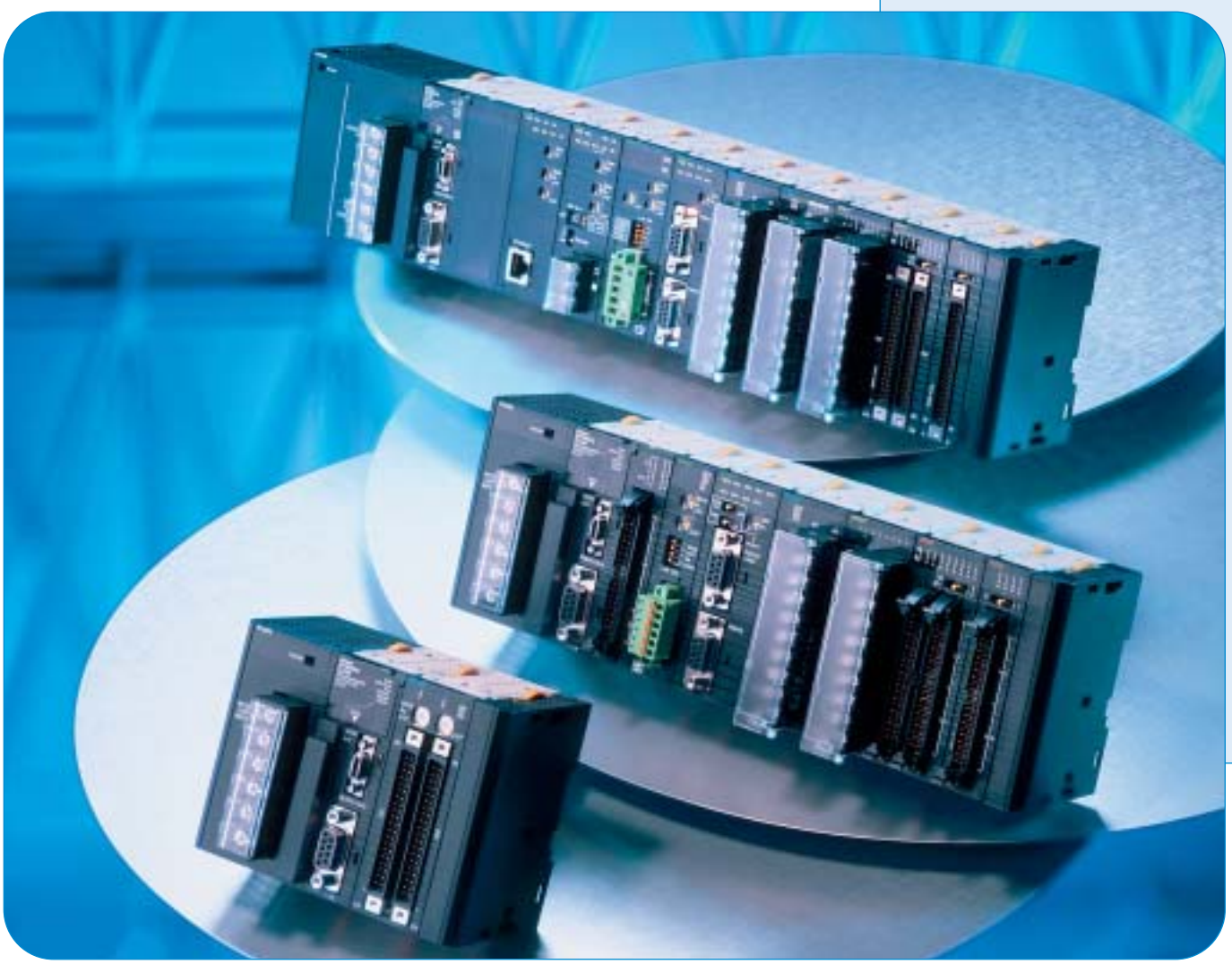
Contents

Smallest, Most Powerful Solution for Tomorrow's Advanced Production Systems

We shrank our most powerful programmable controller by 40% to fit industry's most space-confined cabinets. All of Omron's outstanding performance was retained in the process: That includes the mix of standard and special I/O available, options for system expansion, and standardized programming across all Omron controller platforms.



High-Speed Processing

With separate communications and processing bus structures, the CJ1 delivers the fastest throughput for both advanced and basic instructions for reliable sequential action. Simultaneously, data queries of various sizes and in locations across the entire network can be processed without delaying the cycle time.

Seamless Communications

The CJ1 delivers transparent communications across a variety of network types and protocols: Ethernet, DeviceNet, Controller Link and Serial communications. This capability can allow a user to load programs or acquire data from any location in the facility.

Cost and Space Savings

With no rack to purchase and slim modules that are easy to configure and assemble, the CJ1 lowers overall system cost, takes up little space and leaves you room for future growth.

Five Reasons to Design CJ1 PLCs into Your Application

Ultra-compact Size

- Approx. 40% smaller than mid-size controllers such as CS1 and C200H
- Measures just 90 mm H x 65 mm D; width depends on modules selected. Modules are either 20 mm or 31 mm wide
- Shallow 65 mm depth allows thinner control panels
- Modules lock together to create a flexible “through plane” eliminating the need for a backplane

Three CJ1 PLC part numbers combine to form a powerful 4-axis motion controller that can fit in the palm of your hand

Huge Capabilities

- Control up to 2560 local I/O, plus 32,000 DeviceNet I/O using multiple DeviceNet masters
- Instructions to facilitate every application
  - PID with auto-tuning ideal for multi-loop temperature control and analog process I/O
  - Floating-point decimal math operations ensure precise positioning with X-Y tables
  - Conversion between floating-point decimal and ASCII character string data allows measuring device data to be used in operations
  - High-resolution line approximation allows conversion from a level measurement in mm to tank capacity in liters according to the shape of the tank
- Built-in flash memory backup protects user program and parameter areas
- Optional Omron flash memory cards hold up to 64 MB of data to transfer program modifications, load recipes for quick production changeover or store logged data values from the CPU

One Platform Can Meet All Your Control Needs

Standardizing on the CJ1 platform means that you have chosen a control solution that can be scaled for systems from simple to the most sophisticated. It all starts with choosing the CPU to fit your needs. From there every application will use the same Communications, Specialty, and Basic I/O modules. This versatility preserves your hardware and training investment while delivering the same look and programming feel for every application.

Speed

- Ultra-fast cycle time any way you measure it
  - Basic instruction processing time from 20 nanoseconds
  - Executes 38K steps of basic instructions or 22K of basic and special instructions in a cycle time of 1 ms
  - Fast processing of 20 most-frequently-used data manipulation instructions, including compares, transfers, moves, jumps, subroutine/reset call and more
  - Parallel program execution shortens peripheral processing time by about half
  - Large amounts of data can be exchanged with the host without dependence on the program size in the CPU
  - Data can be refreshed smoothly with uniform timing for data exchanges with SCADA software
  - No effect on cycle time in the event of future network expansions
- 32 MHz system bus transfer speed between CPU and Special I/O impacts overall performance
- Immediate refresh available for Data Links, DeviceNet, Remote I/O communications from the ladder program
- Increased number of cyclic tasks (from 32 to 288) improves efficiency by breaking long programs into sections by function or by developer

Communications

- Easy to set up network communications from device level to controller level to enterprise (information) level
  - Using a common data memory area and routing tables, Omron’s networked PLCs and computers can exchange data regardless of DeviceNet, Profibus-DP, Ethernet or Controller Link formatting
  - Omron networks transparently break down barriers to expansion and change in data collection by eliminating the need for rigid block transfers of data
- Simple connections to general-purpose serial components
  - Built-in Protocol Macros contain handshaking scripts for most Omron temperature controllers and other serial devices for automatic communications
  - CX-Protocol software quickly sets up script and transmission data for serial devices from any manufacturer
- Maintenance can be performed from remote locations
  - Ethernet Module can send e-mail to alert personnel
  - Perform diagnostics and corrective actions locally using CX-Simulator, then implement those corrections and restart the system by modem, using CX-Programmer

Which CPU is Right for You?

CPU selection	CJ1G-H/CJ1H-H	CJ1M
Application	High-end, sophisticated applications with critical response times and large memory requirements • Execution time per basic instruction from: 0.02 µs • Program Memory from 10 to 120K steps • Data memory from 64 to 256K words (Includes Extended Memory)	Simpler applications with fewer I/O and memory requirements: faster processing than most micro controllers • Execution time per basic instruction from: 0.1 µs • Program Memory from 10 to 20K steps • Data memory up to 32K words (No Extended Memory)
Effective system size	I/O counts up to 2560 points	I/O counts up to 640 points
PLC to PLC communications	Uses a Controller Link Communications Module	Built-in serial PLC Link function communicates exclusively between CJ1M CPUs
Built-in basic input/output signals	Uses Basic Input and Output Modules	CPU22 and CPU23 have built-in general purpose I/O: 10 inputs/6 outputs
Interrupt inputs	Uses Interrupt Input I/O Module CJ1W-INT01	Four of the 10 inputs on CPU22 and CPU23 can be designated as interrupt inputs
Pulse catch input	Uses separate Pulse Catch Input Module CJ1W-IDP01	Four of the 10 inputs on CPU22 and CPU23 can be designated as quick-response inputs
High-speed counters	Uses High-speed Counter Module CJ1W-CT021	CPU22 and CPU23 have two built-in high-speed counter inputs rated 50 kHz for phase differential input; 100 kHz for single-phase input from high-speed line driver.
Pulse train for position control	Uses a Position Control Module CJ1W-NC☐☐☐, depending on the number of axes (1, 2, or 4)	CPU22 and CPU23 have 2 pulse outputs for 1 or 2-axis positioning applications
Program storage/exchange medium	Flash memory cards	Flash memory cards

Serial PLC Link Communications

For CJ1M CPUs, this low-cost serial link is simple to use and helps integrate processes or coordinate activities with a master PLC, depending on the application.

Capabilities: 10 words per CPU can be allocated to PLC Link in a master/slave arrangement

Network size: 1 Master and 1 to 8 Slaves (total of 9 CJ1M PLCs) can exchange data

Medium: RS-232C, using port built into each CPU

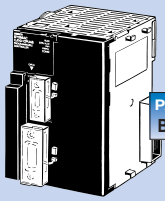
Hardware: CJ1W-CIF11 RS-232C to RS-422/485 converter for multi-drop

Built-In I/O with Extra Capabilities

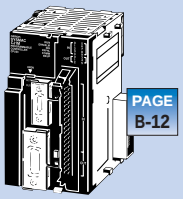
The CJ1M-22/-23 CPUs have 10 inputs and six outputs that provide exceptional versatility for handling most control applications.

- Four interrupt inputs update the CPU with signal changes that take place faster than the scan cycle
- Two high-speed counter inputs for phase differential or single phase input
- Two pulse outputs that can be used for two-axis position control or two single-axis control applications, speed control up to 100 kHz or pulse width modulated (PWM) output

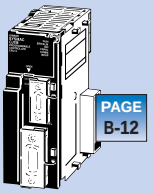
CPUs


PAGE B-11

CJ1G-CPU45H/44H/43H/42H
CJ1H-CPU66H/65H

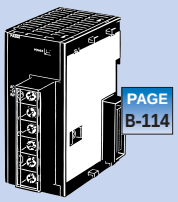

PAGE B-12

Models with Built-in I/O
CJ1M-CPU21 (5K steps)
CJ1M-CPU22 (10K steps)
CJ1M-CPU23 (20K steps)


PAGE B-12

CJ1M-CPU11 (5K steps)
CJ1M-CPU12 (10K steps)
CJ1M-CPU13 (2K steps)

Power Supply


PAGE B-114

CJ1W-PA202 (14 W, AC)
CJ1W-PA205R (25 W, AC)
CJ1W-PD025 (25 W, DC)

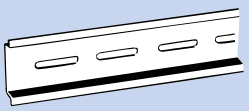
End Cover

CJ1W-TER01
(included with CPU)

End Plate

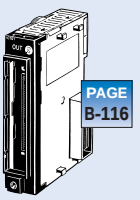
PFP-M
(included with CPU)

DIN Rail



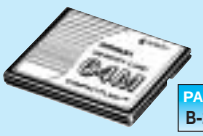
PFP-50N/100N/100N2

I/O Control Module


PAGE B-116

CJ1W-IC101 (required for expansion)

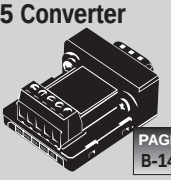
Memory Card


PAGE B-20

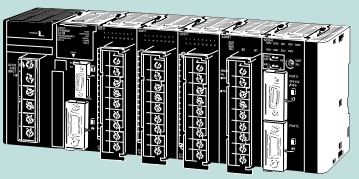
HMC-EF172/372/672

RS-232C to RS-422/485 Converter

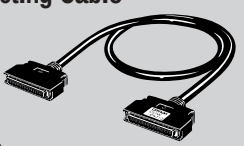
CJ1W-CIF11
(non-isolated converter for converting RS-232C to RS-422/485)


PAGE B-14

CPU

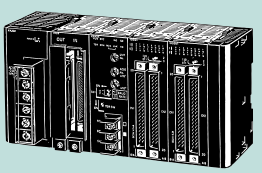


I/O Connecting Cable


PAGE B-117

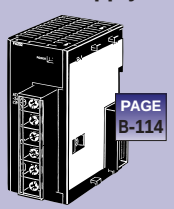
CS1W-CN□□3
(30 cm, 70 cm, 2 m, 3 m, 5 m, 10 m, 12 m)

Expansion



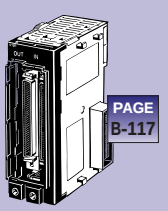
Refer to PAGE B-108 for expansion information.

Power Supply


PAGE B-114

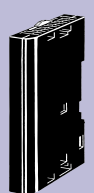
CJ1W-PA202 (14 W, AC)
CJ1W-PA205R (25 W, AC)
CJ1W-PD025 (25 W, DC)

I/O Interface Module


PAGE B-117

CJ1W-II101 (required for expansion)

End Cover

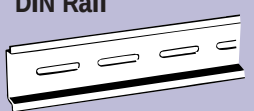


CJ1W-TER01
(included with I/O Interface Module)

End Plate

PFP-M
(included with I/O Interface Module)

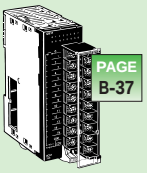
DIN Rail

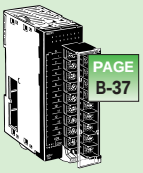


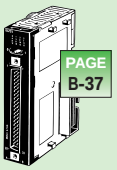
PFP-50N/100N/100N2

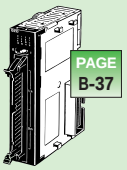
Basic I/O Modules (Allocated words: CIO 0000 to CIO 0039. Allocated in word units (16 bits) according to the mounting position, starting from the left.)

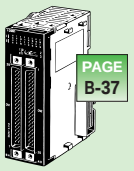
• Input Modules

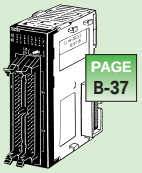

PAGE B-37
8-point
DC Input
CJ1W-ID201

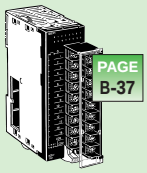

PAGE B-37
16-point
DC Input
CJ1W-ID211


PAGE B-37
32-point
DC Input
CJ1W-ID231

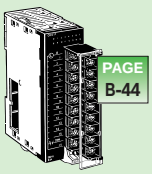

PAGE B-37
32-point
DC Input
CJ1W-ID232

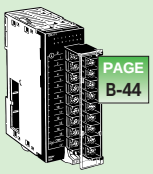

PAGE B-37
64-point
DC Input
CJ1W-ID261


PAGE B-37
64-point
DC Input
CJ1W-ID262

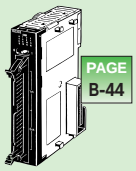

PAGE B-37
8/16-point
AC Input
CJ1W-IA111/201

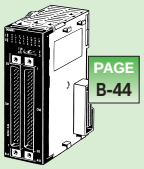
• Output Modules

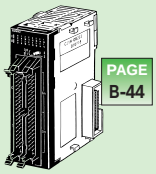

PAGE B-44
8-point
Transistor Output
CJ1W-OD201/202/203/204

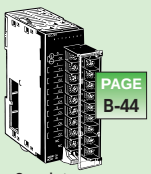

PAGE B-44
16-point
Transistor Output
CJ1W-OD211/212

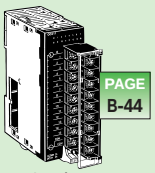

PAGE B-44
32-point
Transistor Output
CJ1W-OD231

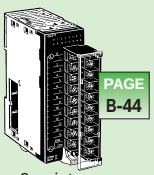

PAGE B-44
32-point
Transistor Output
CJ1W-OD232/233


PAGE B-44
64-point
Transistor Output
CJ1W-OD261

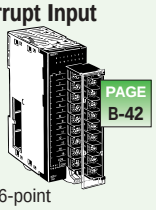

PAGE B-44
64-point
Transistor Output
CJ1W-OD262/OD263


PAGE B-44
8-point
(independent-contact)
Relay Output
CJ1W-OC201

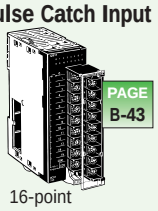

PAGE B-44
16-point
Relay Output
CJ1W-OC211


PAGE B-44
8-point
Triac Output
CJ1W-OA201

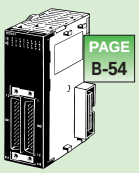
Interrupt Input

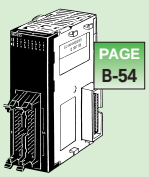

PAGE B-42
16-point
Interrupt Input
CJ1W-INT01

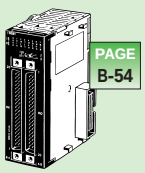
Pulse Catch Input

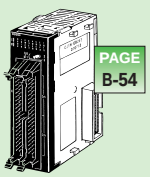

PAGE B-43
16-point
Pulse Catch Input
CJ1W-IDP01

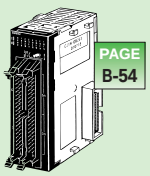
• I/O Modules


PAGE B-54
32-point
DC Input/Transistor Output
CJ1W-MD231

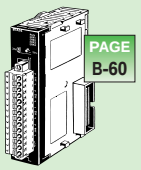

PAGE B-54
32-point
DC Input/Transistor Output
CJ1W-MD232/MD233


PAGE B-54
64-point
DC Input/Transistor Output
CJ1W-MD261


PAGE B-54
64-point
DC Input/Transistor Output
CJ1W-MD263


PAGE B-54
64-point
TTL I/O
CJ1W-MD563

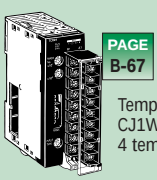
• B7A Interface Modules

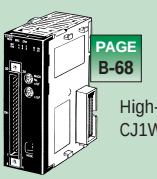

PAGE B-60
64-point
Interface
CJ1W-B7A□□

Special I/O Modules (Allocated words: CIO 2000 to CIO 2959, 10-40 words per Module. Allocated according to unit number.)

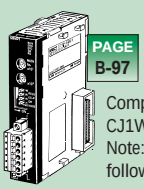

PAGE B-63
Analog Input
CJ1W-AD081-V1
CJ1W-AD041-V1
(4 or 8 inputs)

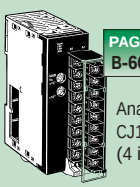

PAGE B-64
Analog Output
CJ1W-DA041/021
CJ1W-DA08V/DA08C
(2, 4, or 8 outputs)


PAGE B-67
Temperature Control
CJ1W-TC□□□ (2 or
4 temperature inputs)


PAGE B-68
High-speed Counter
CJ1W-CT021 (2 axes)


PAGE B-69
Position Control
CJ1W-NC4□3
(1 to 4 axes)

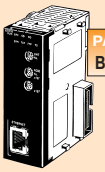

PAGE B-97
CompoBus/S Master
CJ1W-SRM21
Note: for I/O allocation
follow special I/O rules

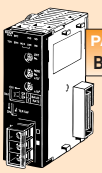

PAGE B-66
Analog I/O
CJ1W-MAD42
(4 inputs, 2 outputs)

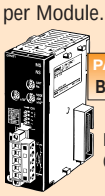

PAGE B-72
ID Sensor
CJ1W-V600C1□
(For 1 or 2 heads)

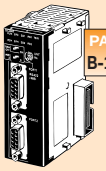

PAGE B-96
Profibus-DP Slave
CJ1W-PRT21

CPU Bus Modules (Allocated words: CIO 1500 to CIO 1899, 25 words per Module. Allocated according to unit number.)

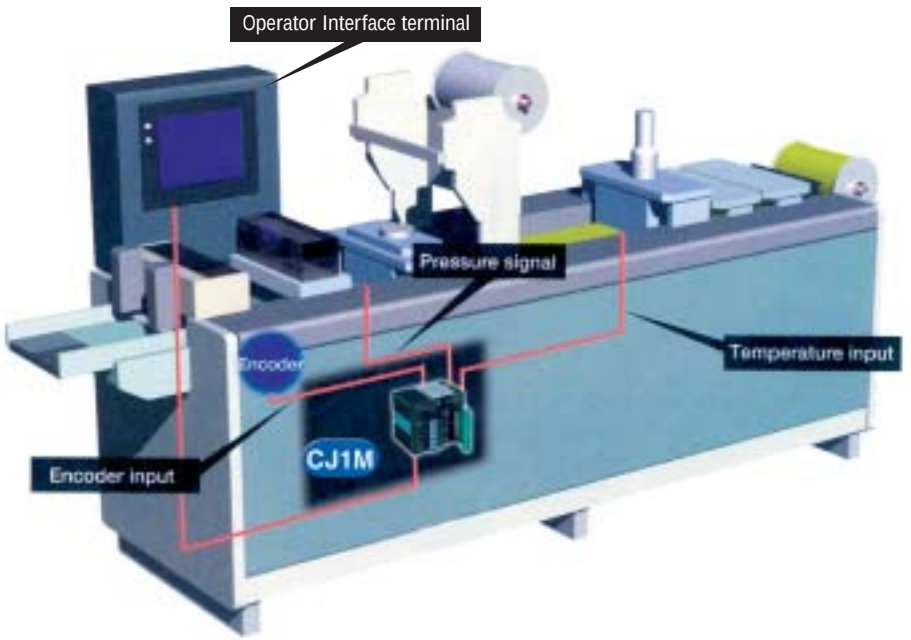

PAGE B-79
Ethernet
CJ1W-ETN21


PAGE B-83
Controller Link
CJ1W-CLK21-V1


PAGE B-89
DeviceNet
CJ1W-DRM21


PAGE B-101
Serial Communications
CJ1W-SCU41 (one RS-232C port
and one RS-422/485 port)
CJ1W-SCU21 (two RS-232C ports)

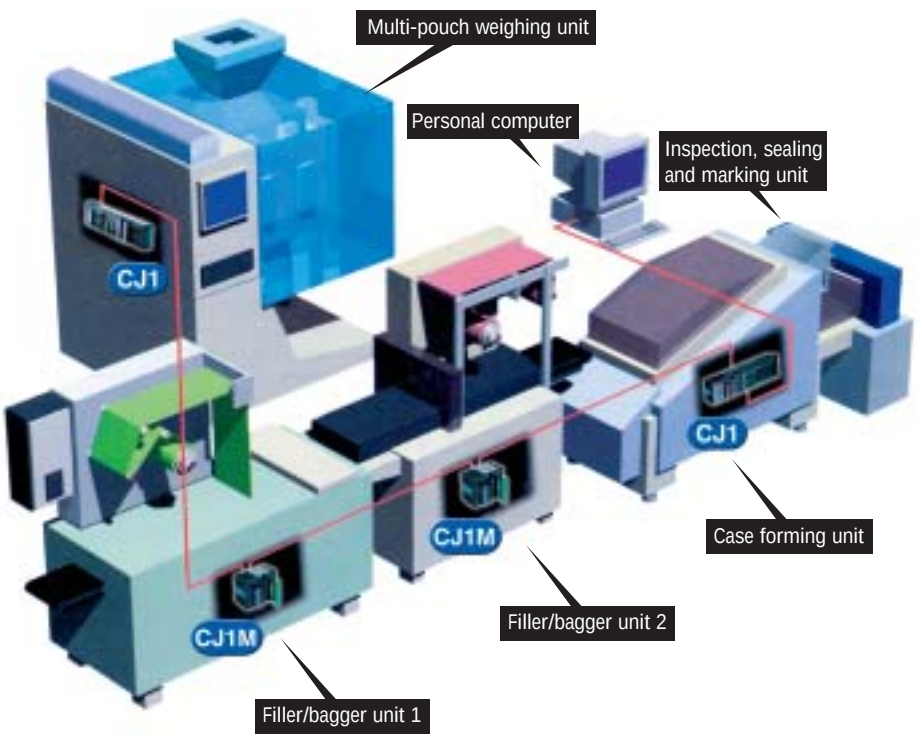
Vacuum-Packing Foods



Omron's CJ1M packs high-speed control and maximum versatility into the industry's most space-efficient package.

- Built-in high speed counter for encoders feedback
- Pulse control for stepper motors
- Built-in I/O available
- Uses CJ1 special I/O for temperature control and analog input for pressure
- Built-in serial port exchanges data with operator interface terminal for parameter and data setting

Weighing and Form-Fill-Seal Packaging Equipment



The CJ1 controllers let you scale control capability to match the needs of each machine unit for flexible reconfiguration. Manage production using data transferred via network from the PLCs on each machine to a personal computer.

- Use CJ1 in the multi-pouch weighing unit to handle high-speed load cell weight measurements and coordinate transfer operations.
- Form-fill-seal machines 1 and 2 use CJ1 or CJ1M controllers to create two different colored bags of product then transfer it to the case packaging unit.
- The small box packager machine forms flat stock into a box that holds multiple bags of product. CJ1M coordinates fabrication and gluing activities.
- Inspection, sealing and date/lot code marking equipment are controlled by CJ1. Data transferred to the PC for finished packages gets archived for production optimization and regulatory record keeping.

When selecting the CPU for your system you'll need to consider…

How many I/O points
Program memory storage
Data memory storage
Portable program storage options

Page B-10

For local Input Modules, consider…

What input voltage
How many points
Input current requirements
Are Terminal Blocks and connection cables necessary

Page B-35

For local Output Modules, consider…

How many points
What type of output
Are Terminal Blocks and connection cables necessary

Page B-36

If Special I/O capabilities are required, consider…

Analog input
Analog output
Analog Mixed I/O
Temperature controllers
High-speed counters
Position control

Page B-61

For networked communications at information, controller and device levels, consider…

Ethernet
Controller Link
Profibus-DP
DeviceNet
CompoBus/S distributed I/O
Serial

Page B-74

For software and programming tools to simplify setup and maintenance you'll need to consider…

CX-Programmer
CX-Simulator
CX-Protocol
Hand-held programmers

Page E-2

For PC-based HMI solutions, consider…

CX-Supervisor
CX-ServerLITE
CX-ServerOPC

Page E-2

For communications and programming cables, consider…

Using serial port
Using peripheral port

Page E-2

Determine power supply and expansion requirements by considering…

Basic CJ1 configuration
Expansion I/O racks
Calculating overall current consumption
Power supply selection
Maximum system expansion

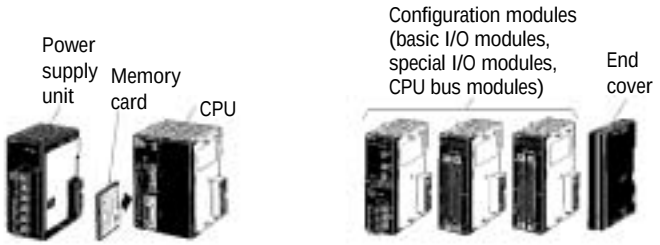
Page B-108

Configuring a CJ1 System

This section provides tools to configure a CJ1G/H or CJ1M system. Included in this section are:

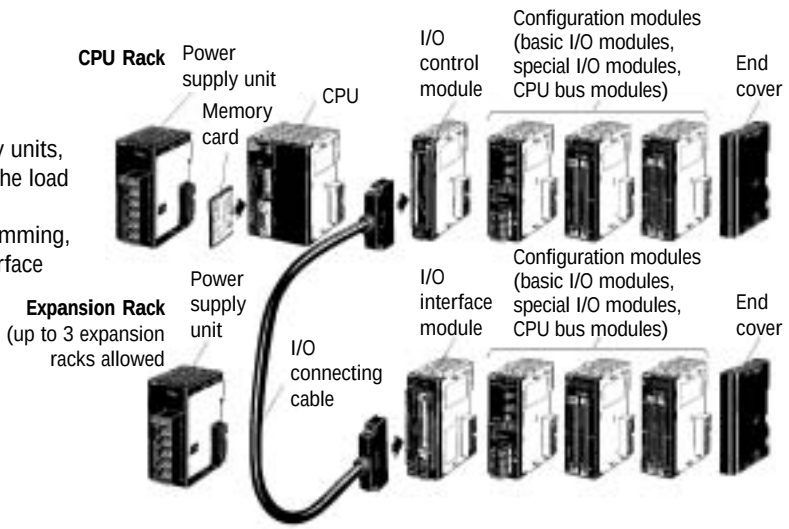
Basic Configuration

A CJ1 Series basic configuration consists of a CPU, power supply unit, and up to 10 basic I/O, special I/O and bus units, and an end cover. Add up the current consumption for all the modules and the CPU according to the chart shown on page B-9, then select the power supply unit suitable for the application.



CPU and Expansion Racks

If the number of modules per rack exceeds 10 or the current consumption is greater than the capacity of the power supply units, use the CPU and expansion rack configuration. This divides the load from the modules across two power supply units. To allow communication and automatic channel assignment in programming, order an I/O control module for the CPU rack and an I/O interface module on each expansion rack.



Select the CPU then determine how many expansion racks.

Depending on the CPU chosen, the system can be expanded with up to three additional racks of basic I/O, special I/O and CPU bus units.

CPU Models	CJ1M-CPU11 CJ1M-CPU21	CJ1M-CPU12 CJ1M-CPU22	CJ1M-CPU13 CJ1M-CPU23	CJ1G-CPU42H CJ1G-CPU43H	CJ1G-CPU44H CJ1G-CPU45H	CJ1H-CPU65H CJ1H-CPU66H
Number of I/O	160 points	320 points	640 points	960 points	1280 points	2560 points
Program memory size	5K words	10K words	10K words	10K words (42) 20K words (43)	30K words (44) 60K words (45)	60K words (65) 120K words (66)
Data memory storage	32K words	32K words	32K words	64K words	64K words (44) 128K words (45)	128K words (65) 256K words (66)
Maximum I/O modules per CPU	10	10	20	30	40	40
Maximum I/O expansion racks per CPU	0	0	1	2	3	3
See page	**B-12**	**B-12**	**B-12**	**B-11**	**B-11**	**B-11**

Note: Order one CJ1W-IC101 I/O control module for the CPU rack and one CJ1W-II101 I/O interface module for each I/O expansion rack. Connect the modules with a cable of the appropriate length. Second and third I/O expansion racks connect between I/O interface modules. See page B-117 for details.

Where are ratings to calculate overall current consumption?

All the current consumption ratings for the CPU, basic I/O, special and CPU bus units are collected in tables on pages B-110 to B-111.

Which power supply is right?

Compare the current consumption total of basic I/O and special I/O modules, and CPU bus units to determine which power supply to use. If more than 10 modules are required or the current consumption exceeds the output capacity of the power supplies, configure the system using CPU and I/O expansion racks.

Input Voltage	**100 to 240 VAC**		**24 VDC**
Output rating	5 A, 5 VDC with 2 A RUN output	2.8 A, 5 VDC	5 A, 5 VDC
Output capacity	25 W max.	14 W max.	25 W max.
Power supply model	CJ1W-PA205R	CJ1W-PA202	CJ1W-PD025
See page	**B-110**	**B-110**	**B-110**

I/O Allocations

In CJ1 PLC systems, part of the I/O memory is allocated to basic, special I/O unit and CJ1 CPU bus units. This summarizes how each of these units is allocated in the memory.

Module type	**Allocated words**	**Unit of allocation**	**Method of allocation**
Basic I/O	CIO 0000 to CIO 0039	1 word (8 or 16 I/O pts) 2 words (32 I/O pts) 4 words (64 I/O pts)	According to mounting position, starting from the left
Special I/O	CIO 2000 to CIO 2959	10 words per module	According to unit number
CPU bus	CIO 1500 to CIO 1899	25 words per module	According to unit number

CPU Selection

This section describes the CPUs and memory cards for a CJ1 system.

How many I/O points are needed?

Number of I/O	160	320	640	960	1280	2560
CPU models	CJ1M-CPU11	CJ1M-CPU12	CJ1M-CPU13	CJ1G-CPU42H	CJ1G-CPU44H	CJ1H-CPU65H
	CJ1M-CPU21	CJ1M-CPU22	CJ1M-CPU23	CJ1G-CPU43H	CJ1G-CPU45H	CJ1H-CPU66H
See page	**B-12**	**B-12**	**B-12**	**B-11**	**B-11**	**B-11**

How much program memory storage is required?

Program Memory Size	CPU Models	See page
5K words	CJ1M-CPU11, CJ1M-CPU21	**B-12**
10K words	CJ1G-CPU42H, CJ1M-CPU12, CJ1M-CPU22	**B-11, B-12**
20K words	CJ1G-CPU43H, CJ1M-CPU13, CJ1M-CPU23	**B-11, B-12**
30K words	CJ1G-CPU44H	**B-11**
60K words	CJ1G-CPU45H, CJ1H-CPU65H	**B-11**
120K words	CJ1H-CPU66H	**B-11**

How much data memory storage is required?

Data memory size	32K Words	64K Words	128K Words	256K Words
CPU models	CJ1M-CPU□1	CJ1G-CPU42H	CJ1G-CPU45H	CJ1H-CPU66H
	CJ1M-CPU□2	CJ1G-CPU43H	CJ1H-CPU65H	
	CJ1M-CPU□3	CJ1G-CPU44H		
See page	**B-12**	**B-11**	**B-11**	**B-11**

Selecting program storage options

Memory card uses:

- Download recipes
- Replace PLC program while operating
- Auto-boot the PLC upon power up

Memory Size	15 MB	30 MB	64 MB
Memory card	HMC-EF172	HMC-EF372	HMC-EF672
See page	**B-20**	**B-20**	**B-20**

Note: An adapter is available to insert the flash memory card into a computer. Go to page B-20 for details.