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This document details how to set up the 1.5 axis MR-MQ100 motion controller to control an A700 Inverter with an FR-A7AP and FR-A7NS cards. (Encoder feedback and SSCNET III Comms card)

Required Equipment:

MR-MQ100, O/S version SW9-SV22QW
MR-J3BUS[]m, SSCNETIII cable
A700 inverter, with firmware version V7970 or later
Suitable Encoder for the motor
FR-A7AP, encoder input card for A700
FR-A7NS, SSCNET III network card for A700.

Required Software:

MT-Developer 2, V1.04E

Pre-requisites

For the A700 to connect to a motion controller the drive must be fitted with both the FR-A7AP encoder feedback module and the FR-A7NS SSCNET III comms module. The A700 must also be configured to function in close loop vector control.

It is assumed that the reader has experience of the A700 Inverter and its configuration.

Its also assumed that the reader has knowledge of Servo systems and the MT Developer 2 software.

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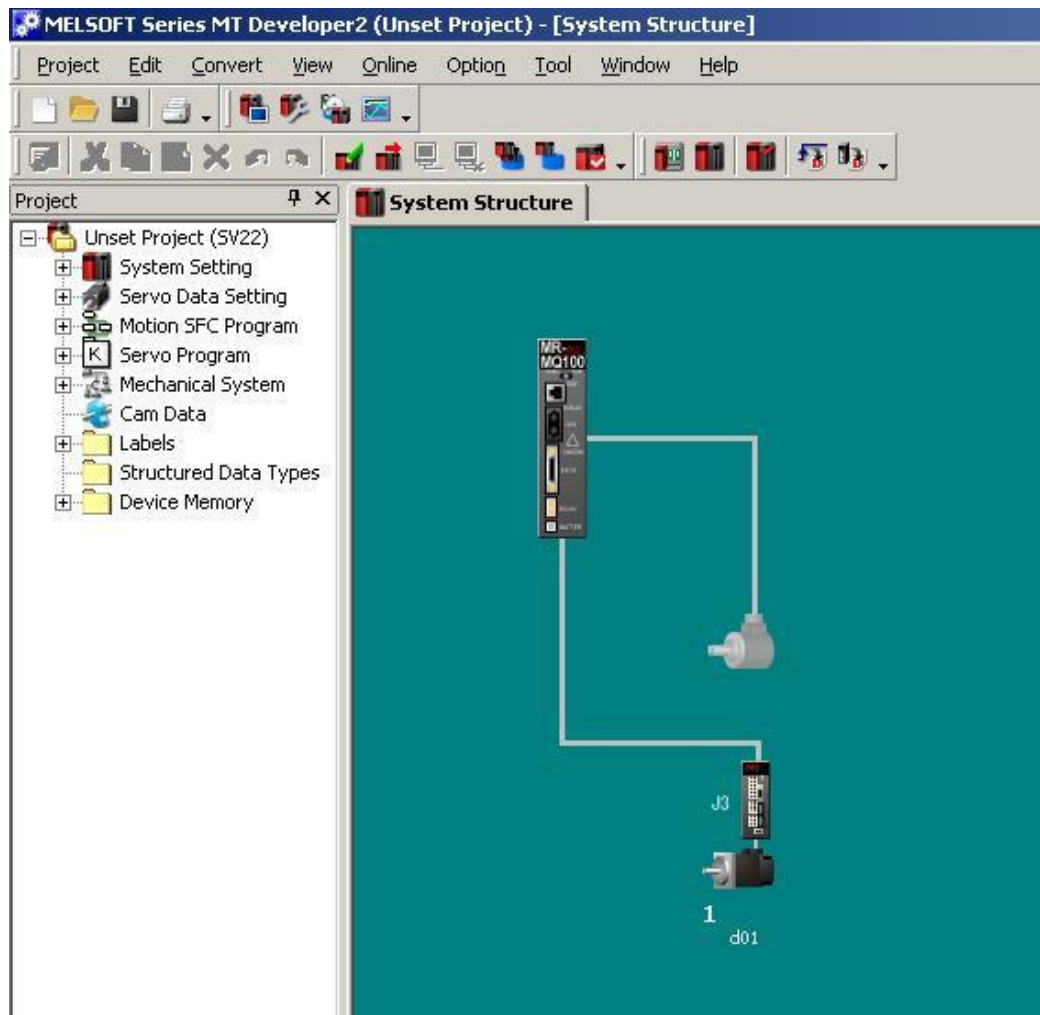
Settings in MT-Developer 2

To be able to select the A700 within the MT-Developer 2 software the following key press must be made during the selection of the amplifier type:

[Shift]&[Control]&[Alt]&[f]

Operation procedure

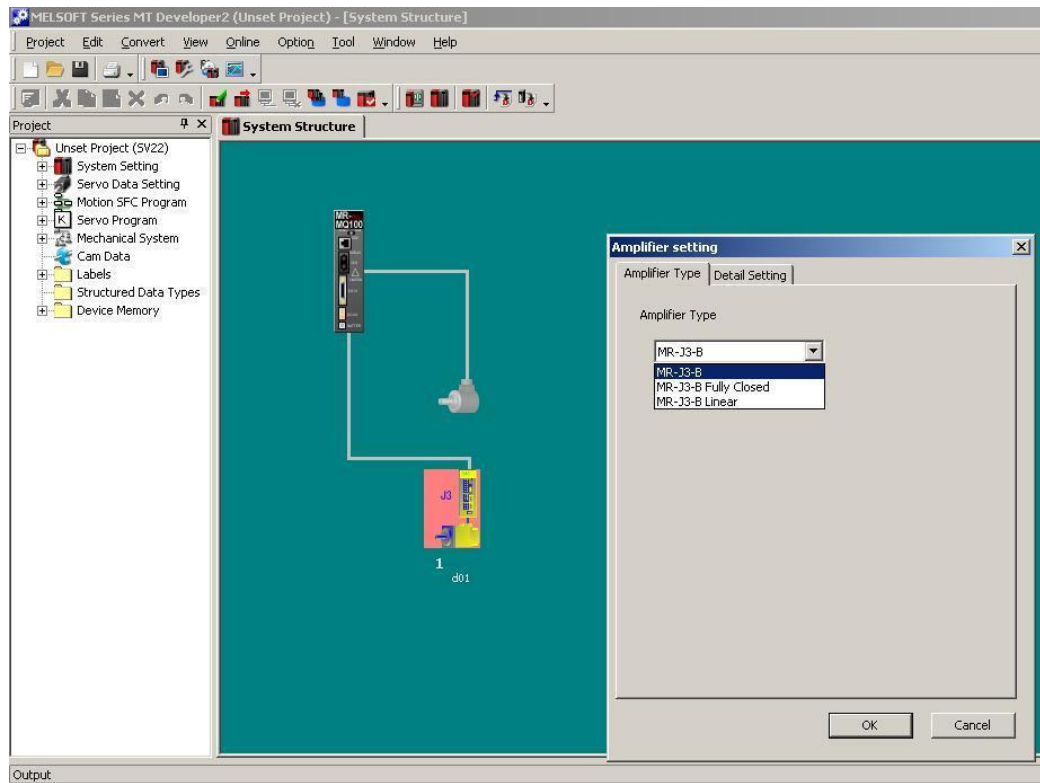
1) Open a new MT-Developer 2 project and open the System Structure show below.



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2) Double left click the mouse pointer on the servo amplifier to select its type.

From the pick list you will only find MR-J3 amplifier type, shown below.

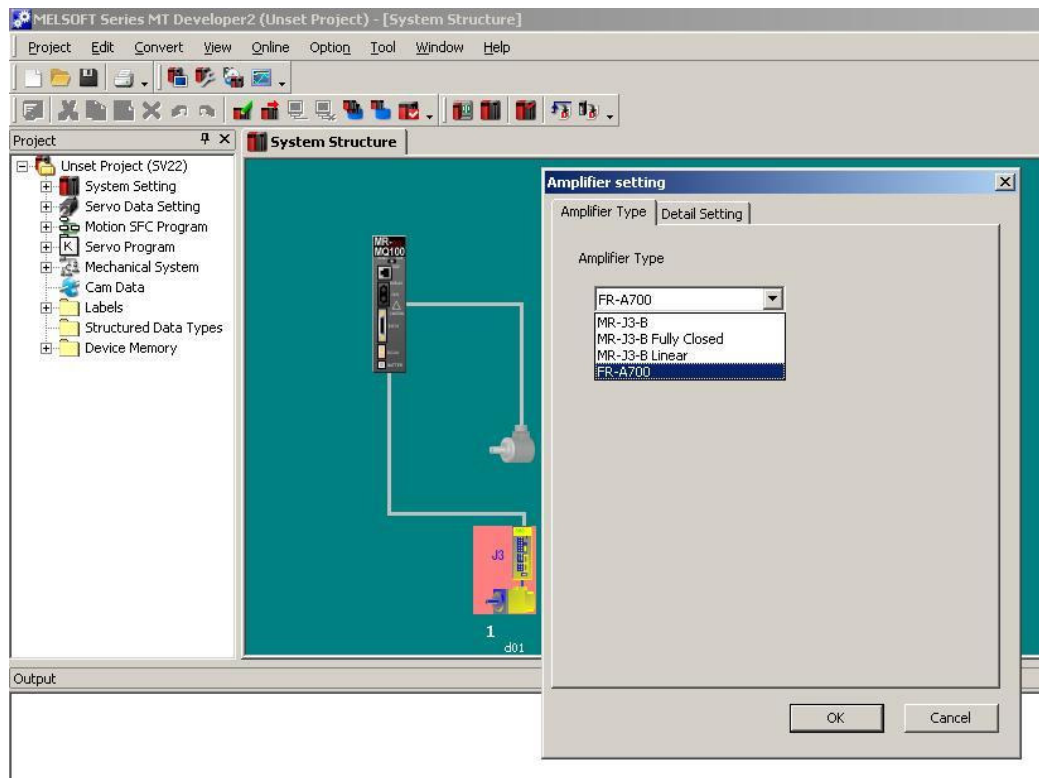


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3) While the Amplifier Type setting dialogue is open press the following keys at the same time.

[Shift]&[Ctrl]&[Alt]&[f]

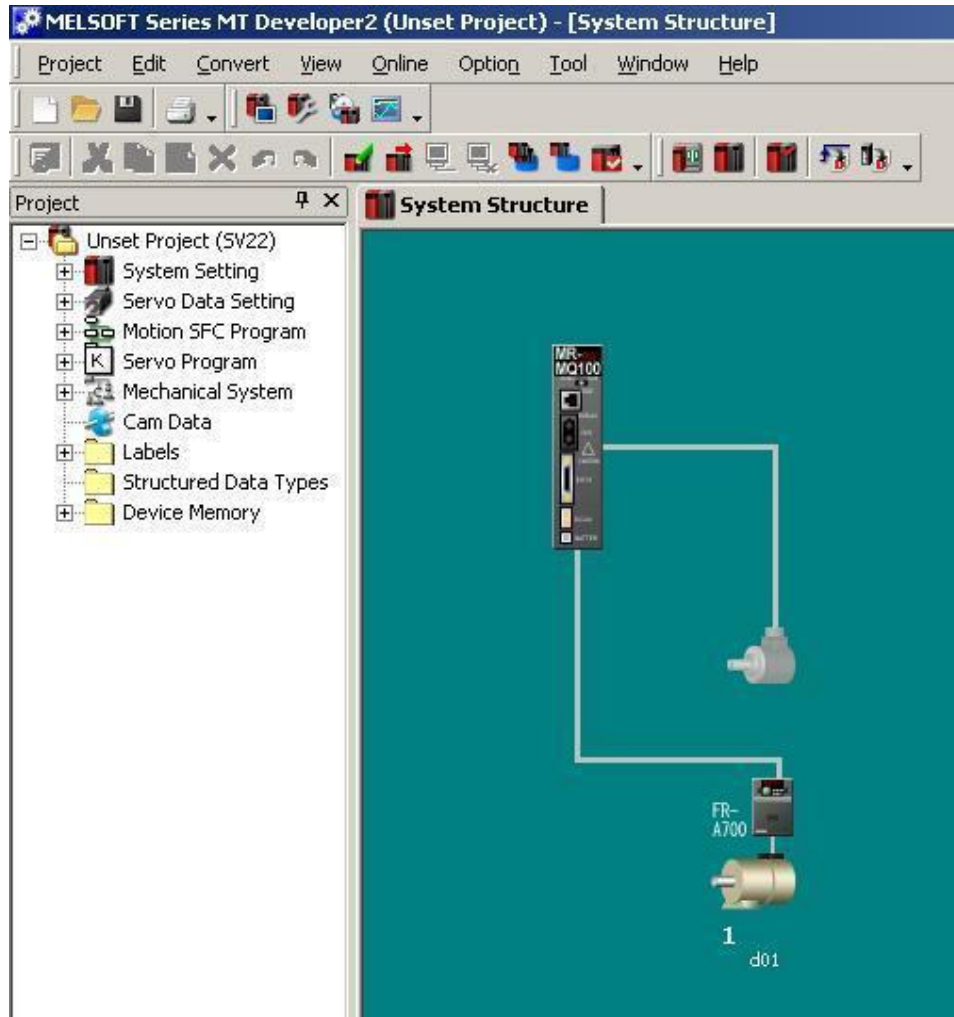
The selection for the FR-A700 will become available, at the bottom of the list. As shown below.



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4) To show the FR-A700 is selected the graphic of the System structure will display the FR-A700.



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Setting in the A700

When using SSCNET III with the FR-A700, the firmware version (V7970) or later must be installed.

Mounting both the FR-A7NS and FR-A7AP and performing vector control enables SSCNET III communication.

The FR-A7NS must be installed in slot no. 3 and FR-A7AP must be installed in slot no. 2.

When operating the inverter with the FR-A7NS mounted and without FR-A7AP, option alarm (E.OPT) occurs.

Set the axis number to "0H" using axis number switches on the FR-A7NS. The setting is reflected at the next power-on or inverter reset.

The following parameters are set for the FR-A7NS option card:

- Pr.499 SSCNET III operation selection: **0 → SSCNET III communication is valid**
9999 → SSCNET communication is invalid
- Pr.359 / 379 motor rotation direction: **0 / 0 or 1 / 1 → CW**
0 / 1 or 1 / 0 → CCW
- Pr.52 DU / PU display data selection: **39 → SSCNET III communication status is displayed instead of the voltage monitor**
- Pr.449 SSCNET III input filter setting: 0 → Disabled (0.88ms)
1 → 0.88ms
2 → 1.77ms
3 → 2.66ms
4 → 3.55ms
- Pr.800 Control method selection: 0-5, 10-12, **20 → Vector control**

Summary:

Pr.499 = 0
Pr.359/379 = 0/0
Pr.52 = 39
Pr.449 = 4
Pr.800 = 20

Control mode depends of command from QH-Motion Controller

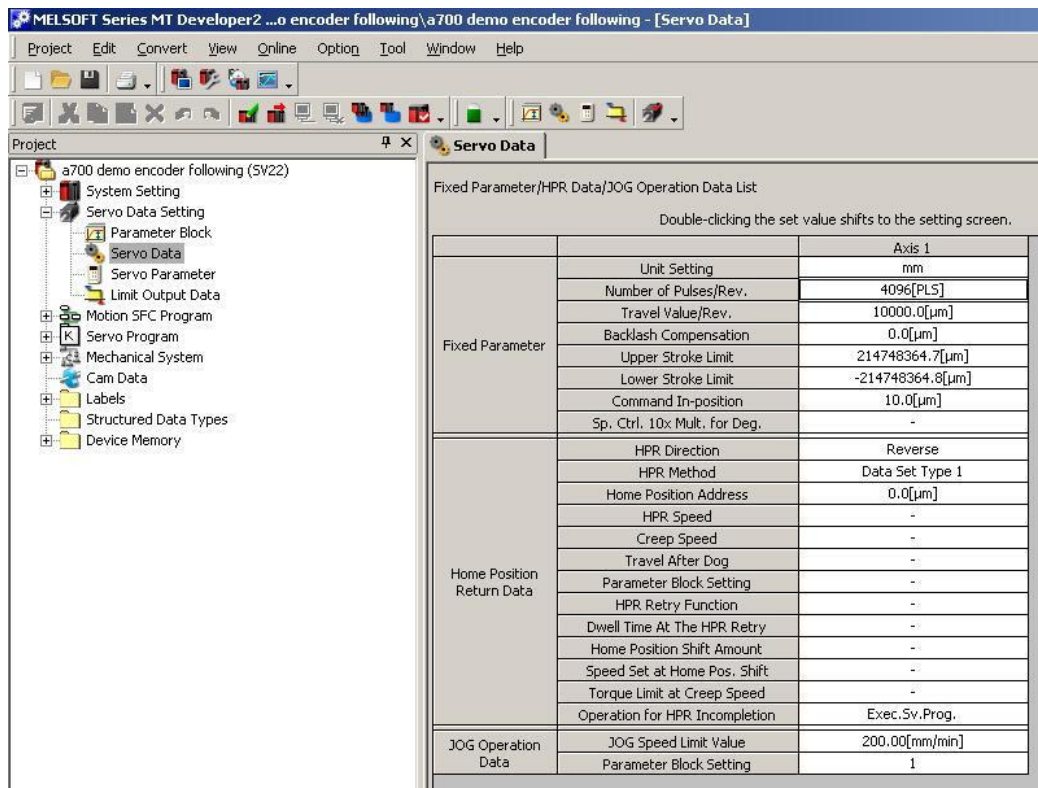
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Parameter must be changed by FR-DU07, FR-PU07 not by FR-Configurator.

Before using the inverter in vector control, the Auto-Tuning function should be activated to get optimum operating characteristics by automatically measuring the motor constants.

The servo parameter settings like Unit setting, Pulse Count/Rev., Travel/Rev. etc. are also active for FR-A700 inverter. In this example an external encoder with 1024 pulses/rev. is used. Due to the FR-A7AP card interprets the leading and falling edge of the A/B phase, the encoder resolution must be multiplied with 4.

The Pulse Count/Rev. is set to 4096 and the Travel/Rev. is set to 1000.0µm. If the travel distance is 1mm, the motor makes exactly 1 rotation.



The screenshot shows the 'Servo Data' window in MELSOFT Series MT Developer2. The left pane shows a project tree with 'a700 demo encoder following (SV22)' expanded to 'Servo Data'. The right pane displays a table of parameters for 'Axis 1'.

		Axis 1
Fixed Parameter	Unit Setting	mm
	Number of Pulses/Rev.	4096[PLS]
	Travel Value/Rev.	10000.0[µm]
	Backlash Compensation	0.0[µm]
	Upper Stroke Limit	214748364.7[µm]
	Lower Stroke Limit	-214748364.8[µm]
	Command In-position	10.0[µm]
Sp. Ctrl. 10x Mult. for Deg.		-
Home Position Return Data	HPR Direction	Reverse
	HPR Method	Data Set Type 1
	Home Position Address	0.0[µm]
	HPR Speed	-
	Creep Speed	-
	Travel After Dog	-
	Parameter Block Setting	-
	HPR Retry Function	-
	Dwell Time At The HPR Retry	-
	Home Position Shift Amount	-
JOG Operation Data	JOG Speed Limit Value	200.00[mm/min]
	Parameter Block Setting	1