

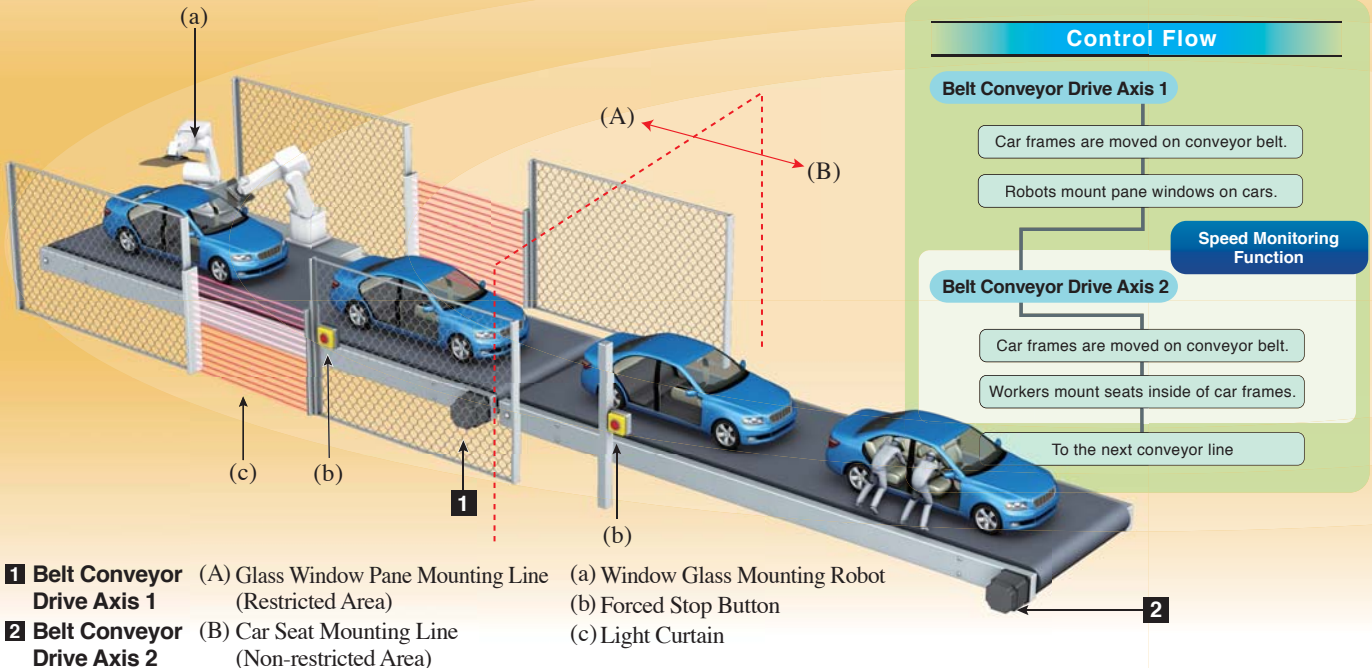
For your all production needs

# MELSERVO-J4 Solutions

MITSUBISHI SERVO AMPLIFIERS & MOTORS  
**MELSERVO-**  
**J4**

vol.07

## Conveyor System Utilizing Safety Observation Function



Issues at  
production  
sites

Issue 1

Safety measures in case of people entering in a restricted area

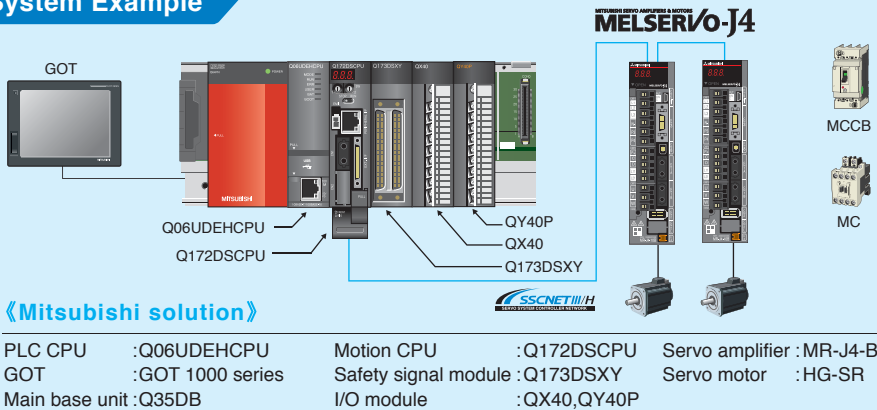
➔ Shut-off Function

Issue 2

Ensuring safe speed for area where people works

➔ Speed Monitoring Function

### System Example



Setup  
Procedure

Step1

Safety Signal Wiring

Step2

System Structure  
Settings

Step3

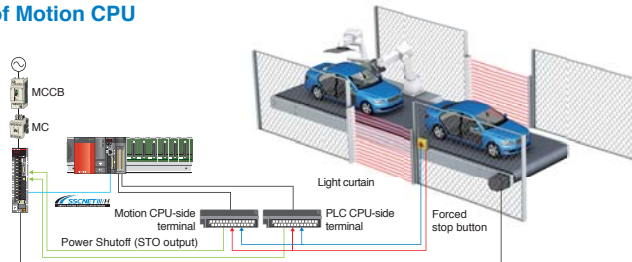
Parameter Settings  
for Safety Observation  
Function

## Solution 1

### Shut-off Function

## Various Reliable Safety Systems Can Be Created with Multiple Safety Functions

### System using "Safety signal comparison function" of Motion CPU



Each of the Motion and PLC CPU independently performs the safety monitoring functions at the same time (giving double CPU safety monitoring). Safety control can be combined with general control, which enables to create more flexible and simple safety systems. This is the best for a system monitoring multiple signals from safety monitoring equipment, such as forced stop buttons, light curtains, etc.

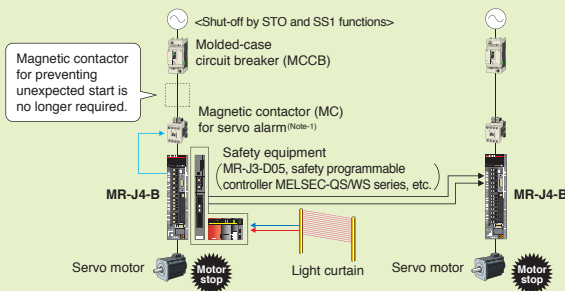
•Safety Functions **STO,SS1,SS2,SOS,SLS,SBC,SSM**

•Specification of Q173DSXY Safety signal module

	Points	Purpose
Input signal	20 points × 2 systems	User safety signal
Output signal	1 point × 2 systems	Shut-off signal
	11 points × 2 systems	User safety signal

### Safety functions achieved only with the servo amplifier

#### • System using the Safety logic module MR-J3-D05



The MR-J3-D05 Safety logic module integrates the STO and SS1 functions, and has an equivalent number of safety I/O signals to that of two servo amplifiers.

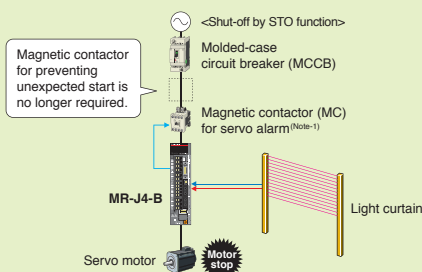
•Safety Functions **STO,SS1**

•Specification of MR-J3-D05 Safety logic module

	Points	Purpose
Input signal	2 points × 2 systems	User safety signal
Output signal	4 point × 2 systems	Shut-off outputs

(Note-1): Two magnetic contactors are not required when STO function is used. However, in this diagram, one magnetic contactor is used to shut off the power at alarm occurrence.

#### • System using the safety functions of the servo amplifier



The MR-J4-B Servo amplifier has integrated STO (Safe Torque Off) function as standard, being suitable for a system using only one piece of safety equipment.

•Safety Functions **STO**

•Specification of MR-J4 Servo amplifier

	Points	Purpose
Input signal	1 point × 2 systems	User safety signal
Output signal	1 point × 2 systems	Shut-off status

(Note-1): Two magnetic contactors are not required when STO function is used. However, in this diagram, one magnetic contactor is used to shut off the power at alarm occurrence.

## Solution 2

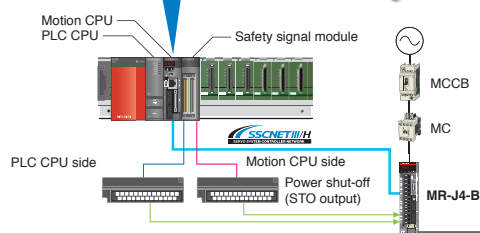
### Speed Monitoring Function (SLS)

## Securing Safe Speeds All the Time

This "Speed monitoring function" checks if the motor speed has exceeded the specified "Safety speed" or not. A safe operation speed can be ensured by comparing the feedback and command speed with the "Safety speed". When an error occurs, the STO and SS1 functions shut off the power.

This function ensures:

- Safety speed > command speed
  - Safety speed > feedback speed
- PLC and Motion CPU both perform the Speed monitoring function. In case the Safety speed is exceeded, the power is shut off.



Monitoring with a standard servo motor

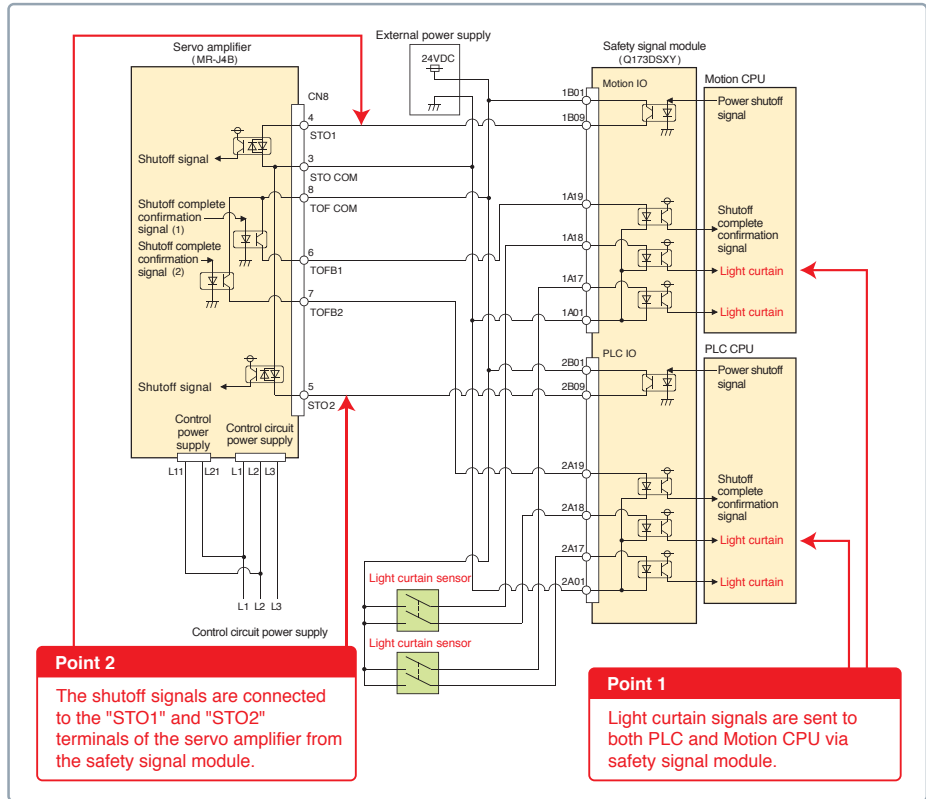
# Setup Procedure

## Step 1

### Safety Signal Wiring

This diagram shows a wiring example of a safety system using a safety signal module. The light curtain signals are wired to the input terminals of the safety signal module, and the module's output terminals are to the STO terminal on the servo amplifier.

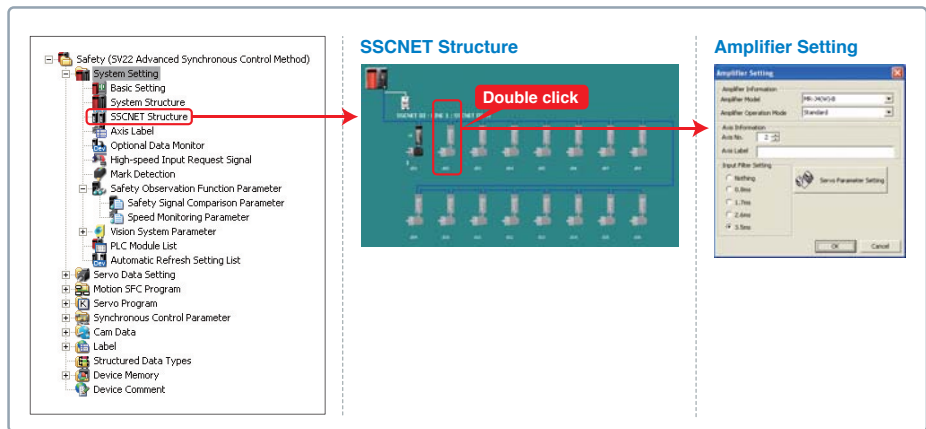
(Note) This example is compliant with EN ISO 13849-1 Category3 PLD.



## Step 2

### System Structure Settings

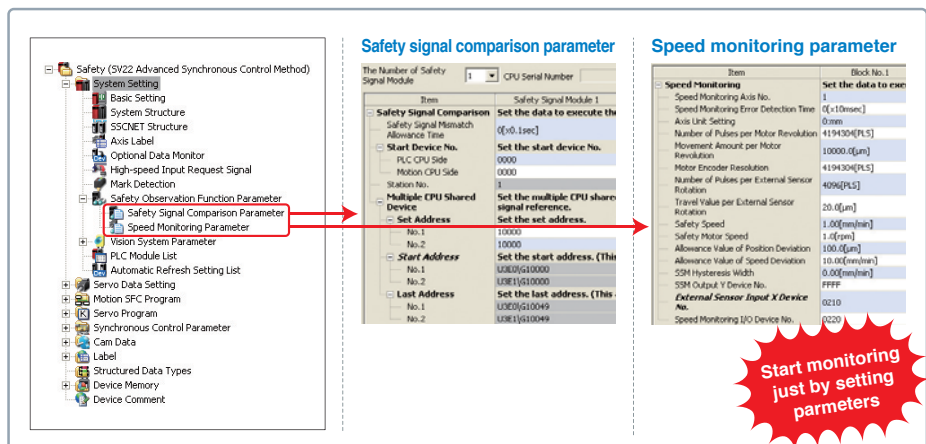
Set the servo amplifier and the servo motor on System Structure screen.



## Step 3

### Parameter Settings for Safety Observation Function

Set the Number of the safety signal modules, etc. with the Safety signal comparison parameter. Set the "Safety speed", Speed monitoring axis No., etc. with the Speed monitoring parameter.



MITSUBISHI SERVO AMPLIFIERS & MOTORS  
**MELSERVO-J4**  
Features

## Advanced Features for World-class Safety

### Safety Standard

- (1) Amplifier + Motion controller "Safety Observation Function"
- (2) Amplifier only
- (3) Amplifier + Safety logic module "MR-J3-D05"

IEC61800-5-2 Safety standard	(1)	(2)	(3)	IEC61800-5-2 Safety standard	(1)	(2)	(3)
<p><b>Safe torque off (STO)</b></p> <p>The STO function shuts off power to the motor electronically using the internal circuit by responding to the input signals (EM1) from external equipment (shuts off through secondary-side output). This function corresponds to the Stop category 0 of IEC 60204-1.</p>	○	○	○	<p><b>Safe stop 1 (SS1)</b></p> <p>Responding to the input signals (EM2) from external equipment, the SS1 function initiates the motor deceleration. After a required time delay for motor stop is passed, the SS1 initiates the STO function. This function corresponds to the Stop category 1 of IEC 60204-1.</p>	○	—	○
<p><b>Safe stop 2 (SS2)</b></p> <p>Responding to the input signals from external equipment (EM2), the SS2 function initiates the motor deceleration. After a required time delay for motor stop is passed, the SS2 function initiates the SOS function. This function corresponds to the Stop category 2 of IEC 60204-1</p>	○	—	—	<p><b>Safe operating stop (SOS)</b></p> <p>This function monitors the position of the motor not to deviate from the specified range. Power is still supplied to the motor during the SOS function.</p>	○	—	—
<p><b>Safely-limited speed (SLS)</b></p> <p>This function monitors the motor not to exceed the required speed limit. If the speed exceeds the limit, the motor power is shut off by the STO or SS1 function.</p>	○	—	—	<p><b>Safe speed monitor (SSM)</b></p> <p>The SSM signal is outputted when the motor speed is below the specified speed limit.</p>	○	—	—
<p><b>Safe brake control (SBC)</b></p> <p>This function outputs a safety output signals for external brake control.</p>	○	—	—	<p>V: Speed Vmax: User specified speed limit value S1, S2: Specified stop position</p> <p><span style="display: inline-block; width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black;"></span> Ensured safety range</p>			

Man, machine and environment in perfect harmony

Solution

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