

New!

OMRON

Programmable Controllers SYSMAC CP1



Multi-functionality Condensed into All-in-one Package PLCs, Including the New Low-cost CP1L PLC



CP1H



CP1L (M Type)



CP1L (L Type)

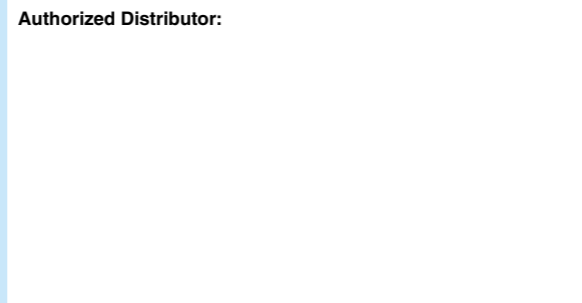
Expanded Range of Applications with Built-in Pulse Outputs for 4 Axes, Analog I/O, Serial Communications, and a Standard-feature USB Port.

Note: Do not use this document to operate the Unit.

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Authorized Distributor:



Note: Specifications subject to change without notice.

Cat. No. P057-E1-01
Printed in Japan
0507-1M

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realizing

All-in-one Package PLCs with Condensed Multi-functionality.

A Wide Variety of Built-in Functions Expand Application Capabilities and Shorten the Design Time Required for the Growing Number and Increasing Complexity of Ladder Programs

Programmable Controllers

SYSMAC CP1H



The Ultimate High-performance Package-type PLC

Three types of CPU Unit are available to meet applications requiring advanced functionality:

- The CP1H-X with pulse outputs for 4 axes.
- The CP1H-Y with 1-MHz pulse I/O.
- The CP1H-XA with built-in analog I/O.

NEW

Programmable Controllers

SYSMAC CP1L



A Standard Package-type PLC

Complete with a standard-feature USB port, CP1L PLCs include CPU Units for applications with as few as 14 points. Whether you need simple sequence control or pulse I/O and a serial port, the CP1L PLCs give you an economical choice from among 14-, 20-, 30-, and 40-point CPU Units.

I/O Capacity,
Program Capacity,
Speed

Building-block PLCs

SYSMAC CJ Series

No Backplane



SYSMAC CS Series

Backplane Construction



Package PLCs

SYSMAC CP Series



CP1H



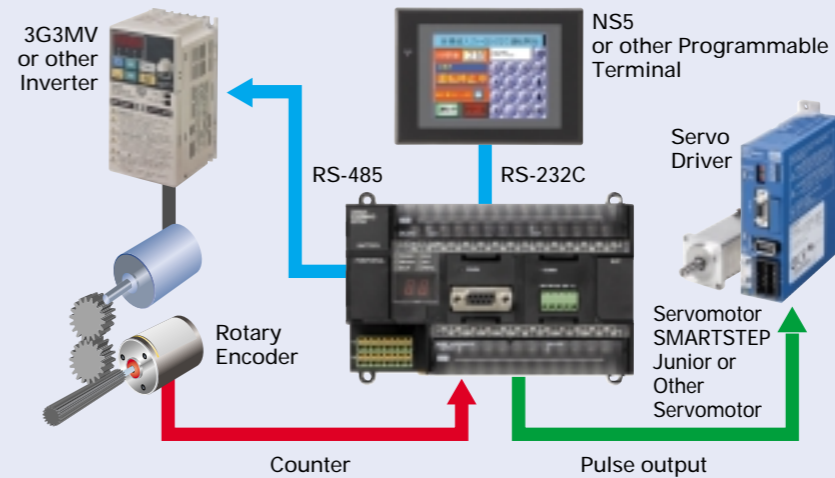
CP1L

From small-scale control, programs can be created incorporating function blocks (FB) and structured text (ST) using the same instructions and with the same easy operation.

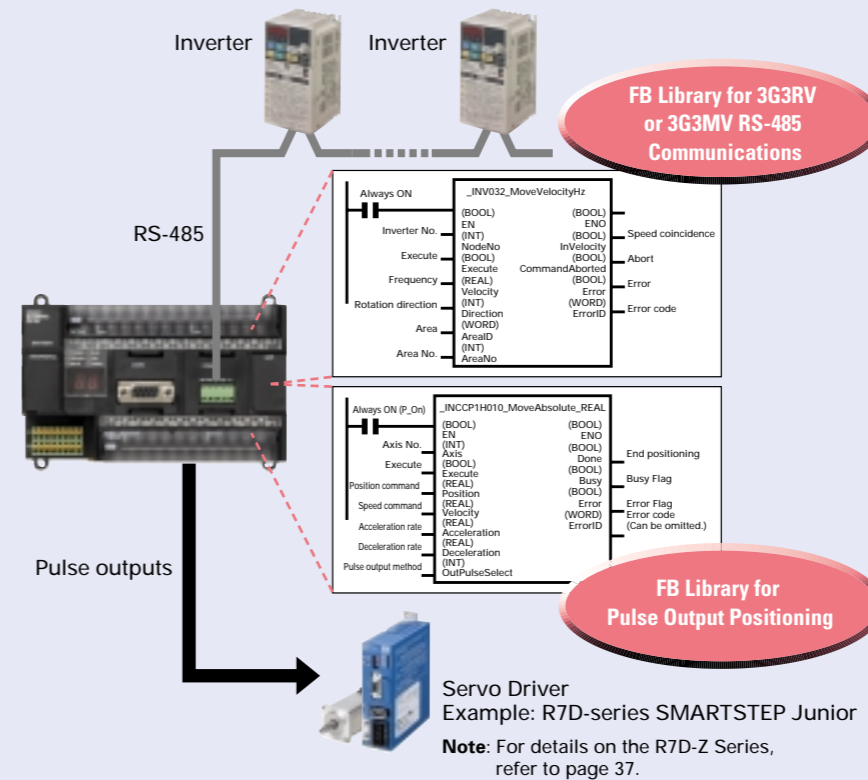
Small-scale Control

Large-scale System Control

Complete Pulse and Serial Functions for Servo and Inverter Applications and Applications Using Programmable Terminals



For positioning or communications, simply enter the set values for the instructions. Even complicated functions can be easily programmed using the OMRON Function Block (FB) Library.



USB Port Standard on all Models



A general-purpose USB cable keeps costs low, including the cable cost.

I N D E X

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A Wide Range of CPU Units Allows You to Select the Ideal Model.

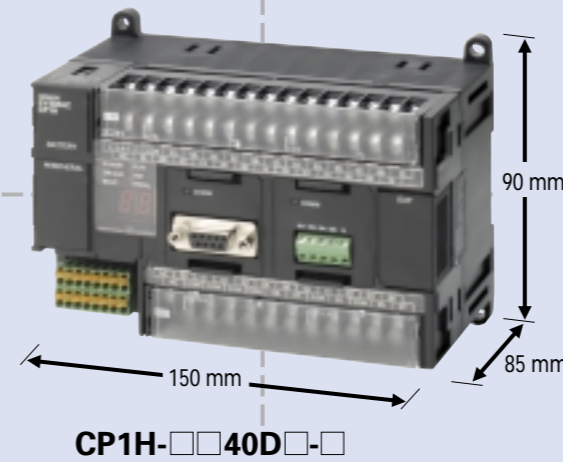
A program capacity of 20K steps and 100-ns high-speed processing provide multi-axis, high-speed positioning control or analog control. CJ-series Special I/O Units and CPU Bus Units can also be used.

CP1H Series

- Program capacity **20K steps**
- Processing speed **0.1 μs** (basic instructions)

A Choice of Three Types of CP1H CPU Unit Lets You Select the Functions You Need.

	High-speed Positioning CP1H-Y CPU Units	Built-in Analog I/O CP1H-XA CPU Units	Standard Type CP1H-X CPU Units
Pulse Outputs for 4 Axes	Two axes at 1 MHz and two axes at 100 kHz	Four axes at 100 kHz	
High-speed Counters for 4 Axes	Two axes at 1 MHz for single-phase (500 kHz for differential phases) and two axes at 100 kHz for single-phase (50 kHz for differential phases)	Four axes at 100 kHz for single-phase (50 kHz for differential phases)	
Built-in Analog I/O		Four analog inputs and two analog outputs	
Serial Communications	RS-232C Option Board	RS-422A/485 Option Board	Up to two Option Boards can be mounted.

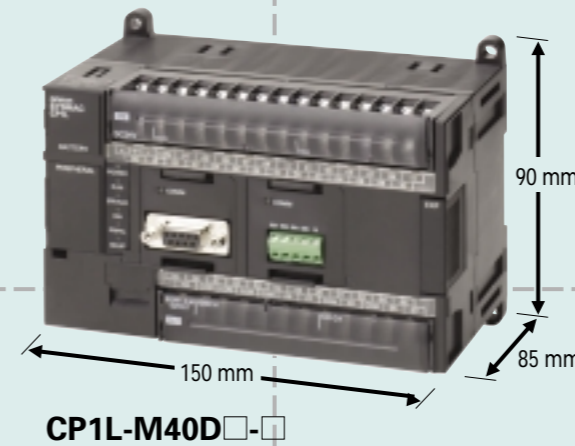
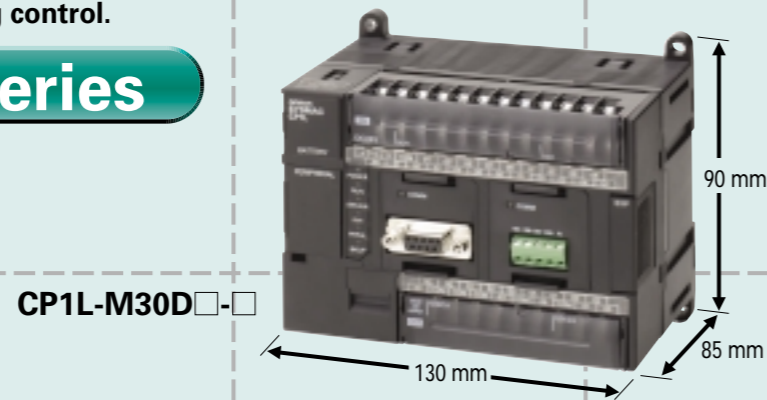


- Pulse Outputs**
Four-axis control is a standard feature.
- Counters**
Four-axis differential-phase control is a standard feature.
- USB Peripheral Port**
Another standard feature.
- Serial Communications**
Two ports. Select Option Boards for either RS-232C or RS-485 communications.
- Built-in Analog I/O**
XA CPU Units provide 4 input words and 2 output words.

Basic package PLCs with serious functions from simple sequence control to 2-axis positioning control.

CP1L Series

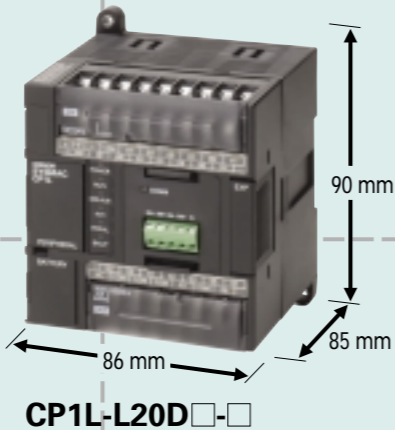
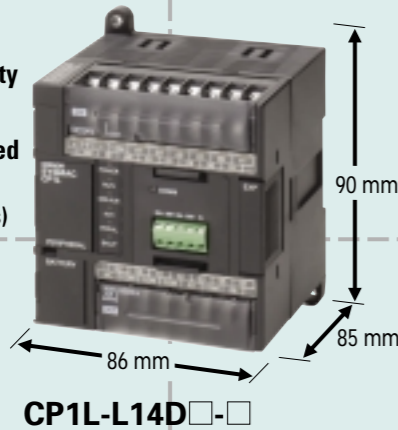
- Program capacity **10K steps**
- Processing speed **0.55 μs** (basic instructions)



- Pulse Outputs**
Two-axis control at 100 kHz is a standard feature.
- Counters with 2-axis differential-phase control** are standard features.
Single-phase: 4 axes at 100 kHz
- USB Peripheral Port**
Another standard feature.
- Serial Communications**
Two ports (See note.). Select Option Boards for either RS-232C or RS-485 communications.

Note: CP1L-L CPU Units with 14 and 20 points support only one port.

- Program capacity **5K steps**
- Processing speed **0.55 μs** (basic instructions)



14 points

20 points

30 points

40 points

Expansion Units Provide for a Wider Range of Applications.

Expandability

Applications

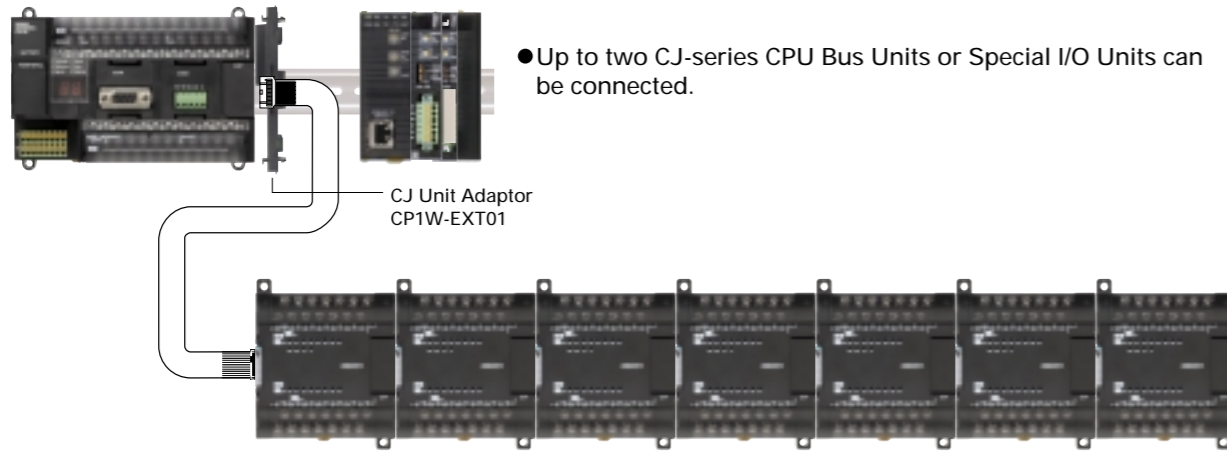
Programmable Controllers SYSMAC CP1H

● Using Only CP1W Units with the CP1H



- Up to 7 CP1W/CPM1A Expansion Units and Expansion I/O Units can be connected.
- Note: Some Expansion Units and Expansion I/O Units have certain restrictions on use. (For details, refer to page 24.)

● Using CJ-series Special I/O Units, CJ-series CPU Bus Units, and CP1W Units with the CP1H



- Up to two CJ-series CPU Bus Units or Special I/O Units can be connected.

- Up to 7 CP1W/CPM1A Expansion Units and Expansion I/O Units can be connected.
- CP1W/CPM1A Expansion Units and Expansion I/O Units and CJ Units can be used simultaneously. CP1W-CN811 I/O Connecting Cable is required.

■ CP1H Application Examples

<p>Built-in Analog I/O: 4 Analog Inputs and 2 Analog Outputs</p> <p>Forming Machine</p> <p>CP1H-XA CPU Unit Temperature Sensor Unit</p> <p>4 analog inputs and 2 analog outputs Hydraulic pressure control</p>	<p>Four-axis, 1-MHz High-speed Pulse Outputs</p> <p>Electronic Parts Assembly Machine</p> <p>Capacitor picking</p> <p>Process depth Process positioning</p> <p>Rotation (final positioning)</p> <p>CP1H-Y CPU Unit</p> <p>Pulse outputs Positioning control via Servomotors</p>	<p>4-axis, 1-MHz High-speed Counters</p> <p>Spinning Machine</p> <p>High-speed counters</p> <p>Thread winding speed and length control</p> <p>CP1H-Y CPU Unit</p>
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Programmable Controllers SYSMAC CP1L

● CP1L-M30D□-□/□ CP1L-M40D□-□



- Up to three CP1W/CPM1A Expansion Units and Expansion I/O Units can be connected.

● CP1L-L14D□-□/CP1L-L20D□-□



- One CP1W/CPM1A Expansion Unit or Expansion I/O Unit can be connected.

■ CP1H/CP1L Communications Interface Options

Two Optional Serial Ports

Standard Feature: USB peripheral port

Option Boards

RS-232C Interface
CP1W-CIF01

RS-422A/485 Interface
CP1W-CIF11

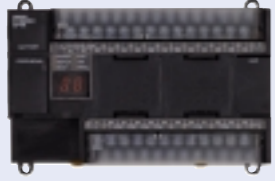
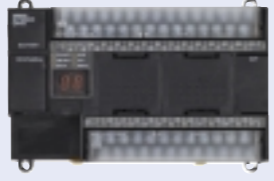
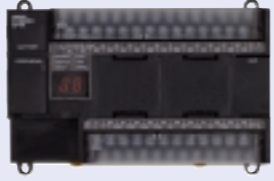
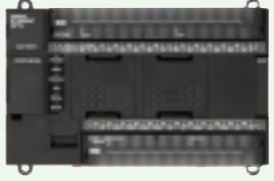
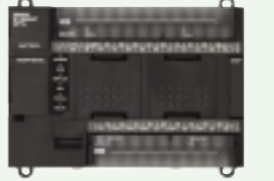














Two types of communications are available. Either two RS-232C ports or two RS-422A/485 ports can be used.

Note: Only one is supported by CP1L CPU Units with 14 or 20 points (CP1L-L).

■ CP1L Application Examples

<p>Two-axis Pulse Outputs</p> <p>Packing Machine</p> <p>CP1L</p> <p>Pulse outputs Sheet feeding control via Servomotors</p>	<p>Sequence Control</p> <p>Air Cleaner Control</p> <p>CP1L</p> <p>Analog Output Unit Cleaner fan motor control (Inverter)</p>	<p>Sequence Control with Clock Function</p> <p>Shopping Mall Fountain Control</p> <p>CP1L</p>
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Maximize Efficiency by Selecting the Optimum CPU Unit for Your Applications.

	CP1H				CP1L			
	Y CPU Units	XA CPU Units	X CPU Units		M Type		L Type	
	 <p>CP1H-Y20DT-D DC power supply, 12 DC inputs, 8 transistor (sinking) outputs Two line-driver inputs Two line-driver outputs</p>	 <p>CP1H-XA40DR-A AC power supply, 24 DC inputs, 16 relay outputs, 4 analog inputs, 2 analog outputs</p> <p>CP1H-XA40DT-D DC power supply, 24 DC inputs, 16 transistor (sinking) outputs, 4 analog inputs, 2 analog outputs</p> <p>CP1H-XA40DT1-D DC power supply, 24 DC inputs, 16 transistor (sourcing) outputs, 4 analog inputs, 2 analog outputs</p>	 <p>CP1H-X40DR-A AC power supply, 24 DC inputs, 16 relay outputs</p> <p>CP1H-X40DT-D DC power supply, 24 DC inputs, 16 transistor (sinking) outputs</p> <p>CP1H-X40DT1-D DC power supply, 24 DC inputs, 16 transistor (sourcing) outputs</p>		 <p>40 Points CP1L-M40DR-A AC power supply, 24 DC inputs, 16 relay outputs</p> <p>CP1L-M40DR-D DC power supply, 24 DC inputs, 16 relay outputs</p> <p>CP1L-M40DT-D DC power supply, 24 DC inputs, 16 transistor (sinking) outputs</p> <p>CP1L-M40DT1-D DC power supply, 24 DC inputs, 16 transistor (sourcing) outputs</p>	 <p>30 Points CP1L-M30DR-A DC power supply, 18 DC inputs, 12 relay outputs</p> <p>CP1L-M30DR-D DC power supply, 18 DC inputs, 12 relay outputs</p> <p>CP1L-M30DT-D DC power supply, 18 DC inputs, 12 transistor (sinking) outputs</p> <p>CP1L-M30DT1-D DC power supply, 18 DC inputs, 12 transistor (sourcing) outputs</p>	 <p>20 Points CP1L-L20DR-A AC power supply, 12 DC inputs, 8 relay outputs</p> <p>CP1L-L20DR-D DC power supply, 12 DC inputs, 8 relay outputs</p> <p>CP1L-L20DT-D DC power supply, 12 DC inputs, 8 transistor (sinking) outputs</p> <p>CP1L-L20DT1-D DC power supply, 18 DC inputs, 12 transistor (sourcing) outputs</p>	 <p>14 Points CP1L-L14DR-A AC power supply, 8 DC inputs, 6 relay outputs</p> <p>CP1L-L14DR-D DC power supply, 8 DC inputs, 6 relay outputs</p> <p>CP1L-L14DT-D DC power supply, 8 DC inputs, 6 transistor (sinking) outputs</p> <p>CP1L-L14DT1-D DC power supply, 8 DC inputs, 6 transistor (sourcing) outputs</p>
 Pulse outputs	1 MHz (single-phase), 500 kHz (differential phases) for two axes (line driver outputs), 100 kHz (single-phase), 50 kHz (differential phases) for two axes (four axes total)	100 KHz for four axes			100 kHz for two axes			
 Counters	1 MHz (single-phase), 500 kHz (differential phases) for two axes (line driver outputs), 100 kHz (single-phase), 50 kHz (differential phases) for two axes (four axes total)	100 kHz (single-phase), 50 kHz (differential phases)			100 kHz (single-phase) for four axes, or 50 kHz (differential phases) for two axes			
 Serial communications	Two serial ports can be added as options (either RS-232C or RS-422A/485 Option Boards).				Two optional serial ports can be added (either RS-232C or RS-422A/485 Option Boards).		One optional serial port can be added (either an RS-232C or RS-422A/485 Option Board).	
 USB peripheral port	Yes	Yes	Yes		Yes		Yes	
 Built-in analog I/O	—	4 analog inputs and 2 analog outputs (resolution: 6,000 or 12,000)			—		—	
 Memory Cassette	Yes	Yes	Yes		Yes		Yes	
 Function blocks (ladder diagrams or ST language)	Yes	Yes	Yes		Yes		Yes	
 Inverter positioning	—	—	—		Yes		Yes	
 7-segment display	Yes	Yes	Yes		—		—	
 Program capacity	20K steps				10K steps		5K steps	
 Data memory capacity	32K words				32K words		10K words	
 High-speed processing	0.1 μs/LD instruction, 0.3 μs/MOV instruction				0.55 μs/LD instruction, 4.1 μs/MOV instruction			

CP1W-series and CJ-series Units Can Be Used for Maximum Expandability

Option Boards

Options



■ RS-232C
Option Board
CP1W-CIF01



■ RS-422A/485
Option Board
CP1W-CIF11



■ Memory Cassette
CP1W-ME05M

CP1H and CP1L

Expansion I/O Units



CP1W-8ED

- Inputs: 8
- DC inputs



CP1W-16ER

- Outputs: 16
- Relay outputs



CP1W-20EDR1

- Inputs: 12 DC inputs
- Outputs: 8 relay outputs



CP1W-40EDR

- Inputs: 24 DC inputs
- Outputs: 16 relay outputs

CP1W-8ER

- Outputs: 8
- Relay outputs

CP1W-8ET

- Outputs: 8
- Transistor outputs (sinking)

CP1W-8ET1

- Outputs: 8
- Transistor outputs (sourcing)

CP1W-20EDT

- Inputs: 12 DC inputs
- Outputs: 8 transistor outputs (sinking)

CP1W-20EDT1

- Inputs: 12 DC inputs
- Outputs: 8 transistor outputs (sourcing)

CP1W-40EDT

- Inputs: 24 DC inputs
- Outputs: 16 transistor outputs (sinking)

CP1W-40EDT1

- Inputs: 24 DC inputs
- Outputs: 16 transistor outputs (sourcing)

Analog Units



■ Analog Input Unit
CP1W-AD041

- Analog inputs: 4 (resolution: 6,000)



■ Analog Output Unit
CP1W-DA041

- Analog outputs: 4 (resolution: 6,000)



■ Analog I/O Unit
CP1W-MAD11

- Analog inputs: 2 (resolution: 6,000)
- Analog outputs: 1 (resolution: 6,000)

Temperature Sensor Unit



■ Temperature Sensor Unit
CP1W-TS001

- Thermocouple inputs: 2
- CP1W-TS002**
- Thermocouple inputs: 4



■ Temperature Sensor Unit
CP1W-TS101

- Platinum-resistance thermometer inputs: 2
- CP1W-TS102**
- Platinum-resistance thermometer inputs: 4

CompoBus/S I/O Link Unit



■ CompoBus/S I/O Link Unit
CP1W-SRT21

- Inputs: 8
- Outputs: 8

I/O Connecting Cable



■ CP1W-CN811 I/O Connecting Cable: 80 cm

Note: CP1W/CPM1A Expansion Units include I/O Connection Cables (in lengths of approx. 6 cm) for side-by-side connection.

CPM1A Expansion Unit and Expansion I/O Units



CPM1A Expansion Unit and Expansion I/O Units can be used with CP1H or CP1L CPU Units under the same conditions as for the CP1W.

CP1H Only

CJ-series Special I/O Units and CPU Bus Units

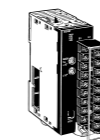
Up to two CJ-series Special I/O Units or CPU Bus Units can be connected by using a CJ Unit Adaptor. (Refer to page 25 for the Units that can be used. For details on CJ-series Units, refer to the CJ Series Catalog (Cat. No. P052).)

CJ Unit Adaptor



CP1W-EXT01 (with End Cover)

Special I/O Units



Analog Input Units
CJ1W-AD041-V1
CJ1W-AD081-V1
(4 or 8 points)



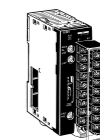
Analog Output Units
CJ1W-DA021/041
CJ1W-DA08V/08C
(2, 4, or 8 points)



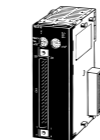
Analog I/O Unit
CJ1W-MAD42
(4 analog inputs,
2 analog outputs)



Process Input Units
CJ1W-PTS51/52
CJ1W-PTS15/16
CJ1W-PDC15



Temperature Control Units
CJ1W-TC□□□
(4 or 2 loops)



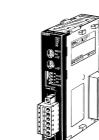
Position Control Units
CJ1W-NC□□□
(1 to 4 axes)



High-speed Counter Unit
CJ1W-CT021
(2 axes)



ID Sensor Units
CJ1W-V600C1□
(1 or 2 Heads)



CompoBus/S Master Unit
CJ1W-SRM21

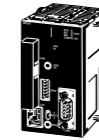
CPU Bus Units



Position Control Unit with
MECHATROLINK-II
Communications
CJ1W-NCF71



Motion Control Unit with
MECHATROLINK-II
Communications
CJ1W-MCH71



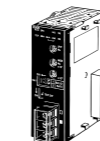
SYSMAC SPU
High-speed Data
Collection Unit
CJ1W-SPU01



Ethernet Unit
CJ1W-ETN21
(100Base-TX)



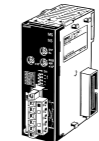
Serial Communications Units
CJ1W-SCU41-V1
(RS-232C and RS-422/485 ports)
CJ1W-SCU21-V1
(Two RS-232C ports)
CJ1W-SCU31-V1
(Two RS-422/485 ports)



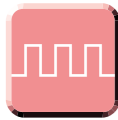
Controller Link Unit
CJ1W-CLK21-V1



FL-Net Unit
CJ1W-FLN22
(100Base-TX)



DeviceNet Unit
CJ1W-DRM21



Pulse Outputs

Up to Four Axes Are Standard. Advanced Power for High-precision Positioning Control.

Positioning for Electronic Component Manufacturing Equipment

Sheet Feeding for Vertical Pillow Packer

CP1H

●Pulse Output Function for Up to Four Axes.
Along with greater precision and more flexibility in multi-product manufacturing, high-speed multi-axis pulse output control responds to the increase in servo applications.

●Example: Four-axis Control in Electronic Component Manufacturing Equipment

Capacitor removal
Processing depth
Processing positioning
Rotation (final positioning)

Pulse outputs

Servomotors
Servo Drivers

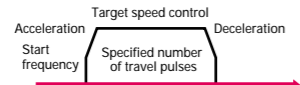
A Full Range of Functions

■Origin Search Function (ORG Instruction)

Origin searches are possible with a single ORG instruction.

■Positioning with Trapezoidal Acceleration and Deceleration (PLS2 Instruction)

Easily achieved with special positioning instruction (PLS2).



S-curve acceleration/ deceleration can be used to reduce vibration in high-speed positioning.



■Interrupt Feeding (ACC and PLS2 Instructions)

Feed Control for Packing Material

Speed control (ACC instruction)
Stop after output of set number of pulses
PLS2 executed

The packing material is fed and stopped at a fixed position after the seal mark is detected.

Applicable CPU Units and Functions

CP1H-Y CPU Unit



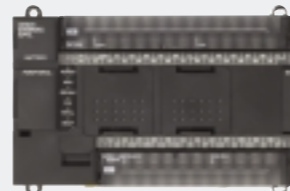
1 MHz for 2 axes and 100 kHz for 2 axes, for a total of 4 axes

CP1H-X CPU Unit



100 kHz for 4 axes

CP1L CPU Unit

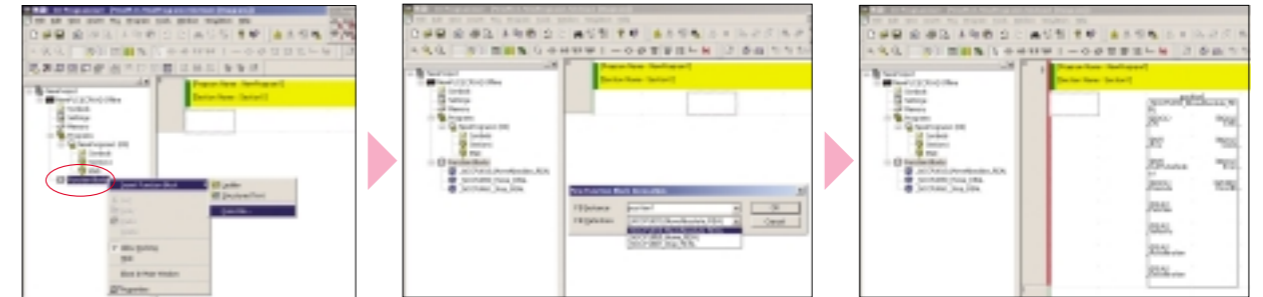


100 kHz for 2 axes



Programming Is Made Easy Using the Smart FB Library.

■ Just use the CX-Programmer to paste function blocks into the ladder program.



1 Start the CX-Programmer and right-click "Function Block" in the tree to select the required library file.

2 Use a function block call to select the desired function block from the library.

3 An instance of the function block will be created in the ladder program.

■ Just insert set values into the function block.

●Example: Using Positioning Function Blocks

Start trigger Bit B Bit D Bit A

Always ON (P-On)

Axis No. 80
Pulse output 0: 80
Start Bit A
Position command 200,000 pulses
Speed command 50,000 Hz
Acceleration rate 100 Hz/4 ms
Deceleration rate 100 Hz/4 ms
Pulse output method CW/CCW: 80

Positioning Function Block Parameters:

- Axis No. (INT)
- Pulse output 0: (INT)
- Start (BOOL)
- Execute (BOOL)
- Position (REAL)
- Speed (REAL)
- Acceleration (REAL)
- Deceleration (REAL)
- Pulse output method (INT)
- OutPulseSelect (INT)

End positioning Bit B
Done (BOOL)
Execute (BOOL)
Error (BOOL)
Error code (WORD)
ErrorID (ErrorID)

Speed: 50,000 Hz
Position command: 200,000 pulses
Acceleration rate: 100 Hz/4 ms
Deceleration rate: 100 Hz/4 ms
CW

●Using Interrupt Feeding Function Blocks

Start trigger Bit B Bit D Bit A

Always ON (P-On)

Axis No. 80
Pulse output 0: 80
Start Bit A
Interrupt input selection 0.00
Interrupt position 0.00
Interrupt feeding amount 200,000 pulses
Speed command +1 5,000 Hz
Speed command -2 1,000 Hz
Acceleration rate 100 Hz/4 ms
Deceleration rate 100 Hz/4 ms
Pulse output method CW/CCW method: 80

Interrupt Feeding Function Block Parameters:

- Axis No. (INT)
- Pulse output 0: (INT)
- Start (BOOL)
- Execute (BOOL)
- Interrupt position (REAL)
- Interrupt feeding amount (REAL)
- Speed command +1 (REAL)
- Speed command -2 (REAL)
- Acceleration rate (REAL)
- Deceleration rate (REAL)
- Pulse output method (INT)
- OutPulseSelect (INT)

Interrupt Task 140
Interrupt input 0 (0.00)

PRV(B81)
#0000 Port designation
#0000 Control data
DO Rightmost word of output destination

Speed: 50,000 Hz
Position command: 200,000 pulses
Acceleration rate: 100 Hz/4 ms
Speed: 1,000 Hz/4 ms
Deceleration rate: 100 Hz/4 ms
Interrupt input signal 00 (Input word 0, bit 00)

CP1H/CP1L

Pulse output CW/CCW

Servo Driver

SMARTSTEP Junior R7D Series, Etc.

The positioning function block library for the CP1H is used in the above application example. The positioning function block library for the CP1L is the same as the function block library for the CJ1M-CPU21/22/23.



High-speed Counters

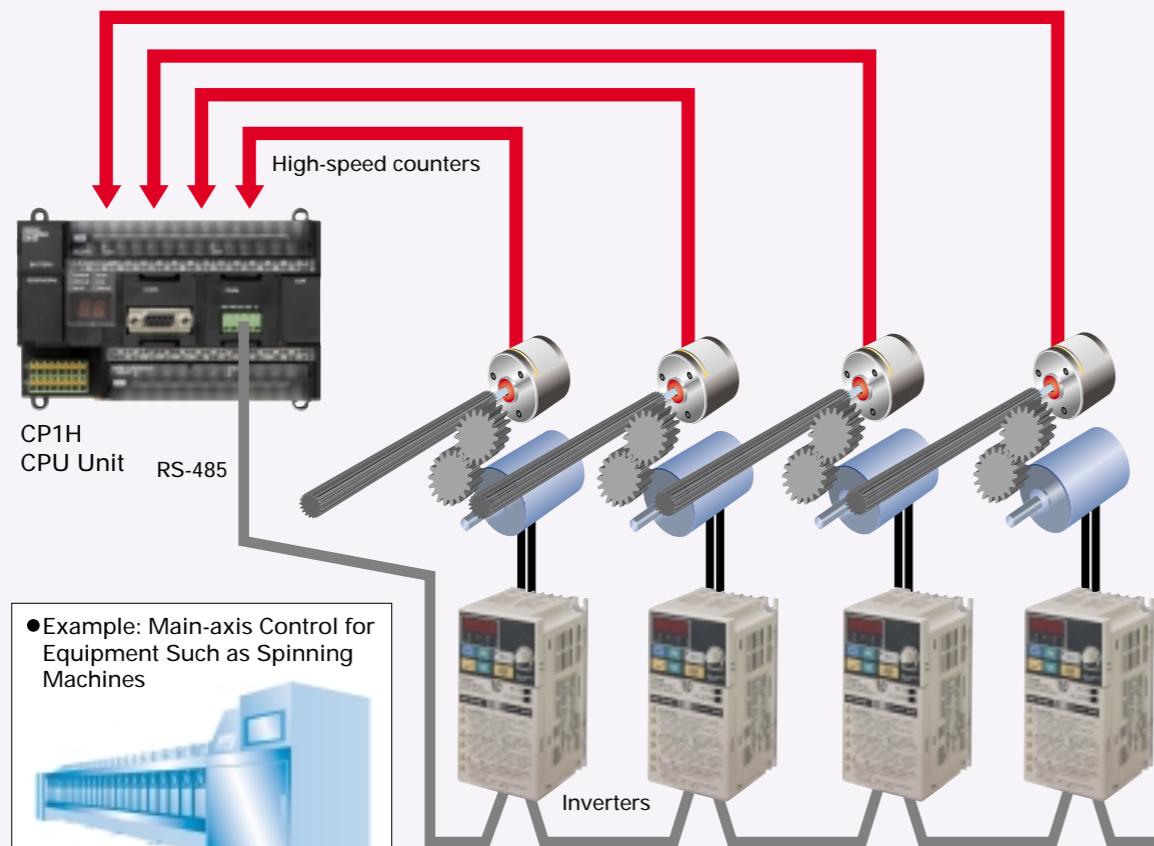
Differential Phases for Up to Four Axes Are Standard. Easily Handles Multi-axis Control with a Single Unit.

Main-axis Control for Equipment Such as Textile Machinery or Spinning Machinery

Positioning Conveyance for Equipment Such as Building Material Manufacturing Machinery and Stone-cutting Machinery

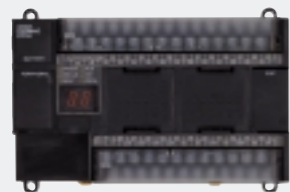
● Four-axis Counter Function (Single-phase or Differential Phases)

Multi-axis counter inputs enable calculations for inverter positioning, spindle speed control in textile manufacturing, and much more.



Applicable CPU Units and Functions

CP1H-Y CPU Unit



1 MHz (single-phase), 500 kHz (differential phases) for two axes, 100 kHz (single-phase), 50 kHz (differential phases) for two axes (four axes total)

CP1H-X□ CPU Unit



100 kHz (single-phase), 50 kHz (differential phases) for four axes

CP1L CPU Unit



100 kHz (single-phase) for four axes, or 50 kHz (differential phases) for two axes



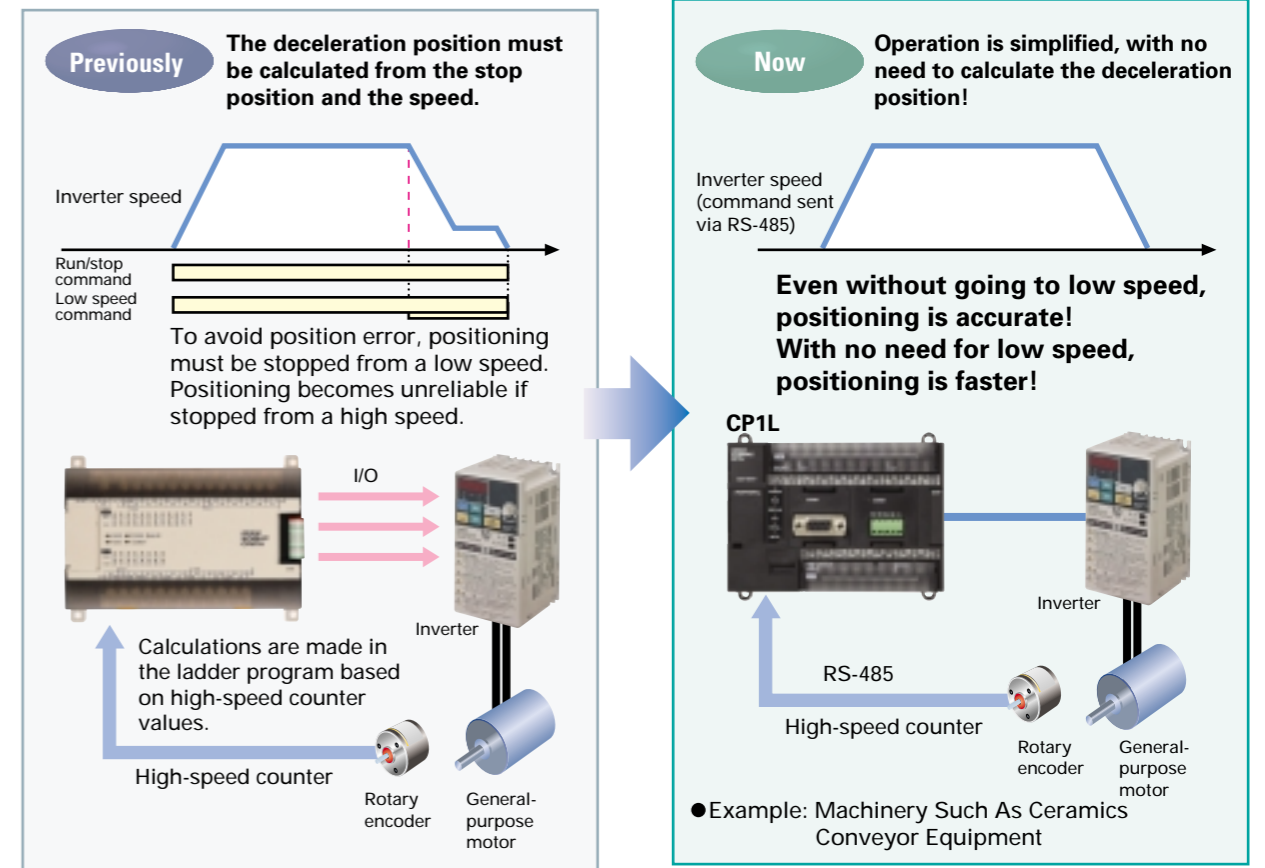
Inverter Positioning

High-speed Positioning Operations Using Inverters Is Made Easy.

High-speed Counters

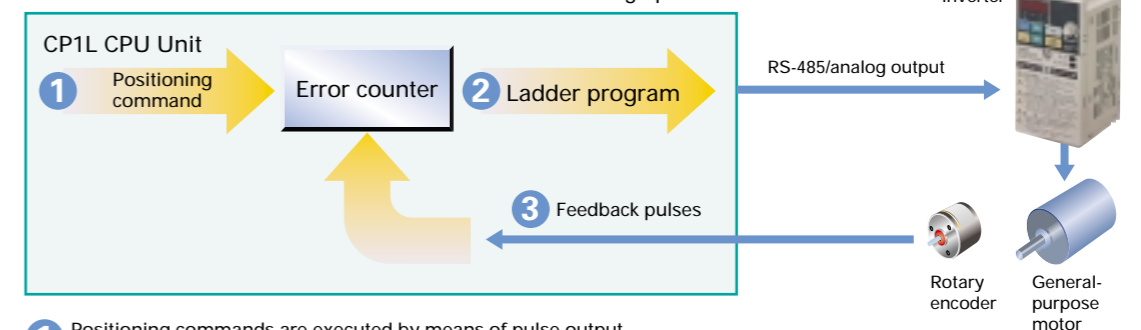
Inverter Positioning

Machinery Such As Ceramics Conveyor Equipment



■ Overview of Inverter Positioning

The CP1L's built-in error counter function enables the following operation.



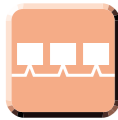
- 1 Positioning commands are executed by means of pulse output instructions. Pulse output instructions normally output pulses from the PLC, but pulses can be output to the error counter according to the operand setting in the instruction (such as PLS2).
- 2 The amount of pulses input to the error counter is converted to a speed command and output to the inverter. A command to the inverter is created in the ladder program using this speed command (proportional to the pulses remaining in the error counter). When RS-485 communications are executed, ladder programming for communicating with the inverter is created. When analog outputs are executed, ladder programming for analog outputs is created.
- 3 When a run/stop command is executed for the inverter, the motor is rotated and feedback pulses (for the amount of movement) are output from the encoder to the CP1L. The error counter value is decremented by these feedback pulses. The CP1L continues sending commands to the inverter until positioning is completed. This enables accurate positioning to the position output by the first position command.

Applicable CPU Units and Functions

CP1L CPU UnitL



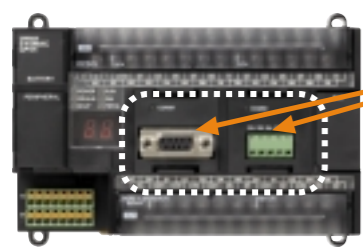
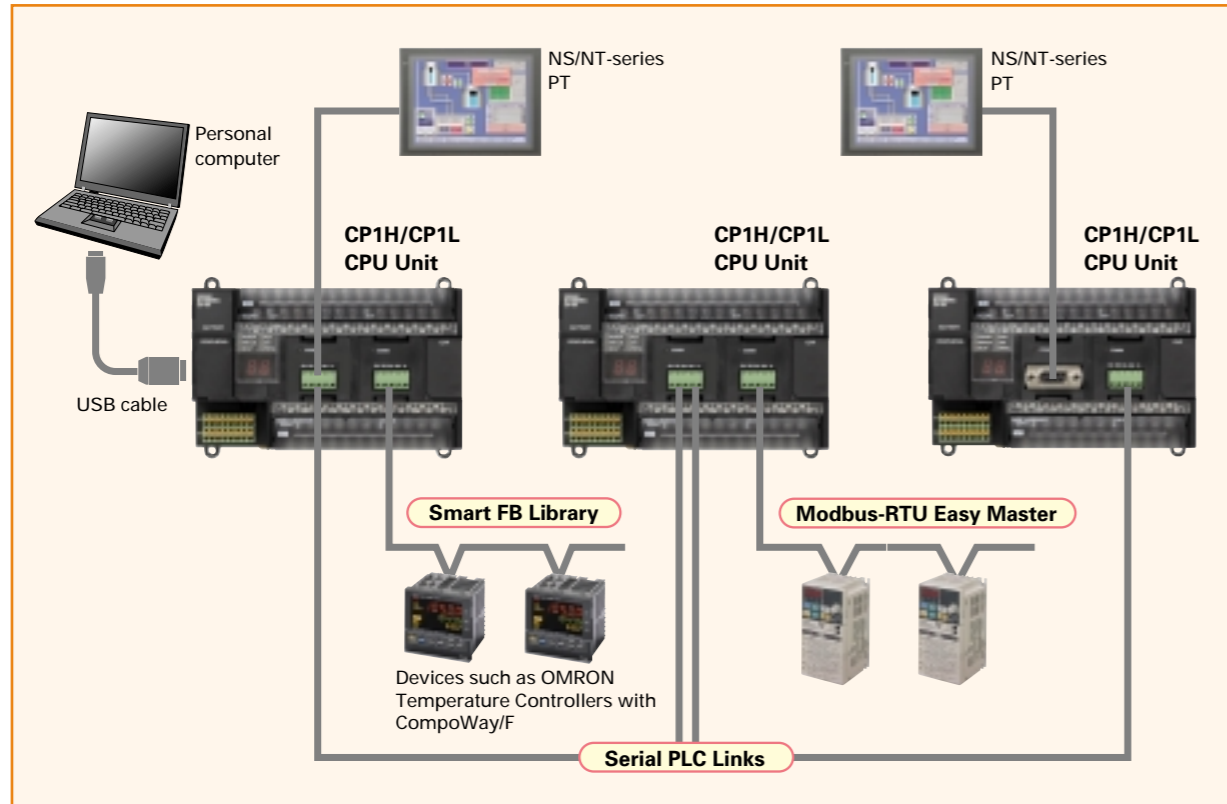
Inverter positioning function for two axes



Serial Communications

A Standard USB Port and Two Serial Ports Enable Connections and Communications with a Wide Range of Components.

Up to two Option Boards can be mounted for RS-232C or RS-422A/485 communications. A peripheral USB port has been added to connect to a personal computer for a total of three communications ports, making it easy to simultaneously connect to a PT, various components (such as Inverters, Temperature Controllers, and Smart Sensors), Serial PLC Link for linking to other PLCs, and a personal computer.



CP1H/CP1L CPU Unit

Two serial option ports can be used for either an RS-232C or RS-422A/485 interface.



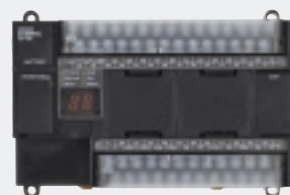
RS-232C Option Board CP1W-CIF01



RS-422A/485 Option Board CP1W-CIF11

Applicable CPU Units and Functions

CP1H CPU Unit



Serial Option Boards for two ports

CP1L CPU Unit (40 or 30 Points)



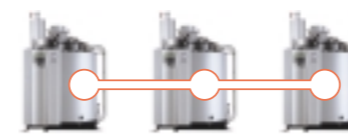
Serial Option Boards for two ports

CP1L CPU Unit (20 or 14 Points)



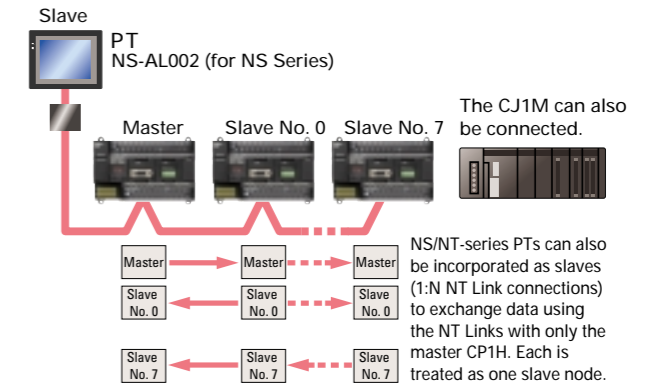
Serial Option Board for one port

Serial PLC Links



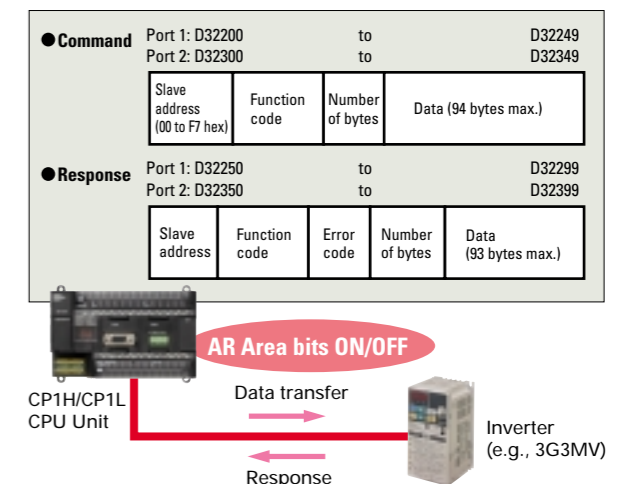
Setting/monitoring operation
Set temperature/present temperature
Errors

When multiple boilers are being controlled, up to 10 words/Unit of data for settings and monitoring can be exchanged using data links between up to nine CP1H, CP1L, and CJ1M CPU Units. Serial PLC Links can be used with either serial port 1 or serial port 2.



Modbus-RTU Easy Master

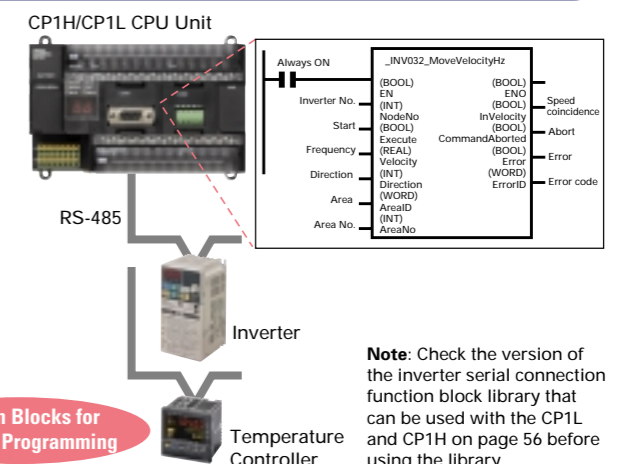
Connecting inverter speed control is made simple using the Modbus-RTU Easy Master. When the address, function, and data for a slave device are preset in a fixed memory area (DM Area), a message can be sent or received simply by turning ON an AR Area bit (A640.00 for port 1 or A641.00 for port 2) in the PLC.



Easy Communications Programming Using the Smart FB Library

The FB Library provides function blocks for communicating with Inverters and Temperature Controllers.

Function blocks are provided for operations such as run/stop, frequency settings, and monitoring when connected to Inverters by serial communications, and for setting SPs and reading PVs for Temperature Controllers.



Note: Check the version of the inverter serial connection function block library that can be used with the CP1L and CP1H on page 56 before using the library.

Function Blocks for Standard Programming

Analog I/O

Four Input Words and Two Output Words for XA CPU Units. Analog Control and Monitoring with Only a Single CPU Unit

Surface Inspections Using Inspection Devices

Mechanisms to Prevent Careless Mistakes in Cell Production (Such as Forgetting to Tighten Screws)

Oil Pressure Control in Forming Machines

Analog I/O

USB Peripheral Port

● Analog Control without Using Expansion Units
Four analog inputs and two analog outputs are built in. CP1H-XA CPU Units handle a wide range of applications with a single PLC.

Previously CPM2A CPU Unit Two CPM1A-MAD11 Analog I/O Units (2 Analog Inputs and 1 Analog Output)

CP1H Up to 4 input words and 2 output words. No Expansion Units required.

● Oil Pressure Control
Oil pressure control can also be handled by this CPU Unit.

Analog I/O Pressure Position Control valves

● Inspection Devices
Inspection devices are required more and more to enhance quality.

1/6,000 or 1/12,000 resolution

Displacement sensors

Inspection for warping and twisting

Applicable CPU Units and Functions

CP1H-XA CPU Unit

Four analog input words Two analog output words

● Complete with CP1W/CPM1A Analog Units.

- Unit with 4 Analog Inputs
- Units with 4 Analog Outputs
- Units with 2 Analog Inputs and 1 Analog Output



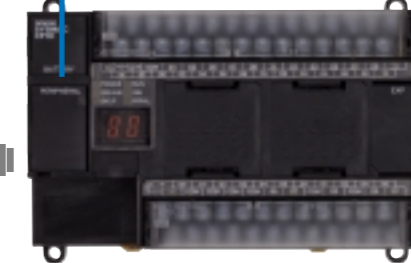
USB Peripheral Port

All CP-series CPU Units Provide a USB Port as a Standard Feature.

FA Integrated Tool Package



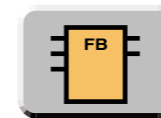
The built-in USB port lets you connect to a personal computer using a general-purpose cable.



Commercially available USB cable (A-type male connector to B-type female connector) can be used, helping to keep costs down.

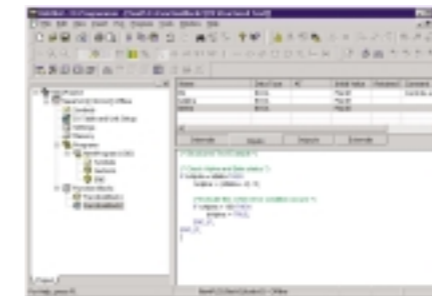
(The CP1H/CP1L USB port is used only for connecting to a Programming Device.)

Note: Programming Consoles (CQM1H-PRO01, C200H-PRO027, etc.) cannot be used with CP1H and CP1L CPU Units.



The Structured Text (ST) Language Makes Math Operations Even Easier.

In addition to ladder programming, function block logic can be written in ST language, which conforms to IEC 61131-3. Arithmetic processing is also possible with ST, including processing of absolute values, square roots, logarithms, and trigonometric functions (SIN, COS, and TAN). Processing that is difficult to write in ladder programming becomes easy using structured text.



● Structured Text Commands (Keywords)

- TRUE, FALSE.
- IF, THEN, ELSE, ELSIF, END_IF.
- DO, WHILE, END_WHILE.
- REPEAT, UNTIL, END_REPEAT.
- FOR, TO, BY, DO, END_FOR.
- CASE, OF, END_CASE.
- EXIT, RETURN.
- Operators**
- Addition (+), Subtraction (-), Multiplication (*), Division (/)
- Parenthesis (brackets), Array Indexing (square brackets [])
- Assignment Operator (=), Less Than Comparison Operator (<), Less Than or Equal To Comparison Operator (<=), Greater Than Comparison Operator (>), Greater Than or Equal To Comparison Operator (>=), Equals Comparison Operator (=), Is Not Equal To Comparison Operator (<>), Bitwise AND (AND or &), Bitwise OR (OR), Exclusive OR (XOR), NOT (NOT), Exponentiation (**)
- Numerical Functions**
- ABS, SQRT, SQRT, LN, LOG, EXP, SIN, COS, TAN, ASIN, ACOS, ATAN, EXPT
- Arithmetic Functions**
- Exponentiation (EXPT)

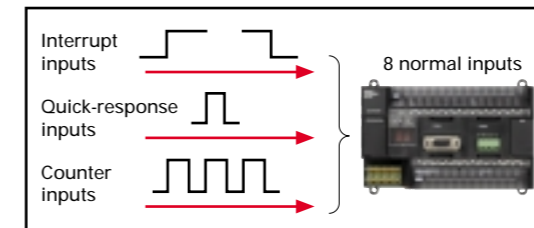
Note: The CP1H/CP1L CPU Units support the same function blocks and ST language as CS/CJ-series CPU Units with unit version 3.0.



High-speed Processing

Up to Eight Interrupt Inputs Can Be Used.

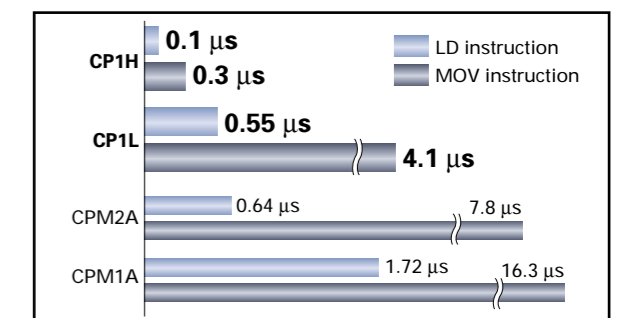
Eight interrupt inputs are built in. Quick-response inputs for pulse widths of 50 μs. The interrupt inputs can also be used as counters. (Response frequency: 5 kHz total for 8 interrupt inputs)



The normal inputs can be set in the PLC Setup as interrupt, quick-response, or counter inputs. (There are 8 normal inputs for the CP1H-X/XA, 6 for the CP1H-Y, 6 for the CP1L with 20, 30, or 40 points, and 4 for the CP1L with 14 points.)

Compared with the CPM2A, Basic Instructions Are at Least Six Times Faster and MOV Instructions Are 26 Times Faster.

Processing speed has been increased not only for basic instructions but also for special instructions as well. Faster processing of approximately 500 instructions speeds up the entire system.



Shortened System Design and Startup. Increased Program Reusability.

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. CP1H/CP1L programming and settings can be done with just the CX-Programmer alone, but CX-One is packaged with Support Software for setting and programming NS-series PTs, Temperature Controllers, and many other components. Using CX-One together with the CP1H/CP1L makes programming and setup easy, shortening the total lead time required for starting up machines and equipment.

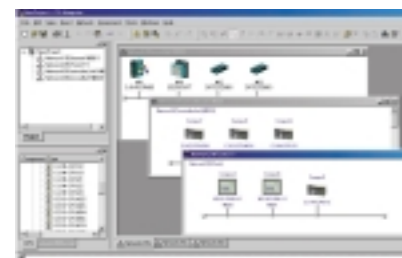
CX-One Configuration

1 Network Software	CX-Integrator CX-FLnet CX-Protocol
2 PLC Software	CX-Programmer CX-Simulator SwitchBox Utility
3 HMI Software	CX-Designer Ladder Monitor software included. (See note.)
4 Motion Controller Software	CX-Drive CX-Motion-NCF CX-Motion-MCH CX-Position CX-Motion
5 PLC Software	CX-Process Tool NS-series Face Plate Auto-Builder
6 Component Software <small>(for Temperature Controllers/ Temperature Controllers)</small>	CX-Thermo

Note: The Ladder Monitor is required to monitor ladder programs running on CS/CJ-series PLCs from an NS-series PT.

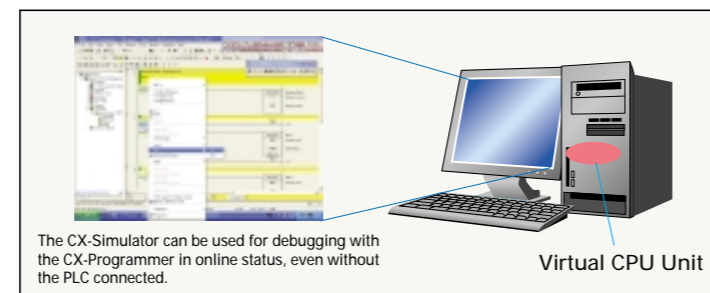
CX-Integrator

Settings and communications for devices such as other PLCs, NS-series PTs, and Temperature Controllers that are connected to a PLC can all be executed together from the CX-One CX-Integrator connected to the PLC.



CX-Simulator

Online CP1H/CP1L CPU Unit operations, such as program monitoring, I/O memory manipulation, PV monitoring, force-setting/resetting memory bits, differential monitoring, data tracing, and online editing, can be executed without the actual PLC.

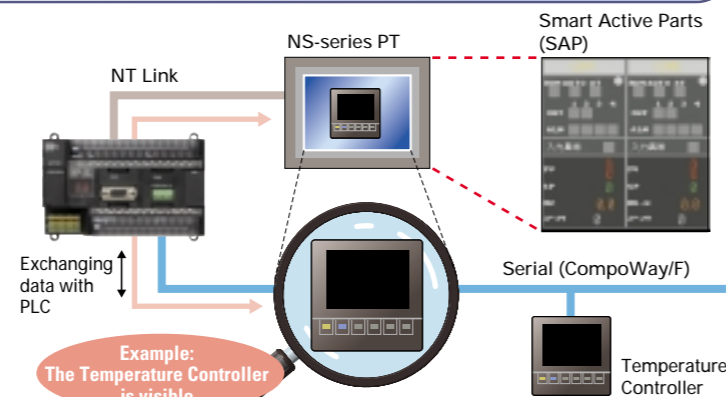


Improved Functional Connectivity with HMI Design Software and Integration of Component Software

Configured with an NS-series PT

CX-Designer

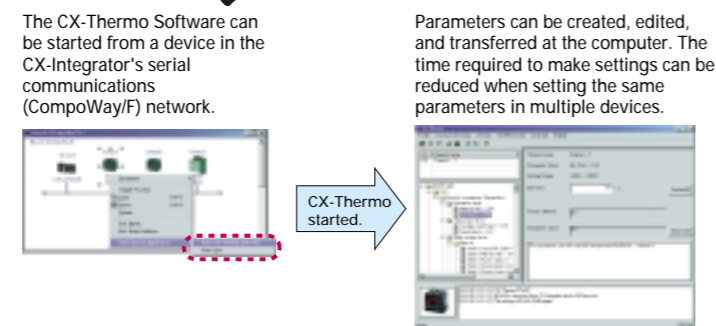
The CX-Designer can be started from the CX-Integrator's NT Link Window. It can be used to design HMI screens. In addition, the Smart Active Parts (SAP) Library is provided with the CX-Designer to enable easily creating setting screens for devices such as Temperature Controllers.



Configured with a Temperature Controller

CX-Thermo

The Support Software for Temperature Controllers (CX-Thermo) can be started from the CX-Integrator's Serial Communications Window.



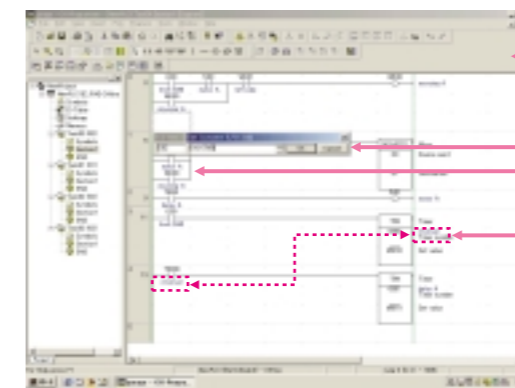
Easy-to-use Programming Software.

Programming with Function Blocks (Ladder Diagrams/ST Language) Is Also Standard.

CX-Programmer

CP1L: Version 7.2 (CX-One version 2.1) or later
CP1H: Version 6.2 (CX-One version 1.1) or later

Easy Operation Simplifies Programming and Debugging.

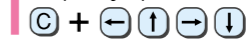


Shortcut keys can be easily checked using the ladder key guide. Programming is simplified by key inputs, such as the **C** Key for an NC input (contact), the **O** Key for an OUT instruction, and the **I** Key for special instructions.

C Key, address, **J** Key, comment, **J** Key. The CX-Programmer automatically goes into character input mode when it is time to enter a comment. Special instructions can be input as follows:

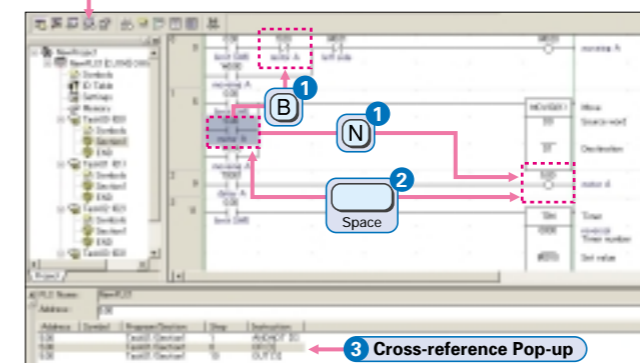


Simple key inputs are also available to connect lines.



Comments can be added for timer and counter instructions through timer and counter input bits.

3 Cross Reference Pop-up Icon



1 Consecutive Address Searches

Pressing the **N** Key (Next) jumps to the next input or output bit with the same address.

Pressing the **B** Key (Back) jumps back to the previous input or output bit with the same address.

2 Trace Searches

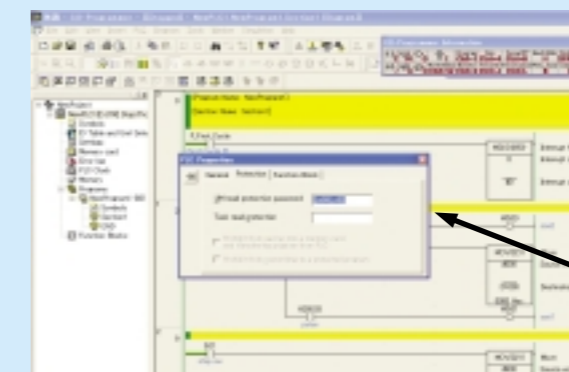
Space Key Pressing the Space Bar with the cursor at an input bit jumps to the output bit with the same address. Pressing the Space Bar with the cursor at an output bit jumps to the input bit with the same address.

3 Cross-reference Popups

Cross-reference information can be displayed for the input or output bit at the cursor to show where the address of the input or output bit is used in the program. Just click a cross-reference to jump to that location in the program.

The Password Function Enables Protecting Important Programs.

Eight-character Password Protection



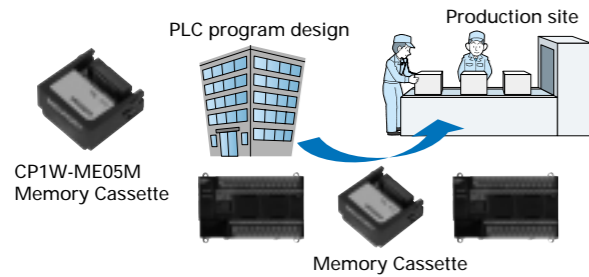
Important programs can be protected by setting a password from the CX-Programmer (with the PLC online).

Password setting: Up to 8 alphanumeric characters (A-Z, a-z, 0-9)

CPU Unit Overview and Built-in Functions

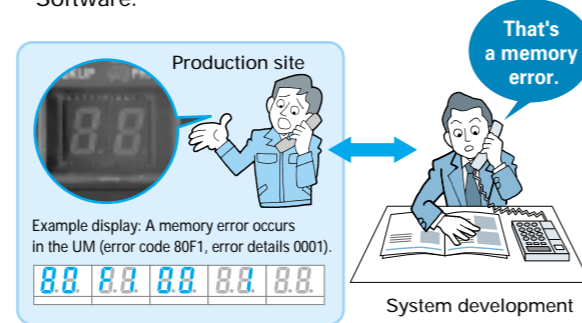
Memory Cassette

- Data, such as programs and initial memory values, can be stored on a Memory Cassette (optional) and copied to other systems.
- The Memory Cassette can also be used when installing new versions of application programs.



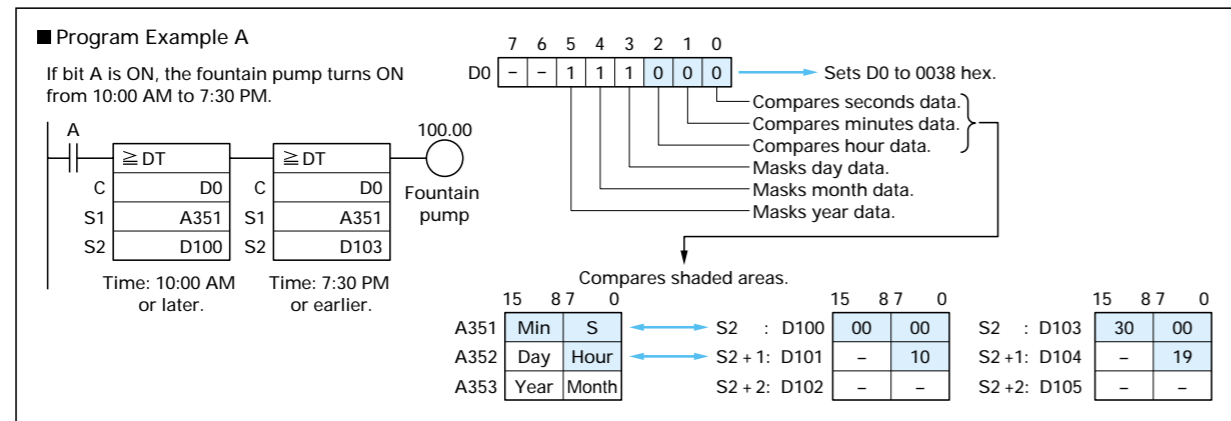
Status Displayed on 7-segment Display (CP1H only)

- The 7-segment display provides two display digits.
- In addition to displaying error codes for errors detected by the PLC, codes can be displayed on the display from the ladder program.
- The 7-segment display is useful for maintenance as well, allowing problems that arise during system operation to be grasped without using any Support Software.



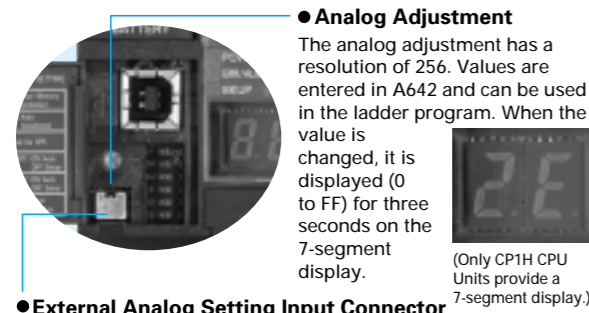
Clock Function

- All CP1H/CP1L CPU Units have a built-in clock.
- Shopping Mall Fountain Control
- Controlling a Fountain for a Period of Time



Analog Inputs Are Made Simple.

An analog adjustment and an external analog setting input connector are provided.



Battery-free Operation

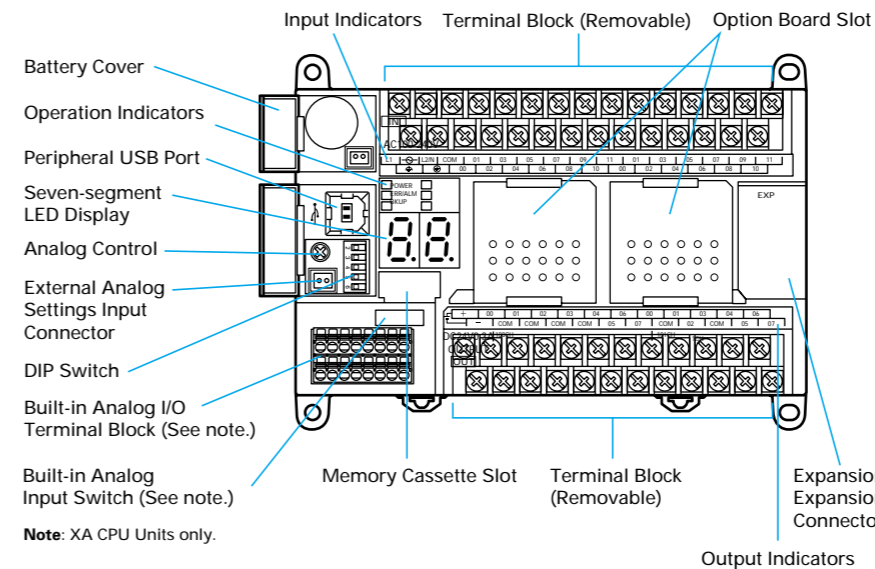
- The values in the DM Area (32K words) are saved in the CPU Unit's built-in flash memory as initial values, and can be read at startup.
- Battery-free operation can be used to enable saving production data and machine parameters in the DM Area, turning OFF the power, and then using then same data again for the next production run. (This is ideal for machinery that is only used seasonally.)

Note:

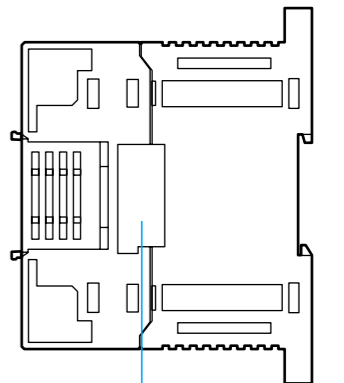
- A battery is required for the clock function and to retain the status of HR Area bits and counter values.
- A battery is provided as a standard feature with the CPU Unit.
- The user program (ladder program) is stored in built-in flash memory, so no battery is required to back it up.

CP1H CPU Unit Nomenclature

Front



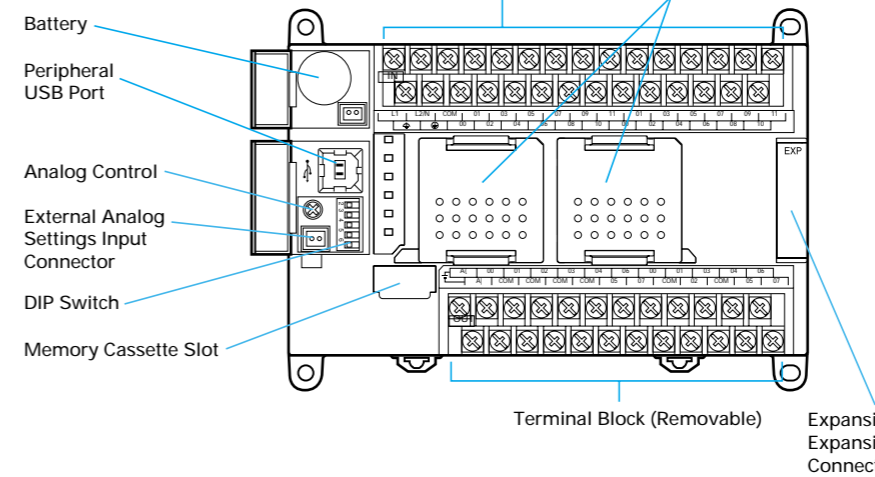
Back



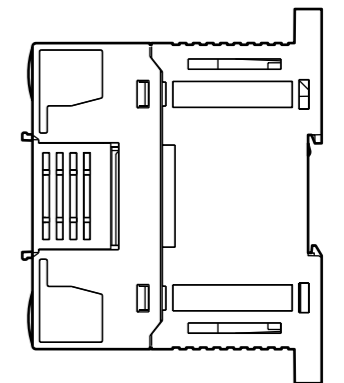
CP1L CPU Unit Nomenclature

CP1L CPU Units (M Type) with 40 Points

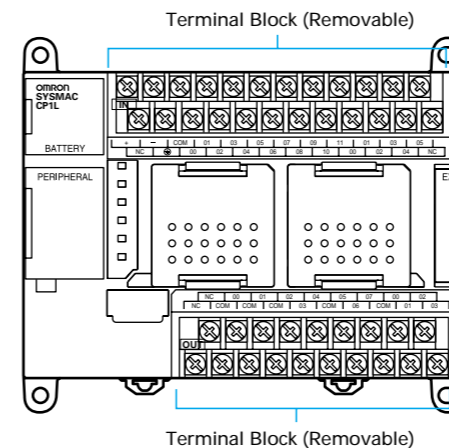
Front



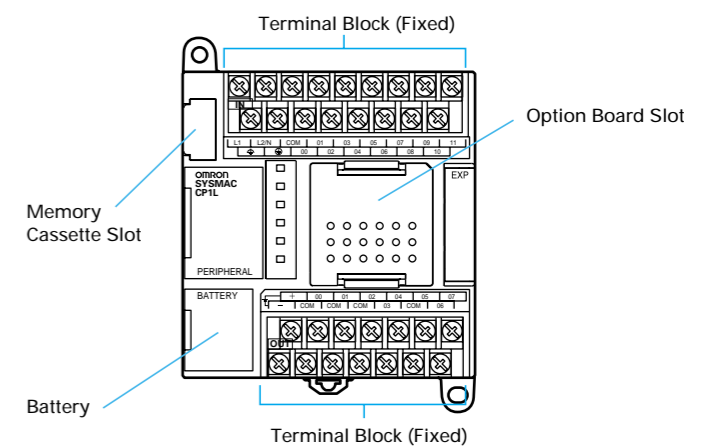
Back



CP1L CPU Units (M Type) with 30 Points



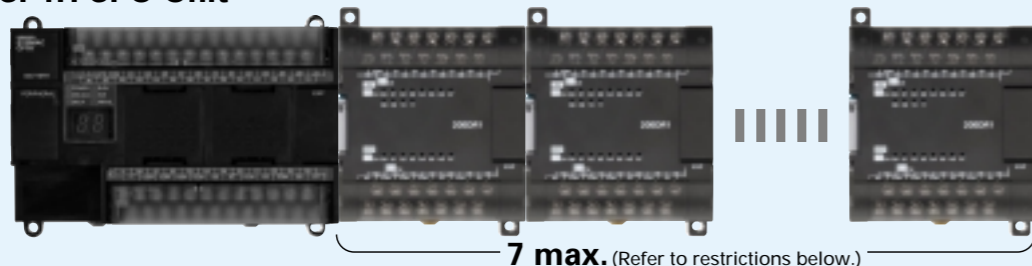
CP1L CPU Units (L Type) with 20 or 14 Points



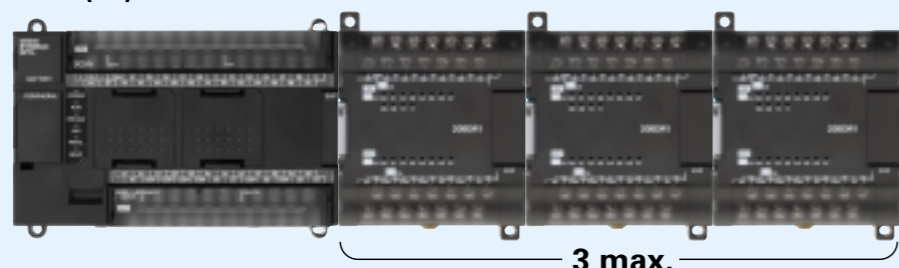
Connecting Expansion Unit and Expansion I/O Units

Maximum Number of CP1W/CPM1A Expansion Unit and Expansion I/O Units

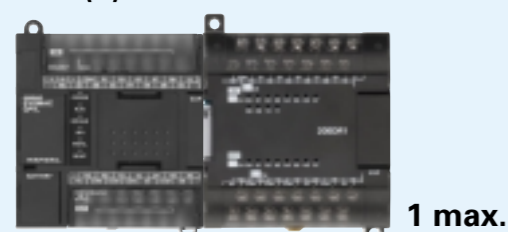
● CP1H CPU Unit



● CP1L (M) CPU Units with 40 or 30 Points



● CP1L (L) CPU Units with 20 or 14 Points



Restrictions on the Number of CP1H Expansion Unit and I/O Unit Connections

Up to seven Expansion Units and Expansion I/O Units can be connected when a CP1H CPU Unit is used, but the following restrictions apply. Observe these restrictions when using the models in the shaded areas in the following tables. A maximum total of 15 input words is allocated for Expansion Units and A maximum total of 15 output words is allocated for Expansion Units and Expansion I/O Units.

■ Words Allocated to CP1W Expansion Units and Expansion I/O Units

Unit type	Model	No. of words	
		Input	Output
Expansion I/O Units	40 I/O points	2	2
	20 I/O points	1	1
	16 inputs	—	2
	8 inputs	1	—
	8 outputs	—	1
Analog Units	2 analog inputs, 1 analog output	2	1
	4 analog inputs	4	2
	4 analog outputs	—	4
Temperature Sensor Units	2 thermocouple inputs	2	—
	4 thermocouple inputs	4	—
	2 platinum resistance thermometer inputs	2	—
	4 platinum resistance thermometer inputs	4	—
CompoBus/S I/O Link Unit	CPM1A-SRT21	1	1

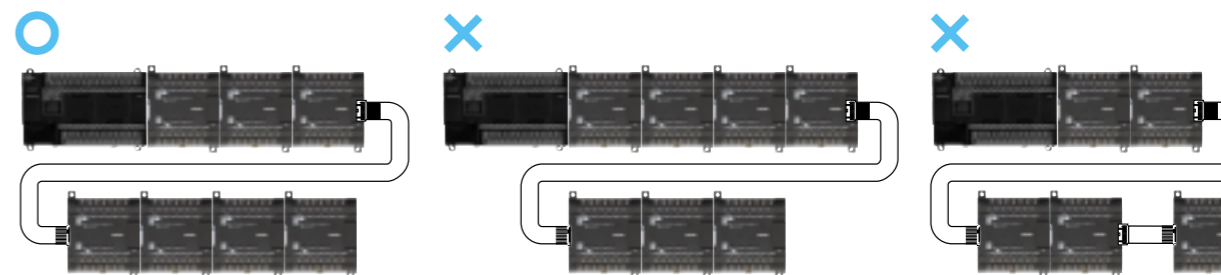
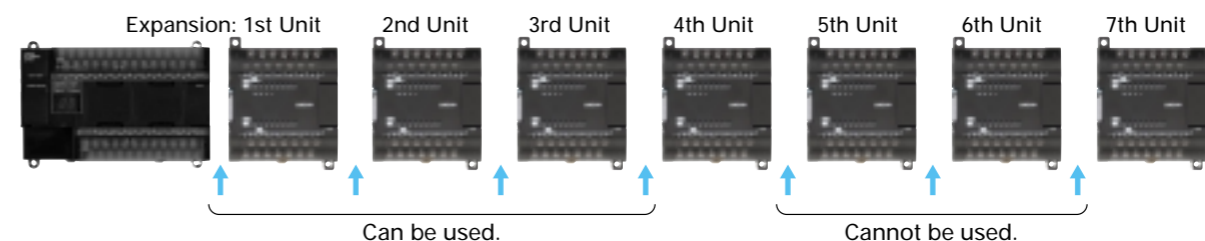
For example, the CP1W-TS002 Temperature Sensor Unit is allocated four words per Unit, so no more than three Units can be connected (4 words x 3 Units = 12 words). It would then be possible to mount a combination of other Units to use the remaining three input and 15 output words.

Examples of Possible Combinations

Number of Units	Input	Output
CP1H-X40DR-A	—	—
CP1W-TS002 x 3	4 words x 3 Units = 12 words	0 words
CP1W-TS001 x 1	2 words x 1 Unit = 2 words	0 words
CP1W-20EDR1 x 1	1 word x 1 Unit = 1 word	1 word x 1 Unit = 1 word
CP1W-DA041 x 2	0 words	4 words x 2 Units = 8 words
Total: 7 Units	Total: 15 words	Total: 9 words
≤ 7 Units	≤ 15 words	≤ 15 words

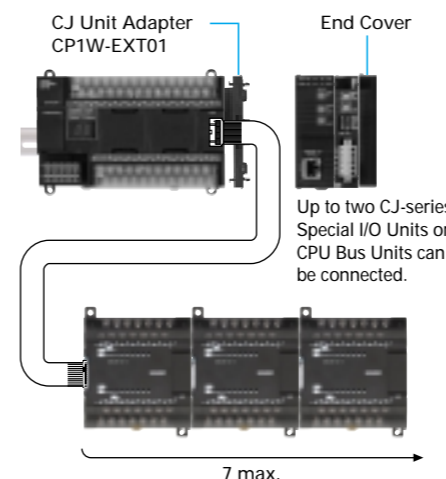
Using CP1W-CN811 I/O Connecting Cable

- I/O Connecting Cable can be connected to any Unit from the CP1H/CP1L CPU Unit to the third Expansion Unit or Expansion I/O Unit (i.e., the fourth Unit).
- Only one I/O Connecting Cable can be used in each CP1H or CP1L PLC.
- Even when I/O Connecting Cable is used, the above restrictions on the number of connectable CP1W/CPM1A Expansion Units and Expansion I/O Units still apply.



Using CJ-series Special I/O Units or CPU Bus Units with a CP1H CPU Unit

Up to two CJ-series Special I/O Units or CPU Bus Units can be connected by using a CP1W-EXT01 CJ Unit Adapter. The number of Units that can be used is as described below.



■ CJ-series Special I/O Units and CPU Bus Units (For details, refer to the CJ Series Catalog (Cat. No. P052)).

Unit name	Model	5V Current consumption (A)		
Analog Input Units	CJ1W-AD081-V1	0.42 A		
	CJ1W-AD041-V1			
Analog Output Units	CJ1W-DA08V	0.14 A		
	CJ1W-DA08C			
	CJ1W-DA041	0.12 A		
	CJ1W-DA021			
Analog I/O Unit	CJ1W-MAD42	0.58 A		
Process Input Units	CJ1W-PTS51	0.25 A		
	CJ1W-PTS52			
	CJ1W-PTS15	0.18 A		
	CJ1W-PTS16			
	CJ1W-PDC15			
	Temperature Control Units		CJ1W-TC001	0.25 A
CJ1W-TC002				
CJ1W-TC003				
CJ1W-TC004				
CJ1W-TC101				
CJ1W-TC102				
CJ1W-TC103				
CJ1W-TC104				
CompoBus/S Master Unit		CJ1W-SRM21	0.15 A	

Unit name	Model	5V Current consumption (A)
Position Control Units	CJ1W-NC113	0.25 A
	CJ1W-NC213	
	CJ1W-NC413	0.36 A
	CJ1W-NC133	0.25 A
	CJ1W-NC233	
CJ1W-NC433	0.36 A	
High-speed Counter Unit	CJ1W-CT021	0.25 A
ID Sensor Units	CJ1W-V600C11	0.26 A (24 VDC 0.12 A)
	CJ1W-V600C12	0.32 A (24 VDC 0.24 A)
Serial Communications Units	CJ1W-SCU41-V1	0.38 A*
	CJ1W-SCU21-V1	0.28 A*
	CJ1W-SCU31-V1	0.38 A
Ethernet Unit	CJ1W-ETN21	0.37 A
DeviceNet Unit	CJ1W-DRM21	0.33 A
Controller Link Unit	CJ1W-CLK21-V1	0.35 A
MECHATROLINK-II Position Control Unit	CJ1W-NCF71	0.36 A
MECHATROLINK-II Motion Control Unit	CJ1W-MCH71	0.6 A
FL-net Unit	CJ1W-FLN22	0.37 A
Storage/Processing Unit	CJ1W-SPU01	0.56 A

● Based on the current consumption when CJ-series Special I/O Units or CPU Bus Units are used with a CP1H CPU Unit, the maximum number of Units that can be used is two CJ-series Units and seven CP1W/CPM1A Expansion Units and Expansion I/O Units. The total current consumption for the CP1H CPU Unit must be no more than 2 A for 5 V and 1 A for 24 V. Check the total current consumption to be sure these limits are not exceeded referring to page 27 for the CP1H CPU Unit and CP1W Expansion Unit and Expansion I/O Unit current consumptions and to the above table for CJ-series Unit current consumptions.

* The current consumption increases by 0.15 A/Adapter when NT-AL001 Link Adapters are used, and by 0.04 A/Converter when CJ1W-CIF11 RS-422A Converters are used.