YAMATAKE **Specification**

[Rel.201]

Harmonas DEO Harmonized Automation System - Dependable Open

Introduction

The Harmonas-DEO system is a next generation automation system.
The Harmonas-DEO system uses open and standard technology bases in vision of the 21st Century, such as Windows OS for information management and Ethernet connections for control and information networking functions, in order to significantly improve the flexibility of information-sharing environments. As a field network, the system complies with the industry standard Fieldbus Foundation specifications. Regarding information sharing, DCOM, ActiveX, and OPC are used for the control software data interface to further improve coordination with general-purpose software products.
The new "Dependable Open" concept assures the level of high reliability that is generally required for process control applications while adopting these open and standardized technology bases.

Features

1) Open Modular Architecture & Information on Demand

The open and distributed functional structure implements Plug and Play solutions in the area of industrial automation systems. Furthermore, its specific feature is that any data is accessible from any location in the system.

The Harmonas-DEO architecture combines a wide variety of applications, including field-level system components as well as production control systems, in an organized structure with open networks to form the core of the system. Any data integrated in a DEO system is accessible from anywhere in the system through open networks. With this feature, all of the staff personnel, ranging from operators in actual fields to higher management people, can track the operational status of the system in real time.

2) Dependable

Total reliability supports plant control environments.

In order to assure the required level of process control reliability for obtaining customer satisfaction while using open and general purpose infrastructure, the Harmonas-DEO automation system uses technology bases that are focused on the concept of dependability. In addition to the basic reliability mechanisms, such as Ethernet redundancy and redundancy and fail-over functions of nodes, a high level of stability in overall automation system operation has been achieved with the Harmonas-DEO system, improving maintainability, operation integrity assurance, and security at the same time.

3) Automation Suite

Solutions necessary for plant automation are provided.

Harmonas-DEO can provide a wide range of software solutions that are necessary for constructing a plant automation system. "Automation Suites" is the generic name of a group of solutions that can be implemented by the Harmonas-DEO system.

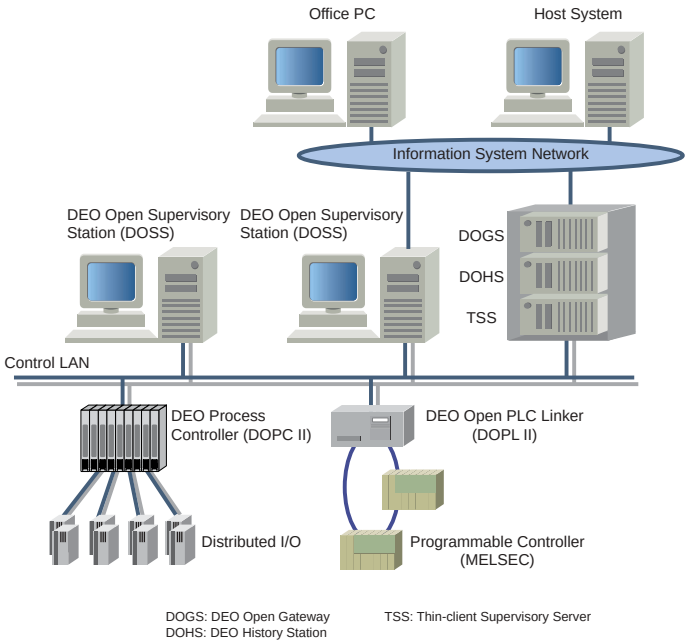

Figure 1. Example System Configuration

System Configuration

A Harmonas-DEO system is comprised of human-machine interface (HMI) nodes to be used for system monitoring and control operations, highly reliable process controller nodes that can be arranged in a redundant configuration, and redundant control LAN (Ethernet) systems to connect all the nodes. Windows OS is used for all HMIs as the basic operating system to provide the users with a comfortable monitoring and control operation environment as well as to provide an open data processing environment.

Furthermore, in order to establish a control system that is suited for the purpose of the system, various types of application modules, including field operation modules, remote monitoring modules, history analysis modules, batch process control modules, communication gateway modules, transient operation support modules, and alarm analysis modules are available.

System Component Equipment

- DEO Supervisory Station (DOSS, DOSS_H)

DOSS provides system construction (engineering) functions as well as HMI functions for process control and monitoring operations. DOSS_H is implemented with the process history database (MS-SQL server) functions in addition to the basic HMI functions of DOSS.

Either a general-purpose desktop CPU type or a console type (single-stage or dual-stage) configuration is selectable for these nodes.

- DEO Open History Station (DOHS)

A DOHS node is implemented with a process history data server (MS-SQL server) and is dedicated to history data collection functions.

- DEO Process Controller (DOPC II, DOPC)

DOPC II and DOPC are multi-functional process controllers that can be used for implementing process input/output control, loop control, logic control, and sequence control functions. High density and redundantly configurable process I/O modules are connected to DOPC and DOPC II. DOPC II is a controller with redundant control CPUs and communication modules. DOPC is a small capacity controller; its non-redundant configuration is also available.

- DEO Open PLC Linker (DOPL II)

DOPL II is a multi-functional and redundantly configurable controller to be used for integrating and controlling Mitsubishi MELSEC devices through MELSECNET/10 (or MELSECNET/H) networks. By using DOPL II, all link devices of MELSECNET are handled as I/O devices for enabling loop control, logic control, and sequence control functions, as well as the operations with DOPC II. The control database of DOPL II is constructed in common with DOPC II.

- Thin-client Supervisory Server (TSS)

TSS server nodes provide client PCs installed in remote fields and offices with a DCS operations environment. DOSS-like control operations can be made from client PCs. Display applications of TSS are constructed in common with DOSS.

- DEO Open Gateway (DOGS)

A DOGS general-purpose communications gateway connects the Harmonas-DEO system to information system networks for enabling data communication with host computers. DOGS uses OPC, a general-purpose protocol, as the communications protocol to function as an OPC server.

System Specification

Table 1. Outline Specifications for the Harmonas-DEO System

Item		Specification
Number of nodes	Total nodes per system	126 nodes
	Total number of HMI nodes (Note 1)	32 nodes
	Total number of controllers (Note 2)	96 nodes
Number of control tags	Graphic tag	60,000 tags per SS node
	Controller tag	100,000 tags per system
Network	Control bus	l0 Mbps/l00 Mbps Ethernet, up to 2.5 km (2 km for 100 Mbps)
	Data Control System LAN	10Mbps/100Mbps/1Gbps Ethernet
Redundancy functions	Redundant control bus (Ethernet)	Standard
	Redundant controller	DOPC II, DOPL II
	Non-redundant controller	DOPC, DOPL II
Maximum number of nodes per node	DOSS	28 nodes
	DOSS_H, DOHS	5 nodes
	Number of clients (Note 3)	50 nodes
	TSS server	20 nodes
	Number of TSS clients (Note 4)	100 nodes
	DOGS	5 nodes
	Number of DOGS clients (Note 5)	50 nodes
Maximum number of nodes per controller	DOPC II, DOPC	96 nodes
	DOPL II	96 nodes
History capacity	Number of history points	Up to 6400 points
	History period	1, 5, 10, or 30 seconds, 1, 2, 5, or 10 minutes

Note 1: Total number of HMI nodes, including DOSS, DOSS_H, TSS, DOHS, and DOGS.
Note 2: Total number of controller nodes, including DOPC II, DOPC, FLC, and DOPL II.
Note 3: The maximum number of history clients for DOSS_H and DOHS is 10 nodes per server. The number of clients includes the DOSS nodes that are remote trend client nodes.
Note 4: The maximum number of clients is 5 nodes per TSS server.
Note 5: The maximum number of DOGS clients is 10 nodes per server.

Table 2. Control Capacity of DOPC II and DOPC

Item			Specification	
			DOPC II	DOPC
Number of nodes per system			Up to 96 units	
Number of distributed I/O modules/controllers			Number of redundant I/O pairs × 2 + Number of non-redundant I/O nodes ≤ 120 nodes	Non-redundant I/O ≤ 40 nodes
Remote I/O extension length		Electrical repeater	Up to 100 m	
		Optical repeater	Up to 1 km	
I/O Point	Analog input module	4 to 20 mA	16 points per module	
		Thermocouple	16 points per module	
		Resistance temperature detector	16 points per module	
	Analog output module	4 to 20 mA	16 points per module	
	Digital input module	24 V dry contact	32 points per module	
	Digital output module	Solid-state	32 points per module	
		Relay	32 points per module	
	Pulse input module		8 points per module	
	Serial communication module	RS232C	2 ports per module	
		High speed RS232C	1 port per module	-
Control point	Regulatory control point (RegCtrl)		640 points	160 points
	Regulatory PV Point (RegPV)		320 points	80 points
	Logic point (Logic)		320 points	80 points
	Digital composite point (DegiComp)		1024 points	255 points
	Sequence point (PMDP)		512 points	160 points
	Function block point (FBD)		511 points	-
	Internal variable point	Numeric variable (NN)	8192 points	2047 points
		Flag variable (FL)	8192 points	1023 points
		Timer variable (TM)	256 points	64 points
Control capacity	PU value (performance capacity)	I/O points	1520PU	Total: 560 PU
		Control points	1520PU	
	MU value (sequence capacity)		48000MU	24000MU
	Control cycle	I/O points	100ms, 200ms, 500ms	125ms, 250ms, 500ms
		Control points other than for sequencing	1000ms	1000ms
		Sequence	100msec, 1sec	1sec

Table 3. Control Capacity of DOPL II

Item			Specification
Number of nodes per system	Non-redundant DOPL II		96 nodes
	Redundant DOPL II		96 pairs
Network	Control network		Redundant Ethernet or non-redundant Ethernet
	I/O network		MELSECNET/10 or MELSECNET/H
Number of MELSEC nodes that can be connected to MELSECNET	Non-redundant DOPL II		63 nodes
	Redundant DOPL II		62 nodes
Capacity of I/O points	Maximum number of virtual I/O modules		240 modules (Note 1)
	Number of points per module	Analog input module	16 points per module
		Analog output module	16 points per module
		Pulse input module	8 points per module
		Digital input module	32 points per module
		Digital output module	32 points per module
		Value input module	8 points per module
		Value output module	8 points per module
Number of link devices to be occupied per I/O point	Input points	Analog input point	One word of input W device
		Digital input point	One bit of input B device
		Pulse input point	Two words of input W device
		Value input point	Two words of input W device
	Output points (Note 2)	Analog output point	One word of output W device
		Digital output point	One bit of output B device
		Value output point	Two words of output W device
Capacity of control points	Regulatory control points (number of control loops)		160 points
	Regulatory PV point		320 points
	Logic point		480 points
	Digital composite point		1600 points
	Sequence point		512 points
	Function block FB point		511 points
	Internal variable point	Numeric variable (NN)	8192 points
		Flag variable (FL)	8192 points
		Timer variable	256 points
Control capacity	PU value (performance capacity)	I/O points	1520PU
		Control points	6000PU
	MU value (sequence capacity)		48000MU
	Control cycle	I/O points Control points other than for sequencing	100ms, 200ms, 500ms, 1000ms
		Sequence point	100msec, 1sec

Note 1: The total number of modules, including analog input, analog output, pulse input, digital input, digital output, value input, and value output modules must be within 240 modules.

Note 2: The maximum value of output link devices is 2000 bytes (1000 words).

Table 4. Outline Specifications for DOSS/DOSS_H Applications

Item			Specification
Hardware	Monitor	LCD monitor	17", 19"
		Display resolution	SXGA (1280× 1024)
	Operation devices	Keyboard	JIS keyboard (standard) Operator keyboard (option)
		Pointing device	Mouse (standard), touch screen (option)
DOSS basic software package	Standard online functions	System status	Standard
		Online change	Standard
		Area status	Standard
		Point detail	Standard
		Alarm summary	Standard
		Unit alarm summary	Standard
		Message summary	Standard
		Online manual	Standard
		Trend graph	Standard (8 pens× 400 screens)
		User graphic	Standard (400 screens)
		Group instrumentation	400 screens (8 instruments per group)
		Smart ID handler	Standard (user authentication function)
	Optional online functions	Brand control	999 brands
		Open report	Daily, monthly, and annual reports (100 reports per type in Excel format)
	Engineering functions	Control point editor	Standard (RTC Editor)
		Control point monitor	Standard (RTC Runtime)
		Virtual simulator function	Option (operates on DOSS/DOSS_H)
		Graphics creation function	Standard for the universal personality version
		Report creation function	Standard (Excel)

Table 5. Outline Specifications for TSS Server/TSS Client Applications

Item			TSS Server Specification	TSS Client Specification
Hardware	Monitor	LCD monitor	17" or 19" type	It does not specify
		Display resolution	SXGA(1280×1024)	XGA (1024×768) or S ×GA
	Operation devices	Keyboard	keyboard	-
		Pointing device	Mouse	-
OS etc.	OS		-	Windows 2000 Professional SP4, Windows XP Professional SP1
	IE		-	- 5.01 SP4 or later - 6.0 SP1 or later - Either 5.5 SP1 or 5.5 SP2 or later Note that its Update Versions field must show "Q323759" (Note). Note: If the update field of IE does not list "Q323759," apply the "Cumulative Patch for Internet Explorer (323759)(MS02-Q47)".
	Windows Media Player		-	6.4 or later If any buzzer is to be sounded, it is necessary to set the client PC to generate sounds.
DOSS basic software package	Standard online functions	System status	Standard	
		Online change	Standard	-
		Area status	Standard	-
		Point detail	Standard	
		Alarm summary	Standard	
		Unit alarm summary	Standard	
		Message summary	Standard	
		Online manual	Standard	
		Trend graph	Standard (8 pens× 400 screens)	
		User graphic	Standard (400 screens)	
		Group instrumentation	400 screens (8 instruments per group)	
	Engineering functions	Control point editor	Standard (RTC Editor)	-
		Control point monitor	Standard (RTC Runtime)	-
		Virtual simulator function	Optional	-
		Graphics generation function	Optional	-

Example System Configuration

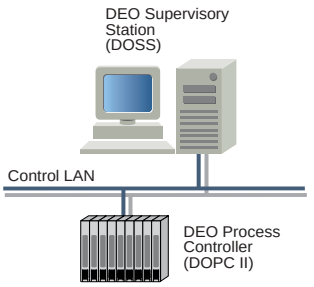

Figure 2. Harmonas-DEO Minimum Configuration (example)

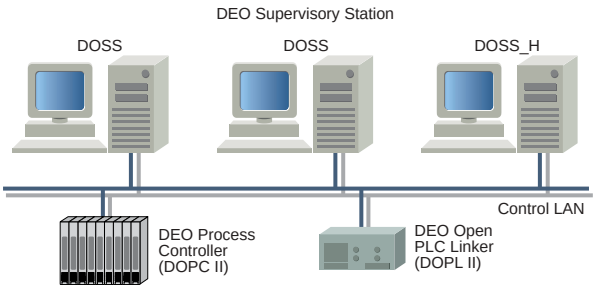

Figure 3. Harmonas-DEO Multiple Node Configuration (example)

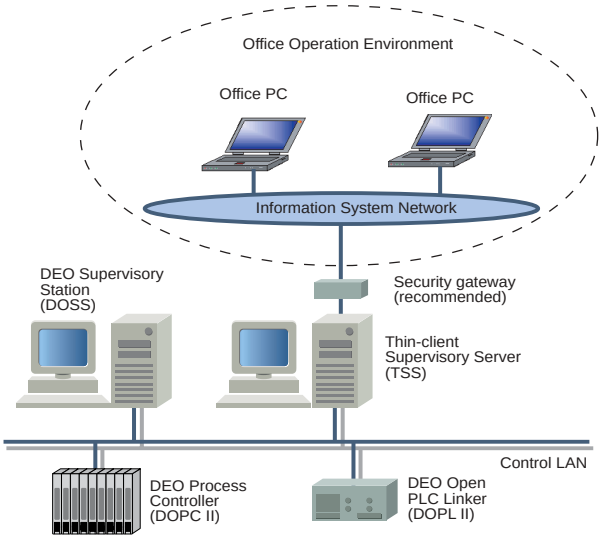

Figure 4. Office Operation Configuration (example)

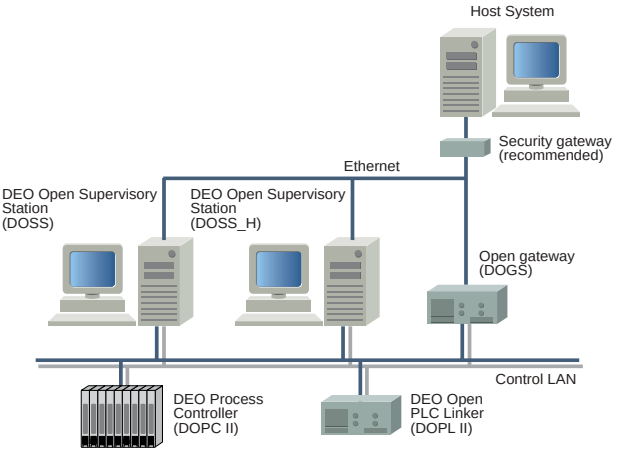

Figure 5. Host System Connection Configuration (example)

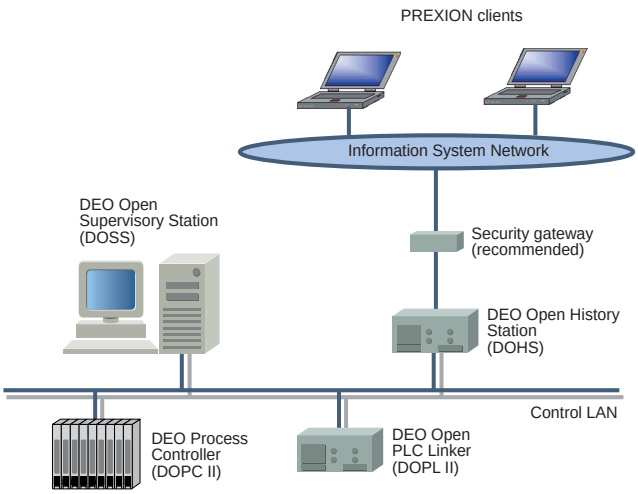

Figure 6. Example Process Data Analysis System (PREXION clients)

Specifications are subject to change without notice.

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