Safety One

FS1A Safety Controller

New **24**-logic model. **24** more safety circuits.

✓ Safety circuit logics compliant with international standards

✓ ISO 13849-1 PLe

International Standard Compliant
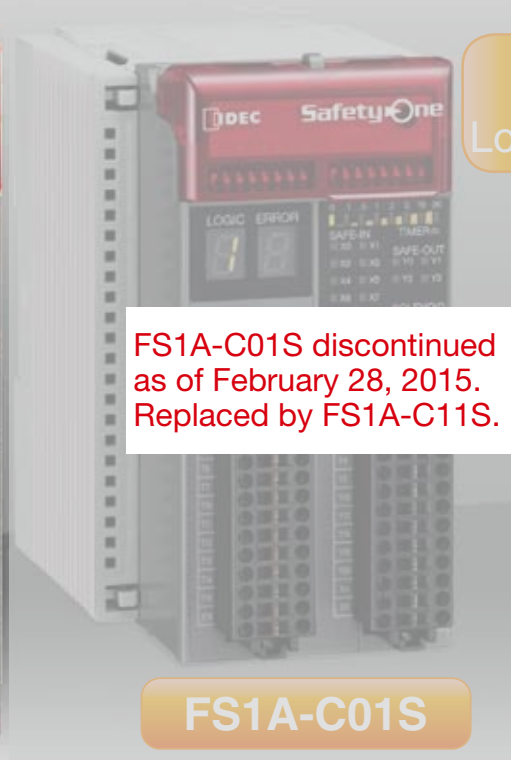
Cost Saving

No Programming Required

Compact

24 Logics

8 Logics

FS1A-C01S discontinued as of February 28, 2015. Replaced by FS1A-C11S.

FS1A-C11S

FS1A-C01S

IDEC CORPORATION

(15/03/05)

Safety One

This is evolution.

The FS1A-C11S safety controller with 24 new logics make it possible to control more types of safety systems.

FS1A-C11S 24 logics

FS1A-C01S 8 logics

FS1A-C01S discontinued as of February 28, 2015. Replaced by FS1A-C11S.

International Standards Compliant

ISO13849-1 PLe

Complies with key safety standards!

The **SafetyOne** satisfies:

EN 954-1	Category 4
IEC 61508	SIL3
ISO 13849-1	Performance level e

ISO	IEC	EN	ANSI/RIA
ANSI	SEMI	NFPA	

With 8 (FS1A-C01S) or 24 (FS1A-C11S) pre-programmed safety circuit logics in a compact housing, the FS1A **SafetyOne** safety controller allows you to build a safety circuit by just sliding a DIP switch. **Because the programs are tested and approved for compliance with key safety standards, labor, cost, and time for safety system certification can be reduced greatly.**

Note: The eight logic programs of FS1A-C01S are not included in the 24 logic programs of FS1A-C11S.

c **UL** US
LISTED

TÜV CE

Cost Saving

Reduces overall cost. Simple wiring!

One **SafetyOne** can replace more than seven safety relay modules.

When configuring mode change system

When using safety modules

· 7 safety relay modules
· 14 safety contactors

Before

The system is complicated, and the interlocking of mode selector switch cannot be determined. Results in a risk of not satisfying the required safety performance.

Emergency Stop Switch

Enabling Switch

Selector Switch

Interlock Switch

Interlock Switch
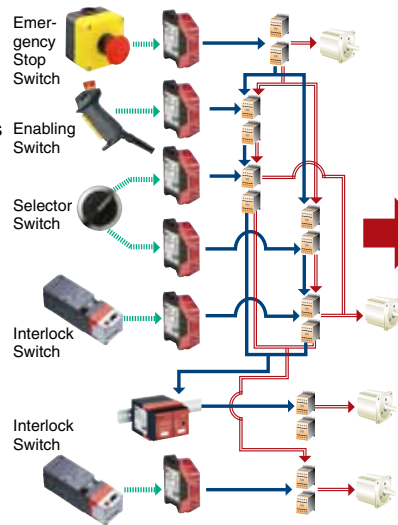
When using **SafetyOne**

(FS1A-C11S, logic 104)

· One FS1A
· 8 safety contactors

After

The system and wiring are much simpler, and the required safety level is satisfied.

No Programming Required

### Selecting a logic—that's all you need!

SafetyOne lets you configure a system without any programming. Just select one logic from 8 (FS1A-C01S) or 24 (FS1A-C11S) to configure a safety system.

Before

• Safety PLC
• Programming tools
• Creating and debugging a program

• Third-party certification for programs (time and cost)

Safety PLC or Safety Controller

Software (programs, function blocks)
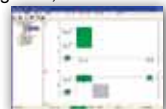
After

Logic selection only!

Simple DIP switch selection

No tools required

No programming or debugging

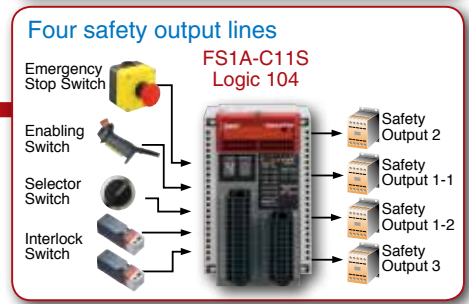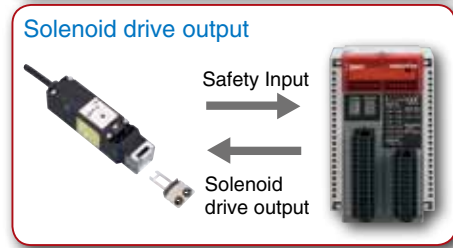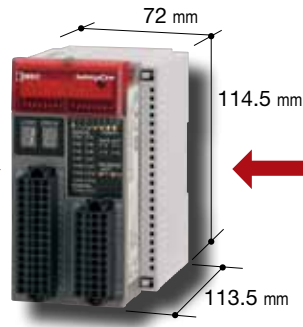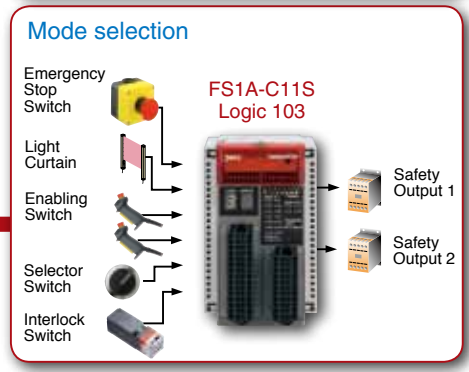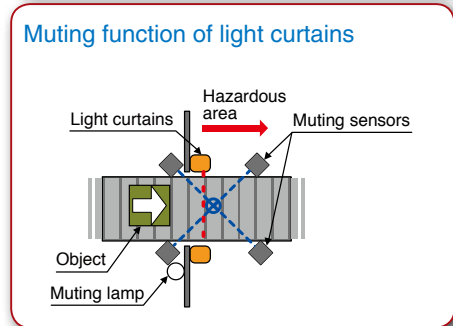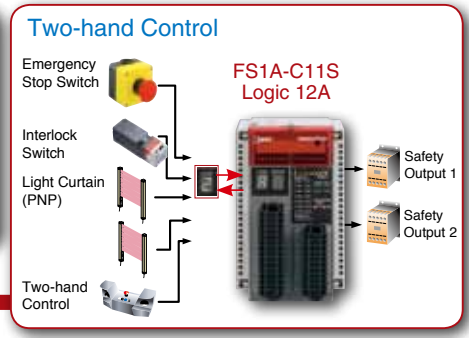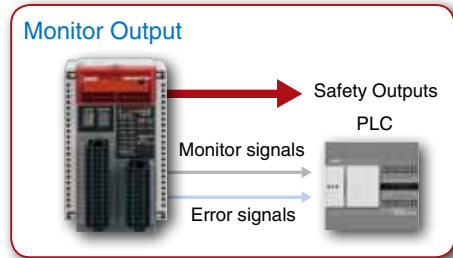No program certification required

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FS1A Safety Controller

Building a safety system has never been so easy, cost effective, or worry-free!

Large functionality in a compact housing!

Small & Compact

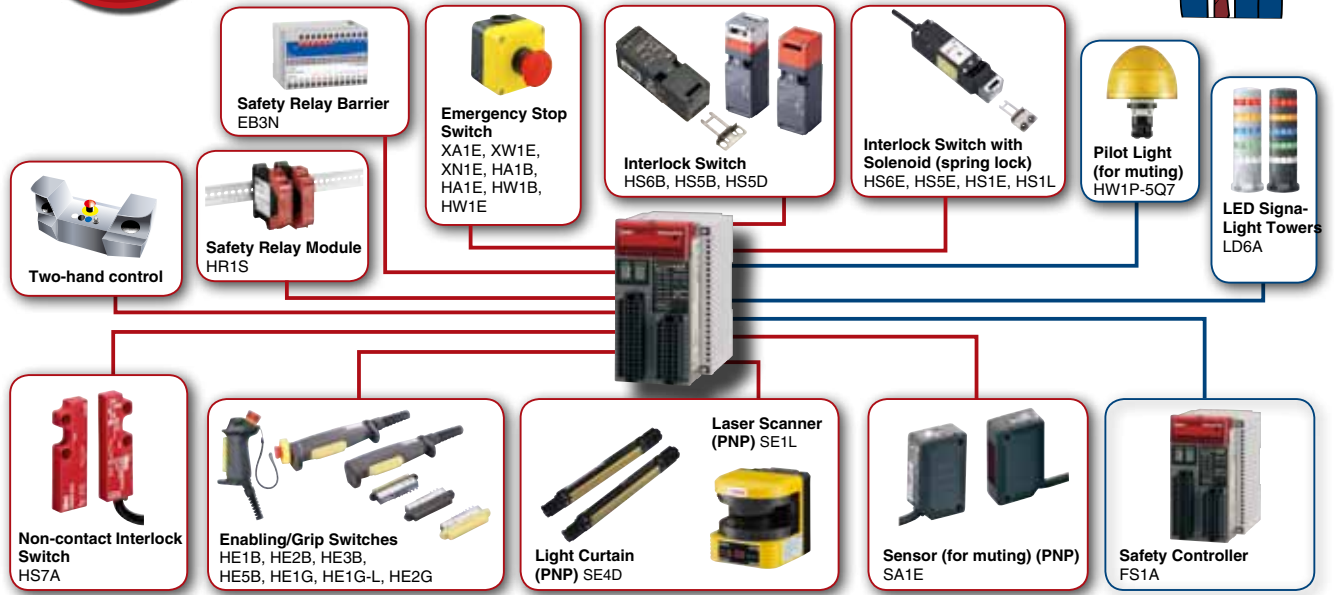**ALL-IN-ONE**

Replaces more than seven safety relay modules

Monitor Output

Safety Outputs

PLC

Monitor signals

Error signals

Two-hand Control

Emergency Stop Switch

Interlock Switch

Light Curtain (PNP)

Two-hand Control

FS1A-C11S Logic 12A

Safety Output 1

Safety Output 2

Muting function of light curtains

Light curtains

Hazardous area

Muting sensors

Object

Muting lamp

72 mm

114.5 mm

113.5 mm

Mode selection

Emergency Stop Switch

Light Curtain

Enabling Switch

Selector Switch

Interlock Switch

FS1A-C11S Logic 103

Safety Output 1

Safety Output 2

Solenoid drive output

Safety Input

Solenoid drive output

Four safety output lines

Emergency Stop Switch

Enabling Switch

Selector Switch

Interlock Switch

FS1A-C11S Logic 104

Safety Output 2

Safety Output 1-1

Safety Output 1-2

Safety Output 3

Various safety products can be connected easily using the **SafetyOne**.

Total Solution

Safety Relay Barrier
EB3N

Emergency Stop Switch
XA1E, XW1E, XN1E, HA1B, HA1E, HW1B, HW1E

Interlock Switch
HS6B, HS5B, HS5D

Interlock Switch with Solenoid (spring lock)
HS6E, HS5E, HS1E, HS1L

Pilot Light (for muting)
HW1P-5Q7

LED Signa-Light Towers
LD6A

Two-hand control

Safety Relay Module
HR1S

Non-contact Interlock Switch
HS7A

Enabling/Grip Switches
HE1B, HE2B, HE3B, HE5B, HE1G, HE1G-L, HE2G

Light Curtain (PNP) SE4D

Laser Scanner (PNP) SE1L

Sensor (for muting) (PNP)
SA1E

Safety Controller
FS1A

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START

Output Lines	Input Device 1	Input Device 2	Input Device 3	Logic No.	FS1A	

FS1A-C01S discontinued as of February 28, 2015. Replaced by FS1A-C11S.

Output Lines	Input Device 1	Input Device 2	Input Device 3	Logic No.	FS1A
1 line (Two dual safety outputs of the same operation)	Mode select necessary			006	FS1A-C01S
	Mode select unnecessary	Light curtain	Using the muting function of FS1A	004	FS1A-C01S
			Not using the muting function of FS1A	003	FS1A-C01S
		NO/NC contact device		002	FS1A-C01S
		Other devices		001	FS1A-C01S
				005	FS1A-C01S

Category 4

Output Lines	Input Device 1	Input Device 2	Input Device 3	Logic No.	FS1A
2 lines (Two dual safety outputs of different operations)	Mode select necessary	Light curtain	Not using the muting function of FS1A	103	FS1A-C11S
				13b	FS1A-C11S
				13C	FS1A-C11S
				13d	FS1A-C11S
		Other devices		103	FS1A-C11S
				13A	FS1A-C11S
				13b	FS1A-C11S
				13C	FS1A-C11S
				13d	FS1A-C11S
	Mode select unnecessary	Two-hand control		12A	FS1A-C11S
		Light curtain	Using the muting function of FS1A	11d	FS1A-C11S
			Not using the muting function of FS1A	11A	FS1A-C11S
				11C	FS1A-C11S
				102	FS1A-C11S
				12C	FS1A-C11S
		NO/NC contact device		11b	FS1A-C11S
		Other devices		007	FS1A-C01S
				008	FS1A-C01S
				101	FS1A-C11S
				11A	FS1A-C11S
				11C	FS1A-C11S
				102	FS1A-C11S
				12b	FS1A-C11S
				12C	FS1A-C11S

Category 3

Output Lines	Input Device 1	Input Device 2	Input Device 3	Logic No.	FS1A
4 lines (Four single safety outputs of different operations)	Mode select necessary	Light curtain	Not using the muting function of FS1A	14d	FS1A-C11S
				108	FS1A-C11S
		Other devices		104	FS1A-C11S
				14A	FS1A-C11S
				14b	FS1A-C11S
				14C	FS1A-C11S
				14b	FS1A-C11S
				108	FS1A-C11S
	Mode select unnecessary	Light curtain	Not using the muting function of FS1A	105	FS1A-C11S
				106	FS1A-C11S
		Other devices		105	FS1A-C11S
				106	FS1A-C11S
				107	FS1A-C11S

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FS1A-C01S discontinued as of February 28, 2015.
Replaced by FS1A-C11S.

FS1A-C01S

Logic Type	Logic No.	Interlock/Emergency Stop Switch	Enabling/Grip Switch	Mode Selection	Light Curtain	Muting	NO/NC Contact Inputs	Two-hand Control	Output 1 Line	Output put 2 Lines	Output 4 Lines	Page
General-purpose logic for various apparatus	001	●							●			6
General-purpose logic for NO/NC contact inputs	002	●					●		●			6
General-purpose logic for apparatus with openings	003	●			●				●			7
M...	004				●	●			●			7
...between contacts cannot be specified	005		●						●			8
The logic applicable for selection of active safety input devices	006	●	●	●					●			8
Partial stop 1 logic for various apparatus	007	●								●		9
Partial stop 2 logic for various apparatus	008	●								●		9

FS1A-C11S

Logic Type	Logic No.	Interlock/Emergency Stop Switch	Enabling/Grip Switch	Mode Selection	Light Curtain	Muting	NO/NC Contact Inputs	Two-hand Control	Output 1 Line	Output put 2 Lines	Output 4 Lines	Page
The logic for various apparatus	101	●	●						●			10
The logic for apparatus with openings	11A	●			●				●			10
The logic for apparatus with NO/NC contact inputs	11b	●					●		●			11
The logic for apparatus with openings	11C	●			●				●			11
Muting function logic for apparatus with openings	11d	●			●	●			●			11
Partial stop logic for apparatus with openings	102	●			●				●			12
The logic for apparatus with a two-hand control device	12A	●			●			●	●			12
The logic constructing an OR circuit for various apparatus	12b	●	●						●			13
The logic constructing an OR circuit for apparatus with openings	12C	●			●				●			13
Partial control logic for apparatus with openings	12d	●	●		●				●			13
Partial stop logic applicable for selection of active safety input devices	103	●	●	●	●				●			14
The logic applicable for selection of active safety input devices	13A	●	●	●					●			14
The logic constructing an OR circuit applicable for selection of active safety input devices	13b	●	●	●	●				●			15
Partial stop logic applicable for selection of active safety input devices	13C	●	●	●	●				●			15
The logic applicable for selection of active safety input devices	13d	●	●	●	●				●			15
Partial stop logic applicable for selection of active safety input devices	104	●	●	●						●		16
Partial stop logic applicable for selection of active safety input devices	14A	●	●	●						●		16
Partial stop logic applicable for selection of active safety input devices	14b	●	●	●						●		17
Partial stop logic applicable for selection of active safety input devices	14C	●	●	●						●		17
Partial stop logic applicable for selection of active safety input devices for apparatus with openings	14d	●	●	●	●					●		17
Partial stop logic for apparatus with openings	105	●			●					●		18
Partial stop logic for apparatus with openings	106	●			●					●		18
Partial stop logic for various apparatus	107	●								●		19
Partial stop logic applicable for selection of active safety input devices in apparatus with openings	108	●	●	●	●					●		19

Compliant with key safety standards

Applicable Standards	
ISO	13849-1, 10218-1, 13851 (FS1A-C11S)
IEC	61508, 62061, 61496-1, 60204-1, 61131-2, 61000-6-2, 61000-6-4
EN	954-1, 13849-1, 62061, 61496-1, 60204-1, 61131-2, 61000-6-2, 61000-6-4
ANSI/RIA	R15.06
ANSI	B11.19
SEMI	S2
NFPA	79
UL	UL508, CSA22.2 No.142

The **SafetyOne** satisfies the requirements of SIL3 (IEC 61508), performance level e (ISO 13849-1), and safety category 3 or 4 (EN 954-1).

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Safety◆One FS1A Safety Controller

FS1A-C01S

8 Logics
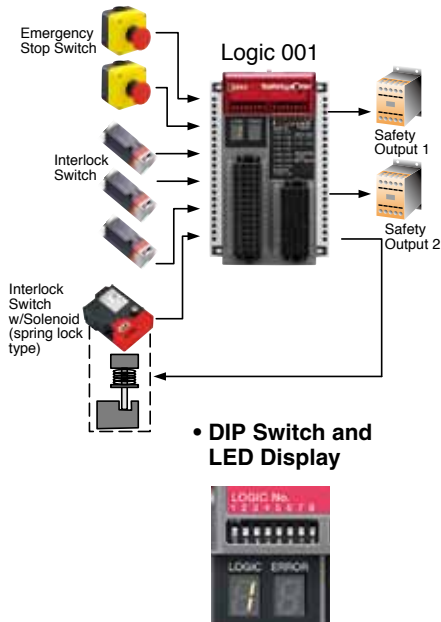
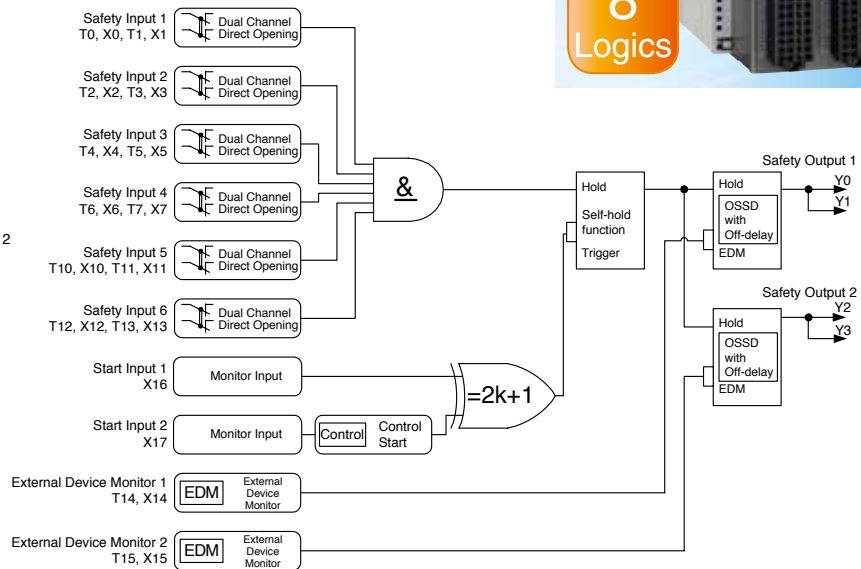| FS1A-C01S Logic 001	General-purpose logic for various apparatus	Output Line: 1 2 dual safety outputs of the same operation	Category 4

Logic 001 is used for safeguarding measures of machine tools and robots. It can be used with dual direct-opening components such as emergency stop switches and interlock switches.
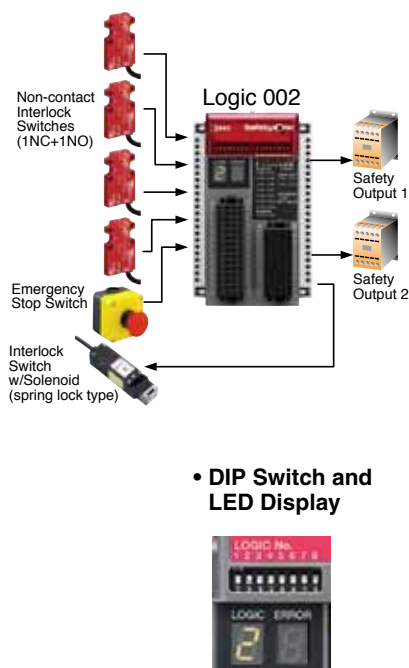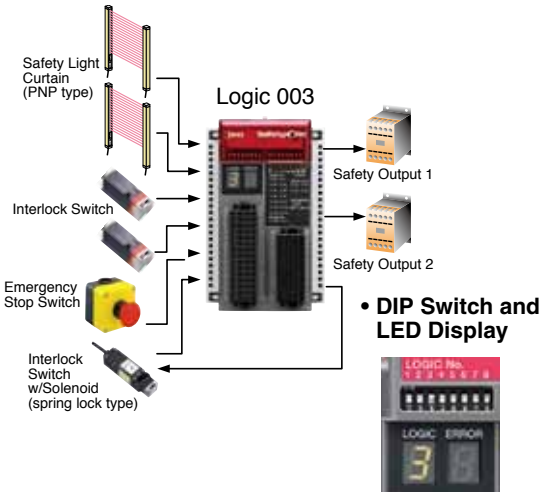
● Wiring Example

● Logic Chart

● DIP Switch and LED Display

FS1A-C01S Logic 002	General-purpose logic for NO/NC contact inputs	Output Line: 1 2 dual safety outputs of the same operation	Category 4

Logic 002 is used for semiconductor manufacturing systems or food packaging systems which have non-contact interlock switches with NO/NC contacts. In this logic, components with dual NO/NC contacts such as a non-contact interlock switch and a mechanical interlock switch, as well as dual direct-opening components such as emergency stop switch and interlock switches can be used at the same time.

● Wiring Example

● Logic Chart

● DIP Switch and LED Display

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Safety One FS1A Safety Controller
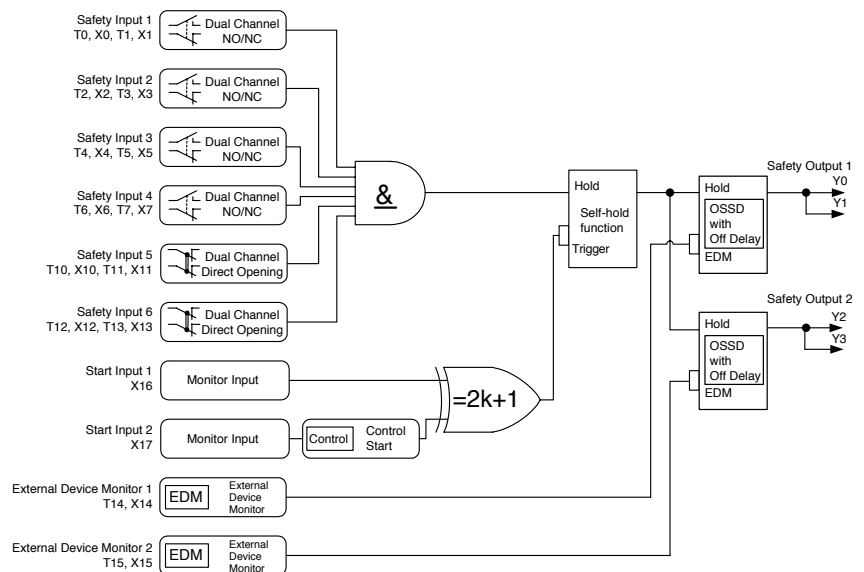
FS1A-C01S Logic 003	General-purpose logic for apparatus with openings	Output Line: 1 2 dual safety outputs of the same operation	Category 4

Logic 003 is a general-purpose logic for robots and conveyor lines which have dual solid state outputs of light curtains and safety laser scanners. In addition, dual direct-opening components such as emergency stop switches and interlock switches can be used at the same time.

Light Curtain for High Level of Safety

Productivity of conveyor lines and process machines can be improved by installing the light curtains (IEC 61496). Safety can be ensured without the need for installing guard doors.

● Wiring Example

Safety Light Curtain (PNP type)

Logic 003

Safety Output 1

Interlock Switch

Safety Output 2

Emergency Stop Switch

Interlock Switch w/Solenoid (spring lock type)

● DIP Switch and LED Display

● Logic Chart
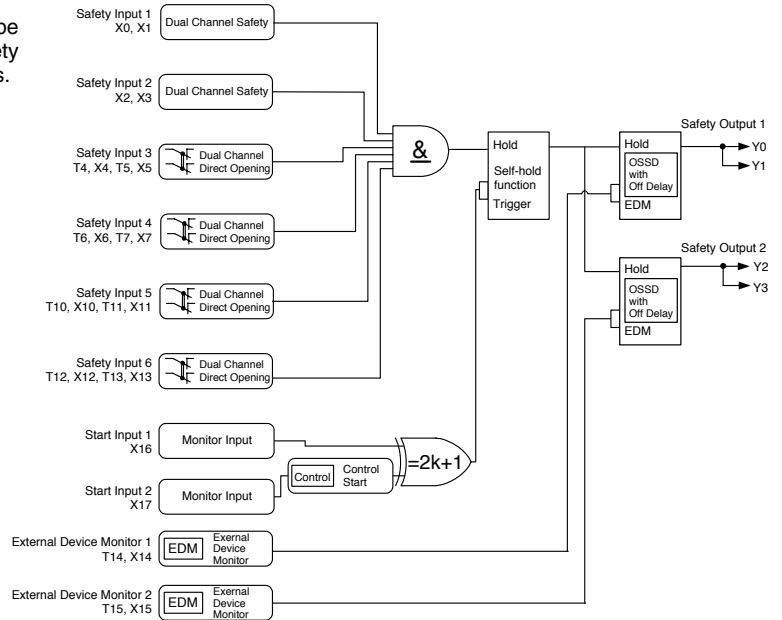
FS1A-C01S Logic 004	Muting function logic for apparatus with openings	Output Line: 1 2 dual safety outputs of the same operation	Category 4

In Logic 004, muting functions are added to the dual solid state output of Logic 003. Dual direct-opening components such as emergency stop switches and interlock switches can be used at the same time.

Muting Function Improves Productivity

With a muting function, the system stops when detecting a human and temporarily defeats the light curtain while work objects are being supplied. This improves the system's productivity. Muting functions can be used easily by connecting a light curtain, muting sensor, and muting lamp to the **SafetyOne** (Note). In muting status, the OFF signals of corresponding safety solid state outputs are defeated.

● Wiring Example

Hazardous Area

Light Curtain — Muting Sensor

Note: Make sure that the intersection of optical axes is within the hazardous area.

Object

Muting Lamp

Light Curtain (PNP type)

Muting Sensor (PNP type)

Light Curtain (PNP type)

Logic 004

Safety Output 1

Muting Sensor (PNP type)

Safety Output 2

Emergency Stop Switch

Muting Lamp

● DIP Switch and LED Display
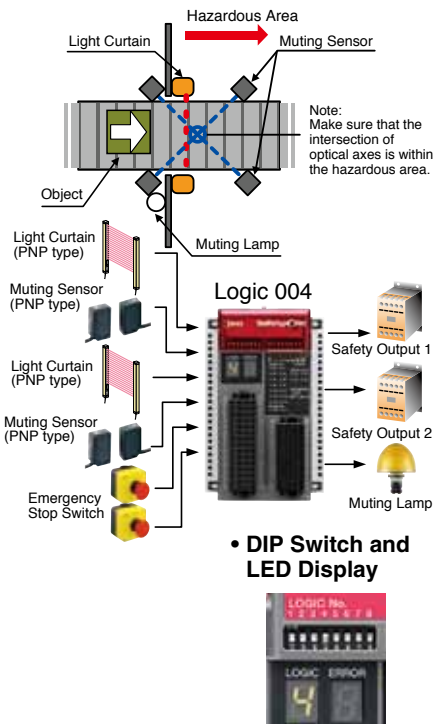
● Logic Chart
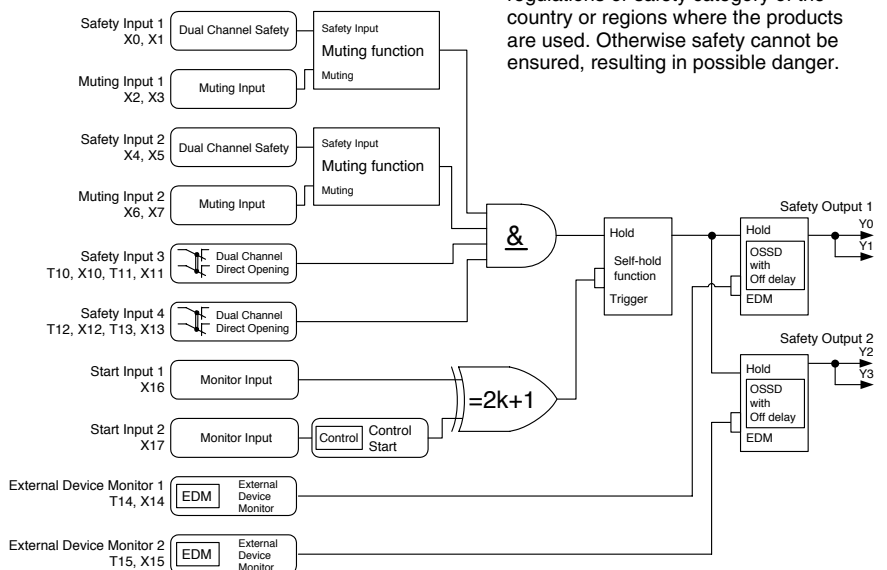
Note: Use light curtains, muting sensors, and muting lamps which meet the safety regulations or safety category of the country or regions where the products are used. Otherwise safety cannot be ensured, resulting in possible danger.

Note: When installing light curtain and muting sensor, ensure safety by referring to IEC TS 62046 technical documents.

Safety One FS1A Safety Controller

| FS1A-C01S Logic 005	General-purpose logic for devices for which sync time between contacts cannot be specified	Output Line: 1 2 dual safety outputs of the same operation	Category 4

Logic 005 is used for providing safeguarding measures of various systems such as machine tools and robots. Because the input error detection time of dual dependent inputs are set to ∞ (infinite), this logic can be used even when there is a long lag time between the two inputs.

• Wiring Example

Logic 005

• DIP Switch and LED Display

• Logic Chart

$$=2k+1$$
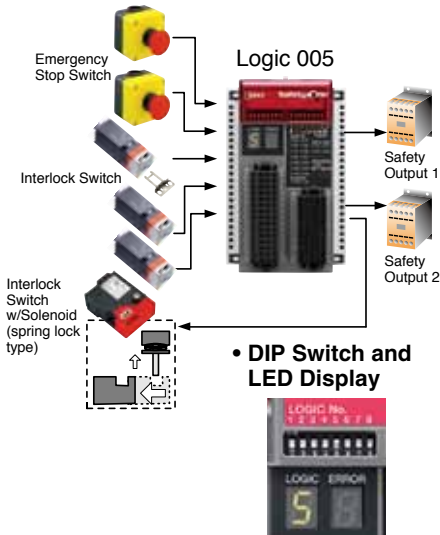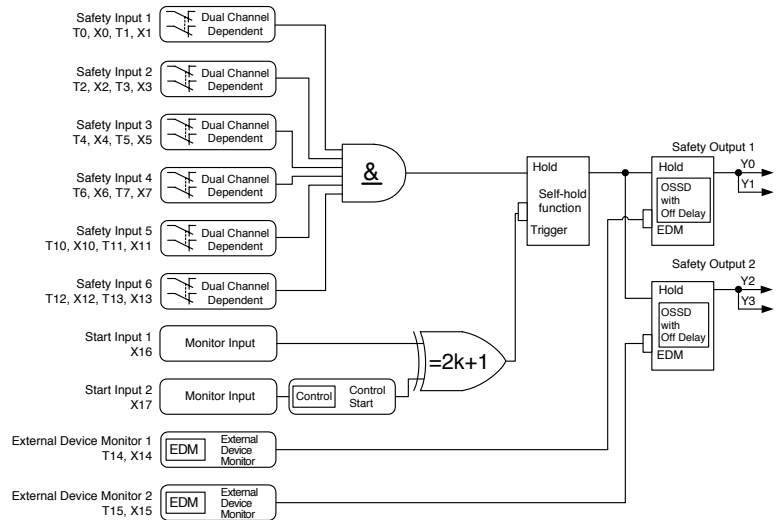
FS1A-C01S Logic 006	The logic applicable for selection of active safety input devices	Output Line: 1 2 dual safety outputs of the same operation	Category 4

Logic 6 is the mode selection logic used in machine tools, semiconductor manufacturing equipment, and other systems where an active safety component is switched depending on the operation mode. Of dual direct-opening input and dual dependent input, an active input can be selected using the mode selection switch.

• Wiring Example

Auto Mode (Machine operating)

Logic 006

Teach mode (During maintenance)

Logic 006

• DIP Switch and LED Display
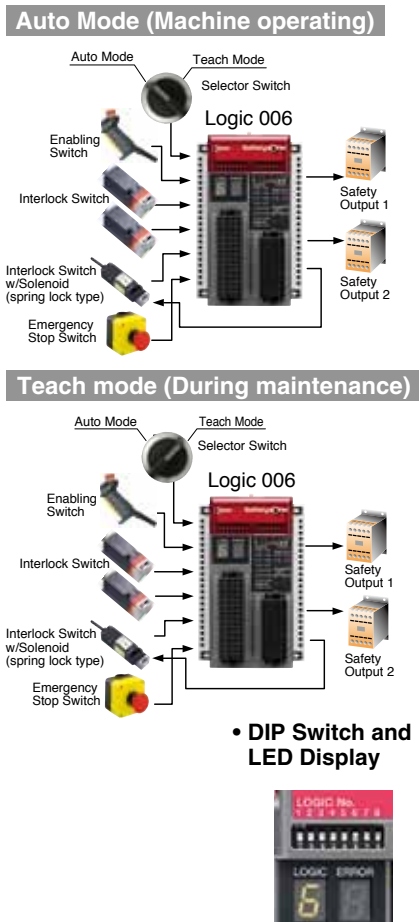
Mode Selection Ensures Safety

When the operator works inside a guard door for teaching, checking, and maintenance, an active safety component needs to be switched from interlock component, such as interlock switch installed on the guard door, or an enabling switch of a grip switch and teaching pendant.

• Logic Chart

$$\geq 1$$

Enabling Switch Ensures Safety

An enabling switch enables the manual operation of machines and robots only when the switch is maintained in the predetermined position (position 2). When the operator either releases (position 1) or holds tightly (position 3) the switch, the circuit is shut down. While an emergency stop switch is used to stop a machine's operation by the operator's intention, an enabling switch is used to disable machine operation by the operator's reaction (releasing or holding tightly) to unexpected machine operation.
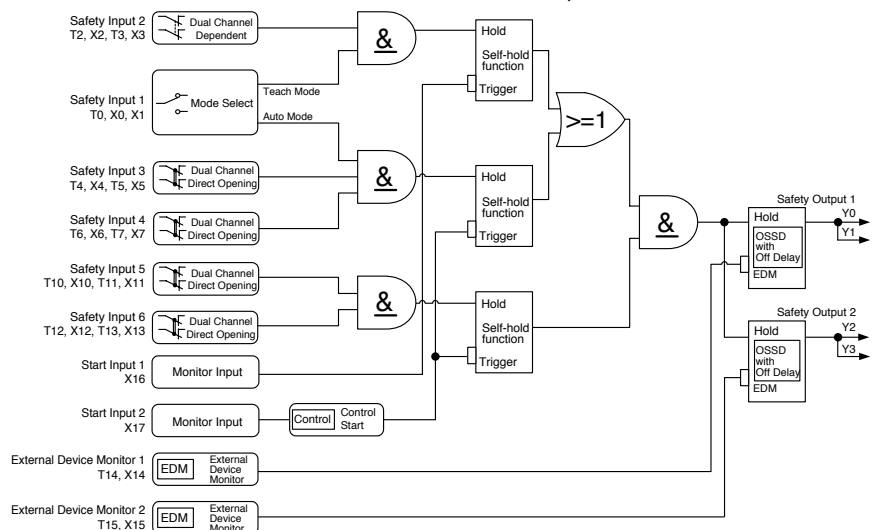
Note: Use spring lock type for interlock switch with solenoid. When using solenoid lock type, do not use the solenoid output on FS1A safety controller. Provide separate solenoid output.
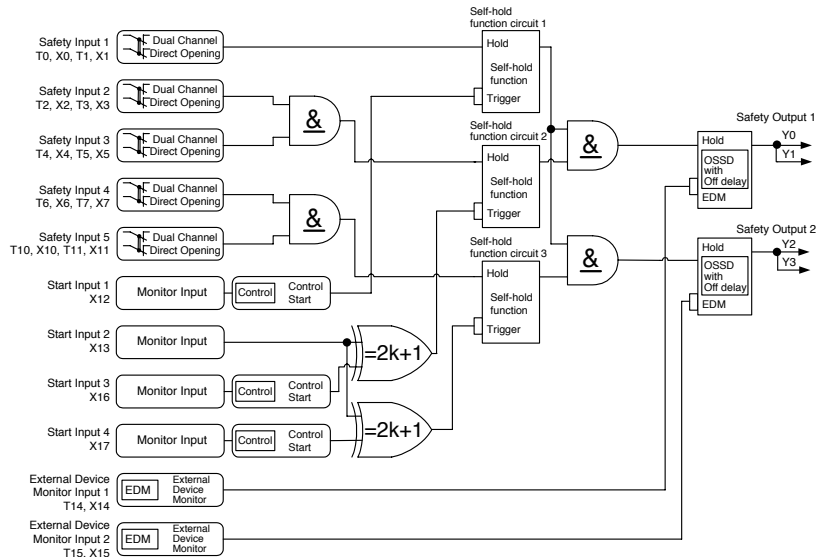
IDEC

FS1A-C01S Logic 007	Partial stop 1 logic for various apparatus	Output Line: 2 2 dual safety outputs of different operations	Category 4

Logic 007 is used for partial stop of systems such as machine tools, semiconductor manufacturing equipment, and food packaging machines. Four safety outputs can be controlled in two lines.
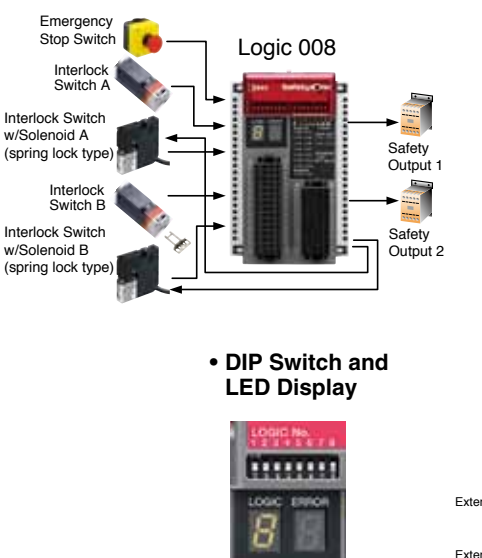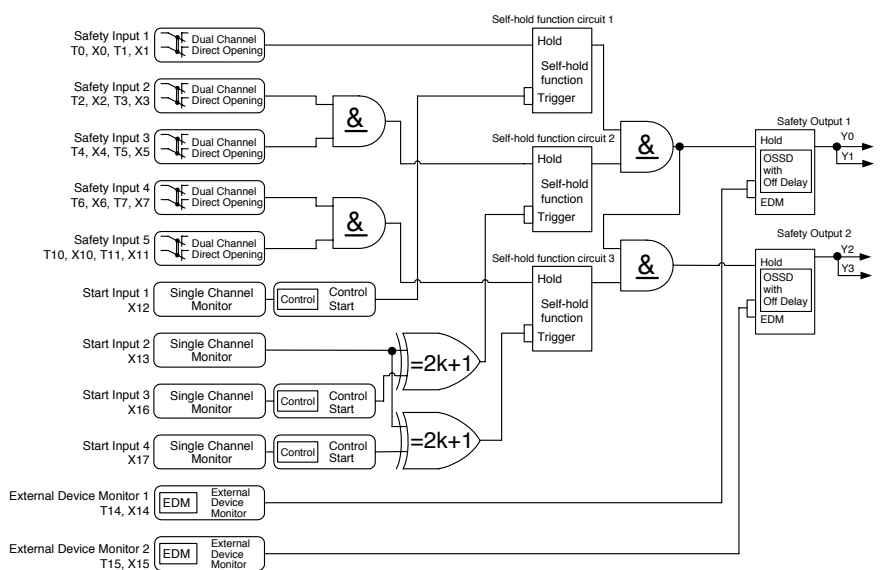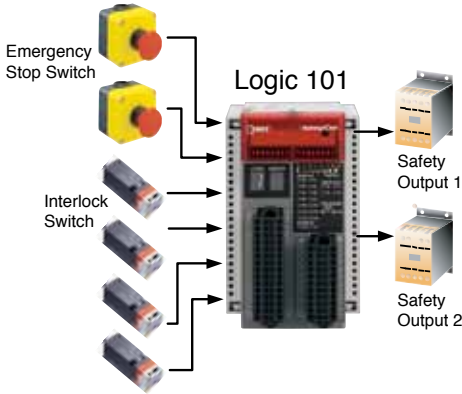
• **Wiring Example**

Partial Stop Improves Productivity

Two-line outputs can be controlled separately for partial stop, improving production efficiency greatly compared to entire stop.

Logic 007

Emergency Stop Switch
Interlock Switch A
Interlock Switch w/Solenoid A (spring lock type)
Interlock Switch B
Interlock Switch w/Solenoid B (spring lock type)

Safety Output 1
Safety Output 2

• **DIP Switch and LED Display**
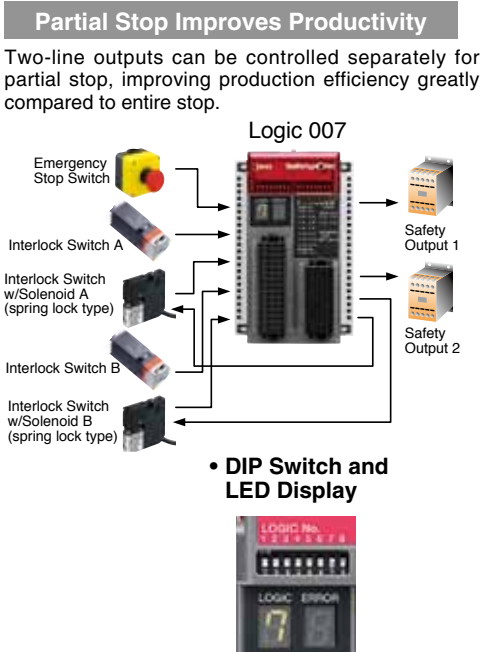
• **Logic Chart**

FS1A-C01S Logic 008	Partial stop 2 logic for various apparatus	Output Line: 2 2 dual safety outputs of different operations	Category 4

Logic 8 is used for interlocked partial stop of systems such as machine tools, semiconductor manufacturing equipment, and food packaging machines. Four safety outputs can be controlled in two lines.

• **Wiring Example**

Logic 008

Emergency Stop Switch
Interlock Switch A
Interlock Switch w/Solenoid A (spring lock type)
Interlock Switch B
Interlock Switch w/Solenoid B (spring lock type)

Safety Output 1
Safety Output 2

• **DIP Switch and LED Display**

• **Logic Chart**

Note: Use spring lock type interlock switch with solenoid. When using solenoid lock type, do not use the solenoid output on FS1A safety controller. Provide separate solenoid output.

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Safety One FS1A Safety Controller

FS1A-C11S

FS1A-C11S Logic 101	The logic for various apparatus	Output Line: 2 2 dual safety outputs of different operations	Category 4

Logic 101 is used for safeguarding measures of machine tools and robots. Safety outputs are dual channel outputs. It can be used with two dual direct-opening components and for dual channel dependent inputs. Safety output 2 has an off-delay timer.
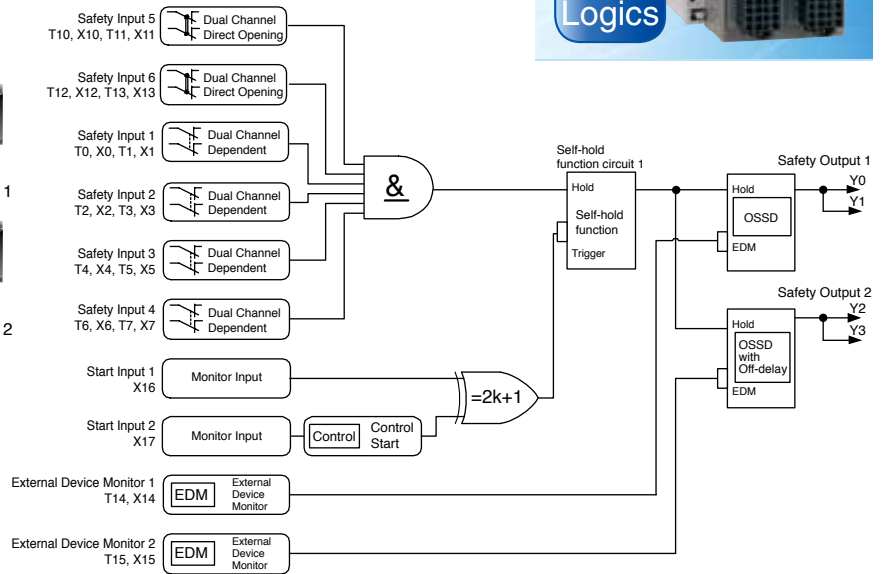
• Wiring Example

Emergency Stop Switch

Logic 101

Interlock Switch

Safety Output 1

Safety Output 2

• DIP Switch and LED Display

• Logic Chart

Safety Input 5 T10, X10, T11, X11 — Dual Channel Direct Opening

Safety Input 6 T12, X12, T13, X13 — Dual Channel Direct Opening

Safety Input 1 T0, X0, T1, X1 — Dual Channel Dependent

Safety Input 2 T2, X2, T3, X3 — Dual Channel Dependent

Safety Input 3 T4, X4, T5, X5 — Dual Channel Dependent

Safety Input 4 T6, X6, T7, X7 — Dual Channel Dependent

&

Self-hold function circuit 1 — Hold / Self-hold function / Trigger

Safety Output 1 — Hold OSSD EDM — Y0 Y1

Start Input 1 X16 — Monitor Input

Start Input 2 X17 — Monitor Input — Control / Control Start

=2k+1

Safety Output 2 — Hold OSSD with Off-delay EDM — Y2 Y3

External Device Monitor 1 T14, X14 — EDM External Device Monitor

External Device Monitor 2 T15, X15 — EDM External Device Monitor

FS1A-C11S Logic 11A	The logic for apparatus with openings	Output Line: 2 2 dual safety outputs of different operations	Category 4

Logic 11A is used for safeguarding measures of machine tools and robots, which use safety equipment such as light curtains with dual solid state outputs. Safety outputs are dual channel outputs. Two dual channel direct opening inputs and four dual channel safety inputs can be connected. Safety output 2 has an off-delay timer.
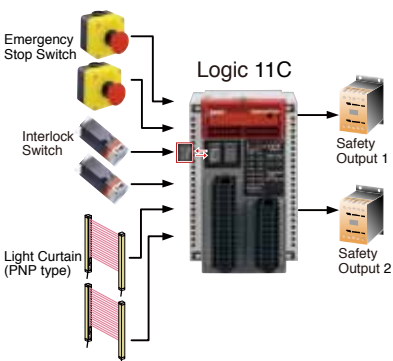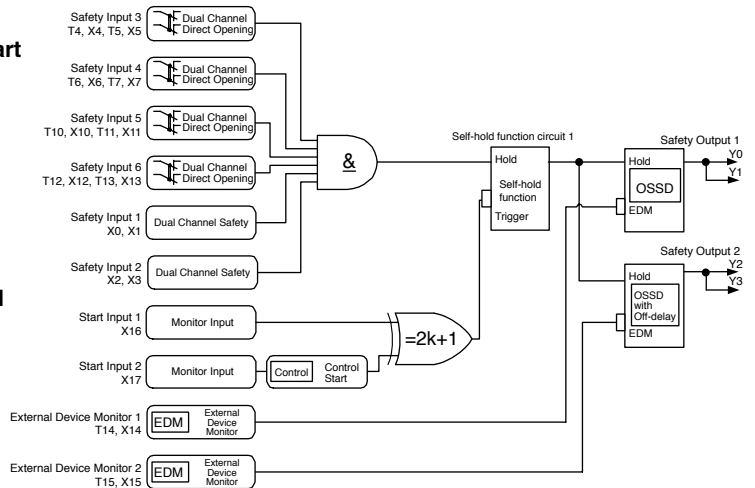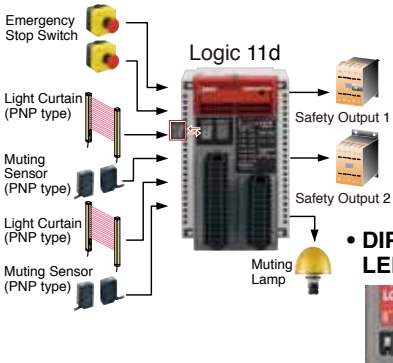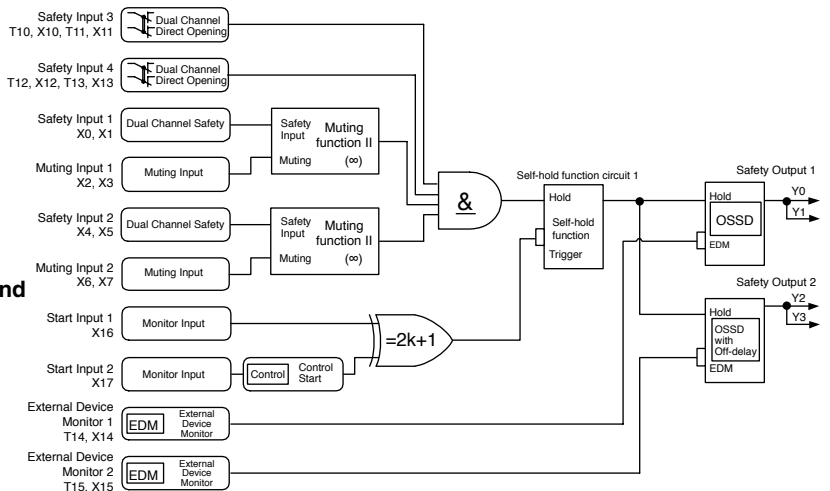
• Wiring Example

Emergency Stop Switch

Logic 11A

Interlock Switch

Light Curtain (PNP type)

Safety Output 1

Safety Output 2

• DIP Switch and LED Display

• Logic Chart

Safety Input 5 T10, X10, T11, X11 — Dual Channel Direct Opening

Safety Input 6 T12, X12, T13, X13 — Dual Channel Direct Opening

Safety Input 1 X0, X1 — Dual Channel Safety

Safety Input 2 X2, X3 — Dual Channel Safety

Safety Input 3 X4, X5 — Dual Channel Safety

Safety Input 4 X6, X7 — Dual Channel Safety

&

Self-hold function circuit 1 — Hold / Self-hold function / Trigger

Safety Output 1 — Hold OSSD EDM — Y0 Y1

Start Input 1 X16 — Monitor Input

Start Input 2 X17 — Monitor Input — Control / Control Start

=2k+1

Safety Output 2 — Hold OSSD with Off-delay EDM — Y2 Y3

External Device Monitor 1 T14, X14 — EDM External Device Monitor

External Device Monitor 2 T15, X15 — EDM External Device Monitor

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FS1A-C11S Logic 11b — The logic for apparatus with NO/NC contact inputs

Output Line: 2 — 2 dual safety outputs of different operations | **Category 4**

Logic 11b is used for safeguarding measures of semiconductor manufacturing equipment and food packing machine which use dual channel NO/NC contact equipment. Safety outputs are dual channel outputs. Two dual channel direct opening inputs and four dual channel NO/NC inputs can be connected. Safety output 2 has an off-delay timer.

• **Wiring Example**

Emergency Stop Switch

Interlock Switch

Non-contact Interlock Switches

Logic 11b

Safety Output 1

Safety Output 2

• **Logic Chart**

• **DIP Switch and LED Display**

Safety Input 5 — T10, X10, T11, X11 — Dual Channel Direct Opening
Safety Input 6 — T12, X12, T13, X13 — Dual Channel Direct Opening
Safety Input 1 — T0, X0, T1, X1 — Dual Channel NO/NC
Safety Input 2 — T2, X2, T3, X3 — Dual Channel NO/NC
Safety Input 3 — T4, X4, T5, X5 — Dual Channel NO/NC
Safety Input 4 — T6, X6, T7, X7 — Dual Channel NO/NC
Start Input 1 — X16 — Monitor Input
Start Input 2 — X17 — Monitor Input — Control / Control Start
External Device Monitor 1 — T14, X14 — EDM External Device Monitor
External Device Monitor 2 — T15, X15 — EDM External Device Monitor

&   =2k+1   Self-hold function circuit 1 (Hold / Self-hold function / Trigger)   Hold / OSSD / EDM — Safety Output 1 Y0, Y1   Hold / OSSD with Off-delay / EDM — Safety Output 2 Y2, Y3

FS1A-C11S Logic 11C — The logic for apparatus with openings

Output Line: 2 — 2 dual safety outputs of different operations | **Category 4**

Logic 11C is used for safeguarding measures of machine tools and robots, which use safety equipment such as light curtains with dual solid state outputs. Safety outputs are dual channel outputs. Four dual channel direct opening inputs, and two dual channel safety inputs can be connected. Safety output 2 has an off-delay timer.

• **Wiring Example**

Emergency Stop Switch

Interlock Switch

Light Curtain (PNP type)

Logic 11C

Safety Output 1

Safety Output 2

• **Logic Chart**

• **DIP Switch and LED Display**

Safety Input 3 — T4, X4, T5, X5 — Dual Channel Direct Opening
Safety Input 4 — T6, X6, T7, X7 — Dual Channel Direct Opening
Safety Input 5 — T10, X10, T11, X11 — Dual Channel Direct Opening
Safety Input 6 — T12, X12, T13, X13 — Dual Channel Direct Opening
Safety Input 1 — X0, X1 — Dual Channel Safety
Safety Input 2 — X2, X3 — Dual Channel Safety
Start Input 1 — X16 — Monitor Input
Start Input 2 — X17 — Monitor Input — Control / Control Start
External Device Monitor 1 — T14, X14 — EDM External Device Monitor
External Device Monitor 2 — T15, X15 — EDM External Device Monitor

&   =2k+1   Self-hold function circuit 1 (Hold / Self-hold function / Trigger)   Hold / OSSD / EDM — Safety Output 1 Y0, Y1   Hold / OSSD with Off-delay / EDM — Safety Output 2 Y2, Y3

FS1A-C11S Logic 11d — Muting function logic for apparatus with openings

Output Line: 2 — 2 dual safety outputs of different operations | **Category 4**

Logic 11d is used for safeguarding measures of robots and conveyor lines, which uses safety equipment such as light curtains with dual solid state outputs, and also equipment that outputs muting signals for safety equipment. Safety outputs are dual channel outputs. Two dual channel direct opening inputs, two dual channel safety inputs, two muting signals (muting sensor or limit switch) (two signals = one muting point) can be connected. Safety output 2 has an off-delay timer.

• **Wiring Example**

Emergency Stop Switch

Light Curtain (PNP type)

Muting Sensor (PNP type)

Light Curtain (PNP type)

Muting Sensor (PNP type)

Logic 11d

Safety Output 1

Safety Output 2

Muting Lamp

• **Logic Chart**

• **DIP Switch and LED Display**

Safety Input 3 — T10, X10, T11, X11 — Dual Channel Direct Opening
Safety Input 4 — T12, X12, T13, X13 — Dual Channel Direct Opening
Safety Input 1 — X0, X1 — Dual Channel Safety — Safety Input / Muting / Muting function II (∞)
Muting Input 1 — X2, X3 — Muting Input
Safety Input 2 — X4, X5 — Dual Channel Safety — Safety Input / Muting / Muting function II (∞)
Muting Input 2 — X6, X7 — Muting Input
Start Input 1 — X16 — Monitor Input
Start Input 2 — X17 — Monitor Input — Control / Control Start
External Device Monitor 1 — T14, X14 — EDM External Device Monitor
External Device Monitor 2 — T15, X15 — EDM External Device Monitor

&   =2k+1   Self-hold function circuit 1 (Hold / Self-hold function / Trigger)   Hold / OSSD / EDM — Safety Output 1 Y0, Y1   Hold / OSSD with Off-delay / EDM — Safety Output 2 Y2, Y3

FS1A-C11S Logic 102	Partial stop logic for apparatus with openings	Output Line: 2 2 dual safety outputs of different operations	Category 4

Logic 102 is used for safeguarding measures of machine tools and robots, which use safety equipment such as light curtains with dual solid state outputs. Safety outputs are dual channel outputs. Three dual channel direct opening inputs and three dual safety inputs can be connected.
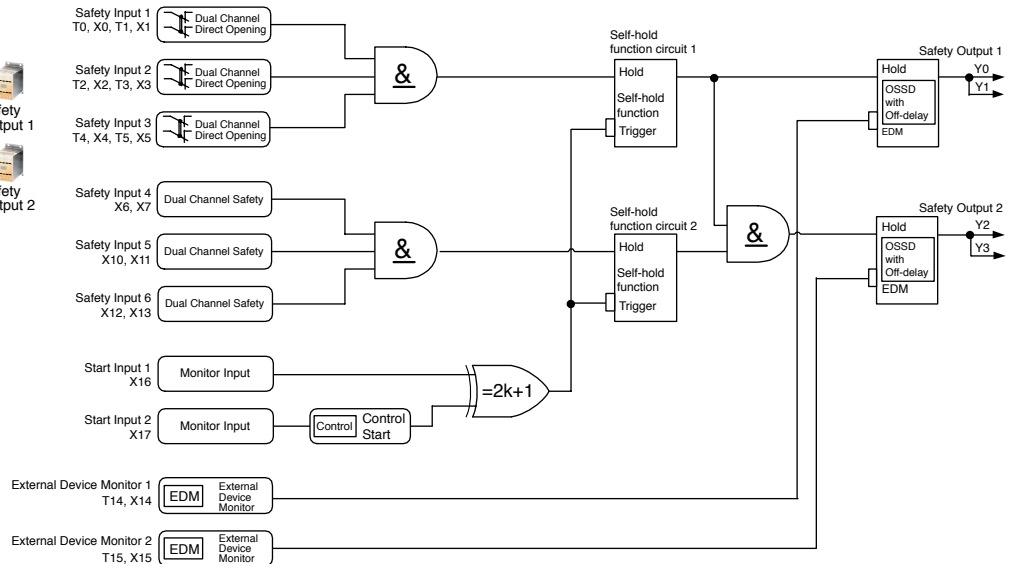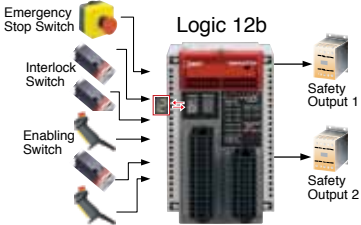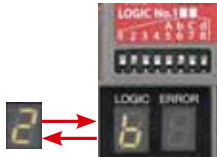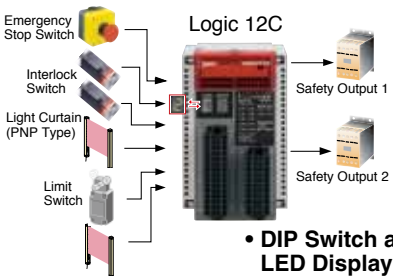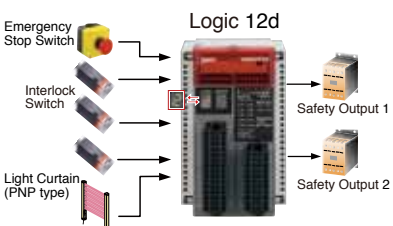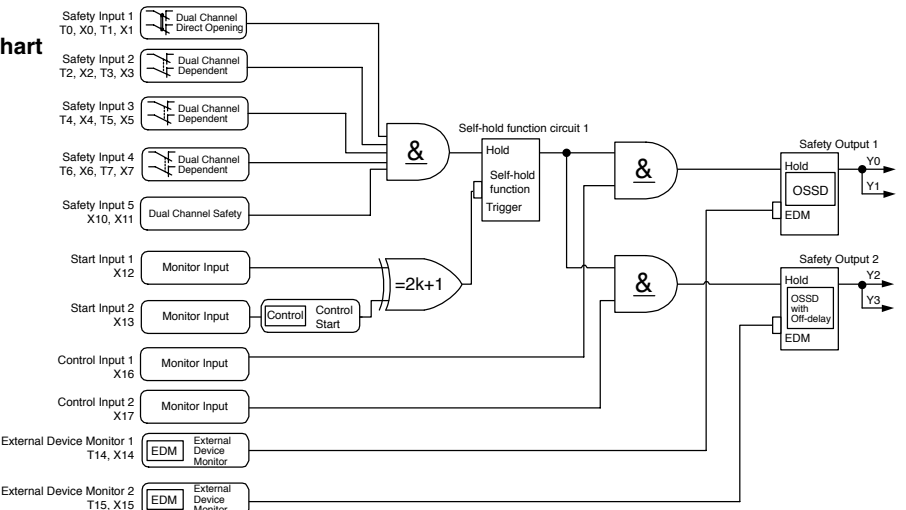
• Wiring Example

• DIP Switch and LED Display

• Logic Chart

Safety Input 1 T0, X0, T1, X1 — Dual Channel Direct Opening
Safety Input 2 T2, X2, T3, X3 — Dual Channel Direct Opening
Safety Input 3 T4, X4, T5, X5 — Dual Channel Direct Opening
Safety Input 4 X6, X7 — Dual Channel Safety
Safety Input 5 X10, X11 — Dual Channel Safety
Safety Input 6 X12, X13 — Dual Channel Safety
Start Input 1 X16 — Monitor Input
Start Input 2 X17 — Monitor Input / Control Control Start
External Device Monitor 1 T14, X14 — EDM External Device Monitor
External Device Monitor 2 T15, X15 — EDM External Device Monitor

Self-hold function circuit 1 — Hold / Self-hold function / Trigger
Self-hold function circuit 2 — Hold / Self-hold function / Trigger
=2k+1
Safety Output 1 Y0 Y1 — Hold OSSD with Off-delay EDM
Safety Output 2 Y2 Y3 — Hold OSSD with Off-delay EDM

FS1A-C11S Logic 12A	The logic for apparatus with a two-hand control device	Output Line: 2 2 dual safety outputs of different operations	Category 4

Logic 12A is used for safeguarding measures of machine tools that use two-hand control. Safety outputs are dual channel outputs. Two dual channel direct opening inputs, one two-hand control input (two safety inputs = one point), and two dual channel safety inputs can be connected. Safety output 2 has an off-delay timer.

• Wiring Example

• DIP Switch and LED Display

• Logic Chart

Safety Input 3 T4, X4, T5, X5 — Dual Channel Direct Opening
Safety Input 4 T6, X6, T7, X7 — Dual Channel Direct Opening
Safety Input 1 X0, X1 — Dual Channel Safety
Safety Input 2 X2, X3 — Dual Channel Safety
Safety Input 5 T10, X10, T11, X11 — Dual Channel NO/NC
Safety Input 6 T12, X12, T13, X13 — Dual Channel NO/NC
Safety Input 1 / Safety Input 2 — Two-hand control Type IIIC
Start Input 1 X16 — Monitor Input
Start Input 2 X17 — Monitor Input / Control Control Start
External Device Monitor 1 T14, X14 — EDM External Device Monitor
External Device Monitor 2 T15, X15 — EDM External Device Monitor

Self-hold function circuit 1 — Hold / Self-hold function / Trigger
=2k+1
Safety Output 1 Y0 Y1 — Hold OSSD EDM
Safety Output 2 Y2 Y3 — Hold OSSD with Off-delay EDM

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FS1A-C11S Logic 12b — The logic constructing an OR circuit for various apparatus

| Output Line: 2 2 dual safety outputs of different operations | Category 4 |

Logic 12b is used for safeguarding measures of machine tools and robots, when an OR circuit is configured. Safety outputs are dual channel outputs. Four dual channel direct opening inputs and two dual channel dependent inputs can be connected. Safety output 2 has an off-delay timer.
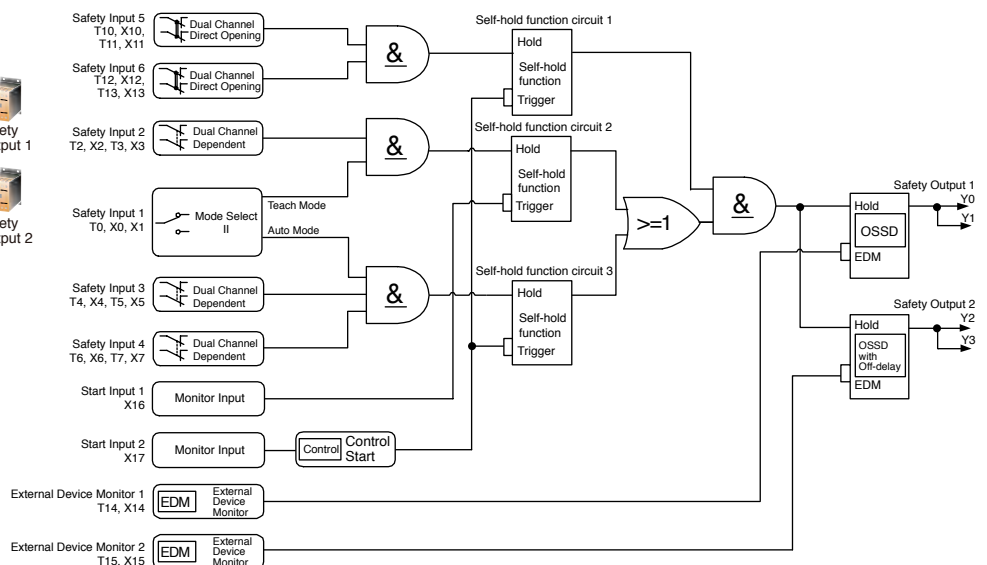
• Wiring Example

Emergency Stop Switch
Interlock Switch
Enabling Switch

Logic 12b

Safety Output 1
Safety Output 2

• DIP Switch and LED Display

LOGIC No.1
A b c d
1 2 3 4 5 6 7 8
LOGIC ERROR
2 → b

• Logic Chart

Safety Input 5 T10, X10, T11, X11 — Dual Channel Direct Opening
Safety Input 6 T12, X12, T13, X13 — Dual Channel Direct Opening
Safety Input 1 T0, X0, T1, X1 — Dual Channel Direct Opening
Safety Input 2 T2, X2, T3, X3 — Dual Channel Dependent >=1
Safety Input 3 T4, X4, T5, X5 — Dual Channel Direct Opening
Safety Input 4 T6, X6, T7, X7 — Dual Channel Dependent >=1
& Self-hold function circuit 1 Hold / Self-hold function / Trigger
Safety Output 1: Hold OSSD EDM Y0 Y1
Start Input 1 X16 — Monitor Input
Start Input 2 X17 — Monitor Input — Control / Control Start =2k+1
Safety Output 2: Hold OSSD with Off-delay EDM Y2 Y3
External Device Monitor 1 T14, X14 — EDM External Device Monitor
External Device Monitor 2 T15, X15 — EDM External Device Monitor

FS1A-C11S Logic 12C — The logic constructing an OR circuit for apparatus with openings

| Output Line: 2 2 dual safety outputs of different operations | Category 4 |

Logic 12C is used for safeguarding measures of machine tools and robots which use safety equipment with dual channel solid state outputs, when configuring OR circuit. Safety outputs are dual channel outputs. Four dual channel direct opening inputs and two dual channel safety inputs can be connected. Safety output 2 has an off-delay timer.

• Wiring Example

Emergency Stop Switch
Interlock Switch
Light Curtain (PNP Type)
Limit Switch

Logic 12C

Safety Output 1
Safety Output 2

• DIP Switch and LED Display

LOGIC No.1
A b c d
1 2 3 4 5 6 7 8
LOGIC ERROR
2 → C

• Logic Chart

Safety Input 5 T10, X10, T11, X11 — Dual Channel Direct Opening
Safety Input 6 T12, X12, T13, X13 — Dual Channel Direct Opening
Safety Input 1 T0, X0, X1,T1 — Dual Channel Direct Opening
Safety Input 2 X2, X3 — Dual Channel Safety &
Safety Input 3 T4, X4, T5, X5 — Dual Channel Direct Opening &
Safety Input 4 X6, X7 — Dual Channel Safety >=1 & Self-hold function circuit 1 Hold / Self-hold function / Trigger
Safety Output 1: Hold OSSD EDM Y0 Y1
Start Input 1 X16 — Monitor Input
Start Input 2 X17 — Monitor Input — Control / Control Start =2k+1
Safety Output 2: Hold OSSD with Off-delay EDM Y2 Y3
External Device Monitor 1 T14, X14 — EDM External Device Monitor
External Device Monitor 2 T15, X15 — EDM External Device Monitor

FS1A-C11S Logic 12d — Partial control logic for apparatus with openings

| Output Line: 2 2 dual safety outputs of different operations | Category 4 |

Logic 12d is used for safeguarding measures of machine tools and robots which use safety equipment with dual channel solid state outputs, when configuring partial control. Safety outputs are dual channel outputs. One dual channel direct opening input, one dual channel safety input, and three dual channel dependent inputs can be connected. Safety output 2 has an off-delay timer.

• Wiring Example

Emergency Stop Switch
Interlock Switch
Light Curtain (PNP type)

Logic 12d

Safety Output 1
Safety Output 2

• DIP Switch and LED Display

LOGIC No.1
A b c d
1 2 3 4 5 6 7 8
LOGIC ERROR
2 → d

• Logic Chart

Safety Input 1 T0, X0, T1, X1 — Dual Channel Direct Opening
Safety Input 2 T2, X2, T3, X3 — Dual Channel Dependent
Safety Input 3 T4, X4, T5, X5 — Dual Channel Dependent
Safety Input 4 T6, X6, T7, X7 — Dual Channel Dependent
Safety Input 5 X10, X11 — Dual Channel Safety & Self-hold function circuit 1 Hold / Self-hold function / Trigger &
Safety Output 1: Hold OSSD EDM Y0 Y1
Start Input 1 X12 — Monitor Input
Start Input 2 X13 — Monitor Input — Control / Control Start =2k+1 &
Safety Output 2: Hold OSSD with Off-delay EDM Y2 Y3
Control Input 1 X16 — Monitor Input
Control Input 2 X17 — Monitor Input
External Device Monitor 1 T14, X14 — EDM External Device Monitor
External Device Monitor 2 T15, X15 — EDM External Device Monitor

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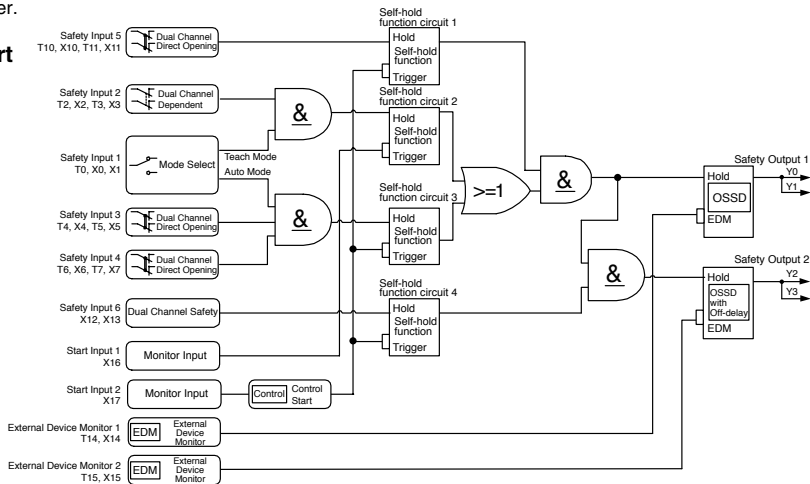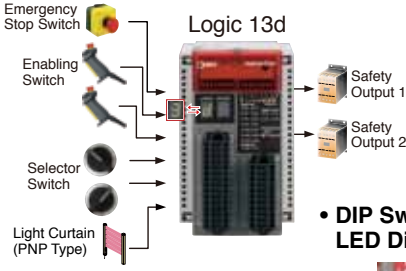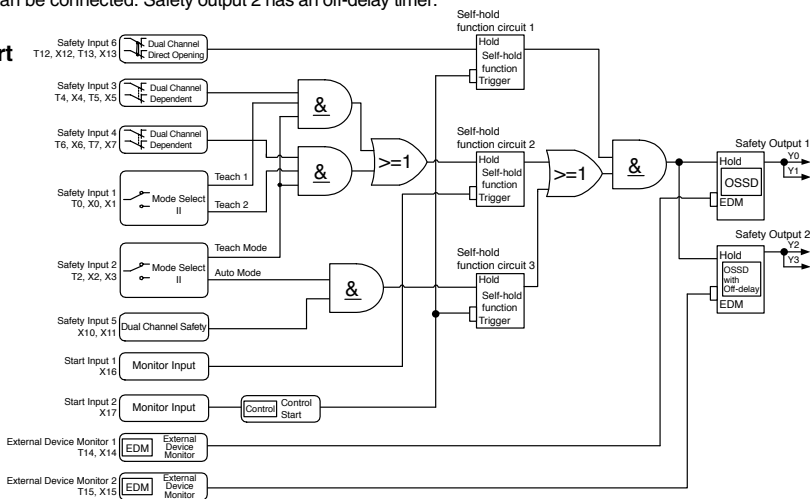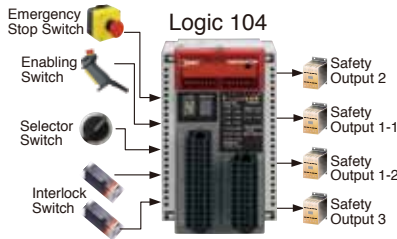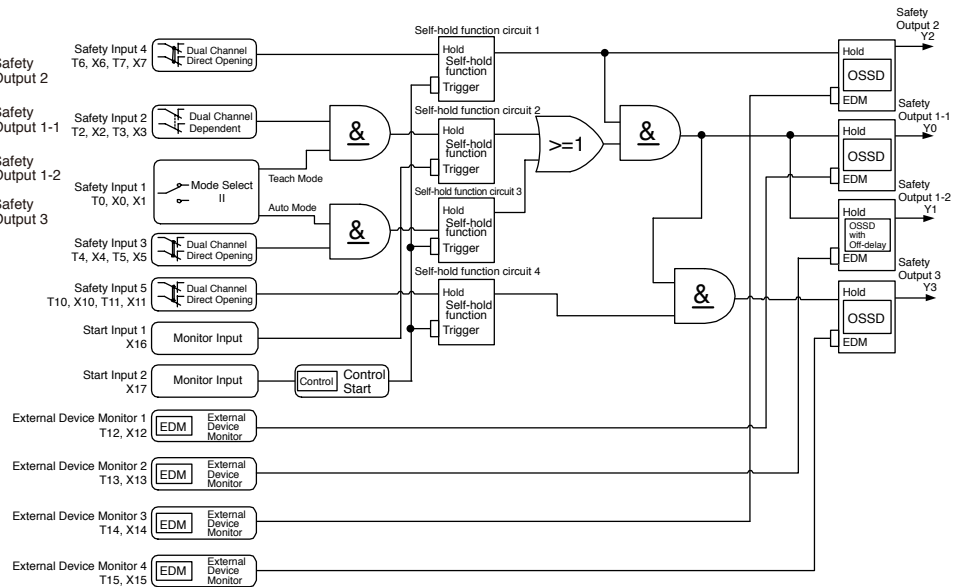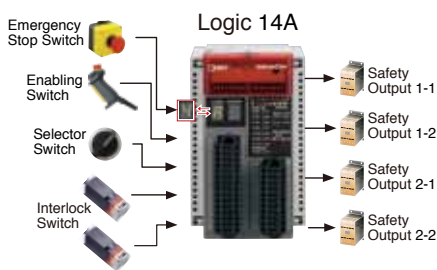# Safety▶One FS1A Safety Controller

FS1A-C11S Logic 103 — Partial stop logic applicable for selection of active safety input devices

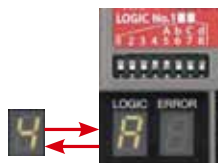| | Output Line: 2 2 dual safety outputs of different operations | Category 4 |

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 103 is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are dual channel outputs. One dual channel direct opening input, one mode select input, three dual channel dependent inputs, and one dual channel safety input can be connected.

• Wiring Example

Emergency Stop Switch
Light Curtain
Enabling Switch
Selector Switch
Interlock Switch

Logic 103

Safety Output 1
Safety Output 2

• DIP Switch and LED Display

• Logic Chart

Safety Input 5 X10, X11 — Dual Channel Safety
Safety Input 6 T12, X12, T13, X13 — Dual Channel Dependent
Safety Input 2 T2, X2, T3, X3 — Dual Channel Dependent
Safety Input 3 T4, X4, T5, X5 — Dual Channel Dependent
Safety Input 1 T0, X0, X1 — Mode Select II — Teach Mode / Auto Mode
Safety Input 4 T6, X6, T7, X7 — Dual Channel Direct Opening
Start Input 1 X16 — Monitor Input
Start Input 2 X17 — Monitor Input
External Device Monitor 1 T14, X14 — EDM External Device Monitor
External Device Monitor 2 T15, X15 — EDM External Device Monitor

Self-hold function circuit 1 — Hold / Self-hold function / Trigger
Self-hold function circuit 2 — Hold / Self-hold function / Trigger
Self-hold function circuit 3 — Hold / Self-hold function / Trigger

Safety Output 2 — Hold / OSSD with Off-delay / EDM — Y2 Y3
Safety Output 1 — Hold / OSSD with Off-delay / EDM — Y0 Y1

FS1A-C11S Logic 13A — The logic applicable for selection of active safety input devices

| | Output Line: 2 2 dual safety outputs of different operations | Category 4 |

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 13A is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are dual channel outputs. Two dual channel direct opening input, one mode select input, and three dual channel dependent inputs can be connected. Safety output 2 has an off-delay timer.
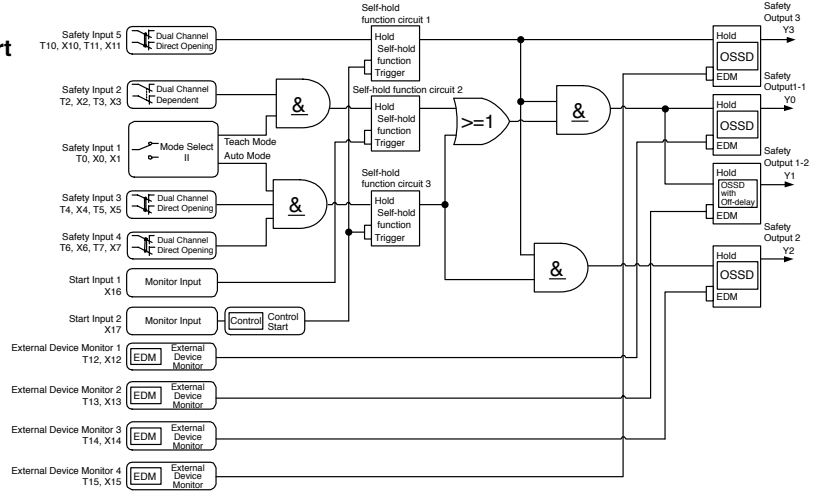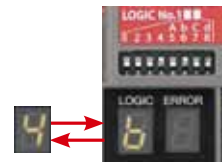
• Wiring Example

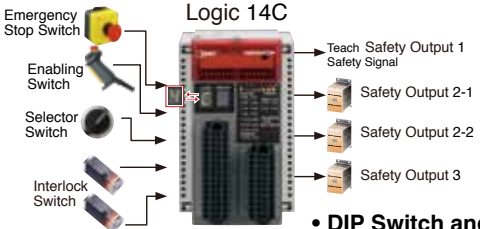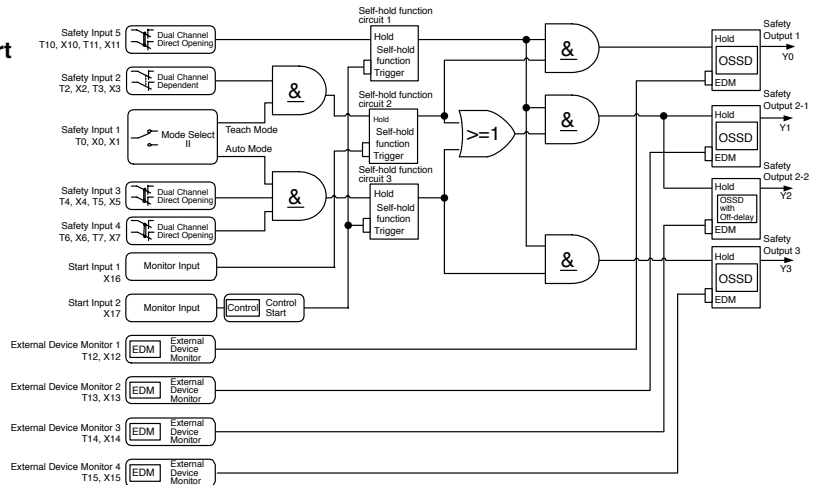Emergency Stop Switch
Enabling Switch
Selector Switch
Interlock Switch

Logic 13A

Safety Output 1
Safety Output 2

• DIP Switch and LED Display

• Logic Chart

Safety Input 5 T10, X10, T11, X11 — Dual Channel Direct Opening
Safety Input 6 T12, X12, T13, X13 — Dual Channel Direct Opening
Safety Input 2 T2, X2, T3, X3 — Dual Channel Dependent
Safety Input 1 T0, X0, X1 — Mode Select II — Teach Mode / Auto Mode
Safety Input 3 T4, X4, T5, X5 — Dual Channel Dependent
Safety Input 4 T6, X6, T7, X7 — Dual Channel Dependent
Start Input 1 X16 — Monitor Input
Start Input 2 X17 — Monitor Input — Control Start
External Device Monitor 1 T14, X14 — EDM External Device Monitor
External Device Monitor 2 T15, X15 — EDM External Device Monitor

Self-hold function circuit 1 — Hold / Self-hold function / Trigger
Self-hold function circuit 2 — Hold / Self-hold function / Trigger
Self-hold function circuit 3 — Hold / Self-hold function / Trigger

Safety Output 1 — Hold / OSSD / EDM — Y0 Y1
Safety Output 2 — Hold / OSSD with Off-delay / EDM — Y2 Y3

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FS1A-C11S Logic 13b — The logic constructing an OR circuit applicable for selection of active safety input devices

Output Line: 2 — 2 dual safety outputs of different operations

Category 4

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 13b is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are dual channel outputs. OR circuit can be configured in auto mode. Two dual channel direct opening input, one mode select input, one dual channel dependent input, and two dual channel safety inputs can be connected. Safety output 2 has an off-delay timer.
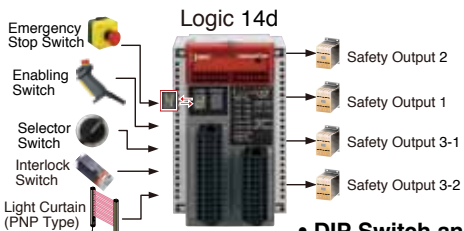
• **Wiring Example**
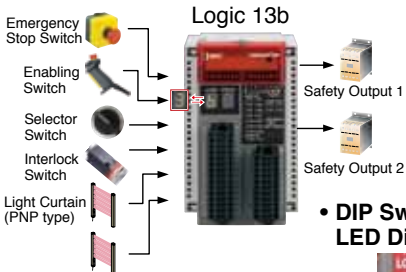
• **Logic Chart**
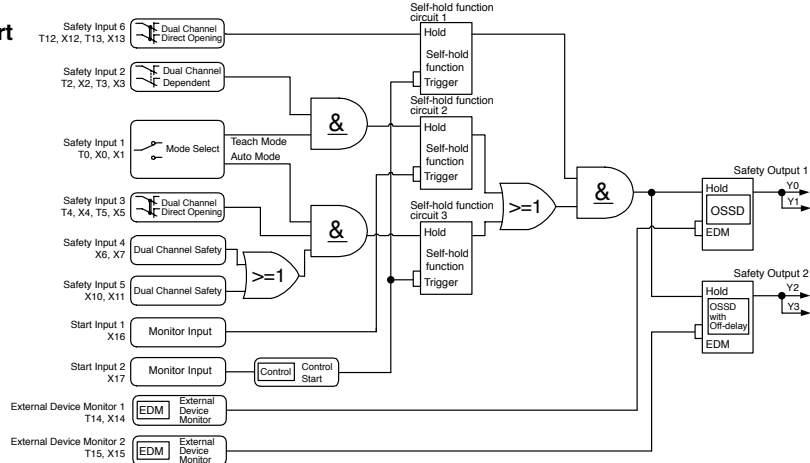
• **DIP Switch and LED Display**
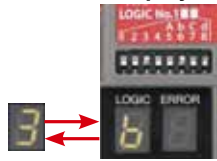
FS1A-C11S Logic 13C — Partial stop logic applicable for selection of active safety input devices

Output Line: 2 — 2 dual safety outputs of different operations

Category 4

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 13C is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are dual channel outputs. Three dual channel direct opening inputs, one mode select input, one dual channel dependent input, one dual channel safety input can be connected. Safety output 2 has an off-delay timer.

• **Wiring Example**
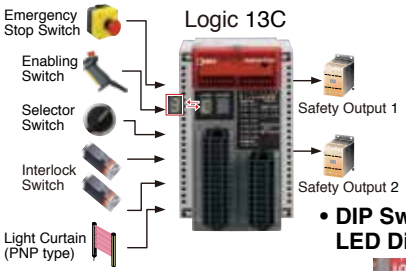
• **Logic Chart**

• **DIP Switch and LED Display**

FS1A-C11S Logic 13d — The logic applicable for selection of active safety input devices

Output Line: 2 — 2 dual safety outputs of different operations

Category 4

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 13d is used to configure a system in which teach or auto mode can be selected using a selector switch, and to select teach 1 or teach 2 within teach mode. Safety outputs are dual channel outputs. One dual channel direct opening input, one mode select input, two dual channel dependent inputs, and one dual channel safety input can be connected. Safety output 2 has an off-delay timer.

• **Wiring Example**

• **Logic Chart**

• **DIP Switch and LED Display**

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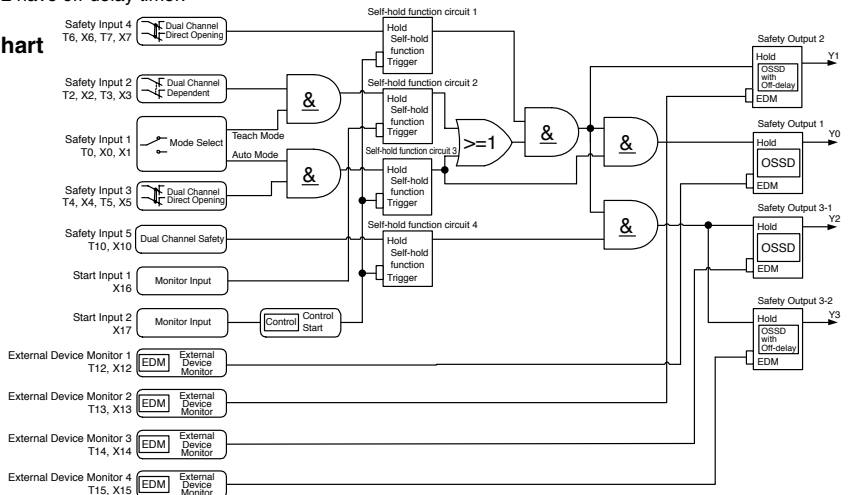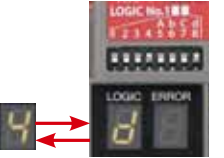| **FS1A-C11S Logic 104**	Partial stop logic applicable for selection of active safety input devices	Output Line: 4 4 single safety outputs of different operations	Category 3

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 104 is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are single output. Three dual channel direct opening inputs, one mode select input, and one dual channel dependent input can be connected. Safety output 1-2 has an off-delay timer.

• **Wiring Example**

• **DIP Switch and LED Display**
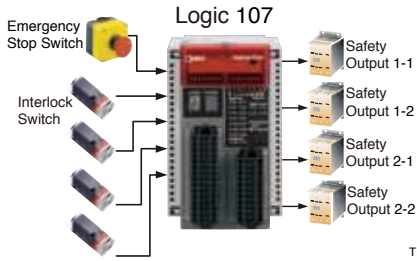

• **Logic Chart**

FS1A-C11S Logic 14A	Partial stop logic applicable for selection of active safety input devices	Output Line: 4 4 single safety outputs of different operations	Category 3

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 14A is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are single output. Three dual channel direct opening inputs, one mode select input, and one dual channel dependent input can be connected. Safety outputs 1-2 and 2-2 have off-delay timers.
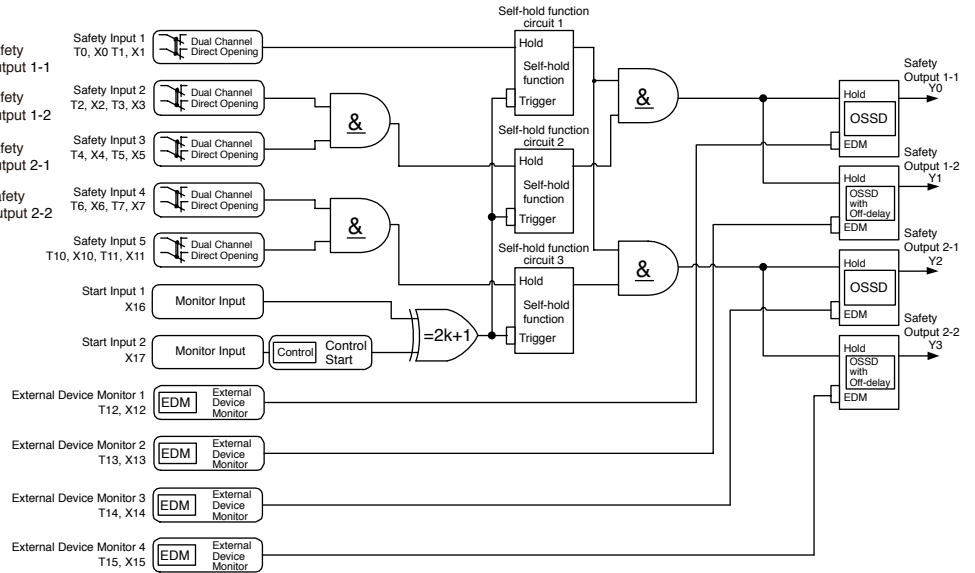
• **Wiring Example**

• **DIP Switch and LED Display**

• **Logic Chart**

IDEC
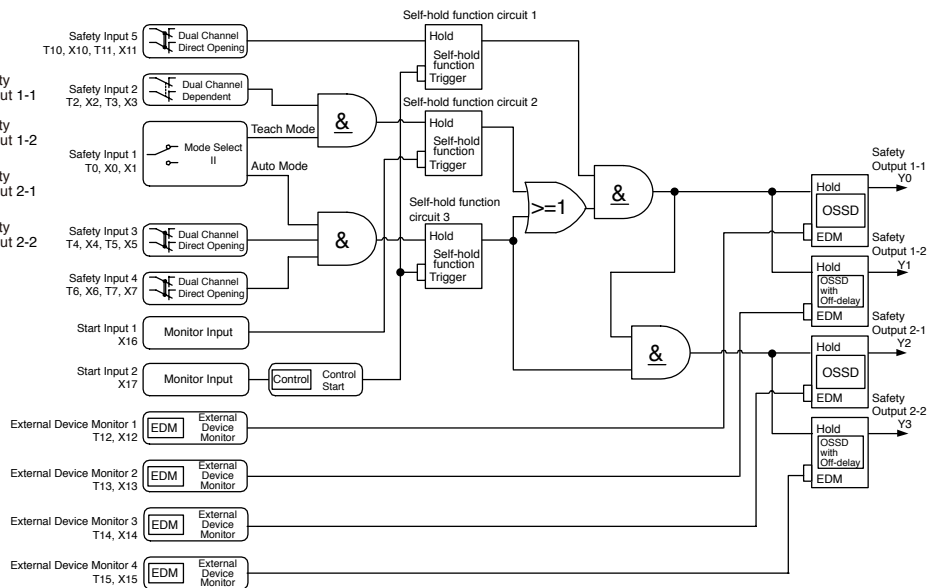
FS1A-C11S Logic 14b — Partial stop logic applicable for selection of active safety input devices

	Output Line: 4 4 single safety outputs of different operations	Category 3

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 14b is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are single output. Three dual channel direct opening inputs, one mode select input, and one dual channel dependent input can be connected. Safety output 1-2 has an off-delay timer.

• Wiring Example
• Logic Chart

Logic 14b

Emergency Stop Switch
Enabling Switch
Selector Switch
Interlock Switch

Safety Output 3
Safety Output 1-1
Safety Output 1-2
Safety Output 2
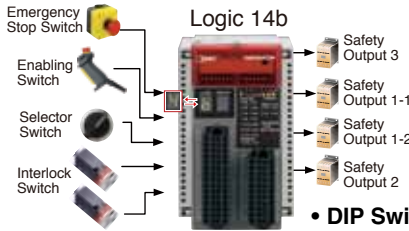
• DIP Switch and LED Display

FS1A-C11S Logic 14C — Partial stop logic applicable for selection of active safety input devices

	Output Line: 4 4 single safety outputs of different operations	Category 3

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 14C is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are single output. Three dual channel direct opening inputs, one mode select input, and one dual channel dependent input can be connected. Safety output 2-2 has an off-delay timer.

• Wiring Example
• Logic Chart

Logic 14C

Emergency Stop Switch
Enabling Switch
Selector Switch
Interlock Switch

Teach Safety Output 1 Safety Signal
Safety Output 2-1
Safety Output 2-2
Safety Output 3

• DIP Switch and LED Display

FS1A-C11S Logic 14d — Partial stop logic applicable for selection of active safety input devices for apparatus with openings

	Output Line: 4 4 single safety outputs of different operations	Category 3

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 14d is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are single output. Two dual channel direct opening input, one mode select input, one dual channel dependent input and one dual channel safety input can be connected. Safety output 2 and 3-2 have off-delay timer.

• Wiring Example
• Logic Chart

Logic 14d

Emergency Stop Switch
Enabling Switch
Selector Switch
Interlock Switch
Light Curtain (PNP Type)

Safety Output 2
Safety Output 1
Safety Output 3-1
Safety Output 3-2

• DIP Switch and LED Display

IDEC

FS1A-C11S Logic 105	Partial stop logic for apparatus with openings	Output Line: 4 4 single safety outputs of different operations	Category 3

Logic 105 is used for safeguarding measures of machine tools and robots, which use safety equipment such as light curtains with dual solid state outputs. Safety outputs are single output. Five dual channel safety inputs can be connected. Safety output 4 has an off-delay timer.

• Wiring Example

Emergency Stop Switch

Logic 105

Light Curtain (PNP type)

Safety Output 1
Safety Output 2
Safety Output 3
Safety Output 4
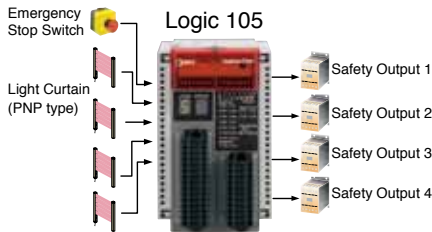
• DIP Switch and LED Display

• Logic Chart
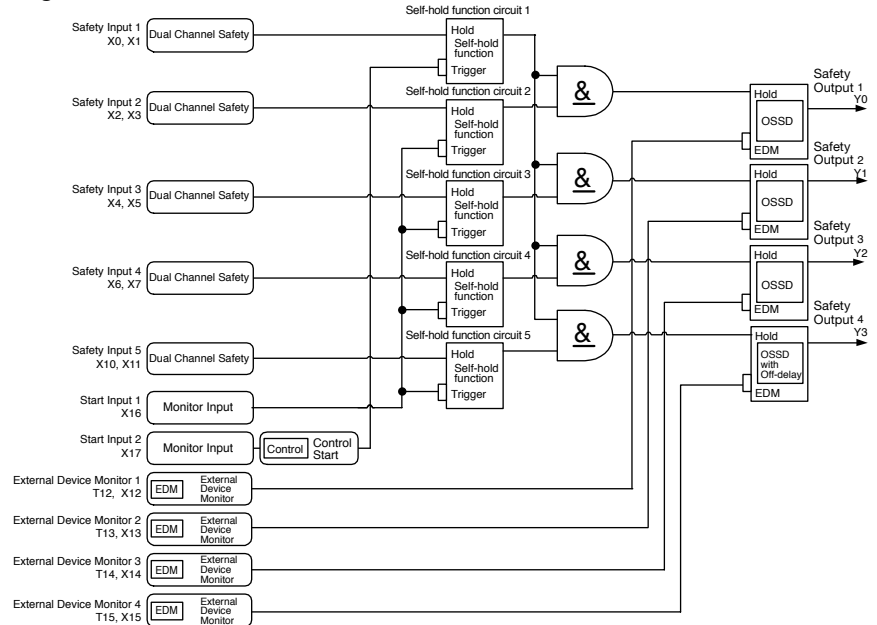
FS1A-C11S Logic 106	Partial stop logic for apparatus with openings	Output Line: 4 4 single safety outputs of different operations	Category 3

Logic 106 is used for safeguarding measures of machine tools and robots, which use safety equipment such as light curtains with dual solid state outputs. Safety outputs are single output. Five dual channel safety inputs can be connected. Safety output 4 has an off-delay timer.

• Wiring Example

Emergency Stop Switch

Logic 106

Light Curtain (PNP type)

Safety Output 1
Safety Output 2
Safety Output 3
Safety Output 4
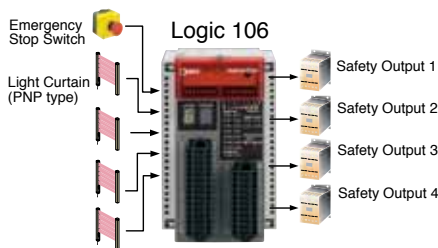
• DIP Switch and LED Display

• Logic Chart
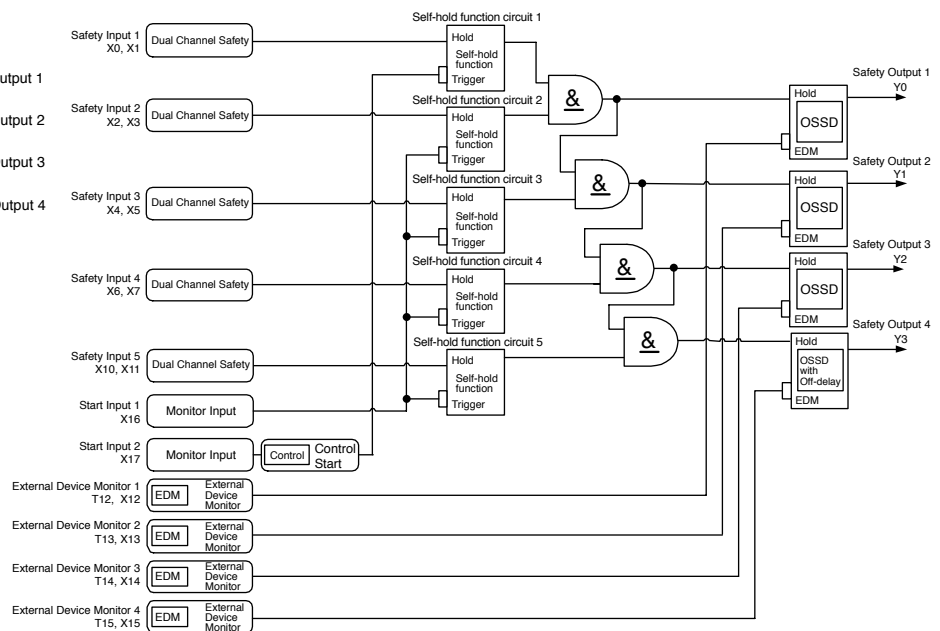
FS1A-C11S Logic 107 — Partial stop logic for various apparatus

| | Output Line: 4 — 4 single safety outputs of different operations | Category 3 |

Logic 107 is used for safeguarding measures of machine tools and robots. Safety outputs are single output. Five dual channel direct opening inputs can be connected. Safety outputs 1-2 and 2-2 have off-delay timers.

• Wiring Example

• DIP Switch and LED Display

• Logic Chart

FS1A-C11S Logic 108 — Partial stop logic applicable for selection of active safety input devices in apparatus with openings

| | Output Line: 4 — 4 single safety outputs of different operations | Category 3 |

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 108 is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety output is single output. Two dual channel direct opening input, one mode select input, one dual channel dependent input, and one dual channel safety input can be connected. Safety outputs 1-2 and 2-2 have off-delay timers.

• Wiring Example
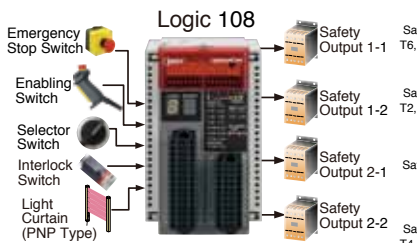
• DIP Switch and LED Display

• Logic Chart
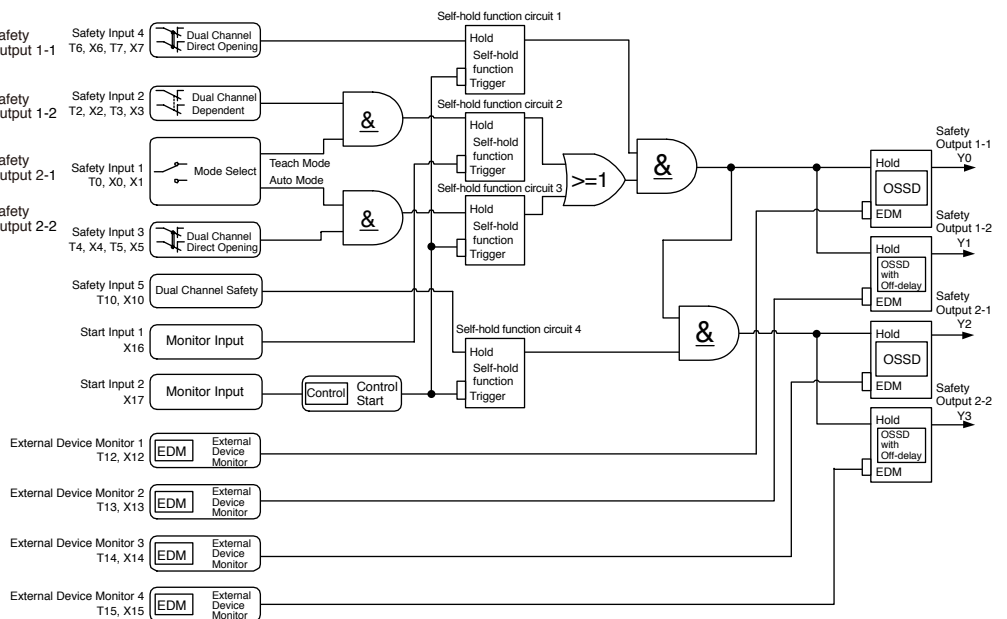
SafetyⓄne FS1A Safety Controller

No programming required. Configuration complete by turning on a logic switch.

- A safety circuit can be configured easily just by selecting a logic from pre-programmed logics.
- Mode selection, partial/entire stop can be achieved just by selecting a logic.
- One SafetyOne module can connect with various safety inputs such as emergency stop switches and light curtains.
- The status of safety I/Os and the SafetyOne errors can be monitored.
- Solenoid drive output is provided, eliminating the need for a PLC.
- IEC 61508 safety integrity level 3, ISO 13849-1 performance level e, and EN954-1 control category 4 compliant

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FS1A-C01S discontinued as of February 28, 2015. Replaced by FS1A-C11S.

FS1A-C11S
(24 logics)

FS1A-C01S
(8 logics)

Types

Product	No. of Logic	Ordering Type No.
SafetyOne	8 Discontinued	FS1A-C01S
	24	FS1A-C11S

Minimum order quantity: 1

• Standard Accessories

Input connector (FS9Z-CN01) ··1 pc
Output connector (FS9Z-CN02) ·····································1 pc
Marked cable tie (FS9Z-MT01)·······································3 pcs
Setting tool ···1 pc
English instruction sheet
    (FS1A-C01S: B-1088, FS1A-C11S: B-1216)············1 pc
Japanese instruction sheet (B-1087, Japanese)
    (FS1A-C01S: B-1087, FS1A-C11S: B-1217)············1 pc

TÜV approval:
IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 61496-1, IEC 61508 Part 1-7, IEC/EN 62061, ISO 13849-1, ISO 13851 (FS1A-C11S), EN 954-1

UL:
UL508, CSA C22.2 No. 142

Applicable standards:
IEC/EN 60204-1, IEC/EN 61131-2, ISO 10218-1, ANSI/RIA R15.06, ANSI B11.19, SEMI S2-0706, NFPA79

Specifications

• Operating Environment

Safety Circuit	Logic selection
Operating Temperature	–10 to +55°C (no freezing)
Operating Humidity	10 to 95% RH (no condensation)
Storage Temperature	–40 to +70°C (no freezing)
Storage Humidity	10 to 95% RH (no condensation)
Pollution Degree	2 (IEC/EN60664-1)
Degree of Protection	IP20 (IEC/EN60529)
Corrosion Immunity	Free from corrosive gases
Altitude	Operation: 0 to 2000m, Transport: 0 to 3000m
Vibration Resistance	Vibration: 5 to 8.4 Hz, amplitude 3.5 mm 8.4 to 150 Hz Acceleration: 9.8 m/s² (2 hours each on three mutually perpendicular axes) (IEC/EN60028-2-6) Bump: Acceleration 98 m/s², 16 ms (1000 times each on three mutually perpendicular axes) (IEC/EN60028-2-29)
Shock Resistance	147 m/s², 11ms (3 shocks each on three mutually perpendicular axes (IEC/EN 60028-2-27)
Connector Insertion/ Removal Durability	50 times maximum
Configuration Switch Durability	100 operations maximum per pole
Enter Button Durability	1000 operations maximum
Housing Material	Modified-polyphenyleneether (m-PPE)
Weight (approx.)	330g

• Optional Parts (sold separately)

Product		Ordering Type No.	Package Quantity	Note
Input Connector		FS9Z-CN01	1	
Output Connector		FS9Z-CN02	1	
Connecting Tool		FS9Z-SD01	1	
Marked Cable Tie		FS9Z-MT01PN10	10	Used to lock the protective cover of the FS1A.
DIN Rail		BAA1000PN10	10	Aluminum, 1m 35mm wide
End Clip		BNL6PN10	10	

• For details, see the user's manual.

• Electric Characteristics

Rated Voltage	24V DC
Allowable Voltage Range	20.4 to 28.8V DC
Maximum Power Consumption	48W (at the rated power voltage, when all I/Os are ON) (incl. output load)
Allowable Momentary Power Interruption	10 ms minimum (at the rated power voltage)
Response Time	ON–OFF: 40 ms maximum (Note 1) 100 ms maximum (Note 2) OFF–ON: 100 ms maximum (Note 3)
Start-up Time (Note 4)	6 sec maximum
Dielectric Strength	Between live part and FE terminal: 500V AC, 1 minute Between housing and FE terminal: 500V AC, 1 minute
Insulation Resistance	Between live part and FE terminal: 10 MΩ minimum (500V DC megger) Between housing and FE terminal: 10 MΩ minimum (500V DC megger)
Impulse Noise Immunity (noise simulator)	Power terminal: ±1 kV 50 ns, 1μs (direct connection) I/O terminal: ±2kV 50 ns, 1μs (coupling adapter)
Inrush Current	25A maximum
Ground	Ground resistance of 100Ω maximum
Effect of Incorrect Wiring	Reverse polarity: No operation, no damage Improper voltage: Permanent damage may occur

Note 1: The time to shut off safety outputs after inputs are turned off or input monitor error is detected (when off-delay timer is set to 0s)

Note 2: Time to shut off safety outputs after an error (except input monitor error) or a configuration change of logic or timer is detected (not depending on the off-delay timer value)

Note 3: Auto start—Time to turn on safety outputs after safe inputs are turned on
    Manual start—Time to turn on safety outputs after start inputs are turned on
    Control start—Time to turn on safety outputs after the start inputs are turned off-on-off (maintain ON for 0.1 to 5s)

Note 4: Time to change to Run state after power supply is turned on.

IDEC

Safety Input Specifications

• Drive Terminals

(T0, T1, T2, T3, T4, T5, T6, T7, T10, T11, T12, T13, T14, T15)

Rated Drive Voltage	Power supply voltage
Minimum Drive Voltage	Power supply voltage – 2.0V
Number of Drive Terminals	14
Maximum Drive Current	20 mA per terminal (28.8V DC) (Note)

Note: Drive terminals of safety inputs send safety confirmation signals (pulse signals) for the diagnosis of safety components and input circuits. Wiring and diagnosis function change depending on the selected logic. See user's manual "Chapter 5 Logic." Basic specifications remain the same.

• Receive Terminals

(X0, X1, X2, X3, X4, X5, X6, X7, X10, X11, X12, X13, X14, X15)

Rated Input Voltage	24V DC
Input ON Voltage	15.0 to 28.8V DC
Input OFF Voltage	Open or 0 to 5.0V DC
Number of Inputs	14
Input Current	10 mA per terminal (at the rated power voltage)
Input Signal	Sink input (for PNP output), Type 1 (IEC61131-2)

• Wire

Cable Length (Note)	100m maximum (total wire length per input)
Allowable Wire Resistance	300Ω maximum

Note: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

・**Receive Terminal Internal Circuit**
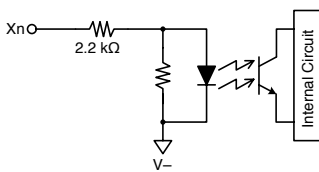
・**Receive Terminal Operating Range**
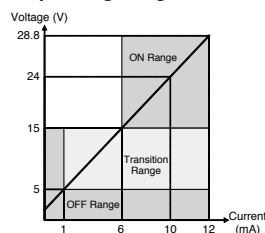
Start Input Specifications

Rated Input Voltage	24V DC
Input ON Voltage	15.0 to 28.8V DC
Input OFF Voltage	Open or 0V to 5.0V DC
Number of Start Inputs	2 (X16, X17)
Input Current	5 mA per terminal (at the rated power voltage)
Input Signal	Sink input (PNP output), Type 1 (IEC61131-2)
Cable Length (Note)	100m maximum (total wire length per input)
Allowable Wire Resistance	300Ω maximum

Note: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

・**Start Input Internal Circuit**
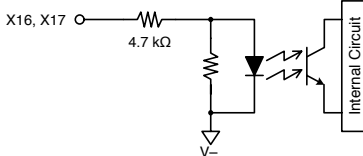
・**Start Input Operation Range**
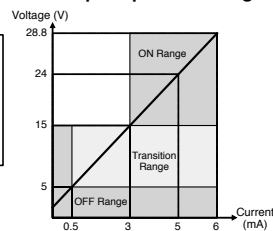
Safety Output Specifications

Output Type		Source output (N channel MOSFET)
Rated Output Voltage		Power supply voltage
Minimum Output Voltage		Power supply voltage – 2.0V
Number of Safety Outputs		4 (Y0, Y1, Y2, Y3)
Maximum Output Current	1 output	500 mA maximum
	Total	1A maximum
Leakage Current		0.1 mA maximum
Allowable Inductive Load (Note 1)		L/R = 25 ms
Allowable Capacitive Load		1 µF maximum
Cable Length (Note 2)		100m maximum (total length per output)

Note 1: When connecting an inductive load, connect a protection element such as a diode.
Note 2: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

・**Safety Output Internal Circuit**
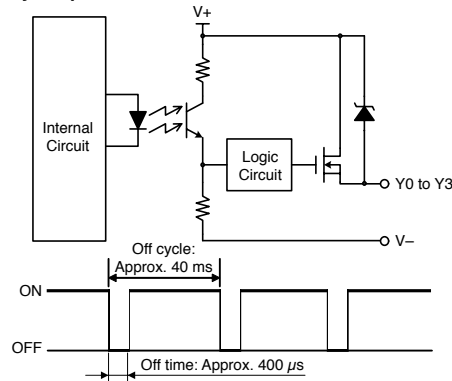
The safety outputs of the SafetyOne are solid state outputs. When the output is on, off-check signals are generated at regular intervals. The operating characteristics of the safety output change depending on the selected logic. For details, see user's manual "Chapter 5 Logic." The basic specifications remain the same.

Note that off-check signals may cause reaction of some safety components depending on their response speed.

Monitor output and solenoid/lamp output do not generate outputs of off-check signals.

Monitor Output Specifications

Output Type		Source output (N channel MOSFET)
Rated Output Voltage		Power supply voltage
Minimum Output Voltage		Power supply voltage – 2.0V
Number of Monitor Outputs		11 (Y4, Y5, Y6, Y7, Y10, Y11, Y12, Y13, Y14, Y15, Y16)
Maximum Output Current	1 output	20 mA maximum
	Total	220 mA maximum
Leakage Current		0.1 mA maximum
Cable Length (Note)		100m maximum (total length per output)

Note: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

・**Monitor Output Internal Circuit**
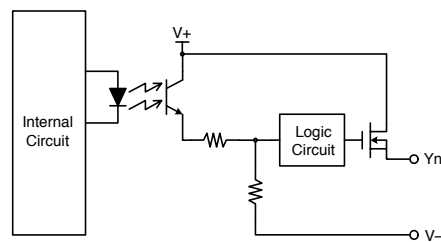
The operating characteristics of the monitor output change depending on the selected logic. For details, see user's manual "Chapter 5 Logic." The basic specifications remain the same.

Do not use monitor output as a safety output, otherwise the system's safety cannot be assured when the SafetyOne or safety components fail.
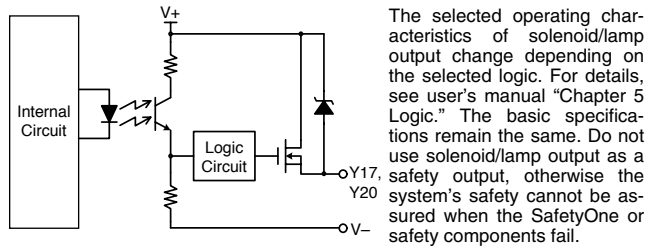
Solenoid/Lamp Output Specifications

Output Type		Source output (N channel MOSFET)
Rated Output Voltage		Power supply voltage
Minimum Output Voltage		Power supply voltage – 2.0V
No. of Solenoid/Lamp Outputs		2 (Y17, Y20)
Maximum Output Current	1 output	500 mA maximum
	Total	500 mA maximum
Leakage Current		0.1 mA maximum
Allowable Inductive Load (Note 1)		L/R = 25 ms
Cable Length (Note 2)		100m maximum (total length per output)

Note 1: When connecting an inductive load, connect a protection element such as a diode.
Note 2: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

● Solenoid/Lamp Output Internal Circuit

The selected operating characteristics of solenoid/lamp output change depending on the selected logic. For details, see user's manual "Chapter 5 Logic." The basic specifications remain the same. Do not use solenoid/lamp output as a safety output, otherwise the system's safety cannot be assured when the SafetyOne or safety components fail.

Internal States

State	Description
Initial	Initial processing is performed immediately after power is supplied to the SafetyOne. The internal circuits are checked and the LEDs show operation confirmation (blinking) for 6 seconds (approx).
Run	The SafetyOne is under normal operation. Logic processing continues without failures or wiring errors.
Configuration	A logic or off-delay timer value is being configured. Configuration enables the logic and off-delay timer value. When completed, the SafetyOne changes to the Run state.
Protection	An input monitor error has occurred with dual channel input, EDM input, or muting input. When the problem is removed, the SafetyOne changes to Run state.
Stop	A failure or error has occurred with an external device or internal circuit. When the problem is removed and the power is turned on, Stop state is cleared.

LED and Output States

● When safety outputs are dual channel outputs

State	Logic LED	Error LED	Timer LED	Safety Output Y0 to Y3	Solenoid/Lamp Output Y17, Y20	Monitor Output			
						Y4 to Y13	Y14	Y15	Y16
Initial	(Note 1)	(Note 1)	(Note 1)	OFF	OFF	OFF	ON	ON	OFF
Run	Logic #	Blank	Selected Value	(Note 2)	(Note 2)	(Note 2)	OFF	OFF	ON
Configuration	(Note 3)	C	(Note 3)	OFF	OFF	OFF	OFF	ON	OFF
Protection	Logic #	1	Selected Value	OFF (Note 6)	OFF	(Note 4)	OFF	ON	OFF
Stop	Blank	(Note 5)	Blank	OFF	OFF	(Note 4)	ON	ON or OFF	OFF

● When safety outputs are single channel outputs

State	Logic LED	Error LED	Timer LED	Safety Output Y0 to Y3	Monitor Output			
					Y4 to Y13, Y17, Y20	Y14	Y15	Y16
Initial	(Note 1)	(Note 1)	(Note 1)	OFF	OFF	ON	ON	OFF
Run	Logic #	Blank	Selected Value	(Note 2)	(Note 2)	OFF	OFF	ON
Configuration	(Note 3)	C	(Note 3)	OFF	OFF	OFF	ON	OFF
Protection	Logic #	1	Selected Value	OFF (Note 6)	(Note 4)	OFF	ON	OFF
Stop	Blank	(Note 5)	Blank	OFF	(Note 4)	ON	ON or OFF	OFF

Note 1: Random display of Initial state.
Note 2: Output and LED display of the selected logic.
Note 3: Blinking LED display of the selected logic number or the selected timer value.
Note 4: Pulsing display of monitor output and output LED corresponding to the input of error. Other LEDs and monitor outputs maintain the display of Run state.
Note 5: Error number is displayed.
Note 6: Safety output with timer is turned OFF after set OFF-delay time.

Caution
Solenoid/lamp outputs (Y17, Y20) turn on for 1 second maximum when the state changes to Run state. Take operation of connected components into consideration.

LEDs

① Logic LED (green)
② Error LED (red)
③ Timer LED (green)
④ Input LED (orange)
⑤ Output LED (orange)
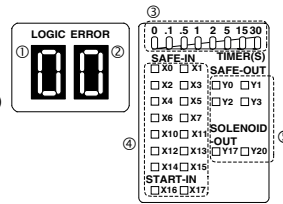
● Logic LED ①

Type	LED	Status	Description
FS1A-C01S	1, 2, 3, 4, 5, 6, 7, 8	ON	The selected logic is in Run or Protection state
		Blink	The selected logic is in Configuration state
FS1A-C11S	1, 2, 3, 4, 5, 6, 7, 8, A, b, C, d	ON	The selected logic is in Run or Protection state (Ex. Logic 14A: 4→A→4→A→4→...)
		Blink	The selected logic is in Configuration state (Ex. Logic 14A: 4→A→OFF→A→4→OFF...)
FS1A-C01S/ C11S	E	Blink	The selected logic has Configuration error (logic not selected, or multiple logics are selected)
	Random	ON/Blink	Initializing (Initial state)
	OFF	OFF	Error (Stop state)

FS1A-C01S setting
Correct: Selecting one logic from 1 to 8
Wrong: Selecting two or more logics from 1 to 8

FS1A-C11S setting
Correct: Selecting one logic from 1 to 8
Selecting one from 1 to 4, and one from A, b, C, or d.
Wrong: Selecting three or more logics from 1 to 8
Selecting two or more logics from 1 to 4
Selecting two or more logics from A (5), b (6), C (7), or d (8)

● Error LED ②

Type	LED	Status	Description
FS1A-C01S / FS1A-C11S	1	ON	Input monitor error (Protection state)
	2	ON	Wiring error at safety input or an error in safety input circuits
	3	ON	Wiring error at start input or an error in start input circuit
	4	ON	Wiring error at safety output or an error in safety output circuit
	5	ON	Muting lamp error (disconnection) (FS1A-C01S: logic 4 only) (FS1A-C11S: logic 11d only)
	6	ON	Power supply error or internal power supply circuit error
	7	ON	Internal error, power supply error, or internal power supply circuit error
	9	ON	EMC disturbance
	C	ON	Configuration procedure is in progress (Configuration state)
		Blink	Configuration is valid (Note) (Configuration state)
	Random	ON/Blink	Initializing (Initial state)
	OFF	OFF	Normal operation (Run state)

Note: Blinks for 1 to 5 seconds after the enter button is pressed. Releasing the button during blinking activates the setting. The blinking LED becomes ON if the button is pressed for more than 5 seconds, and the setting becomes invalid even after the button is released.

● Timer LED ③

Type	LED	Status	Description
FS1A-C01S / FS1A-C11S	0	ON	No off-delay (safety outputs shut down immediately)
	.1	ON	Off-delay timer 0.1s
	.5	ON	Off-delay timer 0.5s
	1	ON	Off-delay timer 1s
	2	ON	Off-delay timer 2s
	5	ON	Off-delay timer 5s
	15	ON	Off-delay timer 15s
	30	ON	Off-delay timer 30s
	Each LED	Blink	Selected timer value (Configuration state)
	Random	ON/Blink	Initializing (Initial state)
	All LEDs	OFF	Timer value is not selected or the **SafetyOne** is in Stop state

• Input LED ④

SAFE-IN (X0 to X15), START-IN (X16, X17)

Type	LED	Status	Description
FS1A-C01S	X0 to X15	ON	Input ON
		OFF	Input OFF, Stop/Configuration state
		Blink	Input monitor error
	X16, X17	ON	Input ON
		OFF	Input OFF, Stop/Configuration state
FS1A-C11S	X0 to X15	ON	Input ON
		OFF	Input OFF, Stop/Configuration state
		Blink	Input error (error displayed on error LED)
	X16, X17	ON	Input ON
		OFF	Input OFF, Stop/Configuration state
		Blink	Input error (error displayed on error LED)

• Output LED ⑤

SAFE-OUT (Y0 to Y3), SOLENOID-OUT (Y17, Y20)

Type	LED	Status	Description
FS1A-C01S	Y0 to Y3	ON	Output ON
		OFF	Output OFF, Stop/Configuration state
		Blink	Off-delay operating
	Y17, Y20	ON	Output ON
		OFF	Output OFF, Stop/Configuration state
FS1A-C11S	Y0 to Y3	ON	Output ON
		OFF	Output OFF
		Blink	Off-delay operating, or output error (error displayed on error LED)
	Y17, Y20	ON	Output ON
		OFF	Output OFF
		Blink	Off-delay operating, or output error (error displayed on error LED)

Connector Specifications

• Input Connector

Applicable connector
- Spring clamp (30-pin)
  FS9Z-CN01 (IDEC)
  2-1871940-5
  (Tyco Electronics)
- Crimp (30-pin)
  2-1871946-5
  (Tyco Electronics)
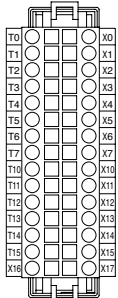
Terminal	No.	Description
T0	A1	Safety input drive terminal 0
T1	A2	Safety input drive terminal 1
T2	A3	Safety input drive terminal 2
T3	A4	Safety input drive terminal 3
T4	A5	Safety input drive terminal 4
T5	A6	Safety input drive terminal 5
T6	A7	Safety input drive terminal 6
T7	A8	Safety input drive terminal 7
T10	A9	Safety input drive terminal 10
T11	A10	Safety input drive terminal 11
T12	A11	Safety input drive terminal 12
T13	A12	Safety input drive terminal 13
T14	A13	Safety input drive terminal 14
T15	A14	Safety input drive terminal 15
X16	A15	Start input terminal 16
X0	B1	Safety input receive terminal 0
X1	B2	Safety input receive terminal 1
X2	B3	Safety input receive terminal 2
X3	B4	Safety input receive terminal 3
X4	B5	Safety input receive terminal 4
X5	B6	Safety input receive terminal 5
X6	B7	Safety input receive terminal 6
X7	B8	Safety input receive terminal 7
X10	B9	Safety input receive terminal 10
X11	B10	Safety input receive terminal 11
X12	B11	Safety input receive terminal 12
X13	B12	Safety input receive terminal 13
X14	B13	Safety input receive terminal 14
X15	B14	Safety input receive terminal 15
X17	B15	Start input terminal 17

Note: For the specifications of crimp connector, contact Tyco Electronics.

Configuration Switches

・FS1A-C01S ・FS1A-C11S
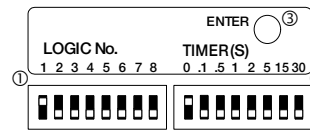
① Logic Switch　② Timer Switch　③ Enter button
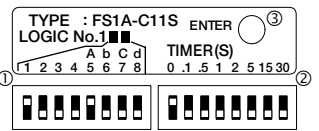
Logic Switch ①

FS1A-C01S
Eight DIP switches are provided for selecting a logic by moving a switch upward. For details, see user's manual "Chapter 5 Logic." Only one logic switch can be selected.

DIP Switch	1	2	3	4	5	6	7	8
Logic	001	002	003	004	005	006	007	008

FS1A-C11S
Eight DIP switches are provided for selecting a logic by moving one or two switch(es) upward. For details, see user's manual "Chapter 5 Logic."

DIP Switch	1	2	3	4	5	6	7	8
Logic	101	102	103	104	105	106	107	108

1 + A	1 + b	1 + C	1 + d	2 + A	2 + b	2 + C	2 + d
11A	11b	11C	11d	12A	12b	12C	12d

3 + A	3 + b	3+ C	3+ d	4 + A	4 + b	4 + C	4 + d
13A	13b	13C	13d	14A	14b	14C	14d

Timer Switch ②

Eight DIP switches are provided for selecting an off-delay timer value, by moving a switch upward. Only one timer switch can be selected.

Switch No.	Timer Value	Description
1	0	No off-delay (safety outputs shut down immediately)
2	.1	Off-delay timer 0.1s
3	.5	Off-delay timer 0.5s
4	1	Off-delay timer 1s
5	2	Off-delay timer 2s
6	5	Off-delay timer 5s
7	15	Off-delay timer 15s
8	30	Off-delay timer 30s

Enter Button ③

The enter button is used to activate the configuration of logic and timer switches. Error LED will blink for 1 to 5 seconds after pressing the enter button. Releasing the button during blinking activates the setting. The blinking LED becomes ON if the button is pressed for more than 5 seconds, and the setting becomes invalid even after the button is released. For setting the switches and enter button, use the setting tool supplied with the SafetyOne.
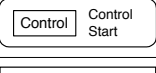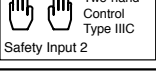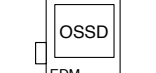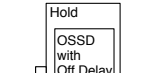
• Output Connector
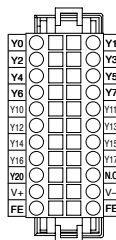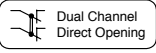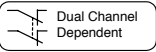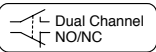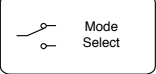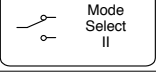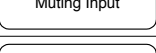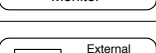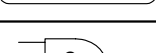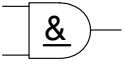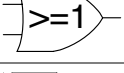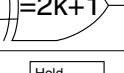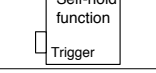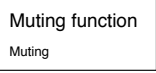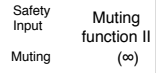
Applicable connector
- Spring clamp (22-pin)
  FS9Z-CN02 (IDEC)
  2-1871940-1
  (Tyco Electronics)
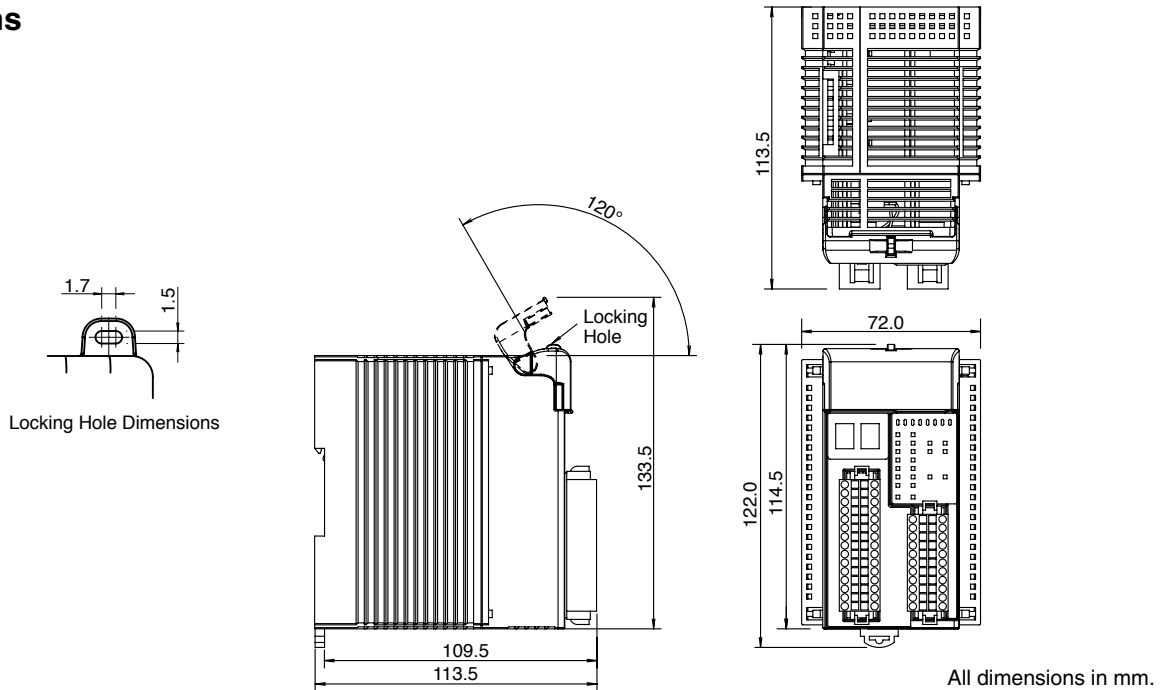- Crimp (22-pin)
  2-1871946-1
  (Tyco Electronics)

Terminal	No.	Description
Y0	A1	Safety output terminal 0
Y2	A2	Safety output terminal 2
Y4	A3	Monitor output terminal 4
Y6	A4	Monitor output terminal 6
Y10	A5	Monitor output terminal 10
Y12	A6	Monitor output terminal 12
Y14	A7	Monitor output terminal 14
Y16	A8	Monitor output terminal 16
Y20	A9	Solenoid/lamp output terminal 20
V+	A10	24V DC power terminal
FE	A11	Functional ground terminal
Y1	B1	Safety output terminal 1
Y3	B2	Safety output terminal 3
Y5	B3	Monitor output terminal 5
Y7	B4	Monitor output terminal 7
Y11	B5	Monitor output terminal 11
Y13	B6	Monitor output terminal 13
Y15	B7	Monitor output terminal 15
Y17	B8	Solenoid/lamp output terminal 17
NC	B9	Blank terminal
V−	B10	0V DC power terminal
FE	B11	Functional ground terminal

IDEC

Logic Functions

Type	Function	Symbol	Description
Input Function	Dual channel direct opening input	Dual Channel Direct Opening	For connecting safety components with dual channel direct opening action mechanism, such as emergency stop switches and interlock switches. Error is detected when the statuses of two inputs disagree for more than 0.5s (input monitor error detection time).
	Dual channel dependent input	Dual Channel Dependent	For connecting safety components with dual channel dependent action mechanism, such as enabling switches. Agreement of two inputs is monitored. Agreement time is ∞ (infinite).
	Dual channel NO/NC Input	Dual Channel NO/NC	For connecting safety components with dual channel NO/NC mechanism, such as non-contact interlock switches. The safety performance such as safety category depends on the configuration of the entire system.
	Dual channel safety input	Dual Channel Safety	For connecting safety components with dual channel solid state output (PNP output), such as light curtains or safety laser scanners, or emergency stop switches or interlock switches.
	Mode select input	Mode Select	For connecting components with mode select function, such as mode selector switches.
	Mode select input II	Mode Select II	For connecting components with mode select function, such as mode selector switches. When the switching of input is within 3 seconds, the function's output remains unchanged.
	Muting input	Muting Input	For connecting components such as muting sensors and limit switches.
	Monitor input	Single Channel Monitor	For connecting switches or sensors for start input.
	External device monitor input	EDM External Device Monitor	For monitoring external devices controlled by the SafetyOne. External devices are diagnosed for errors by connecting a NC contact, such as contactor or safety relay.
Logic Operation Function	AND	&	Logical multiplication (AND) of multiple inputs.
	OR	>=1	Logical addition (OR) of multiple inputs.
	XOR	=2k+1	Exclusive logical addition (XOR) of multiple inputs.
	Self-hold	Hold Self-hold function Trigger	Self-holding of input.
	Muting	Safety Input Muting function Muting	Adds muting function to the connected safety components.
	Muting II	Safety Input Muting function II Muting (∞)	Adds muting function to the connected safety components. ∞ shows that muting time is infinite.
	Control start	Control Control Start	Adds operation confirmation function to the connected start input devices.
	Two-hand control	Safety Input 1 Two-hand Control Type IIIC Safety Input 2	Adds two-hand control input function. Type III C according to ISO 13851.
Output Function	Safety output	Hold OSSD EDM	For controlling the safety output.
	Safety output with timer	Hold OSSD with Off Delay EDM	For controlling the safety output with an off-delay timer.

Dimensions

Locking Hole Dimensions

1.7
1.5

120°

Locking Hole

133.5

109.5
113.5

113.5

72.0

122.0
114.5

All dimensions in mm.

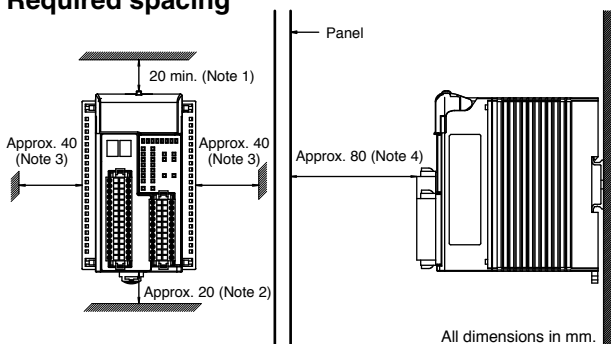
Operating Instructions

Installation Location

Install the SafetyOne in an IP54 enclosure such as a control panel, and make sure that the operating condition satisfies the specifications of the SafetyOne. Do not use the SafetyOne in an environment described below, or where the operating conditions exceed the limit of the SafetyOne. Otherwise electric shock, fire hazard, damage, or malfunction can be caused.

• Near an inductive device or heat source
• Where excessive dust, dirt, salt, or iron powder is present
• Where the SafetyOne is exposed to vibration or shock

For maintenance and ventilation, provide space around the Safety-One as shown in the figure below, so that sufficient distance is kept from other components, heat source, or panel surface. Ensure to use the SafetyOne in the environment of operating temperature −10 to +55°C.

Required spacing

Panel

20 min. (Note 1)

Approx. 40 (Note 3)   Approx. 40 (Note 3)   Approx. 80 (Note 4)

Approx. 20 (Note 2)

All dimensions in mm.

Note 1: For opening/closing of protective cover.
Note 2: For installation/removal of the SafetyOne on the DIN rail, and ventilation.
Note 3: For heat generating equipment such as safety relays.
Note 4: For wiring of input and output connectors

Direction

Install the SafetyOne vertically as shown in Figure 1. Do not install in other directions (Figure 2).

End Clip BNL6
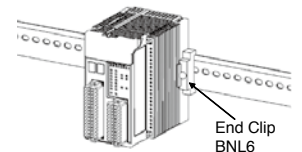
Figure 1. Correct Mounting Direction

Upward   Sideways   Downward
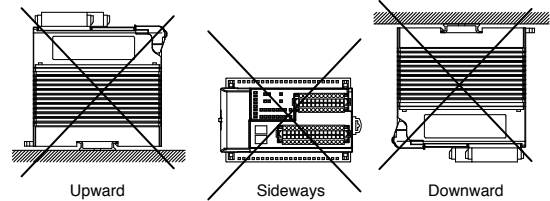
Figure 2. Incorrect Mounting Directions

Installing on DIN Rails

Use 35mm-wide DIN rails for installing the SafetyOne.
Applicable DIN rails: BAA1000 (IDEC)

Installing

1. Fasten the DIN rail to a panel.

2. Pull out the clamp from the SafetyOne module, and put the groove of the module on the DIN rail. Press the module towards the DIN rail and push in the clamp as shown below.

3. Use BNL6 end clips on both sides of the SafetyOne to prevent the module from moving sideways.

Removal

1. Insert the tip of a flat screwdriver into the latch.

2. Pull down the latch until the latch clicks.

3. Pull out the SafetyOne lightly, and remove from the DIN rail.

35-mm-wide DIN Rail

35-mm-wide DIN Rail

Clamp

Installation   Removal

---

IDEC
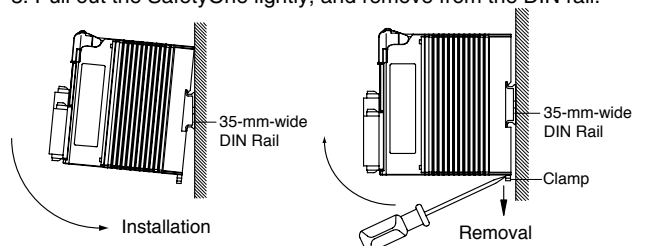
Wiring

For wiring the SafetyOne, spring clamp (supplied with the Safety-One) or crimp connector can be used. For crimp type connector, contact Tyco Electronics AMP.

Push the connector into the SafetyOne until the latches click. For removal, make sure to press down the latches completely before removing the connector, otherwise the connector and wires may be damaged.

Applicable Wire and Ferrule Size (spring clamp type)

AWG#18 to 24 (recommended wire: UL1007)
Strip length 7.0 ±0.3mm.
When using a ferrule for wiring, select a ferrule which satisfies the terminal specifications shown below.

Ferrule

a: 1.02 to 1.21 mm
b: 0.95 to 1.21 mm

Applicable wire: AWG#24 (recommended: UL1007)
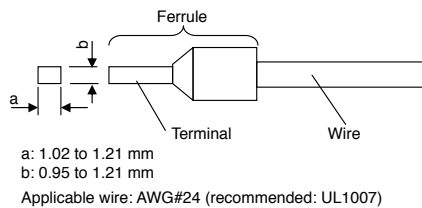
Wiring to Spring Clamp Connector

When wiring to a connector, make sure that the connector is removed from the SafetyOne, otherwise the connector and the SafetyOne may be damaged. For wiring, use the connecting tool FS9Z-SD01. When rewiring, use wire of the same type and size.

● Wiring Using the Connecting Tool

1. Insert the connecting tool completely into the tool slot in the connector at an angle.

2. Insert a wire into the wire slot. When using a stranded wire, twist the wire beforehand so that the wire does not become loose.

3. While the wire is inserted, remove the connecting tool. Wiring is complete. Pull the wire lightly to confirm whether it is clamped securely.

4. To remove the wire, press down the spring using the connecting tool and pull out the wire.

● Using a Screwdriver

When using a screwdriver for wiring, use a screwdriver 2.4mm wide maximum at the tip. Pay extra attention when using a screwdriver, so that the connector is not damaged.

1. Insert the screwdriver into the tool slot on the connector at an angle, and press down so as to pry open the spring. Do not apply excessive force when inserting the screwdriver, otherwise the connector will be damaged. Do not insert the screwdriver into the wire slot.

2. While the screwdriver is inserted, insert a wire into the wire slot. When using stranded wire, twist the wire beforehand so that the wire does not become loose.

3. While the wire is inserted remove the screwdriver. Wiring is complete. Pull the wire lightly to confirm whether it is clamped securely.

4. To remove the wire, press down the spring using the screwdriver and pull out the wire.

Safety Precautions

1. Do not disassemble, repair, or modify the SafetyOne, otherwise the safety characteristics of the SafetyOne are impaired. Turn off the power to the SafetyOne before installation, removal, wiring, maintenance, or inspection of the SafetyOne. Failure to do so may cause electrical shocks or fire hazard.

2. Before operating the SafetyOne, read the instruction sheet and the user's manual carefully, and ensure that the environment conforms to the requirements of the SafetyOne specifications. If the SafetyOne is operated in an environment that exceeds the specifications, the safety characteristics of the SafetyOne are impaired.

3. The installation, wiring, configuration, and operation of the SafetyOne must be performed by safety experts only. Safety experts are personnel who have necessary qualifications authorizing them to perform designing, installation, operation, maintenance, and disposal of the SafetyOne. Persons without technical expertise of safety products must not use the SafetyOne.

4. The SafetyOne must be subjected to a regular test which proves that all functions of the SafetyOne satisfy the required standard.

5. Perform operational checks on the SafetyOne periodically.

6. Install the SafetyOne according to the instruction sheet and the user's manual. Improper installation may cause failure of the SafetyOne.

7. Do not use the monitor outputs or solenoid/lamp outputs as safety outputs, otherwise the system safety is impaired in case the SafetyOne or connected components fail.

8. Do not use the start input and the external device monitor input as safety inputs, otherwise the system safety is impaired in case the SafetyOne or connected components fail.

9. Use the SafetyOne in compliance with laws and regulations of the country or region where the SafetyOne is used.

10. Use safety inputs and safety outputs in circuit configurations which conform to safety requirements and applications.

11. Calculate the respective safety distances, while taking into consideration the response time of the SafetyOne and safety components connected to the SafetyOne.

12. Separate the SafetyOne from components and wires which do not satisfy Class 2 circuit requirements.

13. Safety performance differs depending on system configurations.

14. Use a power supply that meets the following required specifications completely:
    - Complies with the power supply rating of the SafetyOne.
    - The primary and secondary circuits are separated by double insulation or reinforced insulation.
    - Has the functionality equivalent of the control voltage and current of Class 2 circuit specified by UL508 or UL1310.
    - Complies with safety laws or regulations relating to electrical safety or EMC of the country where the SafetyOne is used.

15. Ground the V– line (0V DC) for ground diagnosis.

16. After setting a new configuration or modifying a configuration, check each input and output function.

17. Implement protective measures so that personal other than safety responsible persons operating the SafetyOne do not modify the configuration.

18. The SafetyOne is designed for installation within an enclosure. Do not install the SafetyOne outside an enclosure. Install the SafetyOne in an enclosure of IP54 or higher protection.

19. Install the SafetyOne in environments specified in the catalog, instruction sheet, and user's manual. If the SafetyOne is used in places where the SafetyOne is subjected to high temperature, high humidity, condensation, corrosive gases, excessive vibrations, or excessive shocks, failure such as electrical shocks, fire hazard, or malfunction may result.

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Safety Precautions

20. Use the SafetyOne in an environment of pollution degree 2. (IEC 60664-1).

21. Do not drop the SafetyOne during transportation, otherwise damage or malfunction may result.

22. Prevent metal fragments and pieces of wire from dropping inside the SafetyOne housing. Put a cover on the SafetyOne during installation and wiring. Ingress of such fragments and chips may cause fire hazard, damage or malfunction.

23. Install the SafetyOne so that there is adequate distance from the walls, heat generating devices or peripherals, taking into consideration spacing requirements for maintenance and ventilation.

24. Install the SafetyOne on 35mm DIN rails with BNL6 end clips (sold separately) on both sides of the SafetyOne.

25. Wire to the connectors with proper cables or ferrules.

26. Ground the FE terminal to assure electromagnetic compatibility.

27. Use a common 0V DC line when different power supplies are used for the SafetyOne and other components (ex. light curtain).

28. Separate the input and output wiring from power lines.

29. When overcurrent flows into output terminals, the protective function turns off the output. However, when overcurrent status lasts long, internal protective elements will fuse. To protect the internal elements, insert fuses of double the rated value to each terminal.

30. Use the fuse compliant with IEC60127 requirements on the power line of the SafetyOne. (Required for equipment incorporating the SafetyOne for the use in Europe.)

31. When disposing of the SafetyOne, do so according to the regulations of the country or region.

32. Ensure to install the start switch outside the hazardous area, from where the operator of the start switch can confirm that no one is inside the hazardous area, when starting the operation of safety system.

For instruction sheet and user's manual, see http://www.idec.com/.

Specifications and other descriptions in this brochure are subject to change without notice.