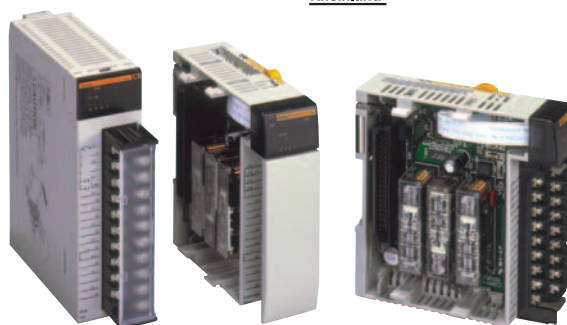


A Safety Relay Unit That Functions as a PLC I/O Unit.

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 certification)

Be sure to read the "Safety Precautions" on page 8.

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

- Function**
SF: PLC I/O Unit Type Emergency-stop Unit
- Contact Configuration (Safety Output)**
2: DPST-NO
- Contact Configuration (OFF-delay Output)**
0: None
- Contact Configuration (Auxiliary Output)**
0: None

Ordering Information

PLC 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

Specifications

Ratings (Safety Circuit Block)

Power Input

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

Contacts

Item	Model Load	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 ϕ =0.3) 13 VDC: 24 VDC, 1 A (L/R=48 ms)
Rated carry current		5 A	5 A

Ratings (General-purpose Input Block)

Item	Model	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	Model	CQM1-SF200	CS1W-SF200
Contact resistance *1		100 mΩ max.	
Operating time *2		300 ms max.	
Response time *3		10 ms max.	
Insulation resistance *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 *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 *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 C0040.	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 *4		147 m/s ² , 3 times each in X, Y, and Z directions, Conforms to JIS C0041.	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/h)	
	Electrical	100,000 operations min. (at approx. 1,800 operations/h)	
Failure rate (P level) (reference value)		5 VDC, 1 mA	
Ambient operating temperature *4		0 to 55°C	
Ambient operating humidity *4		10% to 90% (with no condensation)	
Ambient operating environment *4		No corrosive gases	
Ambient storage temperature *4		-20 to 75°C	
Structure		Built into panel	
Weight		Approx. 260 g	Approx. 300 g

*1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.

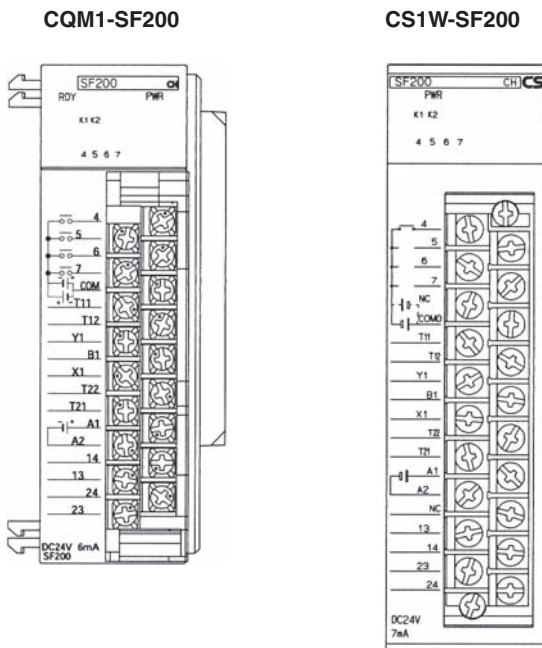
*2. Not including bounce time.

*3. The response time is the time it takes for the main contact to turn OFF after the input is turned OFF. Includes bounce time.

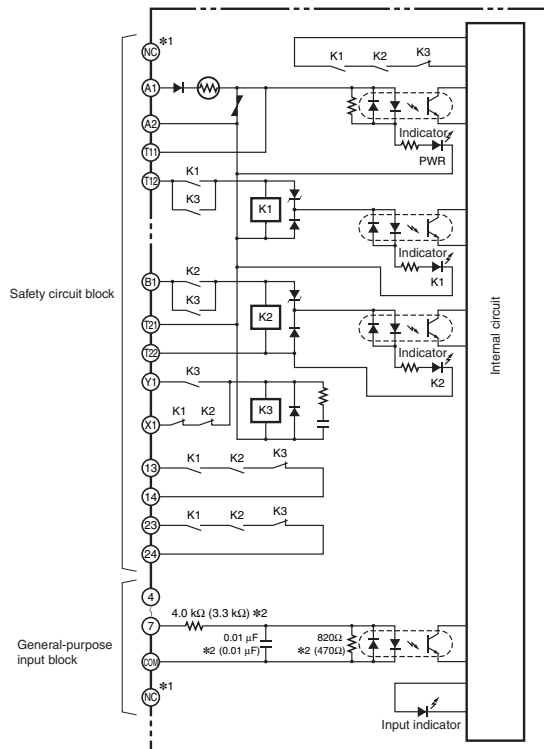
*4. Measured with the Unit mounted to the PLC.

Connections

Terminal Arrangement



Internal Connections



*1. The NC terminals are incorporated in the CS1W-SF200 only.

*2. Values in parentheses are for the CS1W-SF200.

Operation

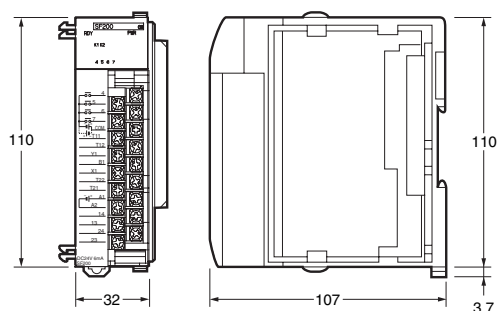
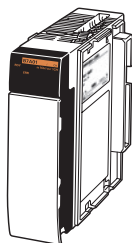
Indicators

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

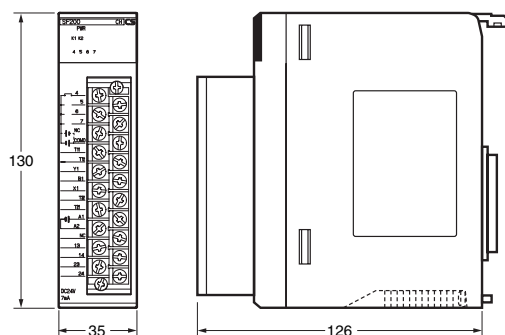
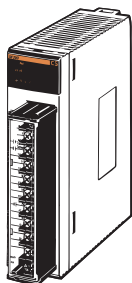
Dimensions

(Unit: mm)

CQM1-SF200

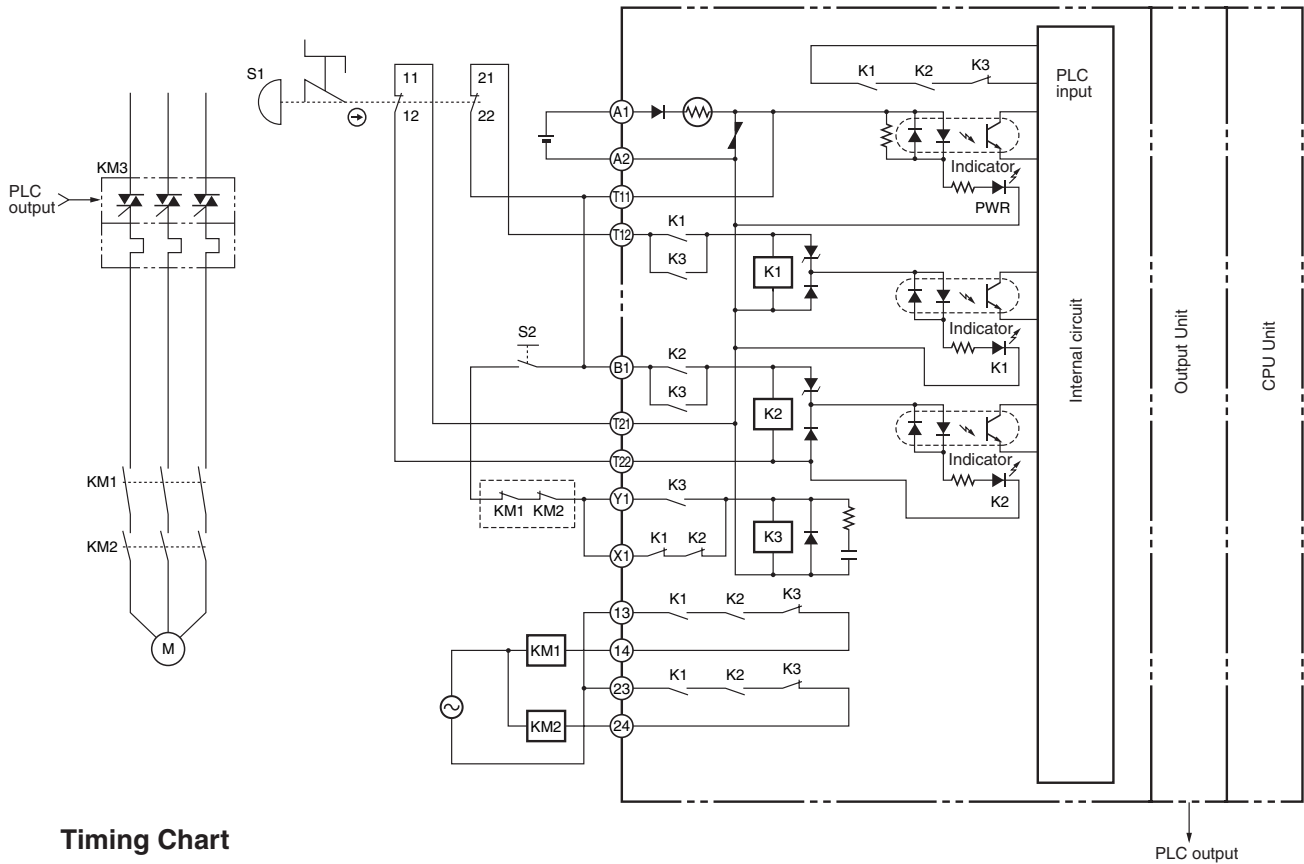


CS1W-SF200

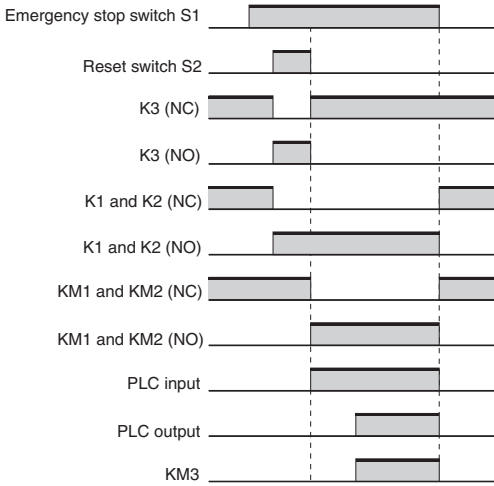


Application Examples

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



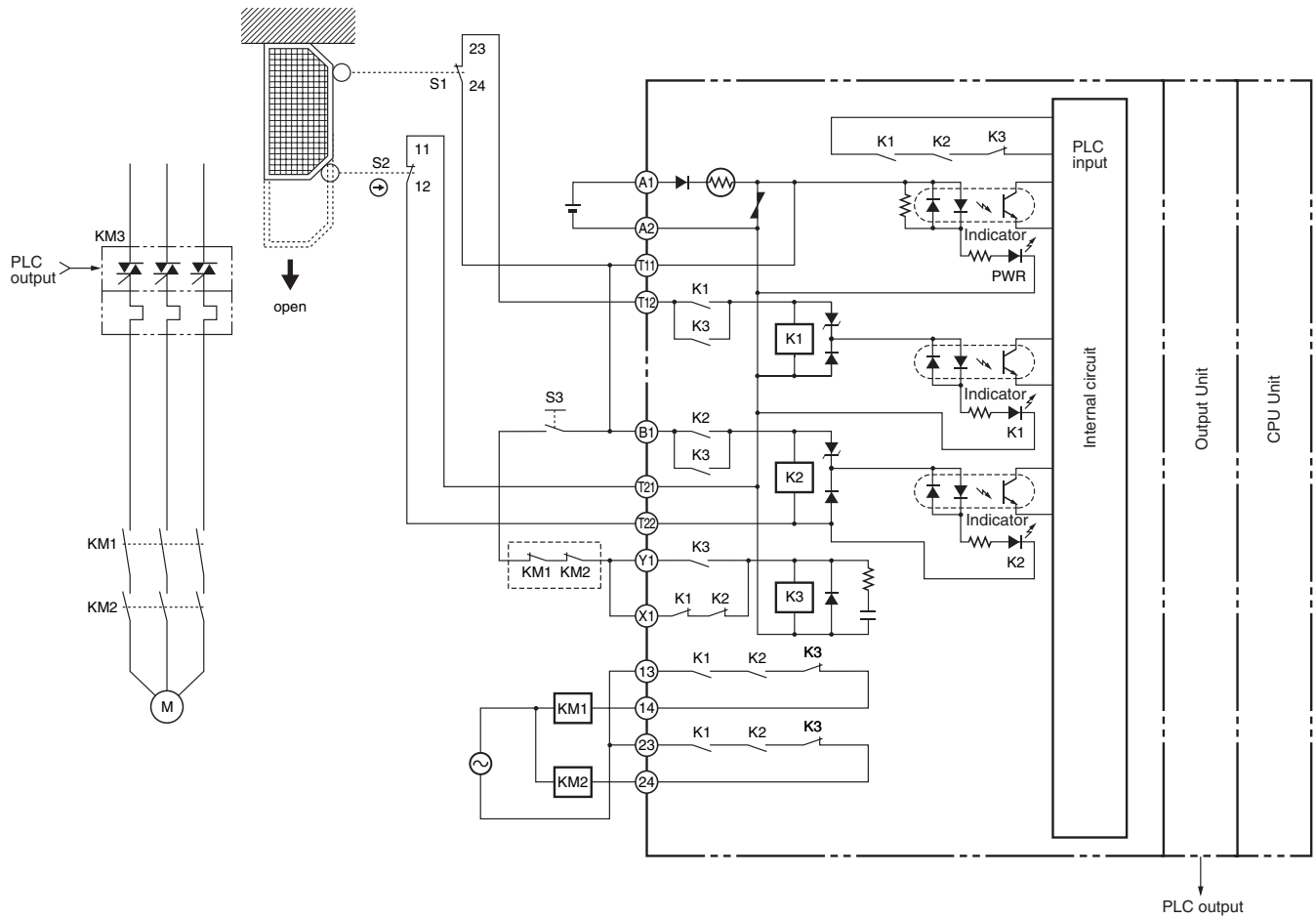
Timing Chart



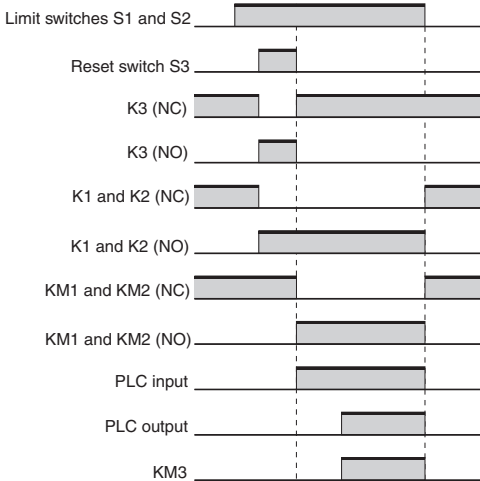
- S1: Emergency stop switch ⊖
- S2: Reset switch (momentary operation switch)
- KM1 and KM2: Magnetic Contactor
- KM3: G3J Solid-state Contactor
- M: 3-phase motor

Note: This circuit conforms to category 4.

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



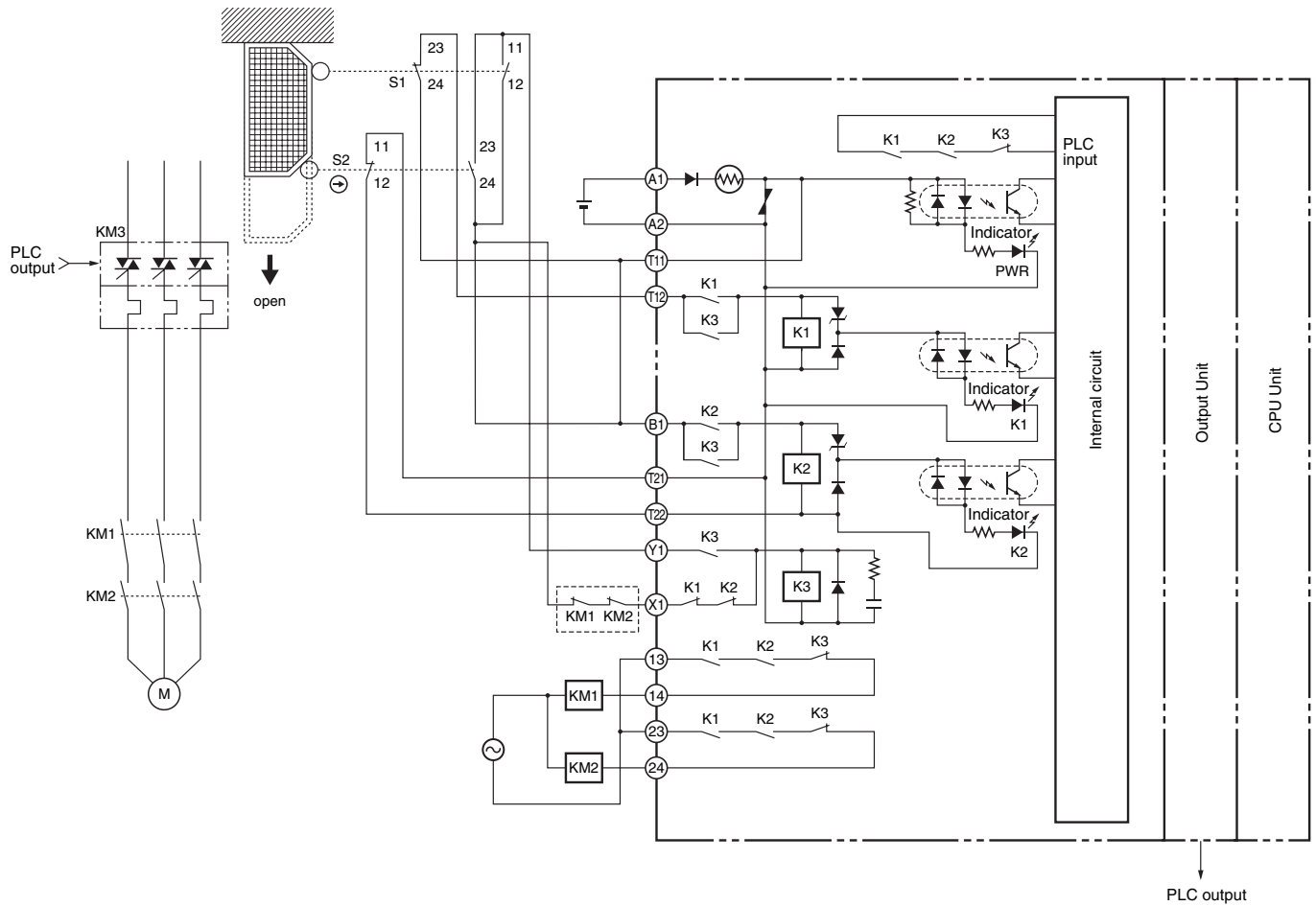
Timing Chart



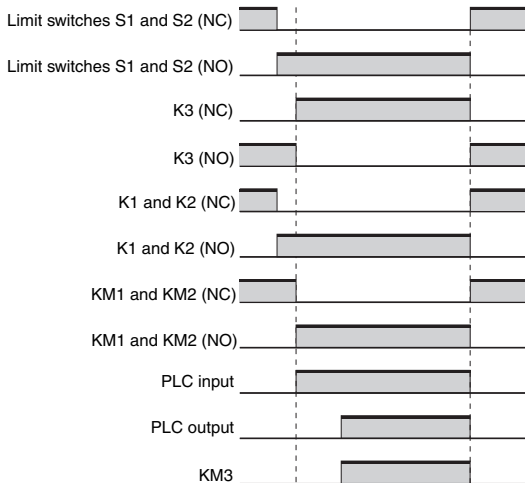
- S1: Limit switch (NO)
- S2: Safety Limit switch with direct opening mechanism (NC) (D4B-N, D4N, D4F) ⊖
- S3: Reset switch (momentary operation switch)
- KM1 and KM2: Magnetic Contactor
- KM3: G3J Solid-state Contactor
- M3: 3-phase motor

Note: This circuit conforms to category 4.

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



Timing Chart



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

Note: This circuit conforms to category 4.

Safety Precautions

Refer to the “*Precautions for All Relays*” and “*Precautions for All Relays with Forcibly Guided Contacts*”. Refer to the CQM1H Catalog (Cat. No. P050) and the CS1-series PLC Catalog (Cat. No. P047) for common performance specifications and precautions.

CAUTION

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.

Durability of Contact Outputs

Relay with Forcibly Guided Contact durability depends greatly on the switching condition. Confirm the actual conditions of operation in which the Relay will be used in order to make sure the permissible number of switching operations.

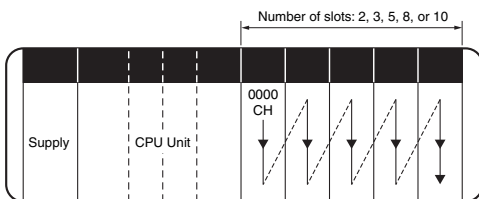
When the accumulated number of operation exceeds its permissible range, it can cause failure of reset of safety control circuit. In such case, please replace the Relay immediately. If the Relay is used continuously without replacing, then it can lead to loss of safety function.

Address Allocations

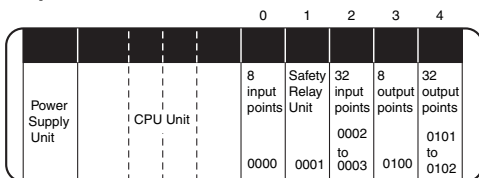
CQM1-SF200

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 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

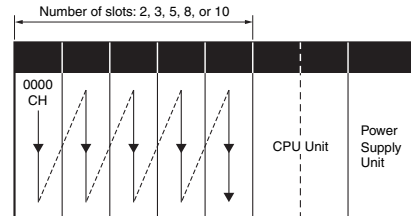
Slot 1
Safety Relay Unit

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
4 000104	General-purpose input
5 000105	General-purpose input
6 000106	General-purpose input
7 000107	General-purpose input

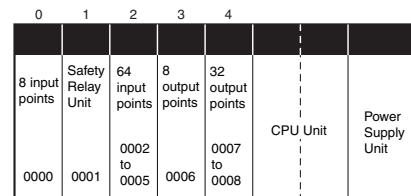
CS1W-SF200

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

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
4 000104	General-purpose input
5 000105	General-purpose input
6 000106	General-purpose input
7 000107	General-purpose input

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.

Certified 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)

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

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OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

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Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

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Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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2008.11

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