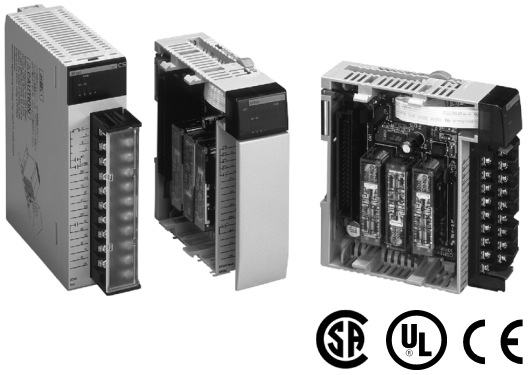
CQM1/CS1W-SF200

OMRON

Safety Relay PLC Module

Same Dimensions as a Typical I/O Module but Requires Less Installation Space and Less Wiring than Conventional Safety Relay Units

- Safety Relay Module functions as an I/O Module 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



Ordering Information

■ I/O MODULE TYPE EMERGENCY-STOP UNIT

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

■ MODEL NUMBER LEGEND

CQM1-□□□□□

1 2 3 4

CQM1: CQM1 I/O Module Type

CS1W-□□□□□

1 2 3 4

CS1W: CS1 I/O Module Type

1. **Function**
   SF: I/O Module 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

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 (cos ϕ =1)	
Rated load	250 VAC, 5 A	
Rated carry current	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 kΩ	3.3 kΩ
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 range: 1 to 128 ms in the PLC Setup.)	8 ms max. (Settable range: 1 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.

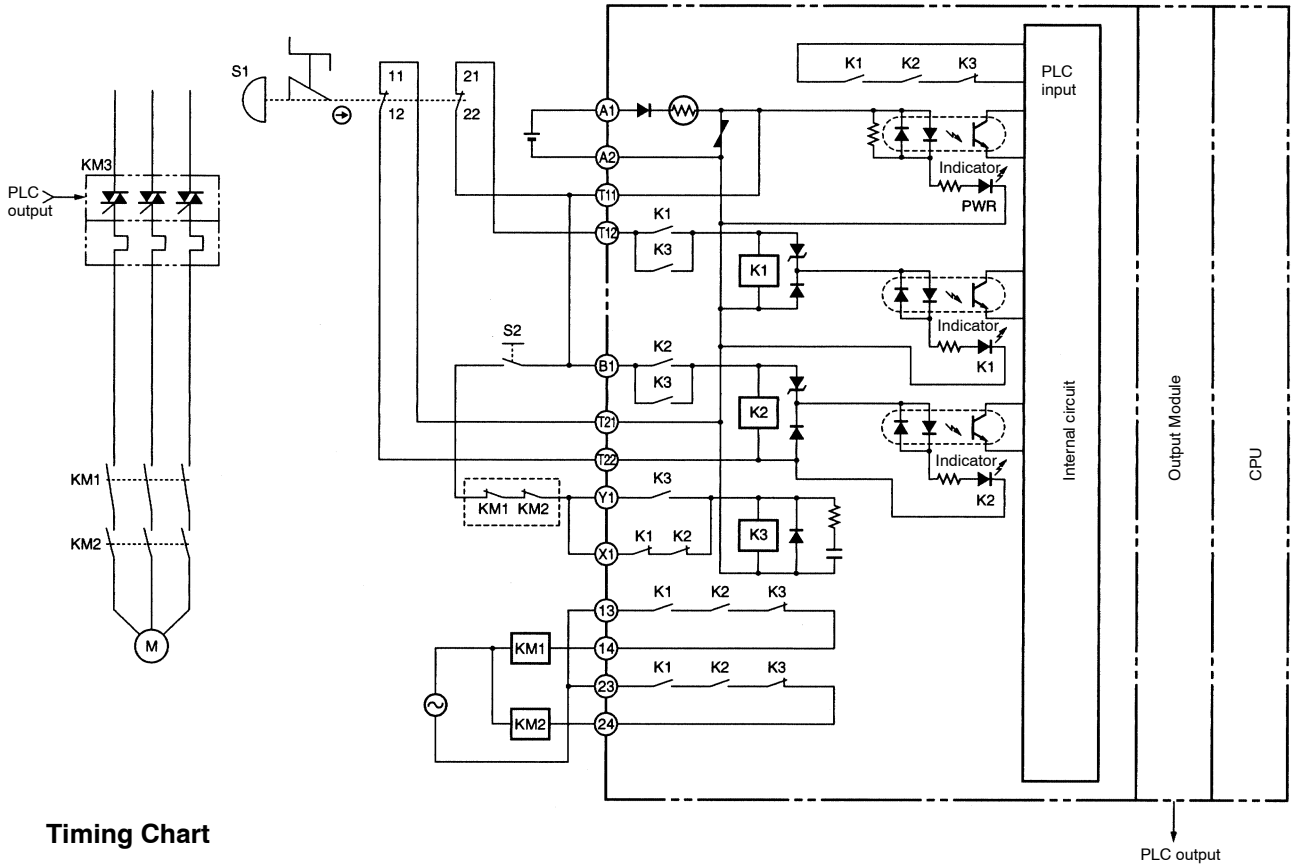
■ CHARACTERISTICS

Item		CQM1-SF200	CS1W-SF200
Contact resistance (See Note 1)		100 mΩ	
Operating time		300 ms max. (not including bounce time)	
Response time (See Note 2)		10 ms max. (not including bounce time)	
Insulation resistance (See Note 3)		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 3)		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 3)		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 C0041.
Shock resistance (See Note 3)		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.
Life expectancy	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 3)		0 to 55°C	
Ambient operating humidity (See Note 3)		10% to 90% (with no condensation)	
Ambient operating environment (See Note 3)		No corrosive gases	
Ambient storage temperature (See Note 3)		-20 to 75°C	
Structure		Built into panel	
Approved standards		EN954-1, EN60204-1, UL508, CSA C22.2 No. 14	
EMC		EMI: EN55011 group 1 class A EMS: EN50082-2	
Weight		Approx. 260 g	Approx. 300 g

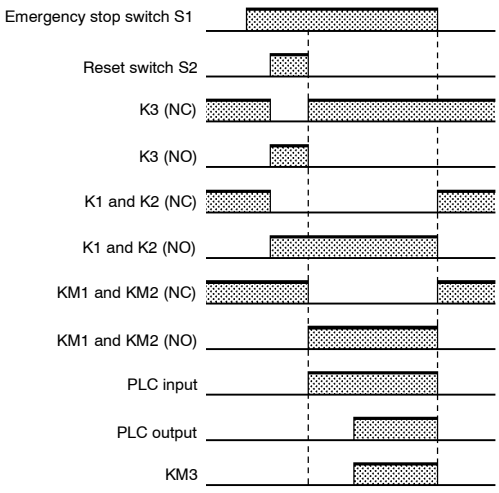
Note: 1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.
2. The response time is the time it takes for the main contact to turn OFF after the input is turned OFF.
3. Measured with the Unit mounted to the PLC.

Application Examples

■ TWO CHANNELS OF EMERGENCY STOP SWITCH INPUT (COMMON TO CQM1-SF200 AND CS1W-SF200)



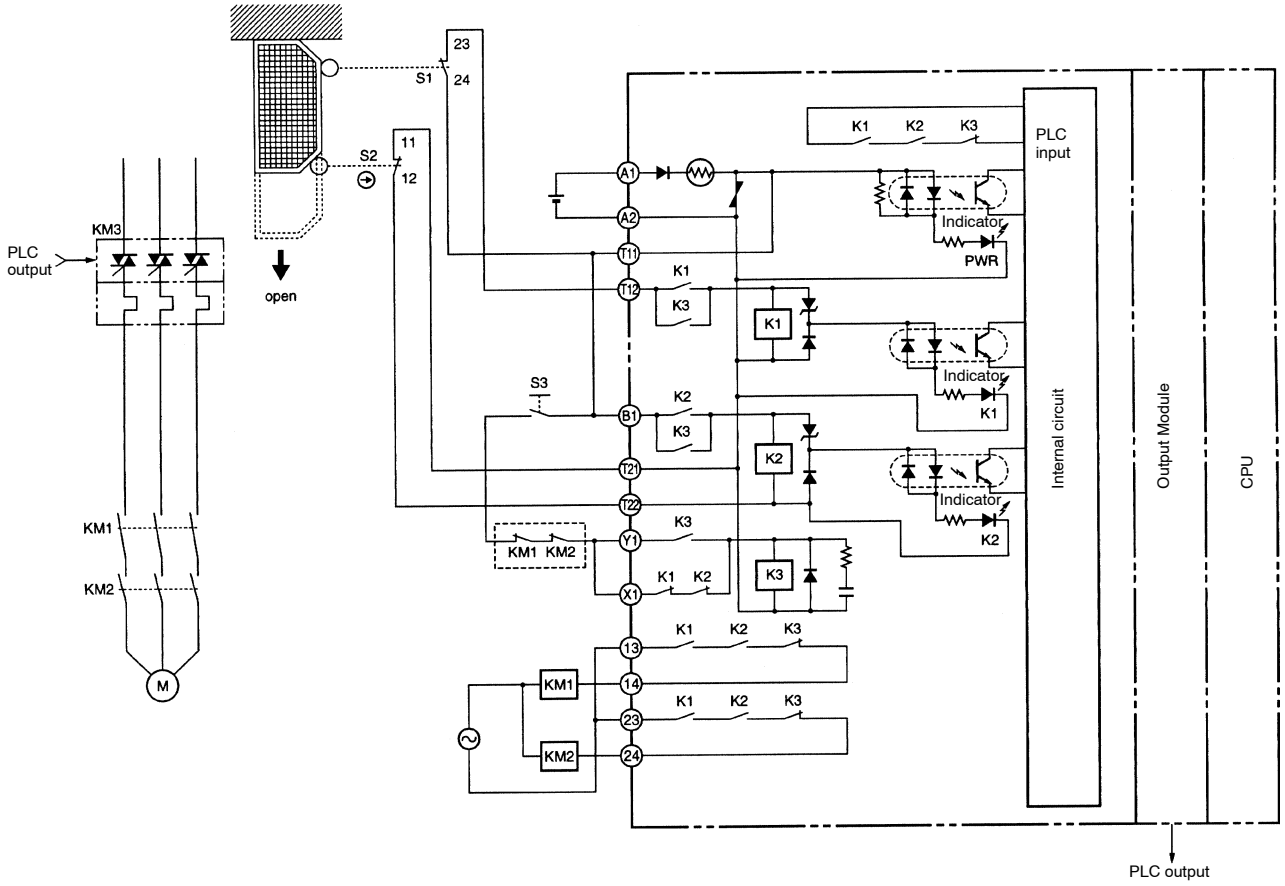
Timing Chart



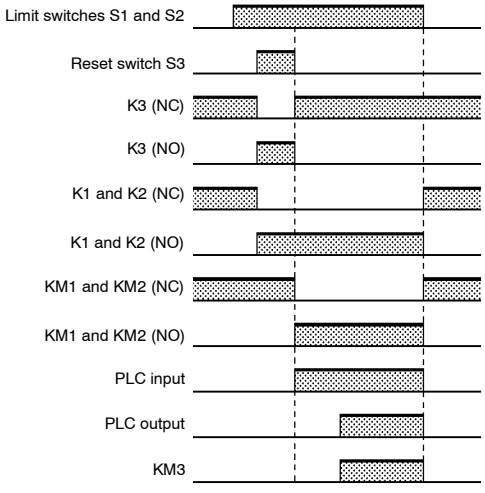
S1: Emergency stop switch ⊖
S2: Reset switch (momentary operation switch)
KM1 and KM2: Magnetic Contactor
KM3: G3J Solid-state Contactor
M: 3-phase motor

Note: The above circuit example falls under Category 4.

■ TWO CHANNELS OF LIMIT SWITCH INPUT (COMMON TO CQM1-SF200 AND CS1W-SF200)



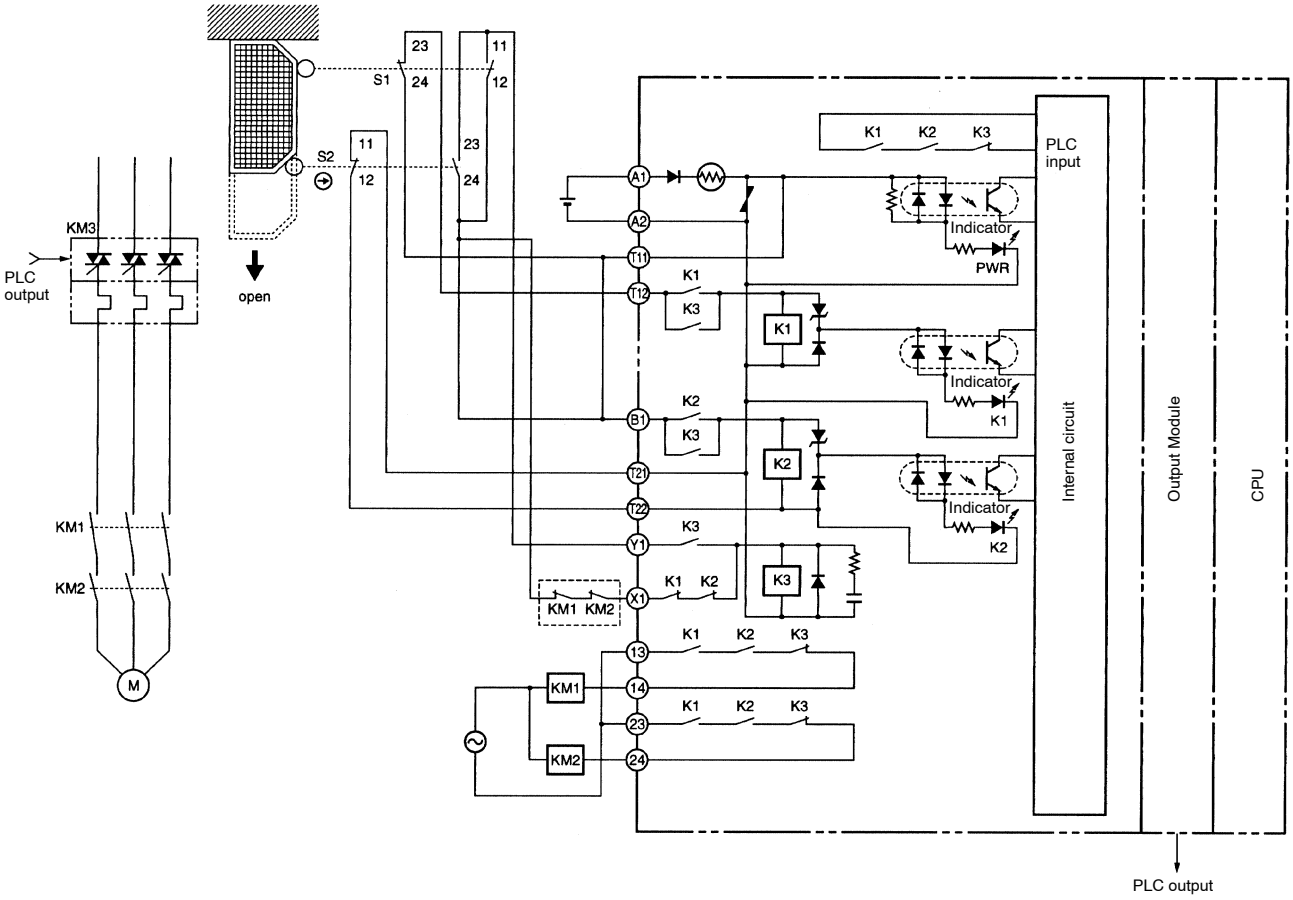
Timing Chart



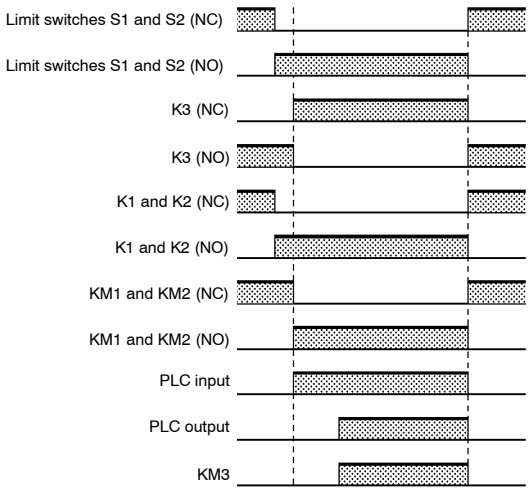
S1:	Limit switch
S2:	Safety Limit switch with positive opening mechanism (D4D or D4B)⊖
S3	Reset switch (momentary operation switch)
KM1 and KM2:	Magnetic Contactor
KM3:	G3J Solid-state Contactor
M3:	3-phase motor

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



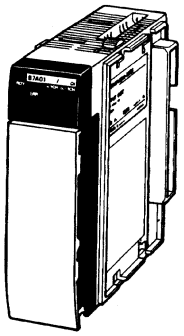
S1: Limit switch
S2: Safety Limit switch with positive opening mechanism (D4D or D4B)
KM1 and KM2: LC1D Magnetic Contactor
KM3: G3J Solid-state Contactor
M3: 3-phase motor

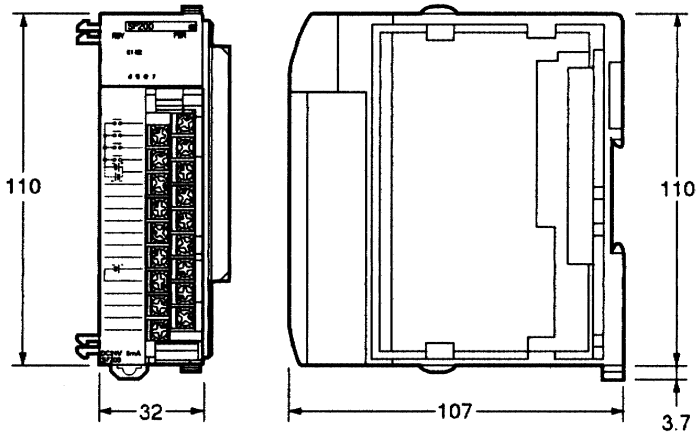
Note: The above circuit example falls under Category 4.

Dimensions

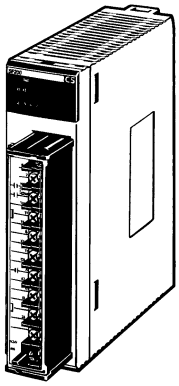
Unit: mm

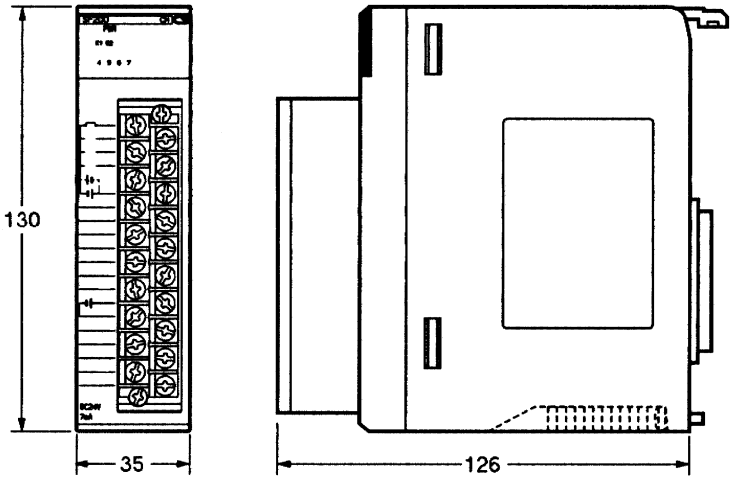
■ CQM1-SF200





■ CS1W-SF200



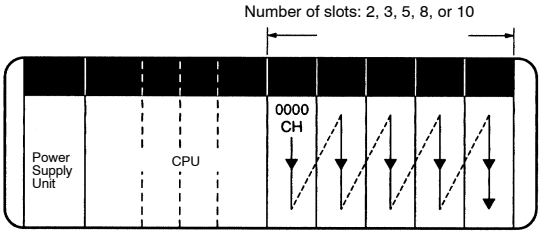


Address Allocations

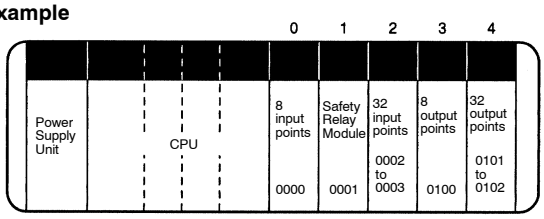
■ CQM1-SF200

Addresses are allocated to Basic I/O Modules 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) beginning with word 0000.

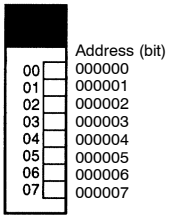
Note: The 1 to 16-point Modules are allocated 16 bits and 17 to 32-point Modules are allocated 32 bits. For example, 8-point DC Input Modules are allocated bits 00 to 07. CQM1-SF200 is allocated 16 points.



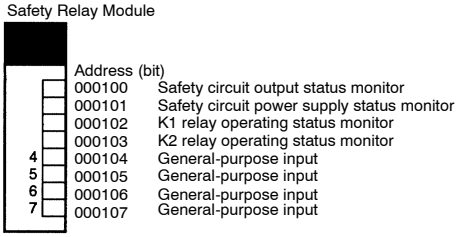
Example



Slot 0
8-point DC Input Module



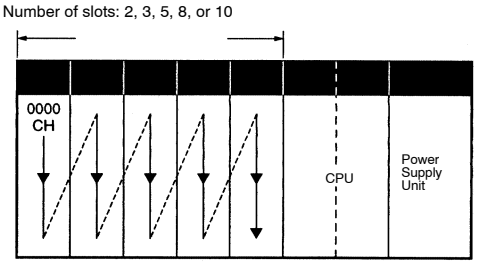
Slot 1
Safety Relay Module



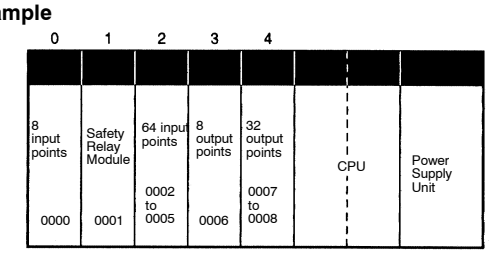
■ CS1W-SF200

Addresses are allocated to Basic I/O Modules 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) beginning with word 0000.

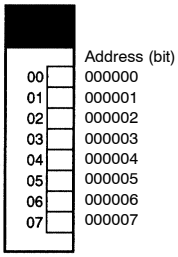
Note: The 1 to 16-point Modules are allocated 16 bits and 17 to 32-point Modules are allocated 32 bits. For example, 8-point DC Input Modules are allocated bits 00 to 15. CS1W-SF200 is allocated 16 points.



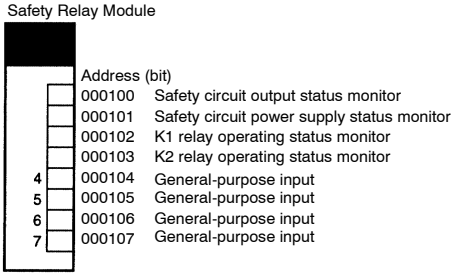
Example



Slot 0
8-point DC Input Module



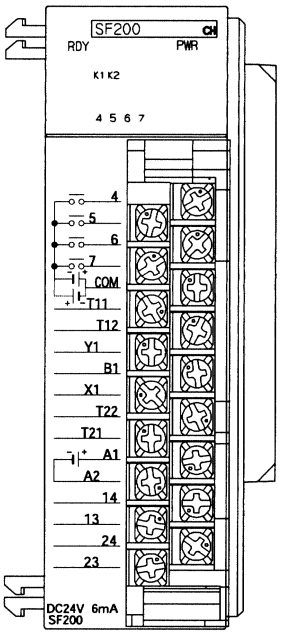
Slot 1
Safety Relay Module



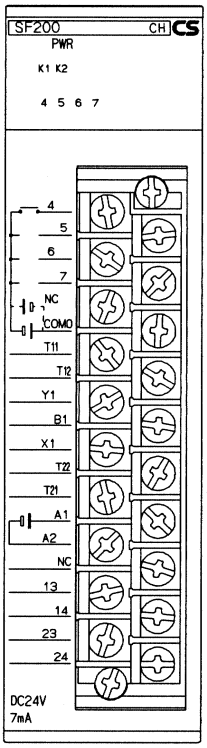
Installation

■ TERMINAL ARRANGEMENT

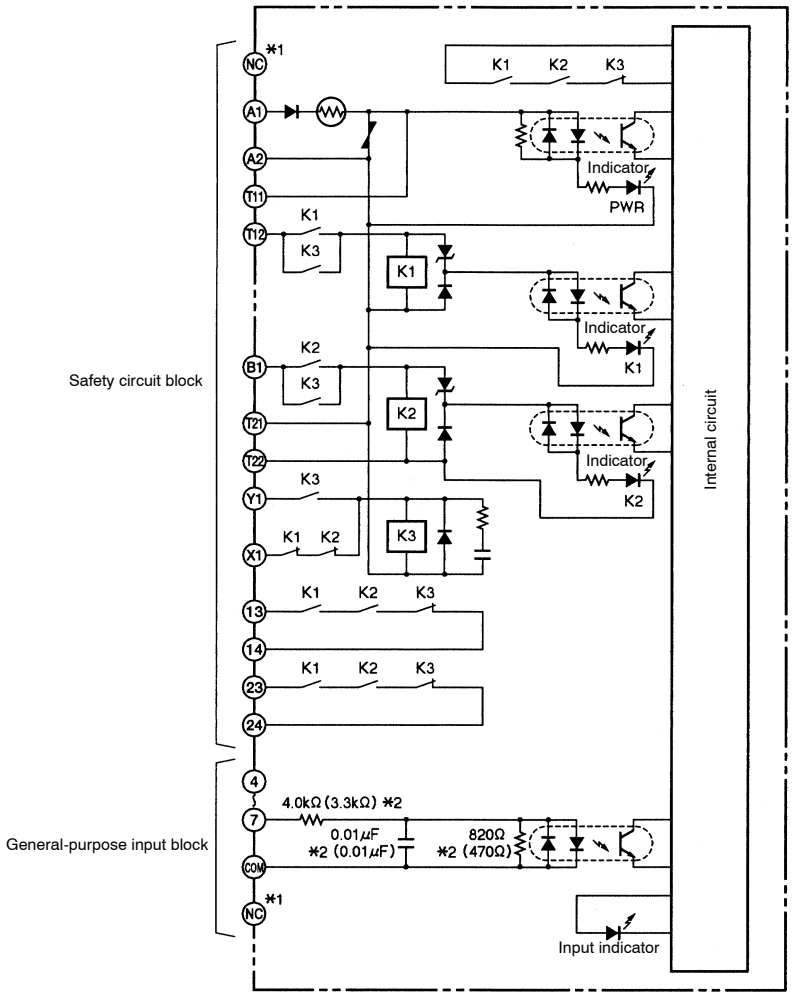
CQM1-SF200



CS1W-SF200



■ 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 Module is recognized by the CQM1H or CQM1 PLC after power is turned ON.
	---	Not lit	No power supply	Indicates one of the following. • Power has not been supplied to the CQM1 PLC. • The Module is waiting for initialization. • The Module 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.

Precautions

■ WIRING

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

Use the following to wire the Module.
Stranded wire: 0.75 to 1.5 mm^2
Solid wire: 1.0 to 1.5 mm^2

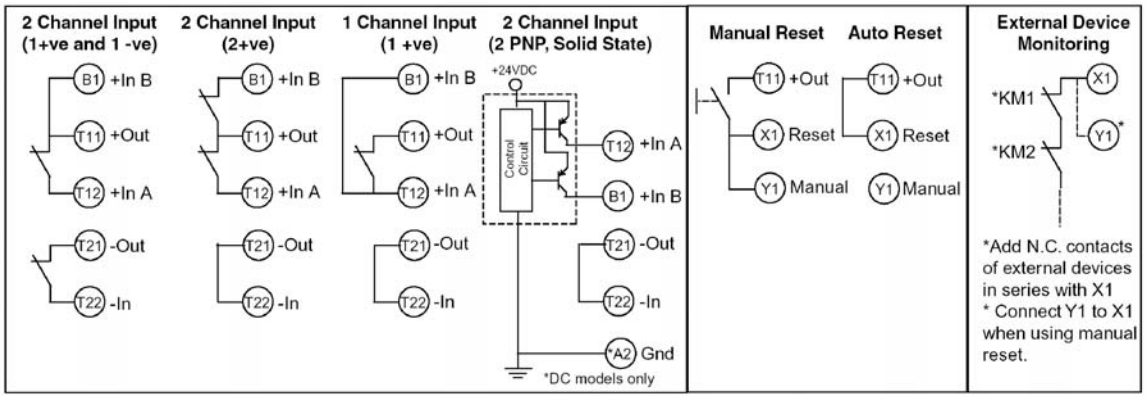
Tighten each screw to a torque of 0.78 to 1.18 N • m, or the Module may malfunction or generate heat.

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

■ APPLICABLE SAFETY CATEGORY (EN954-1)

Safety Relay Modules CQM1-SF200 and CS1W-SF200 meet the requirements of Safety Category 4 of the EN954-1 Standards when 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.

■ EXTERNAL CONNECTIONS



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters into inches, divide by 25.4

OMRON

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