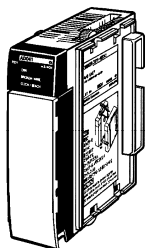


# Dedicated I/O Modules

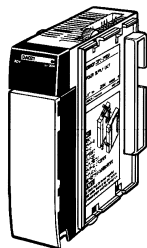
## ■ SUMMARY OF MODULES AVAILABLE

Name	Model	Specifications	
Analog I/O modules	CQM1-AD042	Analog inputs: 4 points, built-in power supply -10 to + 10 V, 0 to 10 V, 0 to 5 V, or 0 to 20 mA	
	CQM1-AD041	Analog inputs: 4 points, order separate power supply -10 to + 10 V, 0 to 10 V, 1 to 5 V, or 0 to 20 mA	
	CQM1-DA022	Analog outputs: 2 points, built-in power supply -10 to +10 V or 0 to 20 mA	
	CQM1-DA021	Analog outputs: 2 points, order separate power supply -10 to +10 V or 0 to 20 mA	
	CQM1-IPS01	Power Supply Module required for AD041 and DA021 modules	For one Analog module
	CQM1-IPS02		For two Analog modules
B7A Link master modules	CQM1-B7A02	16 outputs	
	CQM1-B7A12	16 inputs	
	CQM1-B7A03	32 outputs	
	CQM1-B7A13	32 inputs	
	CQM1-B7A21	16 inputs and 16 outputs	
	B7A Link slave modules	B7A-□6□, B7AS-R6□	16-point transistor inputs and outputs
G70D-R6□-B7A		16-point relay outputs	
B7AM-6□, B7AM-8o		Mixed I/O with 16 inputs/16 outputs or 8 inputs/8 outputs	
B7A-□10□, B7AC-T10		10-point transistor inputs and outputs, 10-point sealed input link	
Temperature controller modules		CQM1-TC001	Thermocouple input (types J and K), transistor (NPN) output, 2 loops
	CQM1-TC002	Thermocouple input (types J and K), transistor (PNP) output, 2 loops	
	CQM1-TC101	Platinum resistance thermometer input (Pt and JPt), transistor (NPN) output, 2 loops	
	CQM1-TC102	Platinum resistance thermometer input, transistor (PNP) output, 2 loops	
	CQM1-TC201	Thermocouple input, transistor (NPN) output, 4 loops	
	CQM1-TC202	Thermocouple input, transistor (PNP) output, 4 loops	
	CQM1-TC203	Thermocouple input, transistor (NPN) output, 2 loops (with heater burn-out alarm)	
	CQM1-TC204	Thermocouple input, transistor (PNP) output, 2 loops (with heater burn-out alarm)	
	CQM1-TC301	Platinum resistance thermometer input, transistor (NPN) output, 4 loops	
	CQM1-TC302	Platinum resistance thermometer input, transistor (PNP) output, 4 loops	
	CQM1-TC303	Platinum resistance thermometer input, transistor (NPN) output, 2 loops (with heater burnout alarm)	
	CQM1-TC304	Platinum resistance thermometer input, transistor (PNP) output, 2 loops (with heater burnout alarm)	
	Linear sensor interface modules	CQM1-LSE01	Measure voltage or current inputs from linear sensors and convert the measurements to numeric data for comparative decision processing. Standard type.
		CQM1-LSE02	Module with monitor output: -9.999 V to +9.999 V
Safety relay module	CQM1-SF200	Emergency stop unit: 2 inputs/2 outputs, 4 general-purpose inputs	

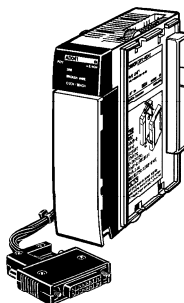
## Analog Input and Output Modules



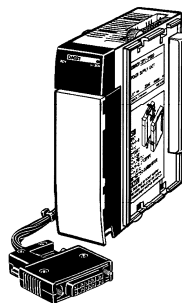
**CQM1-AD042**  
Analog Input Module with  
built-in power supply



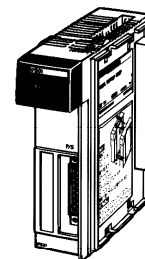
**CQM1-DA022**  
Analog Output Module  
with built-in power supply



**CQM1-AD041**  
Analog Input Module, use  
separate power supply



**CQM1-DA021**  
Analog Output Module, use  
separate power supply



**CQM1-IPS01/IPS02**  
Power Supply Modules

## ■ SPECIFICATIONS

### Analog I/O Modules

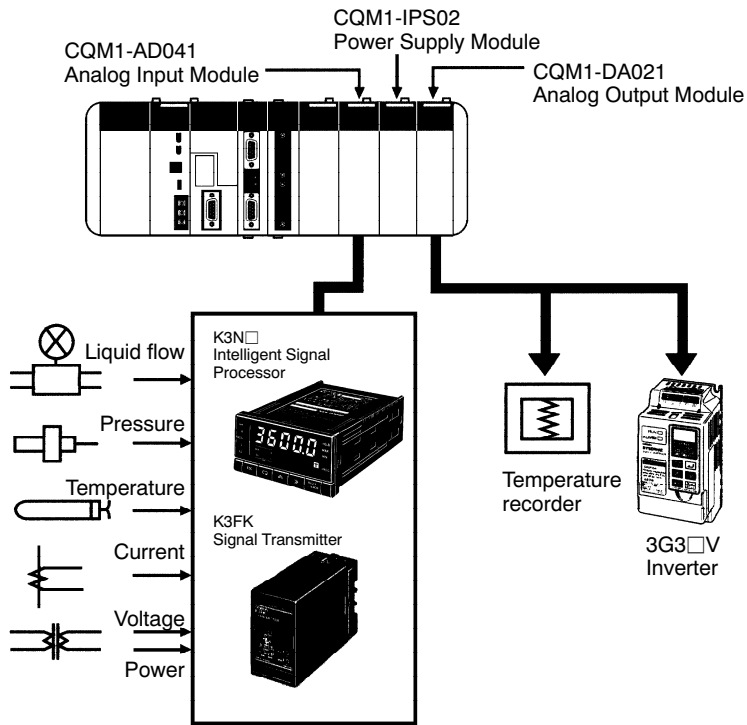
Module type		Analog input		Analog output	
Model number		CQM1-AD042	CQM1-AD041	CQM1-DA022	CQM1-DA021
I/O points		4	4 or 2, selectable	2	2
Ranges		-10 V to +10 V 0 V to 10 V 0 V to 5 V 0 mA to 20 mA	-10 to +10 V 0 V to 10 V 1 V to 5 V 4 mA to 20 mA	-10 V to +10 V 0 mA to 20 mA	-10 V to +10 V 0 mA to 20 mA
Resolution	Voltage	12 bit binary (1/4096)	12 bit binary (1/4000)	12 bit binary (1/4096)	12 bit binary (1/4096)
	Current	12 bit binary (1/4096)	12 bit binary (1/4000)	11 bit binary (1/2048)	11 bit binary (1/2048)
Accuracy	At 25°C	±0.5% of FS	—	±0.5% of FS	—
	0°C to 55°C	±1.0% of FS	±1.0% of FS	±1.0% of FS	±1.0% of FS
Conversion speed		1.2 ms/point	2.5 ms/point	5 ms/2 points	5 ms/2 points
Input impedance	Voltage	1 MΩ min.	1 MΩ min.	—	—
	Current	250 Ω	250 Ω	—	—
External output load resistance	Voltage	—	—	1 kΩ min.	2 kΩ min.
	Current	—	—	520 Ω max. including wiring impedance	350 Ω max.
Power supply		Built-in, DC/DC converter	External, use CQM1-IPS01 or IPS02	Built-in, DC/DC converter	External, use CQM1-IPS01 or IPS02
Current consumption		170 mA at 5 VDC	80 mA max. at 5 VDC	340 mA at 5 VDC	90 mA at 5 VDC

### Power Supply Modules

Model number	CQM1-IPS01	CQM1-IPS02
Number of analog modules supported	One CQM1-AD041 or one CQM1-DA021	Two CQM1-AD041; one CQM1-AD041 and one CQM1-DA021
Current consumption (add to current consumption for analog module)	420 mA max. at 5 VDC	950 mA max. at 5 VDC

Note: To power two CQM1-DA021 analog output modules, use two CQM1-IPS01 power supply modules.

■ SYSTEM CONFIGURATION



## B7A Link Interface Modules

A wire-saving B7A Link for remote I/O consists of master modules mounted to the PLC and remote terminal blocks connected to I/O devices. The terminal blocks can be located up to 500 m away using a single cable.

CQM1-B7A□□



- Just two wires transmit data, simplifies installation and troubleshooting
- High-speed (100 m max. at 3 ms) and long distance (500 m max. at 19.2 ms) configurations available
- Wide range of transistor and relay blocks to meet application needs
- Transmission distance up to 500 m
- Master acts like a high-density I/O module connecting 16 or 32 points to the controller with just two or three wires
- Supports 16-point input, output, mixed I/O and 10-point B7A terminal blocks and printed circuit board modules
- Output modules offer Hold and Load OFF handling of transmission errors

### ■ B7A LINK MASTER MODULES

I/O classification	Model	Transmission capabilities
16-point output	CQM1-B7A02	Long distance (19.2 ms) and high-speed (3 ms) systems, selectable
32-point output	CQM1-B7A03	
16-point input	CQM1-B7A12	
32-point input	CQM1-B7A13	
16-point input/16-point output	CQM1-B7A21	

### ■ SPECIFICATIONS

Item	CQM1-B7A21	CQM1-B7A13	CQM1-B7A03	CQM1-B7A12	CQM1-B7A02
No. of I/O points	16 inputs, 16 outputs (See Note 1)	32 inputs (See Note 2)	32 outputs	16 inputs (See Note 1)	16 outputs
Transmission method	Single-direction, time-division multiplex				
Transmission distance	Long distance: 500 m max. or 100 m max. High-speed: 100 m max. or 50 m max. (See Note 3)				
Transmission speed	Normal: 19.2 ms (typical); 31 ms max. High-speed: 3 ms (typical); 5 ms max.				
I/O word allocation (See Note 4)	1 word each for input and output (2 words total)	2 words for input	2 words for output	1 word for input	1 word for output
Required power supply	0.11 A min.	0.07 A min.	0.10 A min.	0.05 A min.	0.04 A min.
Current consumption (module as part of CQM1)	100 mA max., 5 VDC				

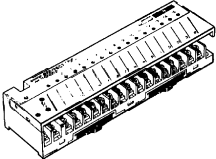
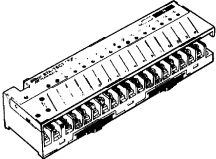
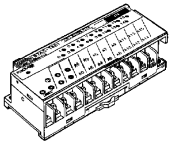
- Note: 1. Input mode setting allows selection between 16-point input and 15-point input + 1 error input.  
 2. Input mode setting allows selection between 32-point input and 30-point input + 2 error inputs.  
 3. The transmission distance varies with the transmission speed and depends on where power is applied:  
For normal speed setting:  
 If B7A Master Link and the B7A input and output modules each have power supplies, the transmission distance is 500 m. If one power supply is attached, the transmission distance is 100 m.  
For high-speed setting:  
 If B7A Master Link and the B7A input and output modules each have power supplies, the transmission distance is 100 m. If one power supply is attached, the transmission distance is 50 m.  
 4. For addressing, words are allocated in sequence according to the location of the B7A Master on the PLC, as with other CQM1 I/O modules.

For more details on the B7A Master Link Interface Modules, refer to the CQM1 *Dedicated I/O Modules Operation Manual* (W238).

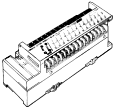
■ B7A LINK SLAVES

16-point Terminals

Transistor I/O Link Modules


Appearance	I/O classification	I/O configuration	I/O delay (typical)	Internal I/O common	Error processing (See Note 1)	Part number	
	Input, 16 points	NPN compatible	Normal speed 19.2 ms	- common	—	<b>B7A-T6A1</b> (See Note 2)	
				+/- common	—	<b>B7A-T6B1</b> (See Note 2)	
		PNP compatible		+/- common	—	<b>B7A-T6C1</b>	
		NPN compatible	High speed 3 ms	- common	—	<b>B7A-T6A6</b> (See Note 2)	
				+/- common	—	<b>B7A-T6B6</b> (See Note 2)	
		PNP compatible		+/- common	—	<b>B7A-T6C6</b>	
	Output, 16 points	NPN open collector 100 mA/point	Normal speed 19.2 ms	+ common	HOLD	<b>B7A-R6B11</b>	
					LOAD OFF	<b>B7A-R6B31</b>	
		NPN open collector 500 mA/point (See Note 3)			HOLD	<b>B7A-R6C11</b>	
					LOAD OFF	<b>B7A-R6C31</b>	
		PNP open collector 100 mA/point	High speed 3 ms	- common	HOLD	<b>B7A-R6F11</b>	
					LOAD OFF	<b>B7A-R6F31</b>	
		PNP open collector 500 mA/point (See Note 4)			HOLD	<b>B7A-R6G11</b>	
					LOAD OFF	<b>B7A-R6G31</b>	
		NPN open collector 100 mA/point	High speed 3 ms	+ common	HOLD	<b>B7A-R6B16</b>	
					LOAD OFF	<b>B7A-R6B36</b>	
		NPN open collector 500 mA/point (See Note 3)			HOLD	<b>B7A-R6C16</b>	
					LOAD OFF	<b>B7A-R6C36</b>	
PNP open collector 100 mA/point	High speed 3 ms	- common	HOLD	<b>B7A-R6F16</b>			
			LOAD OFF	<b>B7A-R6F36</b>			
PNP open collector 500 mA/point (See Note 4)			HOLD	<b>B7A-R6G16</b>			
			LOAD OFF	<b>B7A-R6G36</b>			
	Input, 16 points	NPN compatible	Normal speed 19.2 ms	+/- common	—	<b>B7AS-T6B1</b>	
			High speed 3 ms		—	<b>B7AS-T6B6</b>	
	Output, 16 points	NPN open collector 100 mA/point	Normal speed 19.2 ms	HOLD		<b>B7AS-R6B11</b>	
				LOAD OFF		<b>B7AS-R6B31</b>	
				High speed 3 ms		HOLD	<b>B7AS-R6B16</b>
				LOAD OFF		<b>B7AS-R6B36</b>	

16-point Relay Output Link Modules

Appearance	I/O classification	I/O configuration	I/O delay (typical)	Error processing (See Note 1)	Part number
	Output, 16 points (SPST-NO)	Relay outputs G6D-1A DC24	Normal speed 19.2 ms (See Note 2)	HOLD	G70D-R6R11-B7A
				LOAD OFF	G70D-R6R31-B7A
		Power MOSFET relay outputs G3DZ-2R6PL DC24		HOLD	G70D-R6M11-B7A
				LOAD OFF	G70D-R6M31-B7A

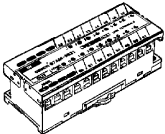
- Note: 1. HOLD: The previous output condition will be on hold when an error occurs.  
LOAD OFF: All outputs will be OFF when an error occurs.
2. The 16-point B7A-T6A□ and 16-point B7A-T6B□ are different from each other in terminal configuration.
3. N-channel MOSFET open drain output
4. P-channel MOSFET open drain output

Link Master Adapters for High-density I/O Modules

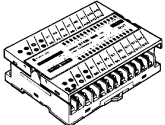
Appearance	I/O classification	I/O configuration	I/O delay (typical)	Error processing (See Note 1)	Part number
	Input, 32 points Use with CQM1-OD213.	NPN compatible	Normal speed 19.2 ms	—	B7A-T3E3
			High speed 3 ms	—	B7A-T3E8
	Output, 32 points Use with CQM1-ID213.	NPN open collector 50 mA/point	Normal speed 19.2 ms	HOLD	B7A-R3A13
				LOAD OFF	B7A-R3A33
			High speed 3 ms	HOLD	B7A-R3A18
				LOAD OFF	B7A-R3A38

Mixed I/O Link Modules

Screw Terminal Models (with 8 Input and 8 Output Points)

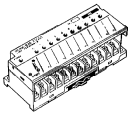
Appearance	I/O configuration	I/O delay (typical)	Error processing (See Note 1)	Part number
	NPN compatible/ NPN open collector 100 mA/point 8 input/8 output points	Normal speed 19.2 ms	HOLD	B7AM-8B11
			LOAD OFF	B7AM-8B31
		High speed 3 ms	HOLD	B7AM-8B16
			LOAD OFF	B7AM-8B36
	PNP compatible/ PNP open collector 100 mA/point 8 input/8 output points	Normal speed 19.2 ms	LOAD OFF	B7AM-8F31

Screw Terminal Model (with 16 Input and 16 Output Points)

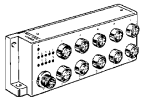

Appearance	I/O configuration	I/O delay (typical)	Error processing (See Note 1)	Part number
	NPN compatible/ NPN open collector 100 mA/point 16 input/16 output points	Normal speed 19.2 ms High speed 3 ms (switch selectable)	HOLD/ LOAD OFF (switch setting)	B7AM-6BS

10-point Terminal Models

Transistor I/O Link Modules

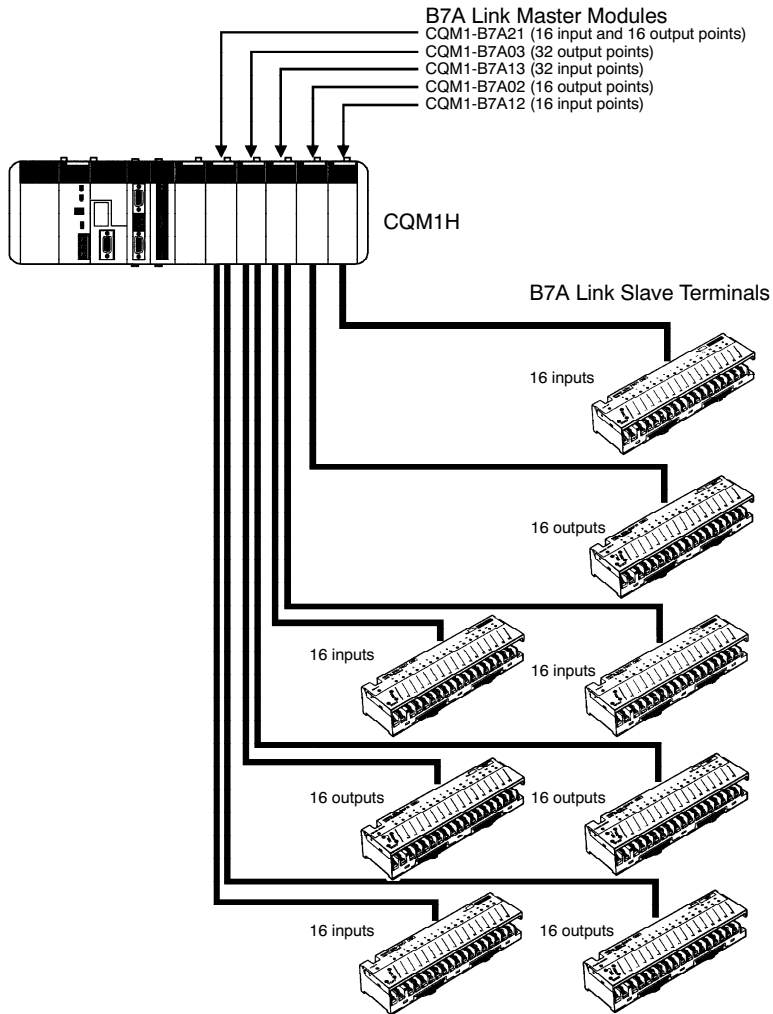
Appearance	I/O classification	I/O configuration	Internal I/O common	Error processing (See Note 1)	Part number
	Input, 10 points (See Note 2)	NPN compatible (No two-wire sensor can be connected.)	- common	—	<b>B7A-T10S1</b>
			+/- common	—	<b>B7A-T10S3</b>
	Output, 10 points	NPN open collector 100 mA/point	+ common	HOLD	<b>B7A-R10SC01</b>

Sealed Input Module with M12 Connectors

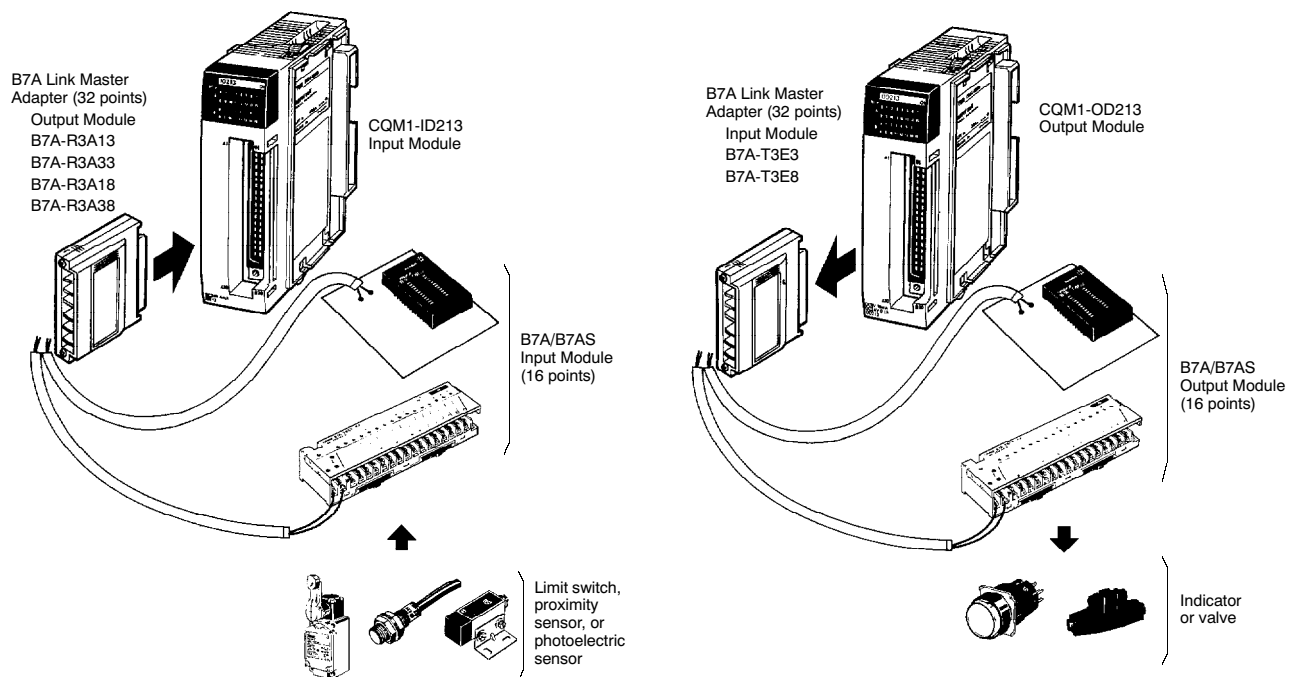
Appearance	Description	I/O configuration	I/O delay (typical)	Enclosure rating	Part number
	B7A 10-point sealed input module; M12 connectors	NPN compatible	19.2 ms	IP67	<b>B7AC-T10A1</b>
	DeviceNet interface module connects up to 3 B7AC modules			IP66	<b>DRT1-B7AC</b>

- Note: 1. HOLD: The previous output condition will be on hold when an error results.  
 LOAD OFF: All outputs will be OFF when an error results.
2. The 10-point B7A-T10S1 and 10-point B7A-T10S3 are different from each other in terminal configuration.

■ SYSTEM CONFIGURATION



**CQM1 High-Density I/O Modules with B7A Link Master Adapters**



## Temperature Controller Modules

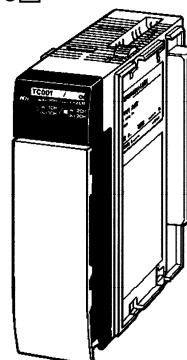
Omron offers Temperature Controller Modules for 4-loop temperature control, 2-loop temperature control, and 2-loop temperature control with heater burnout alarm.

Parameters can be set and data read for these Temperature Controllers by transferring commands from the PLC. With only one word each allocated to the Temperature Controller Module for inputs and outputs, high-density temperature control applications become economical. Commands can be transferred easily using the TRANSFER I/O COMMAND instruction that has been added to the CQM1H CPUs (See Note). The PID with advanced feed-forward circuitry assures stable temperature control. The controllers can also be set to ON/OFF control.

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

**Thermocouple Inputs:**  
CQM1-TC00□/TC20□

**Platinum Resistance Thermometer Inputs:**  
CQM1-TC10□/TC30□



### ■ MODULES

Name	Model	Specifications
Temperature Controller Modules	CQM1-TC001	Thermocouple input (types J and K), transistor (NPN) output, 2 loops
	CQM1-TC002	Thermocouple input (types J and K), transistor (PNP) output, 2 loops
	CQM1-TC101	Platinum resistance thermometer input (Pt and JPt), transistor (NPN) output, 2 loops
	CQM1-TC102	Platinum resistance thermometer input, transistor (PNP) output, 2 loops
	CQM1-TC201	Thermocouple input, transistor (NPN) output, 4 loops
	CQM1-TC202	Thermocouple input, transistor (PNP) output, 4 loops
	CQM1-TC203	Thermocouple input, transistor (NPN) output, 2 loops (with heater burnout alarm)
	CQM1-TC204	Thermocouple input, transistor (PNP) output, 2 loops (with heater burnout alarm)
	CQM1-TC301	Platinum resistance thermometer input, transistor (NPN) output, 4 loops
	CQM1-TC302	Platinum resistance thermometer input, transistor (PNP) output, 4 loops
	CQM1-TC303	Platinum resistance thermometer input, transistor (NPN) output, 2 loops (with heater burnout alarm)
	CQM1-TC304	Platinum resistance thermometer input, transistor (PNP) output, 2 loops (with heater burnout alarm)
Current detectors for heater burnout alarm	E54-CT1	Measuring range of 0 to 30 A, 5.8 mm dia. hole
	E54-CT2	Measuring range of 0 to 50 A, 12 mm dia. hole

■ SPECIFICATIONS

Temperature Controller Modules

Model		CQM1-TC00□	CQM1-TC10□	CQM1-TC20□	CQM1-TC30□
Input	Input type	Thermocouple input	Platinum resistance thermometer input	Thermocouple input	Platinum resistance thermometer input
	Input sensor types 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.)	Pt, JPt (See the following table for temperature ranges.)
	Number of control loops	Two (either 1 or 2 loops can be used)		4 loops (TC□01 or TC□02) or 2 loops with heater burnout alarm (TC□03 or TC□04)	
Control mode		ON/OFF or advanced PID control		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 adjustment		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	
Output	Output refresh period	1 s		0.5 s	
	Output form	NPN (TC□01) or PNP (TC□02) outputs with short-circuit protection		NPN (TC□01/TC□03) or PNP (TC□02/TC□04) outputs with short-circuit protection	
	Maximum switching capacity	100 mA, 24 VDC +10%/-15%		100 mA, 24 VDC +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 VDC +10%/-15%		30 mA min., 24 VDC +10%/-15%	
Internal current consumption		220 mA max. at 5 VDC		190 mA max. at 5 VDC	
Heater burn-out 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 in 0.1 A increments (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**

**Temperature Ranges for Thermocouples**

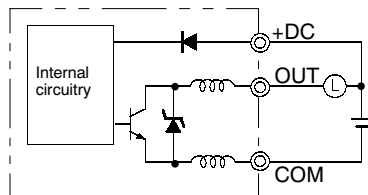
Input type	Code No.	°C	°F
K	0	-200 to 1300	-300 to 2300
K	1	0.0 to 500.0	0.0 to 900.0
J	2	-100 to 850	-100 to 1500
J	3	0.0 to 400.0	0.0 to 750.0
T	4	-200.0 to 400.0	-300.0 to 700.0
L	5	-100 to 850	-100 to 1500
L	6	0.0 to 400.0	0.0 to 750.0
R	7	0 to 1700	0 to 3000
S	8	0 to 1700	0 to 3000
B	9	100 to 1800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

**Temperature Ranges for Platinum Resistance Thermometers**

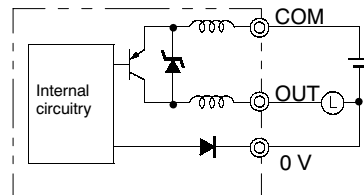
Input type	Code No.	°C	°F
Pt100	0	-200.0 to 650.0	-300.0 to 1200.0
JPt100	1	-200.0 to 650.0	-300.0 to 1200.0
Pt100	2	-20.00 to 250.00	Do not set.
JPt100	3	-20.00 to 250.00	

**Output Circuits**

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



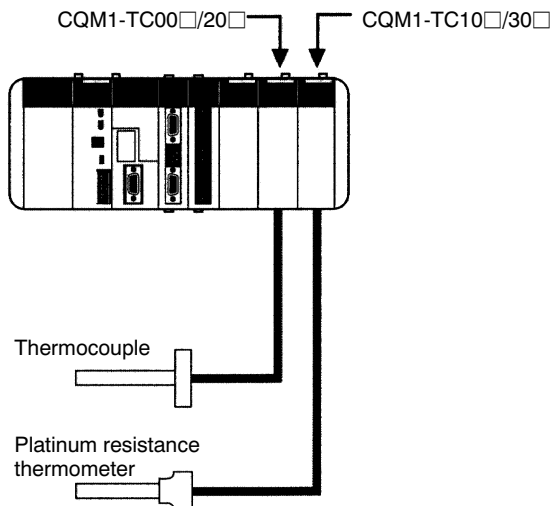
CQM1-TC□02/TC□04: Sourcing Outputs (PNP)



**Heater Burnout Current Detector Ratings**

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

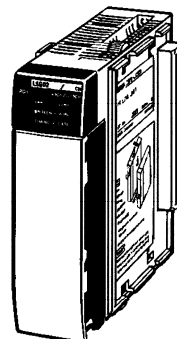
**■ CONFIGURATION**



## Linear Sensor Interface Modules

Used primarily for length and distance calculations, the Linear Sensor Interface Modules measure voltage or current inputs from an Omron measurement sensor then quickly and accurately convert the analog signal to numeric data for comparative decision processing. You can also sync internal processing using external timing signals.

**CQM1-LSE01 (Standard Interface)**  
**CQM1-LSE02 (Interface with Monitor Output)**



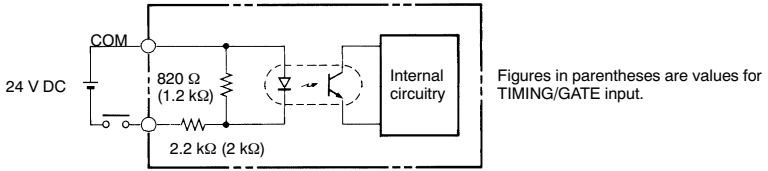
- A high-speed sampling cycle of 1 ms can be combined with high-speed external timing at 0.3 ms to easily detect high-speed changes in analog signals.
- Scaling and comparative decision processing reduces the burden on the CQM1H's CPU, achieving faster processing both in the module and for the PLC all around.
- A forced-zero function lets you easily change reference points for different workpieces.
- 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

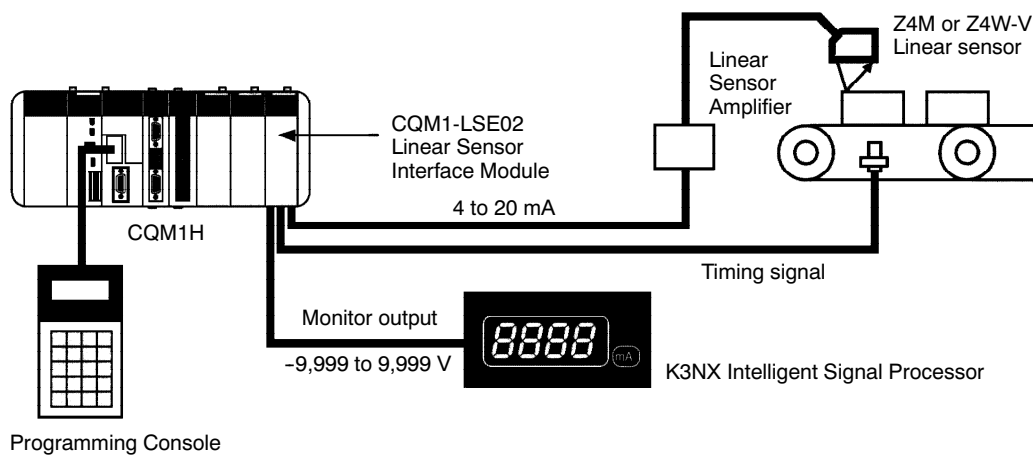
Item		CQM1-LSE01	CQM1-LSE02
Input	No. of analog input points	1	
	Input signal range	Voltage	-9.999 to 9.999 V, -5 to 5 V, 1 to 5 V
		Current	4 to 20 mA
	Input impedance	Voltage	1 MΩ min.
Current		10 Ω	
Linearity		±0.1% FS ±1 digit max. with input sampling speed set to slow ±0.5% FS ±1 digit max. with input sampling speed set to fast	
PLC output code		Signed binary (-9999 to 9999)	
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 V 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 VAC for 1 minute between input terminals and output terminals 1,000 VAC for 1 minute between I/O terminals and FG	
Internal current consumption		380 mA max. at 5 VDC	450 mA max. at 5 VDC
Weight		230 g max.	

**Control Input**

Item	Specification
Input voltage	24 VDC +10%/-15%
Input impedance	TIMING/GATE: 2 kΩ Other control output: 2.2 kΩ
Input current	TIMING/GATE: 9.2 mA typical (24 VDC) Other control output: 10.0 mA typical (24 VDC)
ON voltage	TIMING/GATE: 16.3 VDC min. Other control output: 17.1 VDC min.
OFF voltage	TIMING/GATE: 3.8 VDC max. Other control output: 3.6 VDC max.
ON/OFF response time (See note)	TIMING/GATE: 50 μs typical Other control output: 4 ms typical
Circuit configuration	

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

**■ CONFIGURATION**

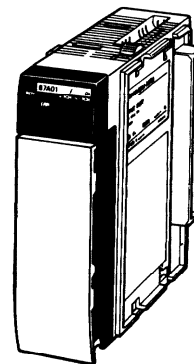


Programming Console

## Safety Relay Module

Use the Safety Relay Module to reduce the wiring time and costs and installation space for safety circuits. It can monitor the following four statuses of the safety circuit:

### CQM1-SF200



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.

In addition to the safety circuit, the module offers general-purpose inputs for synchronization: 4 inputs and 1 common.

## ■ 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 VDC	
Weight	260 g max.	

- Note: 1. Measurement conditions: 1 A at 5 VDC 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.

### Safety Circuit Ratings

#### Power Supply Section

Item	Specifications
Supply voltage	24 VDC
Permissible voltage fluctuation range	-15%/+10% of supply voltage
Power consumption	1.7 W max., 24 VDC

#### Input Section

Item	Specifications
Input current	75 mA max.

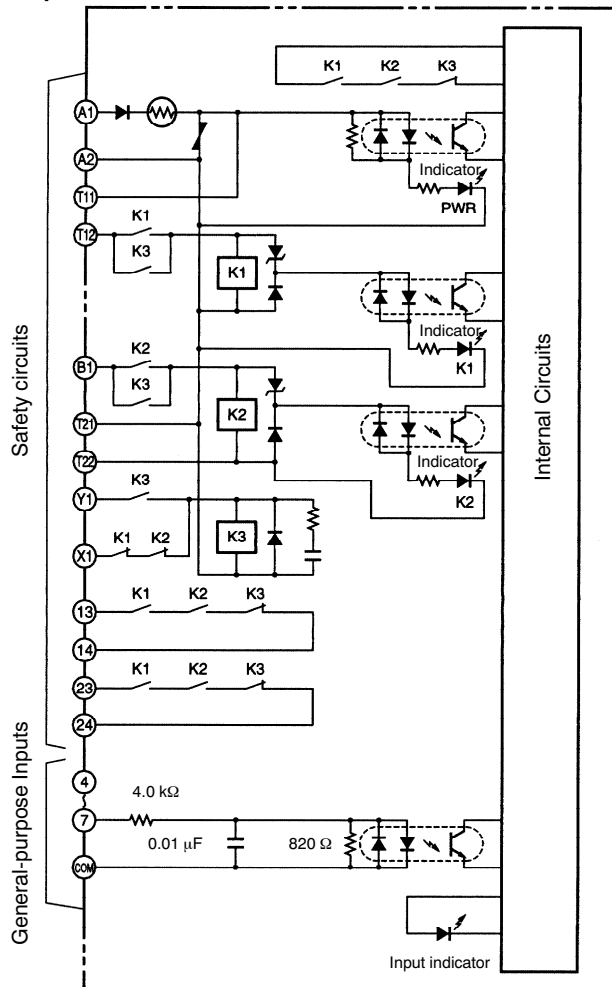
#### Switching Section

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

### General-purpose Input Ratings

Item	Specifications
Rated input voltage	24 VDC -15%/+10%
Input impedance	4.0 kΩ
Input current	6 mA typ. (24 VDC)
ON voltage/ON current	14.4 VDC min./3 mA min.
OFF voltage/OFF current	5 VDC 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.

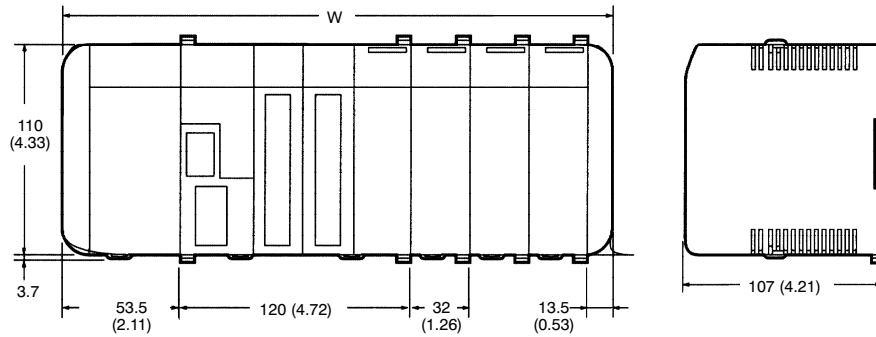
### Output Circuit



# Dimensions

Unit: mm (inch)

## OVERALL CQM1H DIMENSIONS



### Overall PLC Widths for Example Configurations

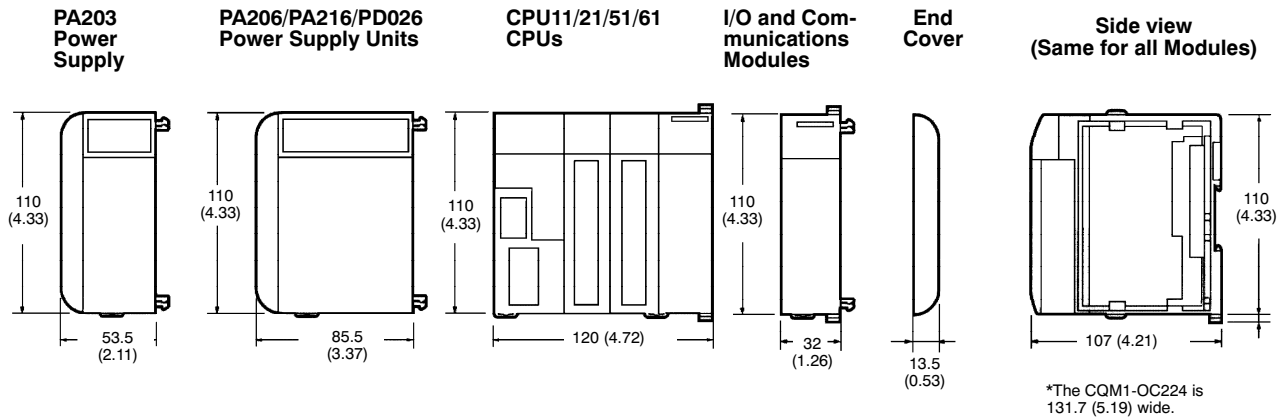
Number of I/O Modules	Width with PA203 Power Supply Unit	Width with PA206, PA216, or PD026 Power Supply Unit
3	283 (11.14)	315 (12.40)
4	315 (12.40)	347 (13.66)
5	347 (13.66)	379 (14.92)

### Calculating Overall PLC Width with "n" I/O Modules

Power Supply Unit	Width formula
CQM1-PA203	$32 \times n + 187$ (1.26 × n + 7.36)
CQM1-PA206	$32 \times n + 219$ (1.26 × n + 8.62)
CQM1-PA216	
CQM1-PD026	

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

## POWER SUPPLY, CPU, COMMUNICATIONS, DEDICATED I/O, AND I/O MODULES



■ WEIGHT

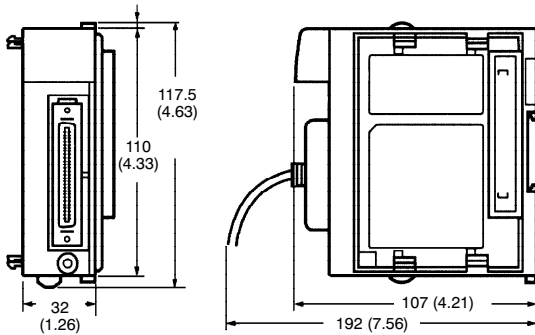
Name	Model	Weight
Power Supply Units	CQM1-PA203	460 g max.
	CQM1-PA206	560 g max.
	CQM1-PD026	
	CQM1-PA216	
CPUs	CQM1H-CPU11	500 g max.
	CQM1H-CPU21	510 g max.
	CQM1H-CPU51	
	CQM1H-CPU61	

Name	Model	Weight
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	

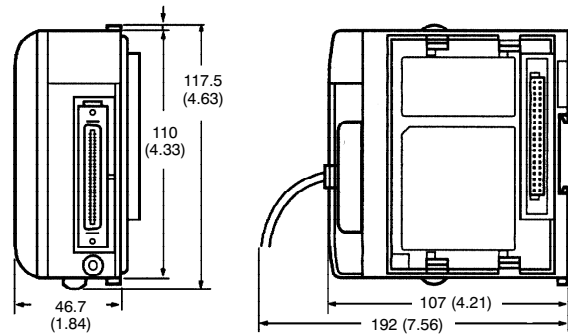
Name	Model	Weight
Output Units	CQM1-OC221	200 g max.
	CQM1-OC222	230 g max.
	CQM1-OC224	270 g max.
	CQM1-OD211	200 g max.
	CQM1-OD212	180 g max.
	CQM1-OD213	160 g max.
Output Units	CQM1-OD214	210 g max.
	CQM1-OD215	240 g max.
	CQM1-OD216	210 g max.
	CQM1-OA221	240 g max.
	CQM1-OA222	

■ I/O CONTROL AND INTERFACE MODULES

CQM1H-IC101



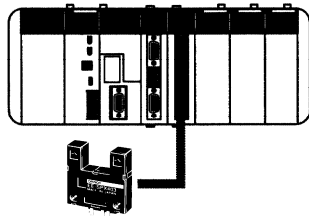
CQM1H-II101



# Functions

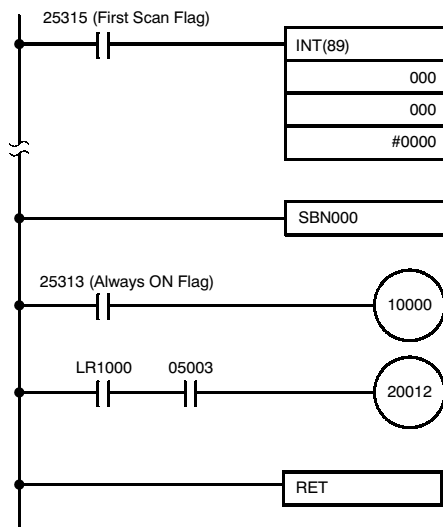
## ■ INTERRUPT INPUT PROCESSING

All CQM1H CPUs 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



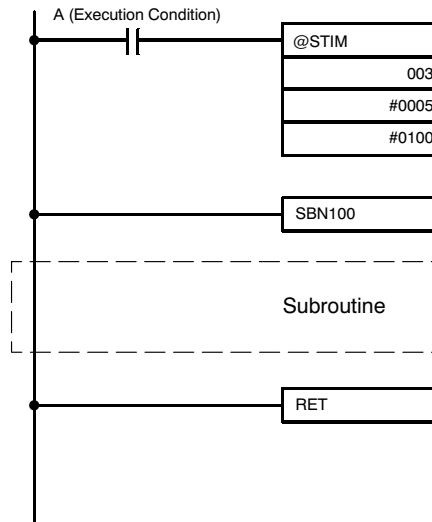
In order for interrupt input processing to be performed, the INTERRUPT CONTROL - INT(89) instruction is set so that interrupt processing is enabled when IR 00000 goes ON. When the external signal to IR 00000 goes from OFF to ON, program execution is temporarily halted, and processing moves to subroutine 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

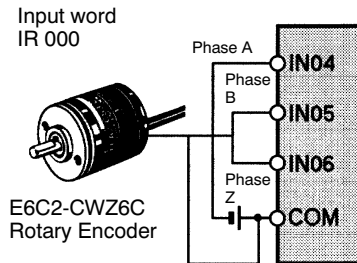


The STIM(69) instruction is used to control an interval timer. In this example, timer 0 is started in repetitive mode. As long as A (the execution condition) is ON, the main program will be halted and the interrupt routine SBN100 will be executed every 5 ms (i.e., each time the interval timer times out).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

## INTERNAL HIGH-SPEED COUNTERS

Pulses from a rotary encoder can be input directly into 3 of the CPU'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

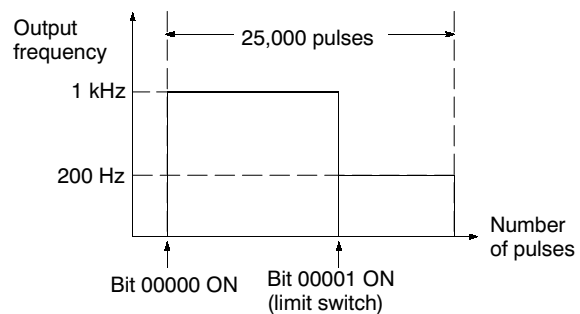
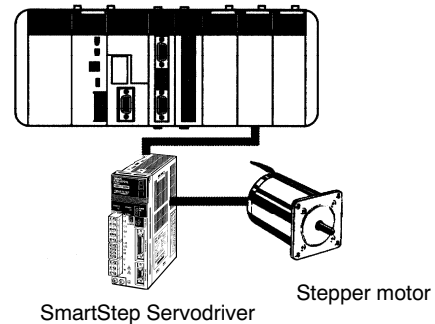
Target value	Up to 16 target values can be set. The specified subroutine will be executed when the count value reaches a target value.
Zone comparison	Up to 8 zones (upper/lower limits) can be set. The specified subroutine will be executed when the count value is within a zone.

## PULSE OUTPUT: PULS(65) AND CHANGE FREQUENCY - SPED(64)

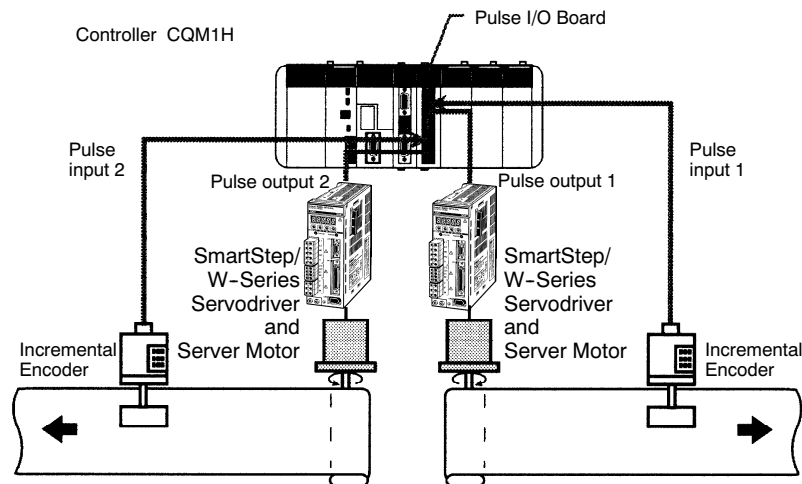
These instructions are used to control pulse outputs. They can greatly simplify tasks such as controlling stepper motors directly from the CQM1H.

### Example

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



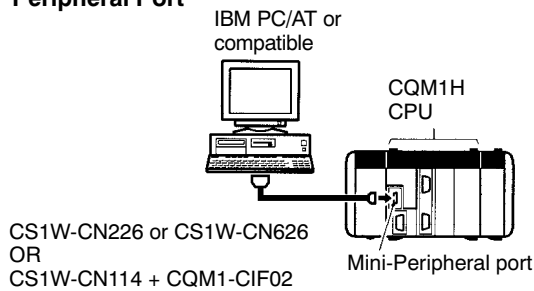
### Typical Application: Two-axis Positioning or Speed Control



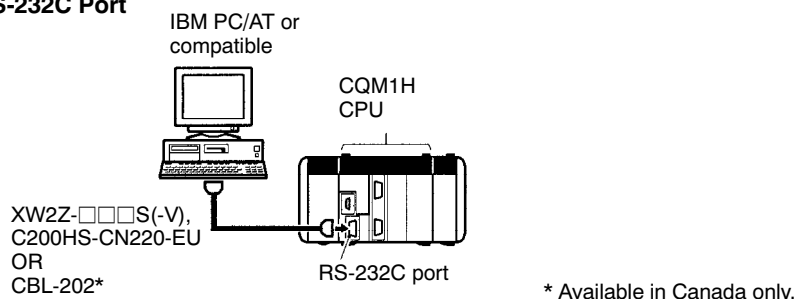
# Connections

## CONNECTIONS TO PROGRAMMING DEVICES

### Personal Computer to CPU Peripheral Port

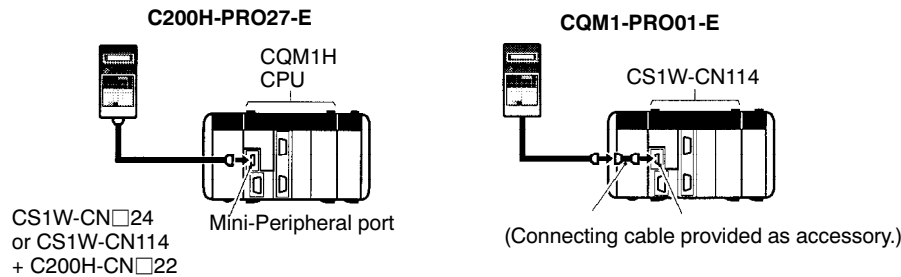


### Personal Computer to CPU RS-232C Port

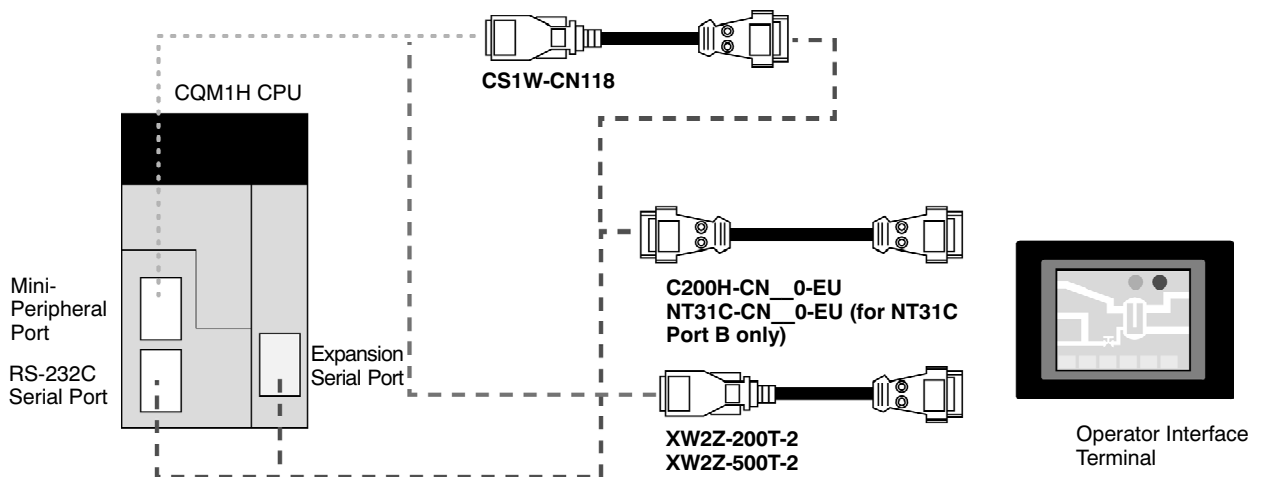


Note: You can also connect to the RS-232C port on a Serial Communications Board.

### Programming Console



## CONNECTIONS TO OPERATOR INTERFACE TERMINAL



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10. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Seller:
  - a. Shipments shall be by a carrier selected by Seller;
  - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
  - c. All sales and shipments of Goods shall be FOB shipping point (unless otherwise stated in writing by Seller), at which point title to and all risk of loss of the Goods shall pass from Seller to Buyer, provided that Seller shall retain a security interest in the Goods until the full purchase price is paid by Buyer;
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  - (iii) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Good.
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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.

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