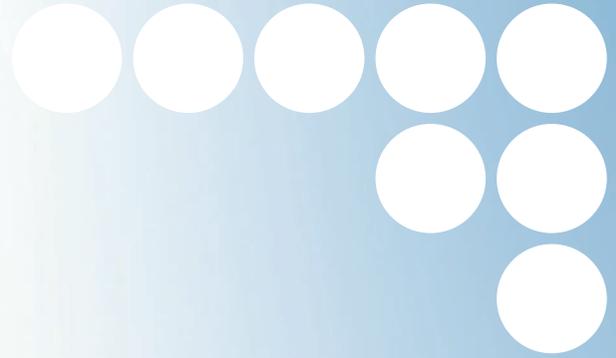


NEW

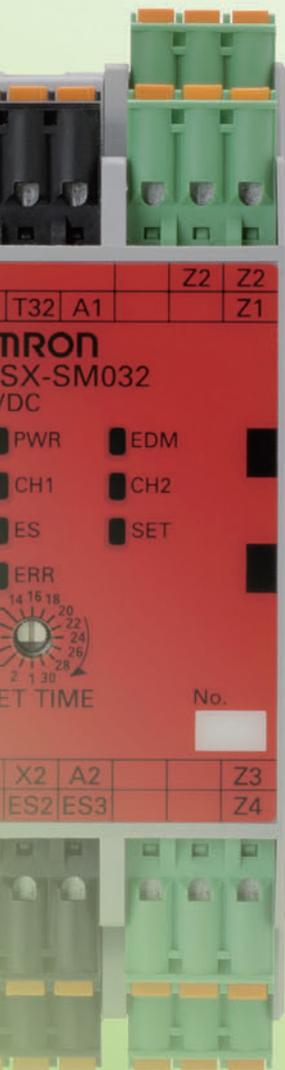
G9SX-SM
G9SX-LM

sti SAFETY,
TECHNOLOGY
& INNOVATION

OMRON



Better Productivity by Standstill and
Low-speed Monitoring

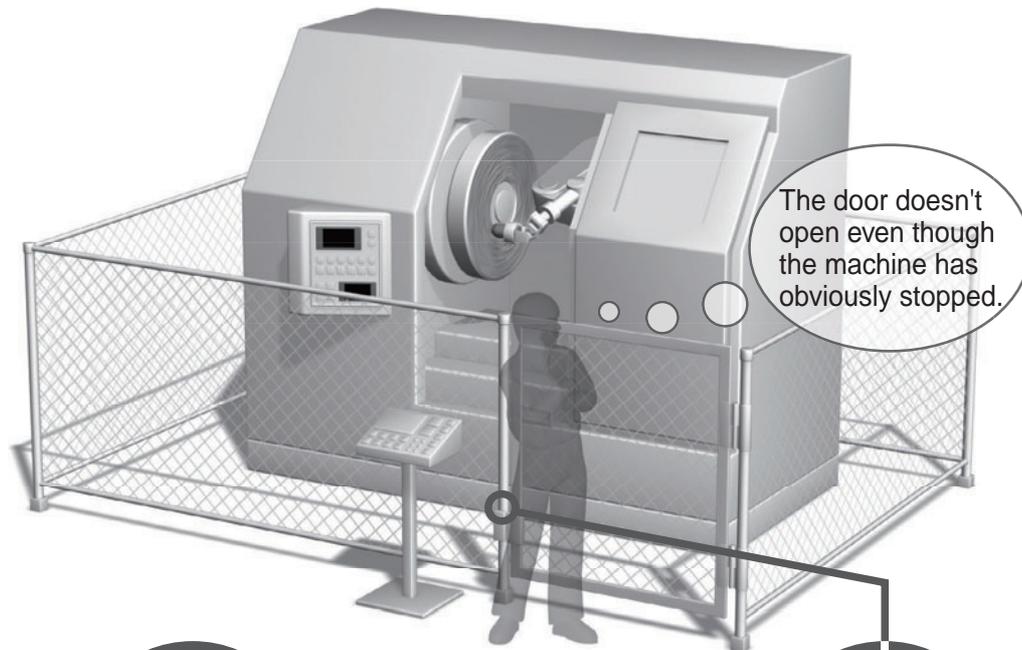


realizing

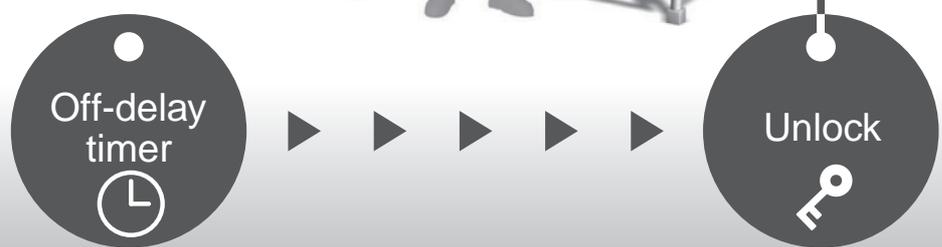
Standstill Monitoring Reduces Extra Waiting Time During Work

Problem

When a hazardous part has a long inertia, door-lock control using an off-delay timer results in extra waiting.

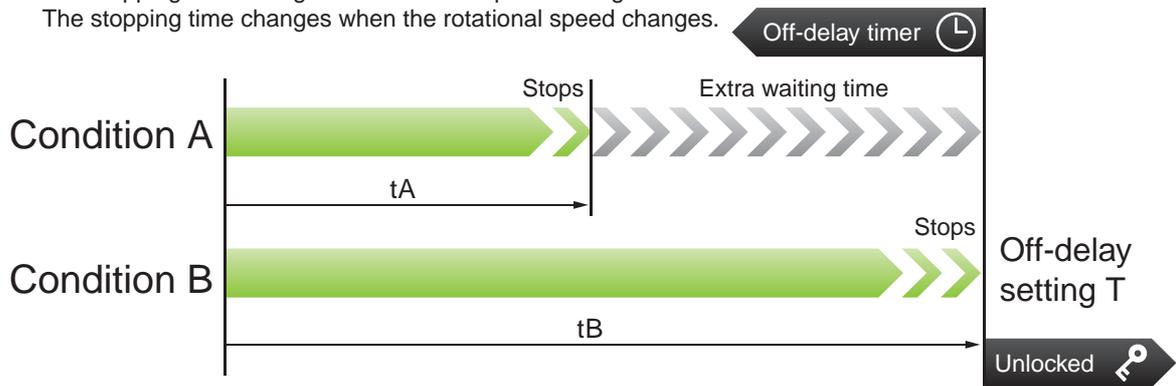


Waiting is a waste of time.



When the time required for a hazardous part to stop varies with different conditions, the off-delay had to be set with an extra margin of time.

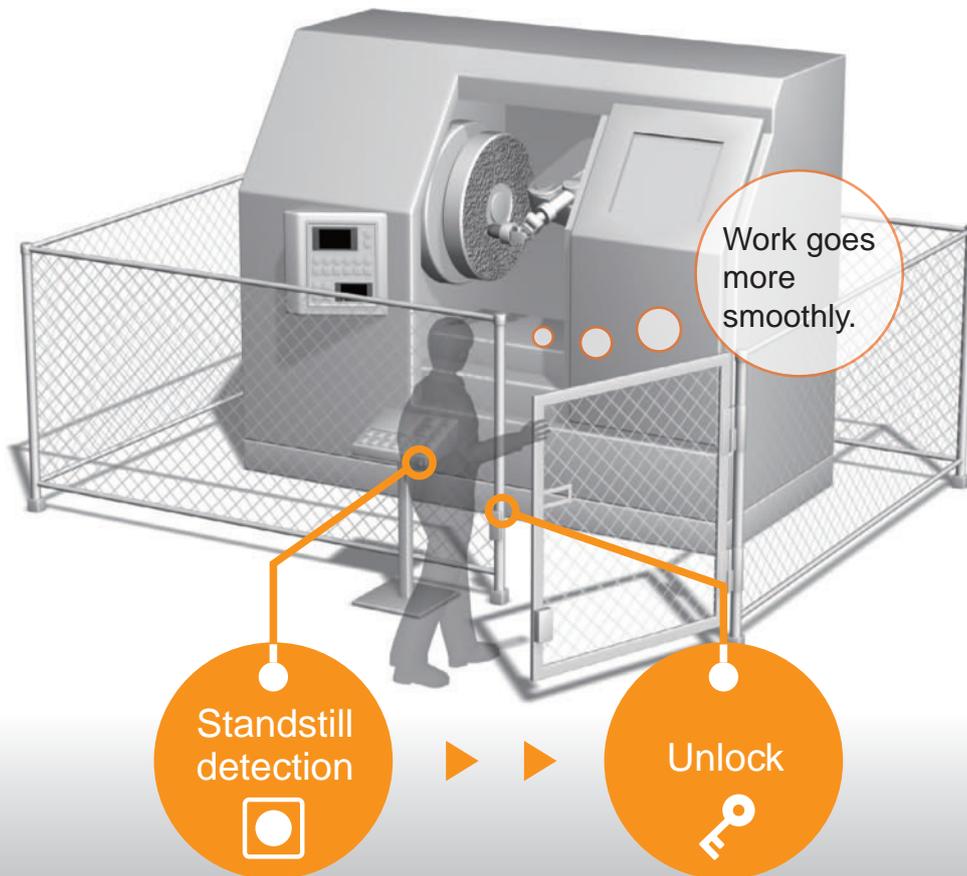
- Examples:
- The stopping time changes when the workpiece changes.
 - The stopping time changes when the rotational speed changes.



T must be set as follows: $T > tB > tA$

Solution

Extra waiting time is reduced by monitoring the motor's movement, then unlocking the door as soon as the motor stops.



Waiting time is reduced.

Productivity improved!

G9SX-SM Requiring No Sensor

Safety Category 4
PLe (ISO13849-1)

Can also be used with inverter control applications.

* Cannot be used for Servomotors.



G9SX-LM Using Proximity Sensors

Safety Category 3
PLd (ISO13849-1)

Can be used with a variety of applications, including Servomotors.



Complies with Global Safety Standards

Standstill and low-speed monitoring are required by international standards for machine tools, printing presses, and other applications. The G9SX Series can reliably be used in these applications, due to its certification for various safety standards.

The G9SX-SM meets Safety Category 4, PLe (ISO13849-1) requirements, and the G9SX-LM meets Safety Category 3, PLd (ISO13849-1) requirements.



Easy Setting with No Sensor Required

Standstill can be detected even when there is no space to install a sensor.

Safety Category 4 (EN954-1)
Performance Level e (ISO13849-1)

No Sensor Required

Detection of BEMF generated by the motor eliminates the need to install a sensor.

1

Ready to use "Standard Configuration"

User Configuration also available for fine-tuning.

2

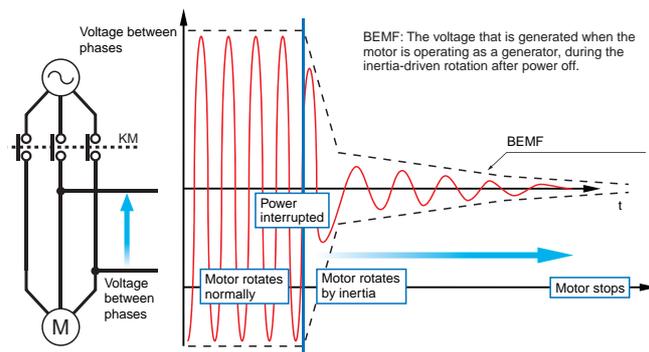
With Inverters

Applicable to inverter controlled systems.

3

1 No Sensor Required

The G9SX-SM detects the back electromotive force (BEMF) that is generated when the motor rotates in order to determine whether the motor is rotating or in standstill condition. Because the BEMF value varies with the motor revolution, the G9SX-SM determines that the motor has stopped when it detects that the BEMF has fallen below a set criterion.



2 No Complicated Settings Required

You can start monitoring by simply connecting the G9SX-SM system in Standard Configuration without any sensitivity adjustment.

Standard Configuration ► **Connect** ► **Start monitoring**

With the "User Configuration", sensitivity can be manually adjusted for each machine.

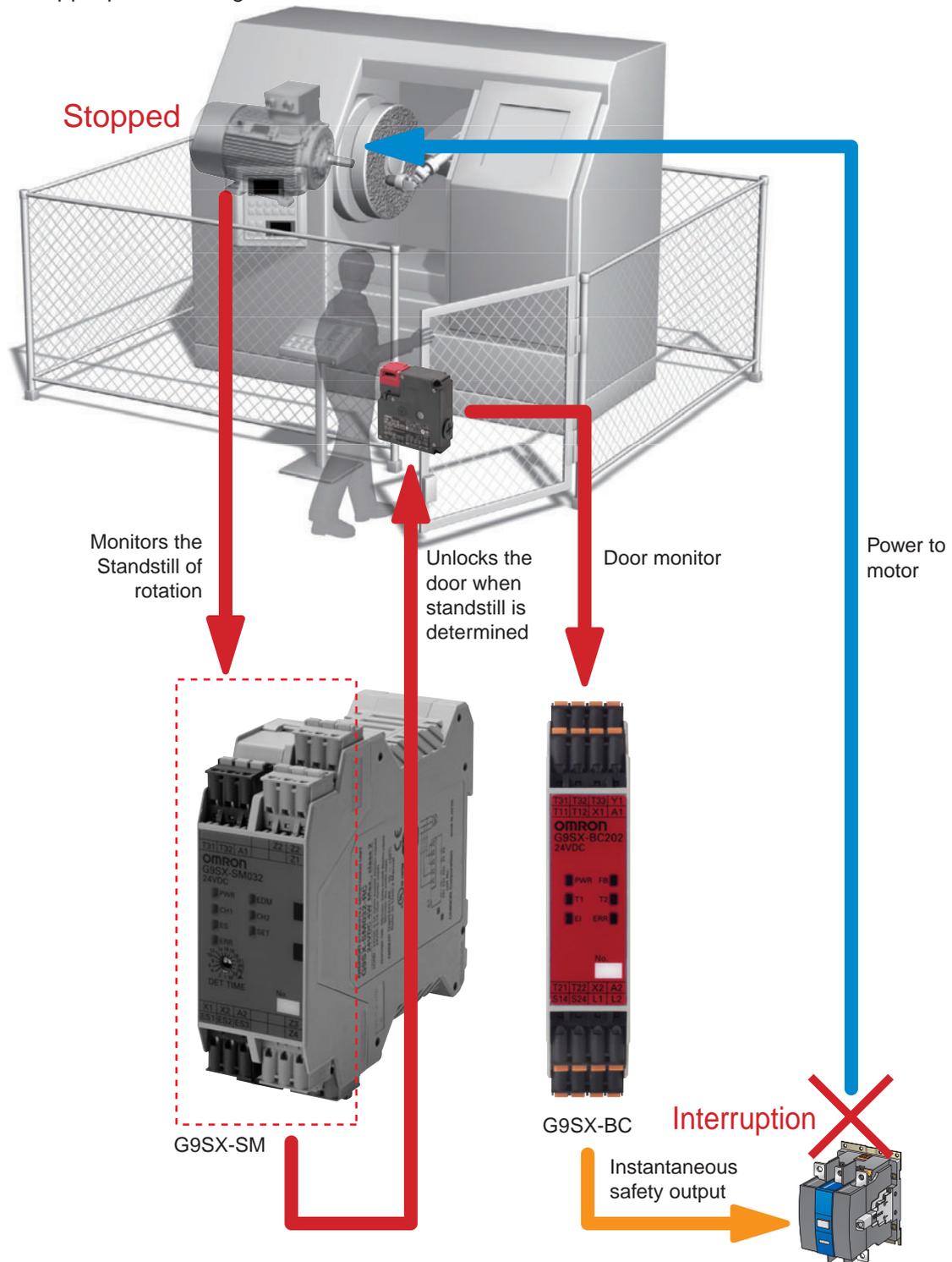
3 With Inverters

The G9SX-SM can be used with an inverter, without resulting in malfunctions due to the inverter's dynamic brake or auto-tuning functions.



System Configuration

This system detects that the machine has stopped, and unlocks the door with the appropriate timing.



Direct Monitoring with Proximity Sensors

Applicable to Various Systems, Including Servomotors

Safety Category 3 (EN954-1)
Performance Level d (ISO13849-1)

Monitoring with Proximity Sensors

Combination of general-purpose proximity sensors and the fault diagnosis of G9SX provide a Category 3 system.

1

Low-speed Monitoring

In addition to standstill monitoring, the G9SX-LM features a low-speed monitoring function for maintenance work.

2

Applicable to Servomotors

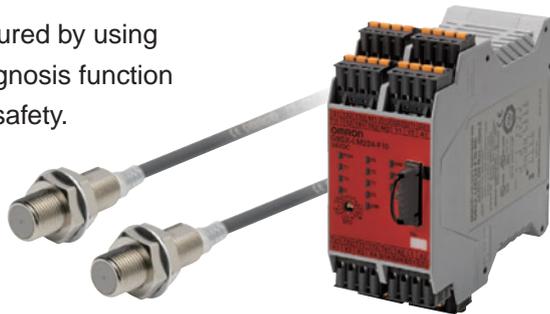
Because rotation is directly monitored with sensors, the G9SX-LM can be used with any motor type or control method.

3

1 Monitoring with Proximity Sensors

A redundant safety system can be configured by using two E2E Proximity Sensors. The fault diagnosis function of the G9SX-LM provides a high level of safety.

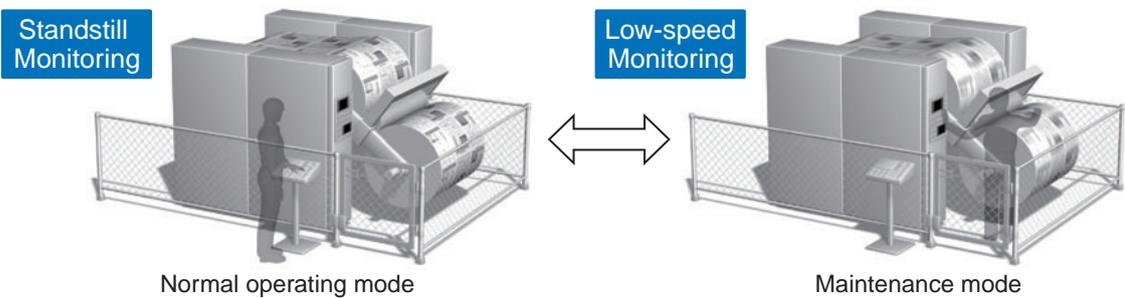
* Use only the DC 3-wire PNP type E2E.



Safety Category 3 (EN954-1)
PLd (ISO13849-1)

2 Speed Monitoring Matched to the Function for Each Operating Mode

In normal operating mode, standstill is monitored to unlock the door.
In maintenance mode, low-speed operation is monitored to allow maintenance work.



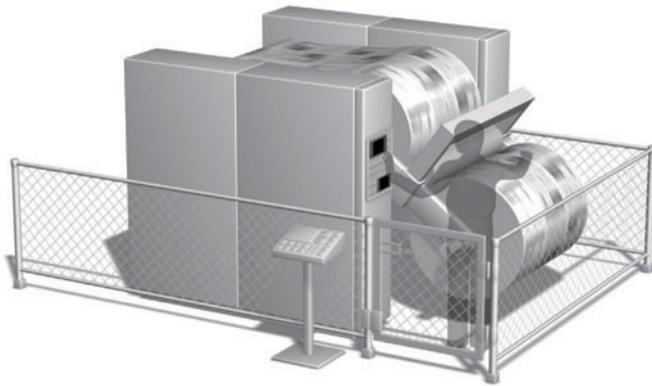
3 Applicable to Servomotors

Because the drive rotation is directly monitored, the G9SX-LM can also be used with Servomotors.



Problem

Achieving safety during maintenance work.



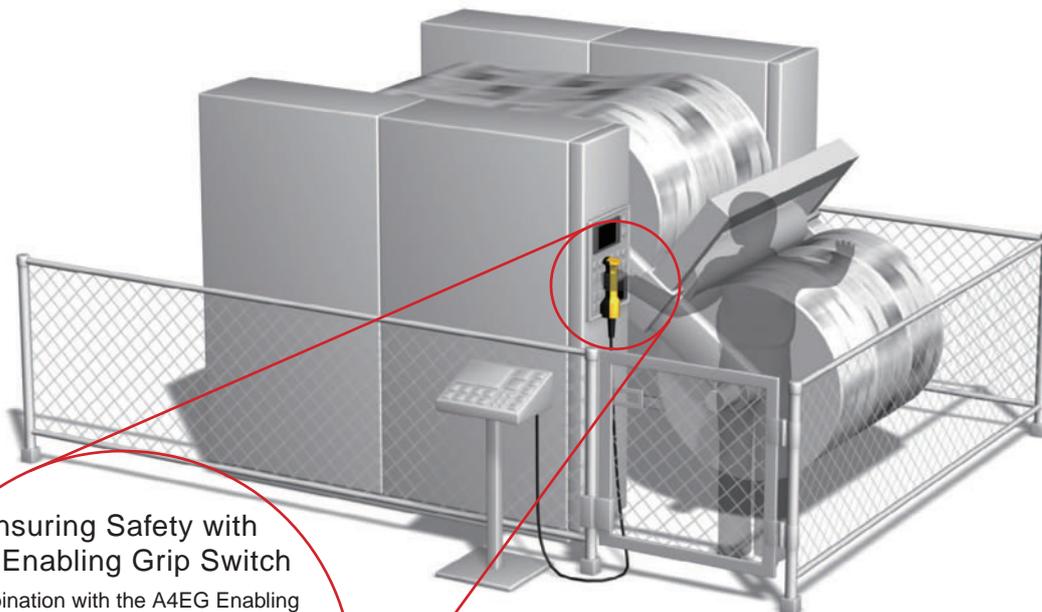
The machine must sometimes be operated for irregular operations, such as maintenance.



Is the operator's safety assured?

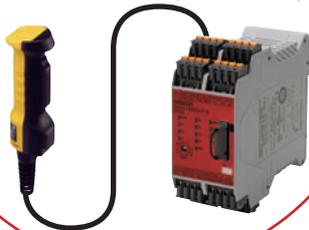
Solution

Operate the machine at low speed, and monitor the speed.



Ensuring Safety with the Enabling Grip Switch

Combination with the A4EG Enabling Grip Switch ensures operator safety.



In order to ensure operator safety...

1 Operate the machine with the Enabling Grip Switch.

2 Monitor that the machine is operating below the preset speed.

3 If the speed exceeds the preset value, stop the machine immediately.

If the Enabling Grip Switch is pressed or released, stop the machine immediately.

Standstill Monitoring Unit G9SX-SM

Sensor-less Monitoring of Standstill for Machines with Long Inertia

- Standstill is monitored by the motor's back electromotive force (BEMF) signal.
- Features a "Standard Configuration", allowing immediate use without sensitivity adjustment.
- "User Configuration" also available for fine-tuning of sensitivity.
- Detailed LED indications enable easy fault diagnosis.
- Safety Category 4 (EN954-1), PLe (ISO13849-1), and SIL 3 (IEC/EN 62061) certified.



List of Models

Standstill Monitoring Unit

Safety outputs	Safety standstill detection output	Auxiliary output	Rated voltage	Terminal block type	Model
---	3	2	24 VDC	Screw terminals	G9SX-SM032-RT
				Spring-cage terminals	G9SX-SM032-RC

Ratings

Power input

Item	Model	G9SX-SM032-□
Rated supply voltage		24 VDC
Operating voltage range		-15% to 10% of rated supply voltage
Rated power consumption *		4 W max.

* Power consumption of loads not included.

Inputs

Item	Model	G9SX-SM032-□
Rated Input voltage		Standstill detection input (between Z1 and Z2 and between Z3 and Z4) *1 480 VAC max. (120Hz max.) *2
Internal impedance		Standstill detection input: Approx. 660 kΩ EDM input: Approx. 2.8 kΩ *3

*1. Input the motor phase-to-phase voltage between Z1 and Z2 and between Z3 and Z4.

*2. When a motor with AC240V or more is used, connect neutral point of the power supply to earth.

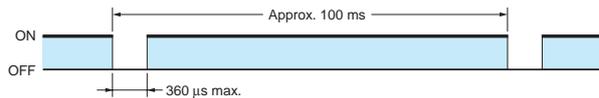
*3. Use a contact that is applicable to microloads (24 VDC, 5 mA) for connection to the EDM input.

Outputs

Item	Model	G9SX-SM032-□
Safety standstill detection output *1		Sourcing output (PNP), load current: 0.3 A DC max. *2
Auxiliary output (output monitor/error)		Sourcing output (PNP), load current: 100 mA DC max.

*1. While safety standstill detection outputs are in the ON state, the following pulse signal is output continuously for output circuit diagnosis.

When using the safety standstill detection outputs as input signals to control devices (i.e. Programmable Controllers), consider the pulse signal shown below.

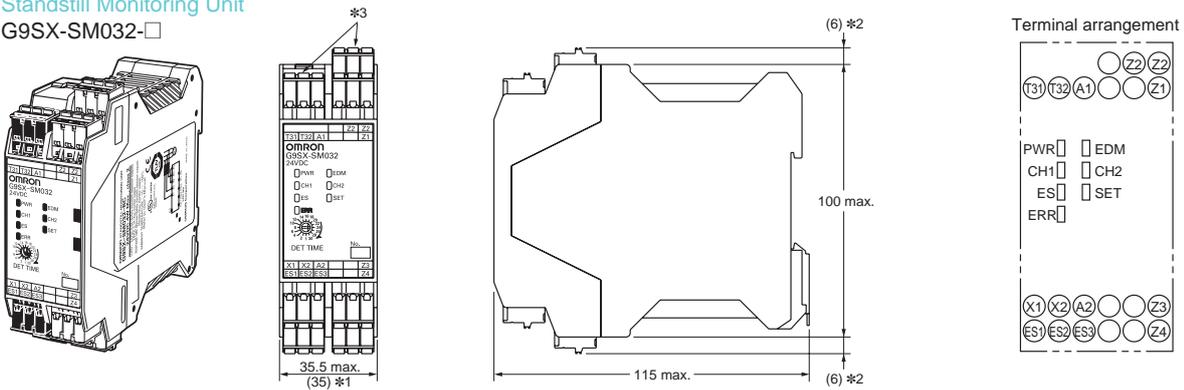


*2. The following derating is required when Units are mounted side-by-side.
G9SX-SM032-□: 0.2 A max. load current

Dimensions and Terminal Arrangement

(Unit: mm)

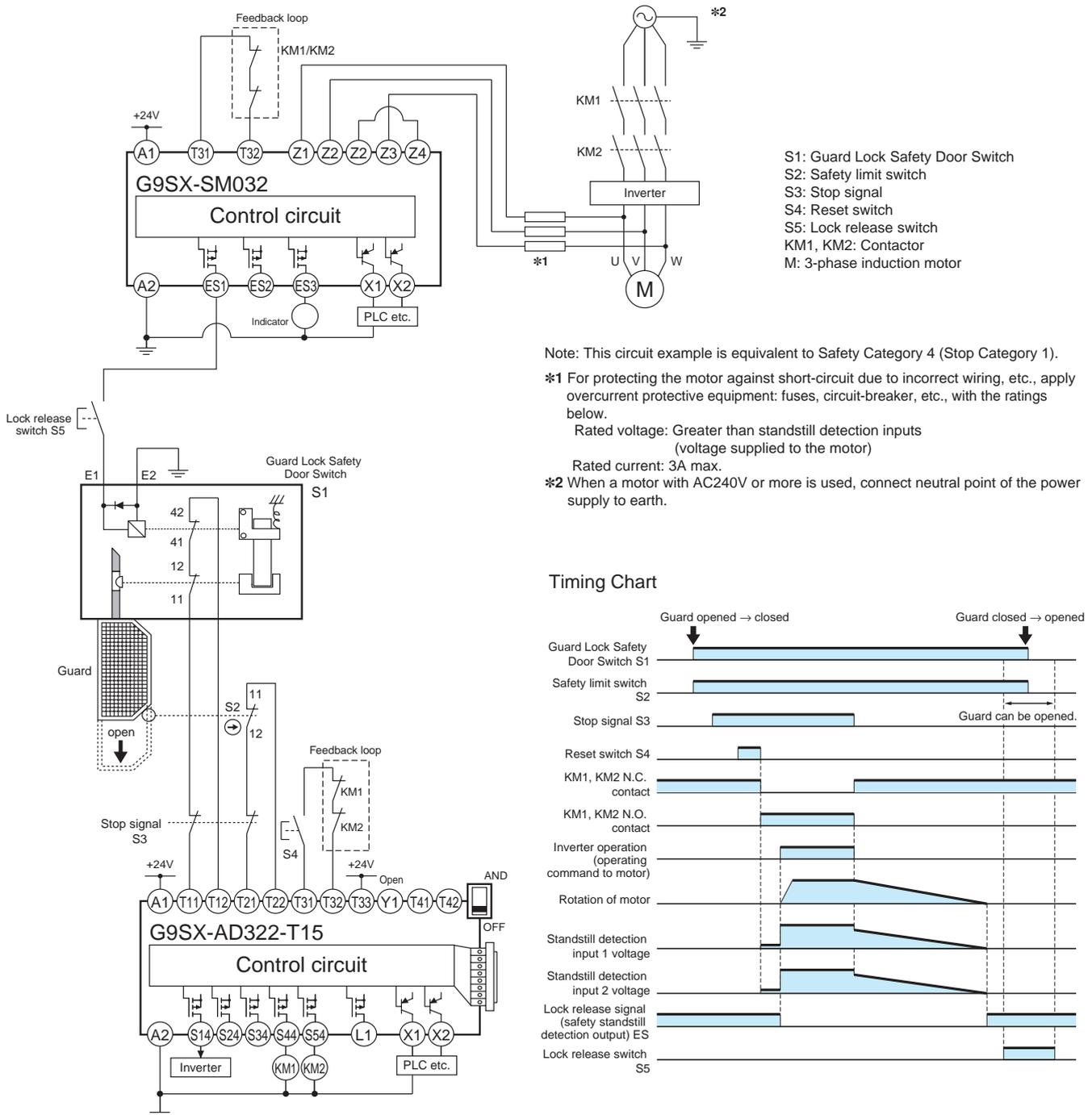
Standstill Monitoring Unit G9SX-SM032-□



*1. Typical dimension
 *2. For -RC terminal type only.
 *3. The terminal colors are green for the Unit right side (standstill detection input) and black for the left side.
 Note: Above outline drawing is for -RC terminal type.

Application Example

G9SX-SM032 (24 VDC) (3-phase Induction Motor) + G9SX-AD322-T15 (24 VDC)
 (Guard Lock Safety Door Switch, 2-channel Safety Limit Switch Inputs / Manual Reset)



Low-speed Monitoring Unit

G9SX-LM



Low-speed Monitoring Function Ensures Safety for Maintenance Work

- Motor rotation speed detected by Proximity Sensor.
- Monitors and confirms that speed does not exceed the preset level.
- Includes an Enabling Switch input for maintenance work.
- Detailed LED indications enable easy fault diagnosis.
- Safety Category 3 (EN954-1), PLd (ISO13849-1), and SIL 3 (IEC/EN 62061) certified.



NEW

List of Models

Low-speed Monitoring Unit

Instantaneous safety output	Safety slow-speed/stopping detection output	Auxiliary output	Maximum set threshold	Rated voltage	Terminal block type	Model
2 (Semiconductor)	2 (Semiconductor)	4 (Semiconductor)	10 Hz	24 VDC	Screw terminals	G9SX-LM224-F10-RT
					Spring-cage terminals	G9SX-LM224-F10-RC

Ratings

Power input

Item	Model	G9SX-LM224-□	G9SX-EX401-□
Rated supply voltage		24 VDC	
Operating voltage range		-15% to 10% of rated supply voltage	
Power consumption *		5 W max.	2 W max

* Power consumption of loads not included.

Inputs

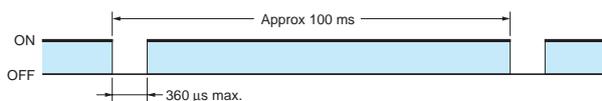
Item	Model	G9SX-LM224-□
Safety input Enabling input Feedback/reset input Mode selector input		Operating voltage: 20.4 VDC to 26.4 VDC Internal impedance: Approx. 2.8 kΩ *
Rotation detection input		Operating voltage: 20.4 VDC to 26.4 VDC Internal impedance: Approx. 2.8 kΩ Frequency input range: 1 kHz max.

* Provide a current equal to or higher than that of the minimum applicable load of the connected input control device.

Outputs

Item	Model	G9SX-LM224-□
Safety instantaneous output *1		Sourcing output (PNP compatible) Load current: 0.8 A DC max. *2
Safety speed detection output *1		Sourcing output (PNP compatible) Load current: 0.3 A DC max.
Auxiliary output		Sourcing output (PNP compatible) Load current: 100 mA DC max.

*1. While safety instantaneous outputs and safety speed detection outputs are in the ON state, the following pulse signal is output continuously for output circuit diagnosis. When using these safety outputs as input signals to control devices (i.e. Programmable Controllers), consider the pulse signal shown below.

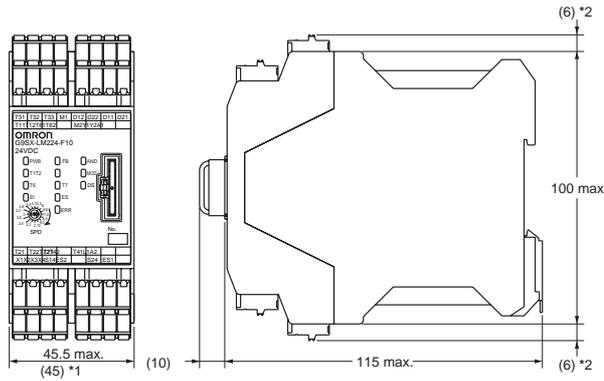
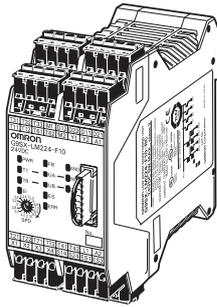


*2. The following derating is required when Units are mounted side-by-side.
G9SX-LM□: 0.4 A DC max. load current

Dimensions and Terminal Arrangement

(Unit: mm)

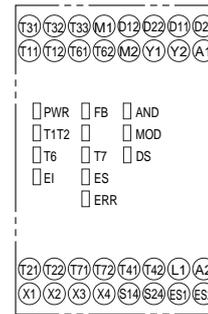
Low-speed Monitoring Unit G9SX-LM224-F10



*1. Typical dimension
*2. For -RC terminal type only.

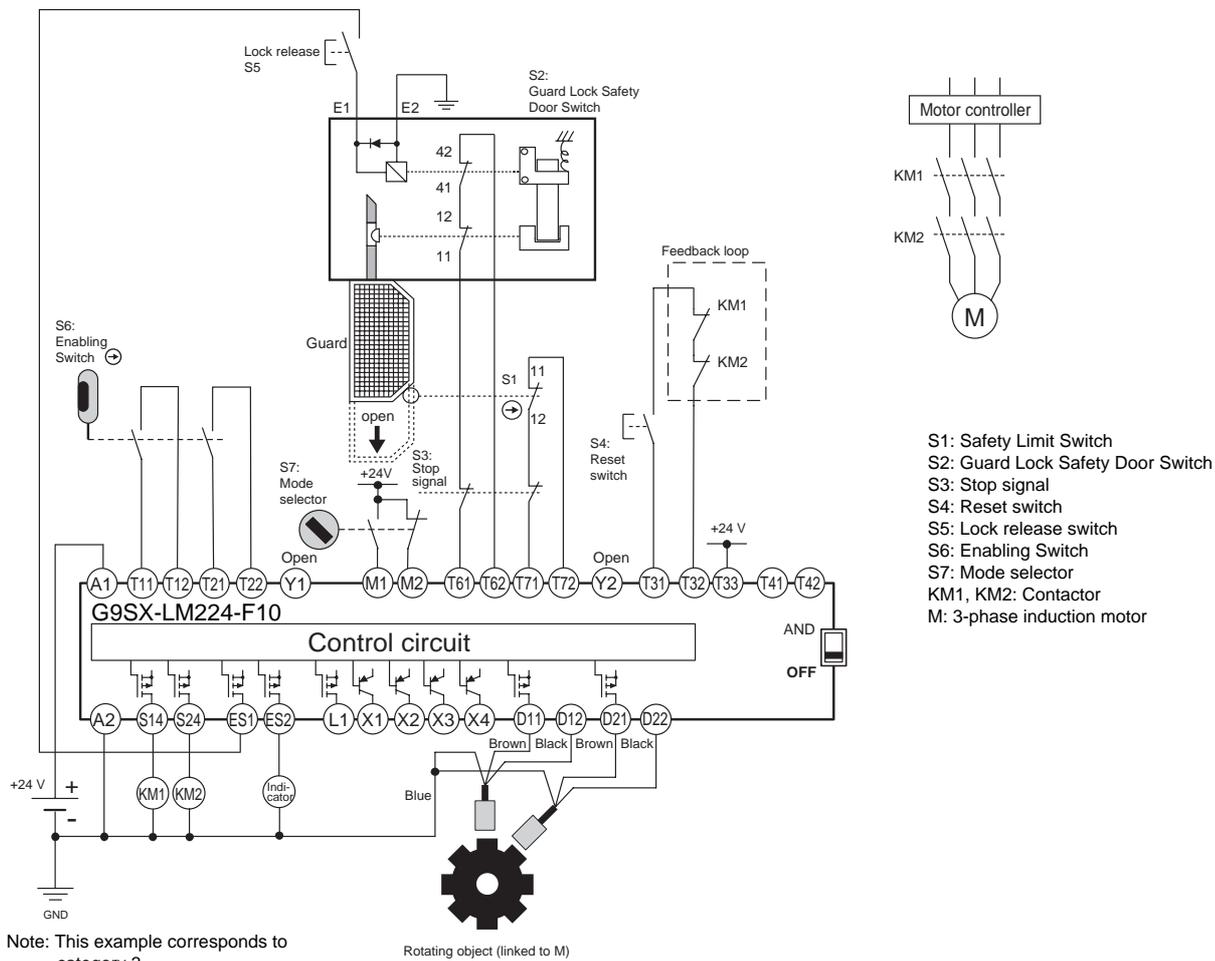
Note: Above outline drawing is for -RC terminal type.

Terminal arrangement



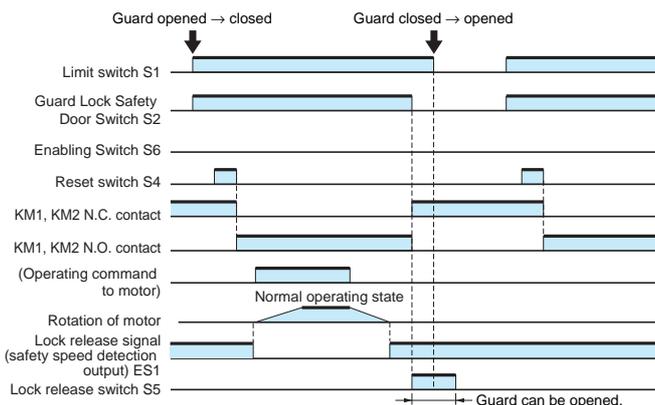
Application Example

G9SX-LM224 (24 VDC) (Guard Lock Safety Door Switch (Mechanical Lock),
2-channel Safety Limit Switch Inputs/2-channel Enabling Switch Inputs/Manual Reset)

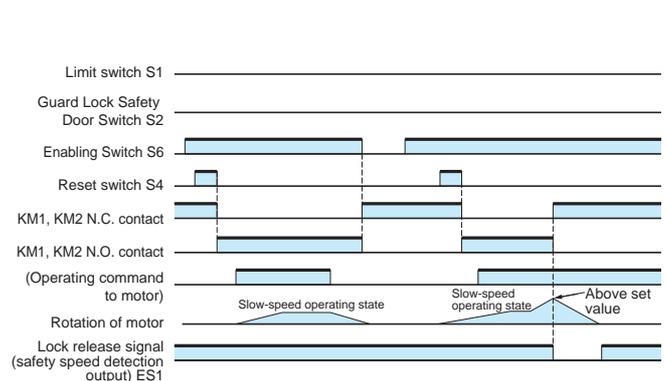


Note: This example corresponds to category 3.

Operating Time Chart For Normal Operating Mode (M1: ON, M2: OFF)



Operating Time Chart For Maintenance Mode (M1: OFF, M2: ON)



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