OMRON

CP1L

The compact machine controller

USB interface for programming

No need for expensive additional cables with the CP1L series because the USB interface enables you to simply plug and play.
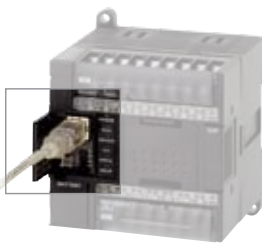
Excellent motion features

The combination of high speed counter inputs, pulse outputs and it's intelligent motion instructions makes the CP1L your ideal compact machine controller.

CX-One

Omron's PLC Lineup

Rack PLCs
CS series

Modular PLCs
CJ series

Compact PLCs
CP series

Same programming method and same instruction set, including function blocks / structured texts, for whole PLC range.

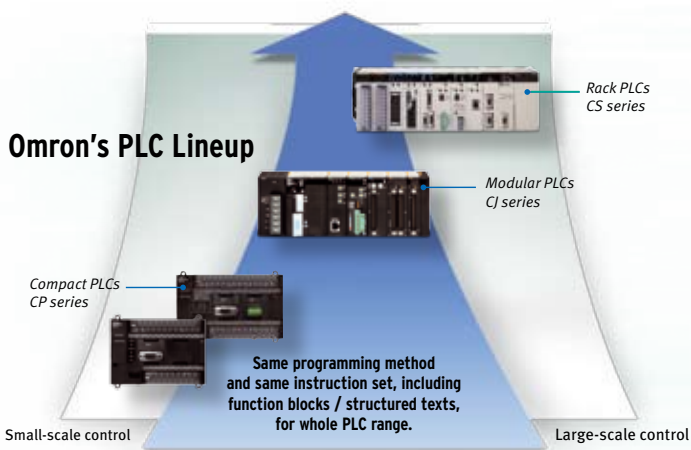Small-scale control   Large-scale control

Easy and familiar programming

Omron's CX-One software offers easy and familiar programming that saves you time and effort. Enabling you to build, configure and program your PLCs, HMIs, networks, motion-control systems, drives, temperature controllers and sensors.

When using Compact PLCs only, the CX-One Lite is your cost effective programming and configuration tool.

CX-One LITE

realizing

Think big...start small...

Ac version (PART NO. CP1LSTARTERKITAC)
CPU unit (Cp1l-l14dr-a)
Rs-232 option port (cp1w-cif01)
Cx-one lite software (cxonelt01cev3)
Usb cable (cp1w-cn221)
Promo cd (cp1lpromocd)
Input switchboard (cp1w-swb06)

Dc version (PART NO. CPILSTARTERKITDC)
Same as Ac version except:
Cp1l-l14dt1-d
Power supply 24vdc,30w,13a (S8VS03024)

FAX: 0870 752 0862 / E-MAIL: UK@EU.OMRON.COM / WWW.OMRON.CO.UK

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or phone us on 0870 752 0861**

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.

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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	0.28A	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	0.20A	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	0.03A	---

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.
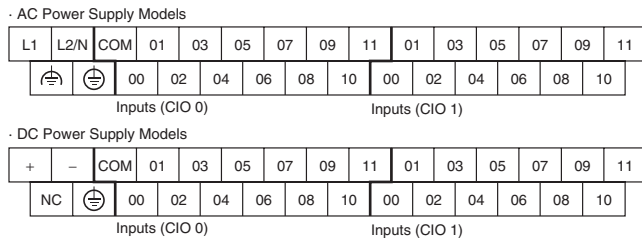
Expansion Units and Expansion I/O Units

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	CP1W-16ER	0.042 A	0.090 A
	8 inputs	CP1W-8ED	0.018 A	---
	8 outputs	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	---

CPU Units

Item \ Type	CP1L-M40 (40 points)	CP1L-M30 (30 points)	CP1L-L20 (20 points)	CP1L-L14 (14 points)
Models	CP1L-M40□□-□	CP1L-M30□□-□	CP1L-L20□□-□	CP1L-L14□□-□
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)
	(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 bits	24: CIO 0.00 to CIO 0.11 and CIO 1.00 to CIO 1.11	18: CIO 0.00 to CIO 0.11 and CIO 1.00 to CIO 1.05	12: CIO 0.00 to CIO 0.11	8: CIO 0.00 to CIO 0.07
I/O areas — Output bits	16: CIO 100.00 to CIO 100.07 and CIO 101.00 to CIO 101.07	12: CIO 100.00 to CIO 100.07 and CIO 101.00 to CIO 101.03	8: CIO 100.00 to CIO 100.07	6: CIO 100.00 to CIO 100.05
I/O areas — 1:1 Link Area	1,024 bits (64 words): CIO 3000.00 to CIO 3063.15 (CIO 3000 to CIO 3063)			
I/O areas — Serial PLC Link Area	1,440 bits (90 words): CIO 3100.00 to CIO 3189.15 (CIO 3100 to CIO 3189)			
Work bits	8,192 bits (512 words): W000.00 to W511.15 (W0 to W511) CIO Area: 37,504 bits (2,344 words): CIO 3800.00 to CIO 6143.15 (CIO 3800 to CIO 6143)			
TR Area	16 bits: TR0 to TR15			
Holding Area	8,192 bits (512 words): H0.00 to H511.15 (H0 to H511)			
AR Area	Read-only (Write-prohibited): 7168 bits (448 words): A0.00 to A447.15 (A0 to A447) Read/Write: 8192 bits (512 words): A448.00 to A959.15 (A448 to A959)			
Timers	4,096 bits: T0 to T4095			
Counters	4,096 bits: 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.	
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	5 years at 25° C. (Use the replacement battery within two years of manufacture.)			
Built-in input terminals	40 (24 inputs, 16 outputs)	30 (18 inputs, 12 outputs)	20 (12 inputs, 8 outputs)	14 (8 inputs, 6 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 × 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)
Interrupt inputs	6 inputs (Response time: 0.3 ms)			4 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
Quick-response inputs	6 points (Min. input pulse width: 50 µs max.)			4 points (Min. input pulse width: 50 µs max.)
Scheduled interrupts	1			
High-speed counters	4 counters, 2 axes (24-VDC input) 4 inputs: Differential phases (4x), 50 kHz or 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)			
Pulse outputs (models with transistor outputs only) — PWM outputs	Duty ratio: 0.0% to 100.0% (specified in increments of 0.1% or 1%) 2 outputs, 0.1 to 6553.5 Hz or 1 to 32,800 Hz (Accuracy: ±5% at 1 kHz)			
Analog control	1 (Setting range: 0 to 255)			
External analog input	1 input (Resolution: 1/256, Input range: 0 to 10 V). Not isolated.			

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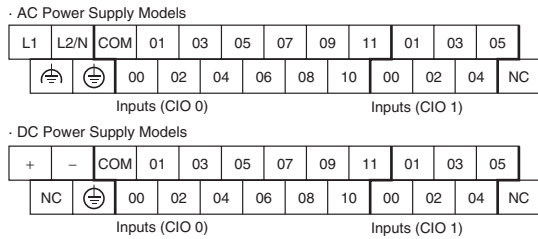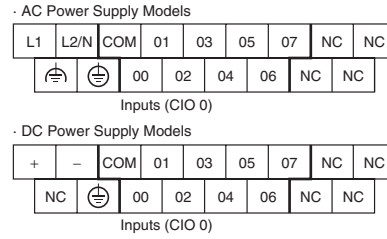## Input Terminal Block Arrangement (Top Block)

CP1L-M40

· AC Power Supply Models

L1	L2/N	COM	01	03	05	07	09	11	01	03	05	07	09	11
⏚	⏚	00	02	04	06	08	10	00	02	04	06	08	10

Inputs (CIO 0)   Inputs (CIO 1)

· DC Power Supply Models

+	−	COM	01	03	05	07	09	11	01	03	05	07	09	11
NC	⏚	00	02	04	06	08	10	00	02	04	06	08	10

Inputs (CIO 0)   Inputs (CIO 1)

CP1L-L20

· AC Power Supply Models

L1	L2/N	COM	01	03	05	07	09	11
⏚	⏚	00	02	04	06	08	10

Inputs (CIO 0)

· DC Power Supply Models

+	−	COM	01	03	05	07	09	11
NC	⏚	00	02	04	06	08	10

Inputs (CIO 0)

CP1L-M30

· AC Power Supply Models

L1	L2/N	COM	01	03	05	07	09	11	01	03	05
⏚	⏚	00	02	04	06	08	10	00	02	04	NC

Inputs (CIO 0)   Inputs (CIO 1)

· DC Power Supply Models

+	−	COM	01	03	05	07	09	11	01	03	05
NC	⏚	00	02	04	06	08	10	00	02	04	NC

Inputs (CIO 0)   Inputs (CIO 1)

CP1L-L14

· AC Power Supply Models

L1	L2/N	COM	01	03	05	07	NC	NC
⏚	⏚	00	02	04	06	NC	NC

Inputs (CIO 0)

· DC Power Supply Models

+	−	COM	01	03	05	07	NC	NC
NC	⏚	00	02	04	06	NC	NC

Inputs (CIO 0)

Built-in Input Area

CPU Units

Number of inputs	Input terminal block		Input operation			High-speed counter operation		Origin search
	Word	Bit	Normal inputs	Interrupt inputs	Quick-response inputs	Operation settings • High-speed counters enabled • Phase-Z signal reset		Origin searches enabled for pulse outputs 0 and 1
						Single-phase (increment pulse input)	Two-phase (differential phase x4, up/down, or pulse plus direction)	
14	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 count input)	---
		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 (See note 1.)
		03	Normal input 3	---	---	High-speed counter 3 (increment)	High-speed counter 1 (phase-B, decrement, or count input)	Pulse output 01 Origin proximity input signal (See note 1.)
		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)	---
		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 (See note 2.)
		11	Normal input 11	---	---	---		Pulse output 1: Origin proximity input signal (See note 2.)
30	CIO 1	00	Normal input 12	---	---	---		---
		01	Normal input 13	---	---	---		---
		02	Normal input 14	---	---	---		---
		03	Normal input 15	---	---	---		---
		04	Normal input 16	---	---	---		---
		05	Normal input 17	---	---	---		---
40		06	Normal input 18	---	---	---		---
		07	Normal input 19	---	---	---		---
		08	Normal input 20	---	---	---		---
		09	Normal input 21	---	---	---		---
		10	Normal input 22	---	---	---		---
		11	Normal input 23	---	---	---		---

Note 1. The origin proximity input signals for CPU Units with 14 points are bits 02 and 03 of CIO 0.
2. The origin proximity input signals for CPU Units with 20 points are bits 10 and 11 of CIO 0.