# High Performing Programmable Controller with Embedded Ethernet

- "CP1L-EM" and "CP1L-EL" has a standard-feature Ethernet port.
- "CP1L-M" and "CP1L-L" has a standard-feature peripheral USB port.
- Function blocks (FB) allow you to build up modular structure and programming of ladder diagrams.



CP1L-EL CPU Units with 20 Points    CP1L-EM CPU Units with 40 Points    CP1L-L CPU Units with 10 Points    CP1L-M CPU Units with 60 Points

## Features

- "CP1L-EM" and "CP1L-EL" have complete with a Ethernet port.
- Pulse output for two axes. Advanced power for high-precision positioning control.
- High-speed Counters. Single-phase for four axes.
- Six interrupt inputs are built in. Faster processing of instructions speeds up the entire system.
- Serial Communications. Two ports. Select Option Boards for either RS-232C or RS-485 communications.
- "CP1L-M" and "CP1L-L" have a peripheral USB port.
- The Structured Text (ST) Language. Makes math operations even easier.
- Can be used for the CP1W series Unit. The extendibility of it is preeminently good.
- LCD displays and settings. Enabled using Option Board.

# CP1L

# Model Number Structure

■ **Model Number Legend(Not all models that can be represented with the model number legend can necessarily be produced.)**
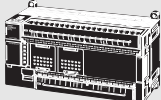
# CP1L-□□□D□-□
   (1) (2) (3)   (4)   (5)
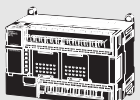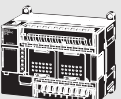
1. Expansion capability
   E : Ethernet port
   None : -
2. Program capacity
   M : 10K steps
   L : 5K steps

3. Number of Built-In number I/O points
   60 : 60 I/O points
   40 : 40 I/O points
   30 : 30 I/O points
   20 : 20 I/O points
   14 : 14 I/O points
   10 : 10 I/O points

4. Output classification
   R : Relay outputs
   T : Transistor Outputs (sinking)
   T1 : Transistor Outputs (sourcing)
5. Power supply
   A : AC
   D : DC

# Ordering Information

● **International Standards**
• The standards are abbreviated as follows: U: UL, U1: UL (Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.
• Contact your OMRON representative for further details and applicable conditions for these standards.

■ **CPU Units**

| CPU Unit | Specifications | | | | | Model | Standards |
|---|---|---|---|---|---|---|---|
| | CPU type | Power supply | Output method | Inputs | Outputs | | |
| CP1L-EM CPU Units with 40 Points | Memory capacity: 10K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only) | DC power supply | Relay output | 24 | 16 | CP1L-EM40DR-D | CE |
| | | | Transistor output (sinking) | | | CP1L-EM40DT-D | |
| | | | Transistor output (sourcing) | | | CP1L-EM40DT1-D | |
| CP1L-EM CPU Units with 30 Points | Memory capacity: 10K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only) | DC power supply | Relay output | 18 | 12 | CP1L-EM30DR-D | CE |
| | | | Transistor output (sinking) | | | CP1L-EM30DT-D | |
| | | | Transistor output (sourcing) | | | CP1L-EM30DT1-D | |
| CP1L-EL CPU Units with 20 Points | Memory capacity: 5K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only) | DC power supply | Relay output | 12 | 8 | CP1L-EL20DR-D | CE |
| | | | Transistor output (sinking) | | | CP1L-EL20DT-D | |
| | | | Transistor output (sourcing) | | | CP1L-EL20DT1-D | |
| CP1L-M CPU Units with 60 Points | Memory capacity: 10K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only) | AC power supply | Relay output | 36 | 24 | CP1L-M60DR-A | UC1, N, L, CE |
| | | | Transistor output (sinking) | | | CP1L-M60DT-A | |
| | | DC power supply | Relay output | | | CP1L-M60DR-D | |
| | | | Transistor output (sinking) | | | CP1L-M60DT-D | |
| | | | Transistor output (sourcing) | | | CP1L-M60DT1-D | |
| CP1L-M CPU Units with 40 Points | Memory capacity: 10K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only) | AC power supply | Relay output | 24 | 16 | CP1L-M40DR-A | UC1, N, L, CE |
| | | | Transistor output (sinking) | | | CP1L-M40DT-A | |
| | | DC power supply | Relay output | | | CP1L-M40DR-D | |
| | | | Transistor output (sinking) | | | CP1L-M40DT-D | |
| | | | Transistor output (sourcing) | | | CP1L-M40DT1-D | |
| CP1L-M CPU Units with 30 Points | Memory capacity: 10K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only) | AC power supply | Relay output | 18 | 12 | CP1L-M30DR-A | UC1, N, L, CE |
| | | | Transistor output (sinking) | | | CP1L-M30DT-A | |
| | | DC power supply | Relay output | | | CP1L-M30DR-D | |
| | | | Transistor output (sinking) | | | CP1L-M30DT-D | |
| | | | Transistor output (sourcing) | | | CP1L-M30DT1-D | |

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| CPU Unit | Specifications | | | | | Model | Standards |
|---|---|---|---|---|---|---|---|
| | CPU type | Power supply | Output method | Inputs | Outputs | | |
| **CP1L-L CPU Units with 20 Points** | **Memory capacity: 5K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only)** | AC power supply | Relay output | 12 | 8 | **CP1L-L20DR-A** | UC1, N, L, CE |
| | | | Transistor output (sinking) | | | **CP1L-L20DT-A** | |
| | | DC power supply | Relay output | | | **CP1L-L20DR-D** | |
| | | | Transistor output (sinking) | | | **CP1L-L20DT-D** | |
| | | | Transistor output (sourcing) | | | **CP1L-L20DT1-D** | |
| **CP1L-L CPU Units with 14 Points** | **Memory capacity: 5K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only)** | AC power supply | Relay output | 8 | 6 | **CP1L-L14DR-A** | UC1, N, L, CE |
| | | | Transistor output (sinking) | | | **CP1L-L14DT-A** | |
| | | DC power supply | Relay output | | | **CP1L-L14DR-D** | |
| | | | Transistor output (sinking) | | | **CP1L-L14DT-D** | |
| | | | Transistor output (sourcing) | | | **CP1L-L14DT1-D** | |
| **CP1L-L CPU Units with 10 Point** | **Memory capacity: 5K steps High-speed counters: 100 kHz, 4 axes Pulse outputs: 100 kHz, 2 axes (Models with transistor outputs only)** | AC power supply | Relay output | 6 | 4 | **CP1L-L10DR-A** | UC1, N, L, CE |
| | | | Transistor output (sinking) | | | **CP1L-L10DT-A** | |
| | | DC power supply | Relay output | | | **CP1L-L10DR-D** | |
| | | | Transistor output (sinking) | | | **CP1L-L10DT-D** | |
| | | | Transistor output (sourcing) | | | **CP1L-L10DT1-D** | |

**Note: 1.** Refer to "Models and Software Versions" about supported software.
　　　**2.** Refer to "Option Unit Specifications" about supported Option Units.

## ■ Options for CPU Units

| Name | | Specifications | Model | Standards |
|---|---|---|---|---|
| **RS-232C Option Board** | | Can be mounted in either CPU Unit Option Board slot 1 or 2. *1 | **CP1W-CIF01** | UC1, N, L, CE |
| **RS-422A/485 Option Board** | | | **CP1W-CIF11** | |
| **RS-422A/485 (Isolated-type) Option Board** | | | **CP1W-CIF12** | UC1, N, L, CE |
| **Ethernet Option Board** | | Can be mounted in either CPU Unit Option Board slot 1 or 2.  *1 *2 *4 | **CP1W-CIF41** | UC1, N, L, CE |
| **Analog Input Option Board** | | Can be mounted in either CPU Unit Option Board slot 1 or 2. *3 2 analog inputs. 0-10V(Resolution:1/4000), 0-20mA (Resolution:1/2000). | **CP1W-ADB21** | CE |
| **Analog Output Option Board** | | Can be mounted in either CPU Unit Option Board slot 1 or 2. *3 2 analog outputs. 0-10V (Resolution:1/4000). | **CP1W-DAB21V** | CE |
| **Analog I/O Option Board** | | Can be mounted in either CPU Unit Option Board slot 1 or 2. *3 2 analog inputs. 0-10V(Resolution:1/4000), 0-20mA(Resolution:1/2000). 2 analog outputs. 0-10V (Resolution:1/4000). | **CP1W-MAB221** | CE |
| **LCD Option Board** | | Can be mounted only in the CPU Unit Option Board slot 1. *1 | **CP1W-DAM01** | UC1, L, N, CE |
| **Memory Cassette** | | Can be used for backing up programs or auto-booting. | **CP1W-ME05M** | UC1, N, L, CE |

**\*1.** Cannot be used for the CP1L-L10.
**\*2.** When using CP1W-CIF41 Ver.1.0, one Ethernet port can be added.
**\*3.** CP1L-EM / EL only.
**\*4.** Cannot be used for the CP1L-EM / EL.

■ **Programming Devices**

| Name | Specifications | | | Model | Standards |
|---|---|---|---|---|---|
| | | Number of licenses | Media | | |
| **FA Integrated Tool Package CX-One Lite Version 4.□** | CX-One Lite is a subset of the complete CX-One package that provides only the Support Software required for micro PLC applications. CX-One Lite runs on the following OS. OS: Windows XP (Service Pack 3 or higher), Vista or 7 Note: Except for Windows XP 64-bit version. <br><br> CX-One Lite Ver. 4.□ includes Micro PLC Edition CX-Programmer Ver. 9.□. | 1 license | CD | **CXONE-LT01C-V4** | --- |
| **FA Integrated Tool Package CX-One Ver. 4.□** | CX-One is a package that integrates the Support Software for OMRON PLCs and components. CX-One runs on the following OS. OS: Windows XP (Service Pack 3 or higher), Vista or 7 Note: Except for Windows XP 64-bit version. <br><br> CX-One Ver. 4.□ includes CX-Programmer Ver. 9.□. | 1 license *1 | DVD *2 | **CXONE-AL01D-V4** | --- |
| **Programming Device Connecting Cable for CP1W-CIF01 RS-232C Option Board *3** | Connects Personal Computers, D-Sub 9-pin (Length: 2.0 m) | For anti-static connectors | | **XW2Z-200S-CV** | --- |
| | Connects Personal Computers, D-Sub 9-pin (Length: 5.0 m) | | | **XW2Z-500S-CV** | |
| | Connects Personal Computers, D-Sub 9-pin (Length: 2.0 m) | | | **XW2Z-200S-V** | |
| | Connects Personal Computers, D-Sub 9-pin (Length: 5.0 m) | | | **XW2Z-500S-V** | |
| **USB-Serial Conversion Cable *3** | USB-RS-232C Conversion Cable (Length: 0.5 m) and PC driver (on a CD-ROM disc) are included. Complies with USB Specification 1.1 On personal computer side: USB (A plug connector, male) On PLC side: RS-232C (D-sub 9-pin, male) Driver: Supported by Windows 98, Me, 2000, and XP | | | **CS1W-CIF31** | N |

**Note: 1.** Refer to "Models and Software Versions" about supported software.
   **2.** The CX-One and CX-One Lite cannot be simultaneously installed on the same computer.
***1.** Multi licenses are available for the CX-One (3, 10, 30 or 50 licenses).
***2.** The CX-One is also available on CD (CXONE-AL□□C-V4).
***3.** Cannot be used with a peripheral USB port.
   To connect to a personal computer via a peripheral USB port, use commercially-available USB cable (A or B type, male).

The following tables lists the Support Software that can be installed from CX-One

| Support Software in CX-One | | CX-One Lite Ver.4.□ | CX-One Ver.4.□ | Support Software in CX-One | | CX-One Lite Ver.4.□ | CX-One Ver.4.□ |
|---|---|---|---|---|---|---|---|
| Micro PLC Edition CX-Programmer | Ver.9.□ | Yes | No | CX-Drive | Ver.2.□ | Yes | Yes |
| CX-Programmer | Ver.9.□ | No | Yes | CX-Process Tool | Ver.5.□ | No | Yes |
| CX-Integrator | Ver.2.□ | Yes | Yes | Faceplate Auto-Builder for NS | Ver.3.□ | No | Yes |
| Switch Box Utility | Ver.1.□ | Yes | Yes | CX-Designer | Ver.3.□ | Yes | Yes |
| CX-Protocol | Ver.1.□ | No | Yes | NV-Designer | Ver.1.□ | Yes | Yes |
| CX-Simulator | Ver.1.□ | Yes | Yes | CX-Thermo | Ver.4.□ | Yes | Yes |
| CX-Position | Ver.2.□ | No | Yes | CX-ConfiguratorFDT | Ver.1.□ | Yes | Yes |
| CX-Motion-NCF | Ver.1.□ | No | Yes | CX-FLnet | Ver.1.□ | No | Yes |
| CX-Motion-MCH | Ver.2.□ | No | Yes | Network Configurator | Ver.3.□ | Yes | Yes |
| CX-Motion | Ver.2.□ | No | Yes | CX-Server | Ver.4.□ | Yes | Yes |

**Note:** For details, refer to the CX-One Catalog (Cat. No: R134).
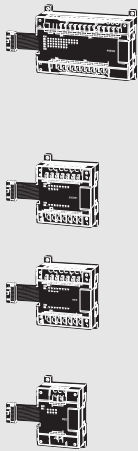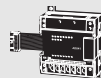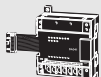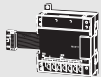
● **Models and Software Versions**
The following versions of the CX-One, CX-Programmer are required.

| Model | | CX-One | CX-Programmer |
|---|---|---|---|
| CP1L-EM40□□-□ CP1L-EM30□□-□ CP1L-EL20□□-□ | *1 | Ver. 4.25 or higher | Ver. 9.40 or higher |
| CP1L-M60□□-□ | *2 | Ver. 2.11 or higher | Ver. 7.20 or higher |
| CP1L-M40□□-□ CP1L-M30□□-□ CP1L-M20□□-□ CP1L-L14□□-□ | *2 | Ver. 2.10 or higher | Ver. 7.10 or higher |
| CP1L-L10□□-□ | *2 | Ver. 2.13 or higher | Ver. 7.30 or higher |

***1.** Update The CX-Programmer version automatically from the website using CX-Programmer version 9.0 (included with CX-One version 4.0).
***2.** Update The CX-Programmer version automatically from the website using CX-Programmer version 7.0 (included with CX-One version 2.0).

**OMRON**

## ■ Expansion Units

| Name | | Output method | Inputs | Outputs | Model | Standards |
|---|---|---|---|---|---|---|
| Expansion I/O Units | | Relay | 24 | 16 | CP1W-40EDR | N, L, CE |
| | | Transistor (sinking) | | | CP1W-40EDT | |
| | | Transistor (sourcing) | | | CP1W-40EDT1 | |
| | | Relay | --- | 32 | CP1W-32ER | N, L, CE |
| | | Transistor (sinking) | | | CP1W-32ET | |
| | | Transistor (sourcing) | | | CP1W-32ET1 | |
| | | Relay | 12 | 8 | CP1W-20EDR1 | U, C, N, L, CE |
| | | Transistor (sinking) | | | CP1W-20EDT | |
| | | Transistor (sourcing) | | | CP1W-20EDT1 | |
| | | Relay | --- | 16 | CP1W-16ER | N, L, CE |
| | | Transistor (sinking) | | | CP1W-16ET | |
| | | Transistor (sourcing) | | | CP1W-16ET1 | |
| | | --- | 8 | --- | CP1W-8ED | U, C, N, L, CE |
| | | Relay | | 8 | CP1W-8ER | |
| | | Transistor (sinking) | --- | 8 | CP1W-8ET | |
| | | Transistor (sourcing) | | | CP1W-8ET1 | |
| Analog Input Unit | | Analog (resolution: 1/6000) | 4 | --- | CP1W-AD041 | UC1, N, L, CE |
| Analog Output Unit | | Analog (resolution: 1/6000) | --- | 4 | CP1W-DA041 | |
| | | | | 2 | CP1W-DA021 | UC1, CE |
| Analog I/O Unit | | Analog (resolution: 1/6000) | 2 | 1 | CP1W-MAD11 | U, C, N, L, CE |
| CompoBus/S I/O Link Unit | | --- | 8 (I/O link input bits) | 8 (I/O link input bits) | CP1W-SRT21 | U, C, N, L, CE |
| Temperature Sensor Unit | | 2 thermocouple inputs | | | CP1W-TS001 | |
| | | 4 thermocouple inputs | | | CP1W-TS002 | |
| | | 2 platinum resistance thermometer inputs | | | CP1W-TS101 | |
| | | 4 platinum resistance thermometer inputs | | | CP1W-TS102 | |

CP1L (L Type) CPU Units with 10 points do not support Expansion Units.

## ■ I/O Connecting Cable

| Name | Specifications | Model | Standards |
|---|---|---|---|
| I/O Connecting Cable | 80 cm (for CP1W/CPM1A Expansion Units) | CP1W-CN811 | UC1, N, L, CE |

**Note:** An I/O Connecting Cable (approx. 6 cm) for horizontal connection is provided with CP1W/CPM1A Expansion Units.

## ■ Optional Products, Maintenance Products and DIN Track Accessories

| Name | | Specifications | Model | Standards |
|---|---|---|---|---|
| Battery Set | | For CPU Units (Use batteries within two years of manufacture.) | CJ1W-BAT01 | CE |
| DIN Track | | Length: 0.5 m; Height: 7.3 mm | PFP-50N | --- |
| | | Length: 1 m; Height: 7.3 mm | PFP-100N | |
| | | Length: 1 m; Height: 16 mm | PFP-100N2 | |
| | End Plate | There are 2 stoppers provided with CPU Units and I/O Interface Units as standard accessories to secure the Units on the DIN Track. | PFP-M | |

## ■ Industrial Switching Hubs

| Product name | Appearance | Specifications | | | Accesories | Current consumption (A) | Model | Standards |
|---|---|---|---|---|---|---|---|---|
| | | Functions | No. of ports | Failure detection | | | | |
| Industrial Switching Hubs | | Quality of Service (QoS): EtherNet/IP control data priority Failure detection: Broadcast storm and LSI error detection 10/100BASE-TX, Auto-Negotiation | 3 | No | • Power supply connector | 0.22 | **W4S1-03B** | UC, CE |
| | | | 5 | No | | 0.22 | **W4S1-05B** | |
| | | | 5 | Yes | • Power supply connector • Connector for informing error | 0.22 | **W4S1-05C** | CE |

# General Specifications

| Item \ Type / Model | AC power supply models CP1L-☐☐☐-A | DC power supply models CP1L-☐☐☐-D |
|---|---|---|
| **Power supply** | 100 to 240 VAC 50/60 Hz | 24 VDC |
| **Operating voltage range** | 85 to 264 VAC | 20.4 to 26.4 VDC |
| **Power consumption** | 50 VA max. (CP1L-M60/-M40/-M30☐☐-A) 30 VA max. (CP1L-L20/-L14/-L10☐☐-A) | 20 W max. (CP1L-EM40/-EM30/-M60/-M40/-M30☐☐-D) 13 W max. (CP1L-EL20/-L20/-L14/-L10☐☐-D) |
| **Inrush current \*** | 100 to 120 VAC inputs: 20 A max. (for cold start at room temperature) 8 ms max. 200 to 240 VAC inputs: 40 A max. (for cold start at room temperature), 8 ms max. | 30 A max. (for cold start at room temperature) 20 ms max. |
| **External power supply** | 300 mA at 24 VDC (CP1L-M60/-M40/-M30☐☐-A) 200 mA at 24 VDC (CP1L-L20/-L14/-L10☐☐-A) | None |
| **Insulation resistance** | 20 MΩ min. (at 500 VDC) between the external AC terminals and GR terminals | No insulation between primary and secondary for DC power supply |
| **Dielectric strength** | 2,300 VAC at 50/60 Hz for 1 min between the external AC and GR terminals, leakage current: 5 mA max. | No insulation between primary and secondary for DC power supply |
| **Noise immunity** | Conforms to IEC 61000-4-4. 2 kV (power supply line) | |
| **Vibration resistance** | CP1L-L/M: Conforms to JIS C60068-2-6. 10 to 57 Hz, 0.075-mm amplitude, 57 to 150 Hz, acceleration: 9.8 m/s$^2$ in X, Y, and Z directions for 80 minutes each. Sweep time: 8 minutes × 10 sweeps = total time of 80 minutes) CP1L-EL/EM: 5 to 8.4 Hz, 3.5 mm amplitude, 8.4 to 150 Hz, acceleration: 9.8 m/s$^2$ in X, Y, and Z directions for 100 minutes each (time coefficient of 10 minutes × coefficient factor of 10 = total time of 100 minutes) | |
| **Shock resistance** | Conforms to JIS C60068-2-27. 147 m/s$^2$ three times each in X, Y, and Z directions | |
| **Ambient operating temperature** | 0 to 55°C | |
| **Ambient humidity** | 10% to 90% (with no condensation) | |
| **Ambient operating environment** | No corrosive gas | |
| **Ambient storage temperature** | −20 to 75°C (Excluding battery.) | |
| **Power holding time** | 10 ms min. | 2 ms min. |

\* The above values are for a cold start at room temperature for an AC power supply, and for a cold start for a DC power supply.
  • A thermistor (with low-temperature current suppression characteristics) is used in the inrush current control circuitry for the AC power supply. The thermistor will not be sufficiently cooled if the ambient temperature is high or if a hot start is performed when the power supply has been OFF for only a short time. In those cases the inrush current values may be higher (as much as two times higher) than those shown above. Always allow for this when selecting fuses and breakers for external circuits.
  • A capacitor charge-type delay circuit is used in the inrush current control circuitry for the DC power supply. The capacitor will not be charged if a hot start is performed when the power supply has been OFF for only a short time, so in those cases the inrush current values may be higher (as much as two times higher) than those shown above.

# Performance Specifications

● **CP1L CPU Unit (EM/EL Type)**

| | Type | CP1L-EM40 (40 points) | CP1L-EM30 (30 points) | CP1L-EL20 (20 points) |
|---|---|---|---|---|
| **Item** | **Models** | CP1L-EM40D□-□ | CP1L-EM30D□-□ | CP1L-EL20D□-□ |
| **Control method** | | Stored program method | | |
| **I/O control method** | | Cyclic scan with immediate refreshing | | |
| **Program language** | | Ladder diagram | | |
| **Function blocks** | | Maximum number of function block definitions: 128 Maximum number of instances: 256 Languages usable in function block definitions: Ladder diagrams, structured text (ST) | | |
| **Instruction length** | | 1 to 7 steps per instruction | | |
| **Instructions** | | Approx. 500 (function codes: 3 digits) | | |
| **Instruction execution time** | | Basic instructions: 0.55 μs min. Special instructions: 4.1 μs min. | | |
| **Common processing time** | | 0.4ms | | |
| **Program capacity** | | 10K steps | | 5K steps |
| | **FB program memory** | 10K steps | | |
| **Number of tasks** | | 288 (32 cyclic tasks and 256 interrupt tasks) | | |
| | **Scheduled interrupt tasks** | 1 (interrupt task No. 2, fixed) | | |
| | **Input interrupt tasks** | 6 (interrupt task No. 140 to 145, fixed) | | |
| | | (High-speed counter interrupts and interrupt tasks specified by external interrupts can also be executed.) | | |
| **Maximum subroutine number** | | 256 | | |
| **Maximum jump number** | | 256 | | |
| **I/O areas** | **Input Area** | 1,600 bits (100 words) CIO 0 to CIO 99 | | |
| | **Built-in Input Area** | 24 bits: CIO 0.00 to CIO 0.11 and CIO 1.00 to CIO 1.11 | 18 bits: CIO 0.00 to CIO 0.11 and CIO 1.00 to CIO 1.05 | 12 bits: CIO 0.00 to CIO 0.11 |
| | **Output Area** | 1,600 bits (100 words) CIO 100 to CIO 199 | | |
| | **Built-in Output Area** | 16 bits: CIO 100.00 to CIO 100.07 and CIO 101.00 to CIO 101.07 | 12 bits: CIO 100.00 to CIO 100.07 and CIO 101.00 to CIO 101.03 | 8 bits: CIO 100.00 to CIO 100.07 |
| | **1:1 Link Area** | 256 bits (16 words): CIO 3000.00 to CIO 3015.15 (CIO 3000 to CIO 3015) | | |
| | **Serial PLC Link Area** | 1,440 bits (90 words): CIO 3100.00 to CIO 3189.15 (CIO 3100 to CIO 3189) | | |
| **Work bits** | | 4,800 bits (300 words): CIO 1200.00 to CIO 1499.15 (words CIO 1200 to CIO 1499) 6,400 bits (400 words): CIO 1500.00 to CIO 1899.15 (words CIO 1500 to CIO 1899) 15,360 bits (960 words): CIO 2000.00 to CIO 2959.15 (words CIO 2000 to CIO 2959) 9,600 bits (600 words): CIO 3200.00 to CIO 3799.15 (words CIO 3200 to CIO 3799) 37,504 bits (2,344 words): CIO 3800.00 to CIO 6143.15 (words CIO 3800 to CIO 6143) | | |
| **TR Area** | | 16 bits: TR0 to TR15 | | |
| **Holding Area** | | 8,192 bits (512 words): H0.00 to H511.15 (H0 to H511) | | |
| **AR Area** | | Read-only (Write-prohibited): 7168 bits (448 words): A0.00 to A447.15 (A0 to A447) Read/Write: 8192 bits (512 words): A448.00 to A959.15 (A448 to A959) | | |
| **Timers** | | 4,096 timer numbers: T0 to T4095 | | |
| **Counters** | | 4,096 counter numbers: C0 to C4095 | | |
| **DM Area** | | 32 Kwords: D0 to D32767 | | 10 Kwords: D0 to D9999, D32000 to D32767 |
| **Data Register Area** | | 16 registers (16 bits): DR0 to DR15 | | |
| **Index Register Area** | | 16 registers (32 bits): IR0 to IR15 | | |
| **Task Flag Area** | | 32 flags (32 bits): TK0000 to TK0031 | | |
| **Trace Memory** | | 4,000 words (500 samples for the trace data maximum of 31 bits and 6 words.) | | |
| **Memory Cassette** | | A special Memory Cassette (CP1W-ME05M) can be mounted. **Note:** Can be used for program backups and auto-booting. | | |
| **Clock function** | | Supported. Accuracy (monthly deviation): -4.5 min to -0.5 min (ambient temperature: 55°C), -2.0 min to +2.0 min (ambient temperature: 25°C), -2.5 min to +1.5 min (ambient temperature: 0°C) | | |
| **Communications functions** | | Built-in Ethernet Port (Connecting Support Software, Message Communications, Socket Service) | | |
| | | A maximum of two Serial Communications Option Boards can be mounted. | | A maximum of one Serial Communications Option Board can be mounted. |
| **Memory backup** | | Flash memory: User programs, parameters (such as the PLC Setup), comment data, and the entire DM Area can be saved to flash memory as initial values. Battery backup: The Holding Area, DM Area, and counter values (flags, PV) are backed up by a battery. | | |
| **Battery service life** | | Service life expectancy is 5 years at 25°C, less at higher temperatures. (From 0.75 to 5 years depending on model, power supply rate, and ambient temperature.) | | |
| **Built-in input terminals** | | 40 (24 inputs, 16 outputs) | 30 (18 inputs, 12 outputs) | 20 (12 inputs, 8 outputs) |
| **Number of connectable Expansion Units and Expansion I/O Units** | | CP-series Expansion Unit and Expansion I/O Units: 3 max. | | CP-series Expansion Units and Expansion I/O Units: 1 max. |
| **Max. number of I/O points** | | 160 (40 built in + 40 per Expansion (I/O) Unit x 3 Units) | 150 (30 built in + 40 per Expansion (I/O) Unit x 3 Units) | 60 (20 built in + 40 per Expansion (I/O) Unit x 1 Unit) |
| **Interrupt inputs** | | 6 inputs (Response time: 0.3 ms) | | |
| **Interrupt inputs counter mode** | | 6 inputs (Response frequency: 5 kHz max. for all interrupt inputs), 16 bits Up or down counters | | |
| **Quick-response inputs** | | 6 points (Min. input pulse width: 50 μs max.) | | |
| **Scheduled interrupts** | | 1 | | |
| **High-speed counters** | | 4 inputs/2 axes (24 VDC) Differential phases (4x), 50 kHz Single-phase (pulse plus direction, up/down, increment), 100 kHz Value range: 32 bits, Linear mode or ring mode Interrupts: Target value comparison or range comparison | | |

| Type | CP1L-EM40 (40 points) | CP1L-EM30 (30 points) | CP1L-EL20 (20 points) |
|---|---|---|---|
| Item Models | CP1L-EM40D□-□ | CP1L-EM30D□-□ | CP1L-EL20D□-□ |
| Pulse outputs (models with transistor outputs only) — Pulse outputs | Trapezoidal or S-curve acceleration and deceleration (Duty ratio: 50% fixed) 2 outputs, 1 Hz to 100 kHz (CCW/CW or pulse plus direction) | | |
| Pulse outputs (models with transistor outputs only) — PWM outputs | Duty ratio: 0.0% to 100.0% (specified in increments of 0.1% or 1%) 2 outputs, 0.1 to 6553.5 Hz or 1 to 32,800 Hz (Accuracy: +1%/0% at 0.1 Hz to 10,000 Hz and +5%/0% at 10,000 Hz to 32,800 Hz) | | |
| Analog input | 2 input (Resolution: 1/1000, Input range: 0 to 10 V). Not isolated. | | |

## ● CP1L CPU Unit (M/L Type)

| Type | CP1L-M60 (60 points) | CP1L-M40 (40 points) | CP1L-M30 (30 points) | CP1L-L20 (20 points) | CP1L-L14 (14 points) | CP1L-L10 (10 points) |
|---|---|---|---|---|---|---|
| Item Models | CP1L-M60□□-□ | CP1L-M40□□-□ | CP1L-M30□□-□ | CP1L-L20□□-□ | CP1L-L14□□-□ | CP1L-L10□□-□ |
| Control method | Stored program method | | | | | |
| I/O control method | Cyclic scan with immediate refreshing | | | | | |
| Program language | Ladder diagram | | | | | |
| Function blocks | Maximum number of function block definitions: 128 Maximum number of instances: 256 Languages usable in function block definitions: Ladder diagrams, structured text (ST) | | | | | |
| Instruction length | 1 to 7 steps per instruction | | | | | |
| Instructions | Approx. 500 (function codes: 3 digits) | | | | | |
| Instruction execution time | Basic instructions: 0.55 µs min. Special instructions: 4.1 µs min. | | | | | |
| Common processing time | 0.4 ms | | | | | |
| Program capacity | 10K steps | | | 5K steps | | |
| Number of tasks | 288 (32 cyclic tasks and 256 interrupt tasks) | | | | | |
| Scheduled interrupt tasks | 1 (interrupt task No. 2, fixed) | | | | | |
| Input interrupt tasks | 6 (interrupt task No. 140 to 145, fixed) | | | | 4 (interrupt task No. 140 to 143, fixed) | 2 (interrupt task No. 140 to 141, fixed) |
| | (Interrupt tasks can also be specified and executed for high-speed counter interrupts and executed.) | | | | | |
| Maximum subroutine number | 256 | | | | | |
| Maximum jump number | 256 | | | | | |
| I/O areas — Input Area | 1,600 bits (100 words) CIO 0 to CIO 99 | | | | | |
| I/O areas — Built-in Input Area | 36 bits: CIO 0.00 to CIO 0.11 and CIO 1.00 to CIO 1.11 and CIO 2.00 to CIO 2.11 | 24 bits: CIO 0.00 to CIO 0.11 and CIO 1.00 to CIO 1.11 | 18 bits: CIO 0.00 to CIO 0.11 and CIO 1.00 to CIO 1.05 | 12 bits: CIO 0.00 to CIO 0.11 | 8 bits: CIO 0.00 to CIO 0.07 | 6 bits: CIO 0.00 to CIO 0.05 |
| I/O areas — Output Area | 1,600 bits (100 words) CIO 100 to CIO 199 | | | | | |
| I/O areas — Built-in Output Area | 24 bits: CIO 100.00 to CIO 100.07 and CIO 101.00 to CIO 101.07 and CIO 102.00 to CIO 102.07 | 16 bits: CIO 100.00 to CIO 100.07 and CIO 101.00 to CIO 101.07 | 12 bits: CIO 100.00 to CIO 100.07 and CIO 101.00 to CIO 100.03 | 8 bits: CIO 100.00 to CIO 100.07 | 6 bits: CIO 100.00 to CIO 100.05 | 4 bits: CIO 100.00 to CIO 100.03 |
| I/O areas — 1:1 Link Area | 256 bits (16 words): CIO 3000.00 to CIO 3015.15 (CIO 3000 to CIO 3015) | | | | | |
| I/O areas — Serial PLC Link Area | 1,440 bits (90 words): CIO 3100.00 to CIO 3189.15 (CIO 3100 to CIO 3189) | | | | | |
| Work bits | 8,192 bits (512 words): W000.00 to W511.15 (W0 to W511) CIO Area: 37,504 bits (2,344 words): CIO 3800.00 to CIO 6143.15 (CIO 3800 to CIO 6143) | | | | | |
| TR Area | 16 bits: TR0 to TR15 | | | | | |
| Holding Area | 8,192 bits (512 words): H0.00 to H511.15 (H0 to H511) | | | | | |
| AR Area | Read-only (Write-prohibited): 7168 bits (448 words): A0.00 to A447.15 (A0 to A447) Read/Write: 8192 bits (512 words): A448.00 to A959.15 (A448 to A959) | | | | | |
| Timers | 4,096 timer numbers: T0 to T4095 | | | | | |
| Counters | 4,096 counter numbers: C0 to C4095 | | | | | |
| DM Area | 32 Kwords: D0 to D32767 | | | 10 Kwords: D0 to D9999, D32000 to D32767 | | |
| Data Register Area | 16 registers (16 bits): DR0 to DR15 | | | | | |
| Index Register Area | 16 registers (32 bits): IR0 to IR15 | | | | | |
| Task Flag Area | 32 flags (32 bits): TK0000 to TK0031 | | | | | |
| Trace Memory | 4,000 words (500 samples for the trace data maximum of 31 bits and 6 words.) | | | | | |
| Memory Cassette | A special Memory Cassette (CP1W-ME05M) can be mounted. **Note:** Can be used for program backups and auto-booting. | | | | | |
| Clock function | Supported. Accuracy (monthly deviation): −4.5 min to −0.5 min (ambient temperature: 55°C), −2.0 min to +2.0 min (ambient temperature: 25°C), −2.5 min to +1.5 min (ambient temperature: 0°C) | | | | | |
| Communications functions | One built-in peripheral port (USB 1.1): For connecting Support Software only. | | | | | |
| Communications functions | A maximum of two Serial Communications Option Boards can be mounted. | | | A maximum of one Serial Communications Option Board can be mounted. | | Not supported. |
| Communications functions | A maximum of two Ethernet Option Board can be mounted. When using CP1W-CIF41 Ver.1.0, one Ethernet Option Board can be mounted. | | | A maximum of one Ethernet Option Board can be mounted. | | Not supported. |
| Memory backup | Flash memory: User programs, parameters (such as the PLC Setup), comment data, and the entire DM Area can be saved to flash memory as initial values. Battery backup: The Holding Area, DM Area, and counter values (flags, PV) are backed up by a battery. | | | | | |
| Battery service life | Service life expectancy is 5 years at 25°C, less at higher temperatures. (From 0.75 to 5 years depending on model, power supply rate, and ambient temperature.) | | | | | |

| Type<br>Item | Models | CP1L-M60<br>(60 points)<br>CP1L-M60☐☐-☐ | CP1L-M40<br>(40 points)<br>CP1L-M40☐☐-☐ | CP1L-M30<br>(30 points)<br>CP1L-M30☐☐-☐ | CP1L-L20<br>(20 points)<br>CP1L-L20☐☐-☐ | CP1L-L14<br>(14 points)<br>CP1L-L14☐☐-☐ | CP1L-L10<br>(10 points)<br>CP1L-L10☐☐-☐ |
|---|---|---|---|---|---|---|---|
| **Built-in input terminals** | | 60 (36 inputs, 24 outputs) | 40 (24 inputs, 16 outputs) | 30 (18 inputs, 12 outputs) | 20 (12 inputs, 8 outputs) | 14 (8 inputs, 6 outputs) | 10 (6 inputs, 4 outputs) |
| **Number of connectable Expansion Units and Expansion I/O Units** | | CP-series Expansion Unit and Expansion I/O Units: 3 max. | | | CP-series Expansion Units and Expansion I/O Units: 1 max. | | Not supported. |
| **Max. number of I/O points** | | 180 (60 built in + 40 per Expansion (I/O) Unit × 3 Units) | 160 (40 built in + 40 per Expansion (I/O) Unit × 3 Units) | 150 (30 built in + 40 per Expansion (I/O) Unit × 3 Units) | 60 (20 built in + 40 per Expansion (I/O) Unit × 1 Unit) | 54 (14 built in + 40 per Expansion (I/O) Unit × 1 Unit) | 10 (10 built in) |
| **Interrupt inputs** | | 6 inputs (Response time: 0.3 ms) | | | | 4 inputs (Response time: 0.3 ms) | 2 inputs (Response time: 0.3 ms) |
| **Interrupt inputs counter mode** | | 6 inputs (Response frequency: 5 kHz max. for all interrupt inputs), 16 bits Up or down counters | | | | 4 inputs (Response frequency: 5 kHz max. for all interrupt inputs), 16 bits Up or down counters | 2 inputs (Response frequency: 5 kHz max. for all interrupt inputs), 16 bits Up or down counters |
| **Quick-response inputs** | | 6 points (Min. input pulse width: 50 μs max.) | | | | 4 points (Min. input pulse width: 50 μs max.) | 2 points (Min. input pulse width: 50 μs max.) |
| **Scheduled interrupts** | | 1 | | | | | |
| **High-speed counters** | | 4 inputs/2 axes (24 VDC): Differential phases (4x), 50 kHz<br>Single-phase (pulse plus direction, up/down, increment), 100 kHz<br>Value range: 32 bits, Linear mode or ring mode<br>Interrupts: Target value comparison or range comparison | | | | | |
| **Pulse outputs (models with transistor outputs only)** | Pulse outputs | Trapezoidal or S-curve acceleration and deceleration (Duty ratio: 50% fixed)<br>2 outputs, 1 Hz to 100 kHz (CCW/CW or pulse plus direction) | | | | | |
| | PWM outputs | Duty ratio: 0.0% to 100.0% (specified in increments of 0.1% or 1%)<br>2 outputs, 0.1 to 6553.5 Hz or 1 to 32,800 Hz (Accuracy: +1%/0% at 0.1 Hz to 10,000 Hz and +5%/0% at 10,000 Hz to 32,800 Hz) | | | | | |
| **Analog control** | | 1 (Setting range: 0 to 255) | | | | | |
| **Analog input** | | 1 input (Resolution: 1/256, Input range: 0 to 10 V). Not isolated. | | | | | |

# CP1L

# Built-in Inputs

## ■ Input Terminal Block Arrangement (Top Block)

### ● CP1L (60 Inputs)

· AC Power Supply Models

| L1 | L2/N | COM | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | 07 | 09 | 11 |
|----|------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| ⏚ | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | 06 | 08 | 10 |
| | | Inputs (CIO 0) | | | | | | | Inputs (CIO 1) | | | | | | Inputs (CIO 2) | | | | | |

· DC Power Supply Models

| + | − | COM | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | 07 | 09 | 11 |
|----|------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| NC | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | 06 | 08 | 10 |
| | | Inputs (CIO 0) | | | | | | | Inputs (CIO 1) | | | | | | Inputs (CIO 2) | | | | | |

### ● CP1L (40 Inputs)

· AC Power Supply Models

| L1 | L2/N | COM | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | 07 | 09 | 11 |
|----|------|-----|----|----|----|----|----|----|----|----|----|----|----|----|
| ⏚ | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | 06 | 08 | 10 |
| | | Inputs (CIO 0) | | | | | | | Inputs (CIO 1) | | | | | |

· DC Power Supply Models

| + | − | COM | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | 07 | 09 | 11 |
|----|------|-----|----|----|----|----|----|----|----|----|----|----|----|
| NC | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | 06 | 08 | 10 |
| | | Inputs (CIO 0) | | | | | | | Inputs (CIO 1) | | | | | |

### ● CP1L (30 inputs)

· AC Power Supply Models

| L1 | L2/N | COM | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | |
|----|------|-----|----|----|----|----|----|----|----|----|----|----|
| ⏚ | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | NC |
| | | Inputs (CIO 0) | | | | | | | Inputs (CIO 1) | | | |

· DC Power Supply Models

| + | − | COM | 01 | 03 | 05 | 07 | 09 | 11 | 01 | 03 | 05 | |
|----|------|-----|----|----|----|----|----|----|----|----|----|----|
| NC | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 | 00 | 02 | 04 | NC |
| | | Inputs (CIO 0) | | | | | | | Inputs (CIO 1) | | | |

### ● CP1L (20 Inputs)

· AC Power Supply Models

| L1 | L2/N | COM | 01 | 03 | 05 | 07 | 09 | 11 |
|----|------|-----|----|----|----|----|----|----|
| ⏚ | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 |
| | | Inputs (CIO 0) | | | | | | |

· DC Power Supply Models

| + | − | COM | 01 | 03 | 05 | 07 | 09 | 11 |
|----|------|-----|----|----|----|----|----|----|
| NC | ⏚ | 00 | 02 | 04 | 06 | 08 | 10 |
| | | Inputs (CIO 0) | | | | | | |

### ● CP1L (14 Inputs)

· AC Power Supply Models

| L1 | L2/N | COM | 01 | 03 | 05 | 07 | NC | NC |
|----|------|-----|----|----|----|----|----|----|
| ⏚ | ⏚ | 00 | 02 | 04 | 06 | NC | NC |
| | | Inputs (CIO 0) | | | | | | |

· DC Power Supply Models

| + | − | COM | 01 | 03 | 05 | 07 | NC | NC |
|----|------|-----|----|----|----|----|----|----|
| NC | ⏚ | 00 | 02 | 04 | 06 | NC | NC |
| | | Inputs (CIO 0) | | | | | | |

### ● CP1L (10 Inputs)

· AC Power Supply Models

| L1 | L2/N | COM | 01 | 03 | 05 |
|----|------|-----|----|----|----|
| ⏚ | ⏚ | 00 | 02 | 04 |
| | | Inputs (CIO 0) | | | |

· DC Power Supply Models

| { | | | COM | 01 | 03 | 05 |
|----|----|-----|----|----|----|
| NC | ⏚ | 00 | 02 | 04 |
| | | Inputs (CIO 0) | | | |

## ■ Built-in Input Area

| Number of inputs | Word | Bit | Normal inputs | Interrupt inputs | Quick-response inputs | Single-phase (increment pulse input) | Two-phase (differential phase x4, up/down, or pulse plus direction) | CPU Units with 20 to 60 points | CPU Units with 14 points | CPU Units with 10 points |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 00 | Normal input 0 | --- | --- | High-speed counter 0 (increment) | High-speed counter 0 (phase-A, increment, or count input) | --- | --- | --- |
| | | 01 | Normal input 1 | --- | --- | High-speed counter 1 (increment) | High-speed counter 0 (phase-B, decrement, or direction) | --- | --- | --- |
| | | 02 | Normal input 2 | --- | --- | High-speed counter 2 (increment) | High-speed counter 1 (phase-A, increment, or count input) | --- | Pulse output 0: Origin proximity input signal | --- |
| 10 | | 03 | Normal input 3 | --- | --- | High-speed counter 3 (increment) | High-speed counter 1 (phase-B, decrement, or count input) | --- | Pulse output 1: Origin proximity input signal | Pulse output 0: Origin proximity input signal |
| | CIO 0 | 04 | Normal input 4 | Interrupt input 0 | Quick-response input 0 | Counter 0, phase-Z/reset input | High-speed counter 0 (phase-Z/reset) | --- | --- | --- |
| | | 05 | Normal input 5 | Interrupt input 1 | Quick-response input 1 | Counter 1, phase-Z/reset input | High-speed counter 1 (phase-Z/reset) | --- | --- | Pulse output 0: Origin input signal- |
| 14 | | 06 | Normal input 6 | Interrupt input 2 | Quick-response input 2 | Counter 2, phase-Z/reset input | | Pulse output 0: Origin input signal | | --- |
| | | 07 | Normal input 7 | Interrupt input 3 | Quick-response input 3 | Counter 3, phase-Z/reset input | | Pulse output 1: Origin input signal | | --- |
| | | 08 | Normal input 8 | Interrupt input 4 | Quick-response input 4 | --- | | --- | --- | --- |
| | | 09 | Normal input 9 | Interrupt input 5 | Quick-response input 5 | --- | | --- | --- | --- |
| 20 | | 10 | Normal input 10 | --- | --- | --- | | Pulse output 0: Origin proximity input signal | --- | --- |
| | | 11 | Normal input 11 | --- | --- | --- | | Pulse output 1: Origin proximity input signal | --- | --- |
| | | 00 | Normal input 12 | --- | --- | --- | --- | --- | --- | --- |
| 30 | | to | to | to | to | to | to | to | to | to |
| | | 05 | Normal input 17 | --- | --- | --- | --- | --- | --- | --- |
| | CIO 1 | 06 | Normal input 18 | --- | --- | --- | --- | --- | --- | --- |
| 40 | | to | to | to | to | to | to | to | to | to |
| | | 11 | Normal input 23 | --- | --- | --- | --- | --- | --- | --- |
| | | 00 | Normal input 24 | --- | --- | --- | --- | --- | --- | --- |
| 60 | CIO 2 | to | to | to | to | to | to | to | to | to |
| | | 11 | Normal input 35 | --- | --- | --- | --- | --- | --- | --- |

# Built-in Outputs

## ■ Output Terminal Block Arrangement (Bottom Block)

### ● CP1L (60 Outputs)

· AC Power Supply Models

| + | 00 | 01 | 02 | 04 | 05 | 07 | 00 | 02 | 04 | 05 | 07 | 00 | 02 | 04 | 05 | 07 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | COM | COM | COM | 03 | COM | 06 | COM | 01 | 03 | COM | 06 | COM | 01 | 03 | COM | 06 |

CIO 100  CIO 101  CIO 102

· DC Power Supply Models

| NC | 00 | 01 | 02 | 04 | 05 | 07 | 00 | 02 | 04 | 05 | 07 | 00 | 02 | 04 | 05 | 07 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NC | COM | COM | COM | 03 | COM | 06 | COM | 01 | 03 | COM | 06 | COM | 01 | 03 | COM | 06 |

CIO 100  CIO 101  CIO 102

### ● CP1L (40 Outputs)

· AC Power Supply Models

| + | 00 | 01 | 02 | 03 | 04 | 06 | 00 | 01 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| - | COM | COM | COM | COM | 05 | 07 | COM | 02 | COM | 05 | 07 |

CIO 100  CIO 101

· DC Power Supply Models

CP1L-EM40DR-D/CP1L-M40D□-D

| NC | 00 | 01 | 02 | 03 | 04 | 06 | 00 | 01 | 03 | 04 | 06 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NC | COM | COM | COM | COM | 05 | 07 | COM | 02 | COM | 05 | 07 |

CIO 100  CIO 101

CP1L-EM40DT-D

| V+ | 00 | 01 | 02 | 03 | 04 | 06 | 00 | 01 | 03 | 04 | 06 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V- | COM(V-) | | | COM | 05 | 07 | COM | 02 | COM | 05 | 07 |

CIO 100  CIO 101

CP1L-EM40DT1-D

| V+ | 00 | 01 | 02 | 03 | 04 | 06 | 00 | 01 | 03 | 04 | 06 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V- | COM(V+) | | | COM | 05 | 07 | COM | 02 | COM | 05 | 07 |

CIO 100  CIO 101

### ● CP1L (30 Outputs)

· AC Power Supply Models

| + | 00 | 01 | 02 | 04 | 05 | 07 | 00 | 02 |
|---|---|---|---|---|---|---|---|---|
| − | COM | COM | COM | 03 | COM | 06 | COM | 01 | 03 |

CIO 100  CIO 101

· DC Power Supply Models

CP1L-EM30DR-D/CP1L-M30D□-D

| NC | 00 | 01 | 02 | 04 | 05 | 07 | 00 | 02 |
|---|---|---|---|---|---|---|---|---|
| NC | COM | COM | COM | 03 | COM | 06 | COM | 01 | 03 |

CIO 100  CIO 101

CP1L-EM30DT-D

| V+ | 00 | 01 | 02 | 04 | 05 | 07 | 00 | 02 |
|---|---|---|---|---|---|---|---|---|
| V- | COM(V-) | | 03 | COM | 06 | COM | 01 | 03 |

CIO 100  CIO 101

CP1L-EM30DT1-D

| V+ | 00 | 01 | 02 | 04 | 05 | 07 | 00 | 02 |
|---|---|---|---|---|---|---|---|---|
| V- | COM(V+) | | 03 | COM | 06 | COM | 01 | 03 |

CIO 100  CIO 101

### ● CP1L (20 Outputs)

· AC Power Supply Models

| + | 00 | 01 | 02 | 04 | 05 | 07 |
|---|---|---|---|---|---|---|
| − | COM | COM | COM | 03 | COM | 06 |

CIO 100

· DC Power Supply Models

CP1L-EL20DR-D/CP1L-L20D□-D

| NC | 00 | 01 | 02 | 04 | 05 | 07 |
|---|---|---|---|---|---|---|
| NC | COM | COM | COM | 03 | COM | 06 |

CIO 100

CP1L-EL20DT-D

| V+ | 00 | 01 | 02 | 04 | 05 | 07 |
|---|---|---|---|---|---|---|
| V- | COM(V-) | | 03 | COM | 06 |

CIO 100

CP1L-EL20DT1-D

| V+ | 00 | 01 | 02 | 04 | 05 | 07 |
|---|---|---|---|---|---|---|
| V- | COM(V+) | | 03 | COM | 06 |

CIO 100

### ● CP1L (14 Outputs)

· AC Power Supply Models

| + | 00 | 01 | 02 | 04 | 05 | NC |
|---|---|---|---|---|---|---|
| − | COM | COM | COM | 03 | COM | NC |

CIO 100

· DC Power Supply Models

| NC | 00 | 01 | 02 | 04 | 05 | NC |
|---|---|---|---|---|---|---|
| NC | COM | COM | COM | 03 | COM | NC |

CIO 100

### ● CP1L (10 Outputs)

· AC Power Supply Models

| { | 00 | 01 | 02 |
|---|---|---|---|
| ǀ | COM | COM | COM | 03 |

CIO 100

· DC Power Supply Models

| NC | 00 | 01 | 02 |
|---|---|---|---|
| NC | COM | COM | COM | 03 |

CIO 100

## ■ Built-in Output Area

| Number of outputs | Output Terminal Block | | When the instructions to the right are not executed | When a pulse output instruction (SPED, ACC, PLS2, or ORG) is executed | | When the origin search function is set to be used in the PLC Setup, and an origin search is executed by the ORG instruction | | When the PWM instruction is executed |
| | | | | Fixed duty ratio pulse output | | | | Variable duty ratio pulse output |
| | Word | Bit | Normal output | CW/CCW | Pulse plus direction | When the origin search function is used | | PWM output |
| | | | | | | CPU Units with 14 to 60 points | CPU Units with 10 point | |
| 10 / 14 / 20 | CIO 100 | 00 | Normal output 0 | Pulse output 0 (CW) | Pulse output 0 (pulse) | --- | --- | --- |
| | | 01 | Normal output 1 | Pulse output 0 (CCW) | Pulse output 0 (direction) | --- | --- | PWM output 0 |
| | | 02 | Normal output 2 | Pulse output 1 (CW) | Pulse output 1 (pulse) | --- | --- | --- |
| | | 03 | Normal output 3 | Pulse output 1 (CCW) | Pulse output 1 (direction) | --- | Origin search 0 (Error counter reset output) | PWM output 1 |
| | | 04 | Normal output 4 | --- | --- | Origin search 0 (Error counter reset output) | --- | --- |
| | | 05 | Normal output 5 | --- | --- | Origin search 1 (Error counter reset output) | --- | --- |
| | | 06 | Normal output 6 | --- | --- | --- | --- | --- |
| | | 07 | Normal output 7 | --- | --- | --- | --- | --- |
| 30 / 40 | CIO 101 | 00 | Normal output 8 | --- | --- | --- | --- | --- |
| | | to | to | to | to | to | to | to |
| | | 03 | Normal output 11 | --- | --- | --- | | --- |
| | | 04 | Normal output 12 | --- | --- | --- | | --- |
| | | to | to | to | to | to | to | to |
| | | 07 | Normal output 15 | --- | --- | --- | --- | --- |
| 60 | CIO 102 | 01 | Normal output 16 | --- | --- | --- | --- | --- |
| | | to | to | to | to | to | to | to |
| | | 07 | Normal output 23 | --- | --- | --- | --- | --- |

# CP1L

# I/O Specifications for CPU Units

## ■ Input Specifications

| ITEM | Specifications | | |
|---|---|---|---|
| | High-speed counter inputs (phases A and B) *1 | Interrupt inputs and quick-response inputs *1 | Normal inputs |
| | CIO 0.00 to CIO 0.03 | CIO 0.04 to CIO 0.09 *2 | CIO 0.10 to CIO 0.11, CIO 1.00 to CIO 1.11, and CIO 2.00 to 2.11 *2 |
| Input voltage | 24 VDC +10%/–15% | | |
| Applicable sensors | 2-wire sensors or 3-wire sensors | | |
| Input impedance | 3.0 kΩ | | 4.7 kΩ |
| Input current | 7.5 mA typical | | 5 mA typical |
| ON voltage | 17.0 VDC min. | | 14.4 VDC min. |
| OFF voltage/current | 1 mA max. at 5.0 VDC | | |
| ON delay *3 | 2.5 μs max. | 50 μs max. | 1 ms max. |
| OFF delay *3 | 2.5 μs max. | 50 μs max. | 1 ms max. |
| Circuit configuration |  |  |  |

**\*1.** High-speed counter inputs, interrupt inputs, and quick-response inputs can also be used as normal inputs.
**\*2.** The bits that can be used depend on the model of CPU Unit.
**\*3.** The response time is the hardware delay value. The delay set in the PLC Setup (0 to 32 ms, default: 8 ms) must be added to this value.

### ● High-speed Counter Function Input Specifications
Input bits: CIO 0.00 to CIO 0.03

| Item | Specifications |
|---|---|
| ON/OFF delay | • Pulse plus direction input mode  • Increment mode  • Up/down input mode    • Differential phase input mode  |

### ● Interrupt Input Counter Mode
Input bits: CIO 0.04 to CIO 0.09

| Item | Specifications |
|---|---|
| ON/OFF delay |  |

## ■ Output Specifications
### ● CPU Units with Relay Outputs

| Item | | | Specifications |
|---|---|---|---|
| Max. switching capacity | | | 2 A, 250 VAC (cosφ = 1), 2 A, 24 VDC 4 A/common) |
| Min. switching capacity | | | 5 VDC, 10 mA |
| Service life of relay | Electrical | Resistive load | 100,000 operations (24 VDC) |
| | | Inductive load | 48,000 operations (250 VAC, cosφ = 0.4) |
| | Mechanical | | 20,000,000 operations |
| ON delay | | | 15 ms max. |
| OFF delay | | | 15 ms max. |
| Circuit configuration | | |  |

**Note:** There are restrictions in the power supply voltage and output load current imposed by the ambient temperature for CPU Units with DC power.
Refer to the CP1L CPU Unit Operation Manual (Cat. No. W462) or the CP Series CP1L-EL/EM CPU Unit Operation Manual (Cat. No. W516).

## ● CPU Units with Transistor Outputs (Sinking/Sourcing)

| Item | Specifications | |
|---|---|---|
| | CIO 100.00 to CIO 100.03 *1 | CIO 100.04 to CIO 100.07 *2 |
| Max. switching capacity | 4.5 to 30 VDC, 300 mA/output, 0.9 A/common,  EM40D□-D 3.6 A/Unit<br>EM30D□-D 2.7 A/Unit<br>EL20D□-D 1.8 A/Unit<br>M60D□-D 5.4 A/Unit<br>M40D□-D 3.6 A/Unit<br>M30D□-D 2.7 A/Unit<br>L20D□-D 1.8 A/Unit<br>L14D□-D 1.5 A/Unit<br>L10D□-D 0.9 A/Unit | |
| Min. switching capacity | 4.5 to 30 VDC, 1 mA | |
| Leakage current | 0.1 mA max. | |
| Residual voltage | 0.6 V max. | 1.5 V max. |
| ON delay | 0.1 ms max. | |
| OFF delay | 0.1 ms max. | 1 ms max. |
| Fuse | CP1L-L/M CPU Unit: 1/common *3<br>CP1L-EL/EM CPU Unit: None | |
| Circuit configuration | CP1L-EL/EM CPU Unit<br> |  |
| | CP1L-L/M CPU Unit<br> |  |

**Note:** Do not apply a voltage or connect a load to an output terminal exceeding the maximum switching capacity.
**\*1.** Also do not exceed 0.9 A for the total of CIO 100.00 to CIO 100.03, which are different common.
**\*2.** The bits that can be used depend on the model of the CPU Unit.
**\*3.** The fuse cannot be replaced by the user.

### ● Pulse outputs
Output bits CIO 100.00 to CIO 100.03

| Item | Specifications |
|---|---|
| Max. switching capacity | 30 mA at 4.75 to 26.4 VDC |
| Min. switching capacity | 7 mA at 4.75 to 26.4 VDC |
| Max. output frequency | 100 kHz |
| Output waveform |  |

**Note: 1.** The above values assume a resistive load and do not consider the impedance of the cable connecting the load.
    **2.** The pulse widths during actual use may be smaller than the ones shown above due to pulse distortion caused by connecting cable impedance.
    **3.** The OFF and ON refer to the output transistor. The output transistor is ON at level "L".

### ● PWM outputs
Output bits CIO100.01, CIO 100.03

| Item | Specifications |
|---|---|
| Max. switching capacity | 30 mA at 4.75 to 26.4 VDC |
| Max. output frequency | 32.8 kHz |
| PWM output precision | For ON duty +1%, "0%:10 kHz output<br>For ON duty +5%, "0%: 0 to 32.8 kHz output |
| Output waveform | <br><br>$$\text{ON duty} = \frac{ton}{T} \times 100\%$$ |

**Note:** The OFF and ON refer to the output transistor. The output transistor is ON at level "L".

# CP1L

## ■ External Analog Setting Input Specifications

| Item | Specifications |
|---|---|
| Number of analog inputs | 1 |
| Input signal range | 0 to 10V |
| Resolution | 1/256 (full scale) |
| Isolation method | None |

**Note:** CP1L-L CPU Unit or CP1L-M CPU Unit only.

## ■ Analog Input Specifications

| Item | Specifications |
|---|---|
| Number of inputs | 2 inputs (2 words allocated in the AR Area) |
| Input signal range | Voltage input: 0 V to 10 V |
| Max. rated input | 0 V to 15 V |
| External input impedance | 100 KΩ min. |
| Resolution | 1/1000 (full scale) |
| Overrall accuracy | 25°C: ± 2.0% (full scale)<br>0 to 55°C: ± 3.0% (full scale) |
| A/D conversion data | 0000 to 03E8 hex |
| Averaging function | Not supported |
| Conversion time | Same as PLC cycle time |
| Isolation method | None |

**Note:** CP1L-EL CPU Unit or CP1L-EM CPU Unit only.

## ■ Built-in Ethernet Specifications (CP1H-EL CPU Units or CP1H-EM CPU Unit Only)

| Item | | Specifications |
|---|---|---|
| Protocol used | | TCP/IP, UDP, ARP, ICMP (ping only), BOOTP |
| Applications | | FINS, Socket, SNTP, DNS (client) |
| Media access method | | CSMA/CD |
| Modulation method | | Baseband |
| Transmission paths | | Star form |
| Baud rate | | 100 Mbit/s (100Base-TX), 10 Mbit/s (10Base-T) |
| Transmission media | 100 Mbit/s | • Unshielded twisted-pair (UDP) cable<br>  Categories: 5, 5e<br>• Shielded twisted-pair (STP) cable<br>  Categories: 100 Ω at 5, 5e |
| | 10 Mbit/s | • Unshielded twisted-pair (UDP) cable<br>  Categories: 3, 4, 5, 5e<br>• Shielded twisted-pair (STP) cable<br>  Categories: 100 Ω at 3, 4, 5, 5e |
| Transmission Distance | | 100 m (distance between hub and node) |

| Item | | FINS Communications Service Specifications |
|---|---|---|
| Number of nodes | | 254 |
| Message length | | 1016 bytes max. |
| Size of buffer | | 8k |
| Communications Function | | FINS Communications Service (UDP/IP, TCP/IP) |
| FINS/UDP method | Protocol used | UDP/IP |
| | Port number | 9600 (default) Can be changed. |
| | Protection | No |
| FINS/TCP method | Protocol used | TCP/IP |
| | Number of connections | Up to 2 simultaneous connections and only one connection can be set to client |
| | Port number | 9600 (default) Can be changed. |
| | Protection | Yes (Specification of client IP addresses when unit is used as a server) |

**\*1.** CX-One version 4.3 or higher is required.
**\*2.** To connect the CP1L CPUs with the NS-series Programmable Terminals via Ethernet, make sure that the system version of NS Series is 8.2 or higher.

**OMRON**

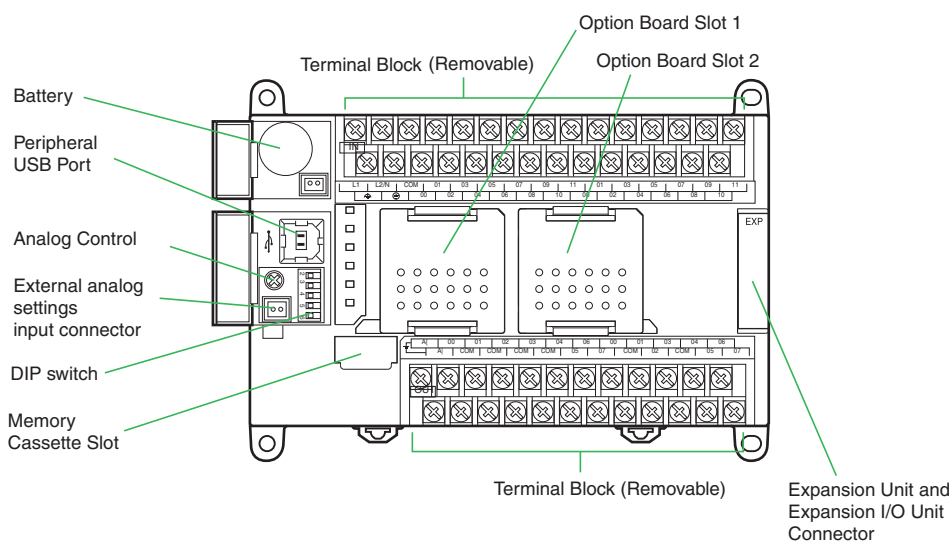# External Interfaces

■ **CP1L CPU Unit Nomenclature**

● **CP1L CPU Units (EL Type) with 20 Points**

Terminal Block (Fixed)

Battery

DIP switch

Memory Cassette slot

Ethernet port

Option Board slot

Terminal Block (Fixed)
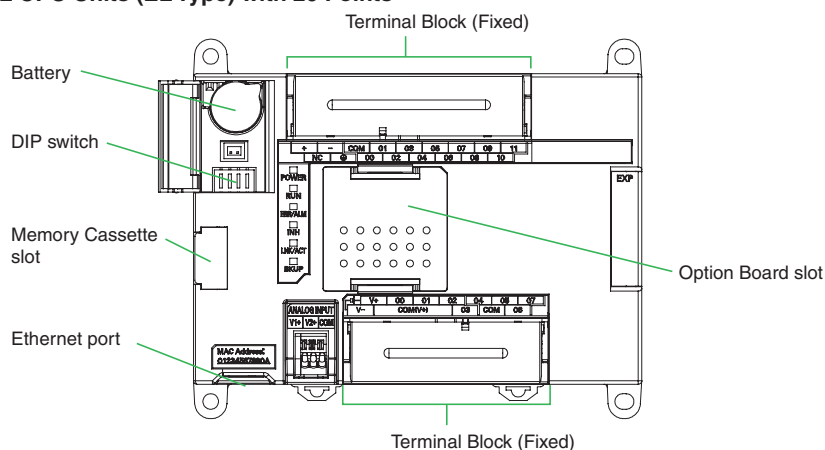
● **CP1L CPU Units (EM Type) with 40 or 30 Points**

Option Board slots 1 (left) and 2 (right)

Terminal Block (Removable)

Battery

DIP switch

Memory Cassette slot

External analog settings input connector

Ethernet port

Terminal Block (Removable)

Expansion I/O Unit connector
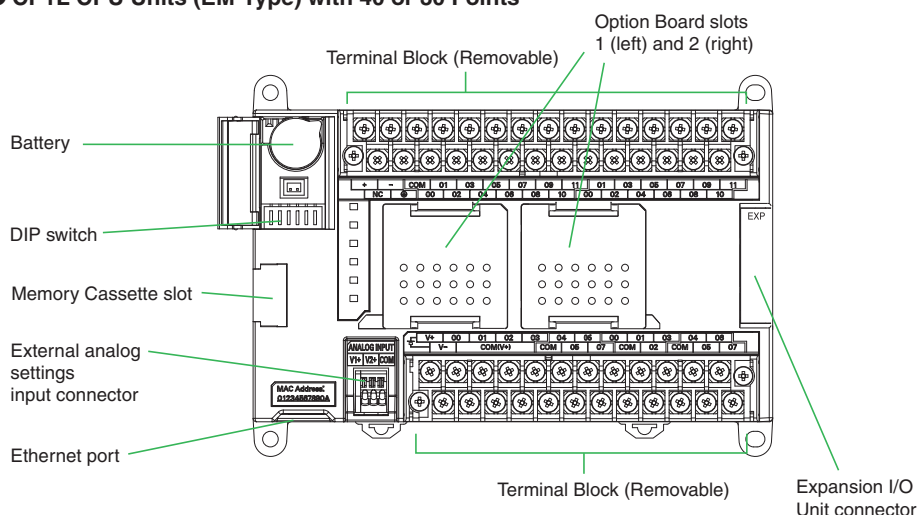
● **CP1L CPU Units (MType) with 40 Points**

Option Board Slot 1

Terminal Block (Removable)

Option Board Slot 2

Battery

Peripheral USB Port

Analog Control

External analog settings input connector

DIP switch

Memory Cassette Slot

Terminal Block (Removable)

Expansion Unit and Expansion I/O Unit Connector

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

Terminal Block (Fixed)

Memory
Cassette Slot

Option Board Slot

Battery

Terminal Block (Fixed)
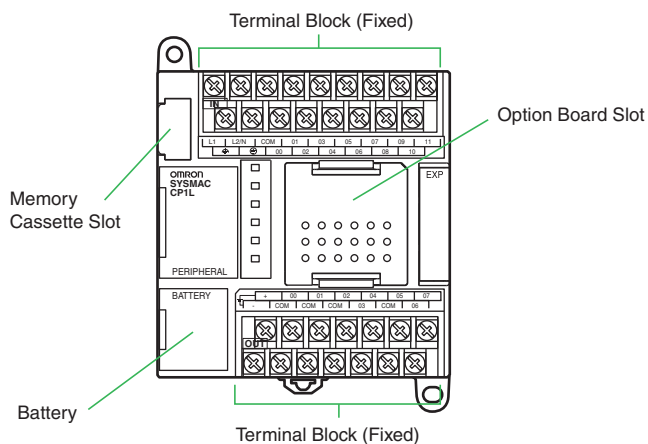
● **CP1L CPU Units (L Type) with 10 Points**

Terminal Block (Fixed)

Memory
Cassette Slot

Battery

Terminal Block (Fixed)

**OMRON**
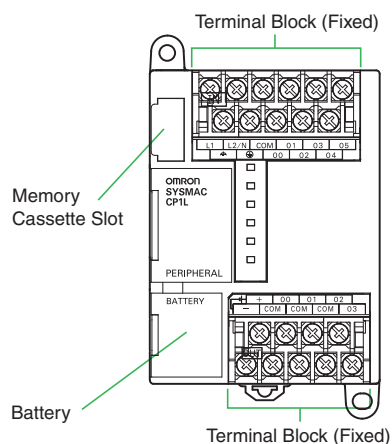
# Connection Methods

## ■ Built-in Standard Features

Yes : Supported, No : Not supported

| Item | Interface | Applicable CPU Units | | | | |
|---|---|---|---|---|---|---|
| | | CP1L-EM Type | CP1L-EL Type | CP1L-M Type | CP1L-L14/L20 | CP1L-L10 |
| **Ethernet port** | Connecting Support Software, Message Communications, and the other. | Yes | Yes | No | No | No |
| **Peripheral USB port** | Bus for communications with various kinds of Support Software running on a personal computer. | No | No | Yes | Yes | Yes |

## ■ Option Unit Specifications

Yes : Supported, No : Not supported

| Item | Option Boards | Applicable CPU Units | | | | |
|---|---|---|---|---|---|---|
| | | CP1L-EM Type | CP1L-EL Type | CP1L-M Type | CP1L-L14/L20 | CP1L-L10 |
| **Serial port 1 ***<br>**(Option board slot 1)** | Serial Communications Option Boards (CP1W-CIF01/CIF11/CIF12) | Yes | Yes | Yes | Yes | No |
| | Ethernet Option Boards (CP1W-CIF41) | No | No | Yes | Yes | No |
| | Analog I/O Option Boards (CP1W-MAB21/ADB21/DAB21V) | Yes | Yes | No | No | No |
| | LCD Option Boards (CP1W-DAM01) | Yes | Yes | Yes | Yes | No |
| **Serial port 2 ***<br>**(Option board slot 2)** | Serial Communications Option Boards (CP1W-CIF01/CIF11/CIF12) | Yes | No | Yes | No | No |
| | Ethernet Option Boards (CP1W-CIF41) | No | No | Yes | No | No |
| | Analog I/O Option Boards (CP1W-MAB21/ADB21/DAB21V) | Yes | No | No | No | No |

**\*** You can choose one from among "Yes".

## ■ Serial Communications Option Boards (CP1W-CIF01/CIF11/CIF12)

| Product name | Model | Specifications | Serial communications mode |
|---|---|---|---|
| **RS-232C Option Board** | CP1W-CIF01 | One RS-232C port<br>Connector: D-Sub, 9 pin, female<br>Maximum transmission distance: 15m<br>One RS-232C connector (D-Sub, 9 pin, male) is included.<br>(Plug: XM2A-0901, Hood: XM2S-0911-E) | Host Link, 1:N NT Link,<br>1:1 NT Link, Noprotocol,<br>Serial PLC Link Slave,<br>Serial PLC Link Master,<br>Serial Gateway converted to<br>CompoWay/F, and Tool Bus,<br>1:1 Link Master, and<br>1:1 Link Slave. |
| **RS-422A/485 Option Board** | CP1W-CIF11 | One RS-422A/485 port<br>Terminal block: using ferrules<br>Maximum transmission distance: 50m | |
| **RS-422A/485 Isolated-type Option Board** | CP1W-CIF12 | One RS-422A/485 port (Isolated)<br>Terminal block: using ferrules<br>Maximum transmission distance: 500m | |

Note: 1. Serial PLC Link can be used with either serial port 1 or serial port 2.
     2. Cannot be used for the CP1L-L10.

# CP1L

## ■ Ethernet Communications Specifications (CP1W-CIF41)

| Item | | | Specifications |
|---|---|---|---|
| Applicable PLCs | | | CP1L CPU Units<br>**Note:** The Ethernet Option Board cannot be used for the CP1L-EM/EL/L10. |
| Number of Units that can be mounted | | | 2 sets. (The CP1W-CIF41 Ver.1.0 and Ver.2.0 can be combined and used with one CPU Unit. When using CP1W-CIF41 Ver.1.0, only one unit can be mounted in an option board slot.) |
| Protocol used | | | TCP/IP, UDP |
| Applications | | | FINS |
| Transfer | Media access method | | CSMA/CD |
| | Modulation method | | Baseband |
| | Transmission paths | | Star form |
| | Baud rate | | 100 Mbit/s (100Base-TX), 10 Mbit/s (10Base-T) |
| | Transmission media | 100 Mbit/s | • Unshielded twisted-pair (UDP) cable<br>  Categories: 5, 5e<br>• Shielded twisted-pair (STP) cable<br>  Categories: 100 Ω at 5, 5e |
| | | 10 Mbit/s | • Unshielded twisted-pair (UDP) cable<br>  Categories: 3, 4, 5, 5e<br>• Shielded twisted-pair (STP) cable<br>  Categories: 100 Ω at 3, 4, 5, 5e |
| | Transmission Distance | | 100 m (distance between hub and node) |

| Item | | FINS Communications Service Specifications |
|---|---|---|
| Number of nodes | | 254 |
| Message length | | 1016 bytes max. |
| Size of buffer | | 8k |
| Communications Function | | FINS Communications Service (UDP/IP, TCP/IP) |
| FINS/UDP method | Protocol used | UDP/IP |
| | Port number | 9600 (default) Can be changed. |
| | Protection | No |
| FINS/TCP method | Protocol used | TCP/IP |
| | Number of connections | Up to 2 simultaneous connections and only one connection can be set to client |
| | Port number | 9600 (default) Can be changed. |
| | Protection | Yes (Specification of client IP addresses when unit is used as a server) |

**Note: 1.** CX-Programmer version 8.1 or higher (CX-One version 3.1 or higher) is required.
  **2.** Use CX-Integrator version 2.33 or higher (CX-One version 3.1 or higher) when the system needs to be set the routing tables. However, CX-Integrator does not support the other functions, using CP1W-CIF41, such as transferring the parameters and network structure.
  **3.** To connect the CP1H/CP1L CPUs with the NS-series Programmable Terminals via Ethernet using CP1W-CIF41, make sure that the system version of NS Series is 8.2 or higher.

## ■ Analog I/O Option Board (CP1W-ADB21/DAB21V/MAB221)

| Product name | Model | Specifications | | | |
|---|---|---|---|---|---|
| | | Input | | Output | |
| | | Voltage Input<br>0V to 10V | Current Input<br>0mA to 20mA | Voltage Output<br>0V to 10V | Conversion time |
| | | Resolution:1/4000 | Resolution:1/2000 | Resolution:1/4000 | |
| Analog Input Option Board | CP1W-ADB21 | 2CH | | - | 2ms/point |
| Analog Output Option Board | CP1W-DAB21V | - | | 2CH | 2ms/point |
| Analog I/O Option Board | CP1W-MAB221 | 2CH | | 2CH | 6ms/4point |

**Note:** CP1L-EL CPU Unit or CP1L-EM CPU Unit only.

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## ■ LCD Option board (CP1W-DAM01)
### ● Specifications

| Item | Function |
|---|---|
| Mounting port | CP1L: Option board slot 1<br>**Note:** The LCD Option Board cannot be used for the CP1L-L10. |
| Communications protocol | Peripheral bus (Turn ON DIP switch pin 4.) |
| Weight | 30 g max. |
| Number of display characters | 4 rows × 12 characters: 48 characters max. |
| Display characters | 5 × 7 dots (alphanumeric and symbols). |
| Backlight | Electroluminescence (EL): Normal: Lit green; Error: Flashing red |

### ● LCD Functions

| Operation | | Description |
|---|---|---|
| Changing operating modes | | Change the PLC operating mode without using the CX-Programmer. |
| I/O memory | | Read and change the present values in the memory areas and force-set or force-reset bits. |
| PLC Setup operations | | Read and change the PLC Setup. |
| Analog I/O monitor | | Monitor the analog adjustment and present value for the external analog setting input. |
| Error log display | | Read the log of errors that have occurred. |
| Memory cassette operation | | Transfer and verify user programs between the PLC and memory cassette. |
| User monitor settings | | Read the status of up to 16 words and bits with comments. You can use this setting to read data on the startup display. |
| Message display function settings | | Display a user-set message of up to 48 characters on the LCD Option Board when a specified bit turns ON.<br>A maximum of 16 screens can be registered for display. |
| Timers | Day timer | Use this timer for ON/OFF switching at a specified times every day from the starting day of the week to the ending day of the week. Sixteen timers cam be set from timer 01 to timer 16.  |
| | Weekly timer | Use this timer for ON/OFF operation in intervals of one week that starts one day and ends another day. Sixteen timers cam be set from timer No. 01 to timer No. 16.  |
| | Calendar timer | Use the calendar timers for ON or OFF operation in intervals of one year from the starting day to the ending day. Sixteen timers can be set from timer 01 to timer 16.  |
| Saving setting | | Save the various settings that you set with the LCD Option Board to the DM Area of the PLC. You can also write the settings saved in the PLC to the LCD Option Board. |
| Language | | Changing the display language (Japanese/English) |
| Other functions | | • Setting the time of the PLC's built-in clock<br>• Reading system data (e.g., unit version and lot number)<br>• Setting the backlight lighting time<br>• Adjusting LCD contrast<br>• Reading cycle time (e.g., average, maximum, and minimum)<br>• Clearing data for the LCD Option Board |

# CP1L

# Expansion I/O Unit Specifications

■ **CP1W-40EDR/40EDT/40EDT1/32ER/32ET/32ET1/20EDR1/20EDT/20EDT1/16ER/16ET/16ET1/8ED/8ER/8ET/8ET1 Expansion I/O Units**

Expansion I/O Units can be connected to the CPU Unit to configure the required number of I/O points.
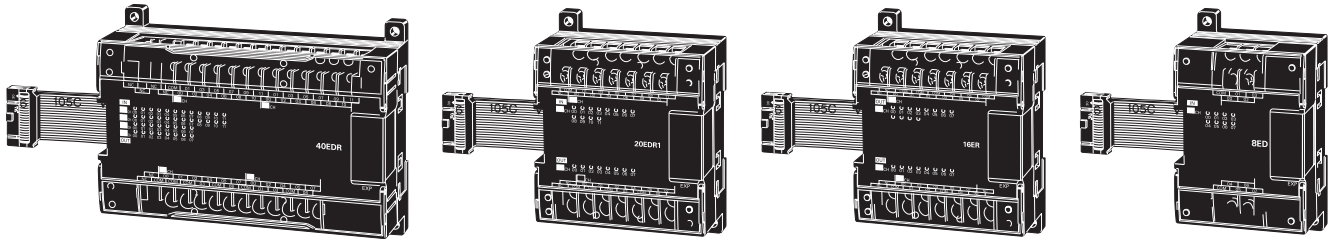


● **DC Inputs (CP1W-40EDR/40EDT/40EDT1/20EDR1/20EDT/20EDT1/8ED)**

| Item | Specifications |
|---|---|
| Input voltage | 24 VDC +10%/−15% |
| Input impedance | 4.7 kΩ |
| Input current | 5 mA typical |
| ON voltage | 14.4 VDC min. |
| OFF voltage | 5.0 VDC max. |
| ON delay | 0 to 32 ms max. (Default: 8 ms) (See note 1.) |
| OFF delay | 0 to 32 ms max. (Default: 8 ms) (See note 1.) |
| Circuit configuration |  |

**Note: 1.** Do not apply a voltage exceeding the rated voltage to an input terminal.
**2.** Can be set in the PLC Setup to 0, 0.5, 1, 2, 4, 8, 16 or 32 ms. The CP1W-40EDR/EDT/EDT1 are fixed at 16 ms.
1ms min. (hardware delay value)

● **Relay Outputs (CP1W-40EDR/32ER/20EDR1/16ER/8ER)**

| Item | | | Specifications |
|---|---|---|---|
| Max. switching capacity | | | 2 A, 250 VAC (cosφ = 1), 24 VDC 4 A/common |
| Min. switching capacity | | | 5 VDC, 10 mA |
| Service life of relay | Electrical | Resistive load | 150,000 operations (24 VDC) |
| | | Inductive load | 100,000 operations (24 VAC cos = 0.4) |
| | Mechanical | | 20,000,000 operations |
| ON delay | | | 15 ms max. |
| OFF delay | | | 15 ms max. |
| Circuit configuration | | |  |

**Note:** There are restrictions in the power supply voltage and output load current imposed by the ambient temperature for CPU Units with DC power.
Use the CPU Unit within the following ranges of power supply voltage and output load current.
Refer to the CP1L CPU Unit Operation Manual (Cat. No. W462) or the CP Series CP1L-EL/EM CPU Unit Operation Manual (Cat. No. W516).

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● **Transistor Outputs (Sinking/Sourcing)**
**(CP1W-40EDT/-40EDT1/-32ET/-32ET1/-20EDT/-20EDT1/-16ET/-16ET1/-8ET/-8ET1)**

| Item | Specifications | | | | |
|---|---|---|---|---|---|
| | CP1W-40EDT CP1W-40EDT1 | CP1W-32E CP1W-32ET1 | CP1W-20EDT CP1W-20EDT1 | CP1W-16ET CP1W-16ET1 | CP1W-8ET CP1W-8ET1 |
| Max. switching capacity (See note 3.) | 4.5 to 30 VDC: 0.3 A/point | | 24 VAC +10%/−5%: 0.3 A/point | 4.5 to 30 VDC: 0.3 A/point | • OUT00/01 4.5 to 30 VDC, 0.2 A/output • OUT02 to 07 4.5 to 30 VDC, 0.3 A/output |
| | 0.9 A/common 3.6 A/Unit | 0.9 A/common 7.2 A/Unit | 0.9 A/common 1.8 A/Unit | 0.9 A/common 3.6 A/Unit | 0.9 A/common 1.8 A/Unit |
| Leakage current | 0. 1mA max. | | | | |
| Residual voltage | 1.5 V max. | | | | |
| ON delay | 0.1ms max. | | | | |
| OFF delay | 1 ms max. at 24 VDC +10%/−5%, 5 to 300 mA | | | | |
| Max. number of Simultaneosly ON Points of Output | 16 pts (100%) | 24 pts (75%) | 8 pts (100%) | 16 pts (100%) | 8 pts (100%) |
| Fuse (See note 2.) | 1/common | | | | |
| Circuit configuration | Sinking Outputs / Sourcing Outputs | | | | |



**Note: 1.** Do not apply a voltage or connect a load to an output terminal exceeding the maximum switching capacity.
**2.** The fuses cannot be replaced by the user.
**3.** A maximum of 0.9 A per common can be switched at an ambient temperature of 50°C.
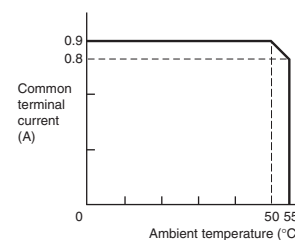
## ■ CP1W-AD041/DA041/DA021/MAD11 Analog Units

Analog values that are input are converted to binary data and stored in the input area, or binary data is output as analog values.
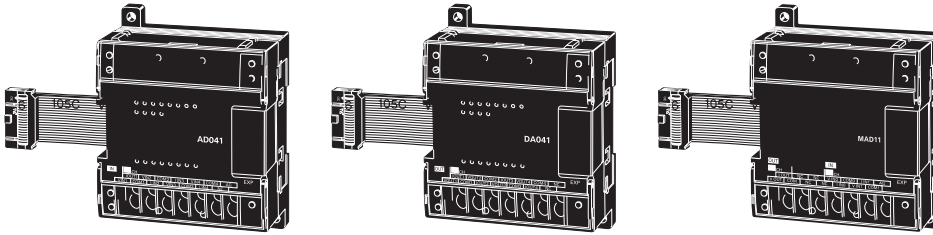


## ■ Analog Input Unit: CP1W-AD041

| Item \ Model | CP1W-AD041 | |
|---|---|---|
| | Input voltage | Input current |
| Number of inputs | 4 | |
| Input signal range | 0 to 5 V, 1 to 5 V, 0 to 10 V, −10 to 10 V | 0 to 20 mA 4 to 20 mA |
| Max. rated input | ±15 V | ±30 mA |
| External input impedance | 1 MΩ min. | Approx. 250 Ω |
| Resolution | 6000 | |
| Overall accuracy 25°C | ±0.3% of full scale | ±0.4% of full scale |
| Overall accuracy 0 to 55°C | ±0.6% of full scale | ±0.8% of full scale |
| Conversion time | 2 ms/point (8ms/4points) | |
| A/D conversion data | Binary data with resolution of 6,000 Full scale for −10 to 10 V: F448 to 0BB8 hex Full scale for other ranges: 0000 to 1770 hex | |
| Averaging | Supported. | |
| Open-circuit detection | Supported. | |
| Isolation method | Photocoupler isolation between analog I/O and internal circuits (There is no isolation between the analog I/O signals.) | |

## ■ Analog Output Unit: CP1W-DA041/DA021

| Item \ Model | CP1W-DA041/DA021 | |
|---|---|---|
| | Input voltage | Input current |
| Number of outputs | DA041: 4, DA021: 2 | |
| Output signal range | 0 to 5 V, 0 to 10 V, or −10 to 10 V | 0 to 20 mA or 4 to 20 mA |
| Allowable external output load resistance | 2 kΩ min. | 350 Ω max. |
| External output impedance | 0.5 Ω max. | --- |
| Resolution | 6000 | |
| Overall accuracy 25°C | ±0.4% of full scale | |
| Overall accuracy 0 to 55°C | ±0.8% of full scale | |
| Conversion time | 2 ms/point (8ms/4points, 4ms/2points) | |
| D/A conversion data | Binary data with resolution of 6,000 Full scale for −10 to 10 V: F448 to 0BB8 hex Full scale for other ranges: 0000 to 1770 hex | |
| Insulation resistance | 20 MΩ min. (at 250 VDC between isolated circuits) | |
| Dielectric strength | 500 VAC for 1 min between isolated circuits | |
| Isolation method | Photocoupler isolation between analog I/O and internal circuits (There is no isolation between the analog I/O signals.) | |

## ■ Analog I/O Unit: CP1W-MAD11

| Item \ Model | | | CP1W-MAD11 | |
|---|---|---|---|---|
| | | | Voltage I/O | Current I/O |
| Analog Input Section | Number o f inputs | | 2 inputs | |
| | Input signal range | | 0 to 5 V, 1 to 5V, 0 to 10 V, or −10 to 10V | 0 to 20 mA, 4 to 20 mA |
| | Max. rated input | | ±15 V | ±30 mA |
| | External input impedance | | 1 MΩ min. | 250 Ω |
| | Resolution | | 1/6000 | |
| | Overall accuracy | 25°C | ±0.3% of full scale | ±0.4% of full scale |
| | | 0 to 55°C | ±0.6% of full scale | ±0.8% of full scale |
| | A/D conversion data | | Binary data −10 to 10 V: F448 to 0BB8 hex Full scale for other ranges: 0000 to 1770 hex | |
| | Averaging | | Supported (Set for each input using a DIP switch.) | |
| | Disconnection detection | | Supported | |
| Analog Output Section | Number of outputs | | 1 output | |
| | Output signal range | | 1 to 5 V, 0 to 10 V, −10 to 10 V | 0 to 20 mA, 4 to 20 mA |
| | External output max. current | | --- | |
| | Allowable external output load resistance | | 1 kΩ min. | 600 Ω max. |
| | External input impedance | | 0.5 Ω max. | --- |
| | Resolution | | 1/6000 | |
| | Overall accuracy | 25°C | ±0.4% of full scale | |
| | | 0 to 55°C | ±0.8% of full scale | |
| | D/A conversion data | | Binary data (hexadecimal, 4 digits) −10 to 10 V: F448 to 0BB8 hex Full scale for other ranges: 0000 to 1770 hex | |
| Conversion time* | | | 2 ms/point (6 ms for all points) | |
| Isolation method | | | Photocoupler isolation between analog I/O and internal circuits (There is no isolation between the analog I/O signals.) | |

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## ■ Temperature Sensor Units: CP1W-TS001/TS002/TS101/TS102

By mounting a Temperature Sensor Unit to the PLC, inputs can be obtained from thermocouples or platinum resistance thermometers, and temperature measurements can be converted to binary data and stored in the input area of the CPU Unit.
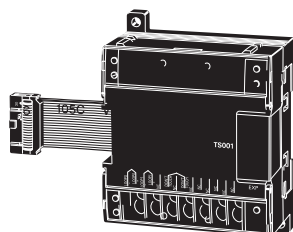


### ● Specifications

| Item      Model | CP1W-TS001/002 | CP1W-TS101/102 |
|---|---|---|
| Number of inputs | 2 (TS001), 4 (TS002) | 2 (TS101), 4 (TS102) |
| Input types | K, J switchable (Note: Same for all inputs.) | Pt100, JPt100 switchable (Note: Same for all inputs.) |
| Indication accuracy | (The larger of the indicated value: ±0.5% and ±2°C (See note.)) ±1 digit max. * | (The larger of the indicated value: ±0.5% and ±1°C) ±1 digit max. |
| Conversion time | 250 ms/2 points (TS001, TS101); 250 ms/4 points (TS002, TS102) | |
| Converted temperature data | Binary | |
| Isolation method | Photocoupler isolation between the temperature input signals. | |

**\*** The indication accuracy when using a K-type thermocouple for temperature less than −100°C is ±4°C±1 digit max.

### ● Input Temperature Ranges for CP1W-TS001/002
(The rotary switch can be used to make the following range and input type settings.)

| Input type | Range (°C) | Range (°F) |
|---|---|---|
| K | −200 to 1300 | −300 to 2300 |
| | 0.0 to 500.0 | 0.0 to 900.0 |
| J | −100 to 850 | −100 to 1500 |
| | 0.0 to 400.0 | 0.0 to 750.0 |

### ● Input Temperature Ranges for CP1W-TS101/102
(The rotary switch can be used to make the following range and input type settings.)

| Input type | Range (°C) | Range (°F) |
|---|---|---|
| Pt100 | −200.0 to 650.0 | −300 to 1200.0 |
| JPt100 | −200.0 to 650.0 | −300 to 1200.0 |

## ■ CP1W-SRT21 CompoBus/S I/O Link Unit

The CompoBus/S I/O Link Unit functions as a slave for a CompoBus/S Master Unit (or an SRM1 CompoBus/S Master Control Unit) to form an I/O Link with 8 inputs and 8 outputs between the CompoBus/S I/O Link Unit and the Master Unit.



CompoBus/S Master Unit
(or SRM1 CompoBus/S
Master Control Unit)

CP1L

CP1W-SRT21
CompoBus/S  I/O Link Unit
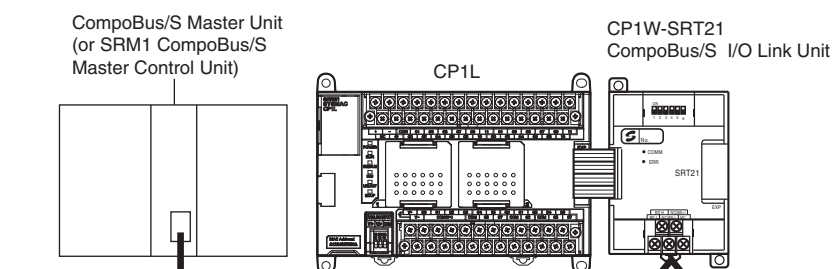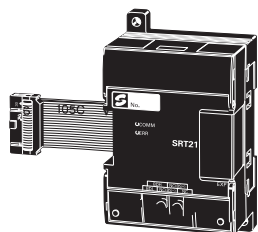
CS/CJ Series
C200H☐ Series
CQM1(H) Series
SRM1 Series
CPM2C-S Series

Special flat cable or VCTF cable

A maximum of 16 Units can be connected
to one CompoBus/S I/O Link Unit.

### ● Specifications

| Item      Model | CP1W-SRT21 |
|---|---|
| Master/Slave | CompoBus/S Slave |
| Number of I/O bits | 8 input bits, 8 output bits |
| Number of words occupied in CP1L I/O memory | 1 input word, 1 output word (Allocated in the same way as for other Expansion Units) |
| Node number setting | Set using the DIP switch (before the CPU Unit is turned ON.) |

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# I/O Bits and I/O Allocations

With CP1L CPU Units, the beginning input and output words (CIO 0 and CIO 100) are allocated by the CPU Unit one or two words at a time. I/O bits are allocated in word units in order of connection to Expansion Units and Expansion I/O Units connected to a CPU Unit.

| CPU Unit | Allocated words | |
|---|---|---|
| | Inputs | Outputs |
| CP1L CPU Unit with 10, 14, or 20 I/O points | CIO 0 | CIO 100 |
| CP1L CPU Unit with 30 or 40 I/O points | CIO 0 and CIO 1 | CIO 100 and CIO 101 |
| CP1L CPU Unit with 60 I/O points | CIO 0, CIO 1, and CIO 2 | CIO 100, CIO 101, and CIO102 |

● **Example: I/O Bit Allocations When Expansion Units Are Connected**
CPU Unit with 40 I/O Points + Temperature Sensor Unit + Analog Output Unit + Expansion I/O Unit with 40 I/O Points
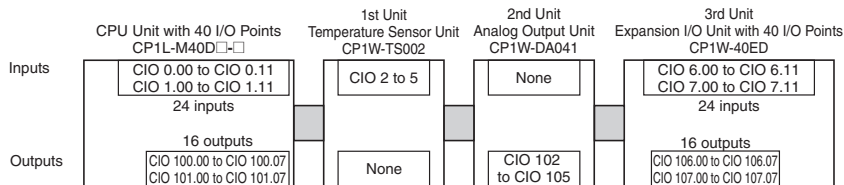


# The Number of the Maximum Connect of Expansion Unit

■ **Maximum Number of CP1W/CPM1A Expansion Unit and Expansion I/O Units**
● **CP1L (EM, EL, M) CPU Units with 60, 40, or 30 Points**



3 max.
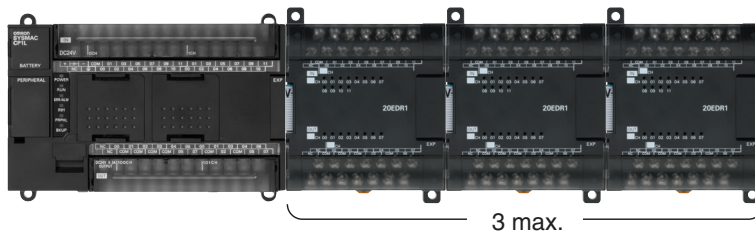
● **CP1L (L) CPU Units with 20 or 14 Points**
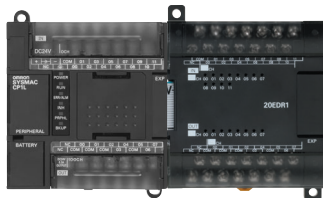


1 max.　Note: CP1L (L Type) CPU Units with 10 points do not support Expansion Units.

# Dimensions

(Unit: mm)

■ **CPU Units**
**CP1L-EM CPU Units with 40 Points**
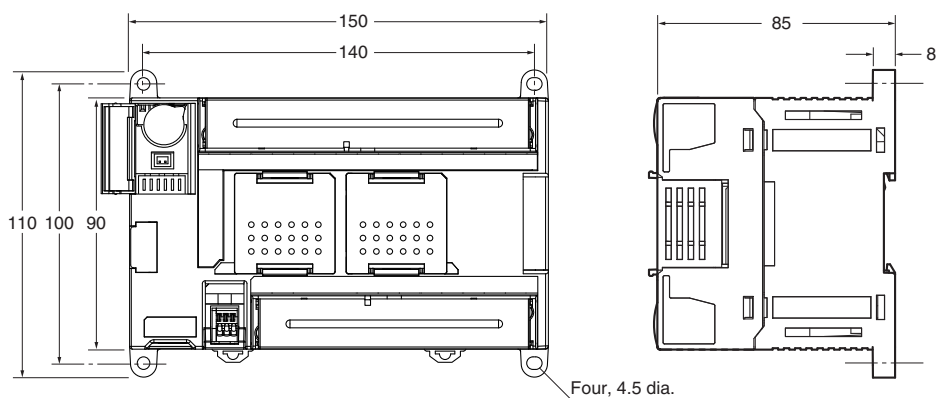
150
140
110 100 90
85
8

Weight:
675 g max.

Four, 4.5 dia.

**CP1L-EM CPU Units with 30 Points**

130
120
110 100 90
85
8

Weight:
610 g max.

Four, 4.5 dia.

**CP1L-EL CPU Units with 20 Points**

130
120
110 100 90
85
8

Weight:
610 g max.

Four, 4.5 dia.
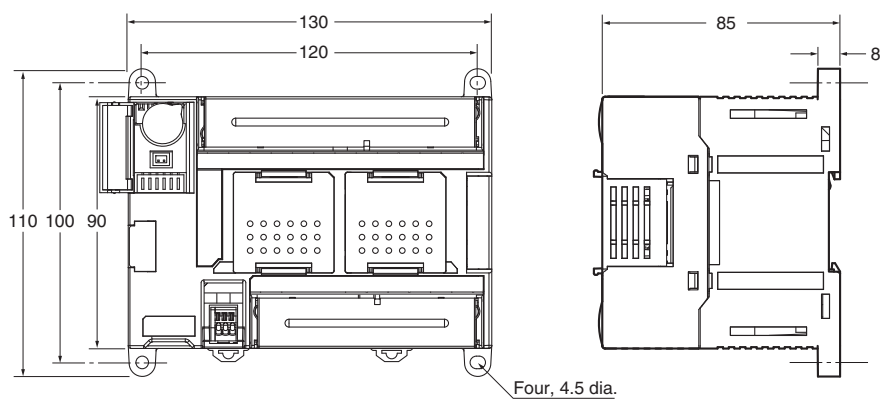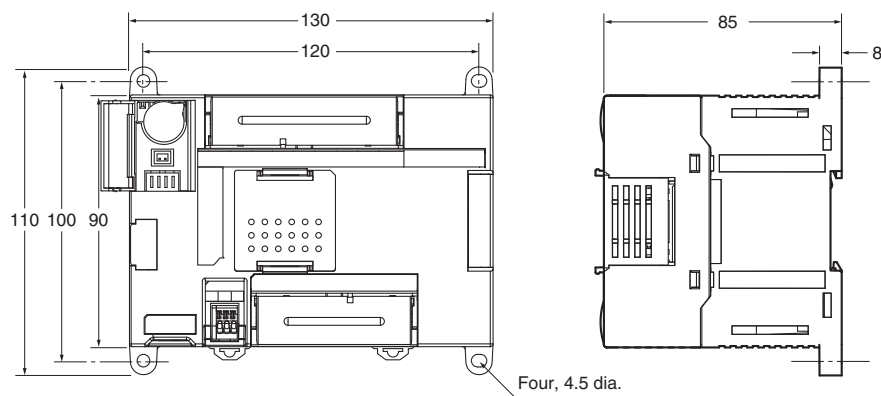
# CP1L

## CP1L CPU Units with 60 I/O Points

195
185

110 100 90

85
8

Four, 4.5 dia.
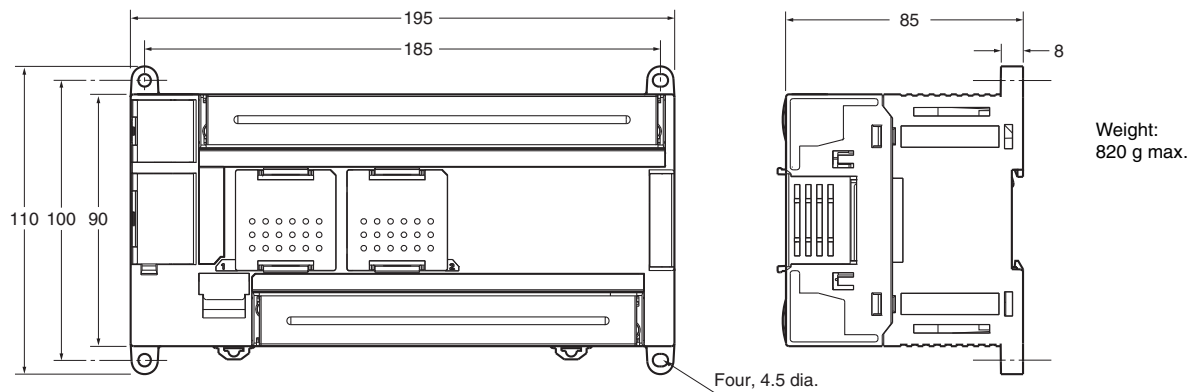
Weight:
820 g max.

## CP1L CPU Units with 40 I/O Points

150
140

110 100 90

85
8

Four, 4.5 dia.
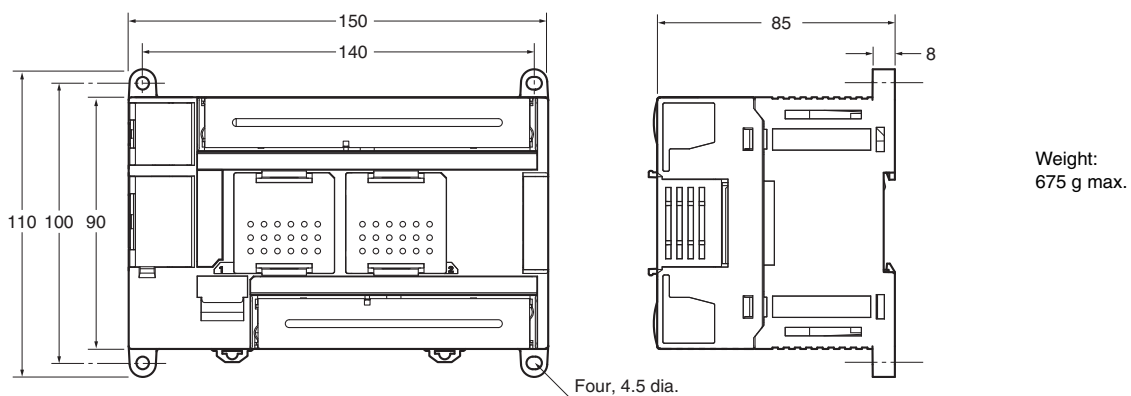
Weight:
675 g max.

## CP1L CPU Units with 30 I/O Points

130
120

110 100 90

85
8

Four, 4.5 dia.

Weight:
610 g max.

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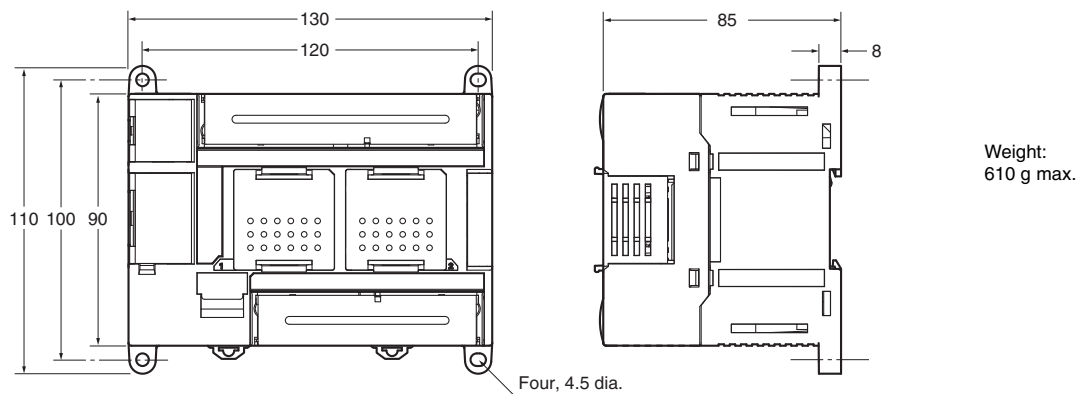
**CP1L CPU Units with 14 or 20 I/O Points**

Weight:
380 g max.

Two, 4.5 dia.
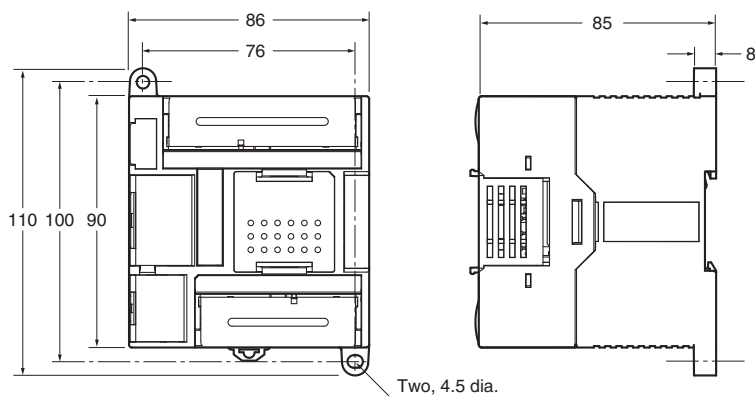
**CP1L CPU Units with 10 I/O Points**

Weight:
300 g max.

Two, 4.5 dia.
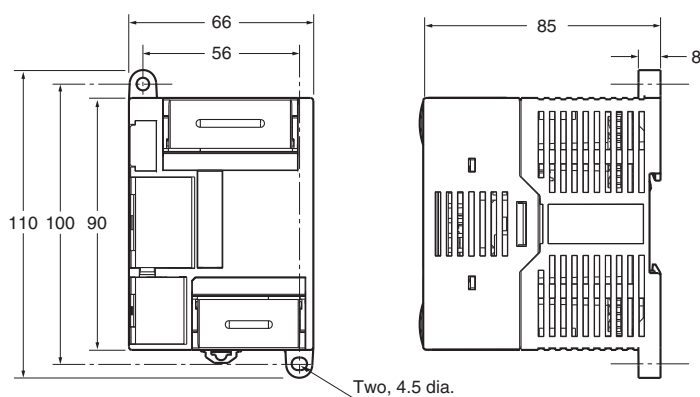
# CP1L

## ■ Expansion Units and Expansion I/O Units

**CP1W-20ED□**
**CP1W-16E□□**
**CP1W-AD041/CP1W-DA041/CP1W-DA021**
**CP1W-MAD11/CP1W-TS□□□**

**CP1W-8E□□**
**CP1W-SRT21**
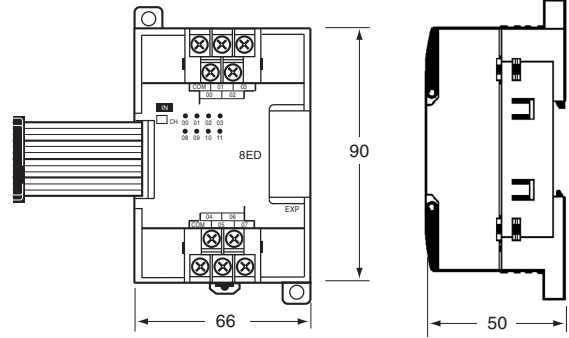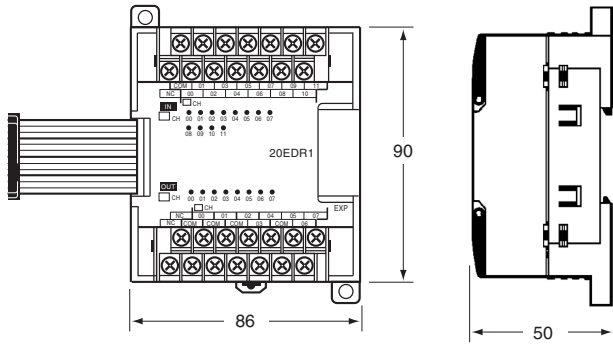


**CP1W-40ED□**
**CP1W-32E□□**
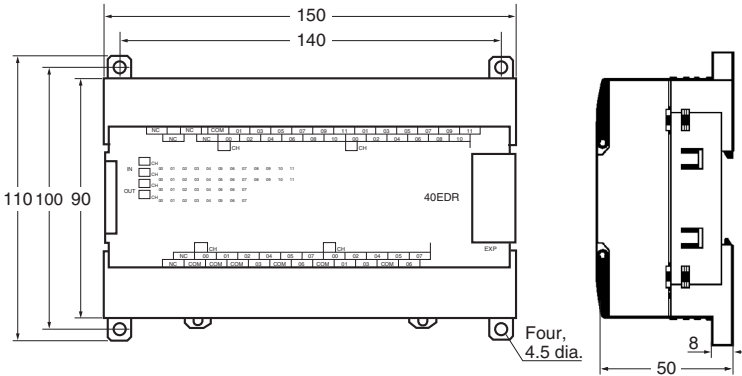


| Unit name | Model number | Weight |
|---|---|---|
| Expansion I/O Units | CP1W-40ER | 380 g |
| | CP1W-40EDT/-40EDT1 | 320 g |
| | CP1W-32ER | 465 g |
| | CP1W-32ET/-32ET1 | 325 g |
| | CP1W-20EDR1/-20EDT/-20EDT1 | 300 g |
| | CP1W-16ER | 280 g |
| | CP1W-16ET/-16ET1 | 225 g |
| | CP1W-8ED | 200 g |
| | CP1W-8ER/-8ET/-8ET1 | 250 g |
| Analog Units | CP1W-AD041/-DA041/-DA021 | 200 g |
| | CP1W-MAD11 | 150 g |
| Temperature Sensor Units | CP1W-TS001/-TS002/-TS101/-TS102 | 250 g |
| CompoBus/S I/O Link Unit | CP1W-SRT21 | 200 g |

# Related Manuals

| Cat. No. | Model numbers | Manual name | Description |
|---|---|---|---|
| W516 | CP1L-EL20D□-□<br>CP1L-EM30D□-□<br>CP1L-EM40D□-□ | CP Series<br>CP1L-EL/EM CPU Unit<br>Operation Manual | Provides the following information on the CP Series:<br>• Overview, design, installation, maintenance, and other basic specifications<br>• Features<br>• System configuration<br>• Mounting and wiring<br>• I/O memory allocation<br>• Troubleshooting<br>Use this manual together with the *CP1H Programmable Controllers Programming Manual* (W451). |
| W462 | CP1L-L10D□-□<br>CP1L-L14D□-□<br>CP1L-L20D□-□<br>CP1L-M30D□-□<br>CP1L-M40D□-□<br>CP1L-M60D□-□ | CP Series<br>CP1L CPU Unit<br>Operation Manual | |
| W451 | CP1H-X40D□-□<br>CP1H-XA40D□-□<br>CP1H-Y20DT-D<br>CP1L-L10D□-□<br>CP1L-L14D□-□<br>CP1L-L20D□-□<br>CP1L-M30D□-□<br>CP1L-M40D□-□<br>CP1L-M60D□-□ | CP Series<br>CP1H/CP1L CPU Unit Programming Manual | Provides the following information on programming the CP Series:<br>• Programming methods<br>• Tasks<br>• Programming instructions |
| W461 | CP1L-L10D□-□<br>CP1L-L14D□-□<br>CP1L-L20D□-□<br>CP1L-M30D□-□<br>CP1L-M40D□-□<br>CP1L-M60D□-□ | CP Series<br>CP1L CPU Unit Introduction Manual | Describes basic setup methods of CP1L PLCs:<br>• Basic configuration and component names<br>• Mounting and wiring<br>• Programming, data transfer, and debugging using the CX-Programmer<br>• Application program examples |
| W342 | SYSMAC CS/CJ/CP/NSJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1H-CPU□□H-R,CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, CJ2H-CPU6□-EIP, CJ2H-CPU6□,CJ2M-CPU□□, CS1W-SCU□□-V1, CS1W-SCB□□-V1, CJ1W-SCU□□-V1, CP1H-X□□□□-□, CP1H-XA□□□□-□,CP1H-Y□□□□-□, CP1L-M/L□□□-□, CP1E-E□□D□-□, CP1E-N□□D□-□, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Communications Commands Reference Manual | CS1G/CS1H/CS1D/CS1W/CJ2H/CJ2M/CJ1G/CJ1H/CJ1M/CJ1W/CP1H/CP1L/CP1E/NSJ SYSMAC CS/CJ/CP/NSJ Series Communications Commands REFERENCE MANUAL | Describes the communications commands used with CS-series, CJ-series, and CP-series PLCs and NSJ Controllers. |

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