



Process Expert - General Purpose Library Classic

Equipment Module Supervision Services Reference Manual

EIO0000003015.06
03/2023



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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 tags, genies, faceplates, and other Supervision components that are the Supervision resources of the EcoStruxure Process Expert Equipment Module templates, providing the Supervision services.

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

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

Users of Supervision services need to have a good knowledge of EcoStruxure Process Expert, and of the 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 Classic Equipment Module Templates Reference Manual	EIO0000003016 (eng)
EcoStruxure™ Process Expert - General Purpose Library Classic Equipment Module Control Services Reference Manual	EIO0000003014 (eng)
EcoStruxure Process Expert User Guide	EIO0000001114 (eng)

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.

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Supervision Services

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Overview

This chapter describes how the Supervision services of the Equipment Module templates that are made available to you through EcoStruxure Process Expert and the embedded Supervision Participant.

Delivering Supervision Services

Introduction

Inside Equipment Module templates, the resources providing Supervision services are organized in composite and facet templates. They are the *elements* of the control module template and its instances.

Interfaces link these elements within the control module and allow making links to instances of other templates.

You can also use Supervision components (genies and faceplates) independently of Equipment Module templates. For example, you have the possibility to use a given genie of the SGC_Include2 project and its associated faceplate to supervise your own control module that you have created for controlling compatible devices.

NOTE: When implemented through control module templates, Supervision services are optional.

Supervision Facet Templates

The facet template is the smallest component of a Equipment Module template.

It encapsulates the constituents of the Supervision Participant, which are the tags (variable, alarm, trend) and genies described in this document.

During generation (see EcoStruxure™ Process Expert, User Guide), these constituents become part of the Supervision (see EcoStruxure™ Process Expert, User Guide) Participant project that you have created in EcoStruxure Process Expert.

NOTE: Genies and other Supervision resources are deployed through the include project (see EcoStruxure™ Process Expert - General Purpose Library Classic Process Supervision Services Reference Manual).

Supervision Composite Templates

The composite template is a container for Supervision elements and/or other composite references.

It helps organizing Supervision services inside the control module template.

Configuring Supervision Services

In Equipment Module templates, Supervision resources that correspond to the selected Control services are activated by default.

To customize the services provided by an instance of a control module template, the **Properties** window of the instance allows you to:

- Deactivate Supervision resources.
- Configure the parameters of selected Supervision resources.

In addition, you can modify the Supervision Participant project and its pages during refinement.

Supervision Resource Structure

Types of Resources

The SGC_Include2 project contains the following Supervision resources grouped in libraries:

Symbols	Static graphical elements are supplied as symbol libraries so that you can 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 SGC_Include2 project to the Supervision Participant project so that the resources it contains are deployed with the master project.

List of Supervision Functions

Overview

The Supervision functions described in this document are grouped by family.

The families are the same as the ones used to group the Equipment Module templates (see EcoStruxure™ Process Expert - General Purpose Library Classic Equipment Module Templates Reference Manual).

Each function is assigned to the same family as the Equipment Module template that references it.

List of Families

The following table lists the Supervision functions of Equipment Module family:

Family name	Supervision Function
Equipment Module	Equipment Module Management, page 40
	Pump Set Pattern Management, page 59
	Flow Control Pattern Management, page 65

Environment Preparation

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Environment Preparation

EcoStruxure Process Expert-Specific Settings

For information on the EcoStruxure Process Expert-specific settings in the OPC Factory Server (OFS) configuration file, refer to *Performance Considerations* (see EcoStruxure™ Process Expert, Supervision Participant Services, User Guide).

OFS OPC Driver Configuration

For information on the OFS OPC driver configuration, select **Driver Help** on the menu of the Supervision Participant. In the help, select **OFSOPC Driver** driver.

OFS Server Configuration

For information on the OFS server configuration, refer to the **User Guide** section (**The OFS Configuration Tool** chapter, **The Alias folder** section) of the OPC Factory Server online help, which is accessible by clicking the ? button on the EcoStruxure Process Expert title bar.

Supervision Features

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Overview

This part describes the main features of Supervision services.

Access Control

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Overview

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

Privilege Levels and Labels

Overview

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

Supervision components use non-hierarchical privilege levels (Supervision default mode) to provide the components with maximum access control flexibility.

Default Privilege Levels

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

Privilege	Use
1	Enables the acknowledgment of alarms associated to Supervision components. NOTE: Alarm acknowledgment is also conditioned by the <i>[Privilege] AckAlarms</i> parameter (set to 1 by default). If a privilege level that is different from that configured in the <i>[Privilege]AckAlarms</i> parameter is configured in the alarm tag, you require both privilege levels to acknowledge the alarm.
2	Operator actions: Operator setpoint changes (including parameters and commands regarding sequences).
3	First-level supervisor actions: <ul style="list-style-type: none"> Changes to alarm setpoints and enabling/disabling first-level alarms (HI, LO, DEV). Adjustments to control parameters.
4	Second-level supervisor actions: Change of owner (Operator/Program)
5	Engineering and/or maintenance personnel actions: <ul style="list-style-type: none"> Set-point changes and enabling/disabling second-level alarms (HIHI, LOLO, digital). Interlock bypassing. Enabling/disabling the simulation mode.
6	Not used.
7	Not used.
8	Not used.

Labels

Supervision labels have been defined in the SGC_Include2 project. These labels define the default privilege level that is required to carry out actions on the different Supervision components. Each action that you can perform on a component is associated to a label.

The syntax of the privilege labels is: SGC_PRIV_<type of component>_<type of action>.

For example, SGC_PRIV_SD_SIM defines the privilege level to enable the simulation mode in the faceplate of a variable speed drive.

You can modify the privilege level that is associated to each label to adapt the behavior of components according to the requirements of the system.

The table lists the values that exist for the <type of component> parameter, the corresponding library, and their description:

<Type of Component>	Library	Component description
AA	Process monitoring	Analog alarms (AALARM)
AI	Process monitoring	Analog inputs (AINPUT)
AI1	Process monitoring	Analog inputs (AINPUT1)
AO	Process monitoring	Analog outputs (AOUTPUT)
AR	Process monitoring	Analog ramps (ARAMP)
AS	Process monitoring	Analog signal selectors (ASELECT1)
B	Control subsystem diagnosis	Battery
BB	Power management	Busbar (BUSBAR)
CPUDIAG	Control subsystem diagnosis	CPU diagnosis
CV	Process monitoring	Control valves (CVALVE)
D	Process monitoring	On-off devices (DEVCTL)
DI	Process monitoring	Digital inputs (DINPUT)
DO	Process monitoring	Digital outputs (DOUTPUT)
DP	Device monitoring	Device publishing (DEVPUB)
EM	Process monitoring	Equipment Module (EMCTL)
FC	Process monitoring	Flow Control (FLOWCTLPATTERN)
G	Power management	Central system (SGU_SYSTEMCONFIG)
GS	Control subsystem diagnosis	Controller status (GENSTS)
GN	Power management	Generators (SGU_ENERGYSOURCE)
HV	Process monitoring	Manual valves (HVALVE)
IM	Process monitoring	IMC controllers (IMCTL)
IN	Power management	Infeeds (INFEED)
LD	Power management	System loads (LOAD)
LL	Process monitoring	Lead-lag controllers (LDLGCTL)
M2	Process monitoring	2-speed/rotation direction motors (MOTOR2)
MB	Process monitoring	Messages for the operator (MSGBOX)
MC	Power management	Masterpact devices (DEVICES)
MD	Process monitoring	Motorized valves without positioner (MVALVED)
MV	Process monitoring	Motorized valves with positioner (MVALVE)

<Type of Component>	Library	Component description
PAR	Uploading and downloading of parameters or recipes	–
PID	Process monitoring	PID controllers (PIDCTL)
PM	Process monitoring	PIDMUX configurators (PIDMUX)
PS	Process monitoring	Pump Set Pattern management (PUMPSETPATTERN)
PW	Process monitoring	PWM controllers (PWMCTL)
RST	Supervision System diagnosis	–
RT	Process monitoring	Ratio controllers (RATIOCTL)
SC	Process monitoring	Sequential control (SEQCTL1)
SD	Process monitoring	Variable speed drives (SDDEVCTL)
SP	Process monitoring	Setpoint management
SPL	Process monitoring	Split range controllers (SPLRGCTL)
SR	Power management	Power supply (SOURCE)
STEP3	Process monitoring	Three-step controllers (STEP3CTL)
TR	Power management	Transformers (SGU_ENERGYSOURCE)
TL	Process Monitoring	Total function (TOTAL)

NOTE: The names that appear in brackets in the *Component description* column are the names of the Control blocks that provide the data to the Supervision resources.

Example

The **SGC_PRIV_AA_ENL** label in the SGC_Include2 project defines the privilege required to enable/disable monitoring of the low-level alarm in resources for analog alarm management.

By default, the privilege level for the label is 3. This action is categorized as an action that should be accessible to users of type first-level supervisor.

Citect Studio - Supervision_FAT 20180216 [Active Project]

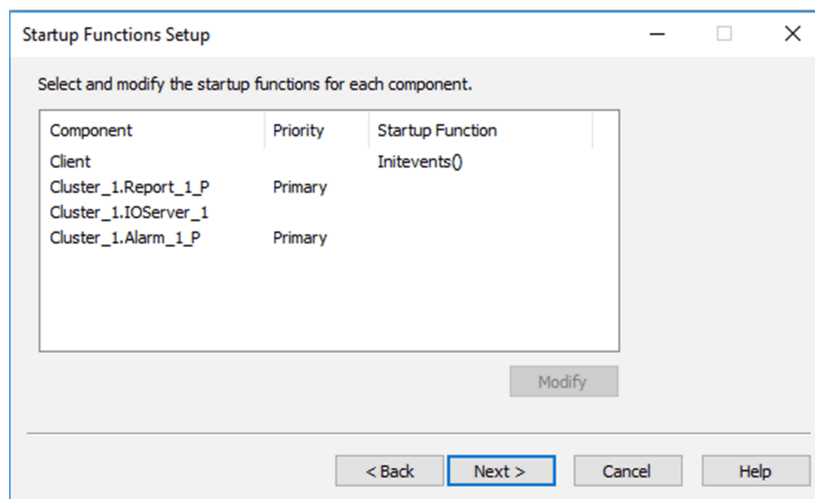
Row	Label Name	Expression	Comment	Project
84	SGC_PRIV_AA_ENL	3	Privilege to change Enable/Disable LO	SGC_Include2

System Access Traceability

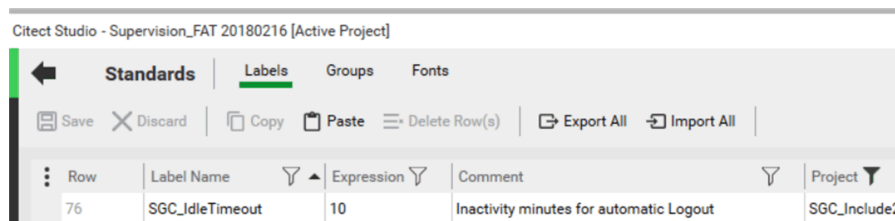
Configuration Aspects

The configuration aspects are listed below.

The Supervision project needs to call the `InitEvents` function. Usually, include this call in the Supervision node configuration.



When necessary, modify the **SGC_IdleTimeout** Supervision label (Labels) in the **SGC_include2** project to define the period (in minutes) of inactivity after which you are automatically logged off from Citect SCADA. It is set to 10 (minutes) by default.



Alarm Functions

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Overview

This chapter describes alarm functions that are managed by Supervision components.

Alarm Category Labels and Numbers

Overview

Labels are defined in the SGC_Include2 project to associate an alarm category to each alarm function. These labels also include a number.

You can change the label that is associated to an alarm function to adapt its behavior to the specific requirements of your project.

Refer to *Advanced Alarm Properties* in the help of the Supervision Participant for details on the alarm category property.

Alarm Category Numbers

By default, the following general criteria is applied to assign category numbers to alarms:

Number	Use
1	Device and input/output detected error; high-level (HIHI) and low-level (LOLO) alarms.
2	Digital alarms; high-level (HI) and low-level (LO) alarms.
3	Deviation alarms regarding setpoints.
253	Process Events, page 24.

Alarm Category Labels

The syntax for alarm category labels is: SGC_CAT_<type of component>_<type of alarm>.

NOTE: Refer to *Privilege Levels and Labels*, page 20 for a list of abbreviations used for <type of component>. It allows you to identify the type of Control block from which data used by alarm functions is originating when you implement Supervision, using control module templates of the General Purpose library.

Process Alarms

Description

Supervision components are preconfigured to manage advanced alarm tags.

During operation, you can view alarms at one or more of the following levels:

- Genie
- Faceplate
- Supervision pages (for example, **Active Alarms**, **Alarm Summary**, **Sequence of Events**)

Alarms need to be acknowledged.

For a list of advanced alarm tags, refer to the chapter describing the Supervision function.

Process Events

Description

Supervision components are preconfigured to manage process events, which are regular process conditions that may need to be traced.

Process events are optional and implemented like alarms although they are auto-acknowledged by the system. They are managed with the help of advanced alarm tags and are assigned a specific alarm category, page 23.

Process events allow you to trace, for example, equipment status and status changes, interlock conditions, asynchronous changes. Certain operator actions (for example, setpoint changes) can also be traced as process events in addition to being logged as activity.

Viewing Process Events

A record of process events is kept on the following pages during operation:

- **Sequence of Events** (SOE) page: Provides a list in chronological order of occurrence, which also includes other events such as alarms or operator actions.
- Alarm pages.

NOTE: To view **Process Events** in **Sequence of Events** page, You use advance filter with category 253 in **Action** menu. The triggered process event will be seen as an **Event Message - Alarm Raised** and cleared process event will be seen as an **Event Message - Alarm Cleared** in the **Sequence of Events** page.

Multilanguage Support

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Multilanguage Support

Overview

Supervision components support multiple languages. The native language used is English but a translation into Spanish is also provided.

Representation of Supervision Data

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Overview

Genies and faceplates use icons, animations, and other graphic elements to convey information related to control modules, such as values, setpoints, statuses, 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.





Color Codes

Dynamic Variable Status

Description

This 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
Digital indicators: <ul style="list-style-type: none"> Status (PV) Setpoint (SP) Control (OP) 	Green 	Active	Active running order. Active running confirmation. Open active valve order. Open valve.
	Black 	Idle	Idle running order. Idle running confirmation. Active close valve order. Closed valve.
	Yellow 	Inconsistency	Open-valve and closed-valve limit switches are active simultaneously.
	Blue 	Transition	Open-valve and closed-valve limit switches are idle at the same time.
Information	Yellow 	Active	Active bypass for an interlock.
	—	Idle	—
Alarms	Red and yellow alternating 	Active, not acknowledged	High level alarm. Detection of unsuccessful operation.
	Red 	Active and acknowledged	

Function	Color	Status	Example of use
	Black and yellow alternating 	Inactive, pending acknowledgement	Thermal overload alarm was generated and the condition was cleared. The alarm has not been acknowledged yet.
	—	Normal	No alarm.
Numeric indicators	Blue on gray background 	Present value (PV)	Current temperature value.
	Green on gray background 	Setpoint value (SP)	Target temperature value.
	Yellow on gray background 	Control output (OP)	Control valve position.

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 `sgc_devctl_motors` library contains six genies for on/off motor management.

These genies allow monitoring and interacting 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 SGC_Include2 project have the **Control Module** and **Area** properties but may also feature additional properties.

The following figure shows an example of the properties dialog box of the `SPBool_Checkbox_10` genie, featuring the additional **Legend** and **HideLegend** properties:

The following figure shows an example of the properties dialog box of the `sgc_ibphase4_10` genie, featuring the additional properties:

1 Name for the control buttons available in Genie and faceplate. If name is not given, the corresponding button will not be available for operation.

2 You can configure any tag name which is available in the project. The tag description and its value will be shown.

3 Option to hide the command buttons in runtime window. Mark **X** to hide the selected button.

4 Strategy name. You can configure eight different strategies. The tag **Parameter 1** will be occupied for strategies if user writes the strategy name in genie form. So you cannot use it as a normal input parameter.

5 The parameters required in the corresponding strategy. The configured parameters only available for the user in run time window.

The following figure shows an example of the properties dialog box of the `sgc_empanelalldata4_10` genie, featuring the additional properties:

1 You can configure any tag name which is available in the project. The tag description and its value will be shown.

2 Option to hide the command buttons in runtime window. Mark **X** to hide the selected button.

Genie Equipment Module Name

The name that appears in the **Control Module** field of the genie properties window is used to generate expressions referencing tags.








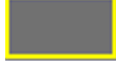













For example, a genie of the `sgc_emctl_10` library with `EMCTL1` as a **Equipment Module** (EM) name generates connections with the following tags: `EMCTL1_EMCTL_STW` and `EMCTL1_EMCTL_CFGW`.









Genie Icons

Description

The table describes the icons that are part of genies representing control modules and that may be displayed during operation:

Function	Icon	Color animation	Meaning	Examples of use	Comments
Owner selection		N/A	Operator	Valve in operator mode (the operator sets the setpoint).	–
			Program	Valve in program mode (the program sets the setpoint).	
Operating mode	AUTO	N/A	Automatic	Closed-loop PID controller.	–
	MAN		Manual		
	CASC		Cascade	Closed-loop PID controller with an externally set set-point. Valve that is controlled remotely according to an externally set set-point.	
Interlocking	Green	N/A	Active	A motor is interlocked because of an interlock condition.	–

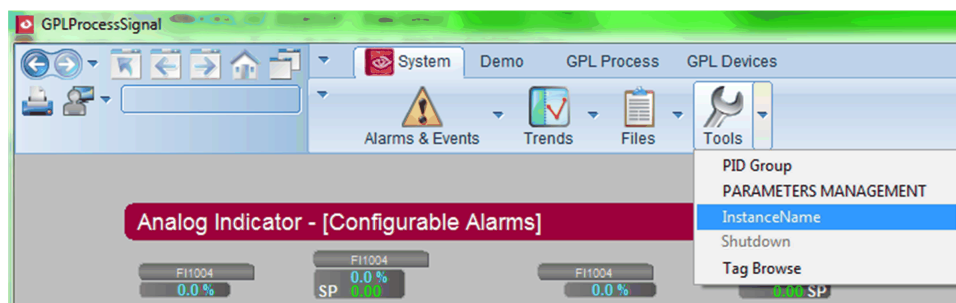
Function	Icon	Color animation	Meaning	Examples of use	Comments
					
	Yellow 	Flashing	Active (waiting for manual resetting)	At least 1 interlock requires manual resetting.	
		N/A	Idle	–	
Bypass		N/A	Global bypass is activated	Global bypass of the interlocks for a valve.	Represented on the element that is bypassed.
			Partial bypass	Bypass of an interlock that appears on the interlocks tab of the faceplate, but not a global bypass.	
	(Invisible)		Idle	–	–
External control / Canceled output "power removal"		N/A	Active	Pump controlled with electrical switching from machine push-button panel.	Represented on the symbol representing the output (OP).
	(Invisible)		Idle	–	–
Resetting required		Flashing	Awaiting resetting	Motor awaiting resetting after thermal trip.	Displayed if mandatory manual resetting is enabled in the resource controlling the device.
	(invisible)	N/A	Does not require resetting	–	–
Simulation	Yellow outline 	N/A	Active	Simulation of limit switches for an on/off valve.	Represented by placing the control module in simulation mode.
	(Invisible)		Not active	–	–
Detection of communication interruption		Alarm standard	Communication interruption	Communication interruption between analog input channel and device	Enables acknowledgment of the alarm.
Detection of alarm/ unsuccessful operation		Alarm standard	Alarm raised/ unsuccessful operation	Level alarm. Position of on/off valve unsuccessful (ZSH).	Enables acknowledgment of the alarm.
Detection of non-operational device		Alarm standard	Inoperable device	Thermal motor overload.	–
Detection of non-operational I/O channel		Alarm standard	Non-operational I/O channel	Analog input channel problem.	–
Level alarms		Alarm standard	Very high	Very high temperature.	Enables acknowledgment of the alarm.
			High	High temperature.	
			Deviation	Temperature outside of setpoint.	
			Low	Low temperature.	
			Very low	Very low temperature.	
Alarm level setpoints	Red 	Black fill 	Very high	Very high temperature.	–
	Red 	Red fill 	High	High temperature.	

Function	Icon	Color animation	Meaning	Examples of use	Comments
	Green 	Black fill 	Valid signal range	Temperature outside of setpoint.	
	Red 	Black fill 	Low	Low temperature.	
	Red 	Black fill 	Very low	Very low temperature.	
Next step enable		Blink 	Proceed to next step	Semi-manual operation of process.	Refer to sequence object for more information.

Displaying Genies

Overview

The label that identifies each dynamic object inserted into a synoptic can be shown or hidden at will during runtime.



NOTE: To hide or show the label, click **InstanceName** available under **System > Tools**.

Faceplates

Overview

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

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

This faceplate allows interacting with the corresponding Control block.

Genie-Faceplate Link

Description

Genies included in the SGC_Include2 project are already linked to a faceplate without the need for further configuration.

The genie-faceplate link is established by the function `sgc_call_faceplate`, which uses the following parameters:

- *GenieType*: Name of the genie type.

- **Parameters:** Function that is called by the *Call Faceplate* function, which opens the faceplate.

For this purpose, a default parameter set is defined in the *sgc_faceplace_ass* table in the *sgc_faceplates.ci* file of the *SGC_Include2* project.

The genie passes the parameters to the function that is defined. These are the parameters that you configure either in the **Properties** window of the instance and/or in the properties window of the genie when assigning it to a page.

You can find the standard code for the functions that have been supplied in the *sgc_faceplates.ci* file of the *SGC_Include2* project.

Changing the Genie-Faceplate Link

You can link to a genie to a different faceplate. To do so, you need to define the `<GenieType>` parameter and the corresponding function in the *SGC_CALL_FACEPLATE* section of the *sgc_faceplates.ci* file.

When the program detects that `<GenieType>` is defined in this section, it calls the function that you have defined with this parameter; otherwise it calls to the default function defined in the *sgc_faceplace_ass* table

You can define this parameter set directly in this file or, preferably, using the **Cicode Editor**, which you can access from the Supervision Participant.

In this example, the parameter set is configured so that genies belonging to the *sgc_ainput* library call the *my_ainput_faceplate* function, which opens the corresponding faceplate:

Parameter	Description
<i>GenieType</i>	For example, <i>AINPUT</i> . NOTE: The name of the genie type corresponds to the root of the library name that the genie belongs to. The library name is indicated in the <i>Genies</i> topic of every chapter describing a Supervision function. For example, for <i>Analog Input Management</i> , the genies belong to the <i>sgc_ainput</i> library. The <code><GenieType></code> is therefore <i>AINPUT</i> .
<i>Parameters</i>	For example, <i>my_ainput_faceplate</i> .

Faceplate Icons

Overview



Faceplates consist of tabs that regroup by category the functionalities provided by the associated Control block during operation.





Each category is represented by an icon that you can click to display its tab.

Certain tabs are *optional*, page 36 and become available only if the control module features the corresponding element and the element is selected.

Description

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

Category/Tab	Icon	Functions	Examples of use
Operation		<ul style="list-style-type: none"> • Owner change • Operating mode change • Setpoint (SP) change • Resetting 	<ul style="list-style-type: none"> • Operator/ program • Manual/Auto • PID controller setpoint (SP) change in auto mode and output change in manual mode
Interlocks / start conditions		<ul style="list-style-type: none"> • Interlock status 	Interlocks associated with an on-off valve

Category/Tab	Icon	Functions	Examples of use
		<ul style="list-style-type: none"> Bypassing and/or resetting of interlocks 	
Diagnostic information		<ul style="list-style-type: none"> Status of abnormal conditions Bypassing of conditions 	High-level alarm
Information		Access to component data in the system	<ul style="list-style-type: none"> Component name and version Addresses used to access controllers
Sequence Tab		<ul style="list-style-type: none"> Current state and strategy are displayed Step that is being executed and its number Elapsed time after the start of sequence 	<ul style="list-style-type: none"> Equipment state and strategy Strategy sequence Three modes of operation - Automatic, Semi-Automatic and Manual Sequence steps
State Machine Tab		Allows the operator to see the current state and the possible next states.	Label of states appear in white while the current state appears in the same color as its frame. Only, names of transient states will be blinking when it is active.

Faceplate Buttons






Overview












Buttons are shown as pressed if their function is activated.

They are shown as disabled if the operator does not have the rights to operate them, or if the function is not available due to the Control block configuration (for example, button to open the valve if the program is configured as the owner).

Description

The table describes the buttons that may appear on the different tabs of a faceplate:

Function	Button	Action	Examples of use	Comment
Change owner		Operator becomes the owner	Placing a motor in operator mode to be able to set its set-point from the Supervision.	–
		Program becomes the owner	Placing a motor in program mode so that the program sets the desired setpoint (SP) depending on the programmed strategies.	–
Set the discrete setpoint (SP)	Green 	Activate	Starting a motor or opening a valve.	–
	Red 	Deactivate	Stopping a motor or closing a valve.	–
Control module reset		Reset	Manually resetting a motor following a thermal overload after the overload condition is cleared.	<p>Available on the Operation tab. The button is enabled when manual resetting of the Control block controlling the device is mandatory after the abnormal condition is cleared.</p> <p>To enable this button, you may need to click the partial reset buttons that appear on the Diagnostic Information tab if the</p>

Function	Button	Action	Examples of use	Comment
				function is enabled in the corresponding Control block.
Simulation		Activate	Entering the simulation mode to operate an on-off valve, using the open/close buttons of the faceplate.	Displayed on the Configuration tab
		Deactivate	Returning to normal operation mode where the valve is controlled by the program.	
Global bypass of interlocks		Activate	Activating the global bypass of interlocks for a valve (the valve is not interlocked anymore).	Available on the Configuration tab
		Deactivate	Deactivating the global bypass of interlocks of a motor (the motor becomes interlocked if applicable).	
Resetting a counter		Set to 0	Resetting the hours-of-operation counter for a device.	The icon on the button is only shown if the counter has exceeded its maximum value (it has started over).
Rotation direction		Forward	Selecting a forward rotation direction on a motor.	–
		Reverse	Selecting a reverse rotation direction on a motor.	–
Enabling		Enable	Activating detection of alarms or deactivate bypass of the interlock (from the list of bypassed interlock conditions).	Available on the Interlocks and Diagnostic Information tabs. The alarm button can be displayed on the Configuration tab also.
			Activating bypass of the interlock (from the list of active interlock conditions).	
Partial reset		Reset	Manually resetting the input of the respective Control block after an interlock condition or a detected error condition is cleared.	Available on the Interlocks and Diagnostic Information tabs. The button is enabled when manual resetting the corresponding input of the Control block that detects the condition is mandatory after the condition is cleared. NOTE: For detected error conditions, may require additional, manual reset of the equipment by using the control module reset button that is located on the Operation tab if the function is enabled.
Close faceplate		Exit	–	–

Process Monitoring Services

What's in This Part

Common Faceplate Tabs 36

Overview

This part describes the Supervision resources that are specific to process monitoring services.

⚠ WARNING
UNEXPECTED SYSTEM BEHAVIOR The Control application must pass on the relevant validations before being used in the process. Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING
UNEXPECTED SYSTEM BEHAVIOR The Supervision has to be used with special caution and always by qualified personnel. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Common Faceplate Tabs

What’s in This Chapter

Information Tab	36
Initial Conditions Tab	37
Diagnostic Information Tab	38

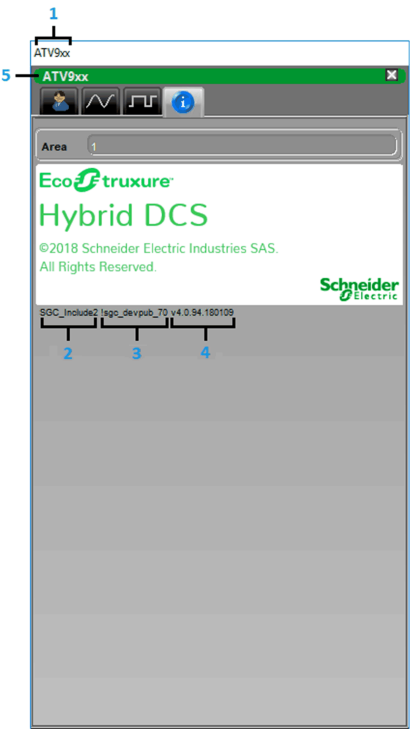
Overview

This chapter describes the different optional tabs that are common to the faceplates, page 31 for process monitoring.

Information Tab

Representation

The following figure shows an example of the information tab that is available for each faceplate:



- 1 Default identifier of the instance using the faceplate
- 2 Name of the include project that contains the faceplate
- 3 Name of the faceplate file
- 4 Version of the include project that contains the faceplate
- 5 Description of the object

Initial Conditions Tab

Overview

The optional Initial Conditions tab is available on Equipment module faceplates, allowing you to view and interact with conditions that are configured to interlock an Equipment module.

Depending on the configuration of the corresponding Control block, the tab allows bypassing each condition. You can also make manual resetting of each input of the corresponding Control block mandatory after the interlock condition is cleared.

For information on the availability of the tab, refer to the topic describing each Supervision function.

Tab Description

At the beginning of this manual, you can find the description of:

- The color convention, page 26 that is used to display data.
- The buttons, page 33 that appear on the tab.

User Interface Messages

The tab displays the messages contained in the *UIMessag.dbf* database to describe interlocking or initial conditions.

Initial Conditions Tab Representation



Diagnostic Information Tab

Overview

The optional Diagnostic Information tab is available on certain faceplates, allowing you to view and interact with detected error conditions at the control module level.

Depending on the configuration of the related Control block, the tab allows bypassing each condition. You can also make manual resetting of each input of the corresponding Control block mandatory after the abnormal condition is cleared.

For information on the availability of the tab, refer to the topic describing each Supervision function.

NOTE:

- This tab is also used to display alarm conditions for alarm summary management.
- The bypass button is available only when the configured length of the description of conditions is more than one character.

Tab Description

At the beginning of this manual, you can find the description of:

- The color convention, page 26 that is used to display data.
- The buttons, page 33 that appear on the tab.

User Interface Messages

The tab displays the messages contained in the *UIMessag.dbf* database to describe abnormal conditions.

Diagnostic Information Tab Representation



Equipment Module


What's in This Part

Equipment Module Management40

Overview

This part describes the components that provide the Supervision functions and runtime services that are available for the management of Equipment Module.

These components do not reflect any specific installation.

 **WARNING**

LOSS OF CONTROL

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

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

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

Equipment Module Management

What's in This Chapter

Description 40

Control/Supervision Relationship 41

Tags 42

Genies 45


Faceplates 47

Input/Output Parameter Configuration for Equipment Module 54

Overview

This chapter describes the Supervision functions and runtime services that are available for the management of Equipment Module.

These components do not reflect any specific installation.

 **WARNING**

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
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Description

Required Software Components

The faceplate implemented for Equipment Module uses a Microsoft® Forms 2.0 ActiveX® control. Verify that the necessary Microsoft® ActiveX® control resources are installed on PCs on which you want to use the faceplate during operation.

Supervision Functions

The table describes the main functions for Equipment Module management:

Function	Description
Equipment state management	Shows the state of the equipment.
Strategy state management	Shows the strategy of the equipment.
Owner selection	Allows you to configure whether the sequence commands come from the program or the operator.
Operating mode	Allows you to operate the sequence in automatic/semi-automatic or manual mode.
Command management	Allows you to send commands (such as <i>Start</i> and <i>Stop</i>) to the strategy.
Parameter management	Allows you to select a strategy, enter input parameter values, and monitor output values.
Initial condition management	Optional function. It allows you to manage initial conditions that are not satisfied and it blocks the start of the strategy.
Diagnostic information management	Optional function that allows you to manage abnormal conditions detected by the strategy.

These functions are implemented in runtime through genies and their associated faceplate.

Control/Supervision Relationship

Overview

The table describes which Control blocks provide data to the Supervision components of the `sgc_emctl` library:

Control blocks		Description	Block status
EMCTL		Equipment module controller	X
CONDSUM		Summary of conditions	O
		Initial conditions and detected error conditions	
X		Mandatory block	
O		Optional block	

The data is created from the corresponding Control templates and shared through interfaces. This allows the necessary tags with the appropriate syntax to be generated in the databases of the Supervision Participant.

For the description of these Control resources, refer to Equipment Module (see EcoStruxure™ Process Expert - General Purpose Library Classic Equipment Module Templates Reference Manual).

Tags

Tag Syntax

Refer to Genie Control Module Name, page 29.

Variable Tags

The table describes the variable tags that are managed by Supervision components:

Name	Data type	Description
Standard Tags		
<i>EM name_EMCTL_EMSTATE</i>	UINT	Equipment state
<i>EM name_EMCTL_STRATEGY</i>	UINT	Strategy
<i>EM name_EMCTL_STATE</i>	UINT	Strategy execution state
<i>EM name_EMCTL_STEPPD</i>	STRING	Step description
<i>EM name_EMCTL_COMMAND</i>	UINT	Strategy Command
<i>EM name_EMCTL_STW</i>	UINT	Status word
<i>EM name_EMCTL_CFGW</i>	UINT	Configuration word
<i>EM name_EMCTL_ETIME</i>	LONG	Elapsed time in current step
<i>EM name_EMCTL_CSTEPPD</i>	STRING	Current step descriptor
<i>EM name_EMCTL_DISSTRATEGY</i>	STRING	Disable strategy
<i>EM name_EMCTL_NSTEP</i>	INT	Next Step
<i>EM name_EMCTL_TRANSD</i>	STRING	Transition descriptions
Input Output Parameter Tags		
<i>EM name_IP01</i>	DIGITAL	Input Parameter 01
<i>EM name_IP02</i>	ULONG	Input Parameter 02
<i>EM name_IP03</i>	ULONG	Input Parameter 03
<i>EM name_IP04</i>	INT	Input Parameter 04
<i>EM name_IP05</i>	REAL	Input Parameter 05
<i>EM name_IP06</i>	INT	Input Parameter 06
<i>EM name_OP01</i>	REAL	Output Parameter 01
<i>EM name_OP02</i>	ULONG	Output Parameter 02
<i>EM name_OP03</i>	DIGITAL	Output Parameter 03
<i>EM name_OP04</i>	ULONG	Output Parameter 04
Optional Tags		
<i>EM name_IC_CONDSUM_BYPASSW</i>	UINT	Bypass word
<i>EM name_IC_CONDSUM_CONDW</i>	UINT	Status word
<i>EM name_IC_CONDSUM_REARMREQW</i>	UINT	Rearm required word
<i>EM name_FC_CONDSUM_BYPASSW</i>	UINT	Detected error condition bypass
<i>EM name_FC_CONDSUM_CONDW</i>	UINT	Detected error condition data
<i>EM name_FC_CONDSUM_REARMREQW</i>	UINT	Resetting signals for detected error conditions

Control Expert Variables

The table describes the variables in Control Expert to establish communication with Citect SCADA for *EMCTL*:

DFB Name	Pin Name	Variable Name
EMCTL	<i>EMCTL_ST</i>	<i>EM name_EMCTL_ST</i>
EMCTL	<i>EMCTL_CFG</i>	<i>EM name_EMCTL_CFG</i>
CONDSUM (Initial conditions)	<i>IC_CONDSUM_ST</i>	<i>EM name_IC_CONDSUM_ST</i>
CONDSUM (Detected error conditions)	<i>FC_CONDSUM_ST</i>	<i>EM name_FC_CONDSUM_ST</i>

Advanced Alarm Tags

The table describes the advanced alarm tags and process events that are managed by Supervision components. It also indicates the expression that is configured in the Supervision components to read or write the corresponding tag:

Name	Expression	Description	Process Events, page 24
EM name_EMCTL_IDLE	EM name_EMCTL_STATE BitAND 0x0001	Execution state (Idle)	Yes
EM name_EMCTL_RUNNING	EM name_EMCTL_STATE BitAND 0x0002	Execution state (Running)	
EM name_EMCTL_HELD	EM name_EMCTL_STATE BitAND 0x0004	Execution state (Held)	
EM name_EMCTL_HELDFORERROR	EM name_EMCTL_STATE BitAND 0x0008	Execution state (Held For Error)	
EM name_EMCTL_STOPPED	EM name_EMCTL_STATE BitAND 0x0010	Execution state (Stopped)	
EM name_EMCTL_PAUSED	EM name_EMCTL_STATE BitAND 0x0020	Execution state (Paused)	
EM name_EMCTL_ABORTED	EM name_EMCTL_STATE BitAND 0x0040	Execution state (Aborted)	
EM name_EMCTL_COMPLETE	EM name_EMCTL_STATE BitAND 0x0080	Execution state (Complete)	
EM name_EMCTL_HOLDING	EM name_EMCTL_STATE BitAND 0x0100	Execution state (Holding)	
EM name_EMCTL_HOLDINGFORERROR	EM name_EMCTL_STATE BitAND 0x0200	Execution state (Holding For Error)	
EM name_EMCTL_RESTARTING	EM name_EMCTL_STATE BitAND 0x0400	Execution state (Restarting)	
EM name_EMCTL_PAUSING	EM name_EMCTL_STATE BitAND 0x0800	Execution state (Pausing)	
EM name_EMCTL_STOPPING	EM name_EMCTL_STATE BitAND 0x1000	Execution state (Stopping)	
EM name_EMCTL_ABORTING	EM name_EMCTL_STATE BitAND 0x2000	Execution state (Aborting)	
EM name_EMCTL_EMOFF	EM name_EMCTL_EMSTATE = 0	Equipment Module state (Off)	
EM name_EMCTL_EMSTOPPED	EM name_EMCTL_EMSTATE = 1	Equipment Module state (Stopped)	
EM name_EMCTL_EMSTARTING	EM name_EMCTL_EMSTATE = 2	Equipment Module state (Starting)	
EM name_EMCTL_EMREADY	EM name_EMCTL_EMSTATE = 3	Equipment Module state (Ready)	
EM name_EMCTL_EMSTANDBY	EM name_EMCTL_EMSTATE = 4	Equipment Module state (Standby)	

Name	Expression	Description	Process Events, page 24
EM name_EMCTL_EMPRODUCING	EM name_EMCTL_EMSTATE = 5	Equipment Module state (Producing)	
EM name_EMCTL EMSWITCHING	EM name_EMCTL_EMSTATE = 6	Equipment Module state (Switching)	
EM name_EMCTL_EMCLEARING	EM name_EMCTL_EMSTATE = 7	Equipment Module state (Clearing)	
EM name_EMCTL_EMHOLDING	EM name_EMCTL_EMSTATE = 8	Equipment Module state (Holding)	
EM name_EMCTL_EMHELD	EM name_EMCTL_EMSTATE = 9	Equipment Module state (Held)	
EM name_EMCTL_EMSTOPPING	EM name_EMCTL_EMSTATE = 10	Equipment Module state (Stopping)	
EM name_EMCTL_EMABORTING	EM name_EMCTL_EMSTATE = 11	Equipment Module state (Aborting)	
EM name_EMCTL_EMABORTED	EM name_EMCTL_EMSTATE = 12	Equipment Module state (Aborted)	
EM name_EMCTL_EMUD1	EM name_EMCTL_EMSTATE = 16	Equipment Module state (Userdefined 1 desc)	
EM name_EMCTL_EMUD2	EM name_EMCTL_EMSTATE = 17	Equipment Module state (Userdefined 2 desc)	
EM name_EMCTL_EMUD3	EM name_EMCTL_EMSTATE = 18	Equipment Module state (Userdefined 3 desc)	
EM name_EMCTL_EMUD4	EM name_EMCTL_EMSTATE = 19	Equipment Module state (Userdefined 4 desc)	
EM name_EMCTL_EMUD5	EM name_EMCTL_EMSTATE = 20	Equipment Module state (Userdefined 5 desc)	
EM name_EMCTL_EMUD6	EM name_EMCTL_EMSTATE = 21	Equipment Module state (Userdefined 6 desc)	
EM name_EMCTL_EMUD7	EM name_EMCTL_EMSTATE = 22	Equipment Module state (Userdefined 7 desc)	
EM name_EMCTL_EMUD8	EM name_EMCTL_EMSTATE = 23	Equipment Module state (Userdefined 8 desc)	
EM name_EMCTL_EMUD9	EM name_EMCTL_EMSTATE = 24	Equipment Module state (Userdefined 9 desc)	
EM name_EMCTL_EMUD10	EM name_EMCTL_EMSTATE = 25	Equipment Module state (Userdefined 10 desc)	
EM name_EMCTL_EMUD11	EM name_EMCTL_EMSTATE = 26	Equipment Module state (Userdefined 11 desc)	
EM name_EMCTL_EMUD12	EM name_EMCTL_EMSTATE = 27	Equipment Module state (Userdefined 12desc)	
EM name_EMCTL_EMUD13	EM name_EMCTL_EMSTATE = 28	Equipment Module state (Userdefined 13 desc)	
EM name_EMCTL_EMUD14	EM name_EMCTL_EMSTATE = 29	Equipment Module state (Userdefined 14 desc)	
EM name_EMCTL_EMUD15	EM name_EMCTL_EMSTATE = 30	Equipment Module state (Userdefined 15 desc)	
EM name_EMCTL_EMUD16	EM name_EMCTL_EMSTATE = 31	Equipment Module state (Userdefined 16 desc)	

Trend Tags

No trend tags are managed by Supervision components for Equipment Module Management.

Genies

Genie Properties

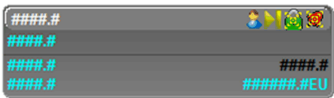
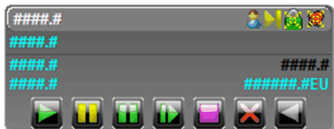
Refer to Using Genies, page 27.


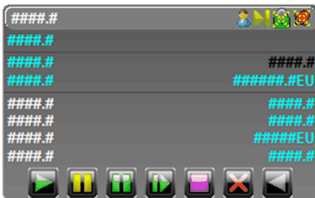
Genie Icons

At the beginning of the manual, you can find a description of the icons, page 29 that are part of the genies.

Representation

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

Graphic symbol	Genie name	Genie Facet Identifier	Description
	<code>sgc_empanelstate_10</code>	<code>\$EMPanelState_CG</code>	<p>The genie Indicates the below statuses.</p> <p>The symbol displays:</p> <ul style="list-style-type: none"> The current equipment state. The current state of the sequence. The step being executed. The strategy that is applied (if configured and selected). The time elapsed for the current step.
	<code>sgc_empanelwithbuttons_10</code>	<code>\$EMPanelWithButtons_CG</code>	<p>The genie Indicates the below statuses.</p> <p>The symbol displays:</p> <ul style="list-style-type: none"> The current equipment state. The current state of the sequence. The step being executed. The strategy that is applied (if configured and selected). The time elapsed for the current step. Control buttons (START, HOLD, PAUSE, RESUME, STOP, ABORT, RESET).

Graphic symbol	Genie name	Genie Facet Identifier	Description
	sgc_empanelallda-ta2_10	\$EMPanelAllda-ta2_CG	<p>The genie Indicates the below statuses.</p> <p>The symbol displays:</p> <ul style="list-style-type: none"> The current equipment state. The current state of the sequence. The step being executed. The strategy that is applied (if configured and selected). The time elapsed for the current step. Control buttons (START, HOLD, PAUSE, RESUME, STOP, ABORT, RESET). Two configurable data (Data1 and Data2).
	sgc_empanelallda-ta4_10	\$EMPanelAllda-ta4_CG	<p>The genie Indicates the below statuses.</p> <p>The symbol displays:</p> <ul style="list-style-type: none"> The current equipment state. The current state of the sequence. The step being executed. The strategy that is applied (if configured and selected). The time elapsed for the current step. Control buttons (START, HOLD, PAUSE, RESUME, STOP, ABORT, RESET). Four configurable data (Data1, Data2, Data3 and Data4).

NOTE:

- The length of Strategy text truncates or lengthens dynamically as the length of Strategy state text increases or decreases, however the tool-tip displays the description. This is applicable for Strategy text available in the faceplate.
- The text to be displayed as a label on top of the genie, it has to be configured in the comment field of STATE variable tag (EM name_EMCTL_STATE).
- The strategy display is provided with a tool-tip of the format Strategy - Current Strategy.
- The Equipment Module state display is provided with a tool-tip of the format State - Equipment Module state.
- The data descriptions support 26 characters (for TIME data type it is 16 characters). However, a tool-tip is provided which displays the description.








Colour Philosophy of the Strategy Sequence State Text

The colour philosophy for the state text is given below:

Strategy Execution State	Text Color
Idle	Black
Running	Green
Held	Red
Held For Error	Red
Stopped	Dark Pink
Paused	Yellow
Aborted	Red
Complete	White

Strategy Execution State	Text Color
Holding	Red and Black (Blinking)
Holding for Error	Red and Black (Blinking)
Restarting	Green and Black (Blinking)
Pausing	Yellow and Black (Blinking)
Stopping	Dark Pink and Black (Blinking)
Aborting	Red and Black (Blinking)

The table shows the command that corresponds to each button on the respective genies and faceplates:

Button	Command
	<i>Start</i> NOTE: Clicking the <i>Start</i> button on genie or sequence tab will open the operator tab and clicking the <i>Start</i> button on the operator tab will give <i>Start</i> command to the strategy.
	<i>Hold</i>
	<i>Pause</i>
	<i>Restart</i>
	<i>Stop</i>
	<i>Abort</i>
	<i>Reset</i> NOTE: When <code>AUTORESETDIS</code> input pin signal is high in <code>EMCTL</code> control block, the reset button will appear on the Operator tab of the faceplate. This is applicable for all Equipment Module genies with buttons.

Faceplates

Overview

During operation, clicking a genie of the `sgc_emctl` library allows you to display a faceplate with the following tabs:

- Standard tabs:
 - Operation, page 48
 - Sequence, page 51
 - State Machine, page 53
 - Information
- Optional tabs:
 - Initial Conditions, page 37
 - Diagnostic Information, page 38

Faceplate Description

At the beginning of this manual, you can find the description of:

- The color convention, page 26 that is used to display data on the faceplate.
- The buttons, page 33 that appear on the different tabs.

Operation Tab

The figure shows the Operation tab when **Input/Output Parameters** sub-tab is selected:

The screenshot displays the 'DISTILLATION_EM' window for a 'Distillation Column'. The 'Owner' section shows 'PROGRAM' and 'OPERATOR' icons. The 'Equipment' section shows 'State: Starting' and 'Strategy: Start Distillation' with a play button. The 'Parameters' section has a green 'Input Parameters' button. The 'Input Parameters' sub-tab is active, showing four input fields: 'Feeding flow SP (l/h)' with value 7000, 'Volatile temperature SP (°C)' with value 50.0, 'Head temperature SP (°C)' with value 45.0, and 'Bottom level SP (%)' with value 75. The 'Strategy Sequence' section shows 'State: Running' and 'Step: 010-Refrigeration ON' with a timer at 0:00:01.7.

You can select a strategy from the ones that have been defined and enter the corresponding values for applicable parameters.

NOTE: Strategy will display <Select . . .> in case of values outside the definition or any disabled strategy is selected.

The **Input Parameter** tab consists of two columns:

- **Description** (read only): Description of input parameter.

- **Value** (read/write): The value is to be formatted as configured. Only editable while the Strategy Status is `Idle`. Formatted as:
 - Boolean: A drop-down list with ON and OFF selection.
 - Duration: Format of duration is `dd.hh:mm:ss.mss`. For additional information (see Modicon Libraries General Purpose for Plant SCADA , Process Supervision Services User Guide).
 - Date/Time: Date/Time as per system regional settings.
 - Enumeration: A drop down list with the configured Enumeration texts in the corresponding parameter.
`<Select . . .>` in case of values outside the definition.
 - Numeric: Numeric value formatted as per the configured **Format** (for example, `#`, `#.##`, `####`, `##EU`).
- Start button available in the **Operation** tab, that is enabled only in case when the equipment module Strategy is in Idle state and Operator is Owner.
- Only applicable parameters of the selected strategy are displayed.
- For text colour of the strategy sequence state, refer Colour Philosophy of the Strategy Sequence State Text topic, page 46.

NOTE:

- The parameters can only be modified when the sequence is in Idle state and the owner is operator.
- The description can display up to 30 characters. In case the description has more than 30 characters, tool-tip will display the whole description.
- The parameter value will show `#BAD` if the tag quality is bad.
- The EngUnit of the parameter will be concatenated with description and displayed.

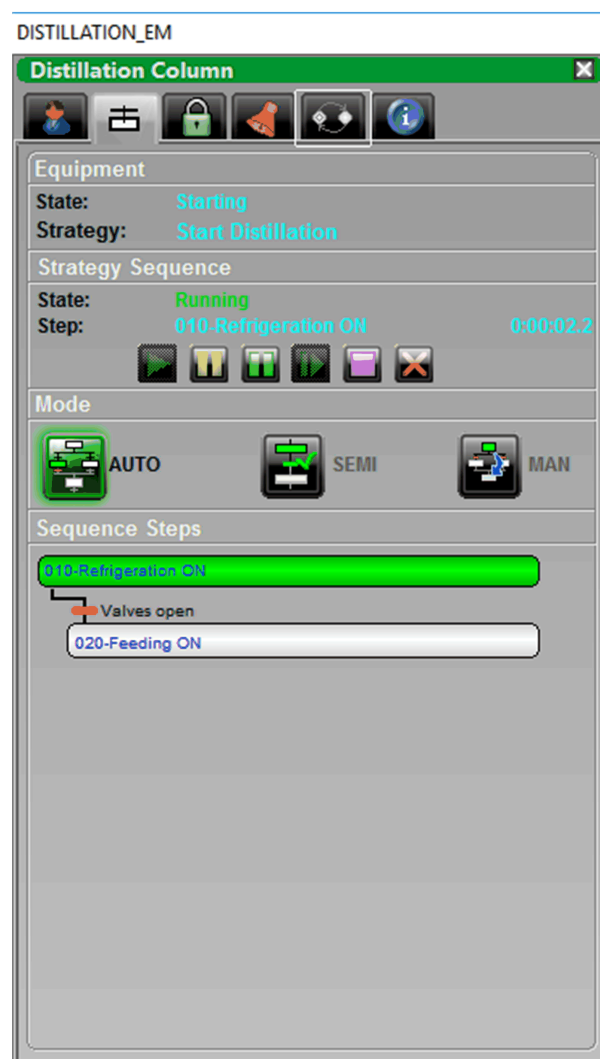
The figure shows the `Operation` tab when **Output Parameters** sub-tab is selected:

NOTE: The **Output Parameter** tab consists of two columns:

- **Description** (read only): Description of input parameter.
- **Value** (read/write): The value is to be formatted as configured. Only editable while the Strategy Status is **Idle**. Formatted as:
 - Boolean: A drop-down list with ON and OFF selection.
 - Duration: Format of duration is dd.hh:mm:ss.mss. For additional information (see EcoStruxure™ Process Expert - General Purpose Library Classic Process Supervision Services Reference Manual).
 - Date/Time: Date/Time as per system regional settings information (see Modicon Libraries General Purpose for Plant SCADA , Process Supervision Services User Guide).
 - Enumeration: A drop down list with the configured Enumeration texts in the corresponding parameter.
<Select...> in case of values outside the definition.
 - Numeric: Numeric value formatted as per the configured **Format** (for example, #, #.##, #####, ##EU).
- The output parameters are read only.
- The description can display up to 30 characters. In case the description has more than 30 characters, tool-tip will display the whole description.
- The parameter value will show #BAD if the tag quality is bad.
- The EngUnit of the parameter will be concatenated with description and displayed.
- For text colour of the strategy sequence state, refer Colour Philosophy of the Strategy Sequence State Text topic, page 46.

Sequence Tab in Automatic Mode

The figure shows the Sequence tab when **OPERATOR** and the **AUTO** mode are selected:



The state and the strategy that is selected are displayed above the buttons.

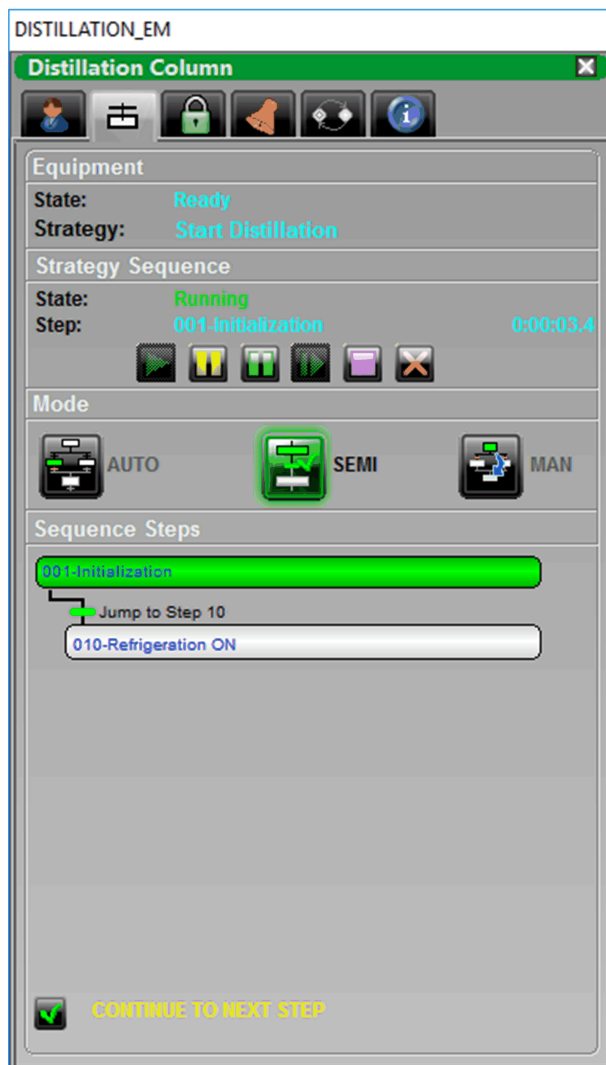
The sequence starts in automatic mode after clicking the *Start* button from the Operator tab, and the sequence tab displays:

- The step that is being executed and its number.
- The elapsed time after the start of sequence
- The transition to the next step:
 - Red: The condition is not yet fulfilled
 - Green: The condition is true.
- The next step to be executed when the current step is completed and the transition is true.

NOTE: Only buttons that correspond to available commands are active, according to the status matrix (see EcoStruxure™ Process Expert - General Purpose Library Classic Equipment Module Control Services Reference Manual).

Sequence Tab in Semi-Automatic Mode

The figure shows the Sequence tab when **OPERATOR** and the **SEMI** mode are selected:



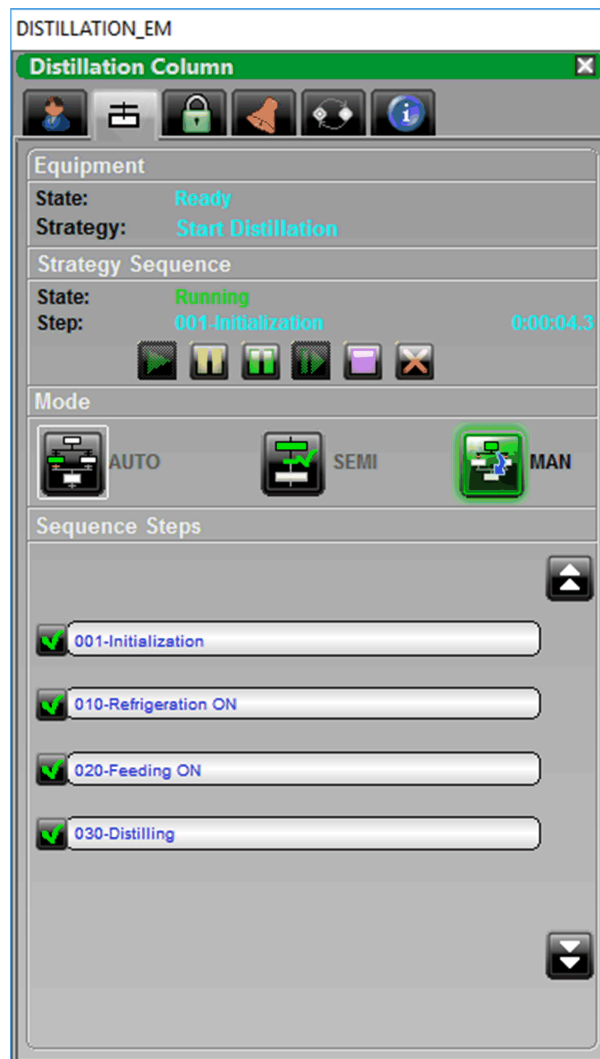
The sequence starts in semi-automatic mode after clicking the *Start* button from the Operator tab, and the Sequence tab displays:

- The step that is being executed and its number.
- The elapsed time after the start of sequence
- The transition to the next step:
 - Red: The condition is not yet fulfilled
 - Green: The condition is true.
- The next step to be executed.

Click **CONTINUE TO NEXT STEP** button to proceed to the next step.

Sequence Tab in Manual Mode

The figure shows the Sequence tab when **OPERATOR** and the **MAN** mode are selected:



The sequence starts in manual mode after clicking the *Start* button from the Operator tab, and the Sequence tab displays:

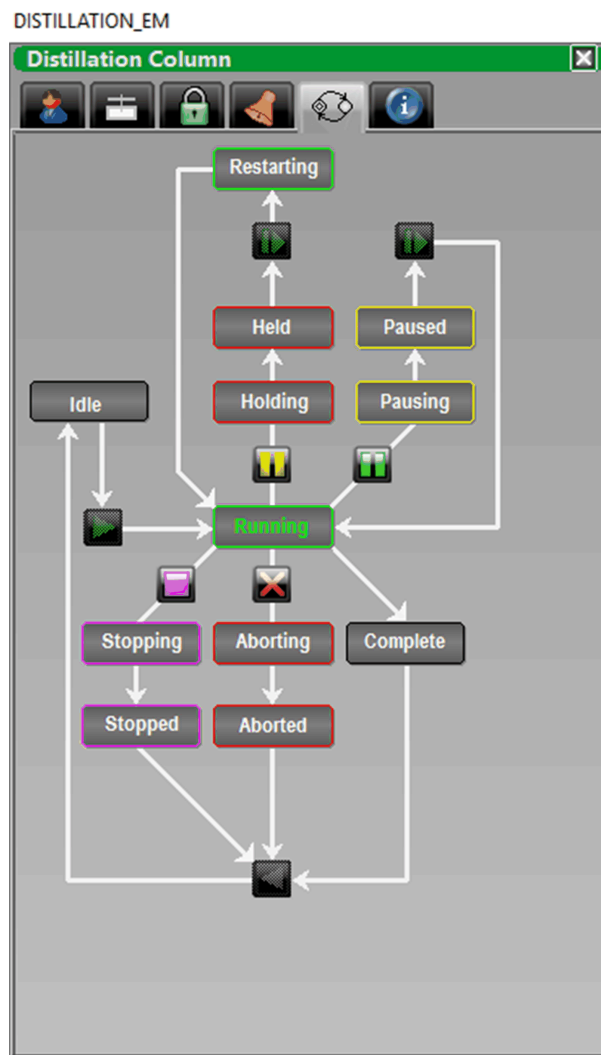
- The steps of the sequence that are programmed in the **Running** state.
- A button next to each step allowing to execute it.

When the step to be executed is selected by clicking on the button next to each step, mode changes to semi mode and the step is executed.

You can scroll up and down through the list of steps by using the two arrow buttons.

State Machine Tab

The state diagram allows the operator to see the current state and the possible next states.



Label of states appear in white while the current state appears in the same color as its frame.

NOTE:

- Names of transient states only will be blinking when it is active.
- The state diagram is applicable only for Strategy states and not for Equipment states.
- Strategy execution state commands are not possible from this tab.

Input/Output Parameter Configuration for Equipment Module

Description

To configure the Input/Output parameters, you can create the variable tag and use these variables for configuring the customized data type as per the requirement.

Below table show the various data types supported by the Equipment Module input and output parameters.

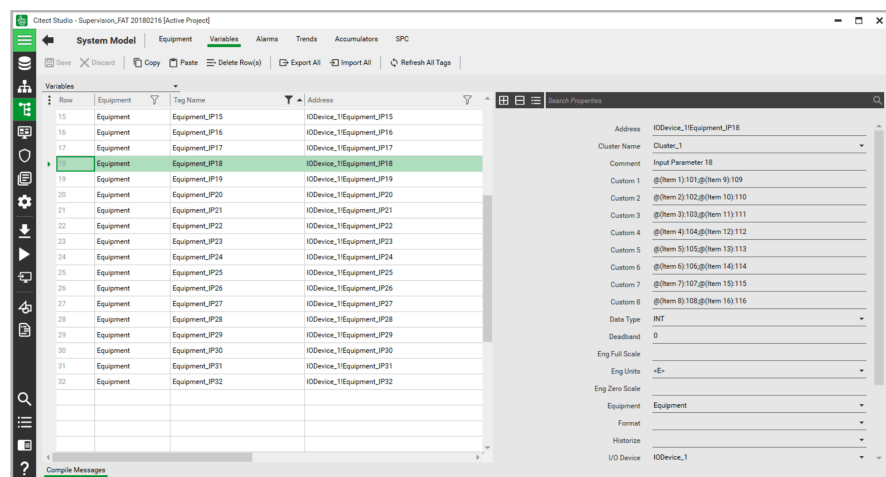
Data type (user)	Control Expert data type	Plant SCADA: Value entered in the Variable Tag Eng Units Field	Plant SCADA variable tag data type
Boolean	BOOL		DIGITAL
Duration	TIME	<D>	ULONG
Date/Time	DINT	<T>	ULONG
Enumeration	INT	<E>	INT
Numeric (Real)	REAL	Citect format (for example, 0.00)	REAL
Numeric (Signed integer)	INT	Citect format (for example, 0)	INT
Numeric (Double signed integer)	DINT	Citect format (for example, 00000)	LONG

NOTE: By default `EMPattern` template is configured with six Input parameters and four Output parameters with each data type. You can create a duplicate of `EMPattern` template (the original template is not to be modified) to create additional Input/Output parameters up to 32 parameters.

Enumeration Management for Faceplate

For Input or Output Parameter as Enumeration type, a maximum of 16 enumerations are supported. The first 8 enumerations are to be defined from the related Custom 1 to 8 of the corresponding variable tag, the potential additional enumerations 9 to 16 can be added to the Custom fields as a list separated by a semicolon (;) such that Custom 1 would accommodate Enumeration 1 and Enumeration 9. Similarly, Custom 2 would accommodate Enumeration2 and Enumeration10, and so on.

Format for entering the data in Custom field: `<item name>:<item value>` (for example, `@ (Item 1) :100;@ (Item 9) :108`)

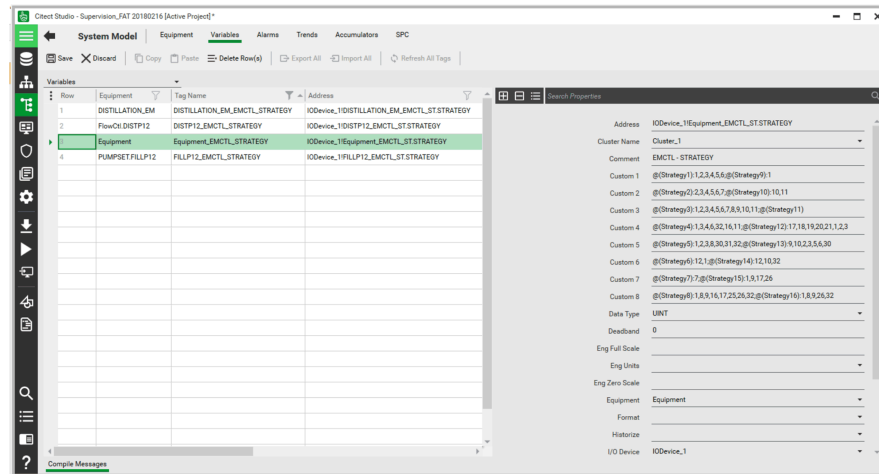


Strategy Management Description

16 strategy descriptions can be configured from the strategy variable tag fields, Custom 1 to 8.

- The applicable list of parameters for each strategy are to be managed from the same Citect Variable Tag Custom field 1 to 8.

- Format for entering the data in the Custom Field: The first eight strategies (1 to 8) are to be defined from the related Custom 1 to 8 (EM name `_EMCTL_STRATEGY`). The potential additional 8 strategies (9 to 16) can be added in such a manner that Custom 1 would accommodate Strategy1 and Strategy9. Similarly, Custom 2 would accommodate Strategy2 and Strategy10, and so on. The format would be accordingly, `<Strategy text>: <list of applicable input parameters separated by comma> (for example, @ (Strategy1) : 1, 2, 5, 8; @ (Strategy9) : 3, 5, 6)`



Equipment State Description Management

- Equipment module supports 32 Equipment States (`EMSTATE0...EMSTATE31`). `EMSTATE0...EMSTATE15` are predefined Equipment States and `EMSTATE16...EMSTATE31` are user configurable. The first sixteen predefined Equipment States are as below:
 - `EMSTATE 00` - Off
 - `EMSTATE 01` - Stopped
 - `EMSTATE 02` - Starting
 - `EMSTATE 03` - Ready
 - `EMSTATE 04` - Standby
 - `EMSTATE 05` - Producing
 - `EMSTATE 06` - Switching
 - `EMSTATE 07` - Cleaning
 - `EMSTATE 08` - Holding
 - `EMSTATE 09` - Held
 - `EMSTATE 10` - Stopping
 - `EMSTATE 11` - Aborting
 - `EMSTATE 12` - Aborted
 - `EMSTATE 13` - Reserved
 - `EMSTATE 14` - Reserved
 - `EMSTATE 15` - Reserved
- 16 user configurable Equipment States descriptions can be defined from `EMSTATE` variable tag (EM name `_EMCTL_STATE`).
- The first eight user configurable states (16 to 23) are to be defined from the related Custom 1 to 8 fields. The potential additional 8 states (`EMSTATE 24` to `31`) can be added to the Custom fields as a list separated by a semicolon (;) such that Custom 1 would accommodate `EMSTATE16` and `EMSTATE24`. Similarly, Custom 2 would accommodate `EMSTATE 17` and `EMSTATE 25`, and so on. The format would be accordingly, `<Equipment State Description>; <Equipment State Description> (for example, @ (EMState16) ; @ (EMState24))`.



Pump Set

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Pump Set Pattern Management

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Description

Required Software Components

Pump Set object is using the supervision components of equipment module and the software components and the main functions of pump set remain identical to equipment module,, page 40.

Supervision Functions

For details about the main functions for Pump Set management,, page 41

Control/Supervision Relationship

Overview

The table describes which Control blocks provide data to the Supervision components of the `sgc_emctl` library:

Control blocks	Description	Block status
EMCTL	Equipment module controller	X
PUMPSETPATTERN	Pump Set Pattern	X
CONDSUM	Summary of conditions	O
	Initial conditions and detected error conditions	
X	Mandatory block	
O	Optional block	

The data is created from the corresponding Control templates and shared through interfaces. This allows the necessary tags with the appropriate syntax to be generated in the databases of the Supervision Participant.

For the description of these Control resources, refer to Equipment Module, page 41.

Tags

Tag Syntax

Refer to Genie Control Module Name, page 29.

Variable Tags

The table describes the variable tags that are managed by Supervision components:

Name	Data type	Description
Standard Tags ,, page 42.		
Input Output Parameter Tags		
<i>EM name_IP01</i>	INT	Required number of active pumps
<i>EM name_IP02</i>	DIGITAL	Reset pumps operation time
<i>EM name_IP03</i>	INT	Priority pump 1
<i>EM name_IP04</i>	INT	Priority pump 2
<i>EM name_IP05</i>	INT	Priority pump 3
<i>EM name_IP06</i>	INT	Priority pump 4
<i>EM name_IP07</i>	INT	Priority pump 5
<i>EM name_OP01</i>	INT	Equipment Module diagnosis state
<i>EM name_OP02</i>	INT	Requested pumps
<i>EM name_OP03</i>	INT	Active pumps
<i>EM name_OP04</i>	ULONG	Pump 01 operation time
<i>EM name_OP05</i>	INT	Pumping asset 01 state
<i>EM name_OP06</i>	ULONG	Pump 02 operation time
<i>EM name_OP07</i>	INT	Pumping asset 02 state
<i>EM name_OP08</i>	ULONG	Pump 03 operation time
<i>EM name_OP09</i>	INT	Pumping asset 03 state
<i>EM name_OP10</i>	ULONG	Pump 04 operation time
<i>EM name_OP11</i>	INT	Pumping asset 04 state
<i>EM name_OP12</i>	ULONG	Pump 05 operation time
<i>EM name_OP13</i>	INT	Pumping asset 05 state
Optional Tags		
<i>EM name_IC_CONDSUM_BYPASSW</i>	UINT	Bypass word
<i>EM name_IC_CONDSUM_CONDW</i>	UINT	Status word
<i>EM name_IC_CONDSUM_REARMREQW</i>	UINT	Rearm required word
<i>EM name_FC_CONDSUM_BYPASSW</i>	UINT	Detected error condition bypass
<i>EM name_FC_CONDSUM_CONDW</i>	UINT	Detected error condition data
<i>EM name_FC_CONDSUM_REARMREQW</i>	UINT	Resetting signals for detected error conditions

Control Expert Variables

The table describes the variables in Control Expert to establish communication with Citect SCADA for *PUMPSETPATTERN*:

DFB Name	Pin Name	Variable Name
PUMPSETPATTERN	IOPAR	EM name_IOPAR
EMCTL	EMCTL_ST	EM name_EMCTL_ST
EMCTL	EMCTL_CFG	EM name_EMCTL_CFG
CONDSUM (Initial conditions)	CONDSUM_ST	EM name_IC_CONDSUM_ST
CONDSUM (Detected error conditions)	CONDSUM_ST	EM name_FC_CONDSUM_ST

Advanced Alarm Tags

The table describes the advanced alarm tags and process events that are managed by Supervision components. It also indicates the expression that is configured in the Supervision components to read or write the corresponding tag:

Name	Expression	Description	Process Events, page 24
EM name_EMCTL_IDLE	EM name_EMCTL_STATE BitAND 0x0001	Execution state (Idle)	Yes
EM name_EMCTL_RUNNING	EM name_EMCTL_STATE BitAND 0x0002	Execution state (Running)	
EM name_EMCTL_COMPLETE	EM name_EMCTL_STATE BitAND 0x0080	Execution state (Complete)	
EM name_EMCTL_PAUSING	EM name_EMCTL_STATE BitAND 0x0800	Execution state (Pausing)	
EM name_EMCTL_PAUSED	EM name_EMCTL_STATE BitAND 0x0020	Execution state (Paused)	
EM name_EMCTL_HOLDING	EM name_EMCTL_STATE BitAND 0x0100	Execution state (Holding)	
EM name_EMCTL_HOLDINGFORERROR	EM name_EMCTL_STATE BitAND 0x0200	Execution state (Holding For Error)	
EM name_EMCTL_HELD	EM name_EMCTL_STATE BitAND 0x0004	Execution state (Held)	
EM name_EMCTL_HELDFORERROR	EM name_EMCTL_STATE BitAND 0x0008	Execution state (Held For Error)	
EM name_EMCTL_RESTARTING	EM name_EMCTL_STATE BitAND 0x0400	Execution state (Restarting)	
EM name_EMCTL_STOPPING	EM name_EMCTL_STATE BitAND 0x1000	Execution state (Stopping)	
EM name_EMCTL_STOPPED	EM name_EMCTL_STATE BitAND 0x0010	Execution state (Stopped)	
EM name_EMCTL_ABORTING	EM name_EMCTL_STATE BitAND 0x2000	Execution state (Aborting)	
EM name_EMCTL_ABORTED	EM name_EMCTL_STATE BitAND 0x0040	Execution state (Aborted)	
EM name_EMCTL_EMOFF	EM name_EMCTL_EMSTATE = 0	Equipment Module state (Off)	Yes
EM name_EMCTL_EMSTOPPED	EM name_EMCTL_EMSTATE = 1	Equipment Module state (Stopped)	
EM name_EMCTL_EMSTOPPING	EM name_EMCTL_EMSTATE = 10	Equipment Module state (Stopping)	Yes

Name	Expression	Description	Process Events, page 24
EM name_EMCTL_RUNPBALANCE	EM name_EMCTL_EMSTATE = 16	Equipment Module state (Running Program SP/ Balance)	
EM name_EMCTL_RUNOBALANCE	EM name_EMCTL_EMSTATE = 17	Equipment Module state (Running Operator SP/ Balance)	
EM name_EMCTL_RUNPPRIORITY	EM name_EMCTL_EMSTATE = 18	Equipment Module state (Running Program SP/ Priority)	
EM name_EMCTL_RUNOPRIORITY	EM name_EMCTL_EMSTATE = 19	Equipment Module state (Running Operator SP/ Priority)	
EM name_EMCTL_CONFIGURING	EM name_EMCTL_EMSTATE = 20	Equipment Module state (Configuring)	
EM name_EMCTL_RunExternally	EM name_EMCTL_EMSTATE = 21	Equipment Module state (Running externally)	
EM name_PumpSet_EM_Alarm	EM name_OP01 = 1	At least one pumping Asset is inoperable	No
EM name_PumpSet_EM_Fail	EM name_OP01 = 2	Unable to run requested pumps	
EM name_PumpSet_Asset01_Alarm	EM name_OP05 = 1	Pumping asset 01 caused a problem during its last operation	
EM name_PumpSet_Asset01_Fail	EM name_OP05 = 2	Pumping asset 01 is inoperable	
EM name_PumpSet_Asset02_Alarm	EM name_OP07 = 1	Pumping asset 02 caused a problem during its last operation	
EM name_PumpSet_Asset02_Fail	EM name_OP07 = 2	Pumping asset 02 is inoperable	
EM name_PumpSet_Asset03_Alarm	EM name_OP09 = 1	Pumping asset 03 caused a problem during its last operation	
EM name_PumpSet_Asset03_Fail	EM name_OP09 = 2	Pumping asset 03 is inoperable	
EM name_PumpSet_Asset04_Alarm	EM name_OP11 = 1	Pumping asset 04 caused a problem during its last operation	
EM name_PumpSet_Asset04_Fail	EM name_OP11 = 2	Pumping asset 04 is inoperable	
EM name_PumpSet_Asset05_Alarm	EM name_OP13 = 1	Pumping asset 05 caused a problem during its last operation	
EM name_PumpSet_Asset05_Fail	EM name_OP13 = 2	Pumping asset 05 is inoperable	

Trend Tags

No trend tags are managed by default in the Supervision components of PUMPSETPATTERN.

Genies

Genie Properties

Refer to Using Genies (see Modicon Libraries General Purpose for Plant SCADA, Equipment Module Supervision Services User Guide).

Genie Icons

At the beginning of the manual, you can find a description of the icons, page 29 that are part of the genies.

Representation

Refer the genies of `sgc_emctl` library (see Modicon Libraries General Purpose for Plant SCADA, Equipment Module Supervision Services User Guide).

Faceplates

Overview

During operation, clicking a genie of the `sgc_emctl` library allows you to display a faceplate with the following tabs:

- Standard tabs:
 - Operation, page 48
 - Sequence, page 51
 - State Machine, page 53
 - Information
- Optional tabs:
 - Initial Conditions, page 37
 - Diagnostic Information, page 38

Faceplate Description

At the beginning of this manual, you can find the description of:

- The color convention, page 26 that is used to display data on the faceplate.
- The buttons, page 33 that appear on the different tabs.

Flow Control

What's in This Part

Flow Control Pattern Management65

Flow Control Pattern Management

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Description

Required Software Components

Flow Control object is using the supervision components of equipment module and the software components and the main functions of Flow Control remain identical to equipment module,, page 40.

Supervision Functions

For details about the main functions for Flow Control management,, page 41

Control/Supervision Relationship

Overview

The table describes which Control blocks provide data to the Supervision components of the `sgc_emctl` library:

Control blocks		Description	Block status
EMCTL		Equipment module controller	X
FLOWCTLPATTERN		Flow Control Pattern	X
CONDSUM		Summary of conditions	O
		Initial conditions and detected error conditions	
X		Mandatory block	
O		Optional block	

The data is created from the corresponding Control templates and shared through interfaces. This allows the necessary tags with the appropriate syntax to be generated in the databases of the Supervision Participant.

For the description of these Control resources, refer to Equipment Module, page 41.

Tags

Tag Syntax

Refer to Genie Control Module Name, page 29.

Variable Tags

The table describes the variable tags that are managed by Supervision components:

Name	Data type	Description
Standard Tags ,, page 42.		
Input Output Parameter Tags		
<i>EM name_IP01</i>	REAL	Flow setpoint
<i>EM name_IP02</i>	DIGITAL	Reset pumps operation time
<i>EM name_IP03</i>	INT	Priority pump 1
<i>EM name_IP04</i>	INT	Priority pump 2
<i>EM name_IP05</i>	INT	Priority pump 3
<i>EM name_IP06</i>	INT	Priority pump 4
<i>EM name_IP07</i>	INT	Priority pump 5
<i>EM name_OP01</i>	INT	Equipment module diagnosis state
<i>EM name_OP02</i>	REAL	Flow present value
<i>EM name_OP03</i>	REAL	Current flow setpoint
<i>EM name_OP04</i>	INT	Pumps required to achieve flow setpoint
<i>EM name_OP05</i>	INT	Active pumps to achieve flow setpoint
<i>EM name_OP06</i>	INT	Total active pumps
<i>EM name_OP07</i>	REAL	Pump 01 speed setpoint
<i>EM name_OP08</i>	ULONG	Pump 01 operation time
<i>EM name_OP09</i>	INT	Pumping asset 01 state
<i>EM name_OP10</i>	REAL	Pump 02 speed setpoint
<i>EM name_OP11</i>	ULONG	Pump 02 operation time
<i>EM name_OP12</i>	INT	Pumping asset 02 state
<i>EM name_OP13</i>	REAL	Pump 03 speed setpoint
<i>EM name_OP14</i>	ULONG	Pump 03 operation time
<i>EM name_OP15</i>	INT	Pumping asset 03 state
<i>EM name_OP16</i>	REAL	Pump 04 speed setpoint
<i>EM name_OP17</i>	ULONG	Pump 04 operation time
<i>EM name_OP18</i>	INT	Pumping asset 04 state
<i>EM name_OP19</i>	REAL	Pump 05 speed setpoint
<i>EM name_OP20</i>	ULONG	Pump 05 operation time
<i>EM name_OP21</i>	INT	Pumping asset 05 state
Optional Tags		

Name	Data type	Description
<i>EM name_IC_CONDSUM_BYPASSW</i>	UINT	Bypass word
<i>EM name_IC_CONDSUM_CONDW</i>	UINT	Status word
<i>EM name_IC_CONDSUM_REARMREQW</i>	UINT	Rearm required word
<i>EM name_FC_CONDSUM_BYPASSW</i>	UINT	Detected error condition bypass
<i>EM name_FC_CONDSUM_CONDW</i>	UINT	Detected error condition data
<i>EM name_FC_CONDSUM_REARMREQW</i>	UINT	Resetting signals for detected error conditions

Advanced Alarm Tags

The table describes the advanced alarm tags and process events that are managed by Supervision components. It also indicates the expression that is configured in the Supervision components to read or write the corresponding tags:

Name	Expression	Description	Process Events, page 24
<i>EM name_FLOWCTL_EM_Alarm</i>	EM name_OP01=1	At least one pumping asset is inoperable	No
<i>EM name_FLOWCTL_EM_Fail</i>	EM name_OP01=2	Unable to run requested pumps	
<i>EM name_FLOWCTL_Asset01_Alarm</i>	EM name_OP09=1	Pumping asset 01 caused a problem during its last operation	
<i>EM name_FLOWCTL_Asset01_Fail</i>	EM name_OP09=2	Pumping asset 01 is inoperable	
<i>EM name_FLOWCTL_Asset02_Alarm</i>	EM name_OP12=1	Pumping asset 02 caused a problem during its last operation	
<i>EM name_FLOWCTL_Asset02_Fail</i>	EM name_OP12=2	Pumping asset 02 is inoperable	
<i>EM name_FLOWCTL_Asset03_Alarm</i>	EM name_OP15=1	Pumping asset 03 caused a problem during its last operation	
<i>EM name_FLOWCTL_Asset03_Fail</i>	EM name_OP15=2	Pumping asset 03 is inoperable	
<i>EM name_FLOWCTL_Asset04_Alarm</i>	EM name_OP18=1	Pumping asset 04 caused a problem during its last operation	
<i>EM name_FLOWCTL_Asset04_Fail</i>	EM name_OP18=2	Pumping asset 04 is inoperable	
<i>EM name_FLOWCTL_Asset05_Alarm</i>	EM name_OP21=1	Pumping asset 05 caused a problem during its last operation	
<i>EM name_FLOWCTL_Asset05_Fail</i>	EM name_OP21=2	Pumping asset 05 is inoperable	

Trend Tags

No trend tags are managed by default in the Supervision components of FLOWCTLPATTERN.

Genies

Genie Properties

Refer to Using Genies, page 27.

Genie Icons

At the beginning of the manual, you can find a description of the icons, page 29 that are part of the genies.

Representation

Refer the genies of `sgc_emctl` library, page 45.

Faceplates

Overview

During operation, clicking a genie of the `sgc_emctl` library allows you to display a faceplate with the following tabs:

- Standard tabs:
 - Operation, page 48
 - Sequence, page 51
 - State Machine, page 53
 - Information
- Optional tabs:
 - Initial Conditions, page 37
 - Diagnostic Information, page 38

Faceplate Description

At the beginning of this manual, you can find the description of:

- The color convention, page 26 that is used to display data on the faceplate.
- The buttons, page 33 that appear on the different tabs.

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EIO0000003015.06