

CP1L

CPU Units and Expansion Units

When it comes to controllers for compact machines, Omron's new CP1L series offers the compactness of a micro-PLC with the capability of a modular PLC.

But this new and exciting range is not only compact, it is scaleable, has a faster processing speed than other controllers and is in a class of its own when it comes to price/performance. Naturally, it is compatible with all other devices in the Omron PLC line up.

- 4 high-speed encoder inputs and 2 high-speed pulse outputs
- CPUs with AC or DC supply and 14, 20, 30 or 40 I/O built-in
- Instruction set compatible with CP1H-, CJ1-, and CS1 series PLC
- Optional RS232C and RS-422A/485 serial ports
- USB programming port
- Scaleable with a wide range of I/O units (maximum up to 160 I/O points)
- Motion functionality
- One and the same software as other Omron controllers



CPU Unit Specification

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-M40/M30DR-A) (See next page.) 30 VA max. (CP1L-L20/L14DR-A)	20 W max. (CP1L-M40/M30□□-D) (See next page.) 13 W max. (CP1L-L20/L14□□-D)
Inrush current (See note.)		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-M30/M40) 200 mA at 24 VDC (CP1L-L14/L20)	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		Conforms to JIS C0040. 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 x 10 sweeps = total time of 80 minutes)	
Shock resistance		Conforms to JIS C0041. 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.

Note: 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.

Current Consumption

The power consumption shown on page 1 is the maximum power consumption. To obtain the correct power consumption for the system configuration, calculate the power consumption for the external power supply from the current consumption given below for the CPU Unit, Expansion Units, and Expansion I/O Units.

CPU Units

Model	Current consumption		External power supply
	5 VDC	24 VDC	24 VDC
CP1L-M40DR-A	0.22 A	0.08 A	0.3 A max.
CP1L-M40DR-D	0.22 A	0.08 A	---
CP1L-M40DT-D	0.31 A	0.03 A	---
CP1L-M40DT1-D	0.31 A	0.03 A	---
CP1L-M30DR-A	0.21 A	0.07 A	0.3 A max.
CP1L-M30DR-D	0.21 A	0.07 A	---
CP1L-M30DT-D	0.28 A	0.03 A	---
CP1L-M30DT1-D	0.28 A	0.03 A	---
CP1L-L20DR-A	0.20 A	0.05 A	0.2 A max.
CP1L-L20DR-D	0.20 A	0.05 A	---
CP1L-L20DT-D	0.24 A	0.03 A	---
CP1L-L20DT1-D	0.24 A	0.03 A	---
CP1L-L14DR-A	0.18 A	0.04 A	0.2 A max.
CP1L-L14DR-D	0.18 A	0.04 A	---
CP1L-L14DT-D	0.21 A	0.03 A	---
CP1L-L14DT1-D	0.21 A	0.03 A	---

- Note 1.** The current consumption of the CP1W-ME05M Memory Cassette and the CP1W-CIF01/CIF11 Option Boards are included in the current consumption of the CPU Unit.
- 2.** CPU Units with DC power do not provide an external power supply.
- 3.** The current consumptions given in the following table must be added to the current consumption of the CPU Unit if an Expansion Unit or Expansion I/O Unit is connected.
- 4.** The external power supply cannot be used if an Expansion Unit or Expansion I/O Unit is connected to a CPU Unit with 14 or 20 I/O points.

Expansion Units and Expansion I/O Units

Unit name		Model	Current consumption	
			5 VDC	24 VDC
Expansion I/O Units	40 I/O points 24 inputs 16 outputs	CP1W-40EDR	0.080 A	0.090 A
		CP1W-40EDT	0.160 A	---
		CP1W-40EDT1	---	---
	20 I/O points 12 inputs 8 outputs	CP1W-20EDR1	0.103 A	0.044 A
		CP1W-20EDT	0.130 A	---
		CP1W-20EDT1	---	---
	16 outputs 8 inputs 8 outputs	CP1W-16ER	0.042 A	0.090 A
		CP1W-8ED	0.018 A	---
		CP1W-8ER	0.026 A	0.044 A
		CP1W-8ET	0.075 A	---
		CP1W-8ET1	---	---
Analog Input Unit	4 inputs	CP1W-AD041	0.080 A	0.120 A
Analog Output Unit	4 outputs	CP1W-DA041	0.080 A	0.120 A
Analog I/O Unit	2 inputs and 1 output	CP1W-MAD11	0.083 A	0.110 A
Temperature Sensor Units	K or J thermocouple inputs	CP1W-TS001	0.040 A	0.059 A
		CP1W-TS002	---	---
	Pt or JPt platinum resistance thermometer inputs	CP1W-TS101	0.054 A	0.073 A
		CP1W-TS102	---	---
CompoBus/S I/O Link Unit	8 inputs and 8 outputs	CP1W-SRT21	0.029 A	---

Connecting Expansion Units and Expansion I/O Units

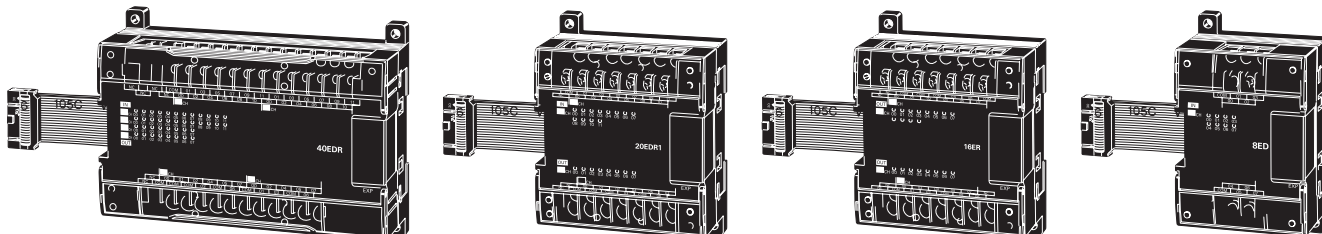
CP-series and CPM1A-series Expansion Units and Expansion I/O Units can be connected to the CP1L. Up to three Expansion Units or Expansion I/O Units can be connected to a CPU Unit with 30 or 40 I/O points and one Expansion Unit or Expansion I/O Unit can be connected to a CPU Unit with 20 or 14 I/O points.

The functionality and performance of CP-series Expansion units and Expansion I/O Units is the same as the functionality and performance of CPM1A-series Expansion Units and Expansion I/O Units. CP-series Units are black, and CPM1A-series units are ivory.

Unit name	Output Method	Inputs	Outputs	Model	
				CP1W	CPM1A
Expansion I/O Units	8-point Input Unit	8	-	CP1W-8ED	CPM1A-8ED
	8-point Output Unit	-	8	CP1W-8ER	CPM1A-8ER
				CP1W-8ET	CPM1A-8ET
				CP1W-8ET1	CPM1A-8ET1
	16-point Output Unit	-	16	CP1W-16ER	-
	20-point I/O Unit	12	8	CP1W-20EDR1	CPM1A-20EDR1
				CP1W-20EDT	CPM1A-20EDT
				CP1W-20EDT1	CPM1A-20EDT1
	40-point I/O Unit	24	16	CP1W-40EDR	CPM1A-40EDR
				CP1W-40EDT	CPM1A-40EDT
				CP1W-40EDT1	CPM1A-40EDT1
Expansion Units	Analog I/O Unit	2	1	-	CPM1A-MAD01
				CP1W-MAD11	CPM1A-MAD11
	Analog Input Unit	4	-	CP1W-AD041	CPM1A-AD041
				CP1W-DA041	CPM1A-DA041
	Analog Output Unit	-	4	CP1W-TS001	CPM1A-TS001
				CP1W-TS002	CPM1A-TS002
				CP1W-TS101	CPM1A-TS101
				CP1W-TS102	CPM1A-TS102
				-	CPM1A-TS101-DA
	Temperature Sensor Unit	2	-	-	-
	Platinum resistance input	4	-	-	-
				-	-
	Platinum resistance input and voltage/current output	2	1	-	-
				-	-
	DeviceNet I/O Link Unit	-	I/O link of 32 input bits and 32 output bits	-	CPM1A-DRT21
	Profibus-DP I/O Link Unit	-	I/O link of 16 input bits and 16 output bits	-	CPM1A-PRT21
	CompoBus I/O Link Unit	-	I/O link of 8 input bits and 8 output bits	CP1W-SRT21	CPM1A-SRT21

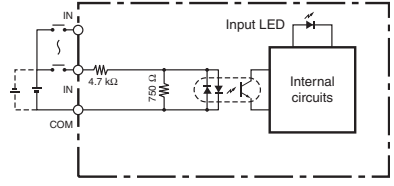
CP1W-40EDR/40EDT/40EDT1/20EDR1/20EDT/20EDT1/16ER/8ED/8ER/8ET/8ET1 Expansion I/O Units

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



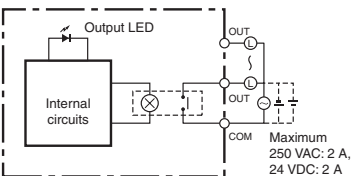
Input Specifications of Expansion I/O Units

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

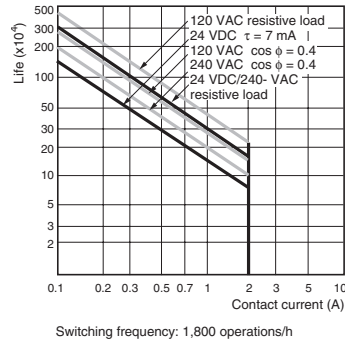
Item	Specifications
Input voltage	24 VDC +10%/-15%
Input impedance	4.7 kΩ
Input current	5 mA typical
ON voltage	14.4 VDC min.
OFF voltage	5.0 VDC max.
ON delay	0 to 32 ms max. (Default: 8 ms) (See note 1.)
OFF delay	0 to 32 ms max. (Default: 8 ms) (See note 1.)
Circuit configuration	

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.

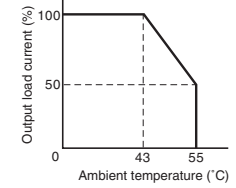
Relay Outputs (CP1W-40EDR/20EDR1/16ER/8ER)

Item			Specifications
Max. switching capacity			2 A, 250 VAC ($\cos\phi = 1$), 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			<div></div>

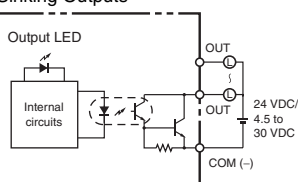
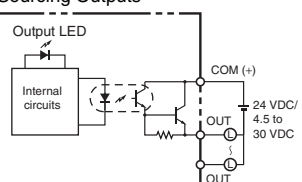
Note: Under the worst conditions, the service life of output contacts is as shown on the left. The service life of relays is as shown in the following diagram as a guideline.



Relationship between Output Load Current and Ambient Temperature (CP1W-16ER)

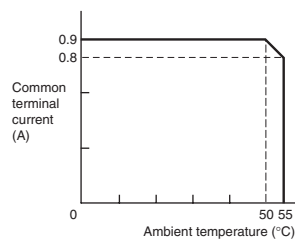


Transistor Outputs (Sinking/Sourcing)

Item	Specifications	CP1W-20EDT CP1W-40EDT1	CP1W-8ET CP1W-8ET1
Max. switching capacity (See note 3.)	4.5 to 30 VDC: 0.3 A/point 0.9 A/common 3.6 A/common	24 VAC +10%/-5%: 0.3 A/point 0.9 A/common 1.8 A/common	OUT00/OUT01: 0.2 A/point at 4.5 to 30 VDC OUT02 to OUT07: 0.3 A/point at 4.5 to 30 VDC
Leakage current	0.1 mA max.	0.1 mA max.	0.1 mA max.
Residual voltage	1.5 V max.	1.5 V max.	1.5 V max.
ON delay	0.1 ms max.	0.1 ms max.	0.1 ms max.
OFF delay	1 ms max. at 24 VDC +10%/-5%, 5 to 300 mA	1 ms max. at 24 VDC +10%/-5%, 5 to 300 mA	1 ms max. at 24 VDC +10%/-5%, 5 to 300 mA
Fuse (See note 2.)	None	1/common	
Circuit configuration	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sinking Outputs</p>  </div> <div style="text-align: center;"> <p>Sourcing Outputs</p>  </div> </div>		

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.

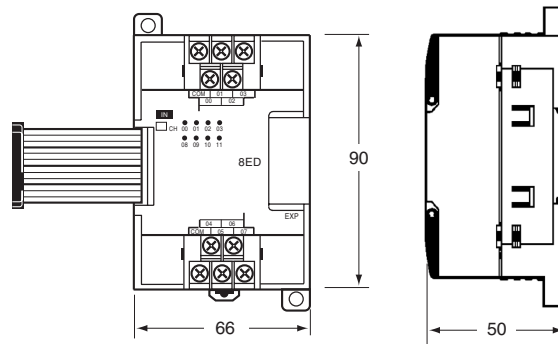
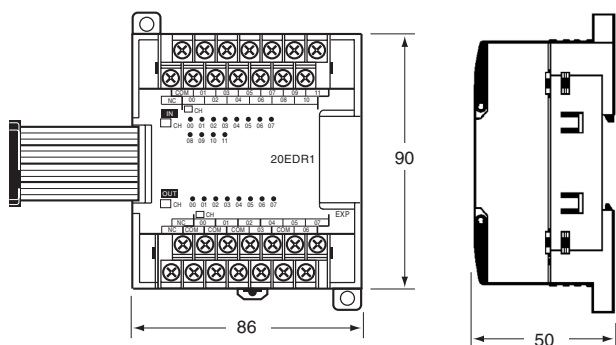
3. A maximum of 0.9 A per common can be switched at an ambient temperature of 50°C.



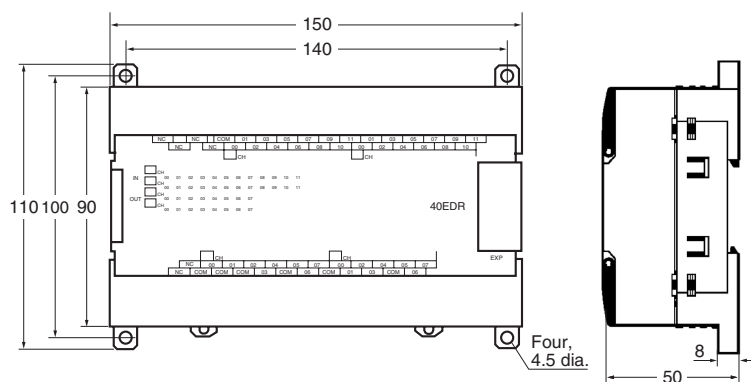
Expansion Units and Expansion I/O Units

CP1W-20ED□
 CP1W-16ER
 CP1W-AD041/CP1W-DA041
 CP1W-MAD11/CP1W-TS□□□

CP1W-8E□□
 CP1W-SRT21

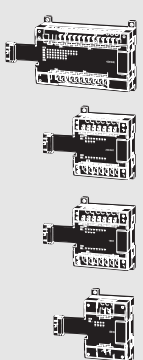
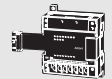
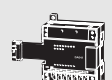





CP1W-40ED□



Unit name	Model number	Weight
Expansion I/O Units	CP1W-40EDR	380 g
	CP1W-40EDT/-40EDT1	320 g
	CP1W-20EDR1/-20EDT/-20EDT1	300 g
	CP1W-16ER	280 g
	CP1W-8ED	200 g
	CP1W-8ER/-8ET/-8ET1	250 g
Analog Units	CP1W-AD041/-DA041	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

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 output (sourcing)			CP1W-40EDT1	
	Relay	12	8	CP1W-20EDR1	U, C, L, CE
	Transistor (sinking)			CP1W-20EDT	U, C, N, L, CE
	Transistor output (sourcing)			CP1W-20EDT1	
	Relay	---	16	CP1W-16ER	CE
	---	8	---	CP1W-8ED	U, C, N, L, CE
	Relay	---	8	CP1W-8ER	
	Transistor (sinking)	---	8	CP1W-8ET	
	Transistor output (sourcing)	---	---	CP1W-8ET1	
Analog Input Unit 	Analog (resolution: 1/6000)	4	---	CP1W-AD041	UC1, CE
Analog Output Unit 	Analog (resolution: 1/6000)	---	4	CP1W-DA041	UC1, CE
Analog I/O Unit 	Analog (resolution: 1/6000)	2	1	CP1W-MAD11	U, C, N, 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	U, C, N, L, CE
	4 thermocouple inputs			CP1W-TS002	
	2 platinum resistance thermometer inputs			CP1W-TS101	
	4 platinum resistance thermometer inputs			CP1W-TS102	

Optional Products, Maintenance Products and DIN Track Accessories

Name	Specifications	Model	Standards
Battery Set	For CP1L 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	PFP-M	
There are 2 stoppers provided with CPU Units and I/O Interface Units as standard accessories to secure the Units on the DIN Track.			

Read and Understand this Catalog

Please read and understand this catalog before purchasing the product. Please consult your OMRON representative if you have any questions or comments.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

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OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the product in the customer's application or use of the product.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.