The Americas YASKAWA Representative

- 24-hour Telephone Number: **(937) 847-3200**
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YASKAWA

YRC1000
GENERAL OPERATOR'S MANUAL

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
YRC1000 INSTRUCTIONS
YRC1000 OPERATOR'S MANUAL (GENERAL) (SUBJECT SPECIFIC)
YRC1000 MAINTENANCE MANUAL
YRC1000 ALARM CODES (MAJOR ALARMS) (MINOR ALARMS)

Have the following information available when contacting the YASKAWA Representative:

- System
- Primary Application
- Software Version *(Located on Programming Pendant by selecting: {Main Menu} - {System Info} - {Version})*
- Warranty ID *(Located on Robot Controller)*
- Robot Serial Number *(Located on Manipulator data plate)*
- Robot Sales Order Number *(Located on Robot controller data plate)*

MANUAL NO. RE-CSO-A051 ⟨11⟩

Part Number: 178645-1CD
Revision: 9

6.12 Present Manipulator Position Output Function

6.12.1 Function for Outputting Present Cartesian Position of Manipulator to Register

6.12.1.1 Outline

The present Cartesian position of the manipulator (values in the base coordinates) is output to the specified registers.

6.12.1.2 Parameters

The following parameters specify the details of the function and output register numbers.

S1CxG	Description
208	Enables/Disables the function for outputting the present Cartesian position (in the base coordinates) to registers. (command value) 0: disable 1: enable
209	Specifies the output size to the register. 0: output in 2 bytes 1: output in 4 bytes
210	Cartesian position (command value) X register number of output destination
211	Cartesian position (command value) Y register number of output destination
212	Cartesian position (command value) Z register number of output destination
213	Cartesian position (command value) Rx register number of output destination
214	Cartesian position (command value) Ry register number of output destination
215	Cartesian position (command value) Rz register number of output destination
216	Cartesian position (command value) Re register number of output destination
217	Enables/Disables the function for outputting the present Cartesian position (in the base coordinates) to registers. (FB value) 0: disable 1: enable
218	Specifies the output size to the register. 0: output in 2 bytes 1: output in 4 bytes
219	Cartesian position (FB value) X register number of output destination
220	Cartesian position (FB value) Y register number of output destination
221	Cartesian position (FB value) Z register number of output destination
222	Cartesian position (FB value) Rx register number of output destination
223	Cartesian position (FB value) Ry register number of output destination
224	Cartesian position (FB value) Rz register number of output destination
225	Cartesian position (FB value) Re register number of output destination

<Example 1>

S1C1G	Setting value
208	1
209	0
210	10
211	11
212	12
213	13
214	14
215	15
216	16

When the parameters are set as shown in the above table, the present position is output to the registers as follows:

M010 = Manipulator's present Cartesian position (command value) X [unit: mm]
M011 = Manipulator's present Cartesian position (command value) Y [unit: mm]
M012 = Manipulator's present Cartesian position (command value) Z [unit: mm]
M013 = Manipulator's present Cartesian position (command value) Rx [unit: deg]
M014 = Manipulator's present Cartesian position (command value) Ry [unit: deg]
M015 = Manipulator's present Cartesian position (command value) Rz [unit: deg]
M016 = Manipulator's present Cartesian position (command value) Re [unit: deg]

<Example 2>

S1C1G	Setting value
217	1
218	1
219	10
220	12
221	14
222	16
223	18
224	20
225	22

When the parameters are set as shown in the above table, the present position is output to the registers as follows:

M010 = Lower 2 bytes of the manipulator's present Cartesian position (FB value) X [unit: µm]
M011 = Upper 2 bytes of the manipulator's present Cartesian position (FB value) X [unit: µm]
M012 = Lower 2 bytes of the manipulator's present Cartesian position (FB value) Y [unit: µm]
M013 = Upper 2 bytes of the manipulator's present Cartesian position (FB value) Y [unit: µm]
M014 = Lower 2 bytes of the manipulator's present Cartesian position (FB value) Z [unit: µm]
M015 = Upper 2 bytes of the manipulator's present Cartesian position (FB value) Z [unit: µm]
M016 = Lower 2 bytes of the manipulator's present Cartesian position (FB value) Rx [unit: 0.001 deg]
M017 = Upper 2 bytes of the manipulator's present Cartesian position (FB value) Rx [unit: 0.001 deg]

M018 =	Lower 2 bytes of the	manipulator's present Cartesian position (FB value)	Ry	[unit: 0.001 deg]
M019 =	Upper 2 bytes of the	manipulator's present Cartesian position (FB value)	Ry	[unit: 0.001 deg]
M020 =	Lower 2 bytes of the	manipulator's present Cartesian position (FB value)	Rz	[unit: 0.001 deg]
M021 =	Upper 2 bytes of the	manipulator's present Cartesian position (FB value)	Rz	[unit: 0.001 deg]
M022 =	Lower 2 bytes of the	manipulator's present Cartesian position (FB value)	Re	[unit: 0.001 deg]
M023 =	Upper 2 bytes of the	manipulator's present Cartesian position (FB value)	Re	[unit: 0.001 deg]

NOTE

- When this function for command values is enabled (S1CxG208=1), be sure to set the register number of output destination for each coordinate value (S1CxG210 to 216).
- When this function for FB values is enabled (S1CxG217=1), be sure to set the register number of output destination for each coordinate value (S1CxG219 to 225).
- When the output size to the register is set to 2 bytes (S1CxG209=0 or S1CxG218=0), the unit for X, Y, Z coordinate values is "mm", and the unit for Rx, Ry, Rz, Re coordinate values is "deg". If the coordinate value exceeds 2 bytes, only the lower 2 bytes will be output.
- When the output size to the register is set to 4 bytes (S1CxG209=1 or S1CxG218=1), the unit for X, Y, Z coordinate values is "μmm", and the unit for Rx, Ry, Rz, Re coordinate values is "0.0001 deg".
- When the output size to the register is set to 4 bytes (S1CxG209=1 or S1CxG218=1), the upper bytes of the coordinate value will be output to the next number of the specified register number. Before performing setting, check the usage status of the registers.

6.12.2 Function for Outputting Present Pulse Position to Register

6.12.2.1 Outline

The present position of the robot axis, the base axis, or the station axis in pulses is output to the specified registers.

6.12.2.2 Parameters

The following parameters specify the details of the function and output register numbers.

S1CxG	Description
202	Specifies the axis to apply the function 1 for outputting the present position in pulses to registers. (command value) The axis is specified in bits. Bit OFF: disable Bit ON: enable
203	Specifies the axis to apply the function 1 for outputting the present position in pulses to registers. (FB value) The axis is specified in bits. Bit OFF: disable Bit ON: enable
204	Specifies the output size to the register. Bit OFF: output in 2 bytes Bit ON: output in 4 bytes
205	Specifies the axis to apply the function 2 for outputting the present position in pulses to registers. (command value) The axis is specified in bits. Bit OFF: disable Bit ON: enable
206	Specifies the axis to apply the function 2 for outputting the present position in pulses to registers. (FB value) The axis is specified in bits. Bit OFF: disable Bit ON: enable
207	Specifies the output size to the register. Bit OFF: output in 2 bytes Bit ON: output in 4 bytes
1090 to 1097	Function 1 register number of output destination
1100 to 1107	Function 1 resolution setting
1110 to 1117	Function 1 offset value setting
1120 to 1127	Function 2 register number of output destination
1130 to 1137	Function 2 resolution setting
1140 to 1147	Function 2 offset value setting

2-byte output specification:

- (specified M register) = (pulse (command or FB)) / (resolution) + (offset value) [unit: pulse]

NOTE When the output size to the register is set to 2 bytes (no axis specified in S1CxG204 or S1CxG207), the pulse value in the size of 2 bytes will be output to the specified register number. If the size exceeds 2 bytes, only the lower 2 bytes will be output.

4-byte output specification:

- (specified M register) = Lower 2 bytes of {(pulse (command or FB)) / (resolution) + (offset value)} [unit: pulse]
- (specified M register + 1) = Upper 2 bytes of {(pulse (command or FB)) / (resolution) + (offset value)} [unit: pulse]

NOTE When the output size to the register is set to 4 bytes (an axis specified in S1CxG204 or S1CxG207), the lower 2 bytes will be output to the specified register number, and the upper 2 bytes will be output to the next number of the specified register number. Before performing setting, check the usage status of the registers.

<Example 1>

S1C1G	Setting value
202	63
203	0
204	0
1090	10
1091	11
1092	12
1093	13
1094	14
1095	15

When the parameters are set as shown in the above table, the present position is output to the registers as follows:

M010	= Present pulse position (command value)	S (1st axis)	[unit: pulse]
M011	= Present pulse position (command value)	L (2nd axis)	[unit: pulse]
M012	= Present pulse position (command value)	U (3rd axis)	[unit: pulse]
M013	= Present pulse position (command value)	R (4th axis)	[unit: pulse]
M014	= Present pulse position (command value)	B (5th axis)	[unit: pulse]
M015	= Present pulse position (command value)	T (6th axis)	[unit: pulse]

<Example 2>

S1C1G	Setting value
202	0
203	63
204	63
1090	10
1091	12
1092	14
1093	16
1094	18
1095	20

When the parameters are set as shown in the above table, the present position is output to the registers as follows:

M010	= Lower 2 bytes of the	Present pulse position (FB value)	S (1st axis)	[unit: pulse]
M011	= Upper 2 bytes of the	Present pulse position (FB value)	S (1st axis)	[unit: pulse]
M012	= Lower 2 bytes of the	Present pulse position (FB value)	L (2nd axis)	[unit: pulse]
M013	= Upper 2 bytes of the	Present pulse position (FB value)	L (2nd axis)	[unit: pulse]
M014	= Lower 2 bytes of the	Present pulse position (FB value)	U (3rd axis)	[unit: pulse]
M015	= Upper 2 bytes of the	Present pulse position (FB value)	U (3rd axis)	[unit: pulse]
M016	= Lower 2 bytes of the	Present pulse position (FB value)	R (4th axis)	[unit: pulse]
M017	= Upper 2 bytes of the	Present pulse position (FB value)	R (4th axis)	[unit: pulse]
M018	= Lower 2 bytes of the	Present pulse position (FB value)	B (5th axis)	[unit: pulse]
M019	= Upper 2 bytes of the	Present pulse position (FB value)	B (5th axis)	[unit: pulse]
M020	= Lower 2 bytes of the	Present pulse position (FB value)	T (6th axis)	[unit: pulse]
M021	= Upper 2 bytes of the	Present pulse position (FB value)	T (6th axis)	[unit: pulse]

NOTE

- If the pulse is a negative value, the pulse will be output to the register in 2's complement notation.
- Even in one control group, "command value" or "FB value" can be specified differently for each axis. However, if "command value" and "FB value" are specified for the same axis, the value "0" will be output to the register.
- If "0" is set as the resolution setting parameter (S1CxG1110 to 1117, S1CxG1130 to 1137), it will be treated as "1" when output to the register is performed.
- If "0" is set as the register number of output destination (S1CxG1090 to 1097, S1CxG1120 to 1127), the present pulse position will not be output to the register. Thus, no value can be output to the register number M000. Also, if the same register number of output destination is used more than twice, the former data will be overwritten by the latter data.

6.12.3 Function for Outputting TCP Speed to Register

6.12.3.1 Outline

The TCP (tool center point) speed of the manipulator is output to the specified registers.

6.12.3.2 Parameters

The following parameters specify the details of the function and output register numbers.

S1CxG	Description
330	Enables/Disables the function for outputting the TCP speed to registers. (command value) 0: no output to register 1: output in 2 bytes [unit: mm/sec] 2: output in 4 bytes [unit: µm/sec]
331	TCP speed (command value) register number of output destination
332	Enables/Disables the function for outputting the TCP speed to registers. (FB value) 0: no output to register 1: output in 2 bytes [unit: mm/sec] 2: output in 4 bytes [unit: µm/sec]
333	TCP speed (FB value) register number of output destination

<Example 1>

S1C1G	Setting value
330	1
331	10
332	2
333	11

When the parameters are set as shown in the above table, the speed is output to the registers as follows:

M010 =	TCP speed (command value)	[unit: mm/sec]
M011 =	Lower 2 bytes of the TCP speed (FB value)	[unit: µm/sec]
M012 =	Upper 2 bytes of the TCP speed (FB value)	[unit: µm/sec]

NOTE

- When the output size to the register is set to 2 bytes (“1” is set in S1CxG330 or S1CxG332), the TCP speed in the size of 2 bytes will be output to the specified register number. If the size exceeds 2 bytes, only the lower 2 bytes will be output.
- When the output size to the register is set to 4 bytes (“2” is set in S1CxG330 or S1CxG332), the lower 2 bytes will be output to the specified register number, and the upper 2 bytes will be output to the next number of the specified register number. Before performing setting, check the usage status of the registers.
- If “0” is set as the register number of output destination (S1CxG331 or S1CxG333), the present TCP speed will not be output to the register. Thus, no value can be output to the register number M000. Also, if the same register number of output destination is used more than twice, the former data will be overwritten by the latter data.

6.12.4 Function for Outputting Each Axis Speed to Register

6.12.4.1 Outline

The speed of each axis of the robot axis, the base axis, and the station axis is output to the specified registers.

6.12.4.2 Parameters

The following parameters specify the details of the function and output register numbers.

S1CxG	Description
334	Enables/Disables the function for outputting each axis speed to registers. (command value) 0: no output to register 1: output in 2 bytes [unit: deg/sec (mm/sec for a linear motion axis)] 2: output in 4 bytes [unit: 0.0001 deg/sec (μm/sec for a linear motion axis)]
335	Enables/Disables the function for outputting each axis speed to registers. (FB value) 0: no output to register 1: output in 2 bytes [unit: deg/sec (mm/sec for a linear motion axis)] 2: output in 4 bytes [unit: 0.0001 deg/sec (μm/sec for a linear motion axis)]
1270 to 1277	Each axis speed (command value) register number of output destination
1280 to 1287	Each axis speed (FB value) register number of output destination

<Example 1>

S1C1G	Setting value
334	1
335	0
1270	10
1271	11
1272	12
1273	13
1274	14
1275	15

When the parameters are set as shown in the above table, the speed is output to the registers as follows:

M010	= Each axis speed (command value)	S (1st axis)	[unit: deg/sec]
M011	= Each axis speed (command value)	L (2nd axis)	[unit: deg/sec]
M012	= Each axis speed (command value)	U (3rd axis)	[unit: deg/sec]
M013	= Each axis speed (command value)	R (4th axis)	[unit: deg/sec]
M014	= Each axis speed (command value)	B (5th axis)	[unit: deg/sec]
M015	= Each axis speed (command value)	T (6th axis)	[unit: deg/sec]

<Example 2>

S1C1G	Setting value
334	0
335	2
1280	10
1281	12
1282	14
1283	16
1284	18
1285	20

When the parameters are set as shown in the above table, the speed is output to the registers as follows:

M010	= Lower 2 bytes of the	Each axis speed (FB value)	S (1st axis)	[unit: 0.0001 deg/sec]
M011	= Upper 2 bytes of the	Each axis speed (FB value)	S (1st axis)	[unit: 0.0001 deg/sec]
M012	= Lower 2 bytes of the	Each axis speed (FB value)	L (2nd axis)	[unit: 0.0001 deg/sec]
M013	= Upper 2 bytes of the	Each axis speed (FB value)	L (2nd axis)	[unit: 0.0001 deg/sec]
M014	= Lower 2 bytes of the	Each axis speed (FB value)	U (3rd axis)	[unit: 0.0001 deg/sec]
M015	= Upper 2 bytes of the	Each axis speed (FB value)	U (3rd axis)	[unit: 0.0001 deg/sec]
M016	= Lower 2 bytes of the	Each axis speed (FB value)	R (4th axis)	[unit: 0.0001 deg/sec]
M017	= Upper 2 bytes of the	Each axis speed (FB value)	R (4th axis)	[unit: 0.0001 deg/sec]
M018	= Lower 2 bytes of the	Each axis speed (FB value)	B (5th axis)	[unit: 0.0001 deg/sec]
M019	= Upper 2 bytes of the	Each axis speed (FB value)	B (5th axis)	[unit: 0.0001 deg/sec]
M020	= Lower 2 bytes of the	Each axis speed (FB value)	T (6th axis)	[unit: 0.0001 deg/sec]
M021	= Upper 2 bytes of the	Each axis speed (FB value)	T (6th axis)	[unit: 0.0001 deg/sec]

NOTE

- When the output size to the register is set to 2 bytes (“1” is set in S1CxG334 or S1CxG335), the axis speed in the size of 2 bytes will be output to the specified register number. If the size exceeds 2 bytes, only the lower 2 bytes will be output.
- When the output size to the register is set to 4 bytes (“2” is set in S1CxG334 or S1CxG335), the lower 2 bytes will be output to the specified register number, and the upper 2 bytes will be output to the next number of the specified register number. Before performing setting, check the usage status of the registers.
- If “0” is set as the register number of output destination (S1CxG1270 to 1277, S1CxG1280 to 1287), the present axis speed will not be output to the register. Thus, no value can be output to the register number M000. Also, if the same register number of output destination is used more than twice, the former data will be overwritten by the latter data.

6.12.5 Function for Outputting Each Axis Position to Register

6.12.5.1 Outline

The position of each axis of the robot axis, the base axis, and the station axis is output to the specified registers.

6.12.5.2 Parameters

The following parameters specify the details of the function and output register numbers.

S1CxG	Description
336	Enables/Disables the function for outputting each axis position to registers. (command value) 0: no output to register 1: output in 2 bytes [unit: deg (mm for a linear motion axis)] 2: output in 4 bytes [unit: 0.0001 deg (μm for a linear motion axis)]
337	Enables/Disables the function for outputting each axis position to registers. (FB value) 0: no output to register 1: output in 2 bytes [unit: deg (mm for a linear motion axis)] 2: output in 4 bytes [unit: 0.0001 deg (μm for a linear motion axis)]
1290 to 1297	Each axis position (command value) register number of output destination
1300 to 1307	Each axis position (FB value) register number of output destination

<Example 1>

S1C1G	Setting value
336	1
337	0
1290	10
1291	11
1292	12
1293	13
1294	14
1295	15

When the parameters are set as shown in the above table, the position is output to the registers as follows:

M010	= Each axis position (command value)	S (1st axis)	[unit: deg]
M011	= Each axis position (command value)	L (2nd axis)	[unit: deg]
M012	= Each axis position (command value)	U (3rd axis)	[unit: deg]
M013	= Each axis position (command value)	R (4th axis)	[unit: deg]
M014	= Each axis position (command value)	B (5th axis)	[unit: deg]
M015	= Each axis position (command value)	T (6th axis)	[unit: deg]

<Example 2>

S1C1G	Setting value
336	0
337	2
1300	10
1301	12
1302	14
1303	16
1304	18
1305	20

When the parameters are set as shown in the above table, the position is output to the registers as follows:

M010	= Lower 2 bytes of the	Each axis position (FB value)	S (1st axis)	[unit: 0.0001 deg]
M011	= Upper 2 bytes of the	Each axis position (FB value)	S (1st axis)	[unit: 0.0001 deg]
M012	= Lower 2 bytes of the	Each axis position (FB value)	L (2nd axis)	[unit: 0.0001 deg]
M013	= Upper 2 bytes of the	Each axis position (FB value)	L (2nd axis)	[unit: 0.0001 deg]
M014	= Lower 2 bytes of the	Each axis position (FB value)	U (3rd axis)	[unit: 0.0001 deg]
M015	= Upper 2 bytes of the	Each axis position (FB value)	U (3rd axis)	[unit: 0.0001 deg]
M016	= Lower 2 bytes of the	Each axis position (FB value)	R (4th axis)	[unit: 0.0001 deg]
M017	= Upper 2 bytes of the	Each axis position (FB value)	R (4th axis)	[unit: 0.0001 deg]
M018	= Lower 2 bytes of the	Each axis position (FB value)	B (5th axis)	[unit: 0.0001 deg]
M019	= Upper 2 bytes of the	Each axis position (FB value)	B (5th axis)	[unit: 0.0001 deg]
M020	= Lower 2 bytes of the	Each axis position (FB value)	T (6th axis)	[unit: 0.0001 deg]
M021	= Upper 2 bytes of the	Each axis position (FB value)	T (6th axis)	[unit: 0.0001 deg]

NOTE

- If the axis position is a negative value, the axis position will be output to the register in 2's complement notation.
- When the output size to the register is set to 2 bytes ("1" is set in S1CxG336 or S1CxG337), the axis position in the size of 2 bytes will be output to the specified register number. If the size exceeds 2 bytes, only the lower 2 bytes will be output.
- When the output size to the register is set to 4 bytes ("2" is set in S1CxG336 or S1CxG337), the lower 2 bytes will be output to the specified register number, and the upper 2 bytes will be output to the next number of the specified register number. Before performing setting, check the usage status of the registers.
- If "0" is set as the register number of output destination (S1CxG1290 to 1297, S1CxG1300 to 1307), the present axis position will not be output to the register. Thus, no value can be output to the register number M000. Also, if the same register number of output destination is used more than twice, the former data will be overwritten by the latter data.

6.12.6 Function for Outputting Torque Command Value to Register

6.12.6.1 Outline

The torque command value of the manipulator is output to a register. The torque command value is the current torque command value of the measured axis. The torque command value is expressed as a percentage [%] with the rated motor torque of the axis as 100%.

6.12.6.2 Parameters

The following parameters specify the details of the function, output register numbers, and offsets.

S1CxG	Description
122	Specifies the output axis to apply the function for a outputting torque command value to a register. The axis is specified in bits. Bit OFF: disable Bit ON: enable
910 to 917	Specifies the register number of the output destination for outputting a torque command value to a register.
1060 to 1067	Specifies the offset for outputting a torque command value to a register.

Output specification

- (specified M register) = (torque command value) + (offset) [unit: %]

<Example 1>

S1C1G	Setting value
122	63
910	10
911	11
912	12
913	13
914	14
915	15

When the parameters are set as shown in the above table, the torque command values are output to the registers as follows:

M010	= Torque (command value)	S (1st axis)	[unit: %]
M011	= Torque (command value)	L (2nd axis)	[unit: %]
M012	= Torque (command value)	U (3rd axis)	[unit: %]
M013	= Torque (command value)	R (4th axis)	[unit: %]
M014	= Torque (command value)	B (5th axis)	[unit: %]
M015	= Torque (command value)	T (6th axis)	[unit: %]

NOTE

- If "0" is set as the register number of the output destination (S1CxG910 to 917), the torque command value will not be output to the register. Thus, no value can be output to the register number M000. Also, if the same register number of the output destination is used more than once, the former data will be overwritten by the latter data.
- The update cycle for the register output values of the torque command values is approximately 100 msec.