

MR-JE-A Positioning Function: Program Method

Create program including the position data, the servo motor speed, and the acceleration/deceleration time constants, and select the program No. with the command interface signals to start the positioning operation. The program method enables more complex positioning operation than the point table method. MR Configurator2 is required to create programs.

Item		Description	
Command method	Command interface	DI/O (Input: 7 points excluding EM2 (Forced stop 2), output: 3 points excluding ALM (Malfunction)), RS-422 communication/RS-485 communication ^(Note 2)	
	Operating specification	Program language (program with MR Configurator2) Program capacity: 480 steps Program points: 16	
	Position command input ^(Note 1)	Absolute value command method	Set with program language. Setting range of feed length: -999999 to 999999 [$\times 10^{\text{STM}}$ μm], -99.9999 to 99.9999 [$\times 10^{\text{STM}}$ inch], -999999 to 999999 [pulse], Setting range of rotation angle: -360.000 to 360.000 [degree]
		Incremental value command method	Set with program language. Setting range of feed length: -999999 to 999999 [$\times 10^{\text{STM}}$ μm], -99.9999 to 99.9999 [$\times 10^{\text{STM}}$ inch], -999999 to 999999 [pulse], Setting range of rotation angle: -999.999 to 999.999 [degree]
	Speed command input	Set servo motor speed, acceleration/deceleration time constants, S-pattern acceleration/deceleration time constants with program language. S-pattern acceleration/deceleration time constants are also settable with [Pr. PC03].	
	System	Signed absolute value command method/signed incremental value command method	
	Analog override	0 V DC to ± 10 V DC/0% to 200%	
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Operation mode	Automatic operation mode	Program Depends on the setting of the program language	
	Manual operation mode	JOG operation	Inching operation is executed with DI or serial communication function ^(Note 2) based on the speed commands set with a parameter.
		Manual pulse generator operation	Manual feeding is executed with a manual pulse generator. Command pulse multiplication: select from $\times 1$, $\times 10$, and $\times 100$ with a parameter.
Home position return mode		Dog type, count type, data set type, stopper type, home position ignorance (servo-on position as home position), dog type rear end reference, count type front end reference, dog cradle type, dog type adjacent Z-phase reference, dog type front end reference, dogless Z-phase reference	
Other functions		Backlash compensation, overtravel prevention with external limit switches (LSP/LSN), roll feed display function, software stroke limit, mark detection (current position latch/interrupt positioning/mark sensor input compensation), simple cam function, encoder following function, command pulse input through function, override	

Notes: 1. STM is the ratio to the setting value of the position data. STM can be changed with [Pr. PT03].

2. RS-422 communication supports Mitsubishi Electric general-purpose AC servo protocol.

RS-485 communication supports Mitsubishi Electric general-purpose AC servo protocol and MODBUS[®] RTU protocol.

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Command List

Command	Name	Setting range	Description
SPN(setting value) (Note 2)	Servo motor speed	0 to instantaneous permissible speed [r/min]	Set a command speed for the servo motor in positioning. Do not set a value exceeding the instantaneous permissible speed of the servo motor.
STA(setting value) (Note 2)	Acceleration time constant	0 to 20000 [ms]	Set acceleration time constant. The setting value is a time period that the servo motor reaches the rated speed from a stop.
STB(setting value) (Note 2)	Deceleration time constant	0 to 20000 [ms]	Set deceleration time constant. The setting value is a time period that the servo motor stops from the rated speed.
STC(setting value) (Note 2)	Acceleration/ deceleration time constants	0 to 20000 [ms]	Set acceleration and deceleration time constants. The setting value is a time period that the servo motor reaches the rated speed from a stop and stops from the rated speed.
STD(setting value) (Note 2)	S-pattern acceleration/ deceleration time constants	0 to 1000 [ms]	Set S-pattern acceleration/deceleration time constants.
MOV(setting value) (Note 4, 5)	Absolute value travel command	-999999 to 999999 [$\times 10^{\text{STM}}$ μm] -99.9999 to 99.9999 [$\times 10^{\text{STM}}$ inch]	Travels based on the value set as an absolute value.
MOVA(setting value) (Note 4, 5)	Absolute value continuous travel command	-360.000 to 360.000 [degree] -999999 to 999999 [pulse]	Travels continuously based on the value set as an absolute value. Be sure to write this command after [MOV] command.
MOVI(setting value) (Note 4, 5)	Incremental value travel command	-999999 to 999999 [$\times 10^{\text{STM}}$ μm] -99.9999 to 99.9999 [$\times 10^{\text{STM}}$ inch]	Travels based on the value set as an incremental value.
MOVIA(setting value) (Note 4, 5)	Incremental value continuous travel command	-999.999 to 999.999 [degree] -999999 to 999999 [pulse]	Travels continuously based on the value set as an incremental value. Be sure to write this command after [MOVI] command.
SYNC(setting value) (Note 1)	Waiting for external signal to switch on	1 to 3	Stops the next step until PI1 (Program input 1) to PI3 (Program input 3) turn on after SOUT (SYNC synchronous output) is outputted.
OUTON(setting value) (Note 1)	External signal on output	1 to 3	Turns on OUT1 (Program output 1) to OUT3 (Program output 3).
OUTOF(setting value) (Note 1)	External signal off output	1 to 3	Turns off OUT1 (Program output 1) to OUT3 (Program output 3) which were turned on with [OUTON] command.
TRIP(setting value) (Note 1, 4, 5)	Absolute value trip point specification	-999999 to 999999 [$\times 10^{\text{STM}}$ μm] -99.9999 to 99.9999 [$\times 10^{\text{STM}}$ inch] -360.000 to 360.000 [degree] -999999 to 999999 [pulse]	Executes the next step after [MOV] or [MOVA] commands are started and then the servo motor moves for the travel amount set in [TRIP] command. Be sure to write this command after [MOV] or [MOVA] command.
TRIP1(setting value) (Note 1, 4, 5)	Incremental value trip point specification	-999999 to 999999 [$\times 10^{\text{STM}}$ μm] -99.9999 to 99.9999 [$\times 10^{\text{STM}}$ inch] -999.999 to 999.999 [degree] -999999 to 999999 [pulse]	Executes the next step after [MOVI] or [MOVIA] commands are started and then the servo motor moves for the travel amount set in [TRIP1] command. Be sure to write this command after [MOVI] or [MOVIA] command.
ITP(setting value) (Note 1, 3, 4, 5)	Interrupt positioning	0 to 999999 [$\times 10^{\text{STM}}$ μm] 0 to 99.9999 [$\times 10^{\text{STM}}$ inch] 0 to 999.999 [degree] 0 to 999999 [pulse]	Stops the operation after the servo motor moves for the travel amount set when the interrupt signal is inputted. Be sure to write this command after [SYNC] command.
COUNT(setting value) (Note 1)	External pulse count	-999999 to 999999 [pulse]	Executes the next step when the value of the pulse counter exceeds the count value set in [COUNT] command. [COUNT (0)] clears the pulse counter to zero.
FOR(setting value) NEXT	Step repeat command	0, and 1 to 10000 [number of times]	Repeats the steps between [FOR(setting value)] and [NEXT] commands for the number of times set. Repeats endlessly with [FOR(0) NEXT].
LPOS (Note 1)	Current position latch	-	Latches the current position with the rising edge of the LPS signal. The latched current position data can be read with the communication command.
TIM(setting value)	Dwell	1 to 20000 [ms]	Waits for the next step until the set time passes.
ZRT	Home position return	-	Executes a manual home position return.
TIMES(setting value)	Program count command	0, and 1 to 10000 [number of times]	Set the number of program execution by writing [TIMES (setting value)] command in the first line of the program. The setting is not required for executing once. Repeats endlessly with [TIMES(0)].
STOP	Program stop	-	Stops the program in execution. Be sure to write this command in the final line.

Notes: 1. [SYNC], [OUTON], [OUTOF], [TRIP], [TRIP1], [ITP], [COUNT], and [LPOS] commands are valid while the commands are outputted.

2. [SPN] command is valid while [MOV], [MOVA], [MOVI], or [MOVIA] commands are in execution. [STA], [STB], [STC], and [STD] commands are valid while [MOV] or [MOVI] command is in execution.

3. [ITP] command will be skipped to the next step when the remaining distance equals to or less than the setting value, when the servo motor is not running, or when the servo motor is decelerating.

4. Change the unit to $\mu\text{m}/\text{inch}/\text{degree}/\text{pulse}$ with [Pr. PT01].

5. STM is the ratio to the setting value of the position data. STM can be changed with [Pr. PT03].

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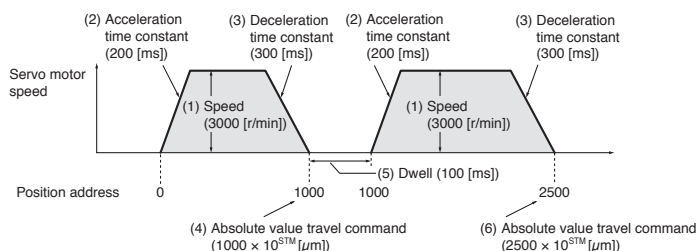
Command list

Command	Name	Setting range	Description
TLP(setting value)	Forward rotation torque limit	0, and 1 to 1000 [0.1%]	Limits the torque generated by the servo motor running in CCW and regenerating in CW, as the maximum torque is 100%. The setting remains valid until the program is stopped. [TLP(0)] enables the setting of [Pr. PA11].
TLN(setting value)	Reverse rotation torque limit	0, and 1 to 1000 [0.1%]	Limits the torque generated by the servo motor running in CW and regenerating in CCW, as the maximum torque is 100%. The setting remains valid until the program is stopped. [TLN(0)] enables the setting of [Pr. PA12].
TQL(setting value)	Torque limit	0, and 1 to 1000 [0.1%]	Limits the torque generated by the servo motor, as the maximum torque is 100%. The setting remains valid until the program is stopped. [TQL(0)] enables the settings of [Pr. PA11] and [Pr. PA12].

Program example 1

The following is an example of executing two types of operations with the same servo motor speed and acceleration/deceleration time constants but the different travel commands.

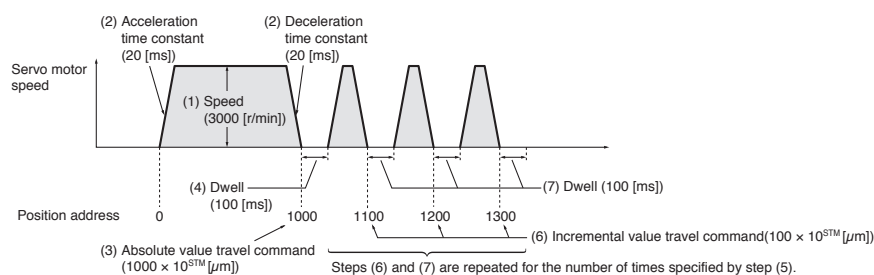
Step	Program (Note 1)	Description
(1)	SPN(3000)	Servo motor speed: 3000 [r/min]
(2)	STA(200)	Acceleration time constant: 200 [ms]
(3)	STB(300)	Deceleration time constant: 300 [ms]
(4)	MOV(1000)	Absolute value travel command: 1000 [$\times 10^{STM} \mu\text{m}$]
(5)	TIM(100)	Dwell: 100 [ms]
(6)	MOV(2500)	Absolute value travel command: 2500 [$\times 10^{STM} \mu\text{m}$]
(7)	STOP	Program stop



Program example 2

The following is an example of repeating the steps between [FOR(setting value)] and [NEXT] commands for the number of times set.

Step	Program (Note 1)	Description
(1)	SPN(3000)	Servo motor speed: 3000 [r/min]
(2)	STC(20)	Acceleration/deceleration time constants: 20 [ms]
(3)	MOV(1000)	Absolute value travel command: 1000 [$\times 10^{STM} \mu\text{m}$]
(4)	TIM(100)	Dwell: 100 [ms]
(5)	FOR(3)	Starting the step repeat command: 3 [number of times]
(6)	MOVI(100)	Incremental value travel command: 100 [$\times 10^{STM} \mu\text{m}$]
(7)	TIM(100)	Dwell: 100 [ms]
(8)	NEXT	Ending the step repeat command
(9)	STOP	Program stop



Notes: 1. The values in [SPN], [STA], [STB], and [STC] commands remains valid until they are reset. The values will not be initialized at the start of the program. The settings are also valid in other programs.