables you to monitor the device. You can control from the controller or with the wired inputs/outputs of the soft starter.

DFB Representation

Representation

The following figure represents the functional module of ATS profile:



Inputs

Input Parameter Description

Parameter	Type	Description
EnabledDFB	BOOL	This input enables the normal execution of the control block. <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, 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.
EnableDe-vice	BOOL	1 = Enables the devices if the EnabledDFB variable is active. The starter has to be enabled in order to be controlled.
Run	BOOL	1 = Starts the starter. (in case controller is controlling). If the device is being enabled or reset, reset the inputs so that unexpected starts do not occur. In these cases, first reset the input to resume the operation.
ResetFail	REAL	Sends a reset command to the device if ControlCommand is 1. You can carry out communication resets when required.
QuickStop	BOOL	1 = Stops the starter quickly with freewheel stop. It is state-based. This input is active on level 1. If there is a QuickStop, the Run bit has to be reset to resume operation. Until QuickStop == 1, it is not possible to Run.
External-Error	BOOL	Detected external error. NOTE: Drive can not be reset when ExternalError is active.. NOTE: User need to map with C312 in ATS device to consider the External Error.
C313	BOOL	User configurable digital input.

Parameter	Type	Description	
C314	BOOL	User configurable digital input.	
C315	BOOL	User configurable digital input.	
IOScan- nerStatus	BOOL	1 = The node is present on the bus. You can find this variable in Modbus TCP/IP and Ethernet IP communications.	
Control- Command	BOOL	Indicates to the DFB whether the motor is being controlled by the controller (DFB) or from a source external to the controller (ex: Terminal, HMI.). <ul style="list-style-type: none"> 0 = Performs only read operations to monitor the status of the device and does not perform any control function and reset. 1 = Performs read operations and performs control operations not conflicting with control commands coming from an external control source. NOTE: This bit allows the controller to switch the control channel from controller to terminal (as configured using ATS480 profile). However, local forcing through terminal or local hmi control are prior to this. NOTE: User need to map with C311 in ATS device to consider the control command.	
EngParam	AT- S480ENG- PARAM	ATS480 engineering parameters for cyclic data.	
	Name	Type	Description
	Com- man- dCtrlWin- dow	TIME	Time window for the device to execute orders.
	ScanTime	TIME	Minimum time to maintain alert signals.
	MaxReset- Time	TIME	Maximum time between two resets.
	Scaling- Factor- Current	REAL	Define scaling factor for current depending on Softstarter rate.
	ResetMode	BOOL	False = Manual reset, True = Automatic reset
Outputs- Map	AT- S480Out- puts	Holds a data structure used to control the soft starter outputs. The soft starter outputs can only be controlled with this input variable These parameters(R1/R2/R3) cannot be controlled from the HMI/ SCADA system.	
	Name	Type	Description
	DO1	BOOL	Controls the state of the Digital output DO1
	DO2	BOOL	Control the state of Digital Output DO2
	R1	BOOL	Controls the state of the R1 digital output. Accessible in write mode if R1 is not assigned
	R2	BOOL	Controls the state of the R2 digital output. Accessible in write mode if R2 is not assigned
	R3	BOOL	Controls the state of the R3 digital output. Accessible in write mode if R3 is not assigned
AQ1	INT	Controls the value of the AQ1 Analog output. Range(0 - 20000).	
COMMUNICATION WITH DEVICE (CYCLIC)			
Inputs	ARRAY [0... 31] INT	Holds an array structure of 32 WORDS with the data obtained from the device. The first elements of the table i.e. Inputs[0] .. Input [7] corresponds to the mandatory elements required by the DFB to support standard features. The Free arrays are available to add any additional variables in Implicit exchanges,	

Parameter	Type	Description	
		<p>You can control the starter with this input variable. This input is reserved for the DFB, and you cannot use this input directly. For the control block to work properly, allocate the structure (%MWx). Refer to the Communication Technologies.</p> <p>The Inputs pin should not be connected when DTMInputs pin is connected, otherwise the function detects an incorrect configuration.</p> <p>The following table describes the INPUTS structure:</p>	
	Name	Type	Description
	Inputs[0]	INT	Status word (ETA)
	Inputs[1]	INT	Motor current (LCR)
	Inputs[2]	INT	Thermic Status (THR)
	Inputs[3]	INT	CiA402 fault code (ERRD)
	Inputs[4]	INT	Logic input states (IL1R)
	Inputs[5] and Inputs[6]	INT	Run elapsed time (RTH)
	Inputs[7] and Inputs[8]	INT	Electrical Energy Consumed (OCK)
	Inputs[9]	INT	Active command channel (CCC)
	Inputs[10]..Inputs[31]	INT	Free
DTMInputs	ATS480_IN_DDT	<p>Holds an array structure for the data to be obtained from device DTM. It is possible to read device monitoring information using this variable.</p> <p>This input has to be used with device DTM and is linked to ATS480 profile I/O scanning configuration.</p> <p>The Inputs pin should not be connected when DTMInputs pin is connected, otherwise the function detects an incorrect configuration. for more details, refer to</p>	
	Parameter	Type	Description
	ETA	WORD	CiA402 status word
	LCR	UINT	Motor current (used for error detection).
	THR	UINT	Motor Thermal state.
	ERRD	WORD	Detected error code.
	IL1R	WORD	Logic inputs states.
	RTH	UDINT	Run elapsed time (s)
	OCK	UDINT	Energy consumed (kWh).
	CCC	WORD	Active command channel

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.

Outputs

Output Parameter Description

Name	Type	Description	
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command. This variable is always TRUE as long as there are no communications error and no detected errors in device.	
Fail	BOOL	1 = A detected failure in the control block or in the device or a communication interruption.To reset the <code>Fail</code> output pin, the <code>ResetFail</code> input has to be activated. The last detected error code is shown on <code>FailCode</code> . NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.	
Warning	BOOL	1 = An alarm has been activated for the device. It does not affect the block operation and does not need to be reset. This signal remains active until the cause of the alarm disappears.	
FailCode	ARRAY [0..2] OF INT	When <code>Fail</code> output is 1, it holds the code for the detected error. If <code>Fail</code> 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 Diagnostic Information Management, page 306 section.	
WarningCode*	ATS480WARNING	The <code>WarningCode</code> output is a data structure with information on the alarm currently on the starter.	
	Name	Type	Description
	Device	BOOL	1 = The device is forced locally. It is controlled through the screw terminals.
	Order	BOOL	1 = An alarm is present on the device.
	ForcedLocalMode	BOOL	1 = A follow-up alarm. The device is not responding to the control command (<code>Run</code> , <code>QuickStop</code> , so on) within the time specified in <code>CommandCtrlWindow</code> .
	ReservedCommand-Channel	BOOL	1 = The device command channel is reserved by DTM (Control Expert or <code>SoMove</code>)..
Running	BOOL	1 = The soft starter is running.	
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 <code>ControlCommand</code> signal, the <code>Owner</code> variable, and the <code>ForcedLocalMode</code> status are used to activate this signal. You cannot use this signal as a <code>ControlCommand</code> input.	
Reseting	BOOL	1 = A reset is being carried out. The <code>CommandCtrlWindow</code> variable indicates the maximum time for resetting the detected failure. When a device or communication reset is carried out with <code>ResetFail</code> , the DFB tries to reset the detected failure within the time period defined in <code>CommandCtrlWindow</code> . If the detected failure is reset, the <code>Fail</code> and <code>Reseting</code> output variables are reset (set to FALSE). On the other hand, if the detected failure is not reset, the <code>Reseting</code> variable is set to FALSE and the <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based. Refer to the Timing diagram below:	

Name	Type	Description
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Name	Type	Description				
	Info	INT	Numerical code with the information on statuses and required actions. Refer to the Info table below.			
InputsMap*	ATS480Inputs	Holds a data structure with the information on the state of the inputs of the soft starter. The following table describes the InputsMap:				
	Parameter	Name	Type	Bit	Description	
	Inputs	DI1	BOOL	0	1 = The state of the digital input DI1.	
		DI2	BOOL	1	1 = The state of the digital input DI2.	
		DI3	BOOL	2	1 = The state of the digital input DI3.	
		DI4	BOOL	3	1 = The state of the digital input DI4.	
Current	REAL	Motor current (A).				
EnergyConsumed	REAL	Electrical energy consumed by the motor. (kWh).				
ThermicStatus	UINT	Motor thermic status in %.				
OperatingTime	REAL	Total time (in hours) during which the soft starter has been operating.				
Outputs	ARRAY [0..31] of INT	WORD		Data sent to the soft starter (Used by DFB). This is an array of 32 words which can be used by User in case he wants to add additional variables in Implicit exchanges. The first elements of the table will correspond to the mandatory elements required by the DFB to support standard features. The other elements will not be used by the DFB itself.		
	Name		Type	Description		
	Outputs {0}		INT	Command word (CMD).		
	Outputs {1}		INT	Logic output states (OL1R).		
	Outputs {2}		INT	AQ1 physical value (AO1C).		
	Outputs {x}		INT	Free		
DTMOutputs	ATS480_OUT_DDT	Holds an array structure with the data obtained from the device. It is not possible to control the soft starter with this input variable. This input is reserved for the DFB, and cannot be used directly. The Inputs pin should not be connected when DTMInputs pin is connected, otherwise the function detects an incorrect configuration. This input is linked to ATS4xx profile I/O scanning configuration.				
	Name	Type		Description		
	CMD	WORD		Command register		
	OL1R	WORD		Logic output states.		
	AO1C	INT		AQ1 physical value		
	ATS_IO*	ATS480_IO_DDT	Device data structure holds the information for performing monitoring functions. The information used by the operator screen is readable from HMI or SCADA system. (device outputs).			
Name		Bit name	Type	Bit	Description	
OutputsMap		–	WORD	–	Data with the soft starter driver's outputs.	
		DO1	BOOL	0	DO1 output state.	
		DO2	BOOL	1	DO2 output state.	
		R1	BOOL	2	R1 output state.	
		R2	BOOL	3	R2 output state.	
		R3	BOOL	4	R3 output state.	
		AQ1	–	INT	Range(0 - 20000). Controls the value of the AO1 analog output. (Value of AQ1 input variable).	

Name	Type	Description			
	Current	–	REAL	Motor current value in Ampere(A) Linked to DTMInputs – [LCR] when DTMInput is used.	
ATS_IOEXT	ATS4XX_IOEXT_DDT	Device data structure that holds information for performing monitoring functions. The Information used by the operator screen is readable from HMI or SCADA system. (device inputs)			
	Name	Bit name	Type	Bit	Description
	InputsMap	–	WORD	–	Data with the soft starter's inputs.
		D1	BOOL	0	Value of digital input DI1 (InputsMap.DI1)
		D2	BOOL	1	Value of digital input DI2 (InputsMap.DI2)
		D3	BOOL	2	Value of digital input DI3 (InputsMap.DI3)
		D4	BOOL	3	Value of digital input DI4 (InputsMap.DI4)
Energyconsumed	–	REAL	Electrical Energy consumed by Motor (kWh).		
NOTE: <ul style="list-style-type: none">x represents from 0 to 31.* These parameters are available only with specific components.					

State

The following table describes the `state` variable of EIOSATS480:

Variable value	Description
-2	DFB error.
-1	Not initialized. Waiting for data.
0	Disabled.
2	Switch on disabled (<code>nst status</code>).
3	Ready to switch on (<code>nst status</code>).
4	SwitchedOn (<code>nst status</code>).
5	Operation enabled (<code>Rdy status</code>).
6	QuickStop (<code>Fst status</code>).
8	Inoperable device (<code>FLT status</code>).

Info

The following table describes the `Info` variable of EIOSATS480:

Variable value	Description
1	Error in parameter configuration
2	WAITING SwitchOnDisable.
3	WAITING ReadyToSwitchOn.
4	WAITING SwitchOn.
5	WAITING OperationEnabled.
6	WAITING QuickStopActive.
10	Waiting for device information
11	MISSING EnableDFB.
12	Detected communications failure
13	ETA value is 0.
14	REMOVE Local forcing should be 0.

Variable value	Description
21	MISSING EnableDevice.
23	REMOVE Run should be 0.
24	REMOVE ResetFail. Reset again
51	Soft starter stopped
53	Soft starter running
56	WAITING Soft starter operation (Run).
57	WAITING soft starter stop
61	REMOVE QuickStop should be 0.
62	QuickStop is activated
81	MISSING ResetFail. Soft starter error
82	DO soft starter reset
99	Unexpected state.

Inputs/Outputs

Input/Output Parameter Description

Name	Type	Description
ATS480_ST*	ATS480_ST_DDT	Device data structure holds the minimum information required for performing control and monitoring. The information is used by the operator screen and can be read from or written to HMI/SCADA system.
ATS_CFG*	ATS_CFG_DDT	Device data structure with device information. Information used by the operator screen is readable from the HMI or SCADA system.
* These parameters are available only with specific components.		

ATS480_ST_DDT Type

Name	Bit name	Bit	Type	Description
STW	-	-	WORD	Provides the device status. Access to the data held in this bit word is read-only.
	Unknown	0	BOOL	Unknown technological module status. No variable refreshing.
	NotReady	1	BOOL	Not ready.
	Running	2	BOOL	Device is running.
	Failure	3	BOOL	Inoperable device.
	Alarm	4	BOOL	Alarm on the device (follow-up requires resetting).
	Communi- cation- Failure	5	BOOL	Detected Communications failure.
	RearmReq	6	BOOL	Requires resetting.
	ExtCon- trolled	7	BOOL	Device is externally controlled.
	Reseting	8	BOOL	1 = A reset is being carried out.
	EnabledDFB	9	BOOL	DFB is enabled, it indicates the normal execution of control block.
CFGW	-	-	WORD	Device control.

Name	Bit name	Bit	Type	Description
				Enables to control the device from the monitoring subsystem or from the operator screen if <code>Owner</code> (1), or only from the monitoring subsystem if <code>Owner</code> (0). If <code>Owner</code> is 0, it takes the input variables of the DFB as a value for reading from the HMI/ SCADA system.
	ResetFail	0	BOOL	ResetFail command.
	Owner	1	BOOL	Owner 0 = Program, 1 = Operator.
	QuickStop	4	BOOL	1 = Quick stop is activated.
	EnableDe-vice	5	BOOL	1 = Soft starter is enabled..
	Run	6	BOOL	Run command.
	Control-Command	7	BOOL	Control Command.
Current	-		REAL	Motor current value in Ampere(A).
Thermic-Status	-		UDINT	Motor thermic status in %..
Operating-Time	-		UINT	Total time (in hours) during which the soft starter has been operating.

ATS480_CFG_DDT Type

Name	Bit name	Bit	Type	Description
Data-Status	-	-	WORD	Provides the device status. Information on the <code>Status</code> output structure.
	ReadyToS-witchOn	0	BOOL	1 = Ready to switch ON.
	Switche-dOn	1	BOOL	1 = Switched ON.
	Operatio-nEnabled	2	BOOL	1 = Operation enabled, Running.
	Malfunc-tion	3	BOOL	1 = Inoperable device.
	Volta-geEnabled	4	BOOL	1 = Voltage on device terminals.
	QuickStop	5	BOOL	0 = Quick stop activated.
	SwitchOn-Disabled	6	BOOL	1 = Switch on disabled.
	Alarm	7	BOOL	1 = Alarm present on device.
	ForcedLo-calMode	8	BOOL	0 = Forced local mode.
Chan-nelSta-tus	-	-	WORD	Information on the channel status.
	Reserved-Command-Channel	0	BOOL	Command channel is reserved by DTM (Control Expert, SoMove) or WEB server
Info	-	-	INT	Provides device information.
State	-	-	INT	Soft starter status code.
Fail-Code0	-	-	INT	The last active FailCode[0] register.
Fail-Code1	-	-	INT	The last active FailCode[1] register

Name	Bit name	Bit	Type	Description
Fail-Code2	-	-	INT	The last active FailCode[2] register
Warning-Code	-	-	WORD	Data structure with information on the alarm currently on the starter.

EMESATS480DATA

Overview

This chapter describes the EMESATS480DATA DFB.

Description

General

The ATS progressive starter profile is used to manage ATS soft starters on a Modbus TCP/IP network.

Function Description

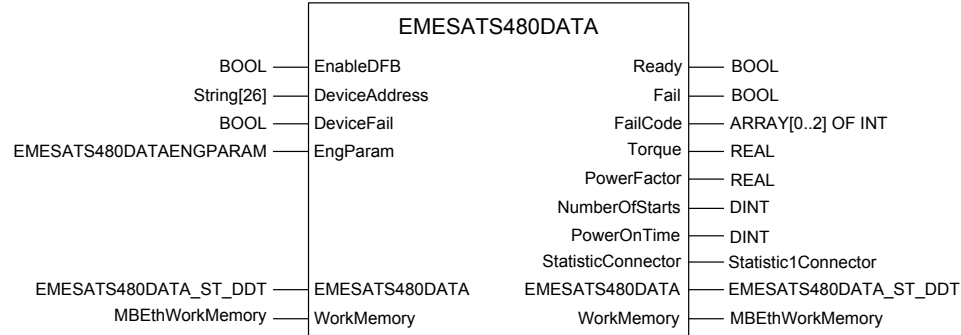
The main functions of the DFB are described in the following table:

Function	Description
Control	Start/Stop command.
Inoperable device	Monitors the inoperable device.
Remote resetting	Allows resetting of the device.
Control	Enables you to monitor the device. You can control from the controller or with the wired inputs/outputs of the soft starter.

DFB Representation

Representation

The following figure represents the functional module of ATS profile:



Inputs

Input Parameter Description

Parameter	Type	Description	
EnabledDFB	BOOL	This input enables the normal execution of the control block. <ul style="list-style-type: none">0 = The entire DFB is restarted (statuses, 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.	
DeviceAddress	STRING[26]	Device address within the Modbus TCP/IP network.	
Device fail	BOOL	Device is in inoperable condition. NOTE: The DeviceFail pin connects to the output Fail pin of the EIOSATS480 DFB.	
EngParam	ATS480DA-TAENGPARAM	ATS480 add-on engineering parameters for acyclic data.	
	Parameter	Type	Description
	StatisticSelector	INT	Set to enable the computation of statistics.
	Refresh	Time	Time to refresh the cyclic data.

Outputs

Output Parameter Description

Name	Type	Description	
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command. This variable is always TRUE as long as there are no communications error and no detected errors in device.	
Fail	BOOL	1 = A detected failure in the control block or in the device or a communication interruption.To reset the Fail output pin, the ResetFail input has to be activated. The last detected error code is shown on FailCode. NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.	
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 Diagnostic Information Management, page 306 section.	
Torque	REAL	Motor torque in %.	
PowerFactor	REAL	Current value of phi cosine.	
NumberOfStarts	DINT	Number of Starts.	
PowerOnTime	DINT	Power on Time.	
StatisticConnector	StatisticConnector	Data to StatisticConnector input of StatisticCounter DFB.	
	Name	Type	Description
	Start	BOOL	Ready to create request.
	EndOK	BOOL	Request is successful.
	EndNOK	BOOL	Request is not successful.
	TotalTime	DINT	Total time taken for the current request.

Inputs/Outputs

Input/Output Parameter Description

Name	Type	Description
EMESATS480-DATA_ST	EMESATS480DATA_ST_DDT	Device data structure 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.
WorkMemory	MBEthWorkMemory	Memory area, which contains the client reference.
* These parameters are available only with specific components.		

EMESATS480DATA_ST_DDT Type

Name	Type	Description		
STW	WORD	Provides the device status. Access to the data held in this bit word is read-only.		
		Name	Type	Bit
		Explic-itCom-Status	BOOL	0
		Description		
		Explicit communication status.		
Torque	REAL	Motor torque in %.		
Power-Factor	REAL	Current value of phi cosine.		
Number-Of-Starts	DINT	Number of starts.		
Power-OnTime	DINT	Power on time.		
HMIS	INT	HMI drive status.		

EIPATS480DATA

Overview

This chapter describes the EIPATS480DATA DFB.

Description

General

The ATS progressive starter profile is used to manage ATS soft starters on a Ethernet IP network.

Function Description

The main functions of the DFB are described in the following table:

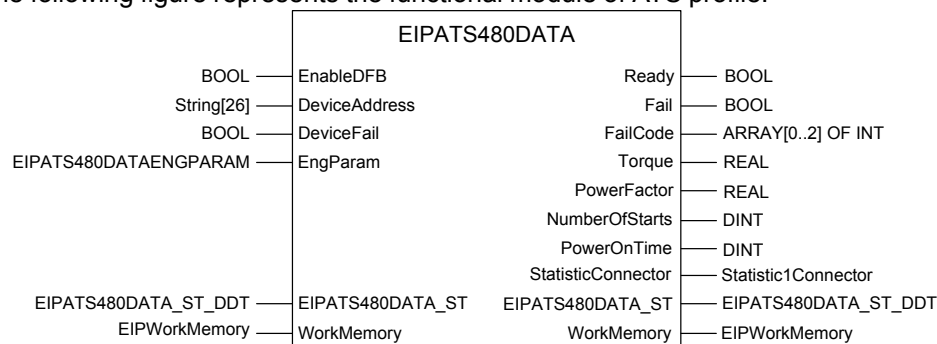
Function	Description
Control	Start/Stop command.
Inoperable device	Monitors the inoperable device.

Function	Description
Remote resetting	Allows resetting of the device.
Control	Enables you to monitor the device. You can control from the controller or with the wired inputs/outputs of the soft starter.

DFB Representation

Representation

The following figure represents the functional module of ATS profile:



Inputs

Input Parameter Description

Parameter	Type	Description	
EnableDFB	BOOL	This input enables the normal execution of the control block. <ul style="list-style-type: none">0 = The entire DFB is restarted (statuses, 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.	
DeviceAddress	STRING[26]	Device address within the Ethernet IP network.	
Device fail	BOOL	Device is in inoperable condition. NOTE: The DeviceFail pin connects to the output Fail pin of the EIOSATS480 DFB.	
EngParam	ATS480DA-TAENGPARAM	ATS480 add-on engineering parameters for acyclic data.	
	Parameter	Type	Description
	StatisticSelector	INT	Set to enable the computation of statistics.
	Refresh	Time	Time to refresh the cyclic data.

Outputs

Output Parameter Description

Name	Type	Description	
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command. This variable is always TRUE as long as there are no communications error and no detected errors in device.	
Fail	BOOL	1 = A detected failure in the control block or in the device or a communication interruption.To reset the <code>Fail</code> output pin, the <code>ResetFail</code> input has to be activated. The last detected error code is shown on <code>FailCode</code> . NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.	
FailCode	ARRAY [0..2] OF INT	When <code>Fail</code> output is 1, it holds the code for the detected error. If <code>Fail</code> 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 <code>Diagnostic Information Management</code> , page 306 section.	
Torque	REAL	Motor torque in %.	
PowerFactor	REAL	Current value of phi cosine.	
NumberOfStarts	DINT	Number of Starts.	
PowerOnTime	DINT	Power on Time.	
StatisticConnector	StatisticConnector	Data to <code>StatisticConnector</code> input of <code>StatisticCounter</code> DFB.	
	Name	Type	Description
	Start	BOOL	Ready to create request.
	EndOK	BOOL	Request is successful.
	EndNOK	BOOL	Request is not successful.
	TotalTime	DINT	Total time taken for the current request.

Inputs/Outputs

Input/Output Parameter Description

Name	Type	Description
EIPATS480-DATA_ST	EIPATS480DATA_ST_DDT	Device data structure 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.
WorkMemory	EIPWorkMemory	Memory area, which contains the client reference.
* These parameters are available only with specific components.		

EIPATS480DATA_ST_DDT Type

Name	Type	Description		
STW	WORD	Provides the device status. Access to the data held in this bit word is read-only.		
	Name	Type	Bit	Description
	Explic- itCom- Status	BOOL	0	Explicit communication status.
Torque	REAL		Motor torque in %.	

Name	Type	Description
Power-Factor	REAL	Current value of phi cosine.
Number-Of-Starts	DINT	Number of starts.
Power-OnTime	DINT	Power on time.
HMIS	INT	HMI drive status.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for ATS480.

Genies

Genie Properties


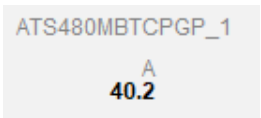
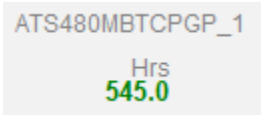
Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
ATS22		
 <p>ATS480MBTCPGP_1</p>	Ats480	Altistart 480 progressive starter.
 <p>ATS480MBTCPGP_1</p> <p>A 40.2</p>	Ats48_Current	Current display of Altistart 480 progressive starter.
 <p>ATS480MBTCPGP_1</p> <p>Hrs 545.0</p>	Itemvalue	ATS480 user configurable item.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a general description, page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking the **ATS480** genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 289
Equipment Status	Running	Equipment status of ATS480 .	–
Failure	LastFailure, DeviceFailActive	Current detected failure status of ATS480 .	
Warning	AlarmActive, CurrentWarning	Current alert status of ATS480 .	
Owner	OwnerSelect	Owner of ATS480 .	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation.	Set rearm

Label	Item name	Description	Security parameter, page 289
		NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	
Current	Current	Active current in Amps.	–
Torque	Torque	Motor Torque in %.	
Thermal status	ThermicStatus	Motor thermal capacity in %.	
Power Factor	PowerFactor	Power Factor.	
Energy Consumed	EnergyConsumed	Electrical energy consumed in kWh.	

Measures Tab

The table lists the items of each groups of measures tab of ATS480:

Group Order Number	1	2	3	4	4	5	6
Group Name	Key Parameters	Owner	Device Status	Device Info	Diagnostics	Inputs	Outputs
Items	Current	Forced Local Mode	Device Status	InformationCode	Last Diagnostic Code	Digital Input1	Analog Output
	Torque		Ready to Switch On	DeviceState	Last Diagnostic Code 0	Digital Input2	Digital Output 1
	Thermal Status		Switched ON		Last Diagnostic Code 1	Digital Input3	Digital Output 2
	Power Factor		Operation Enabled		Last Diagnostic Code 2	Digital Input4	Relay Output 1
	Operation Time		Malfunction				Relay Output 2
	Power On Time		Voltage Enabled				Relay Output 3
	Number of Starts		Quick Stop				
	Energy Consumed		Switch ON Disabled				
			Detected Alarm				
			Equipment Status				
			Command Channel Reserved by DTM				

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of ATS480.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumera- tion	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/ Inactive	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Requires resetting	Required/Not Required	Bit6
OwnerExternal	Device is externally controlled	External/Not External	Bit7
Resetting	Normal execution of control block	–	Bit8
EnableFunctional-Block	Normal execution of control block	–	Bit9
Bit items derived from DataStatusWord ATS480.			
ReadyToSwitchON	Device is ready to switch on	–	Bit0
SwitchedON	Device is ready to switch on	–	Bit1
OperationEnabled	Starter is tripped	–	Bit2
Malfunction	Starter is accelerating or decelerating	–	Bit3
VoltageEnabled	Voltage Enabled	–	Bit4
QuickStop	Quick stop is activated	–	Bit5
SwitchedONDisabled	Switch on is disabled	–	Bit6
AlarmStatus	Alarm present on the device	–	Bit7
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected fail	Active/ Inactive	Bit0
OwnerSelect	Owner of control module	Operator/ Program	Bit1
QuickStopCommand	Stops the device quickly	–	Bit4
EnableDevice	Enables Device	–	Bit5
Run	Start the starter	–	Bit6
ControlCommand	Indicates mode of control	–	Bit7
Stop	Indicates mode of speed control	–	Bit8
IO Items			
StatusWord	Status word	–	ATS480_ST.STW
ConfigurationWord	Configuration word		ATS480_ST.CFGW
DataStatusWord	Data Status word		ATS480_CFG. DataStatus
Calculated Items			

Item name	Description	Enumera- tion	Address
CurrentWarning	Current detected fault	–	<i>GPL_ATS480_ CurrentWarning</i>
LastFailure	Last detected failure		<i>GPL_ATS480_ LastFailure</i>
Owner	Current owner of the ATS480 Refer to Calculated Variable, page 39.		<i>GPL_OwnerBasic</i>
Abnormal	Shows abnormal condition of the ATS480 Refer to Abnormal Conditions.		<i>GPL_DeviceAbnormal</i>
ActionRequired	Shows action required condition of the ATS480 Refer to Action Required Conditions.		<i>GPL_ DeviceActionRequired</i>

Abnormal Conditions

The table describes the abnormal conditions of ATS480:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	<i>Bit0</i>
AbnormalOperatorTab	Abnormal status of operator tab.	<i>Bit8</i>

Action Required Conditions

The table describes the abnormal conditions of ATS480:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	<i>Bit8</i>

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>
AlarmFailure	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
Current	Motor current in Ampere.	ATS480MBTCPGP_1_ATS_Current
Torque	Motor Torque in %.	ATS480MBTCPGP_1_ATS_Torque
Thermic-Status	Motor thermal capacity in %.	ATS480MBTCPGP_1_ATS_ThermicStatus
PowerFactor	Power Factor.	ATS480MBTCPGP_1_ATS_PowerFactor
OperationTime	Operation Time in hours.	ATS480MBTCPGP_1_ATS_OperationTime
PowerOnTime	Power ON Time in hours.	ATS480MBTCPGP_1_ATS_PowerOnTime
NumberOfStarts	Number of Starts.	ATS480MBTCPGP_1_ATS_NumberOfStarts
EnergyConsumed	Electrical energy consumed in kWh.	ATS480MBTCPGP_1_ATS_EnergyConsumed

Variable Speed Drives


What's in This Part

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Overview

This part provides the functionality of the templates, a detailed description of the control (functions,pins, pin layout, and variables of the function blocks), and the supervision functions of variable speed drives.

These components do not reflect any specific installation.

 **WARNING**

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

ATV6xx/ATV9xx/ATV6xxx –Altivar Process Drive

What's in This Chapter

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Overview

This chapter describes the component that provide the functionality of template, control services and Supervision functions of the ATV6xx/ATV9xx/ATV6xxx.

Template

Overview

This section describes functionality of the \$ATV6xxEGP, \$ATV9xxEGP and \$ATV6xxxEGP template.

Description

General Description

The \$ATV6xxEGP, ATV9xxEGP and \$ATV6xxxEGP control module template allows you to manage the ATV6xx, ATV9xx and ATV6xxx variable speed drives.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Speed	Allows the speed set-point of the device to be sent. Allows the control of speed setpoint.
Device status indication	Displays the status of the device.
Remote resetting	Reset the detected communication failure of drive.
Control or Monitoring	Enables you to monitor the device. You can control the command or set-point from the controller or through the wired inputs/outputs of the speed drive. Also allows the command and set-point to be controlled separately.
Owner	Manages the owner of the equipment (Operator or Program).

Parameters

Parameters

The \$ATV6xxEGP, \$ATV9xxEGP and \$ATV6xxxEGP templates provides different control and supervision parameters to the user to control the functions as per the requirement.

Control

The table describes the control parameters of \$ATV6xxEGP and \$ATV9xxEGP:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	False - Manual reset True - Automatic reset	Boolean	FALSE	–
	Enable the starter	Enum	True Value (2)	It enables/ disables the device. Interface: Enable the device Refinement: Disable the devices True: Enable the device False: Disable the device
	Define scaling factor for current, depending on drive rate		100 (100)	–
Range	Maximum inverter speed measured in RPMs	Integer	1500	–
	Minimum inverter speed measured in RPMs		0	–
	Maximum inverter speed measured in user units	Float	1500.0	–
	Minimum inverter speed measured in user units		0.0	–
	Engineering units	String	rpm	–
	Display format		####.#EU	–
Time	Time window for the device to execute orders	Dura- tion	00:00:05	–
	Minimum time to maintain the warning signal		00:00:03	–
	Maximum time between two auto reset of the DFB.		00:01:00	–

The table describes the control parameters of \$ATV6xxxEGP:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Starter mode	Enum	Enable (2)	–
	Automatic Reset	Boolean	FALSE	–
	Current scaling factor	Enum	100 (100)	–
Time	Time window for the device to execute orders	Dura- tion	00:00:05	–
	Minimum time to maintain warning signals		00:00:03	–
	Maximum time between two auto resets.		00:01:00	–
Range	Minimum speed (RPM)	Integer	0	–
	Maximum speed (RPM)		1500	–
	Minimum speed (EU)	Float	0.0	–
	Maximum speed (EU)		1500.0	–

Section	Parameter description	Data type	Default value	Additional remarks
	Engineering unit	String	<i>rpm</i>	–
	Display format		<i>####.#EU</i>	–

Supervision

The table describes the supervision parameters of \$ATV6xxEGP, \$ATV9xxEGP and \$ATV6xxxEGP:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	<i>Program (1)</i>	–
Security	Set owner	Enum	<i>Operator (1)</i>	Privilege to change override mode. .
	Set rearm		<i>Operator (Confirmed) (10)</i>	Privilege to change reset. This parameter is used in operator tab, page 382.
	Set acknowledge		<i>Operator (1)</i>	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 382.
Trend	Sample period	Duration	<i>00:00:05</i>	–
	History length (weeks)	Integer	<i>5</i>	–
	History rollover time	Duration	<i>12:00:00</i>	–
	History rollover day	String	<i>Tuesday</i>	–
	Storage type		<i>TRN_PERIODIC</i>	–
	Data location (optional)		<i>[Data];</i>	–

Data

The table describes the data parameters of \$ATV6xxEGP and \$ATV9xxEGP:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	ATV6xxEBasic			
	Deadband value	Integer	0	—
	Optional tags - ATV6xxEIO and ATV9xxEIO			
	Current phase engineering zero value	Float	0.0	—
	Current phase engineering full value		1000.0	—
	Optional tags - ATV6xxEIOExtended and ATV9xxEIOExtended			
	Torque engineering zero value	Integer	0	—
	Torque engineering full value		255	—
	Power engineering zero value		0	—
	Power engineering full value		255	—
Alarm	Operation failure alarm description/Device failure alarm description/	String	@(Operation Failure Alarm)/@(Device Failure	—

Section	Parameter description	Data type	Default value	Additional remarks
	Communication failure alarm description		Alarm)/@ (Communication Failure Alarm)	
	Operation failure alarm severity/Device failure alarm severity/Communication failure alarm severity	Enum	Low(4000)	–
	Operation failure alarm group/Device failure alarm group/Communication failure alarm group	String	Failure	–
Variable Tag Disable	ATV6xxEBasic			
	Disable present value	Boolean	FALSE	–
	Disable speed setpoint value			–
	Optional tags - ATV6xxEIO and ATV9xxEIO			
	Disable outputs map	Boolean	FALSE	–
	Disable AQ1 analog output			–
	Disable current			–
	Optional tags - ATV6xxEIOExtended and ATV9xxEIO Extended			
	Disable inputs map	Boolean	FALSE	–
	Disable AI1, AI2 and AI3 analog input			–
	Disable AQ2 analog output			–
	Disable torque			–
	Disable power			–
Trend Tag Disable	ATV6xxEBasic			
	Disable present value	Boolean	FALSE	–
	Disable speed setpoint value			–
	Disable torque setpoint NOTE: This parameter is available only for ATV9xxEBasic			–
	Optional tags - ATV6xxEIO and ATV9xxEIO			
	Disable current	Boolean	FALSE	–
	Optional tags - ATV6xxIOExtended and ATV9xxIOExtended			
	Disable torque	Boolean	FALSE	–
	Disable power			–
Historize	ATV6xxEBasic			
	Enable historize data	Boolean	FALSE	–
	Enable historize PV&SP			–
	Enable historize information			–
	Enable historize device state			–
	Enable historize diagnostics code			–
	Enable historize fail code			–
	ATV9xxEBasic			
	Enable historize present value	Boolean	FALSE	–
	Enable historize torque setpoint			–

Section	Parameter description	Data type	Default value	Additional remarks
	Enable historize fail code			—
	Enable historize warning code			—
	Enable historize data			—
	Enable historize info word			—
	Enable historize device state			—
	ATV6xxEIO and ATV9xxEIO			
	Enable historize output map	Boolean	FALSE	—
	Enable historize AQ1 analog output			—
	Enable historize current consumption NOTE: This parameter is applicable only for ATV6xxEIO			—
	ATV6xxEIOExtended and ATV9xxEIOExtended			
	Enable historize input map	Boolean	FALSE	—
	Enable historize analog input (AI1, AI2 and AI3)			—
	Enable historize AQ2 analog output			—
	Enable historize torque			—
	Enable historize power			—

The table describes the data parameters of \$ATV6xxxEGP:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	ATV6xxxEBasic			
	PV & SP deadband value	Integer	0	–
	Torque SP deadband value	Integer	0	–
	Optional tags - ATV6xxxEIO			
	Current phase engineering zero value	Float	0.0	–
	Current phase engineering full value		1000.0	–
	Optional tags - ATV6xxxEIOExtended			
	Torque engineering zero value	Integer	0.0	–
	Torque engineering full value		100.0	–
	Power engineering zero value		0.0	–
	Power engineering full value		100.0	–
Alarm	Operation failure alarm description	String	@(Alarm Failure)	–
	Operation failure alarm severity	Enum	Low(4000)	–
	Operation failure alarm group	String	Failure	–
	Device failure alarm description	String	@(Device Failure Alarm)	–
	Device failure alarm severity	Enum	Low(4000)	–

Section	Parameter description	Data type	Default value	Additional remarks
	Device failure alarm group	String	Failure	–
	Communication failure alarm description	String	@ (Communication Failure Alarm)	–
	Communication failure alarm severity	Enum	Low(4000)	–
	Communication failure alarm group	String	Failure	–
Variable	ATV6xxxEBasic			
	Disable present value	Boolean	FALSE	–
	Disable speed setpoint			–
	Disable torque setpoint			–
	Optional tags - ATV6xxxEIO			
	Disable outputs map	Boolean	FALSE	–
	Disable analog output (AQ1)			–
	Disable current			–
	Optional tags - ATV6xxEIOExtended and ATV9xxEIO Extended			
	Disable inputs map	Boolean	FALSE	–
	Disable analog input (AI1)			–
	Disable analog input (AI2)			
	Disable analog input (AI3)			
	Disable analog output (AQ2)			–
	Disable torque			–
	Disable power			–
	Trend			ATV6xxxEBasic
Disable present value		Boolean	FALSE	–
Disable speed setpoint value				–
Disable torque setpoint				–
Optional tags - ATV6xxEIO and ATV9xxEIO				
Disable current		Boolean	FALSE	–
Optional tags - ATV6xxIOExtended and ATV9xxIOExtended				
Disable torque		Boolean	FALSE	–
Disable power				–
Historize	ATV6xxxEBasic			
	Present value	Boolean	FALSE	–
	Torque setpoint			–
	Fail code			–
	Warning code			–
	Data			–
	Information word			–
	Device state			–
	ATV6xxxEIO			
	Outputs map	Boolean	FALSE	–
	Analog output (AQ1)			–
	Current consumption			–

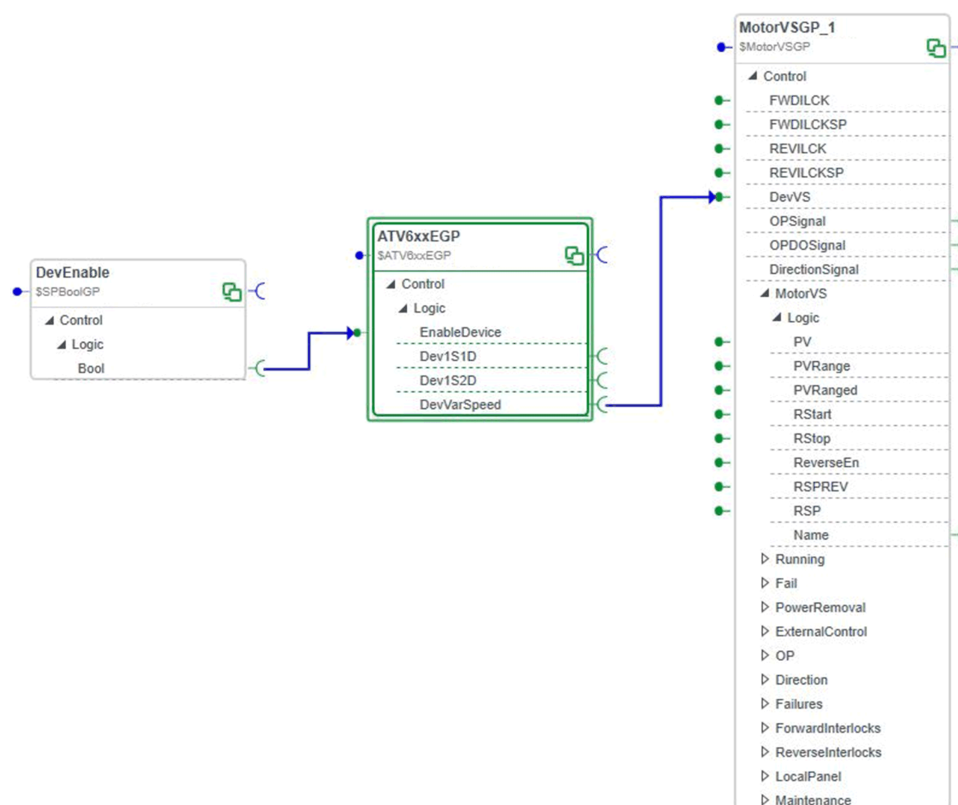
Section	Parameter description	Data type	Default value	Additional remarks
	ATV6xxxEIOExtended			
	Inputs map	Boolean	FALSE	–
	Analog inputs (AI1&AI2&AI3)			–
	Analog output (AQ2)			–
	Torque			–
	Power			–

Asset and Display Parameters

For more details, refer to the topic describing the parameters of asset and display, page 28.

Interfaces

This figure shows the \$ATV6xxEGP and \$ATV9xxEGP (also applicable for \$ATV6xxECE and \$ATV9xxECE) template as it appears in Links Editor and an example of other templates connected to it..



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
EnableDevice	\$Bool/Ref	An input interface from other template to enable device. This will be enabled only when enable device type parameter is Selected as interface.	Connect a boolean variable to enable/disable device.
Dev1S1D	\$DEV1S1D/DO	An output interface to other template	Connect to a one direction motor to control.

Interface identifier	Type/Role	Description	Example
Dev1S2D	<i>\$DEV1S2D/DO</i>	An output interface to other template.	Connect to a two direction motor to control.
DevVarSpeed	<i>\$DEVVS/DO</i>	An output interface to other template.	Connect to a variable speed motor to control.

Control

Overview

This chapter describes the ATV6xx/ATV9xx/ATV6xxx DFB.

Description

General

The ATV profile is used to manage the Altivar variable speed drives on different communication networks.

NOTE: ASATV31 and MBATV31 are deprecated control functions.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Speed	Allows the speed set-point of the device to be sent. Allows the control of speed setpoint.
Device status indication	Displays the status of the device.
Remote resetting	Reset the detected communication failure of drive.
Control or Monitoring	Enables you to monitor the device. You can control the command or set-point from the controller or through the wired inputs/outputs of the speed drive. Also allows the command and set-point to be controlled separately.
Owner	Manages the owner of the equipment (Operator or Program).

I/O Scanning Information

The below table explains the configuration for I/O scanning messaging.

Function Block	Modbus ID	Read Address	Read Length	Write Address	Write Length
ATV7161	255	0	9	0	7
ATV6xx	255	0	12	0	5
ATV9xx	255	0	12	0	6
EATV32	255	0	7	0	5
ATV6xxx	255	0	14	0	6

DTM Profile Selection

To select a DTM profile:

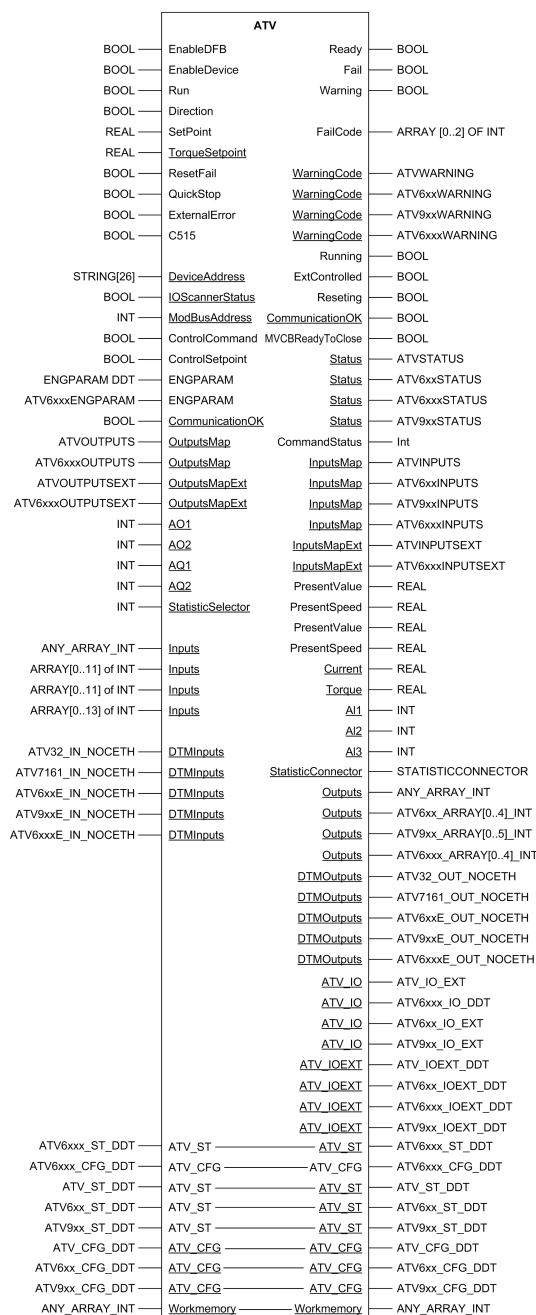
- For ATV6xx, you have to select **ATV6xx DFB** as its DTM profile.
- For ATV9xx, you have to select **ATV9xx DFB** as its DTM profile.
- For ATV6xxx, you have to select **ATV6xxx DFB** as its DTM profile.

NOTE: ATV blocks are designed for **DRIVECOM** profile. In the Command and reference parameter, CHCF (Channel configuration) is set to Combined channel mode as current value.

DFB Representation

Representation

The following figure represents the function module of ATV profile:



NOTE:

- The underlined parameters are specific for some components.
- DTM Inputs and DTM Outputs pins are not supported in EcoStruxure Hybrid DCS.

For DFBs communicating by I/O scanning, variables read from the device retain their last value when a communication interruption occurs. For details, refer to the description of the corresponding output parameter, page 361.

⚠ WARNING**UNINTENDED EQUIPMENT OPERATION**

When you configure the *Last value* parameter of the I/O scanner line, take into consideration the behavior of the DFB when a communication interruption occurs.

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

The table shows the parameters available for specific components:

Parameters		Compo- nents								
		Modbus	Advan- tys STB	Ethernet					Profi- bus	
				All	All	I/O scanning				
AT- V7161	EAT- V32	ATV9xx	ATV6xx			ATV6xxx				
Inputs	DeviceAddress	–	–	X	–	–	–	-	X	–
	IOScannerStatus	–	–	X	X	X	X	X	–	X
	ModBusAddress	X	–	–	–	–	–	-	–	–
	CommunicationOK	–	X	–	–	–	–	-	–	–
	OutputsMap (ATVOUTPUTS)	–	–	X	X	–	–	-	–	–
	OutputsMapExt (ATVOUTPUTSEXT)	–	–	X	X	–	–	-	–	–
	OutputsMap (ATV6xxOUTPUTS)	–	–	–	–	–	X	-	–	–
	OutputsMapExt (ATV6xxOUTPUT- SEXT)	–	–	–	–	–	X	–	–	–
Inputs	OutputsMap (ATV6xxxOUTPUTS)	–	–	–	–	–	–	X	–	–
	OutputsMapExt (ATV6xxxOUTPUT- SEXT)	–	–	–	–	–	–	X	–	–
	OutputsMap (ATV9xxOUTPUTS)	–	–	–	–	X	–	–	–	–
	OutputsMapExt (ATV9xxOUTPUT- SEXT)	–	–	–	–	X	–	–	–	–
	TorqueSetpoint	–	–	–	–	X	–	X	–	–
	AO1	–	–	X	X	–	X	-	–	–
	AO2	–	–	X	–	–	X	-	–	–
	AQ1	–	–	–	–	X	–	X	–	–
	AQ2	–	–	–	–	X	–	X	–	–
	StatisticSelector	X	–	–	–	–	–	-	X	–

Parameters		Compo- nents								
		Modbus	Advan- tys STB	Ethernet					Profi- bus	
		All	All	I/O scanning					Mes- saging	All
				AT- V7161	EAT- V32	ATV9xx	ATV6xx	ATV6xxx		
	<i>ExternalError</i>	–	–	–	–	X	X	X	–	–
Inputs	<i>C515</i>	–	–	–	–	X	X	X	–	–
	<i>Inputs (ANY_ARRAY_INT)</i>	–	X	X	X	–	–	–	–	X
	<i>Inputs (ATV6xx_IN_DDT)</i>	–	–	–	–	–	X	–	–	–
	<i>Inputs (ATV6xxx_IN_DDT)</i>	–	–	–	–	–	–	X	–	–
	<i>Inputs (ATV9xx_IN_DDT)</i>	–	–	–	–	X	–	–	–	–
	<i>DTMInputs (ATV32_IN_NOCEETH)</i>	–	–	–	X	–	–	–	–	–
	<i>DTMInputs (ATV7161_IN_NOCEETH)</i>	–	–	X	–	–	–	–	–	–
	<i>DTMInputs (ATV6xxE_IN_NOCEETH)</i>	–	–	–	–	–	X	–	–	–
	<i>DTMInputs (ATV6xxxE_IN_NOCEETH)</i>	–	–	–	–	–	–	X	–	–
	<i>DTMInputs (ATV9xxE_IN_NOCEETH)</i>	–	–	–	–	X	–	–	–	–
Outputs	<i>WarningCode (ATVWARNING)</i>	X	X	X	X	–	–	–	X	X
	<i>WarningCode (ATV6xxWARNING)</i>	–	–	–	–	–	X	–	–	–
	<i>WarningCode (ATV6xxxWARNING)</i>	–	–	–	–	–	–	X	–	–
	<i>WarningCode (ATV9xxWARNING)</i>	–	–	–	–	X	–	–	–	–
	<i>CommunicationOK</i>	–	–	X	–	X	X	X	–	X
	<i>Status (ATVSTATUS)</i>	X	X	X	X	–	–	–	X	X
	<i>Status (ATV6xxSTATUS)</i>	–	–	–	–	–	X	–	–	–
	<i>Status (ATV6xxxSTATUS)</i>	–	–	–	–	–	–	X	–	–
	<i>Status (ATV9xxSTATUS)</i>	–	–	–	–	X	–	–	–	–
Outputs	<i>CommandStatus</i>	–	–	–	–	–	–	X	–	–
	<i>InputsMap (ATVINPUTS)</i>	–	–	X	X	–	–	–	–	–
	<i>InputsMapExt (ATVINPUTSEXT)</i>	–	–	X	X	–	–	–	–	–
	<i>InputsMap (ATV6xxINPUTS)</i>	–	–	–	–	–	X	–	–	–
	<i>InputsMap (ATV6xxxINPUTS)</i>	–	–	–	–	–	–	X	–	–

Parameters		Compo- nents								
		Modbus	Advan- tys STB	Ethernet						Profi- bus
		All	All	I/O scanning					Mes- saging	All
				AT- V7161	EAT- V32	ATV9xx	ATV6xx	ATV6xxx		
	<i>InputsMapExt</i> (ATV6xxINPUTSEXT)	–	–	–	–	–	X	–	–	–
	<i>InputsMapExt</i> (ATV6xxxINPUT- SEXT)	–	–	–	–	–	–	X	–	–
	<i>InputsMap</i> (ATV9xxINPUTS)	–	–	–	–	X	–	–	–	–
Outputs	<i>InputsMapExt</i> (ATV9xxINPUTSEXT)	–	–	–	–	X	–	–	–	–
	<i>Current</i>	–	–	X	X	X	X	X	–	–
	<i>Torque</i>	–	–	X	X	X	X	X	–	–
	<i>Power</i>	–	–	–	–	X	X	X	–	–
	<i>AI1</i>	–	–	X	–	X	X	X	–	–
	<i>AI2</i>	–	–	X	–	X	X	X	–	–
	<i>AI3</i>	–	–	–	–	X	X	X	–	–
	<i>StatisticConnector</i>	X	–	–	–	–	–	–	–	–
	<i>Outputs (ANY_</i> <i>ARRAY_INT)</i>	–	X	X	X	–	–	–	–	X
	<i>Outputs (ATV6xx_</i> <i>OUT_DDT)</i>	–	–	–	–	–	X	–	–	–
	<i>Outputs (ATV6xxx_</i> <i>OUT_DDT)</i>	–	–	–	–	–	–	X	–	–
Outputs	<i>Outputs (ATV9xx_</i> <i>OUT_DDT)</i>	–	–	–	–	X	–	–	–	–
	<i>DTMOutputs</i> (ATV32_OUT_ NOCETH)	–	–	–	X	–	–	–	–	–
	<i>DTMOutputs</i> (ATV7161_OUT_ NOCETH)	–	–	X	–	–	–	–	–	–
	<i>DTMOutputs</i> (ATV6xxE_OUT_ NOCETH)	–	–	–	–	–	X	–	–	–
	<i>DTMOutputs</i> (ATV6xxxE_OUT_ NOCETH)	–	–	–	–	–	–	X	–	–
	<i>DTMOutputs</i> (ATV9xxE_OUT_ NOCETH)	–	–	–	–	X	–	–	–	–
	<i>ATV_IO (ATV_IO_</i> <i>EXT)</i>	–	–	X	X	–	–	–	–	–
	<i>ATV_IOEXT (ATV_</i> <i>IOEXT_DDT)</i>	–	–	X	X	–	–	–	–	–
Outputs	<i>ATV_IO (ATV6xx_IO_</i> <i>EXT)</i>	–	–	–	–	–	X	–	–	–
	<i>ATV_IO (ATV6xxx_</i> <i>IO_EXT)</i>	–	–	–	–	–	–	X	–	–
	<i>ATV_IOEXT</i> (ATV6xx_IOEXT_ DDT)	–	–	–	–	–	X	–	–	–

Parameters		Compo- nents								
		Modbus	Advan- tys STB	Ethernet					Profi- bus	
		All	All	I/O scanning					Mes- saging	All
				AT- V7161	EAT- V32	ATV9xx	ATV6xx	ATV6xxx		
	ATV_IOEXT (ATV6xx_IOEXT_ DDT)	–	–	–	–	–	–	X	–	–
	ATV_IO (ATV9xx_IO_ DDT)	–	–	–	–	X	–	–	–	–
	ATV_IOEXT (ATV9xx_IOEXT_ DDT)	–	–	–	–	X	–	–	–	–
Inputs/ outputs	ATV_ST (ATV_ST_ DDT)	X	X	X	X	–	–	–	X	X
	ATV_ST (ATV6xx_ ST_DDT)	–	–	–	–	–	X	–	–	–
	ATV_ST (ATV6xxx_ ST_DDT)	–	–	–	–	–	–	X	–	–
	ATV_ST (ATV9xx_ ST_DDT)	–	–	–	–	X	–	–	–	–
	ATV_CFG (ATV_ CFG_DDT)	X	X	X	X	–	–	–	X	X
	ATV_CFG (ATV6xx_ CFG_DDT)	–	–	–	–	–	X	–	–	–
	ATV_CFG (ATV6xxx_ CFG_DDT)	–	–	–	–	–	–	X	–	–
Inputs/ outputs	ATV_CFG (ATV9xx_ CFG_DDT)	–	–	–	–	X	–	–	–	–
	Workmemory	X	–	–	–	–	–	–	X	–
X: Parameter is available. –: Parameter is not available.										

Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	<p>This input enables the normal execution of the control block.</p> <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, output values, counters are lost) and output values are set to 0. 1 = Enables communications with the devices for their operation. <p>Public variable values are loaded during the first enabling cycle.</p>
EnableDevice	BOOL	<p>1 = Enables the devices if the EnableDFB variable is active.</p> <p>The speed drive has to be enabled in order to be controlled.</p>

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**

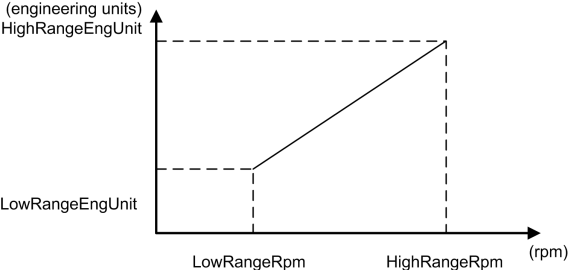
Reset the `Run` variable before resuming operation.

Failure to follow these instructions can result in equipment damage.

NOTICE**UNINTENDED EQUIPMENT OPERATION**

Configure the Torque setpoint through the drive.

Failure to follow these instructions can result in equipment damage.

Parameter	Type	Description
<code>Run</code>	BOOL	1 = Starts the motor run in the direction selected with the <code>Direction</code> input variable.
<code>Direction</code>	BOOL	<p>Direction of rotation of the motor.</p> <ul style="list-style-type: none"> 0 = Activates the reverse direction drive. 1 = Activates the forward direction drive. <p>You cannot change the direction of rotation by changing the sign in <code>SetPoint</code> input variable. <code>SetPoint</code> only accepts positive values.</p>
<code>SetPoint</code>	REAL	<p>The speed set-point is requested from the speed drive and only accepts positive values.</p> <p>It is measured in engineering units and you can configure these units with the following public variables:</p> <ul style="list-style-type: none"> <code>HighRangeRpm</code> <code>LowRangeRpm</code> <code>HighRangeEngUnit</code> <code>LowRangeEngUnit</code> <p>NOTE: Verify that the unit is within the correct range.</p> <p>The DFB makes the conversion between engineering units and speed drive rpms.</p> 
<code>TorqueSetPoint</code> ^{5 and 6}	REAL	The torque set-point is requested from the speed drive.
<code>ResetFail</code>	BOOL	1 = Resets the <code>Fail</code> output parameter to 0 or in case of inoperable device, sends a reset command to the device if <code>ControlCommand</code> is 1.
<code>QuickStop</code>	BOOL	1 = Stops the speed drive quickly with fast stop ramp. If there is a <code>QuickStop</code> , the <code>Run</code> bit has to be reset to resume operation.
<code>ExternalError</code> ⁶	BOOL	Indicates the drive that an inoperable process condition has occurred.
<code>C515</code> ⁶	BOOL	User configurable digital input. For additional information refer to the respective ATV device user manual.
<code>CommunicationOK</code> [*]	BOOL	1 = The node is present on the bus. You can find this variable in Ethernet communications. For more information, refer to the <code>CommunicationOk</code> , page 349 variable.
<code>IOScannerStatus</code> [*]	BOOL	<p>1 = The node is present on the bus.</p> <p>You can find this variable in Ethernet communications.</p>

Parameter	Type	Description
ModbusAddress*	INT	Device address within the modbus network. You can find this variable in modbus communications.
DeviceAddress ⁷	STRING [26]	Device address within the Ethernet network. Depending on the platform, the following definitions apply:
	Platform	IP Addressing DeviceAddress (variable)
	M340	'{IP}ID'
	M580	'{IP}ID'
	Quantum	'{IP}ID'
	NOTE: ID is 0.	
ControlCommand*	BOOL	Indicates to the DFB whether the motor is being controlled locally or from a source external to the DFB. <ul style="list-style-type: none"> 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. If the speed driver is an ATV 61/32/12/212/6xx/6xxx/9xx unit and you need to use this input to switch between sending the set-point through the network and sending it through the screw terminal, you have to configure the speed driver so that it works accordingly. Refer to the Preparing the Device , page 449 for more information on how to set this configuration.
ControlSet-point	BOOL	Indicates to the DFB whether the speed of the device is being controlled by the DFB or from a source external to the DFB. <ul style="list-style-type: none"> 0 = Speed of the device is being controlled from an external source. 1 = Speed of the device is being controlled by the DFB. If the speed driver is an ATV 61/32/12/212/6xx/6xxx/9xx unit and you need to use this input to switch between sending the set-point through the network and sending it through the screw terminal, you have to configure the speed driver so that it works accordingly. Refer to the Preparing the Device , page 449 for more information on how to set this configuration.
ENGPARAM ⁶	ATV6xx-xENGPAM	ATV6xxx engineering parameters.
	Parameter	Type
	Com-man-dCtrlWin-dow	TIME
	ScanTime	TIME
	MaxReset-Time	TIME
	Scaling-Factor-Current	REAL
	HighRan-geEngUnit	REAL
	LowRan-geEngUnit	REAL
	HighRan-geRpm	INT
	LowRan-geRpm	INT
	ResetMode	BOOL
		False = Manual reset True = Automatic reset

Parameter	Type	Description
OutputsMap*	ATVOUT- PUTSMAP	<p>Holds a data structure that is used to control the speed driver outputs. The information is available on Ethernet networks.</p> <p>You can only control the outputs of the speed driver with this input variable. You cannot control the outputs of the speed driver from the HMI/SCADA system.</p> <p>The following table describes the OutputsMap:</p>
	Parameter	Type Description
	R1	BOOL 1 = Controls the state of the R1 relay output
	R2	BOOL 1 = Controls the state of the R2 relay output.
OutputsMap*	ATV6x- xOUTPUTS/ ATV9x- xOUTPUTS/ ATV6xx- xOUTPUTS	<p>Holds a data structure that is used to control the speed driver outputs.</p> <p>You can only control the outputs of the speed driver with this input variable. You cannot control the outputs of the speed driver from the HMI/SCADA system.</p> <p>The following table describes the Outputs Map:</p>
	Parameter	Type Description
	R1	BOOL 1 = Controls the state of the R1 relay output.
	R2	BOOL 1 = Controls the state of the R2 relay output.
	R3	BOOL 1 = Controls the state of the R3 relay output.
OutputsMapExt*	ATVOUT- PUTSMA- PEXT	<p>Holds a data structure that is used to control the speed driver outputs for ATV61 and ATV71 on Ethernet networks and for ATV32 extended cards on Ethernet networks.</p> <p>You can only control the outputs of the speed driver with this input variable. You cannot control the outputs of the speed driver from the HMI/SCADA system.</p> <p>The following table describes the OutputsMapExt:</p>
	Output	Type Description
	R3	BOOL 1 = The state of the R3 relay output.
	R4	BOOL 1 = The state of the R4 relay output.
	LO1	BOOL 1 = The state of the LO1 digital output.
	LO2	BOOL 1 = The state of the LO2 digital output.
	LO3	BOOL 1 = The state of the LO3 digital output.
	LO4	BOOL 1 = The state of the LO4 digital output.
OutputsMapExt*	ATV6x- xOUTPUT- SEXT/ ATV9x- xOUTPUT- SEXT/ ATV6xx- xOUTPUT- SEXT	<p>Holds a data structure that is used to control the speed driver outputs.</p> <p>You can only control the outputs of the speed driver with this input variable. You cannot control the outputs of the speed driver from the HMI/SCADA system.</p> <p>The following table describes the OutputsMapExt:</p>
	Parameter	Type Description
	R4	BOOL 1 = Controls the state of the R4 relay output.
	R5	BOOL 1 = Controls the state of the R5 relay output.
	R6	BOOL 1 = Controls the state of the R6 relay output.
	DQ1 ⁶	BOOL 1 = Controls the state of the digital output DQ1.
	DQ11	BOOL 1 = Controls the state of the digital output DQ11.
	DQ12	BOOL 1 = Controls the state of the digital output DQ12.
AO1*	INT	Controls the value of the AO1 analog output. You can find this value on devices on Ethernet networks. You can only control the analog output of the speed driver with this input

Parameter	Type	Description	
		variable. You cannot control the analog output of the speed from the HMI/SCADA system.	
AO2*	INT	Controls the value of the AO2 analog output. This value can be found on ATV61 and ATV71 on Ethernet networks. You can only control the analog output of the speed driver with this input variable. You cannot control the analog output of the speed from the HMI/SCADA system.	
AQ1 ^{5, 6, 8}	INT	Controls the value of the AQ1 analog output. The speed driver analog output can only be controlled with this input variable; it cannot be controlled from the HMI/SCADA system..	
AQ2 ^{5, 6, 8}	INT	Controls the value of the AQ2 analog output. The speed driver analog output can only be controlled with this input variable; it cannot be controlled from the HMI/SCADA system..	
StatisticSelector*	INT	Variable is used to obtain statistics for the modbus network (requests carried out, time between requests, so on). This data provides information for using StatisticConnector pin within the StatisticCounter DFB in General Purpose library for communication. The following table displays the StatisticSelector value:	
	Variable value	Description	
	1	Read statistics, client.	
	2	Write statistics, client.	
Inputs ¹	ANY_ARRAY_INT	Holds an array structure with the data obtained from the device. You can control the speed driver with this input variable. This input is reserved for the DFB, and you cannot use this input directly. To make the control block to work properly, allocate the structure (%MWx). Refer to the Communications Technologies, page 446. The Inputs pin should not be connected when DTMIInputs pin is connected, otherwise the function detects an incorrect configuration. The information available for the ATV61 and ATV71 on Ethernet is shown in the following table:	
	Parameter	Type	Description
	Inputs [0]	INT	Status word (ETA).
	Inputs [1]	INT	Output velocity (RFRD).
	Inputs [2]	INT	CIA402 diagnostic code (ERRD).
	Inputs [3]	INT	Motor current (LCR).
	Inputs [4]	INT	Motor torque (OTR).
	Inputs [5]	INT	Logic input states (IL1R).
	Inputs [6]	INT	Analog input 1 (AI1C).
	Inputs [7]	INT	Analog input 2 (AI2C).
Inputs ²	ANY_ARRAY_INT	Holds an array structure with the data obtained from the device. You can control the speed driver with this input variable. This input is reserved for the DFB, and you cannot use this input directly. To make the control block to work properly, allocate the structure (%MWx). Refer to the Communications Technologies, page 446. The Inputs pin should not be connected when DTMIInputs pin is connected, otherwise the function detects an incorrect configuration. The information available for the ATV32 on Ethernet is shown in the following table:	
	Parameter	Type	Description
	Inputs [0]	INT	Status word (ETA).

Parameter	Type	Description	
	Inputs [1]	INT	Output velocity (RFRD).
	Inputs [2]	INT	CIA402 diagnostic code (ERRD).
	Inputs [3]	INT	Motor current (LCR).
	Inputs [4]	INT	Motor torque (OTR).
	Inputs [5]	INT	Logic input states (IL1R).
Inputs ³	ANY ARRAY_INT	<p>Holds an array structure with the data obtained from the device. You can control the speed driver with this input variable. This input variable is reserved for the DFB, and you cannot use this variable directly. To make the control block to work properly, allocate the structure (%MWx). Refer to the Communications Technologies, page 446.</p> <p>The information available for speed drivers on an Advantys STB is shown in the following table:</p>	
	Parameter	Type	Description
	Inputs [0]	INT	Status word (ETA).
	Inputs [1]	INT	Control effort (rpm).
Inputs ⁴	ARRAY [0..27] OF BYTE	Holds a structure with the data obtained from the inverter.	
Inputs ^{5,8}	ARRAY [0..11] OF INT	<p>Holds an array structure with the data obtained from the device. You can control the speed driver with this input variable. This input is reserved for the DFB, and you cannot use this input directly. To make the control block to work properly, allocate the structure (%MWx).</p> <p>The Inputs pin should not be connected when DTMIInputs pin is connected, otherwise the function detects an incorrect configuration.</p> <p>The information available for the ATV6xx/ATV9xx on Ethernet is shown in the following table:</p>	
	Parameter	Type	Description
	Inputs [0]	INT	Status word (ETA).
	Inputs [1]	INT	Output Velocity (RFRD).
	Inputs [2]	INT	CiA402 diagnostic code (ERRD).
	Inputs [3]	INT	Motor current (LCR).
	Inputs [4]	INT	Motor torque (OTR).
	Inputs [5]	INT	Logic input states (IL1R).
	Inputs [6]	INT	Analog input 1 (AI1C).
	Inputs [7]	INT	Analog input 2 (AI2C).
	Inputs [8]	INT	Analog input 3 (AI3C).
	Inputs [9]	INT	Active command channel (CCC).
	Inputs [10]	INT	Active reference channel (CRC).
	Inputs [11]	INT	Active electrical output power estimation (EPRW).
Inputs ⁶	ARRAY [0..13] OF INT	<p>Holds an array structure with the data obtained from the device. You can control the speed driver with this input variable. This input is reserved for the DFB, and you cannot use this input directly. To make the control block to work properly, allocate the structure (%MWx).</p> <p>The Inputs pin should not be connected when DTMIInputs pin is connected, otherwise the function detects an incorrect configuration.</p> <p>The information available for the ATV6xxx on Ethernet is shown in the following table:</p>	

Parameter	Type	Description
	Parameter	Type Description
	Inputs [0]	INT Status word (ETA).
	Inputs [1]	INT Output Velocity (RFRD).
	Inputs [2]	INT C1A402 diagnostic code (ERRD).
	Inputs [3]	INT Motor current (LCR).
	Inputs [4]	INT Motor torque (OTR).
	Inputs [5]	INT Logic input states (IL1R).
	Inputs [6]	INT Analog input 1 (AI1C).
	Inputs [7]	INT Analog input 2 (AI2C).
	Inputs [8]	INT Analog input 3 (AI3C).
	Inputs [9]	INT Active command channel (CCC).
	Inputs [10]	INT Active reference channel (CRC).
	Inputs [11]	INT Active electrical output power estimation (EPRW).
	Inputs [12]	INT Mains and Inrush circuit breaker word status (BWS0).
	Inputs [13]	INT Drive command status (CMDS)
DTMInputs ¹	ATV7161_IN_NOCETH	<p>Holds an input structure for the data to be obtained from device DTM. You can read device monitoring information with this input variables. This input pin has to be used with the device DTM.</p> <p>The <i>DTMInputs</i> pin should not be connected when Inputs pin is connected, otherwise the function detects an incorrect configuration</p> <p>The information available for the ATV7161_IN_NOCETH on Ethernet is shown in the following table:</p>
	Parameter	Type Description
	RESERVED	UINT Reserved.
	ETA	UINT Status word.
	RFRD	INT Output velocity.
	ERRD	UINT C1A402 diagnostic code.
	LCR	INT Motor current.
	OTR	INT Motor torque.
	IL1R	INT Logic input states.
	AI1C	INT Analog input 1.
	AI2C	INT Analog input 2.
DTMInputs ²	ATV32_IN_NOCETH	<p>Holds an input structure for the data to be obtained from device DTM. You can read device monitoring information with this input variables. This input pin has to be used with the device DTM.</p> <p>The <i>DTMInputs</i> pin should not be connected when Inputs pin is connected, otherwise the function detects an incorrect configuration</p> <p>The information available for the ATV32_IN_NOCETH on Ethernet is shown in the following table:</p>
	Parameter	Type Description
	ETA	UINT Status word.
	RFRD	INT Output velocity.
	ERRD	UINT C1A402 diagnostic code.

Parameter	Type	Description	
	LCR	UINT	Motor current.
	OTR	INT	Motor torque.
	IL1R	UINT	Logic input states.
DTMInputs ^{5,8}	ATV6XXE_IN_NOCETH/ ATV9XXE_IN_NOCETH	<p>Holds an input structure for the data to be obtained from device DTM. You can read device monitoring information with this input variables. This input pin has to be used with the device DTM.</p> <p>The <i>DTMInputs</i> pin should not be connected when Inputs pin is connected, otherwise the function detects an incorrect configuration</p> <p>The information available for the ATV6XXE_IN_NOCETH/ATV9XXE_IN_NOCETH on Ethernet is shown in the following table:</p>	
	Parameter	Type	Description
	ETA	WORD	Status word.
	RFRD	INT	Output Velocity.
	ERRD	WORD	CIA402 diagnostic code.
	LCR	UINT	Motor current.
	OTR	INT	Motor torque.
	IL1R	WORD	Logic input states.
	AI1C	INT	Analog input 1.
	AI2C	INT	Analog input 2.
	AI3C	INT	Analog input 3.
	CCC	WORD	Active command channel.
	CRC	WORD	Active reference channel.
	EPRW	INT	Active electrical output power estimation.

Parameter	Type	Description
DTMInputs ⁶	ATV6xxxE_IN_NOCETH	<p>Holds an input structure for the data to be obtained from device DTM. You can read device monitoring information with this input variables. This input pin has to be used with the device DTM.</p> <p>The <i>DTMInputs</i> pin should not be connected when Inputs pin is connected, otherwise the function detects an incorrect configuration</p> <p>The information available for the ATV6xxxE_IN_NOCETH on Ethernet is shown in the following table:</p>
	Parameter	Type
	ETA	WORD
	RFRD	INT
	ERRD	WORD
	LCR	UINT
	OTR	INT
	IL1R	WORD
	AI1C	INT
	AI2C	INT
	AI3C	INT
	CCC	WORD
	CRC	WORD
	EPRW	INT
	BWS0	WORD
	CMDS	INT
<p>*: Parameters are available only for specific components.</p> <p>1: Parameter is available only for <i>ATV7161</i>.</p> <p>2: Parameter is available only for <i>EATV32</i>.</p> <p>3: Parameter is available only for <i>ASATV31</i> and <i>ASATV7161</i>.</p> <p>4: Parameter is available only for <i>PBATV7161</i>.</p> <p>5: Parameter is available only for <i>ATV9xx</i>.</p> <p>6: Parameter is available only for <i>ATV6xx</i>, <i>ATV9xx</i> and <i>ATV6xxx</i>.</p> <p>7: Parameter is applicable only for Ethernet messaging.</p> <p>8: Parameter is available only for <i>ATV6xx</i>.</p>		

Outputs

Output Parameter Description

Parameter	Type	Description
Ready	BOOL	<p>1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command.</p> <p>If <i>QuickStop</i> is enabled, this output resets to 0. This variable is TRUE as long as there are no communication interruption and the device is in <i>DSP402</i> state 5.</p>
Fail	BOOL	<p>1 = A detected failure in the control block or in the device or a communication interruption. To reset the <i>Fail</i> output pin, the <i>ResetFail</i> input has to be activated. The last detected error code is shown on <i>FailCode</i>.</p> <p>NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.</p>

Parameter	Type	Description	
Warning	BOOL	1 = An alarm has been activated for the device. It cannot be reset because the signal remains active until the cause of the alarm is removed or until the maximum set ScanTime is reached.	
FailCode	ARRAY [0..2] OF INT	<p>When the Fail output is 1, it holds the code for the detected error.</p> <p>If the Fail bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3 level structure. Refer to the Diagnostic Information Management , page 379 for more details.</p>	
WarningCode*	ATVWARNING	<p>Holds a data structure with the alarm information currently on the speed driver.</p> <p>The following table describes the WarningCode:</p>	
	Parameter	Type	Description
	Device	BOOL	1 = An alarm present on the device.
	Order	BOOL	1 = An alarm. The device is not responding to the control command (Run, QuickStop) within the time specified in CommandCtrlWindow.
	ForcedLocalMode	BOOL	1 = The device is forced locally. It is controlled through the screw terminals.
WarningCode ^{5,6}	ATV6xxWARNING/ ATV6xxxWARNING/ ATV9xxWARNING	<p>Holds a data structure with the alarm information currently on the speed driver.</p> <p>The following table describes the WarningCode:</p>	
	Parameter	Type	Description
	Device	BOOL	1 = An alarm is present on the device.
	Order	BOOL	1 = Follow-up alarm. The device is not responding to the control command (Run, QuickStop, so on) within the time specified in CommandCtrlWindow.
	ForcedLocalMode	BOOL	1 = The device is forced locally. It is controlled through the screw terminals.
	ReservedReference-Channel	BOOL	1 = The drive reference channel is reserved by DTM (Control Expert, SoMove) or WEB server.
	ReservedCommandChannel	BOOL	1 = The drive command channel is reserved by DTM (Control Expert, SoMove) or WEB server.
Running	BOOL	<p>1 = The speed driver is running and has an output frequency.</p> <p>NOTE: If SetPoint is 0 and Run is active, the Running signal is activated.</p>	
ExtControlled	BOOL	<p>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.</p> <p>Provides information for programming.</p> <p>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.</p>	
Resetting	BOOL	<p>1 = A reset is being carried out.</p> <p>The CommandCtrlWindow variable indicates the maximum time for resetting the detected failure.</p> <p>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.</p> <p>If the detected failure is reset, the Fail and Resetting output variables are reset (set to FALSE). If the detected failure is not reset, the Resetting variable is set to FALSE and the Fail variable remains TRUE. The ResetFail is edge-based.</p> <p>Refer to the timing diagram below.</p>	

Parameter	Type	Description																																																
		<p>Fail</p> <p>ResetFail</p> <p>Resetting</p> <p>CommandCtrlWindow</p> <p>Failure is reset</p>																																																
CommunicationOk [*]	BOOL	1 = Communication ok for the device present in the I/O scanner.																																																
MVCBReadyToClose ⁶	BOOL	Medium voltage circuit breaker ready to close.																																																
Status [*]	ATVSTATUS	<p>The structure holds data containing the information that the block extracts from the status variable of the speed driver.</p> <p>The following table describes the status information:</p> <table> <tr> <th>Parameter</th><th>Type</th><th>Description</th></tr> <tr> <td>ReadyToSwitchOn</td><td>BOOL</td><td>1 = The device is ready to switch on (DRIVECOM [ETA.0]).</td></tr> <tr> <td>SwitchedOn</td><td>BOOL</td><td>1 = The device is switched on (ETA.1).</td></tr> <tr> <td>OperationEnabled</td><td>BOOL</td><td>1 = Operation is enabled (ETA.2).</td></tr> <tr> <td>Malfunction</td><td>BOOL</td><td>1 = A detected failure on the device (ETA.3).</td></tr> <tr> <td>VoltageEnabled</td><td>BOOL</td><td>1 = Voltage on the device terminals (ETA.4).</td></tr> <tr> <td>QuickStop</td><td>BOOL</td><td>1 = Quick stop is activated (ETA.5).</td></tr> <tr> <td>SwitchOnDisabled</td><td>BOOL</td><td>1 = Switch-on is disabled (ETA.6).</td></tr> <tr> <td>Alarm</td><td>BOOL</td><td>1 = An alarm is present on the device (ETA.7).</td></tr> <tr> <td>ForcedLocalMode</td><td>BOOL</td><td>1 = Forced local mode (ETA.9).</td></tr> <tr> <td>ReferenceReached</td><td>BOOL</td><td>1 = The speed set-point has been reached (ETA.10).</td></tr> <tr> <td>ReferenceExceeded</td><td>BOOL</td><td>1 = The speed set-point has exceeded limits (ETA.11).</td></tr> <tr> <td>StopImposed</td><td>BOOL</td><td>1 = Stop is forced by remote control STOP key (ETA.14).</td></tr> <tr> <td>ForwardReverseRotation</td><td>BOOL</td><td> <ul style="list-style-type: none"> 0 = Reverse running direction (ETA.15). 1 = Forward running direction (ETA.15). </td></tr> <tr> <td>State</td><td>INT</td><td>Numerical code corresponding to the state of the speed driver. Refer to the <i>State</i>, page 369 table below.</td></tr> <tr> <td>Info</td><td>INT</td><td>Numerical code with the information on statuses and required actions. Refer to the <i>Info</i>, page 369 table below.</td></tr> </table>	Parameter	Type	Description	ReadyToSwitchOn	BOOL	1 = The device is ready to switch on (DRIVECOM [ETA.0]).	SwitchedOn	BOOL	1 = The device is switched on (ETA.1).	OperationEnabled	BOOL	1 = Operation is enabled (ETA.2).	Malfunction	BOOL	1 = A detected failure on the device (ETA.3).	VoltageEnabled	BOOL	1 = Voltage on the device terminals (ETA.4).	QuickStop	BOOL	1 = Quick stop is activated (ETA.5).	SwitchOnDisabled	BOOL	1 = Switch-on is disabled (ETA.6).	Alarm	BOOL	1 = An alarm is present on the device (ETA.7).	ForcedLocalMode	BOOL	1 = Forced local mode (ETA.9).	ReferenceReached	BOOL	1 = The speed set-point has been reached (ETA.10).	ReferenceExceeded	BOOL	1 = The speed set-point has exceeded limits (ETA.11).	StopImposed	BOOL	1 = Stop is forced by remote control STOP key (ETA.14).	ForwardReverseRotation	BOOL	<ul style="list-style-type: none"> 0 = Reverse running direction (ETA.15). 1 = Forward running direction (ETA.15). 	State	INT	Numerical code corresponding to the state of the speed driver. Refer to the <i>State</i> , page 369 table below.	Info	INT	Numerical code with the information on statuses and required actions. Refer to the <i>Info</i> , page 369 table below.
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Status ⁷	MBATV212STATUS	<p>The structure holds data containing the information that the function block extracts from the status variable of the speed driver. The following table describes the status information:</p> <table> <tr> <th>Parameter</th><th>Type</th><th>Description</th></tr> <tr> <td>OutputFailure⁷</td><td>BOOL</td><td> <ul style="list-style-type: none"> 1 = The device is active (ETA.0). 0 = The device is not active (ETA.0). </td></tr> <tr> <td>Tripped⁷</td><td>BOOL</td><td>1 = The device is tripped (ETA.1).</td></tr> <tr> <td>Alarm⁷</td><td>BOOL</td><td>1 = An alarm is present on the device (ETA.2), page 379.</td></tr> <tr> <td>MOFF⁷</td><td>BOOL</td><td>1 = Main circuit undervoltage alarm is issued (ETA.3).</td></tr> <tr> <td>MotorSelectionTHR⁷</td><td>BOOL</td><td> <ul style="list-style-type: none"> 1 = Motor 2 (THR2) is selected (ETA.4). </td></tr> </table>	Parameter	Type	Description	OutputFailure ⁷	BOOL	<ul style="list-style-type: none"> 1 = The device is active (ETA.0). 0 = The device is not active (ETA.0). 	Tripped ⁷	BOOL	1 = The device is tripped (ETA.1).	Alarm ⁷	BOOL	1 = An alarm is present on the device (ETA.2), page 379.	MOFF ⁷	BOOL	1 = Main circuit undervoltage alarm is issued (ETA.3).	MotorSelectionTHR ⁷	BOOL	<ul style="list-style-type: none"> 1 = Motor 2 (THR2) is selected (ETA.4). 																														
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MOFF ⁷	BOOL	1 = Main circuit undervoltage alarm is issued (ETA.3).																																																
MotorSelectionTHR ⁷	BOOL	<ul style="list-style-type: none"> 1 = Motor 2 (THR2) is selected (ETA.4). 																																																

Parameter	Type	Description																																										
		<ul style="list-style-type: none"> 0 = Motor 1 (THR1) is selected (ETA. 4). 																																										
<i>PIControl</i> ⁷	BOOL	1 = PI control is prohibited (ETA. 5)																																										
<i>AccelerationPattern</i> ⁷	BOOL	<ul style="list-style-type: none"> 1 = Acceleration/deceleration pattern 2 (AD2) is selected (ETA. 6). 0 = Acceleration/deceleration pattern 1 (AD1) is selected (ETA. 6). 																																										
<i>DCBraking</i> ⁷	BOOL	1 = Forced DC braking (ETA. 7).																																										
<i>ForwardReverseRotation</i> ⁷	BOOL	<ul style="list-style-type: none"> 1 = Reverse running direction (ETA. 9). 0 = Forward running direction (ETA. 9). 																																										
<i>Run</i> ⁷	BOOL	1 = Device is running (ETA. 10).																																										
<i>CoastStop</i> ⁷	BOOL	1 = ST is off (ETA. 11).																																										
<i>EmergencyStop</i> ⁷	BOOL	1 = Emergency stop status (ETA. 12).																																										
<i>StandbyST</i> ⁷	BOOL	1 = The device is standby ST mode (ETA. 13).																																										
<i>Standby</i> ⁷	BOOL	1 = The device is standby mode (ETA. 14).																																										
<i>LocalRemote</i> ⁷	BOOL	<ul style="list-style-type: none"> 1 = The device is in local mode (ETA. 15). 0 = The device is in remote mode (ETA. 15). 																																										
Status ^{5,6}	ATV6xxSTATUS/ ATV9xxSTATUS/ ATV6xxxSTATUS	<p>The structure holds data containing the information that the function block extracts from the status variable of the speed driver.</p> <p>The following table describes the status information:</p> <table> <tr> <th>Parameter</th><th>Type</th><th>Description</th></tr> <tr> <td>ReadyToSwitchOn</td><td>BOOL</td><td>1 = The device is ready to switch on (DRIVECOM [ETA. 0]).</td></tr> <tr> <td>SwitchedOn</td><td>BOOL</td><td>1 = The device is switched on (ETA. 1).</td></tr> <tr> <td>OperationEnabled</td><td>BOOL</td><td>1 = Operation is enabled (ETA. 2).</td></tr> <tr> <td>Malfunction</td><td>BOOL</td><td>1 = A detected failure on the device (ETA. 3).</td></tr> <tr> <td>VoltageEnabled</td><td>BOOL</td><td>1 = Voltage on the device terminals (ETA. 4).</td></tr> <tr> <td>QuickStop</td><td>BOOL</td><td>1 = Quick stop is activated (ETA. 5).</td></tr> <tr> <td>SwitchOnDisabled</td><td>BOOL</td><td>1 = Switch-on is disabled (ETA. 6).</td></tr> <tr> <td>Alarm</td><td>BOOL</td><td>1 = An alarm is present on the device (ETA. 7).</td></tr> <tr> <td>ForcedLocalMode</td><td>BOOL</td><td>1 = Forced local mode (ETA. 9).</td></tr> <tr> <td>ReferenceReached</td><td>BOOL</td><td>1 = The speed set-point has been reached (ETA. 10).</td></tr> <tr> <td>ReferenceExceeded</td><td>BOOL</td><td>1 = The speed set-point has exceeded limits (ETA. 11).</td></tr> <tr> <td>StopImposed</td><td>BOOL</td><td>1 = Stop is forced by remote control STOP key (ETA. 14).</td></tr> <tr> <td>ForwardReverseRotation</td><td>BOOL</td><td> <ul style="list-style-type: none"> 1 = Forward running direction (ETA. 15). 0 = Reverse running direction (ETA. 15). <p>NOTE:</p> <ul style="list-style-type: none"> Drive is in ready state, default forward status will be active. Drive is in run state, status gets updated as per direction selection. </td></tr> </table>	Parameter	Type	Description	ReadyToSwitchOn	BOOL	1 = The device is ready to switch on (DRIVECOM [ETA. 0]).	SwitchedOn	BOOL	1 = The device is switched on (ETA. 1).	OperationEnabled	BOOL	1 = Operation is enabled (ETA. 2).	Malfunction	BOOL	1 = A detected failure on the device (ETA. 3).	VoltageEnabled	BOOL	1 = Voltage on the device terminals (ETA. 4).	QuickStop	BOOL	1 = Quick stop is activated (ETA. 5).	SwitchOnDisabled	BOOL	1 = Switch-on is disabled (ETA. 6).	Alarm	BOOL	1 = An alarm is present on the device (ETA. 7).	ForcedLocalMode	BOOL	1 = Forced local mode (ETA. 9).	ReferenceReached	BOOL	1 = The speed set-point has been reached (ETA. 10).	ReferenceExceeded	BOOL	1 = The speed set-point has exceeded limits (ETA. 11).	StopImposed	BOOL	1 = Stop is forced by remote control STOP key (ETA. 14).	ForwardReverseRotation	BOOL	<ul style="list-style-type: none"> 1 = Forward running direction (ETA. 15). 0 = Reverse running direction (ETA. 15). <p>NOTE:</p> <ul style="list-style-type: none"> Drive is in ready state, default forward status will be active. Drive is in run state, status gets updated as per direction selection.
Parameter	Type	Description																																										
ReadyToSwitchOn	BOOL	1 = The device is ready to switch on (DRIVECOM [ETA. 0]).																																										
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ReservedReferenceChannel	BOOL	1 = The drive reference channel is reserved by DTM (Control Expert, SoMove) or WEB server (W8441.15) CRC.																																										
ReservedCommandChannel	BOOL	1 = The drive command channel is reserved by DTM (Control Expert, SoMove) or WEB server (W8442.15) CCC.																																										
State	INT	Numerical code corresponding to the state of the speed driver. Refer to the <i>State</i> , page 369 table.																																										
Info	INT	Numerical code with the information on statuses and required actions. Refer to the <i>Info</i> , page 369 table.																																										
CommandStatus ⁶	INT	<p>Indicate to controller program, from which source speed driver command is controlled.</p> <ul style="list-style-type: none"> 0 - No command selected 																																										

Parameter	Type	Description	
		<ul style="list-style-type: none"> 1 - Remote command selected 2 - Local command selected 3 - Panel command selected 	
InputsMap*	ATVINPUTS	Holds a data structure with the information on the state of the inputs of the speed driver. The information is available on Ethernet networks. The following table describes the InputsMap:	
	Input	Type	Description
	L1	BOOL	1 = The state of the digital input L1.
	L2	BOOL	1 = The state of the digital input L2.
	L3	BOOL	1 = The state of the digital input L3.
	L4	BOOL	1 = The state of the digital input L4.
	L5	BOOL	1 = The state of the digital input L5.
	L6	BOOL	1 = The state of the digital input L6.
InputsMap*	ATV6xxINPUTS/ ATV9xxINPUTS/ ATV6xxxINPUTS	Holds a data structure with the information on the state of the inputs of the speed driver. The following table describes the InputsMap:	
	Parameter	Type	Description
	DI1	BOOL	1 = State of the digital input DI1.
	DI2	BOOL	1 = State of the digital input DI2.
	DI3	BOOL	1 = State of the digital input DI3.
	DI4	BOOL	1 = State of the digital input DI4.
	DI5	BOOL	1 = State of the digital input DI5.
	DI6	BOOL	1 = State of the digital input DI6.
	DI7 ⁶	BOOL	1 = State of the digital input DI7.
	DI8 ⁶	BOOL	1 = State of the digital input DI8.
InputsMapExt*	ATVINPUTSEXT	Holds a data structure with the information on the state of the inputs of the speed driver for ATV61 and ATV71 extended cards on Ethernet networks. The following table describes the InputsMapExt:	
	Input	Type	Description
	L7	BOOL	1 = The state of the digital input L7.
	L8	BOOL	1 = The state of the digital input L8.
	L9	BOOL	1 = The state of the digital input L9.
	L10	BOOL	1 = The state of the digital input L10.
	L11	BOOL	1 = The state of the digital input L11.
	L12	BOOL	1 = The state of the digital input L12.
	L13	BOOL	1 = The state of the digital input L13.
	L14	BOOL	1 = The state of the digital input L14.
InputsMapExt ^{5,6}	ATV6xxINPUTSEXT/ ATV9xxINPUTSEXT/ ATV6xxxINPUTSEXT	Holds a data structure with the information on the state of the inputs of the speed driver. The following table describes the InputsMapExt:	
	Parameter	Type	Description
	DI7 ⁵	BOOL	1 = State of the digital input DI7.
	DI8 ⁵	BOOL	1 = State of the digital input DI8.
	DI11	BOOL	1 = State of the digital input DI11.
	DI12	BOOL	1 = State of the digital input DI12.

Parameter	Type	Description	
	DI13	BOOL	1 = State of the digital input DI13.
	DI14	BOOL	1 = State of the digital input DI14.
	DI15	BOOL	1 = State of the digital input DI15.
	DI16	BOOL	1 = State of the digital input DI16.
PresentValue	REAL	Current speed of rotation in engineering units (EU).	
PresentSpeed	REAL	Current motor speed in rpm (rotation per minute).	
Current*	REAL	Present motor current in Ampere (A). You can find this value on speed drives on ATV61 and ATV71 units on Ethernet networks and on speed drivers on ATV32 unit on Ethernet networks..	
Torque*	REAL	Current motor torque in 0.1 A increment. You can find this value on ATV61 and ATV71 on Ethernet networks and on ATV32 unit on Ethernet networks..	
Power*	REAL	Actual drive electrical power in kW. (Resolution is 0.00).	
AI1*	INT	The value of the AI1 analog device input. You can find this value on devices ATV61 and ATV71 units on Ethernet networks.	
AI2*	INT	The value of the AI2 analog device input. You can find this value on ATV61 and ATV71 on Ethernet networks.	
AI3*	INT	The value of the AI3 analog device input.	
ATV_IO*	ATV_IO_DDT, page 370	Device data structure holds the information for performing monitoring functions. The information used by the operator screen is readable from HMI or SCADA system.	
ATV_IOEXT*	ATV_IOEXT_DDT, page 370	Device data structure holds the information for performing monitoring functions. The information used by the operator screen is readable from HMI or SCADA system.	
ATV_IO ^{5,6}	ATV6xx_IO_DDT, page 370/ATV9xx_IO_DDT, page 370/ATV6xxx_IO_DDT, page 370	Device data structure holds the information for performing monitoring functions. The information used by the operator screen is readable from HMI or SCADA system.	
ATV_IOEXT ^{5,6}	ATV6xx_IOEXT_DDT, page 370/ATV9xx_IOEXT_DDT, page 370/ATV6xxx_IOEXT_DDT, page 370	Device data structure holds the information for performing monitoring functions. The information used by the operator screen is readable from HMI or SCADA system.	
Outputs ¹	ANY_ARRAY_INT	<p>Holds an array structure with data sent to the device. You can control the speed driver with this output variable. This variable is reserved for the DFB, and you cannot use this variable directly. To make the control block work properly, allocate the structure (%MWx). Refer to the Communications Technologies, page 379.</p> <p>The following table describes the ANY_ARRAY_INT information available for EATV61 and EATV71 units on Ethernet networks:</p>	
	Parameter	Type	Description
	Outputs [0]	INT	Control word (CMD).
	Outputs [1]	INT	Speed set-point (LFRD).
	Outputs [2]	INT	Logic output states (OL1R).
	Outputs [3]	INT	Analog output 1 physical value (AO1C).
	Outputs [4]	INT	Analog output 2 physical value (AO2C).
	Outputs [5]	INT	Analog output 3 physical value (AO3C).
Outputs ²	ANY_ARRAY_INT	<p>Holds an array structure with data sent to the device. You can control the speed driver with this output variable. This variable is reserved for the DFB, and you cannot use this variable directly. To make the control block work properly, allocate the structure (%MWx). Refer to the Communications Technologies, page 379.</p> <p>The following table describes the ANY_ARRAY_INT information available for ATV32E on Ethernet networks:</p>	
	Parameter	Type	Description
	Outputs [0]	INT	Control word (CMD).
	Outputs [1]	INT	Speed set-point (LFRD).
	Outputs [2]	INT	Logic output states (OL1R).
	Outputs [3]	INT	Analog output 1 physical value (AO1C).

Parameter	Type	Description	
Outputs ³	ANY_ARRAY_INT	<p>Holds an array structure with data sent to the device. You can control the speed driver with this output variable. This variable is reserved for the DFB, and you cannot use this variable directly. To make the control block work properly, allocate the structure (%MWx). Refer to the Communication Technologies, page 379.</p> <p>The information available for speed drivers on an Advantys STB is shown in the following table:</p>	
	Parameter	Type	Description
	Outputs [0]	INT	Control word (CWD).
	Outputs [1]	INT	Speed set-point.
Outputs ⁴	ARRAY [0..27] OF BYTE	Holds an array structure with data sent to the inverter. (Reserved for DFB usage).	
Outputs ⁵	ARRAY [0..4] OF INT	<p>Holds an array structure with data sent to the device. You can control the speed driver with this output variable. This variable is reserved for the DFB, and you cannot use this variable directly. To make the control block work properly, allocate the structure (%MWx).</p> <p>The following table describes the ATV6xx_OUT_DDT information available for ATV6xx on Ethernet networks:</p>	
	Parameter	Type	Description
	Outputs [0]	INT	Control word (CMD).
	Outputs [1]	INT	Speed set-point (LFRD).
	Outputs [2]	INT	Logic output states (OL1R).
	Outputs [3]	INT	Analog output 1 physical value (AO1C).
	Outputs [4]	INT	Analog output 2 physical value (AO2C).
Outputs ⁶	ARRAY [0..5] OF INT	<p>Holds an array structure with data sent to the device. You can control the speed driver with this output variable. This variable is reserved for the DFB, and you cannot use this variable directly. To make the control block work properly, allocate the structure (%MWx).</p> <p>The following table describes the ATV9xx_OUT_DDT/ATV6xxx_OUT_DDT information available for ATV9xx/ATV6xxx on Ethernet networks:</p>	
	Parameter	Type	Description
	Outputs [0]	INT	Control word (CMD).
	Outputs [1]	INT	Speed set-point (LFRD).
	Outputs [2]	INT	Torque set-point (LFR).
	Outputs [3]	INT	Logic output states (OL1R).
	Outputs [4]	INT	Analog output 1 physical value (AO1C).
	Outputs [5]	INT	Analog output 2 physical value (AO2C).
DTMOutputs ¹	ATV7161E_OUT_NOCEETH	<p>Holds an output structure for the data to be written from controller to the device via Device DTM. This output pin has to be used when the device DTM is used.</p> <p>The following table describes the ATV7161E_OUT_NOCEETH information available for ATV7161 on Ethernet networks:</p>	
	Parameter	Type	Description
	Reserved.	UINT	Reserved.
	CMD	UINT	Control word.
	LFRD	INT	Speed set-point.
	OL1R	UINT	Logic output states.
	AO1C	INT	Analog output 1 physical value.
	AO2C	INT	Analog output 2 physical value.
	AO3C	INT	Analog output 3 physical value.
DTMOutputs ²	ATV32_OUT_NOCEETH	<p>Holds an output structure for the data to be written from controller to the device via Device DTM. This output pin has to be used when the device DTM is used</p> <p>The following table describes the ATV32_OUT_NOCEETH information available for ATV32E on Ethernet networks:</p>	

Parameter	Type	Description	
	Parameter	Type	Description
	CMD	UINT	Control word.
	LFRD	INT	Speed set-point.
	OL1R	UINT	Logic output states.
	AO1C	INT	Analog output 1 physical value.
DTMOutputs ⁵	ATV6xxE_OUT_NOCETH	Holds an output structure for the data to be written from controller to the device via Device DTM. This output pin has to be used when the device DTM is used The following table describes the ATV6xxE_OUT_NOCETH information available for ATV6xx on Ethernet networks:	
	Parameter	Type	Description
	CMD	WORD	Control word.
	LFRD	INT	Speed set-point.
	OL1R	WORD	Logic output states.
	AO1C	INT	Analog output 1 physical value.
	AO2C	INT	Analog output 2 physical value.
DTMOutputs ⁶	ATV9xxE_OUT_NOCETH/ ATV6xxxE_OUT_NOCETH	Holds an output structure for the data to be written from controller to the device via Device DTM. This output pin has to be used when the device DTM is used The following table describes the ATV9xx_OUT_NOCETH/ATV6xxxE_OUT_NOCETH information available for ATV9xx/ATV6xxx on Ethernet networks:	
	Parameter	Type	Description
	CMD	WORD	Control word.
	LFRD	INT	Speed set-point.
	LTR	INT	Torque set-point.
	OL1R	WORD	Logic output states.
	AO1C	INT	Analog output 1 physical value.
	AO2C	INT	Analog output 2 physical value.
Statistic-Connector*	STATISTICCONNECTOR	Information data is used with modbus communication to obtain statistics on the modbus network (requests carried out, time between requests). This structure has been created for its use together with the StatisticCounter DFB in General Purpose library for communication. The following table describes the StatisticConnector:	
	Parameter	Type	Description
	Start	BOOL	1 = The operation has started.
	EndOk	BOOL	1 = The operation has ended correctly.
	EndNOk	BOOL	1 = The operation has ended with a detected error.
	PartialTime	DINT	Partial time.
<p>*: Parameters are available for specific components.</p> <p>1: Parameter is available only for ATV7161.</p> <p>2: Parameter is available only for EATV32.</p> <p>3: Parameter is available only for ASATV31 and ASATV7161.</p> <p>4: Parameter is available only for PBATV7161.</p> <p>5: Parameter is available only for ATV6xx.</p> <p>6: Parameter is available only for ATV9xx and ATV6xxx.</p> <p>7: Parameter is available only for MBATV212.</p>			

State

The following table describes the `State` variable:

Variable value	Description
-2	Detected error in DFB.
-1	Not initialized. Waiting for data.
0	Disabled.
2	Switch on disabled (Nst status).
3	Ready to switch on (Nst status).
4	Switched on (Nst status).
5	Operation enabled (Rdy status).
6	Quick stop (Fst status).
8	Inoperable device (Flt status).

Info

The code with the information is shown on the Control Expert operator screen. This variable is for informational purposes only. Do not use it to program switching operations. The following table describes the `Info` variable:

Variable value	Description
1	Incorrect configuration of DFB parameter.
2	Waiting <code>SwitchOnDisabled</code> .
3	Waiting <code>ReadyToSwitchOn</code> .
4	Waiting <code>SwitchOn</code> .
5	Waiting <code>OperationEnabled</code> .
6	Waiting <code>QuickStop</code> active.
10	Waiting for device information.
11	Missing <code>EnableDFB</code> .
12	Communication interruption.
13	ETA value is 0.
14	Remove local forcing has to be 0.
21	Missing <code>EnableDevice</code> .
23	Remove <code>Run</code> has to be 0.
24	Remove <code>ResetFail</code> . Reset again.
51	Speed driver stopped.
52	Speed driver running with speed 0.
53	Speed driver running.
54	Speed driver at rated running
55	Waiting speed-driver operation (Run).
56	Wait speed driver speed.
57	Waiting speed driver stop.
58	Speed set-point is 0.
59	Speed outside limits.
61	Remove <code>QuickStop</code> has to be 0.

Variable value	Description
62	QuickStop is activated.
81	Missing ResetFail. Inoperable speed driver.
82	Do speed driver reset.
99	Unexpected state.

ATV_IO_DDT Type

Name	Type	Description
OutputsMap, page 371	WORD	Data with the outputs of the speed driver.
AO1	INT	Device control. Value of the AO1 analog output (value of the AO1 input variable).
Current	REAL	Present current value. Current motor current in 0.1 A increment (value of the Current output variable).

ATV_IOEXT_DDT Type

Name	Type	Description
InputsMap, page 371	WORD	State of the digital inputs of the speed driver.
AI1*	INT	AI1 analog input. Value of the AI1 analog input (value of the AI1 output variable)
AI2*	INT	AI2 analog input. Value of the AI2 analog output (value of the AI2 output variable).
AO2*	INT	AO2 analog output. Value of the AO2 analog output (Value of the AO2 input variable).
Torque	DINT	Current torque value. Current motor torque in 0.1 A increment (value of the Torque output variable).
*: Parameters are available for specific components.		

ATV6xx_IO_DDT/ATV9xx_IO_DDT/ATV6xxx_IO_DDT Type

Name	Type	Description
OutputsMap, page 371	WORD	Data with the outputs of the speed driver.
AQ1	INT	Device control. Value of the AQ1 analog output (value of the AQ1 input variable).
Current	REAL	Motor current value. Actual motor current in Amps.

ATV6xx_IOEXT_DDT/ATV9xx_IOEXT_DDT/ATV6xxx_IOEXT_DDT Type

Name	Type	Description
InputsMap, page 372	WORD	State of the digital inputs of the speed driver.
AI1	INT	AI1 analog input. Value of the AI1 analog input (value of the AI1 output variable)
AI2	INT	AI2 analog input. Value of the AI2 analog output (value of the AI2 output variable).

Name	Type	Description
AI3	INT	AI3 analog input. Value of the AI3 analog output (value of the AI3 output variable).
AQ2	INT	AQ2 analog output. Value of the AQ2 analog output (Value of the AO2 input variable).
Torque	DINT	Motor torque value. Actual drive torque in %.
Power	REAL	Electrical power value. Actual driver power in kW.

OutputsMap Word Structure (ATV6xx, ATV9xx, ATV6xx)

Provides control over the device outputs. The following table describes the OutputsMap word structure:

Bit	Description
0	R1 output state (<i>OutputsMap.R1</i>).
1	R2 output state (<i>OutputsMap.R2</i>).
2	R3 output state (<i>OutputsMap.R3</i>).
3	R4 output state (<i>OutputsMapExt.R4</i>).
4	R5 output state (<i>OutputsMapExt.R5</i>).
5	R6 output state (<i>OutputsMapExt.R6</i>).
8	DQ1 output state (<i>OutputsMapExt.DQ1</i>).
12	DQ11 output state (<i>OutputsMapExt.DQ11</i>).
13	DQ12 output state (<i>OutputsMapExt.DQ12</i>).

OutputsMap Word Structure (ATV7161)

Provides control over the device outputs. The following table describes the OutputsMap word structure:

Bit	Description
0	R1 output state (<i>OutputsMap.R1</i>).
1	R2 output state (<i>OutputsMap.R2</i>).
2	R3 output state (<i>OutputsMap.R3</i>) for ATV 71 and ATV 61.
3	R4 output state (<i>OutputsMap.R4</i>) for ATV 71 and ATV 61.
4	LO1 output state (<i>OutputsMapExt.LO1</i>) for ATV 71 and ATV 61.
5	LO2 output state (<i>OutputsMapExt.LO2</i>) for ATV 71 and ATV 61.
6	LO3 output state (<i>OutputsMapExt.LO3</i>) for ATV 71 and ATV 61.
7	LO4 output state (<i>OutputsMapExt.LO4</i>) for ATV 71 and ATV 61.

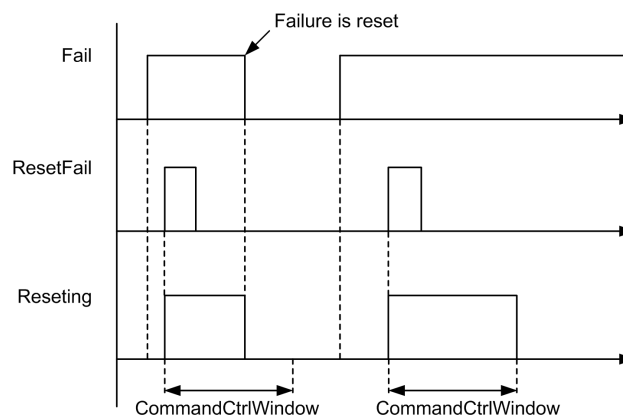
InputsMap Word Structure (ATV7161)

Provides the value of the device inputs. The following table describes the InputsMap word structure:

Bit	Description
0	Value of the digital input DI1 (<i>InputsMap.DI1</i>).
1	Value of the digital input DI2 (<i>InputsMap.DI2</i>).
2	Value of the digital input DI3 (<i>InputsMap.DI3</i>).

Bit	Description
3	Value of the digital input DI4 (<i>InputsMap.DI4</i>).
4	Value of the digital input DI5 (<i>InputsMap.DI5</i>).
5	Value of the digital input DI6 (<i>InputsMap.DI6</i>).
6	Value of the digital input DI7 (<i>InputsMap.DI7</i>).
7	Value of the digital input DI8 (<i>InputsMap.DI8</i>).
10	Value of the digital input DI11 (<i>InputsMap.DI11</i>).
11	Value of the digital input DI12 (<i>InputsMap.DI12</i>).
12	Value of the digital input DI13 (<i>InputsMap.DI13</i>).
13	Value of the digital input DI14 (<i>InputsMap.DI14</i>).
14	Value of the digital input DI15 (<i>InputsMap.DI15</i>).
15	Value of the digital input DI16 (<i>InputsMap.DI16</i>).

Timing diagram:



InputsMap Word Structure (ATV6xx, ATV9xx, ATV6xxx)

Provides the value of the device inputs. The following table describes the InputsMap word structure:

Bit	Description
0	Value of the digital input L1 (<i>InputsMap.L1</i>).
1	Value of the digital input L2 (<i>InputsMap.L2</i>).
2	Value of the digital input L3 (<i>InputsMap.L3</i>).
3	Value of the digital input L4 (<i>InputsMap.L4</i>).
4	Value of the digital input L5 (<i>InputsMap.L5</i>).
5	Value of the digital input L6 (<i>InputsMap.L6</i>).
6	Value of the digital input L7 (<i>InputsMap.L7</i>).
7	Value of the digital input L8 (<i>InputsMap.L8</i>).
8	Value of the digital input L9 (<i>InputsMap.L9</i>).
9	Value of the digital input L10 (<i>InputsMap.L10</i>).
10	Value of the digital input L11 (<i>InputsMap.L11</i>).
11	Value of the digital input L12 (<i>InputsMap.L12</i>).
12	Value of the digital input L13 (<i>InputsMap.L13</i>).

Bit	Description
13	Value of the digital input L14 (InputsMap.L14).
14	Value of the digital input L15 (InputsMap.L15).

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
ATV_ST ¹	ATV_ST_DDT, page 373	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 or SCADA system.
ATV_CFG ¹	ATV_CFG_DDT, page 374	Data structure with the device information. The information is used by the operator screen and is readable from the HMI or SCADA system.
ATV_ST ²	ATV6xx_ST_DDT, page 374/ ATV9xx_ST_DDT, page 374/ ATV6xxx_ST_DDT, page 374	Device data structure 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.
ATV_CFG ²	ATV6xx_CFG_DDT, page 375/ ATV9xx_CFG_DDT, page 375/ ATV6xxx_CFG_DDT, page 374	Data structure with the device information. The information is used by the operator screen, is readable from the HMI/SCADA system.
WorkMemory ¹	ANY_ARRAY_INT	Array is used for modbus communications. This variable is to be used with a modbus port that serializes modbus requests in an optimum manner.
1: Parameters are available only for specific components.		
2: Parameters are available only for ATV6xx, ATV9xx and AVT6xxx.		

ATV_ST_DDT Type

Name	Type	Description
STW, page 376	WORD	Provides the device status. Access to the data held in this bit word is read-only.
CFGW, page 374	WORD	Device control. Provides the means necessary 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.
PresentValue	REAL	Current speed value. Current speed of rotation.
SetPoint	REAL	Set-point variable. The speed set-point is requested from the speed driver.

ATV_CFG_DDT Type

Name	Type	Description
DataStatus, page 376	WORD	Information on the device status. Information on the Status output structure.
Info	INT	Device information. Speed driver information. Its value is Info status.
Warning-Code, page 377	WORD	Alarm code information. Takes the values from the WarningCode output.
State	INT	Speed driver status code. Speed driver status code information. Its value is State status.
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred FailCode[0].
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred FailCode[1].
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred FailCode[2].

ATV6xx_ST_DDT/ATV9xx_ST_DDT/ATV6xxx_ST_DDT Type

Name	Type	Description
STW, page 375	WORD	Provides information on the device status. Access to the data held in this bit word is read-only.
CFGW, page 374	WORD	Device control. Provides the means necessary 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.
PresentValue	REAL	Actual speed value. Present speed of rotation
SetPoint	REAL	Speed set-point variable. The speed set-point is requested from the speed driver.
TorqueSet-Point*	REAL	Torque set-point variable is requested from the speed driver.
*: Parameters are available for 9xx and 6xxx.		

ATV6xx_CFG_DDT/ATV9xx_CFG_DDT/ATV6xxx_CFG_DDT Type

Name	Type	Description
DataStatus, page 376	WORD	Provides information on the device status. Information on the Status output structure.
Channelstatus, page 377	WORD	Provides information on the channel status. Information on the Status output structure.
ExtendedStatus, page 377*	WORD	Extended device status.
Info	INT	Device information. Speed driver information. Its value is Info status.
State	INT	Speed driver status code. Speed driver status code information. Its value is State status.
WarningCode	WORD	Notification code register.
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred FailCode[0].

Name	Type	Description
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred <code>FailCode[1]</code> .
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred <code>FailCode[2]</code> .
*: Parameter is applicable only for ATV6xxx.		

ATV_ST.STW/ATV6xx_ST.STW/ATV9xx_ST.STW/ATV6xxx_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 DFB (follow-up or screw terminal-based control).
5	Communication interruption.
6	Requires resetting. <code>ResetFail</code> is required.
7	Refer to the <code>ExtControlled</code> output pin, page 361.
8	Refer to the <code>Resetting</code> output pin, page 361.
9	Refer to the <code>EnableDFB</code> input pin, page 353.
15	Direction of rotation.

ATV_ST.CFGW Word Structure

Bit	Description
0	Refer to the <code>ResetFail</code> input pin, page 353.
1	Owner.
3	Refer to the <code>Direction</code> input pin, page 353.
4	Refer to the <code>QuickStop</code> input pin, page 353.
5	Refer to the <code>EnableDevice</code> input pin, page 353.
6	Refer to the <code>Run</code> input pin, page 353.
7	Refer to the <code>ControlCommand</code> input pin, page 353.
8	Refer to the <code>ControlSetPoint</code> input pin, page 353.

ATV6xx_ST.CFGW/ATV9xx_ST.CFGW/ATV6xxx_ST.CFGW Word Structure

Bit	Description
0	Refer to the <code>ResetFail</code> input pin, page 353.
1	Owner.
3	Refer to the <code>Direction</code> input pin, page 353.
4	Refer to the <code>QuickStop</code> input pin, page 353.
5	Refer to the <code>EnableDevice</code> input pin, page 353.
6	Refer to the <code>Run</code> input pin, page 353.

Bit	Description
7	Refer to the ControlCommand input pin, page 353.
8	Refer to the ControlSetPoint input pin, page 353.
9	Refer to the ExternalError input pin, page 353.

NOTE: The Owner bit enables to control the block from the ***_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.

ATV_CFG.DataStatus/ATV6xx_CFG.DataStatus/ATV9xx_CFG.DataStatus/ATV6xxx_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the ReadyToSwitchOn status in the Status output pin, page 361.
1	Refer to the SwitchedOn status in the Status output pin, page 361.
2	Refer to the OperationEnabled status in the Status output pin, page 361.
3	Refer to the Malfunction status in the Status output pin, page 361.
4	Refer to the VoltageEnabled status in the Status output pin, page 361.
5	Refer to the QuickStop status in the Status output pin, page 361.
6	Refer to the SwitchOnDisabled status in the Status output pin, page 361.
7	Refer to the Alarm status in the Status output pin, page 361.
8	Refer to the ForcedLocalMode status in the Status output pin, page 361.
9	Refer to the ReferenceReached status in the Status output pin, page 361.
10	Refer to the ReferenceExceeded status in the Status output pin, page 361.
11	Refer to the StopImposed status in the Status output pin, page 361.
12	Refer to the ForwardReverseRotation status in the Status output pin, page 361.

ATV_CFG.DataStatus Word Structure for MBATV212 Variable Speed Drive

Bit	Description
0	Refer to the OutputFailure status in the Status output pin, page 361.
1	Refer to the Tripped status in the Status output pin, page 361.
2	Refer to the Alarm status in the Status output pin, page 361.
3	Refer to the MOFF status in the Status output pin, page 361.
4	Refer to the MotorSelectionTHR status in the Status output pin, page 361.
5	Refer to the PControl status in the Status output pin, page 361.
6	Refer to the AccelerationPattern status in the Status output pin, page 361.
7	Refer to the DCBraking status in the Status output pin, page 361.
9	Refer to the ForwardReverseRotation status in the Status output pin, page 361.
10	Refer to the Run status in the Status output pin, page 361.
11	Refer to the CoastStop status in the Status output pin, page 361.
12	Refer to the EmergencyStop status in the Status output pin, page 361.
13	Refer to the StandbyST status in the Status output pin, page 361.

Bit	Description
14	Refer to the Standby status in the Status output pin, page 361.
15	Refer to the LocalRemote status in the Status output pin, page 361.

ATV6xx_CFG.ChannelStatus/ATV9xx_CFG.ChannelStatus Word Structure

Bit	Description
0	Refer to the ReservedReferenceChannel status in the Status output pin, page 361.
1	Refer to the ReservedCommandChannel status in the Status output pin, page 361.

ATV6xxx_CFG.ExtendedStatus Word Structure

Bit	Description
0	Refer to the ReservedReferenceChannel status in the Status output pin, page 361.
1	Refer to the ReservedCommandChannel status in the Status output pin, page 361.
2	Refer to the MVCBReadyToClose status in the Status output pin, page 361.
3	No command selected. Refer to CommandStatus output pin, page 361.
4	Remote command selected. Refer to CommandStatus output pin, page 361
5	Local command selected. Refer to CommandStatus output pin, page 361
6	Panel command selected. Refer to CommandStatus output pin, page 361

ATV_CFG.WarningCode Word Structure

Bit	Description
1	Refer to the Device in the WarningCode output pin, page 361.
2	Refer to the Order in the WarningCode output pin, page 361.
3	Refer to the ForcedLocalMode in the WarningCode output pin, page 361.

ATV6xx_CFG.WarningCode/ATV9xx_CFG.WarningCode/ATV6xxx_CFG.WarningCode Word Structure

Bit	Description
1	Refer to the Device in the WarningCode output pin, page 361.
2	Refer to the Order in the WarningCode output pin, page 361.
3	Refer to the ForcedLocalMode in the WarningCode output pin, page 361.
4	Refer to ReservedReferenceChannel in the WarningCode output pin, page 361.
5	Refer to ReferenceCommandChannel in the WarningCode output pin, page 361.

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, an alarm is issued. The commands that are controlled are <i>EnableDevice</i> , <i>Run</i> , and <i>QuickStop</i> . In the event of a <i>ResetFail</i> , this is not interpreted as an alarm. Instead, the detected failure continues, and you have to reset the <i>Reseting</i> output.
ScanTime	TIME	Allows you to configure the time for which the alarm signals are kept active. Helps the monitoring subsystem to acquire the data for the alarms that are automatically reset.
HighRangeRpm	INT	High range of the input signal in rpm. NOTE: The parameter value has to be higher than <i>LowRangeRpm</i> .
LowRangeRpm	INT	Low range of the input signal in rpm. NOTE: The parameter value has to be higher than 0.
HighRangeEngUnit	REAL	High range for the measurement in engineering units (Refer to the <i>SetPoint</i> input pin, page 353).

For operating the motor at different rpm, *LowRangeEngUnit* has to be less than the *HighRangeEngUnit*. If both the values are same, motor operates at *HighRangeEngUnit*.

NOTICE

UNEXPECTED EQUIPMENT BEHAVIOR

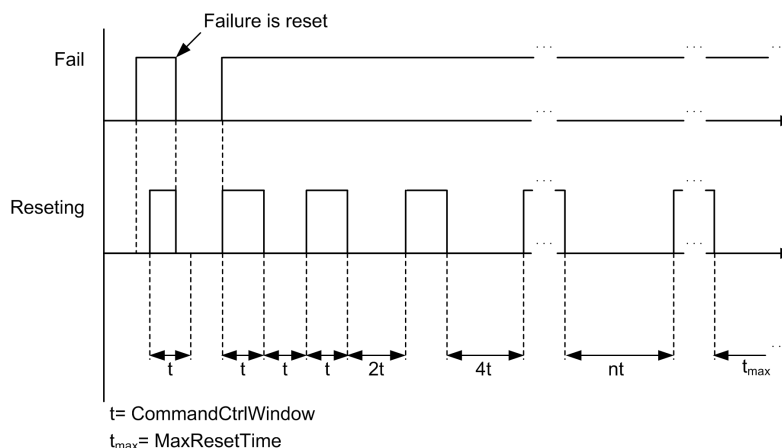
Do not configure *LowRangeEngUnit* to be same as *HighRangeEngUnit*.

Failure to follow these instructions can result in equipment damage.

LowRangeEngUnit	REAL	Low range for the measurement in engineering units (Refer to the <i>SetPoint</i> input pin, page 353). NOTE: The parameter value has to be higher than <i>LowRangeRpm</i> .
ResetMode	BOOL	Enables to configure the type of reset. This type of reset is used for communication interruption and device interruptions. The time defined in <i>CommandCtrlWindow</i> 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 <i>CommandCtrlWindow</i> elapses. The second reset is carried out after <i>CommandCtrlWindow</i> * 2 elapses, so on. If the value of <i>CommandCtrlWindow</i> 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 <i>ResetFail</i> 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. Refer to the Timing diagram below.
ScalingFactorCurrent	REAL	Define scaling factor for current depending on drive rate.

Timing diagram:



Diagnostics Information Management

Overview

The diagnostic codes that the device can return are read on the `FailCode` output variable.

Parameter Configuration Diagnostic Codes

This diagnostic code indicates that the function block has incorrect configuration.

- `FailCode[0]`: 16#0003
- `FailCode[1]`: 16#0000
- `FailCode[2]`: 16#0004

This diagnostic code can occur for any of the below conditions:

- Wrong array size at `Inputs` or `Outputs` pins of the function block.
- Variables connected to both `DTMInputs` and `Inputs` pins of the function Block.

During the above detected `FailCode` the function block does not process any inputs and the function blocks output displays the last processed state.

This detected `FailCode` can be reset by a rising edge to the `EnableDFB` input pin after correcting the configuration of the function block.

Ethernet Communication Diagnostic Codes

This code indicates that communications have not been established and can be reset:

- `FailCode[0]`: 16#0002
- `FailCode[1]`: 16#0000
- `FailCode[2]`: 16#0004

After the communications have been established, check Ethernet client diagnostic codes for `FailCode [0]` and `FailCode [1]`. The components make a distinction between detected read request and write request interruptions:

- `FailCode [2]: 16#0001` Read
- `FailCode [2]: 16#0002` Write

Diagnostic Code Example

For a detected error, the code is:

- `FailCode [1]: 16#0000`
- `FailCode [2]: 16#0005`

The `FailCode [0]` can have one of the following codes:

Diagnostic code	Symbol	Meaning
16#0000	nOF	No detected failure.
16#1000	CrF OLF SOF	Detected failure in capacitor pre-charge. Motor overload or Overspeed.
16#2310	OCF	Overcurrent.
16#2320	SCF	Short-circuit impedance. Power stage detected failure.
16#2330	SCF	Motor ground detected fault.
16#2340	SCF	Short-circuit between motor phases.
16#3110	OSF	Supply over voltage detected failure.
16#3120	USF	Low bus voltage.
16#3130	PHF	Phase dropout detected failure.
16#3310	ObF OPF	Over voltage on DC bus. Motor phase dropout.
16#4210	OHF	Drive overheating.
16#5520	EEF	Inoperable EEPROM memory.
16#6100	InF	Internal detected failure.
16#6300	CFE CFI	Incorrect (parameter) configuration or Invalid parameters.
16#7300	LFF	Inoperable 4...20 mA AI3 input.
16#7510	SLE	Modbus is not operational.
16#9000	EPF	External detected failure.
16#FF00	tnF	Inoperable auto-tuning.
16#FF01	bLF	Brake control unit is not operational.

The inoperable device can be reset if `ControlCommand` is TRUE. If this condition is not met, the detected failure can be reset on the speed driver or through the screw terminal with the correct parameter configuration.

NOTE: The diagnostic codes of the device are available for speed drives, except for those that communicate through the Advantys STB Island.

Diagnostic Code Example for MBATV212 Variable Speed Drive

The `FailCode [0]` can have one of the following codes:

Diagnostic bit	Meaning
0	Overcurrent.
1	Drive overload.
2	Motor overload.
3	Overheat.
4	Overvoltage.
5	Main circuit undervoltage.
6	Reserved.
7	Undercurrent.
8	Over-torque.
9	Reserved.
10	Cumulative operation hours reached.
11	Reserved.
12	Reserved.
13	Main circuit undervoltage alarm same as MS-relay status.
14	At the time of the instant blackout, Forced deceleration/stop.
15	An automatic stop during the lower limit frequency continuance.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the ATV6xx/ATV9xx/ATV6xxx.

Genies

Genie Properties


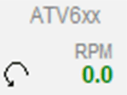


Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	Atv6xx9xx	Altivar 6xx9xx variable speed drives.
	Atv6xx9xx_PV	Altivar 6xx9xx variable speed drives displays the present value (PV).
	Atv6xx9xx_PVSP	Altivar 6xx9xx variable speed drives displays the present value (PV) and set point (SP).
	Atv6xxxEGP	Altivar 6xxx variable speed drive.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a general description, page 40 of the graphic elements that are used in the faceplate.

Available Tabs

During operation, clicking an ATV6xx/ATV9xx/ATV6xxx genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab of ATV6xx:

P1001ATV6xxE_ATV

P1001 Speed Drive

Equipment Status: **On**

Failure: Communication error

Warning: -

Owner: Operator

Reset

RPM
0.00
0.00

Current: 0.00 A

Power: 0.00 kW

Torque: 0.00 %

The table describes the control function of the operator tab:

Label	Item name	Description	Security parameter, page 343
Equipment Status	Closed	Equipment status of ATV6xx.	-
Failure	LastFailure, DeviceFailActive	Current detected failure status of ATV6xx.	
Warning	AlarmActive, CurrentWarning	Current alert status of ATV6xx.	
Owner	OwnerSelect	Owner of ATV6xx.	Set owner
-	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Bar Graph	PresentValue, SpeedSetpoint	Present and speed value of the ATV.	-
Current	Current	Actual current	
Power	Power	Power	
Torque	Torque	Torque	

The figure shows an operator tab of ATV9xx\ATV6xxx:

The table describes the control function of an operator tab:

Label	Item name	Description	Security parameter, page 343
Equipment Status	Closed	Equipment status of ATV6xx.	–
Failure	LastFailure, DeviceFailActive	Current detected failure status of ATV6xx.	
Warning	AlarmActive, CurrentWarning	Current alert status of ATV6xx.	
Owner	OwnerSelect	Owner of ATV6xx.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Bar Graph	PresentValue, SpeedSetpoint, Torque and TorqueSetpoint	Present, speed and torque value of the ATV.	–
Current	Current	Actual current	
Power	Power	Power	
Torque	Torque	Torque	

Measures Tab

The table lists the items of each groups from group number 1 to 4 of measures tab:

Group Order Number	1	2	3	4
Group Name	Key Parameters	Owner	Speed	Device Status
Items	Current	ForcedLocalMode	SpeedSetpoint	DirectionPresentValue
	Torque		ReferenceExceeded	ReadytoSwitchOn
	Power		ReferenceReached	SwitchedOn
	PresentValue			OperationEnabled
				MalfunctionActive
				QuickStop
				SwitchOnDisabled
				DeviceAlarmActive
				StopImposed
				VoltageEnabled
				ReferenceCommand-Channel
				ReservedCommand-Channel

The table lists the items of each groups from group number 5 to 7 of measures tab:

Group Order Number	5	6	7
Group Name	Diagnostics	Inputs	Outputs
Items	WarningCode	AnalogInput1	AnalogOutput1
	FailCode0	AnalogInput2	AnalogOutput2
	FailCode2	AnalogInput3	RelayOutput1
	FailCode1	DigitalInput1	RelayOutput2
		DigitalInput2	RelayOutput3
		DigitalInput3	RelayOutput4
		DigitalInput4	RelayOutput5
		DigitalInput5	RelayOutput6
		DigitalInput6	DigitalOutput11
		DigitalInput7	DigitalOutput12
		DigitalInput8	
		DigitalInput9	
		DigitalInput10	
		DigitalInput11	
		DigitalInput12	
		DigitalInput13	
		DigitalInput14	
		DigitalInput15	
		DigitalInput16	

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of ATV6xx/ATV9xx/ATV6xxx.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	–	Bit0
NotReady	Module not ready	–	Bit1
Running	Module is running	On/Off	Bit2
DeviceFailActive	Device is inoperable	–	Bit3
AlarmActive	Alarm on the device	Active/ Inactive	Bit4
CommunicationFailActive	Communication interruption	–	Bit5
RequireRearm	Detected fail resetting required	Required/Not Required	Bit6
OwnerExternal	Device is externally controlled	External/Not External	Bit7
Resetting	Reset is in process	–	Bit8
EnableFunctional-Block	Normal execution of control block	–	Bit9
DirectionPresent-Value	Direction of rotation	On/Off	Bit15
Bit items derived from DataStatusWord.			
ReadyToSwitchON	Device is ready to switch on	–	Bit0
SwitchedON	Device is switch on	–	Bit1
OperationEnabled	Operation is enabled	–	Bit2
MalfunctionActive	Failure detected	–	Bit3
VoltageEnabled	Voltage on the terminal	–	Bit4
QuickStop	Quick stop is activated	–	Bit5
SwitchedONDisabled	Switch on is disabled	–	Bit6
ReferenceReached	Speed set point reached	–	Bit9
ReferenceExceeded	Speed set point exceeds limit	–	Bit10
StopImposed	Forces stop remotely	–	Bit11
Bit items derived from ExtendedDataStatusWord.			
ReservedCommand-Channel	Command channel reserved by DTM	–	Bit1
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected fail	Active/ Inactive	Bit0
OwnerSelect	Owner of control module	Operator/ Program	Bit1

Item name	Description	Enumera- tion	Address
DirectionSetpoint	Decides direction of activation	Forward/ Reverse	Bit3
QuickStopCommand	Stops the device quickly	–	Bit4
EnableDevice	Enable device	–	Bit5
Run	Start the device in the selected direction	–	Bit6
ControlCommand	Indicates mode of control	–	Bit7
ControlSetpoint	Indicates mode of speed control	–	Bit8
IO Items			
StatusWord	Status word	–	ATV6xx/ATV9xx_ST. STW
ConfigurationWord	Configuration word		ATV6xx/ATV9xx_ST. CFGW
DataStatusWord	Data Status word		ATV6xx/ATV9xx_ CFG.DataStatus
ExtendedDataStatusWord	Extended Data Status word		ATV6xx/ATV9xx_ ExtendedDataSta- tus
Calculated Items			
CurrentWarning	Current alert	–	GPL_ ATVCurrentWarning
LastFailure	Last detected failure		GPL_ATVLastFailure
Owner	Current owner of the ATV6xx/ATV9xx Refer to Calculated Variable, page 39.		GPL_OwnerBasic
Abnormal	Shows abnormal condition of the ATV6xx/ ATV9xx Refer to Abnormal Conditions, page 387.		GPL_DeviceAbnormal
ActionRequired	Shows action required condition of the ATV6xx/ ATV9xx Refer to Action Required Conditions, page 387.		GPL_ DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of ATV6xx/ATV9xx/ATV6xxx:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	Bit0
AbnormalOperatorTab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	Bit8

Action Required Conditions

The table describes the abnormal conditions of ATV6xx/ATV9xx/ATV6xxx:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	Bit8

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
AlarmFailure	Alarm failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
Present-Value	Present value	<i>ATV_PresentValue</i>
SpeedSetpoint	Speed setpoint	<i>ATV_SpeedSetpoint</i>
Torque-Setpoint	Torque setpoint	<i>ATV_TorqueSetpoint</i>
Torque	Torque	<i>ATV_Torque</i>
Current	Current	<i>ATV_Current</i>
Power	Power	<i>ATV_Power</i>

ATV320 Altivar Process Drive

What's in This Chapter

Template	389
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Overview

This chapter describes the component that provide the functionality of template and control Supervision functions of the ATV320.

Template

Overview

This section describes functionality of the \$ATV320EMGP template.

Description

General Description

The \$ATV320EMGP control module template allows you to control and monitor the ATV320 variable speed drive.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Speed	Allows the speed set-point of the device to be sent. Allows the control of speed setpoint.
Device status indication	Displays the status of the device.
Remote resetting	Reset the detected communication failure of drive.
Control or Monitoring	Enables you to monitor the device. You can control the command or set-point from the controller or through the wired inputs/outputs of the speed drive. Also allows the command and set-point to be controlled separately.
Owner	Manages the owner of the equipment (Operator or Program).

Parameters

Parameters

The \$ATV320EMGP template provides different control and supervision parameters to the user to control the functions as per the requirement.

Control

The table describes the control parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Starter mode	Enum	Enable (2)	–
	Modbus identification	String	0	Device specific identification number (Modbus ID). NOTE: Modbus ID 248 is used while communicating with the M340 Controller Ethernet port.
	Enable statistic selector	Boolean	FALSE	–
	Automatic reset			–
	Define scaling factor for current, depending on drive rating	Enum	100 (100)	–
	Item to be displayed on item L3 symbol	Enum	None (0)	–
Time	Drive status update rate	Duration	00:00:01	–
	Drive data update rate		00:00:03	–
	Command timeout		00:00:05	–
	Minimum time to maintain alert signals		00:00:03	–
	Maximum time between resets		00:01:00	–
Range	Maximum speed (RPM)	Integer	1500	–
	Minimum speed (RPM)		0	–
	Maximum speed (EU)	Float	1500.0	–
	Minimum speed (EU)		0.0	–
	Engineering units	String	rpm	–
	Display format		####.#EU	–
IO	Select analog output 1 mode	Enum	Output (0)	–
	Select analog output 2 mode			–
Modbus Custom Read	Request 1 start register	Un-signed-Short	0	–
	Request 1 length	Un-signed-Byte		–
	Request 2 start register	Un-signed-Short		–
	Request 2 length	Un-signed-Byte		–
	Request 3 start register	Un-signed-Short		–

Section	Parameter description	Data type	Default value	Additional remarks
	Request 3 length	Un-signed-Byte		–

Supervision

The table describes the supervision parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Operation	Normal owner	Enum	Operator & Program (2)	–
Security	Set owner	Enum	Operator (1)	Privilege to change override mode. .
	Set rearm		Operator (Confirmed) (10)	Privilege to change reset. This parameter is used in operator tab, page 407.
	Set acknowledge		Operator (1)	Privilege to acknowledge alarm. This parameter is used in alarm tab, page 407.
Asset and Display Parameters	For more details, refer to the topic describing the parameters of asset and display, page 28.			
Trend	For more details, refer to the topic describing the parameters of trend, page 29.			

Data

The table describes the data parameters:

Section	Parameter description	Data type	Default value	Additional remarks
Configuration	Deadband value	Integer	0	–
	Item name NOTE: This parameter is case sensitive.	String	–	Refer to the Item section, page 408.
Alarm	Operation Failure alarm description	String	<i>@(Operational Failure Alarm)</i>	–
	Operation Failure alarm severity	Enum	<i>Low(4000)</i>	It allows to set the criticality of alarm.
	Operation Failure alarm group	String	<i>Failure</i>	Group name for rapid alarm filtering.
	Device failure description	String	<i>@(Device Failure Alarm)</i>	A detail description for alarms.
	Device failure severity	Enum	<i>Low(4000)</i>	It allows to set the criticality of alarm.
	Device failure group	String	<i>Failure</i>	Group name for rapid alarm filtering.
	Communication failure description	String	<i>@(Communication Failure Alarm)</i>	A detail description for alarms.

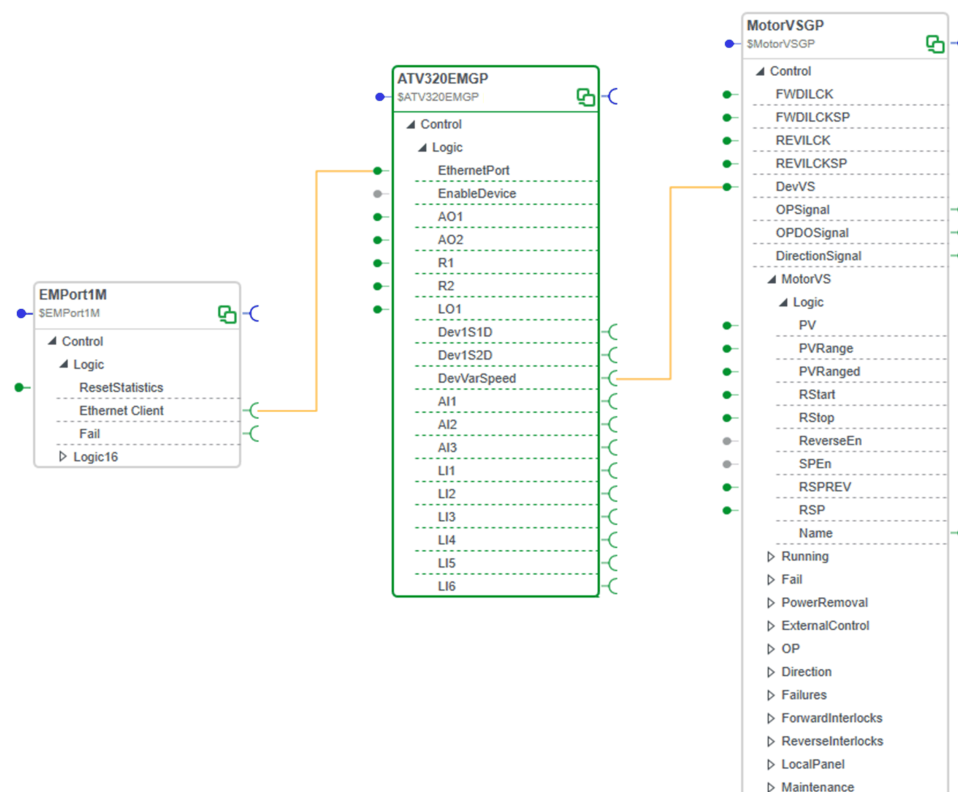
Section	Parameter description	Data type	Default value	Additional remarks
	Communication failure severity	Enum	<i>Low(4000)</i>	It allows to set the criticality of alarm.
	Communication failure group	String	<i>Failure</i>	Group name for rapid alarm filtering.
Trend	Disable present value	Boolean	<i>FALSE</i>	—
	Disable setpoint			—
	Disable speed			—
	Disable current	<i>TRUE</i>	<i>TRUE</i>	—
	Disable power			—
Historize	Data	Boolean	<i>FALSE</i>	—
	PV&SP			—
	Information word			—
	Device state			—
	Fail code			—
	Speed			—

Hyperlink

For more details, refer to the topic describing the parameters of hyperlink, page 30.

Interfaces

This figure shows the \$ATV320EMGP (also applicable for \$ATV320EMCE) Links Editor:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
EthernetPort	<i>\$EMWorkMemory1</i>	A communication interface which allows the device to communicate to controller	Connect to EMport1m template.
EnableDevice	<i>\$Bool/Ref</i>	An input interface from other template to enable device. This will be enabled only when enable device type parameter is Selected as interface.	Connect a boolean variable to enable/disable device.
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control.
Dev1S2D	<i>\$DEV1S2D/DO</i>	An output interface to other template.	Connect to a two direction motor to control.
DevVarSpeed	<i>\$DEVVS/DO</i>	An output interface to other template.	Connect to a variable speed motor to control.

Control

Overview

This chapter describes the *ATVEngine* DFB.

Description

General

The ATV profile is used to manage the Altivar variable speed drives on different communication networks.

Function Description

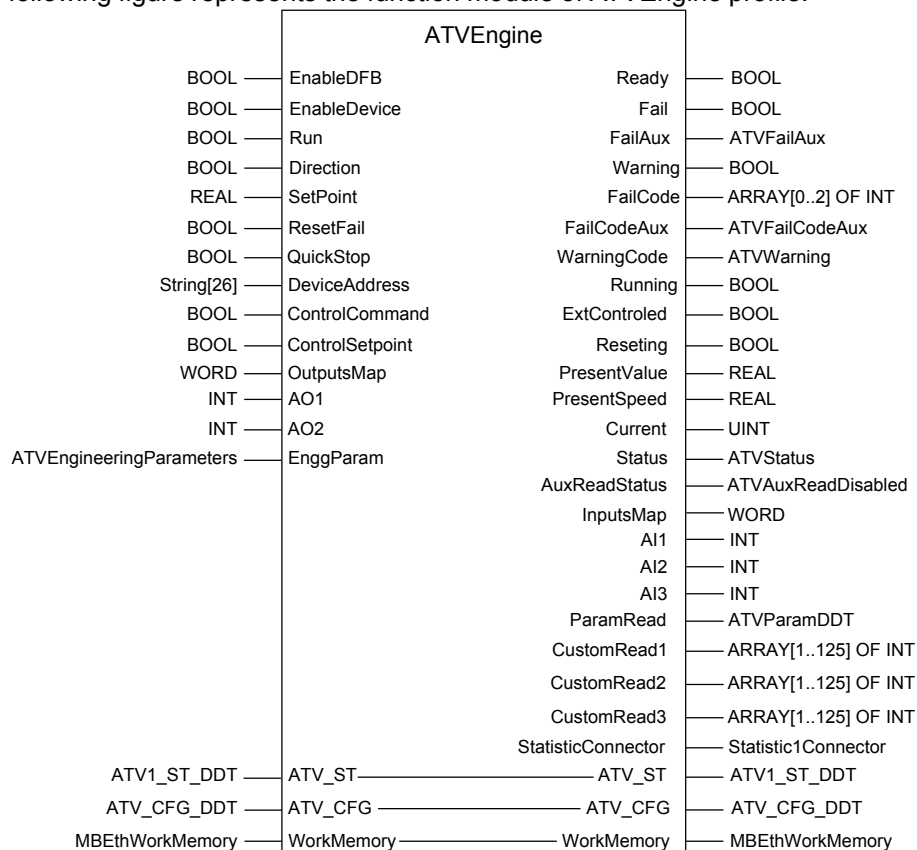
The main functions of the DFB are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Speed	Allows the speed set-point of the device to be sent. Allows the control of speed setpoint.
Device status indication	Displays the status of the device.
Remote resetting	Reset the detected communication failure of drive.
Control or Monitoring	Enables you to monitor the device. You can control the command or set-point from the controller or through the wired inputs/outputs of the speed drive. Also allows the command and set-point to be controlled separately.
Owner	Manages the owner of the equipment (Operator or Program).

DFB Representation

Representation

The following figure represents the function module of ATVEngine profile:



For DFBs communicating by I/O scanning, variables read from the device retain their last value when a communication interruption occurs. For details, refer to the description of the corresponding [output parameter](#), [page 398](#).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

When you configure the *Last value* parameter of the I/O scanner line, take into consideration the behavior of the DFB when a communication interruption occurs.

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

Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	<p>This input enables the normal execution of the control block.</p> <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, output values, counters are lost) and output values are set to 0. 1 = Enables communications with the devices for their operation. <p>Public variable values are loaded during the first enabling cycle.</p>
EnableDevice	BOOL	<p>1 = Enables the devices if the <code>EnableDFB</code> variable is active.</p> <p>The speed drive has to be enabled in order to be controlled.</p>

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.

NOTICE

UNINTENDED EQUIPMENT OPERATION

Configure the Torque setpoint through the drive.

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 <code>Direction</code> input variable.
Direction	BOOL	<p>Direction of rotation of the motor.</p> <ul style="list-style-type: none"> 0 = Activates the reverse direction drive. 1 = Activates the forward direction drive. <p>You cannot change the direction of rotation by changing the sign in <code>SetPoint</code> input variable. <code>SetPoint</code> only accepts positive values.</p>
SetPoint	REAL	<p>The speed set-point is requested from the speed drive and only accepts positive values.</p> <p>It is measured in engineering units and you can configure these units with the following public variables:</p> <ul style="list-style-type: none"> <code>HighRangeRpm</code> <code>LowRangeRpm</code> <code>HighRangeEngUnit</code> <code>LowRangeEngUnit</code> <p>NOTE: Verify that the unit is within the correct range.</p> <p>The DFB makes the conversion between engineering units and speed drive rpms.</p>

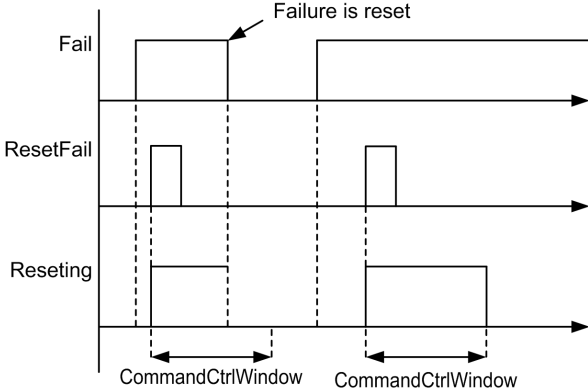
Parameter	Type	Description	
ResetFail	BOOL	Resets <i>fail</i> on the DFB and on the inverter.	
QuickStop	BOOL	1 = Stops the speed drive quickly with fast stop ramp. If there is a <i>QuickStop</i> , the <i>Run</i> bit has to be reset to resume operation.	
DeviceAddress	STRING [26]	IP Address of device in format '{IP1.IP2.IP3.IP4}'.	
ControlCommand	BOOL	Enables or disables the command sending to the inverter. If not set, the commands are expected to be wired.	
ControlSet-point	BOOL	Enables or disables the inverter setpoint being set by this function.	
OutputsMap	WORD	The Digital Output to be written to drive at configured register (OL1R).	
AO1	INT	The Analog Output/Analog Virtual Input to be written to inverter at configured register (AI1C).	
AO2	INT	The Analog Output/Analog Virtual Input to be written to inverter at configured register (AI2C).	
EnggParam	ATVEngi- neering- param- eters	ATV engineering parameters.	
	Parameter	Type	Description
	Statis- ticSelec- tor	INT	Set to enable the computation of statistics.
	ModbusRe- gister- Custom1	UINT	Modbus Register to read request 1.
	ModbusRe- gister- Custom2	UINT	Modbus Register to read request 2.
	ModbusRe- gister- Custom3	UINT	Modbus Register to read request 3.
	Modbus- Read- Length- Custom1	UINT	Length to read request 1.
	Modbus- Read- Length- Custom2	UINT	Length to read request 2.
	Modbus- Read- Length- Custom3	UINT	Length to read request 3.
	ModbusRe- gis- terLFRD	UINT	Default - 8602 Modbus Register to write drive SetPoint.
	ModbusRe- gisterETA	UINT	Default - 3201 Modbus Register to read drive Status.
	ModbusRe- gis- terRFRD	UINT	Default - 8604 Modbus Register to read drive PresentValue.

Parameter	Type	Description
	ModbusRe-gister-ERRD	UINT Default - 8606 Modbus Register to read drive detected fault state.
	ModbusRe-gisterCMD	UINT Default - 8501 Modbus Register to write drive Command.
	ModbusRe-gisterA-I1C	UINT Modbus Register to read Analog Input 1 (5242 in some of the drives).
	ModbusRe-gisterA-I2C	UINT Modbus Register to read Analog Input 2 (5243 in some of the drives).
	ModbusRe-gisterA-I3C	UINT Modbus Register to read Analog Input 3 (5244 in some of the drives).
EnggParam	ModbusRe-gister-IL1R	UINT Modbus Register to read Digital Input (5202 in some of the drives).
	ModbusRe-gister-AO1C	UINT Modbus Register to write either Analog Output 1 or Analog Virtual Input 1.
	ModbusRe-gister-AO2C	UINT Modbus Register to write either Analog Output 2 or Analog Virtual Input 2.
	HighRangeRpm	INT Max drive speed measured in rpms.
	LowRangeRpm	INT Min drive speed measured in rpms.
	HighRangeEngUnit	REAL Max drive speed measured in user units.
	LowRangeEngUnit	REAL Min drive speed measured in user units.
	Refresh	TIME Time to refresh the cyclic data.
	RefreshAux	TIME Time to refresh the auxiliary cyclic data.
	CommandCtrlWindow	TIME Time window for the device to execute orders.
	ScanTime	TIME Minimum time to maintain alert signals.
	MaxResetTime	TIME Maximum time between two resets.
	ModbusRe-gister-OL1R	UINT Modbus Register to write Digital Output.
	Disable-ParamRead	BOOL Set to disable the read request of Parameters which provide Motor information.
	Disable-HardwireIORead	BOOL Set to disable the read request of Soft IOs.
	ResetMode	BOOL FALSE.- Manual Reset TRUE.- Automatic Reset
	Reserved	BOOL -
	Reserved1	INT -
	Command-Frequency	INT The number of scan cycles to wait before successive write.
	Scaling-Factor-Current	REAL Scaling factor for current to be selected based on drive rating.

Outputs

Output Parameter Description

Parameter	Type	Description	
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command.	
Fail	BOOL	1 = A detected failure in the control block or in the device or a communication interruption. To reset the Fail output pin, the ResetFail input has to be activated. The last detected error code is shown on FailCode . NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.	
FailAux	ATVFailAux	Detected fail of Read Requests. The following table describes the FailAux parameters:	
	Parameter	Type	Description
	ParamRead	BOOL	Detected Failure at Parameter Read Request.
	SoftIOsRead	BOOL	Detected Failure at ATV IOs Read Request.
	Custom1Read	BOOL	Detected Failure at Custom 1 Read Request.
	Custom2Read	BOOL	Detected Failure at Custom 2 Read Request.
	Custom3Read	BOOL	Detected Failure at Custom 3 Read Request.
Warning	BOOL	1 = An alarm has been activated for the device. It cannot be reset because the signal remains active until the cause of the alarm is removed or until the maximum set ScanTime is reached.	
FailCode	ARRAY [0..2] OF INT	When the Fail output is 1, it holds the code for the detected error. If the Fail bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3 level structure.	
	Parameter	Type	Description
	FailCode[0]	INT	Refer to the Diagnostic Information Management , page 403 for more details.
	FailCode[1]	INT	
	FailCode[2]	INT	
FailCodeAux	ATVFailCodeAux	Failcode of of auxiliary requests.	
	Parameter	Type	Description
	ReadClient[0..2]	ARRAY [0..2] OF INT	Stores the last active failcode of Auxiliary Read.
	WriteClient[0..2]	ARRAY [0..2] OF INT	Stores the last active failcode of Auxiliary Write
WarningCode	ATVWarning	Stores the last alert code that happened. The following table describes the WarningCode :	
	Parameter	Type	Description
	Device	BOOL	Alarm present from status register W8603.7.
	Order	BOOL	Order alert. The device does not respond to the order in CommandCtrlWindow .
	ForcedLocalMode	BOOL	The device is controlled by the physical inputs. (CommandControl = 1 And ForcedLocalmode = 1).
Running	BOOL	1 = The speed driver is running and has an output frequency. NOTE: If SetPoint is 0 and Run is active, the Running signal is activated.	
ExtControlled	BOOL	The drive is not controlled by the DFB inputs.	
Reseting	BOOL	1 = A reset is being carried out. The CommandCtrlWindow variable indicates the maximum time for resetting the detected failure.	

Parameter	Type	Description																																																
		<p>When a device or communication reset is carried out with <code>ResetFail</code>, the DFB tries to reset the detected failure within the time period defined in <code>CommandCtrlWindow</code>.</p> <p>If the detected failure is reset, the <code>Fail</code> and <code>Resetting</code> output variables are reset (set to FALSE). If the detected failure is not reset, the <code>Resetting</code> variable is set to FALSE and the <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based.</p> <p>Refer to the timing diagram below.</p> 																																																
<code>PresentValue</code>	REAL	Current speed of rotation in engineering units (EU).																																																
<code>PresentSpeed</code>	REAL	Current motor speed in rpm (rotation per minute).																																																
<code>Current</code>	UINT	Present motor current in ampere.																																																
<code>Status</code>	<code>ATVStatus</code>	<p>The structure holds data containing the information that the block extracts from the status variable of the speed driver.</p> <p>The following table describes the status information:</p> <table><tr><th>Parameter</th><th>Type</th><th>Description</th></tr><tr><td><code>ReadyToSwitchOn</code></td><td>BOOL</td><td>DSP402 device states (W8603.0).</td></tr><tr><td><code>SwitchedOn</code></td><td>BOOL</td><td>DSP402 device states (W8603.1).</td></tr><tr><td><code>OperationEnabled</code></td><td>BOOL</td><td>DSP402 device states (W8603.2).</td></tr><tr><td><code>Malfunction</code></td><td>BOOL</td><td>Detected error present on the device (W8603.3).</td></tr><tr><td><code>VoltageEnabled</code></td><td>BOOL</td><td>Power section line supply present (Not W8603.4).</td></tr><tr><td><code>QuickStop</code></td><td>BOOL</td><td>QuickStop active (Not W8603.5).</td></tr><tr><td><code>SwitchOnDisabled</code></td><td>BOOL</td><td>DSP402 device states (W8603.6).</td></tr><tr><td><code>Alarm</code></td><td>BOOL</td><td>1 = An alarm is present on the device (W8603.7).</td></tr><tr><td><code>ForcedLocalMode</code></td><td>BOOL</td><td>Device controlled by the physical inputs (W8603.9).</td></tr><tr><td><code>ReferenceReached</code></td><td>BOOL</td><td>The requested setpoint has been reached by the inverter (W8603.10).</td></tr><tr><td><code>ReferenceExceeded</code></td><td>BOOL</td><td>The requested setpoint has been exceeded by the inverter (W8603.11).</td></tr><tr><td><code>StopImposed</code></td><td>BOOL</td><td>1 = Stop is forced by remote control STOP key (W8603.14).</td></tr><tr><td><code>ForwardReverseRotation</code></td><td>BOOL</td><td>Current inverter direction (Not W8603.15).</td></tr><tr><td><code>State</code></td><td>INT</td><td>Current state number from the DSP402 state machine. Refer to the state table of output pin, page 398.</td></tr><tr><td><code>Info</code></td><td>INT</td><td>Numerical code with the information on statuses and required actions. Refer to the Info table of output pin, page 398.</td></tr></table>	Parameter	Type	Description	<code>ReadyToSwitchOn</code>	BOOL	DSP402 device states (W8603.0).	<code>SwitchedOn</code>	BOOL	DSP402 device states (W8603.1).	<code>OperationEnabled</code>	BOOL	DSP402 device states (W8603.2).	<code>Malfunction</code>	BOOL	Detected error present on the device (W8603.3).	<code>VoltageEnabled</code>	BOOL	Power section line supply present (Not W8603.4).	<code>QuickStop</code>	BOOL	QuickStop active (Not W8603.5).	<code>SwitchOnDisabled</code>	BOOL	DSP402 device states (W8603.6).	<code>Alarm</code>	BOOL	1 = An alarm is present on the device (W8603.7).	<code>ForcedLocalMode</code>	BOOL	Device controlled by the physical inputs (W8603.9).	<code>ReferenceReached</code>	BOOL	The requested setpoint has been reached by the inverter (W8603.10).	<code>ReferenceExceeded</code>	BOOL	The requested setpoint has been exceeded by the inverter (W8603.11).	<code>StopImposed</code>	BOOL	1 = Stop is forced by remote control STOP key (W8603.14).	<code>ForwardReverseRotation</code>	BOOL	Current inverter direction (Not W8603.15).	<code>State</code>	INT	Current state number from the DSP402 state machine. Refer to the state table of output pin, page 398.	<code>Info</code>	INT	Numerical code with the information on statuses and required actions. Refer to the Info table of output pin, page 398.
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<code>AuxReadStatus</code>	<code>ATVAuxReadDisabled</code>	<p>Status of Read Clients.</p> <p>The following table describes the <code>AuxReadStatus</code> parameters:</p> <table><tr><th>Parameter</th><th>Type</th><th>Description</th></tr></table>	Parameter	Type	Description																																													
Parameter	Type	Description																																																

Parameter	Type	Description	
	Parameter	BOOL	Parameter Read Request Disabled.
	SoftIOs	BOOL	Soft IOs Read Request Disabled.
	Custom1	BOOL	Custom 1 Read Request Disabled.
	Custom2	BOOL	Custom 2 Read Request Disabled.
	Custom3	BOOL	Custom 3 Read Request Disabled.
InputsMap	WORD	Logic Input Status (IL1R) read from drive .	
AI1	INT	Analog Input 1 value (AI1C).	
AI2	INT	Analog Input 2 value (AI2C).	
AI3	INT	Analog Input 3 value (AI3C).	
ParamRead	ATVParamDDT	Parameters Value read from drive. The following table describes the ParamRead:	
	Parameter	Type	Description
	MotorCurrent	REAL	Motor Current
	MotorVoltage	UINT	Motor Voltage
	MotorPower	INT	Motor Power
	MotorTorque	REAL	Motor Torque
CustomRead1	ARRAY [1..125] OF INT	Custom 1 Value read from drive.	
CustomRead2	ARRAY [1..125] OF INT	Custom 2 Value read from drive.	
CustomRead3	ARRAY [1..125] OF INT	Custom 3 Value read from drive.	
StatisticConnector	Statistic1Connector	Information data is used with modbus communication to obtain statistics on the modbus network (requests carried out, time between requests). This structure has been created for its use together with the StatisticCounter DFB in General Purpose library for communication. The following table describes the StatisticConnector:	
	Parameter	Type	Description
	Start	BOOL	1 = Ready to create request.
	EndOk	BOOL	1 = Request is successful.
	EndNok	BOOL	1 = Request is detected fail.
	TotalTime	DINT	Total time taken for the current request.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
ATV_ST	ATV1_ST_DDT, page 401	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 or SCADA system.
ATV_CFG	ATV_CFG_DDT, page 402	Data structure with the device information. The information is used by the operator screen and is readable from the HMI or SCADA system.
WorkMemory	MBEthWorkMemory, page 403	Memory area to talk with the ModBus port.

ATV1_ST_DDT Type

Name	Type	Description
STW, page 401	WORD	Device main status.(bit 0 - Unknown state, bit 1- Not Ready, bit 2 - Running, bit 3 - Device Fail, bit 4 - Warning, bit 5 - Communication Fail, bit 6 - Necessary Resetting, bit 7 - Externally controlled, bit 8 - Resetting, bit 9 -EnableDFB, bit 15 - ForwardReverseRotation)
CFGW, page 401	WORD	Device control. Provides the means necessary to control the device from the monitoring subsystem or from the operator screen if <code>Owner</code> (1), or only from the monitoring subsystem if <code>Owner</code> (0). If <code>Owner</code> is 0, it takes the input variables of the DFB as a value for reading from the HMI/SCADA system.
PresentValue	REAL	Current speed value. Current speed of rotation.
SetPoint	REAL	Set-point variable. The speed set-point is requested from the speed driver.
AI1	INT	Refer to the AI1 output pin, page 398.
AI2	INT	Refer to the AI2 output pin, page 398.
AI3	INT	Refer to the AI3 output pin, page 398.
AO1	INT	Refer to the AO1 input pin, page 395.
AO2	INT	Refer to the AO2 input pin, page 395.
InputsWord	WORD	Digital Inputs
OutputsWord	WORD	Digital Outputs
Reserved	INT	Refer to the Reserved input pin, page 395.

ATV_ST.STW Word Structure

Bit	Description
0	Unknown state.
1	Not ready.
2	Refer to the Running output pin, page 398.
3	Inoperable device.
4	Refer to the Warning output pin, page 398.
5	Communication interruption.
6	Necessary resetting.
7	Refer to the ExtControlled output pin, page 398.
8	Refer to the Resetting output pin, page 398.
9	Refer to the EnableDFB input pin, page 395.
15	1 = Forward Rotation. 0 = Reverse Rotation.

ATV_ST.CFGW Word Structure

Bit	Description
0	Refer to the ResetFail input pin, page 395.
1	Owner.

Bit	Description
3	Refer to the <code>Direction</code> input pin, page 395.
4	Refer to the <code>QuickStop</code> input pin, page 395.
5	Refer to the <code>EnableDevice</code> input pin, page 395.
6	Refer to the <code>Run</code> input pin, page 395.
7	Refer to the <code>ControlCommand</code> input pin, page 395.
8	Refer to the <code>ControlSetPoint</code> input pin, page 395.

ATV_CFG_DDT Type

Name	Type	Description
<code>DataStatus</code> , page 402	WORD	Information on the device status. Information on the <code>Status</code> output structure.
<code>Info</code>	INT	Device information. Speed driver information. Its value is <code>Info</code> status.
<code>State</code>	INT	Speed driver status code. Speed driver status code information. Its value is <code>State</code> status.
<code>Warning-Code</code> , page 403	WORD	Alarm code information. Takes the values from the <code>WarningCode</code> output.
<code>FailCode0</code>	INT	Code of last level 0 detected error. Indicates that a detected error has occurred <code>FailCode[0]</code> .
<code>FailCode1</code>	INT	Code of last level 1 detected error. Indicates that a detected error has occurred <code>FailCode[1]</code> .
<code>FailCode2</code>	INT	Code of last level 2 detected error. Indicates that a detected error has occurred <code>FailCode[2]</code> .

ATV_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the <code>ReadyToSwitchOn</code> status in the <code>Status</code> output pin, page 398.
1	Refer to the <code>SwitchedOn</code> status in the <code>Status</code> output pin, page 398.
2	Refer to the <code>OperationEnabled</code> status in the <code>Status</code> output pin, page 398.
3	Refer to the <code>Malfunction</code> status in the <code>Status</code> output pin, page 398.
4	Refer to the <code>VoltageEnabled</code> status in the <code>Status</code> output pin, page 398.
5	Refer to the <code>QuickStop</code> status in the <code>Status</code> output pin, page 398.
6	Refer to the <code>SwitchOnDisabled</code> status in the <code>Status</code> output pin, page 398.
7	Refer to the <code>Alarm</code> status in the <code>Status</code> output pin, page 398.
8	Refer to the <code>ForcedLocalMode</code> status in the <code>Status</code> output pin, page 398.
9	Refer to the <code>ReferenceReached</code> status in the <code>Status</code> output pin, page 398.
10	Refer to the <code>ReferenceExceeded</code> status in the <code>Status</code> output pin, page 398.
11	Refer to the <code>StopImposed</code> status in the <code>Status</code> output pin, page 398.
12	Refer to the <code>FowardReverseRotation</code> status in the <code>Status</code> output pin, page 398.

ATV_CFG.WarningCode Word Structure

Bit	Description
1	Refer to the Device in the WarningCode output pin, page 398.
2	Refer to the Order in the WarningCode output pin, page 398.
3	Refer to the ForcedLocalMode in the WarningCode output pin, page 398.

MBEthWorkMemory Type

Name	Type	Description	
Header	ARRAY [0..15] OF INT	Common data	
	Parameter	Type	Description
	Header[0]	INT	Number of ethernet client.
	Header[1]	INT	Number of request.
	Header[2]	INT	Simultaneous send.
	Header[3]	INT	3.0: Initialization Started ; 3.1: Port Ready; 3.2: Take statistics info.
	Header[4]	INT	Least priority
	Header[5]	INT	Last order number.
	Header[6]	INT	Socket number occupied by the client with least priority.
	Header[7]	INT	Low Word of Min total time.
	Header[8]	INT	High Word of Min total time.
	Header[9]	INT	Low Word of Avg total time.
	Header[10]	INT	High Word of Avg total time.
	Header[11]	INT	Low Word of Max total time.
	Header[12]	INT	High Word of Max total time.
	Header[13]	INT	Low Word for total request.
	Header[14]	INT	High Word for total request.
	Header[15]	INT	Reserved
ClientDataReference, page 403	ARRAY [0..3] OF MBEthSocketData	Array of Client References.	

ClientDataReference Structure

Parameter		Type	Description
ClientDataReference [0..3]	ClientRef	REF_TO MBEth-Client1Data	MBTCP Client Data.
	Status	WORD	Status of the socket (00 - Idle, 01 - Client has sent data, 11 - Port has processed, 10 - Port is processing the request).

Diagnostics Information Management

Overview

The diagnostic codes that the device can return are read on the FailCode output variable.

Ethernet Communication Diagnostic Codes

This code indicates that communications have not been established and can be reset:

- FailCode[0]: 16#0002
- FailCode[1]: 16#0000
- FailCode[2]: 16#0004

After the communications have been established, check Ethernet client diagnostic codes for FailCode [0] and FailCode [1]. The components make a distinction between detected read request and write request interruptions:

- FailCode[2]: 16#0001 Read
- FailCode[2]: 16#0002 Write

Diagnostic Code Example

For a detected error, the code is:

- FailCode[1]: 16#0000
- FailCode[2]: 16#0005

The FailCode[0] can have one of the following codes:

Diagnostic code	Symbol	Meaning
16#0000	nOF	No detected failure.
16#1000	CrF OLF SOF	Detected failure in capacitor pre-charge. Motor overload or Overspeed.
16#2310	OCF	Overcurrent.
16#2320	SCF	Short-circuit impedance. Power stage detected failure.
16#2330	SCF	Motor ground detected fault.
16#2340	SCF	Short-circuit between motor phases.
16#3110	OSF	Supply over voltage detected failure.
16#3120	USF	Low bus voltage.
16#3130	PHF	Phase dropout detected failure.
16#3310	ObF OPF	Over voltage on DC bus. Motor phase dropout.
16#4210	OHF	Drive overheating.
16#5520	EEF	Inoperable EEPROM memory.
16#6100	InF	Internal detected failure.
16#6300	CFF CFI	Incorrect (parameter) configuration or Invalid parameters.
16#7300	LFF	Inoperable 4...20 mA AI3 input.
16#7510	SLF	Modbus is not operational.
16#9000	EPF	External detected failure.
16#FF00	tnF	Inoperable auto-tuning.
16#FF01	bLF	Brake control unit is not operational.
16#7520	CnF	Fieldbus Com interrupted.

The inoperable device can be reset if `ControlCommand` is `TRUE`. If this condition is not met, the detected failure can be reset on the speed driver or through the screw terminal with the correct parameter configuration.

NOTE: The diagnostic codes of the device are available for speed drives, except for those that communicate through the Advantys STB Island.

Diagnostic Code Example for MBATV212 Variable Speed Drive

The `FailCode[0]` can have one of the following codes:

Diagnostic bit	Meaning
0	Overcurrent.
1	Drive overload.
2	Motor overload.
3	Overheat.
4	Overvoltage.
5	Main circuit undervoltage.
6	Reserved.
7	Undercurrent.
8	Over-torque.
9	Reserved.
10	Cumulative operation hours reached.
11	Reserved.
12	Reserved.
13	Main circuit undervoltage alarm same as MS-relay status.
14	At the time of the instant blackout, Forced deceleration/stop.
15	An automatic stop during the lower limit frequency continuance.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the ATV320EMGP.

Genies

Genie Properties


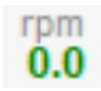
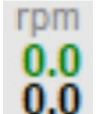

Refer to Genie Properties, page 40

Genie Icons

Refer to Genie Icons, page 41

Representation

The table describes the genres of the `gpl_devices` library:

Graphic symbol	Genie name	Description
ATV320EMGP 	ATV320EMGP	ATV320EMGP variable speed drives.
	ATV320EMGP_PV	ATV320EMGP variable speed drives.
	ATV320EMGP_PVSP	ATV320EMGP variable speed drives.
	ATV320EMGP_ItemValue	ATV320EMGP variable speed drives.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a [general description](#), page 40 of the graphic elements that are used in the faceplate.

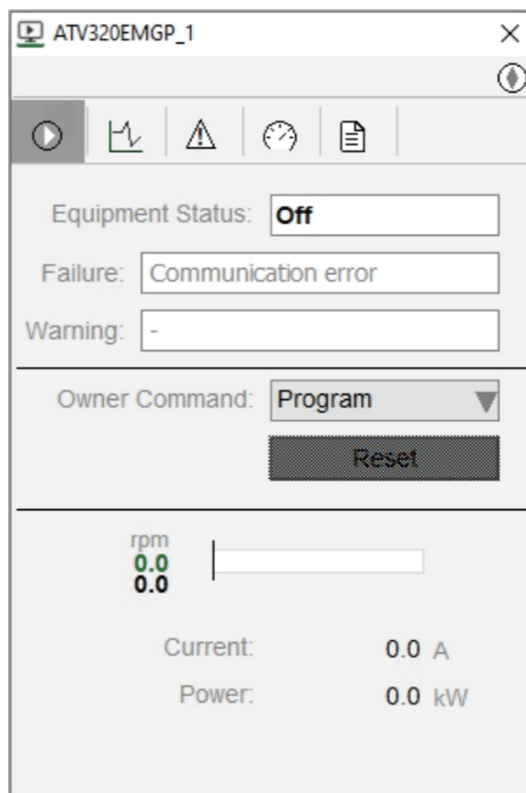
Available Tabs

During operation, clicking an `ATV320EMGP` genie opens a faceplate with the following tabs:

- Operation, page 407
- Trend, page 45
- Measures, page 46
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:



NOTE: The reset on operator tab of ATV320 establishes communication with device. However, another reset is required to clear the communication interruption on ATV320 device which is known behavior of ATV320.

The table describes the control function of an **Operator** tab:

Label	Item name	Description	Security parameter, page 391
Equipment Status	Running	Equipment status of ATV320.	–
Failure	LastFailure, DeviceFailureActive	Current detected failure status of ATV320.	
Warning	AlarmActive, CurrentWarning	Current alert status of ATV320.	
Owner	OwnerSelect	Owner of ATV320.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Current	Current	Actual current	–
Power	Power	Power	–

Measures Tab

The table lists the items of each groups from group number 1 to 5 of **Measures** tab:

Group Order Number	1	2	3	4	5
Group Name	Device Status	Inputs	Outputs	Owner	Speed
Items	Direction of Rotation	Digital Input 1	Relay Output 1	Forced Local Mode	Speed Setpoint
	Ready to Switch On	Digital Input 2	Relay Output 2	–	Speed Setpoint Outside the Limit
	Switched On	Digital Input 3	Digital Output 1	–	Speed Setpoint Reached
	Operation Enabled	Digital Input 4	Analog Output 1	–	–
	Malfunction	Digital Input 5	Analog Output 2	–	–
	Quick Stop	Digital Input 6	–	–	–
	Switch On Disabled	Analog Input 1	–	–	–
	Detected Alarm	Analog Input 2	–	–	–
	Stop is Done by Remote Control Stop Button	Analog Input 3	–	–	–
	Voltage Enabled	–	–	–	–

The table lists the items of each groups from group number 6 to 9 of **Measures** tab:

Group Order Number	6	7	8	9
Group Name	Motor Info	Device Info	Diagnostics	Key Parameters
Items	Current	Device Information	Last Diagnostic Code	Speed
	Voltage	Status Code of Driver	Last Diagnostic Code 0	–
	Power	–	Last Diagnostic Code 1	–
	Torque	–	Last Diagnostic Code 2	–

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of ATV320.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
DirectionPresent-Value	Direction of rotation	ATVDirection	Bit15
EnableFunctional-Block	Normal execution of control block	–	Bit9
Resetting	Reset is being carried out	–	Bit8
OwnerExternal	Device is externally controlled	–	Bit7
RequireRearm	Detected fail resetting required	–	Bit6

Item name	Description	Enumeration	Address
CommunicationFailActive	Communication interruption	–	Bit5
AlarmActive	Alarm on the device	–	Bit4
DeviceFailActive	Device is inoperable	–	Bit3
Running	Module is running	On/Off	Bit2
NotReady	Module not ready	–	Bit1
UnknownState	Unknown module status	–	Bit0
Bit items derived from DataStatusWord.			
StopImposed	Forces stop remotely	–	Bit11
ReferenceExceeded	Speed set point exceeds limit	–	Bit10
ReferenceReached	Speed set point reached	–	Bit9
SwitchedONDisabled	Switch on is disabled	–	Bit6
QuickStop	Quick stop is activated	–	Bit5
VoltageEnabled	Voltage on the terminal	–	Bit4
MalfunctionActive	Failure detected	–	Bit3
OperationEnabled	Operation is enabled	–	Bit2
SwitchedON	Device is switch on	–	Bit1
ReadyToSwitchON	Device is ready to switch on	–	Bit0
Bit items derived from ExtendedDataStatusWord.			
ReservedCommandChannel	Command channel reserved by DTM	–	Bit1
Bit items derived from ConfigurationWord.			
ControlSetpoint	Indicates mode of speed control	–	Bit8
ControlCommand	Indicates mode of control	–	Bit7
Run	Module is running	–	Bit6
EnableDevice	Enable device	–	Bit5
QuickStopCommand	Stops the device quickly	–	Bit4
DirectionSetpoint	Decides direction of activation	ATVDirection	Bit3
OwnerSelect	Owner of control module	–	Bit1
Rearm	Resets the detected fail	–	Bit0
IO Items			
WarningCode	Alert code		ATV320_ATV_CFG.WarningCode
OutputsMapWord	Outputs map		ATV320_ATV_IOEXT.OutputsMap
InputsMapWord	Inputs map		ATV320_ATV_IOEXT.InputsMap
ExtendedDataStatusWord	Extended Data Status word		ATV320_ATV_ExtendedDataStatus
DataStatusWord	Data Status word		ATV320_ATV_CFG.DataStatus
ConfigurationWord	Configuration word		ATV320_ATV_ST.CFGW
StatusWord	Status word		ATV320_ATV_ST.STW
FailCode2	Code of last level 2 detected error		ATV320_ATV_CFG.FailCode2

Item name	Description	Enumeration	Address
FailCode1	Code of last level 1 detected error		ATV320_ATV_CFG.FailCode1
FailCode0	Code of last level 0 detected error		ATV320_ATV_CFG.FailCode0
Current	Actual current	–	ATV320_ATV_IO.Current
Calculated Items			
CurrentWarning	Current alert	–	GPL_ATVCurrentWarning
LastFailure	Last detected failure		GPL_ATVLastFailure
Owner	Current owner of the ATV320 Refer to Calculated Variable, page 39.		GPL_OwnerBasic
Abnormal	Shows abnormal condition of the ATV320 Refer to Abnormal Conditions, page 387.		GPL_DeviceAbnormal
ActionRequired	Shows action required condition of the ATV320 Refer to Action Required Conditions, page 387.		GPL_DeviceActionRequired

Abnormal Conditions

The table describes the abnormal conditions of ATV320:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	Bit0
AbnormalOperatorTab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	Bit8

Action Required Conditions

The table describes the abnormal conditions of ATV320:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	Bit8

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
AlarmFailure	Operation failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
Present-Value	Present value	<i>ATV_PresentValue</i>
Setpoint	Speed setpoint	<i>ATV_SpeedSetpoint</i>
Current	Current	<i>ATV_Current</i>
Power	Power	<i>ATV_Power</i>
Speed	Speed	<i>ATV_PresentValue</i>

ATV340 Altivar Process Drive

What's in This Chapter

Template	412
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Overview

This chapter describes the component that provide the functionality of template, control services and Supervision functions of the `ATV340`.

Template

Overview

This section describes functionality of the `$ATV340` template.

Description

General Description

The `$ATV340EMGP` control module template allows you to control and monitor the `ATV340` variable speed drive on explicit messaging.

The `$ATV340EGP` control module template allows you to control and monitor the `ATV340` variable speed drive on I/O scanning and DTM input/output.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Speed	Allows the speed set-point of the device to be sent. Allows the control of speed setpoint.
Torque	Allows the torque set-point of the device to be sent. Allows the control of torque setpoint.
Device status indication	Displays the status of the device.
Remote resetting	Reset the communication detected fail of drive.
Control or Monitoring	Enables you to monitor the device. You can control the command or set-point from the controller or through the wired inputs/outputs of the speed drive. Also allows the command and set-point to be controlled separately.
Owner	Manages the owner of the equipment (Operator or Program).

\$ATV340EMGP

Overview

This topic describes the \$ATV340EMGP template.

Parameters

The \$ATV340EMGP template provides different control and supervision parameters to the user to control the functions as per the requirement.

Control

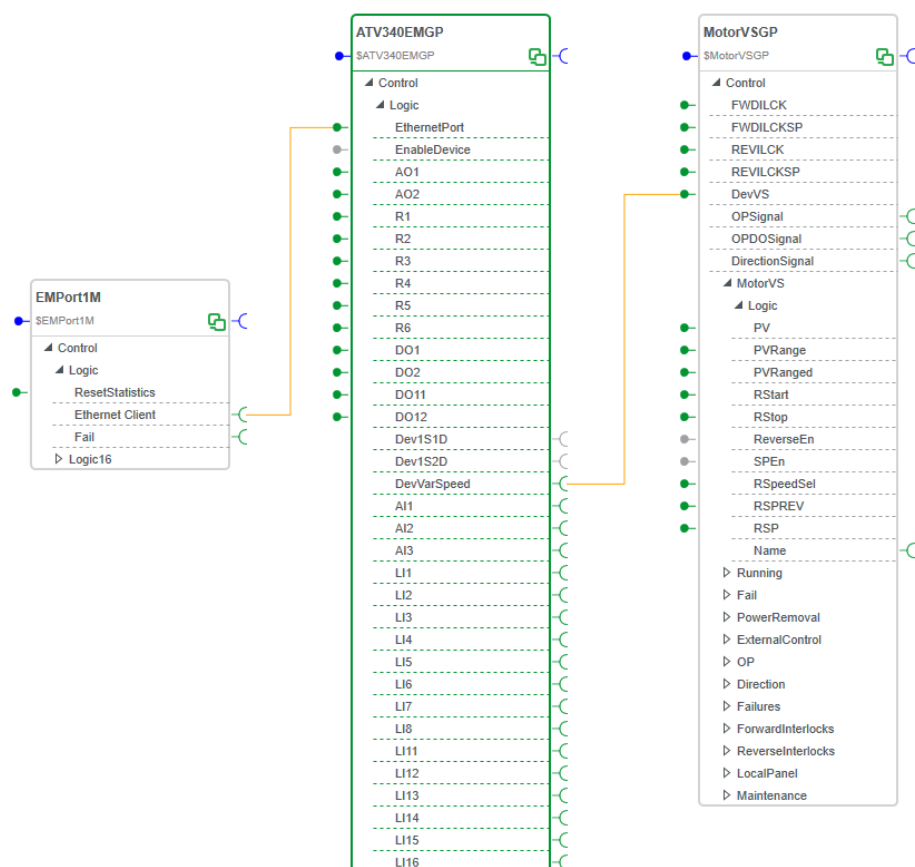
The table describes the control parameters:

Section	Parameter description	Type	Default	Additional remarks
Configuration	Starter mode	Enum	Enable (2)	–
	Modbus identification	String	0	Device specific identification number (Modbus ID). NOTE: Modbus ID 248 is used while communicating with the M340 Controller Ethernet port.
	Enable statistic selector	Boolean	False	–
	Automatic reset			–
	Current scaling factor	Enum	100 (100)	–
	Torque scaling factor		10 (10)	–
	Power Scaling Factor		1 (1)	–
Time	Drive status update rate	Duration	00:00:01	–
	Drive data update rate		00:00:03	–
	Time window for the device to execute orders		00:00:05	–
	Minimum time to maintain the warning signal		00:00:03	–
	Maximum time between two auto resets		00:01:00	–
Range	Minimum speed (RPM)	Integer	0	This refers to the drive speed parameter configuration.
	Maximum speed (RPM)		1500	
	Minimum speed (EU)	Float	0.0	This is user configurable speed unit. Ex: 0-100%, 0-50Hz, 0-1500rpm.
	Maximum speed (EU)		1500.0	
	Engineering unit	String	rpm	–
	Display format		####.#EU	–
IO	Select analog output 1 mode	Enum	Output (0)	–

Section	Parameter description	Type	Default	Additional remarks
	Select analog output 2 mode			—
Modbus Custom Read	Request 1 start register	Un-signed-Short	0	—
	Request 1 length	Un-signed-Byte		—
	Request 2 start register	Un-signed-Short		—
	Request 2 length	Un-signed-Byte		—
	Request 3 start register	Un-signed-Short		—
	Request 3 length	Un-signed-Byte		—

Interfaces

This figures below shows the \$ATV340EMGP (also applicable for \$ATV340EMCE as it appears in the Links Editor:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
EthernetPort	<i>\$EMWorkMemory1</i>	A communication interface which allows the device to communicate to controller	Connect to EMport1m template.
EnableDevice	<i>\$Bool/Ref</i>	An input interface from other template to enable device. This will be enabled only when enable device type parameter is Selected as interface.	Connect a boolean variable to enable/disable device.
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control.
Dev1S2D	<i>\$DEV1S2D/DO</i>	An output interface to other template.	Connect to a two direction motor to control.
DevVarSpeed	<i>\$DEVVS/DO</i>	An output interface to other template.	Connect to a variable speed motor to control.

\$ATV340EGP

Overview

This topic describes the \$ATV340EGP template.

Parameters

The \$ATV340EGP template provides different control and supervision parameters to the user to control the functions as per the requirement.

Control

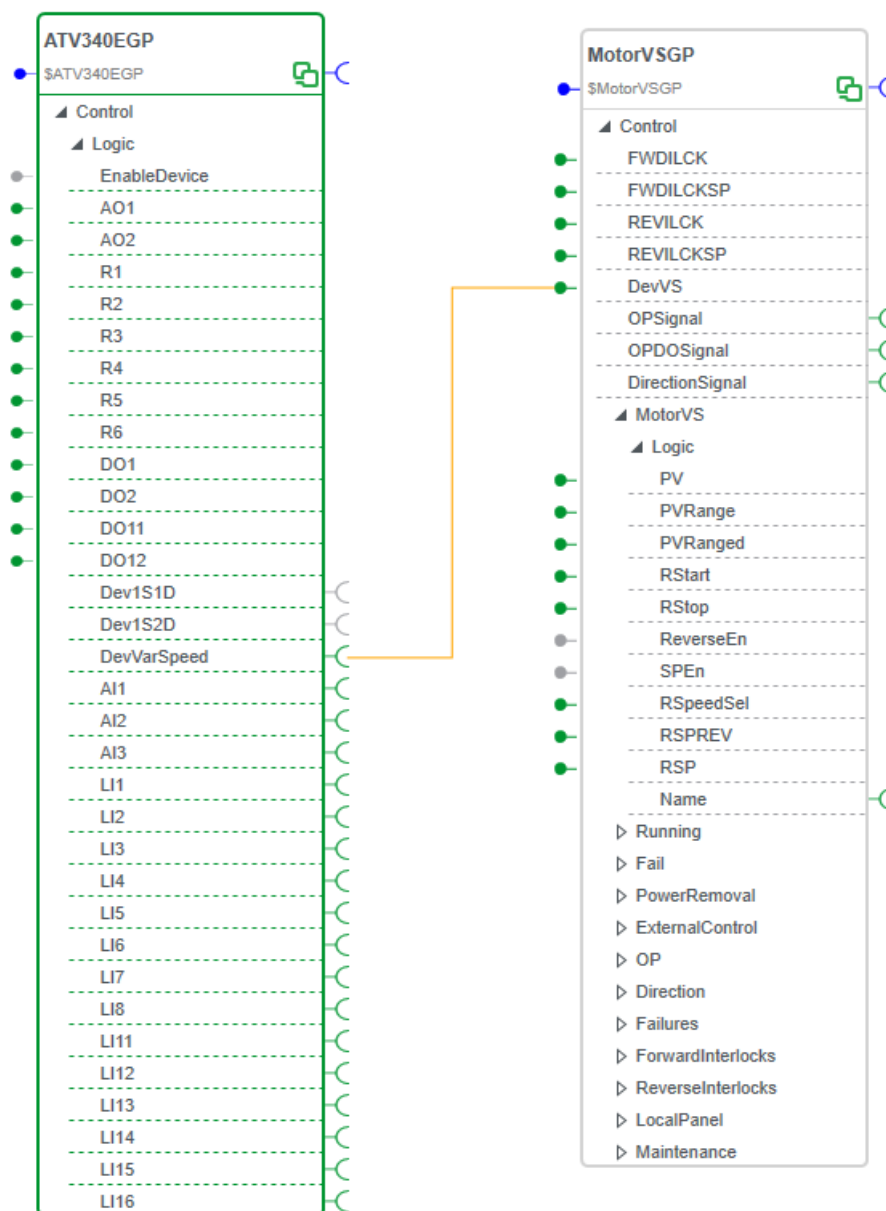
The table describes the control parameters:

Section	Parameter description	Type	Default	Additional remarks
Configuration	Starter mode	Enum	Enable (2)	–
	Automatic reset	Boolean	False	–
	Current scaling factor	Enum	100 (100)	–
	Torque scaling factor		10 (10)	–
	Power Scaling Factor		1 (1)	–
Time	Time window for the device to execute orders	Duration	00:00:05	–
	Minimum time to maintain the warning signal		00:00:03	–
	Maximum time between two auto resets		00:01:00	–
Range	Minimum speed (RPM)	Integer	0	This refers to the drive speed parameter configuration.
	Maximum speed (RPM)		1500	
	Minimum speed (EU)	Float	0.0	This is user configurable speed unit.
	Maximum speed (EU)		1500.0	

Section	Parameter description	Type	Default	Additional remarks
				Ex: 0-100%, 0-50Hz, 0-1500rpm.
	Engineering units	String	rpm	–
	Display format		####.#EU	–

Interfaces

This figures below shows the \$ATV340EGP (also applicable for \$ATV340ECE as it appears in the Links Editor:



The table describes the control module template interfaces:

Interface identifier	Type/Role	Description	Example
EnableDevice	<i>\$Bool/Ref</i>	An input interface from other template to enable device. This will be enabled only when enable device type parameter is Selected as interface.	Connect a boolean variable to enable/disable device.
Dev1S1D	<i>\$DEV1S1D/DO</i>	An output interface to other template	Connect to a one direction motor to control.
Dev1S2D	<i>\$DEV1S2D/DO</i>	An output interface to other template.	Connect to a two direction motor to control.
DevVarSpeed	<i>\$DEVVS/DO</i>	An output interface to other template.	Connect to a variable speed motor to control.

Control

Overview

This chapter describes the EIOSATV340 and EMESATV340 DFB.

Description

General

The ATV profile is used to manage the Altivar variable speed drives on different communication networks.

Function Description

The main functions of the DFB are described in the following table:

Function	Description
Control	Forward/reverse direction of rotation.
Speed	Allows the speed set-point of the device to be sent. Allows the control of speed setpoint.
Torque	Allows the torque set-point of the device to be sent. Allows the control of torque setpoint.
Device status indication	Displays the status of the device.
Remote resetting	Reset the communication detected fail of drive.
Control or Monitoring	Enables you to monitor the device. You can control the command or set-point from the controller or through the wired inputs/outputs of the speed drive. Also allows the command and set-point to be controlled separately.
Owner	Manages the owner of the equipment (Operator or Program).

EMESATV340

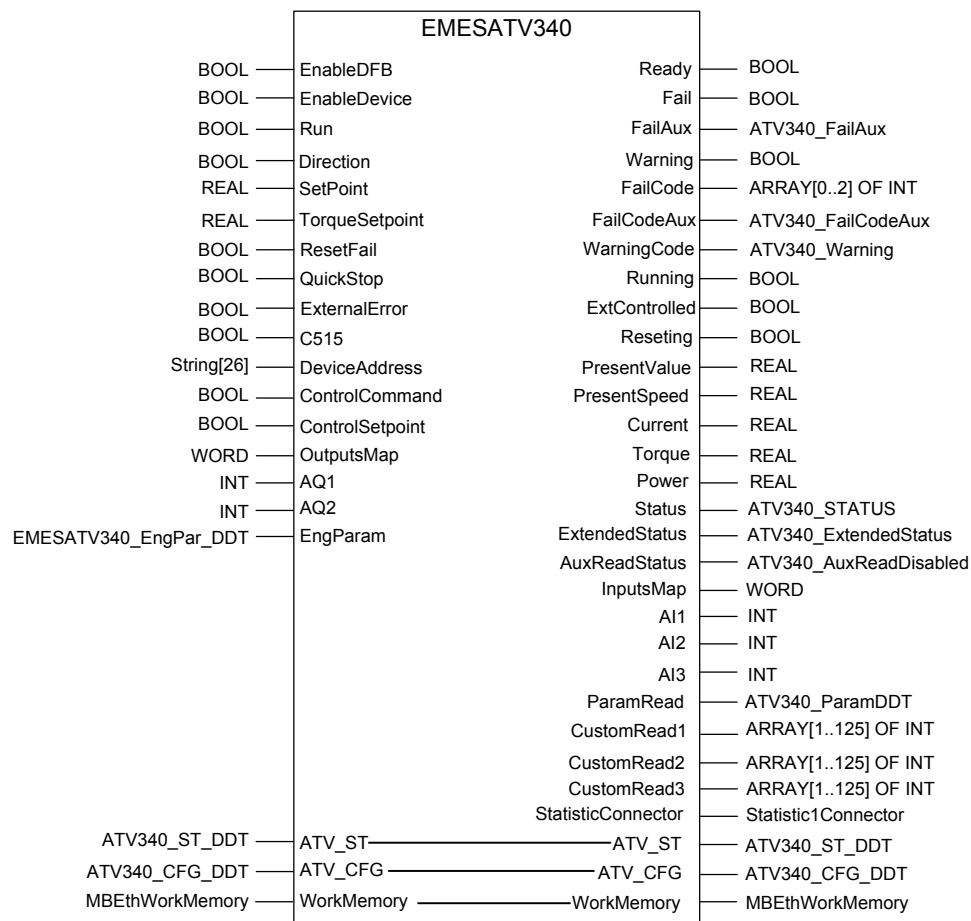
Overview

This topic describes the EMESATV340 DFB.

DFB Representation

Representation

The following figure represents the function module of EMESATV340 profile:



For DFBs communicating by I/O scanning, variables read from the device retain their last value when a communication interruption occurs. For details, refer to the description of the corresponding output parameters, page 421.

⚠ WARNING

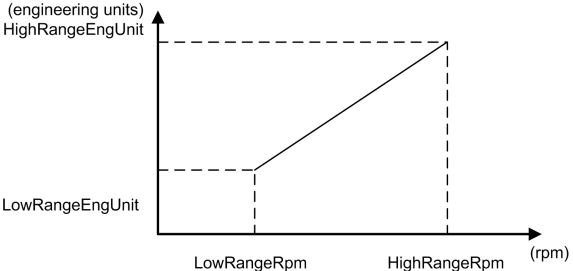
UNINTENDED EQUIPMENT OPERATION

When you configure the *Last value* parameter of the I/O scanner line, take into consideration the behavior of the DFB when a communication interruption occurs.

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

Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	<p>This input enables the normal execution of the control block.</p> <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, output values, counters are lost) and output values are set to 0. 1 = Enables communications with the devices for their operation. <p>Public variable values are loaded during the first enabling cycle.</p>
EnableDevice	BOOL	<p>1 = Enables the devices if the <code>EnableDFB</code> variable is active.</p> <p>The speed drive has to be enabled in order to be controlled.</p>
Run	BOOL	Runs the drive.
Direction	BOOL	<p>Direction of rotation of the motor.</p> <ul style="list-style-type: none"> 0 = Activates the reverse direction drive. 1 = Activates the forward direction drive. <p>You cannot change the direction of rotation by changing the sign in <code>SetPoint</code> input variable. <code>SetPoint</code> only accepts positive values.</p>
SetPoint	REAL	<p>The speed set-point is requested from the speed drive and only accepts positive values.</p> <p>It is measured in engineering units and you can configure these units with the following public variables:</p> <ul style="list-style-type: none"> <code>HighRangeRpm</code> <code>LowRangeRpm</code> <code>HighRangeEngUnit</code> <code>LowRangeEngUnit</code> <p>NOTE: Verify that the unit is within the correct range.</p> <p>The DFB makes the conversion between engineering units and speed drive rpms.</p> 
TorqueSetpoint	REAL	<p>Setpoint measured in Percentage.</p> <p>NOTE: The drive parameter Torque Reference Sign Switching decides the direction of rotation based on the below parameter configuration.</p> <ul style="list-style-type: none"> Unassigned: Torque Setpoint (+ve value) runs in forward direction, Torque Setpoint (-ve value) runs in reverse direction. Yes: Always runs in reverse direction. Others (DigitalInput1..): Direction is decided based on assigned condition.
ResetFail	REAL	Resets the detected fail on the DFB and the inverter.
QuickStop	BOOL	Stops the drive with a fast stop ramp.
ExternalError	BOOL	<p>Indicate drive that a detected process failure has occurred.</p> <p>NOTE: User need to map with <code>C514</code> in VFD device to consider the <code>External Error</code>.</p>
C515	BOOL	User configurable input

Parameter	Type	Description
DeviceAddress	string [26]	IP Address of device in format '{IP1.IP2.IP3.IP4}'
ControlCommand	BOOL	Enables or disables the command sending to the inverter. If not set, the commands are expected to be wired. 1 = Communication channel 0 = Terminals
ControlSetpoint	BOOL	Enables or disables the inverter setpoint being set by this function. 1 = Communication channel 0 = Terminals
OutputsMap	WORD	The Digital Output to be written to drive at configured register (OL1R).
AQ1	INT	The Analog Output/Analog Virtual Input to be written to inverter at configured register (AI1C).
AQ1	INT	The Analog Output/Analog Virtual Input to be written to inverter at configured register (AI2C).
EnggParam	EME-SATV340_EngPar_DDT	ATV Engineering Parameters

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.

NOTICE

UNINTENDED EQUIPMENT OPERATION

Configure the Torque setpoint through the drive.

Failure to follow these instructions can result in equipment damage.

EMESATV340_EngPar_DDT

Parameter	Type	Description
StatisticSelector	INT	Set to enable the computation of statistics.
ModbusRegisterCustom1	UINT	Modbus Register to read request 1.
ModbusRegisterCustom2	UINT	Modbus Register to read request 2.
ModbusRegisterCustom3	UINT	Modbus Register to read request 3.
ModbusReadLengthCustom1	UINT	Length to read request 1.
ModbusReadLengthCustom2	UINT	Length to read request 2.
ModbusReadLengthCustom3	UINT	Length to read request 3.
ModbusRegisterLFRD	UINT	Default - 8602 Modbus Register to write drive SetPoint.
ModbusRegisterETA	UINT	Default - 8603 Modbus Register to read drive Status.
ModbusRegisterRFRD	UINT	Default - 8604 Modbus Register to read drive PresentValue.

ModbusRegisterERRD	UINT	Default - 8606 Modbus Register to read drive detected fault state.
ModbusRegisterCMD	UINT	Default - 8501 Modbus Register to write drive Command.
ModbusRegisterAI1C	UINT	Modbus Register to read Analog Input 1 (5242 in some of the drives).
ModbusRegisterAI2C	UINT	Modbus Register to read Analog Input 2 (5243 in some of the drives).
ModbusRegisterAI3C	UINT	Modbus Register to read Analog Input 3 (5244 in some of the drives).
ModbusRegisterIL1R	UINT	Modbus Register to read Digital Input (5202 in some of the drives).
ModbusRegisterAO1C	UINT	Modbus Register to write either Analog Output 1 or Analog Virtual Input 1.
ModbusRegisterAO2C	UINT	Modbus Register to write either Analog Output 2 or Analog Virtual Input 2.
HighRangeRpm	INT	Max drive speed measured in rpms.
LowRangeRpm	INT	Min drive speed measured in rpms.
HighRangeEngUnit	REAL	Max drive speed measured in user units.
LowRangeEngUnit	REAL	Min drive speed measured in user units.
Refresh	TIME	Time to refresh the cyclic data.
RefreshAux	TIME	Time to refresh the auxiliary cyclic data.
CommandCtrlWindow	TIME	Time window for the device to execute orders.
ScanTime	TIME	Minimum time to maintain alert signals.
MaxResetTime	TIME	Maximum time between two resets.
ModbusRegisterOL1R	UINT	Modbus Register to write Digital Output.
DisableParamRead	BOOL	Set to disable the read request of Parameters which provide Motor information.
DisableHardwireIORead	BOOL	Set to disable the read request of Soft IOs.
ResetMode	BOOL	FALSE.- Manual Reset TRUE.- Automatic Reset
Reserved	BOOL	–
CommandFrequency	INT	The number of scan cycles to wait before successive write
ModbusRegisterCCC	UINT	Active command channel
ModbusRegisterCRC	UINT	Channel for reference frequency
ModbusRegisterLTR	UINT	Torque reference
CurrentScalingFactor	REAL	Current scaling factor
TorqueScalingFactor	REAL	Torque scaling factor
PowerScalingFactor	REAL	Power scaling factor

Outputs

Output Parameter Description

Parameter	Type	Description
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command.
Fail	BOOL	1 = A detected failure in the control block or in the device or a communication interruption. To reset the Fail output pin, the ResetFail input has to be activated. The last detected error code is shown on FailCode.

Parameter	Type	Description	
		NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.	
FailAux	ATVFailAux	Detected fail of Read Requests. The following table describes the FailAux parameters:	
	Parameter	Type	Description
	ParamRead	BOOL	Detected Failure at Parameter Read Request.
	SoftIOsRead	BOOL	Detected Failure at ATV IOs Read Request.
	Custom1Read	BOOL	Detected Failure at Custom 1 Read Request.
	Custom2Read	BOOL	Detected Failure at Custom 2 Read Request.
	Custom3Read	BOOL	Detected Failure at Custom 3 Read Request.
Warning	BOOL	1 = An alarm has been activated for the device. It cannot be reset because the signal remains active until the cause of the alarm is removed or until the maximum set ScanTime is reached.	
FailCode	ARRAY [0..2] OF INT	When the Fail output is 1, it holds the code for the detected error. If the detected Fail bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3 level structure.	
	Parameter	Type	Description
	FailCode[0]	INT	Refer to the Diagnostic Information Management , page 379 for more details.
	FailCode[1]	INT	
	FailCode[2]	INT	
FailCodeAux	ATVFailCodeAux	Failcode of auxiliary requests.	
	Parameter	Type	Description
	ReadClient[0..2]	ARRAY OF INT [0..2]	Stores the last active failcode of Auxiliary Read.
	WriteClient[0..2]	ARRAY OF INT [0..2]	Stores the last active failcode of Auxiliary Write
WarningCode	ATV340Warning	Stores the last alert code that happened. The following table describes the WarningCode:	
	Parameter	Type	Description
	Device	BOOL	Alarm present from status register W8603.7.
	Order	BOOL	Order alert. The device does not respond to the order in CommandCtrlWindow.
	ForcedLocalMode	BOOL	The device is controlled by the physical inputs. (CommandControl = 1 And ForcedLocalmode = 1).
Running	BOOL	1 = The motor is running and has an output frequency. NOTE: If SetPoint is 0 and Run is active, the Running signal is activated.	
ExtControlled	BOOL	The drive is not controlled by the DFB inputs.	
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. Refer to the timing diagram below.	

Parameter	Type	Description																																																						
PresentValue	REAL	Current speed of rotation in engineering units (EU).																																																						
PresentSpeed	REAL	Current motor speed in rpm (rotation per minute).																																																						
Current	UINT	Present motor current in ampere.																																																						
Torque	UINT	Motor torque.																																																						
Power	UINT	Motor power.																																																						
Status	ATVStatus	<p>The structure holds data containing the information that the block extracts from the status variable of the speed driver.</p> <p>The following table describes the status information:</p> <table> <tr> <th>Parameter</th><th>Type</th><th>Description</th></tr> <tr> <td>ReadyToSwitchOn</td><td>BOOL</td><td>DSP402 device states (W8603.0).</td></tr> <tr> <td>SwitchedOn</td><td>BOOL</td><td>DSP402 device states (W8603.1).</td></tr> <tr> <td>OperationEnabled</td><td>BOOL</td><td>DSP402 device states (W8603.2).</td></tr> <tr> <td>Malfunction</td><td>BOOL</td><td>Detected error present on the device (W8603.3).</td></tr> <tr> <td>VoltageEnabled</td><td>BOOL</td><td>Power section line supply present (Not W8603.4).</td></tr> <tr> <td>QuickStop</td><td>BOOL</td><td>QuickStop active (Not W8603.5).</td></tr> <tr> <td>SwitchOnDisabled</td><td>BOOL</td><td>DSP402 device states (W8603.6).</td></tr> <tr> <td>Alarm</td><td>BOOL</td><td>1 = An alarm is present on the device (W8603.7).</td></tr> <tr> <td>ForcedLocalMode</td><td>BOOL</td><td>Device controlled by the physical inputs (W8603.9).</td></tr> <tr> <td>ReferenceReached</td><td>BOOL</td><td>The requested setpoint has been reached by the inverter (W8603.10).</td></tr> <tr> <td>ReferenceExceeded</td><td>BOOL</td><td>The requested setpoint has been exceeded by the inverter (W8603.11).</td></tr> <tr> <td>StopImposed</td><td>BOOL</td><td>1 = Stop is forced by remote control STOP key (W8603.14).</td></tr> <tr> <td>ForwardReverseRotation</td><td>BOOL</td><td>Current inverter direction (Not W8603.15).</td></tr> <tr> <td>State</td><td>INT</td><td>Current state number from the DSP402 state machine. Refer to the state, page 369 table.</td></tr> <tr> <td>Info</td><td>INT</td><td>Numerical code with the information on statuses and required actions. Refer to the Info, page 369 table.</td></tr> <tr> <td>ReservedReferenceChannel</td><td>BOOL</td><td>Drives reference channel is reserved by DTM (Unity, SoMove) or WEB server. (W8441.15) CRC.</td></tr> <tr> <td>ReservedCommandChannel</td><td>BOOL</td><td>Drives command channel is reserved by DTM (Unity, SoMove) or WEB server. (W8442.15) CCC.</td></tr> </table>	Parameter	Type	Description	ReadyToSwitchOn	BOOL	DSP402 device states (W8603.0).	SwitchedOn	BOOL	DSP402 device states (W8603.1).	OperationEnabled	BOOL	DSP402 device states (W8603.2).	Malfunction	BOOL	Detected error present on the device (W8603.3).	VoltageEnabled	BOOL	Power section line supply present (Not W8603.4).	QuickStop	BOOL	QuickStop active (Not W8603.5).	SwitchOnDisabled	BOOL	DSP402 device states (W8603.6).	Alarm	BOOL	1 = An alarm is present on the device (W8603.7).	ForcedLocalMode	BOOL	Device controlled by the physical inputs (W8603.9).	ReferenceReached	BOOL	The requested setpoint has been reached by the inverter (W8603.10).	ReferenceExceeded	BOOL	The requested setpoint has been exceeded by the inverter (W8603.11).	StopImposed	BOOL	1 = Stop is forced by remote control STOP key (W8603.14).	ForwardReverseRotation	BOOL	Current inverter direction (Not W8603.15).	State	INT	Current state number from the DSP402 state machine. Refer to the state , page 369 table.	Info	INT	Numerical code with the information on statuses and required actions. Refer to the Info , page 369 table.	ReservedReferenceChannel	BOOL	Drives reference channel is reserved by DTM (Unity, SoMove) or WEB server. (W8441.15) CRC.	ReservedCommandChannel	BOOL	Drives command channel is reserved by DTM (Unity, SoMove) or WEB server. (W8442.15) CCC.
Parameter	Type	Description																																																						
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ExtendedStatus	ATV340ExtendedStatus	Extended device status.																																																						
		<table> <tr> <th>Parameter</th><th>Type</th><th>Description</th></tr> </table>	Parameter	Type	Description																																																			
Parameter	Type	Description																																																						

Parameter	Type	Description	
	ReservedReferenceChannel	BOOL	Drives reference channel is reserved by DTM (Unity, SoMove) or Web server. (CommandControl = 1 and ReservedReferencedChannel = 1).
	ReservedCommandChannel	BOOL	Drives command channel is reserved by DTM (Unity, SoMove) or Web server. (CommandControl = 1 and ReservedCommandChannel = 1).
AuxReadStatus	ATVAuxReadDisabled	Status of Read Clients. The following table describes the AuxReadStatus parameters:	
	Parameter	Type	Description
	Parameter	BOOL	Parameter Read Request Disabled.
	SoftIOs	BOOL	Soft IOs Read Request Disabled.
	Custom1	BOOL	Custom 1 Read Request Disabled.
	Custom2	BOOL	Custom 2 Read Request Disabled.
	Custom3	BOOL	Custom 3 Read Request Disabled.
InputsMap	WORD	Logic Input Status (IL1R) read from drive .	
AI1	INT	Analog Input 1 value (AI1C).	
AI2	INT	Analog Input 2 value (AI2C).	
AI3	INT	Analog Input 3 value (AI3C).	
ParamRead	ATVParamDDT	Parameters Value read from drive. The following table describes the ParamRead:	
	Parameter	Type	Description
	MotorCurrent	UINT	Motor Current
	MotorVoltage	UINT	Motor Voltage
	MotorPower	INT	Motor Power
	MotorTorque	INT	Motor Torque
CustomRead1	ARRAY [1..125] OF INT	Custom 1 Value read from drive.	
CustomRead2	ARRAY [1..125] OF INT	Custom 2 Value read from drive.	
CustomRead3	ARRAY [1..125] OF INT	Custom 3 Value read from drive.	
StatisticConnector	Statistic1Connector	Information data is used with modbus communication to obtain statistics on the modbus network (requests carried out, time between requests). This structure has been created for its use together with the StatisticCounter DFB in General Purpose library for communication. The following table describes the StatisticConnector:	
	Parameter	Type	Description
	Start	BOOL	1 = Ready to create request.
	EndOk	BOOL	1 = Request is successful.
	EndNOk	BOOL	1 = Request is detected fail.
	TotalTime	DINT	Total time taken for the current request.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
ATV_ST	ATV340_ST_DDT	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 or SCADA system.
ATV_CFG	ATV340_CFG_DDT	Data structure with the device information. The information is used by the operator screen and is readable from the HMI or SCADA system.
WorkMemory	MBEthWorkMemory	Memory area to talk with the ModBus port.

ATV340_ST_DDT Type

Name	Type	Description
STW	WORD	Device main status.(bit 0 - Unknown state, bit 1- Not Ready, bit 2 - Running, bit 3 - Device Fail, bit 4 - Warning, bit 5 - Communication Fail, bit 6 - Necessary Reseting, bit 7 - Externally controlled, bit 8 - Reseting, bit 9 -EnabledFB, bit 15 - FowardReverseRotation)
CFGW	WORD	Device main control orders. Owner = 1 HMI control (write), Owner = 0 information from inputs (read) . (bit 0 - ResetFail, bit 1 - Owner, bit 3 - Direction, bit 4 - QuickStop, bit 5 - EnableDevice, bit 6 - Run, bit 7 - ControlCommand, bit 8 - ControlSetpoint)
PresentValue	REAL	Present speed measured in user units.
SetPoint	REAL	Set-point variable. The speed set-point is requested from the speed driver. Owner = 1 HMI control (write) Owner = 0 information from setpoint input (read)
AI1	INT	Refer to the AI1 output pin, page 421.
AI2	INT	Refer to the AI2 output pin, page 421.
AI3	INT	Refer to the AI3 output pin, page 421.
AO1	INT	Refer to the AO1 input pin, page 419.
AO2	INT	Refer to the AO2 input pin, page 419.
InputsMap	WORD	Digital Inputs
OutputsMap	WORD	Digital Outputs
Reserved	INT	Refer to the Reserved input pin, page 395.
Torque	REAL	Motor Torque
TorqueSet-point	REAL	Torque reference
Current	REAL	Motor Current
Voltage	REAL	Motor Voltage
Power	REAL	Motor power

ATV_ST.STW Word Structure

Bit	Description
0	Unknown state.
1	Not ready.
2	Refer to the Running output pin, page 421.
3	Inoperable device.
4	Refer to the Warning output pin, page 421.
5	Communication interruption.
6	Necessary resetting.
7	Refer to the ExtControlled output pin, page 421.
8	Refer to the Resetting output pin, page 421.
9	Refer to the EnableDFB input pin, page 419.
15	1 = Forward Rotation. 0 = Reverse Rotation.

ATV_ST.CFGW Word Structure

Bit	Description
0	Refer to the ResetFail input pin, page 419.
1	Owner.
3	Refer to the Direction input pin, page 419.
4	Refer to the QuickStop input pin, page 419.
5	Refer to the EnableDevice input pin, page 419.
6	Refer to the Run input pin, page 419.
7	Refer to the ControlCommand input pin, page 419.
8	Refer to the ControlSetPoint input pin, page 419.
9	External Error.

ATV_CFG_DDT Type

Name	Type	Description
DataStatus	WORD	Device status. Data from Register ETA (W458).(bit 0 - ReadyToSwitchOn, bit 1 - SwitchedOn, bit 2 - OperationEnabled, bit 3 - Malfunction, bit 4 - VoltageEnabled, bit 5 - QuickStop, bit 6 - SwitchOnDisabled, bit 7 - Alarm, bit 8 - ForcedLocalMode, bit 9 - ReferenceReached, bit 10 - ReferenceExceeded, bit 11 - StopImposed, bit 12 - ForwardReverseRotation)
Info	INT	Information code used to show extra operator information.
State	INT	Current state number from the DSP402 state machine.
WarningCode	WORD	Alarm code information. Takes the values from the WarningCode output.
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred FailCode[0].
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred FailCode[1].
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred FailCode[2].

ATV_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the ReadyToSwitchOn status in the Status output pin, page 421.
1	Refer to the SwitchedOn status in the Status output pin, page 421.
2	Refer to the OperationEnabled status in the Status output pin, page 421.
3	Refer to the Malfunction status in the Status output pin, page 421.
4	Refer to the VoltageEnabled status in the Status output pin, page 421.
5	Refer to the QuickStop status in the Status output pin, page 421.
6	Refer to the SwitchOnDisabled status in the Status output pin, page 421.
7	Refer to the Alarm status in the Status output pin, page 421.
8	Refer to the ForcedLocalMode status in the Status output pin, page 421.
9	Refer to the ReferenceReached status in the Status output pin, page 421.
10	Refer to the ReferenceExceeded status in the Status output pin, page 421.
11	Refer to the StopImposed status in the Status output pin, page 421.
12	Refer to the ForwardReverseRotation status in the Status output pin, page 421.

ATV_CFG.ExtendedStatus Word Structure

Bit	Description
0	Refer to the ReservedReferenceChannel in the ExtendedStatus output pin, page 421.
1	Refer to the ReservedCommandChannel in the ExtendedStatus output pin, page 421.

ATV_CFG.WarningCode Word Structure

Bit	Description
1	Refer to the Device in the WarningCode output pin, page 421.
2	Refer to the Order in the WarningCode output pin, page 421.
3	Refer to the ForcedLocalModel in the WarningCode output pin, page 421.

MBEthWorkMemory Type

Name	Type	Description	
Header	ARRAY [0..15] OF INT	Common data	
	Parameter	Type	Description
	Header[0]	INT	Number of ethernet client.
	Header[1]	INT	Number of request.
	Header[2]	INT	Simultaneous send.
	Header[3]	INT	3.0: Initialization Started ; 3.1: Port Ready; 3.2: Take statistics info.
	Header[4]	INT	Least priority
	Header[5]	INT	Last order number.
	Header[6]	INT	Socket number occupied by the client with least priority.
	Header[7]	INT	Low Word of Min total time.

Name	Type	Description	
	Header[8]	INT	High Word of Min total time.
	Header[9]	INT	Low Word of Avg total time.
	Header[10]	INT	High Word of Avg total time.
	Header[11]	INT	Low Word of Max total time.
	Header[12]	INT	High Word of Max total time.
	Header[13]	INT	Low Word for total request.
	Header[14]	INT	High Word for total request.
	Header[15]	INT	Reserved
ClientDataReference, page 428	ARRAY [0..3] OF MBethSocketData	Array of Client References.	

ClientDataReference Structure

Parameter		Type	Description
ClientDataReference [0..3]	ClientRef	REF_TO MBeth-ClientData	MBTCP Client Data.
	Status	WORD	Status of the socket (00 - Idle, 01- Client has sent data, 11 - Port has processed, 10 - Port is processing the request).

EIOSATV340

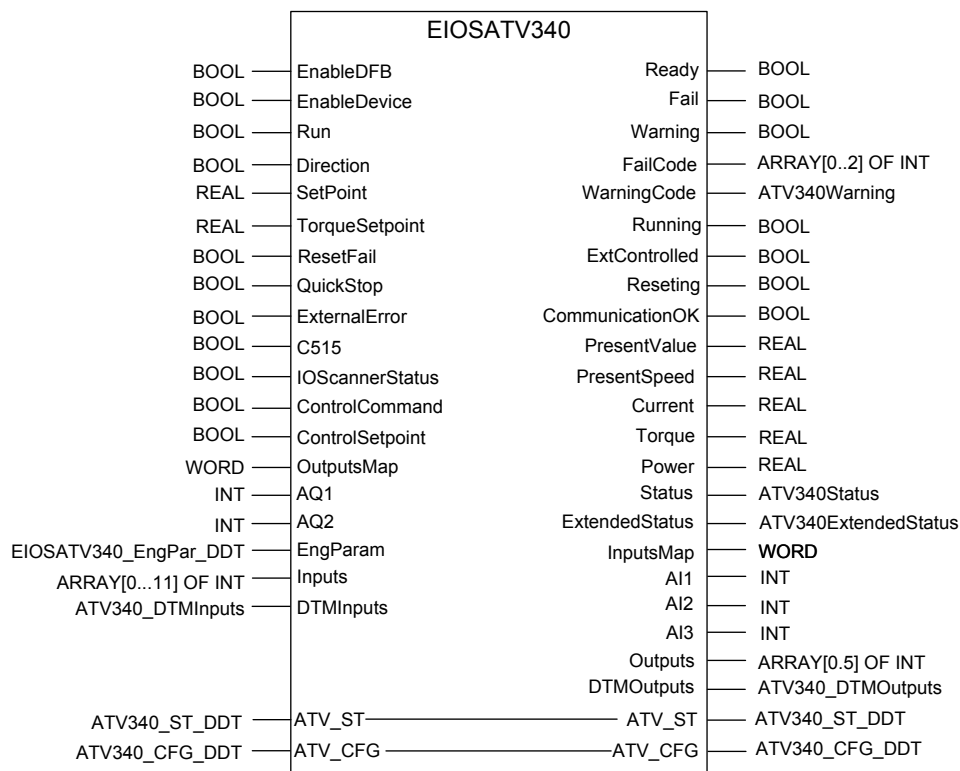
Overview

This topic describes the EIOSATV340 DFB.

DFB Representation

Representation

The following figure represents the function module of EIOSATV340 profile:



For DFBs communicating by I/O scanning, variables read from the device retain their last value when a communication interruption occurs. For details, refer to the description of the corresponding output parameters, page 432.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

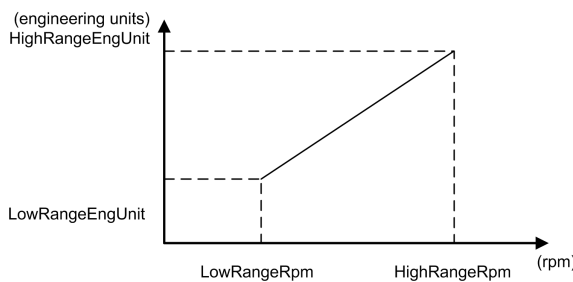
When you configure the *Last value* parameter of the I/O scanner line, take into consideration the behavior of the DFB when a communication interruption occurs.

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

Inputs

Input Parameter Description

Parameter	Type	Description
EnableDFB	BOOL	<p>This input enables the normal execution of the control block.</p> <ul style="list-style-type: none"> 0 = The entire DFB is restarted (statuses, output values, counters are lost) and output values are set to 0. 1 = Enables communications with the devices for their operation. <p>Public variable values are loaded during the first enabling cycle.</p>
EnableDevice	BOOL	<p>1 = Enables the devices if the EnableDFB variable is active.</p> <p>The speed drive has to be enabled in order to be controlled.</p>

Parameter	Type	Description
Run	BOOL	Runs the drive.
Direction	BOOL	<p>Direction of rotation of the motor.</p> <ul style="list-style-type: none"> 0 = Activates the reverse direction drive. 1 = Activates the forward direction drive. <p>You cannot change the direction of rotation by changing the sign in SetPoint input variable. SetPoint only accepts positive values.</p>
SetPoint	REAL	<p>The speed set-point is requested from the speed drive and only accepts positive values.</p> <p>It is measured in engineering units and you can configure these units with the following public variables:</p> <ul style="list-style-type: none"> HighRangeRpm LowRangeRpm HighRangeEngUnit LowRangeEngUnit <p>NOTE: Verify that the unit is within the correct range.</p> <p>The DFB makes the conversion between engineering units and speed drive rpms.</p> 
TorqueSetpoint	REAL	<p>Setpoint measured in Percentage.</p> <p>NOTE: The drive parameter Torque Reference Sign Switching decides the direction of rotation based on the below parameter configuration.</p> <ul style="list-style-type: none"> Unassigned: Torque Setpoint (+ve value) runs in forward direction, Torque Setpoint (-ve value) runs in reverse direction. Yes: Always runs in reverse direction. Others (DigitalInput1...): Direction is decided based on assigned condition.
ResetFail	REAL	Resets the detected fail on the DFB and the inverter.
QuickStop	BOOL	Stops the drive with a fast stop ramp.
ExternalError	BOOL	<p>Indicate drive that a detected process failure has occurred.</p> <p>NOTE: User need to map with C514 in VFD device to consider the External Error.</p>
C515	BOOL	User configurable input
DeviceAddress	string [26]	IP Address of device in format '{IP1.IP2.IP3.IP4}'
ControlCommand	BOOL	<p>Enables or disables the command sending to the inverter. If not set, the commands are expected to be wired.</p> <p>1 = Communication channel</p> <p>0 = Terminals</p>
ControlSetpoint	BOOL	<p>Enables or disables the inverter setpoint being set by this function.</p> <p>1 = Communication channel</p> <p>0 = Terminals</p>
OutputsMap	WORD	The Digital Output to be written to drive at configured register (OL1R).
AQ1	INT	The Analog Output/Analog Virtual Input to be written to inverter at configured register (AI1C).

Parameter	Type	Description
AQ1	INT	The Analog Output/Analog Virtual Input to be written to inverter at configured register (AI2C).
EnggParam	EME-SATV340_EngPar_DDT	ATV Engineering Parameters
Inputs	ARRAY [0..11] OF INT	IO Scan Input parameters
DTMInputs	ATV340_DTMIn-puts	DTM Input parameters

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.

NOTICE

UNINTENDED EQUIPMENT OPERATION

Configure the Torque setpoint through the drive.

Failure to follow these instructions can result in equipment damage.

EMESATV340_EngPar_DDT

Parameter	Type	Description
CommandCtrlWindow	TIME	Time window for the device to execute orders.
ScanTime	TIME	Minimum time to maintain alert signals.
MaxResetTime	TIME	Maximum time between two resets.
ScalingFactorCurrent	REAL	Defines scaling factor for current depending on drive rate
HighRangeEngUnit	REAL	Max drive speed measured in user units.
LowRangeEngUnit	REAL	Min drive speed measured in user units.
HighRangeRpm	INT	Max inverter speed measured in rpms.
LowRangeRpm	INT	Min inverter speed measured in rpms.
ResetMode	BOOL	FALSE.- Manual Reset TRUE.- Automatic Reset
TorqueScalingFactor	REAL	Torque scaling factor
PowerScalingFactor	REAL	Power scaling factor

ATV340_DTMInputs

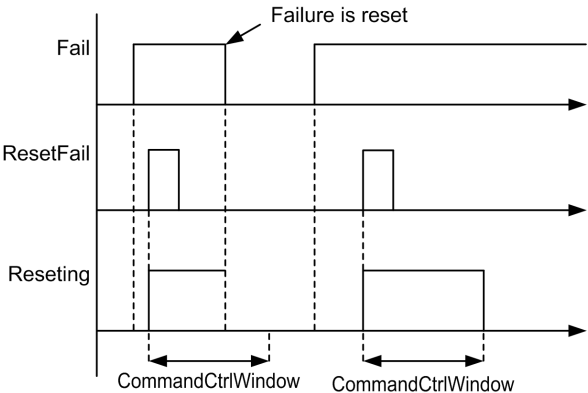
Parameter	Type	Description
ETA	WORD	Status word.
RFRD	INT	Output velocity.

ERRD	WORD	CiA402 fault code.
LCR	UINT	Motor current.
OTR	INT	Motor torque.
IL1R	WORD	Logic input states.
AI1C	INT	Analog input 1.
AI2C	INT	Analog input 2.
AI3C	INT	Analog input 3.
CCC	WORD	Active command channel.
CRC	WORD	Active reference channel.
EPRW	INT	Active electrical output power estimation.

Outputs

Output Parameter Description

Parameter	Type	Description	
Ready	BOOL	1 = The device is enabled and free of detected errors. The device is ready to carry out or carrying out any Run or Stop command.	
Fail	BOOL	1 = A detected failure in the control block or in the device or a communication interruption. To reset the Fail output pin, the ResetFail input has to be activated. The last detected error code is shown on FailCode . NOTE: If a communication interruption occurs, the variables being read from the device cease to be refreshed as a refresh operation can no longer be carried out. The variables keep their last value.	
Warning	BOOL	1 = An alarm has been activated for the device. It cannot be reset because the signal remains active until the cause of the alarm is removed or until the maximum set ScanTime is reached.	
FailCode	ARRAY [0..2] OF INT		When the Fail output is 1, it holds the code for the detected error.
			If the Fail bit is 0, it indicates the last detected error that occurred. The detected error source is specified by using a 3 level structure.
	Parameter	Type	Description
	FailCode[0]	INT	Refer to the Diagnostic Information Management , page 379 for more details.
	FailCode[1]	INT	
	FailCode[2]	INT	
WarningCode	ATVWarning		Stores the last alert code that happened.
			The following table describes the WarningCode :
	Parameter	Type	Description
	Device	BOOL	Alarm present from status register W8603.7.
	Order	BOOL	Order alert. The device does not respond to the order in CommandCtrlWindow .
	ForcedLocalMode	BOOL	The device is controlled by the physical inputs. (CommandControl = 1 And ForcedLocalmode = 1).
	ReservedRefernceChannel	BOOL	Channel for reference frequency (PowerSuite).
	ReservedCmdChannel	BOOL	Active command channel (PowerSuite).
Running	BOOL	1 = The motor is running and has an output frequency. NOTE: If SetPoint is 0 and Run is active, the Running signal is activated.	
ExtControlled	BOOL	The drive is not controlled by the DFB inputs.	
Reseting	BOOL	1 = A reset is being carried out. The CommandCtrlWindow variable indicates the maximum time for resetting the detected failure.	

Parameter	Type	Description																																																			
		<p>When a device or communication reset is carried out with <code>ResetFail</code>, the DFB tries to reset the detected failure within the time period defined in <code>CommandCtrlWindow</code>.</p> <p>If the detected failure is reset, the <code>Fail</code> and <code>Resetting</code> output variables are reset (set to FALSE). If the detected failure is not reset, the <code>Resetting</code> variable is set to FALSE and the <code>Fail</code> variable remains TRUE. The <code>ResetFail</code> is edge-based.</p> <p>Refer to the timing diagram below.</p>  <p>The diagram shows three signals: <code>Fail</code>, <code>ResetFail</code>, and <code>Resetting</code>. <code>Fail</code> is a pulse that goes high when a failure occurs. <code>ResetFail</code> is a short pulse that occurs when a reset is attempted. <code>Resetting</code> is a pulse that goes high when a reset is attempted and remains high until the failure is reset or the <code>CommandCtrlWindow</code> expires. The <code>CommandCtrlWindow</code> is the time period during which the DFB attempts to reset the failure.</p>																																																			
CommunicationOK	BOOL	Communication status.																																																			
PresentValue	REAL	Current speed of rotation in engineering units (EU).																																																			
PresentSpeed	REAL	Current motor speed in rpm (rotation per minute).																																																			
Current	UINT	Present motor current in ampere.																																																			
Torque	UINT	Current torque of the inverter (0.001 Nominal motor torque).																																																			
Power	UINT	Current power of the inverter in %.																																																			
Status	ATVStatus	<p>The structure holds data containing the information that the block extracts from the status variable of the speed driver.</p> <p>The following table describes the status information:</p> <table> <tr> <th>Parameter</th><th>Type</th><th>Description</th></tr> <tr> <td>ReadyToSwitchOn</td><td>BOOL</td><td>DSP402 device states (W8603.0).</td></tr> <tr> <td>SwitchedOn</td><td>BOOL</td><td>DSP402 device states (W8603.1).</td></tr> <tr> <td>OperationEnabled</td><td>BOOL</td><td>DSP402 device states (W8603.2).</td></tr> <tr> <td>Malfunction</td><td>BOOL</td><td>Detected error present on the device (W8603.3).</td></tr> <tr> <td>VoltageEnabled</td><td>BOOL</td><td>Power section line supply present (Not W8603.4).</td></tr> <tr> <td>QuickStop</td><td>BOOL</td><td>QuickStop active (Not W8603.5).</td></tr> <tr> <td>SwitchOnDisabled</td><td>BOOL</td><td>DSP402 device states (W8603.6).</td></tr> <tr> <td>Alarm</td><td>BOOL</td><td>1 = An alarm is present on the device (W8603.7).</td></tr> <tr> <td>ForcedLocalMode</td><td>BOOL</td><td>Device controlled by the physical inputs (W8603.9).</td></tr> <tr> <td>ReferenceReached</td><td>BOOL</td><td>The requested setpoint has been reached by the inverter (W8603.10).</td></tr> <tr> <td>ReferenceExceeded</td><td>BOOL</td><td>The requested setpoint has been exceeded by the inverter (W8603.11).</td></tr> <tr> <td>StopImposed</td><td>BOOL</td><td>1 = Stop is forced by remote control STOP key (W8603.14).</td></tr> <tr> <td>ForwardReverseRotation</td><td>BOOL</td><td>Current inverter direction (Not W8603.15).</td></tr> <tr> <td>ReservedReferenceChannel</td><td>BOOL</td><td>Drives reference channel is reserved by DTM (Unity, SoMove) or WEB server. (W8441.15) CRC.</td></tr> <tr> <td>ReservedCommandChannel</td><td>BOOL</td><td>Drives command channel is reserved by DTM (Unity, SoMove) or WEB server. (W8442.15) CCC.</td></tr> <tr> <td>State</td><td>INT</td><td>Current state number from the DSP402 state machine.</td></tr> </table>	Parameter	Type	Description	ReadyToSwitchOn	BOOL	DSP402 device states (W8603.0).	SwitchedOn	BOOL	DSP402 device states (W8603.1).	OperationEnabled	BOOL	DSP402 device states (W8603.2).	Malfunction	BOOL	Detected error present on the device (W8603.3).	VoltageEnabled	BOOL	Power section line supply present (Not W8603.4).	QuickStop	BOOL	QuickStop active (Not W8603.5).	SwitchOnDisabled	BOOL	DSP402 device states (W8603.6).	Alarm	BOOL	1 = An alarm is present on the device (W8603.7).	ForcedLocalMode	BOOL	Device controlled by the physical inputs (W8603.9).	ReferenceReached	BOOL	The requested setpoint has been reached by the inverter (W8603.10).	ReferenceExceeded	BOOL	The requested setpoint has been exceeded by the inverter (W8603.11).	StopImposed	BOOL	1 = Stop is forced by remote control STOP key (W8603.14).	ForwardReverseRotation	BOOL	Current inverter direction (Not W8603.15).	ReservedReferenceChannel	BOOL	Drives reference channel is reserved by DTM (Unity, SoMove) or WEB server. (W8441.15) CRC.	ReservedCommandChannel	BOOL	Drives command channel is reserved by DTM (Unity, SoMove) or WEB server. (W8442.15) CCC.	State	INT	Current state number from the DSP402 state machine.
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State	INT	Current state number from the DSP402 state machine.																																																			

Parameter	Type	Description	
	Info	INT	Information code used to show extra operator information.
EXtendedSta-tus	BOOL	Extended status	
InputsMap	WORD	Logic Input Status (IL1R) read from drive .	
AI1	INT	Analog Input 1 input.	
AI2	INT	Analog Input 2 input.	
AI3	INT	Analog Input 3 input.	
Outputs	ARRAY [0..5] OF INT	IO Scan Output parameters.	
DTMOutputs	ATV340_DTMOutputs	DTM Output parameters. The following table describes the DTMOutputs:	
	Parameter	Type	Description
	CMD	WORD	Command word.
	LFRD	INT	Speed setpoint.
	LTR	INT	Torque setpoint.
	OL1R	WORD	Logic output states.
	AO1C	INT	Analog output 1 physical value.
	AO2C	INT	Analog output 2 physical value.

Inputs/Outputs

Input/Output Parameter Description

Parameter	Type	Description
ATV_ST	ATV340_ST_DDT	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 or SCADA system.
ATV_CFG	ATV340_CFG_DDT	Data structure with the device information. The information is used by the operator screen and is readable from the HMI or SCADA system.

ATV340_ST_DDT Type

Name	Type	Description
STW	WORD	Device main status.(bit 0 - Unknown state, bit 1- Not Ready, bit 2 - Running, bit 3 - Device Fail, bit 4 - Warning, bit 5 - Communication Fail, bit 6 - Necessary Resetting, bit 7 - Externally controlled, bit 8 - Resetting, bit 9 -EnableDFB, bit 15 - FowardReverseRotation)
CFGW	WORD	Device main control orders. Owner = 1 HMI control (write), Owner = 0 information from inputs (read) . (bit 0 - ResetFail, bit 1 - Owner, bit 3 - Direction, bit 4 - QuickStop, bit 5 - EnableDevice, bit 6 - Run, bit 7 - ControlCommand, bit 8 - ControlSetpoint)
PresentValue	REAL	Present speed measured in user units.
SetPoint	REAL	Set-point variable. The speed set-point is requested from the speed driver. Owner = 1 HMI control (write) Owner = 0 information from setpoint input (read)

Name	Type	Description
AI1	INT	Refer to the AI1 output pin, page 432.
AI2	INT	Refer to the AI2 output pin, page 432.
AI3	INT	Refer to the AI3 output pin, page 432.
AO1	INT	Refer to the AO1 input pin, page 429.
AO2	INT	Refer to the AO2 input pin, page 429.
InputsMap	WORD	Logic Inputs
OutputsMap	WORD	Digital Outputs
Reserved	INT	Refer to the Reserved input pin, page 429.
Torque	REAL	Motor Torque
TorqueSet-point	REAL	Torque reference
Current	REAL	Motor Current
Voltage	REAL	Motor Voltage
Power	REAL	Motor power

ATV_ST.STW Word Structure

Bit	Description
0	Unknown state.
1	Not ready.
2	Refer to the Running output pin, page 432.
3	Inoperable device.
4	Refer to the Warning output pin, page 432.
5	Communication interruption.
6	Necessary resetting.
7	Refer to the ExtControlled output pin, page 432.
8	Refer to the Resetting output pin, page 432.
9	Refer to the EnableDFB input pin, page 429.
15	1 = Forward Rotation. 0 = Reverse Rotation.

ATV_ST.CFGW Word Structure

Bit	Description
0	Refer to the ResetFail input pin, page 429.
1	Owner.
3	Refer to the Direction input pin, page 429.
4	Refer to the QuickStop input pin, page 429.
5	Refer to the EnableDevice input pin, page 429.
6	Refer to the Run input pin, page 429.
7	Refer to the ControlCommand input pin, page 429.
8	Refer to the ControlSetPoint input pin, page 429.
9	External Error.

ATV_CFG_DDT Type

Name	Type	Description
DataStatus	WORD	Device status. Data from Register ETA (W458). (bit 0 - ReadyToSwitchOn, bit 1 - SwitchedOn, bit 2 - OperationEnabled, bit 3 - Malfunction, bit 4 - VoltageEnabled, bit 5 - QuickStop, bit 6 - SwitchOnDisabled, bit 7 - Alarm, bit 8 - ForcedLocalMode, bit 9 - ReferenceReached, bit 10 - ReferenceExceeded, bit 11 - StopImposed, bit 12 - ForwardReverseRotation)
Info	INT	Information code used to show extra operator information.
State	INT	Current state number from the DSP402 state machine.
WarningCode	WORD	Alarm code information. Takes the values from the WarningCode output.
FailCode0	INT	Code of last level 0 detected error. Indicates that a detected error has occurred FailCode[0].
FailCode1	INT	Code of last level 1 detected error. Indicates that a detected error has occurred FailCode[1].
FailCode2	INT	Code of last level 2 detected error. Indicates that a detected error has occurred FailCode[2].

ATV_CFG.DataStatus Word Structure

Bit	Description
0	Refer to the ReadyToSwitchOn status in the Status output pin, page 432.
1	Refer to the SwitchedOn status in the Status output pin, page 432.
2	Refer to the OperationEnabled status in the Status output pin, page 432.
3	Refer to the Malfunction status in the Status output pin, page 432.
4	Refer to the VoltageEnabled status in the Status output pin, page 432.
5	Refer to the QuickStop status in the Status output pin, page 432.
6	Refer to the SwitchOnDisabled status in the Status output pin, page 432.
7	Refer to the Alarm status in the Status output pin, page 432.
8	Refer to the ForcedLocalMode status in the Status output pin, page 432.
9	Refer to the ReferenceReached status in the Status output pin, page 432.
10	Refer to the ReferenceExceeded status in the Status output pin, page 432.
11	Refer to the StopImposed status in the Status output pin, page 432.
12	Refer to the ForwardReverseRotation status in the Status output pin, page 432.

ATV_CFG.WarningCode Word Structure

Bit	Description
1	Refer to the Device in the WarningCode output pin, page 432.
2	Refer to the Order in the WarningCode output pin, page 432.
3	Refer to the ForcedLocalMode1 in the WarningCode output pin, page 432.
4	Refer to the ReservedReferenceChannel in the WarningCode output pin, page 432.
5	Refer to the ReservedCommandChannel in the WarningCode output pin, page 432.

Supervision

Overview

This section describes the Supervision resources and runtime services that are available for the ATV340.

Genies

Genie Properties

Refer to Genie Properties, page 40.

Genie Icons

Refer to Genie Icons, page 41.

Representation

The table describes the genies of the `gpl_devices` library:

Graphic symbol	Genie name	Description
	ATV340_size1to3	ATV340 variable speed drives.
	ATV340_size4to5	ATV340 variable speed drives.
	ATV340_PV	ATV340 present value.
	ATV340_PVSP	ATV340 present value setpoint.
	Itemvalue	ATV340 user configurable item.

Faceplate

Representation of Supervision Data

At the beginning of this document, you can find a general description, page 40 of the graphic elements that are used in the faceplate.

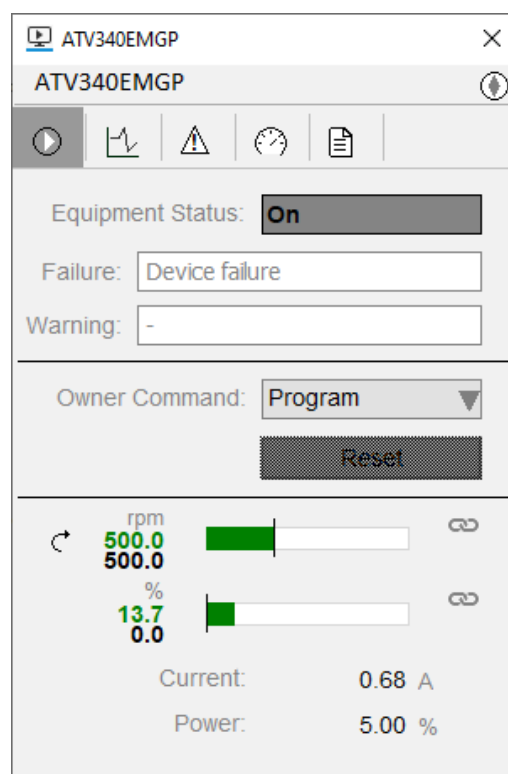
Available Tabs

During operation, clicking an ATV340EMGP genie opens a faceplate with the following tabs:

- Operation
- Trend, page 45
- Measures
- Alarm, page 47
- Event, page 48

Operator Tab

The figure shows an operator tab:



NOTE: The reset on operator tab of ATV340 establishes communication with device. However, another reset is required to clear the communication interruption on ATV340 device which is known behavior of ATV340.

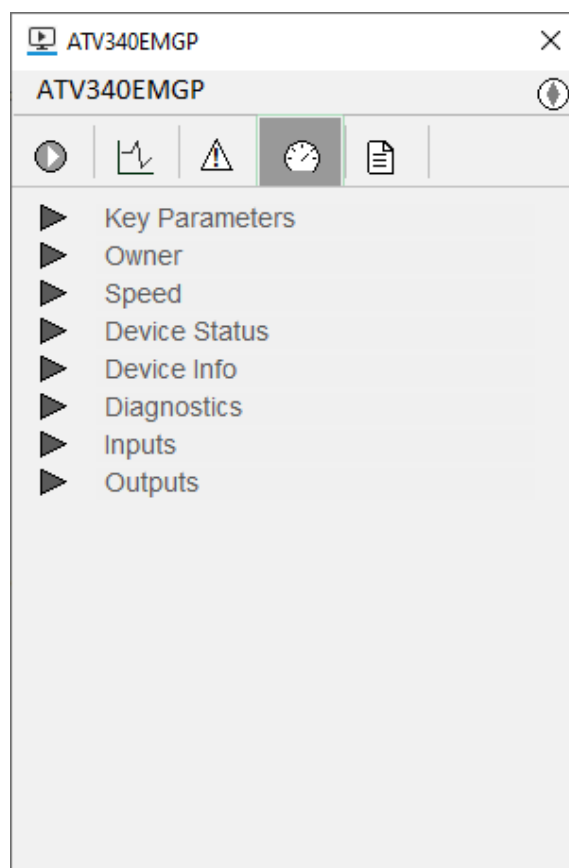
The table describes the control function of an **Operator** tab:

Label	Item name	Description	Security parameter
Equipment Status	Running	Equipment status of ATV340.	—
Failure	LastFailure, DeviceFailureActive	Current detected failure status of ATV340.	

Label	Item name	Description	Security parameter
Warning	AlarmActive, CurrentWarning	Current alert status of ATV340.	
Owner Command	OwnerSelect	Owner of ATV340.	Set owner
–	Rearm	Allows you to reset manually after the detection of an inoperable device condition or unsuccessful operation. NOTE: When the control module is reset, the current setpoint shown in operator tab is effective. Also, when you click Reset , a dialog box opens to confirm.	Set rearm
Current	Current	Actual current	–
Power	Power	Power	–

Measures Tab

The figure below shows the measures tab:



The table shows the measures tab groups:

Key Parameters

ATV340EMGP

ATV340EMGP

▲ **Key Parameters**

Current	:	0.67 A
Torque	:	13.9 %
Power	:	5.00 %
Speed	:	500.0 rpm

Owner

ATV340EMGP

ATV340EMGP

▲ **Owner**

Forced Local Mode

Speed

ATV340EMGP

ATV340EMGP

▲ **Speed**

Speed Setpoint	:	500.0 rpm
Speed Setpoint Outside the Limit		
Speed Setpoint Reached		

Device Status

ATV340EMGP

ATV340EMGP

▲ **Device Status**

Direction of Rotation : Forward

Ready to Switch On

Switched On

Operation Enabled

Malfunction

Quick Stop

Switch On Disabled

Detected Alarm

Stop is Done by Remote Control Stop But..

Voltage Enabled

Device Info

ATV340EMGP

Device Information : 54

Status Code of Driver : 5

Reference Channel Reserved by DTM on

Command Channel Reserved by DTM on

Diagnostics

ATV340EMGP

Last Diagnostic Code : 0

Last Diagnostic Code 0 : 30016

Last Diagnostic Code 1 : 0

Last Diagnostic Code 2 : 5

Inputs

ATV340EMGP

Analog Input 1 : 40

Analog Input 2 : 5

Analog Input 3 : 48

Logic Input 1

Logic Input 2

Logic Input 3

Logic Input 4

Logic Input 5

Logic Input 6

Logic Input 7

Logic Input 8

Logic Input 11

Logic Input 12

Logic Input 13

Logic Input 14

Logic Input 15

Outputs

ATV340EMGP

Analog Output 1 : 0

Analog Output 2 : 0

Relay Output 1

Relay Output 2

Relay Output 3

Relay Output 4

Relay Output 5

Relay Output 6

Logic Output 1

Logic Output 2

Logic Output 12

Logic Output 13

The table lists the items of each group of the **Measures** tab:

Group Order Number	1	2	3	4	5	6	7	8
Group Name	Key Parameters	Owner	Speed	Device Status	Device Info	Diagnostics	Inputs	Outputs
Items	Current	Forced Local Mode	Speed Setpoint	Direction of Rotation	Device Information	Last Diagnostic Code	Analog Input 1	Analog Output 1
	Torque	–	Speed Setpoint Outside the Limit	Ready to Switch On	Status Code of Driver	Last Diagnostic Code 0	Analog Input 2	Analog Output 2

Group Order Number	1	2	3	4	5	6	7	8
Group Name	Key Parameters	Owner	Speed	Device Status	Device Info	Diagnostics	Inputs	Outputs
	Power	—	Speed Setpoint Reached	Switched On	Reference channel reserved by DTM on web server	Last Diagnostic Code 1	Analog Input 3	Relay Output 1..6
	—	—	—	Operation Enabled	Command channel reserved by DTM on web server	Last Diagnostic Code 2	Logic Input 1..15	Logic Output 1
	—	—	—	Malfunction	—	—	—	Logic Output 2
	—	—	—	Quick Stop	—	—	—	Logic Output 12
	—	—	—	Switch On Disabled	—	—	—	Logic Output 13
	—	—	—	Detected Alarm	—	—	—	—
	—	—	—	Stop is Done by Remote Control Stop Button	—	—	—	—
	—	—	—	Voltage Enabled	—	—	—	—

Items

Overview

This section describes the variables, abnormal and action required conditions, alarm items, events, and trends item of ATV340.

Variables

The table describes the variable items that are used by Supervision components:

Item name	Description	Enumeration	Address
Bit items derived from StatusWord.			
UnknownState	Unknown module status	—	Bit0
NotReady	Module not ready	—	Bit1
Running	Module is running	On/Off	Bit2
DeviceFailActive	Device is inoperable	—	Bit3
AlarmActive	Alarm on the device	—	Bit4
CommunicationFailActive	Communication interruption	—	Bit5
RequireRearm	Detected fail resetting required	—	Bit6
OwnerExternal	Device is externally controlled	—	Bit7
Resetting	Reset is being carried out	—	Bit8

Item name	Description	Enumeration	Address
EnableFunctional-Block	Normal execution of control block	–	Bit9
DirectionPresent-Value	Direction of rotation	ATVDirection	Bit15
Bit items derived from DataStatusWord.			
ReadyToSwitchON	Device is ready to switch on	–	Bit0
SwitchedON	Device is switched on	–	Bit1
OperationEnabled	Operation is enabled	–	Bit2
MalfunctionActive	Failure detected	–	Bit3
VoltageEnabled	Voltage on the terminal	–	Bit4
QuickStop	Quick stop is activated	–	Bit5
SwitchedONDisabled	Switch on is disabled	–	Bit6
Alarm	Alarm	–	Bit7
ReferenceReached	Speed set point reached	–	Bit9
ReferenceExceeded	Speed set point exceeds limit	–	Bit10
StopImposed	Forces stop remotely	–	Bit11
ForwardReverseDirection	Direction of rotation	–	Bit12
Bit items derived from ConfigurationWord.			
Rearm	Resets the detected fail	–	Bit0
OwnerSelect	Owner of control module	–	Bit1
DirectionSetpoint	Decides direction of activation	ATVDirection	Bit3
QuickStopCommand	Stops the device quickly	–	Bit4
EnableDevice	Enable device	–	Bit5
Run	Module is running	–	Bit6
ControlCommand	Indicates mode of control	–	Bit7
ControlSetpoint	Indicates mode of speed control	–	Bit8
Actual Items			
WarningCode	Alert code	–	ATV340_ATV_CFG. WarningCode
FailCode2	Code of last level 2 detected error	–	ATV340_ATV_CFG. FailCode2
FailCode1	Code of last level 1 detected error	–	ATV340_ATV_CFG. FailCode1
FailCode0	Code of last level 0 detected error	–	ATV340_ATV_CFG. FailCode0
DataStatusWord	Data Status word	–	ATV340_ATV_CFG. DataStatus
SpeedSetpoint	Speed setpoint	–	ATV340_ATV_ST. Setpoint
PresentValue	Present Value	–	ATV340_ATV_ST. PresentValue
ExtendedDataStatusWord	Extended Data Status word	–	ATV340_ATV_ ExtendedDataStatus
CurrentWarning	Current alert	–	ATV340_ATV_ CurrentWarning
TorqueSetpoint	Torque setpoint	–	ATV340_ATV_ST. TorqueSetPoint

Item name	Description	Enumeration	Address
StatusWord	Status word	–	ATV340_ATV_ST.STW
ConfigurationWord	Configuration word	–	ATV340_ATV_ST.CFGW
OutputsMapWord	Outputs map	–	ATV340_ATV_ST.OutputsMap
AnalogOutput1	AQ1	–	ATV340_ATV_ST.AQ1
AnalogOutput2	AQ2	–	ATV340_ATV_ST.AQ2
InputsMapWord	Inputs map	–	ATV340_ATV_ST.InputsMap
AnalogInput1	AI1	–	ATV340_ATV_ST.AI1
AnalogInput2	AI2	–	ATV340_ATV_ST.AI2
AnalogInput3	AI3	–	ATV340_ATV_ST.AI3
Torque	Torque	–	ATV340_ATV_ST.Torque
Current	Actual current	–	ATV340_ATV_IO.Current
Power	Power	–	ATV340_ATV_ST.Power
Calculated Items			
Owner	Current owner of the ATV340 Refer to Calculated Variable, page 39.	–	<i>GPL_OwnerBasic</i>
Abnormal	Shows abnormal condition of the ATV340 Refer to Abnormal Conditions, page 444.		<i>GPL_DeviceAbnormal</i>
ActionRequired	Shows action required condition of the ATV340 Refer to Action Required Conditions, page 444.		<i>GPL_DeviceActionRequired</i>

Abnormal Conditions

The table describes the abnormal conditions of ATV340:

Item name	Description	Address
AbnormalOwner	Abnormal owner status appears if the current owner is not a normal owner which configured at the instance level.	<i>Bit0</i>
AbnormalOperatorTab	Abnormal status of operator tab. This condition appears if the interlock bypass is enable.	<i>Bit8</i>

Action Required Conditions

The table describes the abnormal conditions of ATV340:

Item name	Description	Address
ActionOperatorTab	Action required status of operator tab.	<i>Bit8</i>

Alarms

The table describes the advanced alarm items that are used by Supervision components. It also indicates the address that is configured in the Supervision components to read the corresponding bit of the status word:

Item name	Description	Expression
ActionAlarm	Action Alarm	–
AlarmFailure	Operation failure	<i>GPL_BitValueCheck(StatusWord, 4)</i>
CommunicationFailure	Communication failure alarm	<i>GPL_BitValueCheck(StatusWord, 5)</i>
DeviceFailure	Device failure alarm	<i>GPL_BitValueCheck(StatusWord, 3)</i>

Events

Event conditions are conditions which are detected during the operation of control module or the logging of operator actions:

Item name	Description
StateAlarm	All changes in the device state and output.
ModeAlarm	All changes in the mode and owner.
ActionAlarm	All actions by the operator.

Trends

The table describes the trend items that are used by Supervision components:

Item name	Description	Expression
Present-Value	Present value	ATV_PresentValue
SpeedSetpoint	Speed setpoint	ATV_SpeedSetpoint
TorqueSetpoint	Torque setpoint	ATV_TorqueSetpoint
Torque	Torque	ATV_Torque
Current	Current	ATV_Current
Power	Power	ATV_Power


Communication Technologies

What's in This Part

Ethernet Technology	447
Modbus over ULP Technology	481
Modbus Technology	486
Profibus Technology	507
CANOpen Technology	511

Overview

This part describes the communication technologies used in the Devices library.
These function blocks do not reflect any specific installation.

 **WARNING**

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system 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.

Ethernet Technology

What's in This Chapter

<i>CommunicationOK</i> Variable	447
ATV71/61 Control Block on Ethernet with IO Scanning	448
Tesys T Control Block on Ethernet	455
Modbus Devices Used Through Gateway	458
Modbus TCP/IP - Implicit with NOE	463
Modbus TCP/IP - Implicit with NOC	467
Modbus TCP/IP - Explicit	472
Modbus TCP/IP - Explicit with Gateway	477

Overview

This chapter describes configuration details of Ethernet technology on various devices.

CommunicationOK Variable

Overview

This section provides the information about the *CommunicationOK* variable.

Description

IODDT Variable Description

To check the presence of a device on an Ethernet network, you can check the IODDT variable for Ethernet communications.

NOTE: The variable is pre-defined by the manufacturer, which includes input and output language objects that are part of the channel corresponding to a module used for a specific function.

This table describes Ethernet communication IODDTs that depend on the type of hardware installed:

SI.NO	IODDT Name	Module Name	Platform
1	T_COM_ETH_BMX	—	M340 Platform

System Word Description

The System Word is used instead of IODDT variable in Quantum platform device on an Ethernet network. For example, %SW160 and %SW167.

This figure shows the IO Scanning rows on Ethernet communication:

Name	Type	Address	Value	Comment
Ethernet	T_COM_ETHCOPRO	%ch0.0.3		
CH_ERROR	BOOL	%I0.0.3.ERR		Channel error
REFRESH_IO_1	BOOL	%Iw0.0.3.1.0		Remote IO scanning refresh indicator : device 1
REFRESH_IO_2	BOOL	%Iw0.0.3.1.1		Remote IO scanning refresh indicator : device 2
REFRESH_IO_3	BOOL	%Iw0.0.3.1.2		Remote IO scanning refresh indicator : device 3
REFRESH_IO_4	BOOL	%Iw0.0.3.1.3		Remote IO scanning refresh indicator : device 4
REFRESH_IO_5	BOOL	%Iw0.0.3.1.4		Remote IO scanning refresh indicator : device 5

Declaring a variable as an IODDT enables to obtain an indicator of the communication status for each IO Scanning row.

NOTE: Templates generated with an Ethernet communications network by the SGStudio program have the Ethernet variable correctly declared and allocated. If a user template is used, declare this variable.

In the case of the Quantum Copro platform, the IODDT variable is not used. System words are used instead (%SW160 to %SW167). For example, IO Scanning line 1 corresponds to %SW160.0.

In the case of the Quantum NOE platform, the IODDT variable is not used. System words are used instead (%IW1 to %IW8). For example, IO Scanning line 1 corresponds to %IW1.0.

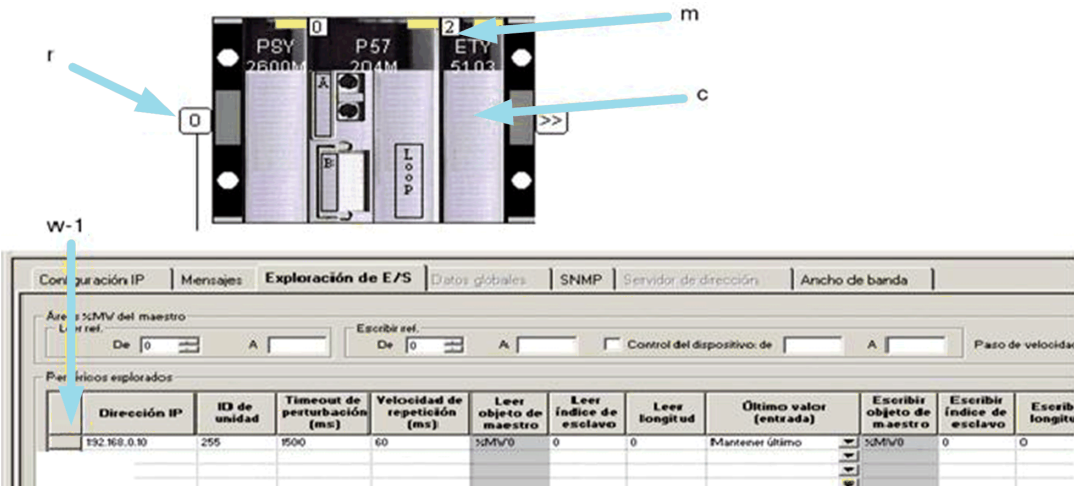
For example, if you use the SG Workbench template, the `CommunicationOK` input is shown as `Ethernet.REFRESH_IO_X`, which has to be replaced with `Ethernet.REFRESH_IO_1.0` for line 1.

The IODDT variable has to be addressed with %cha.b.c, where:

a	= Rack number
b	= Number of slots inside the Controller
c	= Number of channels in the Ethernet module

In the following example, the address for the IODDT variable is %CH0.2.0.

As for the device defined on the first IO Scanning line: Ethernet.REFRESH_IO_1.



ATV71/61 Control Block on Ethernet with IO Scanning

Overview

This section provides the configuration and setup details involving the Altivar 71 and Altivar 61 variable speed drives connected through modbus TCP (Ethernet) in the Modicon M340, M580, and Quantum automation platforms.

Introduction

The Device library currently incorporates many elements with Ethernet technology. One example is the ATV 71 and ATV 61 speed drivers and the Tesys T motor protection devices. You can use any device in serial modbus mode by using a serial modbus–modbus TCP gateway and the `EGtwMB` block from the Communication library.

You can operate both ATV 61 and ATV 71 devices and Tesys T devices with messaging or IO scanning. This documentation refers explicitly to device configurations designed to work with IO Scanning because working with messaging requires the exact same steps until the step of assigning an IP address to the device. After assigning an IP address to the device is completed, the address has to be fed to the `DeviceAddress` input on each one of the devices.

ATV71/61 Control Block on Ethernet

⚠ WARNING

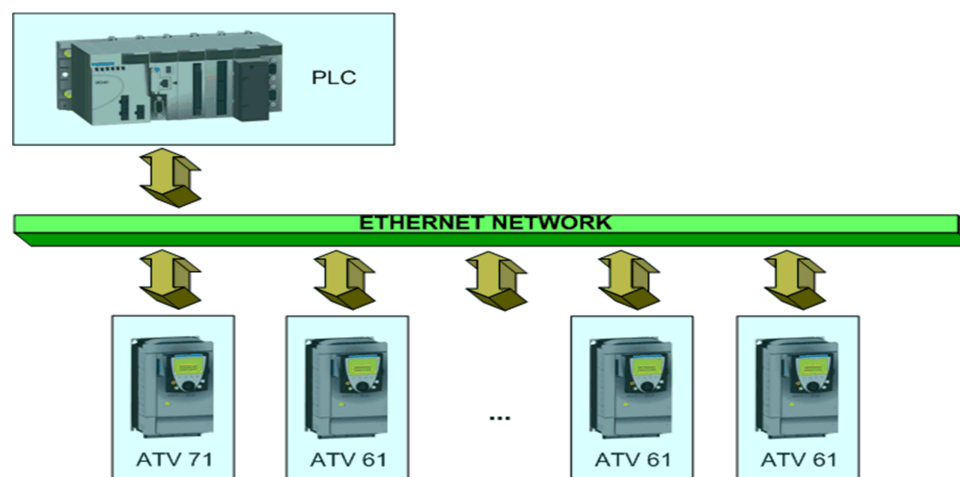
UNINTENDED EQUIPMENT OPERATION

Adapt the below examples to configure device or communication network parameters before you implement them.

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

Refer to the configuration manual for communication networks and Control devices.

This figure represents the hardware configuration:



Preparing the Device

Introduction

Configure each Altivar 71/61 device in such a way that it is on the same network as the Controller that controls it.

Graphic Terminal Settings Description

The following settings need to be defined from the graphic terminal.

1. DRIVE MENU

1.9 COMMUNICATIONS

ETHERNET

IP card (the device IP address)

IP mask (Mask)

IP Gate IP (Gate IP, if any)

IP Process (IP of the controller that controls the device)

You can configure the Process IP section if you want only one single specific controller to control the speed driver. In this case, only the device with the specified IP can access the speed driver. If access control is not required, do not specify an IP, that is, enter 0.0.0.0.

After you have configured this data, you can access the device through the Ethernet network.

ATV 71/61 IO Scanner Configuration

Overview

To implement I/O exchange operations between the speed driver and the controller, both the ATV 61/ATV 71 IO Scanner and I/O scanning of the Controllers have to be configured.

IO Scanner Configuration Procedure


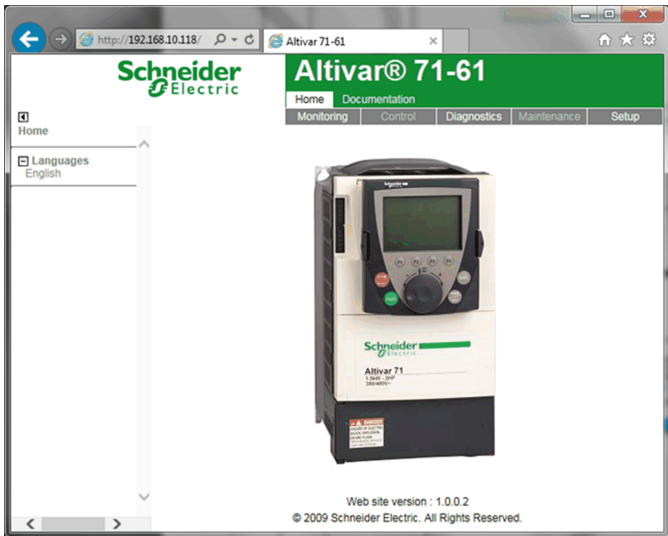
To configure the IO Scanner, you have to access the ATV61/ATV71 webpage. To do this, open Windows Explorer and enter the IP address that has been specified for the device. For example, the address is: `http://197.129.17.118/`.



NOTE: To access the device from the computer, the computer has to be on the same network as the speed driver.

For example, if IP address of the speed driver is 197.129.17.118 and the subnet mask is 255.255.255.0, the valid IP address for the PC will be 192.129.17.xxx, where:

xxx	= Can be any number except for 118 (which is the number corresponding to the speed driver).
-----	---

This table shows the step-by-step configuration of the ATV71/61 I/O scanner:

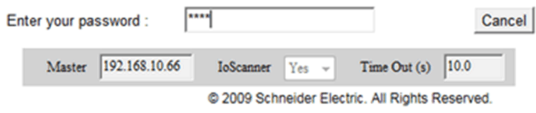
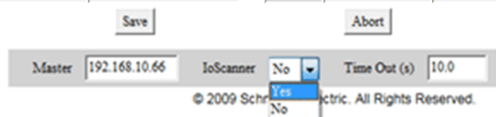

STEP	ACTION	RESULT
1	Enter the Speed drivers IP address into widows explorer	<p>The speed drivers login screen appears.</p> <p>This figure represents the speed drivers login screen:</p>  <p>The default values are:</p> <p>user name: USER</p> <p>Password: USER</p> <p>NOTE: If you change these values, store the values because you cannot access the webpage if the values are not known.</p>
2	Enter the user name and password.	<p>The Home screen for the speed drivers appears:</p> <p>This figure represents the Speed drivers Home screen:</p> 

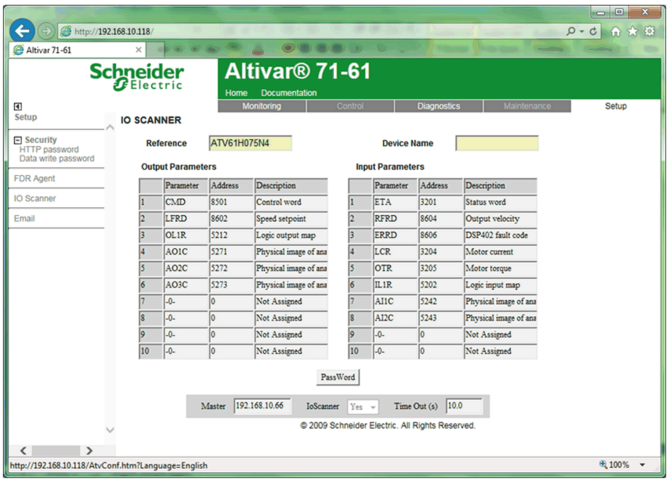
STEP	ACTION	RESULT																								
3	Click Setup tab to access the Configuration menu.	<p>Setup menu appears.</p> <p>This figure represents the home screen with Setup menu:</p> 																								
4	Select the IO Scanner option (on the left menu) to display the IO SCANNER screen.	<p>IO SCANNER screen appears.</p> <p>This figure represents the default configuration values of the latest configuration:</p> <div style="display: flex; justify-content: space-around;"> <table border="1"> <caption>Output Parameters</caption> <thead> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> </thead> <tbody> <tr> <td>1</td><td>CMD</td><td>8501</td></tr> <tr> <td>2</td><td>LFRD</td><td>8602</td></tr> </tbody> </table> <table border="1"> <caption>Input Parameters</caption> <thead> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> </thead> <tbody> <tr> <td>1</td><td>ETA</td><td>3201</td></tr> <tr> <td>2</td><td>RFRD</td><td>8604</td></tr> <tr> <td>3</td><td>ERRD</td><td>8606</td></tr> <tr> <td>4</td><td>LCR</td><td>3204</td></tr> </tbody> </table> </div>  <p>Change the configuration to match the inputs and outputs expected by the device defined in Control.</p> <p>The configuration required corresponds to the inputs (ATV7161_IN_DDT) and outputs (ATV7161_OUT_DDT).</p>		Parameter	Device variable	1	CMD	8501	2	LFRD	8602		Parameter	Device variable	1	ETA	3201	2	RFRD	8604	3	ERRD	8606	4	LCR	3204
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2	RFRD	8604																								
3	ERRD	8606																								
4	LCR	3204																								

Modifying the ATV7161 IOScanner Configuration

Procedure

After the IOScanner is configured, follow the procedure to modify the IOScanner configuration:

STEP	ACTION	RESULT																																																
1	Click PassWord button on the IO SCANNER home screen. Enter the default password (USER).	<p>IO SCANNER home screen refreshes displaying Enter you password field instead of PassWord button to enter the appropriate password.</p> <p>This figure represents the IO SCANNER home screen:</p> <div> <p>Output Parameters</p> <table> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> <tr> <td>1</td><td>CMD</td><td>8501</td></tr> <tr> <td>2</td><td>LFRD</td><td>8602</td></tr> </table> </div> <div> <p>Input Parameters</p> <table> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> <tr> <td>1</td><td>ETA</td><td>3201</td></tr> <tr> <td>2</td><td>RFRD</td><td>8604</td></tr> <tr> <td>3</td><td>ERRD</td><td>8606</td></tr> <tr> <td>4</td><td>LCR</td><td>3204</td></tr> </table> </div>  <p>NOTE: You can change this password but store it in the memory to modify this configuration in future.</p>		Parameter	Device variable	1	CMD	8501	2	LFRD	8602		Parameter	Device variable	1	ETA	3201	2	RFRD	8604	3	ERRD	8606	4	LCR	3204																								
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4	LCR	3204																																																
2	After entering the password, disable IO SCANNER by selecting No from IO Scanner list.	<p>IO SCANNER home screen with disable option appears:</p> <div> <p>Output Parameters</p> <table> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> <tr> <td>1</td><td>CMD</td><td>8501</td></tr> <tr> <td>2</td><td>LFRD</td><td>8602</td></tr> </table> </div> <div> <p>Input Parameters</p> <table> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> <tr> <td>1</td><td>ETA</td><td>3201</td></tr> <tr> <td>2</td><td>RFRD</td><td>8604</td></tr> </table> </div> 		Parameter	Device variable	1	CMD	8501	2	LFRD	8602		Parameter	Device variable	1	ETA	3201	2	RFRD	8604																														
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1	ETA	3201																																																
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3	Enter the modified configuration.	<p>The modified final table appears.</p> <p>This figure represents modified configuration screen:</p> <div> <p>Output Parameters</p> <table> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> <tr> <td>1</td><td>CMD</td><td>8501</td></tr> <tr> <td>2</td><td>LFRD</td><td>8602</td></tr> <tr> <td>3</td><td>OL1R</td><td>5212</td></tr> <tr> <td>4</td><td>AO1C</td><td>5271</td></tr> <tr> <td>5</td><td>AO2C</td><td>5272</td></tr> <tr> <td>6</td><td>AO3C</td><td>5273</td></tr> </table> </div> <div> <p>Input Parameters</p> <table> <tr> <th></th><th>Parameter</th><th>Device variable</th></tr> <tr> <td>1</td><td>ETA</td><td>3201</td></tr> <tr> <td>2</td><td>RFRD</td><td>8604</td></tr> <tr> <td>3</td><td>ERRD</td><td>8606</td></tr> <tr> <td>4</td><td>LCR</td><td>3204</td></tr> <tr> <td>5</td><td>OTR</td><td>3205</td></tr> <tr> <td>6</td><td>IL1R</td><td>5202</td></tr> <tr> <td>7</td><td>AI1C</td><td>5242</td></tr> <tr> <td>8</td><td>AI2C</td><td>5243</td></tr> </table> </div> 		Parameter	Device variable	1	CMD	8501	2	LFRD	8602	3	OL1R	5212	4	AO1C	5271	5	AO2C	5272	6	AO3C	5273		Parameter	Device variable	1	ETA	3201	2	RFRD	8604	3	ERRD	8606	4	LCR	3204	5	OTR	3205	6	IL1R	5202	7	AI1C	5242	8	AI2C	5243
	Parameter	Device variable																																																
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5	OTR	3205																																																
6	IL1R	5202																																																
7	AI1C	5242																																																
8	AI2C	5243																																																

STEP	ACTION	RESULT
4	After you have finished setting the configuration, click Save button.	This action causes the speed driver to store the new configuration in its memory.
5	Activate the IO SCANNER again to enable data exchange with the Controller by selecting Yes .	<p>The reactivated IO SCANNER screen appears.</p> <p>This figure represents reactivated IOScanner configuration screen:</p> 

NOTE: If you have followed the above steps, the **IO SCANNER** home screen with the data configured in the speed driver appears when it is activated.

Configuring the IO Scanning of the Controller

Description

To control the speed driver, configure the I/O scanning of the controller.

This configuration is different for each module and needs to match corresponding IO Scanner configuration of the devices.

In the Modicon M340 automation platform, IO scanning is only available if the hardware configuration features a NOE communications module.

This parameter configuration is used to define the relationship between the function I/Os and the device I/Os, which are configured with the IO Scanner.

The **ATV7161** function requires 8 input words in the *****_Inputs** variable (**ANY_ARRAY_INT**) and 6 output words for the *****_Outputs** variable (**ANY_ARRAY_INT**).

The first I/O scanning word is reserved, this means that an I/O Scanning row with 9 read words and 7 write words has to be configured.

The following table describes data variables:

DFB Variable	Parameter	Device variable	Type	Direction
Input0		Reserved	Read	%MWx
Input1	<i>ETA</i>	Status Word (ETA)	Read	%MWx+1
Input2	<i>RFRD</i>	Output Velocity (rpm)	Read	%MWx+2
Input3	<i>ERRD</i>	Code of last detected error	Read	%MWx+3
Input4	<i>LCR</i>	Present Current	Read	%MWx+4
Input5	<i>OTR</i>	Current Torque	Read	%MWx+5

DFB Variable	Parameter	Device variable	Type	Direction
Input6	<i>IL1R</i>	IL1I (Digital inputs)	Read	%MWx+6
Input7	<i>AI1C</i>	AI1 (Analog input 1)	Read	%MWx+7
Input8	<i>AI2C</i>	AI2 (Analog input 2)	Read	%MWx+8
Output0		Reserved	Write	%MWy
Output1	<i>CMD</i>	CWD (Control Word)	Write	%MWy+1
Output2	<i>LFRD</i>	Speed Set-Point	Write	%MWy+2
Output3	<i>OL1R</i>	OL1R (ATV digital outputs)	Write	%MWy+3
Output4	<i>AO1C</i>	AO1 (Analog output 1)	Write	%MWy+4
Output5	<i>AO2C</i>	AO2 (Analog output 2)	Write	%MWy+5
Output6	<i>AO3C</i>	AO3 (Analog output 3)	Write	%MWy+6

Scanning Row Appearance

The following figure shows an example of how a scanning row would look in Control Expert.

In this example, 9 words are read starting with %MW500 and 7 words are written starting with %MW550. The slave variables need to have a value of 0.

The following figure shows the controller IO scanning rows.

Scanned peripherals	IP address	Device Name	Unit ID	Slave Syntax	Health Timeout (ms)	Repetitive rate (ms)	RD Master Object	RD Ref Slave	RD length	Last value (Input)	VR Master Object	VR Ref Slave	VR length	Gate Bus Den
1	192.168.1.118		255	Index	1500	64	%Mv/500	0	9	Hold last	%Mv/550	0	7	

When this configuration is used, the data used by the controller is as follows

The following figure shows configuration data used by the controller:

Nombre	Tipo	Dirección	Valor	Comentario
EATV71_OutputData	ATV7161_OUT_ETH	%Mv/550		
Reserved	INT	%Mv/550		Reserved
Data	ATV7161_OUT_DDT	%Mv/551		Output Data to ATV71 or ATV61 (MemoryBlock %Mv/x6 linked to DFB)
Data[0]	INT	%Mv/551		
Data[1]	INT	%Mv/552		
Data[2]	INT	%Mv/553		
Data[3]	INT	%Mv/554		
Data[4]	INT	%Mv/555		
Data[5]	INT	%Mv/556		
EATV71_InputData	ATV7161_IN_ETH	%Mv/500		
Reserved	INT	%Mv/500		Reserved
Data	ATV7161_IN_DDT	%Mv/501		Input Data from ATV71 or ATV61 (MemoryBlock %Mv/x8 linked to DFB)
Data[0]	INT	%Mv/501		
Data[1]	INT	%Mv/502		
Data[2]	INT	%Mv/503		
Data[3]	INT	%Mv/504		
Data[4]	INT	%Mv/505		
Data[5]	INT	%Mv/506		
Data[6]	INT	%Mv/507		
Data[7]	INT	%Mv/508		

Tesys T Control Block on Ethernet

Overview

This section provides the complete connection and setup details of TeSys T devices connected through modbus TCP (Ethernet) on Modicon M340, M580, or Quantum automation platforms.

Tesys T Hardware Configuration

⚠ WARNING

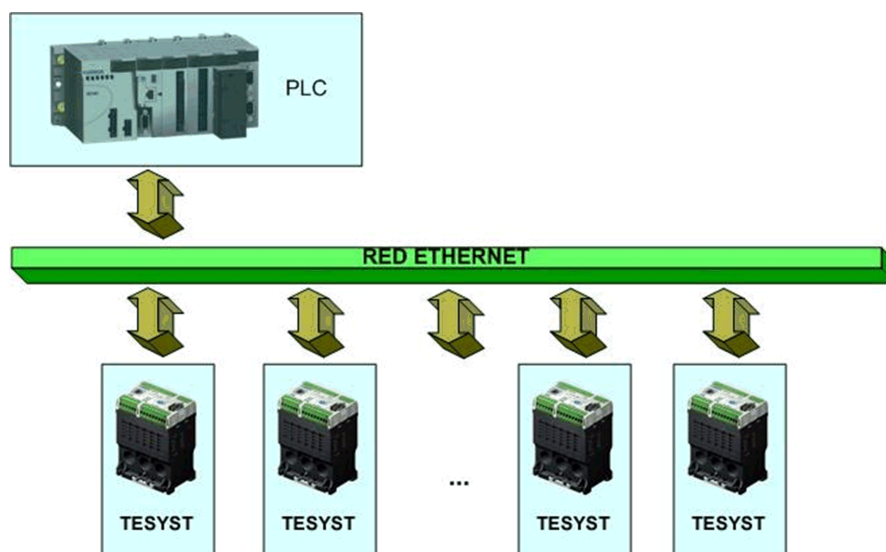
UNINTENDED EQUIPMENT OPERATION

Adapt the below examples to configure device or communication network parameters before you implement them.

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

Refer to the configuration manual for communication networks and Control devices.

The following figure represents the hardware configuration of the Tesys T devices:



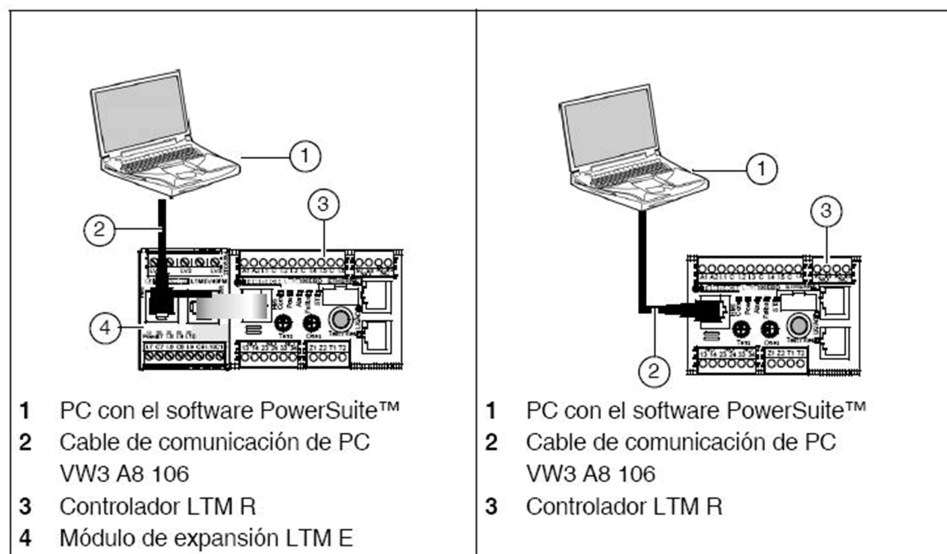
Preparing the Device

Introduction

Configure each Tesys T devices on the same network as the Controller that controls it.

Configuration with and without Expansion Module

To configure the Tesys T, Use the Power Suite software tool by connecting the system exactly as shown in the following figure.



After you are connected, you have to define the options that appear in the following figure.

Network

IP Parameters configuration format

IP address: 197 . 129 . 17 . 150 ☒ Big Endian ☐ Little Endian

Subnet mask: 255 . 255 . 255 . 0 Frame Type: Ethernet II

Default gateway: 0 . 0 . 0 . 0

Communication Loss

Master IP address: 0 . 0 . 0 . 0

☐ Warning

☐ Fault Fault time: 60,00 Seconds FallBack: L01_L02_OFF

Configuration Mode

☐ Configuration via Network port ☒ Local Configuration

☐ Faulty Device Replacement Enabled ☐ Auto Backup

Auto Backup Period: 120 Seconds

Configuring the IO Scanning of the Controller

Description

To control the Tesys T, configure the I/O scanning of the controller.

In the Modicon M340 automation platform, IO Scanning is only available if the hardware configuration features a NOE communications module.

This parameter configuration is used to define the relationship between the function I/Os and the device I/Os.

2 different Tesys T functions use I/O scanning. A function (ETESYST) uses limited amount of words that are refreshed very quickly and the other function (EIOSTESYST) reads a large portion of the words available but at lower speeds.

The ETESYST function requires 4 input words in the *Inputs* variable (ANY_ARRAY_INT structure) and 3 output words in the *Outputs* variable (ANY_ARRAY_INT structure). The input words are read starting on word 2502, and the write words are written starting on word 2506.

The EIOSTESYST function requires 64 input words in the *Inputs* variable (ANY_ARRAY_INT structure) and 5 output words in the *Outputs* variable (ANY_ARRAY_INT structure). The input words are read starting on word 451, and the output words are read starting on word 700. The refresh rate has to be more than or equal to 200 ms.

The data used in the controller by the ETESYST DFB is as follows::

DFB Variable	Device Variable	Type	Direction
Input0	Status register 1	Read	%MWx
Input1	Status register 2	Read	%MWx+1
Input2	Logic input status	Read	%MWx+2
Input3	Logic output status	Read	%MWx+3
Output0	Output control	Write	%MWy
Output1	CWD (Control Word)	Write	%MWy+1
Output2	Reserved	Write	%MWy+2

Scanning Row Appearance

The following figure shows an example of a scanning line for an ETESYST DFB in Control Expert.

In this example, 4 words are read starting with %MW500 and 3 words are written starting with %MW550. The slave ID needs to be 0.

The following figure shows the controller IO scanning rows.

IP Configuration

Messaging

IO Scanning

Global Data

SNMP

Address Server

Bandwidth

Scanned peripherals

☐ Device Control Block: (%MDi4) (%MDi4)

	IP address	Unit ID	Health Time-out (ms)	Repetitive rate (ms)	RD Master Object	RD Slave Index	RD length	Last value (Input)	VR Master Object	VR Slave Index	VR length	Description
1	197.192.17.118	255	1500	60	%Mv500	0	9	Hold last	%Mv550	7	0	ATV780

Modbus Devices Used Through Gateway

Overview

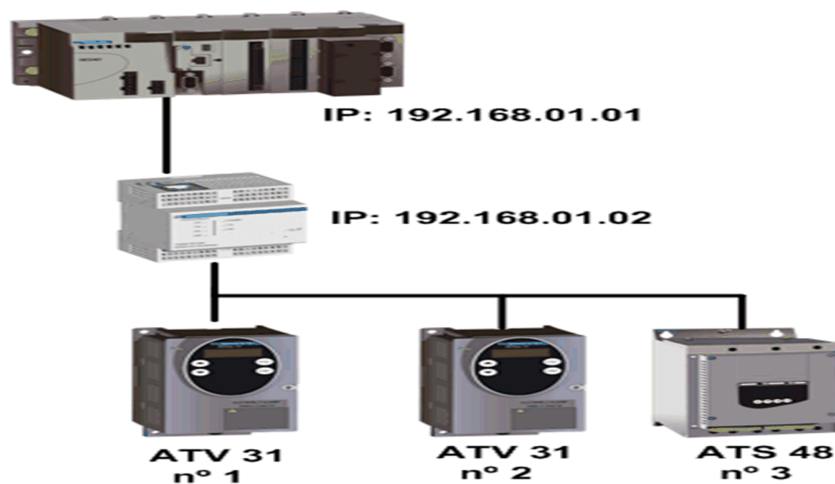
This section provides the complete connection details of several devices on an Ethernet network using an M340 controller and a TSXETG100 gateway.

Modbus Devices Used Through Gateway

M340 Controller

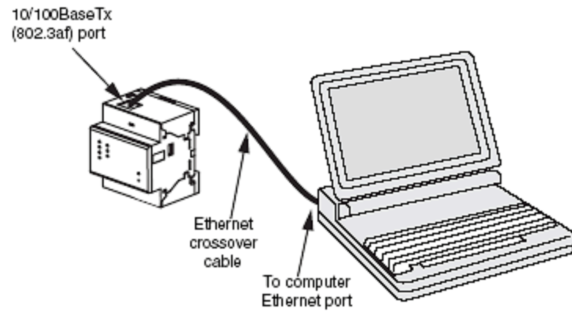
This section includes an example that shows how to connect several devices on an Ethernet network using M340 controller and a TSXETG100 gateway. Refer to the hardware manual and the Communication library manual for more details regarding the elements used in this example.

This figure represents the hardware configuration of M340 controller:



Configuration Procedure

This table describes the procedure to configure the IP address within the Ethernet network:

STEP	ACTION	DESCRIPTION
1	Access the home screen of the gateway to configure the IP address within the Ethernet network by using your computer.	<p>Check the manual for the selected gateway chosen to find the factory IP address and the login/password required to access the gateway for the first time from the computer.</p> <p>This figure shows the hardware configuration:</p> 
2	Configure the gateway address.	<p>Configure the new IP address (which needs to be within the working range), the media type (type of cable), and the baud rate for communicating with the devices on the Ethernet network.</p> <p>This figure represents the IP address configuration:</p> <p style="text-align: center;">Ethernet & TCP/IP</p> <p style="text-align: center;">Ethernet</p> <p>MAC Address - 00:80:67:80:4B:80</p> <p>Frame Format: <input type="text" value="Ethernet II"/></p> <p>Media Type: <input type="text" value="10T/100Tx Auto"/></p> <p style="text-align: center;">IP Parameters</p> <p>IP Address: <input type="text" value="192"/> <input type="text" value="168"/> <input type="text" value="1"/> <input type="text" value="10"/></p> <p>Subnet Mask: <input type="text" value="255"/> <input type="text" value="255"/> <input type="text" value="255"/> <input type="text" value="0"/></p> <p>Default Gateway: <input type="text" value="192"/> <input type="text" value="168"/> <input type="text" value="1"/> <input type="text" value="1"/></p> <p style="text-align: center;"><input type="button" value="Apply"/></p>
3	Configure the modbus network.	<p>This figure represents the modbus network configuration:</p> <p style="text-align: center;">Serial Port</p> <p>Mode: <input type="text" value="Master"/></p> <p>Physical Interface: <input type="text" value="RS485 2-wire"/></p> <p>Transmission Mode: <input type="text" value="Automatic"/></p> <p>Baud Rate: <input type="text" value="19200"/></p> <p>Parity: <input type="text" value="None"/></p> <p>Response Timeout: <input type="text" value="0.4"/> (Seconds)</p> <p style="text-align: center;"><input type="button" value="Apply"/></p> <p>Refer to the TSXETG100 Configuration Description, page 460.</p>

TSXETG100 Gateway Configuration Description

General

The TSXETG100 gateway can operate either in Master mode or in Slave mode. usually, it needs to operate in the Master mode for SGU solutions.

Master Mode

The gateway function as the Master for the modbus network under it, forcing a communication speed and parity for the entire network that it controls and a time out in case of a communications interruption.

Timeout

The configurable `TimeOut` time is the Hardware time out.

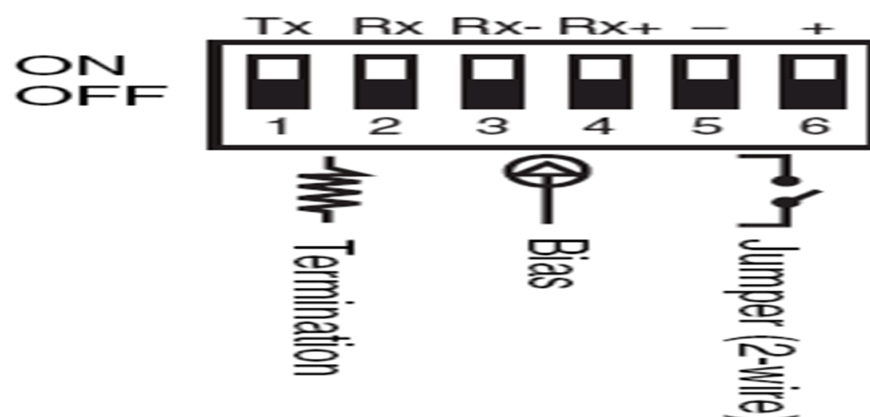
Slave Mode

This gateway model can also work in Slave mode, in which case it serves as an additional slave in the modbus network. This is useful in networks in which the network Master is a Controller on a modbus network. To this you can connect an Ethernet slave, that is, the exact opposite route when compared to the one described in this manual.

Polarity

Regarding the polarization of the modbus network and the addition of terminating resistors, the EGT100 gateway has micro switches available for their configuration.

This figure shows the gateway with Polarization circuit:



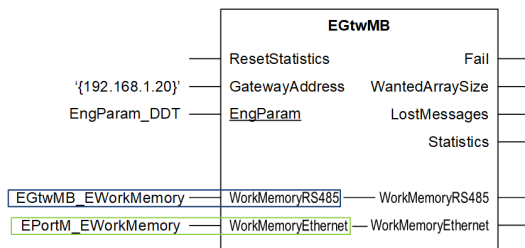
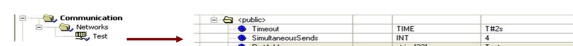
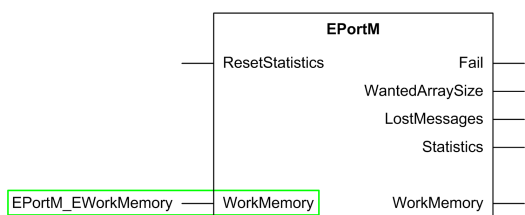
Control Program Example

Program Procedure

The control program for the 2 variable speed drives and for the ATS 48 starter using the CPU's own Ethernet port is as follows.

This table describes the declaration and configuration of the parameters for the devices on the modbus network.

STEP	ACTION	RESULT
1	Declare and configure the first speed driver with address 1.	<p>The first speed driver is configured with address 1.</p> <p>This figure represents the configured first speed driver</p>
2	Declare and configure the second speed driver with address 2.	<p>The second speed driver is configured with address 2.</p> <p>This figure represents the configured second speed driver.</p>
3	Declare and configure the starter with address 3.	<p>The starter is configured with address 3.</p> <p>This figure represents the configured starter:</p>

STEP	ACTION	RESULT
4	Insert EGtwMB DFB.	<p>The IP address needs to be entered in the GatewayAddress input variable.</p> <p>This figure represents the EGtwMB DFB:</p> 
5	The DFB has a public variable in which the name of the configured channel of the Controller (IP + services) needs to be entered.	<p>This is the channel through which the Controller sends its requests to the slave.</p> <p>This figure represents the slave configuration:</p>  <p>This figure represents Ethernet port configuration:</p> 

NOTE: The name of the EGtwMB_MBWorkMemory variable needs to match in the ATV, ATS, and EGtwMB.

NOTE: The name of the EPortM_EWorkMemory variable needs to match in the EGtwMB and EPortM.

Modbus TCPIP - Implicit with NOE

Overview

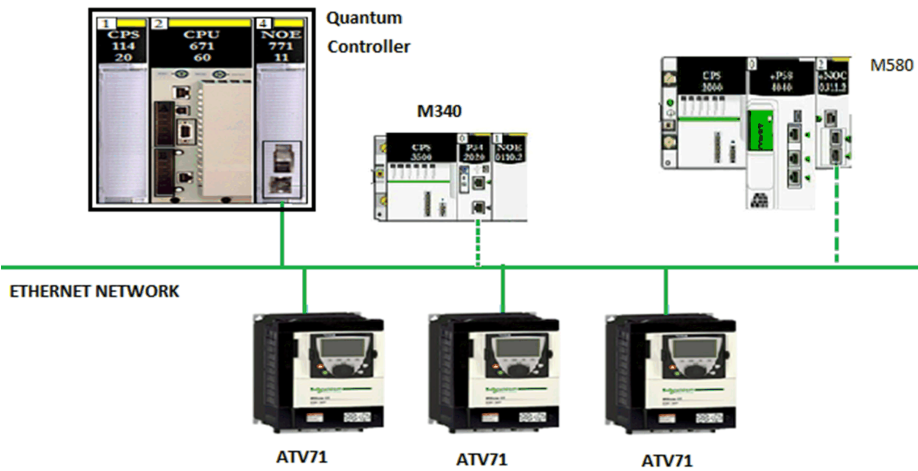
This section describes the procedure to create an application using modbus TCPIP communication technology (implicit). In this example ATV71 and Quantum controller with NOE is used as a reference. However, same procedure can be followed for creating an application with any other ModBus TCPIP devices or Controller.

Creating an Application using Modbus TCPIP Communication Technology (Implicit with NOE)

Overview

In this example ATV71 and **Quantum** controller with **NOE** is used as a reference. However, same procedure can be followed for creating an application with any other modbus devices or controller.

Architecture



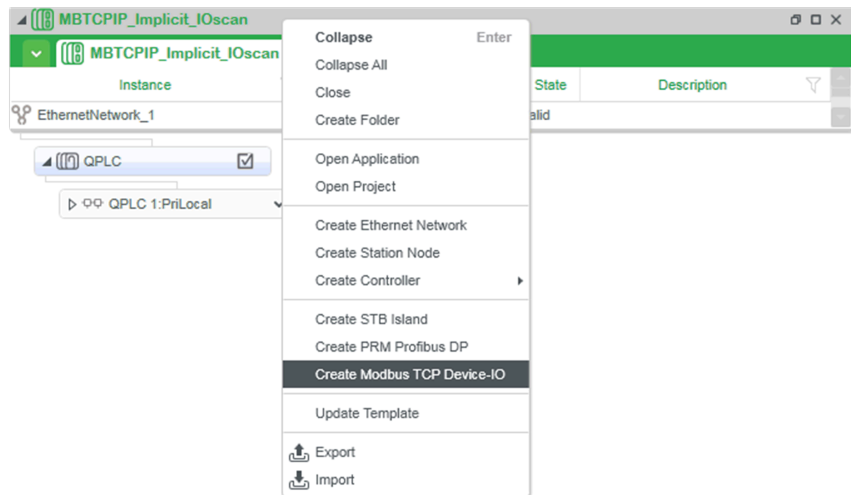
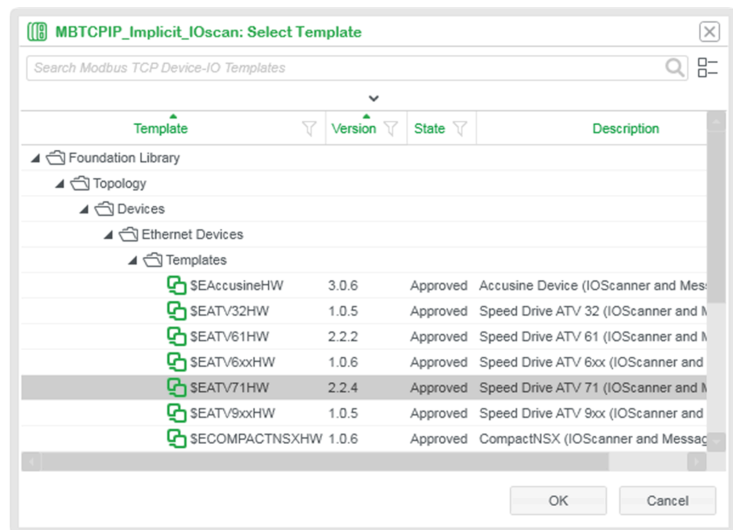
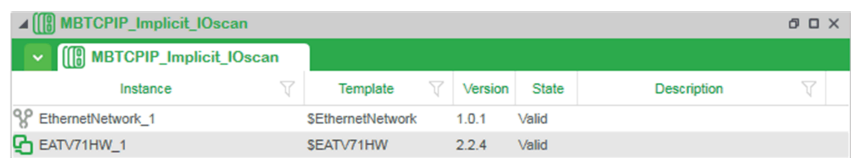
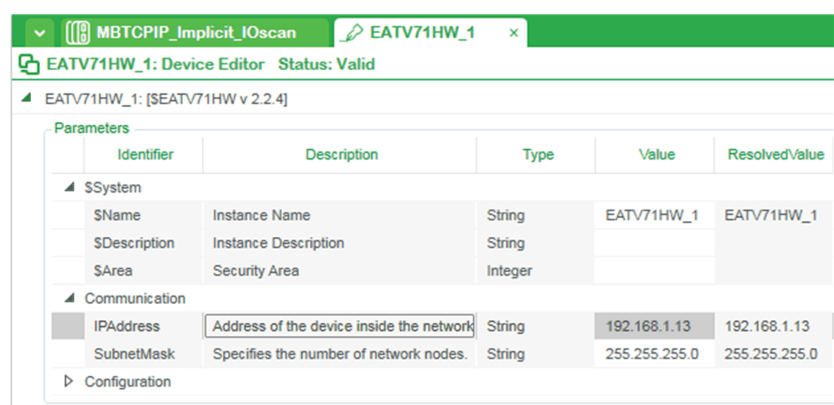
Application Explorer

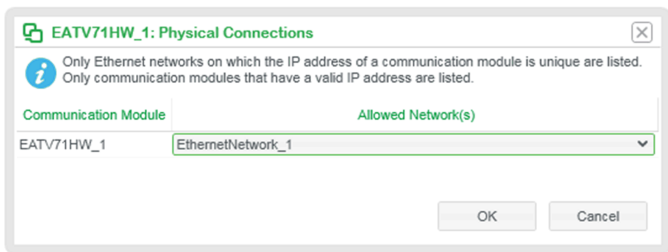
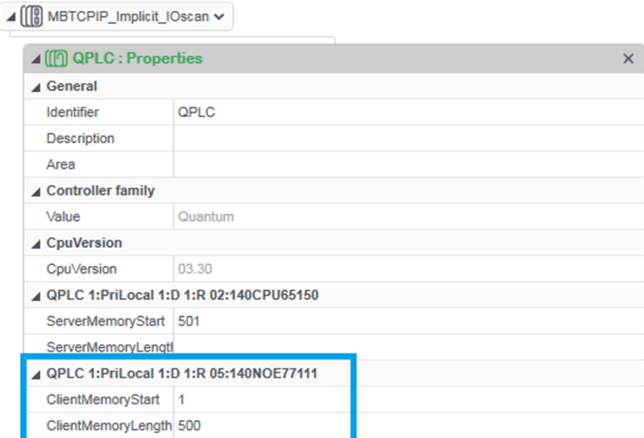
Step	Action
1	Instantiate <code>ATV71E</code> and <code>Motor2</code> templates in Application Explorer .
2	Right click on instance of <code>ATV71E</code> and select Edit Links . Link the objects as shown below. <div><p>The screenshot shows the Application Explorer interface. On the left, the <code>ATV71E_2</code> object is expanded, showing its Logic section with <code>EnableDevice</code>, <code>Dev1S1D</code>, <code>Dev1S2D</code>, and <code>DevVarSpeed</code>. On the right, the <code>Motor2_2</code> object is expanded, showing its Control section with <code>ILCK</code>, <code>OP1</code>, <code>OP2</code>, <code>DEV1S2D</code>, and <code>DEV2S1D</code>. The <code>Motor2_2</code> object also has a Motor2 section with <code>Logic</code> (including <code>RSPSEL</code>, <code>RSP</code>, and <code>ILCKSEL</code>) and <code>Supervision</code> (including <code>ForwardRunningSignal</code>, <code>ReverseRunningSignal</code>, <code>ForwardFailSignal</code>, <code>ReverseFailSignal</code>, <code>ExternalControl</code>, <code>OP1DOSignal</code>, <code>OP2DOSignal</code>, <code>Local Panel</code>, and <code>Supervision</code>). The <code>ATV71E_2</code> object is linked to the <code>Motor2_2</code> object via the <code>Dev1S1D</code> and <code>Dev1S2D</code> properties.</p></div>

Topology Explorer

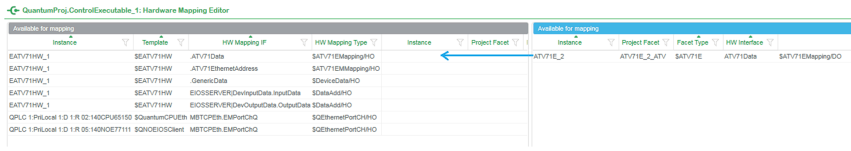
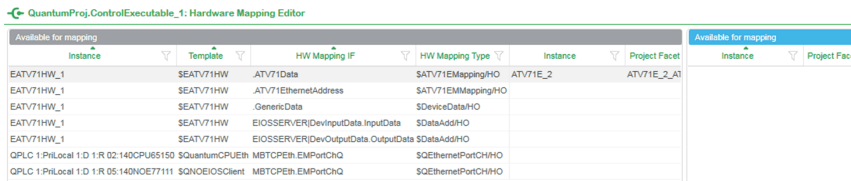
Step	Action
1	In Topology, create controller hardware configuration with Quantum Controller.
2	Link the controller to Ethernet network.

Create Hardware Template

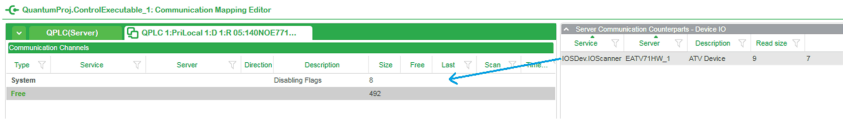
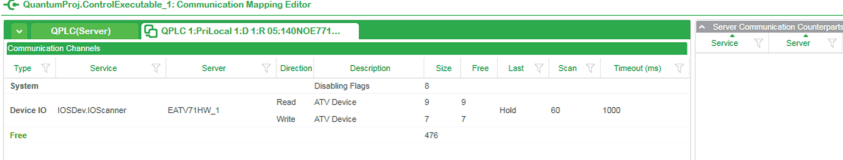
Step	Action																																													
1	<p>Right click on Topology and select Create Modbus TCP Device - IO.</p> 																																													
2	<p>A dialog box appears on the screen. Select \$EATV71HW template and click OK as shown.</p>  <table><thead><tr><th>Template</th><th>Version</th><th>State</th><th>Description</th></tr></thead><tbody><tr><td>\$EAccusineHW</td><td>3.0.6</td><td>Approved</td><td>Accusine Device (IOScanner and Mes</td></tr><tr><td>\$EATV32HW</td><td>1.0.5</td><td>Approved</td><td>Speed Drive ATV 32 (IOScanner and M</td></tr><tr><td>\$EATV61HW</td><td>2.2.2</td><td>Approved</td><td>Speed Drive ATV 61 (IOScanner and M</td></tr><tr><td>\$EATV6xxHW</td><td>1.0.6</td><td>Approved</td><td>Speed Drive ATV 6xx (IOScanner and</td></tr><tr><td>\$EATV71HW</td><td>2.2.4</td><td>Approved</td><td>Speed Drive ATV 71 (IOScanner and M</td></tr><tr><td>\$EATV9xxHW</td><td>1.0.5</td><td>Approved</td><td>Speed Drive ATV 9xx (IOScanner and</td></tr><tr><td>\$ECompactNSXHW</td><td>1.0.6</td><td>Approved</td><td>CompactNSX (IOScanner and Messag</td></tr></tbody></table>	Template	Version	State	Description	\$EAccusineHW	3.0.6	Approved	Accusine Device (IOScanner and Mes	\$EATV32HW	1.0.5	Approved	Speed Drive ATV 32 (IOScanner and M	\$EATV61HW	2.2.2	Approved	Speed Drive ATV 61 (IOScanner and M	\$EATV6xxHW	1.0.6	Approved	Speed Drive ATV 6xx (IOScanner and	\$EATV71HW	2.2.4	Approved	Speed Drive ATV 71 (IOScanner and M	\$EATV9xxHW	1.0.5	Approved	Speed Drive ATV 9xx (IOScanner and	\$ECompactNSXHW	1.0.6	Approved	CompactNSX (IOScanner and Messag													
Template	Version	State	Description																																											
\$EAccusineHW	3.0.6	Approved	Accusine Device (IOScanner and Mes																																											
\$EATV32HW	1.0.5	Approved	Speed Drive ATV 32 (IOScanner and M																																											
\$EATV61HW	2.2.2	Approved	Speed Drive ATV 61 (IOScanner and M																																											
\$EATV6xxHW	1.0.6	Approved	Speed Drive ATV 6xx (IOScanner and																																											
\$EATV71HW	2.2.4	Approved	Speed Drive ATV 71 (IOScanner and M																																											
\$EATV9xxHW	1.0.5	Approved	Speed Drive ATV 9xx (IOScanner and																																											
\$ECompactNSXHW	1.0.6	Approved	CompactNSX (IOScanner and Messag																																											
3	<p>EATV71HW hardware template gets added in Topology instance.</p>  <p>Right click on EATV71HW_1 instance and select Properties.</p>																																													
4	<p>Set the corresponding IP address and subnet mask of MBTCP device as shown below.</p>  <table><thead><tr><th>Identifier</th><th>Description</th><th>Type</th><th>Value</th><th>ResolvedValue</th></tr></thead><tbody><tr><td colspan="5">\$System</td></tr><tr><td>\$Name</td><td>Instance Name</td><td>String</td><td>EATV71HW_1</td><td>EATV71HW_1</td></tr><tr><td>\$Description</td><td>Instance Description</td><td>String</td><td></td><td></td></tr><tr><td>\$Area</td><td>Security Area</td><td>Integer</td><td></td><td></td></tr><tr><td colspan="5">Communication</td></tr><tr><td>IPAddress</td><td>Address of the device inside the network</td><td>String</td><td>192.168.1.13</td><td>192.168.1.13</td></tr><tr><td>SubnetMask</td><td>Specifies the number of network nodes.</td><td>String</td><td>255.255.255.0</td><td>255.255.255.0</td></tr><tr><td colspan="5">Configuration</td></tr></tbody></table>	Identifier	Description	Type	Value	ResolvedValue	\$System					\$Name	Instance Name	String	EATV71HW_1	EATV71HW_1	\$Description	Instance Description	String			\$Area	Security Area	Integer			Communication					IPAddress	Address of the device inside the network	String	192.168.1.13	192.168.1.13	SubnetMask	Specifies the number of network nodes.	String	255.255.255.0	255.255.255.0	Configuration				
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Configuration																																														
5	<p>Right-click on EATV71HW_1 instance and select Physical Connections.</p>																																													

Step	Action
	 <p>Select the Ethernet network address in Allowed Network(s) as shown above.</p>
6	In Topology, right click on Controller and open Properties .
7	<p>Define ClientMemoryStart address and ClientMemoryLength to access under the NOE.</p> 

Project Explorer

Step	Action
1	Create a project for Quantum controller.
2	Assign the facets and generate the control project.
3	Create Executables and do Map Service .
4	Navigate to Executables section, right-click on Executables and select Map Hardware .
5	<p>Map the Hardware interfaces by drag and drop of application interfaces, as shown below.</p> <p>Map - ATV71 Data to .ATV71Data of \$EATV71HW.</p>  <p>In this example, NOE port for communication is used.</p> <p>After Mapping</p> 

Map Communication

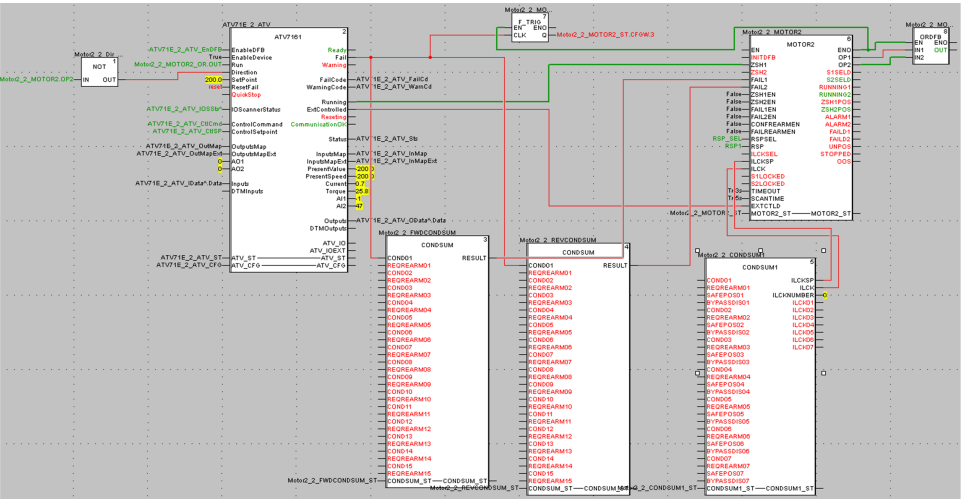
Step	Action
1	Navigate to Executables section, right-click on Executables and select Map Communication .
2	Map the communication counterparts - IO device to Communication Channels .  <p>This figure shows the performing of communication mapping.</p> 

Action Steps

Step	Action
1	Now, generate and build your project and open the project online.

Read/Write Devices

Now, you should be able to read/write devices.



Modbus TCPIP - Implicit with NOC

Overview

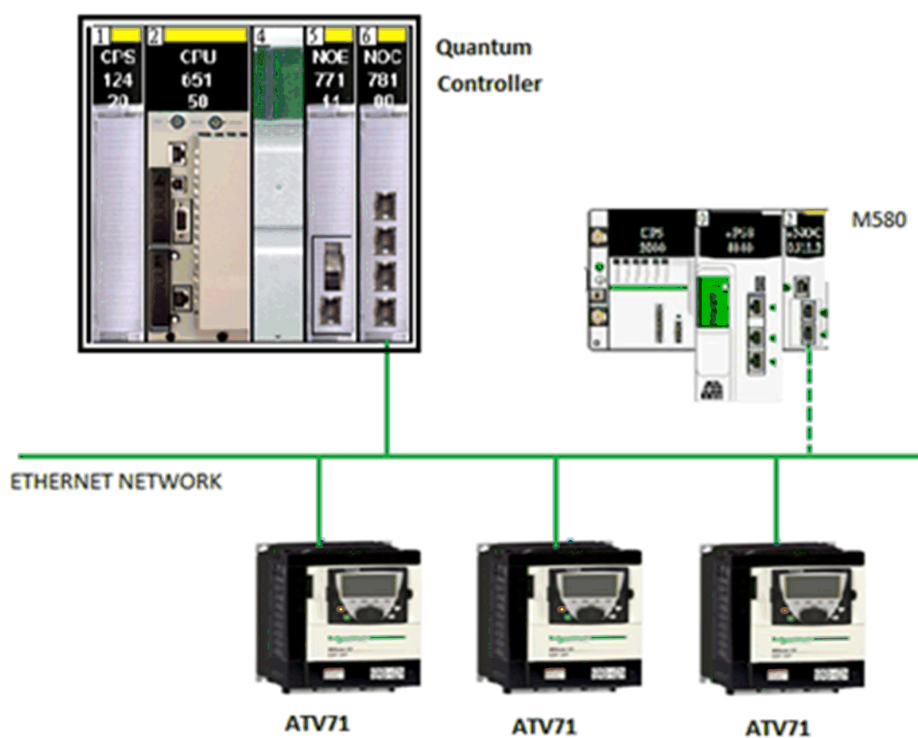
This section describes the procedure to create an application using modbus TCPIP communication technology (implicit). In this example ATV71 and **Quantum** controller with **NOC** is used as a reference. However, same procedure can be followed for creating an application with any other ModBus TCPIP devices or Controller.

Modbus TCP/IP - Implicit with NOC

Overview

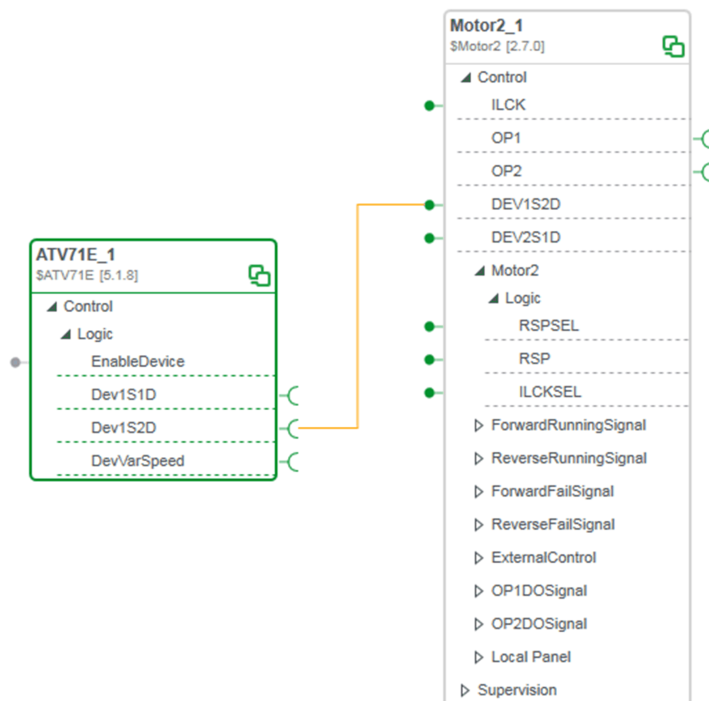
This document explains the process of creating an application using modbus TCP/IP implicit Communication Technology through Quantum controller - NOC and ATV71 is used as a reference. However, same procedure can be used for creating an application with other devices.

Architecture



Application Explorer

Step	Action
1	Instantiate ATV71E and Motor2 templates in Application Explorer .
2	Right click on instance of ATV71E and select Edit Links . Link the objects as shown below.

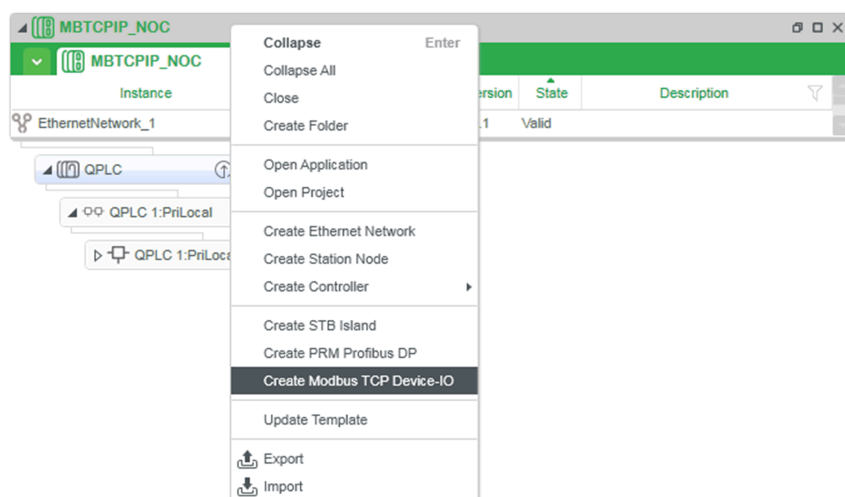


Topology Explorer

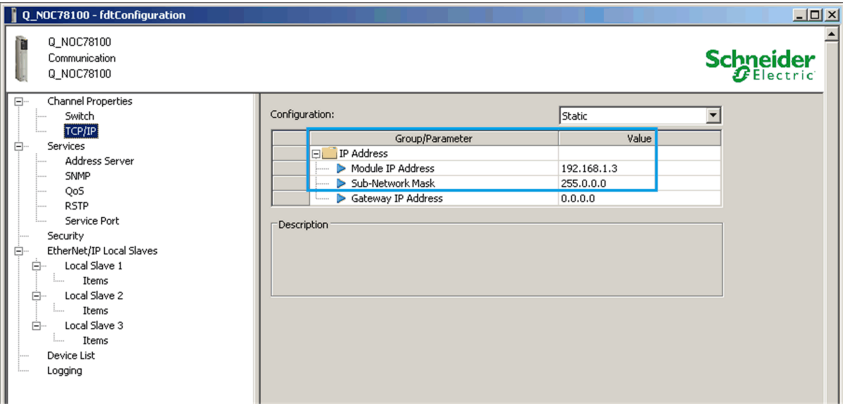
Step	Action
1	In Topology, create controller hardware configuration with Quantum controller.
2	Link the Controller to Ethernet network.

Create Hardware Template

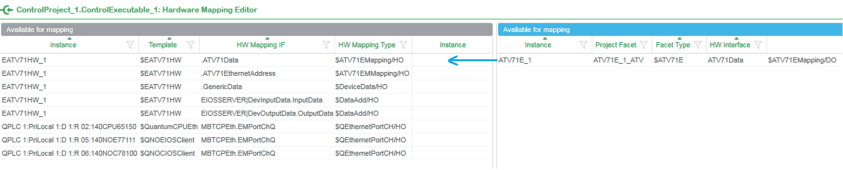
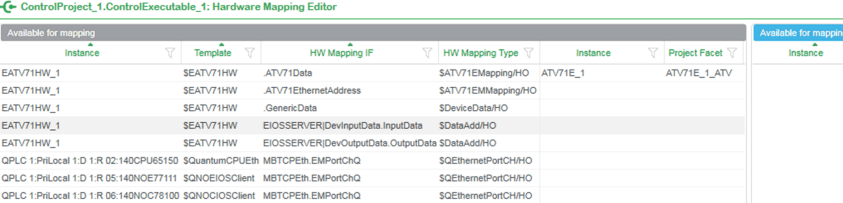
Step	Action
1	Right-click on Topology and select Create Modbus TCP Device - IO .
2	A dialog box appears, select \$EATV71HW template and click OK as shown in the following figure.



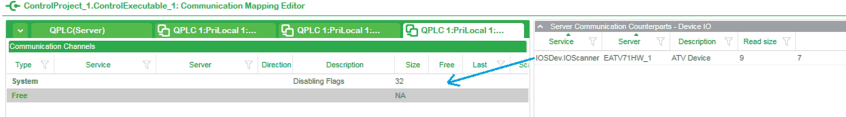
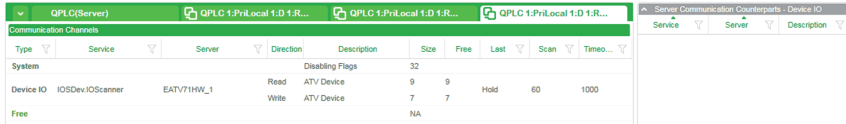
Step	Action								
	<div><div>MBTCP_IP_NOC: Select Template</div><div><div>Search Modbus TCP Device-I/O Templates</div><div><div>Template</div><div>Version</div><div>State</div><div>Description</div></div><div><div>Foundation Library</div><div>Topology</div><div>Devices</div><div>Ethernet Devices</div><div>Templates</div><div><div>SEAccusineHW</div><div>3.0.6</div><div>Approved</div><div>Accusine Device (IOScanner and Mes</div></div><div><div>SEATV32HW</div><div>1.0.5</div><div>Approved</div><div>Speed Drive ATV 32 (IOScanner and M</div></div><div><div>SEATV61HW</div><div>2.2.2</div><div>Approved</div><div>Speed Drive ATV 61 (IOScanner and M</div></div><div><div>SEATV6xxHW</div><div>1.0.6</div><div>Approved</div><div>Speed Drive ATV 6xx (IOScanner and</div></div><div><div>SEATV71HW</div><div>2.2.4</div><div>Approved</div><div>Speed Drive ATV 71 (IOScanner and M</div></div><div><div>SEATV9xxHW</div><div>1.0.5</div><div>Approved</div><div>Speed Drive ATV 9xx (IOScanner and</div></div><div><div>SECOMPACTNSXHW</div><div>1.0.6</div><div>Approved</div><div>CompactNSX (IOScanner and Messag</div></div></div><div><div>OK</div><div>Cancel</div></div></div></div> <tr><td>3</td><td><p>EATV71HW hardware template gets added in Topology instance.</p><div><div>MBTCP_IP_NOC</div><div><div>Instance</div><div>Template</div><div>Version</div><div>State</div><div>Description</div></div><div><div>EthernetNetwork_1</div><div>SEthernetNetwork</div><div>1.0.1</div><div>Valid</div><div></div></div><div><div>EATV71HW_1</div><div>SEATV71HW</div><div>2.2.4</div><div>Valid</div><div></div></div></div><p>Right click on EATV71HW_1 instance and select Properties.</p></td></tr> <tr><td>4</td><td><p>Set the corresponding IP address and subnet mask of MBTCP_IP device as shown in the following figure.</p><div><div>MBTCP_IP_NOC</div><div><div>MBTCP_IP_NOC</div><div>EATV71HW_1</div></div><div><div>EATV71HW_1: Device Editor</div><div>Status: Valid</div></div><div><div>EATV71HW_1: [SEATV71HW v 2.2.4]</div><div><div>Parameters</div><div><div>Identifier</div><div>Description</div><div>Type</div><div>Value</div><div>Resolved/Value</div></div><div><div>\$System</div><div><div>\$Name</div><div>Instance Name</div><div>String</div><div>EATV71HW_1</div><div>EATV71HW_1</div></div><div><div>\$Description</div><div>Instance Description</div><div>String</div><div></div><div></div></div><div><div>\$Area</div><div>Security Area</div><div>Integer</div><div></div><div></div></div></div><div><div>Communication</div><div><div>IPAddress</div><div>Address of the device inside the network</div><div>String</div><div>192.168.1.13</div><div>192.168.1.13</div></div><div><div>SubnetMask</div><div>Specifies the number of network nodes.</div><div>String</div><div>255.0.0.0</div><div>255.0.0.0</div></div></div><div><div>Configuration</div></div></div></div></div></td></tr> <tr><td>5</td><td><p>Right-click on EATV71HW_1 instance and select Physical Connections.</p><p>Select the Ethernet network address in Allowed Network(s) as shown above.</p><div><div>EATV71HW_1: Physical Connections</div><div><div>Only Ethernet networks on which the IP address of a communication module is unique are listed. Only communication modules that have a valid IP address are listed.</div><div><div>Communication Module</div><div>EATV71HW_1</div></div><div><div>Allowed Network(s)</div><div>EthernetNetwork_1</div></div><div><div>OK</div><div>Cancel</div></div></div></div><tr><td>6</td><td><p>In Topology, navigate to Configure and open DTM browser.</p></td></tr></td></tr>	3	<p>EATV71HW hardware template gets added in Topology instance.</p> <div><div>MBTCP_IP_NOC</div><div><div>Instance</div><div>Template</div><div>Version</div><div>State</div><div>Description</div></div><div><div>EthernetNetwork_1</div><div>SEthernetNetwork</div><div>1.0.1</div><div>Valid</div><div></div></div><div><div>EATV71HW_1</div><div>SEATV71HW</div><div>2.2.4</div><div>Valid</div><div></div></div></div> <p>Right click on EATV71HW_1 instance and select Properties.</p>	4	<p>Set the corresponding IP address and subnet mask of MBTCP_IP device as shown in the following figure.</p> <div><div>MBTCP_IP_NOC</div><div><div>MBTCP_IP_NOC</div><div>EATV71HW_1</div></div><div><div>EATV71HW_1: Device Editor</div><div>Status: Valid</div></div><div><div>EATV71HW_1: [SEATV71HW v 2.2.4]</div><div><div>Parameters</div><div><div>Identifier</div><div>Description</div><div>Type</div><div>Value</div><div>Resolved/Value</div></div><div><div>\$System</div><div><div>\$Name</div><div>Instance Name</div><div>String</div><div>EATV71HW_1</div><div>EATV71HW_1</div></div><div><div>\$Description</div><div>Instance Description</div><div>String</div><div></div><div></div></div><div><div>\$Area</div><div>Security Area</div><div>Integer</div><div></div><div></div></div></div><div><div>Communication</div><div><div>IPAddress</div><div>Address of the device inside the network</div><div>String</div><div>192.168.1.13</div><div>192.168.1.13</div></div><div><div>SubnetMask</div><div>Specifies the number of network nodes.</div><div>String</div><div>255.0.0.0</div><div>255.0.0.0</div></div></div><div><div>Configuration</div></div></div></div></div>	5	<p>Right-click on EATV71HW_1 instance and select Physical Connections.</p> <p>Select the Ethernet network address in Allowed Network(s) as shown above.</p> <div><div>EATV71HW_1: Physical Connections</div><div><div>Only Ethernet networks on which the IP address of a communication module is unique are listed. 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6	<p>In Topology, navigate to Configure and open DTM browser.</p>								

Step	Action
7	<p>Open DTM device configuration, under TCP/IP section provide the IP address of NOC device.</p> 
8	Click Apply and OK to confirm the settings.

Project Explorer

Step	Action
1	Create a project for Quantum controller.
2	Assign the facets and generate the control project.
3	Create Executables and do Map Service .
4	Navigate to Executables section, right-click on Executables and select Map Hardware .
5	<p>Map the Hardware interfaces by drag and drop of application interfaces, as shown in the following figure.</p> <p>Map - ATV71 Data to ATV71Data of \$EATV71HW.</p> <p>This mapping is required to pass ATV71 data to DFB.</p>  <p>After Mapping</p> 

Map Communication

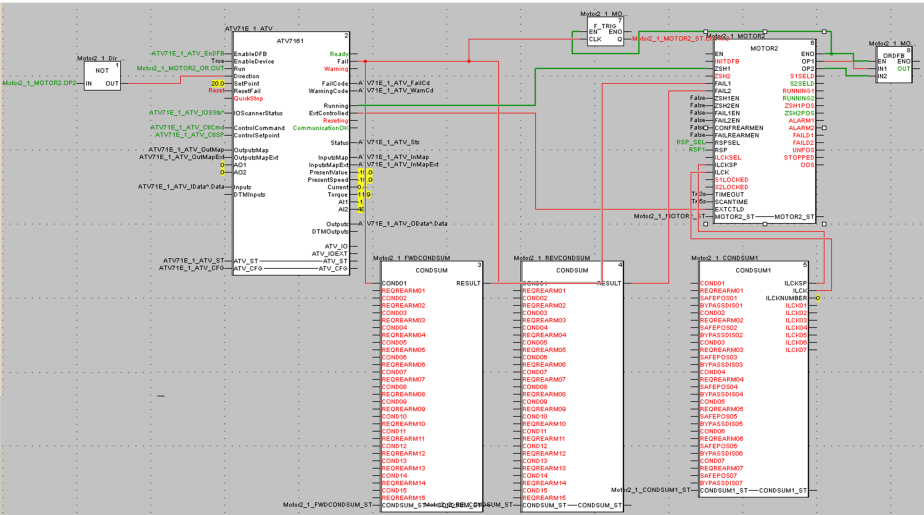
Step	Action
1	Navigate to Executables section, right-click on Executables and select Map Communication .
2	Map the communication counterparts - IO device to Communication Channels .  After Mapping 

Action Steps

Step	Action
1	Now, generate and build your project and open the project online.

Read/Write Devices

Now, you should be able to read/write devices.



Modbus TCPIP - Explicit

Overview

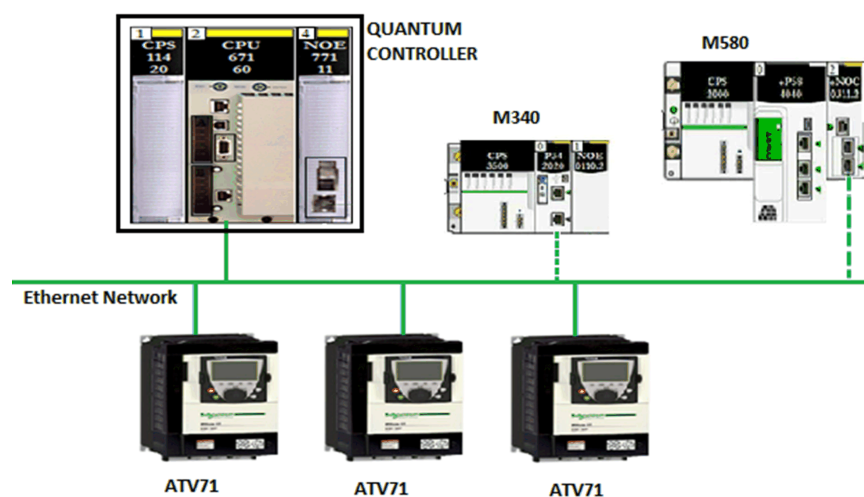
This section describes the procedure to create an application using modbus TCPIP communication technology (explicit). In this example ATV71 and **Quantum** controller is used as a reference. However, same procedure can be followed for creating an application with any other ModBus devices or controller.

Creating an Application using Modbus TCP/IP Communication Technology (Explicit)

Overview

In this example, ATV71 and Quantum controller is used as a reference. However, same procedure can be followed for creating an application with any other modbus devices or controller.

Architecture



Application Explorer

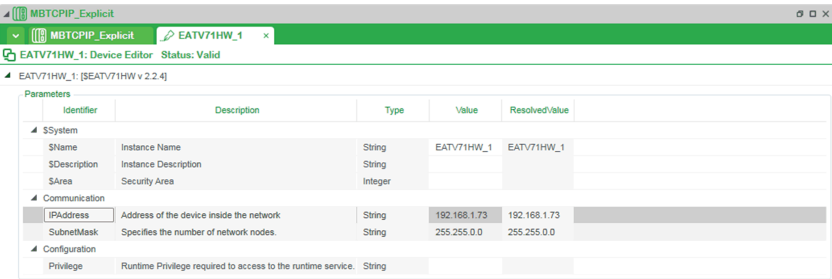
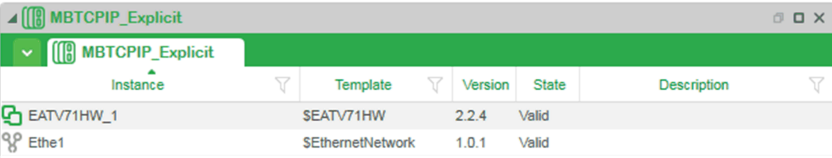
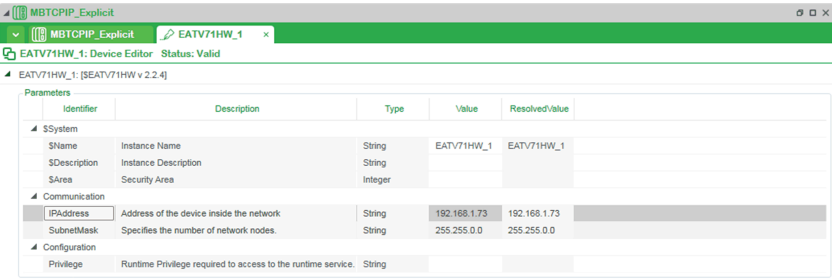
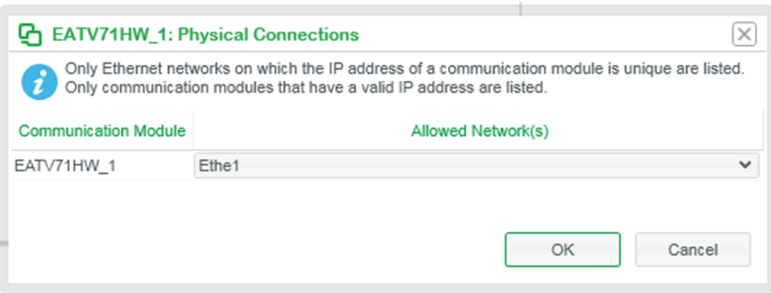
Step	Action
1	Instantiate ATV71EM , Motor2 and EMPortQ templates in Application Explorer .
2	Right click on EMPortQ_2 instance and select Properties . Provide the memory address as shown in the following figure. <div> </div>
3	Right-click on instance of ATV71EM and select Edit Links . Link the objects as shown in the following figure. <div> </div>

Topology Explorer

Step	Action
1	In Topology, create controller hardware configuration with Quantum controller.
2	Link the controller to Ethernet network.

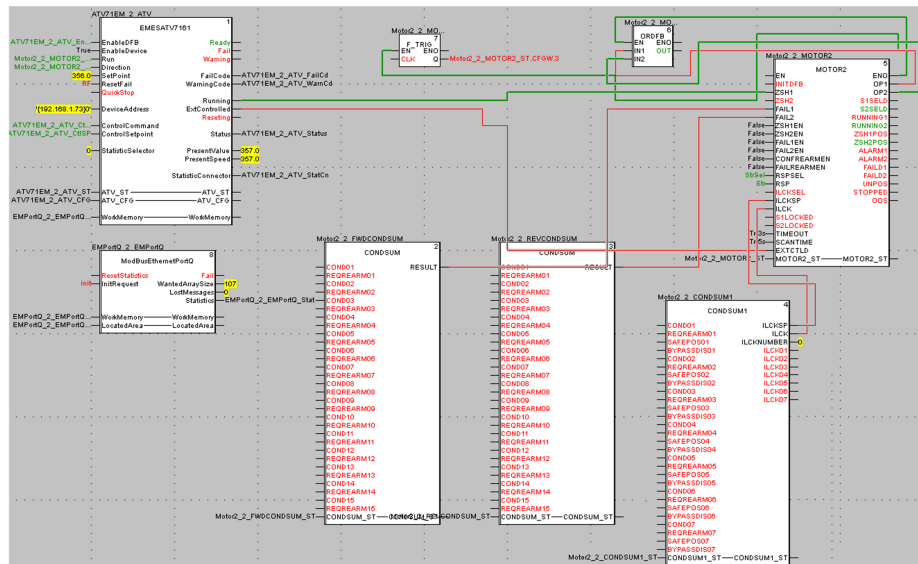
Project Explorer

Step	Action
1	Create a project for Quantum controller.
2	Assign the facets and generate the control project.
3	Create Executables and do Map Service .
4	Navigate to Executables section, right click on Executables and select Map Hardware .
5	Map the application interfaces by drag and drop in front of respective field, as shown in the following figure. Map - EMPortChQ to MBTCPeth.EMPortChQ of \$QuantumCPUEth. This mapping is required to pass Quantum controller Port address to DFB.

Step	Action
	
3	<p>EATV71HW hardware template gets added in Topology instance</p>  <p>Right click on EATV71HW_1 instance and go to Properties.</p>
4	<p>Set the corresponding IP address and subnet mask of MBTCP_IP device as shown in the following figure.</p> 
5	<p>Right-click on EATV71HW_1 instance and go to Physical Connections.</p> <p>Select the Ethernet network address in Allowed Network(s) as shown in the following figure.</p> 

Read/Write Devices

Now, you should be able to read/write devices.



Modbus TCPIP - Explicit with Gateway

Overview

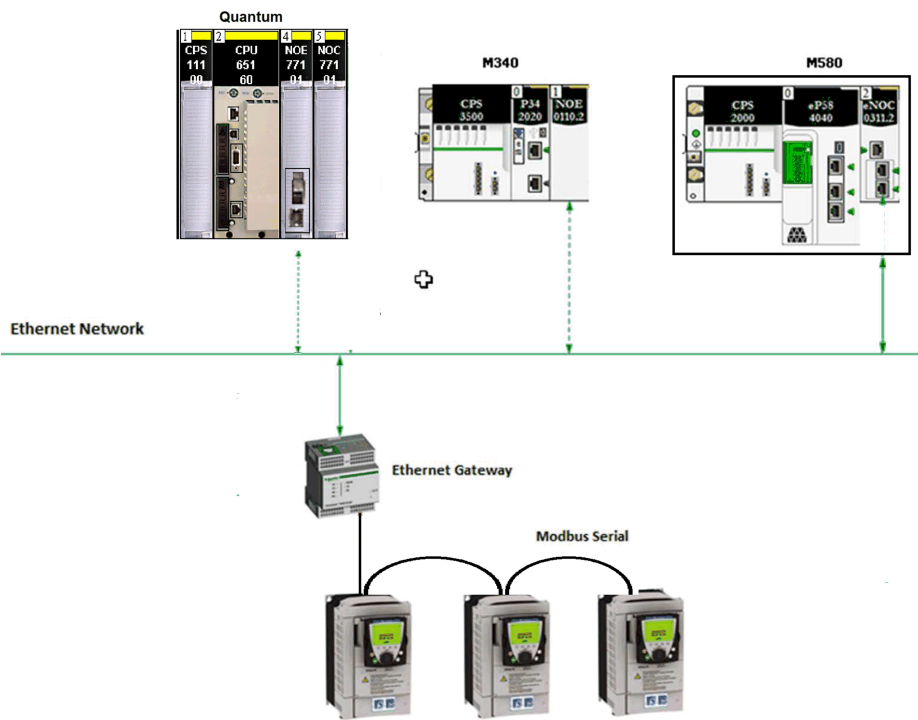
This section describes the procedure to create an application using modbus TCPIP communication technology (explicit). In this example ATV71 and M580 is used as a reference. However, same procedure can be followed for creating an application with any other ModBus TCPIP devices or controller.

Creating an Application using Modbus Communication Technology (Explicit) with Gateway

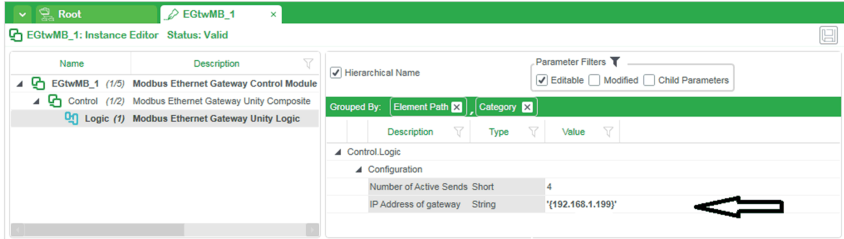
Overview

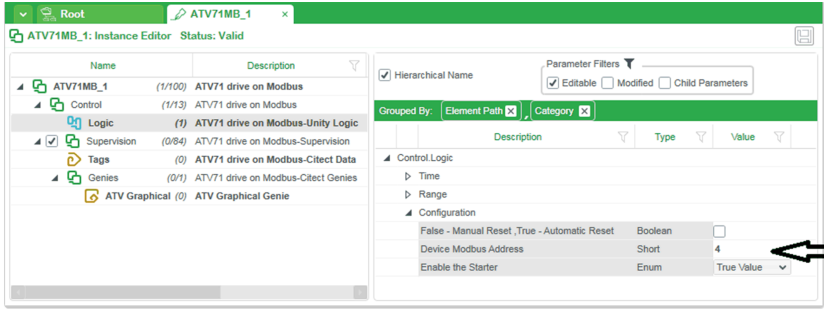
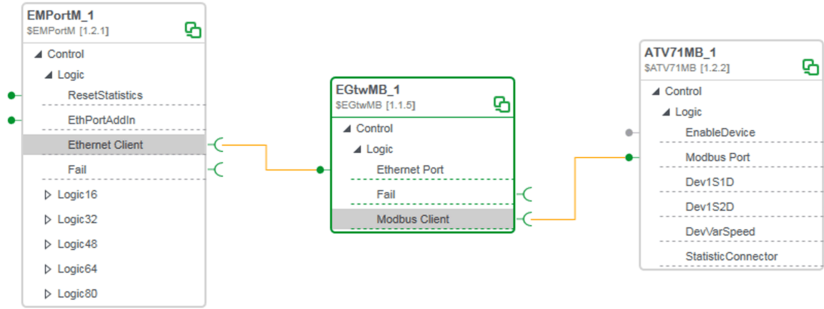
In this example, ATV71 and M580 controller is used as a reference. However, same procedure can be followed for creating an application with any other modbus devices or controller.

Architecture



Application Explorer

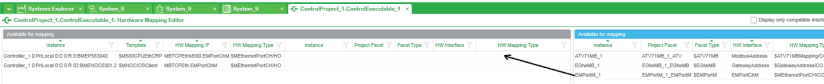
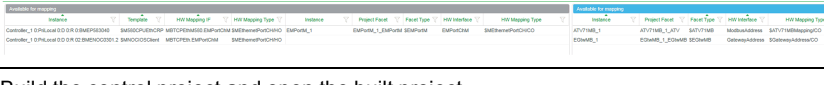
Step	Action
1	Instantiate <code>ATV71MB</code> , <i>Motor</i> , <code>EGtwMB</code> and <code>EMPortM</code> templates in Application Explorer .
2	In Application Explorer right click on instance of EGtwMB and select properties to set the IP address of the gateway. <div></div>

Step	Action
3	<p>In Application Explorer, right click on instance of ATV71MB and select properties to set the modbus address of the ATV71.</p> 
4	<p>Right-click on instance of EGtwMB_1 and select Edit Links. Link the objects as shown in the following figure.</p> 

Topology Explorer

Step	Action
1	In Topology, create controller hardware configuration with M580 controller.
2	Link the controller to Ethernet network.

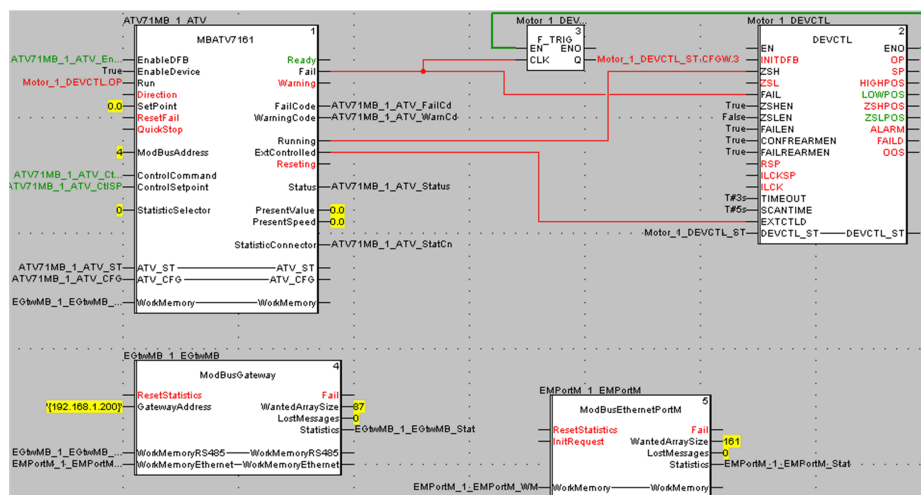
Project Explorer

Step	Action
1	Create a project for M580 controller.
2	Assign the facets and generate the control project.
3	Create Executables and do Map Service .
4	Navigate to Executables section, right-click on Executables and select Map Hardware .
5	<p>Map the application interfaces by drag and drop in front of respective field, as shown in the following figure:</p> <p>Map - EMPortM_1 to MBTCPeth.EMPortCHM of \$M580CPUETHCRP.</p> <p>This mapping is required to pass <i>M580</i> controller Port address to DFB. In this example we are using <i>M580</i> CPU port for communication.</p>  <p>After Mapping,</p> 
6	Build the control project and open the built project.

Step	Action																																																																							
7	<p>In Function block section, check public parameters for <code>EMPortM</code> block.</p> <table><thead><tr><th>Name</th><th>no.</th><th>Type</th><th>Value</th><th>Comment</th></tr></thead><tbody><tr><td>ATV71MB_1_ATV</td><td></td><td>MBATV71...</td><td></td><td></td></tr><tr><td>EGbMB_1_EGbMB</td><td></td><td>ModBusG...</td><td></td><td></td></tr><tr><td>EMPortM_1_EMPortM</td><td></td><td>ModBusEt...</td><td></td><td></td></tr><tr><td><inputs></td><td></td><td></td><td></td><td></td></tr><tr><td><outputs></td><td></td><td></td><td></td><td></td></tr><tr><td><inputs/outputs></td><td></td><td></td><td></td><td></td></tr><tr><td><public></td><td></td><td></td><td></td><td></td></tr><tr><td>Timeout</td><td></td><td>TIME</td><td>T#2s</td><td>Time to wait a response. Must be greater than the hardware timeout</td></tr><tr><td>SimultaneousSends</td><td></td><td>INT</td><td>4</td><td>Number of active sendings</td></tr><tr><td>PortAddress</td><td></td><td>string[33]</td><td>0.0.3</td><td>Name of the network to send the data</td></tr><tr><td>MaxRetryAfterSwitch</td><td></td><td>INT</td><td>3</td><td>Max. number of retry for first request to be successful after the controller switchover</td></tr></tbody></table> <p>Verify the port addressing as per below table:</p> <table><thead><tr><th colspan="2">Controller</th><th>Port Addressing</th></tr></thead><tbody><tr><td rowspan="2">Quantum</td><td>CPU</td><td>'254'</td></tr><tr><td>NOE/NOC</td><td>'Slot'</td></tr><tr><td>M340/M580</td><td>CPU/NOE/NOC</td><td>'Rack.Slot.channel'</td></tr></tbody></table>	Name	no.	Type	Value	Comment	ATV71MB_1_ATV		MBATV71...			EGbMB_1_EGbMB		ModBusG...			EMPortM_1_EMPortM		ModBusEt...			<inputs>					<outputs>					<inputs/outputs>					<public>					Timeout		TIME	T#2s	Time to wait a response. Must be greater than the hardware timeout	SimultaneousSends		INT	4	Number of active sendings	PortAddress		string[33]	0.0.3	Name of the network to send the data	MaxRetryAfterSwitch		INT	3	Max. number of retry for first request to be successful after the controller switchover	Controller		Port Addressing	Quantum	CPU	'254'	NOE/NOC	'Slot'	M340/M580	CPU/NOE/NOC	'Rack.Slot.channel'
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ATV71MB_1_ATV		MBATV71...																																																																						
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EMPortM_1_EMPortM		ModBusEt...																																																																						
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M340/M580	CPU/NOE/NOC	'Rack.Slot.channel'																																																																						

Read/Write Devices

Now you should be able to read/write devices.



Modbus over ULP Technology

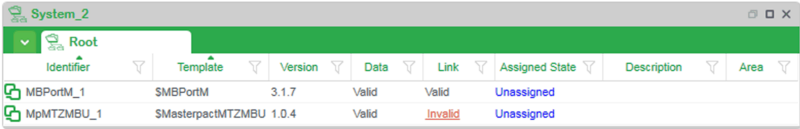
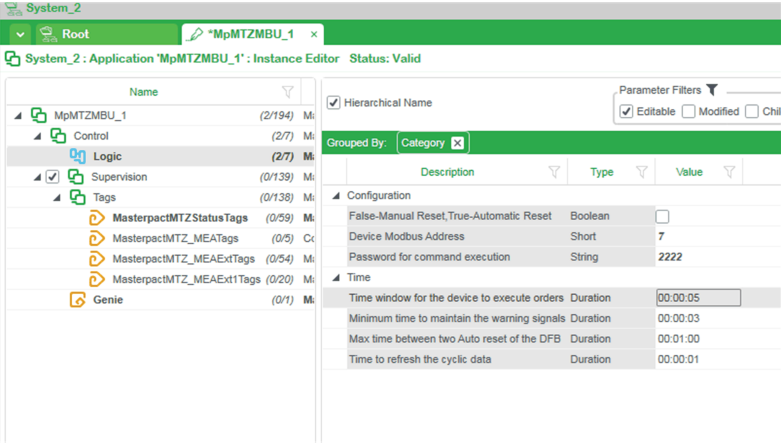
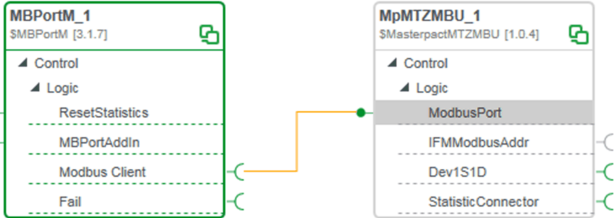
What's in This Chapter

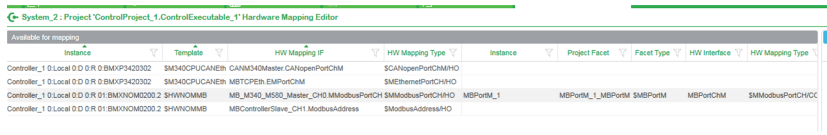
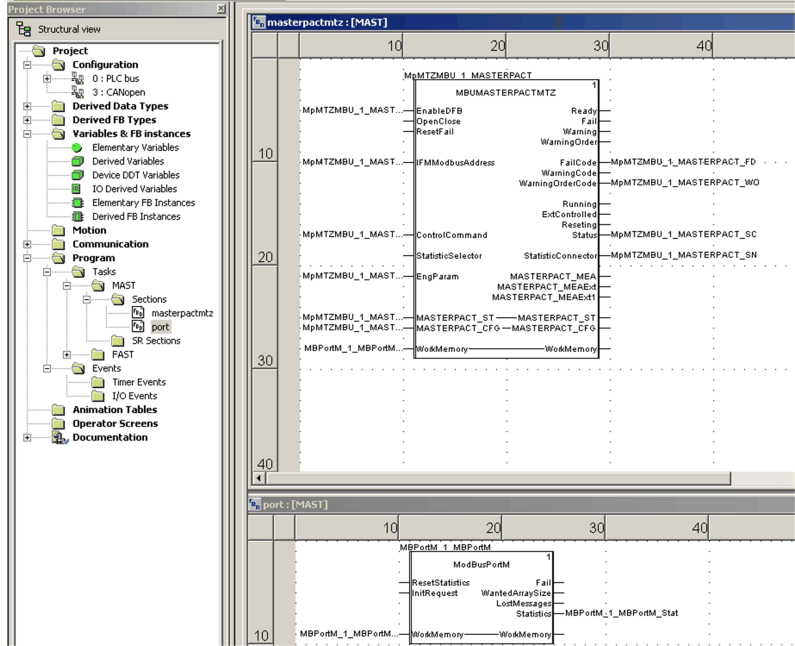
Creating a Project with \$MasterpactMTZMBU for IFM connected to
Masterpact MTZ and Modbus Serial RJ45 Ports 481

Creating a Project with \$MasterpactMTZMBU for IFE or IFE stacked with
IFM connected to Masterpact MTZ and Modbus Ethernet RJ45 Ports..... 483

Creating a Project with \$MasterpactMTZMBU for IFM connected to Masterpact MTZ and Modbus Serial RJ45 Ports

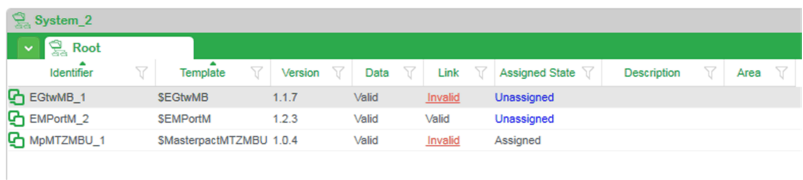
NOTE: These steps are also applicable for \$MasterpactMTZMBUCE template.

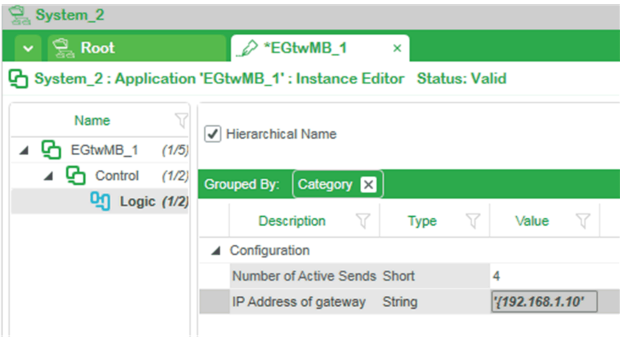
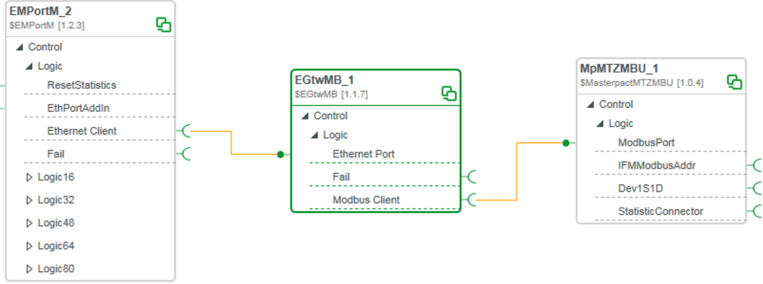
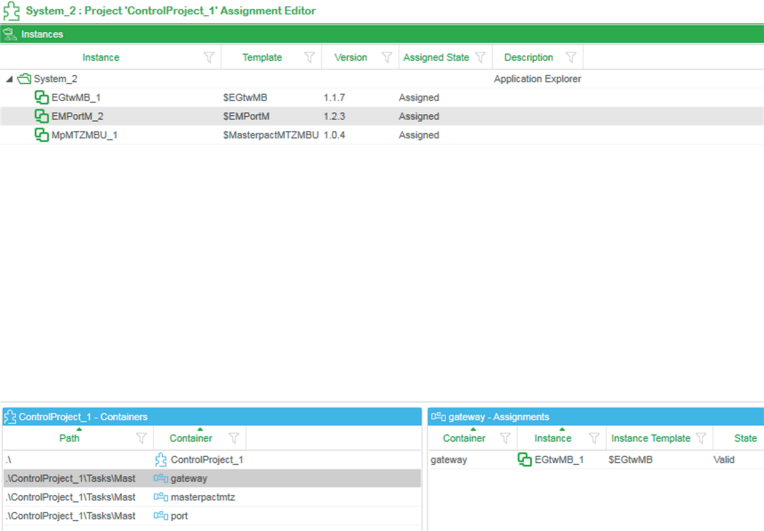
Step	Action
1	<div>Instantiate \$MasterpactMTZMBU and \$MBPortM as shown.</div> <div></div>
2	<div>Configure the parameters as shown.</div> <div></div>
3	<div>Perform edit links as shown.</div> <div></div>
4	<div>Create MAST sections and assign the facets accordingly and perform Generate.</div>

Step	Action
6	<p>Perform map hardware as shown.</p>  <p>The screenshot shows the 'Hardware Mapping Editor' for 'System_2'. It displays a table with columns: Instance, Template, HW Mapping IP, HW Mapping Type, Instance, Project Fileset, Facet Type, HW Interface, and HW Mapping Type. The table lists several components like 'CANOpenPortCHMO', 'SMOpenPortCHMO', 'SMOpenPortCHHO', 'MBPortM_1', and 'SMModbusPortCHCC'.</p>
7	<p>Perform build to obtain project as shown.</p>  <p>The screenshot shows the 'Project Browser' on the left and the 'masterpactmtz : [MAST]' block diagram on the right. The project browser shows a hierarchy of folders including 'Configuration', 'Derived Data Types', 'Variables & FB Instances', 'Motion', 'Communication', 'Program', 'Tasks', 'Sections', 'FAST', 'Events', 'Timer Events', 'I/O Events', 'Animation Tables', 'Operator Screens', and 'Documentation'. The block diagram shows the internal structure of the 'masterpactmtz' block, including sub-blocks like 'MBMASTERPACTMTZ', 'MASTERPACT_MEAS', 'MASTERPACT_MEAS1', 'MASTERPACT_ST', 'MASTERPACT_CFO', and 'MASTERPACT_CFO1'.</p>

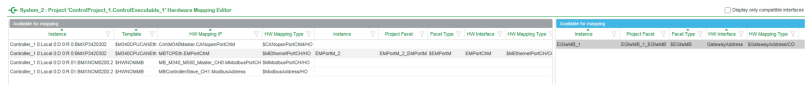
Creating a Project with \$MasterpactMTZMBU for IFE or IFE stacked with IFM connected to Masterpact MTZ and Modbus Ethernet RJ45 Ports

NOTE: These steps are also applicable for \$MasterpactMTZMBUCE template.

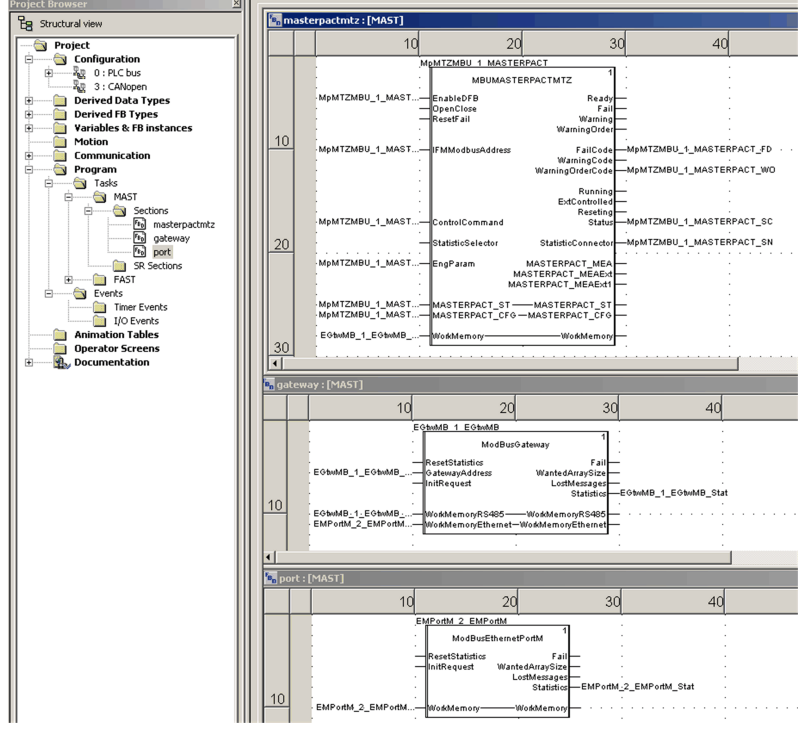
Step	Action
1	<p>Instantiate \$MasterpactMTZMBU, \$EGtwMB, \$MBPortM as shown.</p>  <p>The screenshot shows the 'System_2' project with a 'Root' folder. It lists three instantiated components: 'EGtwMB_1' (template \$EGtwMB, version 1.1.7, data valid, link invalid, state unassigned), 'EMPortM_2' (template \$EMPortM, version 1.2.3, data valid, link valid, state unassigned), and 'MpmTZMBU_1' (template \$MasterpactMTZMBU, version 1.0.4, data valid, link invalid, state assigned).</p>
2	<p>Configure the parameters as shown.</p>

Step	Action
	
3	<p>Perform edit links as shown.</p> 
4	<p>Create MAST sections and assign the facets accordingly and perform Generate.</p>  <p>NOTE: The port DFB should have higher execution order than MBUMASTERPACTMTZ DFB.</p>
5	Create topology project.

Step	Action
6	Perform map hardware as shown.
7	Perform build to obtain project as shown.



The screenshot shows the 'Hardware Mapping Editor' for 'Project_1'. It displays a table with columns for 'Address', 'Name', 'HMI Mapping ID', 'HMI Mapping Type', 'Instance', 'Project Name', 'Plant Type', 'HMI Interface', 'HMI Mapping Type', 'HMI Mapping ID', 'Project Name', 'Plant Type', 'HMI Interface', and 'HMI Mapping Type'. The table lists various hardware components and their mappings.



The screenshot shows the 'Project Browser' on the left and the 'masterpactmz : [MAST]' diagram on the right. The 'Project Browser' shows a hierarchical view of the project structure, including 'Configuration', 'Derived Data Types', 'Derived FB Types', 'Variables & FB instances', 'Motion', 'Communication', 'Program', 'Tasks', 'Sections', 'FAST', 'Events', 'Timer Events', 'I/O Events', 'Animation Tables', 'Operator Screens', and 'Documentation'. The 'masterpactmz : [MAST]' diagram shows a detailed view of the hardware mapping, including 'MpmTZMBU_1_MAST', 'gateway', 'port', and 'EMPortM_2_EMPortM'. The diagram includes various status indicators and data points.

Modbus Technology

What's in This Chapter

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Overview

This chapter describes the configuration and setup details of the devices connected through modbus on the Modicon M340 automation platform.

General

Overview

This section describes the complete configuration and setup details of the devices connected through modbus on the Modicon M340 automation platform.

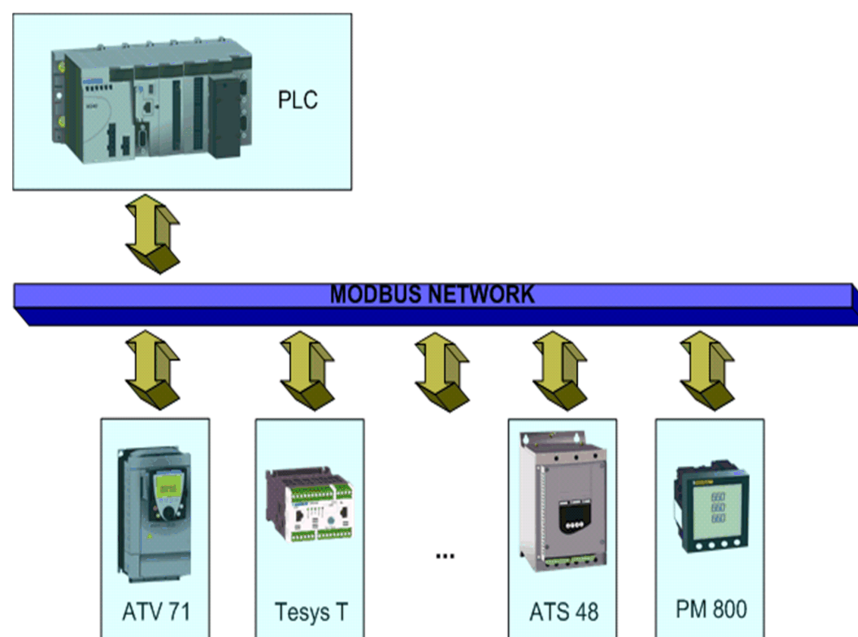
Modbus Technology

Modbus Network Configuration

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Adapt the below examples to configure device or communication network parameters before you implement them.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Refer to the configuration manual for communication networks and Control devices.

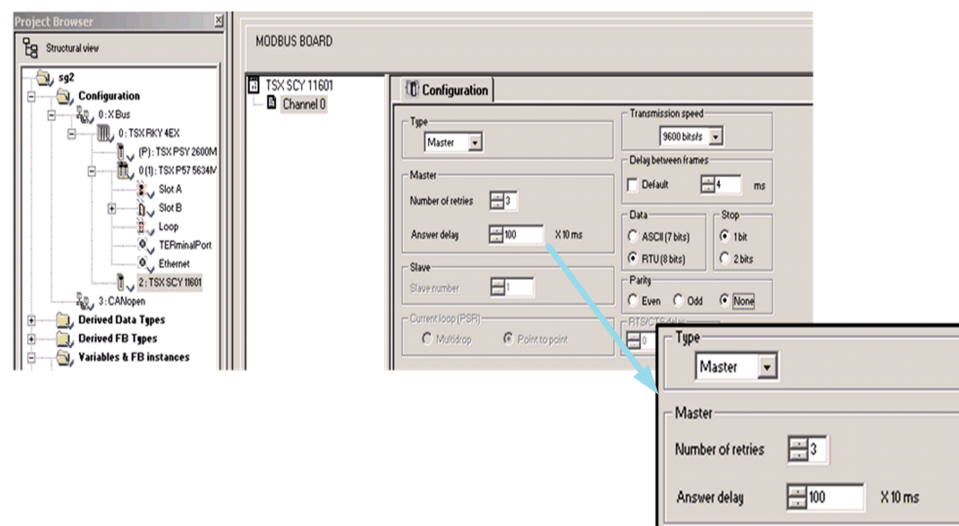
This figure shows the complete configuration and setup details for the devices connected through modbus on the Modicon M340 automation platforms.



Determining Timeout Times

Introduction

This section provides guidelines for correctly selecting Timeout and Refresh times based on the known parameters by using an example with a modbus connection close to 10 ATV 31 devices:



Hardware Timeout

The timeout setting is selected on the MB physical port (PCMCIA or module). During this time, the controller HW uses as the maximum permissible time that can elapse before indicating a detected failure if it does not receive a response to any sent request.

With a modbus TSX SCY21601 module, for example, the module Timeout is 3 seconds (1 second x 3 retries). When connecting 10 ATV31 devices on modbus, a good setting would be to set the time to 200 ms and 1 retry (400 ms).

Software Timeout


The timeout setting is selected on the serializer (modbus port - component that manages the modbus port). During this time, the SW uses as the maximum permissible time that can elapse before indicating a detected failure if it does not receive a response from any of the devices.

The following is the minimum time that needs to be selected:

With Hardware Timeout = tHW

Software Timeout > tHW x No. of simultaneous send operations (modbus port `SimultaneousSends` public parameter).

The default number of simultaneous requests managed by the ModbusPort is 4. (The SGS on the modbus port function generates a value of 4 for simultaneous transmissions.)

Software Timeout > 400 ms x 4 sim.sends  Software Timeout > 1600 ms

NOTE: Check the default value for the public variable of the ModbusPort function if you want to modify the software Timeout.

Device Timeout

This timeout is selected on the speed driver. During this time, the device uses as the maximum permissible time that can elapse before indicating a detected failure if it does not receive any requests. It tends to be a large number, but as a guideline:

Device Timeout > tHW x No. of devices connected to the modbus port

For instance, if the network has 10 ATV 31 devices, check the timeout value that is configured in the parameters of each communications menu of the ATV 31:

Device Timeout > 400msec x 10 devices > Device Timeout > 4 s

The guidelines are as follows:

- The value of this timeout depends on the conditions that you establish for the ATV 31 when operating it. That is, a timeout of 4 seconds for each ATV 31 means that if the ATV 31 ceases to communicate, it stops or indicate a detected failure after 4 seconds.
- If there is a communications interruption with an ATV 31, the master attempts to establish communications with the device, and with that device only, during the time specified in the Hardware Timeout.

In this example, the master attempts to establish communications with the ATV 31 that is having a communication interruption of 400 ms.

As a result, if the device Timeout < Hardware Timeout (that is, lower than 400 ms in this example), the remaining network devices begins to drop out (indicate a detected error) consequently due to a timeout while the master is attempting to establish communications with the first ATV 31.

NOTE: The device Timeout need to be higher than the `Refresh` time (Refresh).

Refresh

Refresh is the data refresh time, that is, the time between the cyclic requests sent to each one of the devices.

This time has to be sufficient for the data to be refreshed quickly but not so short as to saturate the bus with cyclic requests.

An estimated value between 200 and 1500 is necessary to refresh their data depending on the type of devices and the number of requests.

Configuring the Devices

Overview

This section explains the configuration of the devices.

ATV 31, ATV 312, and ATV 12

Description

The speed drives are connected to modbus networks through an RJ45 connector.

Configure each Altivar 31, Altivar 312, and Altivar 12 devices with the same baud rate and with a different station number so that each device is uniquely identified on the modbus bus.

From the actual ATV without a programming console, in the **Con** menu for ATV 31 units and the **Conf > FULL > Con** menu for ATV 312 and ATV 12 units:

- PrO : Protocol (modbus RTU)
- Adrc or Add: modbus address
- Bdr or tpr: Baud rate (19.2 = 19200 bps)
- Tfo: Communications mode (usually 8E1)
- tto : Communications Timeout (10 s by default)

NOTE: Communication parameters are recognized after the device is energized, that is, when the parameters are edited, the device has to be power cycled so that the parameters are applied.

ATV 71 and ATV 61

Description

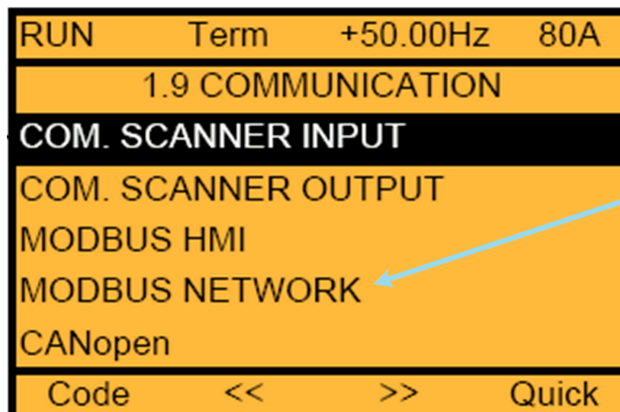
The ATV 71/61 speed driver is also connected to the modbus network through a RJ45 connector.

That is, you can use an infrastructure identical to that used for the ATV 31.

Configure each Altivar 71 device with the same baud rate and with a different station number so that each device is uniquely identified on the modbus bus.

From the actual ATV without a programming console, in the menu; or from the **1.9 COMMUNICATION** menu if there is a parameter configuration console:

- Add : modbus address
- Tbr : Baud rate (19.2 = 19200bps)
- Tfo : Format (8-N-1 by default)
- tto : Communications Timeout (10 s by default)



NOTE: Communication parameters are recognized after the device is energized.

Tesys U

Description

The LULC033 is the communications module for Tesys U starters and controllers that is used for communicating with the M340 platform directly on the modbus.

The Tesys U communications module is connected to the modbus network through an RJ45 connector.

The available protection and control information depends on the control unit with which the modbus communications module is associated.

The Tesys U communications module has 3 types of control unit:

- Standard (reference: LUCA)
- Advanced (references: LUCB/C/D, LUCBT/DT)
- Multifunction (references: LUCM/MT)

The following table shows the information and controls that can be accessed with each type of control unit:

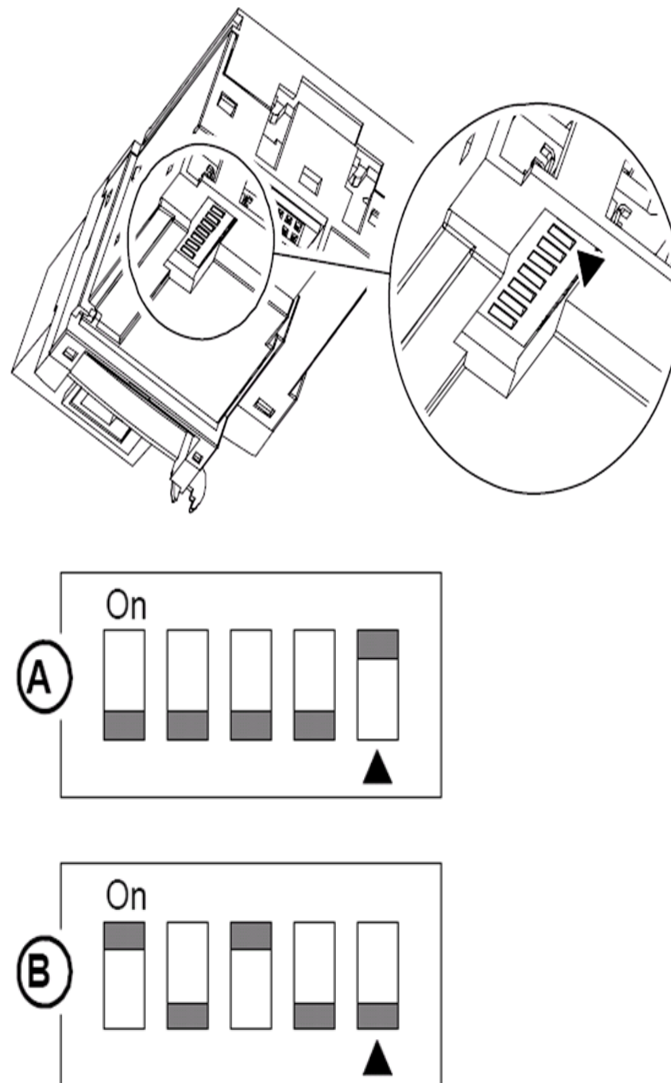
Information/ Controls	Control unit		
	Standard (LUCA)	Advanced (LUCB/C/D, LUCBT/DT)	Multifunction (LUCM/MT)
Start and stop controls *	X	X	X
Statuses (ready, running, detected failure) *	X	X	X
Alarm *	–	X	X
Automatic resetting and remote resetting through the bus *	–	X	X
Indication of motor load *	–	X	X
Detected failure differentiation *	–	X	X
Parameter configuration and remote query for all functions	–	–	X
Log function	–	–	X

Information/ Controls	Control unit		
	Standard (LUCA)	Advanced (LUCB/C/ D, LUCBT/DT)	Multifunction (LUCM/ MT)
Monitoring function	–	–	X
Meaning of symbols used:			
X	Applicable		
–	Not Applicable		

* The control block implemented in the GPL enables to work with the information marked with an asterisk. Refer to *Tesys U profile* for more information regarding control based on the device and communications used.\

Modbus Module Address

The address of the modbus communications module is defined by switches that are located on the bottom of the module. To access these switches, module has to be turned around:



A) The module is delivered with address 1 (factory settings).

B) Configuration example for address 20.

The range of accepted values goes from 1 to 31, and the address code is binary.

The least significant bit is on the right and is indicated with ▲.

NOTE: Addressing is recognized after the communications module is energized.

The control block implemented in the SGU is programmed to work with the factory default configuration.

The parameter configuration of the communications module enables you to define the following:

- The operating mode
- The reset mode for a reset due to a thermal overload event
- The correspondence between the communication module outputs and the LUTM controller inputs

The parameter configuration registers (modbus protocol) can be accessed in read/write mode or with the Power Suite software.

The following table shows factory default values:

Item	Register	Factory settings	Meaning
Reset mode for a reset due to a detected thermal overload fault	602.0	1	Manual mode
Return mode for the control outputs in case of a communication interruption	682	2	Forced Stop Power base: OA1 and OA3 to 0 Controller base: 13 and 23 to 0
In power base, assignment for: <ul style="list-style-type: none"> • LO1 output • OA1 output • OA3 output In control base, assignment for: <ul style="list-style-type: none"> • Output 13 • Output 23 	685 LSB 685 MSB 686 MSB 687 LSB 687 MSB	2 12 13 12 13	LO1 is the image of control bit 700.0 OA1 is the image of control bit 704.0 OA3 is the image of control bit 704.1 13 is the image of control bit 704.0 23 is the image of control bit 704.1
Recovery mode after stop	688	0	The outputs revert to the state before the power supply interrupted.

Controller

If a controller is used, 7 inputs are used in a configuration by using a communications module.

Input	Function	Output	Comment
I.1	In Local mode: Each input controls the output relay.	13	The input image
I.2		23	The input image
I.1	In Remote through bus mode: These inputs are available for sending external information through the communication bus (writing to a register).	13	The register image
I.2		23	The register image
NOTE: If the voltage is too low, the output opens. Detected external and control unit problems do not affect the state of this relay.			
I.3 or I.4	These inputs are dedicated to the status return of the contactor controlled by the output relay.	–	–
I.5 RST (Reset)	This dedicated input allows you to reset the	–	Through Reset button on the front side of the box or panel.

Input	Function	Output	Comment
	controller manually after a inoperable unit.		
I.6 SF (System detected fault or inoperable system)	This dedicated input enables sending trip information when a protection mechanism that complements the controller is tripped.	–	Example: Reception of information provided by the Trip NC contact: => From a circuit breaker, from a relay with a probe, from a voltage relay => from a chain of these contacts.
I.10	In Local or Remote through bus mode. This input sends external information through the communication bus (writing to a register).		
	In Local mode.	Output	= The input image
	In Remote through bus mode.	Output	= The register image
	In combined mode: This input sends local or remote through the bus information and allows the controller to manage the control priorities.		
	If I.10 = 1: Local mode.	Output	= The input image
	If I.10 = 0: Remote through bus mode:	Output	= The register image

This table describes the dedicated input:

Input	Function	Comment
I.7 SR (System ready)	This dedicated input allows system availability to be communicated through the bus. If the correlation Ready bit is not used, I.7 is available for sending the rest of the information.	Example: Reception of information provided by the circuit breaker Ready NO contact.
I.8	This input sends external information through the communication bus (writing to a register). It has no effect on the controller operation.	Example: Status of the Emergency Stop button.
I.9		Example: In case of a cabinet in test position panel.

Tesys T

Description

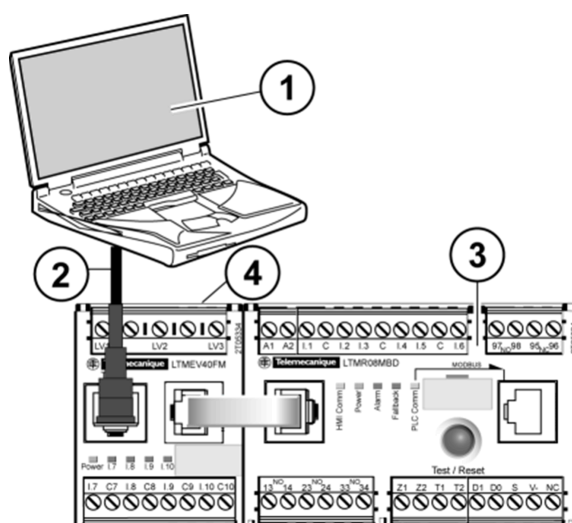
To connect a Tesys T device on a modbus network, the following communication parameters need to be configured.

Parameter	Value
Network	Modbus (Device Settings menu)
Address	From 1 to 247 (Network Port menu)
Baud rate	From 1200 bps to 19200 bps (Network Port menu)
Parity	Even or No Parity (Network Port menu)

Use PowerSuite program to configure the Tesys T.

Configuration with Expansion Module

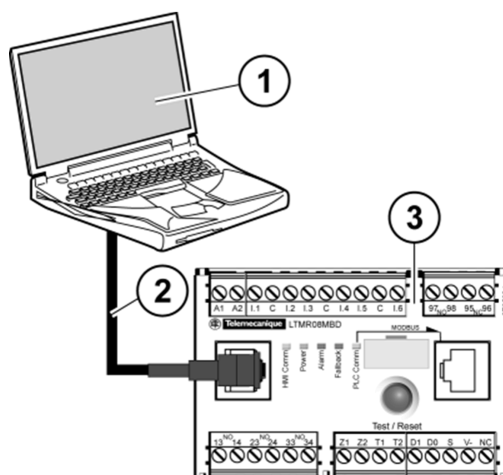
This figure shows the connection of a Tesys T module with an expansion module.



- 1 PC with PowerSuite software
- 2 VW3 A8 106 cable
- 3 LMT R Controller
- 4 Expansion module

Configuration without Expansion Module

This figure shows the connection of a Tesys T module without an expansion module.



- 1 PC with PowerSuite software
- 2 VW3 A8 106 cable
- 3 LMT R controller

ATS 22 and ATS 48

Description

NOTE: A reference to the ATS 48 unit is also referred to the ATS 22 unit unless otherwise specified.

The ATS 48 starter is connected to the modbus network through an RJ45 connector.

Configure each ATS 48 device with the same baud rate and with a different station number so that each device is uniquely identified on the modbus bus.

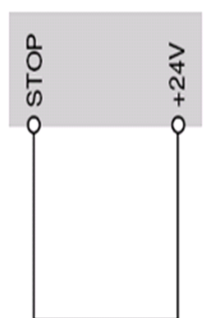
Access the **COP** menu and configure the following:

Parameter	Description
Add	ATS 48 modbus address within the modbus network. Address from 0 to 31 for ATS 48 units and from 0 to 247 for ATS 22 units.
tbr	Network baud rate at 4800, 9600, or 19200 bps.
FOr	Configure the amount of communication bits (8 bits), parity (even, odd, or no parity), and 1 or 2 Stop bits.
TLP/TTO	(TTO for ATS 22 units) Time out. You can configure with a value of 0.1 to 60.0 in 0.1 s increments.
Ctrl	Only for ATS 22 units. Enables you to configure whether control is modbus-based or screw terminal-based. Configure dbS for modbus-based control.

The timeout configured on the ATS 48 device has to be longer than the time configured in the `Refresh` variable of the generated component.

NOTE: Communication parameters are recognized after the device is energized.

To use controller-based control, the following connection needs to be made.



Control by PC or PLC

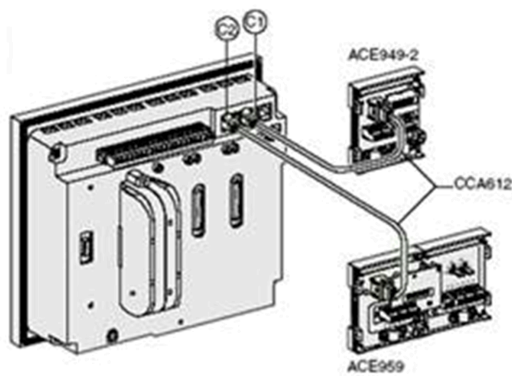
SEPAM

Description

Modbus communication allows connecting Sepam units to a monitor that is equipped with a master modbus communications path.

To connect this unit, an ACE949-2 (2-wire RS485 network connection interface) or ACE949 (4-wire RS485 network connection interface) interface module with a 12 VCC or 24 VCC power supply is required.

This figure shows the Sepam series 80 configuration:



To connect a Sepam device to a modbus network, configure the following communication parameters with the configuration software:

Parameter	Value
Bus	Modbus
Address	From 1 to 247
Baud Rate	From 1200 bps to 19200 bps
Parity	Even, odd, or no parity

PM
Description

Configure each PM device with the same baud rate and with a different station number so that each device is uniquely identified on the modbus bus.

After accessing the internal menu of the signal analyzer, configure the following:

Set Up Communications

- 1. In SETUP mode, press ----> until COM is visible.
- 2. Press COM.
- 3. Enter the ADDR (meter address): 1 to 247.
- 4. Press OK.
- 5. Select the BAUD (baud rate): 2400, 4800, 9600, or 19200.
- 6. Press OK.
- 7. Select the parity: EVEN, ODD, or NONE.
- 8. Press OK to return to the SETUP MODE screen.

NOTE: Default values are displayed.



Compact and Masterpact
Description

Both Compact and Masterpact units are configured the same way in the modbus section. This configuration is implemented with the TRV00210 device.

This device automatically detects the baud rate of the bus as long as it is working with 8 bits, even parity, and 1 stop bit.



The rotary selectors on the front of the device are used to configure the modbus node address (address from 1 to 99). To control the device remotely, the last selector has to be pointing at the open lock symbol.

Modbus Serial - Explicit

Overview

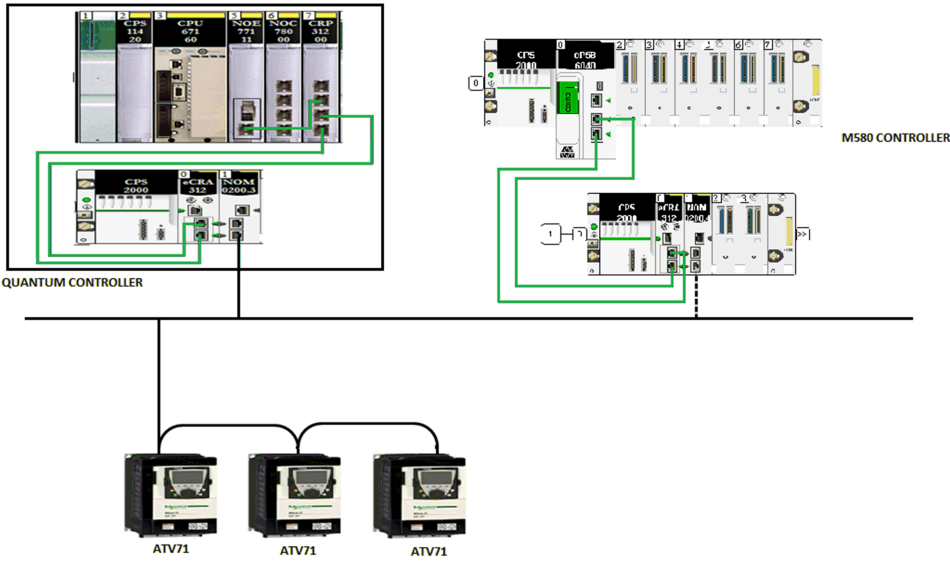
This section describes the procedure to create an application using modbus communication technology (Explicit).

Creating an Application using Modbus Communication Technology (Explicit)

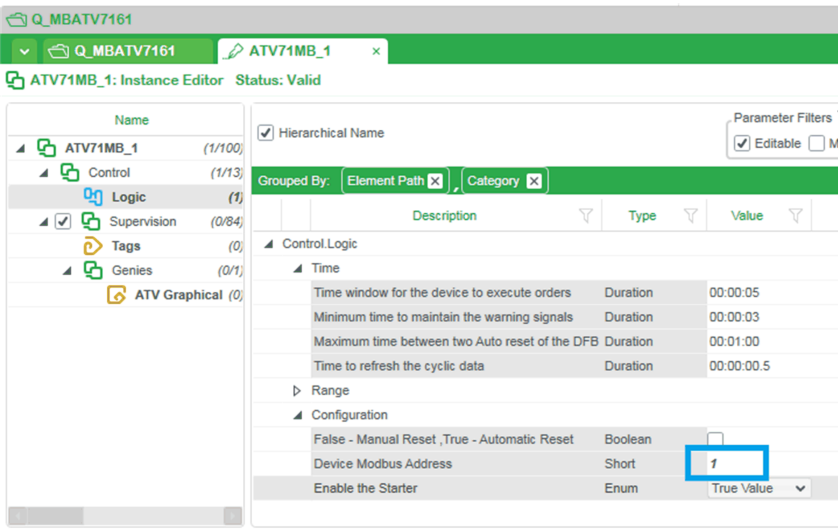
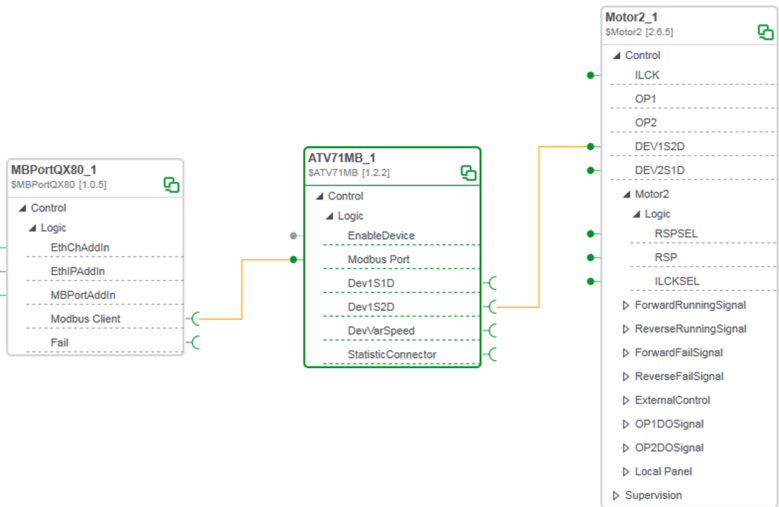
Overview

In this example, ATV71 and Quantum controller is used as a reference. However, same procedure can be followed for creating an application with any other modbus devices or controller.

Architecture



Application Explorer

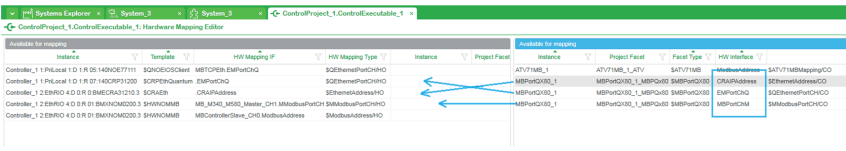
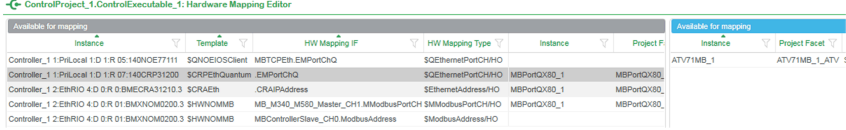
Step	Action
1	Instantiate ATV71MB , Motor2 and MBPortQX80 templates.
2	<p>Right-click on ATV71MB instance and navigate to Properties. Enter the address in Device Modbus Address field under Logic Section as shown below.</p>  <p>The screenshot shows the 'ATV71MB_1: Instance Editor' window. The 'Logic' section is expanded, and the 'Device Modbus Address' field is highlighted with a red box, showing the value '1'.</p>
3	<p>Right click on instance of ATV71MB and select Edit Links. Link the objects as shown in below.</p>  <p>The screenshot shows the 'Edit Links' dialog box with three instances: MBPortQX80_1, ATV71MB_1, and Motor2_1. Connections are shown between the 'Modbus Client' of MBPortQX80_1 and the 'Modbus Port' of ATV71MB_1, and between the 'Dev1S1D' of ATV71MB_1 and the 'RSPSEL' of Motor2_1.</p>

Topology Explorer

Step	Action
1	In Topology, create Controller hardware configuration with Quantum controller.
2	Link the controller to Ethernet network.

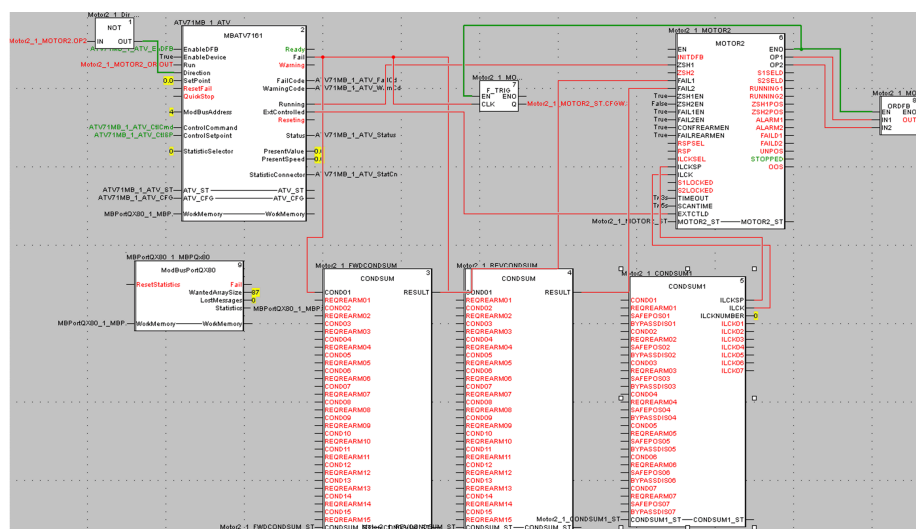
Project Explorer

Step	Action
1	Create a project for Quantum controller.
2	Assign the facets and generate the control project.
3	Create Executables and do Map Service .

Step	Action
4	Navigate to Executables section, right-click on Executables and select Map Hardware .
5	<p>Map the application interfaces by drag and drop in front of respective field, as shown below.</p> <p>Map:</p> <ul style="list-style-type: none"> CRAIPAddress to CRAIPAddress EMPortChQ to EMPortChQ MBPortChM to MB_M340_M580_Master_CH1.MModbusPortCH <p>This mapping is required to pass the IP address of CRA, Port address of CRP and Port address of NOM module to DFB.</p>  <p>After Mapping</p> 
6	Build the control project and open the built project.
7	In Function Block section, check public parameters for MBPortQX80 block.
8	Verify the IP address of CRA , Port address of CRP and Port address of NOM module is correct.

Read/Write Devices

Now, you should be able to read/write devices.

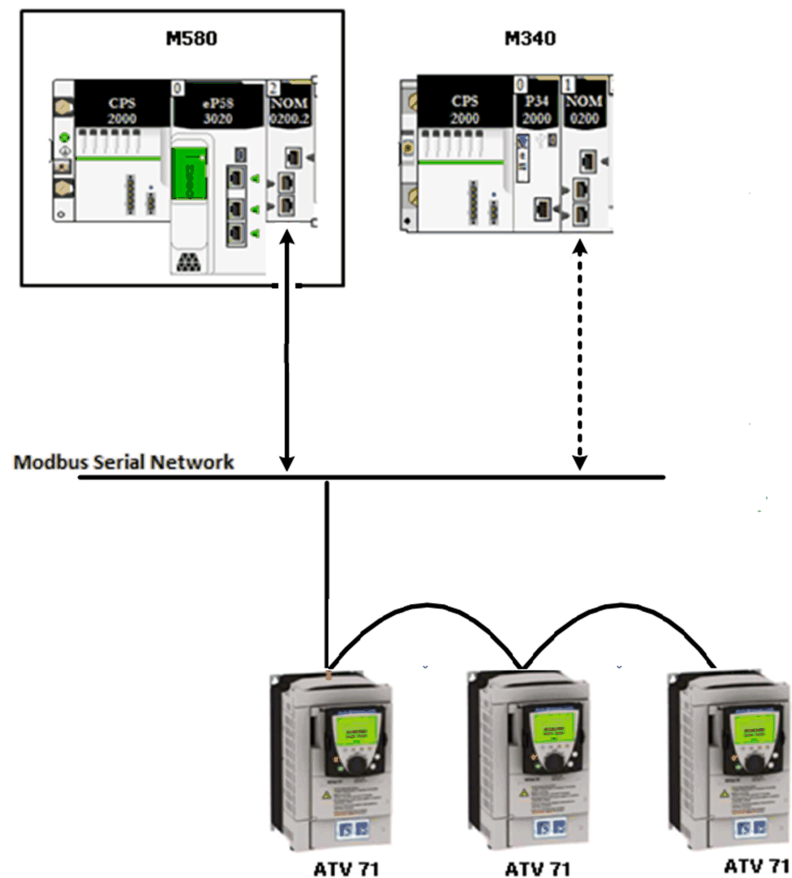


Creating an Application using Modbus Communication Technology (Explicit) with M580/M340 Controller

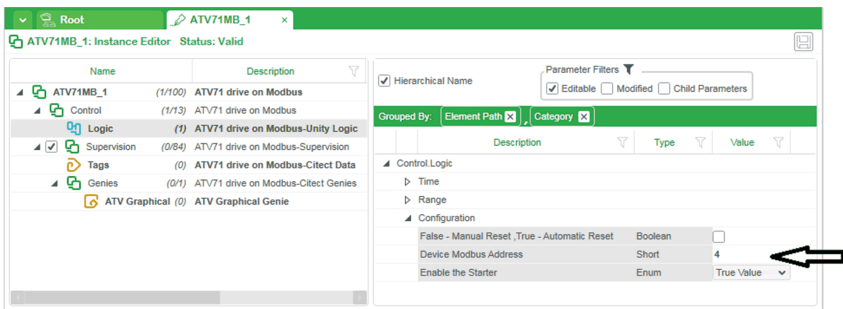
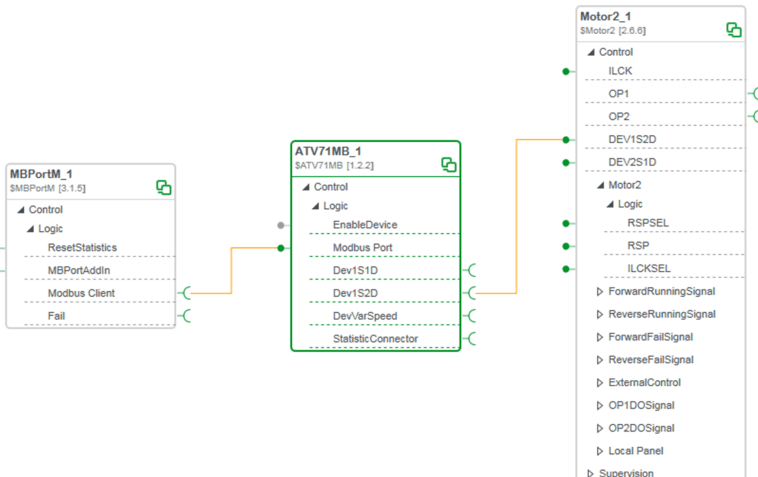
Overview

In this example, ATV71 and M580 controller is used as a reference. However, same procedure can be followed for creating an application with any other modbus devices or controller.

Architecture



Application Explorer

Step	Action
1	Instantiate ATV71MB , Motor and MBPortM templates in Application Explorer .
2	<p>In Application Explorer, right-click on instance of ATV71MB and select properties to set the modbus address of the ATV71.</p> 
3	<p>Right-click on instance of ATV71MB and select Edit Links. Link the objects as shown in below.</p> 

Topology Explorer

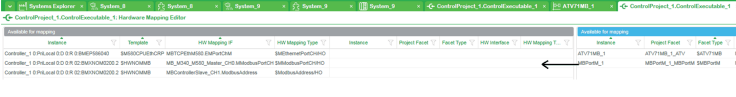
Step	Action
1	In Topology, create Controller hardware configuration with M580 controller.
2	Link the controller to Ethernet network.

Project Explorer

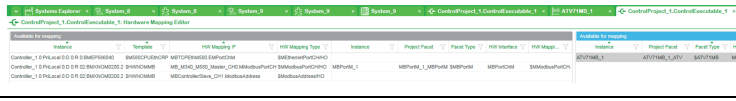
Step	Action
1	Create a project for M580 controller.
2	Assign the facets and generate the control project.
3	Create Executables and do Map Service .
4	Navigate to Executables section, right click on Executables and select Map Hardware .
5	<p>Map the application interfaces by drag and drop in front of the respective field, as shown below.</p> <p>Map - MBPortM_1 to MB_M340_M580_Master_CH1.MModbusPortCH of \$HWNOMMB.</p> <p>This mapping is required to pass Port address to DFB. In this example we are using NOM port (Channel 0) for communication.</p>

Step

Action



After Mapping,



6

Build the control project and open the built project.

7

In Function block section, check public parameters for MBPORTM block.

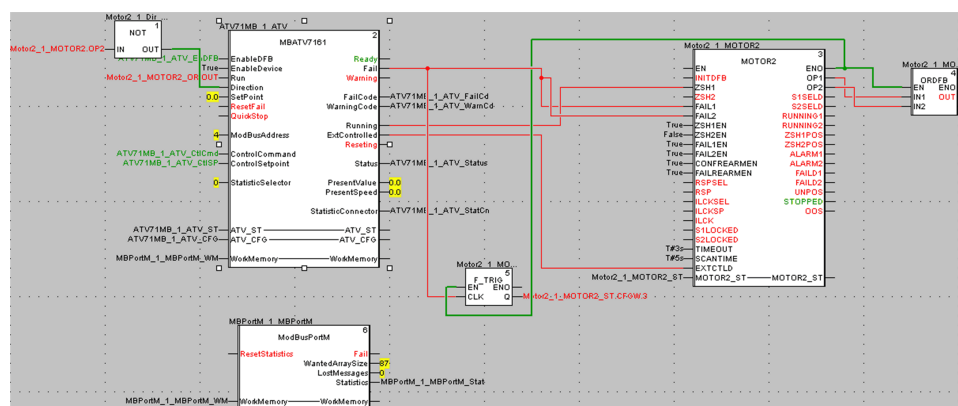
Name	no.	Type	Value	Comment
MBPortM_1_MBP0rtM		MBATV71_1	ModBusP...	
<div style="margin-left: 20px;"> <input type="checkbox"/> <inputs> <input type="checkbox"/> <outputs> <input type="checkbox"/> <inputs/outputs> <input type="checkbox"/> <public> </div> <div style="margin-left: 20px;"> <input checked="" type="radio"/> Timeout <input type="radio"/> PortAddress <input type="radio"/> SimultaneousSends </div>		TIME STRING INT	T#2s 0.02.0 4	Time to wait a response. Must be greater than the hardware timeout The channel address of the hardware that will be used to send the messages Number of active sendings

Verify the port addressing as per the below table:

Controller	CPU/NOE/NOC	Port Addressing
M340/M580	CPU/NOE/NOC	'Rack.Slot.channel'

Read/Write Devices

Now, you should be able to read/write devices.



Creating an Application using Modbus Communication Technology (Explicit) with M580 controller on x80 drop

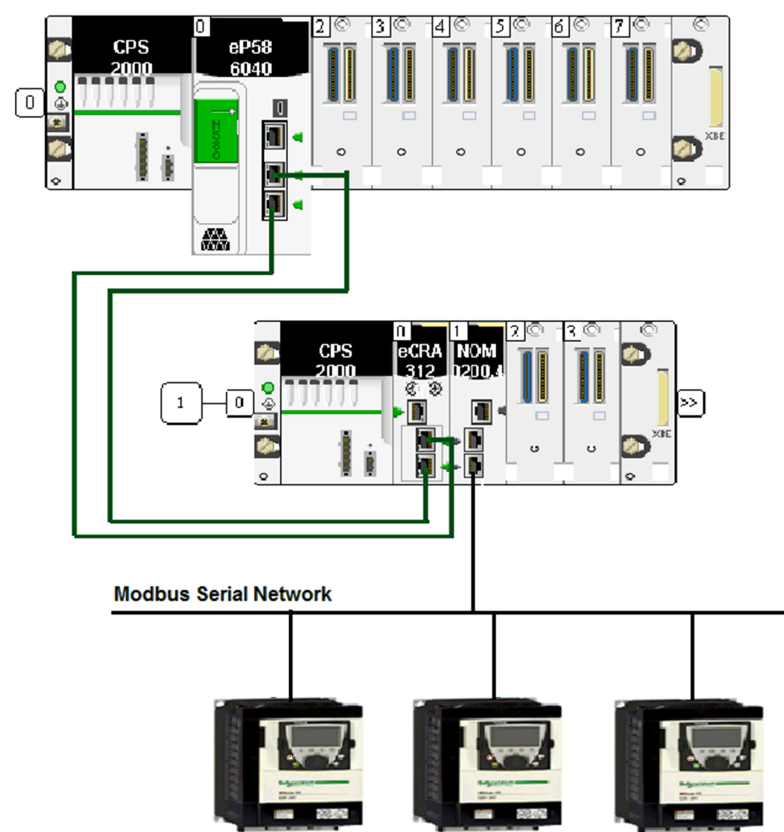
Overview

In this example, ATV71 and M580 controller is used as a reference. However, same procedure can be followed for creating an application with any other modbus devices.

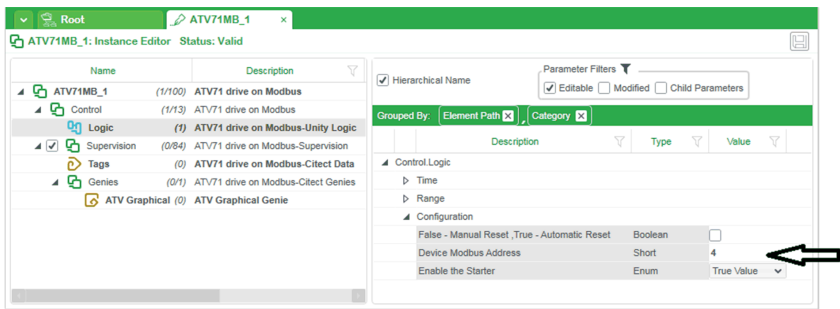
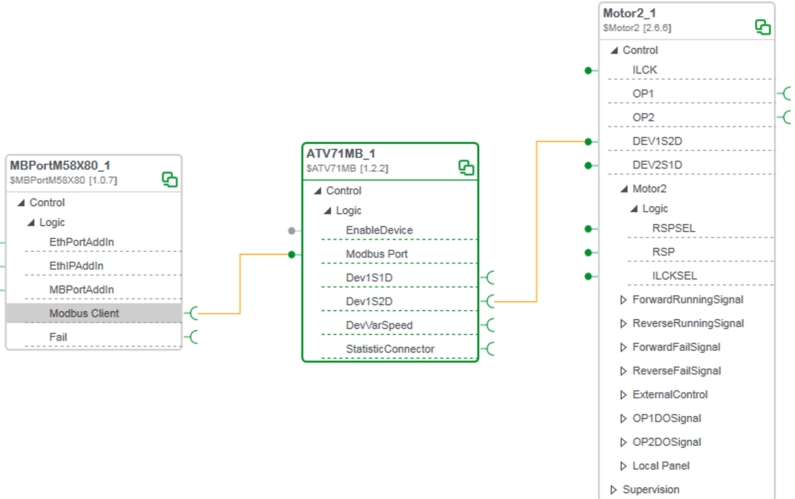
NOTE:

- \$MBPortM58x80 DFB is to be used only when **M580** controller is used.
- User needs to add the number of instances of MBPortM58x80 depending on the number of **NOM** ports used.

Architecture



Application Explorer

Step	Action
1	Instantiate ATV71MB , Motor2 , MBPortM58X80 templates in Application Explorer .
2	<p>In Application Explorer, right-click on instance of ATV71MB and select properties to set the modbus address of the ATV71.</p> 
3	<p>In Application Explorer, right click on instance of ATV71MB and select properties to set the modbus address of the ATV71.</p> 

Topology Explorer

Step	Action
1	In Topology, create controller hardware configuration with M580 controller.
2	Link the controller to Ethernet network.

Project Explorer

Step	Action
1	Create a project for M580 controller.
2	Assign the facets and generate the control project.
3	Create Executables and do Map Service .
4	Navigate to Executables section, right click on Executables and select Map Hardware .
5	<p>Map the application interfaces by drag and drop in front of respective field, as shown below.</p> <p>MAP:</p> <ul style="list-style-type: none"> CRAIPAddress to .CRAIPAddress EMPortChQ to .EMPortCh

Profibus Technology

What's in This Chapter

Steps to Create a Working Project with Profibus Templates 507

Overview

This chapter describes the configuration and setup details of the devices connected through Profibus.

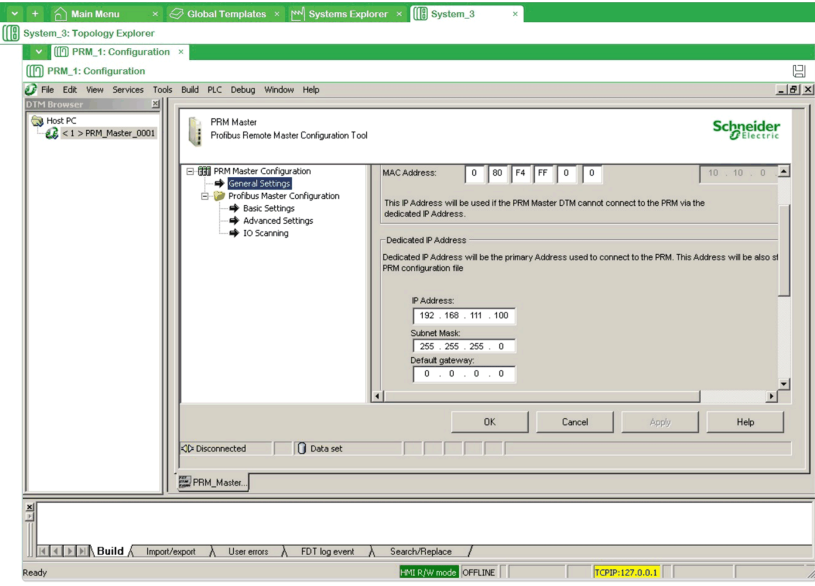
Steps to Create a Working Project with Profibus Templates

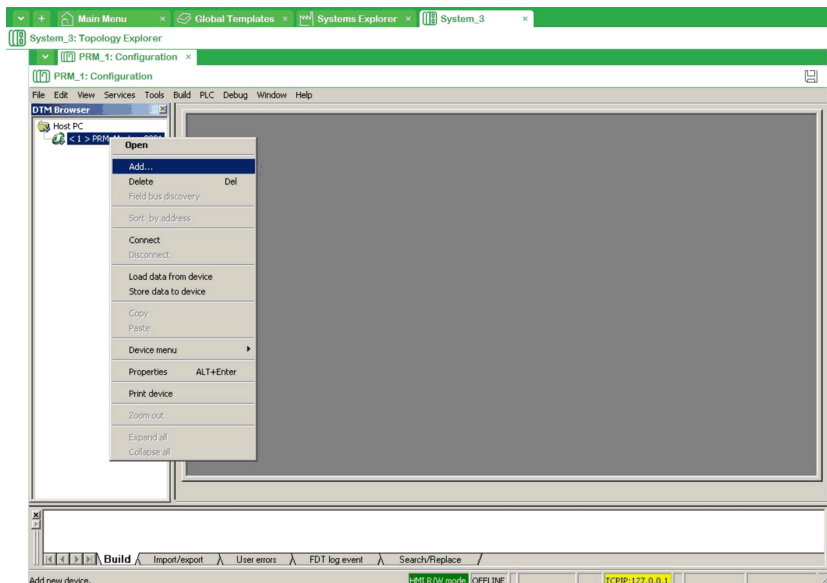
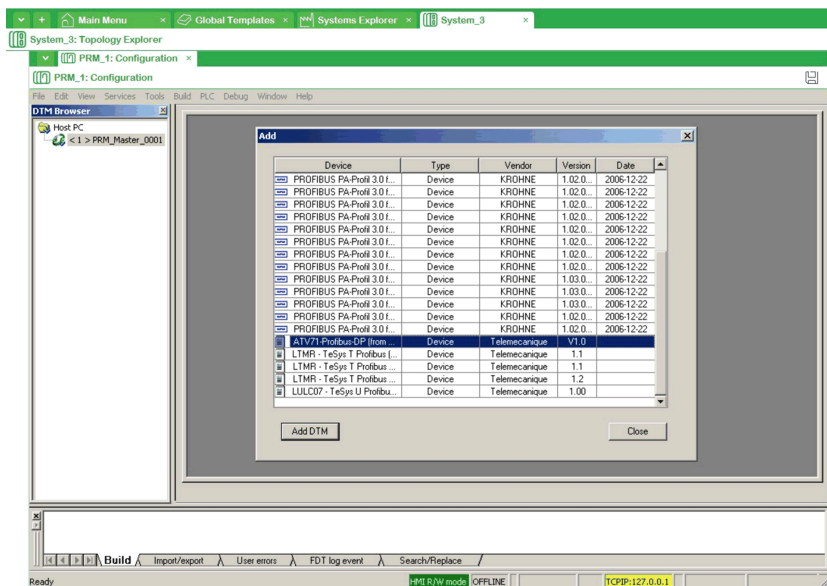
Overview

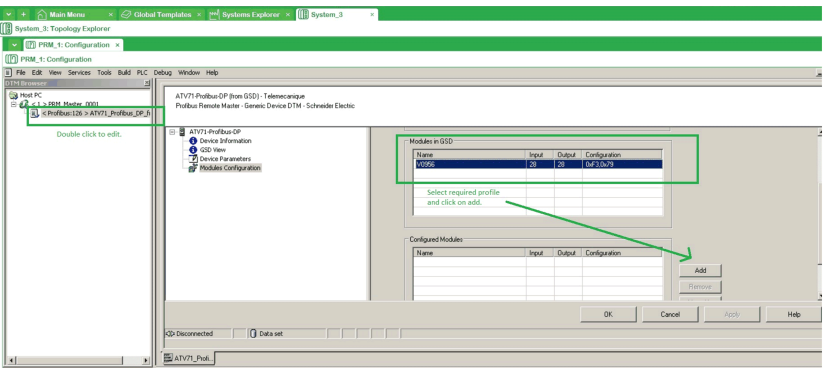
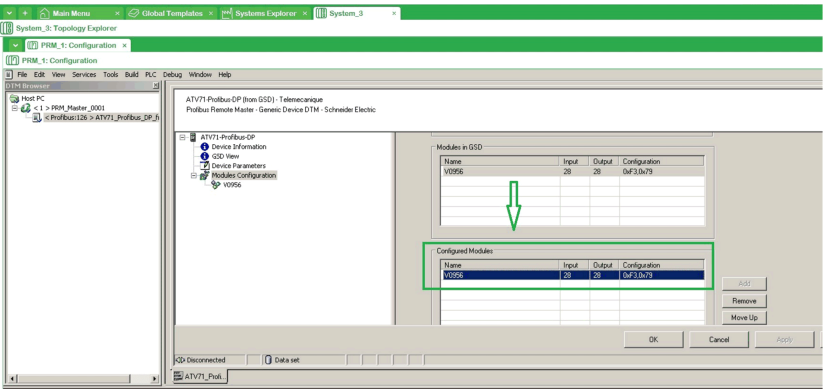
This section provides the PRM configuration and project creation details involving the Profibus templates.

Configuring PRM Device

The following table describes the steps for configuring a PRM device:

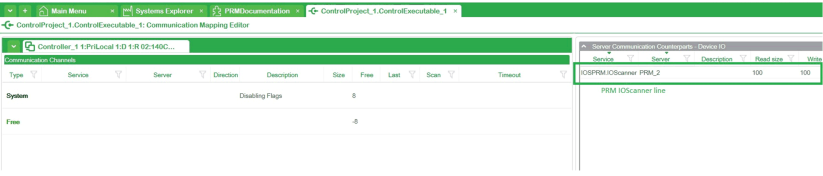
Step	Action
1	Create a PRM device in Topology Explorer > System > Create PRM Profibus DP .
2	Configure the created PRM device PRM (right click) > Configure . It opens the Configuration editor for the topological entity.
3	Configure the PRM hardware settings as required. 
4	In the DTM Configuration window PRM (right click) > Add .

Step	Action																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	 <p>The screenshot shows the 'PRM_1: Configuration' window with the 'DTM Browser' menu open. The menu options include: Open, Add..., Delete, Field bus discovery, Sort by address, Connect, Disconnect, Load data from device, Store data to device, Copy, Paste, Device menu, Properties (ALT+Enter), Print device, Zoom out, Expand all, and Collapse all.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
5	<p>Select the required GSD file to be added based on the device. Here ATV71 is shown in the following figure.)</p>  <p>The screenshot shows the 'Add' dialog box with a table of devices. The 'ATV71 Profibus DP (from...)' device is selected.</p> <table><tr><th>Device</th><th>Type</th><th>Vendor</th><th>Version</th><th>Date</th></tr><tr><td>PROFIBUS PA-Profit 3.0 I...</td><td>Device</td><td>KROHNE</td><td>1.02.0.</td><td>2006-12-22</td></tr><tr><td>PROFIBUS PA-Profit 3.0 I...</td><td>Device</td><td>KROHNE</td><td>1.02.0.</td><td>2006-12-22</td></tr><tr><td>PROFIBUS PA-Profit 3.0 I...</td><td>Device</td><td>KROHNE</td><td>1.02.0.</td><td>2006-12-22</td></tr><tr><td>PROFIBUS PA-Profit 3.0 I...</td><td>Device</td><td>KROHNE</td><td>1.02.0.</td><td>2006-12-22</td></tr><tr><td>PROFIBUS PA-Profit 3.0 I...</td><td>Device</td><td>KROHNE</td><td>1.02.0.</td><td>2006-12-22</td></tr><tr><td>PROFIBUS PA-Profit 3.0 I...</td><td>Device</td><td>KROHNE</td><td>1.02.0.</td><td>2006-12-22</td></tr><tr><td>PROFIBUS PA-Profit 3.0 I...</td><td>Device</td><td>KROHNE</td><td>1.02.0.</td><td>2006-12-22</td></tr><tr><td>PROFIBUS PA-Profit 3.0 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Step	Action
7	<p>Double-click and select the profile to be added. Click Add.</p> <p>NOTE: In ATV, only one profile exists.</p> 
8	<p>Selected profile appears in the Configured Modules tab.</p> 
9	Assign the required Profibus address and save the Configuration .
10	Complete the required settings like physical connections and close Topological Editor .

Creating a Project with Profibus Template

The following table describes the steps for creating a project with Profibus templates:

Step	Action
1	Instantiate the required control module template (for example, ATV71PB) in Application Editor .
2	Configure the instance as required.
3	<p>Click Projects Explorer > Assign > Generate > Create Executable > Map Controller and Communication.</p> <p>The PRM IO scanner line would be available for mapping.</p> 

CANOpen Technology

What's in This Chapter

Advantys Configuration in EcoStruxure Process Expert..... 511

Overview

This chapter describes the configuration and setup details of the devices connected through CANOpen.

Advantys Configuration in EcoStruxure Process Expert

Overview

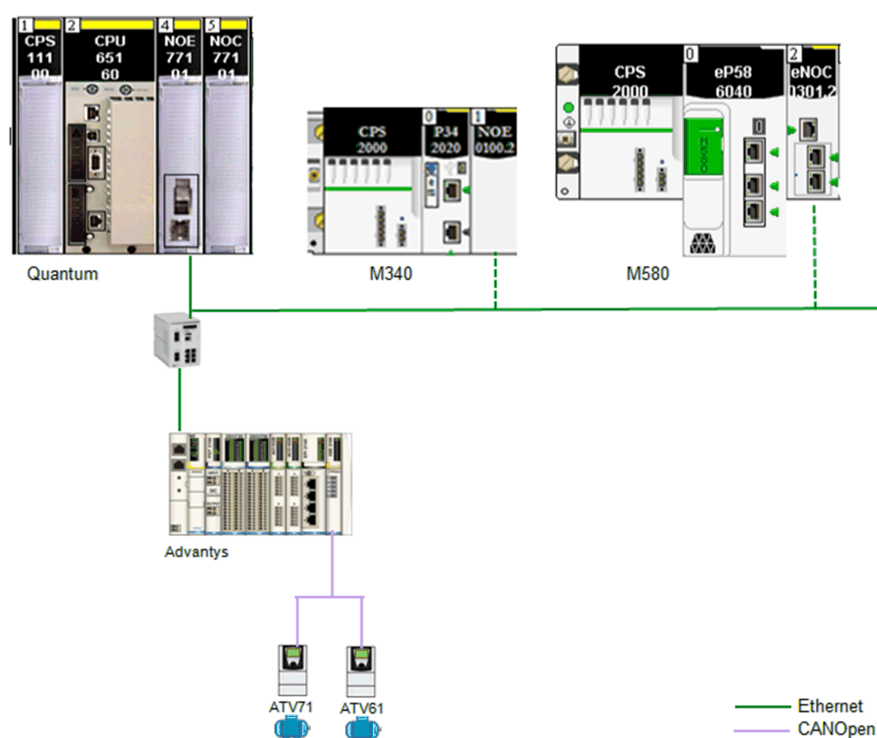
This section describes the procedure to configure Advantys island. In this example **ATV71** is used as a reference. However, same procedure can be used for creating an application with other devices.

Advantys Configuration in EcoStruxure Process Expert

Overview

This document explains the steps to be followed for configuring Advantys island using **IOScanning**. **ATV71** is used as a reference. However, same procedure can be used for creating an application with other devices

Architecture

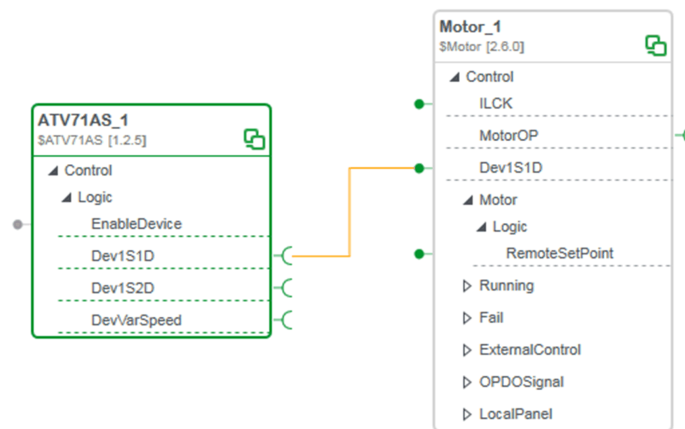


Prerequisites

Step	Action
1	In Project Explorer , create a project for Quantum controller.
2	In Topology , create Controller hardware configuration with IOScanning enabled for communication port.
3	Configure IP address in Advantys island. IP address is 192.168.1.114.

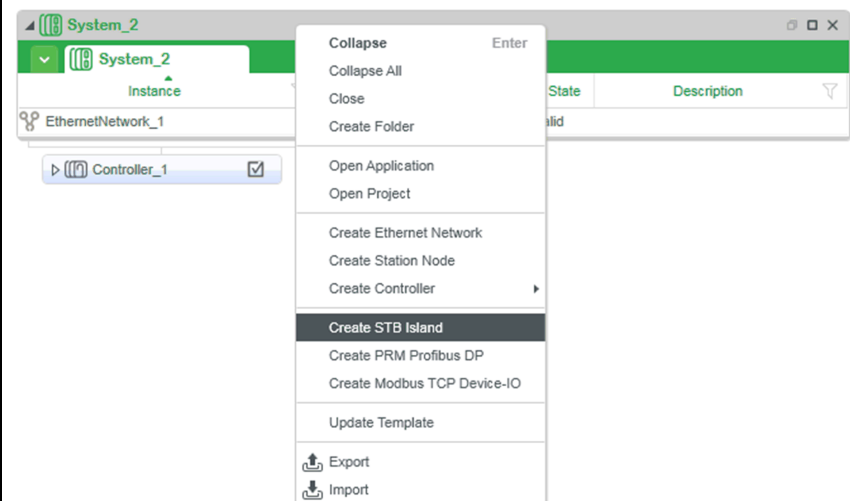
Application Explorer

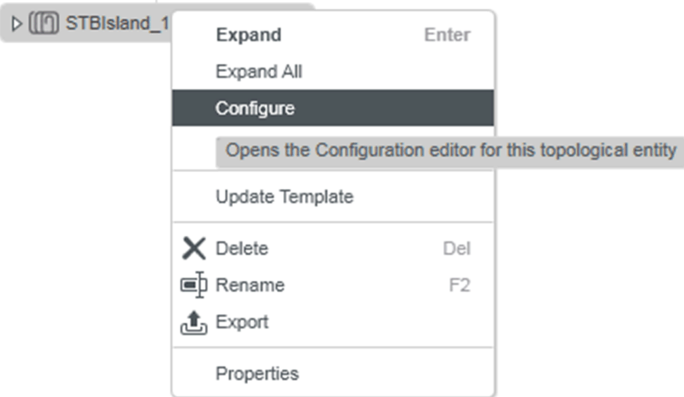
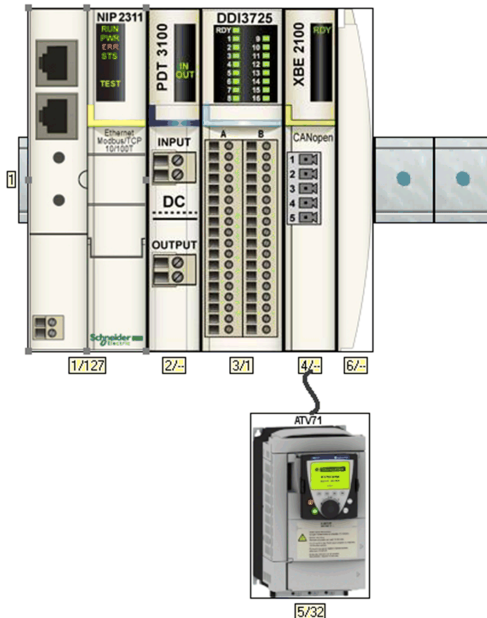
Step	Action
1	Instantiate ATV71AS and Motor templates in Application Explorer .
2	Right click on Instance of ATV71AS and select Edit Links . Link the objects as shown below.

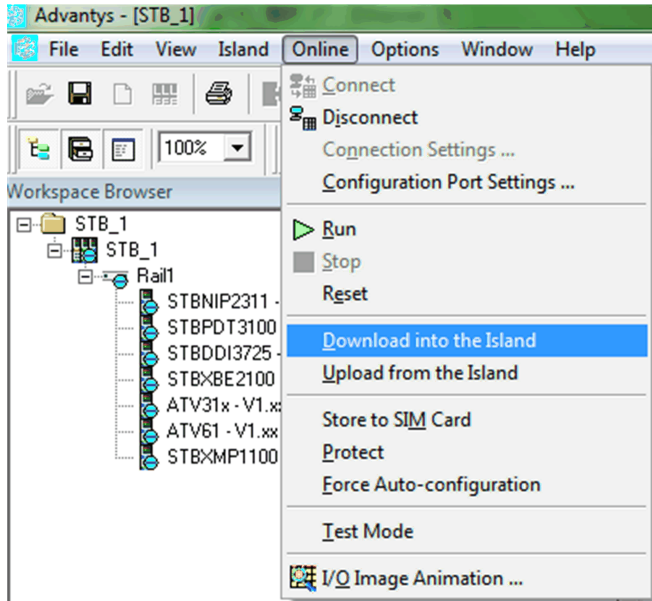
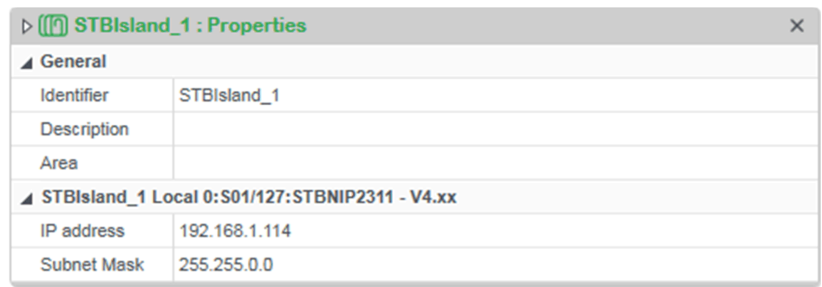
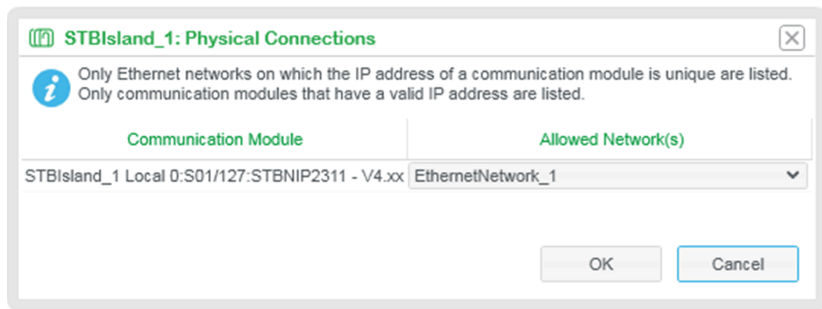


Topology Explorer

Step	Action
1	Navigate to Topology , right-click on System and select Create STB Island . New hardware instance, STBIsland_1 is created under topology explorer.
2	Configure the Advantys island by right-click as shown below.

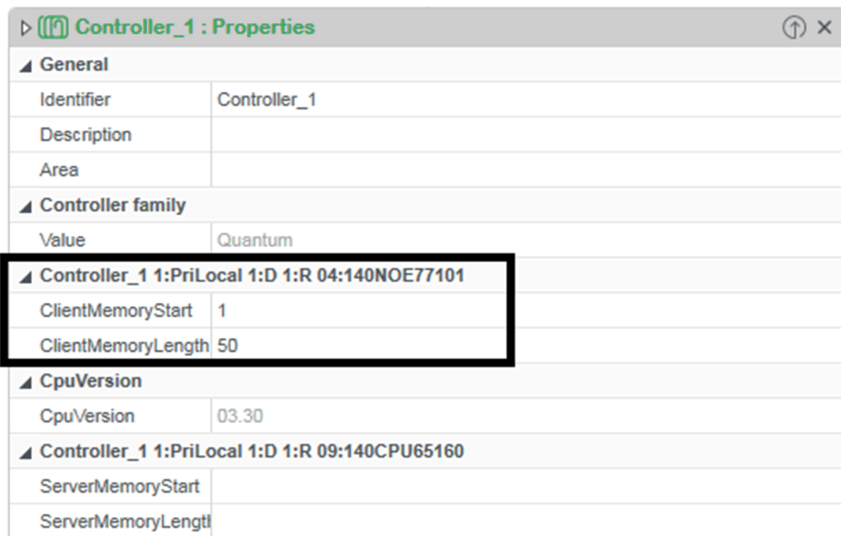


Step	Action
	
3	<p>The architecture shown below is configured with a CANOpen master, ATV71 drive is selected under CANOpen master. Check that required configurations are done in the ATV71 drive to communicate on CANOpen protocol.</p>  <p>NOTE: User should make the required configuration as per the application.</p>
4	<p>Perform Build All, once configuration is completed and download the same to the Advantys island as shown below. Island is healthy status appears after download is completed and starts working without any detected error. Once download is done successfully, close the window to save the configuration.</p>

Step	Action
	
5	<p>Right-click on STBIsland_1 and select Properties to configure the IP address. Set the required IP address and subnet mask of Advantys Island device as shown below.</p> 
6	<p>Right-click on STBIsland_1 instance and goto physical connections and select the Ethernet Network Address in Allowed Network(s) as shown.</p> 

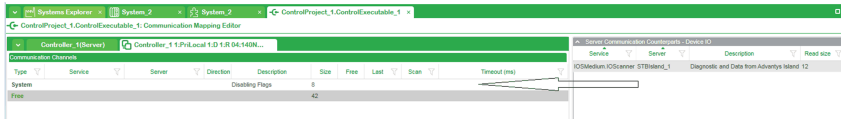
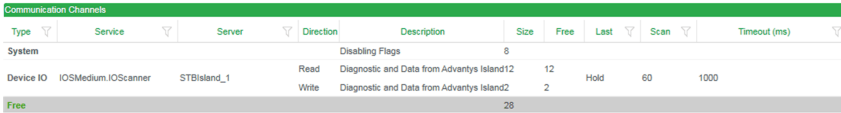
IO Scanning

In this example, Advantys is connected to NOE module of the Quantum controller, so the configuration has to be made in the same module.

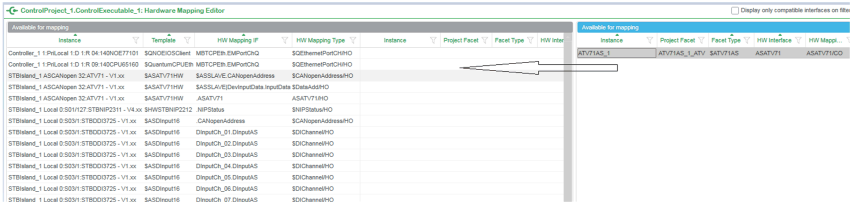
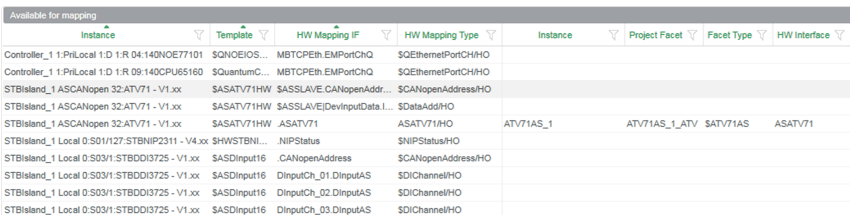
Step	Action
1	In Topology, right click on Controller instance and open Properties .
2	<p>Define ClientMemoryStart address and ClientMemoryLength to access under the NOE.</p>  <p>NOTE: ClientMemoryLength can be given as per the user requirement. For example, the above configuration occupies 14 ClientMemoryLength. User will get to know the required length when the Communication Mapping is done.</p>

Project Explorer

Map Communication

Step	Action
1	Navigate to executables section, right-click on Executables and select Map Communication .
2	<p>Map the communication counterparts - IO device to communication channels.</p> 
3	A dialog box opens to allow the user to configure the scan rate, timeout, and so on. Select the required values and click OK .
4	<p>Now, Advantys is available under Communication Channels and it occupies memory length required for this application.</p> 

Map Hardware

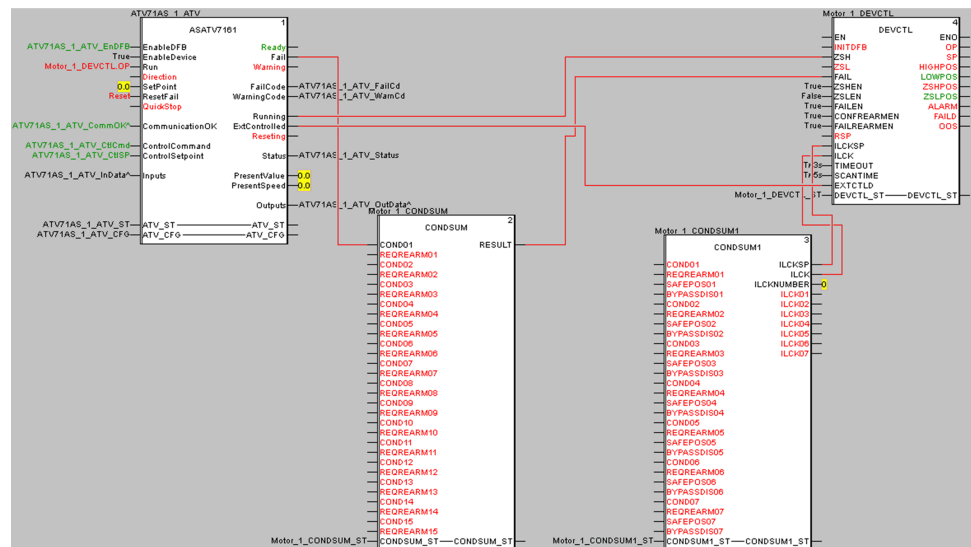
Step	Action
1	Navigate to Executables section, right-click on Executables and select Map Hardware .
2	Map the hardware interfaces by drag and drop of application interfaces, as shown below. <div>  <p>Map ATV71AS Data to ATV71/HO of \$ASATV71HW. This mapping is required to pass ATV71 data to DFB.</p> </div>
3	Once hardware mapping is done, ATV71 instance will be moved as shown below. <div>  </div>

Generation and Build

Step	Action
1	Assign the facet and generate and build the control project.
2	Perform build all and deploy the built project.

Read/Write Devices

Now, user should be able to read/write devices. If configurations are correct, *CommunicationOK* bit will be high. Now, user can perform *ResetFail* and make the DFB into *Ready* state and control the device using the DFB.



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