

# General Specifications

GS 36J06B10-01E

NTPS200  
Exapilot Professional,  
Exapilot Standard, Exapilot Office  
Operation Efficiency Improvement  
Package

# Exapilot

## OVERVIEW

This GS provides an overview of the Exapilot Operation Efficiency Improvement Package. Reducing operating costs (increasing profit) is a major issue for plant operators. To enhance operating efficiency and increase profit, manual operations — such as startup, shutdown, load changes and grade changes — need to be automated.

The Exapilot for Windows (abbreviated to Exapilot below) Operation Efficiency Improvement Package makes it easy for knowledgeable operators to create semi-automatic sequences that replace manual operation

Exapilot was developed to be “Easy to Use”, and to “Realize Continuous Improvements in Operating Efficiency”, and it supports the following improvements in operating efficiency:

- Reduce operating time while maintaining product quality,
- Reduce labor while maintaining safe operation
- Prevent operator errors
- Ensure that operator know-how is not lost

Exapilot runs on Windows XP, Windows 2000 and Windows NT. Using Exaopc (OPC interface package), Exapilot can communicate with a process control system, and access process data.

## PACKAGE OVERVIEW

It used to require a lot of control system resources and engineering work to automate process control system manual operation procedures. And even after procedures were created, changes in equipment and products required expensive maintenance work.

To solve these problems, Exapilot builder functions are designed to make it easy to represent operating procedures, so maintenance is easy.

Exapilot builder functions include procedure parts such as Pump Start/Stop, Set Valve Opening, Ramp Up/Down, Request Field Work, Pause, Wait for Condition. By linking these parts on the screen, an experienced operator can create a procedure that operates as a semi-automatic sequence. A created sequence can be used as an operating screen.

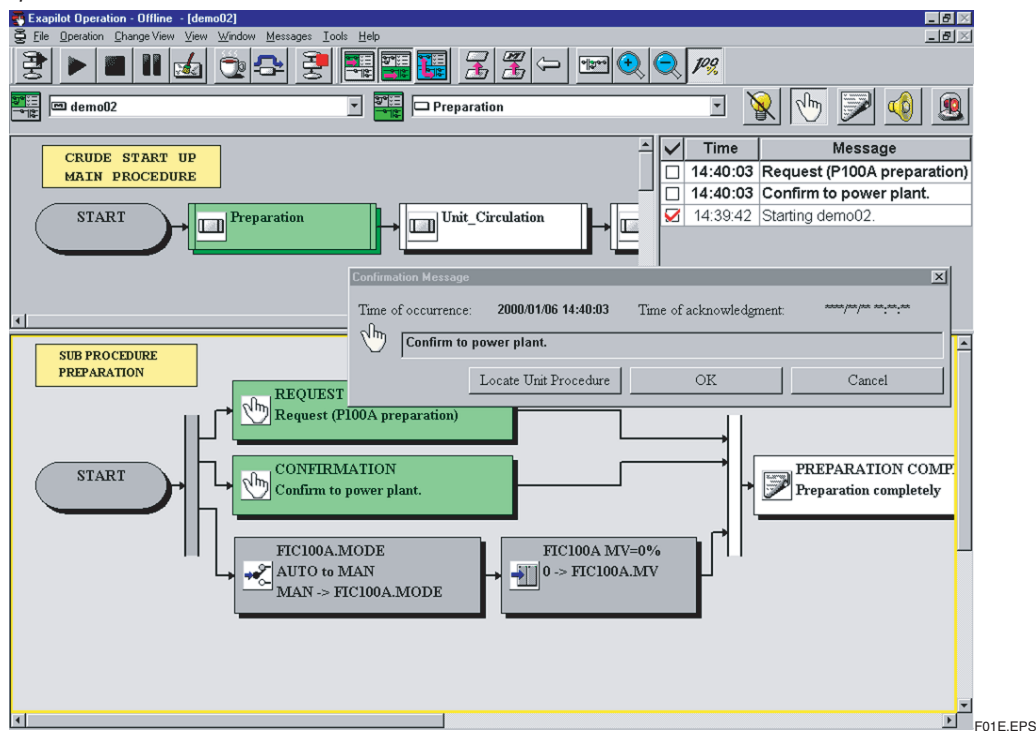


Figure: Exapilot Operation Main Window

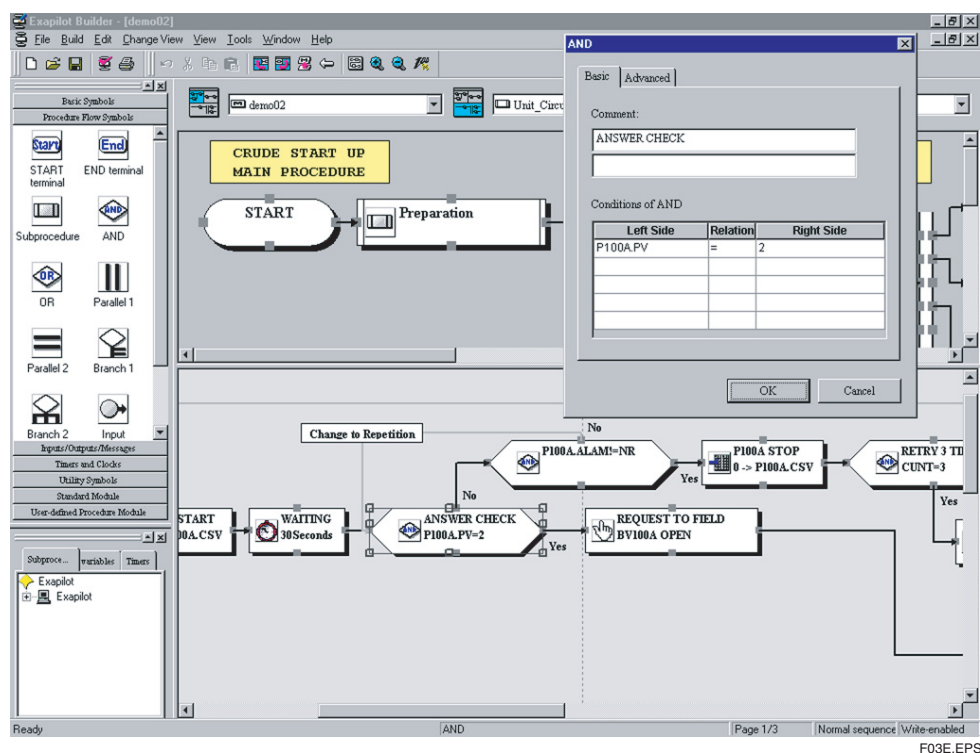


Figure: Exapilot Builder Main Window

## FUNCTION OVERVIEW

Exapilot functions are based on an “operational efficiency improvement cycle” which is repeated continuously to maintain or improve operational efficiency. Starting with “Enhance” to determine areas where efficiency improvement can be expected, “Engineer (Build Procedures)” and “Operate” steps are used to automate, and realize operating efficiency improvements. “Evaluate” and “Enhance” steps are under development.

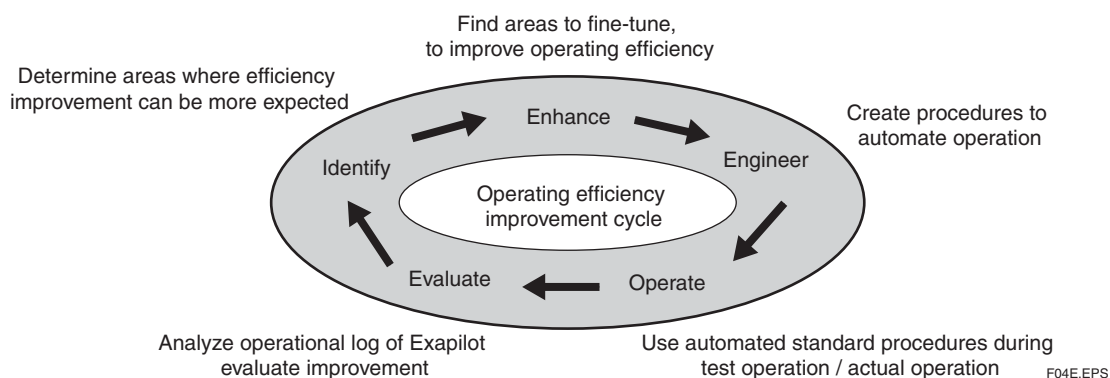
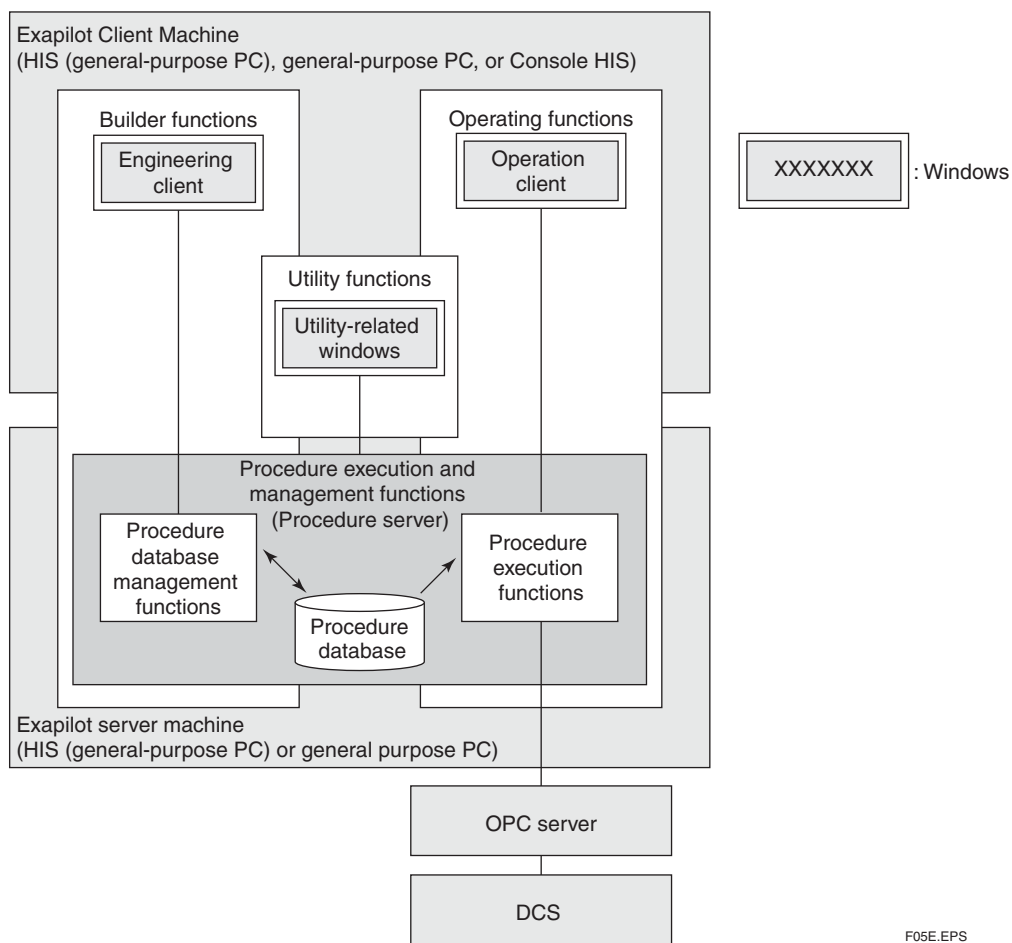


Figure: Operating Efficiency Improvement Cycle

**FUNCTION OVERVIEW contd.****Figure: Function Overview**

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## ● Builder Functions

Easy to understand (easy to represent an operation procedure).

### Procedure Builder Functions

- Procedure Flow Builder Functions
- Procedure Flow Documentation Functions
  - Setting the header/footer
  - Additional print out
- Character variable functions
- DCS tag existence-checking functions

### Operating Procedure Parts

- Procedure modules
- Intrinsic user functions (created using Visual C language) supported

## ● Operating Functions

The procedure flow window displays procedure operating status detail, for operation and monitoring.

### Operation Monitoring Functions

- Operating procedure display,
- Operating data display,
- Output history display

### Operating Functions

- Operation start/stop commands,
- Detailed operating commands (skip, break, pause),
- Operation message display,

## ● Procedure Execution and Management Functions

Executes and manages procedures defined by builder functions.

### Procedure Execution Functions

- Controls procedure flow.
- Client/server functions
- Multiple-procedures execution functions
- Offline functions
- Test run functions

### Procedure Database Management Functions

- Procedure flow display functions (display data processing, database editing, syntax check)

## ● Utility Functions

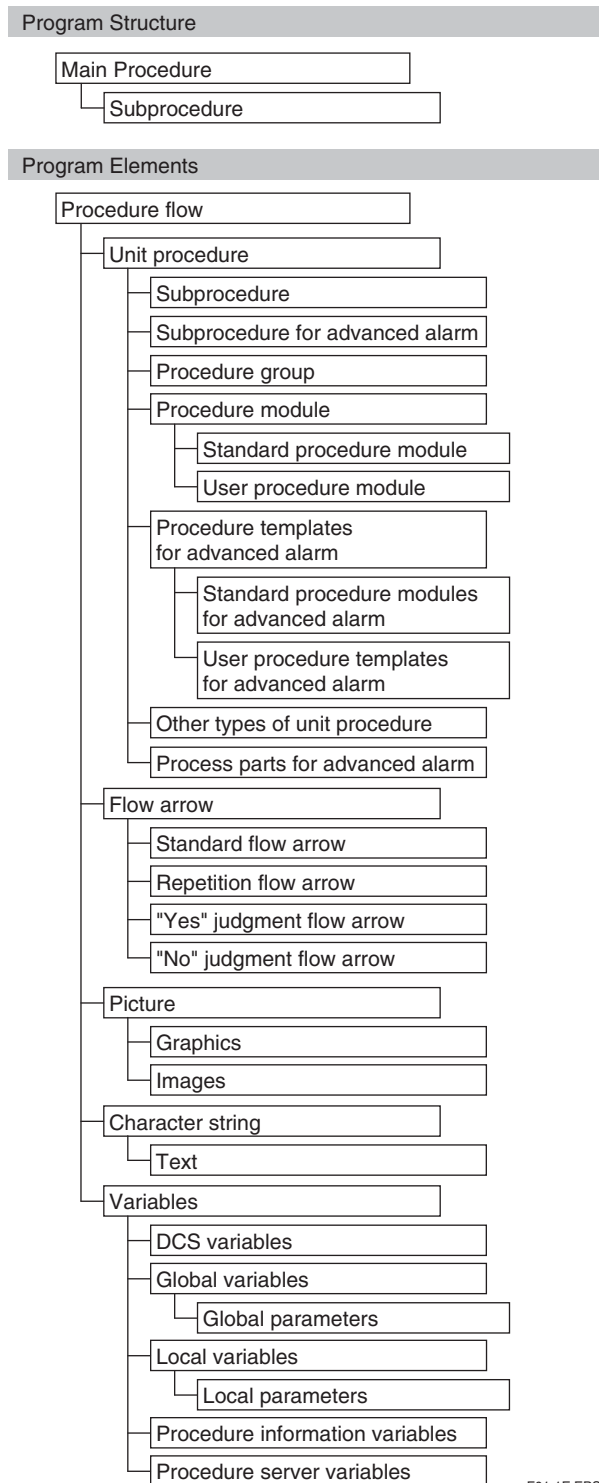
These provide necessary functions for package management.

### Installer Functions

- Installer functions
- System parameter setting functions
- Procedure maintenance functions
- Multiple OPC servers connecting functions
- Security functions
- Historical Report (Message) functions
- Historical Report (DCS output history) functions
- Watchdog Notification and Operation Status Monitoring

## ■ PROGRAM ELEMENTS, TERMINOLOGY

### ● Program Structure Diagram



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### ● Program Configuration Terminology

#### Program Configuration

**Main Procedure:** individual operating procedure units, each with individual names (Example: Boiler start-up). "Main Procedure" means Subprocedure of the to prank, too.

**Subprocedure:** units which are part of the hierarchy below the main procedure and have individual names (Example: Heating phase).

#### Program Elements

**Flow:** Individually-defined operating procedures

**Unit Procedure:** A process associated with a single procedure flow.

**Subprocedure:** Special unit procedure representing a process hierarchy (Example: heating process).

**Subprocedure for advanced alarm:** Special unit procedure used to represent the hierarchy of the procedure for advanced alarm. A chart for advanced alarm or another subprocedure for advanced alarm can be provided within the subprocedure for advanced alarm (example: valve failure monitoring).

**Procedure Group:** Special subprocedure representing a group of unit procedures.

**Procedure Module:** Special unit procedure used to represent a subprocedure part registered in a library.

**Standard Procedure Module:** Module provided as standard by Yokogawa.

**User Procedure Module:** Module created by user (and registered in a library).

**Procedure templates for advanced alarm:** Special unit procedure equivalent to a subprocedure for advanced alarm designed as a component (and registered in a library).

**Standard procedure modules for advanced alarm:** Procedure templates for advanced alarm provided as standard by Yokogawa

**User procedure templates for advanced alarm:** Component subprocedure for advanced alarm created by user (and registered in a library).

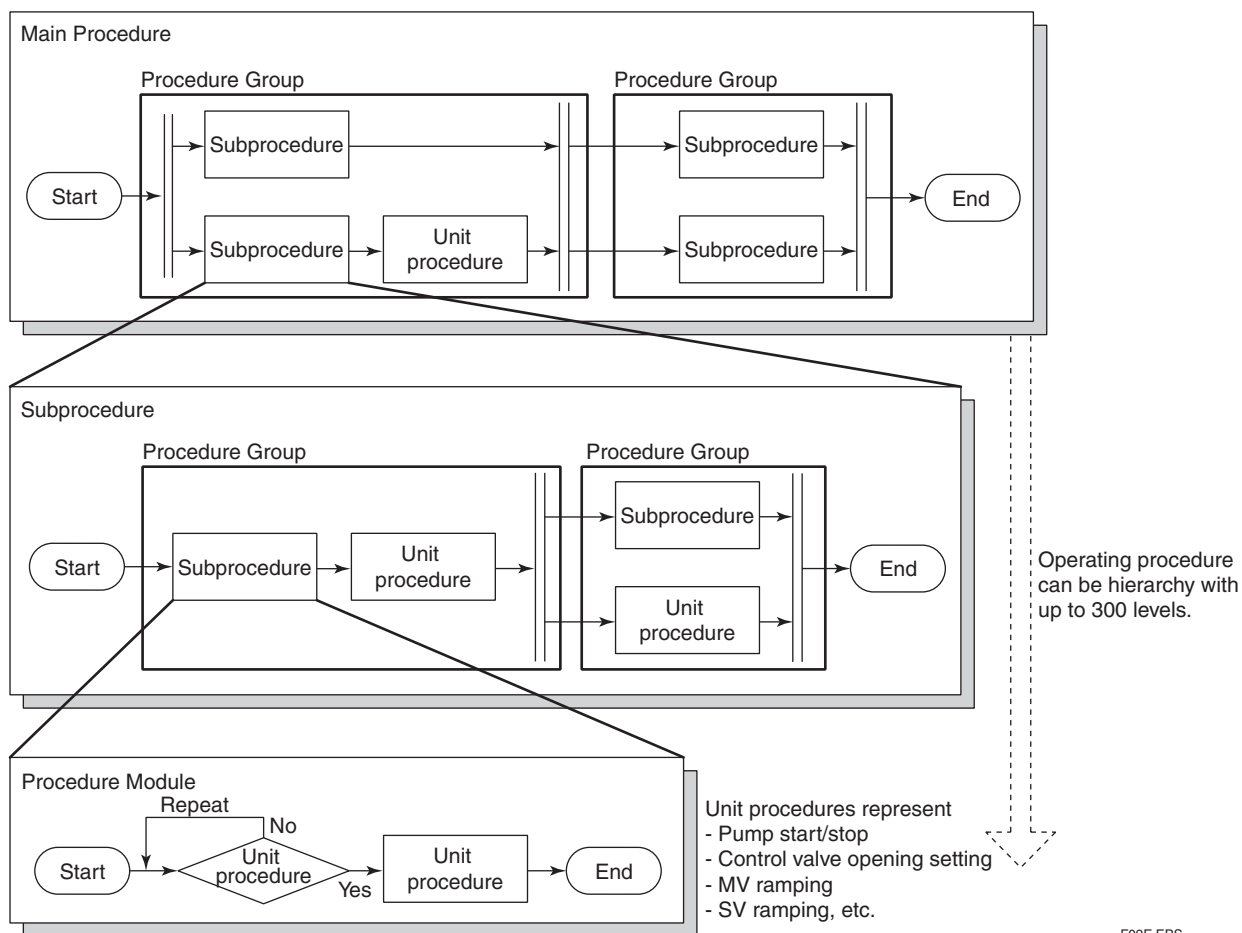
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- Flow arrow: Structural element used to represent a procedure and connect subprocedures in a flow chart.
- Process parts for advanced alarm: The unit procedures which can be used in a procedure for advanced alarm.
- Standard flow arrow: Starts from one subprocedure (other than a decision subprocedure) and connects to another, defining the order in which they are processed.
- Repetition flow arrow: Loops back to previous processing (used to perform repeated processing).
- “Yes” judgment flow arrow: Branches to process corresponding to “Yes” decision.
- “No” judgment flow arrow: Branches to process corresponding to “No” decision.
- Picture: Graphics (JPEG or bitmap) to be pasted on the work space and figure (circle or line).
- Character string: Program element for which a string of characters or a hyperlink can be specified.
- Variables: Data used in Exapilot.
- DCS variables: Variables used to transmit data between Exapilot and DCS.
- Global parameters: Variables declared as global (main-procedure-level) parameters; can be modified by user.
- Local parameters: Variables declared as local (subprocedure-level) parameters; can be modified by user.
- Procedure information variables: Variables in which main procedure specific information is stored.
- Procedure server variables: Variables the procedure server manages.

## ■ PROGRAM STRUCTURE

Application programs created in Exapilot represent user procedures as flowcharts.

The procedures which make up the program are connected between the start and end terminals. In general, major procedures are created as part of the top-level main procedure, with the second and lower levels used to represent smaller subprocedures and unit operations. Application programs may contain a hierarchy of up to 300 levels.

### ● Structure



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## ● Unit Procedures

Unit Procedures	Function / Unit Procedure Name
Procedure flow symbols	A unit procedure used to represent a procedure in a flowchart format
	START terminal, END terminal, Subprocedure, Parallel 1, Parallel 2, AND, OR, Branch 1, Branch 2, Output connector, Input connector
I/O Messages	Input processing, Output processing, Unit procedures with message processing functions
	Output to DCS, Block mode Setting, Input from other main procedures' variables, Output to other main procedures' variables, Confirmation Messages, Guidance Messages, Alarm Messages, Calculations, Substitution, HIS Operator Guide Messages, HIS Alarm Messages, HIS Window, Event Wait, User Event Wait, String Operation, Statistic Processing
Timer block	Time processing, Unit procedures with time-series processing functions
	Timer, Clock, Start Timer, Stop Timer, Check elapsed time, Pause Timer, Restart Timer
Utilities	In addition, unit procedures required to create various procedure flows
	Parameter declaration, Pause, Start subprocedure command, Initialize subprocedure command, Judge subprocedure status, End subprocedure command, Pause subprocedure command, End main procedure command, Pause main procedure command, Start other main procedure command, Judge other main procedure status, End other main procedure command, User function, Procedure group label, Comment, Generic name declaration, Dynamical generic name

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## ■ FEATURES

### ● Engineering and Operation: Client/Server Functions

The Exapilot server PC can be accessed by a client PC, for remote engineering and remote operation.

### ● Engineering: Intuitive GUI

Exapilot represents an operation procedure in flowchart format. No special programming language needs to be learnt, and the user can easily perform engineering, debugging, operation and maintenance.

### ● Engineering: Seamless connection to DCS

Exapilot uses Exapilot's standard OPC interface for connecting to other systems. This provides a way of connecting various process control systems, other companies' DCS systems as well as Yokogawa's, more easily and at less cost than with previous methods.

### ● Engineering: Sharing and reuse of operator know-how

Exapilot procedure flow engineering parts (unit: subprocedure) can be stored in a library. Reusable subprocedures can be used in user templates, and a set of general-purpose standard templates is provided with Exapilot.

### ● Operation: Preserving operator know-how

The operating know-how of experienced operators can be preserved as system programs, as standard operating procedures. Creating semi-automatic Standard Operating Procedures can help prevent operator errors.

### ● Operation: Workflow self-documentation

You can display a created workflow on the operating screen, and print out the workflow as self-documentation for the Standard Operating Procedure.

Operating know-how is shared. This function is helpful for operation training.

### ● Operation: Debug functions

You can debug procedures either in "offline operation" mode or in "test operation" mode.

#### - Offline operation mode

This allows debugging without an DCS. Input values that have been previously set in Exapilot are used. Output values are not sent to the DCS, but rather are used within Exapilot.

#### - Test run mode

Data is input from DCS or from other procedures; output values are not sent to the DCS, but rather are used within Exapilot.

### ● Evaluation: Evaluation of operating efficiency

After actual operation, the operation history is displayed as a time series, and the improvement due to Exapilot evaluated. (Under development).

### ● Enhancement: Finding operating procedure enhancements

Displaying operating dead time, and the volume of process requests and operator actions, suggests where further improvements can be made. (Under development).

### ● Utility: Multiple OPC servers connecting functions

This function enables users to define the OPC server to be connected separately for each procedure.

(Supported by R1.10 and later)

### ● Builder: Character variable functions

This character variable allows users to describe other vendor's DCS tag name or data item.

(Supported by R1.10 and later)

### ● Builder: DCS tag existence-checking functions

This function checks the DCS tag existence and tag type during the preparation to run procedures.

(Supported by R1.10 and later)

### ● Utility: Security Functions

This function allows users to restrict operation to authorized personnel and restrict operating procedures. Users can qualify the operational range for each operator.

(Supported by R1.10 and later)

### ● Builder: Procedure Flow Printing Functions

- This function enables users to set header/footer
- This function enables users to specify optional printing of exceptional flow, procedure modules, and delete spare subprocedures.

(Supported by R1.10 and later)

### ● Utility: Historical Report Functions

#### - Message Report

This outputs Confirm, Alarm, Guidance, Error messages to CSV type file.

#### - Output History Report

This outputs the history that process components have outputted, to CSV type file.

(Supported by R1.10 and later)

### ● Builder: Graphics Drawing Function

This function allows users to draw lines, circles, rectangles, and arrows on the workspace of Exapilot, facilitating the creation of effective SOP (Standard Operation Procedures).

(Supported by R2.10 and later)

### ● Operation: Procedure Operation Function

This function allows users to start and stop other procedures from a unit procedure.

(Supported by R2.10 and later)

### ● Operation: Message Window Component

This function allows users to copy a message window and display it as a CENTUM CS 1000 or CENTUM CS 3000 graphic for display.

(Supported by R2.10 and later)

### ● Operation: Event Wait Unit Procedure

This function allows reception of process alarm messages, sequence messages, and others from the CENTUM.

(Supported by R2.10 and later)

### ● Operation: Automatic Update of Current Executed Unit Procedure

This function allows display of unit procedures of a hierarchical procedure that is being executed on the Operation window.

(Supported by R2.10 and later)

### ● Builder: Selection from Third-party OPC Menu

This feature facilitates selection from the menu of third-party vendor options when selecting an OPC server. The menu for tag mode selection also changes to one provided for third-party vendors.

(Supported by R2.10 and later)

### ● Operation: Dynamical Generic Name

This feature facilitates swapping the existing tag name with an arbitrary tag name.

(Supported by R2.20 and later)

### ● Operation: Dynamic Message Function

This function facilitates changing the current message and displaying a new message during system operation.

(Supported by R2.20 and later)

### ● Operation: Hyperlink Function

This function facilitates opening a specified document or starting other programs in a message window.

(Supported by R2.01 and later)

This function also allows for opening a specified document or starting other programs through text pasted to a workspace.

(Supported by R2.20 and later)

### ● Operation: Subprocedure Expansion Function

This function facilitates executing subprocedures that are not wired.

(Supported by R2.20 and later)

### ● Operation: Procedure Display Mode

This mode only displays the procedure without executing it.

(Supported by R2.20 and later)

## ■ Exapilot OPTIONAL PRODUCTS

### ● Exapilot Procedures Expansion

This option increases the number of main procedures that can be executed concurrently with the Exapilot Professional and Exapilot Standard, as well as the number of main procedures that can be built and number of Exapilot clients.

### ● Exapilot Multi-run Procedures Expansion

This option allows identical main procedures to be executed by assigning different operating ID when Exapilot starts. This makes it possible to monitor operating progress and automate half the manual operations for simple batch processes that do not need to be rearranged.

### ● Exapilot Additional of Advanced Alarm Function

This advanced alarm component allows for monitoring during steady-state operation, such as "equipment module failure monitoring," "process failure monitoring," or "operator misoperation monitoring."

## ■ APPLICATION CAPACITY

### ● Exapilot Application Capacity

Item			Exapilot Basic		
			Standard	Professional	Office
Installation	No. of installation		1 / PC		
	Installed distination PC	HIS	X (*1)	XX (*2)	X
		Exaopc-installed PC or general-purpose PC	X		
Procedure Capacity and Restrictions	No. of built main procedures		5	20	5
	No. of procedures concurrently executable		1	4	1
	No. of multiple runs of Multi-run main procedures		—	—	—
	No. of Exapilot client (*3)		2	8	2
	Max. No. of unit procedures	No. of unit procedures	10000 / main procedure		
		No. of unit procedures	1000 / subprocedure		
		No. of unit subprocedures	300 / main procedure		
		No. of unit procedure modules	1000 / main procedure		
		No. of registered procedure modules	1000 / PC		
DCS Communication	Data read from DCS		X		—
	Data write to DCS		X		—

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\*1: The Exaopc OPC Interface package (for HIS) needs to be prepared separately.

\*2: The client can only be installed.

\*3: Total number of Operation windows and Builder windows that can be connected at the same time to the procedure server.

## ● Exapilot Option

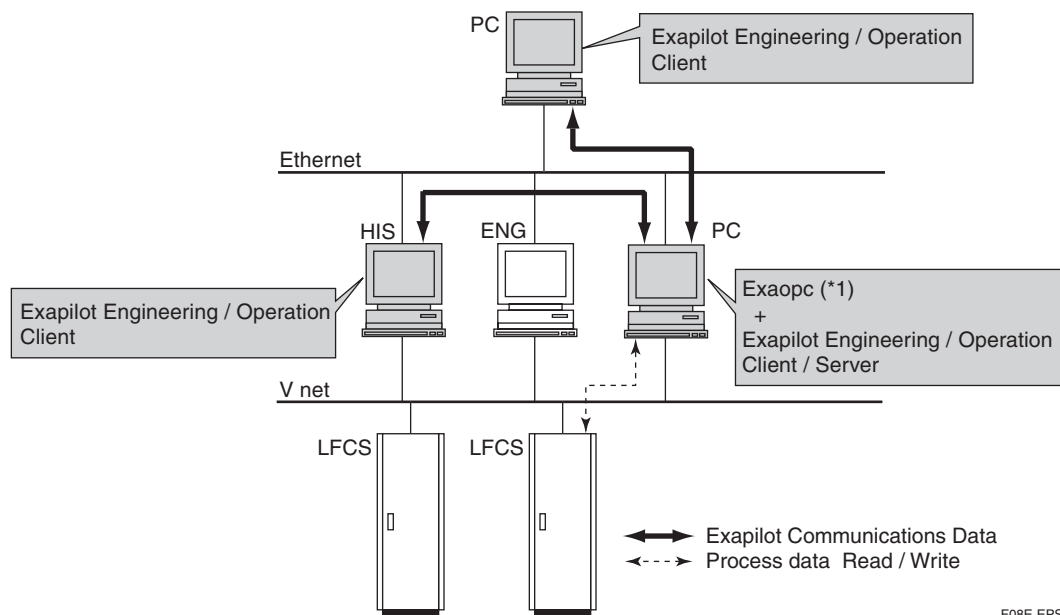
Item			Exapilot Option			
			Procedure Expansion		Multi-run Procedures Expansion	Additional of Advanced Alarm Function
			Standard	Professional		Standard / Professional
Installation	No. of installation		Max. of 2 options / PC	Max. of 3 options / PC	Max. of 3 options / PC	1 / PC
	Installed destination PC	HIS	X (*1)	XX (*2)	—	X
		Exaopc-installed PC or general-purpose PC	X			
Procedure Capacity and Restrictions	No. of built main procedures		+5 / option (*3)		+1 / option (*8)	—
	No. of procedures concurrently executable		+1 / option (*4)	+2 / option (*5)	—	—
	No. of multiple runs of Multi-run main procedures		—		+3 / option (*9)	—
	No. of Exapilot client (*6)		+2 / option (*7)		+3 / option (*10)	—
	Max. No. of unit procedures	No. of unit procedures	10000 / main procedure		5000 / multi-run main procedure	10000 / main procedure
		No. of unit procedures	1000 / subprocedure			
		No. of unit subprocedures	300 / main procedure			
		No. of unit procedure modules	1000 / main procedure			
		No. of registered procedure modules	1000 / PC			
DCS Communication	Data read from DCS		X			—
	Data write to DCS		X			—

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- \*1: The Exaopc OPC Interface package (for HIS) needs to be prepared separately.  
 \*2: The client can only be installed.  
 \*3: If one Exapilot Procedures Expansion is added onto Exapilot Standard, the number of procedures that can be created is expanded to 10.  
 If one Exapilot Procedures Expansion is added onto Exapilot Professional, the number of procedures that can be created is expanded to 25.  
 \*4: Example: For Exapilot Standard + Procedures Expansion x 2, the number of main procedures that can be run concurrently is 3.  
 \*5: Example: For Exapilot Professional + Procedures Expansion x 3, the number of main procedures that can be run concurrently is 10.  
 \*6: Total number of Operation windows and Builder windows that can be connected at the same time to the procedure server.  
 \*7: Example: For Exapilot Professional + Procedures Expansion x 3, the number of the Exapilot client is 14.  
 \*8: If the Exapilot Multi-run Procedures Expansion is added onto Exapilot Standard, the number of procedures that can be created is expanded to 6, allowing all procedures to be created as multi-run main procedures.  
 If the Exapilot Multi-run Procedures Expansion is added onto Exapilot Professional, the number of procedures that can be created is expanded to 21, allowing all procedures to be created as multi-run main procedures.  
 \*9: Example: For Exapilot Standard + Multi-run Procedures Expansion x 2  
 The number of multi-run main procedures that can be run concurrently is 2, and the total number of multiple runs with these two main procedures amounts to 6.  
 \*10: Total number of Operation windows and Builder windows that can be connected at the same time to the procedure server.  
 Example: If one Exapilot Multi-run Procedures Expansion is added onto Exapilot Standard, the total number of Operation windows and Builder windows that can be connected at the same time to the procedure server amounts to 5.

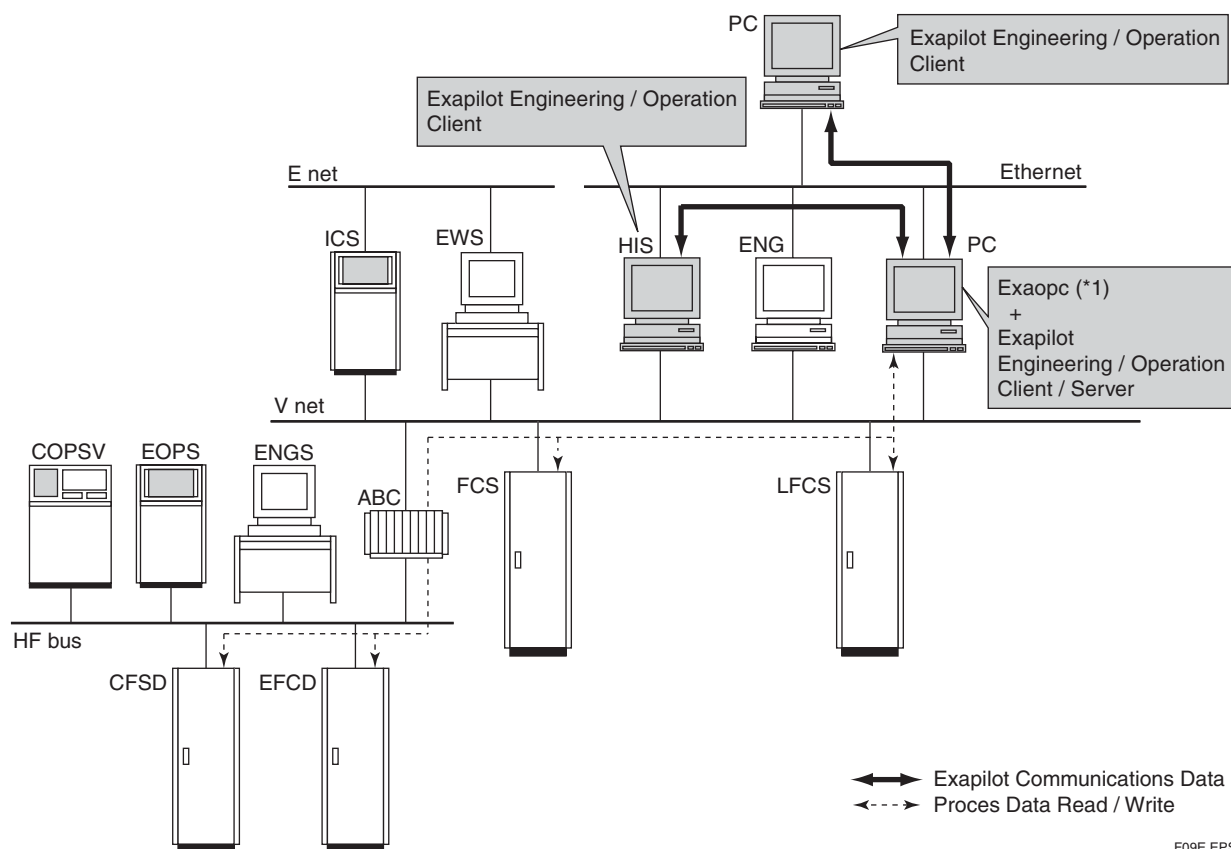
## ■ SYSTEM CONFIGURATION

### ● Example of Connection to CS 3000



\*1: At System Configuration (Engineering) time, refer to Exaopc (OPC interface package) GS 36J02A10-01E.

### ● Example of Connection to CENTUM Integrated System



\*1: At System Configuration (Engineering) time, refer to Exaopc (OPC interface package) GS 36J02A10-01E.

## ■ OPERATING ENVIRONMENT

### ● Hardware Operating Environment

#### Exapilot Server

Machine: IBM PC/AT (or DOS/V) compatible (which will run Windows NT, Windows 2000 or Windows XP)  
 CPU: Pentium III 600 MHz or better. (Exapilot cannot be supported to multiprocessor)  
 RAM: at least 256 MB (for 1 or 2 number of procedures concurrently executable)  
 at least 512 MB (for 3 to 6 number of procedures concurrently executable or when OS is Windows XP)  
 at least 1 GB (for 7 to 10 number of procedures concurrently executable)  
 Disk: at least 4 GB  
 Color: at least 32,768 colors (24-bit True Color or lower resolution is recommended)  
 Resolution: at least 1024 x 768 recommended  
 Sound: Recommended (for message output)  
 Network: Ethernet card (for CENTUM CS 3000 and CENTUM CS 1000).  
 Yokogawa VF701 control bus interface card (for CENTUM CS).

#### Exapilot Client

Machine: IBM PC/AT (or DOS/V) compatible (which will run Windows NT, Windows 2000 or Windows XP).  
 CPU: Pentium II 500 MHz or better.  
 RAM: at least 128 MB or at least 256 MB (when OS is Windows XP)  
 Disk: at least 2 GB.  
 Color: at least 32,768 colors (24-bit True Color or lower resolution is recommended)  
 Resolution: at least 1024 x 768 recommended  
 Sound: Recommended (for message output)  
 Network: Ethernet card (for CENTUM CS 3000 and CENTUM CS 1000).  
 Yokogawa VF701 control bus interface card (for CENTUM CS).

### ● Software Operating Environment

#### Exapilot (Server / Client functions)

Exapilot Revision	OS	Windows Service Pack
<b>R1.01, R1.02, R1.03 R1.10</b>	Windows NT Workstation 4.0 or Windows NT Server 4.0 Stand-alone Server	Service Pack 4, 5, 6
<b>R2.01</b>	Windows NT Workstation 4.0 or Windows NT Server 4.0 Stand-alone Server	Service Pack 4, 5, 6
	Windows 2000 Professional or Windows 2000 Server Stand-alone Server	Service Pack 1
<b>R2.10</b>	Windows NT Workstation 4.0 or Windows NT Server 4.0 Stand-alone Server	Service Pack 4, 5, 6
	Windows 2000 Professional or Windows 2000 Server Stand-alone Server	Service Pack 1, 2
<b>R2.20</b>	Windows NT Workstation 4.0 or Windows NT Server 4.0 Stand-alone Server	Service Pack 4, 5, 6
	Windows 2000 Professional or Windows 2000 Server Stand-alone Server	Service Pack 1, 2, 3
<b>R3.01</b>	Windows NT Workstation 4.0 or Windows NT Server 4.0 Stand-alone Server	Service Pack 4, 5, 6
	Windows 2000 Professional or Windows 2000 Server Stand-alone Server	Service Pack 1, 2, 3
	Windows XP Professional	Service Pack 1

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Application: VC++6.0 (Service Pack 3) (required to create user functions (unit procedures)).

### ● Operating Environment in Combination of Exapilot and OPC Interface Packages

- Exapilot cannot be connected to Exaopc OPC Interface Package R1.01.
- Exapilot cannot be connected to Exaopc OPC Interface Package (for HIS) R2.10 or earlier.
- When Exapilot and Exaopc OPC Interface Package are installed in separate PCs, they do not run on the combination of Windows NT 4.0 and Windows XP.

Note: Please refer to GS 36J02A10-01E (NTPF100 Exaopc OPC Interface Package).

## ■ MODEL AND SUFFIX CODE

### Exapilot Operation Efficiency Improvement Package

		Description
<b>Model</b>	NTPS200	Exapilot Operation Efficiency Improvement Package
<b>Suffix Codes</b>	-S	Basic Software License (with media)
	1	Exapilot Professional
	2	Exapilot Standard
	4	Exapilot Office
	0	Japanese
	1	English
<b>Option Codes</b>	/□-A10	Exapilot Procedures Expansion (□: required quantity)
	/□-A20	Exapilot Multi-run Procedures Expansion (□: required quantity)
	/1-A30	Exapilot Additional of Advanced Alarm Function

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Note: The Exapilot Office can be upgraded to Exapilot for HIS, Exapilot Standard, or Exapilot Professional.  
 The Exapilot for HIS can be upgraded to Exapilot Standard or Exapilot Professional.  
 The Exapilot Standard can be upgraded to Exapilot Professional.

### Exapilot Annual Support Contract

The product is supplied at prices not covering the manufacturer's warranty costs. Therefore, users are required to sign onerous annual maintenance contracts to receive maintenance service from the first year of purchase onward.

		Description
<b>Model</b>	NTMS200	Maintenance Service for Exapilot
<b>Suffix Codes</b>	-S	Annual Contract
	1	For Exapilot Professional
	2	For Exapilot Standard
	1	Always 1
<b>Option Codes</b>	/□-A10	For Exapilot Procedures Expansion (□: required quantity)
	/□-A20	For Exapilot Multi-run Procedures Expansion (□: required quantity)
	/1-A30	For Exapilot Additional of Advanced Alarm Function

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Note: Order to YMX customer service via FAX.  
 Note: Although the Exapilot Office is not officially supported, inquiries will be accepted for 90 days from the delivery date via the following URL:  
[http://www.yokogawa.co.jp/EXASOFT/03\\_Contact/contact\\_us.htm](http://www.yokogawa.co.jp/EXASOFT/03_Contact/contact_us.htm)

## ■ ORDERING INSTRUCTION

Specify model and suffix codes.

## ■ TRADEMARK

- Exapilot is a trademark of Yokogawa Electric Corporation.
- CENTUM is a registered trademark of Yokogawa Electric Corporation.
- Windows 2000, Windows NT and VC++ are registered trademarks of Microsoft Corporation.
- Ethernet is a registered trademark of XEROX Corporation.
- Pentium II, III are registered trademarks of Intel Corporation.
- All other company and product names in this GS are registered trademarks or trademarks of respective companies.