

# CQM1

THE FLEXIBLE,  
HIGH SPEED  
CONTROL SOLUTION



**OMRON**<sup>®</sup>

*Giving you every advantage.*

CQM1 THE FLEXIBLE, HIGH SPEED CONTROL SOLUTION

# CQM1

## Controlling Quality with this Exceptional Machine

Take control of your small machine applications with Omron's CQM1 PLC. It offers many hardware options, including multiple CPUs, power supplies and I/O modules with varying capabilities that make it an easy-to-customize fit for your control applications. In addition, its physical and performance features make it an attractive and practical solution for multiple small and medium sized control applications.

The versatile CQM1 offers seven CPUs with different performance levels and memory capacities. Standard features include high-speed counters and the ability to accept quadrature inputs at 2.5 kHz. Combine standard and special I/O for a customized solution to your application. Standard I/O modules feature a variety of input and output options. Among special I/O options are a DeviceNet slave, a high-speed remote I/O (CompoBus/S) master and temperature control. The CQM1 lets you mix and match the I/O to your application. Its unique connect-and-lock design does not require a back plane for quick, customized PLC configurations.

In terms of performance, the CQM1 is one of the fastest PLCs in its class with an overhead processing speed of only 0.8 milliseconds. This fast processing speed reduces the CQM1's scan time and increases its operation speed.

### CPUs

The CQM1's small size does not mean limited options or restricted memory. There are seven CPUs to choose from, all having large memory capacities that can be enhanced with optional memory cassettes (EPROM and EEPROM). These cassettes will prevent the CQM1's program memory from being accidentally lost and protect it during a power interruption. Complementing this large memory capacity is a 137-word command instruction set. Selected capabilities include: 16 DC inputs, direct hardware interrupts, a high-speed counter and a built-in RS-232 port. Other modules feature:

- Built-in analog timers
- 2 axis position control capabilities
- Built-in analog I/O
- Dual high speed (50 KHz) encoder interfaces or dual absolute encoder interfaces

### Special I/O Modules

Address your particular needs with a combination of our special I/O modules. In addition to our B7A interface module that reduces I/O wiring, our remote I/O link module for distributed control applications and our high-speed CompoBus/S communications I/O, you have a choice of other modules that include:

- Four-point analog input
- Two-point analog input
- DeviceNet
- Dual loop temperature control
- Direct sensor input

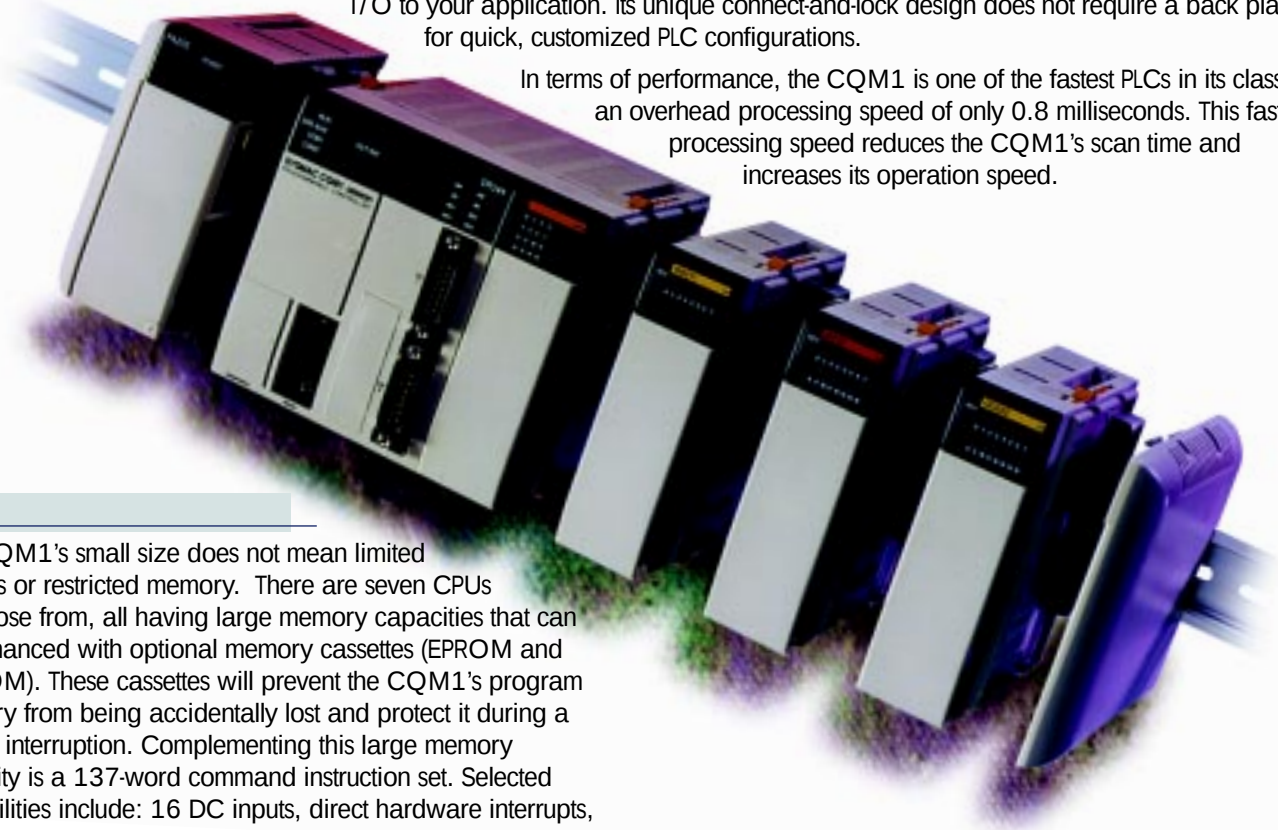
### Standard I/O Modules

The input modules include AC or DC models with capacities ranging from eight to 32 points. The output models also have capacities ranging from eight to 32 points and the following outputs:

- Triac
- Transistor
- Relay

### Power Supply Modules

Power your CQM1 with one of three power supply units: two AC modules – one with and one without a service power supply and DC module.



## Standard Models

*Customize the CQM1 to your application by using the wide selection of units.*

### Power Supply Units

There are three available power supply units – one using 24 VDC and the rest using 100 to 240 VAC. The AC units come with or without a built-in 24 VDC service power supply.

| Supply Voltage             | 24 VDC Service Power Supply | Supplied to Units (5V)                   | Model      |
|----------------------------|-----------------------------|------------------------------------------|------------|
| 100 to 240 VAC<br>50/60 Hz | None                        | 3.6 A, 18 W                              | CQM1-PA203 |
|                            | 0.5 A                       | 6.0 A, 30 W<br>(includes service supply) | CQM1-PA206 |
| 24 VDC                     | —                           | 6.0 A, 30 W                              | CQM1-PD026 |



### CPU Units

The CQM1 CPU units have 16 built-in DC inputs. Four of these inputs can be used as interrupt inputs and one can be used as a high-speed counter input.



| Max. I/O Points | Program Capacity | DM Capacity | RS-232C Port | Analog Setting | Pulse I/O | ABS Interface | Built-in Analog I/O | Current Consumption            | Model          |
|-----------------|------------------|-------------|--------------|----------------|-----------|---------------|---------------------|--------------------------------|----------------|
| 128             | 3.2K words       | 1K words    | —            | —              | —         | —             | —                   | 800 mA, 5 VDC                  | CQM1-CPU11-E   |
|                 |                  |             | Yes          | —              | —         | —             | —                   | 820 mA, 5 VDC                  | CQM1-CPU21-E   |
| 256             | 7.2K words       | 6K words    | Yes          | —              | —         | —             | —                   | 820 mA, 5 VDC<br>980 mA, 5 VDC | CQM1-CPU41-EV1 |
|                 |                  |             |              | Yes            | —         | —             | —                   |                                | CQM1-CPU42-EV1 |
|                 |                  |             |              | —              | Yes       | —             | —                   |                                | CQM1-CPU43-EV1 |
|                 |                  |             |              | —              | —         | Yes           | —                   |                                | CQM1-CPU44-EV1 |
|                 |                  |             |              | —              | —         | —             | Yes                 |                                | CQM1-CPU45-EV1 |

**Note:** The End Plate that covers the right side of the CQM1 is included with the CPU unit.

### Memory Cassettes (optional)



Choose either the EEPROM or the EPROM Memory Cassette to enhance the CQM1's memory. They will prevent the CQM1's Program Memory and DM from being lost during power interruption. The program and data in DM can be transferred between the CPU unit's RAM and the Memory Cassette. Data cannot be written to EPROM from the CPU unit.

| Memory                    | Capacity | Clock | Model      |
|---------------------------|----------|-------|------------|
| EEPROM                    | 4K words | —     | CQM1-ME04K |
|                           |          | Yes   | CQM1-ME04R |
|                           | 8K words | —     | CQM1-ME08K |
|                           |          | Yes   | CQM1-ME08R |
| EPROM<br>(IC socket only) | —        | —     | CQM1-MP08K |
|                           |          | Yes   | CQM1-MP04R |

### Clock Function

Clock and calendar data can be used in the program when a Memory Cassette with the clock function is installed.

Input Modules

| Inputs | Input Points | Input Voltage  | Configuration        | Model      |
|--------|--------------|----------------|----------------------|------------|
| DC     | 8            | 12 to 24 VDC   | Independent contacts | CQM1-ID211 |
|        | 16           | 12 VDC         | 16 points / common   | CQM1-ID111 |
|        |              | 24 VDC         |                      | CQM1-ID212 |
|        | 32           | 12 VDC         | 32 points / common   | CQM1-ID112 |
|        |              | 24 VDC         |                      | CQM1-ID213 |
| AC     | 8            | 100 to 240 VAC | 8 points / common    | CQM1-IA121 |
|        |              | 200 to 240 VAC |                      | CQM1-IA221 |



Output Modules

| Outputs    | Output Points | Max. Switching Voltage | Configuration                  | Model      |
|------------|---------------|------------------------|--------------------------------|------------|
| Contact    | 8             | 250 VAC / 24 VDC       | Independent contacts           | CQM1-OC221 |
|            | 16            |                        | 16 pts / common                | CQM1-OC222 |
|            | 8             |                        | Independent                    | CQM1-OC224 |
| Transistor | 8             | 24 VDC<br>24 VDC PNP   | 8pts / common                  | CQM1-OD211 |
|            | 16            |                        | 16pts / common                 | CQM1-OD212 |
|            | 32            |                        | 32pts / common                 | CQM1-OD213 |
|            | 16            |                        | 16pts / common                 | CQM1-OD214 |
|            | 8             |                        | 8pts / common                  | CQM1-OD215 |
| AC         | 8             | 100 to 240 VAC         | 4pts / common<br>2 circuits    | CQM1-OA221 |
|            | 6             |                        | 4pts / common<br>2pts / common | CQM1-OA222 |



Special I/O Modules

CQM1-SRM21  
(CompoBus/S)  
Master Module

Module acts as the Master of a high-speed ON / OFF remote I/O unit, controlling a maximum of 128 I/O points.



CQM1-DA021  
Analog Output  
Module

This module allows two-point digital-to-analog conversion. Requires CQM1-IPS01/02 power supply unit.



CQM1-TC00□ / 10□  
Temperature  
Control Module

Module provides two temperature control loops and is ideal for simple ON and OFF temperature control.



CQM1-DRT21  
DeviceNet Slave

DeviceNet Slave constructs an I/O link of 32 I/O points with the DeviceNet Master.



CQM1-IPS01/02  
Power Supply  
Module

Required power supply for analog input and output modules.



CQM1-LSE0□  
Linear Sensor  
Interface Module

The module converts voltage or current inputs from linear sensors to numeric data for comparative decision processing.



CQM1-AD041  
Analog Input  
Module

Use this module to input 4 analog voltage or current signals into the CQM1. Requires CQM1-IPS01/02 power supply module.



CQM1-B7A□□  
B7A Interface  
Module

Allows direct link to Omron's B7A Remote I/O series via twisted-pair wire.

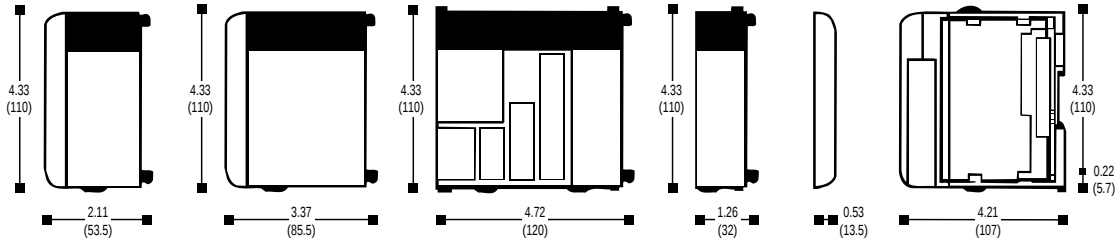


CQM1-SEN01  
Sensor Module

Space saving module reduces wiring and allows direct connection of selected sensors to the CQM1.



### Dimensions: Inches (Millimeters)



## General Specifications (Power Supply Unit)

| ITEM                             | CQM1-PA203                    | CQM1-PA206                    | CQM1-PD026            |
|----------------------------------|-------------------------------|-------------------------------|-----------------------|
| Supply Voltage                   | 100 to 240 VAC<br>at 50/60 Hz | 100 to 240 VAC<br>at 50/60 Hz | 24 VDC                |
| Operating Voltage Range          | 85 to 264 VAC                 | 85 to 264 VAC                 | 20 to 28 VDC          |
| Power Consumption                | 60 VA max.                    | 120 VA max.                   | 50 W max.             |
| Output Capacity                  | 5 VDC @<br>3.6 A (18 W)       | 5 VDC @<br>6 A (30 W)         | 5 VDC @<br>6 A (30 W) |
| 24 VDC<br>(Service power supply) | —                             | 24 VDC @<br>0.5 A             | —                     |
| Ambient Operating Temperature    | 0° to 55° C                   | 0° to 55° C                   | 0° to 55° C           |
| Ambient Operating Humidity       | 10% to 90%                    | 10% to 90%                    | 10% to 90%            |

## Performance Specifications (CPU)

| ITEM                         | CQM1-CPU11, CPU21                                                                                                             | CQM1-CPU41-EV1,<br>CPU42-EV1, CPU43-EV1,<br>CPU44-EV1, CPU45-EV1                                                              |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| CONTROL METHOD               | Stored program method                                                                                                         | Stored program method                                                                                                         |
| I/O CONTROL METHOD           | Cyclic scan with direct output; immediate interrupt processing                                                                | Cyclic scan with direct output; immediate interrupt processing                                                                |
| PROGRAMMING LANGUAGE         | Ladder diagram                                                                                                                | Ladder diagram                                                                                                                |
| INSTRUCTION LENGTH           | 1 step per instruction, 1 to 4 words per instruction                                                                          | 1 step per instruction, 1 to 4 words per instruction                                                                          |
| NUMBER OF INSTRUCTIONS       | 117 instructions                                                                                                              | 137 instructions                                                                                                              |
| INSTRUCTION EXECUTION TIME   | Basic instructions:<br>0.5 μs to 1.5 μs<br>(e.g., LD=0.5 μs, TIM=1.5 μs)<br>Special instructions:<br>(e.g., MOV (21)=23.5 μs) | Basic instructions:<br>0.5 μs to 1.5 μs<br>(e.g., LD=0.5 μs, TIM=1.5 μs)<br>Special instructions:<br>(e.g., MOV (21)=23.5 μs) |
| PROGRAM CAPACITY             | Program memory:<br>3.2K words                                                                                                 | Program memory:<br>7.2K words                                                                                                 |
| MAX. NUMBER OF I/O MODULES   | 7 modules                                                                                                                     | 11 modules                                                                                                                    |
| DATA AREAS                   |                                                                                                                               |                                                                                                                               |
| I/O Points                   | 128 points max.                                                                                                               | 256 points max.                                                                                                               |
| Work Area (IR)               | 2,720 bits                                                                                                                    | 2,720 bits                                                                                                                    |
| SR Area (SR)                 | 192 bits                                                                                                                      | 192 bits                                                                                                                      |
| Temporary Memory Area (TR)   | 8 bits (TR0 to TR7)                                                                                                           | 8 bits (TR0 to TR7)                                                                                                           |
| Holding Area (HR)            | 1,600 bits (HR00 to HR99)                                                                                                     | 1,600 bits (HR00 to HR99)                                                                                                     |
| Auxiliary Area (AR)          | 448 bits (AR00 to AR27)                                                                                                       | 448 bits (AR00 to AR27)                                                                                                       |
| Link Area (LR)               | 1,024 bits (LR00 to LR63)                                                                                                     | 1,024 bits (LR00 to LR63)                                                                                                     |
| Timer/Counter Area (TIM/CNT) | 512 timers/counters;<br>high-speed timer:<br>16 (0.01 s increments)                                                           | 512 timers/counters;<br>high-speed timer:<br>16 (0.01 s increments)                                                           |
| Data Memory (DM)             | 1K words                                                                                                                      | 6K words                                                                                                                      |
| BUILT-IN FEATURES            |                                                                                                                               |                                                                                                                               |
| Interrupt Processing         | Hardware interrupts: 4 points;<br>Scheduled interrupts: 3 points<br>with minimum setting 0.5 mS                               | Hardware interrupts: 4 points;<br>Scheduled interrupts: 3 points<br>with minimum setting 0.5 mS                               |
| High-Speed Counter           | 2 phases:<br>2.5 kHz x 1 point;<br>additional phases:<br>5 kHz x 1 point                                                      | 2 phases:<br>2.5 kHz x 1 point;<br>additional phases:<br>5 kHz x 1 point                                                      |
| Pulse Output                 | 1 kHz x 1 point                                                                                                               | 1 kHz x 1 point                                                                                                               |

## Ordering Information

| PRODUCT NAME | MAIN SPECIFICATION                                                        | MODEL      |
|--------------|---------------------------------------------------------------------------|------------|
| POWER SUPPLY | 100 to 240 VAC at 50/60 Hz                                                | CQM1-PA203 |
|              | 100 to 240 VAC at 50/60 Hz,<br>with service power supply: 0.5 A at 24 VDC | CQM1-PA206 |
|              | 24 VDC                                                                    | CQM1-PD026 |

| CPU            | User memory | Data memory | RS-232C | BUILT-IN FEATURES: |           |         |            |
|----------------|-------------|-------------|---------|--------------------|-----------|---------|------------|
|                |             |             |         | Analog Timer       | Pulse I/O | ABS I/F | Analog I/O |
| CQM1-CPU11-EV1 | 3.2K words  | 1K words    | —       | —                  | —         | —       | —          |
|                | 7.2K words  | 6K words    | •       | —                  | —         | —       | —          |
|                |             |             | •       | •                  | —         | —       | —          |
|                |             |             | •       | —                  | •         | —       | —          |
|                |             |             | •       | —                  | —         | •       | —          |
|                |             |             | •       | —                  | —         | —       | •          |

## INPUT MODULES

|          |                          |            |
|----------|--------------------------|------------|
| DC Input | 8 points, 12 to 24 VDC   | CQM1-ID211 |
|          | 16 points, 24 VDC        | CQM1-ID212 |
|          | 32 points, 24 VDC        | CQM1-ID213 |
| AC Input | 8 points, 100 to 120 VAC | CQM1-IA121 |
|          | 8 points, 200 to 240 VAC | CQM1-IA221 |

## OUTPUT MODULES

|                    |                                                                                                      |            |
|--------------------|------------------------------------------------------------------------------------------------------|------------|
| Relay Outputs      | 8 points, 2 A at 24 VDC or 250 VAC (16 A per Unit)<br>independent commons                            | CQM1-OC221 |
|                    | 16 points, 2 A at 24 VDC or 250 VAC (8 A per Unit)                                                   | CQM1-OC222 |
| Transistor Outputs | 8 points, 2 A at 24 VDC (5 A per Unit)                                                               | CQM1-OD211 |
|                    | 16 points, 50 mA at 4.5 VDC to 300 mA at 26.4 VDC                                                    | CQM1-OD212 |
|                    | 32 points, 100 mA at 24 VDC                                                                          | CQM1-OD213 |
|                    | 16 points, 50 mA at 4.5 VDC to 300 mA<br>at 26.4 VDC, PNP outputs                                    | CQM1-OD214 |
|                    | 8 points, 1.0 A at 24 VDC (4 A per Unit),<br>PNP outputs with short-circuit protection, alarm output | CQM1-OD215 |
| Triac Outputs      | 8 points, 0.4 A at 100 to 240 VAC                                                                    | CQM1-OA221 |
|                    | 6 points, 0.4 A at 100 to 240 VAC                                                                    | CQM1-OA222 |

## SPECIAL I/O MODULES

|                             |                                                                                                                                                           |                                                                     |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Analog Input                | Analog inputs: 4 points<br>4 to 20 mA/V–10 to 10 V/1 to 5 V/0 to 10 V                                                                                     | CQM1-AD041                                                          |
| Analog Output               | Analog outputs: 2 points, 0 to 20 mA/V–10 to 10 V                                                                                                         | CQM1-DA021                                                          |
| Power Supply Module         | The analog input and output modules require a power supply, available in two modules. Note: Two CQM1-DA021 cannot be used with CQM1-IPS02.                | For one module<br>CQM1-IPS01<br>For two modules<br>CQM1-IPS02       |
| Temperature Control Module* | Two temperature controllers in a single-slot module                                                                                                       | CQM1-TC000                                                          |
| Sensor Module*              | Up to four amplifier units mount directly to a single slot                                                                                                | CQM1-SEN01                                                          |
| CompoBus Module             | CompoBus/S master module<br>DeviceNet I/O link terminal                                                                                                   | CQM1-SRM1<br>CQM1-DRT21                                             |
| B7A Interface Module        | 16 inputs and 16 outputs<br>16 outputs<br>32 outputs                                                                                                      | CQM1-B7A01<br>CQM1-B7A02<br>CQM1-B7A03                              |
| I/O Link Module             | Used as a Slave Unit in a Sysmac BUS Wired Remote I/O System. 2 input words (32 bits), 2 output words (32 bits).                                          | CQM1-LK501                                                          |
| <b>MEMORY</b>               | EEPROM, 4K words                                                                                                                                          | CQM1-ME04K                                                          |
| <b>CASSETTE</b>             | EEPROM, 4K words, with real-time clock built-in                                                                                                           | CQM1-ME04R                                                          |
| <b>(OPTIONAL)</b>           | EEPROM, 8K words                                                                                                                                          | CQM1-ME08K                                                          |
|                             | EEPROM, 8K words, with real-time clock built-in                                                                                                           | CQM1-ME08R                                                          |
|                             | EPROM, IC socket only                                                                                                                                     | CQM1-MP08K                                                          |
|                             | EPROM, IC socket only, with real-time clock built-in                                                                                                      | CQM1-MP08R                                                          |
| <b>PROGRAMMING CONSOLE</b>  | Provided with a 1.5 m connection cable (compatible with C-series PLCs)                                                                                    | CQM1-PR001-E or<br>C200H-PR027-E                                    |
| <b>PROGRAMMING SOFTWARE</b> | SYS-WIN (Windows based)<br>Connecting Cable (Peripheral Port to Computer)<br>Connecting Cables (RS232 to Computer 9 pin ),<br>(RS232 to Computer 25 pin ) | SYSWIN-HL-V3.2A<br>CQM1-C1F02<br>C200HS-CN220-EU<br>C200HS-CN229-EU |

\* For more details, please contact Omron and refer to catalog number.

# Omron Control Solutions



The revolutionary SRM1 micro network controller combines the compact power of block style micro PLCs with the remote I/O flexibility of larger PLC systems and an innovative design that reduces wiring. Its superior performance is based on a 4K word-program capacity, extensive 137-word command instruction set, an instruction execution speed of 0.8 microseconds or faster, and a constant 750 kbps baud rate for superior operating speeds. Use the SRM1 to control up to 256 I/O points and place them directly where you want them.



The CPM1A family of micro-programmable controllers is the best way to maximize dollars and space while meeting your control needs for

small-scale control systems. These versatile units feature new transistor output CPUs that have a pulse output capability to control a stepper motor, a built-in 5kHz high speed counter and a peripheral port that can be converted to an RS-232 port for easy communications. The CPM1As can be expanded to 100 I/O and feature the new MAD-01 (Mixed Analog Digital I/O) used to integrate analog signals into your control systems.



Get the advantages of large PLC performance and I/O versatility with the C200H Alpha. Choose from 13 CPU models that can support more than 1,000 I/O, including 16 special I/O modules per CPU for customized control. Use the built-in Protocol Macro function to support most common serial devices or customize one of your own for RS-232C, RS-422 and RS-485 communications. The C200H Alpha smoothly fits into either DeviceNet or Ethernet networks.

## OMRON®

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