

Safety Relay Unit (PLC I/O Unit Type)

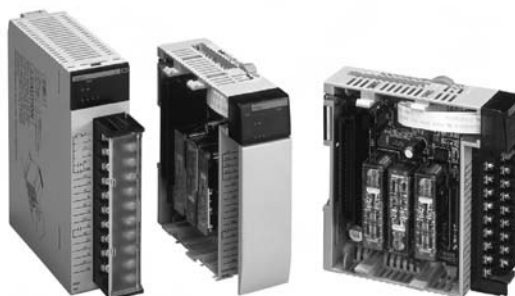
CQM1-SF200/CS1W-SF200

Same Dimensions as I/O Unit

Less Installation Space and Wiring Required

- Safety Relay Unit that can be used as an I/O Unit for OMRON's CQM1H and CS1-series PLCs.
- Requires less installation space and wiring.
- Monitors power supply, output, and internal relays for safety circuits.
- Equipped with four general-purpose input terminals.
- Conforms to EN standards. (TÜV approval)

Note: Be sure to read the "Safety Precautions" on page H-72.



Ordering Information

■ I/O Unit Type Emergency-stop Unit

Main contact	Rated voltage	Auxiliary contact	Number of input channels	Number of general-purpose inputs	Model
DPST-NO	24 VDC	None	1 channel or 2 channels possible	4 inputs	CQM1-SF200 CS1W-SF200

Model Number Structure

■ Model Number Legend:

CQM1-□□□□□□
1 2 3 4

CQM1: CQM1 I/O Unit Type

CS1W-□□□□□□
1 2 3 4

CS1W: CS1 I/O Unit Type

1. Function

SF: I/O Unit Type Emergency-stop Unit

2. Contact Configuration (Safety Output)

2: DPST-NO

3. Contact Configuration (OFF-delay Output)

0: None

4. Contact Configuration (Auxiliary Output)

0: None

CQM1-SF200/CS1W-SF200

Safety Application Controllers

Specifications

■ Ratings

Safety Circuit Block

Power Input

Item	CQM1-SF200	CS1W-SF200
Power supply voltage	24 VDC	
Operating voltage range	85% to 110% of rated power supply voltage	
Power consumption	24 VDC: 1.7 W max.	

Inputs

Item	CQM1-SF200	CS1W-SF200
Input current	75 mA max.	

Contacts

Item	CQM1-SF200, CS1W-SF200	
	Resistive load	Inductive load
Rated load	250 VAC, 5 A 30 VDC, 5 A	15 VAC: 240 VAC, 2 A ($\cos\phi=0.3$) 13 VDC: 24 VDC, 1 A (L/R=48 ms)
Rated carry current	5 A	5 A

General-purpose Input Block

Item	CQM1-SF200	CS1W-SF200
Power supply voltage	24 VDC	
Operating voltage range	85% to 110% of rated power supply voltage	
Input impedance	4.0 k Ω	3.3 k Ω
Input current	6 mA (typical) at 24 VDC	7 mA (typical) at 24 VDC
Must-operate voltage/current	14.4 VDC min./3 mA min.	
Reset voltage/current	5 VDC max./1 mA max.	
ON/OFF response time	8 ms max. (Settable in the range 1 to 128 ms in the PLC Setup.)	8 ms max. (Settable in the range 0 to 32 ms in the PLC Setup.)
Number of circuits	4 inputs, 1 common	
Simultaneous ON points	All points	
Internal current consumption	50 mA max.	100 mA max.

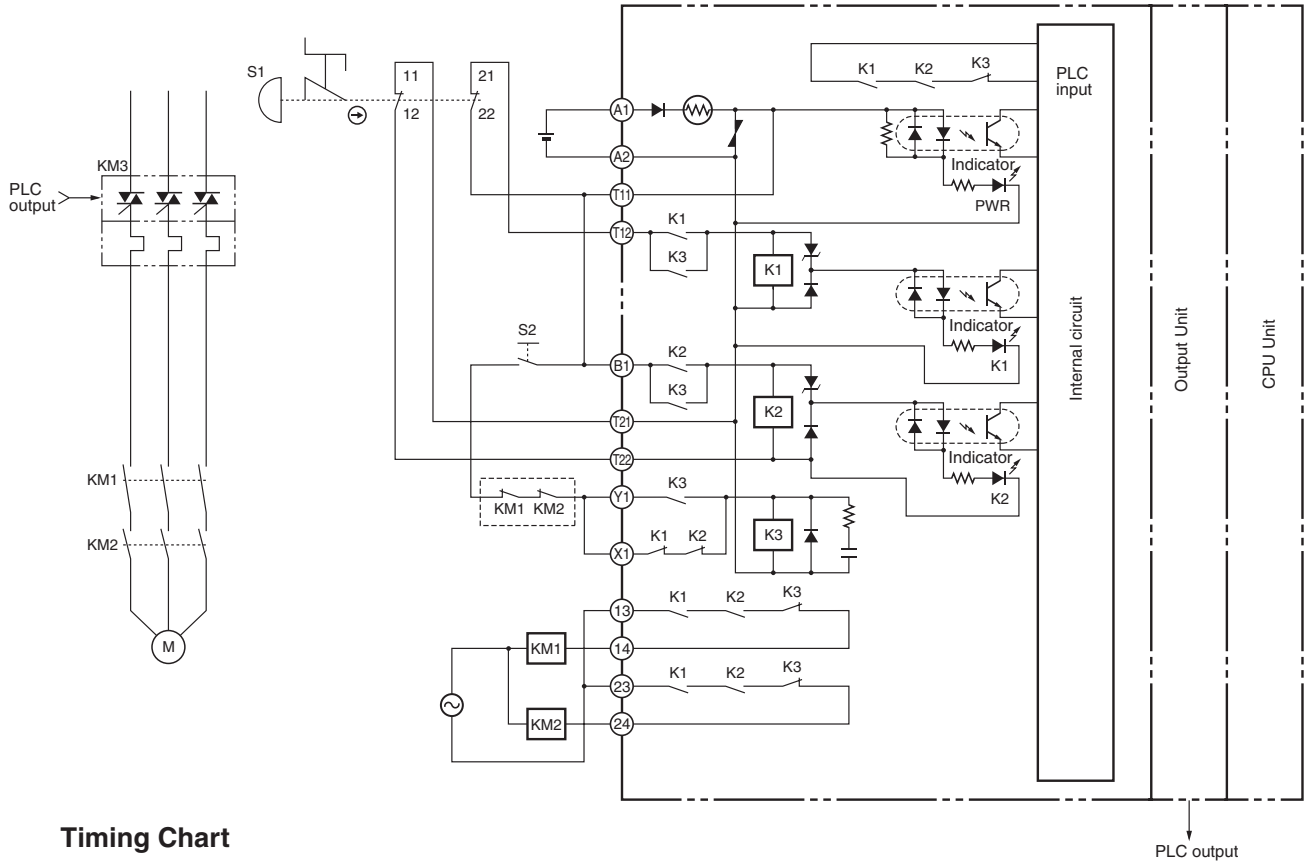
■ Characteristics

Item	CQM1-SF200	CS1W-SF200
Contact resistance (see note 1)	100 mΩ	
Operating time (see note 2)	300 ms max. (not including bounce time)	
Response time (see note 2, 3)	10 ms max. (not including bounce time)	
Insulation resistance (see note 4)	Between safety circuits and safety output: 20 MΩ min. (at 500 VDC) Between general-purpose inputs and safety output: 20 MΩ min. (at 500 VDC) Between different poles of safety output: 20 MΩ min. (at 500 VDC) Between safety circuits and general-purpose inputs: 20 MΩ min. (at 500 VDC)	
Dielectric strength (see note 4)	Between safety circuits and safety output: 2,500 VAC, 50/60 Hz for 1 min Between general-purpose inputs and safety output: 2,500 VAC, 50/60 Hz for 1 min Between different poles of safety output: 2,500 VAC, 50/60 Hz for 1 min Between safety circuits and general-purpose inputs: 500 VAC, 50/60 Hz for 1 min	
Vibration resistance (see note 4)	10 to 57 Hz at 0.075-mm single amplitude, 57 to 150 Hz at 9.8 m/s ² for 80 minutes each in X, Y, and Z directions (sweep time 8 minutes × 10 = 80 minutes) Conforms to JIS C0911.	10 to 57 Hz at 0.075-mm single amplitude, 57 to 150 Hz at 9.8 m/s ² for 80 minutes each in X, Y, and Z directions (sweep time 8 minutes × 10 = 80 minutes) (when mounted on DIN track: 2 to 55 Hz, 2.94 m/ s ² for 20 minutes each in X, Y, and Z directions) Conforms to JIS C0040.
Shock resistance (see note 4)	147 m/s ² , 3 times each in X, Y, and Z directions, Conforms to JIS C0912.	147 m/s ² , 3 times each in X, Y, and Z directions, Conforms to JIS C0041.
Durability	Mechanical	5,000,000 operations min. (at approx. 7,200 operations/hr)
	Electrical	100,000 operations min. (at approx. 1,800 operations/hr)
Error rate (P-level) (reference value)	5 VDC, 1 mA	
Ambient operating temperature (see note 4)	0 to 55°C	
Ambient operating humidity (see note 4)	10% to 90% (with no condensation)	
Ambient operating environment (see note 4)	No corrosive gases	
Ambient storage temperature (see note 4)	-20 to 75°C	
Structure	Built into panel	
Weight	Approx. 260 g	Approx. 300 g

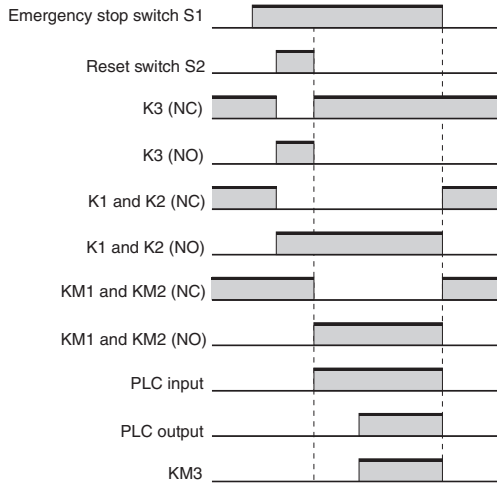
- Note:**
1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.
 2. Includes bounce time.
 3. The response time is the time it takes for the main contact to turn OFF after the input is turned OFF.
 4. Measured with the Unit mounted to the PLC.

Application Examples

Two Channels of Emergency Stop Switch Input/Manual Reset (Common to CQM1-SF200 and CS1W-SF200)



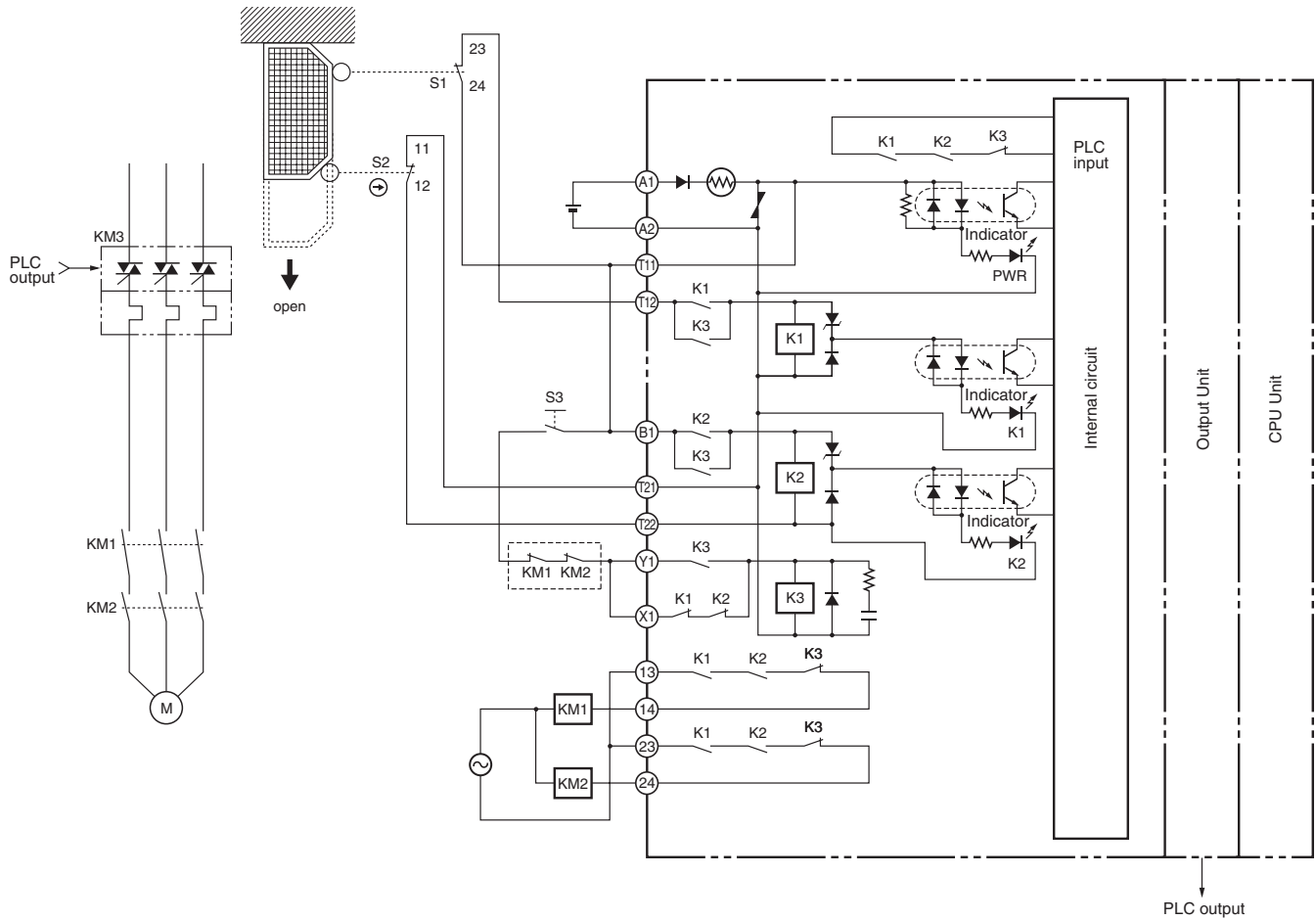
Timing Chart



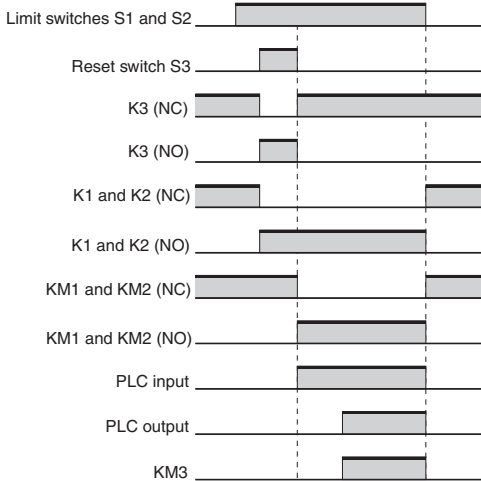
- S1: Emergency stop switch ⊕
- S2: Reset switch (momentary operation switch)
- KM1 and KM2: Magnetic Contactor
- KM3: G3J Solid-state Contactor
- M: 3-phase motor

Note: The above circuit example falls under category 4.

Two Channels of Limit Switch Input/Manual Reset (Common to CQM1-SF200 and CS1W-SF200)



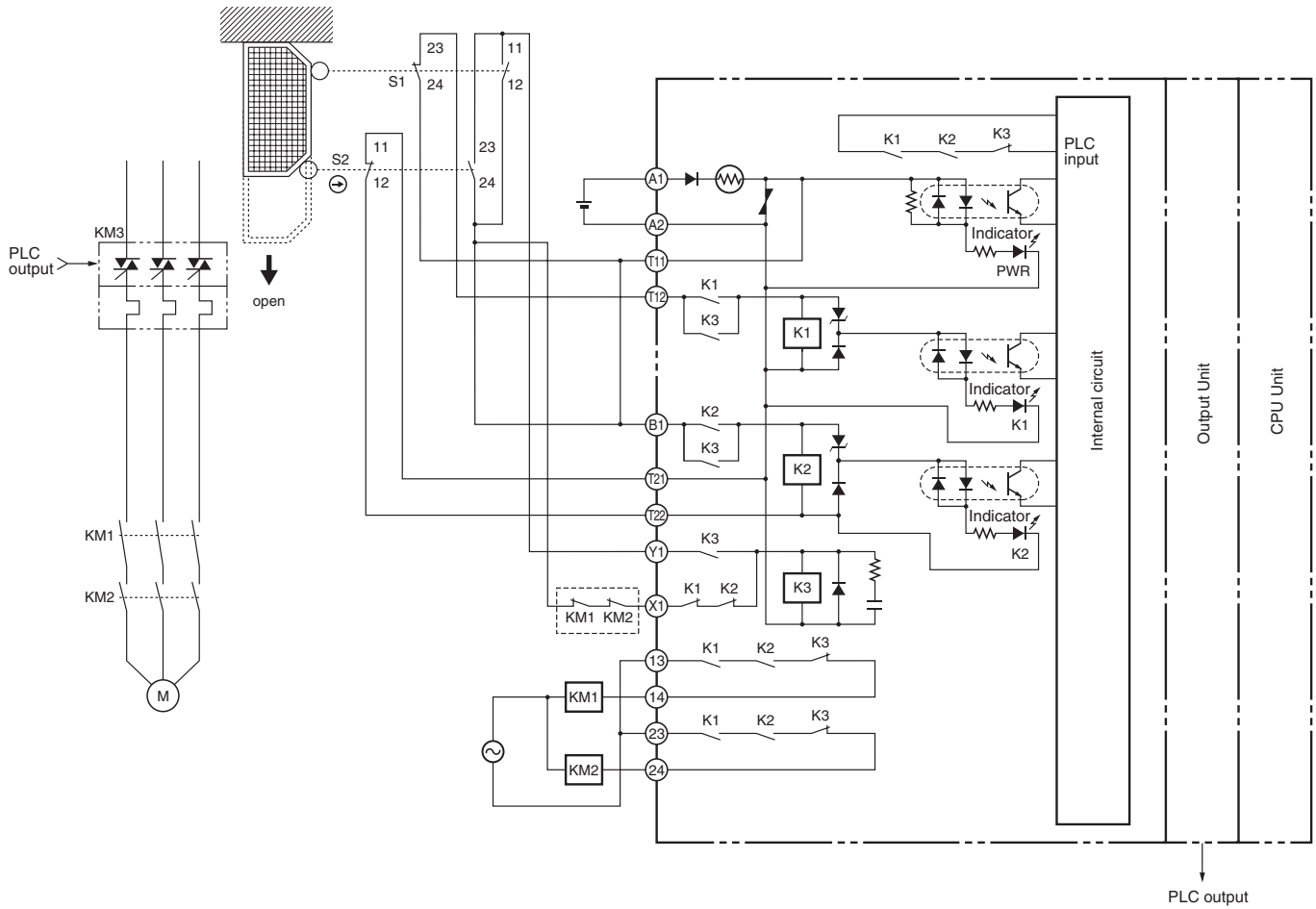
Timing Chart



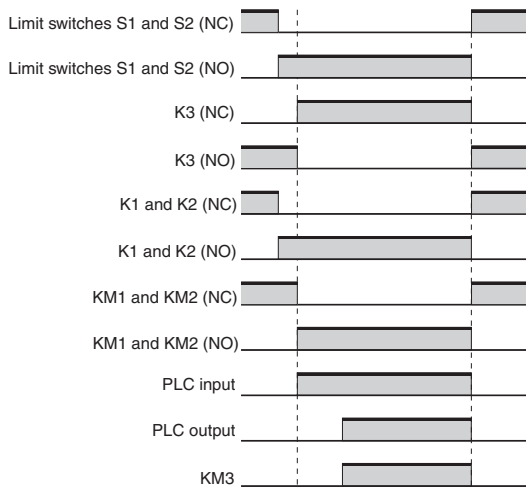
- S1: Limit switch (NO)
- S2: Safety Limit switch with positive opening mechanism (NC) (D4B-N, D4N, D4F) ⊕
- S3: Reset switch (momentary operation switch)
- KM1 and KM2: Magnetic Contactor
- KM3: G3J Solid-state Contactor
- M3: 3-phase motor

Note: The above circuit example falls under category 4.

Two Channels of Limit Switch Input with Auto-reset (Common to CQM1-SF200 and CS1W-SF200)



Timing Chart



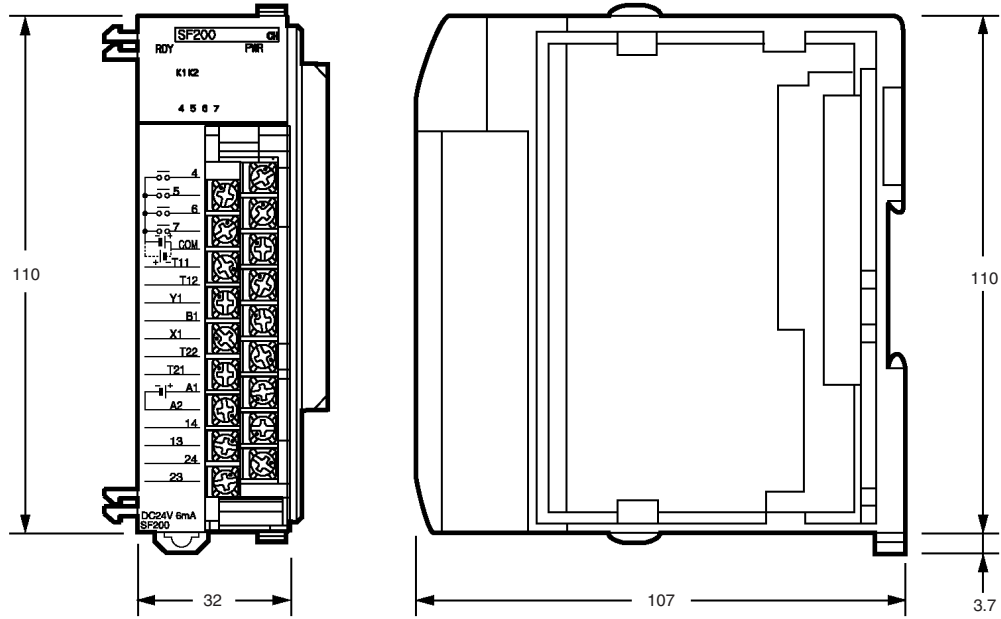
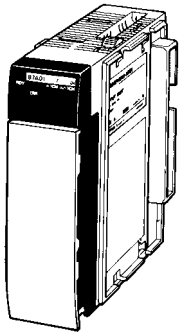
- S1: Limit switch
- S2: Safety Limit switch with positive opening mechanism (D4B-N, D4N, D4F) ⊕
- KM1 and KM2: LC1D Magnetic Contactor
- KM3: G3J Solid-state Contactor
- M3: 3-phase motor

Note: The above circuit example falls under category 4.

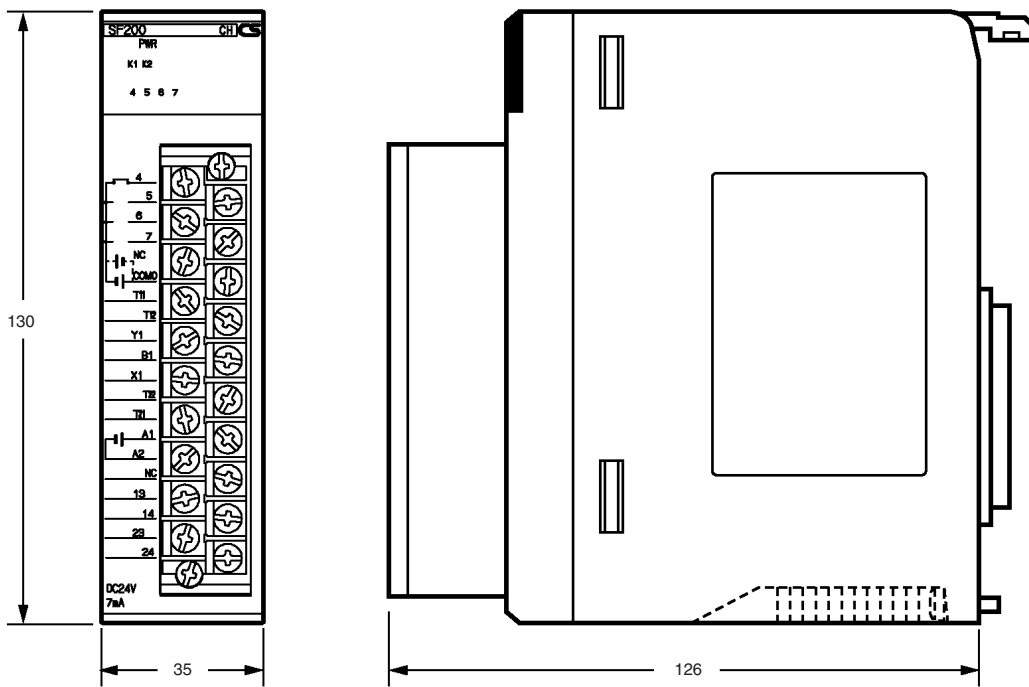
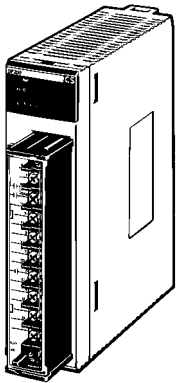
Dimensions

Note: All units are in millimeters unless otherwise indicated.

CQM1-SF200



CS1W-SF200



CQM1-SF200/CS1W-SF200

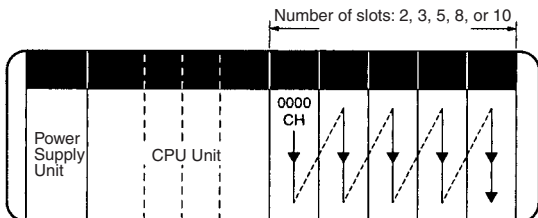
Safety Application
Controllers

Address Allocations

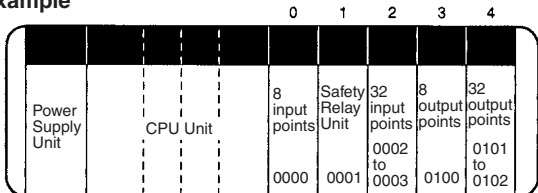
■ CQM1-SF200

Addresses are allocated to Basic I/O Units according to the order in which they are mounted in the CPU Block. Addresses (bits) are allocated in word (16-bit) units starting from the left (the position nearest to the CPU Unit) beginning with word 0000.

Note: The 1 to 16-point Units are allocated 16 bits and 17 to 32-point Units are allocated 32 bits. For example, 8-point DC Input Units are allocated bits 00 to 07. CQM1-SF200 is allocated 16 points.



Example



Slot 0
8-point DC Input Unit

Address (bit)	
00	000000
01	000001
02	000002
03	000003
04	000004
05	000005
06	000006
07	000007

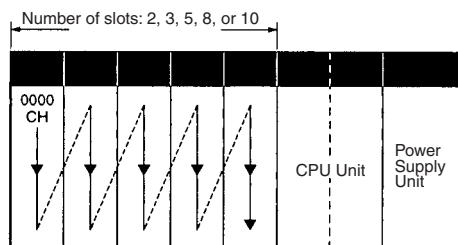
Slot 1
Safety Relay Unit

Address (bit)	Description
000100	Safety circuit output status monitor
000101	Safety circuit power supply status monitor
000102	K1 relay operating status monitor
000103	K2 relay operating status monitor
000104	General-purpose input
000105	General-purpose input
000106	General-purpose input
000107	General-purpose input

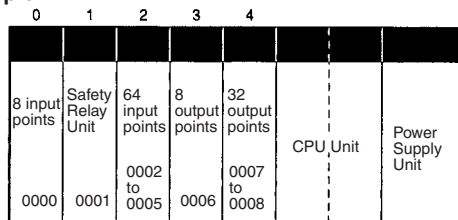
■ CS1W-SF200

Addresses are allocated to Basic I/O Units according to the order in which they are mounted on the CPU Block. Addresses (bits) are allocated in word (16-bit) units starting from the left (the position farthest from the CPU Unit) beginning with word 0000.

Note: The 1 to 16-point Units are allocated 16 bits and 17 to 32-point Units are allocated 32 bits. For example, 8-point DC Input Units are allocated bits 00 to 15. CS1W-SF200 is allocated 16 points.



Example



Slot 0
8-point DC Input Unit

Address (bit)	
00	000000
01	000001
02	000002
03	000003
04	000004
05	000005
06	000006
07	000007

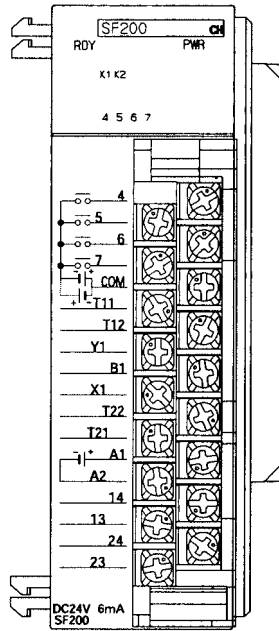
Slot 1
Safety Relay Unit

Address (bit)	Description
000100	Safety circuit output status monitor
000101	Safety circuit power supply status monitor
000102	K1 relay operating status monitor
000103	K2 relay operating status monitor
000104	General-purpose input
000105	General-purpose input
000106	General-purpose input
000107	General-purpose input

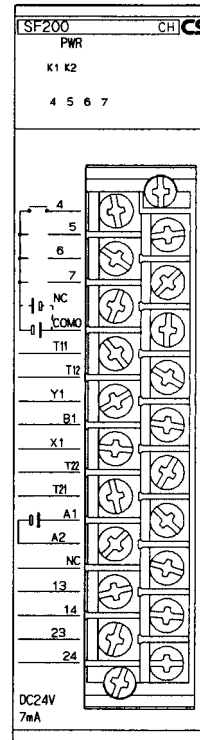
Installation

Terminal Arrangement

CQM1-SF200



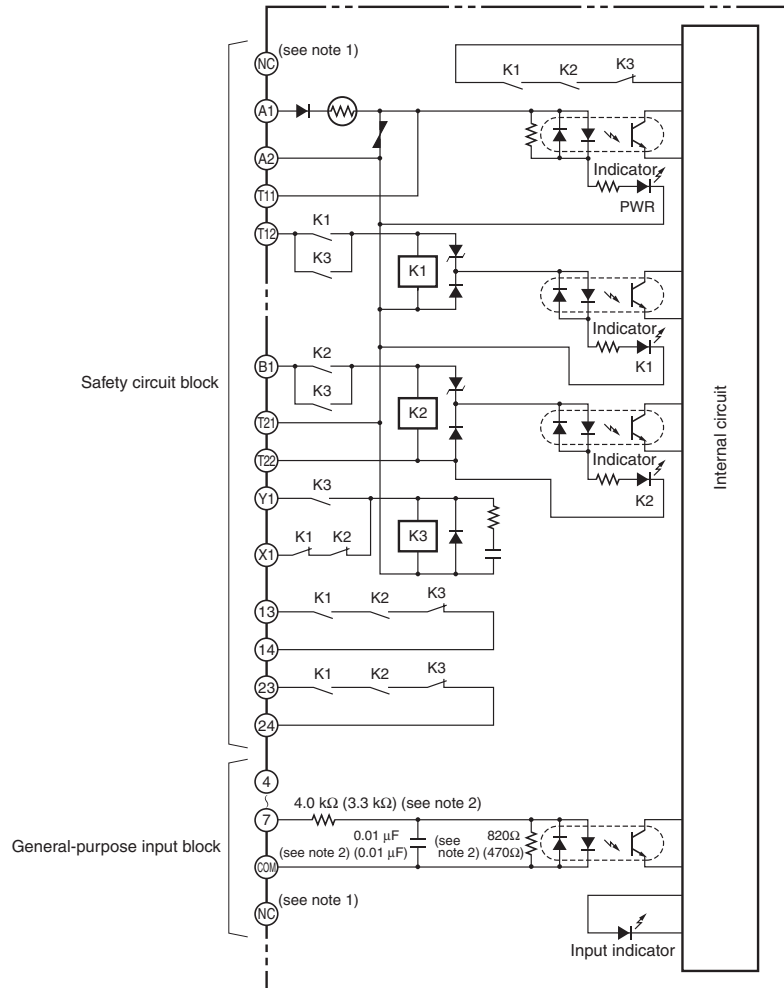
CS1W-SF200



CQM1-SF200/CS1W-SF200

Safety Application
Controllers

Internal Connections



- Note: 1.** The NC terminal is incorporated in the CS1W-SF200 only.
2. Values in parentheses are for the CS1W-SF200.

Indicators

Indicator	Color	Indicator status	Operating status	Meaning
RDY (CQM1-SF200 only)	Green	Lit	Normal	The Unit is recognized by the CQM1H or CQM1 PLC after power is turned ON.
		Not lit	No power supply	Indicates one of the following. <ul style="list-style-type: none"> Power has not been supplied to the CQM1 PLC. The Unit is waiting for initialization. The Unit is being reset.
PWR	Green	Lit	The safety block is turned ON.	Power is supplied to the safety block.
		Not lit	The safety block is not turned ON.	Power is not supplied to the safety block.
K1 and K2	Yellow	Lit	The K1 and K2 relays are ON.	The K1 and K2 relays are ON.
		Not lit	The K1 and K2 relays are OFF.	The K1 and K2 relays are OFF.
4, 5, 6, 7	Yellow	Lit	Input signals are ON.	General-purpose inputs are ON.
		Not lit	Input signals are OFF.	General-purpose inputs are OFF.

Safety Precautions

Refer to the "Precautions for All Relays" on page I-9 and "Precautions for All Relays with Forcibly Guided Contacts" on page G-2.

Refer to the CQM1H Catalog (Cat. No. P050) and the CS1-series PLC Catalog (Cat. No. P047) for common performance specifications and precautions.

WARNING

Turn OFF the CQM1-SF200 or CS1W-SF2000 before wiring the Unit. Do not touch the terminals of the Unit while the power is turned ON, because the terminals are charged and may cause an electric shock.



■ Precautions for Correct Use

Wiring

Use the following to wire the Unit.

Stranded wire: 0.75 to 1.5 mm²

Solid wire: 1.0 to 1.5 mm²

Tighten each screw to a torque of 0.78 to 1.18 N·m, or the Unit may malfunction or generate heat.

External inputs connected to T11 and T12, or T21 and T22 of the Relay unit must be no-voltage contact inputs.

■ Applicable Safety Category (EN954-1)

CQM1-SF200, CS1W-SF200 meet the requirements of Safety Category 4 of the EN954-1 standards when it is used as shown in the examples provided by OMRON. The Relays may not meet the standards in some operating conditions.

The applicable safety category is determined from the whole safety control system. Make sure that the whole safety control system meets EN954-1 requirements.

■ Approved Standards

The CQM1-SF200 and CS1W-SF200 conform to the following standards.

- EN standards, certified by TÜV Product Service
EN954-1
EN60204-1
- Conformance to EMC (Electromagnetic Compatibility), certified by TÜV Product Service:
EMI (Emission): EN55011 Group 1 Class A
EMS (Immunity): EN61000-6-2
- UL standards: UL508 (Industrial Control Equipment)
- CSA standards: CSA C22.2 No. 14 (Industrial Control Equipment)

CQM1-SF200/CS1W-SF200

Safety Application
Controllers

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. J126-E1-04

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