

Programmable Controller

MELSEC iQ-F
series

MELSEC iQ-F

Sample Ladder Reference for FX5 and Power
Distribution Measuring Instrument with RS-485
Communication (MODBUS RTU Protocol)

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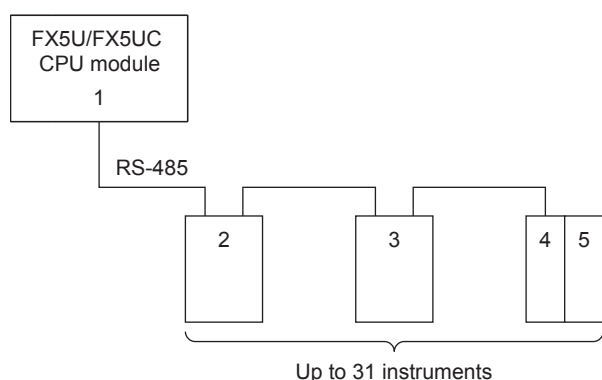
1 SAMPLE LADDER LIST

This program is sample ladder for a system where the MELSEC iQ-F series FX5U/FX5UC CPU module is connected to power distribution measuring instruments with RS-485 communication (MODBUS RTU protocol) (hereafter "power distribution measuring instruments").

Name	Description	Version
Data Read	Reads measurement data from power distribution measuring instruments.	Ver.1.00A
Data Write	Writes setting values to power distribution measuring instruments.	Ver.1.00A

System configuration

The following figure shows the system configuration for this sample ladder.



No.	Name	Description
1	FX5U(C)	Built-in RS-485 port
	FX5U + FX5-485-BD	RS-485 communication expansion port
	FX5U(C) + FX5-485ADP	RS-485 communication expansion adapter
2	ME110SSR-MB	Electronic multi-measuring instrument
3	EMU4-BD1-MB EMU4-HD1-MB	Energy measuring unit
4	EMU4-BM1-MB EMU4-HM1-MB EMU4-LG1-MB	Energy measuring unit
5	EMU4-A2	Mitsubishi energy measuring unit (energy measuring extension unit for same voltage system)
	EMU4-VA2	Mitsubishi energy measuring unit (energy measuring extension unit for different voltage system)
	EMU4-PX4	Mitsubishi energy measuring unit (pulse input unit)
	EMU4-AX4	Mitsubishi energy measuring unit (analog input unit)

Prerequisites for using sample ladder

The sample ladder is provided for the model whose name is included in the project name, shown as below.

Ex.

For the following project name, the FX5U/FX5UC model is applicable.













LD-FX5U_□□□_□□□_V100A_J

Operation of the provided project is not guaranteed for user systems. Check and set device assignments, parameters, and other settings in accordance with the user system specifications.

Wiring and communication setting

This program requires wiring and communication settings, such as setting station numbers of a CPU module and power distribution measuring instruments and transmission speed, before communications. For the details on the wiring and communication setting methods, refer to the operating manual of each power distribution measuring instrument, and for the CPU module to the MELSEC iQ-F FX5 User's Manual (MODBUS Communication).

Related manuals

-  MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks)
-  MELSEC iQ-F FX5 User's Manual (Application)
-  MELSEC iQ-F FX5 User's Manual (MODBUS Communication)
-  Electronic Multi-Measuring Instrument User's Manual: Detailed Edition (ME110SSR-MB Series)
-  Electronic Multi-Measuring Instrument User's Manual: Detailed Edition (ME110SSR-MB Series) (Three phase 4-wire)
-  Electronic Multi-Measuring Instrument MODBUS Interface specifications (ME110SSR-MB Series)
-  Energy Measuring Unit User's Manual (Details) (EMU4-BD1-MB, EMU4-HD1-MB)
-  Energy Measuring Unit User's Manual (Details) (EMU4-BM1-MB, EMU4-HM1-MB)
-  Energy Measuring Unit User's Manual (Details) (EMU4-LG1-MB)
-  Energy Measuring Unit User's Manual (Details) (EMU4-A2, EMU4-VA2)
-  Energy Measuring Unit User's Manual (Details) (EMU4-PX4, EMU4-AX4)
-  Energy Measuring Unit EcoMonitorLight/EcoMonitorPlus MODBUS Interface specifications (EMU4-BD1-MB, EMU4-HD1-MB, EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB, EMU4-A2, EMU4-VA2, EMU4-PX4, EMU4-AX4)

Notice

This manual includes information related to the functions of the sample ladder. It does not include information on restrictions of use such as combination with programmable controller, each expansion board, expansion adapter or expansion device. Please make sure to read user's manuals for the corresponding products before using the products.

2 SAMPLE LADDER

2.1 Data Read

Name

Data Read

Outline

Reads measurement data from power distribution measuring instruments.

Programs used

This program is used for the FX5U and FX5UC.

The following table shows the project used in this program.

No.	Project name	Program name	Remark
1	LD-FX5U_e-MEASURE-MB_V100A_E	01_Data Read	This project is created with the FX5U or FX5UC.

Devices used

The following table lists the devices used in this program.

■Input device

No.	Device name	Data type	Type	Device comment	Remark
1	M0	Bit	Input	Execution Command	ON: The program is activated. OFF: The program is not activated.
2	M1	Bit	Input	Dedicated Instruction Execute Flag	ON: The MODBUS communication is performed using dedicated instructions. OFF: The MODBUS communication is not performed.
3	D0	Word [Signed]	Input	Number of Settings	Specifies the number of the target power distribution measuring instruments to be set with Setting Parameter (R0 to R5099). [Setting range (decimal)] 1 to 255

No.	Device name	Data type	Type	Device comment	Remark																																																																
4	R0 to R5099	Word [Signed]	Input	Setting Parameter	Sets the parameters of the connected power distribution measuring instruments (station numbers, numbers of sends/ receives, and register address of measurement item).																																																																
Register the setting data for the measurement circuits set with Number of Settings (D0). Setting Parameter uses 20 words for a single measurement circuit. The following shows a configuration of the setting parameter data. ■Configuration of Setting Parameter																																																																					
<table><tr><th>Device</th><th>Description</th><th>Setting range</th></tr><tr><td>S1</td><td>Station number</td><td>1 to 32 (decimal)</td></tr><tr><td>S1+1</td><td>Number of sends/receives</td><td>0 to 16 (decimal)</td></tr><tr><td>S1+2</td><td>Measurement item (1) register address</td><td rowspan="16">The setting range depends on the target power distribution measuring instrument. Refer to the MODBUS interface specifications of each power distribution measuring instrument.</td></tr><tr><td>S1+3</td><td>Measurement item (2) register address</td></tr><tr><td>S1+4</td><td>Measurement item (3) register address</td></tr><tr><td>S1+5</td><td>Measurement item (4) register address</td></tr><tr><td>S1+6</td><td>Measurement item (5) register address</td></tr><tr><td>S1+7</td><td>Measurement item (6) register address</td></tr><tr><td>S1+8</td><td>Measurement item (7) register address</td></tr><tr><td>S1+9</td><td>Measurement item (8) register address</td></tr><tr><td>S1+10</td><td>Measurement item (9) register address</td></tr><tr><td>S1+11</td><td>Measurement item (10) register address</td></tr><tr><td>S1+12</td><td>Measurement item (11) register address</td></tr><tr><td>S1+13</td><td>Measurement item (12) register address</td></tr><tr><td>S1+14</td><td>Measurement item (13) register address</td></tr><tr><td>S1+15</td><td>Measurement item (14) register address</td></tr><tr><td>S1+16</td><td>Measurement item (15) register address</td></tr><tr><td>S1+17</td><td>Measurement item (16) register address</td></tr><tr><td>S1+18</td><td>Spare</td><td></td></tr><tr><td>S1+19</td><td>Spare</td><td></td></tr><tr><td>S1+20</td><td>Station number</td><td></td></tr><tr><td>S1+21</td><td>Number of sends/receives</td><td></td></tr><tr><td colspan="3">⋮</td></tr><tr><td>S1+n×20-3</td><td>Measurement item (16) register address</td><td rowspan="3">Setting data for a single measurement circuit (setting n)</td></tr><tr><td>S1+n×20-2</td><td>Spare</td></tr><tr><td>S1+n×20-1</td><td>Spare</td></tr></table>						Device	Description	Setting range	S1	Station number	1 to 32 (decimal)	S1+1	Number of sends/receives	0 to 16 (decimal)	S1+2	Measurement item (1) register address	The setting range depends on the target power distribution measuring instrument. Refer to the MODBUS interface specifications of each power distribution measuring instrument.	S1+3	Measurement item (2) register address	S1+4	Measurement item (3) register address	S1+5	Measurement item (4) register address	S1+6	Measurement item (5) register address	S1+7	Measurement item (6) register address	S1+8	Measurement item (7) register address	S1+9	Measurement item (8) register address	S1+10	Measurement item (9) register address	S1+11	Measurement item (10) register address	S1+12	Measurement item (11) register address	S1+13	Measurement item (12) register address	S1+14	Measurement item (13) register address	S1+15	Measurement item (14) register address	S1+16	Measurement item (15) register address	S1+17	Measurement item (16) register address	S1+18	Spare		S1+19	Spare		S1+20	Station number		S1+21	Number of sends/receives		⋮			S1+n×20-3	Measurement item (16) register address	Setting data for a single measurement circuit (setting n)	S1+n×20-2	Spare	S1+n×20-1	Spare
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* S1 corresponds to R0. "n" indicates the number of settings in Number of Settings (D0). When Number of Settings (D0) is set to 255, 5100 words are used for Setting Parameter (R0 to R5099).																																																																					

■Output device


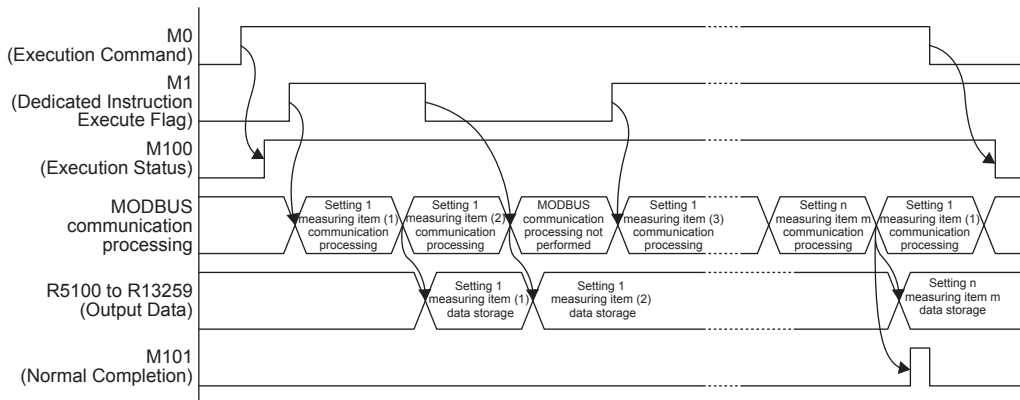
No.	Device name	Data type	Type	Device comment	Remark																																																	
1	M100	Bit	Output	Execution Status	ON: The execution command is on. OFF: The execution command is off.																																																	
2	M101	Bit	Output	Normal Completion	When this label is on, it indicates that the processing has been completed.																																																	
3	Y0	Bit	Output	Error Completion	When this label is on, it indicates that an error has occurred in the program.																																																	
4	D100	Word [Signed]	Output	Error Code	Stores the error code that occurred in the program.																																																	
5	R5100 to R13259	Word [Signed]	Output	Output Data	Outputs the measurement data of power distribution measuring instruments. [Initial value] Holds the previous value.																																																	
<p>Output Data uses 32 words for a single setting. When the measurement data cannot be obtained, the previous output data is held.</p> <p>■Configuration of Output Data</p> <table><thead><tr><th>Device</th><th colspan="2">Description</th></tr></thead><tbody><tr><td>S2, S2+1</td><td rowspan="16">Setting 1</td><td>Measurement data of the measurement item (1)</td></tr><tr><td>S2+2, S2+3</td><td>Measurement data of the measurement item (2)</td></tr><tr><td>S2+4, S2+5</td><td>Measurement data of the measurement item (3)</td></tr><tr><td>S2+6, S2+7</td><td>Measurement data of the measurement item (4)</td></tr><tr><td>S2+8, S2+9</td><td>Measurement data of the measurement item (5)</td></tr><tr><td>S2+10, S2+11</td><td>Measurement data of the measurement item (6)</td></tr><tr><td>S2+12, S2+13</td><td>Measurement data of the measurement item (7)</td></tr><tr><td>S2+14, S2+15</td><td>Measurement data of the measurement item (8)</td></tr><tr><td>S2+16, S2+17</td><td>Measurement data of the measurement item (9)</td></tr><tr><td>S2+18, S2+19</td><td>Measurement data of the measurement item (10)</td></tr><tr><td>S2+20, S2+21</td><td>Measurement data of the measurement item (11)</td></tr><tr><td>S2+22, S2+23</td><td>Measurement data of the measurement item (12)</td></tr><tr><td>S2+24, S2+25</td><td>Measurement data of the measurement item (13)</td></tr><tr><td>S2+26, S2+27</td><td>Measurement data of the measurement item (14)</td></tr><tr><td>S2+28, S2+29</td><td>Measurement data of the measurement item (15)</td></tr><tr><td>S2+30, S2+31</td><td>Measurement data of the measurement item (16)</td></tr><tr><td>S2+32, S2+33</td><td rowspan="2">Setting 2</td><td>Measurement data of the measurement item (1)</td></tr><tr><td>S2+34, S2+35</td><td>Measurement data of the measurement item (2)</td></tr><tr><td colspan="3">⋮</td></tr><tr><td>S2+n×32-4, S2+n×32-3</td><td rowspan="2">Setting n</td><td>Measurement data of the measurement item (15)</td></tr><tr><td>S2+n×32-2, S2+n×32-1</td><td>Measurement data of the measurement item (16)</td></tr></tbody></table> <p>* S2 corresponds to R5100. "n" indicates the number of settings in Number of Settings (D0). When Number of Settings (D0) is set to 255, 8160 words are used for Output Data (R5100 to R13259).</p>						Device	Description		S2, S2+1	Setting 1	Measurement data of the measurement item (1)	S2+2, S2+3	Measurement data of the measurement item (2)	S2+4, S2+5	Measurement data of the measurement item (3)	S2+6, S2+7	Measurement data of the measurement item (4)	S2+8, S2+9	Measurement data of the measurement item (5)	S2+10, S2+11	Measurement data of the measurement item (6)	S2+12, S2+13	Measurement data of the measurement item (7)	S2+14, S2+15	Measurement data of the measurement item (8)	S2+16, S2+17	Measurement data of the measurement item (9)	S2+18, S2+19	Measurement data of the measurement item (10)	S2+20, S2+21	Measurement data of the measurement item (11)	S2+22, S2+23	Measurement data of the measurement item (12)	S2+24, S2+25	Measurement data of the measurement item (13)	S2+26, S2+27	Measurement data of the measurement item (14)	S2+28, S2+29	Measurement data of the measurement item (15)	S2+30, S2+31	Measurement data of the measurement item (16)	S2+32, S2+33	Setting 2	Measurement data of the measurement item (1)	S2+34, S2+35	Measurement data of the measurement item (2)	⋮			S2+n×32-4, S2+n×32-3	Setting n	Measurement data of the measurement item (15)	S2+n×32-2, S2+n×32-1	Measurement data of the measurement item (16)
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6	R13260 to R13769	Word [Signed]	Output	Error Station Output	Outputs the error codes and error measurement items of the error station.																																																	
<p>Error Station Output uses 2 words for a single setting.</p> <p>■Configuration of Error Station Output</p> <table><thead><tr><th>Device</th><th colspan="2">Description</th></tr></thead><tbody><tr><td>S3</td><td rowspan="2">Setting 1 measurement item error bit The following shows the details of each bit and measurement item.</td><td>Bit</td></tr><tr><td></td><td>Measurement item</td></tr><tr><td>S3+1</td><td>Setting 1 error code</td><td></td></tr><tr><td>S3+2</td><td>Setting 2 measurement item error bit</td><td></td></tr><tr><td>S3+3</td><td>Setting 2 error code</td><td></td></tr><tr><td colspan="3">⋮</td></tr><tr><td>S3+n×2-2</td><td>Setting n measurement item error bit</td><td></td></tr><tr><td>S3+n×2-1</td><td>Setting n error code</td><td></td></tr></tbody></table> <p>* S3 corresponds to R13260. "n" indicates the number of settings in Number of Settings (D0). When Number of Settings (D0) is set to 255, 510 words are used for Error Station Output (R13260 to R13769). When an error occurs while the measurement items are being read, the bit corresponding to the measurement item with an error turns on. Example: When an error occurs while the measurement data of the measurement item (1) in the setting 1 The setting 1 measurement item error bit (S3) turns on. The error code is stored in the setting 1 error code (S3+1).</p> <p>■Error Code</p> <table><thead><tr><th>Error code (hexadecimal)</th><th>Description</th><th>Action</th></tr></thead><tbody><tr><td>1001H</td><td>The station number in Setting Parameter (R0 to R5099) is out of the setting range.</td><td>Check the station number in Setting Parameter (R0 to R5099).</td></tr><tr><td>1002H</td><td>The number of sends/receives in Setting Parameter (R0 to R5099) is out of the setting range.</td><td>Check the number of sends/receives in Setting Parameter (R0 to R5099).</td></tr><tr><td>Serial communication error code</td><td>The error code is the same as that occurs in the MODBUS serial communication.</td><td>Refer to MELSEC iQ-F FX5 User's Manual (MODBUS Communication).</td></tr></tbody></table>						Device	Description		S3	Setting 1 measurement item error bit The following shows the details of each bit and measurement item.	Bit		Measurement item	S3+1	Setting 1 error code		S3+2	Setting 2 measurement item error bit		S3+3	Setting 2 error code		⋮			S3+n×2-2	Setting n measurement item error bit		S3+n×2-1	Setting n error code		Error code (hexadecimal)	Description	Action	1001H	The station number in Setting Parameter (R0 to R5099) is out of the setting range.	Check the station number in Setting Parameter (R0 to R5099).	1002H	The number of sends/receives in Setting Parameter (R0 to R5099) is out of the setting range.	Check the number of sends/receives in Setting Parameter (R0 to R5099).	Serial communication error code	The error code is the same as that occurs in the MODBUS serial communication.	Refer to MELSEC iQ-F FX5 User's Manual (MODBUS Communication).											
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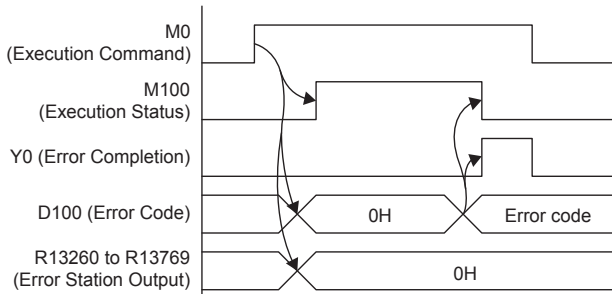
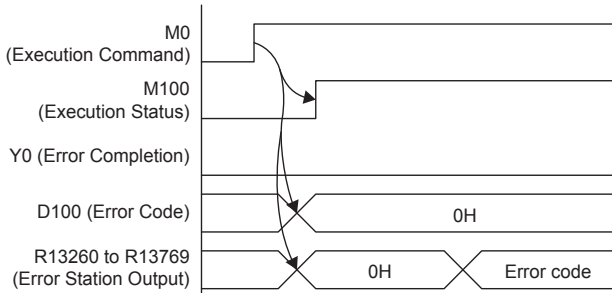
Internal device

No.	Device name	Data type	Type	Device comment	Remark
1	M200	Bit	Internal	Setting Data Check Command	Holds the check command flag of setting data.
2	M202	Bit	Internal	Execution Command Before Start Main Process	Holds the execution command flag of the process before the start of main process.
3	M204	Bit	Internal	Main Process Execution Completed	Holds the execution completion flag of the main process.
4	M205	Bit	Internal	Program Error	Holds the error flag of the program.
5	M210	Bit	Internal	Program Completion Pulse	Holds the pulse flag of program completion.
6	M211	Bit	Internal	Setting Parameter Read	Holds the read flag of the setting parameter.
7	M212	Bit	Internal	Transition to Next Setting Parameter	Holds the transition flag of the next setting parameter.
8	M213	Bit	Internal	Confirm Program Completion	Holds the confirmation flag of program completion.
9	M214	Bit	Internal	Setting Parameter Error	Holds the error flag of the setting parameter.
10	M215	Bit	Internal	Data Send/Receive	Holds the data send/receive flag.
11	M216	Bit	Internal	Control Data Set	Holds the control data set flag.
12	M217	Bit	Internal	Register Address 4-Byte Data	Holds the flag of register address 4-byte data.
13	M218	Bit	Internal	Register Address Bit Data	Holds the flag of the register address bit data.
14	M219	Bit	Internal	ADPRW Instruction Execution	Holds the ADPRW instruction execution flag.
15	M220	Bit	Internal	ADPRW Instruction Executing	Holds the ADPRW instruction executing flag.
16	M221	Bit	Internal	Register Address H8000 or Higher	Holds the flag of register address H8000 or higher.
17	M222	Bit	Internal	Read Normal Completion	Holds the read normal completion flag.
18	M223	Bit	Internal	Read Error Completion	Holds the read error completion flag.
19	M224	Bit	Internal	Read Completion	Holds the read completion flag.
20	M225 to M227	Bit (0..2)	Internal	Instruction Completion Flag	Holds the instruction completion flag.
21	D50 to D51	Double word [Signed]	Internal	Setting Parameter Start Address	Holds the start address of the setting parameter.
22	D52 to D53	Double word [Signed]	Internal	Setting Parameter Address Offset	Holds the address offset of the setting parameter.
23	D54 to D55	Double word [Signed]	Internal	Output Data Start Address	Holds the start address of the output parameter.
24	D56 to D57	Double word [Signed]	Internal	Output Data Offset	Holds the offset of the output data.
25	D58 to D59	Double word [Signed]	Internal	Output Data Address Offset	Holds the address offset of the output data.
26	D60 to D61	Double word [Signed]	Internal	Output Data TMP	Holds the output data temporarily.
27	D62 to D63	Double word [Signed]	Internal	Error Station Output Start Address	Holds the output start address of the error station.
28	D64 to D65	Double word [Signed]	Internal	Error Station Output Address Offset	Holds the output address offset of the error station.
29	D66 to D67	Word [Signed] (0..1)	Internal	Error Station Output TMP	Holds the output from the error station temporarily.
30	D68 to D69	Word [Signed] (0..1)	Internal	Read Data Storage Device	Holds the read data from the connected devices.
31	D70 to D71	Word [Signed] (0..1)	Internal	Address Backup	Backs up the address.
32	D72 to D88	Word [Signed] (0..16)	Internal	Setting Data	Holds the setting data.
33	D89	Word [Signed]	Internal	Number of Settings	Holds the specified number.
34	D90	Word [Signed]	Internal	Access Points	Holds the access points.
35	D91	Word [Signed]	Internal	Read Register Address	Holds the read register address.
36	D92	Word [Signed]	Internal	Number of Data Processing Times	Holds the number of data processing times.
37	D93	Word [Signed]	Internal	Setting Read Count	Holds the setting read count.
38	D94	Word [Signed]	Internal	Error Station Output TMP	Holds the error station output TMP.
39	D95	Word [Signed]	Internal	Number of Transitions to Next Setting Parameter	Holds the number of transitions to the next setting parameters.

No.	Device name	Data type	Type	Device comment	Remark
40	D96	Word [Signed]	Internal	Setting Station Number	Holds the setting station number.
41	D99	Word [Signed]	Internal	For Z9 Register Backup	Backs up the register Z9.

Details of functions

Item	Description				
Applicable device	<table> <tr> <td>CPU module</td><td>FX5U CPU, FX5UC CPU</td></tr> <tr> <td>Engineering tool</td><td>GX Works3 Version 1.031H or later</td></tr> </table>	CPU module	FX5U CPU, FX5UC CPU	Engineering tool	GX Works3 Version 1.031H or later
CPU module	FX5U CPU, FX5UC CPU				
Engineering tool	GX Works3 Version 1.031H or later				
Language	Ladder				
Number of basic steps	1160 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and the option setting in GX Works3. For the option setting in GX Works3, refer to  GX Works3 Operating Manual.				
Processing	<ul style="list-style-type: none"> When Execution Command (M0) and Dedicated Instruction Execute Flag (M1) are turned on, this program reads data from power distribution measuring instruments set with Setting parameter (R0 to R5099). If an incorrect value is specified, Error Completion (Y0) turns on and the processing is suspended. In addition, the error code is stored in Error Code (D100). <p>* Note: This sample ladder backs up or recovers the index register. When the index register value need not to be held in other programs, the backup/recovery processing is not required.</p>				
Timing chart of I/O signals	<p>[For normal completion]</p>  <ul style="list-style-type: none"> When Execution Command (M0) is turned on, Execution Status (M100) turns on and this program starts. When Dedicated Instruction Execute Flag (M1) is turned on, the MODBUS communication processing starts. When the MODBUS communication processing is completed on each measurement item, data is stored in Output Data (R5100 to R13259). When Dedicated Instruction Execute Flag (M1) is turned on and off, the MODBUS communication processing stops after the current processing is completed. When Dedicated Instruction Execute Flag (M1) is turned off and on again, the MODBUS communication processing restarts from the measurement item next to the item whose data has been obtained in the previous processing. When the MODBUS communication processing is completed on the measurement item m in the setting n, the data is stored and Normal Completion (M101) turns on for one pulse. When Execution Command (M0) is turned off, Execution Status (M100) turns off after the current MODBUS communication is completed. Consequently, this program ends. 				

Item	Description
Timing chart of I/O signals	<p>[For error completion]</p>  <p>[For MODBUS communication error]</p>  <ul style="list-style-type: none"> • When Execution Command (M0) is turned on, Error Code (D100) and Error Station Output (R13260 to R13769) are reset (0). <p>[For error completion]</p> <ul style="list-style-type: none"> • When an error occurs in the setting parameter, the error code is stored in Error code (D100), Error Completion (Y0) turns on for one pulse, and Execution Status (M100) turns off. Consequently, this program ends. <p>[For MODBUS communication error]</p> <ul style="list-style-type: none"> • The error station and error code are output to Error Station Output (R13260 to R13769), and the next MODBUS communication processing is performed.
Restrictions and precautions	<ul style="list-style-type: none"> • This program does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation. • This program cannot be used as an interrupt program. • Do not use this program with programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because Execution Command (M0) cannot be turned off and the normal operation cannot be performed. Always use this program with programs that can turn off Execution Command (M0). • This program uses the index register Z9. • Setting Parameter (R0 to R5099) uses word devices of "value of Number of Settings (D0) × 20". • Output Data (R5100 to R13259) uses word devices of "value of Number of Settings (D0) × 36". • Error Station Output (R13260 to R13769) uses word devices of "value of Number of Settings (D0) × 2". • Do not use any device in the area where the internal user device, data register (D), and link register (W) are consecutive.

Error Code

Error code (decimal)	Description	Action
11	A value out of the setting range is set in Number of Settings (D0).	Review Number of Settings (D0), and execute the program again.
13	No setting is configured in Setting Parameter (R0 to R5099).	Review the setting values (station number setting and number of sends/receives) of Setting Parameter (R0 to R5099), and execute the program again.

Version upgrade history

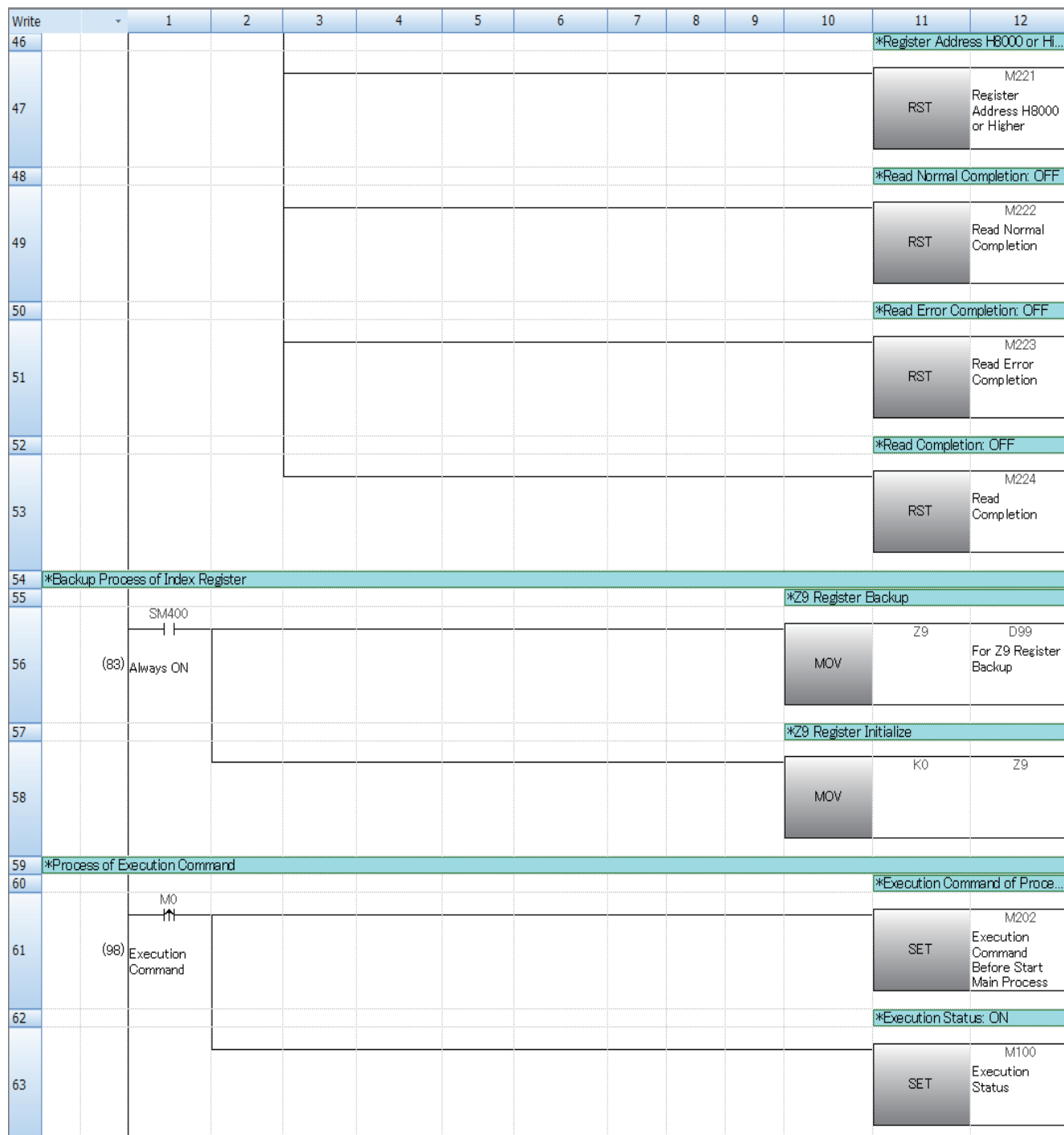
Version	Date	Description
Ver.1.00A	2017/3	First edition

Program

Write	1	2	3	4	5	6	7	8	9	10	11	12
1	*Sample Ladder Name: LD-FX5U_e-MEASURE-MB_V100A_E											
2	*Function: Data Read											
3	*Version: Ver.1.00A											
4	*Process of Initializing Program											
5											*Execution Command of Proce...	
6		(0)	Execution Command								RST	M202 Execution Command Before Start Main Process
7											*Setting Data Check Command...	
8											RST	M200 Setting Data Check Command
9											*Normal Completion: OFF	
10											RST	M101 Normal Completion
11											*Error Completion: OFF	
12											RST	Y0 Error Completion
13											*Program Error: OFF	
14											RST	M205 Program Error

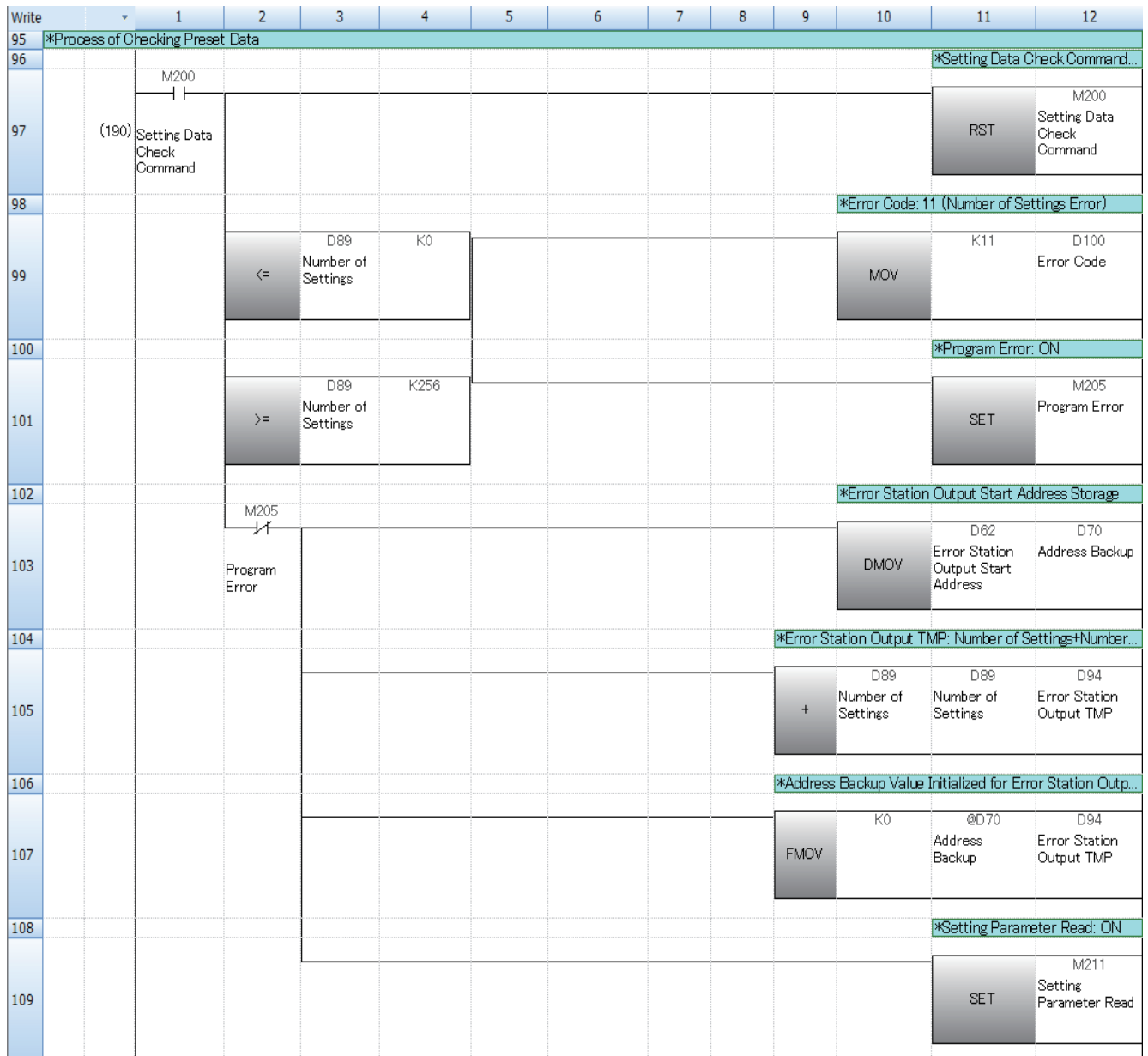
Write	1	2	3	4	5	6	7	8	9	10	11	12
15											*Main Process Execution Com...	
16											RST	M204 Main Process Execution Completed
17											*Data Send/Receive: OFF	
18											RST	M215 Data Send/Receive
19											*Control Data Set: OFF	
20											RST	M216 Control Data Set
21											*Transition to Next Setting Pa...	
22											RST	M212 Transition to Next Setting Parameter
23											*Setting Parameter Read: OFF	
24											RST	M211 Setting Parameter Read
25											*Setting Parameter Error: OFF	
26											RST	M214 Setting Parameter Error
27											*ADPRW Instruction Execution...	
28											RST	M219 ADPRW Instruction Execution
29											*Program Completion Check ...	
30											SET	M213 Confirm Program Completion

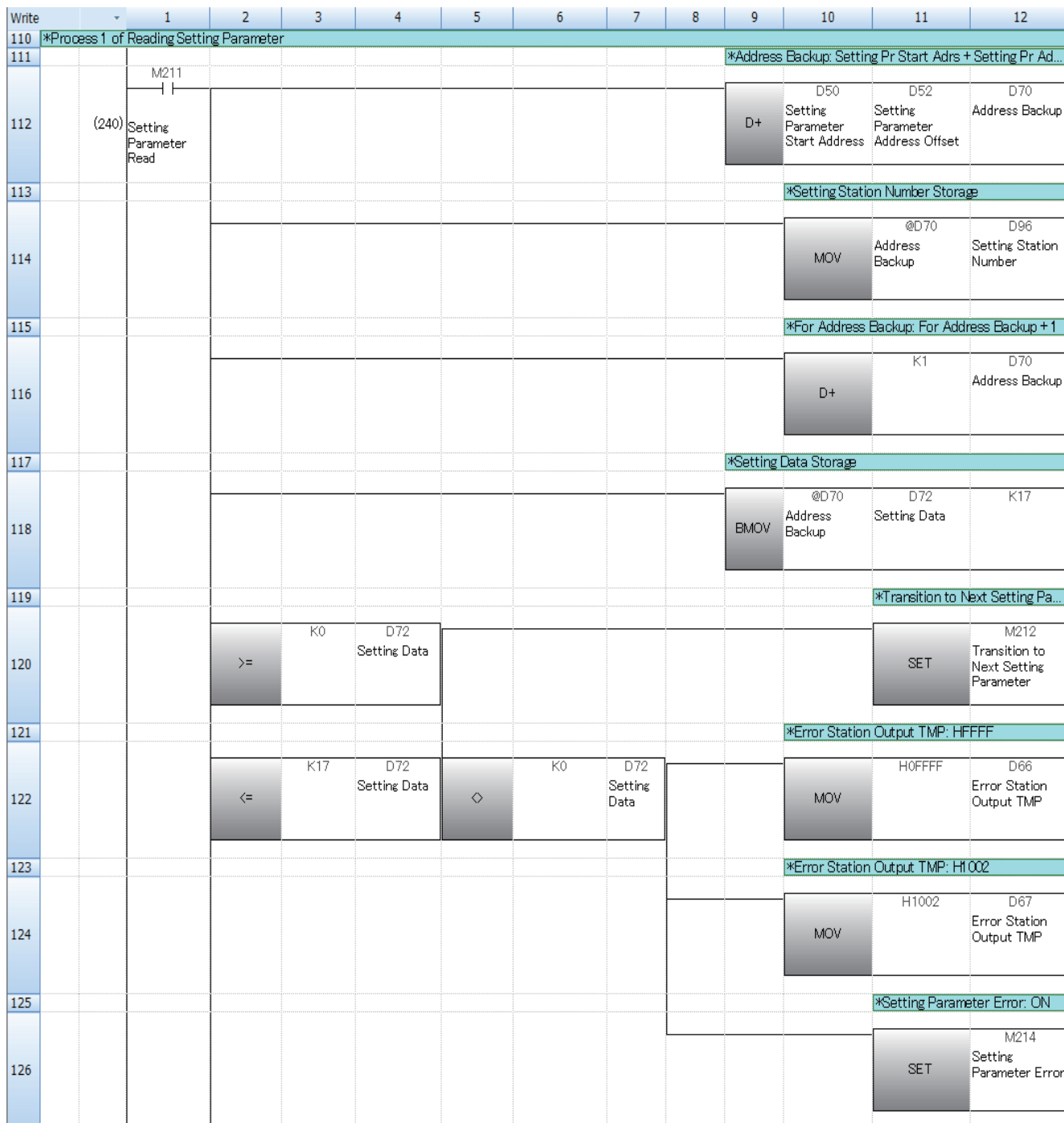
Write	1	2	3	4	5	6	7	8	9	10	11	12
31	*Process of Program Completion											
32											*Program Completion Check ...	
		M213 	M220 									
33	(45)	Confirm Program Completion	ADPRW Instruction Executing								RST	M213 Confirm Program Completion
34											*Execution Status: OFF	
35											RST	M100 Execution Status
36											*Register Address 4-byte Dat...	
37											RST	M217 Register Address 4-Byte Data
38											*Register Address Bit Data: O...	
39											RST	M218 Register Address Bit Data
40											*Instruction Completion Flag ...	
41											RST	M225 Instruction Completion Flag [0]
42											*Instruction Completion Flag ...	
43											RST	M226 Instruction Completion Flag [1]
44											*Instruction Completion Flag ...	
45											RST	M227 Instruction Completion Flag [2]



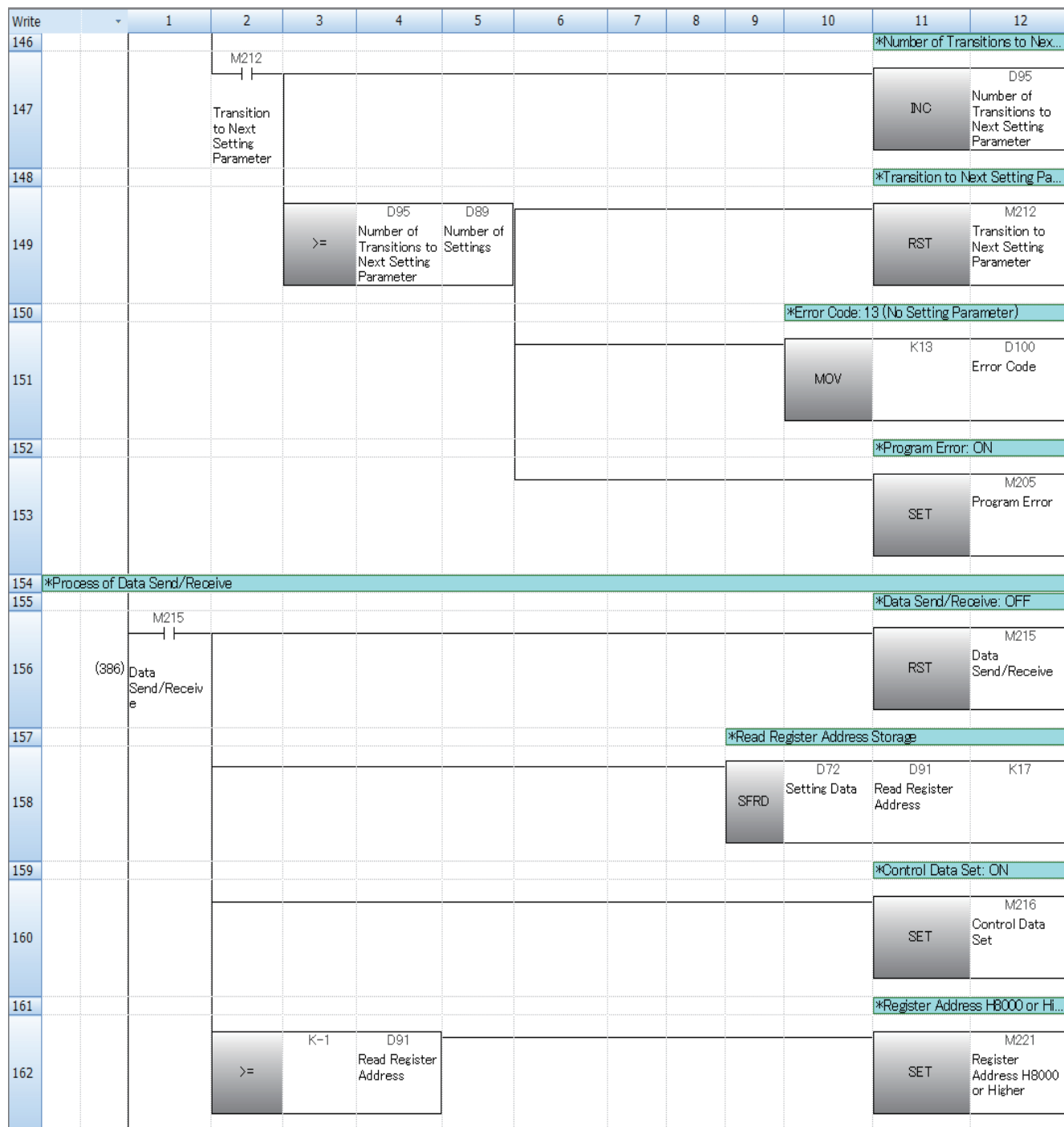
Write	1	2	3	4	5	6	7	8	9	10	11	12
64	*Process Before Starting Main Process											
65											*Execution Command of Proce...	
		M202										
66	(109)	Execution Command Before Start Main Process									RST	M202 Execution Command Before Start Main Process
67											*Error Code: 0 (Initialization)	
68										MOV	K0	D100 Error Code
69											*Number of Data Process Times: 0 (Initializati...	
70										MOV	K0	D92 Number of Data Processing Times
71											*Number of Transitions to Next Setting Param...	
72										MOV	K0	D95 Number of Transitions to Next Setting Parameter
73											*Setting Parameter Address Offset: 0 (Initialize)	
74										DMOV	K0	D52 Setting Parameter Address Offset
75											*Output Data Address Offset: 0 (Initialize)	
76										DMOV	K0	D58 Output Data Address Offset
77											*Output Data Offset: 0 (Initialize)	
78										DMOV	K0	D56 Output Data Offset

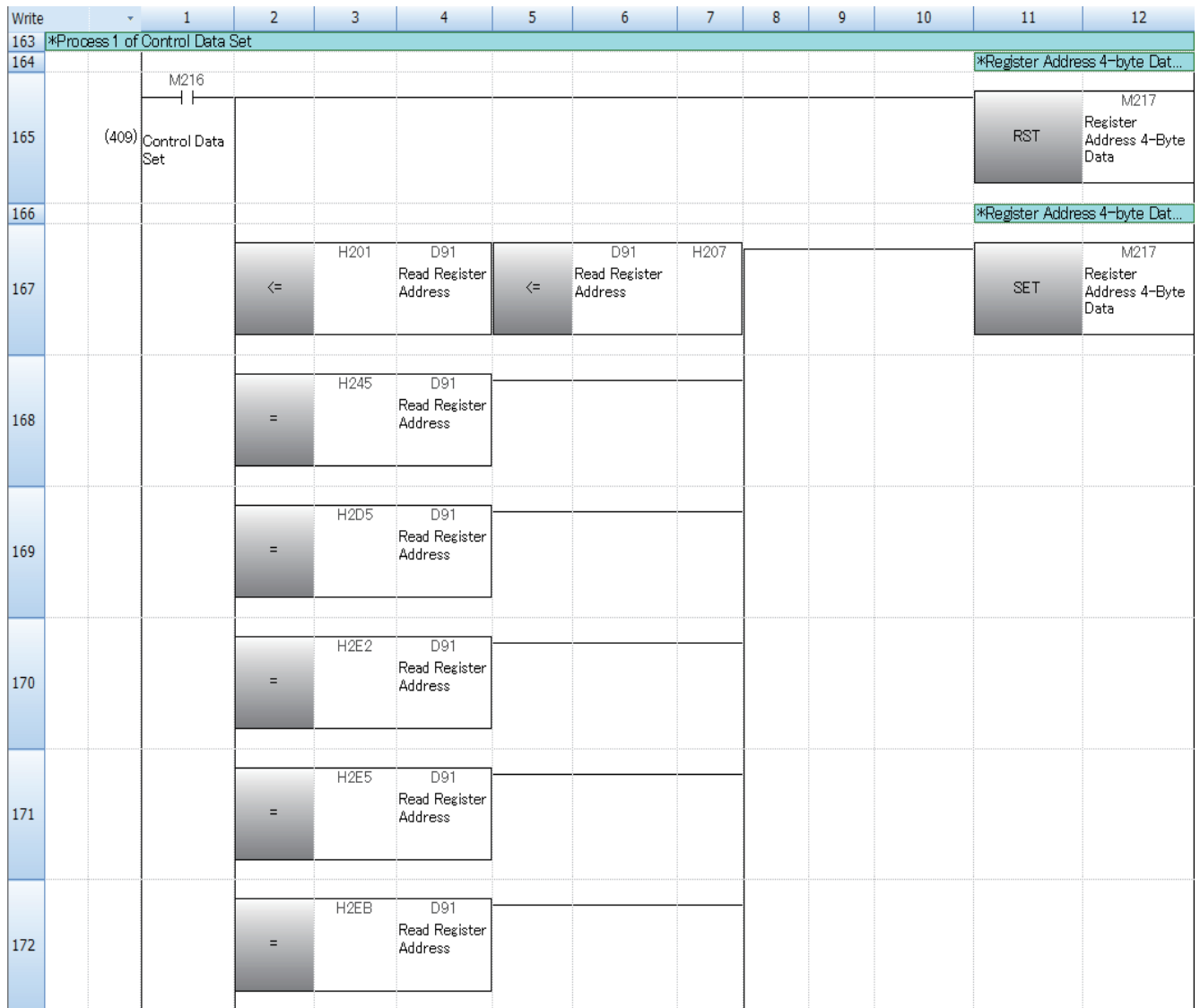
Write	1	2	3	4	5	6	7	8	9	10	11	12
79										*Output Data TMP: 0 (Initialize)		
80										DMOV	K0	D60 Output Data TMP
81										*Error Station Output Address Offset: 0 (Initia...		
82										DMOV	K0	D64 Error Station Output Address Offset
83										*Set Read Count: 0 (Initialize)		
84										MOV	K0	D93 Setting Read Count
85										*Setting Parameter Start Address Storage		
86										ADRSET	R0 Setting Parameter	D50 Setting Parameter Start Address
87										*Output Data Start Address Storage		
88										ADRSET	R5100 Output Data	D54 Output Data Start Address
89										*Error Station Output Start Address Storage		
90										ADRSET	R13260 Error Station Output	D62 Error Station Output Start Address
91										*Number of Settings Storage		
92										MOV	D0 Number of Settings	D89 Number of Settings
93										*Setting Data Check Command...		
94										SET	M200	Setting Data Check Command



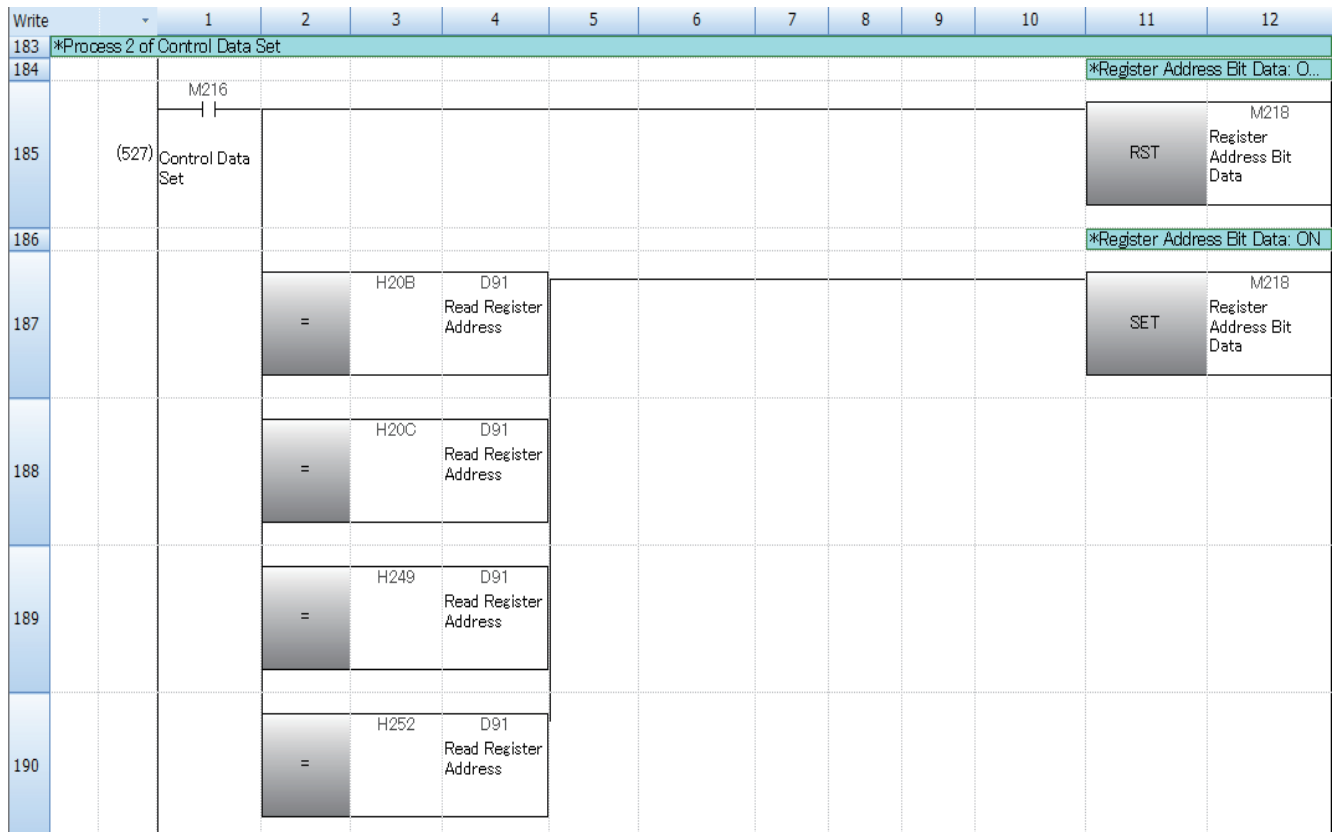


Write		1	2	3	4	5	6	7	8	9	10	11	12
127												*Transition to Next Setting Pa...	
128			>=	K0	D96 Setting Station Number							SET	M212 Transition to Next Setting Parameter
129												*Error Station Output TMP: HFFFF	
130			<=	K33	D96 Setting Station Number	◇	K0	D96 Setting Station Number			MOV	H0FFFF	D66 Error Station Output TMP
131												*Error Station Output TMP: H1001	
132											MOV	H1001	D67 Error Station Output TMP
133												*Setting Parameter Error: ON	
134												SET	M214 Setting Parameter Error
135	*Process 2 of Reading Setting Parameter												
136												*Setting Parameter Read: OFF	
137		(334) Setting Parameter Read	M211 ┌┐									RST	M211 Setting Parameter Read
138												*Data Send/Receive: ON	
139			M212 └┘									SET	M215 Data Send/Receive
140												*Address Backup: Err Sta Out Start Adrs + Err Sta Out ...	
141										D+	D62 Error Station Output Start Address	D64 Error Station Output Address Offset	D70 Address Backup
142												*Error Station Output TMP: Address Backup ...	
143											MOV	@D70 Address Backup	D66 Error Station Output TMP
144												*Number of Transitions to Next Setting Param...	
145											MOV	K0	D95 Number of Transitions to Next Setting Parameter



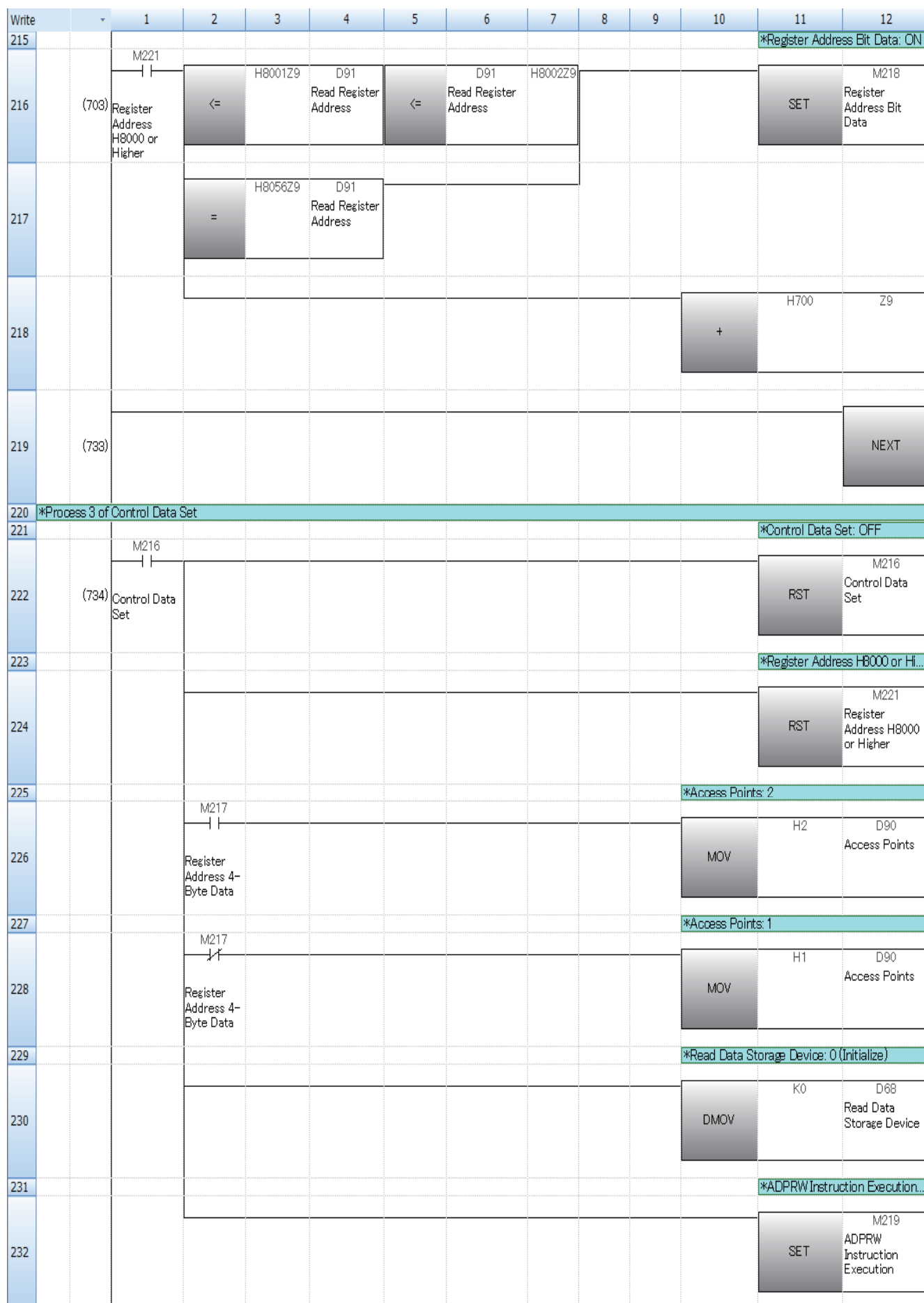


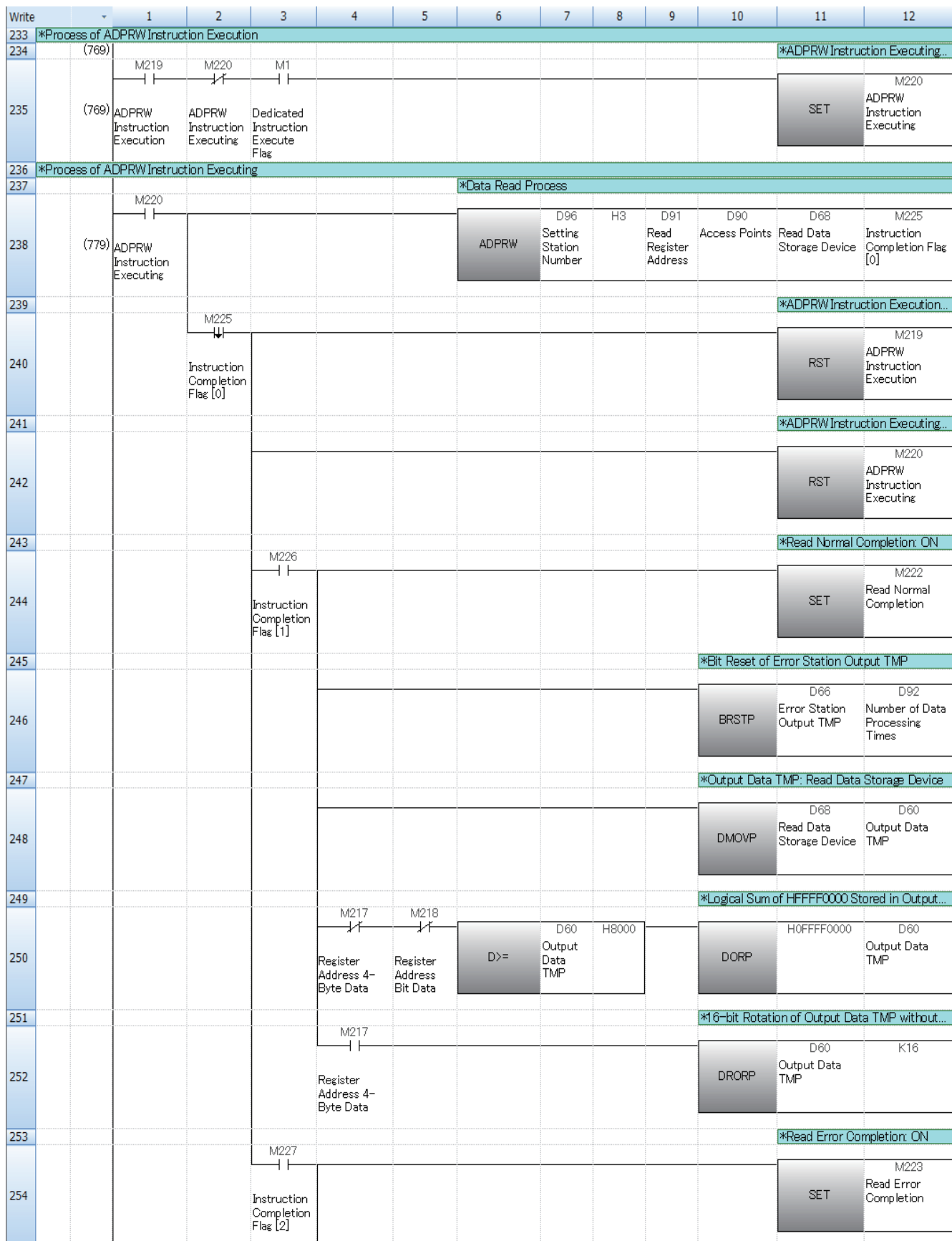
Write		1	2	3	4	5	6	7	8	9	10	11	12
173			<=	H39D	D91 Read Register Address	<=	D91 Read Register Address	H39F					
174			<=	H3AA	D91 Read Register Address	<=	D91 Read Register Address	H3B0					
175			=	H40C	D91 Read Register Address								
176			=	H418	D91 Read Register Address								
177			<=	H42A	D91 Read Register Address	<=	D91 Read Register Address	H432					
178			<=	H518	D91 Read Register Address	<=	D91 Read Register Address	H52E					
179			<=	H538	D91 Read Register Address	<=	D91 Read Register Address	H53E					
180			<=	H552	D91 Read Register Address	<=	D91 Read Register Address	H5AE					
181			<=	H5B4	D91 Read Register Address	<=	D91 Read Register Address	H62C					
182			<=	H632	D91 Read Register Address	<=	D91 Read Register Address	H63C					



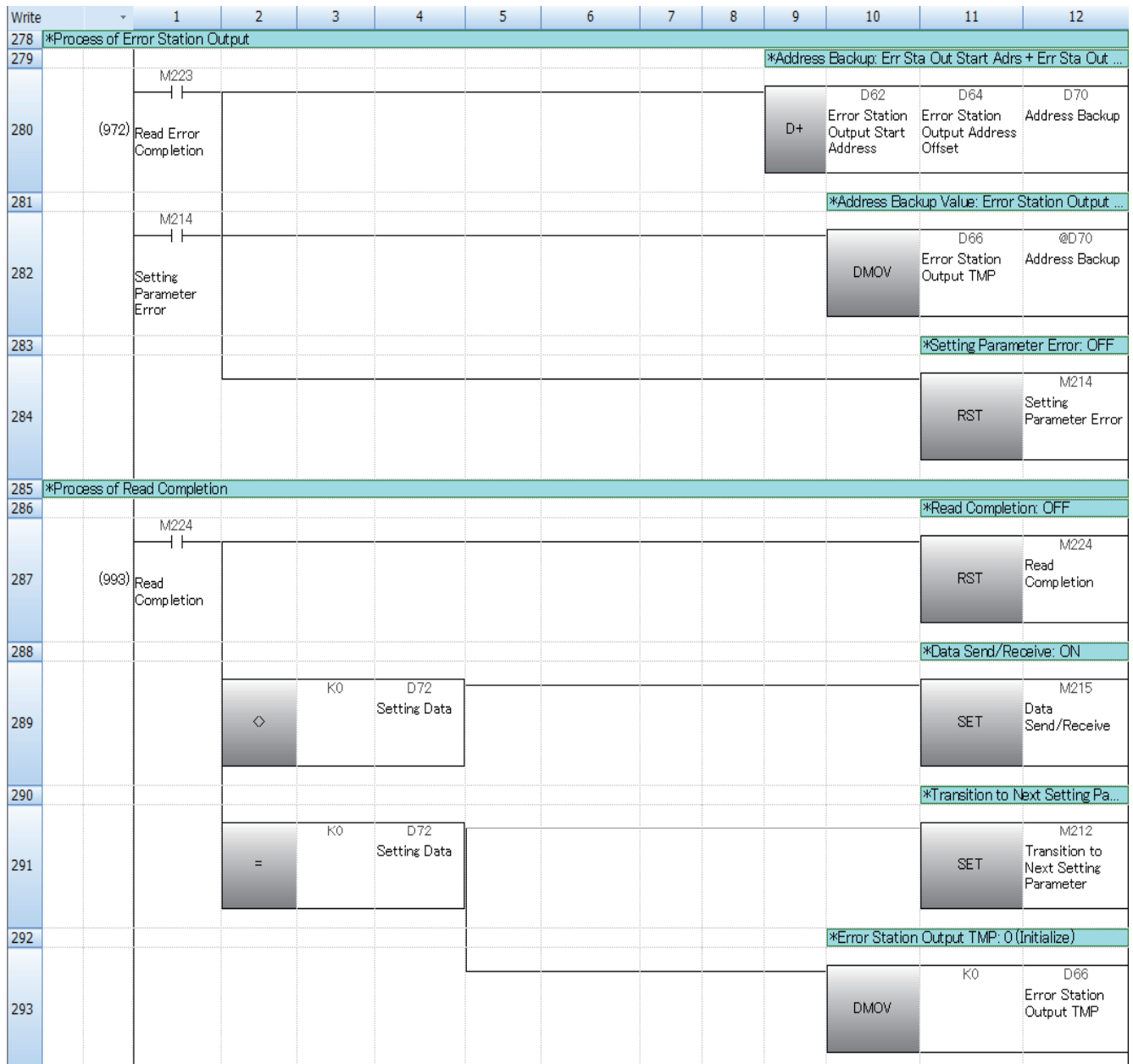
Write	1	2	3	4	5	6	7	8	9	10	11	12
191	*Process of Register Address H8000 or Higher											
192	(553)										FOR	K7
193											*Register Address 4-byte Dat...	
194	(557)	M221 Register Address H8000 or Higher	<=	H800DZ9 Read Register Address	<=	D91 Read Register Address	H8011Z9				SET	M217 Register Address 4-Byte Data
195			<=	H8016Z9 Read Register Address	<=	D91 Read Register Address	H801AZ9					
196			=	H802BZ9 Read Register Address								
197			=	H802EZ9 Read Register Address								
198			=	H8031Z9 Read Register Address								
199			=	H8034Z9 Read Register Address								
200			=	H803EZ9 Read Register Address								
201			=	H8042Z9 Read Register Address								
202			=	H8046Z9 Read Register Address								
203			=	H8075Z9 Read Register Address								

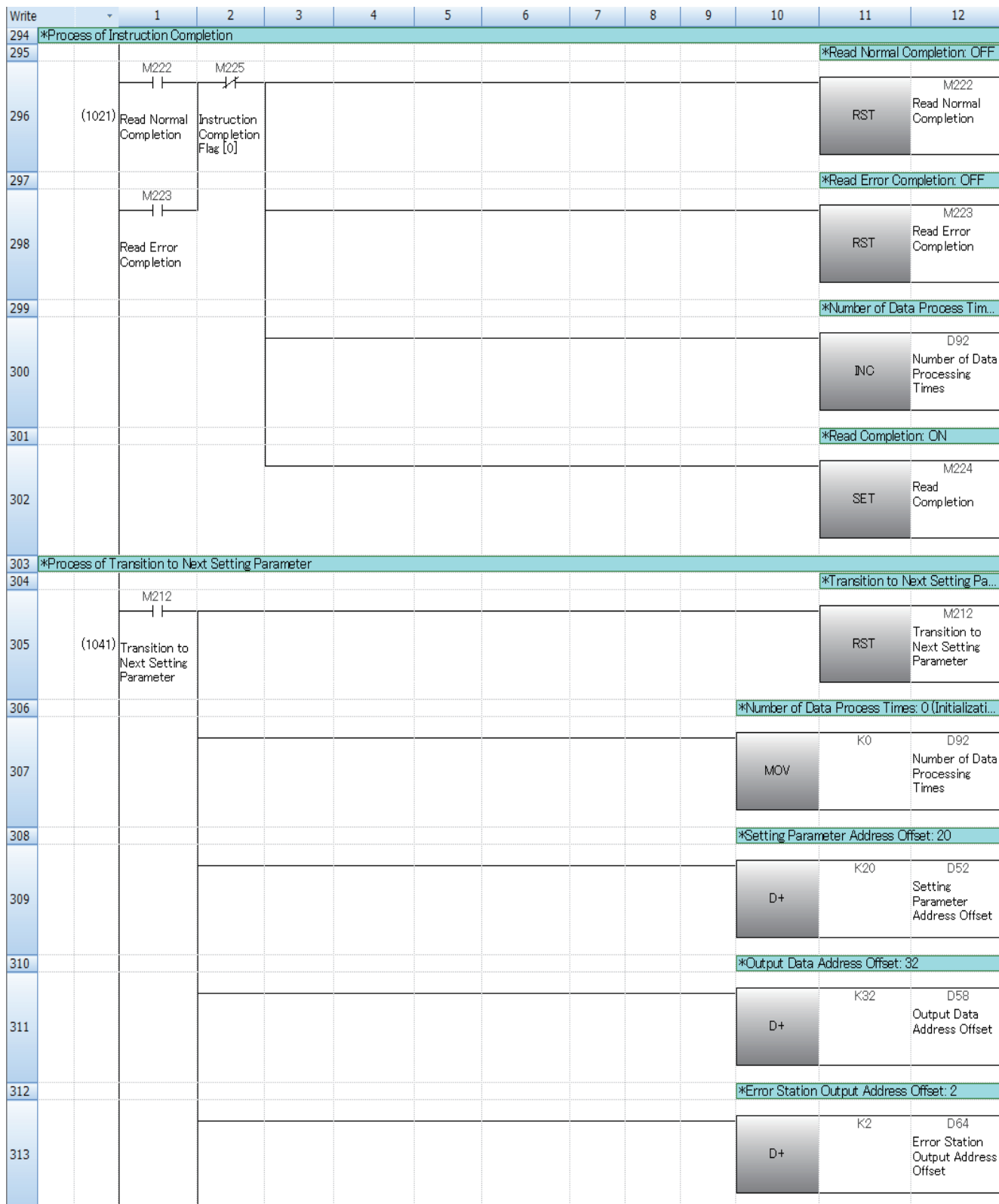
Write		1	2	3	4	5	6	7	8	9	10	11	12
204			=	H8078Z9	D91 Read Register Address								
205			=	H807BZ9	D91 Read Register Address								
206			=	H807EZ9	D91 Read Register Address								
207			=	H8096Z9	D91 Read Register Address								
208			=	H80A1Z9	D91 Read Register Address								
209			=	H80A4Z9	D91 Read Register Address								
210			=	H80A7Z9	D91 Read Register Address								
211			<=	H8178Z9	D91 Read Register Address	<=	D91 Read Register Address	H817AZ9					
212			<=	H8218Z9	D91 Read Register Address	<=	D91 Read Register Address	H8234Z9					
213			<=	H823AZ9	D91 Read Register Address	<=	D91 Read Register Address	H8240Z9					
214			<=	H8246Z9	D91 Read Register Address	<=	D91 Read Register Address	H828AZ9					



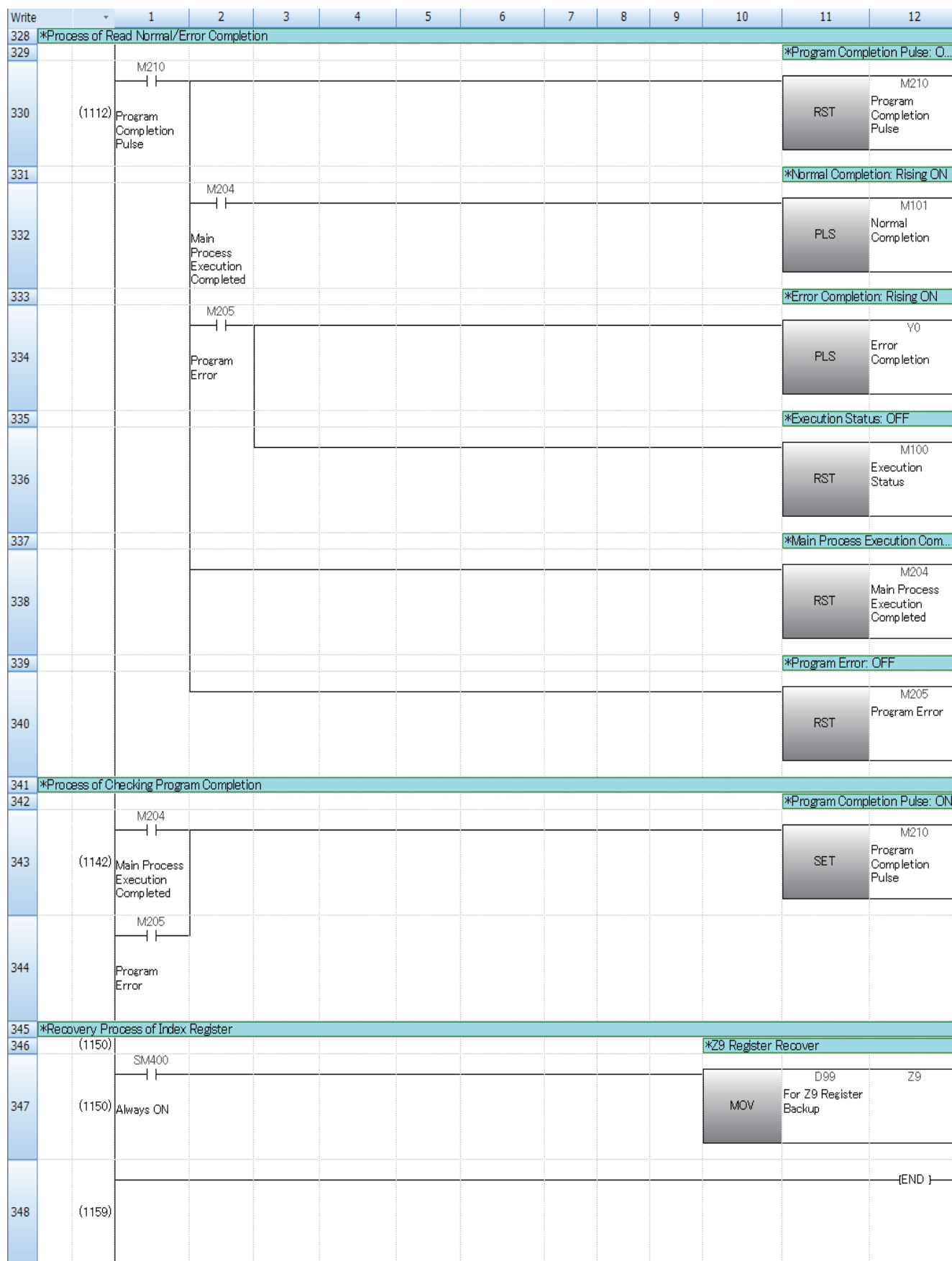


Write	1	2	3	4	5	6	7	8	9	10	11	12
255										*Error Station Output TMP: Error Code		
256				=	K9	SD8503 Serial Communication Operation Mode (CH1)	=	K0	SD8861 Slave Node Address (CH1)	MOV	SD8500 Serial Communication Error Code (CH1)	D67 Error Station Output TMP
257										*Error Station Output TMP: Error Code		
258				=	K9	SD8513 Serial Communication Operation Mode (CH2)	=	K0	SD8871 Slave Node Address (CH2)	MOV	SD8510 Serial Communication Error Code (CH2)	D67 Error Station Output TMP
259										*Error Station Output TMP: Error Code		
260				=	K9	SD8523 Serial Communication Operation Mode (CH3)	=	K0	SD8881 Slave Node Address (CH3)	MOV	SD8520 Serial Communication Error Code (CH3)	D67 Error Station Output TMP
261										*Error Station Output TMP: Error Code		
262				=	K9	SD8533 Serial Communication Operation Mode (CH4)	=	K0	SD8891 Slave Node Address (CH4)	MOV	SD8530 Serial Communication Error Code (CH4)	D67 Error Station Output TMP
263										*Bit Set of Error Station Output TMP		
264										BSETP	D66 Error Station Output TMP	D92 Number of Data Processing Times
265	*Process of Read Normal Completion											
266										*Address Backup: Output Data Start Adrs + Output Dat...		
267		M222 ┌─┴─┐ (929) Read Normal Completion								D+	D54 Output Data Start Address	D58 Output Data Address Offset D70 Address Backup
268										*Output Data Offset: Number of Data Process Times*2		
269										*	K2	D92 Number of Data Processing Times D56 Output Data Offset
270										*Output Data Offset Added to Address Backup		
271										D+	D56 Output Data Offset	D70 Address Backup
272										*Output Data TMP Stored in Address Backup ...		
273										DMOV	D60 Output Data TMP	@D70 Address Backup
274										*Address Backup: Err Sta Out Start Adrs + Err Sta Out ...		
275										D+	D62 Error Station Output Start Address	D64 Error Station Output Address Offset D70 Address Backup
276										*Address Backup Value: Error Station Output ...		
277										MOV	D66 Error Station Output TMP	@D70 Address Backup





Write	1	2	3	4	5	6	7	8	9	10	11	12
314											*Set Read Count Increment	
315											INC	D93 Setting Read Count
316											*Set Read Count: 0 (Initialize)	
317			D93 Setting Read Count	D89 Number of Settings						MOV	K0	D93 Setting Read Count
318											*Setting Parameter Address Offset: 0 (Initialize)	
319										DMOV	K0	D52 Setting Parameter Address Offset
320											*Output Data Address Offset: 0 (Initialize)	
321										DMOV	K0	D58 Output Data Address Offset
322											*Error Station Output Address Offset: 0 (Initia...	
323										DMOV	K0	D64 Error Station Output Address Offset
324											*Main Process Execution Com...	
325											SET	M204 Main Process Execution Completed
326											*Setting Parameter Read: ON	
327											SET	M211 Setting Parameter Read



2.2 Data Write

Name

Data Write

Outline

Writes setting values to power distribution measuring instruments.

Programs used

This program is used for the FX5U and FX5UC.

The following table shows the project used in this program.

No.	Project name	Program name	Remark
1	LD-FX5U_e-MEASURE-MB_V100A_E	02_Data Write	This project is created with the FX5U or FX5UC.

Devices used

The following table lists the devices used in this program.

■Input device

No.	Device name	Data type	Type	Device comment	Remark																
1	M300	Bit	Input	Execution Command	ON: The program is activated. OFF: The program is not activated.																
2	D200 to D203	Word [Signed]	Input	Setting Parameter	Sets the data set to the power distribution measuring instrument.																
■Configuration of Setting Parameter																					
<table><tr><th>Device</th><th>Description</th><th>Setting range</th><th>Remark</th></tr><tr><td>S4</td><td>Station number</td><td>0 to 32</td><td>When the station number is set to 0, broadcast communication is performed.</td></tr><tr><td>S4+1</td><td>Setting register address</td><td>The setting range depends on the target power distribution measuring instrument.</td><td>For the details on the setting register address and setting range of setting data, refer to the MODBUS interface specifications of each power distribution measuring instrument.</td></tr><tr><td>S4+2 to S4+3</td><td>Setting data</td><td>The setting range depends on the setting register address.</td><td></td></tr></table>						Device	Description	Setting range	Remark	S4	Station number	0 to 32	When the station number is set to 0, broadcast communication is performed.	S4+1	Setting register address	The setting range depends on the target power distribution measuring instrument.	For the details on the setting register address and setting range of setting data, refer to the MODBUS interface specifications of each power distribution measuring instrument.	S4+2 to S4+3	Setting data	The setting range depends on the setting register address.	
Device	Description	Setting range	Remark																		
S4	Station number	0 to 32	When the station number is set to 0, broadcast communication is performed.																		
S4+1	Setting register address	The setting range depends on the target power distribution measuring instrument.	For the details on the setting register address and setting range of setting data, refer to the MODBUS interface specifications of each power distribution measuring instrument.																		
S4+2 to S4+3	Setting data	The setting range depends on the setting register address.																			
* S4 corresponds to D200.																					

■Output device

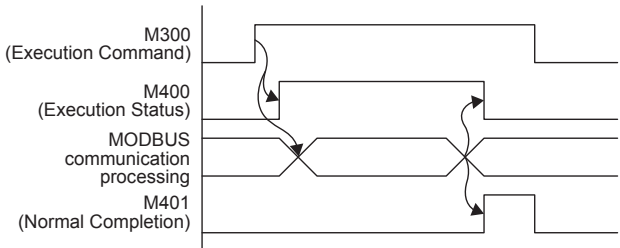
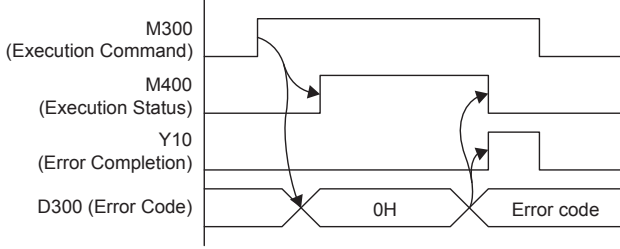
No.	Device name	Data type	Type	Device comment	Remark
1	M400	Bit	Output	Execution Status	ON: The execution command is on. OFF: The execution command is off.
2	M401	Bit	Output	Normal Completion	When this label is on, it indicates that the processing has been completed.
3	Y10	Bit	Output	Error Completion	When this label is on, it indicates that an error has occurred in the program.
4	D300	Word [Signed]	Output	Error Code	Stores the error code that occurred in the program.

■Internal device

No.	Device name	Data type	Type	Device comment	Remark
1	M500	Bit	Internal	Setting Data Check Command	Holds the check command flag of setting data.
2	M502	Bit	Internal	Execution Command Before Start Main Process	Holds the execution command flag of the process before the start of main process.
3	M505	Bit	Internal	Program Error	Holds the error flag of the program.
4	M510	Bit	Internal	Program Completion Pulse	Holds the completion pulse flag of the program.
5	M511	Bit	Internal	Confirm Program Completion	Holds the confirmation flag of program completion.
6	M512	Bit	Internal	Control Data Set	Holds the control data set flag.
7	M513	Bit	Internal	Register Address 4-Byte Data	Holds the flag of register address 4-byte data.

No.	Device name	Data type	Type	Device comment	Remark
8	M514 to M516	Bit (0..2)	Internal	Instruction Completion Flag	Holds the instruction completion flag.
9	M517	Bit	Internal	Write Normal Completion	Holds the write normal completion flag.
10	M518	Bit	Internal	Write Error Completion	Holds the write error completion flag.
11	M519	Bit	Internal	ADPRW Instruction Execution	Holds the ADPRW instruction execution flag.
12	D250 to D251	Double word [Signed]	Internal	Write Data Storage Device	Holds the data written to the connected devices.
13	D252	Word [Signed]	Internal	Access Points	Holds the access points.
14	D253 to D256	Word [Signed] (0..3)	Internal	Setting Parameter	Holds the setting parameter.
15	D299	Word [Signed]	Internal	For Z9 Register Backup	Backs up the register Z9.

Details of functions

Item	Description				
Applicable device	<table> <tr> <td>CPU module</td><td>FX5U CPU, FX5UC CPU</td></tr> <tr> <td>Engineering tool</td><td>GX Works3 Version 1.031H or later</td></tr> </table>	CPU module	FX5U CPU, FX5UC CPU	Engineering tool	GX Works3 Version 1.031H or later
CPU module	FX5U CPU, FX5UC CPU				
Engineering tool	GX Works3 Version 1.031H or later				
Language	Ladder				
Number of basic steps	550 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and the option setting in GX Works3. For the option setting in GX Works3, refer to GX Works3 Operating Manual .				
Processing	<ul style="list-style-type: none"> When Execution Command (M300) is turned on, the items of Setting Parameter (D200 to D203) are set to the power distribution measuring instrument. If an incorrect value is specified, Error Completion (Y10) turns on and the processing is suspended. In addition, the error code is stored in Error Code (D300). <p>* Note: This sample ladder backs up or recovers the index register. When the index register value need not to be held in other programs, the backup/recovery processing is not required.</p>				
Timing chart of I/O signals	<p>[For normal completion]</p>  <ul style="list-style-type: none"> When Execution Command (M300) is turned on, Execution Status (M400) turns on and the MODBUS communication processing is performed. After the MODBUS communication processing is completed, Normal Completion (M401) turns on for one pulse and Execution Status (M400) turns off. Consequently, this program ends. <p>[For error completion]</p>  <ul style="list-style-type: none"> When Execution Command (M300) is turned on, Error Code (D300) is reset (0). The error code is stored in Error Code (D300), Error Completion (Y10) turns on for one pulse, and Execution Status (M400) turns off. Consequently, this program ends. 				
Restrictions and precautions	<ul style="list-style-type: none"> This program does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation. This program cannot be used as an interrupt program. Do not use this program with programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because Execution Command (M300) cannot be turned off and the normal operation cannot be performed. Always use this program with programs that can turn off Execution Command (M300). This program uses the index register Z9. 				

Error Code

Error code (decimal)	Description	Action
14	A value out of the setting range is set in Setting Parameter (D200 to D203).	Review the station number setting of Setting Parameter (D200 to D203), and execute the program again.
Serial communication error code	The error code is the same as that occurs in the MODBUS serial communication.	Refer to MELSEC iQ-F FX5 User's Manual (MODBUS Communication).

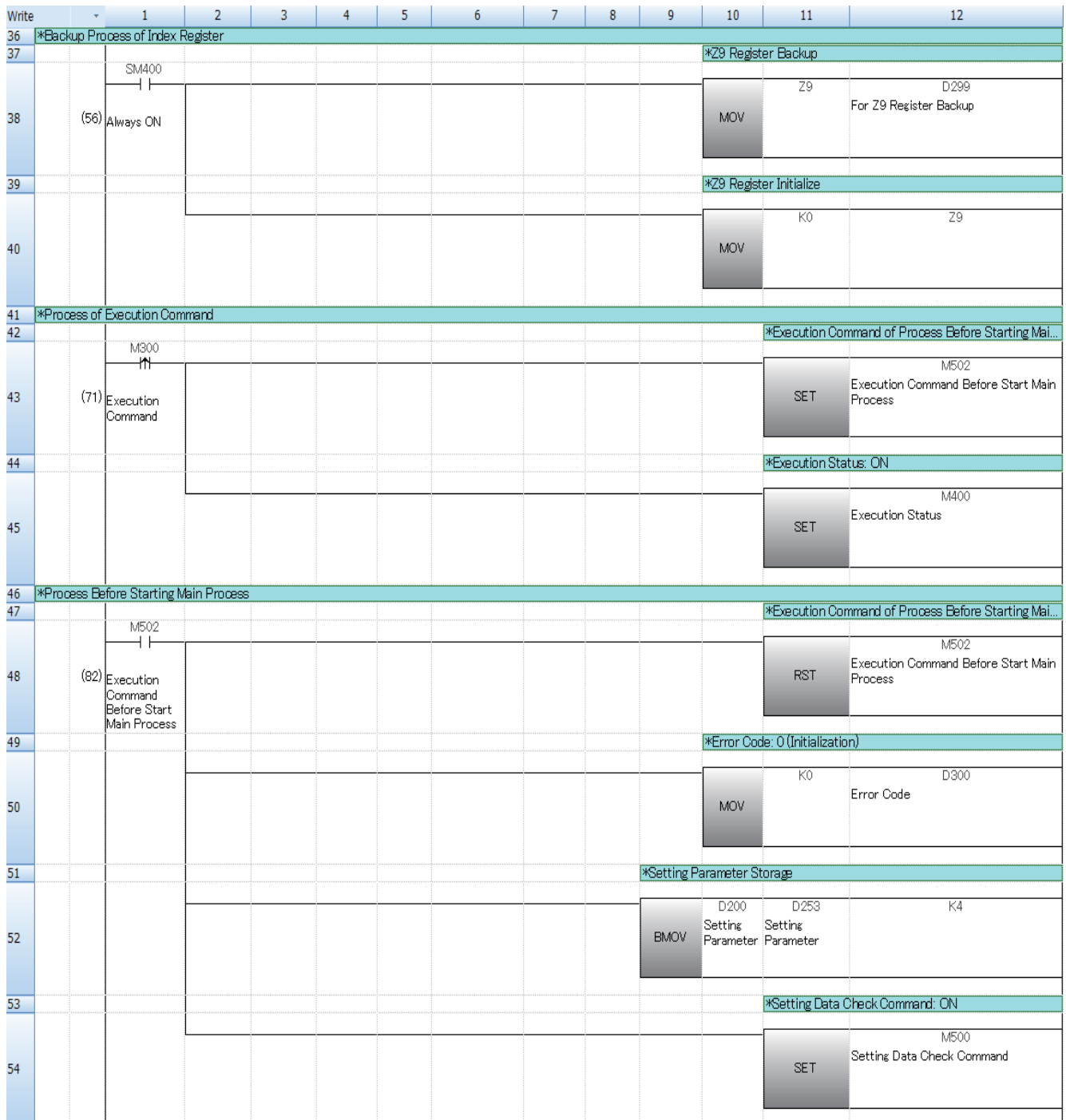
Version upgrade history

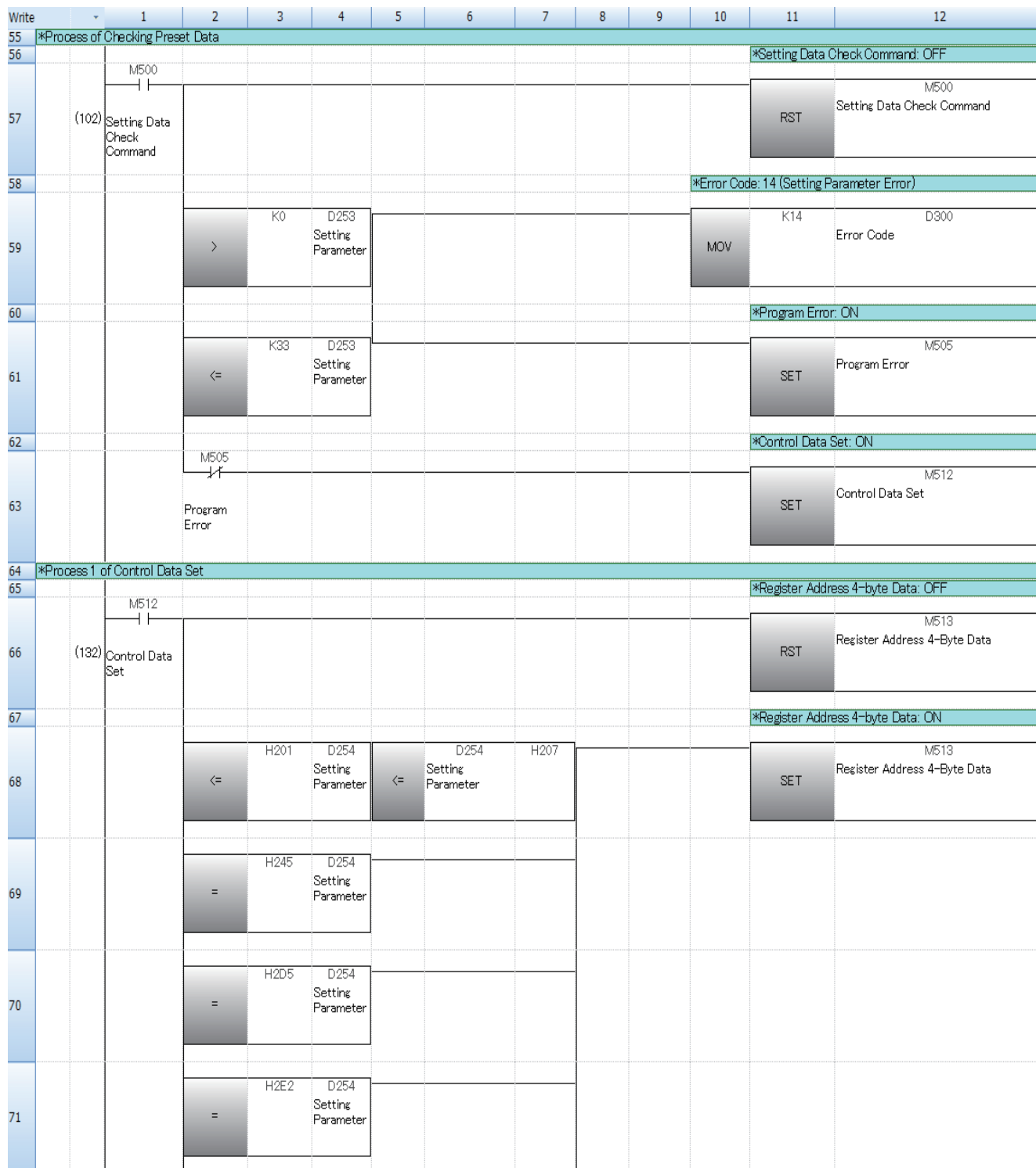
Version	Date	Description
Ver.1.00A	2017/3	First edition

Program

Write	1	2	3	4	5	6	7	8	9	10	11	12
1	*Sample Ladder Name: LD-FX5U.e-MEASURE-MB.V100A.E											
2	*Function: Data Write											
3	*Version: Ver.1.00A											
4	*Process of Initializing Program											
5											*Execution Command of Process Before Starting Mai...	
6		(0) Execution Command									RST	M502 Execution Command Before Start Main Process
7											*Setting Data Check Command: OFF	
8											RST	M500 Setting Data Check Command
9											*Normal Completion: OFF	
10											RST	M401 Normal Completion
11											*Error Completion: OFF	
12											RST	Y10 Error Completion
13											*Program Error: OFF	
14											RST	M505 Program Error
15											*Control Data Set: OFF	
16											RST	M512 Control Data Set
17											*Program Completion Check: ON	
18											SET	M511 Confirm Program Completion

Write		1	2	3	4	5	6	7	8	9	10	11	12
19	*Process of Program Completion												
20		M511	M519									*Program Completion Check: OFF	
21	(27) Confirm Program Completion	ADPRW Instruction Execution										RST	M511 Confirm Program Completion
22												*Execution Status: OFF	
23												RST	M400 Execution Status
24												*Register Address 4-byte Data: OFF	
25												RST	M513 Register Address 4-Byte Data
26												*Instruction Completion Flag: OFF	
27												RST	M514 Instruction Completion Flag [0]
28												*Instruction Completion Flag: OFF	
29												RST	M515 Instruction Completion Flag [1]
30												*Instruction Completion Flag: OFF	
31												RST	M516 Instruction Completion Flag [2]
32												*Write Normal Completion: OFF	
33												RST	M517 Write Normal Completion
34												*Write Error Completion: OFF	
35												RST	M518 Write Error Completion

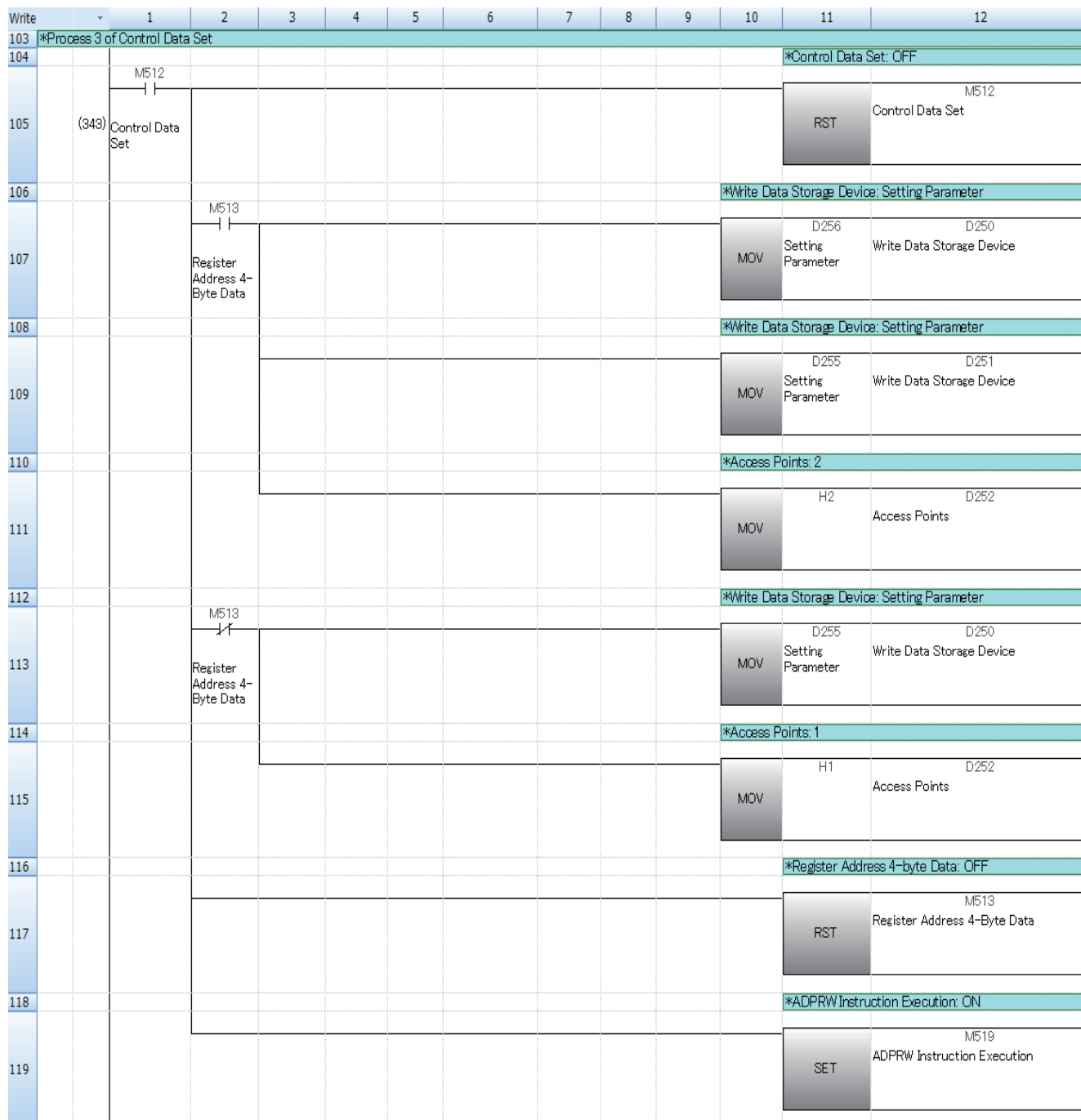




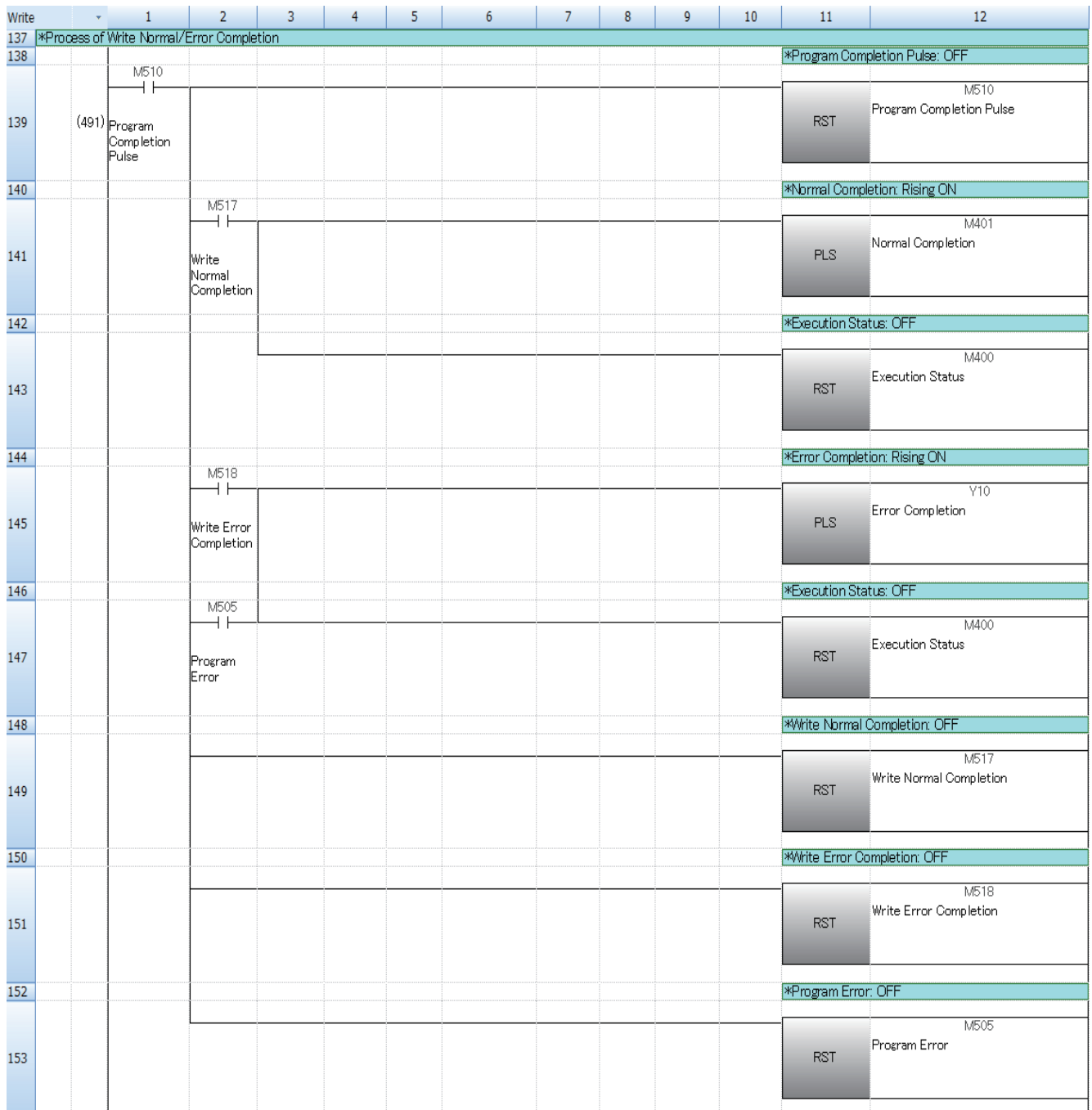
Write		1	2	3	4	5	6	7	8	9	10	11	12
72			=	H2E5	D254 Setting Parameter								
73			=	H2EB	D254 Setting Parameter								
74			=	H40C	D254 Setting Parameter								
75			=	H418	D254 Setting Parameter								
76			<=	H42E	D254 Setting Parameter	<=	D254 Setting Parameter	H432					
77			<=	H518	D254 Setting Parameter	<=	D254 Setting Parameter	H62C					
78			<=	H632	D254 Setting Parameter	<=	D254 Setting Parameter	H63C					

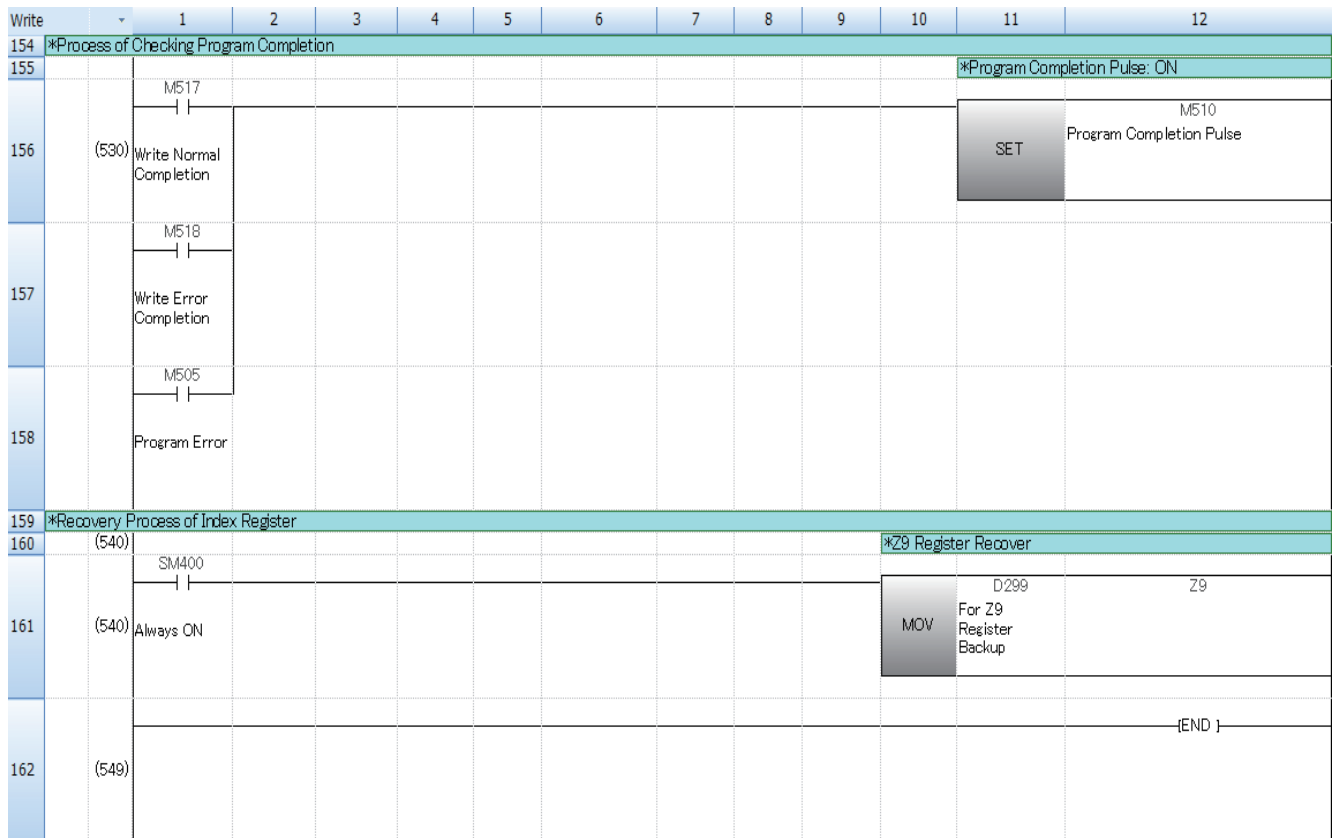
Write		1	2	3	4	5	6	7	8	9	10	11	12
79		*Process 2 of Control Data Set											
80	(205)											FOR	K7
81												*Register Address 4-byte Data: ON	
82	(209)	M512 Control Data Set	<=	H800D29 Setting Parameter	<=	D254 Setting Parameter	H8011Z9					SET	M513 Register Address 4-Byte Data
83			<=	H8016Z9 Setting Parameter	<=	D254 Setting Parameter	H801AZ9						
84			=	H802BZ9 Setting Parameter									
85			=	H802EZ9 Setting Parameter									
86			=	H8031Z9 Setting Parameter									
87			=	H8034Z9 Setting Parameter									
88			=	H803EZ9 Setting Parameter									
89			=	H8042Z9 Setting Parameter									
90			=	H8046Z9 Setting Parameter									
91			=	H8075Z9 Setting Parameter									

Write		1	2	3	4	5	6	7	8	9	10	11	12
92			=	H8078Z9	D254 Setting Parameter								
93			=	H807BZ9	D254 Setting Parameter								
94			=	H807EZ9	D254 Setting Parameter								
95			=	H8096Z9	D254 Setting Parameter								
96			=	H80A1Z9	D254 Setting Parameter								
97			=	H80A4Z9	D254 Setting Parameter								
98			=	H80A7Z9	D254 Setting Parameter								
99			<=	H8178Z9	D254 Setting Parameter	<=	D254 Setting Parameter	H817AZ9					
100			<=	H8218Z9	D254 Setting Parameter	<=	D254 Setting Parameter	H828AZ9					
101											+	H700	Z9
102	(342)												NEXT



Write		1	2	3	4	5	6	7	8	9	10	11	12	
120	*Process of ADPRW Instruction Execution													
121							*Data Write Process							
122	(387)	ADPRW Instruction Execution	M519 ┌┐				ADPRW	D253 Setting Parameter	H10	D254 Setting Parameter	D252 Access Points	D250 Write Data Storage Device	M514 Instruction Completion Flag [0]	
123												*ADPRW Instruction Execution: OFF		
124			M514 ┐┐									RST	M519 ADPRW Instruction Execution	
125												*Write Normal Completion: ON		
126												SET	M517 Write Normal Completion	
127												*Write Error Completion: ON		
128												SET	M518 Write Error Completion	
129												*Error Code Storage		
130						=	K9	SD8503 Serial Communication Operation Mode (CH1)	=	K0	SD8861 Slave Node Address (CH1)	MOV	SD8500 Serial Communication Error Code (CH1)	Error Code D300
131												*Error Code Storage		
132						=	K9	SD8513 Serial Communication Operation Mode (CH2)	=	K0	SD8871 Slave Node Address (CH2)	MOV	SD8510 Serial Communication Error Code (CH2)	Error Code D300
133												*Error Code Storage		
134						=	K9	SD8523 Serial Communication Operation Mode (CH3)	=	K0	SD8881 Slave Node Address (CH3)	MOV	SD8520 Serial Communication Error Code (CH3)	Error Code D300
135												*Error Code Storage		
136						=	K9	SD8533 Serial Communication Operation Mode (CH4)	=	K0	SD8891 Slave Node Address (CH4)	MOV	SD8530 Serial Communication Error Code (CH4)	Error Code D300





REVISIONS

Revision date	Revision	Description
March 2017	A	First edition

Japanese manual number: JY997D74401A

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Manual number: JY997D74501A

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