General Specifications

Model VP6E5210
Module-based Engineering Package

GS 33J10D22-01EN

[Release 6]

■ GENERAL

Module-based Engineering Package is one of the optional packages in Automation Design Suite (AD Suite) to use with VP6E5000 Engineering Server Function and VP6E5100 Standard Engineering Function.

The AD Suite provides an engineering environment for configuring and maintaining overall control systems, including plant instrumentation, safety instrumentation, and maintenance management. Automation Design Server (AD server) centrally manages the database of all the CENTUM VP's engineering data, which makes the latest design information always available for expanding, modifying, or maintaining the system, and saves unnecessary manpower for fixing inconsistency between the design information and the actual information stored in the system. For details of the AD Suite, refer to the General Specifications (GS) of "Automation Design Suite (AD Suite) - VP6E5000 Engineering Server Function and VP6E5100 Standard Engineering Function" (GS 33J10D10-01EN).

The module-based engineering refers to an engineering method to design control applications and alarms by transforming the control logic and design information into modules and then combining the modules in AD Suite. The modules consisting of independent software components such as customer information and know-hows gathered from the past design pattern experiences also include control logics, alarm attributes, and design information. By re-using the modules configured in previous projects improves the engineering quality and reduces the engineering time which contributes to shorten the project period.

Modules can be configured, registered to, and downloaded from the AD Server by Automation Design Organizer (AD Organizer).

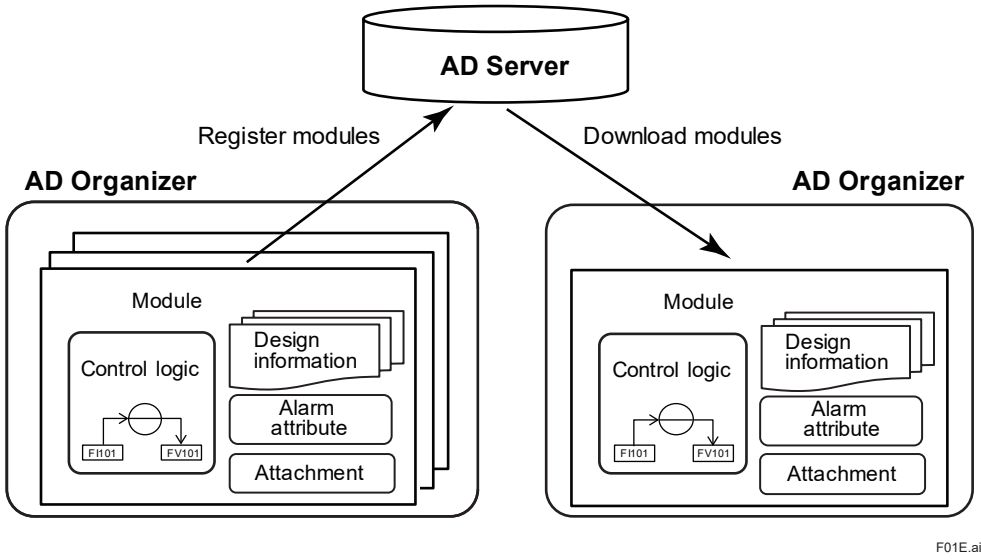

Figure Conceptual Diagram of Registering and Downloading Modules in Module-based Engineering

The engineering design information is saved to create a summary document of the engineering results.

In addition, the module-based engineering can be concurrently performed with the following engineering tasks.

- I/O design
- Control application design
- System configuration design

This concurrent engineering enables designing control applications and inputs/outputs before the system configuration is determined, yet design changes can flexibly performed for inputs/outputs after the control application design is finalized.

This package is applicable to the following field control stations (FCSs).

AFV30S, AFV30D, AFV40S, AFV40D, A2FV50S, A2FV50D, A2FV70S, and A2FV70D

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■ FUNCTIONAL SPECIFICATIONS

In the module-based engineering, designing of I/O module assignment information setting and FCS setting can be implemented independently, which enables flexibly modifying the I/O assignments even after the control application design is done.

However, conventional engineering method (used for CENTUM VP R5 or earlier) can still be used for an FCS with which the module-based engineering is not available or in the environment where only VP6E5100 Standard Engineering Function and VP6E5000 Engineering Server Function without module-based engineering packages are applied. In this case, engineering work, referred to as module-less engineering, for each of the hardware starts only after the hardware configuration such as FCS and I/O modules are decided. The module-less engineering method can also be applied to the FCSs applicable for the module-based engineering packages.

● Module components

In the module-based engineering, control logic, alarm attribute, design information, and attachments are treated as a module. These modules are composed of the following elements.

Design information (e.g. functional specification)
Design information, such as a functional specifications, can be defined as a module component. The design information consists of texts, images, and tables that explain the details of the module.

Control logic
Control logic consists of a control drawing and detailed definitions of functional blocks, switches, and messages. The control logic is defined in a class module or an application module.

Tuning parameters
VP6E5215 Tuning parameter management package (for Module-based engineering) is one of the AD Suite's optional packages. By using this package, tuning parameters can be treated as module components.

This package allows bulk editing of tuning parameter design values in functional blocks defined in control logic of an FCS, and comparing and setting tuning parameter design values and current values of an FCS. For more details, refer to the GS of "VP6E5215 Tuning Parameter Management Package (for Module-based Engineering)" (GS 33J10D24-01EN).

Alarm attributes
Alarm attributes such as alarm setting values and alarm priorities are defined. Alarm settings of CENTUM VP functional blocks and definitions of alarm attributes of CAMS for HIS are defined as the alarm attributes.

Attachments
An arbitrary file can be attached as a module component. The list of attachments can be launched by a simple operation.

● Types of modules

Two types of modules are available for module-based engineering; one is a class module and the other is an application module. The class module is used as a template for a control application, and the application module acts as an actual control application.

Class module
The class module is a template. Based on the class module, an application module to perform an actual control application can be created. The application module maintains the relationship with the class module which is used as a template, and changes made to the class module are reflected to the application module. A single module is used as a template for multiple application modules. Creating an application module from the class module is called instantiation.

Two types of class modules are available; one is a local class module and the other is a global class module. A user creates and modifies local class modules and configures the user-dedicated library. Yokogawa's process engineering know-hows and experiences in the various industries are provided in the global class modules as a part of the engineering services.

Application module
Application modules perform control applications by assigning I/Os and tag names to the application modules. Two types of modules are available; one is a class-based application module created based on a class module, and the other is a class-less application module created without using a class module.

● Group module

The following group class module and group application module are collectively referred to as a group module.

Group class module
A grouping of class modules is referred to as a group class module. A large-scale application can be reused more easily by grouping class modules. Each class module in a group class module is referred to as a child class module, which has only reference information to the original class module.

Group application module
A group application module is created by instantiating a group class module. Each application module in a group application module is referred to as a child application module. It is possible to specify not to instantiate some of child class modules when instantiating. This makes it possible to create multiple group application modules that differ only in part, so modules can be reused more easily.

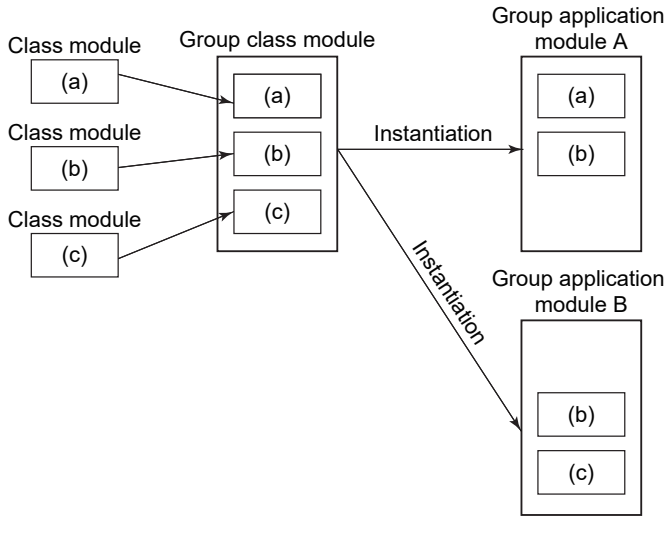

Figure Relationship of class module, group class module, and group application module

Group modules allow multiple modules to be combined and allow complex loops that span multiple control drawings to be managed as a single group.
The scope of the module-based engineering in the batch control can be expanded to the control unit level, by using the group module together with FCS sequence library created by the AD organizer.
Group module is supported by CENTUM VP R6.07 or later.

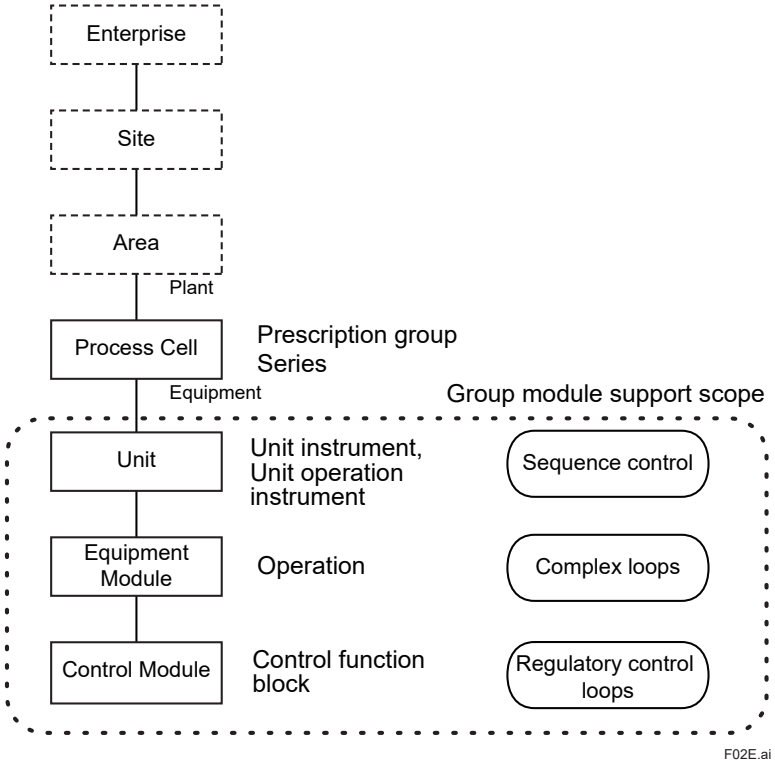

Figure Group module support scope (for batch control)

● Group module components

Group module components contain the following elements.

Design information
Contents to freely describe design information such as group module function specifications.

Attachments
Documents such as the test procedure for group modules, test data, or guidelines, and data files can be attached to modules.

Allocation
Information that indicates to which control drawing a child application module is allocated to.

Group module hierarchical structure
Group module can be managed hierarchically because folders can be created in group module. The hierarchical management of group modules makes it possible to position reusable child class modules and child application modules according to their purpose and make maintenance easier.

● Module-based engineering flow

AD Suite's module-based engineering allows designing of I/O, control applications, and system configuration in parallel, which enables to start designing control applications and I/Os before the system configurations are finalized. Even after designing control applications, the I/O designs can be changed flexibly.

Designing I/O

Plant information contains various kinds of information for implementing control systems engineering.
In the module-based engineering, I/O is designed based on the obtained I/O information of the plant. The AD Organizer is used for designing I/O to configure plant I/O information into a table-format I/O information list. The I/O information list defines information such as I/O tag names, I/O module types, and FCS station names where I/O modules are mounted, as well as the specific information of each I/O.
I/O information list can be exported / imported. The setting information of the I/O information list can be edited on the exported external file (Microsoft Excel xlsx format), and it can be imported to the AD Organizer.

Designing control applications

An application module is created by the module. Create a class module as needed to start with, and then create an application module using or not using the class module. The AD Organizer is used for engineering of the control application design.
An I/O tag name is given to the I/O terminal of the application module, and an actual tag name is applied for the application module's functional block.
Since a control application is created based on the I/O tag name, a control application can be created prior to completion of the I/O design such as I/O module assignment information or specific information of each I/O.
When the module-based engineering is performed over several control drawings, a group module can be used for designing control applications.
The module-based engineering in the batch control can be performed expanding to the control unit level, by using the group module together with FCS sequence library created by the AD Organizer.

Designing system configuration

Engineering of items other than designing I/Os and control applications are done by designing the system configuration such as FCS and HIS of CENTUM VP project as well as items common for the project and relevant to stations. These items are configured by the System View. As for setting the following switches and messages, the AD Organizer is used.

- Common switch
- Global switch
- Annunciator messages
- Signal event messages
- Operator guide messages
- Printing messages

The engineering data of the I/O design and control application design created in the AD Organizer independently from the system configuration are eventually assigned to an FCS and generated as the CENTUM VP project data (referred to as VP generation).
The engineering for process I/O, serial communication Ethernet communication completes when the VP generation is completed.
Additional engineering work (i.e. field network engineering) is required after the VP generation is completed for fieldbus Input/Output, PROFIBUS-DP communication (*1), PROFINET communication (*2), YFGW communication, and Ethernet communication modules; as well as for Turbomachinery I/O modules (*3).

*1: ALP111 is out of scope of the module-based engineering.
*2: Field network engineering of PROFINET communication can be performed even before VP generation.
*3: Turbomachinery I/O modules can be used with AFV30S, AFV30D, AFV40S, and AFV40D.

When module-based engineering is finished by completing the VP generation, the control applications test is conducted by using the CENTUM VP's test functions. For details of the test functions, refer to the GS of "VP6E5420 Test Functions" (GS 33J10D50-01EN).

● Functions supporting module-based engineering

Functions to support module-based engineering are as shown below:

- Document generation function
- Bulk editing function
- Tuning parameter management function

Document generation function

Design information of a module and various engineering data are integrated to generate a single document file.

Tuning parameter management function

The functional block tuning parameter values designed when creating control applications and the FCS's current tuning parameter values are managed.
VP6E5215 Tuning Parameter Management Package (for Module-based Engineering) is required for using this function. For details, refer to "Tuning Parameters" section in "Module Components."

Bulk editing function
Control logics and alarm attributes of the modules designed while configuring control applications are collectively edited by this function. Bulk editing and data consistency check functions are also provided for large volume of data defined by a table-format window. These functions can be automated. VP6E5216 Bulk Editing Package (for Module-based Engineering) is required for using this function. For details, refer to the GS “VP6E5216 Bulk Editing Package (for Module-based Engineering)” (GS 33J10D26-01EN).

■ OPERATING ENVIRONMENT

● Hardware requirements

Conforms to the operating environment of VP6E5100 Standard Engineering Function.

● Software requirements

Conforms to the operating environment of VP6E5100 Standard Engineering Function.

Required Software:

VP6E5000 Engineering Server Function
VP6E5100 Standard Engineering Function

The following software is required when editing the design information or using the document generation function.

Microsoft Word

The following software is required when importing/exporting the I/O information list(s) from/to an external file (Microsoft Excel xlsx format).

Microsoft Excel

For the operating environment of the Microsoft Word, and Microsoft Excel refer to the GS of “Automation Design Suite (AD Suite) VP6E5000 Engineering Server Function, VP6E5100 Standard Engineering Function” (GS 33J10D10-01EN).

The following packages are required for using the tuning parameter management function and the bulk editing functions.

VP6E5215 Tuning Parameter Management Package (for Module-based Engineering)
VP6E5216 Batch Editing Package (for Module-based Engineering)

■ MODELS AND SUFFIX CODES

		Description
Model	VP6E5210	Module-based Engineering Package
Suffix Codes	-V	Software license
	1	Always 1
	1	English version

■ NOTE

For CENTUM VP R6.04 and later, this package is included in Automation Design Suite Standard Engineering Function (VP6E51AD) and may not be ordered separately (see GS 33J10D21-01EN for details).

■ TRADEMARKS

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