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Modular PLC series

CQM1H

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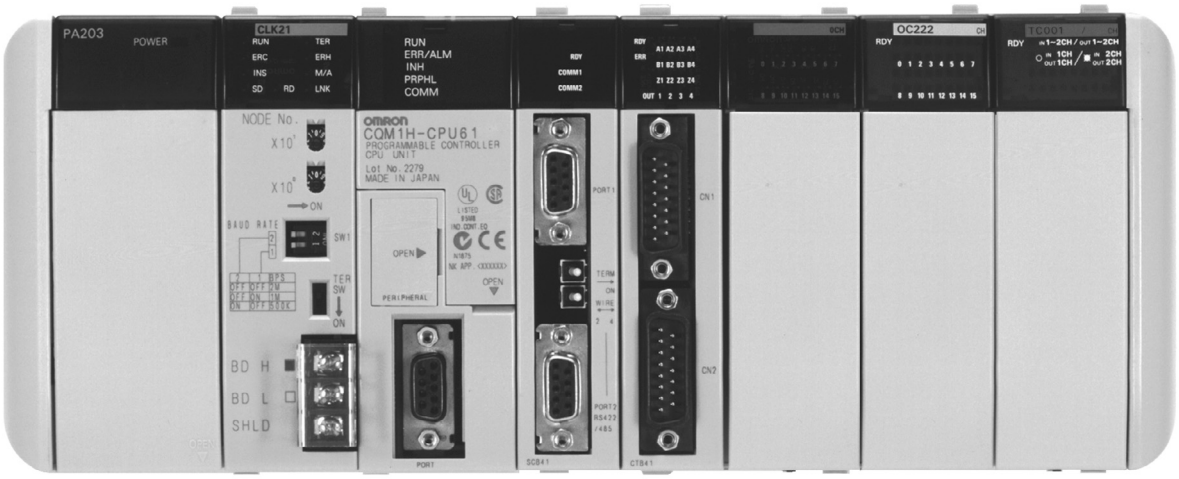
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Modular PLC series

CQM1H

The original modular PLC system for versatile machine control



Distributed control with the high-speed, high-capacity Controller Link network

Use Controller Link to automatically exchange data between PLCs, and to maintain programs and data of all connected PLC's from a single PC. You can share operating data among machines without any programming, and centralize the supervision of machine productivity, production progress and quality data.

Advanced inner boards enable flexible system configuration

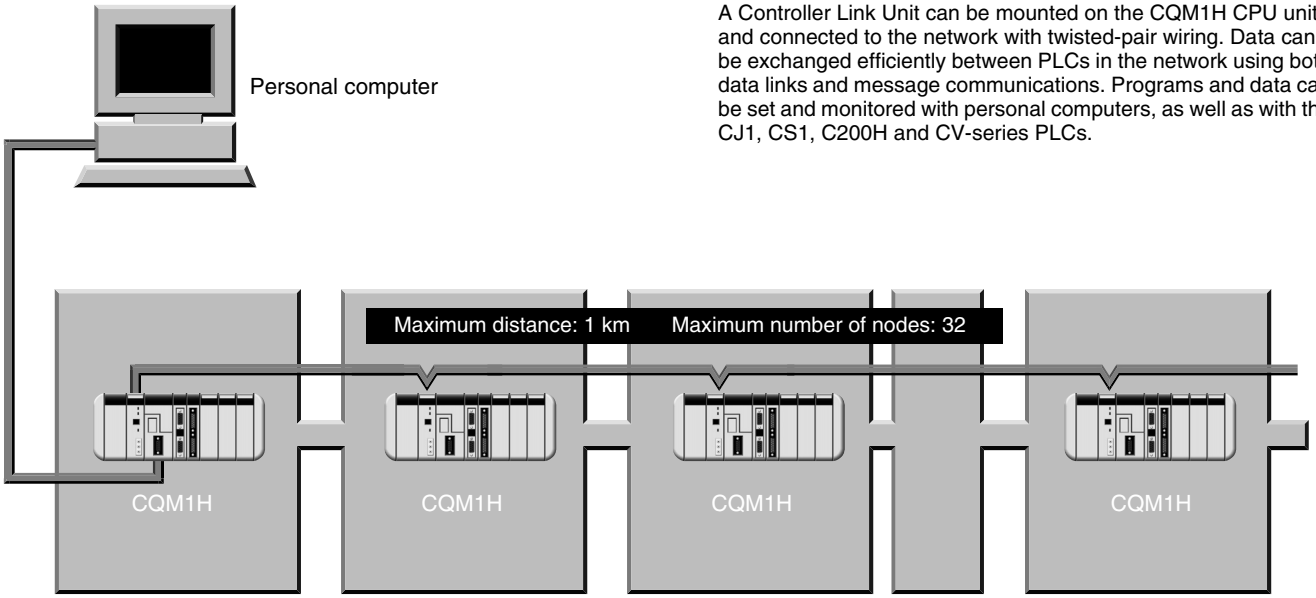
Advanced Inner Boards can be added to the CPU Unit to respond flexibly to the applications of each machine. Use of the Serial Communications Board, for example, enables connection with peripheral components, like temperature controllers and bar-code readers, that are equipped with serial ports. This kind of flexibility lets you build systems that better match the specifications and scale of the machine or equipment being controlled.

I/O points and memory capacity doubled to provide an extra margin of control

The I/O capacity, program capacity, and Data memory have been doubled over those of previous CQM1 models. This gives you an extra margin of control to meet the data processing load that accompanies the growing complexity and advanced functions of today's control systems, and assures you of plenty of capacity for the I/O points of dedicated I/O Units for your applications.

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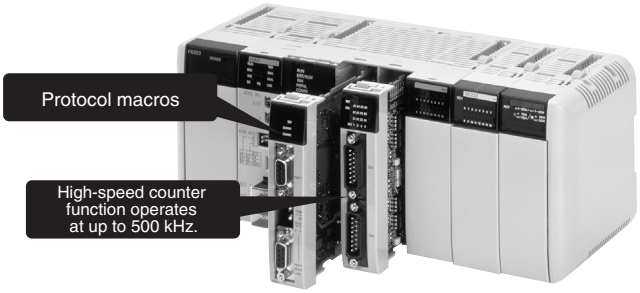
Establish distributed control with the Controller Link Network to transfer data easily between PLCs in the network.



A Controller Link Unit can be mounted on the CQM1H CPU unit, and connected to the network with twisted-pair wiring. Data can be exchanged efficiently between PLCs in the network using both data links and message communications. Programs and data can be set and monitored with personal computers, as well as with the CJ1, CS1, C200H and CV-series PLCs.

Advanced Inner Boards allow flexible system configurations.

A variety of advanced Inner Boards, such as the High-speed Counter Board and Serial Communications Board, are available. Mount the desired Inner Board in the CPU Unit to meet the requirements of each machine application. A Serial Communications Board can communicate with essentially any device with a serial port, such as temperature controllers or bar-code readers. The optimum system can be configured to match the specifications and scale of the machine or equipment being controlled.



Increased capacity and speed provide extra capacity for control applications.

The program capacity, I/O capacity, and DM capacity have been doubled compared to the original CQM1 series. A 16 Kword Memory Cassette can be installed to accommodate the storage and transfer of the program. Furthermore, the execution times have been reduced from 0.50 ms to 0.375 ms for basic instructions and from 23.5 ms to 17.7 ms for special instructions (MOV). Overall, the cycle time has been reduced by about 25%.

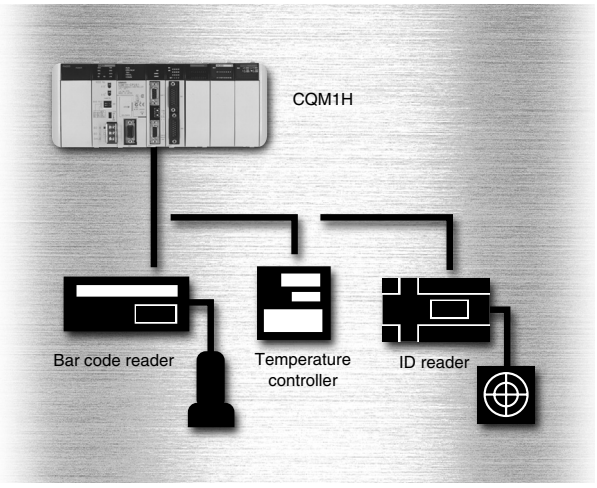
Flexible System Configuration

The CQM1H does not require a Backplane and is constructed by connecting Units via a parallel bus connector at the side of each Unit, allowing flexible system configuration and the most efficient use of space. The CPU Unit contains 16 built-in DC input points. Two Inner Boards can be mounted in the CPU Unit. One Controller Link Unit (a Communications Unit) and a combined maximum of eleven I/O Units can also be connected.



Improve Communications Compatibility with the Serial Communications Board.

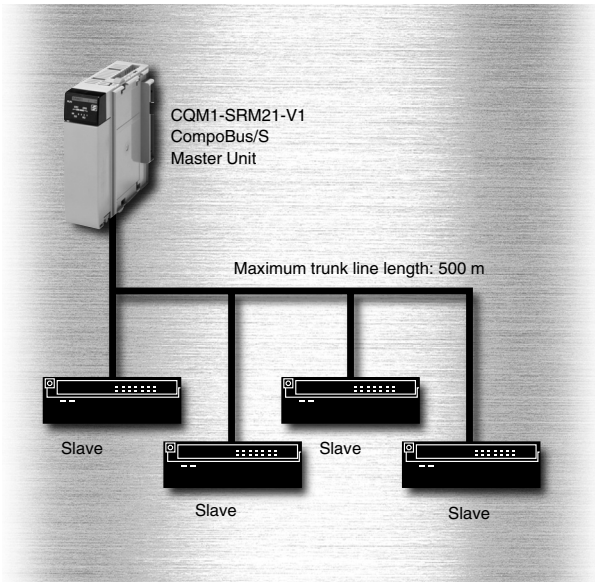
Connections can be easily made to general-purpose machine components and dedicated controllers. The Serial Communications Board (a CPU Inner Board) supports protocol macros. You can create macros for protocols to match the communications specifications of an external device, allowing data transfers with devices such as temperature controllers and bar code readers to be executed with a single PMCR instruction in the PLC program..



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Establish High-speed/Long-distance Communications with CompoBus/S.

Connect a CompoBus/S Master Unit to the CQM1H to establish high-speed or long-distance remote I/O communications with CompoBus/S Slaves.



Use Existing System Components and Programs.

All existing CQM1 Power Supply Units, Basic I/O Units, Dedicated I/O Units, programs, Programming Consoles, and Memory Cassettes can be used, so a system upgrade can be performed very smoothly.

Easy-to-use Support Software

The Windows-based CX-Programmer Support Software reduces software development time and provides powerful monitoring and debugging functions. Data exchange with other Windows applications is available through ActiveX, OLE, OPC and standard file formats.

The CQM1H is equipped with the protocol macro function. Protocol macros allow specific serial communications protocols to be developed to transfer data to and from external devices. Custom protocol macros can be created easily with the Windows-based CX-Protocol Software.

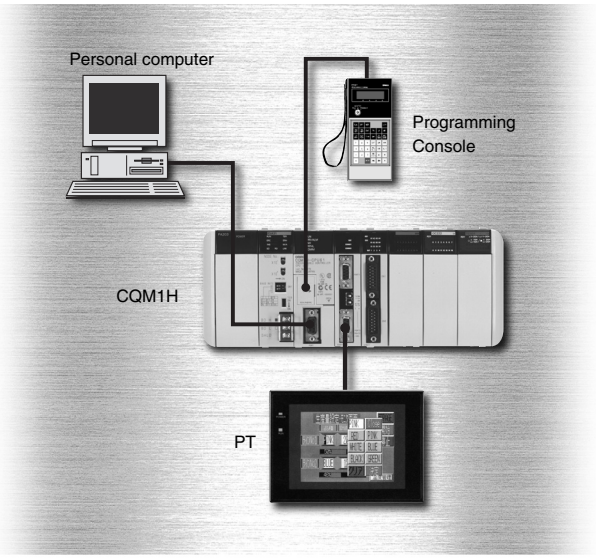
Advanced Math and Communications Instructions

Many advanced instructions have been added to the CQM1H, including floating-point math instructions, exponential/logarithm instructions, trigonometric instructions, the TTIM (TOTALIZING TIMER) instruction, PMCR (PROTOCOL MACRO) instruction, STUP (CHANGE SERIAL PORT SETUP) instruction, and network (SEND, RECV, and CMND) instructions. These advanced instructions are easy-to use and simplify program development.

A Wealth of Monitoring and Setting Methods Greatly Improve the HMI.

Programming Devices and Programmable Terminals (PTs) can be connected to up to four communication ports. You can set up and monitor machine control from a PT while monitoring or programming from a Programming Console or a personal computer. It is also possible to monitor and program the PLC remotely from a personal computer connected through a modem.

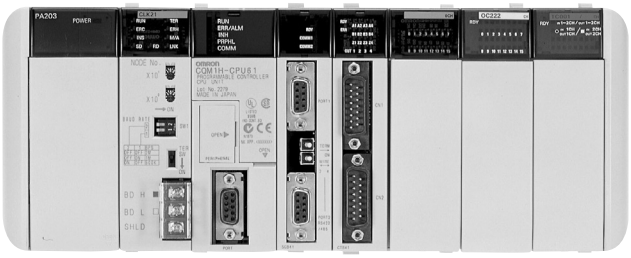
- Omron's Programmable Terminals now support program and monitor functions for easy PLC maintenance.
- Program and monitor from a remote location by modem.



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Flexible system configuration adds value to machine control. A high-performance, modular PLC for stand-alone or distributed control.

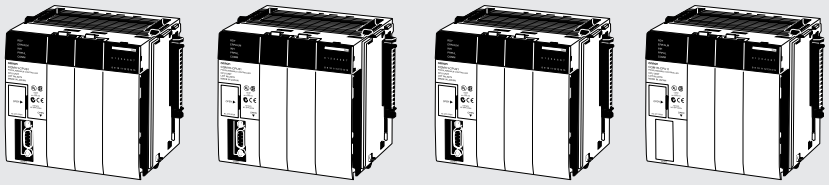
SYSMAC CQM1H



In response to growing demands for more advanced functions and higher speeds in machine control, the CQM1H lets you add value through greater power. This compact PLC boasts a long list of leading-edge functions, including distributed control compatibility, versatile Inner Boards for easy, add-on expandability, increased program and DM capacity, and an efficient, Windows-based development environment. Let the CQM1H help you start building machines that easily beat the competition.

CPU Units

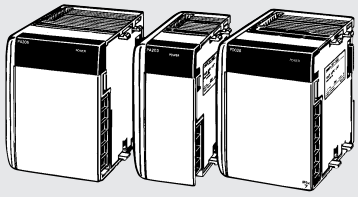
Four CPU Unit models are available. Two of them support Inner Boards and a Controller Link Unit. You can select the CPU Unit that best suits your application according to program capacity, I/O capacity, memory size, and RS-232C port communication functions. The following table shows the specifications of each CPU Unit.



CQM1H-CPU61 CQM1H-CPU51 CQM1H-CPU21 CQM1H-CPU11

Power Supply Units

Both AC and DC Power Supply Units are available. The AC Power Supply Units require a power supply input in the range 100 to 240 V AC and two models are equipped with a 24-V DC power supply output. The CQM1H's left End Cover is partof the Power Supply Unit. Refer to the CQM1H Operation Manual (W363) for details on selecting a Power Supply Unit.



■ AC Power Supply Units
CQM1-PA206
CQM1-PA216

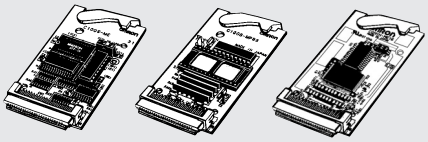
■ AC Power Supply Units
CQM1-PA203

■ DC Power Supply Units
CQM1-PD026

Memory Cassettes (Optional)

Memory Cassettes are available with flash memory, EEPROM and EPROM.Store data on the Memory Cassette to avoid losing program or DM data in the event of battery expiration or careless programming/monitoring operations. The program and data can be transferred between the CPU Unit's RAM and the Memory Cassette. (Data can be transferred from the CPU Unit's RAM to Memory Cassettes with flash memory or EEPROM only.)

●Built-in clock
When a Memory Cassette with a built-in clock is installed, time and date information can be used in the program.

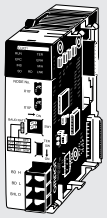


■EEP-ROM ■EP-ROM ■Flash memory

Controller Link Unit

Connect a Controller Link Unit to the CQM1H to integrate it into a Controller Link Network. Large quantities of data can be transferred easily and flexibly with personal computers, as well as with other CS1, CJ1, C200H and CV-series PLCs.

* The CQM1H-CPU51 and CQM1H-CPU61 support Controller Link Units.

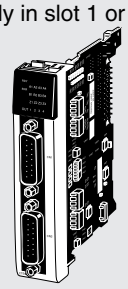


CQM1H-CLK21

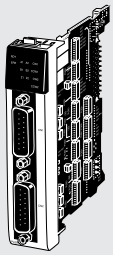
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Inner Boards

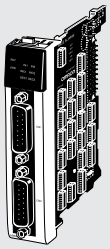
The six Inner Boards are shown below. Inner Boards can be mounted in slot 1 or slot 2 of a CQM1H-CPU51 or CQM1H-CPU61. (Some Inner Boards can be mounted only in slot 1 or only in slot 2.)



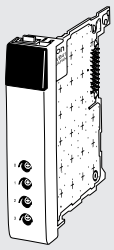
■ High-speed Counter Board
CQM1H-CTB41



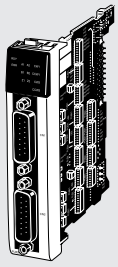
■ Pulse I/O Board
CQM1H-PLB21



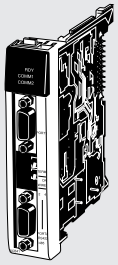
■ Absolute encoder Board
CQM1H-ABB21



■ Analog setting Board
CQM1H-AVB41



■ Analog I/O Board
CQM1H-MAB42



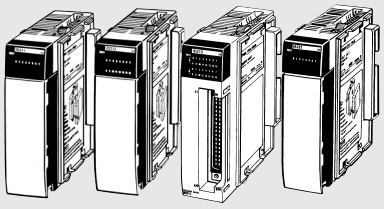
■ Serial Communications Board
CQM1H-SCB41

Input Units

Select from AC or DC Input Units with 8 to 32 input points.

■ DC Input Units
CQM1-ID211
CQM1-ID111
CQM1-ID212
CQM1-ID213
CQM1-ID214
CQM1-ID112

■ AC Input Units
CQM1-IA121
CQM1-IA221



CQM1-ID211 CQM1-ID212 CQM1-ID213 CQM1-IA121

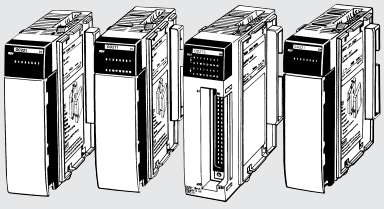
Output Units

Select from relay outputs, transistor outputs or triac outputs with 8 to 32 output points.

■ Relay Contact Output Units
CQM1-OC221
CQM1-OC222
CQM1-OC224

■ Transistor Output Units
CQM1-OD211
CQM1-OD212
CQM1-OD213
CQM1-OD214
CQM1-OD215
CQM1-OD216

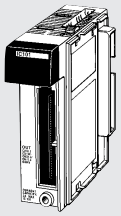
■ AC Output Units
CQM1-OA221
CQM1-OA222



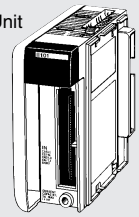
CQM1-OC221 CQM1-OD211 CQM1-OD213 CQM1-OA221

I/O Expansion Units

■ CQM1H-IC101
I/O Control Unit

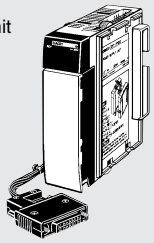


■ I/O Interface Unit
CQM1H-II101

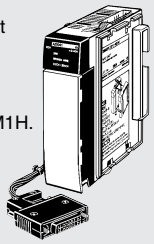


Dedicated I/O Units

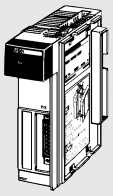
■ Analog Output Unit
CQM1-DA022
Performs digital-to-analog conversion for two outputs.



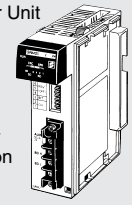
■ Analog Intput Unit
CQM1H-AD042
Receives 4 analog voltage or current inputs into the CQM1H.



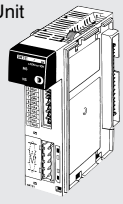
■ PROFIBUS-DP I/O Link Unit
CQM1-PRT21
PROFIBUS-DP slave unit provides an I/O link of 2 to 8 I/O words with any Master Unit.



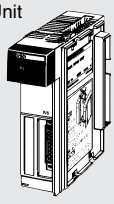
■ CompoBus/S Master Unit
CQM1-SRM21-V1
A high-speed Remote I/O Master Unit that controls up to 128 I/O points supports a long-distance communication up to 500 m.



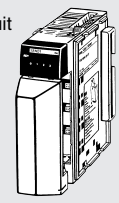
■ DeviceNet I/O Link Unit
CQM1-DRT21
Operates as a DeviceNet slave to establish an I/O link of 32 I/O points with a DeviceNet Master.



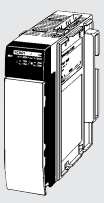
■ AS-Interface Master Unit
CQM1-ARM21
Controls up to 31 standard AS-Interface slaves. No special configuration tools are required.



■ Safety Relay Unit
CQM1-SF200
Monitors safety circuit status and allows space saving.



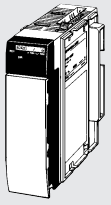
■ Temperature Control Units
CQM1-TC00□
CQM1-TC10□
CQM1-TC20□
CQM1-TC30□
One Unit can receive data from two or four temperature sensors and executes advanced PID control.



■ Linear Sensor Interface Units
CQM1-LSE01/02
Make high-speed and high-precision measurements of analog inputs from linear sensors and convert the measurements to numeric data for processing.



■ B7A Interface Unit
CQM1-B7A□□
Five Units are available that can connect with B7A Link Terminals.



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CQM1H CPU Units

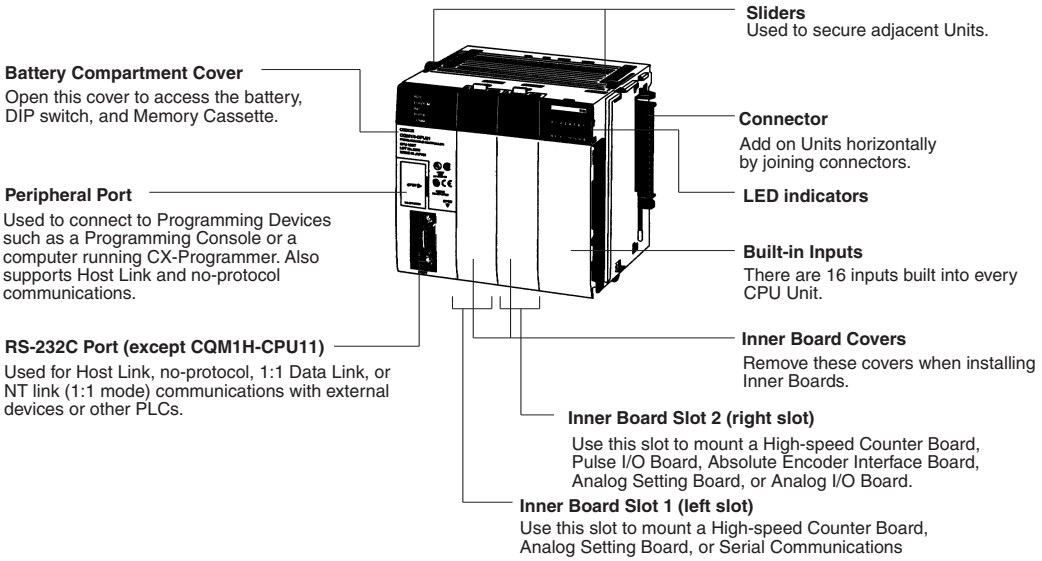
CQM1H-CPU□□

CPU Units

The four models of CPU Units can be broadly divided into two groups: Models that support Inner Boards and the Controller Link Unit, and models that do not. The CPU Units also vary in their program capacities, I/O capacities, memory capacities, and the presence of an RS-232C port, as shown in the *Basic Specifications* table, below.

CPU Unit Overview

The following illustration shows the main components of a CQM1H-CPU61 CPU Unit.



Basic Specifications

Model	I/O capacity (See note.)	Program capacity (words)	DM capacity (words)	EM capacity (words)	CPU Unit built-in inputs	Built-in serial ports		Inner Boards	Controller Link Unit
						Peripheral port	RS-232C port		
CQM1H-CPU61	512	15.2 K	6 K	6 K	DC: 16	Yes	Yes	Supported	
CQM1H-CPU51		7.2 K	6 K	None					
CQM1H-CPU21	256	3.2 K	3 K					Not supported	
CQM1H-CPU11							No		

Note: I/O capacity = Number of input points (≤ 256) + Number of output points (≤ 256).

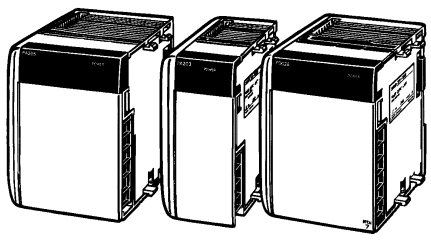
Maximum Number of Units

CPU Unit	Controller Link Unit	Inner Boards	I/O Units and Dedicated I/O Units
CQM1H-CPU61	1 max.	2 max.	11 max. (total)
CQM1H-CPU51			
CQM1H-CPU21	Not supported.	Not supported.	
CQM1H-CPU11			

Power Supply Units

Both AC and DC Power Supply Units are available. The AC Power Supply Units require a power supply input from 100 to 240 V AC and two of the AC Power Supply Units are equipped with a 24-V DC power supply output.

The CQM1H's left End Cover is part of the Power Supply Unit.



CQM1-PA206 CQM1-PA203 CQM1-PD016
CQM1-PA216 CQM1-PD026

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Specifications

Name	Model number	Specifications			
		Supply voltage	Operating voltage range	Output capacity	Service power supply
AC Power Supply Units	CQM1-PA203	100 to 240 V AC, 50/60 Hz (wide range)	85 to 265 V AC	5 V DC: 3.6 A (18 W)	None
	CQM1-PA206			5 V DC: 6 A 24 V DC: 0.5 A (30 W total, see note)	24 V DC: 0.5 A
	CQM1-PA216	100 or 230 V AC (selectable), 50/60 Hz		5 V DC: 6 A 24 V DC: 0.5 A (30 W total, see note)	
DC Power Supply Units	CQM1-PD026	24 V DC	20 to 28 V DC	30 W 5 V DC: 6 A	None

Note: The total power consumed at 5 V DC and 24 V DC must be less than 30 W.
(5 × Current consumed at 5 V DC) + (24 × Current consumed at 24 V DC) ≤ 30 W

I/O Expansion Units

Use Expansion I/O Blocks to split the configuration into 2 groups, allowing greater flexibility with mounting space as well as the use of at least 12 I/O Units or Dedicated I/O Units. Expansion Units can be used with any CQM1H CPU Unit.



CQM1H-IC101 CQM1H-II101

Maximum Number of Units Mountable

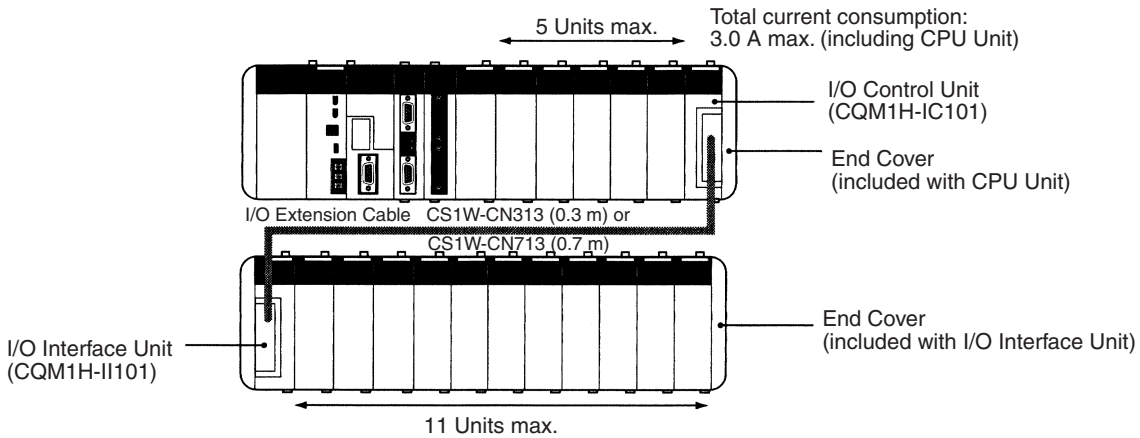
CPU Unit model	CPU Block only	CPU Block + I/O Expansion Block			
	CPU Block	CPU Block			I/O Expansion Block
	I/O Units + Dedicated I/O Units	Controller Link Unit	Inner Boards	I/O Units + Dedicated I/O Units	I/O Units + Dedicated I/O Units
CQM1H-CPU61	11 Units max. (see note 1)	1 Unit	2 Boards max.	5 Units max. (see note 2)	11 Units max. (see note 3)
CQM1H-CPU51					
CQM1H-CPU21		Not supported	Not supported		
CQM1H-CPU11					

Note: 1. Ensure that the total current consumption of the mounted Units (CPU Unit, Controller Link Unit, Inner Boards, I/O Units, and Dedicated I/O Units)

2. Ensure that the total current consumption of the mounted Units (CPU Unit, Controller Link Unit, Inner Boards, I/O Units, Dedicated I/O Units, and I/O Control Units) does not exceed 3.0 A.

3. Ensure that the total current consumption of the mounted Units (I/O Interface Units, I/O Units, and Dedicated I/O Units) does not exceed 2.0 A.

System Configuration



Total current consumption: 2.0 A max. (I/O Units and Dedicated I/O Units)

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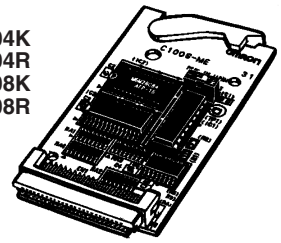
Memory Cassettes

An optional Memory Cassette can be used to store the user program, PLC Setup, and other data in ROM so that vital data will not be lost in the event of battery expiration or careless programming/monitoring operations.

If the PLC's settings need to be changed to execute another process, the entire software setup and user program can be changed just by exchanging the Memory Cassette and rebooting the PLC.

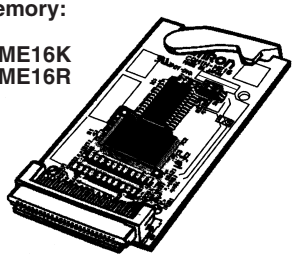
EEPROM:

CQM1-ME04K
CQM1-ME04R
CQM1-ME08K
CQM1-ME08R



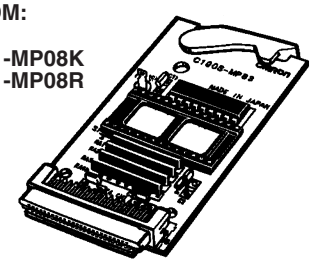
Flash Memory:

CQM1H-ME16K
CQM1H-ME16R



EPROM:

CQM1-MP08K
CQM1-MP08R



Available Memory Cassettes

The following Memory Cassettes are available.

Memory	Model	Specifications
EEPROM	CQM1-ME04K	4 kWords without clock
	CQM1-ME04R	4 kWords with clock
	CQM1-ME08K	8 kWords without clock
	CQM1-ME08R	8 kWords with clock
EPROM	CQM1-MP08K	Without clock (see below)
	CQM1-MP08R	With clock (see below)
Flash	CQM1H-ME16K	16 kWords without clock
	CQM1H-ME16R	16 kWords with clock

The following EPROM chips (sold separately) are required for EPROM Memory Cassettes.
The chip is mounted in the I/O socket on the Memory Cassette.

Model	ROM version	Capacity	Access speed
ROM-ID-B	27128 or equivalent	8 kWords	150 ns
ROM-JD-B	27256 or equivalent	16 kWords	150 ns
ROM-KD-B	27512 or equivalent	32 kWords	150 ns

Specifications

General (Power Supplies and CPU Units)

Item	CQM1-PA203	CQM1-PA206	CQM1-PA216	CQM1-PD026
Supply voltage	100 to 240 V AC, 50/60 Hz		100 or 230 V AC (selectable), 50/60 Hz	24 V DC
Operating voltage range	85 to 264 V AC		85 to 132 V AC or 170 to 264 V AC	20 to 28 V DC
Operating frequency range	47 to 63 Hz			---
Power consumption	60 VA max.	120 VA max.		50 W max.
Inrush current	30 A max.			
Output capacity	5 V DC: 3.6 A (18 W)	5 V DC: 6 A 24 V DC: 0.5 A (30 W total)		5 V DC: 6 A (30 W)
Insulation resistance	20 MΩ min. (at 500 V DC) between AC external terminals and GR terminals (Eee Note)			
Dielectric strength	2,300 V AC 50/60 Hz for 1 min between AC external and GR terminals, leakage current: 10 mA max. (see note) 1,000 V AC 50/60 Hz for 1 min between DC external and GR terminals, leakage current: 20 mA max. (see note)			
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power lines)			
Vibration resistance	10 to 57 Hz with an amplitude of 0.075 mm, and 57 to 150 Hz with an acceleration of 9.8 m/s^2 in the X, Y, and Z directions for 80 minutes each (i.e., swept for 8 minutes, 10 times).			
Shock resistance	147 m/s^2 (118 m/s^2 for Contact Output Units) 3 times each in X, Y, and Z directions			
Ambient temperature	Operating: 0 to 55 °C Storage: –20 to 75 °C (except battery)			
Ambient operating humidity	10% to 90% (no condensation)			
Operating environment	No corrosive gas			
Ground	Less than 100 Ω			
Construction	Panel mounted			
Weight	5 kg max.			
Internal current consumption	CQM1H-CPU11:820 mA max. at 5 V DC CQM1H-CPU21/51/61:840 mA max. at 5 V DC			
Dimensions (without cables)	CQM1H-CPU11/21:187 to 571 × 110 × 107 mm (W×H×D) CQM1H-CPU51/61:187 to 603 × 110 × 107 mm (W×H×D)			
Accessories	RS-232C connector (one XM2A-0901 Plug and one XM2S-0911-E Hood) (except CQM1H-CPU11) CPM2A-BAT01 Battery Set (installed in CPU Unit when shipped)			

Note: Disconnect the Power Supply Unit's LG terminal from the GR terminal when testing insulation and dielectric strength. Repeatedly testing the insulation and dielectric strength with the LG terminal and the GR terminals connected will damage internal circuits in the CPU Unit.

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CPU Unit

Characteristics

Item		Specifications
Control method		Stored program method
I/O control method		Cyclic scan and direct output/immediate interrupt processing
Programming language		Ladder-diagram programming
I/O capacity		CQM1H-CPU11/21:256 CQM1H-CPU51/61:512
Program capacity		CQM1H-CPU11/21: 3.2 kWords CQM1H-CPU51: 7.2 kWords CQM1H-CPU61: 15.2 kWords
Data memory capacity		CQM1H-CPU11/21: 3 kWords CQM1H-CPU51: 6 kWords CQM1H-CPU61: 12 kWords (DM: 6 kWords; EM: 6 kWords)
Instruction length		1 step per instruction, 1 to 4 words per instruction
Number of instructions		162 (14 basic, 148 special instructions)
Instruction execution times		Basic instructions: 0.375 to 1.125 μs Special instructions:17.7 μs (MOV instruction)
Overseeing time		0.70 ms
Mounting structure		No Backplane (Units are joined horizontally using connectors)
Mounting		DIN rail mounting (screw mounting not possible)
CPU Unit built-in DC input points		16
Maximum number of Units		CPU Block only: 11 Units (I/O Units and Dedicated I/O Units) max. CPU Block and Expansion I/O Block CPU Block: 5 Units max. Expansion I/O Block: 11 Units max.
Inner Boards		CQM1H-CPU11/21:None CQM1H-CPU51/61:2 Boards
Communications Units (Controller Link Unit)		CQM1H-CPU11/21:None CQM1H-CPU51/61:1 Unit
Types of interrupts	Input interrupts (4 inputs max.)	Input Interrupt Mode: Interrupts are executed in response to inputs from external sources to the CPU Unit's built-in input points. Counter Mode: Interrupts are executed in response to reception of a set number of pulses (counted down) via the CPU Unit's internal built-in input points (4 points).
	Interval timer interrupts (3 timers max.)	Scheduled Interrupt Mode: Program is interrupted at regular intervals measured by one of the CPU Unit's internal timers. One-shot Interrupt Mode: An interrupt is executed after a set time, measured by one of the CPU Unit's internal timers.
	High-speed counter interrupts	Target Value Comparison: Interrupt is executed when the high-speed counter PV is equal to a specified value. Range Comparison: Interrupt is executed when the high-speed counter PV lies within a specified range. **Note:** Counting is possible for high-speed counter inputs from the CPU Unit's internal input points, Pulse I/O Boards, or Absolute Encoder Interface Boards. (The High-speed Counter Board has no interrupt function, but can output bit patterns internally and externally.)
I/O allocations		I/O is automatically allocated in order from the Unit nearest to the CPU Unit. (Because there are no I/O tables, it is not necessary, and not possible, to create I/O tables from a Programming Device.)

Note: Analog Power Supply Units must also be counted.

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Memory Area Structure

Data area		Size	Words	Bits	Function
IR area	Input area	256 bits	IR 000 to IR 015	IR 00000 to IR 01515	Input bits are allocated to Input Units or Dedicated I/O Units. The 16 bits in IR 000 are always allocated to the CPU Unit's built-in inputs. Bits in IR 001 to IR 015 are allocated to I/O or Dedicated I/O Units connected to the CPU Unit.
	Output area	256 bits	IR 100 to IR 115	IR 10000 to IR 11515	Output bits are allocated to Output Units or Dedicated I/O Units connected to the CPU Unit.
	Work areas	2,528 bits min.	IR 016 to IR 089	IR 01600 to IR 08915	Work bits do not have any specific function and they can be freely used within the program. (A minimum 2,528 bits are available as work bits. Most bits in the IR and LR areas can be used as work bits when they are not used for their allocated functions, so the total number of available work bits depends on the configuration of the PLC.)
			IR 116 to IR 189	IR 11600 to IR 18915	
			IR 216 to IR 219	IR 21600 to IR 21915	
			IR 224 to IR 229	IR 22400 to IR 22915	
Controller Link status areas		96 bits	IR 090 to IR 095	IR 09000 to IR 09515	Status Area 1: Stores the Controller Link data link status information.
		96 bits	IR 190 to IR 195	IR 19000 to IR 19515	Status Area 2: Stores the Controller Link error and network participation information.
MACRO operand area	Input area	64 bits	IR 096 to IR 099	IR 09600 to IR 09915	Used when the MACRO instruction, MCRO(99), is used.
	Output area	64 bits	IR 196 to IR 199	IR 19600 to IR 19915	
Inner Board slot 1 area		256 bits	IR 200 to IR 215	IR 20000 to IR 21515	These bits are allocated to the Inner Board mounted in slot 1 of a CQM1H-CPU51/61. High-speed Counter Board:IR 200 to IR 213 Serial Communications Board:IR 200 to IR 207
Analog settings area		64 bits	IR 220 to IR 223	IR 22000 to IR 22315	Used to store the analog settings when a CQM1H-AVB41 Analog Setting Board is mounted.
High-speed Counter 0 PV		32 bits	IR 230 to IR 231	IR 23000 to IR 23115	Used to store the present values of high-speed counter 0.
Inner Board slot 2 area		192 bits	IR 232 to IR 243	IR 23200 to IR 24315	These bits are allocated to the Inner Board mounted in slot 2. High-speed Counter Board:IR 232 to IR 243 Absolute Encoder Interface Board:IR 232 to IR 239 Pulse I/O Board: IR 232 to IR 239 Analog I/O Board:IR 232 to IR 239
SR area		184 bits	SR 244 to SR 255	SR 24400 to SR 25507	These bits serve specific functions such as flags and control bits.
HR area		1,600 bits	HR 00 to HR 99	HR 0000 to HR 9915	These bits store data and retain their ON/OFF status when power is turned OFF or when the operating mode is changed.
AR area		448 bits	AR 00 to AR 27	AR 0000 to AR 2715	These bits serve specific functions such as flags and control bits.
TR area		8 bits	---	TR 0 to TR 7	These bits are used to temporarily store ON/OFF status at program branches.
LR area		1,024 bits	LR 00 to LR 63	LR 0000 to LR 6315	Used for 1:1 data link through the RS-232 port or through a Controller Link Unit.
Timer/Counter area		512 bits	TIM/CNT 000 to TIM/CNT 511 (timer/counter numbers)		The same numbers are used for both timers and counters. Timer numbers 000 to 015 can be used with TIMH(15) for interrupt-refreshed PVs to ensure proper timing without inaccuracy being caused by the cycle time.
DM area	Read/write	3,072 words	DM 0000 to DM 3071	---	DM area data can be accessed in word units only. Word values are retained when the power is turned OFF.
		3,072 words	DM 3072 to DM 6143	---	Available in CQM1H-CPU51/61 CPU Units only.
	Read-only[4]	425 words	DM 6144 to DM 6568	---	Cannot be written from the program (only from a Programming Device). DM 6400 to DM 6409:Controller Link parameters DM 6450 to DM 6499: Routing tables DM 6550 to DM 6559: Serial Communications Board Setup
	Error history area[4]	31 words	DM 6569 to DM 6599	---	Cannot be written from the program (only from a Programming Device). Stores the time of occurrence and error code of errors that occur.
	PLC Setup[4]	56 words	DM 6600 to DM 6655	---	Cannot be written from the program (only from a Programming Device). Stores various parameters that control PLC operation.
EM area		6,144 words	EM 0000 to EM 6143	---	EM area data can be accessed in word units only. Word values are retained when the power is turned OFF or the operating mode is changed. (CQM1H-CPU61 CPU Unit only.)

Memory Cassette Specifications

Item	Details
Memory Cassette (EEPROM or flash memory)	Mounted from the front of the CPU Unit and used to store and read the user's program, DM (read-only DM and PLC Setup), and expansion instruction information as one block. It is possible to set the CPU Unit so that data stored in the Memory Cassette (user's program, DM, expansion instruction information) is automatically sent to the CPU Unit (auto-boot) at startup. Transfer and comparison of data between the CPU Unit and Memory Cassette are possible using AR area control bits.

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Other Functions

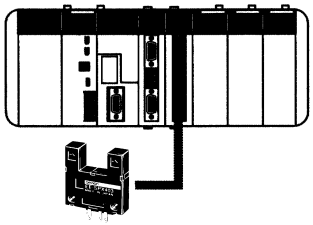
Item	Specification			
Macro instructions	Subroutines called by instructions containing arguments.			
Min. cycle time	1 to 9,999 ms (Unit: 1 ms)			
Cycle time monitoring	When the cycle time exceeds 100 ms, the Cycle Time Over Flag turns ON, and operation continues. (A setting can be made in the PLC Setup so that this error is not generated.) When the cycle time exceeds the cycle monitor time, operation is stopped. Cycle monitor time settings: 0 to 990 ms in 10-ms units, 0 to 9,900 ms in 100-ms units, 0 to 99 s in 1-s units. **Note:** The maximum and current values of the cycle time are stored in the AR area.			
I/O refreshing	Cyclic refreshing, refreshing by IORF(97), direct output refreshing (set in the PLC Setup), interrupt input refreshing. (The inputs that are refreshed can be set separately for input interrupts, high-speed counter interrupts, and interval timer interrupts in the PLC Setup.)			
I/O memory status when changing operating mode	Depends on the ON/OFF status of the I/O Hold Bit (SR 25212).			
Load OFF	All outputs on Output Units can be turned OFF when the CPU Unit is operating in RUN, MONITOR, or PROGRAM mode. (Used for stopping output in emergencies, for debugging, etc.)			
User-customized DIP switch setting	A pin setting on the DIP switch on the front of the CPU Unit is stored in AR 0712. This setting can be used as an ON/OFF condition (e.g., to switch between trial operation and actual operation).			
Mode setting at power-up	Possible			
Debugging	Forced set/reset, differential monitoring, data tracing (scheduled, cyclic, or when instruction is executed).			
Online editing	User programs can be overwritten in program-block units when the CPU Unit is in MONITOR mode. With the CX-Programmer, more than one program block can be edited at the same time.			
Program protection	Write-protection of user program and data memory (DM 6144 to DM 6655: read-only DM): Set using pin 1 of the DIP switch.			
Error check	User-defined errors (i.e., user can define fatal errors and non-fatal errors using the FAL(06) and FALS(07) instructions.) (It is possible to stop operation using FALS(07) for fatal errors. User-defined error logs can be created in specific bits (logging) when using FAL(06).			
Error log	Up to 10 errors (including user-defined errors) are stored in the error log. Information includes the error code, error details, and the time the error occurred.			
Serial communications	Built-in peripheral port: Programming Device (including Programming Console) connections, Host Links, no-protocol communications Built-in RS-232C port: Programming Device (excluding Programming Console) connections, Host Links, no-protocol communications, NT Links (1:1 mode), 1:1 Data LInks			
	RS-232C port and RS-422A/485 port on Serial Communications Board (sold separately): Programming Device (excluding Programming Console) connections, Host Links, no-protocol communications, NT Links (1:1 mode, 1:N mode), 1:1 Data LInks, protocol macros			
Serial communications modes	CQM1H CPU Unit's built-in port	Built-in peripheral port	Built-in RS-232C port	Serial Communications Board ports
Programming Console bus	Connects to Programming Console.	YES (pin 7 OFF)	No	No
Peripheral bus	Connects to a computer running CX-Programmer or other Support Software. (Automatically used if the network type is set to peripheral bus on the Support Software.)	YES (pin 7 ON)	No	No
Host Link (SYSMAC WAY)	Enables reading/writing CPU Unit I/O memory or program using Host Link commands. Computers running Support Software or OMRON Programmable Terminals can also be connected. PLC-initiated communications are possible.	YES (pin 7 ON)	YES	YES
No-protocol	Enables sending or receiving up to 256 bytes of data without a protocol or data conversion. A start code, end code, and transmission delay can be set.	YES (pin 7 ON)	YES	YES
1:1 data link	Enables 1:1 data link with a CQM1H, CQM1, CPM-series, C200HX/HG/HE, C200HS, or SRM1 PLC.	No	YES	YES
NT links (1:1 and 1:N)	Enables 1:1 or 1:N communications with OMRON Programmable Terminals without additional programming.	No	YES (1:1 only)	YES (1:1 and 1:N)
Protocol macros	Enables user-created protocols to communicate with essential any device equipped with a serial communications port (e.g., RS-232C). Standard protocols are also provided.	No	No	YES
Clock	Some Memory Cassette are equipped with a clock. (The time of the error will recorded if a clock is used.			
Input time constants	Used to set the ON (or OFF) response times for DC Input Units. Settings: 1, 2, 4, 8, 16, 32, 64, and 128 ms.			
Power OFF detection time	AC power supply: 10 to 25 ms (not fixed), DC power supply: 5 to 25 ms (not fixed)			
Memory protection	Held Areas: Holding bits, contents of Data Memory and Extended Data Memory, and status of the counter Completion Flags and present values. **Note:** If the I/O Hold Bit (SR 25212) is turned ON, and the PLC Setup is set to maintain the I/O Hold Bit status when power is turned ON, the contents of the IR area and the LR area will be saved.			
Commands to a host computer	Host Link command responses can be sent to a computer connected via the Host Link System using the TXD(—) (communications port output) instruction.			
Remote programming and monitoring	Host Link or peripheral bus communications via a CPU Unit's serial communications port can be used for remote programming and remote monitoring of the PLC through a Controller Link System. (This function is, however, not supported for the serial communications ports on the Serial Communications Board.)			
Program check	Program is checked at the beginning of operation for items such as no END(01) instruction and instruction errors. CX-Programmer can also check programs. (The level of program checking can be set.)			
Battery life	5 years at 25°C (Depends on the ambient temperature and power supply conditions. Min.: 1 yr) Battery replacement must be performed within 5 minutes.			
Errors from self-diagnostics	CPU (watchdog timer), I/O verification, I/O bus, memory, FALS system (FALS execution or cycle monitor time over), FAL system (FAL execution or PLC Setup error etc.), battery, cycle time over and communications port.			
Other functions	Storage of number of times power has been interrupted. (Stored in AR area.)			

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I/O Functions

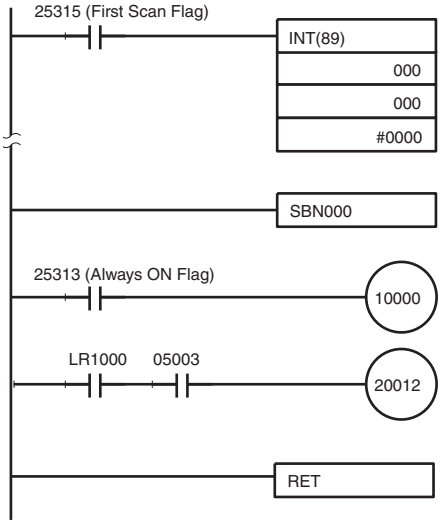
Interrupt Input Processing

All CQM1H CPU Units are equipped with four inputs (IR 00000 to IR 00003) that can be used as interrupt inputs. Interrupt processing can be enabled and disabled with the INTERRUPT CONTROL – INT(89) instruction.



Photomicrosensor etc.

Sample Program

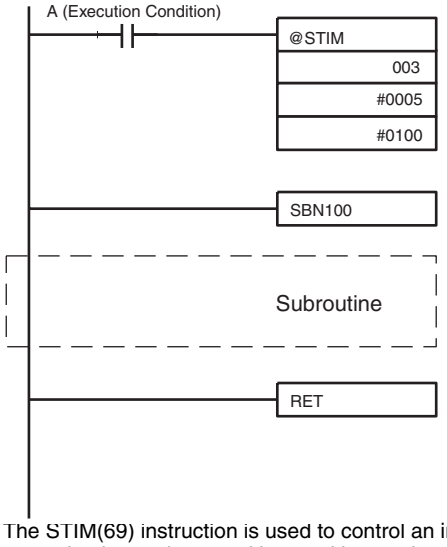


In order for interrupt input processing to be performed, the INTERRUPT CONTROL – INT(89) instruction is set so that interrupt processing is enabled when IR 00000 goes ON.
When the external signal to IR 00000 goes from OFF to ON, program execution is temporarily halted, and processing moves to subroutine 00.
When subroutine 000 (SBN000) is completed, its results are output immediately. The entire interrupt process, from IR 00000 going ON to the refreshing of outputs IR 10000 and IR 20012, provides high-speed I/O response that is not affected by the PLC's cycle time.

Interval Timer Interrupt Processing

The INTERVAL TIMER – STIM(69) instruction is useful for performing repetitive processes, such as output processing, that need to be performed regularly at intervals shorter than the cycle time.
Place an STIM(69) instruction in the program to define a timer that will call and execute a subroutine at regular intervals. Up to 3 interval timers can be used.

Sample Program

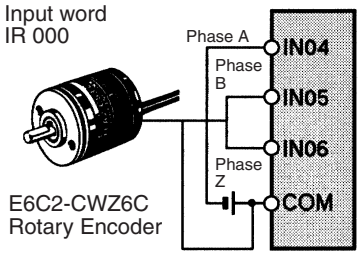


The STIM(69) instruction is used to control an interval timer. In this example, timer 0 is started in repetitive mode.
As long as A (the execution condition) is ON, the main program will be halted and the interrupt routine SBN100 will executed every 5 ms (i.e., each time the interval timer times out). Main program execution is continued when interrupt routine execution has been completed.

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Internal High-speed Counters

Pulses from a rotary encoder can be input directly into 3 of the CPU Unit's inputs (IN04, IN05, and IN06) and used as internal high-speed counter.
Pulses can be counted from 0 to 65535 in the increment mode and –32767 to 32767 in the up/down mode, with a single-phase response speed of 5 KHz and a two-phase response speed of 2.5 KHz.



The high-speed counter's input mode is set in the DM Area's PLC Setup.

Input Modes

Up/Down mode	Uses phase A and phase B to count up and down.
Increment mode	Uses phase A only to count up.
Normal mode	Input bit 04 to bit 06 are used as normal inputs.

Reset Method

There are two ways to reset the counter's PV. The PV can be reset by the software reset alone or by a logical AND between the phase-Z input and the software reset.

Comparison Conditions

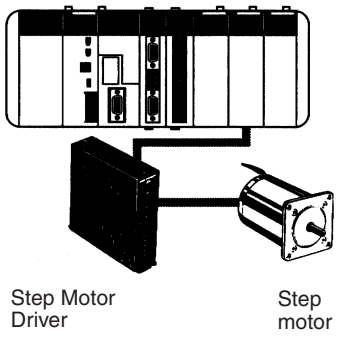
Target value	Up to 16 target values can be set. The specified subroutine will be executed when the count value reaches a target value.
Zone comparison	Up to 8 zones (upper/lower limits) can be set. The specified subroutine will be executed when the count value is within a zone.

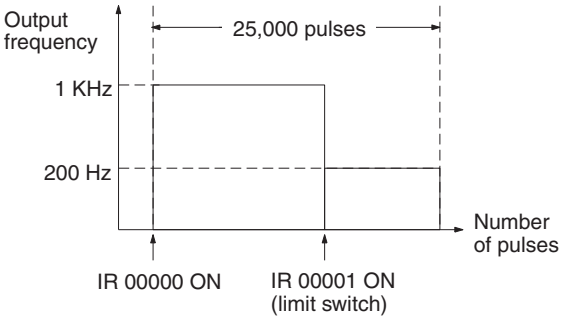
Pulse Output - PULS(65) and Change Frequency - SPED(64)

These instructions are used to control pulse outputs. They can greatly simplify tasks such as controlling step motors from the CQM1H.

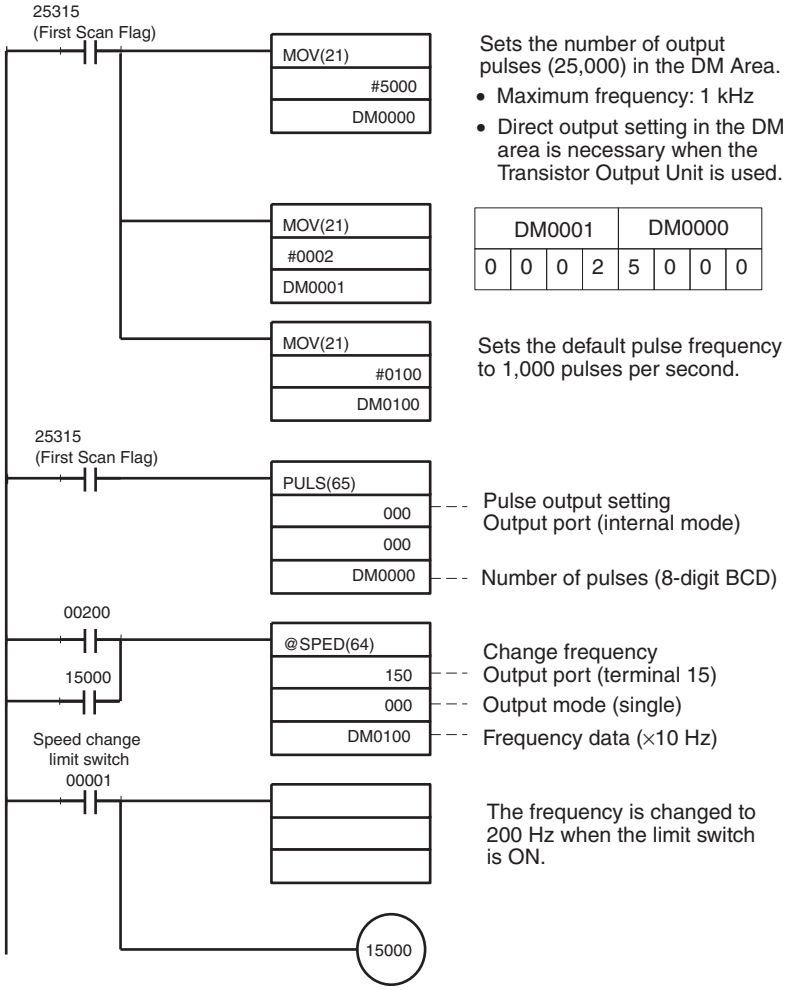
Example

In this example, the speed of a step motor is changed.





Sample Program



Note: Fuses are not user-serviceable.

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I/O Memory Allocation

/O words are allocated to I/O Units according to a fixed location. When the I/O Units and Dedicated I/O Units are connected, the I/O words will be allocated as described next.

Input Word Allocation

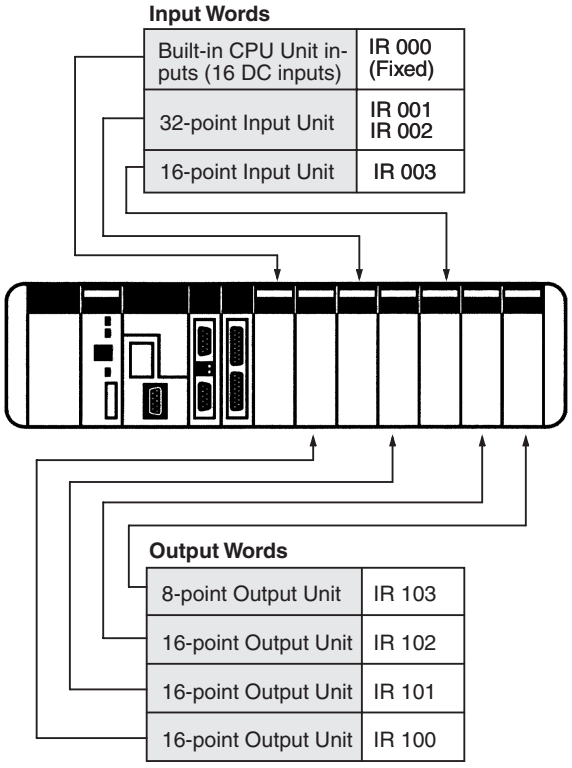
IR 000 to IR 015 are allocated as input bits. The first input word (IR 000), however, is allocated to the CPU Unit's 16 built-in input points.

Note: Built-in CPU Unit's inputs are used for interrupt processing and built-in high-speed counter inputs.

Output Word Allocation

R 100 to IR 115 are allocated as output bits. When Output Units or Dedicated I/O Units are connected, words will be allocated in order starting from IR 100.

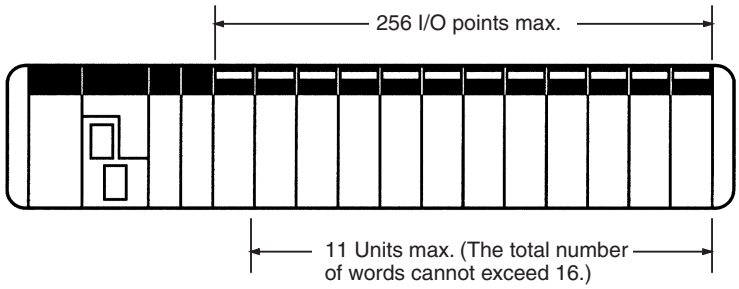
Unit		I/O word allocation		
		Input words	Output words	
Input Units		1 or 2	---	Each 8-point or 16-point Input Unit is allocated one input word and each 32-point Input Unit is allocated two input words. Words will be allocated in order starting from IR 001.
Output Units		---	1 or 2	Each 8-point or 16-point Output Unit is allocated one output word and each 32-point Output Unit is allocated two output words. Words will be allocated in order starting from IR 100.
Sensor Units		1	---	Each Sensor Unit is allocated one input word. Bits 00 through 03 are allocated in order from the top to a maximum of four modules. All other bits can be used as work bits in programming.
B7A Interface Units	B7A02	---	1	Depending on the Unit, each B7A Interface Unit is allocated input words and output words.
	B7A12	1	---	
	B7A03	---	1	
	B7A13	2	---	
	B7A21	1	1	
DeviceNet I/O Link Unit		1	1	Each DeviceNet I/O Link Unit is allocated one input word and one output word.
PROFIBUS-DP I/O Link Unit		2, 4, 6 or 8	2, 4, 6 or 8	Number of input words is always equal to the number of output words, and can be set by DIP switches.
AS-Interface Master Unit		3, 4, 5, 6 or 8	3, 4, 5, 6 or 8	Number of input words is always equal to the number of output words, and depends on the number of connected AS-Interface slaves.
CompoBus/S Master Units	IN:16 points OUT: 16 points	1	1	Depending on the Unit, each CompoBus/S Master Unit is allocated input words and output words.
	IN: 32 points OUT: 32 points	2	2	
	IN: 64 points OUT: 64 points	4	4	
Analog Input Unit		2 or 4	---	Each Analog Input Unit can be set to input either 2 or 4 points. If the Unit is set to input 2 points, two input words are allocated. If the Unit is set to input 4 points, four input words are allocated.
Analog Output Unit		---	2	Each Analog Output Unit is allocated two output words.
Analog Power Supply Units		---	---	Power Supply Units are not involved directly in I/O operations and are thus not allocated I/O words.
Temperature Control Units	00□/10□	2 or 1	2 or 1	Each Temperature Control Unit is allocated two input words and two output words when two loops are used. Only one input word and one output word are allocated when one loop is used.
	20□/30□	1	1	One input word and one output word are allocated in the order the Unit is connected.
Safety Relay Unit		1	---	One input word is allocated per Unit in the order the Unit is connected



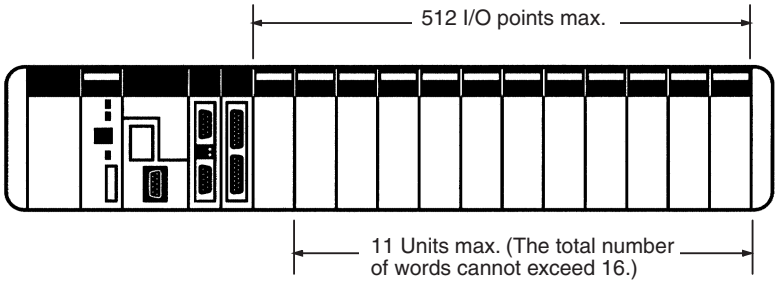
I/O Units

The number of I/O Units that can be connected depends on the CPU Unit being used.

CQM1H-CPU11/CPU21



CQM1H-CPU51/CPU61



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I/O Specifications

Input Specifications

All of the Input Units listed in the following tables have photocoupler isolation and LED input indicators.

CPU Units

Number of inputs	Input voltage	Input current	Input impedance	Operating voltage		Response times		External connection	Inputs/ common	Current consumption (5 V DC)	Weight
				ON voltage	OFF voltage	ON delay	OFF delay				
16 pts	24 V DC +10%/15%	10 mA for IN04/05 6 mA for the rest (24 V DC)	2.2 kΩ for IN04/05 3.9 kΩ for the rest	17.4 V DC min.	5.0 V DC max.	8 ms max. (see note)	8 ms max. (see note)	Terminal block	16	---	---

DC Input Units

Model	Number of inputs	Input voltage	Input current	Input impedance	Operating voltage		Response times		External connection	Inputs/ common	Current consumption (5 V DC)	Weight
					ON voltage	OFF voltage	ON delay	OFF delay				
CQM1-ID211	8 pts	12 to 24 V DC +10%/15%	10 mA (24 V DC)	2.4 kΩ	10.2 V DC min.	3.0 V DC max.	8 ms max. (see note)	8 ms max. (see note)	Terminal block	8 independent commons	50 mA max.	180 g max.
CQM1-ID111	16 pts	12 V DC +10%/15%	6 mA (12 V DC)	1.8 kΩ	8.0 V DC min.	3.0 V DC max.	8 ms max. (see note)	8 ms max. (see note)		16	85 mA max.	180 g max.
CQM1-ID212	16 pts	24 V DC +10%/15%	6 mA (24 V DC)	3.9 kΩ	14.4 V DC min.	5.0 V DC max.	8 ms max. (see note)	8 ms max. (see note)		16	85 mA max.	180 g max.
CQM1-ID112	32 pts	12 V DC +10%/15%	4 mA (12 V DC)	2.2 kΩ	8.0 V DC min.	3.0 V DC max.	8 ms max. (see note)	8 ms max. (see note)	Connector	32	170 mA max.	160 g max.
CQM1-ID213	32 pts	24 V DC +10%/15%	4 mA (24 V DC)	5.6 kΩ	14.4 V DC min.	5.0 V DC max.	8 ms max. (see note)	8 ms max. (see note)		32	170 mA max.	160 g max.
CQM1-ID214	32 pts	24 V DC +10%/15%	6 mA (24 V DC)	3.9 kΩ	15.4 V DC min.	5.0 V DC max.	8 ms max. (see note)	8 ms max. (see note)		32	170 mA max.	160 g max.

AC Input Units

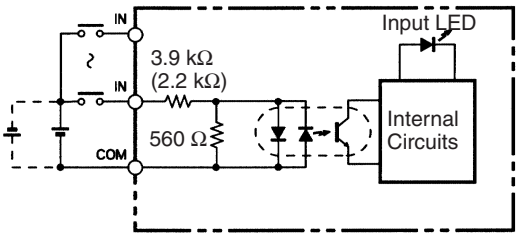
Model	Number of inputs	Input voltage	Input current	Input impedance	Operating voltage		Response times		External connection	Inputs/ common	Current consumption (5 V DC)	Weight
					ON voltage	OFF voltage	ON delay	OFF delay				
CQM1-IA121	8 pts	100 to 120 V AC +10%/15%	5 mA (100 V AC)	20 kΩ (50 Hz) 17 kΩ (60 Hz)	60 V AC min.	20 V AC max.	35 ms max.	55 ms max.	Terminal block	8	50 mA max.	210 g max.
CQM1-IA221	8 pts	200 to 240 V AC +10%/15%	6 mA (200 V AC)	38 kΩ (50 Hz) 32 kΩ (60 Hz)	150 V AC min.	40 V AC max.	35 ms max.	55 ms max.		8	50 mA max.	210 g max.

Note: Selectable from 1 to 128 ms in the PLC Setup.

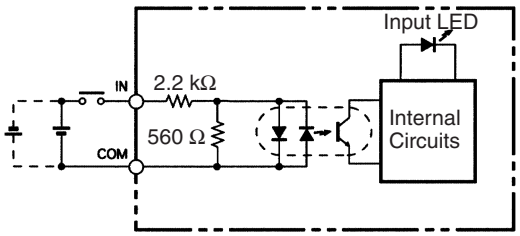
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Circuit Configuration

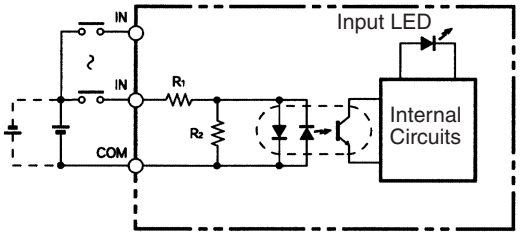
CQM1H-CPU11/21/51/61



CQM1-ID211

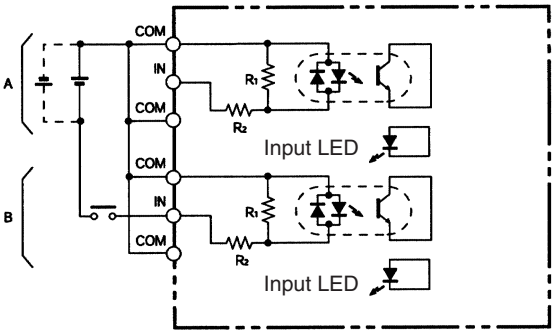


CQM1-ID111/212



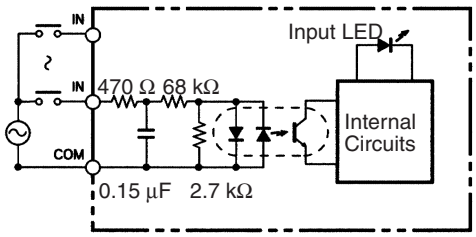
ID111
R_1: 1.8 kΩ
R_2: 620 Ω
ID211
R_1: 3.9 kΩ
R_2: 560 Ω

CQM1-ID112/213/214

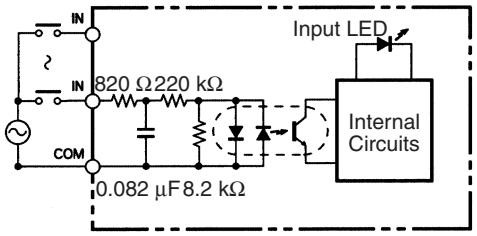


ID112
R_1: 750 Ω
R_2: 2.2 kΩ
ID213
R_1: 620 Ω
R_2: 5.6 kΩ
ID214
R_1: 620 Ω
R_2: 3.9 kΩ

CQM1-IA121



CQM1-IA221



Output Unit Specifications

All of the Output Units have LED output indicators.

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Contact Output Units

Model	Number of outputs	Max. switching capacity	Min. switching capacity	Response times		External connector	Leakage current	Outputs/ common	Fuses (see note)	External power supply capacity	Internal current consumption (5 V DC)	Weight
				ON delay	OFF delay							
CQM1-OC221	8 pts	2 A, 250 V AC (cosϕ= 1) 2 A, 250 V AC (cosϕ= 0.4) 2 A, 24 V DC (16 A/Unit)	10 mA, 5 V DC	10 ms max.	5 ms max.	Terminal block	---	Independent commons	None	---	430 mA max.	200 g max.
CQM1-OC222	16 pts	2 A, 250 V AC (cosϕ= 1) 2 A, 250 V AC (cosϕ= 0.4) 2 A, 24 V DC (8 A/Unit)	10 mA, 5 V DC	10 ms max.	5 ms max.			16		---	850 mA max.	230 g max.
CQM1-OC224	8 pts	2 A, 250 V AC (cosϕ= 1) 2 A, 250 V AC (cosϕ= 0.4) 2 A, 24 V DC (16 A/Unit)	10 mA, 5 V DC	15 ms max.	5 ms max.			Independent commons		---	440 mA max.	270 g max.

Transistor Output Units

Model	Number of outputs	Max. switching capacity	Min. switching capacity	Response times		External connector	Leakage current	Outputs/ common	Fuses (see note)	External power supply capacity	Internal current consumption (5 V DC)	Weight
				ON delay	OFF delay							
CQM1-OD211	8 pts	2 A at 24 V DC $^{+10\%}/_{-15\%}$ 5 A/Unit	---	0.1 ms max.	0.3 ms max.	Terminal block	0.1 mA max.	8	7A (one fuse/ common)	24 V DC $^{+10\%}/_{-15\%}$ 15 mA min.	90 mA max.	200 g max.
CQM1-OD212	16 pts	50 mA at 4.5 V DC to 300 mA at 26.4 V	---	0.1 ms max.	0.4 ms max.		0.1 mA max.	16	5A (one fuse/ common)	5 to 24 V DC ±10% 40 mA min.	170 mA max.	180 g max.
CQM1-OD213	32 pts	16 mA at 4.5 V DC to 100 mA at 26.4 V	---	0.1 ms max.	0.4 ms max.	Connector	0.1 mA max.	32	3.5A (one fuse/ common)	5 to 24 V DC ±10% 110 mA min.	240 mA max.	180 g max.
CQM1-OD214 (PNP, sourcing)	16 pts	50 mA at 4.5 V DC to 300 mA at 26.4 V	---	0.1 ms max.	0.4 ms max.	Terminal block	0.1 mA max.	16	3.5A (two fuses/ common)	5 to 24 V DC ±10% 60 mA min.	170 mA max.	210 g max.
CQM1-OD215 (PNP, sourcing)	8 pts	1.0 A at 24 V DC $^{+10\%}/_{-15\%}$ 4 A/ Unit	---	0.2 ms max.	0.8 ms max.		0.1 mA max.	8	Short-circuit protection function	24 V DC $^{+10\%}/_{-15\%}$ 24 mA min.	110 mA max.	240 g max.
CQM1-OD216 (PNP, sourcing)	32 pts	0.5 A at 24 V DC $^{+10\%}/_{-15\%}$ 5 A/ Unit	---	0.1 ms max.	0.3 ms max.	Connector	0.1 mA max.	32	7A (one fuse/ common)	24 V DC $^{+10\%}/_{-15\%}$ 160 mA min.	240 mA max.	210 g max.

AC Output Units

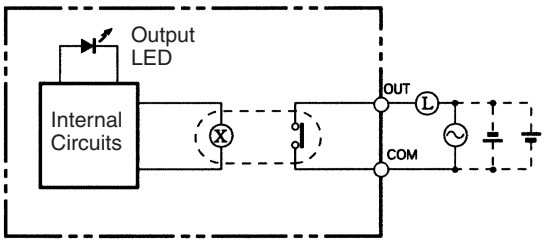
Model	Number of outputs	Max. switching capacity	Min. switching capacity	Response times		External connector	Leakage current	Outputs/ common	Fuses (see note)	External power supply capacity	Internal current consumption (5 V DC)	Weight
				ON delay	OFF delay							
CQM1-OA221	8 pts	0.4 A at 100 to 240 V AC	---	6 ms max.	1/2 cycle + 5 ms max.	Terminal block	1 mA max. at 100 V AC, 2 mA max. at 200 V AC	4 each (2 circuits)	2A (one fuse/ common)	---	110 mA max.	240 g max.
CQM1-OA222	6 pts	0.4 A at 100 to 240 V AC	100 mA at 10 V AC 50 mA at 24 V AC 10 mA at 100 V AC 10 mA at 240 V AC	1 ms max.	Load frequency of 1/2 cycle + 1 ms max.			4 and 2 (2 circuits)	5A (one fuse/ common)	---	250 mA max.	240 g max.

Note: Fuses are not user-serviceable.

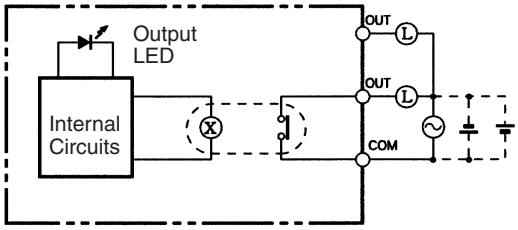
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Circuit Configuration

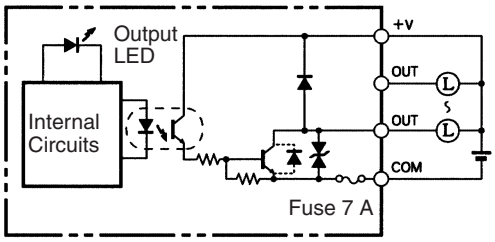
CQM1-OC221



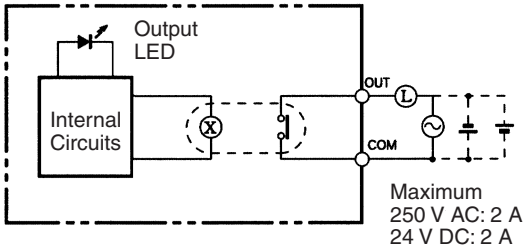
CQM1-OC222



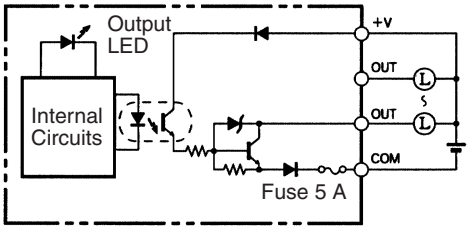
CQM1-OD211



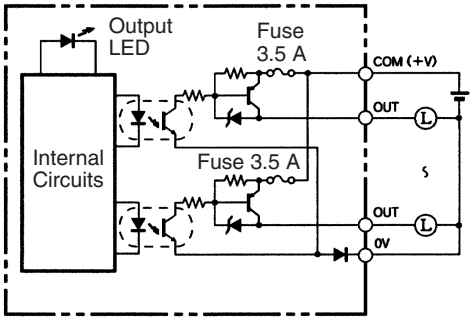
CQM1-OC224



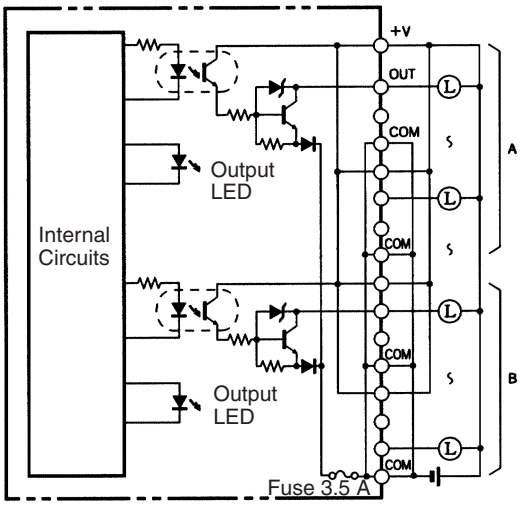
CQM1-OD212



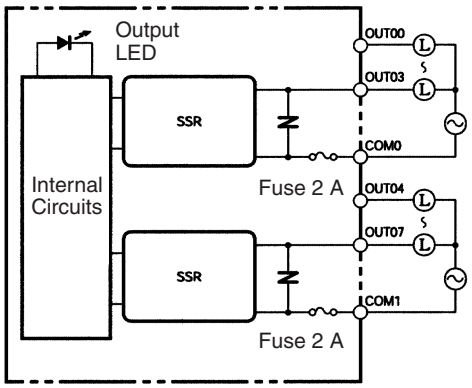
CQM1-OD214



CQM1-OD213

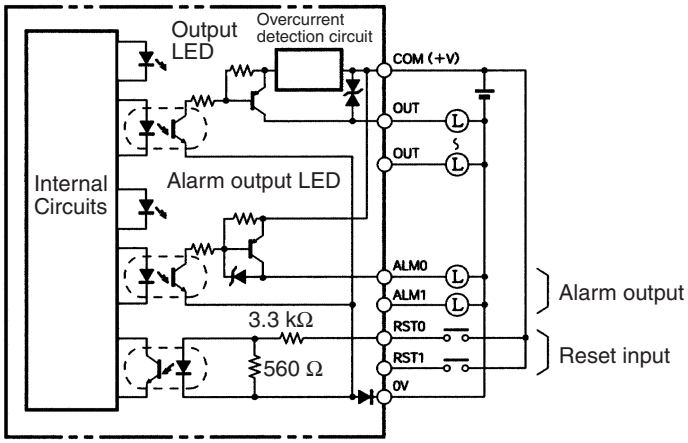


CQM1-OA221

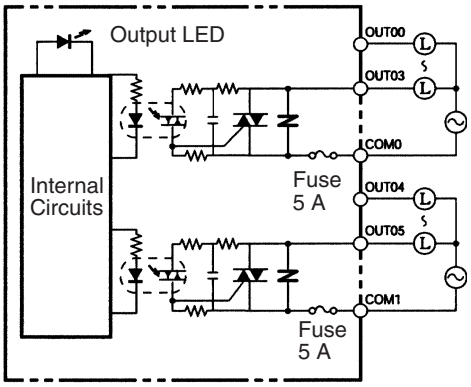


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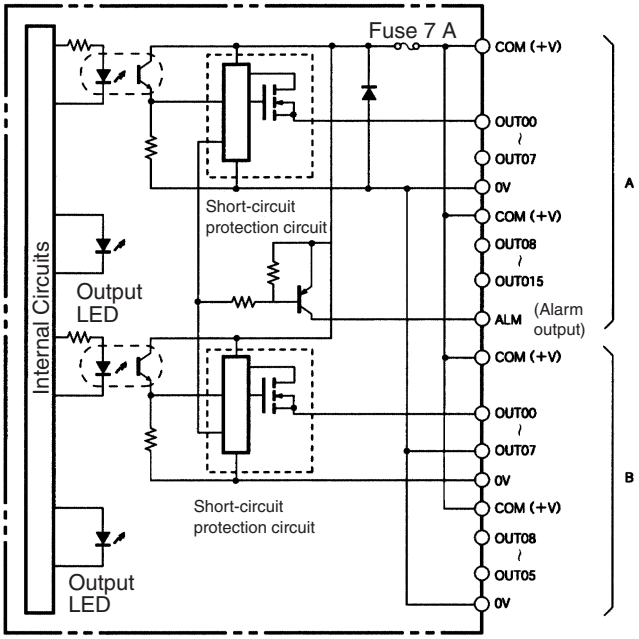
CQM1-OD215



CQM1-OA222



CQM1-OD216



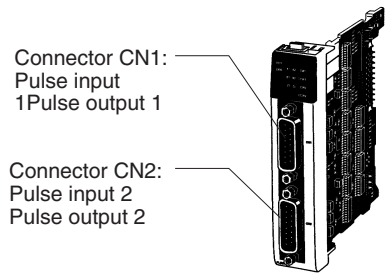
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OMRON

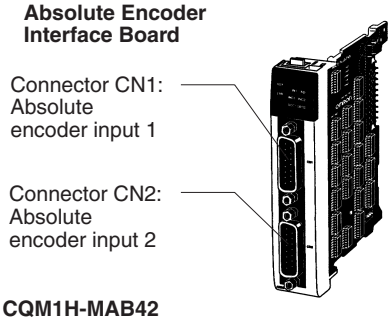
Inner Boards

The six available Inner Boards are shown below. Inner Boards can be mounted in slot 1 or slot 2 of a CQM1H-CPU51 or CQM1H-CPU61 CPU Unit. (Some Inner Boards must be mounted in either slot 1 or slot 2.)

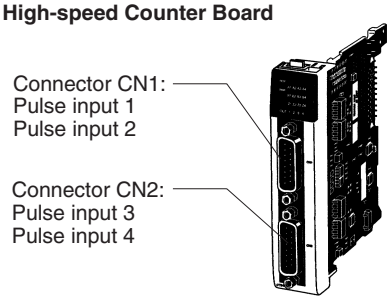
CQM1H-PLB21
Pulse I/O Board



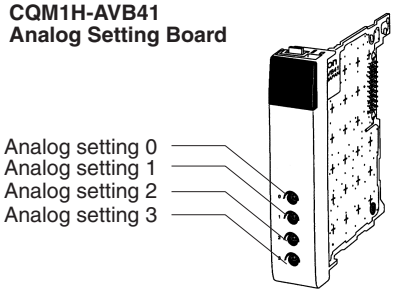
CQM1H-ABB21
Absolute Encoder Interface Board



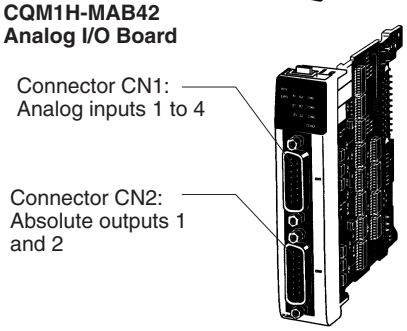
CQM1H-CTB41
High-speed Counter Board



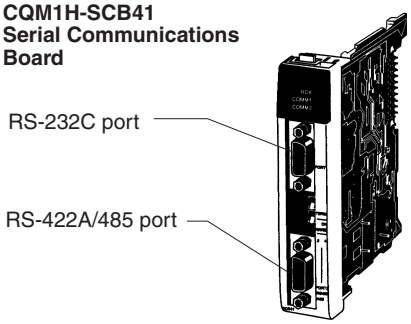
CQM1H-AVB41
Analog Setting Board



CQM1H-MAB42
Analog I/O Board

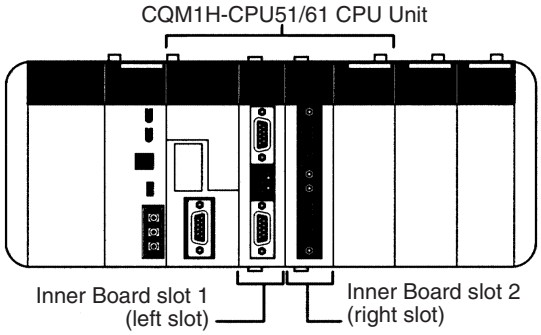


CQM1H-SCB41
Serial Communications Board



Specifications

Name	Specifications	Model number	Slot 1 (left slot)	Slot 2 (right slot)	Page
Analog Setting Board	Analog settings: 4 points	CQM1H-AVB41	Yes (Install in either but not in both slots.)		27
Analog I/O Board	Four inputs: 0 to 5 V, 0 to 10 V, –10 to +10 V, 0 to 20 mA Two outputs: 0 to 20 mA, –10 to +10 V	CQM1H-MAB42	No	Yes	28
High-speed Counter Board	Pulse inputs (high-speed counter): 4 points (50 kHz/500 kHz switchable) External outputs: 4 points	CQM1H-CTB41	Yes	Yes	36
Pulse I/O Board	Pulse inputs (high-speed counter): 2 points (single-phase: 50 kHz, phase difference: 25 kHz) Pulse outputs: 2 points (50 kHz) (fixed duty factor and variable duty factor supported)	CQM1H-PLB21	No	Yes	38
Absolute Encoder Interface Board	Encoder (binary gray code) inputs: 2 points (4 kHz)	CQM1H-ABB21			40
Serial Communications Board	One RS-232C port and one RS-422A/485 port	CQM1H-SCB41	Yes	No	43



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Dedicated I/O Units

Summary of Dedicated I/O Units

Name	Specifications	Model number	Page
B7A Interface Units	16 output points	CQM1-B7A02	24
	16 input points	CQM1-B7A12	
	32 output points	CQM1-B7A03	
	32 input points	CQM1-B7A13	
	16 input points and 16 output points	CQM1-B7A21	
Safety Relay Unit	Emergency stop unit: 2 inputs/2 outputs, 4 general-purpose inputs	CQM1-SF200	25
Analog Input Unit	4 analog input points –10 to +10 V, 0 to 10 V, 0 to 5 V, or 0 to 20 mA	CQM1-AD042	30
Analog Output Unit	2 analog output points –10 to +10 V or 0 to 20 mA	CQM1-DA021	31
Temperature Control Units	Thermocouple input (J/K), ON/OFF or advanced PID control, transistor (NPN) output, 2 loops	CQM1-TC001	32
	Thermocouple input (J/K), ON/OFF or advanced PID control, transistor (PNP) output, 2 loops	CQM1-TC002	
	Platinum resistance thermometer input (Pt, JPt), ON/OFF or advanced PID control, transistor (NPN) output, 2 loops	CQM1-TC101	
	Platinum resistance thermometer input (Pt, JPt), ON/OFF or advanced PID control, transistor (PNP) output, 2 loops	CQM1-TC102	
	Thermocouple input (K, J, L, T, R, S, B), ON/OFF or advanced PID control, manual operation, transistor (NPN) output, 4 loops	CQM1-TC201	
	Thermocouple input (K, J, L, T, R, S, B), ON/OFF or advanced PID control, manual operation, transistor (PNP) output, 4 loops	CQM1-TC202	
	Thermocouple input (K, J, L, T, R, S, B), heater burnout alarm, ON/OFF or advanced PID control, manual operation, transistor (NPN) output, 2 loops	CQM1-TC203	
	Thermocouple input (K, J, L, T, R, S, B), heater burnout alarm, ON/OFF or advanced PID control, manual operation, transistor (PNP) output, 2 loops	CQM1-TC204	
	Platinum resistance thermometer input (Pt100, JPt100), manual operation, ON/OFF or advanced PID control, transistor (NPN) output, 4 loops	CQM1-TC301	
	Platinum resistance thermometer input (Pt100, JPt100), manual operation, ON/OFF or advanced PID control, transistor (PNP) output, 4 loops	CQM1-TC302	
	Platinum resistance thermometer input (Pt100, JPt100), heater burnout alarm, manual operation, ON/OFF or advanced PID control, transistor (NPN) output, 2 loops	CQM1-TC303	
	Platinum resistance thermometer input (Pt100, JPt100), heater burnout alarm, manual operation, ON/OFF or advanced PID control, transistor (PNP) output, 2 loops	CQM1-TC304	
Linear Sensor Interface Units	Measure voltage or current inputs from linear sensors and convert the measurements to numeric data for comparative decision processing. Standard type	CQM1-LSE01	34
	With monitor output (–9.999 V to 9.999 V).	CQM1-LSE02	

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CQM1-B7A□□

B7A I/O Interface Unit

A B7A Interface Unit can connect to I/O devices located up to 500 m way using a single cable. Units are available with a wide range of I/O capacities to help reduce wiring in just about any application. Connect to PLCs for simple digital communications, connect to a control panel, or connect to a robot. Whatever you connect to, you'll achieve more efficient wiring by reducing the number of connection cables required.



Specifications

General

Item	Specification
I/O points	CQM1- B7A21:16 input points (see note 1), 16 output points B7A13:32 input points (see note 2) B7A03:32 output points B7A12:16 input points (see note 1) B7A02:16 output points
I/O word allocation	CQM1- B7A21:1 word each for input and output (2 words in total) B7A13:2 words for input B7A03:2 words for output B7A12:1 word for input B7A02:1 word for output
Communication method	Unidirectional, time-shared multiplex
Transmission distance	STANDARD:500 m max. (see note 3) RAPID:100 m max. (see note 3)
I/O delay	STANDARD:19.2 ms (rated delay), 31 ms max. RAPID:3 ms (rated delay), 5 ms max. (STANDARD or RAPID set via switch.)
Power consumption	100 mA at 5 V DC
External power supply	12 to 24 V DC ±10%, 0.11 A min. (excluding the power required by the B7A Link Terminals)
Weight	200 g max.
Dimensions	32 x 110 x 107 mm (W x H x D)

Note: 1. Input mode setting allows selection between 16-point input and 15-point+1 error input.

2. Input mode setting allows selection between 32-point input and 30-point+2 error input.

3. The transmission distance depends on the power supply wiring methods.

B7A Link Terminals

Input Units

Name	Model	Transmission delay time
Screw terminal models	B7A-T6□1	STANDARD (19.2 ms)
	B7AS-T6□1	
	B7A-T6□6	RAPID (3 ms)
	B7AS-T6□6	
Module models	B7A-T6D2	STANDARD (19.2 ms)
	B7A-T6D7	RAPID (3 ms)
PLC connector models	B7A-T□E3	STANDARD (19.2 ms)
	B7A-T□E8	RAPID (3 ms)

Output Units

Name	Model	Transmission delay time
Screw terminal model	B7A-R6□□1	STANDARD (19.2 ms)
	B7AS-R6□□1	
	B7A-R6□□6	RAPID (3 ms)
	B7AS-R6□□6	
	G70D-R6R□1-B7A	STANDARD (19.2 ms)
	G70D-R6M□1-B7A	
Module model	B7A-R6A52	STANDARD (19.2 ms)
	B7A-R6A57	RAPID (3 ms)
PLC connector models	B7A-R□A□3	STANDARD (19.2 ms)
	B7A-R□A□8	RAPID (3 ms)

Note: Combine B7A Interface Units and B7A Link Terminals with equal transmission delay times. Do not connect B7A Link Terminals with 10 points and mixed I/O points.

I/O Unit and 32-point Input Unit

Name		Model	Transmission delay time
Screw terminal model	I/O	B7AM-6BS	STANDARD (19.2 ms)/ RAPID (3 ms) (switchable)
	32 inputs (16 pts/circuit)	B7AS-T3BS	

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CQM1-SF200

Safety Relay Unit



- Reduces wiring effort and installation space for safety circuits.
- Monitors the following four statuses of the safety circuit

1. Safety Circuit Output Status
   Monitors if the safety circuit is operating and producing outputs.
2. Safety Circuit Power Status
   Monitors the status of the power supply to the safety circuit.
3. K1 Relay Operating Status
4. K2 Relay Operating Status
   Monitors the status of the internal relays that form the safety circuit. This helps troubleshooting safety circuit problems.

- General-purpose Inputs
  In addition to the safety circuit, a general-purpose input section (4 inputs and 1 common) is provide, which can be used for general controls.

Specifications

General

Item		Specifications
Contact resistance (See note 1.)		100 mΩ
Operating time (See note 2.)		300 ms max.
Response time (See notes 2 and 3.)		10 ms max.
Durability	Mechanical	5 million operations min. (switching frequency: 7,200 times/hour)
	Electrical	100,000 operations min. (rated load, switching frequency: 1,800 times/hour)
Error rate (P level: reference value)		1 mA at 5 V DC
Weight		260 g max.

Note: 1. Measurement conditions: 1 A at 5 V DC voltage drop method
2. Bounce time is not included.
3. The response time is from when the input is turned OFF to when the main contact turns OFF.

Ratings (Safety Circuit)

Power Supply Section

Item	Specifications
Supply voltage	24 V DC
Permissible voltage fluctuation range	–15%/+10% of supply voltage
Power consumption	24 V DC: 1.7 W max.

Input Section

Item	Specifications
Input current	75 mA max.

Switching Section

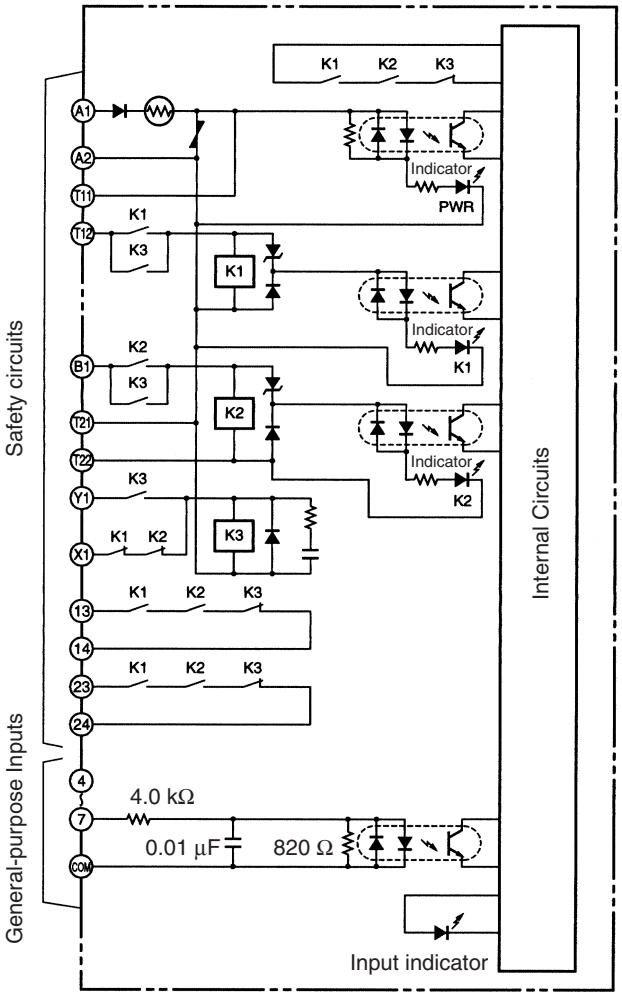
Item	Specifications
Load	Resistive load (cos=ϕ1)
Rated load	5 A at 250 V AC
Rated switching current	5 A

Ratings (General-purpose Input)

Item	Specifications
Rated input voltage	24 V DC –15%/+10%
Input impedance	4.0 kΩ
Input current	6 mA typical (24 V DC)
ON voltage/ON current	14.4 V DC min./3 mA min.
OFF voltage/OFF current	5 V DC max./1 mA max.
ON/OFF response time	8 ms max. (selectable from 1 to 128 ms using System Setup.)
Number of circuits	4 inputs and 1 common
Number of points that turn ON simultaneously	100% simultaneously ON
Internal current consumption	50 mA max.

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Circuit Configuration (Inputs)

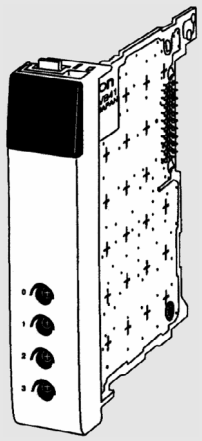


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CQM1H-AVB41

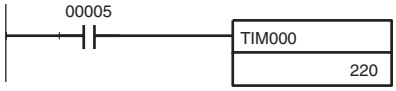
Analog Setting Board

- The Analog Setting Board is an Inner Board that provides four variable resistor adjustments. The settings on the four adjustments are stored in the analog setting words.
- By using the Analog Setting Board, an operator can, for example, set the value of a timer instruction using an analog adjustment, and thereby slightly speed up or slow down the speed or timing of a conveyor belt simply by turning an adjustment screw with a screwdriver, removing the need for a Programming Device.



Using the Analog Timer

The following example shows the 4-digit BCD setting (0000 to 0200) stored in IR 220 to IR 223 being used as a timer setting.



The setting of TIM 000 is set externally in IR 220. (TIM 000 is executed using the SV set with analog adjustment 0.)

Specifications

General

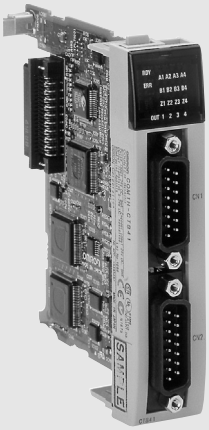
Item	Specifications
Name	Analog Setting Board
Model number	CQM1H-AVB41
Applicable CPU Units	CQM1H-CPU51/61
Unit classification	CQM1H-series Inner Board
Mounting locations and number of Boards	1 Board can be mounted in either slot 1 or slot 2. **Note:** Two Analog Setting Boards cannot be used at the same time.
Settings	4 analog (variable resistor) adjustment screws on front panel (Adjustable using Phillips screwdriver.) The settings of adjustments 0 to 3 are stored as 4-digit BCD values between 0000 and 0200 in IR 220 to IR 223 respectively.
Current consumption (Supplied from Power Supply Unit)	5 V DC, 10 mA max.
Dimensions	25 × 110 × 107 mm (W × H × D)
Weight	60 g max.

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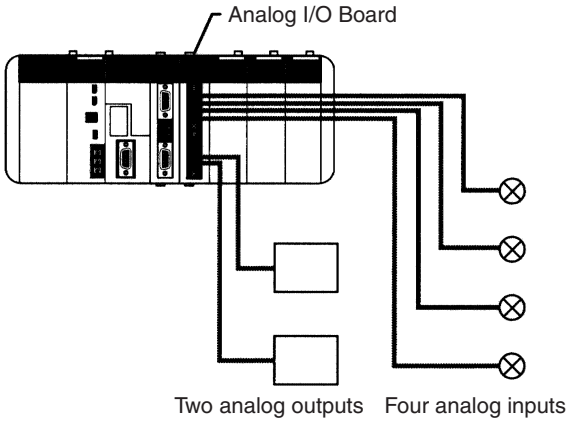
CQM1H-MAB42

Analog I/O Board

- The Analog I/O Board is an Inner Board with four analog inputs and two analog outputs.
- The signal ranges that can be used for each of the four analog inputs are –10 to +10 V, 0 to 10 V, 0 to 5 V, and 0 to 20 mA. Each input's signal range can be set independently.
- The signal ranges that can be used for each of the two analog output points are –10 to +10 V and 0 to 20 mA. Each output's signal range can be set independently.



Example System Configuration



Specifications

General

Item	Specifications
Name	Analog I/O Board
Model number	CQM1H-MAB42
Applicable CPU Units	CQM1H-CPU51/61
Unit classification	CQM1H-series Inner Board
Mounting locations and number of Boards	1 Board in Inner Board slot 2 (right slot)
Analog inputs	4 inputs
Analog outputs	2 outputs
Current consumption (Supplied from Power Supply Unit)	5 V DC, 400 mA max.
Dimensions	25 × 110 × 107 mm (W × H × D)
Weight	100 g max.
Standard accessories	Plugs:XM2D-1501 (OMRON) x 2 Hoods:XM2S-1511 (OMRON) x 2

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Analog Inputs

Item		Specifications	
Input signals		Voltage inputs	Current inputs
Number of analog inputs		4 inputs	
Input signal ranges[1]		–10 to 10 V 0 to 10 V 0 to 5 V	0 to 20 mA
A/D conversion time[2]		1.7 ms max./point	
Resolution		1/4,096	
A/D conversion output data		12-bit binary data –10 to +10 V: F800 to 07FF Hex 0 to 10 V, 0 to 5 V:0000 to 0FFF Hex	12-bit binary data 0 to 20 mA: 0000 to 0FFF Hex
External input impedance		1 MΩ typical	250 Ω typical
Absolute maximum rated input		±15 V	±30 mA
Overall precision[3]	23±2°C	±0.5% of FS	
	0 to 55°C	±1.0% of FS	

Note: 1. Separate input signal ranges can be set for each input.

2. The A/D conversion time is the time taken for an analog signal to be stored in memory as digital data. At least one cycle is required to transfer the data to the CPU Unit.

3. The overall precision is the precision with respect to full scale.

4. The CQM1H-MAB42 Analog I/O Board, unlike the CQM1-AD041, does not have a hardware average processing function. If averaging of data is required, use the CPU Unit's data averaging instruction (AVG).

Analog Outputs

Item		Specifications	
Output signals		Voltage outputs	Current outputs
Number of analog outputs		2 outputs	
Output signal ranges[1]		–10 to 10 V	0 to 20 mA
D/A conversion time[2]		1.7 ms max./2 points	
Resolution		1/4,096	1/2,048
Set output data		12-bit binary data –10 to +10 V: F800 to 07FF Hex	11-bit binary data 0 to 20 mA: 0000 to 07FF Hex
Allowable external output load resistance		2 KΩ min.	350 Ω max.
Overall precision[3]	23±2°C	±0.5% of FS	
	0 to 55°C	±1.0% of FS	

Note: 1. Separate output signal ranges can be set for each output.

2. The D/A conversion time is the time taken for the output data set in memory to be converted to analog signals and output. At least one cycle is required to transfer the data in the CPU Unit to the Analog I/O Board.

3. The overall precision is the precision with respect to full scale.

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CQM1-AD042

Analog Input Unit

The CQM1-AD042 Analog Input Unit retrieves four analog signals from sensors or measuring equipment.

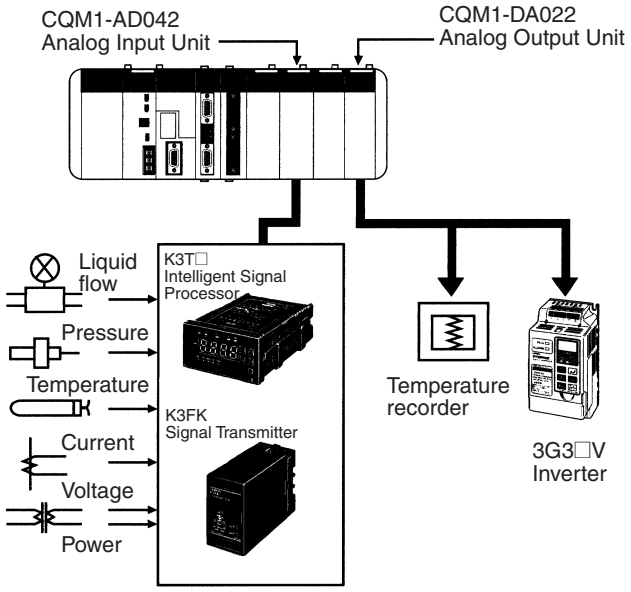


Specifications

General

Item		Specification
No. of analog input points		4 or 2 (selected with DIP switch)
Input signal range	Voltage input	−10 to +10 V 0 to 10 V 0 to 5 V
	Current input	0 to 20 mA
Input impedance	Voltage input	1 MΩ min.
	Current input	250 Ω
Resolution		1/4000
Accuracy		at 25°C: ±0.5% 0 to 55 °C: ±1.0%
Conversion speed		1.2 ms/1 pt.
Internal current consumption		170 mA max. at 5 V DC

System Configuration



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CQM1-DA022

Analog Output Unit

A single Analog Output Unit makes two-point digital-to-analog conversion possible at a speed of 0.5 ms/two points.

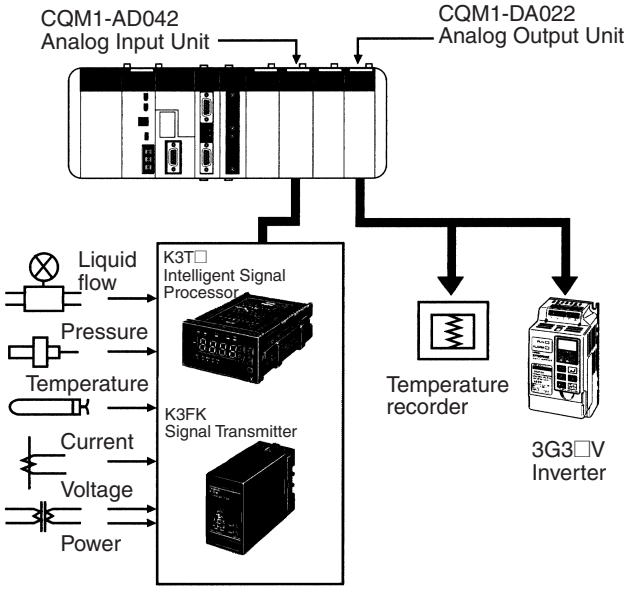


Specifications

General

Item	Specification	
No. of analog output points	2	
Output signal range	Voltage output	–10 to 10 V
	Current output	0 to 20 mA
External output permissible load resistance	Voltage output	2 kΩ min.
	Current output	350 Ω max. (including wiring impedance)
External output impedance	Voltage output	0.5 Ω max.
Resolution	Voltage output	1/4096
	Current output	1/2048
Accuracy	at 25 °C: ±0.5% 0 to 55 °C: ±1.0%	
Conversion speed	0.5 ms/2 points	
Internal current consumption	340 mA at 5 V DC	

System Configuration



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CQM1-TC□0□

Temperature Control Units



CQM1-TC00□/TC20□: Thermocouple Inputs
CQM1-TC10□/TC30□: Platinum Resistance Thermometer Inputs

- Temperature Control Units are available for either 4-loop temperature control or 2-loop temperature control, and Units with 2-loop temperature control provide a heater burnout alarm.
- Parameters can be set and data read for these Temperature Control Units by transferring commands. Therefore, only one word each is allocated to the Temperature Control Unit for inputs and outputs, enabling high-density temperature controls. Commands can be easily transferred using the TRANSFER I/O COMMAND instruction (see note 1) that was been added to the CQM1H CPU Units.
- The PID with advanced feed-forward circuitry (2 degrees of freedom) assures stable temperature control. The Units can also be set to ON/OFF control.

Note: Parameters can be set and data read for the CQM1-TC20□ and TC30□ using the new IOTC(—) instruction. The IOTC instruction is supported by the following combination of CPU Unit and Support Software: CX-Programmer version 2.0 or later and a CQM1H CPU Unit with a lot number of 0160 or later.

Specifications

General

Item		Thermocouple input CQM1-TC00□	Platinum resistance thermometer input CQM1-TC10□	Thermocouple input CQM1-TC20□	Platinum resistance thermometer input CQM1-TC30□
Input	Input sensors and set point ranges	K: –200 to 1,300 °C (-300 to 2,300 °F) J: -100 to 850 °C (-100 to 1,500 °F)	JPt: -99.9 to 450.0 °C (-99.9 to 800.0 °F) Pt: -99.9 to 450.0 °C (-99.9 to 800.0 °F)	K, J, T, L, R, S, B (See the following table for temperature ranges.)	Pt100, JPt100 (See the following table for temperature ranges.)
	Number of control loops	Two (either 1 or 2 loops can be used)		4 loops or 2 loops with heater burnout alarm	
Control mode		ON/OFF or advanced PID control (2 degrees of freedom)		ON/OFF control, advanced PID control (2 degrees of freedom), or manual operation	
Setting and display accuracy		°C Ranges (Set point ±1% or ±3 °C, whichever is larger) ±1 digit max. °F Ranges (Set point ±1% or ±6 °F, whichever is larger) ±1 digit max.	°C Ranges (Set point ±1% or ±2 °C, whichever is larger) ±1 digit max. °F Ranges (Set point ±1% or ±4 °F, whichever is larger) ±1 digit max.	°C Ranges (Set point ±0.3% or ±1 °C, whichever is larger) ±1 digit max. °F Ranges (Set point ±0.3% or ±2 °F, whichever is larger) ±1 digit max.	0.1 °C Ranges (Set point ±0.3% or ±0.8 °C, whichever is larger) ±1 digit max. 0.1 °F Ranges (Set point ±0.3% or ±1.6 °F, whichever is larger) ±1 digit max. (See note 1.) 0.01 °C Ranges (Set point ±0.3% or ±0.5 °C, whichever is larger) ±1 digit max.
Temperature hysteresis		0.8 °C/°F		0.1 to 999.9 °C/°F (0.1°C/°F unit)	
Proportional band		40.0 °C/°F		0.1 to 999.9 °C/°F (0.1°C/°F unit)	
Derivative time		240 s		0 to 3,999 s (1 s unit)	
Integral time		40 s		0 to 3,999 s (1 s unit)	
Manual output		---		0.0% to 100.0% (0.1% unit)	
Control period		20 s		1 to 99 s (1 s unit)	
Input shift range		---		–99.9 to 999.9 °C/°F (0.1°C/°F unit)	0.1 °C Ranges –99.9 to 999.9 °C/°F (0.1°C/°F unit) 0.01 °C Ranges –9.99 to 99.99 °C/°F (0.01°C/°F unit)
Sampling period		1 s		0.5 s	

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Item		Thermocouple input CQM1-TC00□	Platinum resistance thermometer input CQM1-TC10□	Thermocouple input CQM1-TC20□	Platinum resistance thermometer input CQM1-TC30□
Output	Output refresh period	1 s		0.5 s	
	Output form	NPN or PNP outputs (with short-circuit protection)		NPN or PNP outputs (with short-circuit protection)	
	Maximum switching capacity	100 mA, 24 V DC $^{+10\%}_{-15\%}$		100 mA, 24 V DC $^{+10\%}_{-15\%}$	
	Leakage current	0.3 mA max.		0.1 mA max.	
	Residual voltage	3.0 V max.		0.8 V max.	
External supply voltage		15 mA min., 24 V DC $^{+10\%}_{-15\%}$		30 mA min., 24 V DC $^{+10\%}_{-15\%}$	
Internal current consumption		220 mA max. at 5 V DC		190 mA max. at 5 V DC	
Heater burnout alarm	Maximum heater current	---		50 A, single-phase AC	
	Input current monitoring accuracy	---		±5 % FS ±1 digit	
	Heater burnout alarm setting	---		0.1 to 49.9 A (0.1 A unit) (See note 1.)	
	Minimum ON time for detection	---		200 ms (See note 2.)	

Note: 1. Heater burnout detection will be disabled if the alarm is set to 0.0 A. The heater burnout alarm output will turn ON if the alarm is set to 50.0 A.

2. If the control output is ON for less than 200 ms, heater burnout will not be detected and the heater current will not be measured.

Temperature Ranges

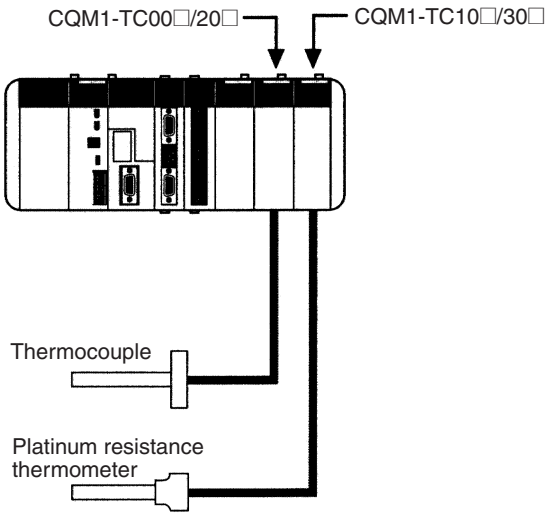
Units for Thermocouples

Input type	Code No.	°C	°F
K	0	–200 to 1300	–300 to 2300
K	1	0.0 to 500.0	0.0 to 900.0
J	2	–100 to 850	–100 to 1500
J	3	0.0 to 400.0	0.0 to 750.0
T	4	–200.0 to 400.0	–300.0 to 700.0
L	5	–100 to 850	–100 to 1500
L	6	0.0 to 400.0	0.0 to 750.0
R	7	0 to 1700	0 to 3000
S	8	0 to 1700	0 to 3000
B	9	100 to 1800	300 to 3200

Units for Platinum Resistance Thermometers

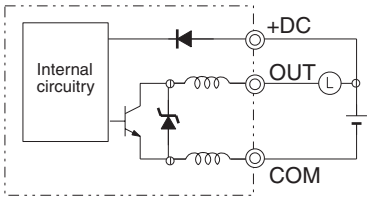
Input type	Code No.	°C	°F
Pt100	0	–200.0 to 650.0	–300.0 to 1200.0
JPt100	1	–200.0 to 650.0	–300.0 to 1200.0
Pt100	2	–20.00 to 250.00	Do not set.
JPt100	3	–20.00 to 250.00	

Example System Configuration

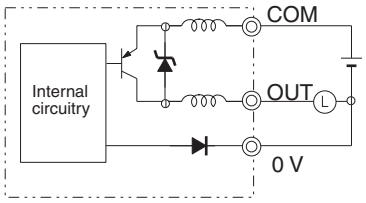


Circuit Configuration (Outputs)

CQM1-TC□01/TC□03: Sinking Outputs (NPN)



CQM1-TC□02/TC□04: Sourcing Outputs (PNP)



Current Detector Ratings

Item	E54-CT1	E54-CT3
Continuous maximum heater current	50 A	
Range for accurate measurement	0 to 30 A	0 to 50 A
Withstand voltage	1,000 V AC	
Shock resistance	50 Hz (Approx. 98 m/s^2)	
Hole diameter	5.8 mm	12.0 mm
Weight	Approx. 11.5 g	Approx. 50 g
Accessories	None	Contactors: 2 Plugs: 2

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CQM1-LSE0□

Linear Sensor Interface Units



The Linear Sensor Interface Units measure voltage or current inputs from linear sensors quickly and accurately and convert the measurements to numeric data for comparative decision processing. You can also sync internal processing using external timing signals.

- A high-speed sampling cycle of 1 ms can be combined with high-speed external timing at 0.3 ms to easily detect high-speed changes in analog signals.
- Scaling and comparative decision processing reduces the burden on the CQM1H's CPU Unit, achieving faster processing both in the Unit and for the PLC all around.
- A forced-zero function lets you easily change reference points for different work pieces.
- The monitor output allows a specified voltage to be output from the ladder-diagram program to provide analog output capability (CQM1-LSE02 only).

Specifications

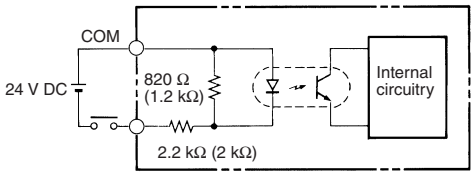
General

Item			CQM1-LSE01	CQM1-LSE02
Input	No. of analog input points		1	
	Input signal range	Voltage input	–9.999 to 9.999 V, –5 to 5 V, 1 to 5 V	
		Current input	4 to 20 mA	
	Input impedance	Voltage input	1 MΩ min.	
		Current input	10 Ω	
	Linearity		±0.1% FS ±1 digit max. with input sampling speed set to slow ±0.5% FS ±1 digit max. with input sampling speed set to fast	
PLC output code			Signed binary (–9999 to 9999 V)	
Sampling time			0.3 ms with input sampling speed set to fast and 0.6 ms with input sampling speed set to slow	
Sampling cycle			1 ms with input sampling speed set to fast and 2 ms with input sampling speed set to slow	
Arithmetic processing time			5 ms	
External control inputs			TIMING/GATE, ZERO, ZERO RESET, RESET	
Words allocated			1 input word and 1 output word	
Monitor output	Output signal		---	–9.999 to 9.999 V
	Output linearity		---	±0.1% FS
	Output resolution		---	1/8192
	Output refresh period		---	0.5 s
	Output response time		---	0.5 s
	Allowable load resistance		---	10 kΩ min.
Insulation			Photocoupler insulation between input terminals and PLC signals and between input terminals and output terminals.	
Dielectric strength			500 V AC for 1 minute between input terminals and output terminals 1,000 V AC for 1 minute between I/O terminals and FG	
Internal current consumption			380 mA max. at 5 V DC	450 mA max. at 5 V DC
Weight			230 g max.	

Control Input

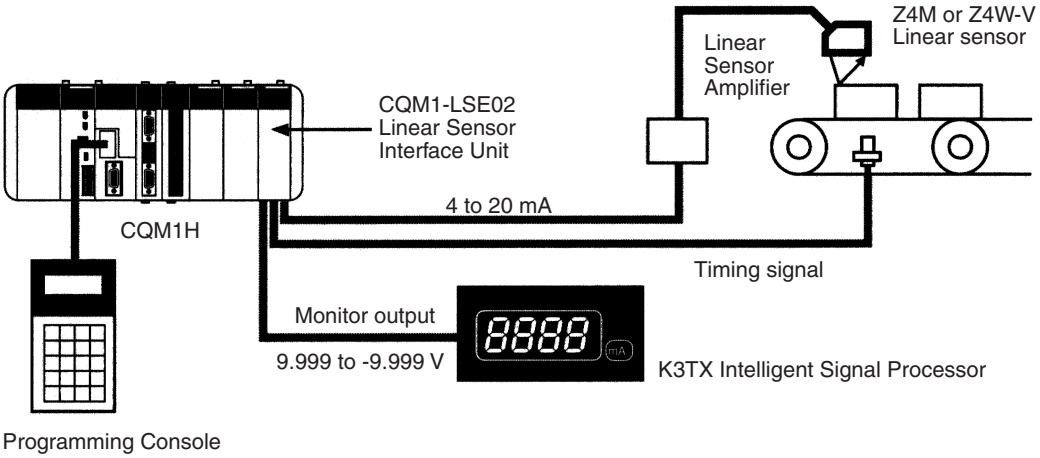
Item	Specification
Input voltage	24 V DC $^{+10\%}_{-15\%}$
Input impedance	TIMING/GATE:2 kΩ Other control output:2.2 kΩ
Input current	TIMING/GATE:9.2 mA TYP. (24 V DC) Other control output:10.0 mA TYP. (24 V DC)
ON voltage	TIMING/GATE:16.3 V DC min. Other control output:17.1 V DC min.
OFF voltage	TIMING/GATE:3.8 V DC max. Other control output:3.6 V DC max.

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Item	Specification
ON/OFF response time (see note)	TIMING/GATE:50 µs TYP. Other control output:4 ms TYP.
Circuit configuration	 Figures in parentheses are values for TIMING/GATE input.

Note: The ON/OFF response time is the time required for the Unit's CPU Unit to detect input turned ON or OFF.

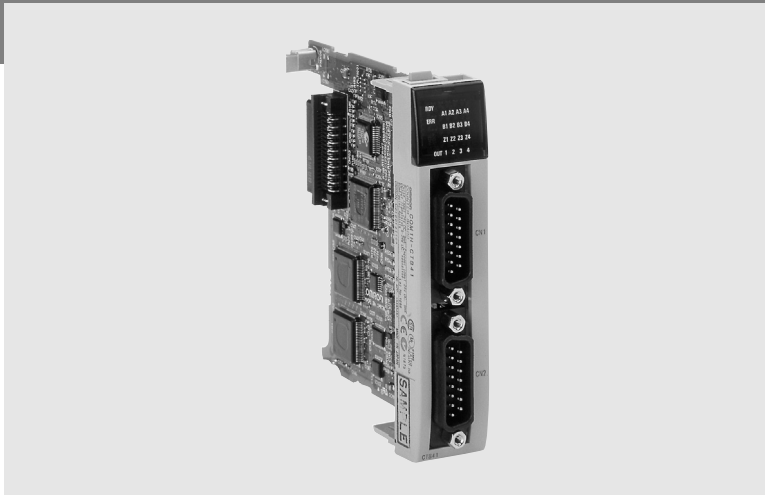
Example System Configuration



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CQM1H-CTB41

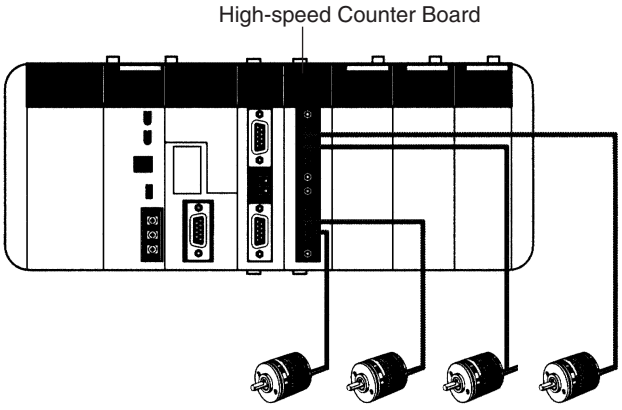
High-speed Counter Board



The High-speed Counter Board is an Inner Board that counts up to 4 high-speed pulse inputs at up to 500 kHz, and can perform tasks according to the number of pulses counted.

- Can count 4-axis high-speed pulses at up to 500 kHz.
- Provides 4 external outputs on the Board.
- Both linear and ring counting modes are supported.
- The input can be a voltage input or an RS-422A line driver input.
- Three input modes are available: differential phase mode, up/down mode, and pulse + direction mode
- The counters can be set to record the present values in decimal or hexadecimal.

System Configuration



Specifications

General

Item	Specifications
Name	High-speed Counter Board
Model number	CQM1H-CTB41
Applicable CPU Units	CQM1H-CPU51/61
Unit classification	CQM1H-series Inner Board
Mounting location/No. of Boards	Maximum of two Boards can be mounted simultaneously in slots 1 and 2.
Pulse inputs	4 inputs
External outputs	4 outputs
Current consumption (Supplied from Power Supply Unit)	5 V DC, 400 mA max.
Dimensions	25 × 110 × 107 mm (W × H × D)
Weight	90 g max.
Standard accessories	Plugs: XM2D-1501 (OMRON) x 2 Hoods: XM2S-1511 (OMRON) x 2

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Pulse Inputs (High-speed Counters)

Pulse Input Function

Item		Specifications		
Number of counters		4 counters (4 ports)		
Input modes (Set in the PLC Setup.)		Differential Phase Inputs	Up/Down Pulse Inputs	Pulse/Direction Inputs
Input method		Switching between inputs using phase difference multiples of 1x, 2x, or 4x. (Set in the PLC Setup.)	Two single-phase inputs	Single-phase pulse and direction inputs
Count frequency (Set for each port in the PLC Setup.)		25 kHz (default) or 250 kHz	50 kHz (default) or 500 kHz	50 kHz (default) or 500 kHz
Count values		Linear counting:–8388608 to 8388607 BCD, F8000000 to 07FFFFFF Hex Ring counting:00000000 to 08388607 BCD, 00000000 to 07FFFFFF Hex		
Control method	Target value comparison	Up to 48 target values and external/internal output bit patterns registered.		
	Range comparison	Up to 16 upper limits, lower limits, and external/internal output bit patterns registered.		

Pulse Input

Item	Specifications			
Number of pulse inputs	4 inputs (Ports 1 to 4 = High-speed counters 1 to 4)			
Signals	Encoder inputs A and B; pulse input Z			
Input voltage	Switched by means of input voltage switch on the Board (Specified separately for phases A, B, and Z.)			
	24 V DC±10%		RS-422A line driver (AM26LS31 or equivalent)	
	Phase A and B	Phase Z	Phase A and B	Phase Z
Input current	5 mA typical	8 mA typical	10 mA typical	13 mA typical
ON voltage	19.6 V DC min.	18.6 V DC min.	---	---
OFF voltage	4.0 V DC min.	4.0 V DC min.	---	---

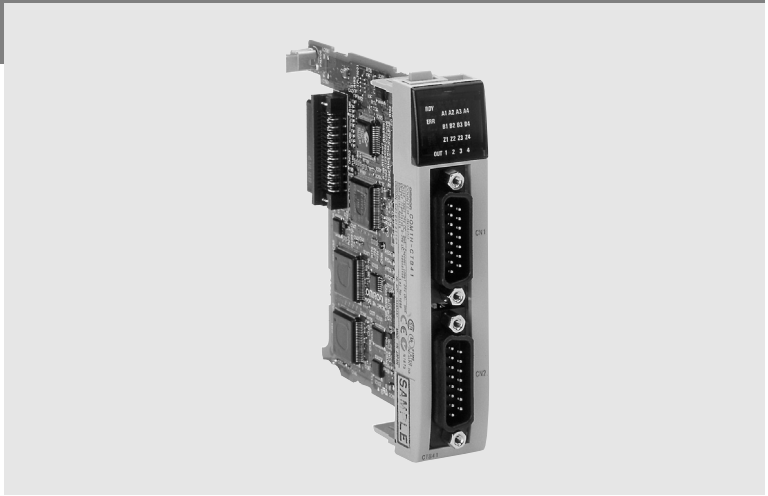
External Output

Item	Specifications
Number of external outputs	4 transistor outputs (The four outputs are set together as sinking or sourcing outputs in the PLC Setup.)
Function	The target comparison or range comparison results of high-speed counters 1 to 4 output four user-defined 4-bit external bit patterns (bits 08 to 11 of either IR 208 to IR 211 or IR 240 to IR 243). An OR is taken of corresponding bits in these four bit patterns, and the result is output on external outputs 1 to 4.
External power supply	5 to 24 V DC±10%
Switching capacity	16 mA/4.5 V DC to 80 mA/26.4 V
Leakage current	0.1 mA max.
Residual voltage	0.8 V max.
Response time	ON response: 0.1 ms max.; OFF response: 0.4 ms max.

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CQM1H-PLB21

Pulse I/O Board



The Pulse I/O Board is an Inner Board that supports two pulse inputs and two pulse outputs.

Pulse Inputs

- The two pulse inputs to high-speed counters count pulses at up to 50 kHz (signal phase) or 25 kHz (differential phase). Interrupt can be created based on the counter present values (PV).

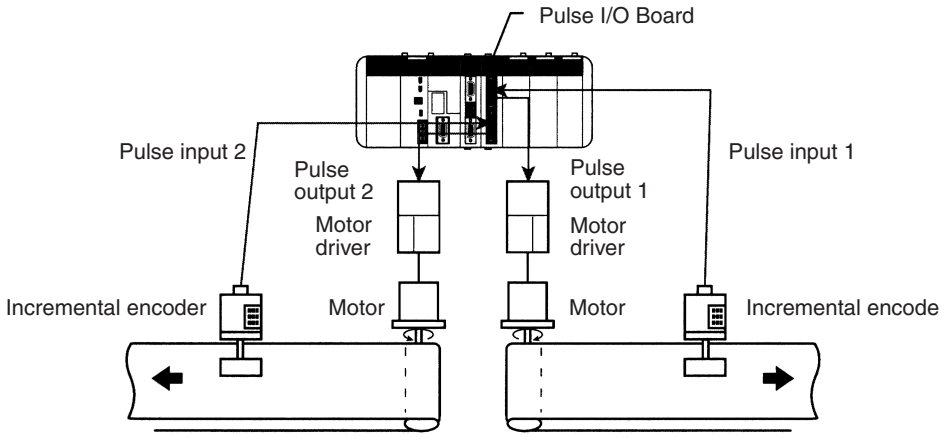
Interrupts
The Board can execute an interrupt subroutine when the counter PV matches a specified target value (target value comparison) or falls within a specified comparison range (range comparison.)

Pulse Outputs 1 and 2

Two 10 Hz to 50 kHz pulses can be output. Both fixed and variable duty factors can be used.

- The fixed duty factor can be used to change the output frequency (accelerate or decelerate) from 10 Hz to 50 kHz smoothly.
- The variable duty factor performs using a duty factor ranging from 1% to 99%. Variable duty factor pulses can be used for applications such as time-proportional control.

Example System Configuration



Specifications

General

Item	Specifications
Name	Pulse I/O Board
Model number	CQM1H-PLB21
Applicable CPU Units	CQM1H-CPU51/61
Unit classification	CQM1H-series Inner Board
Mounting locations/No. of Boards	One in Inner Board slot 2 (right slot)
Pulse inputs	2 inputs
Pulse outputs	2 outputs
Current consumption (Supplied from Power Supply Unit)	5 V DC, 160 mA max.
Dimensions	25 × 110 × 107 mm (W × H × D)
Weight	90 g max.
Standard accessories	Two XM2D-1501 Plugs and two XM2S-1511 Hoods (OMRON)

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Pulse Input (High-speed Counter)

Pulse Input Function

Item		Specifications		
Number of counters		2 counters (ports)		
Input Modes (Set for each port in the PLC Setup.)		Differential phase input	Pulse/Direction input	Up/Down pulse input
Input method		Phase difference multiple of 4 (Fixed)	Single-phase pulse + direction	Single-phase input x 2
Count frequency		25 kHz	50 kHz	50 kHz
Count values		Linear counting:–8388608 to 8388607 BCD Ring counting:00000000 to 00064999 BCD		
Control method	Target value comparison	Register up to 48 target values and interrupt subroutine numbers.		
	Range comparison	Register up to 8 upper limits, lower limits, and interrupt subroutine numbers.		

Pulse Input

Item	Specifications			
Number of pulse inputs	2 inputs (Ports 1 and 2 = Pulses 1 and 2)			
Signal names	Encoder input A, encoder input B, pulse input Z			
Input voltage	Switched by means of connector pins (Can be specified separately for phases A, B, and Z.)			
	12 V DC±10%		24 V DC±10%	
Input current	Phases A and B	Phase Z	Phases A and B	Phase Z
	5 mA typical	12 mA typical	5 mA typical	12 mA typical
ON voltage	10.2 V DC min.		20.4 V DC min.	
OFF voltage	3.0 V DC min.		4.0 V DC min.	

Pulse Output

Pulse Output Function

Pulse output function is determined by the output method, as indicated below.

Item	Fixed duty factor			Variable duty factor
	Without trapezoidal acceleration/ deceleration	With trapezoidal acceleration/deceleration		
		Same acceleration/ deceleration rates	Separate acceleration/ deceleration rates	
Instruction	PULS(65)/SPED(64)	PLS2(—)	PULS(65)/ ACC(—)	PWM(—)
Output frequency	10 Hz to 50 kHz (10 Hz to 20 kHz for stepping motor)	0 Hz to 50 kHz	100 Hz to 50 kHz	91.6 Hz, 1.5 kHz, 5.9 kHz
Output frequency pitch	1 or 10 Hz	10 Hz		---
Duty factor	50% fixed			1 to 99%
Number of output pulses	1 to 16,777,215			---
Acceleration/ deceleration rate	---	10 Hz to 2 kHz (every 4.08 ms)		---

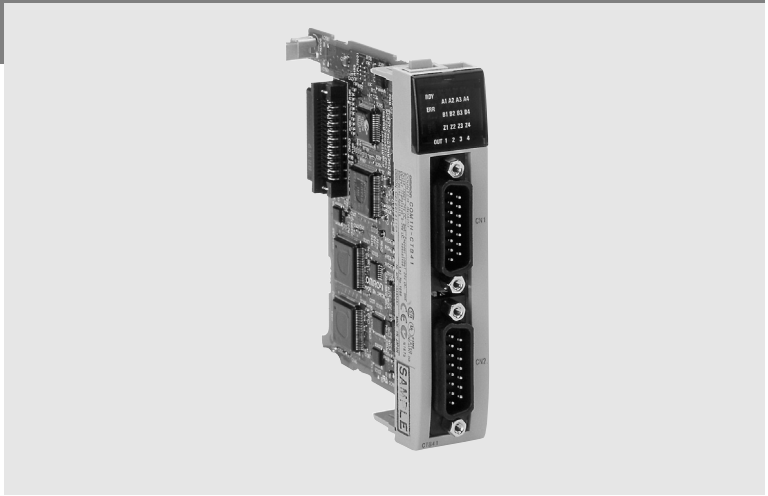
Output

Item	Specifications
Number of pulse outputs	2 outputs (Ports 1 and 2 = Pulse outputs 1 and 2)
Signal names	CW and CCW pulse output
Max. output frequency	50 kHz (20 kHz with stepping motor connected.)
External power supply	5 V DC±5% 30 mA min.; 24 V DC $^{+10\%}/_{-15\%}$ 30 mA min.
Max. switching capacity	NPN open collector, 30 mA/5 to 24 V DC±10%
Min. switching capacity	NPN open collector, 7 mA/5 to 24 V DC±10%
Leakage current	0.1 mA max.
Residual voltage	0.4 V max.

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CQM1H-ABB21

Absolute Encoder Interface Board



The Absolute Encoder Interface Board is an Inner Board that allows position data to be directly input from absolute rotary encoders.

Absolute High-speed Counter

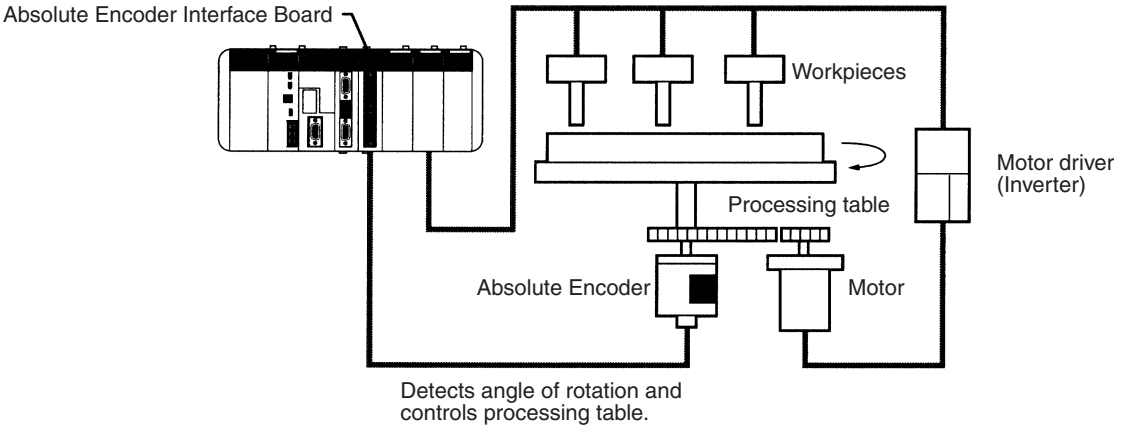
The Absolute Encoder Interface Board reads binary gray codes (inverted binary codes) input from an absolute encoder at a maximum counting rate of 4 kHz, and can perform interrupt processing according to the input values.

Interrupts

An interrupt subroutine can be executed when the PV (present value) of the absolute high-speed counter matches a specified target value (target value comparison) or falls within a specified comparison range (range comparison.)

Note: When an absolute encoder is used the position data can be retained even during power interrupts, so it isn't necessary to perform an origin return when power is returned. In addition, the origin compensation function allows the user to specify any position as the origin.

Example System Configuration



Specifications

General

Item	Specifications
Name	Absolute Encoder Interface Board
Model number	CQM1H-ABB21
Applicable CPU Units	CQM1H-CPU51/61
Unit classification	CQM1H-series Inner Board
Mounting locations and number of Boards	1 Board can be mounted in slot 2.
Absolute Encoder inputs	2 inputs
Current consumption (Supplied from Power Supply Unit)	5 V DC, 150 mA max.
Dimensions	25 × 110 × 107 mm (W × H × D)
Weight	90 g max.
Standard accessories	Plugs:XM2D-1501 (OMRON) x 2 Hoods:XM2S-1511 (OMRON) x 2

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Absolute Encoder Input

Item		Specifications
Number of inputs		Two inputs
Input code		Binary gray code
Operating modes		BCD Mode or 360° Mode (Set in PLC Setup.)
Resolutions		8-bit, 10-bit, or 12-bit (Set in PLC Setup.)
Origin compensation		Supported. (Current position can be designated as origin). Compensation is set in PLC Setup.
Counting rate		4 kHz max.
Control methods	Target value comparison	Register up to 48 target values and interrupt subroutine numbers.
	Range comparison	Register up to 8 upper limits, lower limits, and interrupt subroutine numbers.

Pulse Inputs

Item	Specifications
Input voltage	24 V DC +10%, –15%
Input impedance	5.4 kΩ
Input current	4 mA typical
ON voltage	16.8 V DC min.
OFF voltage	3.0 V DC max.

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Communications Units

Summary of Dedicated I/O Units

Name	Specifications	Model number	Page
Serial Communications Board	One RS-232C port and one RS422/RS485 port, Protocol Macro function	CQM1H-SCB41	43
Controller Link Unit	High-capacity, efficient data link between PLC's	CQM1H-CLK21	45
PROFIBUS-DP I/0 Link Unit	Exchanges from 2 to 8 words I/0 with any PROFIBUS-DP Master Unit	CQM1-PRT21	47
DeviceNet I/O Link Unit	DeviceNet Slave: 32 points (16 inputs and 16 outputs)	CQM1-DRT21	49
CompoBus/S Master Unit	128 points (64 inputs and 64 outputs), 64 points (32 inputs and 32 outputs), or 32 points (16 inputs and 16 outputs) selectable with a switch.	CQM1-SRM21-V1	50
AS-Interface Master Unit	Can control up to 31 AS-Interface slaves with up to 4 inputs + 4 outputs each.	CQM1-ARM21	51

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CQM1H-SCB41

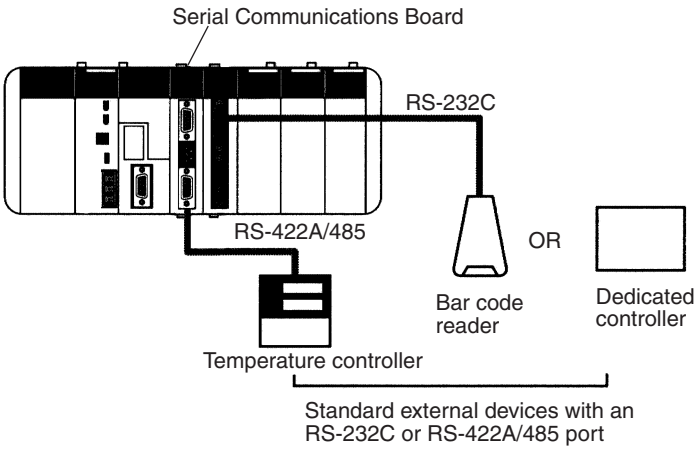
Serial Communications Board



The Serial Communications Board is an Inner Board equipped with 2 ports that can be used to connect host computers, Programmable Terminals, external serial devices, or Programming Devices other than a Programming Console.

- Unlike the CPU Unit's built-in ports, the Serial Communications Board supports the protocol macro function which can improve communications between the CQM1H and external serial devices.
- The Serial Communications Board has 2 ports: an RS-232C port and an RS-422A/485 port. The RS-422A/485 port supports 1:N connections (protocol macro or NT Link in 1:N mode) without an adapter.

Example System Configuration



Specifications

Serial Communications Board

Item		Specification
Model		CQM1H-SCB41
Unit classification		CQM1H-series Inner Board
Applicable CPU Units		CQM1H-CPU61/51
Mounting locations and number of Boards		1 Board can be mounted in slot 1.
Serial Communications ports	Port 1	RS-232C: 19.2 kbps max., 15 m max.
	Port 2	RS-422A/485: 19.2 kbps max., 500 m max.
Protocols	Port 1	Each port can be set independently to Host Link, No-protocol, Protocol macro, 1:1 Data Link, NT Link in 1:N mode, or NT Link in 1:1 mode.
	Port 2	
Current consumption		5 V DC, 200 mA max.
Dimensions		25 × 110 × 107 mm (W × H × D)
Weight		90 g max.
Standard accessories		Plugs:XM2SA-0901 (OMRON) x 2 Hoods:XM2SA-0911 (OMRON) x 2 (ESD)

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Communications Modes

The following 6 communications modes can be set independently for the two Serial Communications Board ports.

- Host Link: Communications with a host computer, Programming Device, or Programmable Terminal
- No-protocol: No-protocol communications (TXD and RXD) with standard external devices
- Protocol macro: Communications according to the external device's communications specifications
- 1:1 Data Link: Data link with a CQM1H, CQM1, or other C-series PLC
- NT Link in 1:N mode: One-to-one or one-to-N communications with Programmable Terminals
- NT Link in 1:1 mod: One-to-one communications with Programmable Terminal

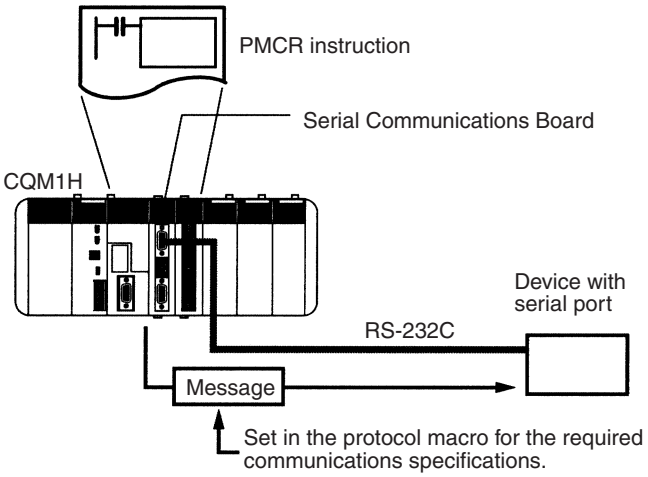
Serial communications protocol	CQM1H-SCB41 Serial Communications Board	
	RS-232C port (port 1)	RS-422A/485 port (port 2)
Peripheral bus or Programming Console bus	No	No
Host Link (SYSMAC WAY)	YES	YES[1]
Protocol macro	YES	YES
No-protocol	YES	YES[1]
1:1 Data Link	YES	YES[1]
NT Link in 1:1 mode	YES[2]	YES[2]
NT Link in 1:N mode	YES[2]	YES[2]

Note: 1. The 4-wire method must be used if the RS-422A/485 port is used in Host Link, No-protocol, or 1:1 Data Link mode.
2. A Programmable Terminal's Programming Console function cannot be used.

Protocol Macros

Protocol macros provide a way to create data communications protocols for the communications specifications of external devices with serial communications ports (half-duplex, start-stop sync only). The protocol macros are made on the CX-Protocol Support Software and then recorded in the Serial Communications Board, where they can be executed at any time using the PMCR instruction in the CPU Unit's ladder program.

Standard system protocols are also provided with the CX-Protocol and Serial Communications Board for easy communications with OMRON components, such as Temperature Controllers, Intelligent Signal Processors, Bar Code Readers, and Modems. The standard system protocols can also be modified for specific applications using the CX-Protocol.



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CQM1H-CLK21

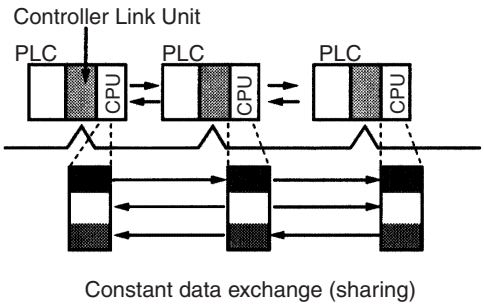
Controller Link Unit



Controller Link is an FA network to send and receive large data packets flexibly and easily among the OMRON CQM1H-series, C200HX/HG/HE, CS-series, CVM1, and CV-series PLCs.
Controller Link supports data links that enable data sharing and a message service that enables sending and receiving data when required. Data link areas can be freely set to create a flexible data link system and effectively use data areas.

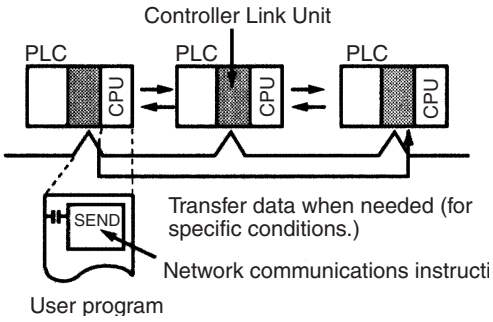
- High-capacity, flexible, and efficient data links
- Message service can transfer large quantities of data.
- Simple twisted-pair wiring
- Easily connects different PLC models and computers.
- Flexible inter-network connections
- Robust error-handling functions

Data Links



Constant data exchange (sharing)

Message Service



Specifications

General

Item	Specifications
Name	Controller Link Unit
Model number	CQM1H-CLK21
Applicable CPU Units	CQM1H-CPU51/CPU61
Unit classification	Communications Unit
Connection location and number of Units	One Unit only. The Unit must be connected between the Power Supply Unit and the CPU Unit.
Current consumption	270 mA
Dimensions	32 × 110 × 107 mm (W × H × D) (without terminals)
Weight	170 g max.

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Communications

Item	Specifications
Communications method	N:N token bus
Code	Manchester code
Modulation	Baseband code
Synchronization	Flag synchronization (conforms to HDLC frames)
Transmission path form	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
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 max. Data link area in one CQM1H-series PLC (send/receive): 8,000 words 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 $X^{16} + X^{12} + X^5 + 1$)

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CQM1-PRT21

PROFIBUS-DP I/O Link Unit



PROFIBUS-DP Slave for CQM1(H) PLCs

- No PLC settings need to be made.
- Auto-detect all PROFIBUS-DP baud rates from 9.6 kbit/s to 12 Mbit/s.
- Slave address setting, selectable from 0 to 99.
- Support and indication of PROFIBUS-DP broadcast functions (Sync/Freeze/Clear).
- Communication status available externally via relay output.
- Configurable for 2, 4, 6 or 8 words.

Ordering Information

Product Code	Description
CQM1-PRT21	PROFIBUS-DP slave unit for CQM1(H) PLCs

Specifications

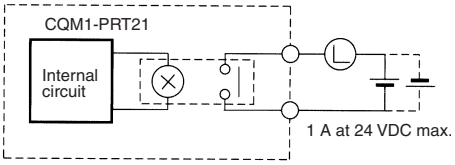
Communication Specification

Applicable standard	EN 50170 vol. 2
Station type	Modular station, max. 1 module Configurable with I/O-modules of 2, 4, 6 or 8 words
Data consistency	By word
Bus connector	9-pin female sub-D connector (RS-485 PROFIBUS connector)
Bus termination	External
Baud rate (auto-detect)	9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 kbit/s, 1.5 / 3 / 6 / 12 Mbit/s
PROFIBUS address range	0 to 99, Remote setting not supported
Communication cable	Type A (EN 50170 vol. 2)
Minimum slave interval time	0.5 ms
Watchdog base	10 ms, 1 ms selectable by parameter setting
Supported DP functions	• Data_Exchange • Slave_Diag • Set_Prm • Chk_Cfg • Global_Control (SYNC, FREEZE, CLEAR) • Get_Cfg • RD_Inp • RD_Outp
PROFIBUS-DP GSD file	OC_054D.GSD

Unit Specification

Host PLC system	CQM1, CQM1H
Switch settings	Number of I/O words Motorola/Intel data format PROFIBUS-DP address
LED indicators	Unit status: RUN (green LED),ERR (red LED) Network status: COMM (green LED),BF (red LED) WD OFF (yellow LED),CLEAR (yellow LED) SYNC (yellow LED), FREEZE (yellow LED)
No. of occupied words	Configurable by DIP switches (see note) • 2 words in + 2 words out • 4 words in + 4 words out • 6 words in + 6 words out • 8 words in + 8 words out
I/O refresh time (data exchange with CPU)	Max. 0.16 ms
Current consumption (max)	350 mA at 5 V DC (at CQM1 I/O bus)
Weight	170 g

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Storage temperature	–20 to +75 °C
Operating temperature	0 to +55 °C
Operating humidity	10% to 90% (non-condensing)
EMC compliance	EN50081-2, EN61131-2
Circuit configuration	Communication status output (COMM) terminal 

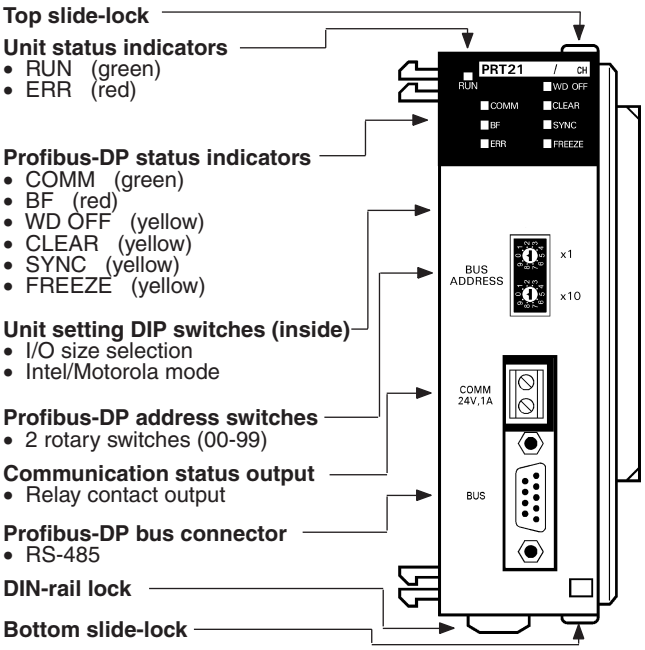
Note: The CQM1-PRT21 can be mounted to any CQM1- or CQM1H-series CPU. The maximum amount of I/O data that can be exchanged with the CPU depends on the selected CPU type, and on the number and type(s) of any additional I/O unit(s). To operate with the Unit's maximum I/O capacity, a CQM1H-CPU51 or CQM1H-CPU61 is required.

Communication status output

The COMM relay contact output indicates if data exchange with the PROFIBUS-DP master unit is active. This signal can be connected to a PLC input or external signalling device. It is recommended to use this information in the PLC to judge the validity of the received data.

ON state	• I/O data exchange with the PROFIBUS-DP master is active.
OFF state	• PLC Power OFF • Fatal error in PLC CPU or I/O bus. • No I/O data exchange with PROFIBUS-DP master (check LED indication).
Relay type	OMRON G6H-2F, non-replaceable
Maximum load	1 A at 24 V DC
ON/OFF delay	less than 10 ms
Connector	Phoenix MSTBA 2,5/2-G

Nomenclature



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CQM1-DRT21

DeviceNet I/O Link Unit



Distributed control

The DeviceNet I/O link unit is a DeviceNet slave that conforms to the open standard DeviceNet. DeviceNet I/O link units can be used to connect one or more CQM1H PLCs to a DeviceNet Master.
A maximum of 32 I/O points (16 inputs and 16 outputs).

Specifications

General

Communications power supply voltage	11 to 25 V DC supplied through communications connector
Current consumption	Communications power supply:40 mA max. at 24 V DC Internal circuit power supply:80 mA max. at 5 V DC
Number of I/O points	16 inputs and 16 outputs (32 in total)
Number of occupied words	1 input word and 1 output word (2 words in total)
Weight	185 g max.

Communications (Conforming to DeviceNet Standards)

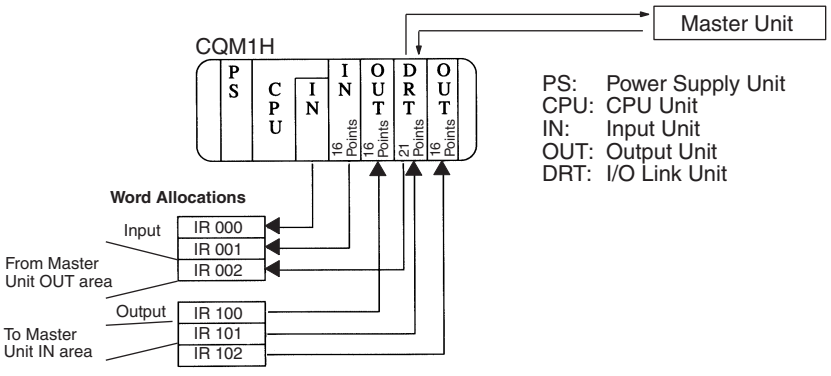
Connection method	Multi-drop, T-type bifurcation (both require external terminating resistor)
Baud rate	500, 250, or 125 kbps (selectable with a switch)
Communications cycle time	9.3 ms with 16 Input Slaves (16 inputs) and 16 Output Slaves (16 outputs) at a speed of 500 kbps.
Cable	Dedicated 5-conductor cable (with two signal wires, two power wires, and a shield wire)
Communications distance	Baud rate / Max. network length (see note 1) / Branch line length / Total branch line length 500K bps / 100 m max. (see note 2) / 6 m max. / 39 m max. 250K bps / 250 m max. (see note 2) / 6 m max. / 78 m max. 125K bps / 500 m max. (see note 2) / 6 m max. / 156 m max.
Max. number of connectable nodes	CVM1 or CV Series: 64 nodes, C200HX/HG/HE: 50 nodes, C200HS: 32 nodes
Error control	CRC errors, node address duplication, scan line checks

Note: 1. The maximum network length refers to the distance between two nodes farthest from each other.
2. The communications distance will be 100 m or less if a thin dedicated cable is used for the trunk line.

Words Allocated by CQM1H Slaves

The CQM1H treats the I/O Link Unit as a single I/O Unit that has one input word and one output word. Words are allocated like I/O Units (i.e., input words from IR 001 and output words from IR 100 in order of the Units) beginning with the leftmost Unit.

Allocation Example



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CQM1-SRM21-V1

CompoBus/S Master Unit



CompoBus/S master unit supports both a High-speed Communications Mode and a Long-distance Communications Mode.

- Number of I/O points per Master:
  128 max.
  (may be set to 64 or 32 points)
- Number of Slaves per Master: 16 or 32
- Communications cycle time: 0.5 ms max. (baud rate: 750 kbps)
- Communications distance: 500 m max. (baud rate: 93.75 kbps)

Specifications

General

Internal current consumption	180 mA max. at 5 V DC
Number of I/O points	128 points (64 inputs and 64 outputs), 64 points (32 inputs and 32 outputs), or 32 points (16 inputs and 16 outputs) selectable with a switch.
Number of occupied words	128 points:4 input words and 4 output words 64 points:2 input words and 2 output words 32 points:1 input word and 1 output word
Number of points per node	8 or 4 points (selectable with a switch)
Max. number of connectable Slaves	32 (with 4 points per node)
Status data	Alarm terminal output
Weight	200 g max.

Note: For details regarding CompoBus/S, refer to the CompoBus/S part of the Industrial Communication chapter.

Communication

<table>
<tr><td colspan="2">Communications protocol</td><td>Dedicated CompoBus/S protocol</td></tr>
<tr><td colspan="2">Code</td><td>Manchester code</td></tr>
<tr><td colspan="2">Connection method</td><td>Multi-drop, T-type bifurcation (both methods require external terminating resistor) (See note 1.)</td></tr>
<tr><td colspan="2">Baud rate</td><td>750 kbps, 93.75 kbps (selectable with a DIP switch) (See note 2.)</td></tr>
<tr><td rowspan="2">Communications cycle time</td><td>High-speed Communications Mode</td><td>0.5 ms (with a maximum number of 8 Input and 8 Output Slaves)
0.8 ms (with a maximum number of 16 Input and 16 Output Slaves)</td></tr>
<tr><td>Long-distance Communications Mode</td><td>4.0 ms (with a maximum number of 8 Input and 8 Output Slaves)
6.0 ms (with a maximum number of 16 Input and 16 Output Slaves)</td></tr>
<tr><td colspan="2">Cable</td><td>Two-conductor cable (VCTF 0.75 x 2), four-conductor cable (VCTF 0.75 x 4), or dedicated flat cable</td></tr>
<tr><td>Communications distance</td><td>High-speed Communications Mode</td><td>Two-conductor VCTF cable
<table>
<tr><th>Communications Mode</th><th>Trunk line length</th><th>Branch line length</th><th>Total line length</th></tr>
<tr><td>High-speed mode</td><td>100 m max.</td><td>3 m max.</td><td>50 m max.</td></tr>
<tr><td>Long-distance mode</td><td>500 m max.</td><td>6 m max.</td><td>120 m max.</td></tr>
</table>
Dedicated flat cable/ four-conductor VCTF cable
<table>
<tr><th>Communications Mode</th><th>Trunk line length</th><th>Branch line length</th><th>Total line length</th></tr>
<tr><td>High-speed mode (see note 3)</td><td>30 m max.</td><td>3 m max.</td><td>30 m max.</td></tr>
<tr><td>Long-distance mode (see note 4)</td><td colspan="3">Free branching (total cable length: 200 m max.)</td></tr>
</table></td></tr>
<tr><td colspan="2">Max. number of connectable nodes</td><td>32</td></tr>
<tr><td colspan="2">Error control</td><td>Manchester code, frame length, and parity checks</td></tr>
</table>

Note: **1.** An external Terminating Resistor is required.
2. Setting must be made using the DIP switch. (Change the DM setting for selecting the communications mode. Default setting: 750 kbps)
3. If the number of Slaves connected is smaller than 16, the trunk line length can be less than 100 m and the total line length can be less than 50 m.
4. There are no restrictions on the branching method, trunk line length, branch line length, or total line length. Connect the terminating resistor on the location, most remote from the master.

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CQM1-ARM21

AS-Interface Master Unit



AS-Interface master for CQM1(H) PLCs

- Controls up to 31 AS-Interface slaves with up to 4 inputs + 4 outputs each.
- Communications cycle time: 5 ms max.

Specifications

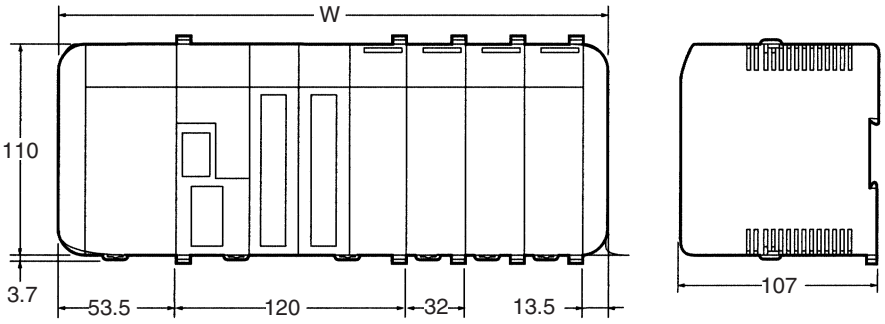
Max. number of units per CPU	One			
Master Unit mounting position	Recommended:	right most I/O unit position of the CQM1 system		
Settings	Switches:	IR channel allocation Operation Mode (Protected Configuration) Store Configuration		
Displays	Unit status:	RUN ERR	(green LED) (red LED)	Startup, normal operation Failure, illegal operation
	Network status:	APF CER AUP CM	(red LED) (red LED) (yellow LED) (yellow LED)	AS-Interface Power Fall Configuration Error Auto-programming available Configuration Mode
	Slave status:	0-15, +16	(yellow LED)	Slave cinfigured/active
External connectors	2 x ASI+, 2 x ASI-, M3 screw terminals, detachable terminal block			
No. of DM settings	1 word of unit setup information (DM 6604)			
No. of IR words	Switch selectable. Minimum: 3 words in + 3 words out			Maximum: 8 words in + 8 words out
Max. No. of Slaves per Master Unit	Switch selectable: With minimum IR words: 11 slaves			With maximum IR words: 31 slaves
Status information in PLC	Operation Mode flag System Error flag Normal Operation flag Configuration OK flag			
Communication specification	European Standard EN 50295 AS-Interface Complete Specification V 2. 04. AS-Interface Master 1,5, profile MD. Test Specification for AS-Interface V 1.1 Certification No. 22701			
Network configuration	Built-in functions: Get_Permanent_Configuration Set_Permanent_Configuration Read_Actual_Configuration Change_Slave_Address			Get_Permanent_Parameter Set_Permanent_Parameter Read_Parameter Write_Parameter
Current consumption	maximum 300 mA at 5 V DC (from the PLC power supply) maximum 100 mA at 30.5 V DC (from the AS-Interface line)			
Storage temperature	-20 to +75 °C			
Operating temperature	0 to +55 °C			
Operation humidity	10% to 90% (non-condensing)			
Conformance to EMC- and environmental standards	EN 50081-2 EN 61131-2			

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Dimensions

Note: All dimensions are in millimeters.

Overall CQM1H Dimensions



Overall PLC Widths for Example Configurations

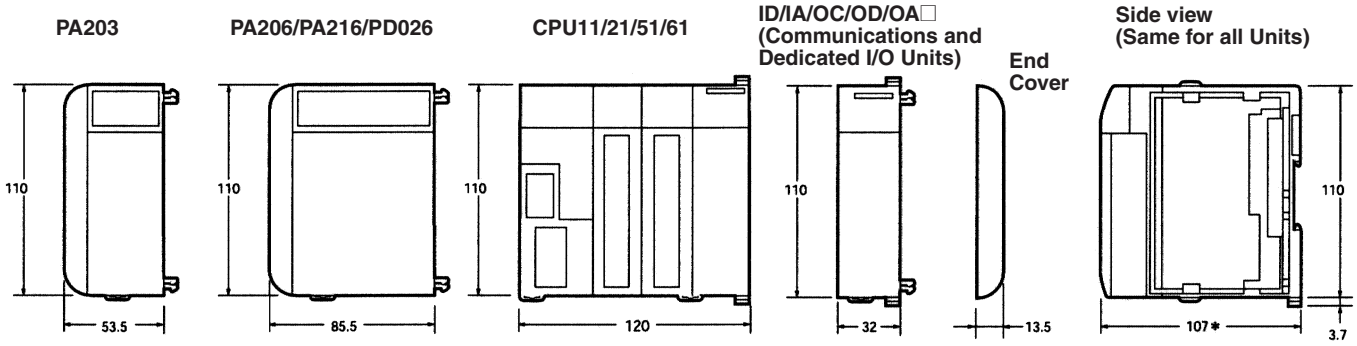
Number of I/O Units	PA203 Power Supply Unit	PA206, PA216, or PD026 Power Supply Unit
	W (mm)	W (mm)
3	283	315
4	315	347
5	347	379

Calculating Overall PLC Width with "n" I/O Units

Power Supply Unit	W (mm)
CQM1-PA203	32 × n + 187
CQM1-PA206	32 × n + 219
CQM1-PA216	
CQM1-PD026	

Note: The total number of I/O Units and Dedicated I/O Units (n) is limited to 12 Units (11 without a Communications Unit) for the CQM1H-CPU51/61 and 11 Units for the CQM1H-CPU11/21.

Power Supply, CPU, Communications, Dedicated I/O and I/O Units



*The CQM1-OC224 is 131.7 mm wide.

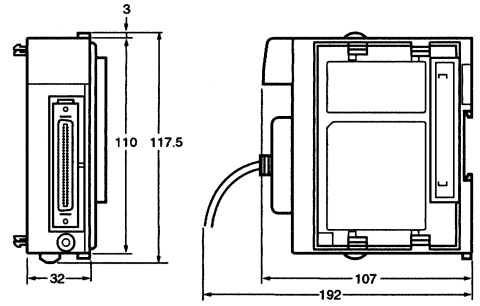
Name	Model	Weight
Power Supply Units	CQM1-PA203	460 g max
	CQM1-PA206	560 g max
	CQM1-PD026	
	CQM1-PA216	
CPU Units	CQM1H-CPU11	500 g max.
	CQM1H-CPU21	510 g max.
	CQM1H-CPU51	
	CQM1H-CPU61	
Input Units	CQM1-ID211	180 g max.
	CQM1-ID111	
	CQM1-ID212	
	CQM1-ID112	160 g max.
	CQM1-ID213	
	CQM1-ID214	
	CQM1-IA121	210 g max.
	CQM1-IA221	

Name	Model	Weight
Output Units	CQM1-OC221	200 g max.
	CQM1-OC222	230 g max.
	CQM1-OC224	270 g max.
	CQM1-OD211	200 g max.
	CQM1-OD212	180 g max.
	CQM1-OD213	160 g max.
Output Units	CQM1-OD214	210 g max.
	CQM1-OD215	240 g max.
	CQM1-OD216	210 g max.
	CQM1-OA221	240 g max.
	CQM1-OA222	

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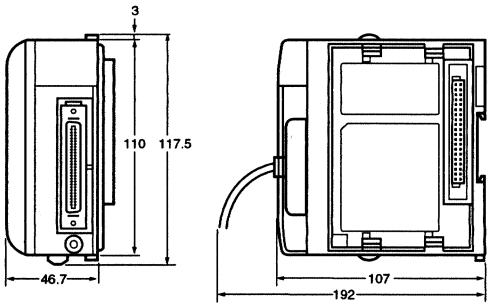
I/O Expansion Units

CQM1H-IC101



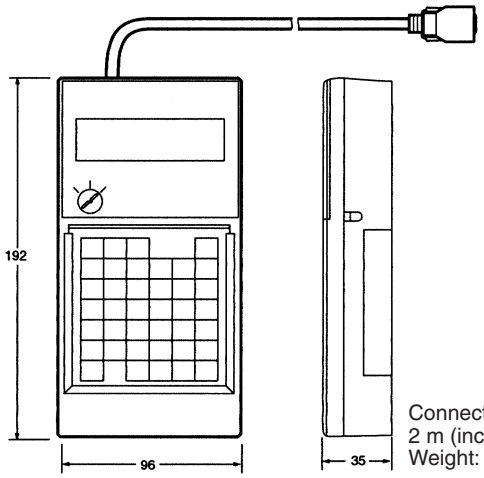
Weight: 131 g max.

CQM1H-II101



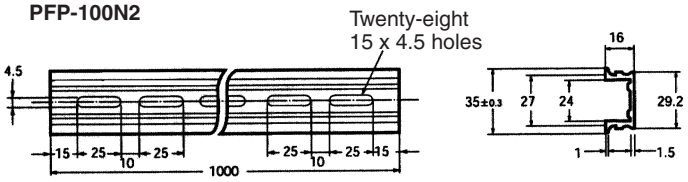
Weight: 211 g max.

Programming Console
CQM1H-PRO01-E

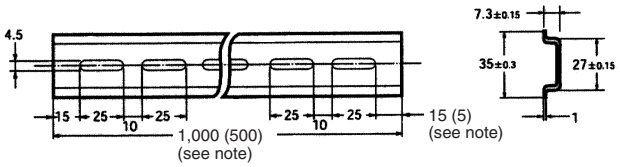


Connecting cable length:
2 m (included)
Weight: 515 g max.

DIN Track
PFP-100N2



PFP-100N/50N



Note: The figures in parentheses are for the PFP-50N.

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Ordering Information

International Standards

The products shown in the attached tables are those that conform to the UL, CSA, cULus, cUL, NK, Lloyd's Register, and EC Directives as of September 2003.
(U: UL, C: CSA, UC: cULus, CU: cUL, N: NK, L: Lloyd, CE: EC Directives)
Please contact OMRON representative for application conditions.

EMC Directives

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards (see the following note). Whether the products conform to the standards in the system used by the customer, however, must be confirmed by the customer.

EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Applicable EMC Standards

EMS (Electromagnetic Susceptibility):
EN61131-2
EMI (Electromagnetic Interference):
EN50081-2
(Radiated emission: 10-m regulations)

Low Voltage Directive

OMRON Power Supply Units and I/O Units have been determined safe when operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC according to the safety standards in EN61131-2.

Power Supply Units

Name	Specifications				Model	International standards
	Rated voltage	Allowed voltage range	Output capacity	Service power supply		
AC Power Supply Units	100 to 240 V AC 50/60 Hz	85 to 265 V AC	18 W	None	CQM1-PA203	U, C, N, L, CE
			30 W	24 V DC 0.5 A	CQM1-PA206	U, C, L, N
	110/230 V AC 50/60 Hz	80 to 138 V AC 160 to 276 V AC	30 W	24 V DC 0.5 A	CQM1-PA216	N, L, CE
DC Power Supply Units	24 V DC	20 to 28 V DC	30 W	---	CQM1-PD026	UC, N, L, CE

CPU Units (with 16 built-in DC input points)

Specifications						Model	International standards
Memory capacity	I/O capacity	Built-in inputs	Built-in RS-232C port	Support of Inner Boards	Support of Controller Link Unit		
Program: 3.2 kWords DM area: 3 kWords	256 points	16 DC inputs	No	No	No	CQM1H-CPU11	U, C, N, L, CE
			Yes			CQM1H-CPU21	
Program: 7.2 kWords DM area: 6 kWords	512 points			Yes	Yes	CQM1H-CPU51	UC, N, L, CE
Program: 15.2 kWords DM area: 6 kWords EM area: 6 kWords						CQM1H-CPU61	U, C, N, L, CE

Inner Boards

Name	Specifications	Model	International standards
High-speed Counter Board	4 pulse inputs (high-speed counter) at 500 kHz max. 4 external outputs	CQM1H-CTB41	U, C, N, L, CE
Pulse I/O Board	2 pulse inputs, Single-phase: 50 kHz, Differential phase: 25 kHz 2 pulse outputs, 50 kHz max. Both fixed and variable duty factors are supported.	CQM1H-PLB21	U, C
Absolute Encoder Interface Board	2 absolute encoder (gray code binary) inputs (4 kHz)	CQM1H-ABB21	U, C, N, L
Analog Setting Board	4 analog settings	CQM1H-AVB41	U, C, N, L, CE
Analog I/O Board	4 analog inputs of 0 to 5 V, 0 to 20 mA, –10 to +10 V 2 analog outputs of 0 to 20 mA, –10 to +10 V	CQM1H-MAB42	CE
Serial Communications Board	One RS-232C port and one RS-422A/485 port	CQM1H-SCB41	U, C, N, L, CE

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Communications Units

Name	Specifications	Model	International standards
Controller Link Unit (Wired)	Data link (Maximum number of words per node: 8,000) Message communications (SEND/RECV/CMND instructions)	CQM1H-CLK21	U, C, CE
PROFIBUS-DP I/O Link Unit	Exchanges from 2 to 8 words I/O with any PROFIBUS-DP Master Unit	CQM1-PRT21	UC, L, CE
DeviceNet I/O Link Unit	Number of I/O points: 16 inputs and 16 outputs	CQM1-DRT21	U, C, CE
CompoBus/S Master Unit	Number of I/O points per Master: 128 (64 inputs and 64 outputs) Communications cycle time: 0.5 ms min.	CQM1-SRM21-V1	U, C, CE
AS-Interface Master Unit	Can control up to 31 AS-Interface slaves with up to 4 inputs + 4 outputs each. Communications cycle time: 5 ms max.	CQM1-ARM21	CE

Memory Cassettes

Memory	Memory capacity/Clock function		Model	International standards
Flash memory	16 kWords		CQM1H-ME16K	U, C, N, L, CE
		with clock	CQM1H-ME16R	
EEPROM	8 kWords		CQM1-ME08K	UC, N, L, CE
		with clock	CQM1-ME08R	
	4 kWords		CQM1-ME04K	
		with clock	CQM1-ME04R	U, C, N, L, CE
EPROM Memory Cassette (Memory chip not included)	Cassette with IC socket only (EPROM chip sold separately)		CQM1-MP08K	
		with clock	CQM1-MP08R	
EPROM chip	128 KB (8 kWords), 150 ns, 27128 IC or equivalent, 12.5 V		ROM-ID-B	L
	256 KB (16 kWords), 150 ns, 27256 IC or equivalent, 12.5 V		ROM-JD-B	CE
	512 KB (32 kWords), 150 ns, 27512 IC or equivalent, 12.5 V		ROM-KD-B	

Available Models

Memory	Memory capacity/Clock function		Model	International standards
I/O Control Unit	Connects to right-hand side of CPU Block		CQM1H-IC101	U, C, CE
I/O Interface Unit	Connects to left-hand side of Expansion I/O Block		CQM1H-II101	
I/O Extension Cable	For connection with I/O Control Unit and I/O Interface Unit	Cable length: 0.3 m	CS1W-CN313	L, CE
		Cable length: 0.7 m	CS1W-CN713	

I/O Units

Input Units

Input type	Specifications	Model	International standards
DC inputs	8 points, 12 to 24 V DC (independent commons, 1 point/common × 8 circuits)	CQM1-ID211	U, C, N, L, CE
	16 points, 12 V DC (16 points/common × 1 circuit)	CQM1-ID111	U, C
	16 points, 24 V DC (16 points/common × 1 circuit)	CQM1-ID212	UC, N, L, CE
	32 points, 12 V DC (32 points/common)	CQM1-ID112	U, C
	32 points, 24 V DC (32 points/common)	CQM1-ID213	U, C, N, L, CE
	32 points, 24 V DC (32 points/common × 1 circuit)	CQM1-ID214	U, C, CE
AC inputs	8 points, 100 to 120 V AC (8 points/common)	CQM1-IA121	U, C, L, CE
	8 points, 200 to 240 V AC (8 points/common)	CQM1-IA221	

Output Units

Output type	Specifications	Model	International standards
Contact outputs	8 points, 250 V AC (cosϕ = 1.0/0.4)/24 V DC 2 A (16 A/Unit), independent commons	CQM1-OC221	U, C, N, L
	16 points, 250 V AC (cosϕ = 1.0/0.4)/24 V DC 2 A (8 A/Unit)	CQM1-OC222	UC, N, L
	8 points, 250 V AC 2 A (cosϕ = 1.0/0.4)/24 V DC 2 A, independent common	CQM1-OC224	CE
Transistor outputs	8 points, 24 V DC, 2A (5 A/Unit), 8 points/common	CQM1-OD211	U, C, N, L, CE
	16 points, 50 mA at 4.5 V DC to 300 mA at 26.4 V DC, 16 points/common	CQM1-OD212	
	32 points, 16 mA at 4.5 V DC to 100 mA at 26.4 V DC	CQM1-OD213	
	16 points, 24 V DC, 300 mA, PNP outputs	CQM1-OD214	U, C, L, CE
	8 points, 24 V DC, 1.0 A, PNP outputs (4 A/Unit), short-circuit protection	CQM1-OD215	
	32 points, 24 V DC, 0.5 A, PNP outputs (5 A/Unit), short-circuit protection	CQM1-OD216	CE
AC outputs	8 points, 0.4 A at 100 to 240 V AC, two circuits with 4 points/common each	CQM1-OA221	U, C, L
	6 points, 0.4 A at 100 to 240 V AC, two circuits with 4 points/common and 2 points/common	CQM1-OA222	CE

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Dedicated I/O Units

Name	Specifications	Model	International standards
Analog Input Unit	Analog inputs: 4 points	CQM1-AD042	U, C, L, CE
Analog Output Unit	Analog outputs: 2 points	CQM1-DA022	
B7A Interface Unit	16 outputs	CQM1-B7A02	---
	16 inputs	CQM1-B7A12	U, C
	32 outputs	CQM1-B7A03	
	32 inputs	CQM1-B7A13	
	16 inputs and 16 outputs	CQM1-B7A21	---
Temperature Control Units	Thermocouple input, transistor (NPN) output, 2 loops	CQM1-TC001	U, C, CE
	Thermocouple input, transistor (PNP) output, 2 loops	CQM1-TC002	
	Platinum resistance thermometer, transistor (NPN) output, 2 loops	CQM1-TC101	
	Platinum resistance thermometer, transistor (PNP) output, 2 loops	CQM1-TC102	
	Thermocouple input, transistor (NPN) output, 4 loops	CQN1-TC201	U, C, CE
	Thermocouple input, transistor (PNP) output, 4 loops	CQN1-TC202	U, C, CE
	Platinum resistance thermometer, transistor (NPN) output, 2 loops (with heater burnout alarm)	CQN1-TC203	U, C, CE
	Platinum resistance thermometer, transistor (PNP) output, 2 loops (with heater burnout alarm)	CQN1-TC204	U, C, CE
	Thermocouple input, transistor (NPN) output, 4 loops	CQN1-TC301	U, C, CE
	Thermocouple input, transistor (PNP) output, 4 loops	CQN1-TC302	U, C, CE
	Platinum resistance thermometer, transistor (NPN) output, 2 loops (with heater burnout alarm)	CQN1-TC303	U, C, CE
	Platinum resistance thermometer, transistor (PNP) output, 2 loops (with heater burnout alarm)	CQN1-TC304	U, C, CE
Safety Relay Unit	Emergency stop unit: 2 inputs/2 outputs, 4 general-purpose inputs	CQM1-SF200	U C, CE

DIN Track

Name	Specifications		Model	International standards
Mounting Tracks	Track length: 50 cm	Height: 7.3 mm	PFP-50N	L
	Track length: 1 m		PFP-100N	
	Track length: 1 m	Height: 16 mm	PFP-100N2	
End Plate	Fasten mounting brackets on both sides of the PLC to prevent it from sliding left or right. Two End Plates are provided with the CPU Unit.		PFP-M	

Note: DIN rail products must be ordered in lots of ten.

Programming Devices and Accessories

Programming Consoles

Name	Specifications	Model	International standards
Programming Consoles	2-m Connecting Cable included (No other Connecting Cables required.)	CQM1H-PRO01-E	U, C, CE
	2-m Connecting Cable included (compatible with C-series PLCs) The CS1W-CN114 peripheral port conversion cable must be purchased separately (see below).	CQM1-PRO01-E	U, C, N, CE
	Requires a separate Connecting Cable, The C200H-CN222 connecting cable, C200HS-CN222 connecting cable, or CS1W-CN114 peripheral port conversion cable must be purchased separately (see below).	C200H-PRO27-E	U, C, N, CE
Connecting Cables	Cable length: 2 m	C200H-CN222	N
	Cable length: 2 m (for CPUs complying with EC directives)	C200HS-CN222	CE
Peripheral Port Conversion Cable	Connects the peripheral port on the CQM1H to a personal computer or Programming Console through a CQM1-CIF01/02 cable.	CS1W-CN114	CE

CX-One

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Support Software

Product	Model	International standards
Expansion Memory Unit	CPM1-EMU01-V1	---
EEPROM (256 K)	EEROM-JD	---

Maintenance Products

Product	Function	Model	International standards
Battery	Backs up memory in the CPU Unit.	CPM2A-BAT01	---
End Cover	Connects to the I/O Unit located on the extreme right	CQM1H-TER01	U, C, CE

Programming Device Connecting Cables

Name	Specifications	Model	International standards
Connecting Cables (Peripheral port to Programming Device (computer))	Connects to Programming Console or CQM1-CIF01/02.	CS1W-CN114	CE
	Connects to a D-Sub 9-pin port of an IBM PC/AT or compatible computer. (Use together with the CS1W-CN114.) Length: 3.3 m	CQM1-CIF02	U, C, N, L, CE
Connecting Cables (Peripheral port to RS-422)	Peripheral port to RS-422 conversion cable (length: 0.2 m)	CQM1H-CIF12	U, C, CE
	D-Sub 9-pin computer cable (length: 2 m)	CS1W-CN226	CE
	D-Sub 9-pin computer cable (length: 6 m)	CS1W-CN626	CE
	D-Sub 9-pin receptacle (length: 0.1 m)	CS1W-CN118	CE
Connecting Cables (RS-232C port to Programming Device (computer))	D-Sub 9-pin computer cable (length: 2 m)	XW2Z-200S-V	---
	D-Sub 9-pin computer cable (length: 2 m) (anti-static)	XW2Z-200S-CV	---
	D-Sub 9-pin computer cable (length: 5 m)	XW2Z-500S-V	---
	D-Sub 9-pin computer cable (length: 5 m) (anti-static)	XW2Z-500S-CV	---
RS-422 Adapter	Converts peripheral port levels.	CQM1-CIF121	---

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ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. P07E-EN-02

In the interest of product improvement, specifications are subject to change without notice.

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