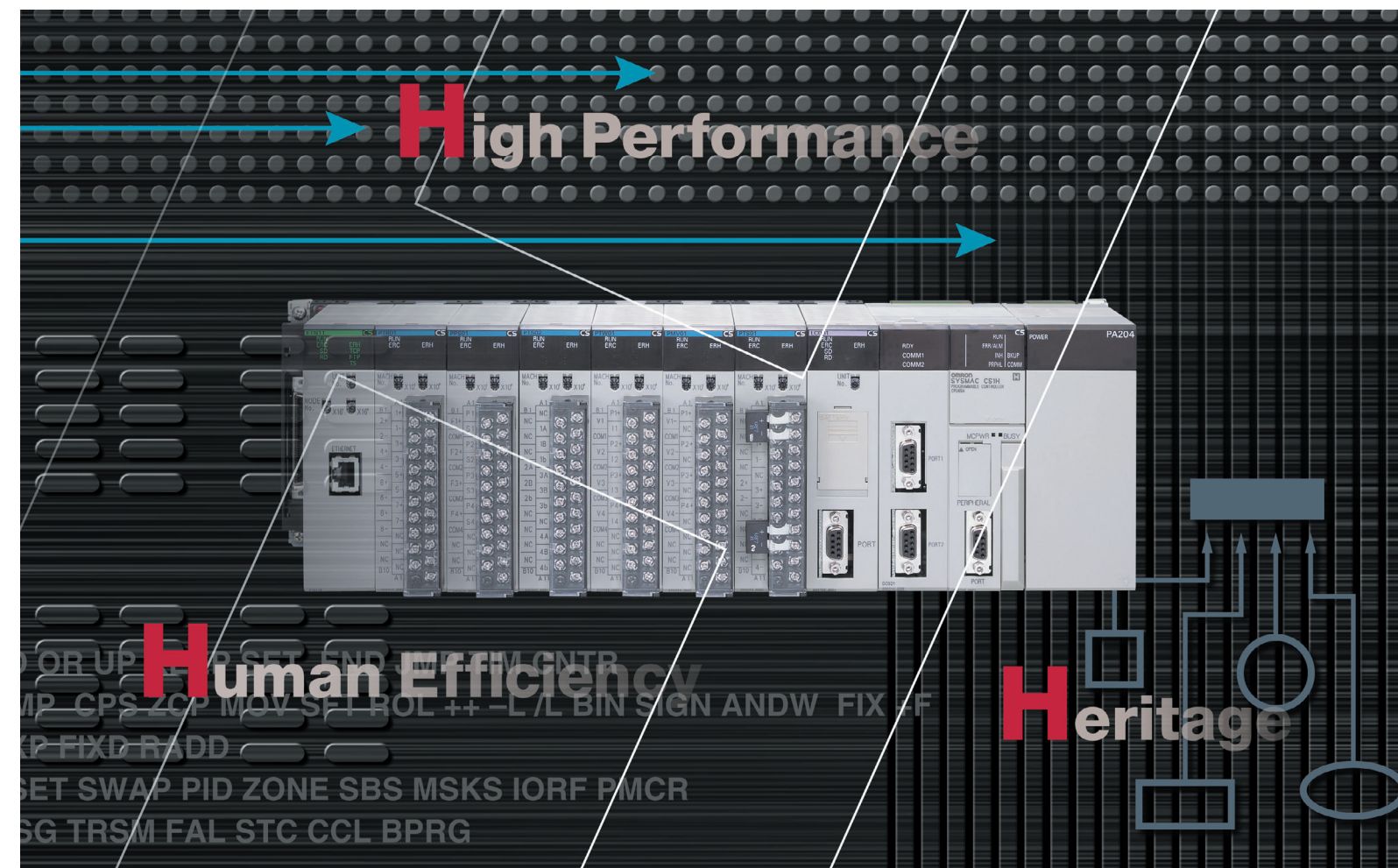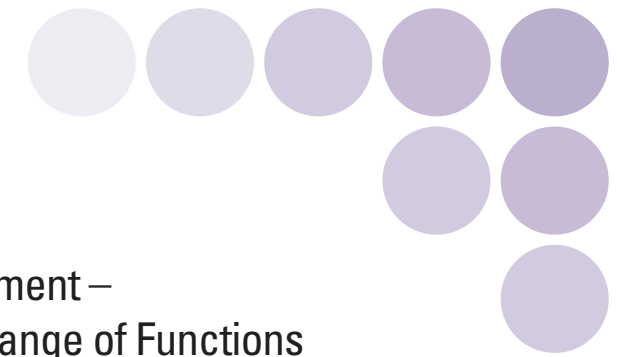# OMRON

SYSMAC
CS1
Programmable Controllers

From Machine Control to Information Management –
Multiple-application Controllers with a Wide Range of Functions

High Performance

Human Efficiency

Heritage

The popular SYSMAC CS1 is better than ev er – finely tuned to allow new levels of control.
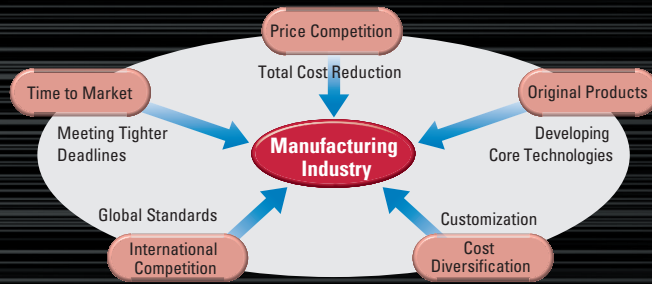
The current climate of ever-intensifying competition has created a large number of different needs for manufacturing industries around the world. To meet these needs, OMRON has made further improvements to its SYSMAC CS1 PLCs, which have been used successfully in thousands of systems, to deliver even greater performance. With an "H" for Hyper Controller, the new PLCs boast the highest standards in performance, functionality, and expandability.

High Performance

In order to create facilites that have the production capability to withstand sudden changes in demand, or to create machinery that is easily distinguished from that created by market competitors, a top-speed controller that can deliver the performance required to support these needs is required. The SYSMAC CS1 PLCs have been equipped with the highest I/O responsiveness and data control functionality to significantly reduce processing time and to control machinery movement with greater precision.

Human Efficiency

In order to allow easier development of complex programs, in addition to an integrated Windows-based development environment, the new PLCs are equipped with a variety of instructions. Structured programming functionality has been improved to allow programs to be reused with greater efficiency and thereby reduce labor requirements and cut costs.

Heritage

The know-how that our customers have accumulated through the years forms the core of their competitive strength. At OMRON, we believe in enhancing this know-how to the utmost. The key to doing this is 100% upward compatibility. CS1 PLCs allow existing Units and programs to be used without any changes.

● **Unit Versions**
Unit versions have been introduced to control differences in functions featured by CPU Units that are the result of version upgrades.
The unit version is marked on the nameplates of products subject to version control, as shown in the diagram.
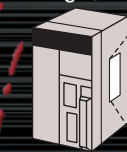

```
OMRON   CS1H-CPU67H
CPU UNIT



Lot No. 031001 0000  Ver. 3.0
OMRON Corporation      MADE IN JAPAN
```

Unit version

Use the improved SYSMAC CS1 PLCs to scal e advanced systems to the optimum size.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

1

Faster Instruction Execution and Faster Overall Performance

In addition to further improvements to the instruction execution engine, which is the core of overall PLC performance, the high-speed RISC chip has been upgraded to **realize the fastest instruction execution performance in** **the industry**. Also, the new models have a mode where instruction execution and peripheral processing are processed in parallel, enabling balanced improvements in overall speed.

● **Common Processing: 1.6 Times Faster**

Previous CS1 models	0.5 ms
New CS1 models	0.3 ms

The figures above are for high-speed, general-purpose PLCs with interchangeable boards.

● **PCMIX Value: 3 Times Higher**

Previous CS1 models	5
New CS1 models	16

The PCMIX is the average number of instructions that can be executed in 1 µs and expresses the over execution performance of the ladder program. This unit was conceived to allow comparing the performance of PLCs from different manufacturers using a common metric.
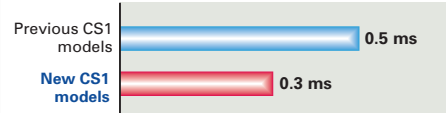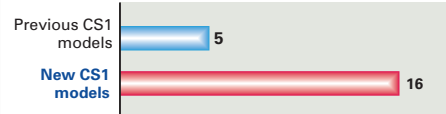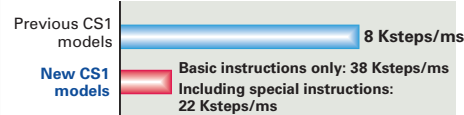
● **Cycle Time: 2.5 to 4.8 Times Shorter**
(Cycle time for 128 inputs and 128 outputs)

Previous CS1 models	8 Ksteps/ms
New CS1 models	Basic instructions only: 38 Ksteps/ms Including special instructions: 22 Ksteps/ms

With normal I/O refresh, 1-ms pulses are not lost even for large-capacity (e.g., 30-Kstep) programs. This allows use in applications requiring a high working accuracy, such as molding equipment.
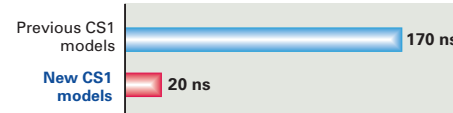
● **LD Instruction Processing Speed: 2 Times Faster**

|	
Previous CS1 models	40 ns
New CS1 models	20 ns
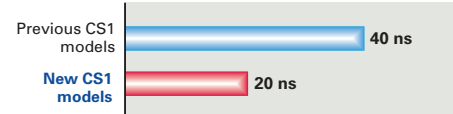
The development of a special LSI to execute instructions and use of a high-speed RISC chip enable high-speed processing at the CPU.

● **OUT Instruction Processing Speed: 8 Times Faster**

Previous CS1 models	170 ns
New CS1 models	20 ns

Programs consisting mainly of basic instructions are processed at ultrahigh speed.

● **Subroutine Processing Speed: 17.6 Times Faster**

Previous CS1 models	37 µs
New CS1 models	2.1 µs
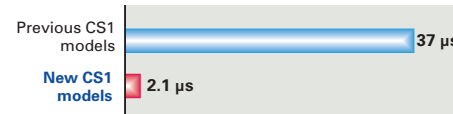
Cycle time overhead due to program structuring is minimized.

System Bus Baud Rate Doubled

The data transfer rate between the CPU Unit and certain Units has been doubled to further improve total system performance.
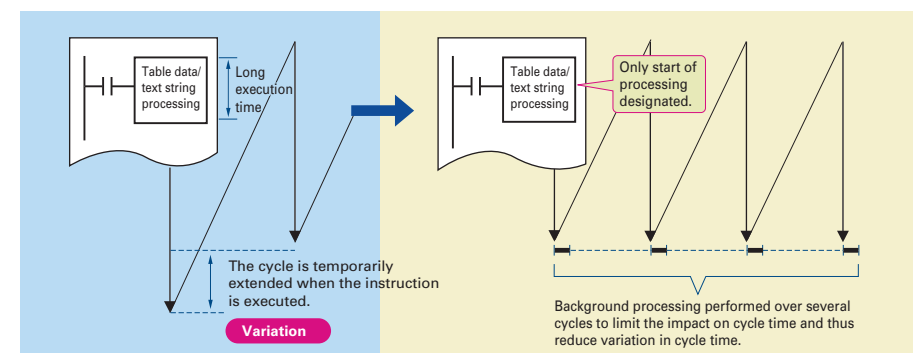
Baud rate **doubled**

System bus
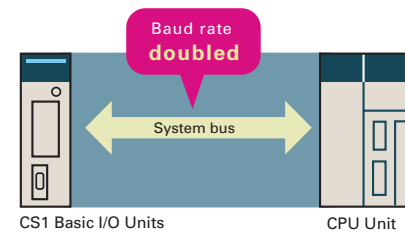
CS1 Basic I/O Units
CS1 Special I/O Units
CS1 CPU Bus Units

CPU Unit

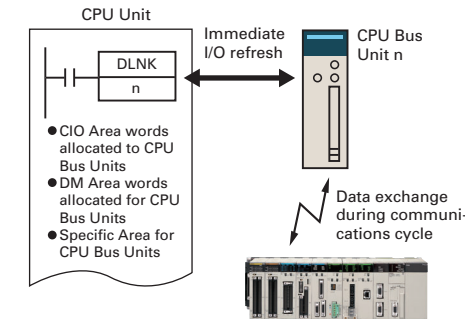## Reduced Variation in Cycle Time During Data Processing

Instructions that require long execution time, such as table data processing instructions and text string processing instructions, are processed over multiple cycles to minimize variations in cycle time and maintain stable I/O response.

Table data/ text string processing — Long execution time

Table data/ text string processing — Only start of processing designated.

The cycle is temporarily extended when the instruction is executed.

Variation

Background processing performed over several cycles to limit the impact on cycle time and thus reduce variation in cycle time.

Improved Refresh Performance for Data Links, Remote I/O Communications, and Protocol Macros

In the past, I/O refresh processing with the CPU Bus Unit only occurred during I/O refresh after instructions were executed. With the new CS1, however, I/O can be refreshed immediately by using the DLNK instruction. Immediate refreshing for processes peculiar to the CPU Bus Unit, such as for data links and DeviceNet remote I/O communications, and for allocated CIO Area/DM Area words when instructions are executed, means greater refresh responsiveness for CPU Bus Units.

CPU Unit

DLNK n

Immediate I/O refresh

CPU Bus Unit n

● CIO Area words allocated to CPU Bus Units
● DM Area words allocated for CPU Bus Units
● Specific Area for CPU Bus Units

Data exchange during communications cycle

Unit name	Refresh function
Controller Link Unit	Data links
DeviceNet Unit	Remote I/O
Serial Communications Unit	Protocol macros
Ethernet Unit	Socket service based on manipulation of specific bits.

Large Capacity CPU Units for Greater Component Control Power

The CS1 CPU Units boast amazing capacity with up to 5,120 I/O points, 250 Ksteps of programming, 448 Kwords of data memory (including expanded data memory) and 4,096 timers/counters each. With a large programming capacity, CS1 PLCs are not only ideal for large-scale systems but easily handle value-added applications and other advanced data processing.

Control Up to 960 Points with Units Mounted to the CPU Rack

The CS1 provides a high level of space efficiency. As many as 960 I/O points can be controlled by simply mounting ten Basic I/O Units, with 96 I/O points each, to the CPU Rack. Alternatively, as many as 80 analog I/O points can be used by mounting five Analog Input Units and five Analog Output Units.

Ten I/O Units of 96 points each

Five Analog Output Units of 8 points each   Five Analog Input Units of 8 points each
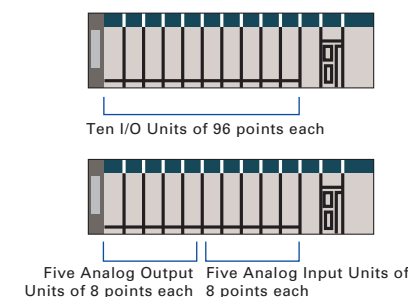
Wide Lineup Makes It Easy to Build the Optimum System

A total of nine CPU Unit models provide for a wide range of applications, from small-scale systems to large. The lineup also includes Memory Cards, Serial Communications Boards, and a wide selection of Special I/O Units that can be used with any CPU Units to flexibly build the system that meets the requirements.

Product lineup (Example: LD instruction processing speed, DM capacity)

Program Capacity

250 Ksteps — (LD: 0.02 µs, DM: 448 Kwords)
120 Ksteps — (LD: 0.02 µs, DM: 256 Kwords)
(LD: 0.02 µs, DM: 128 Kwords)
60 Ksteps — (LD: 0.04 µs, DM: 128 Kwords)
30 Ksteps — (LD: 0.04 µs, DM: 64 Kwords)   (LD: 0.02 µs, DM: 64 Kwords)
20 Ksteps — (LD: 0.04 µs, DM: 64 Kwords)   (LD: 0.02 µs, DM: 64 Kwords)
10 Ksteps — (LD: 0.04 µs, DM: 64 Kwords)

960 pts   1,280 pts   5,120 pts

Number of I/O points
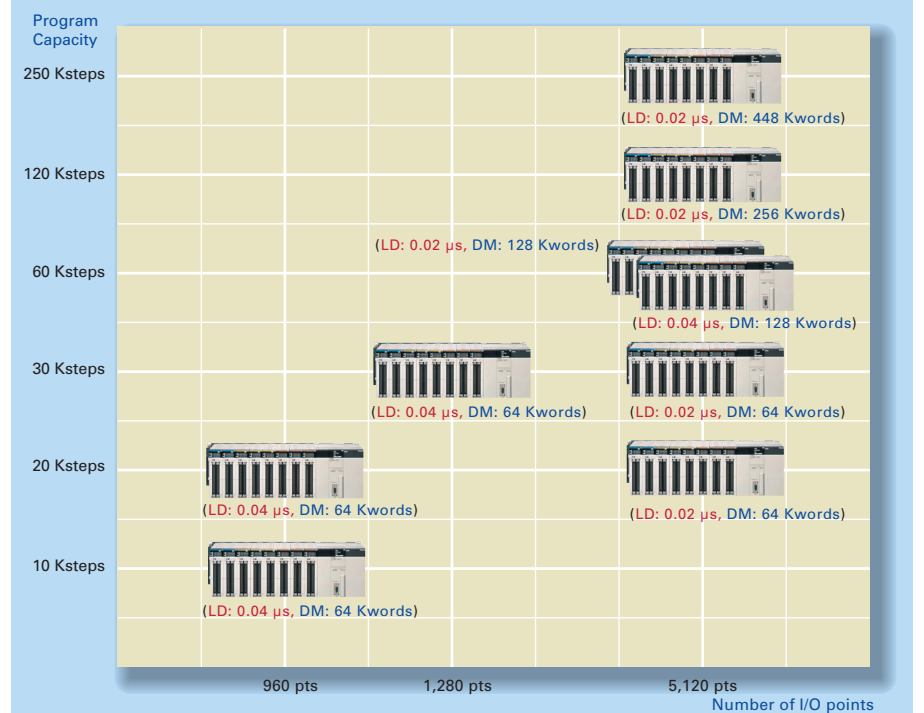
Two Series of Expansion Racks Up to 50 m Long for Long-distance Expansion with Up to 72 Units and 7 Racks

With an expansion capacity of up to 80 Units and 7 Racks over a distance of 12 meters, the CS1 can meet large-scale control needs. Alternatively, an I/O Control Unit and I/O Interface Units can be used to connect two series of CS1 Long-distance Expansion Racks extending up to 50 m each and containing a total of up to 72 Units and 7 Racks. CS1 Basic I/O Units, CS1 Special I/O Units, and CS1 CPU Bus Units can be mounted anywhere on the Racks and programmed without being concerned about special remote programming requirements.

Note: C200H Units cannot be mounted on the Long-distance Expansion Racks.

I/O Control Unit   CPU

2 Series of Expansion Racks; Up to 7 Racks Total

9 Units

I/O Interface Unit

50 m   50 m

Terminating Resistor
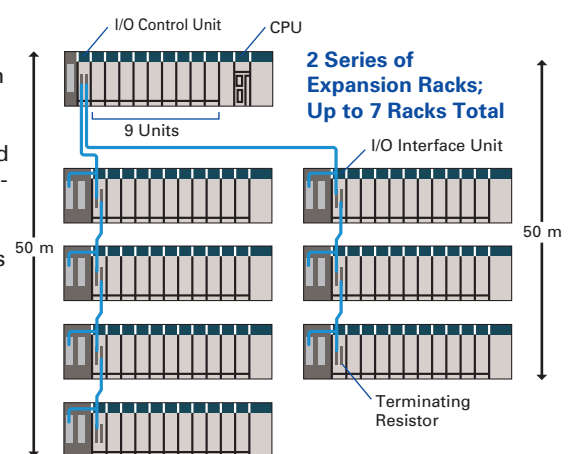
Equipped with functions demanded by the production site to suit a variety of applications.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

2

Nested Interlocks (for CPU Unit Ver. 2.0 or Later)

Although strictly speaking the present interlock instructions do not allow nesting, applications can be created to include combination of complete and partial interlock conditions that achieve nested interlocks.

Emergency stop button

Operator
Contact a
Product added by contact a
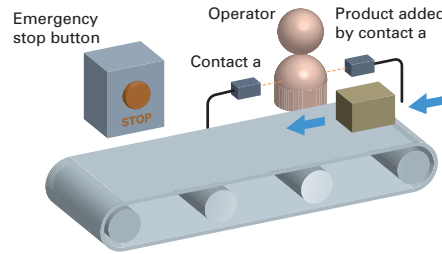
STOP

(1) Conveyor operates
(2) Contact "a" turns ON when operator is present and products are supplied.
(3) When the emergency stop button is pressed, the conveyor and product addition both stop.

Emergency stop button
Conveyor operates
Worker present (a)
MILH 0
MILH 1
Product added
MILC 1
MILC 0

CX-Programmer Screen

Support Software clearly shows the interlock status.

Easy Cam Switch Control with Ladder Instructions
(for CPU Unit Ver. 2.0 or Later)

Angular data
Comparison table
Upper limit | Lower limit
Output
ON
OFF
OFF

Cam switch

Value converted by GRY instruction

Absolute encoder

ON
OFF

Compared using BCMP2 instruction

Parallel wiring

GRY
+
BCMP2

Gray code converted into binary, BCD, or angles.

Compared to see whether data is between upper and lower limits.

The time interval for execution by the GRY instruction is determined by the response speed for reading data from the absolute encoder.

Easy Calendar Timer Function
(for CPU Unit Ver. 2.0 or Later)

=DT

Compares two dates/times Comparison can be limited to any combination of years, months, days, hours, minutes, or seconds.
Example:
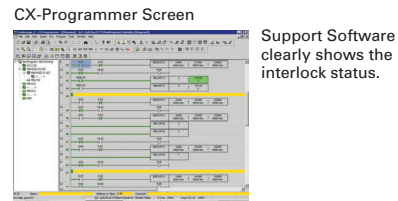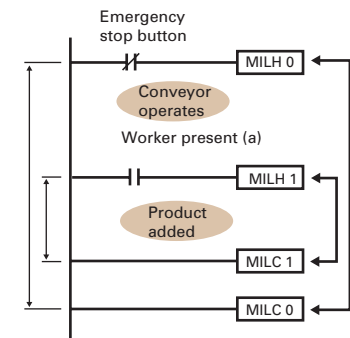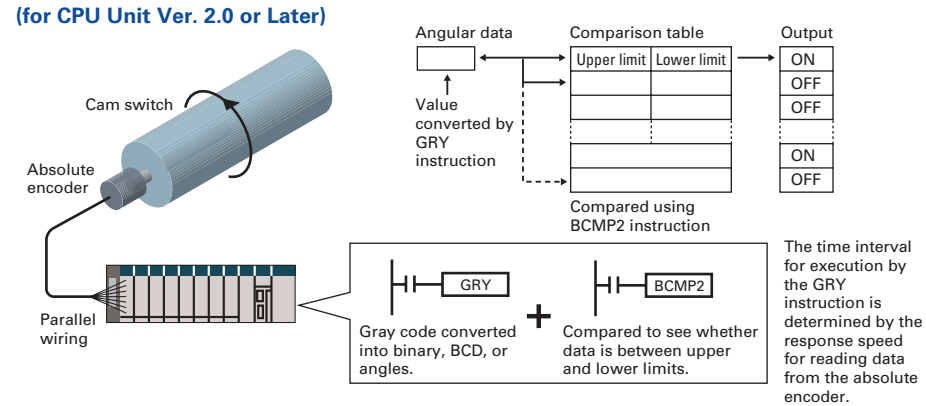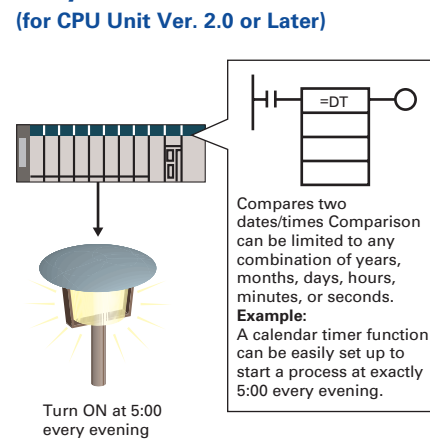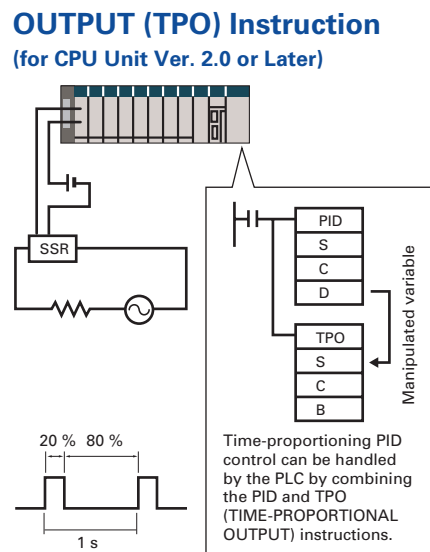A calendar timer function can be easily set up to start a process at exactly 5:00 every evening.

Turn ON at 5:00 every evening

TIME-PROPORTIONAL OUTPUT (TPO) Instruction
(for CPU Unit Ver. 2.0 or Later)

SSR

PID
S
C
D
TPO
S
C
B

Manipulated variable

20 % 80 %
1 s

Time-proportioning PID control can be handled by the PLC by combining the PID and TPO (TIME-PROPORTIONAL OUTPUT) instructions.

Convert Between Floating-point Decimal and Character Strings

The new CS1 can convert floating-point decimal (real numbers) to character strings (ASCII) for display on a PT (operator interface). The data can be displayed on the PT as a character-string display element.

Conversion instruction
Floating-point decimal → Character string
PT
500.00
E.g., 500.00   353030E23030
Character-string display element

The new CS1 can convert ASCII character strings read from measurement devices by serial communications to floating-point decimal data for use in data processing.

Measurement device (example)

Serial communications
Conversion instruction
Character string → Floating-point decimal

PID Autotuning

The new CS1 can autotune PID constants with a PID control instruction. The limit cycle method is used for autotuning, so the tuning is completed quickly. This is particularly effective for multiple-loop PID control.

PIDAT ← Autotuning for PID constants

PID control instruction with autotuning
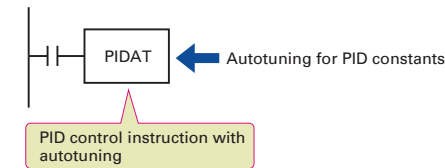
Error Status Generation for Debugging

A specified error status can be simulated by executing the diagnostic instructions (FAL/FALS). With the new CS1, debugging is simple for applications that display messages on a PT or other display device based on the error status of the CPU Unit.

(Example)
PT
An error has occurred at unit number xx.

Error in Special I/O Unit

FAL

PT
There is a possibility that rack number xx is disconnected.

I/O bus error

FALS

Highly Accurate Positioning with XY Tables

The new CS1 has many double-precision processing instructions for floating-point decimal operations, enabling positioning with greater accuracy.

Floating-point decimal instruction

High-precision positioning
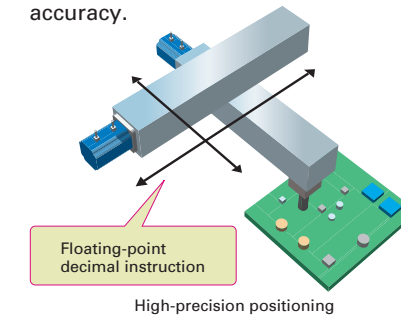
Easy Reading of Maintenance Data via DeviceNet
(for CPU Unit Ver. 2.0 or Later)

The addition of special explicit message instructions makes it easy to send explicit messages without having to consider FINS commands. Transferring data among PLCs with explicit messages is also simplified.

Special explicit message instruction

No need to consider FINS

DeviceNet
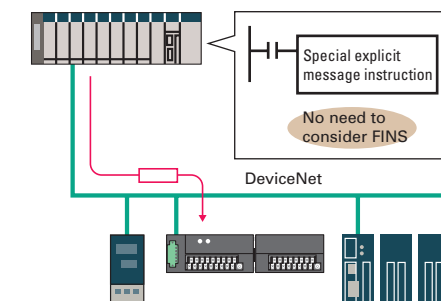
Simpler Ladder Programs

Ladder programs that use a lot of basic instructions can be simplified using differentiation instructions LD NOT, AND NOT, and OR NOT, and instructions that access bits in the DM and EM Areas.

● With other PLCs   ● With CS1-series PLCs

a   a

a

a
ORW
D00000
#0001
D00000

OUTB
D00000
#0000

a
ANDW
D00000
#FFFE
D00000
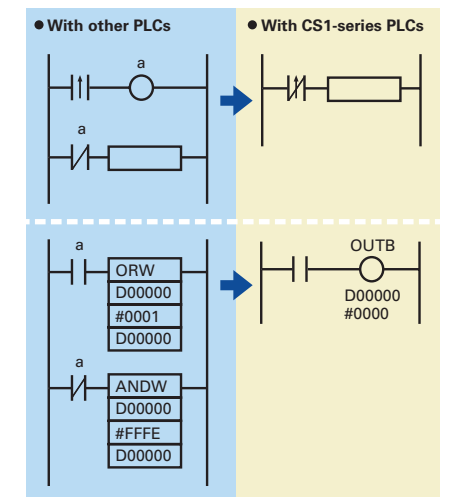
Binary Set Values for Timer/Counter Instructions

The SV for a timer or counter instruction can be specified using either BCD or binary. Using binary SV enables longer timers and higher-value counters.

Examples: Timer/Counter Instructions
TIM (BCD): 0 to 999.0 s
TIMX(550) (binary) 0 to 6553.5 s
CNT (BCD): 0 to 999 counts
CNTX(546) (binary) 0 to 65,535 counts

Applicable Timer/Counter Instructions
TIMER: TIMX(550)
COUNTER: CNTX(546)
HIGH-SPEED TIMER: TIMHX(551)
ONE-MS TIMER: TMHHX(552)
ACCUMULATIVE TIMER: TTIMX(555)
LONG TIMER: TIMLX(553)
MULTI-OUTPUT TIMER: MTIMX(554)
REVERSIBLE COUNTER: CNTRX(548)
RESET TIMER/COUNTER: CNRX(547)

Easier and more efficient design, developmen t, and maintenance with Windows-based software and middleware.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

3

Improved Support Software for an Integrated Windows-based Development Environment

More efficient design and development using the CX-Programmer for programming and network configuration, and CX-Simulator for operation simulation.

CX-Programmer

CX-Simulator

System PLC CS1

Online connection

● **Inside the personal computer**

CX-Programmer (Programming software)

Integrated development environment

Online connection

CX-Simulator (Virtual CPU Unit)

Windows

CX-Net Network Configuration Tool

CX-Programmer

OMRON FB Library *NEW*
(Unit Ver. 3.0 or later)

The OMRON FB library provides function blocks for setting SPs, reading PVs, and reading/writing RUN/STOP status and other Temperature Controller parameters. The programmer simply pastes function blocks from the OMRON FB Library into the ladder program. The desired functions can be utilized simply by inputting the Temperature Controller unit number and address.

Example: Function Block for Writing Temperature Controller SPs

Temperature Controller unit number / Address / Normal end

SYSMAC CJ-series PLC (See note.)

DeviceNet Master Unit

DeviceNet

Simply paste a function block from the OMRON FB Library into the ladder program and enter the unit number, set point, and other parameters.

Temperature Controller

● **What is the OMRON FB Library?**
The OMRON FB Library is a set of functional objects for ladder programming for OMRON CS/CJ-series PLCs. By incorporating the OMRON function blocks provided by OMRON into a ladder program, the program interface for different control devices is easily completed. This reduces the number of working hours required for program development and, at the same time, improves product quality through standardization.

The Structured Text (ST) Language Enables Trigonometric Functions and other Arithmetic Processes *NEW* (Unit Ver. 3.0 or later)

In addition to ladder programming, function block logic can be written in ST, which conforms to IEC61131-3. With ST, arithmetic processing is also possible, including processing of absolute values, square roots, logarithms, and trigonometric functions (SIN, COS, and TAN). Processing difficult to achieve in ladder programs becomes easy to write.

NEW
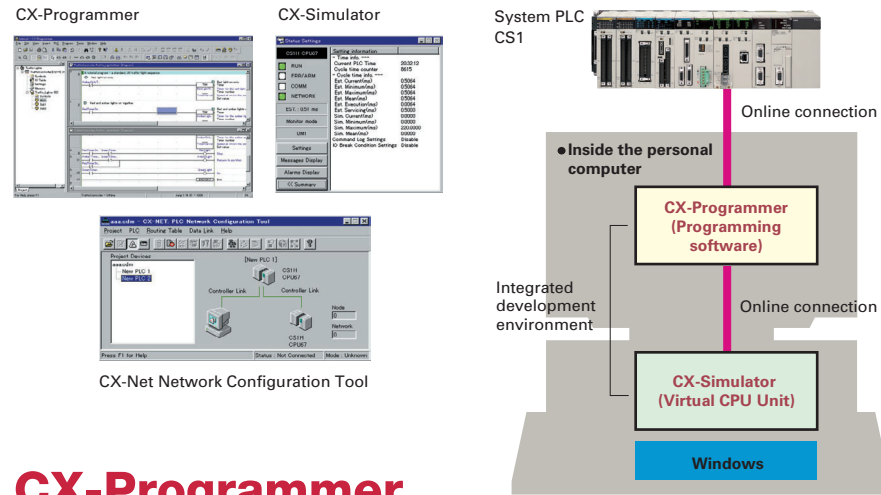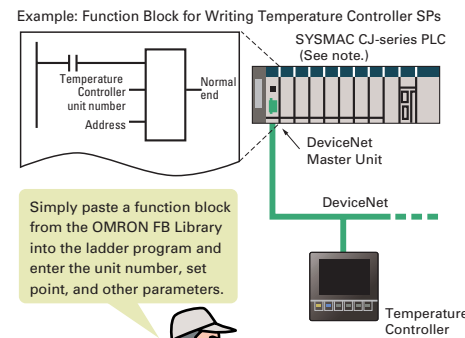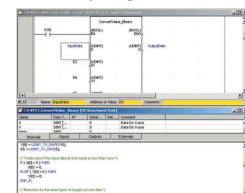CX-Programmer Ver. 5.0 or higher is required.

Recovery Possible by Uploading Function Blocks from Working PLC *NEW* (Unit Ver. 3.0 or later)

Programs with function blocks can be uploaded from CPU Units, just like normal programs, without the need for additional memory, such as a Memory Card.

CX-Programmer Ver.5.0

Programs with function blocks can be uploaded from working PLCs.

FB

CS/CJ-series Unit Ver. 3.0
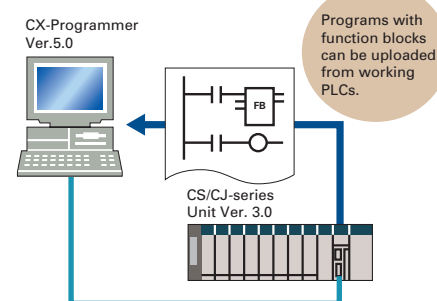
Enhanced Efficiency for Program Development Teams
(for CPU Unit Ver. 2.0 or Later)

Multiple programmers will enjoy better efficiency when working on task-based programs, thanks to automatic checking for address duplication among tasks, downloading and uploading in task units, and easy monitoring of task operating status.

● The execution status of each task can be monitored with CX-Programmer to improve debugging efficiency.

Task 1 → Task 1 → Task 1

Executing / Executing / Executing

Monitoring with CX-Programmer
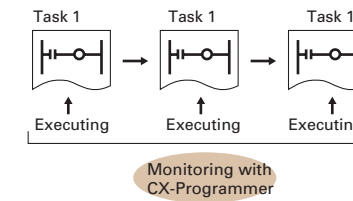
● Checking for address duplication among tasks developed by multiple programmers is automatically executed with the cross reference report of CX-Programmer.

Check for duplicate addresses

The report shows that this address is used in the program in the right column, and tells how many times it is used.

CX-Programmer list of duplicate addresses

● When development is done by several people, only the tasks that have been revised need to be downloaded from CX-Programmer.

Download only the revised tasks.
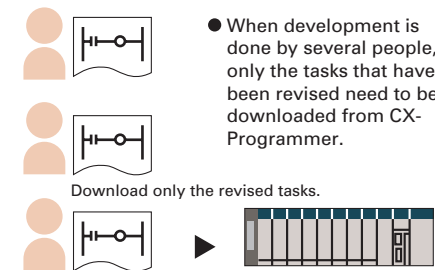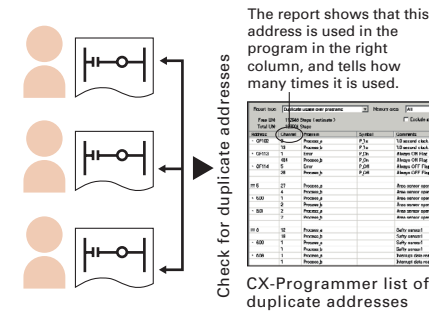
Copy and Paste between Spreadsheets and Symbol Tables

You can use your favorite spreadsheet application to prepare an allocation table with symbol names, addresses, and I/O comments, then copy and paste it into a symbol table, and also do the reverse. This greatly improves programming productivity.

CX-Simulator

Programs Can Be Executed, Monitored, and Debugged without an Actual PLC

The CX-Simulator Software simulates ladder execution of the new CS1 CPU Unit on a computer. Online functions, such as monitoring of I/O bit status, monitoring of I/O memory present values, forced set/reset, differential monitoring, data tracing, and online editing, can be performed by connecting to the virtual CPU Unit on the computer from the CX-Programmer using the CX-Simulator. This reduces the total lead time to machine or system startup.

CX-Simulator

System status setting window

Debugging console window

Virtual CPU Unit
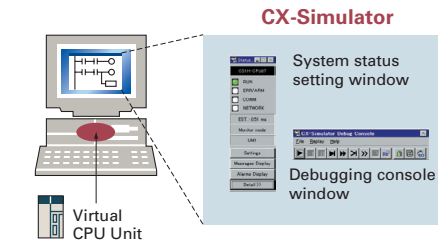
Data Logging On-site and Operation Verification in the Office

Sequential data from I/O memory in the actual PLC can be obtained and saved as a data recreation file (CSV format). On-site PLC ladder execution can be recreated on a computer by inputting

this data to the CX-Simulator as virtual external input data.

CX-Simulator

Virtual external input

Sequential data

Virtual CPU Unit

Actual PLC CS1
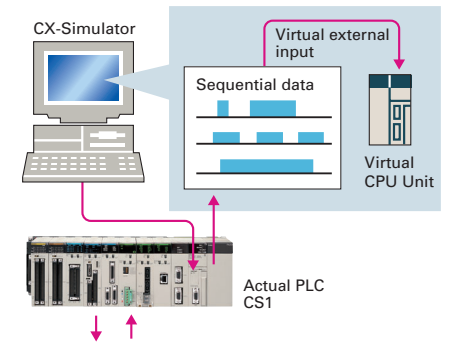
Comprehensive Debugging Functions Including Ladder Step Execution and Break Points

The new CS1 has comprehensive debugging functions, including ladder step execution (execution by instruction), start point settings, break point setting, I/O break conditions, and scan execution. This enables more detailed debugging without using an actual PLC. Interrupt tasks can be simulated, enabling more realistic debugging.

Virtual CPU Unit

Start / Stop
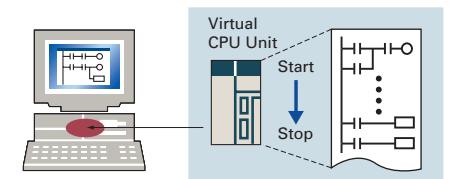
Middleware to Support PLC-centered System Construction
Easy development of user applications for communications with the new CS1.

SYSMAC Compolet: Accessing the CS1 with Visual Basic

Use SYSMAC Compolet for communications with OMRON PLCs to greatly reduce development time of user applications for CS1 I/O memory read and write, forced set/reset, and FINS message communications using Visual Basic.

Visual Basic user application
Compolet
Fins Gateway
Network board or port

Network support: Controller Link, Ethernet, or RS-232C serial communications

CS1
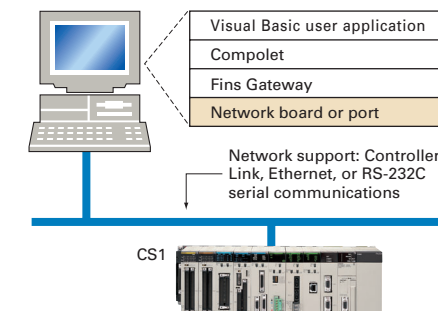
PLC Reporter 32: Add-on Software for Accessing the New CS1 Using Excel

Use PLC Reporter 32 to automatically collect specific CS1 I/O memory data into Excel 97 or Excel 2000 cells without special programming. Basically, a system can be constructed with a computer, PLC Reporter 32, Excel, and a host link cable. The cost of constructing a monitoring system can thus be greatly reduced.

Excel
PLC Reporter (Fins Gateway)
Network board or port

Network support: Controller Link, Ethernet, or RS-232C serial communications

CS1
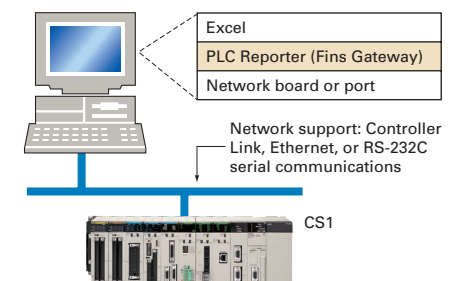
Further improvements to communications f unctions.
Seamless networks increase production site transparency.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

4

The Solution for Communicating across Network Levels

The SYSMAC CS1 enables FINS message communications across a maximum of eight levels (See note) (using CX-Programmer Ver. 4.0 or higher) in comparison with three levels in previous OMRON systems Expansion up to eight levels lets you build a seamless communications system for sending FINS messages across multiple levels of Ethernet and Controller Link networks.

Note: For CPU Unit Ver. 2.0 or later.

A Wide Range of Systems, from Small-scale to Large

OMRON offers a full lineup of reliable PLCs including the "flagship" CS1 Series, and ranging from the small-scale CQM1H to the large-scale CV Series. The CS1 Series meets the needs not only of small-scale to large-scale systems, but of distributed systems as well. This allows the construction of the optimum system for the scale and applications of the production site.

High Event Responsiveness and High-speed Instruction Execution

The new CS1 has an operating mode that allows parallel processing for program execution and peripheral services. This has the following benefits.

- Fast exchange with host computers of large amounts of data, without dependence on the program capacity of the new CS1.
- Smooth refreshing of data exchanged with SCADA software without variations in timing.
- Cycle time not affected if communications traffic or networks increase when expanding facilities in the future.
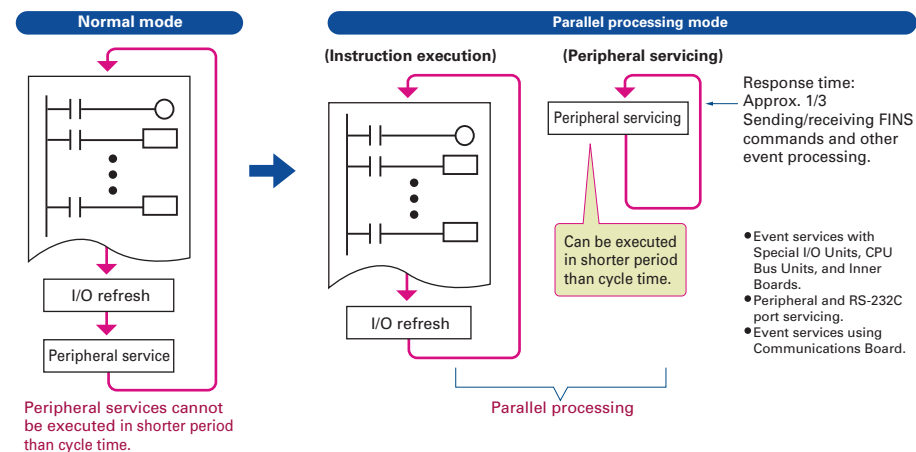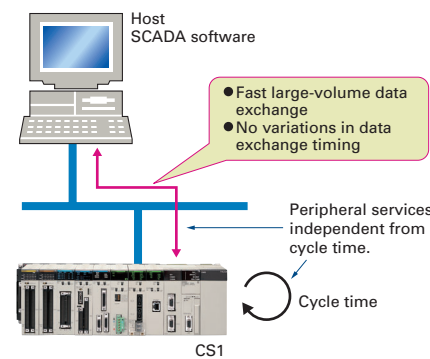
Flexible System Building Based on the DeviceNet

The CS1 Series supports the worldwide multivendor bus standard, DeviceNet. Component connections in a multivendor environment are greatly enhanced by connecting to up to 64 nodes for a wide range of FA applications, and by device profiles and configurator tools that ensure high reliability and easy maintenance. Production systems can be configured even more flexibly by incorporating products such as the MULTIPLE I/O TERMINAL.

Functions for Better Ethernet Support

Ethernet is becoming an increasingly important standard for information networks. Up to eight socket interfaces for TCP/IP and UDP/IP are supported, in addition to FINS messages, FTP file transfers, and mail notification, so that production management can now be organically linked with the production site.

Add a Redundant Optical Ring to Your Controller Link Communications

A redundant network configuration will keep communications flowing over the duplicate ring-shaped path in the event of a broken optical fiber, preventing system malfunction.

Remote Monitoring via the Web

Connecting via an ONC enables remote monitoring from a Web browser with a user-defined Web application (using Web Tool Kit). It is also possible to automatically collect data on a Memory Card mounted to an ONC and automatically transfer data to the host PLC (using Data Collection/Distribution Software).

Host SCADA software

- Fast large-volume data exchange
- No variations in data exchange timing

Peripheral services independent from cycle time.

Cycle time

CS1

Normal mode

I/O refresh

Peripheral service

Peripheral services cannot be executed in shorter period than cycle time.

Parallel processing mode

(Instruction execution)

(Peripheral servicing)

Peripheral servicing

Can be executed in shorter period than cycle time.

I/O refresh

Parallel processing

Response time: Approx. 1/3 Sending/receiving FINS commands and other event processing.

- Event services with Special I/O Units, CPU Bus Units, and Inner Boards.
- Peripheral and RS-232C port servicing.
- Event services using Communications Board.

Information network

Seamless

Controller network

Component network

Head office, remote office, home, business trip destination
- CX-Programmer

Modem

Public telephone line

FINS message

Email

Modem

CS1

Serial communications

Ethernet Unit
- TCP/IP or UDP/IP socket service
- FINS message communications
- Message client (SMTP) function
- FTP server function (File read/write to Memory Card)

FINS message

Controller Link

Controller Link Unit

CS1

Controller Link Unit

Data links

FINS message

Head office or remote office
- Web browser
- CX-Programmer

Ethernet (Intranet)

DeviceNet Configurator

RS-232C

DeviceNet Unit

CS1

Internet

Email

HTTP/socket

Automatic FTP transfer of collected data

Open Network Controller
- Web server function
- Email client (SMTP)
- FTP client (Collected data file transferred to host using FTP when transfer conditions are met.)
- FINS message communications

ONC

Head office, remote office, home, business trip destination
- Web browser

CS1

CJ1

DeviceNet

Remote I/O communications

FINS message

CS1

DeviceNet Unit (can operate as master or slave)

Temperature Controller (PID and other parameter settings possible from the DeviceNet Configurator).

DeviceNet Slave DRT2-series Series

Robot or other device

Programmable Slave

CompoBus/S

Construction of systems in multivendor env ironments simplified with protocol macros.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

5

NEW Serial Gateway (CPU Unit Ver. 3.0 or later) (Serial Communications Units/Boards with Ver. 1.2 or later)

Truly Seamless Incorporation of OMRON Components and Other Devices into Networks

When the CPU Unit (Ver. 3.0 or later) or Serial Communications Board or Serial Communications Unit (Ver. 1.2 or later) receive a FINS command containing a CompoWay/F command (see note 1) via network or serial communications, the command is automatically converted to a protocol suitable for the message and forwarded using serial communications.

● CompoWay/F (See note 2.)
● Host Link FINS
(Possible only with Serial Communications Boards or Serial Communications Units Ver. 1.2 or later)
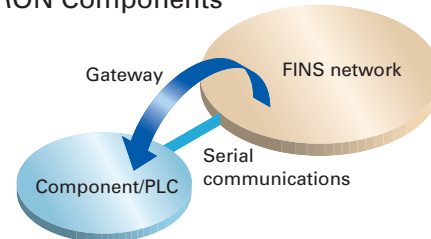
Note 1: FINS
Abbreviation for Factory Interface Network Service. A command system for message services common to OMRON networks. FINS commands can be sent across up to 8 network levels, including serial communications paths using a serial gateway. (Possible only with CS/CJ-series CPU Unit Ver. 2.0 or later.)

Note 2: CompoWay/F
CompoWay/F is an integrated communications protocol used for OMRON general-purpose serial communications. It is used by Temperature Controllers, Digital Panel Meters, Timer/Counters, Smart Sensors, Cam Positioners, Safety Controllers, etc. (as of July 2004).

Gateway — FINS network
Component/PLC — Serial communications

● **Serial Gateway System (Reference)**
When CompoWay/F commands are enclosed in FINS commands and sent to Serial Communications Boards or Serial Communications Units (Ver. 1.2) or serial ports on CPU Unit Ver. 3.0, the enclosed CompoWay/F command is retrieved using a Serial Gateway Function and sent as a CompoWay/F command.

FINS command received
Serial Gateway: FINS command "capsule" opened and contents retrieved.
Sent as a CompoWay/F command

Temperature Controller   Smart Sensor

OMRON Components

More Ports for Even More Serial Device Connections

Protocol macros make it easy to create serial communications protocols (communications frames, error checks, retries, error processing, etc.) to match those of remote communications devices. Multiple ports are provided for this function. Each PLC supports up to 16 Serial Communications Units (32 ports total) and one Serial Communications Board (with 2 ports). This makes it possible to connect up to 34 devices with serial communications at a speed of 38.4 Kbps. Message length has been increased from 256 to 1,000 bytes to give communications more power than ever before.

Windows-based Software Simplifies Serial Device Connections

Protocol macros for Serial Communications Units and Boards can be created using the CX-Protocol, thus enabling message tracing and greatly reducing the time involved in connecting various serial devices.
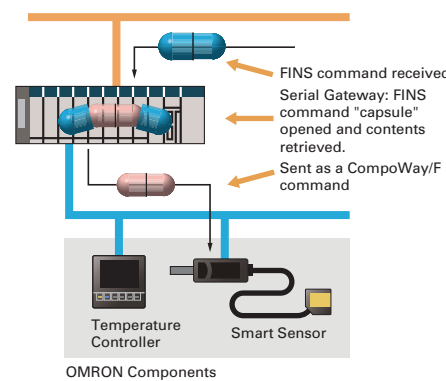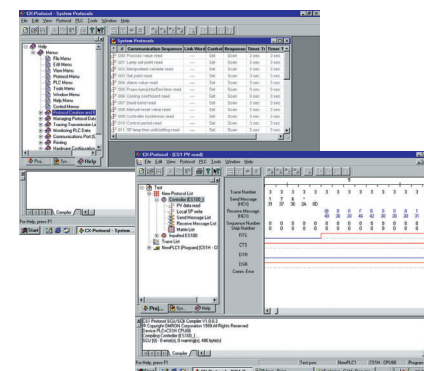
Enhanced Protocol Macro NEW Functionality
(Serial Communications Units/Boards with Ver. 1.2 or later)

● Baud rate increased from 38,400 bps to 57,600 bps for faster communications.
● Standard system protocol added for greater connectability with components and PLCs.
  ● CompoWay/F Master
  ● Host Link Master functions
  ● Mitsubishi Computer Link Master

Wide Range of Applicable Protocols Allows for High Value-added Programs

The CS1 Series supports a wide range of serial communications protocols, such as Host Link, no-protocol, NT Link, peripheral bus, and more. These allow for high value-added programs such as MMI, communications, and data processing.

The Fastest Communications in the Industry with High-speed NT Links

Combine with one of the NS Series Programmable Terminals (NS8, NS10, or NS12) to enable connecting High-speed NT Links. Using NT Link terminology together with a communications speed of 115 Kbps provides high-speed response.

NT Links (1:N Mode)

Programmable Terminal   Programmable Terminal
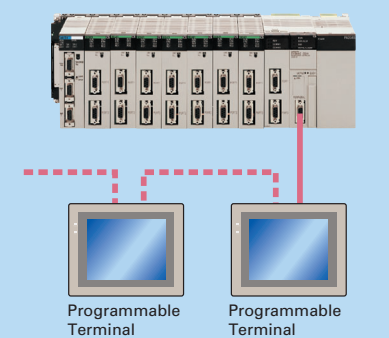
PLC-to-PT connection in NT Link (1:N mode) communications can be either one-to-one or one-to-many.

Serial Communications Configuration Example

Programming Devices
CX-Programmer
CX-Protocol
CX-Motion
Programming Console

Host computer, etc.

Host Link
Serial Communications Board
CPU Unit

Peripheral bus
(Programming Console bus)

Programmable Terminal

NT Link

ASCII Unit   Serial Communications Unit

Commercially-available external device

General-purpose protocol using BASIC in ASCII Unit

Protocol macros

Commercially-available external device
Microcomputer, etc.
Non-OMRON PLCs, etc.

Temperature controller, bar code reader, etc.

Protocol macros   Protocol macros

Host Links

Sending Host Link and FINS commands
Reading and writing of I/O memory and operating modes

Device   Response

No-protocol

CPU Unit RS-232C Port

Serial Communications Unit
Serial Communications Board

TXD instruction or RXD instruction using Serial Communications Unit

TXD instruction or RXD instruction using CPU Unit's RS-232 port or Serial Communications Board

Data input from a bar code reader   Data output to printer

Supports No-protocol Communications NEW
(Serial Communications Units/Boards with Ver. 1.2 or later)
● No-protocol communications supported for Serial Communications Units and Serial Communications Boards
● This mode enables components to be connected to multiple communications ports using no-protocol communications.
● Serial port I/O instructions executable using no-protocol communications from Serial Communications Units and Serial Communications Boards (TXDU, RXDU, TXD, and RXD) are supported for CPU Units with Ver. 3.0 or later.

Advanced management and resource inheri tance providing powerful support for maintenance and operation.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

6

Remote Maintenance

1. Program or monitor a remote PLC via a modem connection.
2. Program or monitor a network PLC via a Host Link connection.
3. Send e-mail for errors from PLCs connected to Ethernet.

3. Mail
Ethernet
Modem
Host Link

1. Remote programming/monitoring via modem (See note.)

Phone line

2. Remote programming/ monitoring via Host Link (See note.)

Modem

Note: The same kind of programming and monitoring performed via normal Host Link is possible.

Memory Cards for Data File Management

User programs, I/O memory, or system parameters can be converted to Windows-based files and stored in Memory Cards or in EM file memory in the CPU Unit. It is also possible to automatically read the user program and other data from the Memory Card to the CPU Unit at startup, replacing ROM operation. Change programs on-site using only a Memory Card and Programming Console, or use Memory Cards to store symbol tables or I/O comments. Connecting a Programming Device allows monitoring operations with ladder programs with comments. It is also possible to save and read data such as DM data to a Memory Card during operation, and the Memory Cards are ideal for operations such as saving quality data and reading recipes.

Office

Download

PC Card Adapter
64M

Memory Card
64M

Upload

Production site

Programming Console
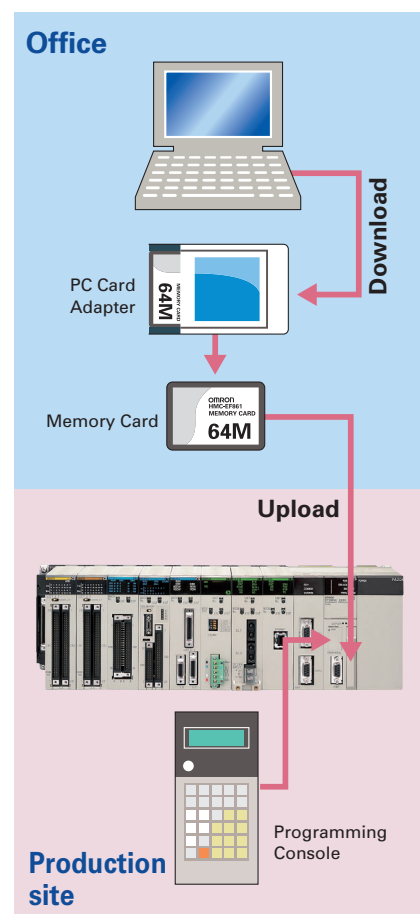
Boost Program Security by Keeping Part of It Hidden
(for CPU Unit Ver. 2.0 or Later)

You can prevent access to special tasks by requiring the user to have a password to read them.

Task 1
Use a password to prevent reading of only task 2.
Task 2
Crucial programming cannot be read.
CX-Programmer Ver. 4.0
Task 3
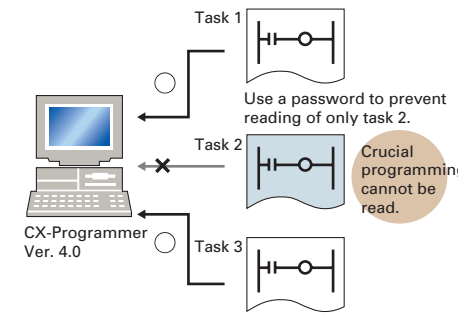
This allows you to hide crucial parts of the program.

By applying write protection, you can also prevent a user from inadvertently writing over the hidden part of the program. This provides additional protection for your program.

Read protection
Write protection
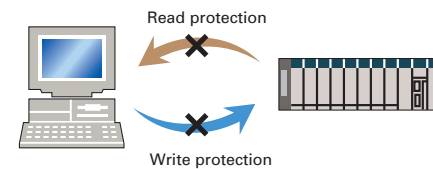
Internal Flash Memory-based Battery-free Operation

Flash memory (non-volatile memory) is built into the new CS1's CPU Unit. User programs and system parameters (e.g., PC Setup and data link tables) are automatically saved to this flash memory. This means that the new CS1 can operate without a Memory Card and battery.

Built-in flash memory
• User program
• Parameter area data

CS1

Battery-free operation with no Memory Card.
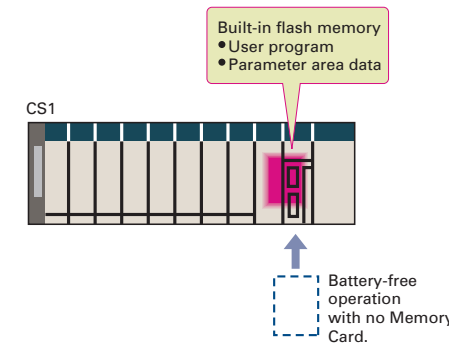
NEW CX-Programmer Ver. 5.0 or higher required.

Prevent Information Leaks from PLCs
(for CPU Unit Ver. 2.0 or Later)

In addition to applying read protection functions to the user program area and tasks, you can also protect against the transfer of user programs to a Memory Card.This prevents leaks of proprietary information by completely protecting against the reading of programs inside the PLC.

Read protection
CX-Programmer Ver. 4.0
No transfer possible
64M
Memory Card
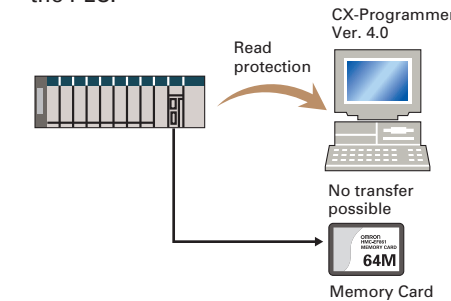
Easy Replacement of Existing Models

Programs designed for existing models (C200HX/HG/HE, CVM1, or CV-series PLCs) using the CX-Programmer can be converted for use with the new CS1. The following functions are available to make the conversion to the new CS1 even easier.

● CV-CS address conversion instruction to convert programs designed for the CVM1/CV that include internal I/O memory addresses.
● C200HX/HG/HE: Region comparison (ZCP and ZCPL) instructions.

C200HX/HG/HE
Easy replacement
CS1
CVM1/CV
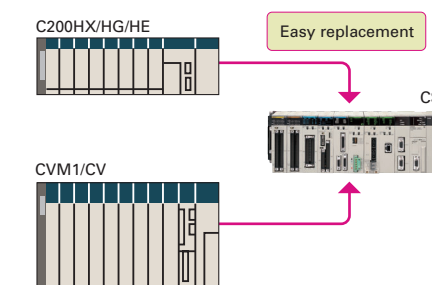
Store All I/O Comments, Symbol Names, Rung Comments, NEW and Other Information in CPU Unit Comment Memory
(Unit Ver. 3.0 or later)

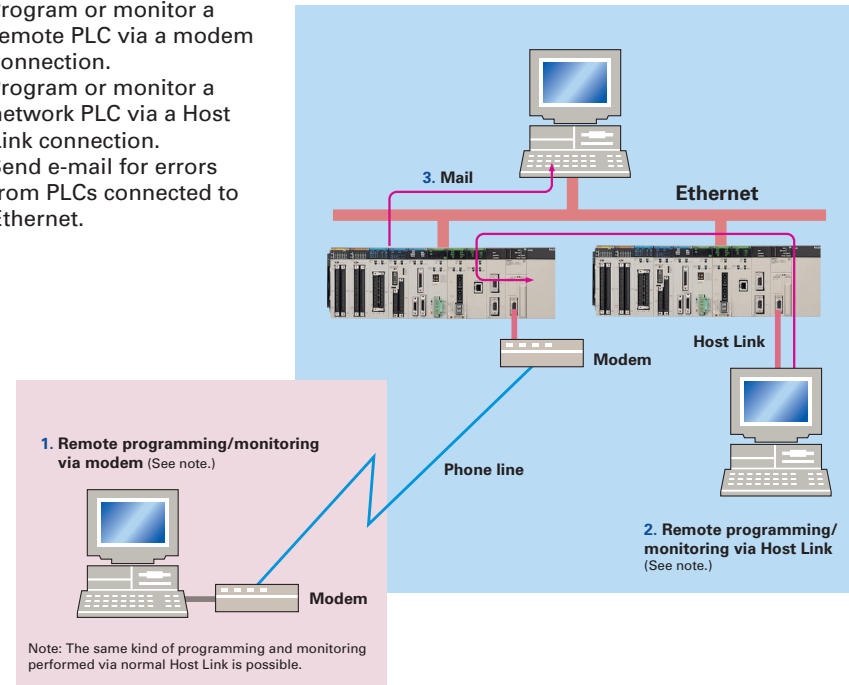When downloading projects, the Memory Card, EM file memory, or comment memory (in the CPU Unit's flash memory) can be selected as the transfer destination for I/O comments, symbol names, rung comments, and other data. This enables data such as I/O comments, symbol names, and rung comments to be stored in the CPU

Write Protection from a Specific Node over the Network
(for CPU Unit Ver. 2.0 or Later)

You can now stop specific nodes from writing over the network.By preventing unintentionally writes to the PLC while monitoring data over the network, you can prevent potential problems.

Reading possible
Reading possible
Write protection
Write enabled
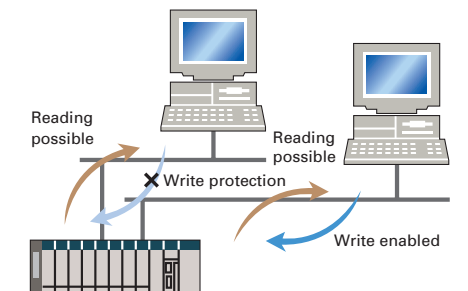
Replace Malfunctioning Units without Turning OFF the Power (Online Unit Replacement)

When an I/O Unit, a Special I/O Unit, or a CPU Bus Unit is malfunctioning, it is now possible to replace the faulty Unit while the system continues operating. This is particularly effective for systems that cannot be stopped when a problem has occurred in another part of the system.
(This function requires a CS1D-CPU□□S CPU Unit, a CS1D-BC082 or CS1D-BI092 Backplane, and a CS1D-PA207R or CS1D-PD024 Power Supply Unit.)

Faulty Unit
CPU
PS

(1) Remove the faulty Unit after stopping access to it.
(2) Resume access after replacing the Unit.
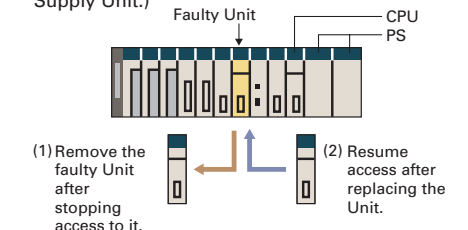
Unit's internal comment memory when a Memory Card or EM file memory are both not available. (PLC models: CS/CJ-series with unit version 3.0 or later only.)

Machine performance improved with high-speed, high-precision motion control.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

7

● Position Control Units

Two Types of Outputs and Control of 1, 2, or 4 Axes

Select from 1-axis, 2-axis, and 4-axis models with either open-collector output or line-driver output to suit a number of different applications.

A Variety of Positioning Functions

There are 2 operating modes: direct operation (position, speed, acceleration, and deceleration data specified from the ladder program), which is effective for setting target positions and speeds immediately or during operation, and memory operation, where fixed patterns are stored beforehand in the Unit and used for operation. There are also a variety of positioning functions, such as interrupt feeding, which is effective for feeder control, and forced interrupt, which is useful in emergencies.

● Advanced Motion Control Units

Easy System Construction

Up to 30 physical axes and two virtual axes, making a total of 32, can be controlled, and the servo interface is handled by high-speed servo communications (MECHATROLINK-II, a registered trademark of Yaskawa Electric Corporation). This makes it possible to control multiple axes with less wiring.

Easy Data Control

High-speed servo communications lets you read programs and parameter settings from CX-Programmer on a PC. You can also read and track the operating status of parameter settings inside the Servo Driver.

Easy Motion Control

Motion control, including positioning, synchronizing (electronic gears, electronic cams, tracking), speed, and torque control, can all be handled by the CS1.
Eight motion tasks can be used for simultaneous motion program execution.

● Motion Control Units

Easy Programming with G Language and Multitasking

The Motion Control Units use G language to ensure easy programming. The Units have a large programming capacity of up to 100 programs and 2,000 program blocks, and allow independent operation of 4 tasks.

High-speed Interlocks

Interrupt programs can be executed from the motion control program using D codes (interrupt codes). Easy, fast interlocks ensure greater production efficiency.

● Customizable Counter Units

A Whole New Concept

A high-speed PLC with 20 I/O points, a 2-axis high-speed counter, and 2 pulse or analog outputs have all been combined into 1 Unit. The Customizable Counter Units allow easy execution of complicated applications.

High-speed PLC overhead 0.1 ms

Customizable Counter Unit

PLC
- 20 I/O points
- Pulse output
- Analog output
- Analog input
- Counter
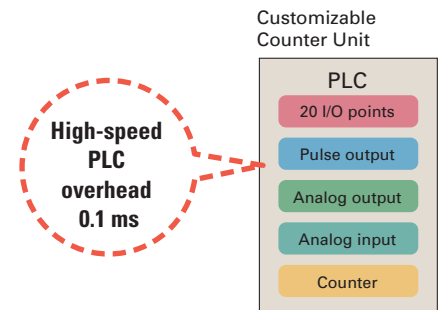
Easy Control for Bending and Pressing

It is possible to switch between speed control and torque control from the ladder program, enabling bending operation for metals and pressing operation for bonding.

CS1W-HCA22

Torque   Speed
Torque
Speed   Torque Sensor
Position
Servomotor   Analog input Servo Driver
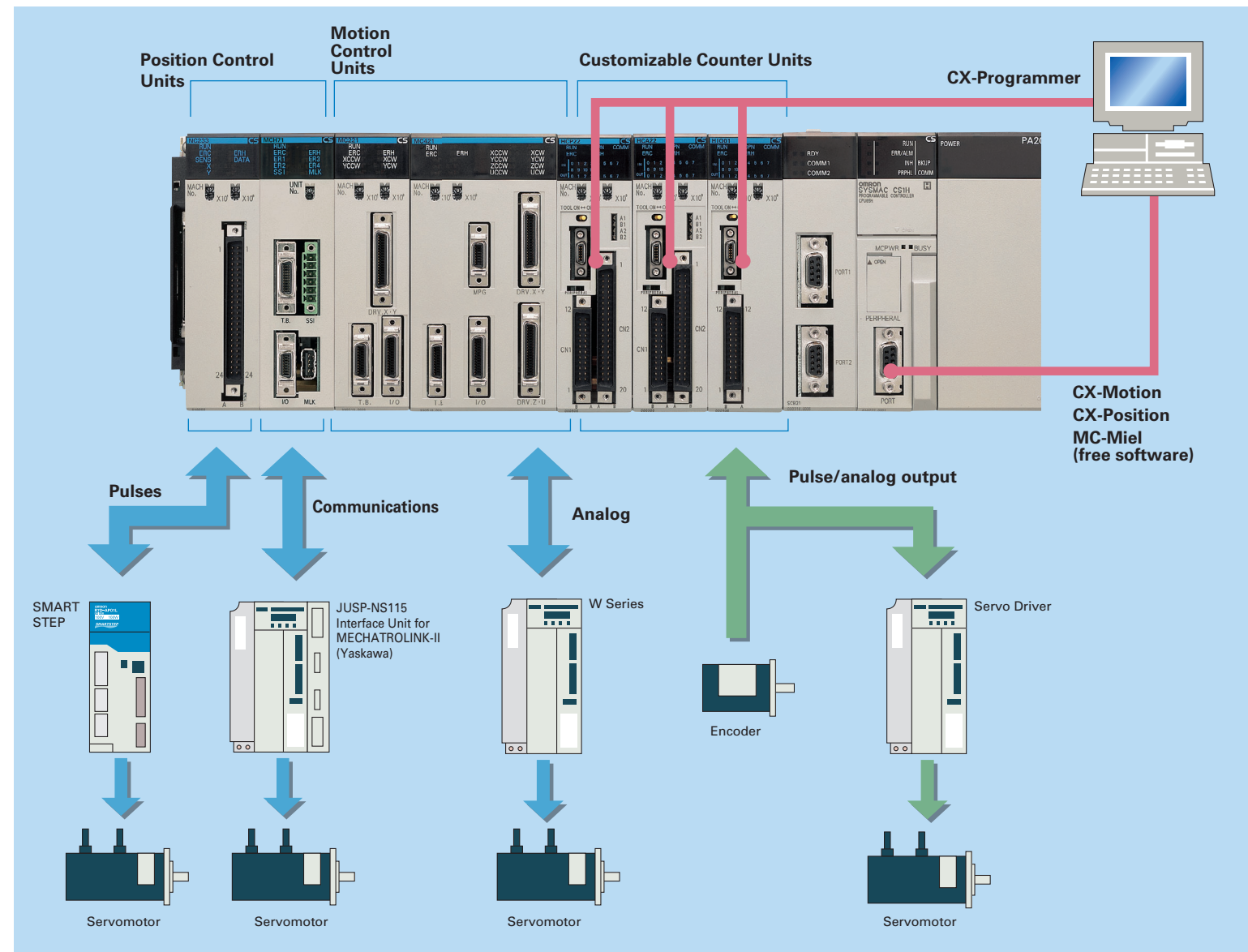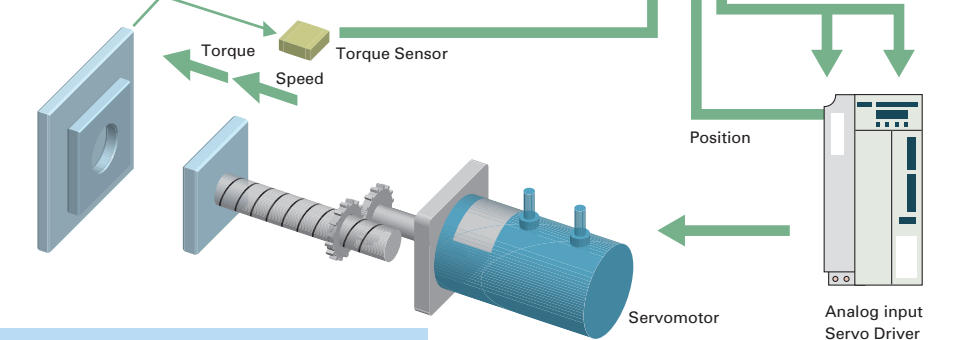
Synchronous Control with Electronic Cam

Counter input and pulse output that previously could only be connected via a CPU Unit can now both be handled by the same Unit. The built-in high-speed PLC enables synchronous control of, for example, electronic cams. The cam curve that determines the relationship between counter input and pulse output can be defined freely using the line-segment approximation function from the ladder program.

Design Costs Reduced by Modularization

Ladder programs and I/O instructions to be re-used or shared by designers can be transferred from the main CPU Unit to the Units, allowing "modularization" that helps to reduce design costs. Up to 96 Units can be used, enabling easy system expansion in the future.

Motion Applications with High-speed Response

A wide range of interrupt functions and superior response performance enable motion applications requiring high-speed response using pulse I/O.

Position Control Units

Motion Control Units

Customizable Counter Units

CX-Programmer

CX-Motion
CX-Position
MC-Miel
(free software)

Pulses   Communications   Analog   Pulse/analog output

SMART STEP   JUSP-NS115 Interface Unit for MECHATROLINK-II (Yaskawa)   W Series   Encoder   Servo Driver

Servomotor   Servomotor   Servomotor   Servomotor

Smart Process Control
OMRON PLC-based Process Control brings   Major Innovations to Process Automation

The evolution of
the SYSMAC CS1
accelerates DCS
downsizing.

8

- DCS functionality in a PLC
- Analog Units with signal conversion functions
- A scaleable system configuration

Down-sizing

PLC-based Process Control

Easy Engineering

High Reliability

- Duplex operation supported
- Complete maintenance functions

- Function block programming
- Sequence programming using either step ladders or sequence tables
- A direct link to HMI products

Provides an exceptionally open environment with PLC-based process control to advance standardization and IT integration of the process control system.

Operation, Monitoring, and Data Logging

Touch Panels	User Application	HMI Software
●NS-series PT	●**PLC Reporter** PLC data can be collected and written in Excel. ●**Compolet** Communications programming between a PC and PLC can be accomplIshed easlly with ActiveX control.	Special HMI software ●**CX-Process Monitor Plus** Commercially available HMI software ●**HMI software compatible with FinsGateway**

Ethernet/Controller Link

PLC (CS1 Duplex)	CS-series)
●**CS1D Process-control CPU Unit** Duplex Process-control CPU Unit can help reduce risk insystems that must not stop. ●**Process I/O Units** Analog I/O Units are available for diverse functions such as Isolators, power supplies, and signal conversion.	●**Loop Control Board/Unit** Condenses DCS functions in a compact Unit and enables function-block programming. ●**CX-Process Tool** Function blocks can be pasted into windows and graphic programming can be perfomed by arranging blocks with the mouse.

Diversified Loop Control is even easier to use.
Programming becomes even easier with function-block programming.

Packed with complete DCS functionality, the LCBs/LCUs are programmed with function blocks designed specifically for process control. Similar to preparing a flow sheet, function blocks are pasted and connections made using a graphic interface. A wide array of control methods, from basic PID control to cascade and feed-forward control, are possible.

●Example: Cascade Control (Heating and Cooling)

With Function Blocks:

PID1

Analog Input Unit / Analog Output Unit / Loop Control Unit/Board

PV1 PID1 MV1 RSP1
PV2 PID2 MV2
Split conversion

Temperature
Temperature Heat exchange
Steam
Cooling water
Drain

Isolated-type Ai4 Terminal
| Y1 |
| Y2 |
| Y3 |
| Y4 |

Basic PID
PV	SP
PVE	Y1
RSP	MV
MIE	
MVE	

Split Conversion
| X1 | Y1 |
| | Y2 |

Isolated-type Ao4 Terminal
X1	Y1
X2	Y2
X3	Y3
X4	Y4

Basic PID
PV	SP
PVE	Y1
RSP	MV
MIE	
MVE	

PID2

PLC-based Process Control Application Examples

●**In-line Blending in a Food Plant**

RSView32 Monitoring Screen (collecting and saving data)

Personal computer HMI software

Ethernet

SYSMAC CS1 PLC with advanced Loop Control Board

Flowrate control (blended PID control)

Materials tanks
A
B
C

Flowrate   Control outputs

Motor

Product tanks
A
B

Intermediate tank

●**Batch Control in a Chemical Factory**

Personal computer HMI software

Ethernet

SYSMAC CS1 Duplex PLC (CS1D Process-control CPU Unit)

Reaction control

Motor
Motor
Motor
Motor

Drying equipment

A Complete Lineup of Units for Optimum Control.

CPU Rack

Note: Connection is not possible to a 2-slot CPU Backplane.

CPU Backplanes

CS1W-BC□□2
(2, 3, 5, 8, or 10 slots)
Note: Expansion is not possible for 2-slot Backplanes. These Backplanes are for CS1 Units only.
Use a CS1W-BC□□3 Backplane for C200H Units.

Serial Communications Board
CS1W-SCB21-V1
CS1W-SCB41-V1

Loop Control Board
CS1W-LCB01/05

CPU Units
CS1H-CPU □□H
CS1G-CPU □□H

Power Supply Units
C200HW-PA204/PA204R/
PA204S/PA209R/PD024/
PD025/PD106R

Note: C200H Units cannot be mounted on the Long-distance Expansion Racks.

I/O Control Unit
CS1W-IC102

Long-distance Expansion Connecting Cables
CV500-CN□□2

I/O Interface Unit
CS1W-II102

Terminating Resistor
CV500-TER01
(Two provided with CS1W-IC102.)

Memory Card
HMC-372/672

CS1 I/O Connecting Cables
CS1W-C□□□3
(30 or 70 cm; 2, 3, 5, 10, or 12 m)

CS1 Expansion Rack

CS1 Expansion Backplanes
CS1W-BI□□2
(3, 5, 8, or 10 slots)
Note: These Expansion Backplanes are for CS1 Units only. Use a CS1W-BI□□3 Backplane

Power Supply Units
C200HW-PA204/
PA204S/
PA209R/
PD024/PD025/
PD106R

CS1 to C200H I/O Connecting Cables
CS1W-CN□□□
(30 or 70 cm; 2, 3, 5, 10, or 12 m)

C200HX/HG/HE Expansion I/O Rack

C200H I/O Connecting Cables
C200H-CN□□1
(30 or 70 cm; 2, 5, or 10 m)

C200HX/HG/HE Expansion I/O Rack

C200HX/HG/HE Expansion I/O Backplanes
C200HW-BI□□1(-V1)
(3, 5, 8, or 10 slots)

Power Supply Units
C200HW-PA204/
PA204S/
PA204R/
PA209R/
PD024/
PD025

CS1 CPU Bus Units

Loop Control Unit	Motion Control Unit	Serial Communications Unit	Ethernet Units	Controller Link Units	SYSMAC Link Units (coaxial, optical)	DeviceNet Unit
CS1W-LC001	CS1W-MCH71	CS1W-SCU21-V1	CS1W-ETN21 CS1D-ETN21D	CS1W-CLK21-V1/12-V1/52-V1	CS1W-SLK21/SLK11	CS1W-DRM21-V1

Basic I/O Units

Note: C200H Basic I/O Units and C200H Group 2 High-density I/O Units can also be used.

CS1 Basic I/O Units

16 pts Input Unit: CS1W-ID211	32 pts Input Unit: CS1W-ID231	64 pts Input Unit: CS1W-ID261	96 pts Input Unit: CS1W-ID291	16 pts Output Units: CS1W-OD21□	32 pts Output Units: CS1W-OD23□	64 pts Output Units: CS1W-OD26□	96 pts Output Units: CS1W-OD29□
32 inputs/32 outputs I/O Units: CS1W-MD26□	48 inputs/48 outputs I/O Units: CS1W-MD29□	16 pts AC Input Units: CS1W-IA111/211	8 pts Triac Output Unit: CS1W-OA201	16 pts Triac Output Unit: CS1W-OA211	8 pts (independent) Relay Output Unit: CS1W-OC201	16 pts Relay Output Unit: CS1W-OC211	32 inputs/ 32 outputs TTL I/O Unit: CS1W-MD561

Interrupt Input Unit
Interrupt function supported on CPU Rack only.
(Two Units mountable on CPU Rack.)
C200H Interrupt Input Unit can also be used.
16 pts CS1W-INT01

Analog Timer Unit
C200H-TM001

B7A Interface Units
16 pts C200H-B7A11/O1
Group-2 Unit C200H-B7A02/12/21/22

High-speed Input Unit
16 pts CS1W-IDP01

Safety Relay Unit
CS1W-SF200

Special I/O Units

CS1 Special I/O Unit

Analog Input Units
CS1W-AD041-V1/AD081-V1

Analog Input Unit
CS1W-AD161

Analog Output Units
CS1W-DA041/DA08V/DA08C

Analog I/O Unit
CS1W-MAD44

Process I/O Units
CS1W-P□□□ (-V1)

Position Control Units
CS1W-NC□□□

Motion Control Units
CS1W-MC221/MC421-V1

High-speed Counter Units
CS1W-CT021/041

Customizable Counter Units
CS1W-HCP22-V1/HCA22-V1/HCA12-V1/HIO01-V1

ID Sensor Units
CS1W-V600C11
CS1W-V600C12

GP-IB Interface Unit
CS1W-GPI01

C200H Special I/O Units

Temperature Sensor Units
C200H-TS□□□

Temperature Control Units
C200H-TC□□□
C200H-TV□□□

PID Control Units
C200H-PID0 □

Cam Positioner Unit*
C200H-CP114

Position Control Units*
C200HW-NC□□□

2-axis Motion Control Unit*
C200H-MC221

ID Sensor Units*
C200H-IDS □□

ASCII Units*
C200H-ASC □□

DeviceNet I/O Link Unit
C200HW-DRT21

CompoBus/S Master Unit
C200HW-SRM21-V1

High-speed Counter Units*
C200H-CT□□□

Note 1. Only CS1-series Units (i.e., with model numbers starting ÒCS1WÓ) can be used with CS1D PLCs.
2. The HMC-EF372/EF672 cannot be used with CS1G-CPU□□H, CS1H-CPU□□H, CJ1G-CPU□□H, and CJ1H-CPU□□H CPU Units with lot numbers of 02108 or earlier (i.e., CPU Units manufactured before 8 January 2002) or with NS7-series PTs with lot numbers of 0852 or earlier (i.e., PTs manufactured before 8 May 2002). Be careful when ordering.
3. There are restrictions in data transfers with the CPU Unit for bit and DM Area specifications for the C200H Special I/O Units marked with asterisks, as well as in data transfers programmed from these Units. Refer to CS-series PLC Operation manuals for details.

■ Specifications by Model

Item	Specifications								
Model	CS1H-CPU67H CS1D-CPU67S	CS1H-CPU66H	CS1H-CPU65H CS1D-CPU65S	CS1H-CPU64H	CS1H-CPU63H	CS1G-CPU45H	CS1G-CPU44H CS1D-CPU44S	CS1G-CPU43H	CS1G-CPU42H CS1D-CPU42S
No. of I/O points	5,120 (No. of Expansion Racks: 7)						1,280 (No. of Expansion Racks: 3)	960 (No. of Expansion Racks: 2)	
Program capacity	250 Ksteps	120 Ksteps	60 Ksteps	30 Ksteps	20 Ksteps	60 Ksteps	30 Ksteps	20 Ksteps	10 Ksteps
DM Area	32 kW								
EM Area	32 kW x 13 banks	32 kW x 7 banks	32 kW x 3 banks	32 kW x 1 bank	32 kW x 1 bank	32 kW x 3 banks	32 kW x 1 bank	32 kW x 1 bank	32 kW x 1 bank
LD instruction time	20 ns					40 ns			
Control	Stored program method								
I/O control	Both cyclic scan method and on-demand mode can be used.								
Programming language	Ladder diagram								
Instruction length	1 to 7 steps/instruction								
No. of instructions	Approx. 400								
No. of tasks	288 (256 shared with interrupt tasks)								
Interrupt types	Scheduled interrupts, I/O interrupts, power OFF interrupt, and external I/O interrupts (interrupts from Inner Boards and CPU Bus Units).								
Internal communications port	1 peripheral port and 1 RS-232C port								
Mountable optional products	Memory Cards, Inner Boards (e.g., Serial Communications Boards)								
Main functions	Parallel peripheral service processing, constant (minimum) cycle time, cycle time monitoring, input time constant settings, debugging (online edit, error simulation, forced set and reset, data trace, differential monitoring, etc.), program protection, diagnostic check, error history, clock, power OFF detection delay time, remote programming and monitoring, eight-level communications, etc. (See note.)								

Note: CPU Unit must be Unit Ver. 2.0 or later for 8 levels of communications (Pre-Ver. 2.0 CPU Units allow communications over three network levels).

■ Configuration Devices (CPU and Expansion Units)

Name	Model	Specifications			International standards
CPU Units	CS1H-CPU67H	5,120 I/O points	250 Ksteps	448 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 13 banks)	UC1, N, L, CE
	CS1H-CPU66H	5,120 I/O points	120 Ksteps	256 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 7 banks)	
	CS1H-CPU65H	5,120 I/O points	60 Ksteps	128 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 3 banks)	
	CS1H-CPU64H	5,120 I/O points	30 Ksteps	64 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 1 bank)	
	CS1H-CPU63H	5,120 I/O points	20 Ksteps	64 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 1 bank)	
	CS1G-CPU45H	5,120 I/O points	60 Ksteps	128 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 3 banks)	
	CS1G-CPU44H	1,280 I/O points	30 Ksteps	64 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 1 bank)	
	CS1G-CPU43H	960 I/O points	20 Ksteps	64 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 1 bank)	
	CS1G-CPU42H	960 I/O points	10 Ksteps	64 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 1 bank)	
CPU Unit (with on-line replacement capability)	CS1D-CPU67S	5,120 I/O points	250 Ksteps	448 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 13 banks)	UC1, N, L, CE
	CS1D-CPU65S	5,120 I/O points	60 Ksteps	128 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 3 banks)	
	CS1D-CPU44S	1,280 I/O points	30 Ksteps	64 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 1 bank)	
	CS1D-CPU42S	960 I/O points	10 Ksteps	64 Kwords of data (DM: 32 Kwords, EM: 32 Kwords x 1 bank)	
CPU Backplanes	CS1W-BC023	2 slots (Expansion I/O Units cannot be connected.)			U, C, N, L, CE
	CS1W-BC033	3 slots			
	CS1W-BC053	5 slots			U, C, N, L, CE
	CS1W-BC083	8 slots			UC1, N, L, CE
	CS1W-BC103	10 slots			UC, N, L, CE
CPU Backplanes (for CS1 Units only)	CS1W-BC022	2 slots (Expansion I/O Units cannot be connected.)			U, C, N, CE
	CS1W-BC032	3 slots			
	CS1W-BC052	5 slots			
	CS1W-BC082	8 slots			
	CS1W-BC102	10 slots			
CS1D CPU Backplane (with on-line replacement capability)	CS1D-BC082S	8 slots (use together with the CS1D-CPU□□S)			UC1, N, CE, L
Expansion Backplanes	CS1W-BI033	3 slots			U, C, N, L, CE
	CS1W-BI053	5 slots			
	CS1W-BI083	8 slots			
	CS1W-BI103	10 slots			UC1, N, L, CE
CS1 Expansion Backplanes (for CS1 Units only)	CS1W-BI032	3 slots			U, C, N, CE
	CS1W-BI052	5 slots			U, C, N, L, CE
	CS1W-BI082	8 slots			
	CS1W-BI102	10 slots			
CS1D Expansion Backplane (with on-line replacement capability)	CS1D-BI092	9 slots (use together with the CS1D-CPU□□S)			UC1, N, L, CE
Power Supply Units	C200HW-PA204	100 to 120 VAC/200 to 240 VAC; Output capacity: 5 VDC at 4.6 A, 26 VDC at 0.625 A, total 30 W max.			U, C, N, L, CE
	C200HW-PA204S	100 to 120 VAC/200 to 240 VAC (with 24 VDC, 0.8-A service power supply); Output capacity: 5 VDC at 4.6 A, 26 VDC at 0.625 A, total 30 W max.			U, C
	C200HW-PA204R	100 to 120 VAC/200 to 240 VAC (with RUN output); Output capacity: 5 VDC at 4.6 A, 26 VDC at 0.625 A, total 30 W max.			U, C, N, L, CE
	C200HW-PA209R	100 to 120 VAC/200 to 240 VAC (with RUN output); Output capacity: 5 VDC at 9 A, 26 VDC at 1.3 A, total 45 W max.			U, C, N, L, CE
	C200HW-PD024	24 VDC; Output capacity: 5 VDC at 4.6 A, 26 VDC at 0.625 A, total 30 W max.			UC1, N, L, CE
	C200HW-PD025	24 VDC, Output capacity: 5 VDC at 5.3 A, 26 VDC at 1.3 A, total 40 W max.			UC1, L (approval pending), N, CE
	C200HW-PD106R	100 VDC; Output capacity: 5 VDC at 6 A, 26 VDC at 1.0 A, total 30 W max.			UC
CS1D Power Supply Unit (with on-line replacement capability)	CS1D-PA207R	100 to 120 V AC/200 to 240 V, 50/60 Hz (RUN output), output capacity: 5 V DC at 7 A, 26 V DC at 1.3 A, total 35 W max. (for both Duplex-CPU Systems and Single-CPU Systems)			UC1, N, L, CE
	CS1D-PD024	24 V DC, Output capacity: 5 V DC at 4.3 A, 26 V DC at 0.56 A, total 28 W max. (for both Duplex-CPU Systems and Single-CPU Systems)			UC1, CE, N, L
	CS1D-PD025	24 VDC, Output capacity: 5 VDC at 5.3 A, 26 VDC at 1.3 A, total 40 W max. (for both Duplex-CPU Systems and Single-CPU Systems)			UC1, L (approval pending), N, CE
I/O Control Unit	CS1W-IC102	For long distance expansion exceeding 12 m (50 m max.). (With 2 terminating resistors.)			U, C, CE
I/O Interface Unit	CS1W-II102	For long distance expansion exceeding 12 m (50 m max.).			U, C, CE
Memory Cards	HMC-EF372	Flash memory, 30 Mbytes			L, CE
	HMC-EF672	Flash memory, 64 Mbytes			
	HMC-AP001	Memory Card Adapter (for PCMIA slot on personal computer)			CE
Serial Communications Boards	CS1W-SCB21-V1	Two RS-232C ports			U, C, N, L, CE
	CS1W-SCB41-V1	One RS-232C port and one RS-422/485 port			
Loop Control Board	CS1W-LCB01	50 blocks maximum including both adjustment and operation blocks	CPU Unit Inner Board for CS1 Series		UC1, N, CE
	CS1W-LCB05	500 blocks maximum including both adjustment and operation blocks			
Programming Consoles	CQM1-PRO01-E	Console for on-site operation			U, C, N, CE
	C200H-PRO27-E	Console for on-site operation			

■ Support Software

Product name	Model		Specifications
CX-One FA integrated Tool Package	CX-ONE-AL01C-E	One license	CX-One is a package that integrates the Support Software for OMRON PLCs and components. CX-One operates on the following OS OS: Windows 98SE, Me, NT4.0 (service Pack 6a), 2000 (Service Pack 3 or higher), or XP. CX-One includes CX-Programmer Ver. 6.□., CX-Simulator Ver. 1.□., CX-Protocol Ver. 1.□., CX-Motion Ver. 2.□., CX-Position Ver. 2.□., CX-Process Tool Ver. 4.□ For details, refer to the CX-One Catalog (Cat. No. R134).
	CX-ONE-AL03C-E	Three licenses	
	CX-ONE-AL10C-E	Ten licenses	
			CX-One includes CX-Programmer, CX-Simulator, CX-Protocol, CX-Motion, CX-Position, and CX-Process Tool can still be ordered individually using the following model numbers.
CX-Programmer Ver. 6.□	WS02-CXPC1-E-V6□	One license	PLC programming software OS: Windows 98SE, Me, NT4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP
	WS02-CXPC1-E03-V6□	Three licenses	
	WS02-CXPC1-E10-V6□	Ten licenses	
CX-Simulator Ver. 1.□	WS02-SIMC1-E	One license	Ladder program simulation software Support Software for Windows. OS: Windows 98SE, Me, NT4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP
CX-Protocol Ver. 1.□	WS02-PSTC1-E	One license	Software to create protocol macros OS: Windows 98SE, Me, NT4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP
CX-Motion Ver. 2.□	WS02-MCTC1-EV2	One license	Motion Control Unit support software OS: Windows 98SE, Me, NT4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP
CX-Position Ver. 2.□	WS02-NCTC1-EV2	One license	Position Control Unit support software OS: Windows 98SE, Me, NT4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP
CX-Process Tool Ver. 4.□	WS02-LCTC1-EV4	One license	Loop Controller programming software OS: Windows 98SE, Me, NT4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP
	WS02-LCTC1-EV4L03	Three licenses	
	WS02-LCTC1-EV4L10	Ten licenses	
CX-Process Monitor Plus	WS02-LCMC1-E		Loop Control Board, Unit Monitoring Software OS: Windows 2000, NT4.0
Support Software for Process I/O Unit	WS02-PUTC1-E		Process I/O Unit Settings Software OS: Windows 95, 98, NT4.0, 2000
DeviceNet Configurator Software	WS02-CFDC1-E		DeviceNet Configuration Software OS: Windows 95, 98, Me, NT4.0, 2000, XP

■ Middleware

Product name	Model	Specifications	Corresponding operating system
SYSMAC Compolet Version 2003	SCPL-SYSFL-2003E	Software for communications with OMRON PLCs	Windows2000/XP
PLC Reporter 32	SDKY-95HLK-E97	Simple Data Collection Software (host link version)	Windows98/Me/2000/XP
	SDKY-95MLT-E97	Simple Data Collection Software (multi-network version)	Windows98/Me/2000/XP
FinsGateway Version 2003	SFGW-RT-2003	Communications Middleware	Windows2000/XP

■ CS1-series Basic I/O Units

Classification	Name	Model	Specifications	International standards
Input Units	DC Input Unit	CS1W-ID211	7 mA, 24 VDC, 16 inputs	UC1, N, L, CE
		CS1W-ID231	6 mA, 24 VDC, 32 inputs	
		CS1W-ID261	6 mA, 24 VDC, 64 inputs	
		CS1W-ID291	Approx. 5 mA, 24 VDC, 96 inputs	U, C, N, L, CE
	AC Input Unit	CS1W-IA111	100 to 120 VAC, 100 to 120 VDC, 16 inputs	UC1, N, L, CE
		CS1W-IA211	200 to 240 VAC, 16 inputs	UC, N, L, CE
	Interrupt Input Unit	CS1W-INT01	7 mA, 24 VDC, 16 inputs	UC1, N, L, CE
	High-speed Input Unit	CS1W-IDP01	7 mA, 24 VDC, 16 inputs	
	Safety Relay Unit	CS1W-SF200	24 VDC, 1 word/2 word shared input, 4 commons	U, C, CE
Output Units	Relay Contact Output Units	CS1W-OC201	2 A, 250 VAC, 2 A, 24 VDC, 0.1 A, 120 VDC max., independent contacts, 8 outputs	UC1, N, L, CE
		CS1W-OC211	2 A, 250 VAC, 2 A, 24 VDC, 0.1 A, 120 VDC max., 16 outputs	
	Transistor Output Unit	CS1W-OD211	0.5 A, 12 to 24 VDC, 16 sinking outputs	U, C, N, L, CE
		CS1W-OD212	0.5 A, 24 VDC, 16 sourcing outputs, with load short-circuit protection and alarm function	
		CS1W-OD231	0.5 A, 12 to 24 VDC, 32 sinking outputs	UC1, N, L, CE
		CS1W-OD232	0.5 A, 24 VDC, 32 sourcing outputs, with load short-circuit protection and alarm function	UC, N, L, CE
		CS1W-OD261	0.3 A, 12 to 24 VDC, 64 sinking outputs	UC1, N, L, CE
		CS1W-OD262	0.3 A, 24 VDC, 64 sourcing outputs, with load short-circuit protection and alarm function	
		CS1W-OD291	0.1 A, 12 to 24 VDC, 96 sinking outputs	U, C, N, L, CE
		CS1W-OD292	0.1 A, 12 to 24 VDC, 96 sourcing outputs	
	Triac Output Unit	CS1W-OA201	1.2 A, 250 VAC max., 8 outputs.	UC, N, L, CE
		CS1W-OA211	0.5 A, 250 VAC max., 16 outputs.	
I/O Units	Mixed I/O Units DC Input/Transistor Outputs Units	CS1W-MD261	6 mA, 24 VDC, 32 inputs/ 0.3 A, 12 to 24 VDC, 32 sourcing outputs	UC1, N, L, CE
		CS1W-MD262	6 mA, 24 VDC, 32 inputs/0.3 A, 24 VDC, 32 sourcing outputs, with load short-circuit protection and alarm function	
		CS1W-MD291	Approx. 5 mA, 24 VDC, 48 inputs/ 0.1 A, 12 to 24 VDC, 48 sinking outputs	U, C, N, L, CE
		CS1W-MD292	Approx. 5 mA, 24 VDC, 48 inputs/ 0.1 A, 12 to 24 VDC, 48 sourcing outputs	
	TTL I/O Unit	CS1W-MD561	5 VDC, 32 inputs, 32 outputs	UC, N, L, CE

C200H and C200HW Basic I/O Units can be used in addition to the above Units.

22

23

A C200H Expansion Backplane can be used in addition to the above Backplanes.

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■ Special I/O Units

Name		Model	Specifications	International standards
Temperature Control Units		C200H-TC001	Thermocouple input, feed-forward PID or ON/OFF transistor output	U, C, CE
		C200H-TC002	Thermocouple input, feed-forward PID or ON/OFF voltage output	
		C200H-TC003	Thermocouple input, feed-forward PID or ON/OFF current output	
		C200H-TC101	Platinum-resistance thermometer input, feed-forward PID or ON/OFF transistor output	
		C200H-TC102	Platinum-resistance thermometer input, feed-forward PID or ON/OFF voltage output	
		C200H-TC103	Platinum-resistance thermometer input, feed-forward PID or ON/OFF current output	
PID Control Units		C200H-PID01	Voltage input/current input, feed-forward PID or ON/OFF transistor output	
		C200H-PID02	Voltage input/current input, feed-forward PID or ON/OFF voltage output	
		C200H-PID03	Voltage input/current input, feed-forward PID or ON/OFF current output	
Cam Positioner Unit		C200H-CP114	48 cam outputs (16 external outputs/32 internal outputs) Resolver response time: 200 μs max. (5 KHz)	U, C
ASCII Units		C200H-ASC11	200 Kbytes RAM, 2 RS-232C ports	U, C, CE
		C200H-ASC21	200 Kbytes RAM, 1 RS-232C port, 1 RS-422A/485 port	
		C200H-ASC31	200 Kbytes RAM, 2 RS-232C ports, 1 RS-232C port for terminal	
Analog Input Units		CS1W-AD041-V1	4 inputs, 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA, resolution of 1/4000	UC1, N, CE
		CS1W-AD081-V1	8 inputs, 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA, resolution of 1/4000	
		CS1W-AD161	16 inputs, 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA, resolution of 1/8000 (connector models)	UC1, CE
Analog Output Units		CS1W-DA041	4 outputs, 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA, resolution of 1/4000	UC1, N, CE
		CS1W-DA08V	8 outputs, 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, resolution of 1/4000	U, C, N, CE
		CS1W-DA08C	8 outputs, 4 to 20 mA, resolution of 1/4000	
Analog I/O Unit		CS1W-MAD44	4 inputs (4 to 20 mA, 1 to 5 V), 4 outputs (1 to 5 V, 0 to 10 V, etc.)	U, C, N, L, CE
Process I/O Units	Isolated Thermocouple Input (high resolution)	CS1W-PTS11	4 inputs, B, E, J, K, N, R, S, T, U, Wre5-26, PL II, ±100 to 100 mV	UC1, CE, N
	Isolated Resistance Thermometer Input (high resolution)	CS1W-PTS12	4 inputs, Pt100 Ω (JIS, IEC), JPt100 Ω, Ni508.4 Ω	
	Isolated DC Input (high resolution)	CS1W-PDC11	4 inputs, 4 to 20 mA, 0 to 20 mA, 0 to 10 V, 0 to 5 V, ±5 V, 1 to 5 V, 0 to 1.25 V, ±1.25 V	
	Isolated Thermocouple Input (economical type)	CS1W-PTS51 *NEW*	4 inputs, R, S, K, J, T, L, B	UC1, CE
		CS1W-PTS55	8 inputs, R, S, K, J, T, L, B	
	Isolated Resistance Thermometer Input (economical type)	CS1W-PTS52 *NEW*	4 inputs, Pt100 Ω, JPt100 Ω (JIS, IEC)	
		CS1W-PTS56	8 inputs, Pt100 Ω, JPt100 Ω (JIS, IEC)	
	Isolated DC Input (economical type)	CS1W-PDC55 *NEW*	8 inputs, 4 to 20 mA, 0 to 10 V, 0 to 5 V, 1 to 5 V	
	Isolated Thermocouple Input	CS1W-PTS01-V1	4 inputs, B, E, J, K, N, R, S, T, ±80 mV	
	Isolated Platinum-resistance Thermometer Input	CS1W-PTS02	4 inputs, Pt100 Ω, JPt100 Ω	
	Isolated Temperature Resistance Input (Ni508.4 ½)	CS1W-PTS03	4 inputs, Ni508, 4 Ω	
	Isolated Two-wire Transmitter Input	CS1W-PTW01	4 inputs, 4 to 20 mA, 1 to 5 V	
	Isolated DC Input	CS1W-PDC01	4 inputs, 4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 5 V, ±5 V, 0 to 10 V, ±10 V	
	Isolated Pulse Input	CS1W-PPS01	4 inputs	
	Isolated Control Output	CS1W-PMV01	4 outputs, 4 to 20 mA, 1 to 5 V	
	Isolated Control Output	CS1W-PMV02	4 outputs, 0 to 10 V, ±10 V, 0 to 5 V, ±5 V, 0 to 1 V, ±1 V	
	Power Transducer Input	CS1W-PTR01	8 inputs, 0 to 1 mA, ±1 mA	
	DC Input (100 mV)	CS1W-PTR02	8 inputs, 0 to 100 mV, ±100 mV	
High-speed Counter Units		CS1W-CT021	2-axis pulse input, 500 Kcps	UC, CE
		CS1W-CT041	4-axis pulse input, 500 Kcps	
GP-IB Interface Units		CS1W-GPI01	Supports Master Mode/Slave Mode	UC, CE
Motion Control Units		CS1W-MC421	4-axis analog output, G language compatible	U, C, CE
		CS1W-MC221	2-axis analog output, G language compatible	
Position Control Units		CS1W-NC113	1-axis pulse train open collector output	
		CS1W-NC213	2-axis pulse train open collector output	
		CS1W-NC413	4-axis pulse train open collector output	
		CS1W-NC133	1-axis pulse train line driver output	
		CS1W-NC233	2-axis pulse train line driver output	
		CS1W-NC433	4-axis pulse train line driver output	
ID Sensor Unit		CS1W-V600C11	For V600 RFID System, 1 Head	U, CE
		CS1W-V600C12	For V600 RFID System, 2 Heads	
DeviceNet I/O Link Unit		C200HW-DRT21	DeviceNet remote I/O slave	U, C, N, CE
CompoBus/S Master Unit		C200HW-SRM21-V1	CompoBus/S remote I/O	U, C, N, L, CE
Customizable Counter Units		CS1W-HCA12-V1	1-axis pulse input, 1 analog input, 2 analog outputs, 12 DC inputs, 8 transistor outputs	U, C, CE
		CS1W-HCP22-V1	2-axis pulse input, 2-axis pulse output, 12 DC inputs, 8 transistor outputs	
		CS1W-HCA22-V1	2-axis pulse input, 2 analog outputs, 12 DC inputs, 8 transistor outputs	
		CS1W-HIO01-V1	12 DC inputs, 8 transistor outputs	

C200H and C200HW Special I/O Units can be used in addition to the above Units.

■ CPU Bus Units

Name	Model	Specifications	International standards
Motion Control Unit	CS1W-MCH71	MECHATROLINK II; Real axes: 30; Virtual axes: 2; Special motion control language	UC1, CE
Controller Link Units	CS1W-CLK21-V1	Wired	UC1, N, L, CE
	CS1W-CLK12-V1	Optical ring (H-PCF cable)	UC1, CE
	CS1W-CLK52-V1	Optical ring (GI cable)	
SYSMAC LINK Units	CS1W-SLK21	Coaxial (5C-2V cable)	
	CS1W-SLK11	Optical (H-PCF cable)	U, C, N, CE
Serial Communications Unit	CS1W-SCU21-V1	Two RS-232C ports	
Ethernet Units	CS1W-ENT01	10 Base-5 (FINS communications, socket service, FTP server, email notification)	UC1, N, L, CE
	CS1W-ENT11	10 Base-T (FINS communications, socket service, FTP server, email notification)	
	CS1W-ETN21	100 Base-TX	
FL-net Units	CS1W-FLN02	FL-net (OPCN-2) Ver. 2 specifications, 10 Base-5	UC1, CE
	CS1W-FLN12	FL-net (OPCN-2) Ver. 2 specifications, 10 Base-T	
	CS1W-FLN22	FL-net (OPCN-2) Ver. 2 specifications, 100 Base-TX	
DeviceNet Unit	CS1W-DRM21-V1	DeviceNet remote I/O master	U, C, CE, L
Loop Control Unit	CS1W-LC001	Control loops: 32 max., No. of operations: 250 max.	U, C, N, CE

■ Peripheral Devices

Name	Model	Specifications	International standards
Programmable Slaves	CPM2C-S100C-DRT	SYSMAC CPU2C CPU Unit, controller function built-in 6 inputs, 4 outputs (sinking)	U, C, CE
	CPM2C-S110C-DRT	SYSMAC CPU2C CPU Unit, controller function built-in 6 inputs, 4 outputs (sinking)	
Open Network Controllers (See notes 1, 2, and 3.)	ITNC-EIS01-CST	Basic model (with CS1 bus interface)	
	ITNC-EIX01-CST	Expansion model (with CS1 bus interface)	
CS1 Pulse Interface Board (See note 4.)	ITBC-CST01	PCI board	
CS1 Pulse Interface Cables	ITBC-CN001-CST	1 m	—
	ITBC-CN005-CST	5 m	
	ITBC-CN012-CST	12 m	
Controller Link Support Boards	3G8F7-CLK21-EV1	Wired for PCI bus	CE
	3G8F7-CLK12-EV1	Optical ring for PCI bus (H-PCF cable)	
	3G8F7-CLK52-EV1	Optical ring for PCI bus (GI cable)	
Controller Link Repeater Units	CS1W-RPT01	Wire-to-wire	UC1, CE
	CS1W-RPT02	Wire-to-optical (H-PCF cable)	
	CS1W-RPT03	Wire-to-optical (GI cable)	
Controller Link Relay Terminal Block	CJ1W-TB101	Wired (set of 5)	—
SYSMAC LINK Support Boards	3G8F7-SLK21-E	Coaxial for PCI bus (5C-2V cable)	CE
	3G8F7-SLK11-E	Optical for PCI bus (H-PCF cable)	

Note 1: The Open Network Controller is the same as the Open Network Controller for DeviceNet except that the DeviceNet section has been converted to a CS1 bus interface.
2: Inquire when developing user applications for the Open Network Controller (with CS1 bus interface).
3: All optional software for the Open Network Controller can be used.
4: Inquire regarding the Windows driver for the CS1 bus interface board.
5: The CS1W-CLK12-V1 and CS1W-CLK52-V1 manufactured on June 1, 2003 or later from lot number 030602 or later support automatic 1:N data links and changing data link tables during operation.
6: Controller Link Support Boards with a "-V1" suffix now support automatic 1:N data links, changing data link tables during operation, and connection to up to 62 wired nodes.

■ International Standards

● As of May 31, 2005, the designated products conform to UL, CSA, cULus, cUL, NK, Lloyd's standards, and EC Directives. (U: UL, U1: UL (Class I Division 2 Hazardous Area Certification), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Hazardous Area Certification), CU: cUL, N: NK, L: Lloyd's, CE: EC Directives)
● Consult your OMRON representative for details on operating condition.

MEMO.

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