CP series CP1L CPU Unit
CP1L-EM□□D□-D/CP1L-EL□□D□-D
CP1L-M□□DR-A/CP1L-L□□DR-A

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.

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)

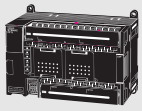
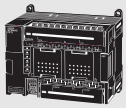
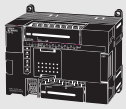
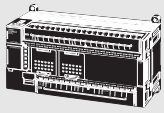
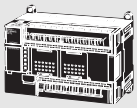
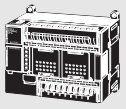
1. Expansion capability
   E : Ethernet port
   None : -
2. Program capacity
   M : 10K steps
   L : 5K steps
3. Number of Built-In number I/O points
   60 : 60 I/O points
   40 : 40 I/O points
   30 : 30 I/O points
   20 : 20 I/O points
   14 : 14 I/O points
   10 : 10 I/O points
4. Output classification
   R : Relay outputs
   T : Transistor Outputs (sinking)
   T1 : Transistor Outputs (sourcing)
5. Power supply
   A : AC
   D : DC

Ordering Information

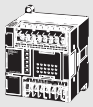
● **International Standards**

- 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	Number of licenses	Media	Model	Standards
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. 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. 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).

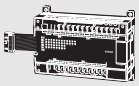
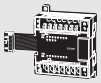
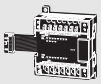
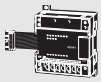
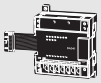
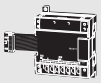
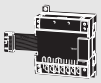
● Models and Software Versions

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).

■ 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

Type / Item / Model	AC power supply models	DC power supply models
	CP1L-□□□-A	**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/s² 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/s² 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/s² 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)

Item \ 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)		
	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					
		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
	Output Area		1,600 bits (100 words) CIO 100 to CIO 199					
		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
	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			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.					
			A maximum of two Serial Communications Option Boards can be mounted.			A maximum of one Serial Communications Option Board can be mounted.		Not supported.
			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.)					

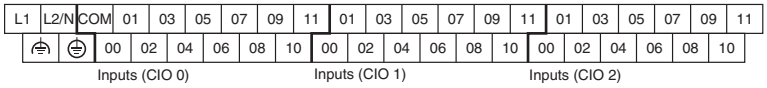
Item \ Type	CP1L-M60 (60 points)	CP1L-M40 (40 points)	CP1L-M30 (30 points)	CP1L-L20 (20 points)	CP1L-L14 (14 points)	CP1L-L10 (10 points)
Models	**CP1L-M60□□-□**	**CP1L-M40□□-□**	**CP1L-M30□□-□**	**CP1L-L20□□-□**	**CP1L-L14□□-□**	**CP1L-L10□□-□**
Built-in input terminals	60 (36 inputs, 24 outputs)	40 (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 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					
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)					
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 control	1 (Setting range: 0 to 255)					
Analog input	1 input (Resolution: 1/256, Input range: 0 to 10 V). Not isolated.					

Built-in Inputs

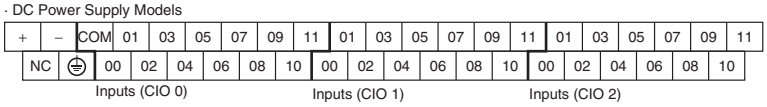
■ Input Terminal Block Arrangement (Top Block)

● CP1L (60 Inputs)

· AC Power Supply Models

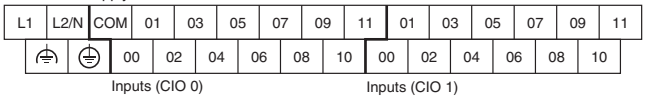


· DC Power Supply Models

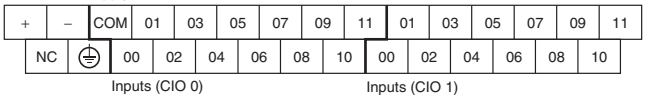


● CP1L (40 Inputs)

· AC Power Supply Models

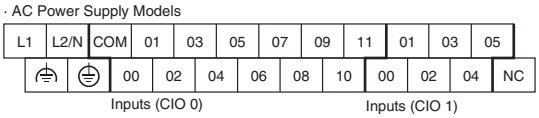


· DC Power Supply Models

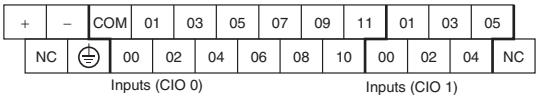


● CP1L (30 inputs)

· AC Power Supply Models

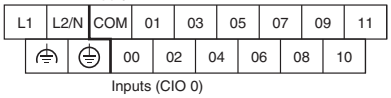


· DC Power Supply Models

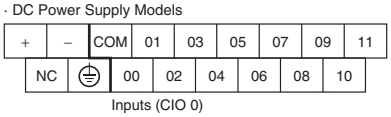


● CP1L (20 Inputs)

· AC Power Supply Models

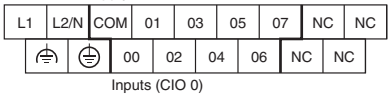


· DC Power Supply Models

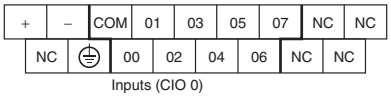


● CP1L (14 Inputs)

· AC Power Supply Models

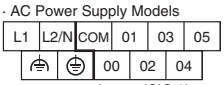


· DC Power Supply Models

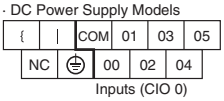


● CP1L (10 Inputs)

· AC Power Supply Models



· DC Power Supply Models



■ Built-in Input Area

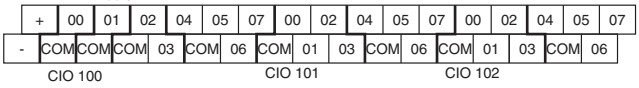
Number of inputs	Input terminal block		Input operation			High-speed counter operation		Origin search		
						Operation settings • High-speed counters enabled • Phase-Z signal reset		Origin searches enabled for pulse outputs 0 and 1		
	Word	Bit	Normal inputs	Interrupt inputs	Quick-response inputs	Single-phase (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
10	CIO 0	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	---
		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
		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		---
20		08	Normal input 8	Interrupt input 4	Quick-response input 4	---		---	---	---
		09	Normal input 9	Interrupt input 5	Quick-response input 5	---		---	---	---
		10	Normal input 10	---	---	---		Pulse output 0: Origin proximity input signal	---	---
		11	Normal input 11	---	---	---		Pulse output 1: Origin proximity input signal	---	---
30	CIO 1	00	Normal input 12	---	---	---		---	---	---
		to	to	to	to	to	to	to	to	to
		05	Normal input 17	---	---	---	---	---	---	---
40		06	Normal input 18	---	---	---	---	---	---	---
		to	to	to	to	to	to	to	to	to
		11	Normal input 23	---	---	---	---	---	---	---
60	CIO 2	00	Normal input 24	---	---	---	---	---	---	---
		to	to	to	to	to	to	to	to	to
		11	Normal input 35	---	---	---	---	---	---	---

Built-in Outputs

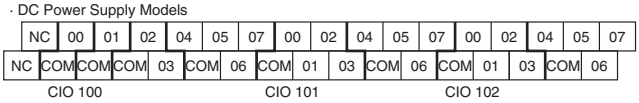
■ Output Terminal Block Arrangement (Bottom Block)

● CP1L (60 Outputs)

· AC Power Supply Models

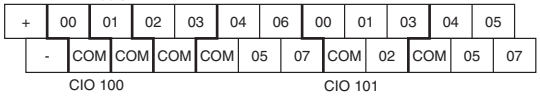


· DC Power Supply Models



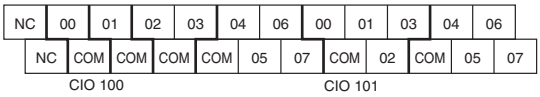
● CP1L (40 Outputs)

· AC Power Supply Models

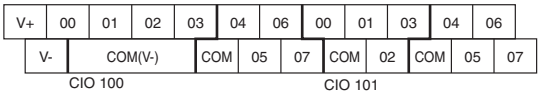


· DC Power Supply Models

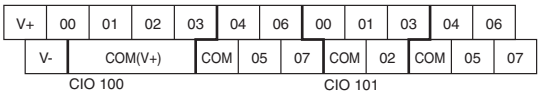
CP1L-EM40DR-D/CP1L-M40D□-D



CP1L-EM40DT-D

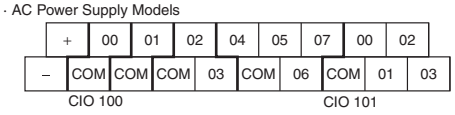


CP1L-EM40DT1-D



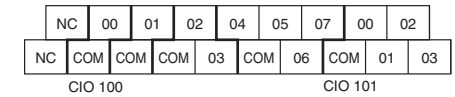
● CP1L (30 Outputs)

· AC Power Supply Models

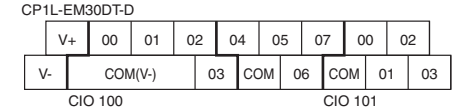


· DC Power Supply Models

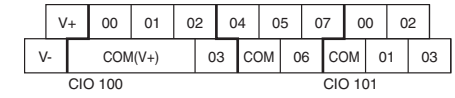
CP1L-EM30DR-D/CP1L-M30D□-D



CP1L-EM30DT-D

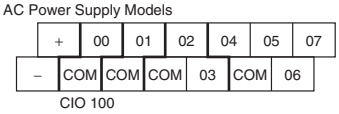


CP1L-EM30DT1-D



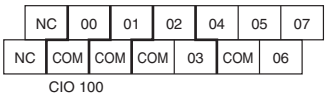
● CP1L (20 Outputs)

· AC Power Supply Models

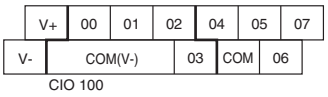


· DC Power Supply Models

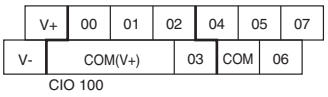
CP1L-EL20DR-D/CP1L-L20D□-D



CP1L-EL20DT-D

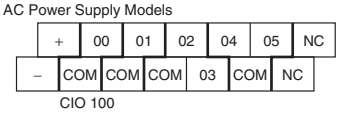


CP1L-EL20DT1-D

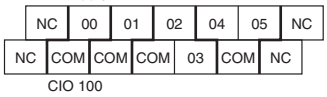


● CP1L (14 Outputs)

· AC Power Supply Models

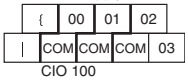


· DC Power Supply Models

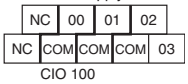


● CP1L (10 Outputs)

· AC Power Supply Models



· DC Power Supply Models

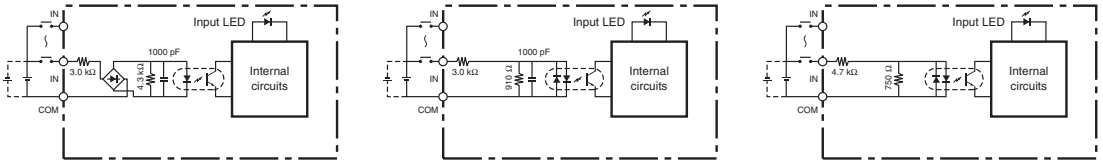


■ Built-in Output Area

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
						When the origin search function is used		
	Word	Bit	Normal output	CW/CCW	Pulse plus direction	CPU Units with 14 to 60 points	CPU Units with 10 point	PWM output
10	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
14		04	Normal output 4	---	---	Origin search 0 (Error counter reset output)	---	---
		05	Normal output 5	---	---	Origin search 1 (Error counter reset output)	---	---
20		06	Normal output 6	---	---	---	---	---
		07	Normal output 7	---	---	---	---	---
30	CIO 101	00	Normal output 8	---	---	---	---	---
		to	to	to	to	to	to	to
		03	Normal output 11	---	---	---		---
40		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	---	---	---	---	---

I/O Specifications for CPU Units

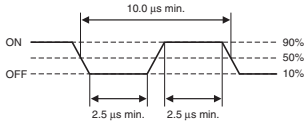
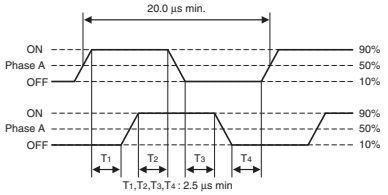
■ Input Specifications

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.

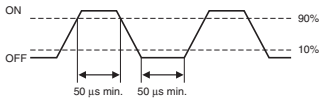
● High-speed Counter Function Input Specifications

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 

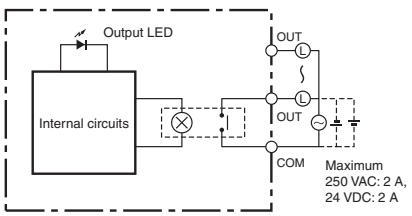
● Interrupt Input Counter Mode

Input bits: CIO 0.04 to CIO 0.09

Item	Specifications
ON/OFF delay	

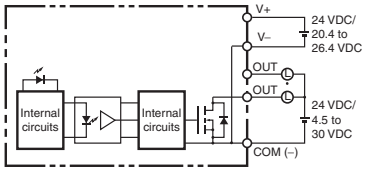
■ Output Specifications

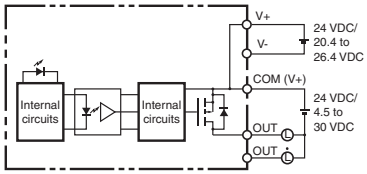
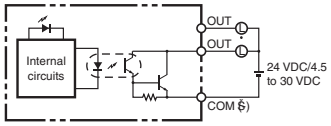
● CPU Units with Relay Outputs

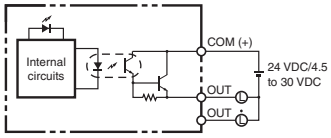
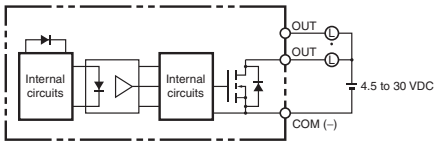
Item			Specifications
Max. switching capacity			2 A, 250 VAC (cosϕ = 1), 2 A, 24 VDC 4 A/common)
Min. switching capacity			5 VDC, 10 mA
Service life of relay	Electrical	Resistive load	100,000 operations (24 VDC)
		Inductive load	48,000 operations (250 VAC, cosϕ = 0.4)
	Mechanical		20,000,000 operations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

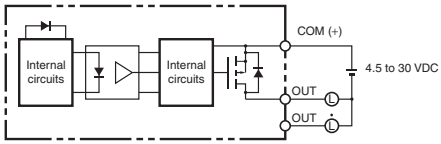
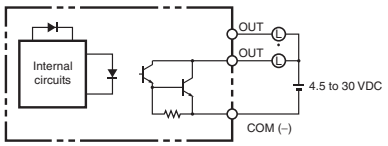
Note: There are restrictions in the power supply voltage and output load current imposed by the ambient temperature for CPU Units with DC power. Refer to the CP1L CPU Unit Operation Manual (Cat. No. W462) or the CP Series CP1L-EL/EM CPU Unit Operation Manual (Cat. No. W516).

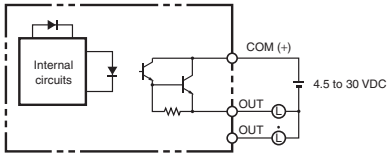
● CPU Units with Transistor Outputs (Sinking/Sourcing)

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


Sourcing Outputs

</td><td>Sinking Outputs


Sourcing Outputs

</td></tr>
<tr><td>CP1L-L/M CPU Unit</td><td>Sinking Outputs


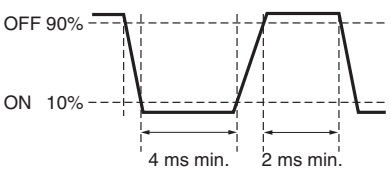
Sourcing Outputs

</td><td>Sinking Outputs


Sourcing Outputs

</td></tr>
</table>

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

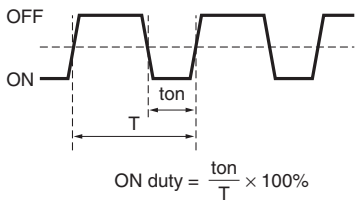
Output bits CIO 100.00 to CIO 100.03

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 For ON duty +5%, "0%: 0 to 32.8 kHz output
Output waveform	

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

■ 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) 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 Categories: 5, 5e • Shielded twisted-pair (STP) cable Categories: 100 Ω at 5, 5e
	10 Mbit/s	• Unshielded twisted-pair (UDP) cable Categories: 3, 4, 5, 5e • Shielded twisted-pair (STP) cable Categories: 100 Ω at 3, 4, 5, 5e
Transmission Distance		100 m (distance between hub and node)

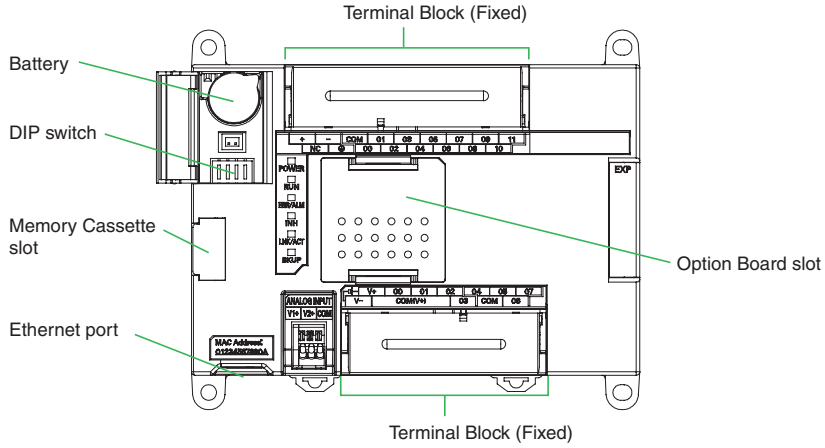
Item		FINS Communications Service Specifications
Number of nodes		254
Message length		1016 bytes max.
Size of buffer		8k
Communications Function		FINS Communications Service (UDP/IP, TCP/IP)
FINS/UDP method	**Protocol used**	UDP/IP
	Port number	9600 (default) Can be changed.
	Protection	No
FINS/TCP method	**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.

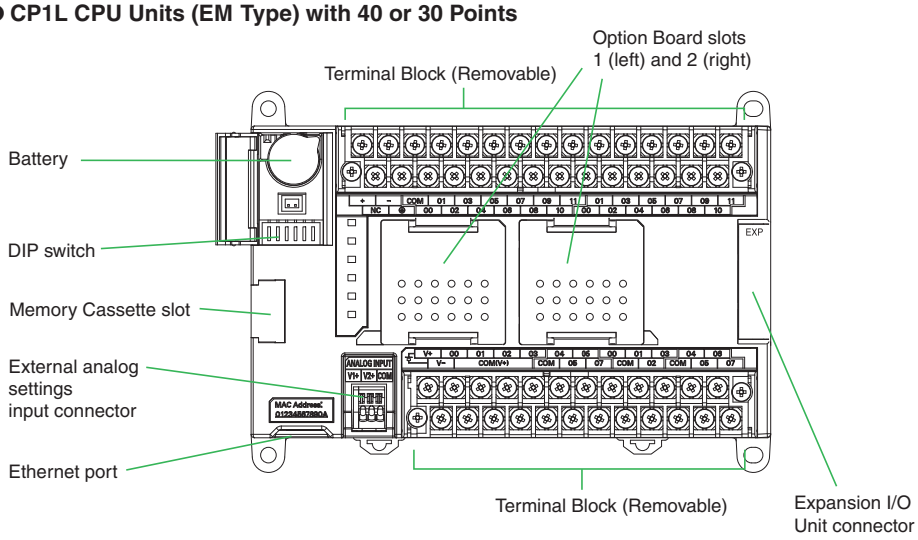
External Interfaces

■ CP1L CPU Unit Nomenclature

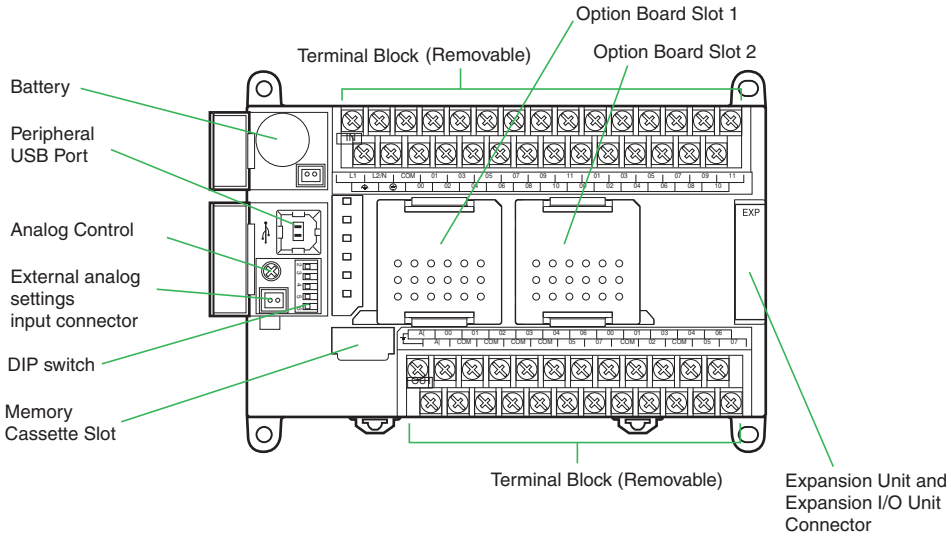
● CP1L CPU Units (EL Type) with 20 Points



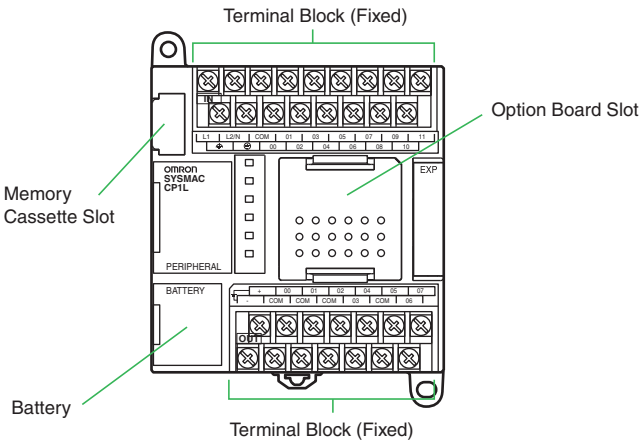
● CP1L CPU Units (EM Type) with 40 or 30 Points



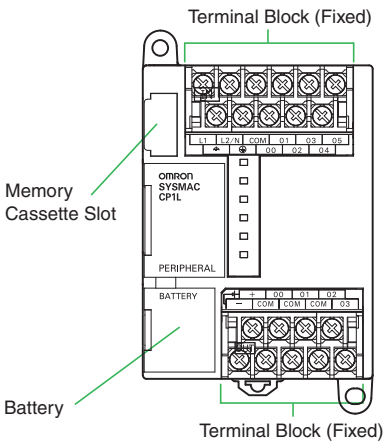
● CP1L CPU Units (MType) with 40 Points



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



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



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

■ Ethernet Communications Specifications (CP1W-CIF41)

Item			Specifications
Applicable PLCs			CP1L CPU Units **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 Categories: 5, 5e • Shielded twisted-pair (STP) cable Categories: 100 Ω at 5, 5e
		10 Mbit/s	• Unshielded twisted-pair (UDP) cable Categories: 3, 4, 5, 5e • Shielded twisted-pair (STP) cable 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	Conversion time
		Voltage Input 0V to 10V	Current Input 0mA to 20mA	Voltage Output 0V to 10V	
		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

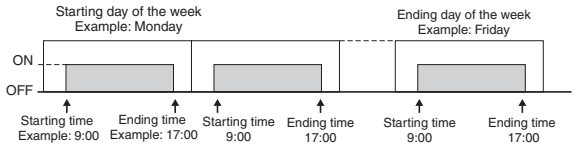
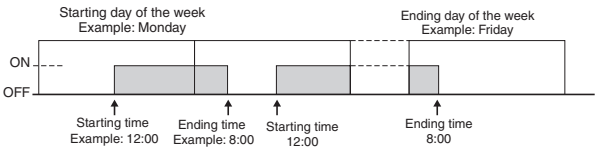
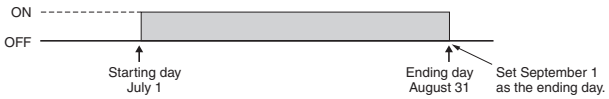
Note: CP1L-EL CPU Unit or CP1L-EM CPU Unit only.

■ LCD Option board (CP1W-DAM01)

● Specifications

Item	Function
Mounting port	CP1L: Option board slot 1 **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

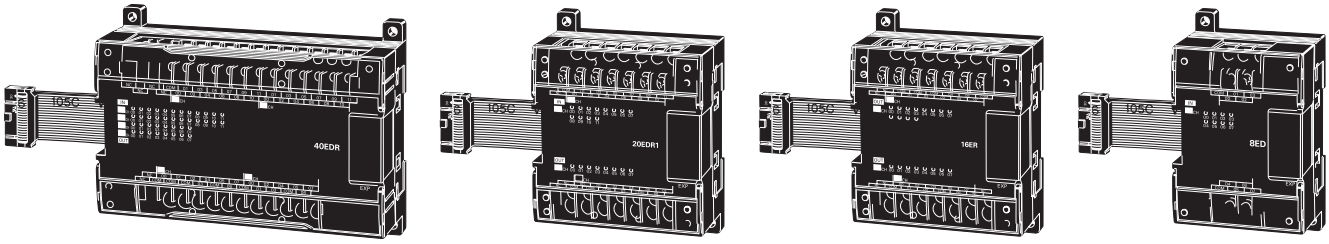
● LCD Functions

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. 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. Operation: 
	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. Operation: 
	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. Operation: 
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 • Reading system data (e.g., unit version and lot number) • Setting the backlight lighting time • Adjusting LCD contrast • Reading cycle time (e.g., average, maximum, and minimum) • Clearing data for the LCD Option Board

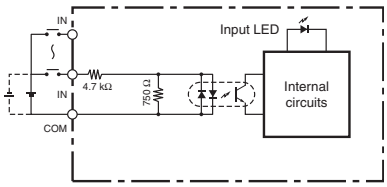
Expansion I/O Unit Specifications

■ 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.

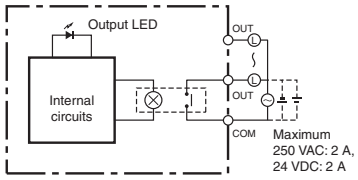


● DC Inputs (CP1W-40EDR/40EDT/40EDT1/20EDR1/20EDT/20EDT1/8ED)

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	

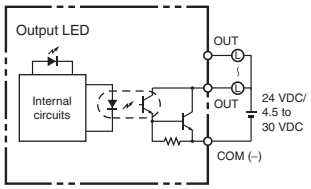
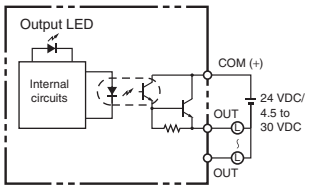
Note: 1. Do not apply a voltage exceeding the rated voltage to an input terminal.
2. Can be set in the PLC Setup to 0, 0.5, 1, 2, 4, 8, 16 or 32 ms. The CP1W-40EDR/EDT/EDT1 are fixed at 16 ms.
1ms min. (hardware delay value)

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

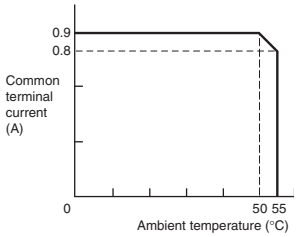
Item			Specifications
Max. switching capacity			2 A, 250 VAC (cosϕ = 1), 24 VDC 4 A/common
Min. switching capacity			5 VDC, 10 mA
Service life of relay	Electrical	Resistive load	150,000 operations (24 VDC)
		Inductive load	100,000 operations (24 VAC cos = 0.4)
	Mechanical		20,000,000 operations
ON delay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

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

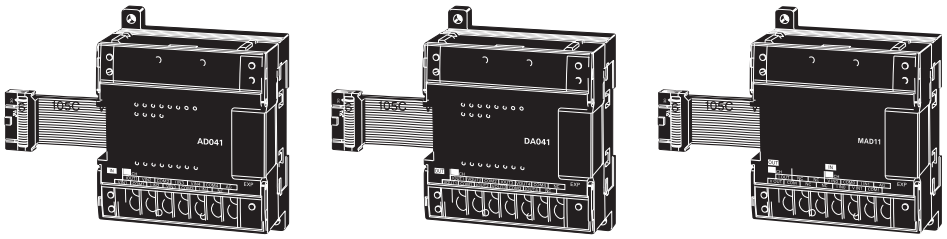
Item	Specifications				
	CP1W-40EDT CP1W-40EDT1	CP1W-32E CP1W-32ET1	CP1W-20EDT CP1W-20EDT1	CP1W-16ET CP1W-16ET1	CP1W-8ET CP1W-8ET1
Max. switching capacity (See note 3.)	4.5 to 30 VDC: 0.3 A/point		24 VAC +10%/ −5%: 0.3 A/point	4.5 to 30 VDC: 0.3 A/point	• OUT00/01 4.5 to 30 VDC, 0.2 A/output • OUT02 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
	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

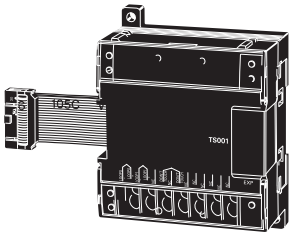
Item \ Model		CP1W-DA041/DA021	
		Input voltage	Input current
Number of outputs		DA041: 4, DA021: 2	
Output signal range		0 to 5 V, 0 to 10 V, or −10 to 10 V	0 to 20 mA or 4 to 20 mA
Allowable external output load resistance		2 kΩ min.	350 Ω max.
External output impedance		0.5 Ω max.	---
Resolution		6000	
Overall accuracy	25°C	±0.4% of full scale	
	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.)	

■ 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.)

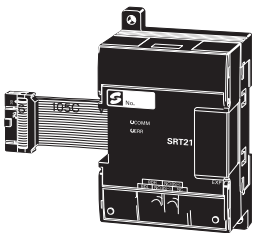
Input type	Range (°C)	Range (°F)
K	−200 to 1300	−300 to 2300
	0.0 to 500.0	0.0 to 900.0
J	−100 to 850	−100 to 1500
	0.0 to 400.0	0.0 to 750.0

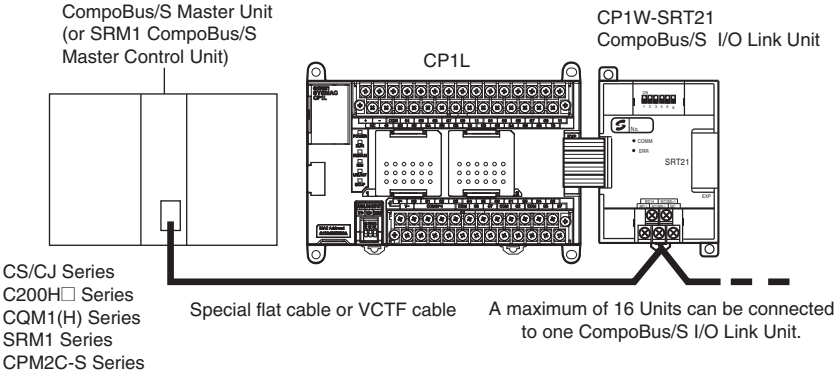
● Input Temperature Ranges for CP1W-TS101/102
(The rotary switch can be used to make the following range and input type settings.)

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.





● 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.)

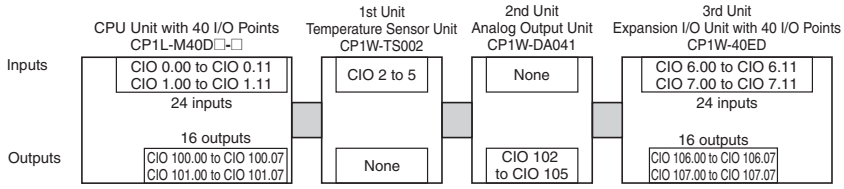
I/O Bits and I/O Allocations

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

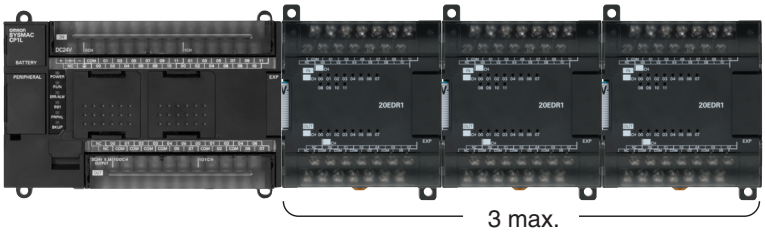
CPU Unit with 40 I/O Points + Temperature Sensor Unit + Analog Output Unit + Expansion I/O Unit with 40 I/O Points



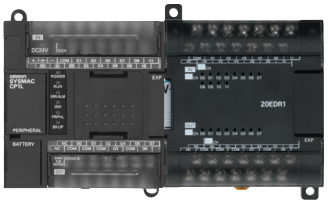
The Number of the Maximum Connect of Expansion Unit

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

● CP1L (EM, EL, M) CPU Units with 60, 40, or 30 Points



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



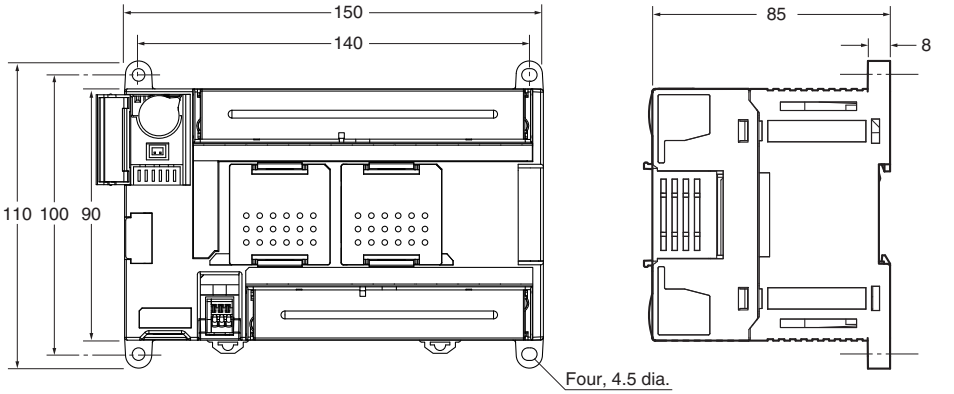
1 max. Note: CP1L (L Type) CPU Units with 10 points do not support Expansion Units.

Dimensions

(Unit: mm)

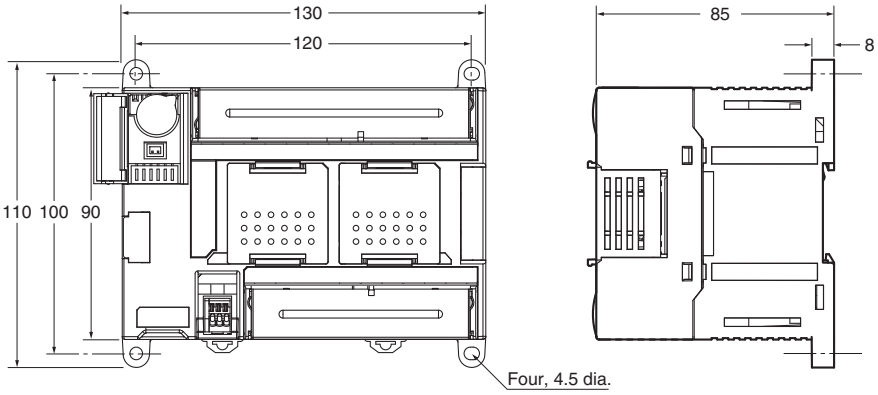
■ CPU Units

CP1L-EM CPU Units with 40 Points



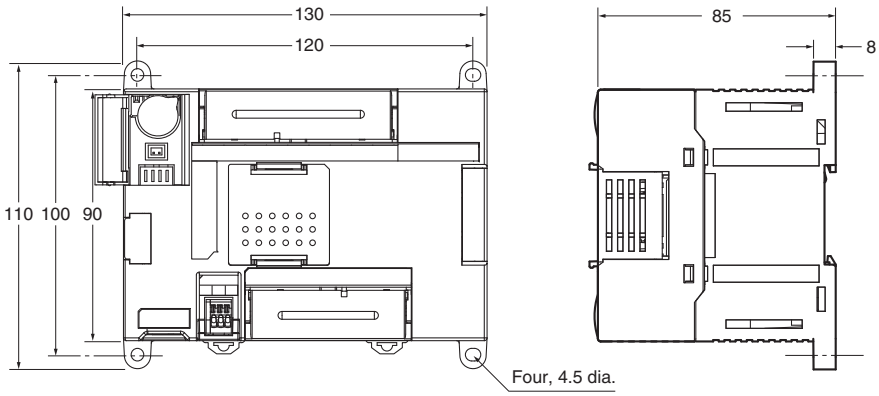
Weight:
675 g max.

CP1L-EM CPU Units with 30 Points



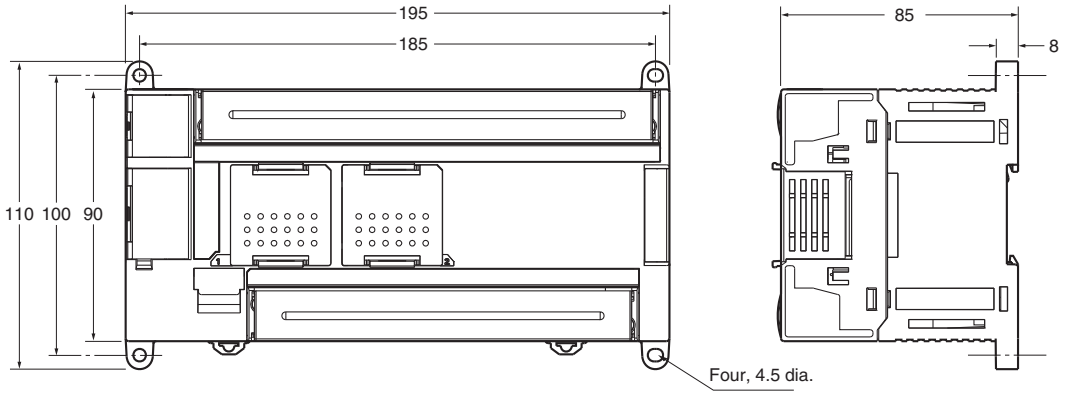
Weight:
610 g max.

CP1L-EL CPU Units with 20 Points



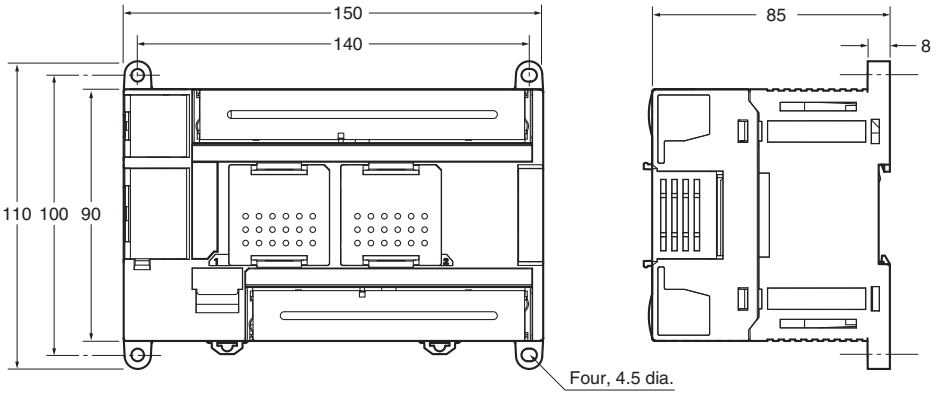
Weight:
610 g max.

CP1L CPU Units with 60 I/O Points



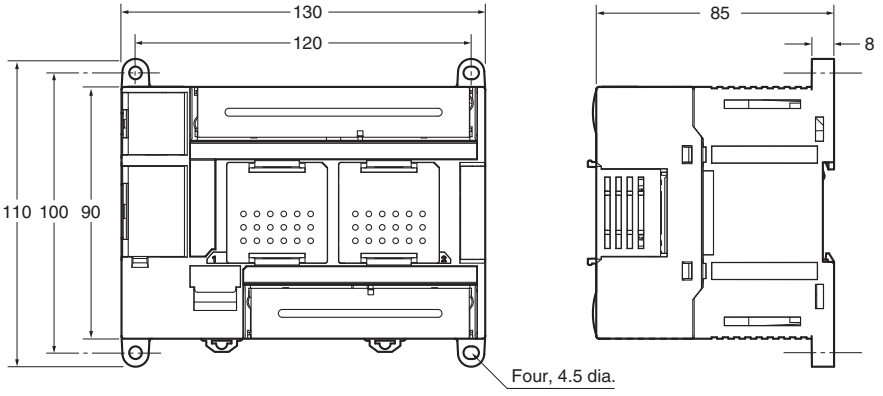
Weight:
820 g max.

CP1L CPU Units with 40 I/O Points



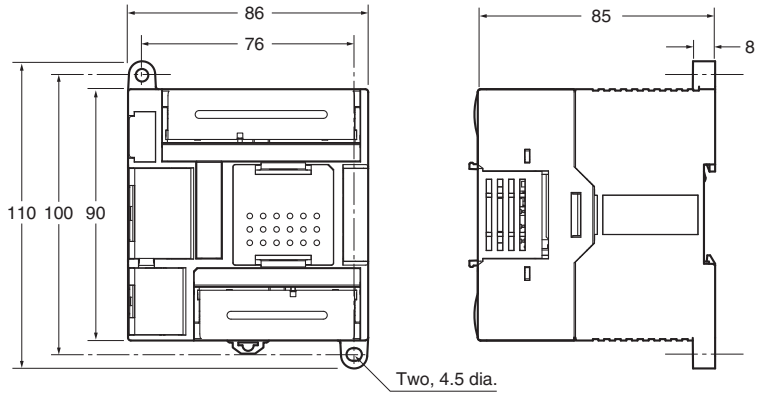
Weight:
675 g max.

CP1L CPU Units with 30 I/O Points



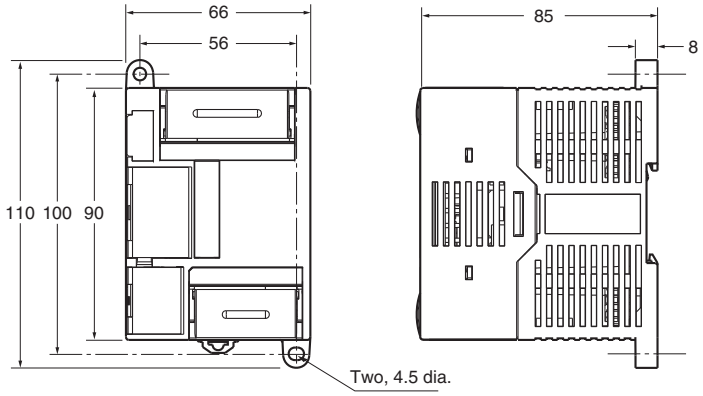
Weight:
610 g max.

CP1L CPU Units with 14 or 20 I/O Points



Weight:
380 g max.

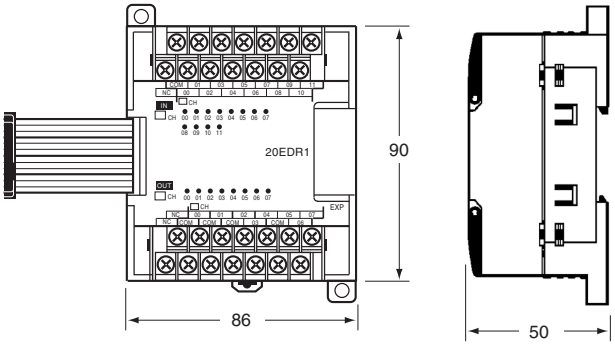
CP1L CPU Units with 10 I/O Points



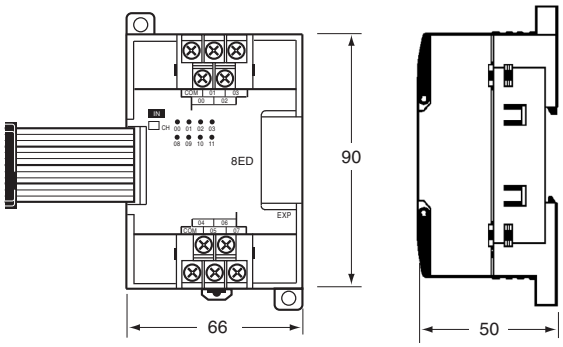
Weight:
300 g max.

■ Expansion Units and Expansion I/O Units

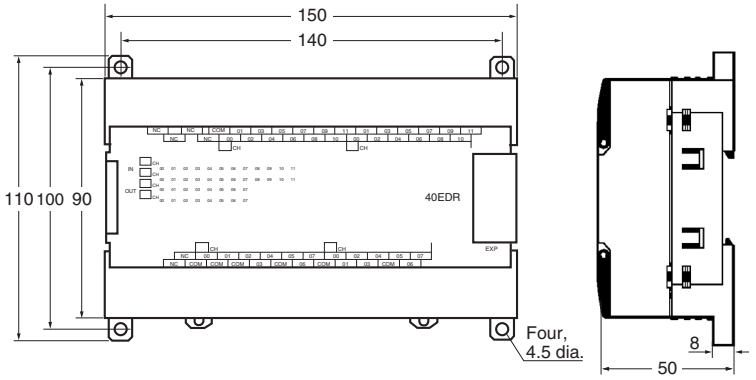
CP1W-20ED□
CP1W-16E□□
CP1W-AD041/CP1W-DA041/CP1W-DA021
CP1W-MAD11/CP1W-TS□□□



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□-□ CP1L-EM30D□-□ CP1L-EM40D□-□	CP Series CP1L-EL/EM CPU Unit Operation Manual	Provides the following information on the CP Series: • Overview, design, installation, maintenance, and other basic specifications • Features • System configuration • Mounting and wiring • I/O memory allocation • Troubleshooting Use this manual together with the *CP1H Programmable Controllers Programming Manual* (W451).
W462	CP1L-L10D□-□ CP1L-L14D□-□ CP1L-L20D□-□ CP1L-M30D□-□ CP1L-M40D□-□ CP1L-M60D□-□	CP Series CP1L CPU Unit Operation Manual	
W451	CP1H-X40D□-□ CP1H-XA40D□-□ CP1H-Y20DT-D CP1L-L10D□-□ CP1L-L14D□-□ CP1L-L20D□-□ CP1L-M30D□-□ CP1L-M40D□-□ CP1L-M60D□-□	CP Series CP1H/CP1L CPU Unit Programming Manual	Provides the following information on programming the CP Series: • Programming methods • Tasks • Programming instructions
W461	CP1L-L10D□-□ CP1L-L14D□-□ CP1L-L20D□-□ CP1L-M30D□-□ CP1L-M40D□-□ CP1L-M60D□-□	CP Series CP1L CPU Unit Introduction Manual	Describes basic setup methods of CP1L PLCs: • Basic configuration and component names • Mounting and wiring • Programming, data transfer, and debugging using the CX-Programmer • 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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