

AC Servo Sales and Service

The STO Function of MR-J4 Series General-Purpose AC Servo Amplifiers Receives SIL 3 Certification

Thank you for your continued patronage of the Mitsubishi Electric general-purpose AC servo and Mitsubishi Electric FA products.

The MR-J4 series general-purpose AC servo amplifiers now comply with safety integrity level 3 (SIL 3) of the IEC 61508:2010 functional safety standard. This change does not affect the servo amplifier appearance.

1. Target Model

MR-J4 series AC servo amplifiers (excluding MR-J4-03A6(-RJ) and MR-J4W2-0303B6)

2. Details of the Change

The target MR-J4 servo amplifiers now comply with SIL 3, and their safety performance is changed as shown in Table 1. The SIL 3-certified servo amplifiers also meet the requirements of SIL 2. This change does not affect the hardware specifications.

Table 1. Changes of the safety performance

	Before change	After change
Safety performance (Standards certified by CB)	EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, EN 62061 SIL CL 2, EN 61800-5-2 STO function	EN ISO 13849-1 Category 3 PL e , IEC 61508 SIL 3 , EN 62061 SIL CL 3 , EN 61800-5-2 STO function

3. Schedule

For the products manufactured in Japan, this change has been made sequentially from the June 2015 production.

* For the products manufactured and sold in China, this change has been made sequentially from the December 2015 production.

There may be cases where both the former and new products exist in the distribution stage.

4. Safety Integrity Level (SIL)

The following shows PFH (Probability of failure per hour) for SIL (safety integrity level). For SIL 3, the PFH is reduced to 1/10 of that for SIL 2. (according to IEC 61508-1)

- SIL 2: $10^{-7}/h \leq PFH < 10^{-6}/h$
- SIL 3: $10^{-8}/h \leq PFH < 10^{-7}/h$

5. Use with SIL 3

Set the safety level with [Pr. PF18 STO diagnosis error detection time] (Figure 1).

To use the servo amplifier with SIL 3, set [Pr. PF18 STO diagnosis error detection time] within the range of 1 to 60, and execute the STO input diagnosis by TOFB output. To execute the diagnosis, connect the TOFB output (CN8) of the servo amplifier to the input of a SIL 3-certified controller. SIL 3 functional safety of the servo amplifiers is certified by TÜV SÜD.

For the details, refer to the Instruction Manual.

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No.	Symbol	Name and function	Initial value [unit]	Setting range													
PF18	**STOD	<p>STO diagnosis error detection time</p> <p>Set the time from when an error occurs in the STO input signal or STO circuit until the detection of [AL. 68.1 Mismatched STO signal error].</p> <p>When 0 s is set, the detection of [AL. 68.1 Mismatched STO signal error] is not performed.</p> <p>The following shows safety levels at the time of parameter setting.</p> <table border="1"> <thead> <tr> <th>Setting value</th> <th>STO input diagnosis by TOFB output</th> <th>Safety level</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0</td> <td>Execute</td> <td>EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2</td> </tr> <tr> <td>Not execute</td> <td>EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, and EN 62061 SIL CL 3</td> </tr> <tr> <td rowspan="2">1 to 60</td> <td>Execute</td> <td>EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2</td> </tr> <tr> <td>Not execute</td> <td>EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2</td> </tr> </tbody> </table> <p>When the short-circuit connector is connected to the CN8 connector, set "0" in the parameter.</p> <p>When MR-D30 functional safety unit is used, the parameter is not available.</p> <p>For safety levels at the time of using MR-D30, refer to "MR-D30 Instruction Manual".</p> <p>This parameter is available with servo amplifiers with software version C1 or later.</p>	Setting value	STO input diagnosis by TOFB output	Safety level	0	Execute	EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2	Not execute	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, and EN 62061 SIL CL 3	1 to 60	Execute	EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2	Not execute	EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2	0 [s]	0 to 60
Setting value	STO input diagnosis by TOFB output	Safety level															
0	Execute	EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2															
	Not execute	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, and EN 62061 SIL CL 3															
1 to 60	Execute	EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2															
	Not execute	EN ISO 13849-1 Category 3 PL d, IEC 61508 SIL 2, and EN 62061 SIL CL 2															

Figure 1. Parameter setting (for the MR-J4-B)

6. Use with SIL 2 (as conventional)

The servo amplifiers are still capable of SIL 2 as before regardless of whether the STO diagnosis function is enabled or not.

The conventionally-used TÜV Rheinland certification became invalid on February 28, 2017. The TÜV SÜD certification for functional safety is continuously valid even after March 1, 2017. The safety level remains the same.

7. How to Check the Country of Origin, and the Year and Month of Manufacture

The country of origin, and the year and month of manufacture are indicated on the packaging box (Figure 2) and the rating plate (Figure 3).



Figure 2. Indication example on the packaging box

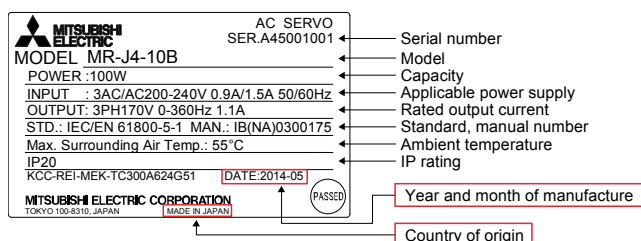


Figure 3. Indication example on the rating plate

Revision

Version	Date of issue	Revision
A	February 2017	The contents of Figure 1 in "5. Use with SIL 3", and "6. Use with SIL 2 (as conventional)" are revised.