YAMATAKE Specification

Advanced-PS APS5000

Advanced-PS System

1. Achieves Effective, Industrial Plant Automation Solutions

The Advanced-PS system is Yamatake's latest open automation system for industrial plants.

Designed to ensure progressive evolution from legacy control systems, Advanced-PS protects automation investments, delivers added power and enhances the flexibility of operations in industrial plants and factories. In today's competitive markets, the knowledge contained in a system represents a significant part of the investment. Advanced-PS secures that investment and shares data across the whole corporation.

A Windows NT-based human-machine interface, the Open Universal Station shares data with the Open History Station to merge automation of material processes, via the Open Gate for Ethernet, with business decision-making processes. The system enables multi-directional information flows between system users, process control systems and information management systems.

2. Integration of Information Management and Control

Advanced-PS enables the selection of functionality and sizing in a distributed architecture, eases system development, and facilitates upgrading. It is a highly reliable system, having a duplex structure at all stages. Three optional function blocks can also be used to design a system that meets specific needs of system users and of the plant.

■ **Process Interface Machine**

Executes data collection and basic control functions.

■ **Function Module**

Independently executes specific functions such as advanced control, history collection, and user programming.

■ **Gateway, Interface Module**

Connects process operators and other users to the information highway, to universal control networks, and to third-party computers. The Advanced-PS communication network provides a rich functionality aimed at improving management and control of information.

- Common Human-Machine Interface Function (Single window)
- Data Access Function
- Multi-layered Control Hierarchy
- History Function
- Report Function
- Computer Communication Function
- Integration of Information Management with Control Systems
- Coexistence and Development with Existing Systems

2-1. Common Human-Machine Interface (Single Window)

The Advanced-PS is a system which obtains a truly common human interface for processes and associated systems. This single window provides:

2-1-1. Common Access to Data

The Open Universal Station (IOUS), which is used as the Advanced-PS operator station, can access data available in Advanced-PS and in connected computer networks. The IOUS is a single-window interface to the process where requests and data searches are made using tags and parameter names, without knowledge of their physical locations.

Ensuring plant operation safety is easy by specifying the ranges and levels of data which can be operated at each IOUS station.

2-1-2. Wide Range of Operation Targets

Because each IOUS has identical functions they serve up common operation functions for all operation targets in the spread:

- Number of points to be handled : 8,000-160,000
- Control levels : Adjustment, Supervisor, Optimization
- With/without supervisory or other higher-level computers, information management, supervisory control
- System Size : Small - Medium - Large
- System Attributes : Simple - Complex
- Process Methods : Continuous Processing - Batch Processing

All operations, from screen call-up, parameter operation, alarm and message operations, to batch start/stop, brand switching, and report printing are scaleable and function identically regardless of the size and complexity of the system.

2-1-3. Flexible Screen Structure

All IOUS allow the creation of custom displays to create an appropriate screen structure for your operations in an ideal combination with standard displays.

2-1-4. User Tools

IOUS provides several standard tools: process/system monitoring and operating tools for operators, tools to build up a system for process engineers, and system self-diagnostic tools for maintenance engineers. IOUS also provides several tools for research and development, and management staff.

2-2. Data Access Functions

The Advanced-PS collects data on multiple universal control networks (UCNs) to which it is connected, and can also access any process interface machines on the information highway as well as computers on higher-level networks. Collected and used to print reports, to display on screens, and to perform other tasks, such data optimizes and integrates any participating devices through the Advanced-PS.

2-3. Multi-Layered Control Hierarchy

2-3-1. Control Optimized for Accessibility and Reliability

The Advanced-PS performs control on three levels of which level 1 is the basic level of control-loop control and sequence control, and is performed by process interface machines. Level 2 is for control, using complex operations and controls that are performed flexibly at the user's discretion. At the level 3 control hierarchy, performance of high-level control provides such functions as overall plant optimization, scheduling, volume operations, and modeling.

The three levels of control offer an economical and effective control method for every action. Should upper-level control functions stop, the optimal range of operations shall be performed at the lower level.

This hierarchy allows you to select the levels necessary to introduce system functions required by the process. Scalable, Advanced-PS enables expansions for the long-term view so that you can expand control levels on an existing system simply by adding system functions.

2-3-2. Continuous/Discontinuous Process Operations

Because batch processing is neither continuous nor discontinuous we consider that it has both characteristics and a single system is able to perform both types of control and operation.

2-4. History Function

A warehouse of all data connected to the system is maintained in a common history database, which is available to most of the departments in an industrial plant. Often, the operations department and the safety department have similar history requirements for data which contains process variables such as temperature, pressure, and flow rate. The operations department uses such data to support its day-to-day work.

The safety department uses history data on each piece of equipment for fault analysis and preventive maintenance. The operations department also needs such data as shift or monthly averages; and the safety department compiles data on temperature, pressure, and oscillations in operating devices. Generally, this data is subject to summing or averaging.

The technical department wants to use history data in a different way. Generally, to perform process analysis, researchers need history data at many points in one section of the plant over a short period of time. It is simple in Advanced-PS's history database to change the history collection method and collection points. It is also possible to perform statistical processing using history data.

The quality control department wants data for analysis of sample products from the process. They require that this data is included in the general history. But the product management department wants data about monthly plant output and average productivity, and they also need cost data for each product group.

With flexible and comprehensive history functions, the Advanced-PS can satisfy a diversity of history requirements throughout the plant, and the company.

2-5. Reporting Functions

The Advanced-PS provides standard report formats to organize current and historical data relating to the process and the system. Simple examples include real-time printing when events occur (such as when alarms sound or operators perform an action), and trend data printing, for specific point groups. Events and history data can be formatted, and printed or displayed, regularly or else on demand.

2-6. Computer Communications Function

Many computers in the plant work independently in different systems handling distribution, transportation, storage, shipment, inventory control, production planning, and management. All of these computers should be integrated in a single, plant-wide system.

The Advanced-PS gateway inter-connects computers in each department on an LCN communication network. The gateway also provides functions for collection, conversion, and data storage. The gateway function allows the IOUS to display data from third-party computers in the same way as from Advanced-PS devices.

2-7. Integration of Information Management And Control Systems

Information management functions -- filing, data management, and communications -- merge process control data with other fields of finance, inventory management, shipment and infotech departments. You can develop a plant model to analyze or estimate statistics for production planning, and establish necessary management functions, all based on real-time history data.

High-level information can be displayed on any IOUS via the single-window interface.

2-8. Coexistence and Development with Existing Systems

TDC 3000^X and TDC 3000 BASIC, both legacy systems which can be integrated with the Advanced-PS, have been treated as progressive and evolutionary systems since their release by Yamatake, in the markets we serve. The evolution concept required an expandable system that would optimally conserve the system investment for the longest period of time. Now the Advanced-PS fully accommodates both TDC 3000^X and TDC 3000 BASIC systems, and can coexist with the information highway and the process interface machines employed in the TDC 3000 BASIC system. Also, the universal control network (UCN), an open network for process control, and the information highway, are able to coexist with zero loss in functionality.

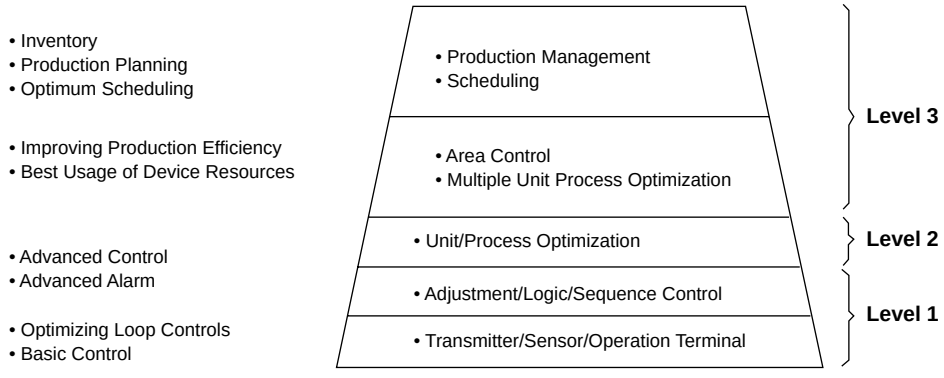

Figure.1 Advanced-PS Multi-Layered Control Hierarchy

3. System Configuration

Functions such as advanced control and history, which have been handled by computers, are distributed in the Advanced-PS to build a highly capable, reliable, and flexible system architecture.

The nucleus of the system is the LCN, which connects with upper plant information networks and a universal control network (UCN), which is the process control network. Other devices connect these networks together.

The Advanced-PS architecture has these main characteristics.

- The existing TDC 3000^X and TDC 3000 BASIC systems are seamlessly integrated into the Advanced-PS architecture.
- The system is easily expanded to include new control networks, or controllers.
- The LCN enables communication between software devices connected to the network.
- The system contains functionally-distributed devices. Such devices enable the control application and provide device redundancy.
- Third-party computers can be connected via the gateway, and multiple LCNs can be linked together.

The distributed inf ormation management control system includes these fundamental elements.

- Basic data collection/control is performed in a variety of controllers, on the UCN. Multiple UCNs can be connected to the LCN via network interface modules.
- Data contained in the Advanced-PS can be displayed and operated by universal stations, and by IOUS.
- In the Advanced-PS, system data can be accessed using tag numbers and parameter names, even in ignorance of their physical locations.
- Add or maintain devices even when the system is operating.
- Control functions are easily hierarchized.
- The system is highly reliable, and contains utilities that guarantee system safety.

3-1. System Network

The Advanced-PS system networks are the LCN, which is the system's core network, and the UCN, which serves as a controller network. The information highway and Ethernet also form part of the system, for upper-level networking.

3-1-1. Local Control Network (LCN)

The LCN uses a high-speed bit-serial communication bus to control access, employing the token-passing method. Information is transferred at 5 megabits/second, and guarantees stable system performance even under high loads. High-reliability duplex cables are employed for the LCN, which verifies all transferred data. Up to 64* LCN devices can be connected to the network.

(*For 40 or more devices to be connected, an LCN extender should be used.)

3-1-2. Universal Control Network (UCN)

The UCN is a high-speed serial communication network operating at 5 megabits/second and controlling access, using the token-passing method. It is an open-oriented network having real-time MAP-based communication protocols. The UCN can freely exchange data among controllers, and up to 30 redundancy controllers can be connected on the network.

3-1-3. Information highway

The information highway, which is the control network of the TDC 3000 BASIC system, can be connected to the LCN via a highway gateway (HG).

3-1-4. Other Communication Functions

Optimizing UCNs for difficult environmental conditions may require use of fiberoptic links. When installing universal stations in local instrumentation rooms, connect optical-fiber links to the LCN using LCN extenders.

3-2. Devices on the LCN

The Advanced-PS controls functions such as information processing and advanced control that are subject to processing by process computers, and distributes them to each module on the LCN. Each independent module provides these functions.

- You can access the system through a single window.
- Each module provides "customized" data management and storage functions.

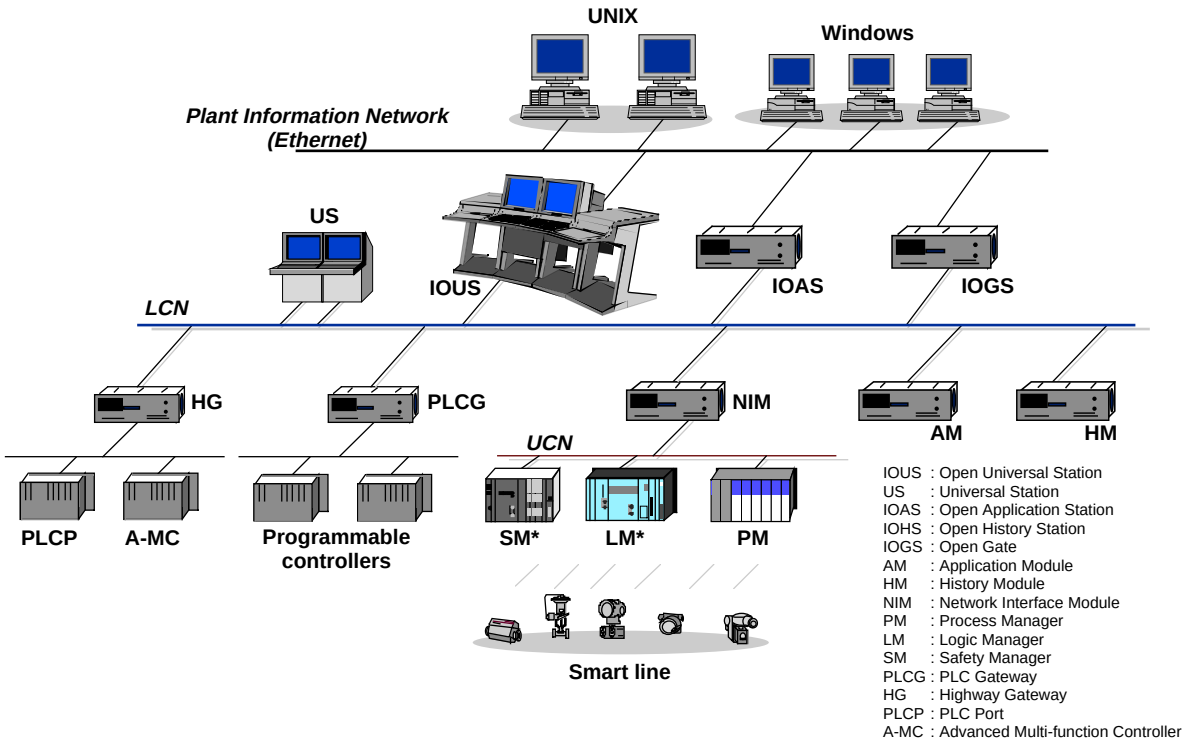

Figure.2 Advanced-PS System Arechitecture

* SM and LM are Honeywell products.

■ Each module has functions to collect and control process data at levels 2 and 3, for each process or process area.

The Advanced-PS employs a modular structure that allows selection of functions, capacities, and speeds that will suit the size and type of process application.

When introducing the system, start with minimal functionality and redundancy provision; then, if any expansion to the system is required, increase the range of functions or increase the level of redundancy, and add or replace modules, without impacting on the system performance.

Modules can be grouped together from a single operating center. Distributed over a wide area, modules can take various forms, depending on the system's size. The gateway helps to expand the functionality of an Advanced-PS system.

These are the modules and gateways that are used to create an Advanced-PS system.

3-2-2. Human Interface

One or more of two types of human interface may be applied to any Advanced-PS system. Each human interface is housed in either a Z-shaped console (Figure 3) or a P-shaped console (Figure 4). Designed using the latest developments in ergonomics, Z-type consoles maximize operational efficiency and minimize user fatigue.

■ Open Universal Station (IOUS)

The human interface is connected to the information network and to the LCN, the IOUS controls processes and transmits process data to the higher-level network. The IOUS performs three major functions:

- Process Control
  - – Monitors and handles process information
  - – Monitors system status
- Information Integration
  - – Displays process computer sub-system information
- Open Process Data
  - – Disseminates real-time data to networked PCs

An IOUS can display schematic screens on a Windows NT graphic displays and also on a universal station (US). In Windows NT, the computer allows the user to customize screens to show rich, plant-specific functionality.

■ Universal Stations (US)

All information derived from process control devices, measurement subsystems, computers, and other devices is displayed on the US and can be used as process data. System information is displayed on the CRT monitor of each US and each display can be invoked by touching a single key on the keyboard, or by touching a target on the screen.

US operations are based on a consistent system of procedures which are independent of system size. Regardless of which level is processing the control functions, all processing is considered to be either continuous or discontinuous and therefore all processing lies within the Advanced-PS system scope in Advanced-PS.

Its common window allows operators to monitor and manipulate processes and resolve system events efficiently. The US permits a variety of display operations and other data handling:

- Display/print process histories, trends, averages, etc.
- Print reports, logs, and journals
- Store databases to offline media disk
- Operate system devices and monitor device status

For process engineers, US creates a process database, outputs schematic displays and reports, and loads system software from diskettes. For maintenance engineers, US displays diagnostic messages created by the system, diagnoses system faults which cannot be internally detected by system devices, and checks on the status of devices in the control room and in the process area.

3-2-3. Data Collection and Storage Modules

■ History Module (HM)

Providing mass storage for the Advanced-PS, the HM has functions to collect and store system information from any control device, and from any module and gateway. The information can be freely accessed from any module or gateway on the LCN, and displayed by the IOUS and printed as a report. Information can also be transferred to computer modules, for other purposes.

The HM also stores databases for other modules and for process control devices. In the event of restarting after a power failure, the latest module or box database being stored can be used to restart the system and restore operations to the condition that obtained immediately before shutdown.

The HM's capacity is determined according to the volume of historical data anticipated by process engineers and by the number of devices to be connected to the UCN, at the time of system creation.

Performance of all transactions relating to storage of specific data in the HM is automatically managed.

3-2-4. High-Level Arithmetic and Control Unit

■ Application Module (AM)

The AM performs level 1 control functions (Figure 1) for process interface machines, and performs arithmetic and control functions at higher, and more complex, levels. Situated on the LCN, the AM can handle a wide range of process control information in multiple UCNs. The AM can create a high-level, distributed, complex control system using standard algorithms. By creating custom algorithms and custom routines the AM can build a special control system. The AM has a powerful process control language (CL) designed specifically for process engineers.

Figure.3 Open Universal Station (IOUS Z-shaped console)

Figure.4 Universal Stations (US P-shaped console)

3-2-5. Gateway/Interface Module

The Advanced-PS provides several gateways for connection of other devices.

■Computer Gateway (CG)

The computer gateway is a standard device that enables the efficient connection of third-party computers to the LCN. The computer gateway integrates the Advanced-PS with third-party computers in an organic way, via standard communication protocols. The CG also employs BSC2780 and HDLC-LAPB communication protocols, that are highly general-purpose and allow connection with a broad range of computers.

■Open Gate (IOGS)

The open gate (IOGS) enables connection to PCs on the higher-level Ethernet. IOGS can perform standard data exchanges, such as OLE.

■PLC Gateway (PLCG)

The PLC gateway connects a sequencer (PLC) or its network, to the LCN, enabling data from the connected PLC to be handled in the same way as other data in the Advanced-PS.

3-2-6. Open Application Platform

■Open Application Station (IOAS)

The IOAS is connected to both the LCN and the higher-level Ethernet.

The IOAS performs supervisory control and runs a control package which is a Windows NT application. Packages may include Knowledge Power I to support transitional automation and Knowledge Power II to support regular operations.

3-2-7. Large-Scale Integrated Modules

■Network Gateway (NG)

The NG is a module for operating and integrating multiple Advanced-PSs and is employed mostly to expand the system beyond the limit of 64 nodes/Advanced-PS. Connected via a NG, an Advanced-PS (and its human interface modules) can monitor and operate the Advanced-PS to which its node is connected, as well as those of other, NG-linked Advanced-PSs.

3-3. Process Interface Machines

The interface machines on UCNs, the open control networks, are described below.

■Process Manager 100 (PM100)

The process manager is a process controller for integrating functions such as advanced control, sequence control, logic/interlock control, and input/output. It can be used to set your own process speed and capacity for each function, and enables the flexible and safe performance of a wide range of applications, from process input/output monitoring to high-level control. The process manager provides many standard algorithms for adjustment and advanced control. Sequence programs are described in CL, the system's common control language. Logic interlock executes a logic algorithm independent of sequences. Input/output monitoring includes monitoring of analog input/output, digital input/output, and counter input, as well as updating databases and checking alarms. The process manager can freely exchange data with other controllers on UCNs using tag names and engineering units. Maintenance staff can change PM100 function slots on-line, and PM100 offers other maintainability features. The functional modules and input/output modules used for control can be doubled to improve reliability, if necessary.

■Logic Manager (LM)

The LM is a high-level mass-storage programmable controller that enables the installation of up to 2000 input/output, serial communication input, and input/output cards, in remote locations. The LM also performs numerical processes and is directly connected to UCNs. LM efficiently performs high-speed logic control including electric control and transfer control. Because complete information integration is achieved through the UCN, the LM cooperates with other LMs on the network, performing integrated control, in combination with the PM100. The LM helps to build a highly reliable system and implements CPU and duplex communication interfaces.

■Safety Manager

The safety manager is a microprocessor-based logic controller having advanced multiplex and self-diagnostic technologies. To ensure plant safety, the safety manager provides advance detection of situations in which the plant should not be interrupted due to hazardous conditions existing in its emergency cut-off system. The safety manager has these characteristics.

- Meet safety requirements and working rates
- Allows efficient engineering via logic diagrams
- On-line change of hardware and software

■PLC Port

The port integrates subsystems, such as programmable controllers, with UCNs. The PLC databases are accessed via serial interfaces for integration with UCNs providing standard access using tag names operator interaction, and advanced control by higher-level modules. Using the PLC port it is possible to communicate with other controllers and PLC ports on UCNs, and integrate them at the control level.

■Network Interface Module (NIM)

The NIM is a device for connecting LCNs having different protocols, with UCNs. UCN devices include process managers, logic manager controllers, and PLC ports. The NIM exchanges data formats and protocols between process devices on UCNs and the LCN, and notifies operators of event alarms.

■HG & Information Highway Box

The HG connects interface machines on the TDC 3000 BASIC system highway (controllers) to the LCN. The HG can be redundant.

4. System Reliability and Maintainability

Three system features are required to ensure effective process management:

■Reliability

■Maintainability

■System Support

4-1. Reliability

The Advanced-PS is highly dependable and is supported by these elements.

(1) System Design. The Advanced-PS is designed to detect errors in hardware configuration and in software screens, to maintain maximum system performance even if errors occur, and to minimize damage to the system when something goes wrong. In other words, the influence of errors is limited to the devices in which they occur; even when a malfunction occurs due to an event, the system can continue to operate normally.

(2) Redundant Configuration. Advanced-PS uses duplex LCN/UCN data communication cables. Boxes and gateways can be doubled for back-up. Back-up is automated.

(3) Ease of Operation. Guidance messages are displayed to enable operators, engineers, and maintenance technicians to follow plant procedures. In addition, our training and technical support can enhance the system benefits by offering searchable online databases.

Considerable attention has been paid to security. The Advanced-PS system has several access levels for process data and provides for data modification restrictions by implementing key locks. Moreover, the system performs "type checks" to ensure that only valid data is entered.

4-2. Maintainability

Various criteria facilitate maintenance of the Advanced-PS.

(1) Maintenance procedures are minimized.

(2) Most maintenance procedures can be performed by users.

The Advanced-PS uses common hardware and software so, for example, LCN modules are composed of only ten types of card, and also use common memory boards CPU boards and so on. Software is modularized and parts of these modules are shared, which optimizes the total number of software parts.

This standardized software can be easily modified. The basic Advanced-PS software and the communications software share modules, for example. The modules and gateways also execute functions using standardized software modules.

The system performs integrity checks to detect and correct errors that occur during data exchanges, and records and analyzes errors on hardware and software screens. The system also recommends maintenance procedures in case of device faults. Each module automatically executes self-diagnosis without prompting, and recommends maintenance procedures. A module would subsequently test, verify, and replace each optimum replaceable unit (ORU). If self-diagnosis cannot handle errors that occur in ORUs, users would place off-line the suspect devices and execute a diagnostic program, while other modules operate normally. For procedural maintenance, each device can be independently set to on-line/off-line. In-situ service is provided for each ORU.

4-3. System Support

The Advanced-PS support system covers all sub-systems, from production to maintenance. The Advanced-PS is supported by various training courses and documents so that you can build a system easily. Training courses optionally by skilled instructors are conducted at fully-equipped facilities. We can optionally send trainers to your site, if so requested. The documents are well arranged. Control methods are based on long experience in a wide range of processes. A well-organized service system assures consistent, life-cycle support, from system design and construction to engineering and start-up, globally.

Main Advanced-PS Specifications

■ LCN (Local Control Network)

Maximum Number of Tags	160,000 + AM tags
Communications Method	Token path
Communication Speed	5 megabits/second
Cable Length	300 m (4.9 km when LCNE is used)
Number of Connected Devices	64 (for 40 units or above, use LCNE)
Number of Areas	10 areas
Number of Units	100 units
	36 units/area
Number of Consoles	10 consoles/LCN
Number of IOUSs / USs	10 units/console
Number of Connected Process Networks	20
Redundancy	Duplex as standard

■ IOUS (Open Universal Station)

CRT	CRT	21" flat square type	
	CRT Resolution	1024 (wide) x 768 (high) dots	
	CRT Color Number of CRTs to Be Connected	16,770,000-color (1CRT), 65,536-color (2CRT) (Except 15 colors for native windows)	
Console	Name	Z-type console	
	Location	Linear alignment, sectorial alignment	
Processor	Name	LCN Processor	NT processor
	Purpose	For plant operations	For operation management
	OS Name	RNOS	Windows NT 4.0
	Main Storage Memory	8MW / 16MW	128MB / 256MB
Communication Interface	Communication Port	LCN interface	Ethernet Ethernet, 10BASE-T or 2
	Communication Protocol	LCN special protocols (token passing method)	TCP/IP (CSMA/CD)
Keyboard	For Operation	Anti-dust flat panel keyboard (special arrangement) Anti-dust flat panel 8-loop serial operation keyboard (special arrangement)	
	For Engineering	ASCII LAYOUT	
Large Screen Display		Optional	
Multimedia Function		Optional, ITV picture display, video display	
Auxiliary memory		Built-in hard disk 2GB (maximum 4GB), CD-ROM, Zip disk 100 MB (Optional) TRAVAN tape 4GB (non-compression) / 8GB (compression) (Optional)	
Pointing Device		Touch screen, track ball or mouse	
Buzzer		3 types	
Voice Output Function		Optional, 6 seconds x 254 words/unit	
Peripherals	Printer	Dot-matrix printer, Monochrome Laser printer / Color page printer (Network connection available)	

■ HM (History Module)

Main Storage Memory		4MW
Disk Capacity		1.8GB/unit (up to 2 units)
Number of Registered Graphic Screens		Infinite
Number of Registered Group Screens		450 screens/area
Number of Registered Trend Screens		400 screens/area
Number of Registered Reports		Infinite
Continuous History Function	History Points	Up to 3000 points/HM
	Period of Storage	5, 10, 20, 60 seconds or as defined by the user (3-30 minutes)
	Duration of Storage	240 hours (5 seconds), 480 hours (10 seconds), 960 hours (20 seconds), 999 hours (60 seconds), 999 hours (as defined by the user)
	Average History	Hour/Shift/Day/Month/User Average
Event History (Journal) Function		Up to 9,999 events, including process alarms, operator changes, operator messages, system status changes, system errors, and system maintenance
Redundancy		Optional
Disk Redundancy		Optional

■ AM (Application Module)

Main Storage Memory	4MW, 6MW, 8MW, 16MW
User Memory	4.3MW (6MW AM)
Standard Algorithm	PID, speed addition, rapid/slow compensation, addition, residual division, ratio, switch, override, selector, ramp soak, CL algorithm
Redundancy	Optional
Application Package	Predictive control PREDIMAT, fuzzy deduction FUZZICS, etc

■ CG (Computer Gateway)

Main Storage Memory	2MW, 4MW
Upper Communication Function	RS-232C/RS422
Communication Protocol	BSC2780, HDCL-LAPB

■ IOGS (Open Gate)

CPU		Single configuration
OS		Windows NT4.0 Workstation
Main Storage		128MB
Communications Interface		LCN, Ethernet (10baseT)
Communications Protocol		TCP/IP, DCOM
Auxiliary Memory		FDD, 4GB hard disk (at minimum) TRAVAN tape 4GB (non-compression) / 8GB (compression) (Optional)
Monitor	Connected during maintenance	15" CRT or 14" liquid crystal
Keyboard		ASCII LAYOUT
Pointing Device		Mouse
Mounting Method		Mounted on LCN cabinet or console

■ PLCG (PLC Gateway)

Main Storage Memory	4MW
Maximum Number of Handled Points	UP to 3000 points
Communications Port	2 RS-232C ports
Data Collection Speed	400-500 points/second (per port)
Maximum Number of PLCGs	20 units/LCN
Transfer Speed	Up to 19200 bps
Communication Protocol	Modicon - semi-doubled, mode path, RTU mode, DF1 Allen Bradly - completely doubled
Redundancy	Option

■ IOAS (Open Application Station)

CPU		Single configuration (standard)
OS		Windows NT4.0 Workstation
Main Storage		128, 256MB
Communications Interface		LCN, Ethernet (10baseT)
Communications Protocol		TCP/IP
Auxiliary Memory		FDD, 4GB hard disk (at minimum) TRAVAN tape 4GB (non-compression) / 8GB (compression) (Optional)
Monitor	Connected during maintenance	15" CRT (standard) or 14" liquid crystal (optional)
Keyboard		ASCII LAYOUT
Pointing Device		Mouse
Mounting Method		Mounted on a flat console (standard), LCN cabinet,

■ Network Gateway (NG)

Main Storage Memory		4MW
Communication Specifications	Network Type	IEEE802.4 based
	Carrier Band	Indoor; 500 m, 5MBPS
	Optical Cable	Indoor or outdoor; 12 km, 10 MBPS

■ NIM (Network Interface Module)

Main Storage Memory	4MW
Number of Point Tags	8000 tags/UCN
Redundancy	Optional

■ UCN (Universal Control Network)

Network Type	ISO8802/4 based LAN
Communication Method	Carrier band, token path method
Communication Speed	5 megabits/second
Number of Connected Devices	Up to 32 redundant nodes
Cable Length	Up to 700 m
Redundancy	Duplex as standard

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