Programmable Controller

OMRON

SYSMAC CVM1

The Perfect Programmable Controller for Large-scale Machine Control

High-speed Control for Large-scale Machinery with the SYSMAC CVM1

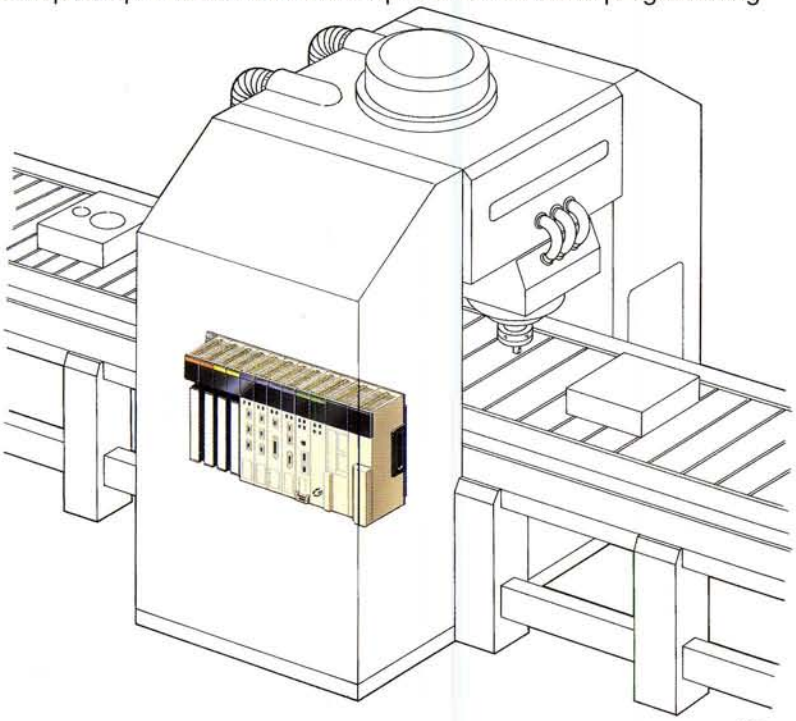
The SYSMAC CVM1 brings intelligence to large-scale machine control. A faster and more complete instruction set simplifies process control, data processing, and other control tasks. And there's plenty of I/O capacity to handle large-scale systems with CPU models that support up to 2,048 local I/O points. You also get three-level network communications with SYSMAC LINK, Controller Link, and/or Ethernet networks to easily achieve high-speed system control. The SYSMAC CVM1 is the ideal Programmable Controller for machine control in systems requiring data processing.

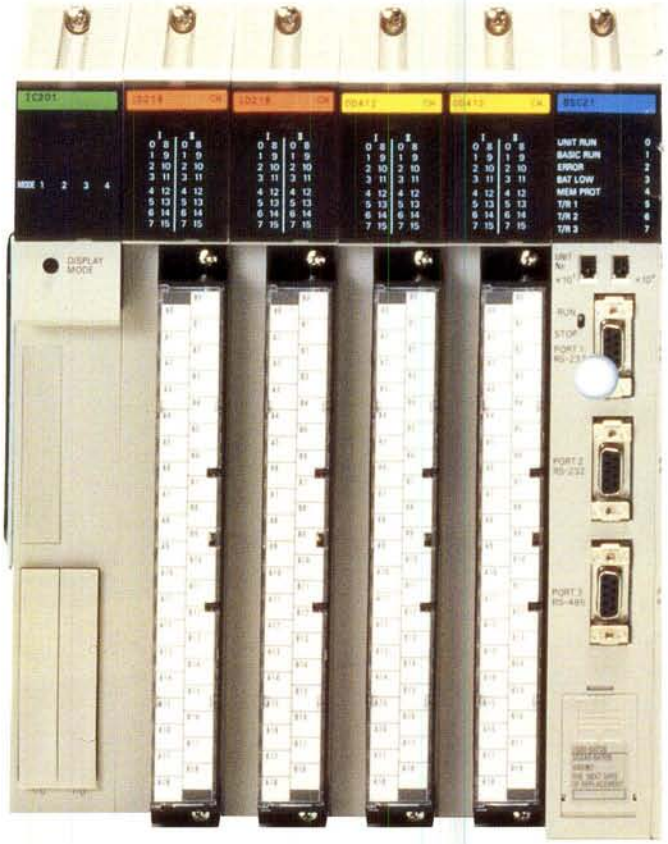

POWER
RUN
ERROR
WDT
ALARM
OUT INH
COMM
SYSTEM PROTECT
NORMAL
POWER
PS221
SYSMAC CVM1-CPU01-V2
PROGRAMMABLE CONTROLLER
OMRON
PERIPHERAL
HOST LINK
MOUSE
KEYBOARD

Better Functionality

Simplify Complex Control Operations with New Instructions
(125 Instructions with 204 Variations)

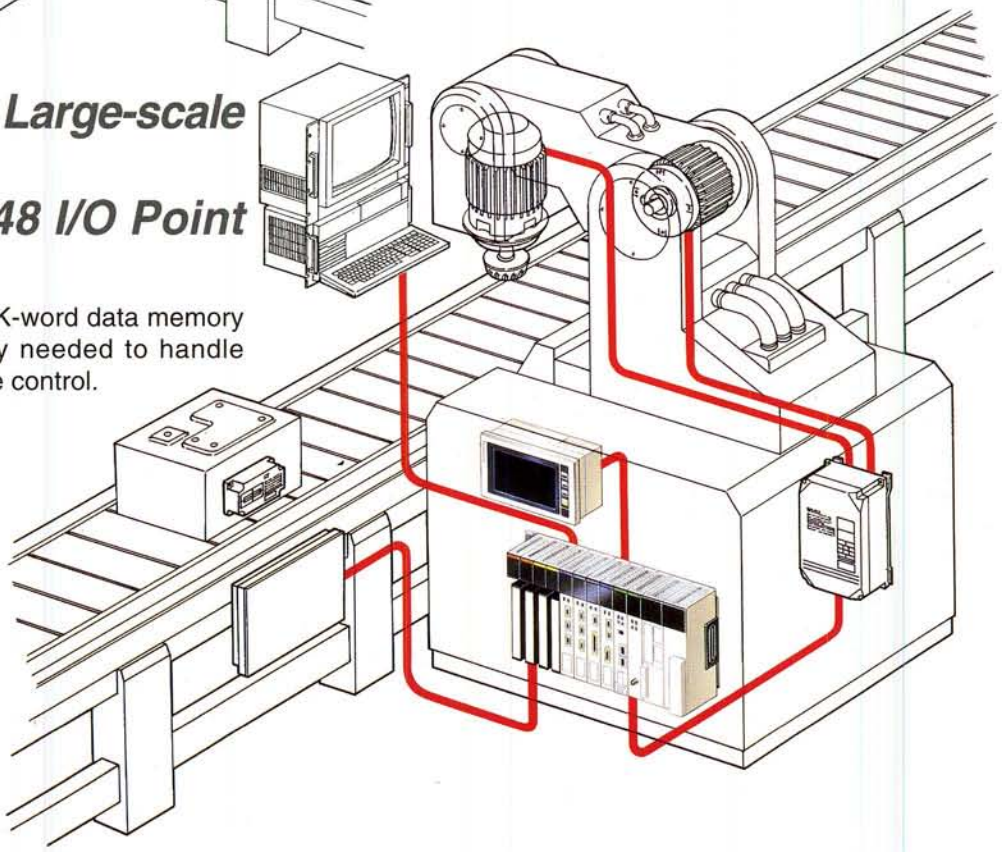
Floating-point arithmetic, symbol math, PID, and many other new instructions have been added to simplify everything from data processing and process control through high-speed positioning and other complex operations. It all adds up to more efficient programming.





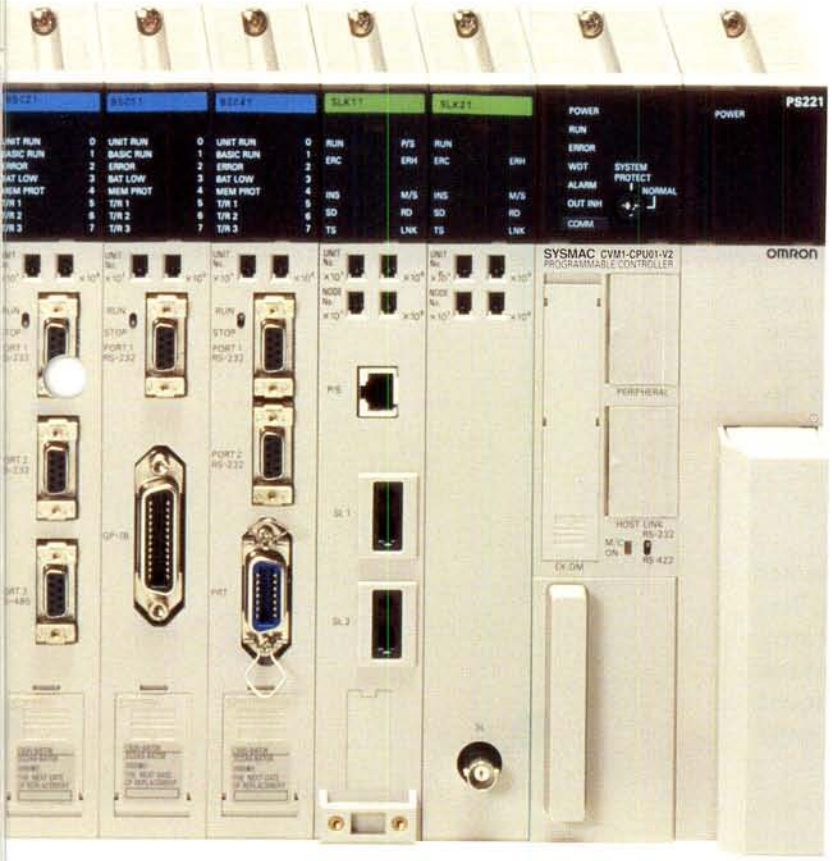
Capacity to Handle Large-scale Control: New CPU with 2,048 I/O Point Capacity

A 62K-word user memory and 24K-word data memory also provide the added capacity needed to handle complex operations for large-scale control.



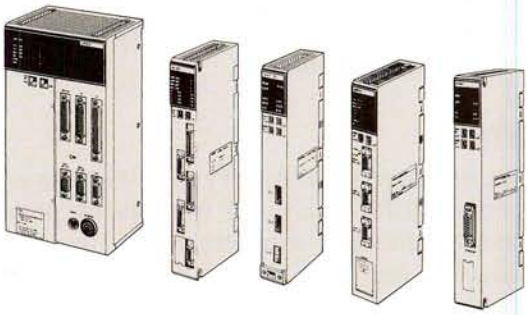
Easier, Simpler Large-scale Control with Advanced PLC Intelligence

CVM1



System Control through Advanced Units

A Motion Control Unit (scheduled for release soon) provides 4-axis position control capability, while a Personal Computer Unit places DOS right on the PLC Rack (see page 11). And a Temperature Controller Data Link Unit manages data from multiple temperature controllers. These, and other CPU Bus Units achieve easy system control.



SYSMAC C-series Compatibility

The SYSMAC Support Software allows you to program ladder diagrams that can be used both for the CVM1 and for C-series PLCs.

■ More Features for Powerful Large-scale Machine Control

High Speed and Capacity

You get basic instructions processed in 0.125 µs, 64K words of user memory, 24K words of data memory, up to 2,048 local I/O points, up to 2,048 SYSMAC BUS remote I/O points, and up to 2,048 SYSMAC BUS/2 remote I/O points.

Expandable Data Memory

Expansion Data Memory can be added to increase the data memory capacity to up to 256K words (32K words x 8 banks).

Standard Memory Card Interface

Memory Cards enable easy and rapid production line switchovers. Data can also be written from Memory Cards to EEPROM in the CPU.

Error Logs

An internal clock can be used to store up to 20 records of time-tagged error information to greatly facilitate managing operating status.

Standard RS-232C Port

An RS-232C port is provided in addition to the peripheral port to enable direct connection to personal computers, Programmable Terminals, and other RS-232C devices.

High-speed Programmable Terminal Communications

A special NT link enables high-speed communications with NT-series Programmable Terminals for real-time screen displays and inputs.

Expansion I/O via One Cable

When only one Expansion I/O Rack is required, it can be connected via a single cable without the use of any special interface units.

Complete Communications

High-speed Communications

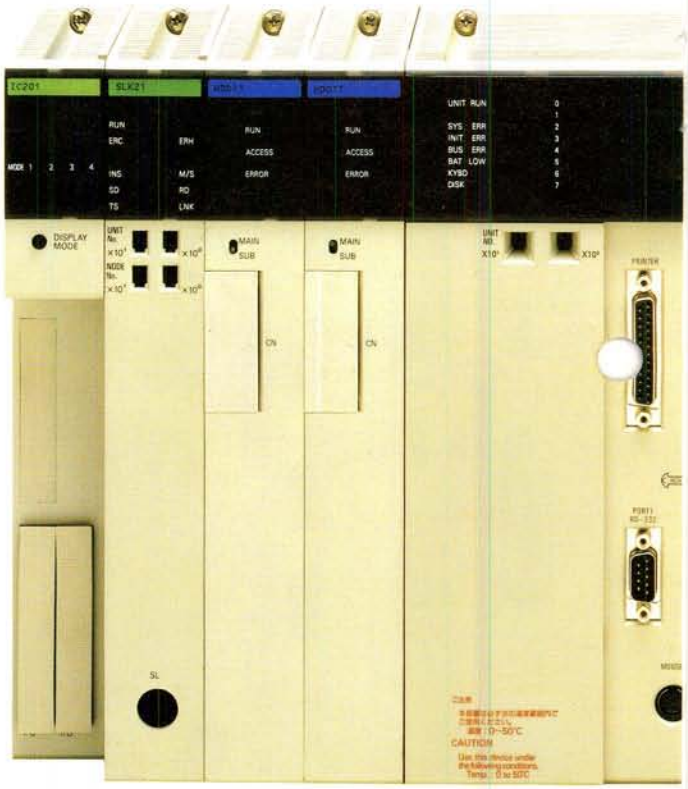
Various networks provide communications designed for essentially every level of FA production: between PLCs, between PLCs and host computers, or between PLCs and other system components. High-speed communications processed asynchronously with the PLC's cycle time are also possible.

Communications Across Three Hierarchies

Connect Programming Devices to monitor and program the local node or go through Host Link, SYSMAC LINK, Controller Link, Ethernet, or SYSMAC BUS/2 networks to monitor and program other nodes. You can also connect Programming Devices to Remote I/O Racks or Expansion I/O Racks to enable monitoring and programming across networks.

Ethernet

The CVM1 communicates easily with computers via an Ethernet network using the TCP/IP or UDP/IP international protocols. The CVM1's Ethernet Unit also supports a File Transfer Protocol, which enables file transfers as well. FINS (Factory Interface Network Service), a message communications protocol developed by OMRON for its FA controllers, also enables easy reading and writing of PLC memory.



■ CPU Bus Units Let You Take Full Advantage of FA Networks

SYSMAC LINK Unit

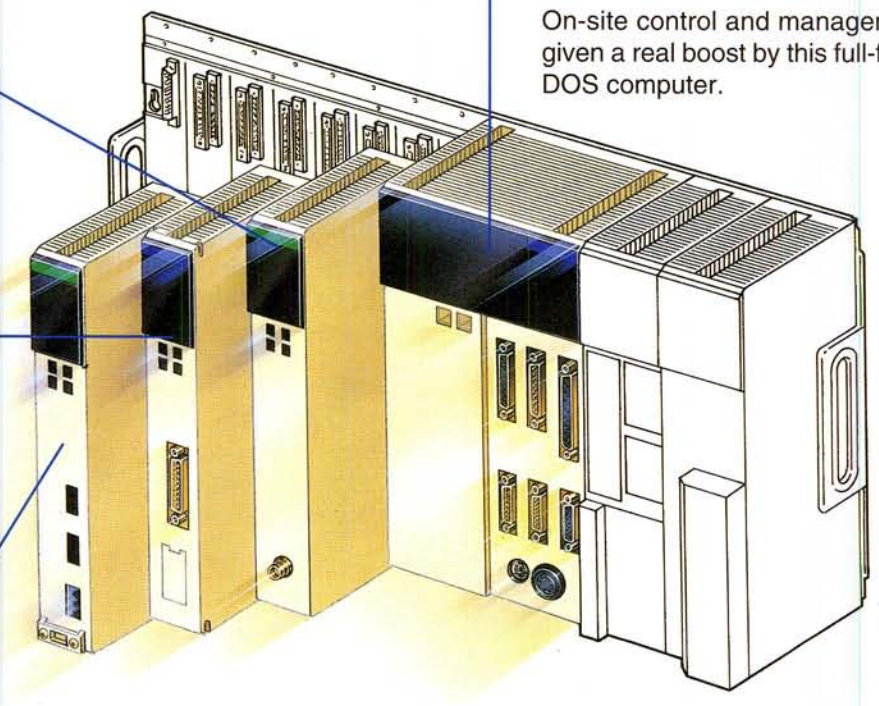
The SYSMAC LINK Unit is OMRON's basic communications unit and it enables peer-to-peer PLC communications.

Ethernet Unit

For information level networks, the Ethernet Unit enables direct connection to personal computers.

Controller Link Unit

For main control-level networks, the Controller Link Unit enables connection to a wide range of FA devices.



Personal Computer Unit

On-site control and management is given a real boost by this full-fledged DOS computer.

CVM1 Communications for Systemized Production Facilities

CVM1

■ Build a Large-scale FA Network with Complete Communications

System Configuration

Select from a wide range of units for large-scale machine control, system-oriented control, and essentially any special need.

Memory Card
RAM:
HMC-ES□□1
EEPROM:
HMC-EE□□1
EPROM:
HMC-EP□□1

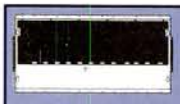
Expansion Data Memory Unit
CV1000-DM□□1

CPU Backplane
CVM1-BC103/BC053
CV500-BC101/BC051/BC031

I/O Control Unit
CV500-IC101/IC201
/IC301

Power Supply Unit
CVM1-PA208
CV500-PS221/PS211

CPU
CVM1-CPU01-EV2
CVM1-CPU11-EV2
CVM1-CPU21-EV2

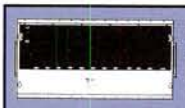


Expansion CPU Backplane
CV500-BI111

I/O Interface Unit
CV500-II101

Power Supply Unit
CV500-PS221/PS211
CVM1-PA208

Terminator
CV500-TER01
(Two provided with
CV500-IC101/201)



Expansion I/O Backplane
CVM1-BI114/BI064
CV500-BI112/BI064/BI042

I/O Interface Unit
CV500-II201

Power Supply Unit
CVM1-PA208
CV500-PS221/PS208

I/O Backplane
3G2A5-BI081/BI051

I/O Interface Unit
3G2A5-II002

I/O Power Supply
3G2A5-PS222-E
/PS212-E

Expansion I/O Backplane
CV500-BI112

Remote I/O Slave Unit
CV500-RT211 (optical)
CV500-RT221 (wired)

Power Supply Unit
CVM1-PA208
CV500-PS221/PS212

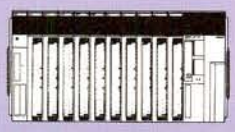
I/O Backplane
3G2A5-BI081/
BI051

Remote I/O Slave Unit
3G2A5-RT001
/002-(P)EV1 (optical)
3G2A5-RT201 (wired)

I/O Power Supply
3G2A5-PS222-E
/PS212-E

CVM1

CPU Rack



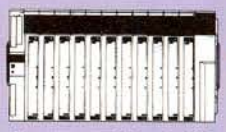
Mount up to 8 Special I/O Units.

Expansion CPU Rack

Required to mount more than 10 CPU Bus Units.

CPU Bus Cable
CV500-CN□□1

I/O Cable
CV500-CN□□2

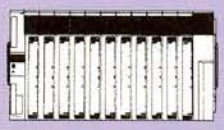


Mount up to 8 Special I/O Units.

Expansion I/O Rack

Required to increase number of I/O Units.

I/O Cable
CV500-CN□□2/3



Mount up to 8 Special I/O Units.

Expansion I/O Rack (C Series)

C500-CN□□N

Cannot connect Programming Devices.

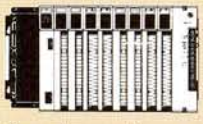
SYSMAC BUS/2 Slave Rack

Optical fiber cable or special shielded twisted-pair cable

Mount up to 8 Special I/O Units.

SYSMAC BUS Slave Rack

Optical fiber cable or 2-core cable



Cannot connect Programming Devices; READ/WRIT instructions not supported.

CVM1

CPU Bus Units


BASIC Unit
CV500-BSC□1


Personal Computer Unit
CV500-VP□□□-E


Temperature Controller Data Link Unit
CV500-TDL21


Motion Control Unit
CV500-MC□□□
(scheduled for release soon)

CPU Bus Units for Communications


Ethernet Unit
CV500-ETN01


Controller Link Unit
CVM1-CLK12/52 (optical)
CVM1-CLK21 (wired)


Host Link Unit
CV500-LK201

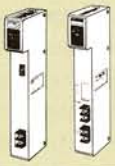

SYSMAC BUS/2 Remote I/O Master Unit
CV500-RM211 (optical)
CV500-RM221 (wired)


SYSMAC LINK Unit
CV500-SLK11 (optical)
CV500-SLK21 (coaxial)

SYSMAC BUS Remote I/O Master Units


Remote I/O Master Unit
3G2A5-RM001-(P)EV1 (optical)
C500-RM201 (wired)


Optical I/O Link Unit
3G2A5-LK010-(P)E


Remote I/O Slave Unit
3G2A5-RT001-(P)EV1 (optical)
C500-RT201 (wired)


Power Feeder Unit
C1000H-APS01 (For optical SYSMAC LINK Unit)

Special I/O Units


Analog Input Unit
3G2A5-AD□□□
/C500-AD□□□


Analog Output Unit
3G2A5-DA□□□
/C500-DA□□□


GPIB Interface Unit
C500-GPI01


High-speed Counter Unit
3G2A5-CT□□□


Cam Positioner Unit
C500-CP131


Ladder Program I/O Unit
C500-LDP01-V1


ID Sensor Unit
C500-IDS□□(-V1)


Fuzzy Logic Unit
C500-FZ001


Position Control Unit
3G2A5-NC□□□-E(V1)
C500-NC□□□-E


ASCII Unit
C500-ASC04

I/O Units


DC Input Units
3G2A5-ID□1□


TTL Input Unit
C500-ID501CN
(32 pts)


AC Input Unit
3G2A5-IA□□□
(16/32 pts)


AC/DC Input Unit
3G2A5-IM21□
(16/32 pts)


Interrupt Input Unit
3G2A5-ID216
(8 pts)


Dummy I/O Unit


Contact Output Unit
3G2A5-OC22□
(16/32 pts)


Transistor Output Unit
3G2A5-OD□□□
(16/32/64 pts)


TTL Output Unit
C500-OD501CN
(32 pts)


Triac Output Unit
3G2A5-OA□□□
(16/32/64 pts)


DC Input/Triac Output Unit
C500-MD211CN
(16 input/16 output pts)


I/O Power Supply Unit
CV500-IPS01
(Not allocated words)

Specifications

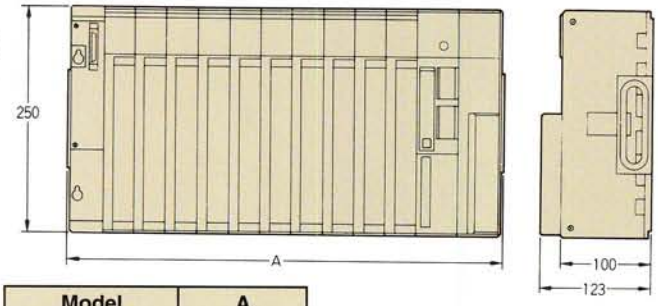
Ratings

Power Supply Unit	CVM1-PA208	CV500-PS221	CV500-PS211
Supply voltage	100 to 120 or 200 to 240 VAC (automatic voltage setting), 50/60 Hz		24 VDC
Operating voltage range	85 to 132 or 170 to 264 VAC		20.4 to 28.8 VDC
Power consumption	150 VA max.	200 VA max.	100 W max.
Output capacity	8 A, 5 VDC	12 A, 5 VDC	
Insulation resistance	20 MΩ min. (at 500 VDC) between AC external terminals and GR terminals (See note.)		
Dielectric strength	2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals, leakage current: 10 mA max. 1000 VAC 50/60 Hz for 1 min between DC external and GR terminals, leakage current: 20 mA max.		
Noise immunity	1,000 Vp-p, pulse width: 100 ns to 1 μs, rise time: 1 ns (via noise simulation)		
Vibration resistance	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 (Time coefficient; 8 minutes x coefficient factor 10 = total time 80 minutes) (according to JIS C0040)		
Shock resistance	147 m/s² 3 times each in X, Y, and Z directions (according to JIS C0041)		
Ambient operating temperature	0° to 55°C		
Ambient operating humidity	10% to 90% (with no condensation)		
Atmosphere	Must be free from corrosive gasses		
Ambient storage temperature	–20° to 75°C (except Memory Card and battery)		
Grounding	Less than 100 Ω		
Enclosure rating	IEC IP-30 (mounted in a panel)		
Weight	9 kilograms max. per Rack		
Dimensions (without cables)	CVM1-BC103/BI114, CV500-BC101/BI112: 480 x 250 x 123 mm (WxHxD) CVM1-BC053/BI064, CV500-BC051/BI062: 306 x 250 x 123 mm (WxHxD) CV500-BC031/BI042: 236 x 250 x 123 mm (WxHxD)		

Note: Disconnect the LG terminal of the Power Supply Unit from the GR terminal when performing insulation and dielectric strength tests. If the tests are repeatedly performed with the LG and GR terminals short-circuited, the internal components may be damaged.

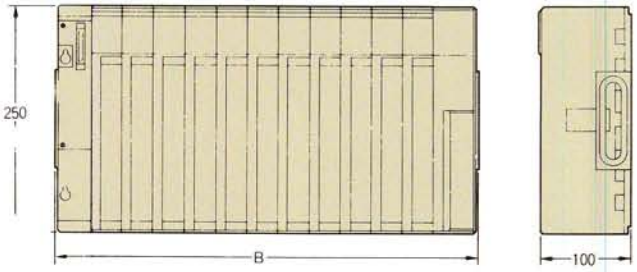
Dimensions (Unit: mm)

CPU Rack



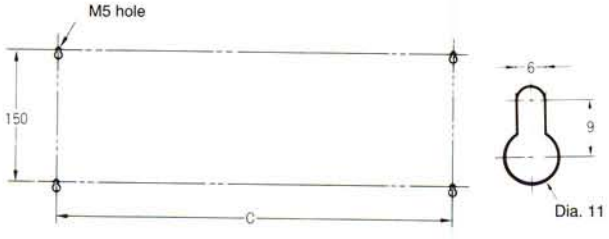
Model	A
CVM1-BC103 CV500-BC101	480
CVM1-BC053 CV500-BC051	306
CV500-BC031	236

Simple Expansion I/O Rack



Model	B
CVM1-BI114 CV500-BI112	480
CVM1-BI064 CV500-BI062	306
CV500-BI042	236

Panel Cutout Dimensions



Model	C
CVM1-BC103 CVM1-BI114 CV500-BC101 CV500-BI112	465
CVM1-BC053 CVM1-BI064 CV500-BC051 CV500-BI062	291
CV500-BC031 CV500-BI042	221

Note: Panel cutouts are the same for CPU Racks and Simple Expansion I/O Racks.

■ CPU Specifications

CPU		CVM1-CPU01-EV2	CVM1-CPU11-EV2	CVM1-CPU21-EV2
I/O capacity		512 pts (2,048 max. with remote I/O)	1,024 pts (4,096 max. with remote I/O)	2,048 pts (6,144 max. with remote I/O)
Control method		Stored program		
I/O control method		Cyclic, programmed, scheduled, and zero-cross refreshing		
Programming		Ladder diagrams or mnemonics		
Instruction length		1 to 8 words/instruction, 1 address/instruction		
Ladder instructions		284 (515 variations)		285 (517 variations)
Execution time		Basic: 0.15 μs to 0.45 μs Special: 0.6 μs to 9.90 μs	Basic: 0.125 μs to 0.375 μs Special: 0.5 μs to 8.25 μs	
Program capacity (See note 1.)		30K words (16 bits/word)		62K words (16 bits/word)
Local I/O bits		512 pts (words CIO 0000 to CIO 0031)	1,024 pts (words CIO 0000 to CIO 0063)	2,048 pts (words CIO 0000 to CIO 0127)
Remote I/O bits	SYSMAC BUS/2	12,800 (0200 to 0999)		
	SYSMAC BUS	4,096 (2,300 to 2555)		
Work bits		2,688 (words CIO 0032 to CIO 0199)	2,176 (words CIO 0064 to CIO 0199)	1,152 (words CIO 0128 to CIO 0199)
Temporary bits		8 (TR0 to TR7)		
CPU bus link bits		4,096 (words G000 to G255)		
Auxiliary bits		8,192 (words A000 to A511)		
Timers		512 (T0000 to T0511) Normal timers: 0 to 999.9 s High-speed timers: 0 to 99.99 s	1,024 (T0000 to T1023) Normal timers: 0 to 999.9 s High-speed timers: 0 to 99.99 s	
Counters		512 (C0000 to C0511) (0 to 9999 counts)	1,024 (C0000 to C1023) (0 to 9999 counts)	
Data memory		8,192 words (D00000 to D08191)	24,576 words (D00000 to D24575)	
Expansion DM		---		256K words (E00000 to E32765 x 8 banks)
Data registers		3 (DR0 to DR2)		
Index registers		3 (IR0 to IR2)		
Trace memory		1K words	2K words	
Control input signals		START input: In RUN mode, PLC begins operation when input is ON and halts when it is OFF. Input specifications: 24 VDC, 10 mA		
Control output signals		RUN output: The RUN output terminals are ON (closed) while PLC is operating. Maximum switching capacity: 250 VAC/2 A (resistive load, cos ø = 1) 250 VAC/0.5 A (inductive load, cos ø = 0.4) 24 VDC/2 A (See note 2.)		
Memory protection		Holding bits (internal status maintained), contents of counters and data memory, SFC execution status (can be set)		
Battery life		Service life: 5 years The memory backup time when PLC is not powered varies with the ambient temperature. If BAT ERR indicator lights, replace the battery with a new one within 1 week.		
Self-diagnostics		CPU failure (watchdog timer), I/O verify error, I/O bus error, memory failure, remote I/O error, battery error, link error, or Special I/O Unit/CPU Bus Unit errors		

Note: 1. The usable program capacity is 28 K words or 60 K words.
2. To meet the EC Low Voltage Directive, use the CV500-PS211 at 24 VDC only.

CPU Bus Units

Advanced Data Processing in BASIC Language

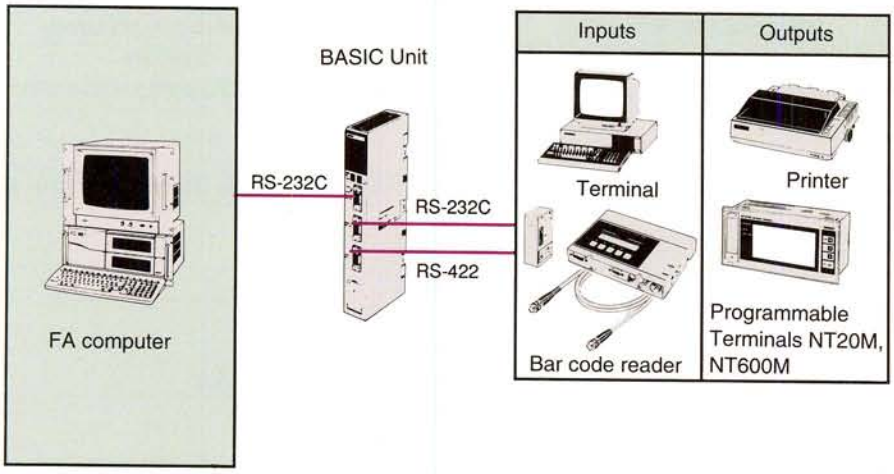
BASIC Unit

CV500-BSC11
(w/o EEPROM)
CV500-BSC21
(w/EEPROM)

CV500-BSC31
(w/o EEPROM)
CV500-BSC41
(w/EEPROM)

CV500-BSC51
(w/o EEPROM)
CV500-BSC61
(w/EEPROM)

- **Multiple I/O Interfaces**
  Select from RS-232C, RS-422, Centronics, or GP-IB interfaces. Input from bar code readers and other devices; output to display devices, printers, or other devices. Communicate with measurement instruments.
- **High-speed Multi-task BASIC**
  Intermediate language execution enables fast, easy-to-use BASIC without compiling. Multi-task execution enables parallel processing.
- **Exchange Data with PLC**
  No programming is required in the PLC's CPU to read and write data from the BASIC Unit.



Interface	BSC11/21	BSC31/41	BSC51/61
RS-232C	2 ports	2 ports	1 port
RS-422	1 port	---	---
Centronics	---	1 port	---
GP-IB	---	---	1 port

RS-232C

Communications:	Half duplex
Sync:	Start-stop
Baud rate:	300, 600, 1,200, 2,400, 4,800, 9,600, 19,200 bps
Transmission method:	Point to point
Transmission distance:	15 m max.
Interface:	Conforming to EIA RS-232C

Centronics

Communications:	Simplex
Handshaking:	Two-line (STROBE and BUSY)
Data transmissions:	8-bit parallel
Interface:	TTL level Low: Output ≦ 0.5 V, Input ≦ 0.8 V High: Output ≧ 2.4 V, Input ≧ 2.0 V

RS-422

Communications:	Half duplex
Sync:	Start-stop
Baud rate:	300, 600, 1,200, 2,400, 4,800, 9,600, 19,200 bps
Transmission method:	1:N up to 1:32 Termination resistance set via front-panel DIP switch
Transmission distance:	500 m total max.
Interface:	Conforming to EIA RS-422 (RS-485 applicable driver used)

GP-IB

Communications:	Half duplex
Handshaking:	Three-line handshaking
Baud rate:	Depends on device connected
Data transmissions:	8-bit parallel
Transmission distance:	4 m max. between devices (Total of 20 m or 2 m x number of devices on bus, whichever is less)
Number of connectable devices: 15 including BASIC Unit	
Interface:	IEE Std; Conforming to 488-1978 standard

Item		Specification	
Programming language		Interpreter, multi-task BASIC and machine language (V25)	
Number of user tasks		16 (parallel operation possible)	
Intertask communications		Messages sent/received via SEND/RECV instructions. Common data via global variables.	
Intertask sync		Event generation/communications via SENDSIG, ON SIGNAL, GOSUB, and TWAIT commands.	
Task control		Starting: TASK command; stopping: END, STOP, and EXIT commands	
Debugging functions		Tracing via TRON command; statement execution via STEP command; pausing via STOP, BREAK, and CONT commands.	
Memory		RAM	Source program area: 63 KB Variable and execution code area: 110 KB (32 KB non-volatile)
		EEPROM	Source program save area: 63 KB (BSC21/41/61 only)
Battery life		5 years (effective battery life)	
CPU interface		Cyclic	IN/OUT 384 words total max. Default: 10 input words 15 output words (for cyclic servicing)
		CPU bus link	Reading from PLC's CPU: 128 words max. With other CPU Bus Units: 8 words each (refreshed every 10 ms)
		Events	Execution with PLC READ and PLC WRITE commands: 512 bytes max. read/written Execution with PRINT command: 538 bytes max. read/written
Diagnostic functions	BASIC Unit	Watchdog timer, low battery voltage detection	
	PLC's CPU	Bus disconnection check, horizontal parity check for send/receive data	

Mount a 4-slot DOS Computer to the Rack to Manage Data More Effectively than Ever Before

CVM1

Personal Computer Unit

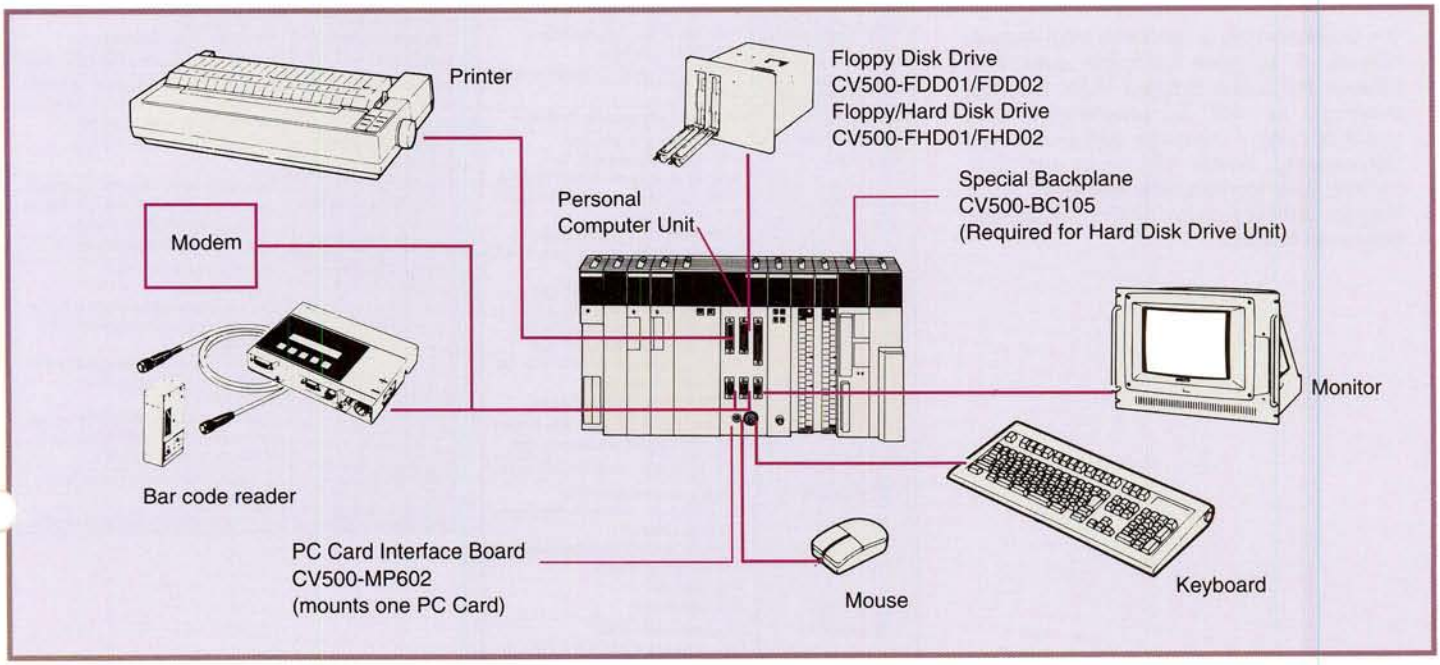
CV500-VP213-E (4-MB memory; w/o floating-point processor)
CV500-VP217-E (8-MB memory; w/o floating-point processor)
CV500-VP223-E (4-MB memory; w/floating-point processor)
CV500-VP227-E (8-MB memory; w/floating-point processor)
[486 SX: W/O floating-point processor]
[486 DX: W/ floating-point processor]

With the Personal Computer Unit, you can mount a full-fledged DOS computer right to the Rack to take advantage of networking and support production line monitoring and control.

- **On-Rack PLC**
  Mount directly to the Rack without any extra wiring while saving the space required for a separate computer. You also get faster SYSMAC communications.
- **Hard Disk Drive Unit**
  To save even more space, the 80-MB hard disk also mounts directly to the Rack. You can mount up to two Units to provide extra storage space.
- **Complete Peripherals**
  Connect the peripherals required by your system just as you would for a stand-alone computer: displays, keyboard, drives, etc.
- **DOS Software**
  You can run any of a wide range of IBM PC/AT compatible software available world-wide (VGA compatible).
- **Advanced Development Environment**
  Standard function libraries include BASIC and C languages to support your software development needs.

Specifications

Item		Specification	
CPU		i80486SX (25 MHz) or i80486DX (25 MHz)	
Memory		Standard	Optional
	Main memory	4 MB or 8 MB	---
	RAM	64 KB	2 MB (two RAM max.)
	ROM	1.5 MB (Contains part of DOS.)	---
Interfaces		Two RS-232C ports (D-sub 9-pin) Keyboard interface Mouse interface Printer interface (D-sub 25-pin) Floppy disk interface Hard disk interface (Optional) CRT interface	
Expansion slots		2 slots (dedicated slots)	
PC Card (Optional)		PC Card Interface Board (sold separately): One PC card can be installed. (PCMCIA 2.1 Type II)	
Self-diagnostic functions		Main memory parity check ROM checksum CPU bus communications check Low battery voltage detection	
Battery life		Effective life: 5 years max.	
Dimensions		140 x 250 x 100 mm (WxHxD)	
Weight		3.2 kg max.	



CPU Bus Units for Communications

Ethernet Unit

CV500-ETN01

The CV-series Ethernet Unit supports the TCP/IP or UDP/IP international protocols to enable the PLC to connect to an Ethernet network without going through a personal computer. The Ethernet Unit also supports a built-in File Transfer Protocol, which enables file transfers between the PLC and host computers. FINS commands also enable any host computer connected to the Ethernet Unit to easily read and write PLC memory. Finally, RAS functions ensure reliable operation.

Specifications

Item		Specifications
Transmission specifications	Medium access method	CSMA/CD
	Modulation	Base band
	Transmission path	Bus
	Baud rate	10 Mbit/s
	Transmission medium	Coaxial cable
	Transmission distance	500 m max./segment; 2.5 km max./network
	Number of connectable nodes	100 nodes/segment
	Distance between nodes	Multiples of 2.5 m
	Transceiver cable length	50 m max.
	Transceiver power supply capacity	0.35 A at 12 V
Communications services		1. TCP/IP and UDP/IP socket services 2. FINS communications 3. FTP server
RAS (Reliability, Availability, and Safety) functions		1. PING command (echo request via ICMP) PING response (echo response via ICMP) 2. Internode tests 3. Error logs 4. Self-diagnostic functions (hardware operation check) 5. Network status reads (via FINS commands)

Controller Link Units

CVM1-CLK21
(Coaxial cable)

CVM1-CLK12/52
(Optical fiber)

The Controller Link is OMRON's main FA-level network. It supports automatic data links between PLCs and between PLCs and host computer, as well as programmed data transfers using a message service. You get high-capacity, flexible data links and high-capacity data transfers with messages. For a low-cost communications system, twisted-pair cables can be used.

Wired System (CVM1-CLK21)

Items	Specifications
Communications method	N:N token bus
Code	Manchester code
Modulation	Baseband code
Synchronization	Flag synchronization (conforms to HDLC frames)
Transmission path	Multi-drop bus
Baud rate and maximum transmission distance	The maximum transmission distance varies with the baud rate as follows: 2 Mbps: 500 m 1 Mbps: 800 m 500 Kbps: 1 km
Media	Specified shielded twisted-pair cable Number of signal lines: 2, shield line: 1
Node connection method	PLC: Connected to a terminal block IBM PC/AT or compatible: Connected via a special connector (included)
Maximum number of nodes	32 nodes
Communications functions	Data links and message service
Number of data link words	Transmission area per node: 1,000 words (2,000 bytes) max. Data link area in one C200HX/HG/HE, CVM1, CV-series, or CQM1H-series PLC (send/receive): 8,000 words (16,000 bytes) max. Data link area in one CS1-series PLC (send/receive): 12,000 words (24,000 bytes) max. Data link area in one IBM PC/AT or compatible (transmission/reception): 32,000 words (64,000 bytes) max. Number of data link words in one network (total transmission): 32,000 words (64,000 bytes) max.
Data link areas	Bit areas (IR, AR, LR, CIO), data memory (DM), and extended data memory (EM)
Message length	2,012 bytes max. (including the header)
RAS functions	Polling node backup function Self-diagnosis function (hardware checking at startup) Echoback test and broadcast test (using the FINS command) Watchdog timer Error log function
Error control	Manchester code check CRC check (CCITT $X^{16} + X^{12} + X^5 + 1$)

Optical Ring System (CVM1-CLK12/52)

Items	Specifications
Type	Optical Ring (H-PCF cable)
Communications method	N:N token-ring method (token-ring mode) N:N token-bus method (token-bus mode)
Code	Manchester code
Modulation	Baseband code
Synchronization	Flag synchronization (conforms to HDLC frames)
Transmission path	Ring method (token-ring mode) Daisy-chain method (token-bus mode)
Transmission speed	2 Mbps
Maximum transmission distance	20 km
Maximum distance between nodes	Crimp cut: 800 m Adhesive: 1 km (See note 1.)
Medium	H-PCF cable (optical two-core cable)
Node connection method	Connected via a special (full-lock connector) connector. (A half-lock connector can also be used.)
Maximum number of nodes	62 nodes (See notes 2 and 3.)
Applicable Programming Devices	Controller Link Support Software (Ver. 2.00 or later) and CX-Net in CX-Programmer (See note 3.)
Communications functions	Data links and message service
Number of data link words	Transmission area per node: 1,000 words max. Data link area (send/receiver) that can be created for one CVM1 or CV-series PLC: 8,000 words max. Data link area (send/receive) that can be created for one CS1-series PLC: 12,000 words max. Number of data link words that can be used in one network (total transmission): 62,000 words max. (See note 2.)
Data link areas	Bit areas (CIO, AR, LR), DM, EM (See note 4.)
Message length	2,012 bytes max. (including the header)

SYSMAC LINK Units

CV500-SLK11
(Optical fiber)

CV500-SLK21
(Coaxial cable)

SYSMAC LINK Systems enable high-speed, large-scale data links between PLCs or between PLCs and host computers in either a wired or optical network. Bridges can be used to communicate between interconnected SYSMAC LINK networks, or the PLC gateway function can be used to communicate with PLCs on SYSMAC BUS/2 networks, enabling centralized system management from a host computer.

Specifications

Item	Specifications	
Model	CV500-SLK21 (coaxial)	CV500-SLK11 (optical)
Method	N:N token ring	
Transmission path	Bus	Daisy chain
Baud rate	2 Mbps	
Transmission distance	1 km total	800 m between nodes, 10 km total
Transmission cable	Coaxial cable (5C-2V)	2-core optical fiber cable (H-PCF)
Number of connecting nodes	62 max.	
Connector	BNC connector	Full- or half-lock crimping style connector
Link services	Datalink and message service	
Data link words	2,966 words max. (in I/O Area + DM Area)	
Message length	542 bytes max. (excluding the header)	
Send buffer capacity	1 message	
Receive buffer capacity	2 messages	
RAS (Reliability, Availability, and Safety) functions	1. Automatic polling unit backup 2. Self-diagnostics (internode tests) 3. Node bypasses (optical system) using power supply 4. Watchdog timer 5. Error detection (CRC-CCITT: Generating function = $X^{16} + X^{12} + X^5 + 1$) 6. Error log	

SYSMAC BUS/2 Remote I/O Units

SYSMAC BUS/2
Remote I/O Master Unit
CV500-RM211 (optical)
CV500-RM221 (wired)

SYSMAC BUS/2
Remote I/O Slave Unit
CV500-RT211 (optical)
CV500-RT221 (wired)

SYSMAC BUS/2 Systems provide high-speed bus networks that can be used to connect the PLC to I/O devices and FA components. They effectively reduce the time and expense of wiring distributed controls and increase system maintenance efficiency by enabling remote monitoring and programming.

Specifications

Item	Specifications	
	Wired Units	Optical Units
Transmission medium	Special shielded twisted-pair cable	2-core optical fiber cable (H-PCF)
Communications method	1:N polling and selection	
Data transfer speed	1.5 Mbps	
Transmission path	Multidrop	Daisy chain or loop
Transmission distance	500 m total length	Total length: 10 km; Between nodes: 1 km with purchased connector-equipped cables or 800 m with user-produced cables
Max. I/O capacity on Slave Racks	CVM1-CPU01-EV2: 1,024 pts CVM1-CPU11-EV2: 2,048 pts CVM1-CPU21-EV2: 2,048 pts	

SYSMAC BUS Remote I/O Units

Remote I/O Master Unit
3G2A5-RM001-(P)EV1 (optical)
C500-RM201 (wired)

Remote I/O Slave Unit
3G2A5-RT001/002-(P)EV1 (optical)
3G2A5-RT201 (wired)

SYSMAC BUS Systems enable communications between the PLC and controllers/components with reduced wiring time and expense, and are ideal for large-scale distributed control or any other time remote I/O processing is required. Select either a wired or optical system to suit your needs. With an optical system, I/O Link Units can also be used to easily transfer data between PLCs.

Specifications

Item	Specifications	
	Wired Units	Optical Units
Transmission medium	Twisted-pair cable	2-core optical fiber cable
Communications method	2-line half duplex	Time-shared multiplex cyclic system
Data transfer speed	187.5 kbps	
Transmission path	Multidrop	Daisy chain or loop
Transmission distance	200 m total length	Total length: 6.4 km; Between nodes: 800 m max.
Max. I/O capacity on Slave Racks	CVM1-CPU01-EV2: 512 pts CVM1-CPU11-EV2: 1,024 pts CVM1-CPU21-EV2: 2,048 pts	

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Note: Specifications subject to change without notice.

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