



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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Programmable Controllers

**SYSMAC**

**CS1**

Multiple-application Controllers with a Wide Range of Functions



» High Performance

» Human Efficiency

» Heritage

# Multi-application Controllers: From High-performance Machine C Highly Reliable Process Control



## **H** Ultimate Controller Performance High Performance

In order to create facilities 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 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.

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## **H** User-friendly Development Environment 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.

# ontrol to



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### **H** Efficient Use of Valuable Assets

# eritage

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 knowhow 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.

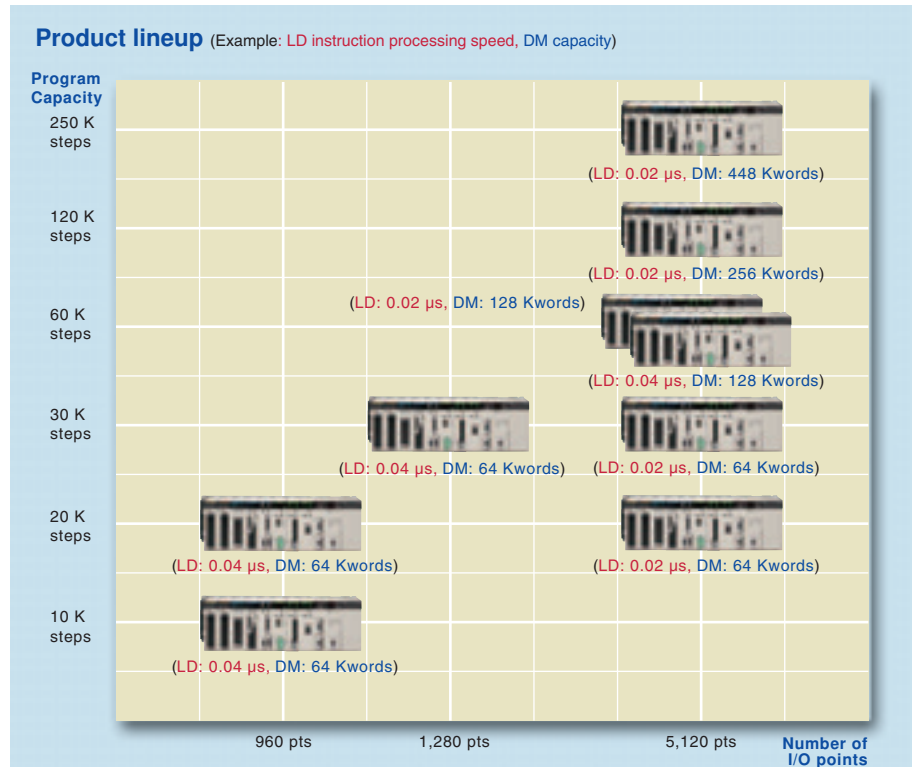
# Use the improved CS1 PLCs to scale advanced systems to the optimum size.

# 1

## 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

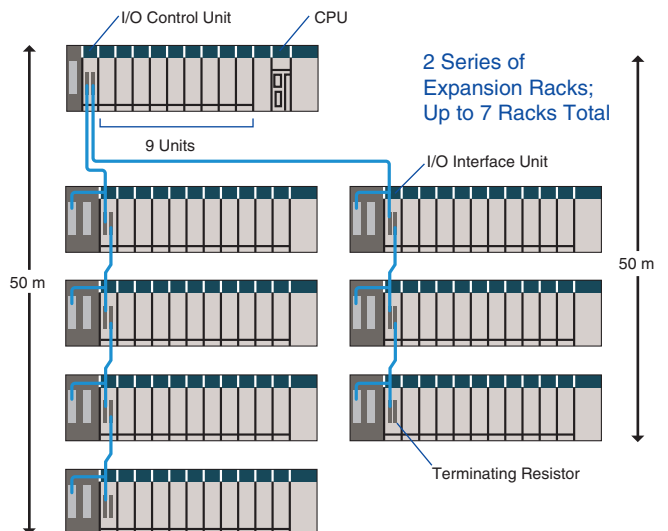
Communications Boards, and a wide selection of Special I/O Units that can be used with any CPU Units to flexibly build the system that meets the requirements.



## 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 Longdistance 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 Longdistance Expansion Racks.





## 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



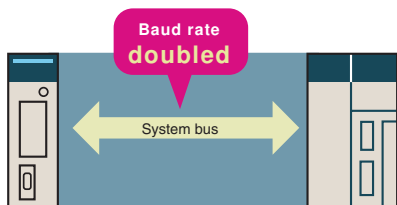
Five Analog Output Units of 8 points each  
Five Analog Input Units of 8 points each

## 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.

## 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.

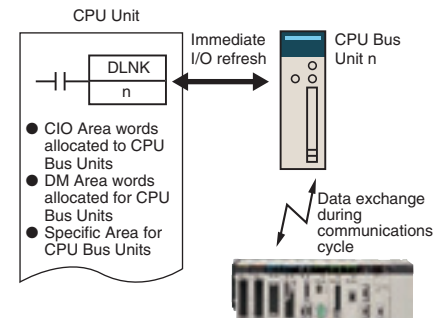


Special I/O Unit

CPU Unit

## 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.

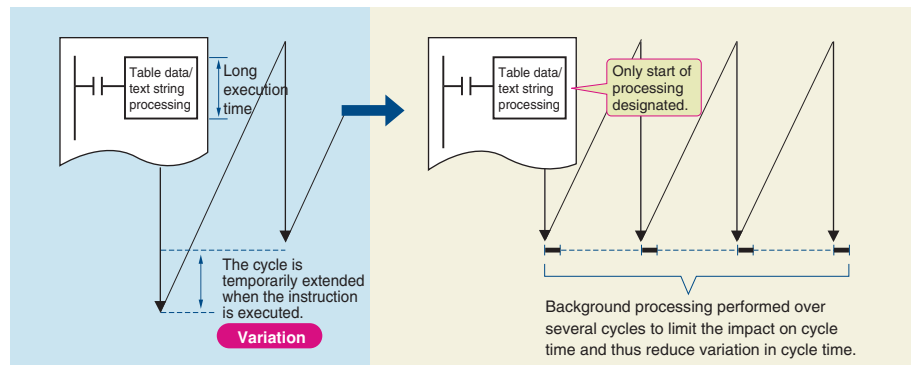


Unit name	Refresh function
Controller Link Unit	Data links
DeviceNet Unit	Remote I/O
Serial Communications Unit	Protocol macros
Ethernet Unit	Socket service based on manipulation of specific bits.

## 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.



## 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.

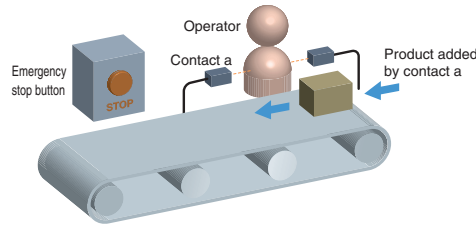
● Common Processing	<b>0.3 ms</b>
● PCMIX Value	<b>16</b>
● Cycle Time (Cycle time for 128 inputs and 128 outputs)	<b>Basic instructions only: 38 Ksteps/ms Including special instructions: 22 Ksteps/ms</b>
● LD Instruction Processing Speed	<b>20 ns</b>
● OUT Instruction Processing Speed	<b>20 ns</b>
● Subroutine Processing Speed	<b>2.1 μs</b>

# Equipped with functions demanded by the production site to suit a variety of applications

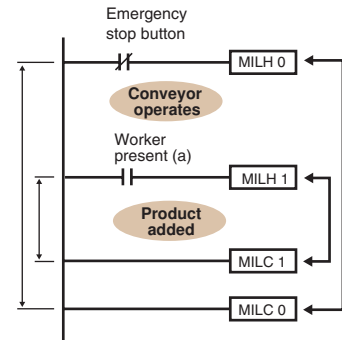
## 2

### 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.



- (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.

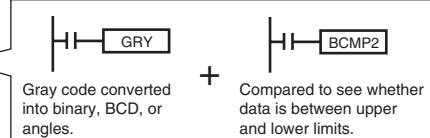
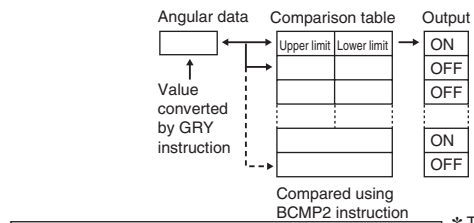
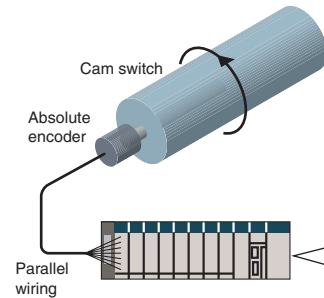


● CX-Programmer Screen



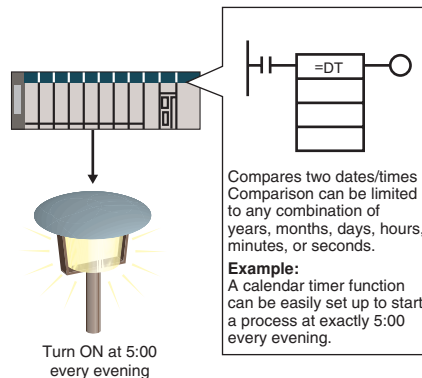
Support Software clearly shows the interlock status.

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

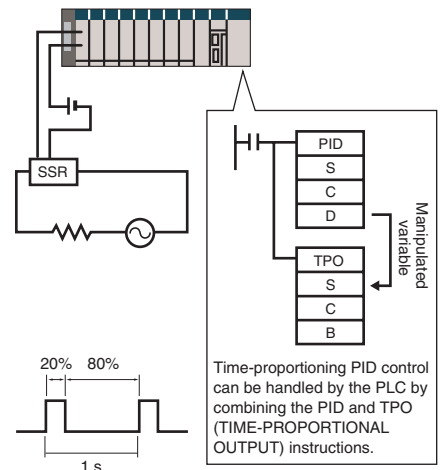


\* The time interval for execution by the GRY instruction is determined by the response speed for reading data from the absolute encoder.

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

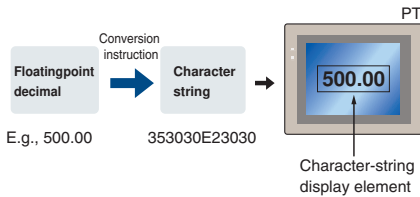


### TIME-PROPORTIONAL OUTPUT (TPO) Instruction (for CPU Unit Ver. 2.0 or Later)



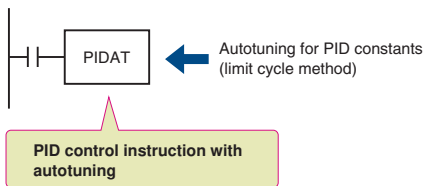
## Convert Between Floating-point Decimal and Character Strings

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.



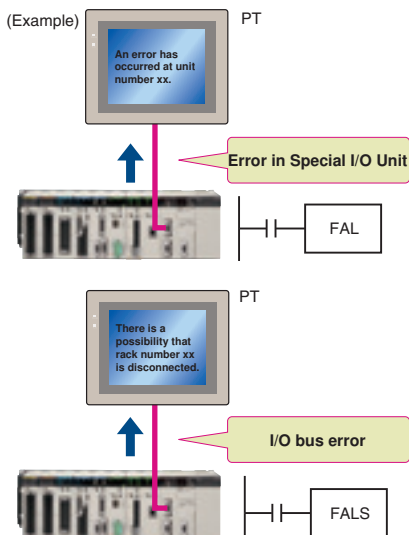
## PID Autotuning

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.

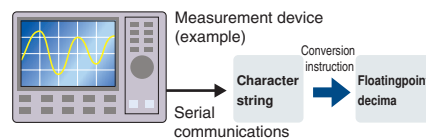


## Error Status Generation for Debugging

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.

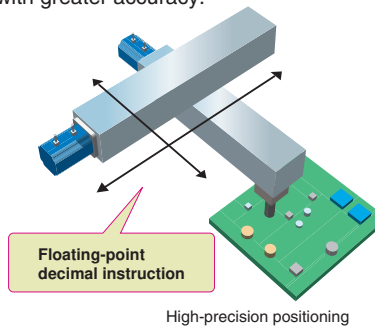


The new CS1 can convert ASCII character strings read from measurement devices by serial communications to floating-point decimal data for use in data processing.



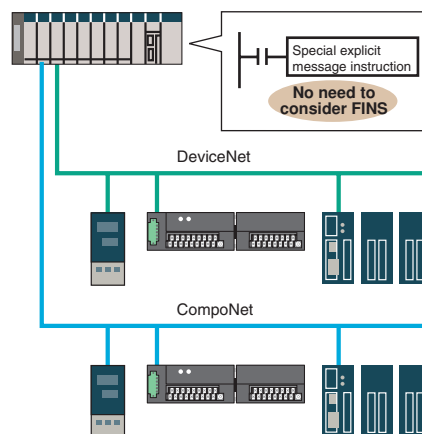
## Highly Accurate Positioning with XY Tables

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



## Easy Reading of Maintenance Data via CompoNet/DeviceNet

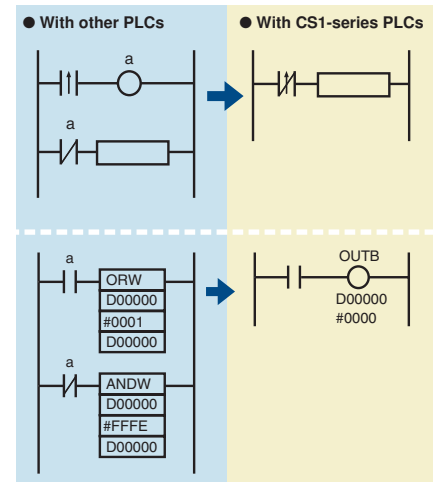
The addition of special explicit message instructions makes it easy to send explicit messages without having to consider FINS commands. Transferring data among PLCs with explicit messages is also simplified.



(Supported for DeviceNet Unit version 2.0 or later.)

## 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.



## 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 Instructions]

#### Timer/Counter Instructions

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



# The CX-One FA Integrated Tool Package makes design development, and maintenance easy and efficient.

## 3

### Integrated OMRON PLCs and Component Support Software

#### FA Integrated Tool Package



The CX-One is an FA Integrated Tool Package for connecting, setting, and programming OMRON components, including PLCs. CS1 programming and settings can be done with just the CX-Programmer, but the CX-One provides Support Software for setting and programming PTs, Temperature Controllers, and many other components. Using the CX-One makes programming and setup easy, shortening the total lead time required for starting up machines and equipment.

#### CX-One Configuration

1 Network Software	CX-Integrator CX-FLnet CX-Protocol CX-Configurator FDT Network Configurator
2 PLC Software	CX-Programmer CX-Simulator SwitchBox Utility
3 HMI Software	CX-Designer The Ladder Monitor Software is included. (See note 1.) NV-Designer (See note 2.)
4 Motion Control Software	CX-Drive CX-Motion-NCF CX-Motion-MCH CX-Position CX-Motion
5 PLC-based Process Control Software	CX-Process Tool Face Plate Auto-Builder for NS
6 Component Software for Temperature Controllers	CX-Thermo

Note: 1. The Ladder Monitor is required to monitor ladder programs running on CS/CJ-series PLCs from an NS-series PT.  
2. Include with CX-One Lite version 4.0 and in CX-One version 3.2 or later.

### Easy Programming

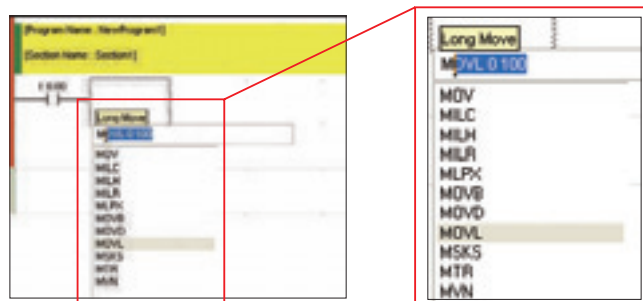
#### Smart Input

A complete range of intuitive programming functions is provided, including instruction and address input assistance, address incrementing, and address Incremental Copy. These functions enable waste-free programming with minimal effort.

#### Instruction and Address Input Assistance

When you begin typing an instruction from the keyboard while in the Ladder Editor Window, suggested instructions are displayed.

All you have to do is select the instruction from the list for easy input even if you do not remember the entire mnemonic.



Suggested instructions displayed

#### Automatic Insertion of Connecting Lines

When an output or application instruction is input, the required connecting line is inserted automatically starting at the cursor location. This greatly simplifies the work required to insert lines.

#### Address Incremental Copy

To create the same group of ladder instructions more than once, the address incremental copy function can be used to reuse the instructions simply by inputting an address offset. Also, address offsets can be set individually and I/O comments can be created automatically.

## Improved Programming Efficiency with Single-key Operation

The CX-Programmer features the "Single-key Concept" to increase operability. Apart from inputs to ladder diagrams, history searches, and model jumps, single-key operation can be used for simulation debugging as well.

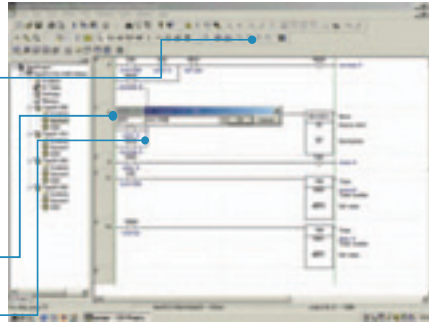
### Single-key Inputs

The allocation of shortcut keys can be checked in the guidance for ladder input key operations. Key inputs, such as the **C** Key for NO input conditions, the **O** Key for OUTPUT instruction, and the **I** Key for special instructions are convenient when programming.

Just press the **C** Key and enter the bit number and comment to complete the input condition. Special instruction can be input as shown in the following figure.



Lines can be easily connected using key operations.

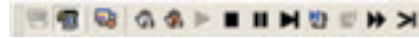


### Single-key Searches and Jumps

Search functions, such as Find Back (searching for input conditions or outputs with the same address) and Find Address can be executed with a single key.

### Single-key Simulation

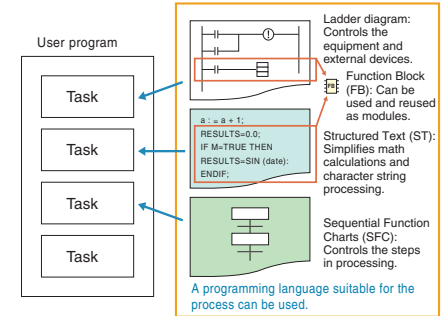
Simulation and debugging of a PLC program can also be executed with a single key. Applications using both a PLC and Programmable Terminal can be debugged using a computer without the actual devices using PLC-PT Integrated Simulation.



Icons for the simulation function can be accessed directly.

## Multiple Languages Can Be Combined To Make Programming Flexible

The multilingual feature supports IEC 61131-3. Programming is possible in a language that is appropriate for the process by combining ladder diagram and ST languages. Function blocks can be created to make programming even more efficient.



### OMRON FB Library, SAP

Ladder diagrams, communications programs, and control screens can be created simply by selecting and pasting program modules from the extensive libraries. Using FB and SAP modules to build the programs, it is possible to create programs that are easier to understand.

## Debugging

### Management of Multiple Networks

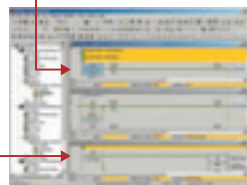
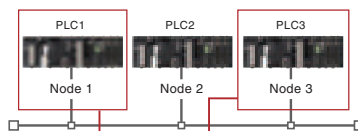
The operation of networks with configurations consisting of multiple networks including PLC networks such as EtherNet/IP and Controller Link, field networks such as DeviceNet and CompoNet, and networks for Programmable Terminals and Serial Devices, can be restored simultaneously from the CX-One. Onsite start up and debugging can be conducted efficiently and without errors because PLCs and devices can be selected from the window to transfer programs and parameter data to the computer during operation.



CX-Integrator

### Ladder diagram Monitoring for Multiple PLCs

Multiple PLCs can be monitored by displaying them in series on the screen. This way it is easy to debug data links between PLCs and monitor the inputs and outputs of different PLCs.

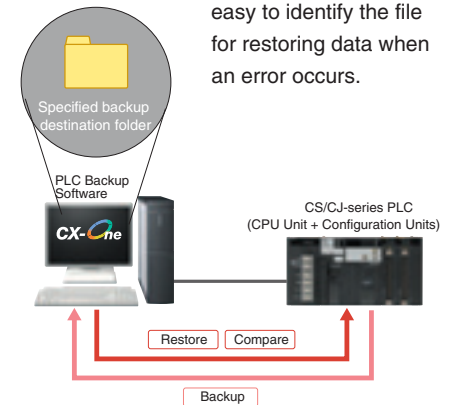


CX-Programmer

## Batch Backup

### Batch Backup/Restore with a Computer

A computer can be used to backup, compare, or restore data for all or specific PLC Units when connected online. Backup information is automatically tagged with a date stamp. It is thus possible to return to the state before an error occurred. It is also easy to identify the file for restoring data when an error occurs.



## Time Require for Debugging and Maintenance Has Been Reduced with the Comprehensive Data Trace Function

Functionality and operability has been significantly upgraded compared to the previous data trace function. The new data trace function provides comprehensive debugging, such as I/O comment display of sampled addresses, specification using symbols, checking the measurement time between two selected points, and layering waveforms. Furthermore, data sampled from the CPU Unit's trace memory can be saved to a file on the computer at a specified frequency. This can be used as for long-term logging of data.

### Data Trace Function



The traced waveforms can be displayed as layers.

Sampled value from a specific input bit will be displayed.

# Further improvements to communications function

## Seamless networks increase production site trans

# 4

### High-speed, High-capacity Data Links between PLCs via EtherNet/IP

EtherNet/IP is supported. EtherNet/IP is a global-standard network that uses cutting-edge general Ethernet technology for control and information network integration. This enables data links between PLCs, data links between a PLC and multi-vendor devices, and communications between PLCs and PTs over a general Ethernet network.

### CompoNet Greatly Advances Wiring Reductions, Greater Information Handling, and Standardization

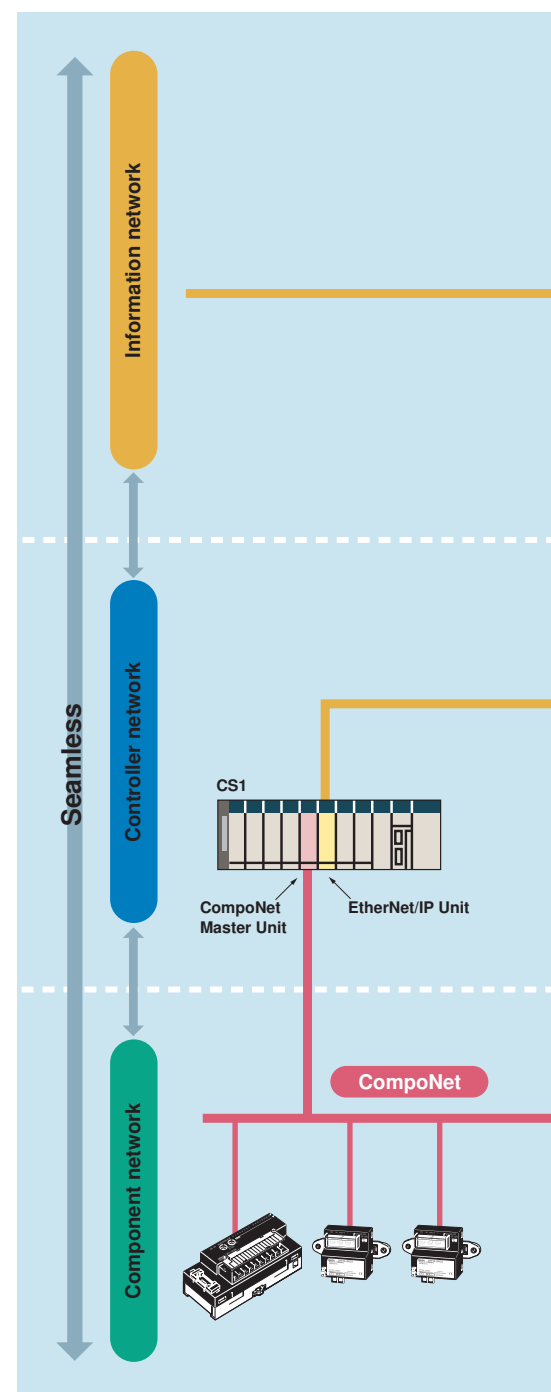
CompoNet is a multi-vendor network for bit-level control of approximately 1,000 points in 1.0 ms. It supports message communications at the sensor and actuator levels. Maintenance information can be controlled in each Slave for preventative maintenance of equipment.

### 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 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.





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### The Solution for Communicating across Network Levels

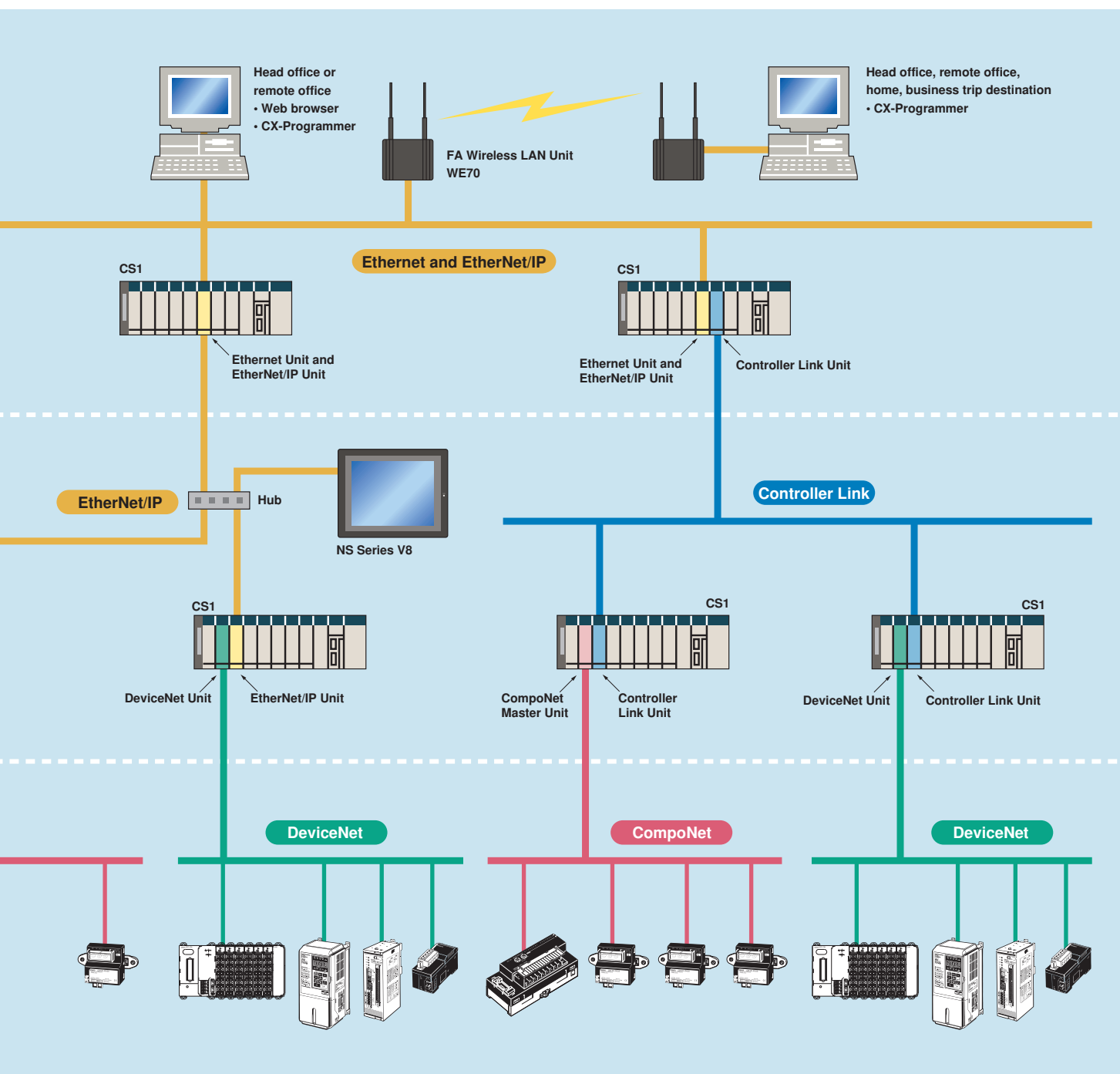
The CS1 enables FINS message communications across a maximum of eight levels (See note.) (using CX-Programmer Ver. 4.0 or higher) in comparison with three levels in previous OMRON systems  
 Expansion up to eight levels lets you build a

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 CP1H 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.



# Construction of systems in multi-vendor environment with Serial Gateway Function.

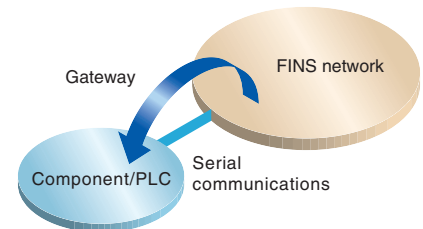
## 5

### 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 Units or Serial Communications Boards)

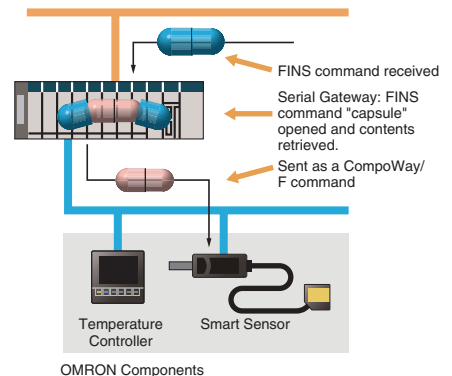


**Note 1: FINS**  
Abbreviation for Factory Interface Network Service. A command system for message services common to OMRON networks. FINS commands can be sent across up to 8 network levels\*, including serial communications paths using a serial gateway. (\*Possible only with CS/CJ-series CPU Unit Ver. 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).

#### ● 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.



#### 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.



# ments simplified

## Enhanced Protocol Macro 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 connectivity with components and PLCs.
- **CompoWay/F Master**
- **Host Link Master functions**
- **Mitsubishi Computer Link Master**

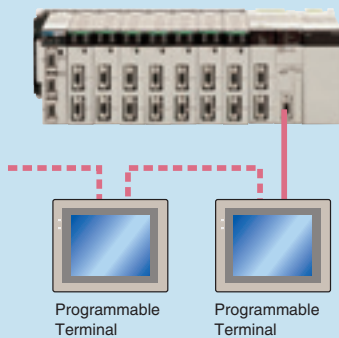
## Wide Range of Applicable Protocols Allows for High Value-added Programs

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

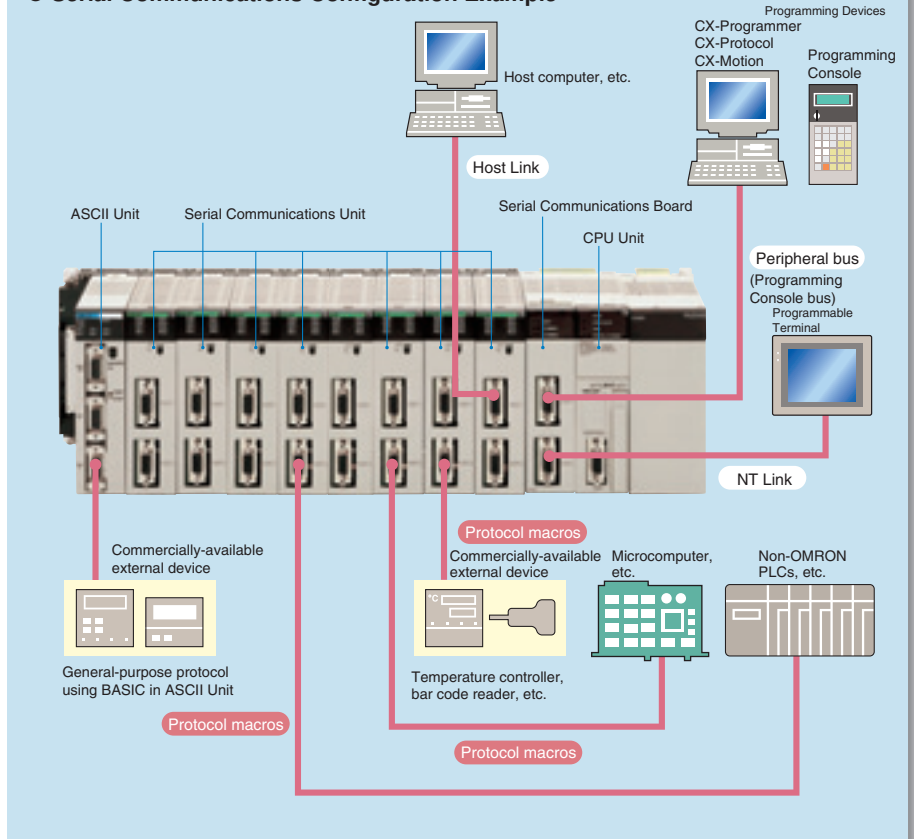
Combine with one of the NS Series Programmable Terminals (NS12, NS10, or NS7) to enable connecting Highspeed NT Links. Using NT Link terminology together with a communications speed of 115 Kbps provides high-speed response.

### ● NT Links (1:N Mode)

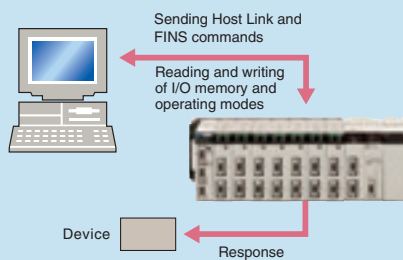


\* PLC-to-PT connection in NT Link (1:N mode) communications can be either one-to-one or one-to-many.

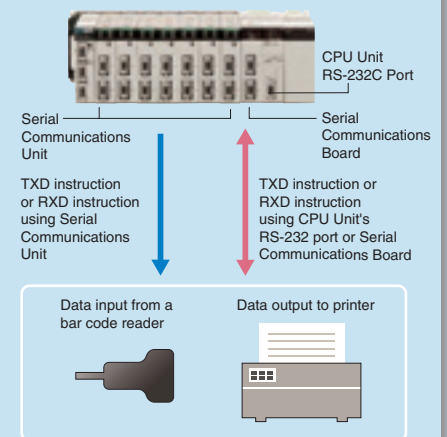
### ● Serial Communications Configuration Example



### ● Host Links



### ● No-protocol



### Supports No-protocol Communications

(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.

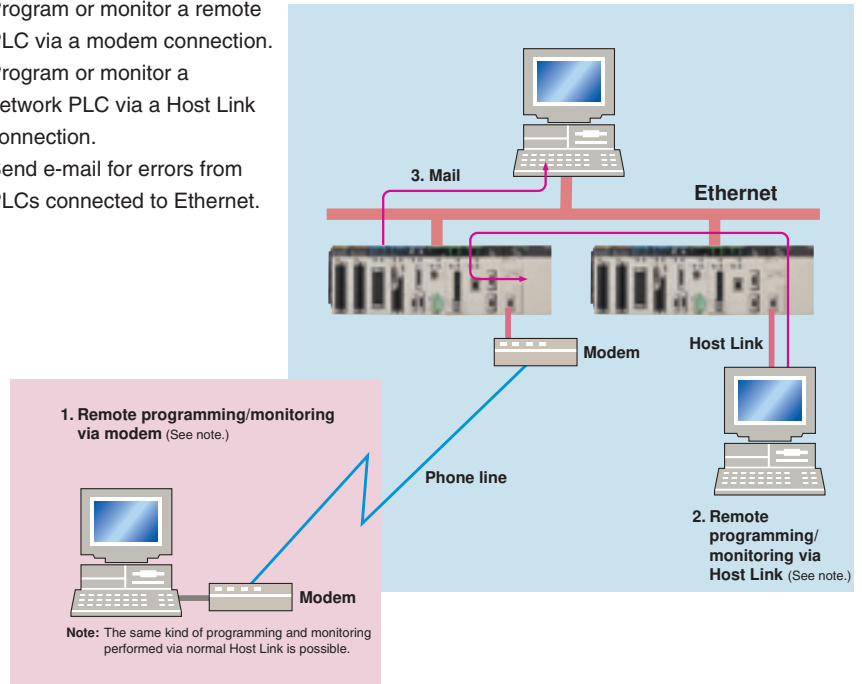


# Advanced management and resource inheritance providing powerful support for maintenance and

## 6

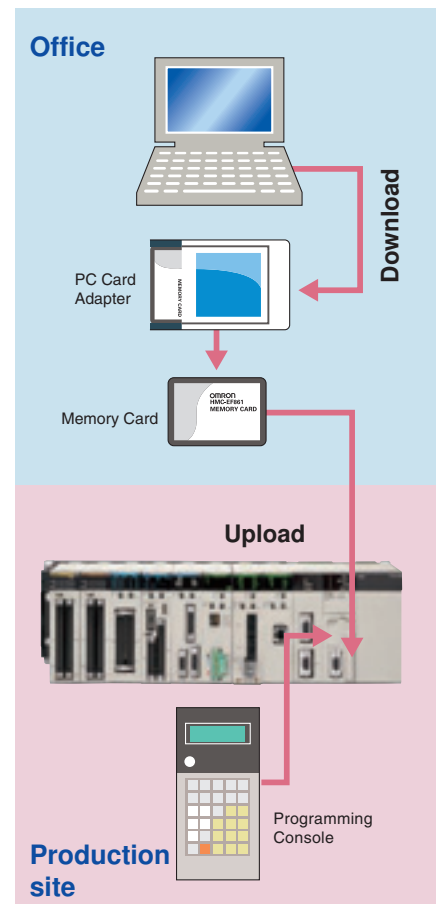
### Remote Maintenance

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.



### Memory Cards for Data File Management

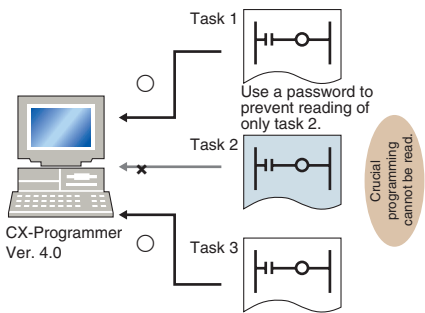
User programs, I/O memory, or system parameters can be converted to Windows-based files and stored in Memory Cards or in EM file memory in the CPU Unit. It is also possible to automatically read the user program and other data from the Memory Card to the CPU Unit at startup, replacing ROM operation. 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.



## Boost Program Security by Keeping Part of It Hidden

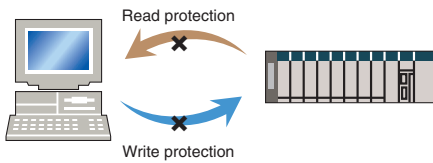
(for CPU Unit Ver. 2.0 or Later)

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



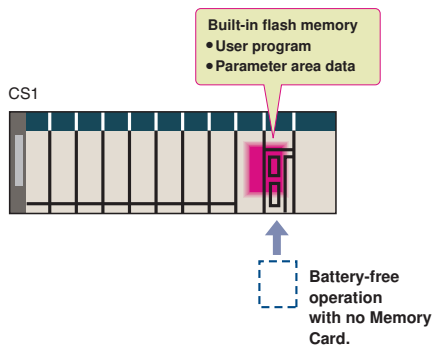
This allows you to hide crucial parts of the program.

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.



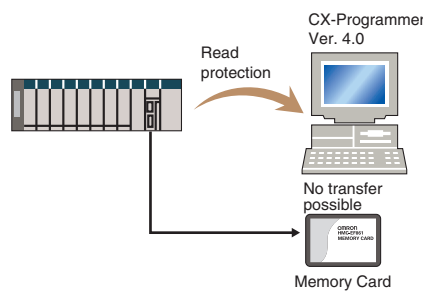
## Internal Flash Memory-based Battery-free Operation

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.



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

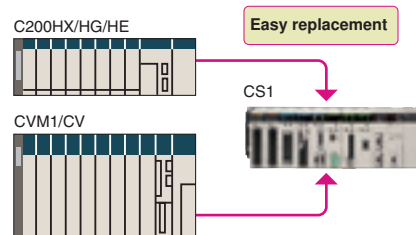
In addition to applying read protection functions to the user program area and tasks, you can also protect against the transfer of user programs to a Memory Card. This prevents leaks of proprietary information by completely protecting against the reading of programs inside the PLC.



## 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.



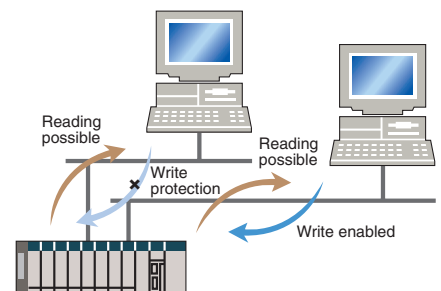
## Store All I/O Comments, Symbol Names, Rung Comments, and Other Information in CPU Unit Comment Memory (See note.) (Unit Ver. 3.0 or later)

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

## 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.

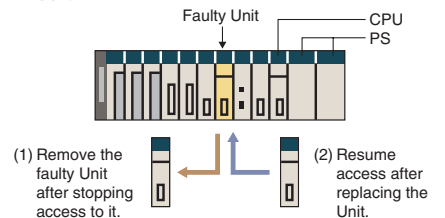


## Replace Malfunctioning Units without Turning OFF the Power

(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.)



I/O comments, symbol names, and rung comments to be stored in the CPU Unit's internal comment memory when a Memory Card or EM file memory are both not available.

**Note:** CX-Programmer Ver. 5.0 or higher required.

# The CS1 Duplex System Boosts the Reliability of Facilities and Equipment



- Communications Units can be either duplexed or used individually.
- Power Supply Units can be either duplexed or used individually.

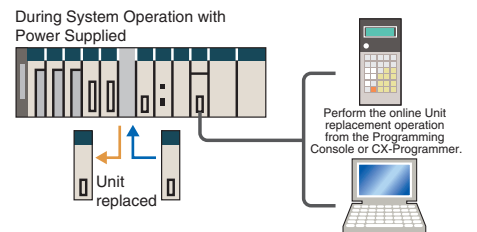
## Hot Standby System Adopted for CPU Unit Duplexing

- When a problem occurs in the CPU Unit, the system instantly switches control to the other CPU Unit, enabling continuous operation with minimal effect on the system.
- Because there is no need for special duplex programming, the design process is simple and design steps are reduced.

The system can also be configured with only one each of the CPU, Power Supply, and Communications Units. This lets you optimize the system cost by selecting the Units that you need. (The Duplex Unit must be used even when using only one each of the CPU, Power Supply, and Communications Units.)

## Online Unit Replacement

With either a Duplex-CPU or Single-CPU CS1D System, Basic I/O Units, Special I/O Units, and CPU Bus Units can be replaced online while the system continues operation. Although operation will stop for the Unit being replaced, all other Units will continue operation.



## Duplex operation is possible for any or all of the following: CPU Units, Power Supply Units, and Communications Units.

Use duplex operation for the CPU Unit, power supply, or communications depending on system requirements for reliability, costs, and functionality. For example, use duplex operation for all of

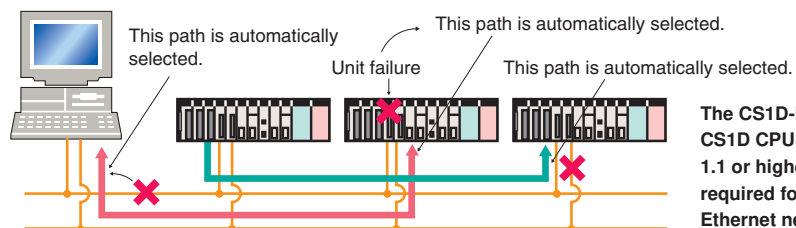
these for systems that must never go down or use duplex operation for only the power supply (which has a relatively short service life). Just build in the redundancy required by the system.

## Increase the Reliability of Information with Duplex Networks

### Duplex Ethernet for Greater Information Network Reliability

With redundant networks and Communications Units, communications will continue even if a network line is broken or one of the Communications Units fails. The communications path is automatically

selected for each communications process (as opposed to switching the entire line), to enable creating a highly reliable network even against a network line broken in more than one location.



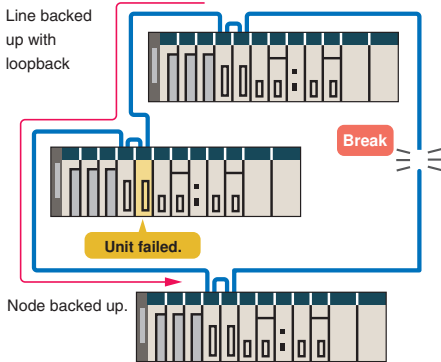
The CS1D-ETN21D and CS1D CPU Unit version 1.1 or higher are required for a duplex Ethernet network.



## Duplex Networks between PLCs with Controller Link

Even if one Unit fails, the other Unit will back it up and continue communications. Even if a line breaks, a loopback will be used to maintain the network.

Either the CS1W-CLK13 or CS1W-CLK53 is required for a Duplex Controller Link network.



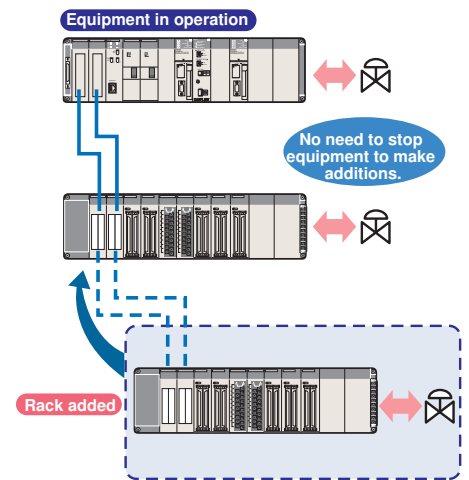
## Expansion Cables and Expansion Backplanes can be duplexed and replaced online.

### Expansion Cables can be duplexed and replaced online.

By mounting Duplexed Expansion I/O Units and Expansion Cables, the Expansion Cables can be replaced during operation. In addition, problems such as cable disconnections are monitored, so the location of the failure can be easily identified.

### Expansion Backplanes can be added online.

- Even in systems where the power cannot be turned OFF or operation cannot be stopped, it is easy to add functions after system operation has started.
- Modifications can be easily made after startup for devices for which the power is not easily turned OFF.



Initial and maintenance costs are reduced.

### Allows effective use of software assets.

The same support software can be used in systems combining the CS1 and CJ1 Series, and all software programs and data are compatible. Their application and reuse are extremely easy. There is also no need for ladder programs for duplexing. This means that when converting an existing system to a Duplex System, there is almost no need to revise ladder programs.

### Complete compatibility among Units.

The CS1D Duplex System is fully compatible with the I/O Units of the entire CS Series. Accordingly, the same Units and materials can be used for restoring the system and conducting maintenance. There is no need to purchase different Units and materials for each system, making the CS1D Duplex System highly economical. (C200H Units, however, cannot be used with CS1D PLCs. Refer to user documentation for details.)

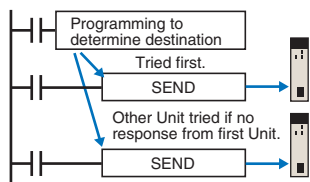
Refer to *CS1D Catalog* (Cat. No. R103) for details.

## Program without Being Concerned with Duplex Operation

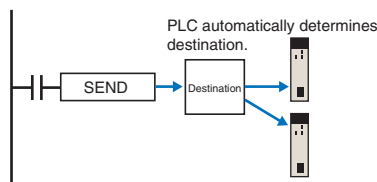
### No special programming is required to use duplex communications with the CS1D, making it simple to design programs for duplex systems.

- The complex programming required in previous applications for duplex communications with Ethernet is eliminated.

Previously it was necessary to program operation for both Ethernet Units.

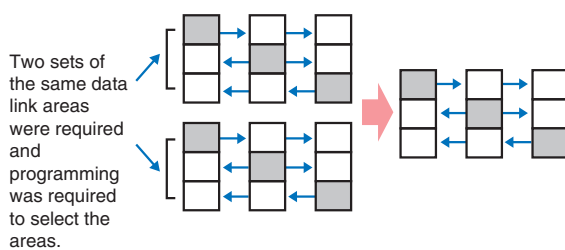


Just program the operation as if for one Ethernet Unit, and the PLC will determine the destination and send the message.



- Controller Link networks enable allocating data link areas without wasting memory.

Previously, twice the memory was required to implement data links for two Controller Link Units, and it was necessary to determine which data could be used.



Just create the data links for one Controller Link Unit to eliminated wasted data memory. The Duplex Controller Link Units share the data links.

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



## ● Position Control Unit with MECHATROLINK-II interface

### Single Cable Connection and Flexible Routing!

With MECHATROLINK-II\*, the Servo Drive can be easily connected with a single cable (2-core shielded twisted pair cable). The wire savings over the total length of 50 m (or 30 m for 16 axes) enables Racks to be more freely located.

### Time Saved in Startup and Maintenance

Servo Drive parameters can be set from the PLC.

Settings and adjustments can be made from one location, without connecting the Support Software to individual Servo Drives. In addition, Servo Drive alarm status, speed, and torque monitoring can be centralized at the PLC.

## ● 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, speeds, and acceleration rates 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.

## ● Motion Control Unit with MECHATROLINK-II interface

### 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\*). This makes it possible to control multiple axes with less wiring.

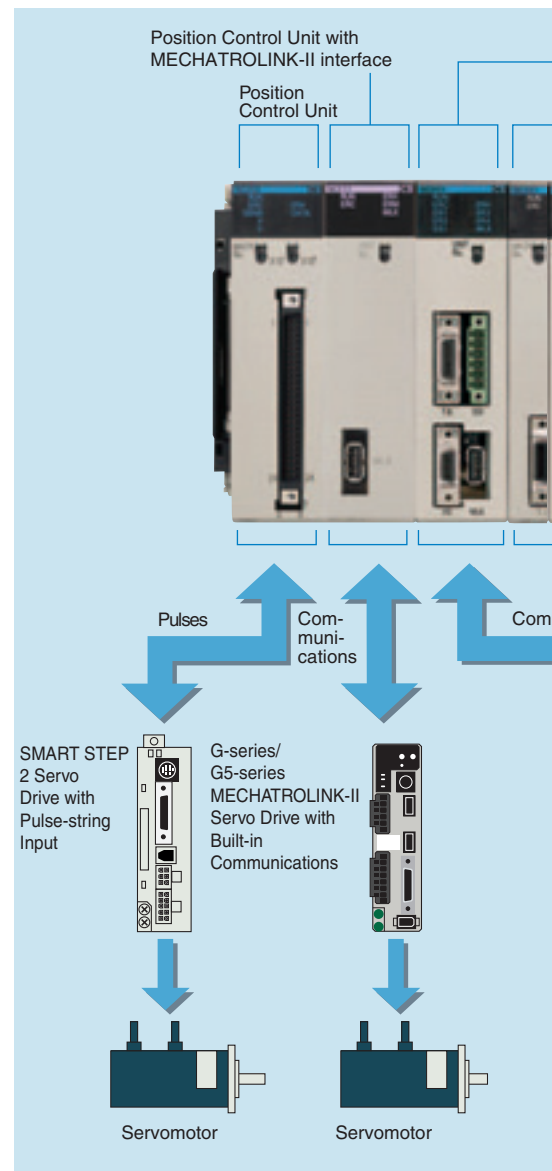
## Easy Data Control

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**

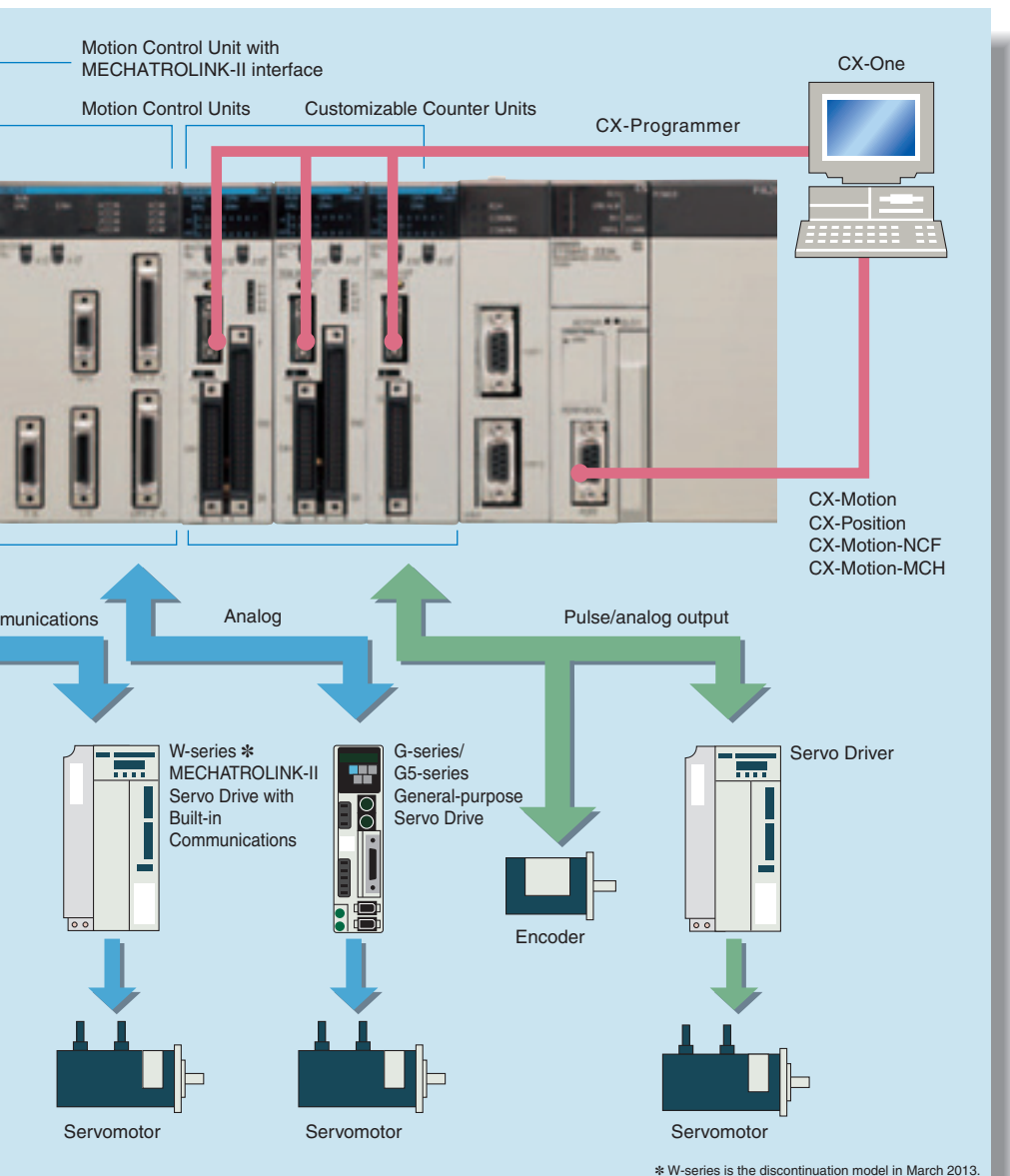
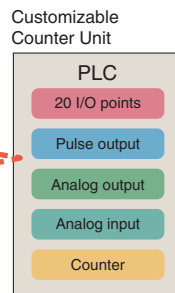
Interrupt programs can be executed from the motion control program using D codes (interrupt codes). Easy, fast interlocks ensure greater production efficiency. Synchronous control (electronic gears, electronic cams) is also possible.

● **Customizable Counter Units**

**A Whole New Concept, Customizable Counter Units**

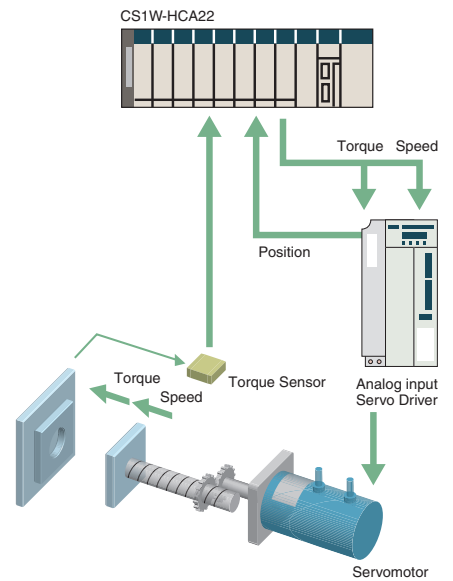
A high-speed PLC with 20 I/O points, a 2-axis high-speed counter, and 2 pulse or analog outputs have all been combined into 1 Unit. The Customizable Counter Units allow easy execution of complicated applications.

High-speed PLC overhead 0.1 ms



**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.



**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.

# Smart Process Control OMRON PLC-based Process Control brings Major Innovations to Proc

9



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

Easy Engineering

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

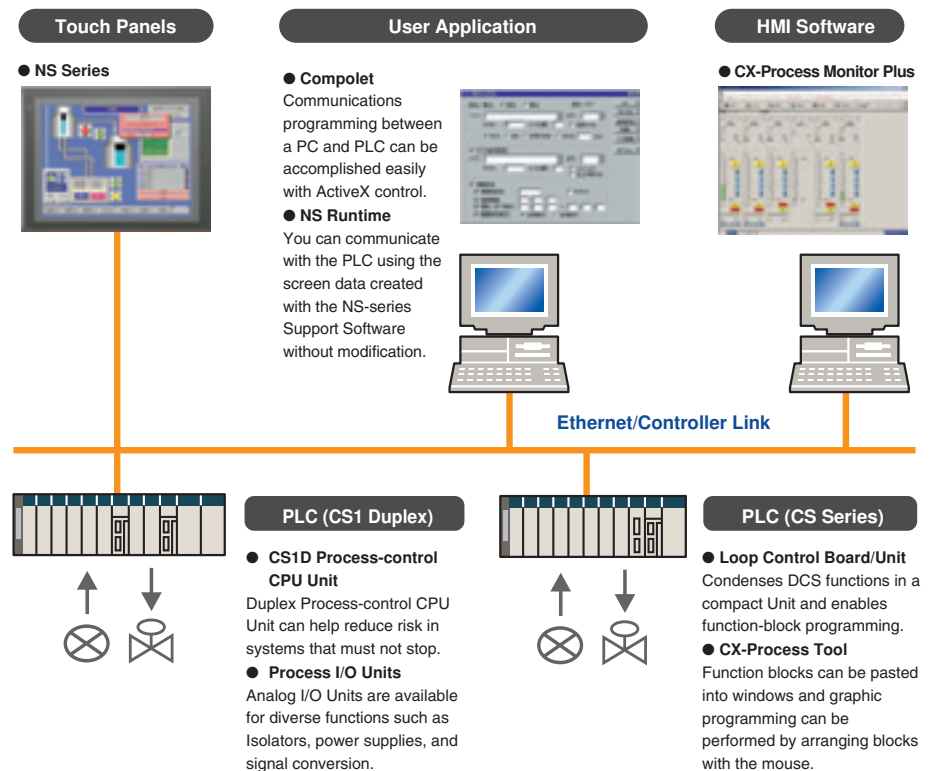
SMARTPROCESS CONTROL

High Reliability

- Duplex operation supported
- Complete maintenance functions

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

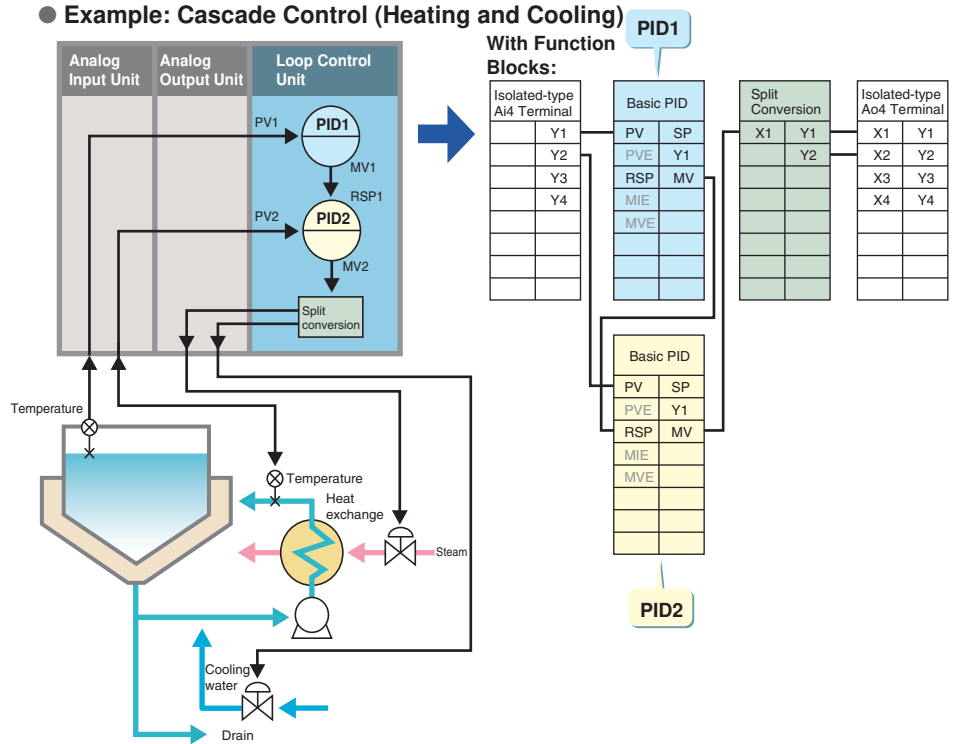




**Diversified Loop Control is even easier to use. Programming becomes even easier with function-block programming.**

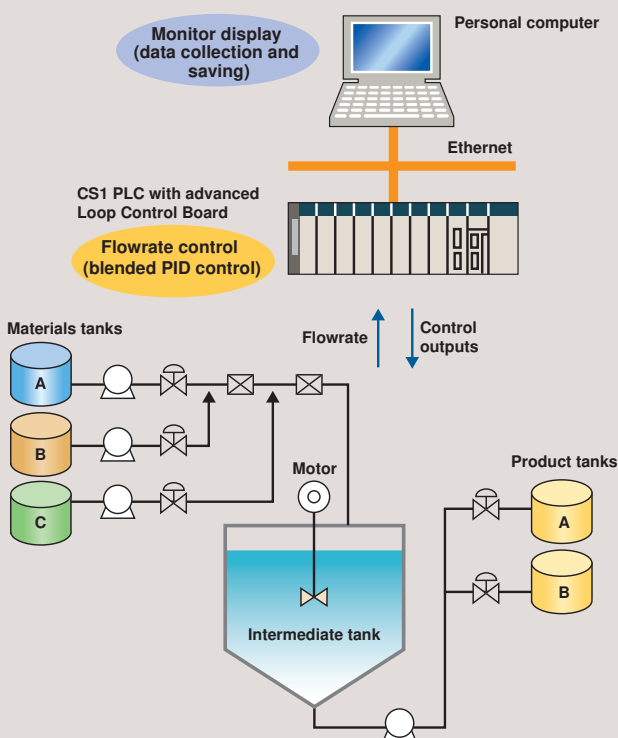
Depending on the function block software connections, all functions such as operation block I/O combination specification can be achieved using only function blocks. Moreover, combining function blocks makes possible a wide array of control methods, from basic PID control to cascade control, feed forward control, and variable gain control.

● **Example: Cascade Control (Heating and Cooling)**

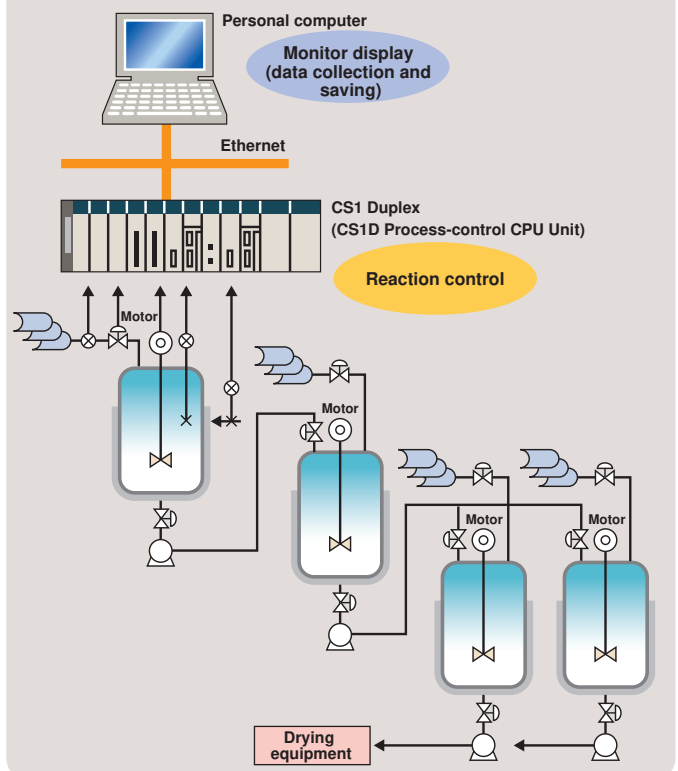


**PLC-based Process Control Application Examples**

● **In-line Blending in a Food Plant**



● **Reaction Control in a Chemical Plant**





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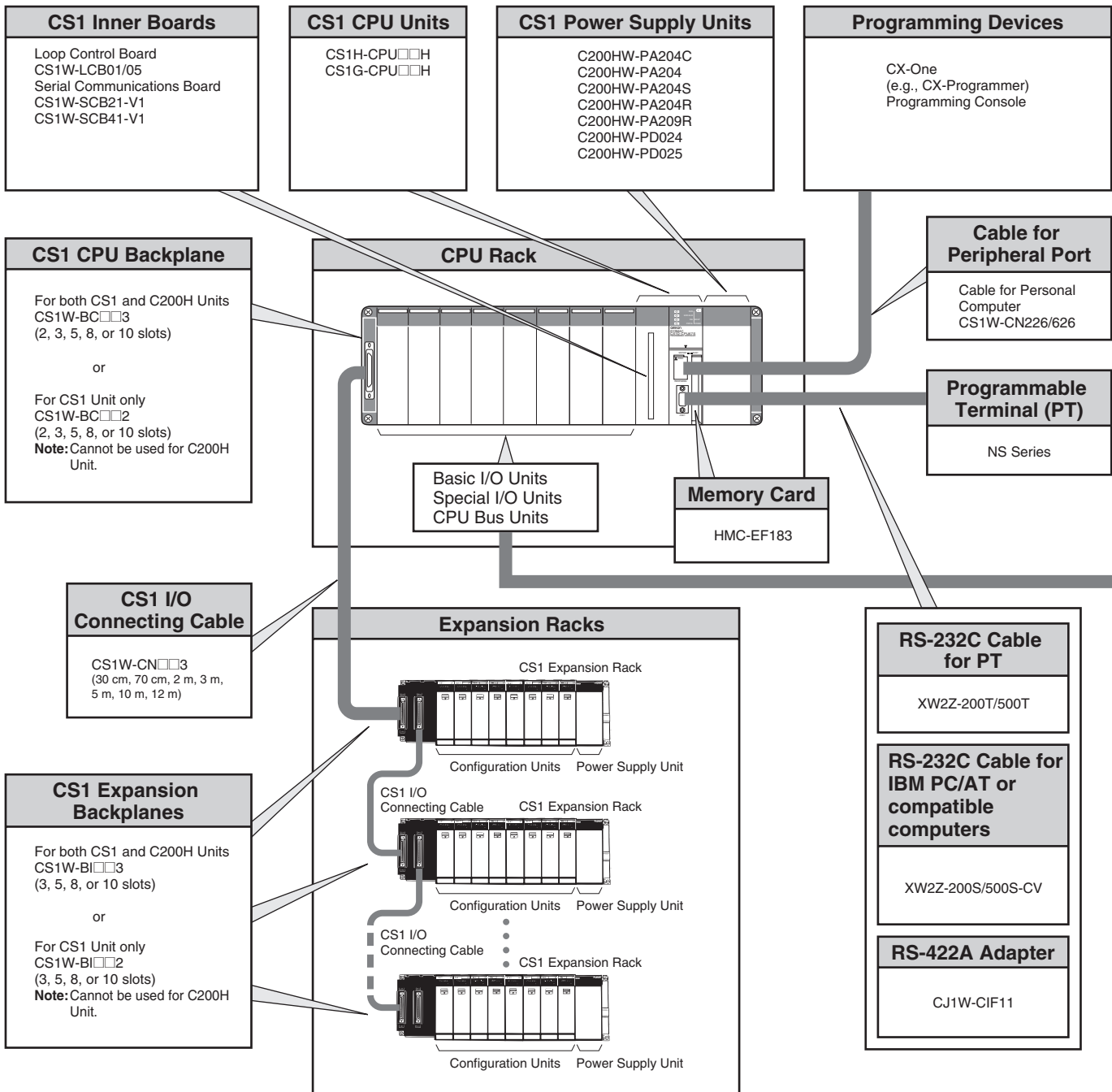
# System Design Guide

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Common Specifications for CPU Units .....	12
Current Consumption for Power Supply Units .....	15

# System Configuration

## Basic System Configuration





■ Configuration Units

CS1 Basic I/O Units				
8-point Units	16-point Units	32-point Units	64-point Units	96-point Units
<b>Input Units</b>				
---	<ul style="list-style-type: none"> <li>● DC Input Unit CS1W-ID211</li> <li>● AC Input Unit CS1W-IA□11</li> </ul>	<ul style="list-style-type: none"> <li>● DC Input Unit CS1W-ID231</li> </ul>	<ul style="list-style-type: none"> <li>● DC Input Unit CS1W-ID261</li> </ul>	<ul style="list-style-type: none"> <li>● DC Input Unit CS1W-ID291</li> </ul>
<b>Output Units</b>				
<ul style="list-style-type: none"> <li>● Triac Output Unit CS1W-OA201</li> <li>● Relay Contact Output Unit (independent commons) CS1W-OC201</li> </ul>	<ul style="list-style-type: none"> <li>● Transistor Output Units CS1W-OD21□</li> <li>● Triac Output Unit CS1W-OA211</li> <li>● Relay Contact Output Unit CS1W-OC211</li> </ul>	<ul style="list-style-type: none"> <li>● Transistor Output Units CS1W-OD23□</li> </ul>	<ul style="list-style-type: none"> <li>● Transistor Output Units CS1W-OD26□</li> </ul>	<ul style="list-style-type: none"> <li>● Transistor Output Units CS1W-OD29□</li> </ul>
<b>I/O Units</b>				
---	---	---	(32 inputs, 32 outputs) <ul style="list-style-type: none"> <li>● DC Input/Transistor Output Units CS1W-MD26□</li> </ul> (32 inputs, 32 outputs) <ul style="list-style-type: none"> <li>● TTL I/O Unit CS1W-MD561</li> </ul>	(48 inputs, 48 outputs) <ul style="list-style-type: none"> <li>● DC Input/Transistor Output Units CS1W-MD29□</li> </ul>
<b>Other Units</b>				
<ul style="list-style-type: none"> <li>● Safety Relay Unit CS1W-SF200</li> </ul>	<ul style="list-style-type: none"> <li>● Interrupt Input Unit CS1W-INT01</li> <li>● Quick-response Input Unit CS1W-IDP01</li> </ul>	<ul style="list-style-type: none"> <li>● B7A Interface Units (32 inputs) CS1W-B7A12 (32 inputs) CS1W-B7A02 (16 inputs, 16 outputs) CS1W-B7A21</li> </ul>	<ul style="list-style-type: none"> <li>● B7A Interface Units (32 inputs, 32 outputs) CS1W-B7A22</li> </ul>	---
<b>C200H Basic I/O Units and C200H Group-2 High-density I/O Units</b>				
<ul style="list-style-type: none"> <li>● Input Units C200H-I□□□□ (Including group-2 high-density input units)</li> </ul>	<ul style="list-style-type: none"> <li>● Output Units C200H-O□□□□ (Including group-2 high-density output units)</li> </ul>	<ul style="list-style-type: none"> <li>● Interrupt Input Unit C200HS-INT01</li> </ul>	<ul style="list-style-type: none"> <li>● Analog Timer Unit C200H-TM001</li> </ul>	<ul style="list-style-type: none"> <li>● B7A Interface Units C200H-B7A□□□</li> </ul>

CS1 Special I/O Units, CPU Bus Units, and Inner Boards			
<ul style="list-style-type: none"> <li>■ Temperature Sensor Input Units (Process I/O Units) CS1W-PTS□□</li> <li>■ Analog Input Units</li> <li>● Analog Input Units CS1W-AD□□□(-V1)</li> <li>● Isolated-type DC Input Units (Process I/O Units) CS1W-PDC□□ CS1W-PTW01 CS1W-PTR0□</li> <li>■ Analog Output Units</li> <li>● Analog Output Units CS1W-DA0□□</li> <li>● Isolated-type Control Output Units (Process I/O Units) CS1W-PMV0□</li> <li>■ Analog I/O Units CS1W-MAD44</li> <li>■ Isolated-type Pulse Input Units (Process I/O Units) CS1W-PPS01</li> <li>■ Loop Control Board CS1W-LCB0□</li> </ul>	<ul style="list-style-type: none"> <li>■ High-speed Counter Units CS1W-CT0□□</li> <li>■ Customizable Counter Units CS1W-HCP22-V1 CS1W-HCA□2-V1 CS1W-HIO01-V1</li> <li>■ Position Control Units CS1W-NC□□3</li> <li>■ Position Control Unit with MECHATROLINK-II interface CS1W-NCF71 CS1W-NC□71</li> <li>■ Motion Control Units CS1W-MC□21-V1</li> <li>■ Motion Control Unit with MECHATROLINK-II interface CS1W-MCH71</li> </ul>	<ul style="list-style-type: none"> <li>■ Serial Communications Units/ Serial Communications Boards CS1W-SCB□1-V1 CS1W-SCU□1-V1</li> <li>■ EtherNet/IP Unit CS1W-EIP21</li> <li>■ Ethernet Unit CS1W-ETN21</li> <li>■ Controller Link Units CS1W-CLK□3</li> <li>■ SYSMAC Link Units CS1W-SLK□1</li> <li>■ FL-net Unit CS1W-FLN22</li> <li>■ DeviceNet Units CS1W-DRM21-V1</li> <li>■ CompoNet Master Unit CS1W-CRM21</li> <li>■ CompoBus/S Master Unit CS1W-SRM21</li> </ul>	<ul style="list-style-type: none"> <li>■ ID Sensor Units CS1W-V680C1□ CS1W-V600C1□</li> <li>■ GP-IB Interface Unit CS1W-GPI01</li> <li>■ High-speed Data Storage Unit CS1W-SPU0□-V2</li> </ul>
<b>C200H Special I/O Units</b>			
<ul style="list-style-type: none"> <li>■ I/O Units (Special I/O Units) C200H-ID□□□ C200H-OD□□□ C200H-MD□□□</li> <li>■ Temperature Sensor Units C200H-TS□□□</li> <li>■ Analog Input Units C200H-AD□□□</li> <li>■ Analog Output Units C200H-DA□□□</li> <li>■ Analog I/O Units C200H-MAD01</li> <li>■ Temperature Control Units C200H-TC□□□</li> <li>■ Heat/Cool Control Units C200H-TV□□□</li> <li>■ PID Control Units C200H-PID0□</li> </ul>	<ul style="list-style-type: none"> <li>■ High-speed Counter Units C200H-CT□□□(-V1)</li> <li>■ Cam Positioner Unit C200H-CP114</li> <li>■ Position Control Units C200HW-NC□□3</li> <li>■ Motion Control Units C200H-MC221</li> </ul>	<ul style="list-style-type: none"> <li>■ DeviceNet Master Unit C200HW-DRM21-V1</li> <li>■ CompoBus/S Master Unit C200HW-SRM21-V1</li> <li>■ PC Link Unit C200H-LK401</li> <li>■ SYSBUS Bus Remote I/O Master Units C200H-RM□□□(-PV1)</li> </ul>	<ul style="list-style-type: none"> <li>■ ID Sensor Units C200H-IDS01-V1</li> <li>■ ASCII Units C200H-ASC□□</li> </ul>

Note: Including models whose production are discontinued.