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Guide To Using SSCNET Servos with Braked Motors in Vertical Applications (Controlled by QD75M)

Introduction

The MR-J2S-B series of SSCNET bus servo amplifiers has a dedicated interlock signal for use with motors that have an electromagnetic brake (herein referred to as the brake), primarily used in applications with a vertical axis. This signal is called MBR.

This document describes the functionality of the MBR signal, shows how it relates to the timing of the servo amplifier base circuit (which provides holding torque at the servomotor), and advises how to control the Servo-ON and Servo-OFF requests from the QD75M (herein referred to as the PLC) to ensure the vertical load does not drop.

This document is intended to complement the information that can be found in these manuals:-

Type QD75M Positioning Module (User's Manual)

SSCNET Compatible Model MR-J2S- B Servo Amplifier Instruction Manual

Servo Motor Instruction Manual

Brake Interlock function

The location of MBR in the servo amplifier is described in Figure 1.

Signal	Symbol	Connector Pin No.		Function/Application
		7kw or less	11kw or more	
Electromagnetic brake interlock	MBR	CN3 13	CON2 3	In the servo-off or alarm status, MBR turns off.

Figure 1 - MBR location and function

The connection diagram for MBR is shown in Figure 2.

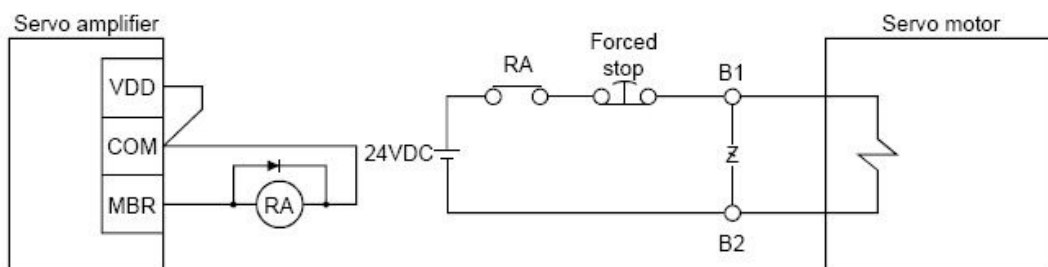


Figure 2 - Connection of MBR signal

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The servo amplifier automatically controls the status of the MBR signal based on the status of the "All axis Servo-ON" and "Servo-OFF" signals from the PLC, and alarm status of the servo.

When MBR signal turns ON, the brake coil is energised, releasing the brake mechanism.

When MBR signal turns OFF, the brake coil is de-energised, engaging the brake mechanism.

Naturally, the electromagnetic brake takes time to physically release and engage (the delay times for each motor can be found in the Servo Motor Instruction Manual).

In the case of requesting Servo-OFF from the PLC, it is important to ensure that the brake is engaged before the servo amplifier turns off the 'base circuit' (i.e. when the servo amplifier releases holding torque on the servomotor). Otherwise, the vertical load may drop.

The servo amplifier contains a parameter called "Electromagnetic brake sequence output" (Pr.21), for setting how long after MBR signal turns OFF the holding torque should be removed, in order to give the brake time to engage.

The timing of the various signals after requesting Servo-OFF can be seen in Figure 3.

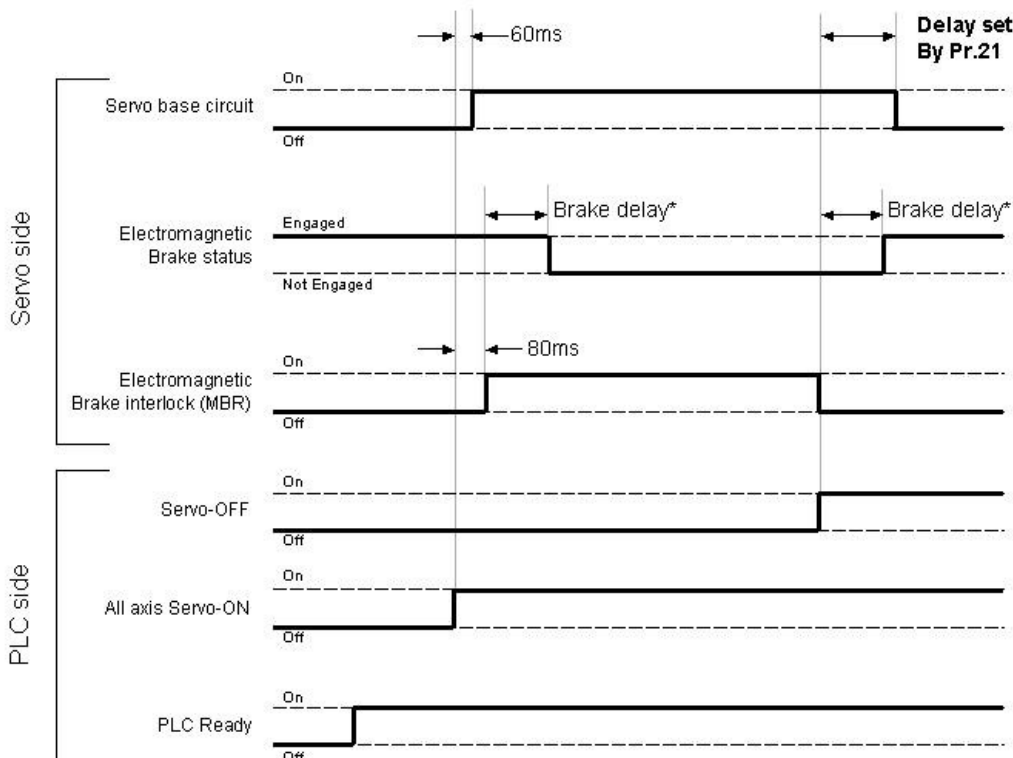


Figure 3 - Timing chart for brake interlock when Servo-OFF requested

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* The brake delay time can be found in the Servo Motor Instruction Manual. The setting for Pr.21 should not be less than the brake delay time; otherwise the axis may drop before the brake has engaged.

Note: The delay between MBR going OFF and removal off the base circuit after Pr.21 setting time takes effect ONLY when both “PLC Ready” and “All axis Servo-ON” are ON, and “Servo-OFF” is turned ON at the PLC side, as shown in Figure 3.

To ensure that the brake has engaged before holding torque is removed from the servomotor, the method described in Figure 3 should be used.

If “All axis Servo-ON” is turned OFF, then the servo amplifier immediately turns the base circuit OFF, and holding torque is removed from the servomotor, without applying the delay set in Pr.21. This is shown in Figure 4.

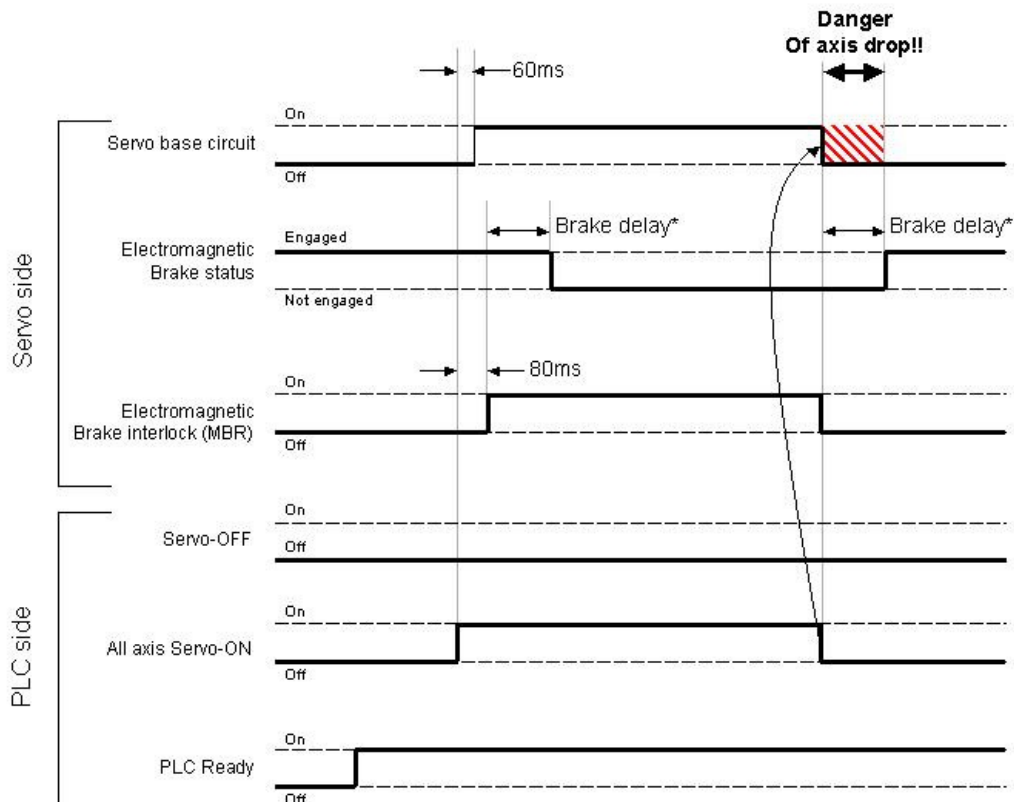


Figure 4 - Timing chart for brake interlock when All Axis Servo-ON is turned OFF

When the All Axis Servo-ON signal is turned off from the PLC side as shown in Figure 4, the delay set in Pr.21 is ignored. This is because the All Axis Servo-ON signal acts as an enable to all the connected servo amplifiers. Turning this signal OFF effectively disables the connected servos.

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In the case shown in Figure 4, the holding torque of the servomotor is turned OFF before the brake can engage.

QD75M servo control flags

Figure 5 shows the addresses of the “PLC Ready” and “All Axis Servo-ON” command flags described earlier (the addresses given assume the QD75M is located at I/O address 00).

Signal direction: PLC CPU → QD75	
Device No.	Signal name
Y0	PLC READY
Y1	All axis servo ON

Figure 5 - PLC Ready and All Axis Servo-ON command signals

Figure 6 shows the buffer memory addresses of the “Servo-OFF” request signals described earlier. There is a buffer memory per axis, and servo-OFF is requested by moving the value of “1” into the corresponding buffer memory.

Axis 1	Axis 2	Axis 3	Axis 4	
1551	1651	1751	1851	Cd.100 Servo OFF command

Figure 6 - Servo-OFF request buffer memory locations