General Specifications

VP6F1200, VP6ESETA
APCS Control Functions
APCS Package Set

CENTUM VP

GS 33J15U10-01EN

[Release 6]

■ GENERAL

The APCS advanced process control station is a server computer that is connected to a control network and serves as a station to carry out advanced control for plant efficiency improvement. While a normal FCS typically performs constant-setpoint control for processes with small changes at 1-second intervals, an APCS is designed mainly for performing the following types of control:

- *Control requiring a huge amount of calculations to be executed in long intervals*
- *Control to which changes and additions need to be made frequently as the season or equipment conditions change in long intervals*

The functions of an APCS are configured with the following software packages:

- *VP6F1200 APCS Control Functions*
- *VP6ESETA APCS Package Set*

■ APCS CONTROL FUNCTIONS

● Overview

The APCS Control Functions utilize standard function blocks of CENTUM VP's FCS, such as CALC general-purpose calculation blocks and SEBOL blocks, in order to improve the plant efficiency.

Although the APCS Control Functions include the same function blocks as those in FCSs of the CENTUM VP, the APCS Control Functions are not intended for substituting an FCS, but are intended to supplement constant-setpoint control by FCSs so as to improve plant efficiency.

● Function Specifications

Standard Blocks

• SFC Blocks

An SFC block runs a program coded in SFC. In SFC, each set of actions is described within a step, which is coded as SEBOL script or sequence table. There are three types of SFC blocks: Three-position switch SFC blocks, Pushbutton SFC blocks, and Analog SFC blocks. (SEBOL is a programming language developed for sequential process control and facilitates creation of a program for reading data from FCS's function blocks and writing calculation results to function blocks.)

• Regulatory Control Blocks

These function blocks are mainly used for feedback control.

Input Indicator Blocks: Input indicator, Input indicator with deviation alarm
Controller Blocks: PID controller, Sampling PI controller, PID controller with batch switch, Two-/Three-position ON/OFF controllers, Time-proportioning ON/OFF controller, PD controller with manual reset, Blending PI controller, Self-tuning PID controller
Manual Loader Blocks: Manual loader, Manual loader with input indicator, Manual loader with Auto/Man SW, Two-/Three-position motor control
Signal Setter Blocks: Ratio set, 13-zone program set, Flow-totalizing batch set, Weight-totalizing batch set
Signal Limiter Block: Velocity limiter
Signal Selector Blocks: Autoselector, Signal selector, Dual-redundant signal selector
Signal Distributor Blocks: Cascade signal distributor, Feedforward signal summing, Non-interference control output, Control signal splitter
Pulse Count Input Block: Pulse count input

• Sequence Blocks

These function blocks are mainly used for interlock and batch control sequences.

Sequence Table Blocks: Table type sequence
　Sequence table (Total number of inputs and outputs is 64 and the number of rules is 32.)
　Rule extension (Each expansion table adds 32 rules to Sequence Table)
Logic Chart Block: Interlock block diagram to describe the relationship between input and output signals with logical operators. It consists of 32 inputs, 32 outputs and 64 logical operators. The following logical operators are available: AND, OR, NOT, Set-/Reset-dominant flip-flop with 1 or 2 outputs, Wipeout, ON-/OFF-delay timers, One-shot, Comparator (>, ≥ , =)

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Switch Instrument Blocks: Mainly used to operate and monitor motors and valves.
1 input, 2 inputs, 1 output, 2 outputs, 1 input 1 output, 1 input 2 outputs, 2 inputs 1 output, 2 inputs 2 outputs, 1 input 2 one-shot outputs, 2 inputs 2 one-shot outputs
Sequence Element Blocks: Mainly used to generate input signals for sequence tables.
Sequence Elements 1: Timer, Software counter, Pulse train counter, Code input, Code output.
Sequence Elements 2: Relational expression, Resource scheduler, Representative alarms, Valve monitor

• Calculation Blocks
These function blocks are mainly used to perform calculation.

Arithmetic Calculation Blocks: Addition, Averaging, Multiplication, Division.
Analog Calculation Blocks: Square root, Exponential, First-order lag, Integration, Derivative, Ramp, Lead/lag, Dead-time, Dead-time compensation, Moving-average, Cumulative-average, Variable line-segment function, Temperature and pressure correction, ASTM correction: Old JIS, ASTM correction: New JIS
General-Purpose Calculation Blocks: General-purpose calculation, General-purpose calculation with string I/O
Logic Operation Blocks: AND, OR, NOT, Set-/Reset-dominant flip-flop with 1 or 2 outputs, Wipeout, ON-/OFF-delay timers, One-shot, Comparator (>, ≥ , =), bitwise AND/OR/NOT.
Auxiliary Blocks: Three-pole three-position selector switch, One-pole nine-position selector switch, Selector switch for 16 data, Selector switch for 16 string data, Data set, Data set with input indicator.
Batch Data Blocks: One-batch data set, One-batch string data set, Two-batch data set, Two-batch string data set, Batch data acquisition, Batch string data acquisition.

• Faceplate Blocks
These faceplate blocks have a human-machine interface function that allows several function blocks to be represented by a single tag.

Analog Faceplate Blocks: Groups the control loops of a multi-block configuration as a single tag.
Dual-pointer indicating station: Indicates PVs and sets SVs.
Dual-pointer manual station: Sets SVs and manipulated output values.
Triple-pointer manual station: Indicates PVs and sets SVs and manipulated output values.
Sequence Faceplate Blocks: Used for push-button operation from the HIS, and display and operation of sequence processes as a human-machine interface for sequence control function.
Batch status indicator: Displays sequence processes and lamps of 3-push-button switch, uses for push-button operation.
Extended 5-push-button switch: Displays five lamps and uses for push-button operation.
Extended 10-push-button switch: Displays ten lamps and used for push-button operation.
Hybrid Faceplate Block: Has the functions of analog and sequence faceplate blocks.
Extended hybrid manual station: Has the functions of triple-pointer operating station and 5-push-button switch.

• Internal Switches
Used as buffers for storing statuses.

Common Status Switches: Accessible within an FCS.
Global Switches: Transmits status data to other stations in the system via control network.

• Message Output Function
This function notifies events from one FCS to another FCS, HIS or computer. Messages are generated by sequence functions.

Annunciator Message: Has annunciator function of the instrument panel.
Sequence Message: Initiates action on HIS or supervisory computer – prints messages, displays operator guide messages, or prompts for data entry.
Event Message: Transmits signal event messages and SFC return event messages to other functions within the FCS.

● Application Capacity
The table below shows the maximum amount of functions that can be executed by each APCS.

Table Application Capacity

Items		Capacity
Internal status switches	Common switches	4000
	Global switches	256
Messages	Annunciator messages	500
	Print messages	200
	Operator messages	200
	Request messages	200
	Event messages	200
Control functions	Control drawings	200

Scan Period
• Standard scan period: Selectable from 4, 8, and 16 seconds
• High-speed scanning period: 1 second

Inter-station Connection
Maximum number of other stations' data that can be read and written: 5120

Database Allotment

Table APCS Database Allocation

Items	Capacity
Regulatory control and calculation blocks	300
Sequence blocks	300
General-purpose calculation blocks	300
SFC blocks	50
Switch instrument blocks	300
Sequence auxiliary blocks 1	600
Faceplate blocks	200
Logical operation blocks	100
Sequence auxiliary blocks 2	150
Batch data blocks	400
Unit blocks	10
User SEBOL functions	70

● **System Requirements**

Hardware Requirements
Conforms to the operating environment of VP6E5100 Standard Engineering Function
However, the following is recommended.
Main memory: ECC memory
    Windows Server 2008 Standard Edition (*1)   4 GB or more
    Windows Server 2008 R2 Standard Edition (*2)   8 GB or more
    Windows Server 2016 Standard (*3)   8 GB or more
    Windows Server (IoT) 2019 Standard (*4)   8 GB or more
    Windows Server (IoT) 2022 Standard (*5)   8 GB or more

Hard disk: RAID5
Peripheral: Uninterruptible power supply (UPS)
Graphic items are not required.

    *1:   Supported by R6.03.10 or earlier
    *2:   Supported by R6.07.00 or earlier
    *3:   Supported by R6.06.00 or later
    *4:   Supported by R6.09.00 or later
    *5:   Supported by R6.11.00 or later

Software Requirements
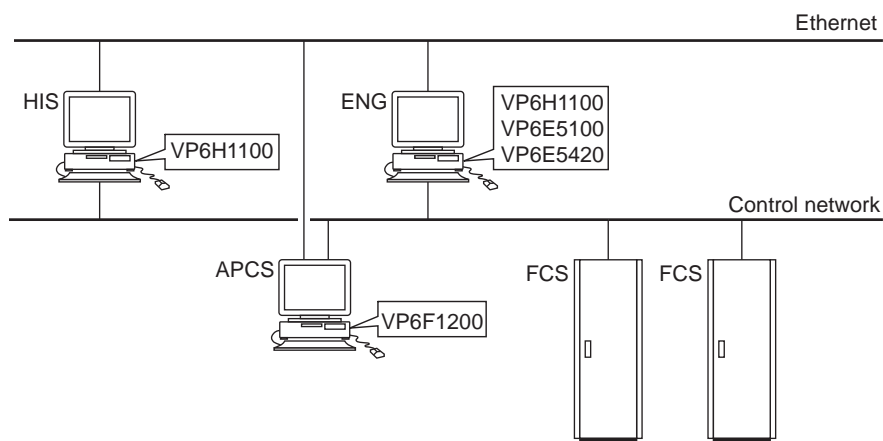Windows Server 2008 Standard Edition SP2 (32-bit) (*1)
Windows Server 2008 R2 Standard (64-bit) (*2)
Windows Server 2016 Standard (64-bit) (*3)
Windows Server (IoT) 2019 Standard (64-bit) (*4)
Windows Server (IoT) 2022 Standard (64-bit) (*5)

    *1:   Supported by R6.03.10 or earlier
    *2:   Supported by R6.07.00 or earlier
    *3:   Supported by R6.06.00 or later
    *4:   Supported by R6.09.00 or later
    *5:   Supported by R6.11.00 or later

Ethernet

HIS — VP6H1100

ENG — VP6H1100 / VP6E5100 / VP6E5420

Control network

APCS — VP6F1200

FCS   FCS

F01E.ai

VP6H1100:   Standard Operation and Monitoring Function
VP6E5100:   Standard Builder Function
VP6E5420:   Test Function
VP6F1200:   APCS Control Function

Figure Example of System Configuration

■ APCS Package Set

● Overview

The APCS Suite is a set of software packages needed for operation, monitoring, and engineering for an APCS.

● Function Specifications

The APCS Suite is a set of software packages for connecting an APCS to a CENTUM CS, but cannot be supported for connecting it to a CENTUM VP or CS 3000 system. The APCS Suite contains the following software packages:

  VP6H1100 Standard Operation and Monitoring Function
  VP6H4450 Multiple Project Connection Package
  VP6E5100 Standard Engineering Function
  VP6E5420 Test Function
  VP6E5150 Graphic Builder
  VP6E5490 Self-documentation Package
  VP6E5495 Electronic Instruction Manual
  VP6E5450 Multiple Project Connection Builder (for only Integrating CENTUM CS Project)

● Optional Software

The following software can be included optionally to an APCS Suite as requested:

  VP6H2411 Exaopc OPC Interface Package (for HIS)
  VP6H6510 Long-term Data Archive Package
  VP6H6530 Report Package

● System Requirements

The same as those for VP6E5100 Standard Engineering Function.

■ MODEL AND SUFFIX CODES

APCS Control Functions

		Description
Model	VP6F1200	APCS Control Functions
Suffix Codes	-V	Software license
	1	For CENTUM-XL or CENTUM V
	2	For CENTUM CS
	3	For CENTUM CS 3000
	4	For CENTUM VP
	1	English version

APCS Package Set

		Description
Model	VP6ESETA	APCS Package Set
Suffix Codes	-V	Software license
	1	For CENTUM-XL or CENTUM V
	2	For CENTUM CS
	1	English version

Note: APCS Package Set does not support an FCS of the CENTUM VP or CS 3000.

■ ORDERING INFORMATION

Specify model and suffix codes.

■ TRADEMARK ACKNOWLEDGMENT

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