

MELSEC-L Flexible High-Speed I/O Control Module FB Library Reference Manual

Applicable modules:
LD40PD01

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Reference Manual Revision History

Reference Manual Number	Date	Description
FBM-M205-A	2017/10	First edition

1. Overview

1.1. Overview of the FB Library

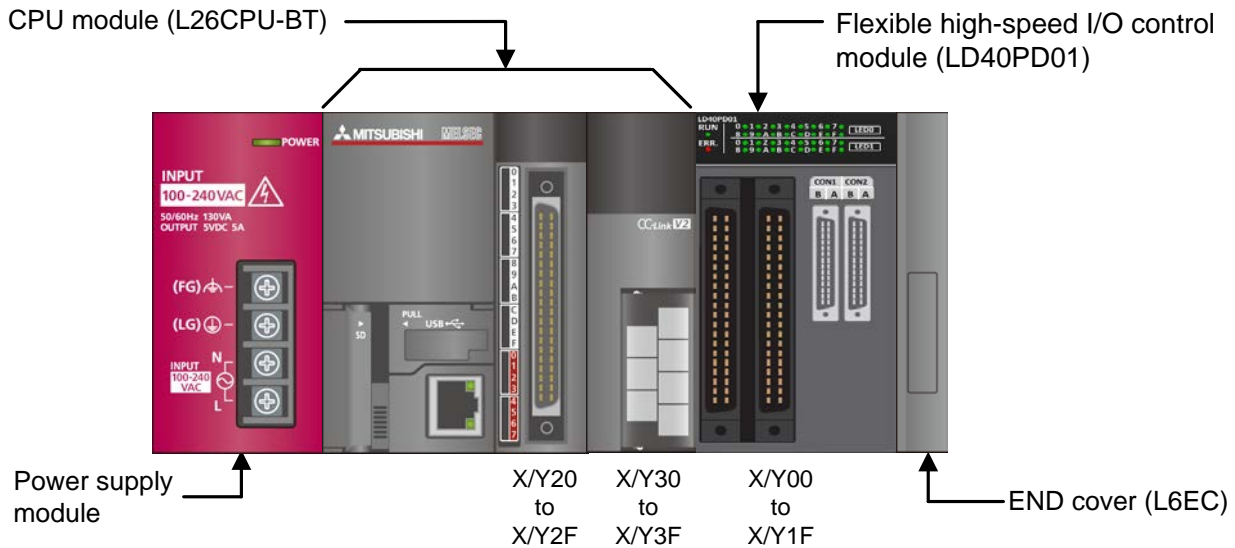
These FB libraries are for using the MELSEC-L flexible high-speed I/O control module LD40PD01 (hereinafter LD40PD01).

1.2. Function of the FB Library

Item	Description
M+LD40PD01_SaveSamplingData	Reads sampling data collected using the logic analyzer function, and saves it in a CSV file.
M+LD40PD01_ContinuousLoggingReq	Issues the continuous logging start/stop request.
M+LD40PD01_ReadContinuousLogging	Reads logging data collected using the continuous logging function and stores it in the specified file register.



1.3. System Configuration Example



1.4. Relevant Manuals

- MELSEC-L Flexible High-Speed I/O Control Module User's Manual
- MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)
- MELSEC-Q/L Programming Manual (Common Instruction)
- GX Works2 Version 1 Operating Manual (Common)
- GX Works2 Version 1 Operating Manual (Simple Project, Function Block)

1.5. Note

Please make sure to read user's manuals for the corresponding products before using the products.

2. Details of the FB Library

2.1. M+LD40PD01_SaveSamplingData (Sampling data save)

FB Name

M+LD40PD01_SaveSamplingData

Function Overview

Item	Description													
Function overview	Reads sampling data collected using the logic analyzer function, and saves it in a CSV file.													
Symbol	<div><div><div>Execution command</div><div>Module start XY address</div><div>Maximum number of save files</div><div>Overwrite save command</div></div><div><div><div>M+LD40PD01_SaveSamplingData</div><div><div>B : FB_EN</div><div>W : iw_Start_IO_No</div><div>W : iw_Max_Number</div><div>B : ib_Over_Write</div></div><div><div>FB_ENO : B</div><div>FB_OK : B</div><div>ob_Making_File : B</div><div>ob_Exceed_Number : B</div><div>FB_ERROR : B</div><div>ERROR_ID : W</div></div></div><div><div>Execution status</div><div>Normal completion</div><div>Creating file</div><div>Maximum number exceeded flag</div><div>Error completion</div><div>Error code</div></div></div></div>													
Applicable hardware and software	Flexible high-speed I/O control module	LD40PD01 * Only flexible high-speed I/O control modules whose first five digits of the product information are "19102" or later are applicable.												
	CPU module	<table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU*1</td></tr></table> *1 Only the model that has the SD memory card slot is applicable.	Series	Model	MELSEC-L Series	LCPU*1								
	Series	Model												
MELSEC-L Series	LCPU*1													
Engineering software	GX Works2 *1 <table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version 1.86Q or later</td></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version 1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version 1.49B or later</td></tr><tr><td>Korean version</td><td>Version 1.49B or later</td></tr></table> *1 For software versions applicable to the modules used, refer to "Relevant manuals".		Language	Software version	Japanese version	Version 1.86Q or later	English version	Version 1.24A or later	Chinese (Simplified) version	Version 1.49B or later	Chinese (Traditional) version	Version 1.49B or later	Korean version	Version 1.49B or later
Language	Software version													
Japanese version	Version 1.86Q or later													
English version	Version 1.24A or later													
Chinese (Simplified) version	Version 1.49B or later													
Chinese (Traditional) version	Version 1.49B or later													
Korean version	Version 1.49B or later													
Programming language	Ladder													



Item	Description
Number of steps	<p>1310 steps (for MELSEC-L series CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>
Function description	<ol style="list-style-type: none"> 1) If FB_EN (Execution command) is on and Sampling data acquired flag (Un\G124) is on, sampling data is acquired from the LD40PD01. The acquired sampling data is sorted in chronological order, and the data is saved in the SD memory card inserted into the CPU module in the CSV format. 2) For the format of the CSV file that this FB creates, refer to "Appendix 2 CSV File Format for Sampling Data Save (CSV File) FB". 3) If FB_EN (Execution command) is on, this FB starts the save processing of sampling data every time Sampling data acquired flag (Un\G124) turns on. 4) Multiple scans are required to complete the save processing of sampling data. After sampling data save processing is completed, FB_OK (Normal completion) is turned on. 5) If Sampling data acquired flag (Un\G124) is turned off while sampling data is being saved, FB_ERROR (Error completion) turns on and the processing of the FB is interrupted. The error code 32 (Decimal) is stored in ERROR_ID (Error code). An incomplete CSV file is saved in the SD memory card. Discard the incomplete CSV file. 6) The format for the file name that the FB saves in an SD memory card is "FLX" + "second and third digits of the start I/O number of the LD40PD01 that is expressed in 4 digits" + "serial number (3 digits)" + ".CSV". The maximum serial number depends on iw_Max_Number (Maximum number of saved files). If FB_EN (Execution command) is turned off, the serial number is reset and the serial number starts from 1 again. If the start I/O number of the LD40PD01 is H0450 and iw_Max_Number (Maximum number of save files) is 30, the file name of the 6th file created by this FB will be "FLX45006.CSV". 7) When this FB creates a CSV file in an SD memory card and another CSV file that already exists in the SD memory card has the same name as that of the newly created file, the existing file is replaced with the newly created file. Save the existing file if necessary. 8) If ib_Over_Write (Overwrite save command) is on and the number of files that this FB has saved in an SD memory card exceeds iw_Max_Number (Maximum number of save files), the serial number returns back to 1 and the save processing of sampling data continues. 9) If ib_Over_Write (Overwrite save command) is off and the number of files that this FB has saved in an SD memory card reaches iw_Max_Number (Maximum number of save files), the save processing of sampling data stops.



Item	Description
Function description	<p>10) If the number of files that this FB has saved in an SD memory card reaches iw_Max_Number (Maximum number of save files), ob_Exceed_Number (Maximum number exceeded flag) turns on regardless of the on or off state of ib_Over_Write (Overwrite save command).</p> <p>11) If an incorrect value is set in iw_Max_Number (Maximum number of save files), FB_ERROR (Error completion) turns on and the processing of the FB is interrupted. The error code 11 (Decimal) is stored in ERROR_ID (Error code).</p> <p>12) If SM601 (Memory card protect flag) is on while sampling data is being saved, the sampling data cannot be saved because it cannot be written to the SD memory card. In this case, FB_ERROR (Error completion) turns on, and the error code 31 (Decimal) is stored in ERROR_ID (Error code).</p> <p>13) When the SD memory card inserted into the CPU module does not have enough capacity or when the number of files to be created exceeds the number of storable files *1, a CPU error *2 occurs.</p> <p>14) When this FB is executed without the SD memory card inserted into the CPU module, FB_ERROR (Error completion) turns on and error code 33 (Decimal) is stored in ERROR_ID (Error code).</p> <p>15) If SM600 (Memory card enable flag) is off while sampling data is being saved, the sampling data cannot be saved because it cannot be written to the SD memory card. In this case, FB_ERROR (Error completion) turns on, and the error code 35 (Decimal) is stored in ERROR_ID (Error code).</p> <p>16) If SM606 (SD memory card forced disable instruction) is on while sampling data is being saved, the sampling data cannot be saved because the SP.FWRITE is not processed. In this case, FB_ERROR (Error completion) turns on, and the error code 36 (Decimal) is stored in ERROR_ID (Error code).</p> <p>17) When processes for accessing the SD memory card, such as the data logging function of the LCPU, are executed simultaneously, timeout may occur. In this case, FB_ERROR (Error completion) turns on, and the error code 40 (Decimal) is stored in ERROR_ID (Error code).</p> <p>*1: For information on the capacity of the SD memory card and number of storable files, refer to "MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)".</p> <p>*2: Setting the operation status of the CPU module (RUN/STOP) when an access error to SD memory card occurs is available with parameters.</p>
Compiling method	Macro type



Item	Description
Restrictions and precautions	<ol style="list-style-type: none"> 1) This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) This FB cannot be used in an interrupt program. 3) Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (Execution command) cannot be turned off and the normal operation cannot be performed. Always use this FB in programs that can turn off FB_EN (Execution command). 4) This FB uses index registers Z8 and Z9. When using an interrupt program, do not use the corresponding index register. 5) In this FB, the sampling data can be saved only in the SD memory card. 6) This FB uses the SP.FWRITE command. Thus, when an execution error of the SP.FWRITE command occurs, a CPU error occurs. 7) When two or more of these FBs are used, implement an interlock to prevent them from being executed simultaneously. 8) This FB requires the configuration of the ladder for every input label. 9) When determining iw_Max_Number (Maximum number of save files), pay attention to the capacity of the SD memory card and the number of storable files. If the capacity of the SD memory card or the number of storable files is exceeded when this FB is executed, a CPU error occurs. For information on the capacity of the SD memory card and the number of storable files, refer to "MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)". 10) To operate the flexible high-speed I/O control module, a hardware logic must be set according to each connected device and system. For the hardware logic setting method, refer to "MELSEC-L Flexible High-Speed I/O Control Module User's Manual".
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 FB Library Application Examples".



Item	Description
Timing chart	<p>[When operation completes without error]</p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Sampling data acquired flag (Un\G124)</p> <p>ob_Making_File (Creating file)</p> <p>FB_OK (Normal completion)</p> <p>ob_Exceed_Number (Maximum number exceeded flag)</p> <p>FB_ERROR (Error completion)</p> <p>ERROR_ID (Error code) 0</p>
	<p>[When an error occurs]</p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Sampling data acquired flag (Un\G124)</p> <p>ob_Making_File (Creating file)</p> <p>FB_OK (Normal completion)</p> <p>ob_Exceed_Number (Maximum number exceeded flag)</p> <p>FB_ERROR (Error completion)</p> <p>ERROR_ID (Error code) 0 Error code 0</p> <p>* The above operation is performed when the error code 32 (Sampling data acquired flag is turned off while sampling data is being saved) occurs. Depending on the error that occurred, the FB_ERROR (Error flag) ON timing differs.</p>
Relevant manuals	<ul style="list-style-type: none">• MELSEC-L Flexible High-Speed I/O Control Module User's Manual• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)• MELSEC-Q/L Programming Manual (Common Instruction)• GX Works2 Version 1 Operating Manual (Common)• GX Works2 Version 1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
11 (Decimal)	The setting value is outside the range of the maximum number of save files. iw_Max_Number (Maximum number of save files) is not within the range of 1 to 999.	Review and correct the setting and then execute the FB again.
31 (Decimal)	No data can be written to the SD memory card because SM601 (Memory card protect flag) is on (Write prohibited).	Execute the FB again after turning off (Write enable) the protect switch of the SD memory card and confirming that SM601 (Memory card protect flag) is off.
32 (Decimal)	Processing is interrupted because Sampling data acquired flag (Un\G124) was turned off while sampling data was being saved. An incomplete CSV file is saved in the SD memory card.	Request a trigger start again after turning off FB_OK (Normal completion). Also, discard the incomplete CSV file.
33 (Decimal)	This FB is executed with no SD memory card inserted into the CPU module.	Execute the FB again after inserting the SD memory card where the target CSV file is saved into the CPU module.
35 (Decimal)	The SD memory card cannot be accessed because SM600 (Memory card enable flag) is off (disabled).	Enable the SD memory card, and then execute the FB again.
36 (Decimal)	The SD memory card cannot be accessed because SM606 (SD memory card forced disable instruction) is on. When SM606 (SD memory card forced disable instruction) is turned on while sampling data is being saved, an incomplete CSV file is saved in the SD memory card.	Execute the FB again after turning off SM606 (SD memory card forced disable instruction) and confirming that SM607 (SD memory card use force stop condition flag) is off. Also, discard the incomplete CSV file.
40 (Decimal)	The SD memory card is frequently accessed from programs in addition to this FB, and a timeout has occurred in the sampling data write processing.	Reduce the frequency of the access processing to the SD memory card.
Error codes other than the above	Error codes related to the SP.FWRITE instruction executed when logging data is written to an SD memory card	For details on the error code that has occurred, refer to the description of the SP.FWRITE instruction (MELSEC-Q/L Programming Manual (Common Instruction)).



Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	On, off	On: The FB is activated. Off: The FB is not activated.
Module start XY address	iw_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the start XY address (in hexadecimal) where the LD40PD01 is connected. (For example, enter H10 for X10.)
Maximum number of save files	iw_Max_Number	Word	1 to 999	Specify the maximum number of CSV files this FB saves.
Overwrite save command	ib_Over_Write	Bit	On, off	Specify whether to overwrite a CSV file with the youngest serial number when the number of CSV files saved by this FB exceeds the maximum number of save files. (On: Serial No. 1 is overwritten. Off: Save processing of sampling data stops.)



●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	Off	On: Execution command is on. Off: Execution command is off.
Normal completion	FB_OK	Bit	Off	The on state indicates that the file save is completed. Restarting the logic analyzer function turns off this label.
Creating file	ob_Making_File	Bit	Off	The on state indicates that a file is being created.
Maximum number exceeded flag	ob_Exceed_Number	Bit	Off	The on state indicates that the number of CSV files saved by this FB has reached the maximum number of save files.
Error completion	FB_ERROR	Bit	Off	The on state indicates that an error has occurred.
Error code	ERROR_ID	Word	0	The error code that occurred in the FB is returned.

FB Version Upgrade History

Version	Date	Description
1.00A	2017/10	First edition

Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Please make sure to read user's manuals for the corresponding products before using the products.



2.2. M+LD40PD01_ContinuousLoggingReq (Continuous logging start/stop request)

FB Name

M+LD40PD01_ContinuousLoggingReq

Function Overview

Item	Description												
Function overview	Issues the continuous logging start/stop request.												
Symbol	<div><div><div>Execution command</div><div>Module start XY address</div><div>Continuous logging start/stop request</div><div>Continuous logging cycle setting</div></div><div><div><div>M+LD40PD01_ContinuousLoggingReq</div><div><div>B : FB_EN</div><div>W : iw_Start_IO_No</div><div>B : ib_Log_Enable</div><div>W : iw_Log_Cycle</div></div><div><div>FB_ENO : B</div><div>FB_OK : B</div><div>ow_LogStatus_Mon : W</div><div>ow_LogCycle_Mon : W</div><div>FB_ERROR : B</div><div>ERROR_ID : W</div></div></div><div><div>Execution status</div><div>Normal completion</div><div>Continuous logging status monitor</div><div>Continuous logging cycle monitor</div><div>Error completion</div><div>Error code</div></div></div></div>												
Applicable hardware and software	Flexible high-speed I/O control module	LD40PD01 * Only flexible high-speed I/O control modules whose first five digits of the product information are "19102" or later are applicable.											
	CPU module	<table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table>	Series	Model	MELSEC-L Series	LCPU							
	Series	Model											
MELSEC-L Series	LCPU												
Engineering software	<div>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version 1.86Q or later</td></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version 1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version 1.49B or later</td></tr><tr><td>Korean version</td><td>Version 1.49B or later</td></tr></table> *1 For software versions applicable to the modules used, refer to "Relevant manuals".</div>	Language	Software version	Japanese version	Version 1.86Q or later	English version	Version 1.24A or later	Chinese (Simplified) version	Version 1.49B or later	Chinese (Traditional) version	Version 1.49B or later	Korean version	Version 1.49B or later
Language	Software version												
Japanese version	Version 1.86Q or later												
English version	Version 1.24A or later												
Chinese (Simplified) version	Version 1.49B or later												
Chinese (Traditional) version	Version 1.49B or later												
Korean version	Version 1.49B or later												
Programming language	Ladder												

Item	Description
Number of steps	<p>305 steps (for MELSEC-L series CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>
Function description	<ol style="list-style-type: none"> 1) This FB outputs Continuous logging status monitor (Un\G15010) and Continuous logging cycle monitor (Un\G15011) values when FB_EN (Execution command) is turned on. 2) After FB_EN (Execution command) is turned on, the continuous logging starts by turning ib_Log_Enable (Continuous logging start/stop request) from "Off: Stop" to "On: Start". The continuous logging function stops by turning ib_Log_Enable (Continuous logging start/stop request) from "On: Start" to "Off: Stop". 3) After FB_EN (Execution command) is turned on, iw_Log_Cycle (Continuous logging cycle setting) is reflected by turning ib_Log_Enable (Continuous logging start/stop request) from "Off: Stop" to "On: Start". Even when a setting value is changed during the continuous logging, the setting is not reflected. To reflect the setting, turn ib_Log_Enable (Continuous logging start/stop request) to "Off: Stop" and "On: Start" again. 4) When a continuous logging start/stop request is issued while the hardware logic is stopped, FB_ERROR (Error completion) turns on and the processing of the FB is interrupted. The error code 22 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 5) When a setting value other than 1 to 3 is set to iw_Log_Cycle (Continuous logging cycle setting), FB_ERROR (Error completion) turns on and the processing of the FB is interrupted. The error code 21 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 6) If the continuous logging is started when the continuous logging status is disabled, FB_ERROR (Error completion) turns on and the processing of the FB is interrupted. The error code 22 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type



Item	Description
Restrictions and precautions	<ol style="list-style-type: none"> 1) This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) This FB cannot be used in an interrupt program. 3) Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (Execution command) cannot be turned off and the normal operation cannot be performed. Always use this FB in programs that can turn off FB_EN (Execution command). 4) This FB uses index registers Z8 and Z9. When using an interrupt program, do not use the corresponding index register. 5) This FB requires the configuration of the ladder for every input label. To operate the flexible high-speed I/O control module, a hardware logic must be set according to each connected device and system. For the hardware logic setting method, refer to "MELSEC-L Flexible High-Speed I/O Control Module User's Manual."
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 FB Library Application Examples".



Item	Description
Timing chart	<p>[When operation completes without error]</p> <p>[When an error occurs]</p> <p>* The above operation is performed when the error code 22 occurs.</p>
Relevant manuals	<ul style="list-style-type: none"> • MELSEC-L Flexible High-Speed I/O Control Module User's Manual • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) • GX Works2 Version 1 Operating Manual (Common) • GX Works2 Version 1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
21 (Decimal)	The setting value is outside the range of the continuous logging cycle. Set a value within 0 to 3 in iw_Log_Cycle (Continuous logging cycle setting).	Review and correct the setting and then execute the FB again.
22 (Decimal)	<p>When the continuous logging execution status was disabled, the continuous logging start request was issued.</p> <p>In any of the following cases, the continuous logging function cannot be performed.</p> <ul style="list-style-type: none">• Hardware logic area (High speed area) (Un\G1000 to Un\G1029) is assigned to an item of the user address setting in the hardware logic.• The SSI encoder block is used for the hardware logic.• The logic analyzer function is in progress.• The simulation function is in progress.• The hardware logic control is stopped.	Review and correct the setting and program, and then execute the FB again.



Labels

● Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	On, off	On: The FB is activated. Off: The FB is not activated.
Module start XY address	iw_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the start XY address (in hexadecimal) where the LD40PD01 is connected. (For example, enter H10 for X10.)
Continuous logging start/stop request	ib_Log_Enable	Bit	Off: Stop On: Start	Off: The continuous logging is stopped. On: The continuous logging is started.
Continuous logging cycle setting	iw_Log_Cycle	Word	1: 10 μ s 2: 100 μ s 3: 1000 μ s	Set the continuous logging cycle.



●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	Off	On: Execution command is on. Off: Execution command is off.
Normal completion	FB_OK	Bit	Off	The on state indicates that continuous logging start or stop request has been completed.
Continuous logging status monitor	ow_LogStatus_Mon	Word	Off	The continuous logging status is stored. 0: Disabled 1: Start request waiting 2: In progress
Continuous logging cycle monitor	ow_LogCycle_Mon	Word	Off	The continuous logging cycle (in units of μ s) is stored.
Error completion	FB_ERROR	Bit	Off	The on state indicates that an error has occurred.
Error code	ERROR_ID	Word	0	The error code that occurred in the FB is returned.

FB Version Upgrade History

Version	Date	Description
1.00A	2017/10	First edition

Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Please make sure to read user's manuals for the corresponding products before using the products.



2.3. M+LD40PD01_ReadContinuousLogging (Continuous logging data read)

FB Name

M+LD40PD01_ReadContinuousLogging

Function Overview

Item	Description													
Function overview	Reads logging data collected using the continuous logging function and stores it in the specified file register.													
Symbol	<div><div><div>Execution command</div><div>Module start XY address</div><div>File register start address</div><div>Number of read points</div></div><div><div><div>M+LD40PD01_ReadContinuousLogging</div><div><div>B : FB_EN</div><div>W : iw_Start_IO_No</div><div>D : id_Data_Addr</div><div>W : iw_Read_Points</div></div><div><div>FB_ENO : B</div><div>FB_OK : B</div><div>od_CompLogPoints : D</div><div>FB_ERROR : B</div><div>ERROR_ID : W</div></div></div><div><div>Execution status</div><div>Normal completion</div><div>Number of read completed logging data points</div><div>Error completion</div><div>Error code</div></div></div></div>													
Applicable hardware and software	Flexible high-speed I/O control module	LD40PD01 * Only flexible high-speed I/O control modules whose first five digits of the product information are "19102" or later are applicable.												
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Language	Software version													
Japanese version	Version 1.86Q or later													
English version	Version 1.24A or later													
Chinese (Simplified) version	Version 1.49B or later													
Chinese (Traditional) version	Version 1.49B or later													
Korean version	Version 1.49B or later													
Programming language	Ladder													

Item	Description
Number of steps	<p>437 steps (for MELSEC-L series CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>
Function description	<ol style="list-style-type: none"> 1) This FB reads the continuous logging data when FB_EN (Execution command) is turned on. 2) This FB turns on FB_ENO (Execution status) while FB_EN (Execution command) is on. 3) Logging data is continuously transferred to the file register of the CPU module in the storage order of the logging data (A side → B side → A side →...). When the total of read logging data points reaches the value of iw_Read_Points (Number of read points) × 5120 points, the data transfer ends and FB_OK (Normal completion) turns on. 4) At the first execution of this FB, both of Continuous logging data A side storage flag and Continuous logging data B side storage flag are turned off. After the off of both flags, at the first turning on of either Continuous logging data A side storage flag or Continuous logging data B side storage flag, the logging data read starts. 5) If both Continuous logging data A side storage flag and Continuous logging data B side storage flag are turned on during the execution of this FB, FB_ERROR (Error completion) turns on and the processing of the FB is interrupted. The error code 24 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 6) Set the number of read points of the continuous logging data in increments of 5120 points. 7) If the setting value of the number of iw_Read_Points (Number of read points) is out of the range, FB_ERROR (Error completion) turns on and the processing of the FB is interrupted. The error code 23 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type



Item	Description
Restrictions and precautions	<ol style="list-style-type: none"> 1) When using this FB, set ZZ in the index modification setting of the ZR device from PLC parameters. 2) This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 3) When two or more of these FBs are used, set the start address and the number of read points not to overlap file register areas. 4) This FB uses index registers Z6, Z7, Z8 and Z9. When using an interrupt program, do not use the corresponding index register. 5) This FB requires the configuration of the ladder for every input label. 6) When saving of the logging data is attempted to the file register areas other than the ones reserved by the file register setting of the CPU parameters, an operation error (4101) occurs. Set the start address and the number of read points so that the logging data is saved in the reserved file register areas. 7) Arrange this FB in the programs such as a scan execution type program and fixed scan execution type program that are executed periodically. The program including this FB must satisfy the following condition. When this condition is not satisfied, both of Continuous logging data A side storage flag and Continuous logging data B side storage flag may be turned on and the FB may be completed with an error. Condition: Execution interval of the FB (μs) ≤ 5120 (points) \times "Continuous logging cycle" - 1100 (μs) 8) To operate the flexible high-speed I/O control module, a hardware logic must be set according to each connected device and system. For the hardware logic setting method, refer to "MELSEC-L Flexible High-Speed I/O Control Module User's Manual".
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 FB Library Application Examples".



Error Codes

●Error code list

Error code	Description	Action
23 (Decimal)	The setting value is outside the range of the read points. A value other than 1 to 76 is set in iw_Read_Points (Number of read points).	Review and correct the setting and then execute the FB again.
24 (Decimal)	<p>Both Continuous logging data A side storage flag and Continuous logging data B side storage flag are turned on.</p> <p>Create a program so that the execution interval of the FB satisfies the following condition.</p> <p>(Condition)</p> <p>Execution interval of the FB (μs) \leq $5,120 \text{ (points)} \times \text{"Continuous logging cycle" (}\mu\text{s)} - 1,100 \text{ (}\mu\text{s)}$</p>	Review and correct the program and then execute the FB again.



Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	On, off	On: The FB is activated. Off: The FB is not activated.
Module start XY address	iw_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the start XY address (in hexadecimal) where the LD40PD01 is connected. (For example, enter H10 for X10.)
File register start address	id_Data_Addr	Double Word	Effective device range: The effective range depends on the file register setting of the CPU parameter.	Specify the start address of the file register (ZR).
Number of read points	iw_Read_Points	Word	1 to 76	Specify the number of read points of the continuous logging data in increments of 5120 points. * When iw_Read_Points (Number of read points) is 1, the total logging data is 5,120 points. When iw_Read_Points (Number of read points) is 76, the total logging data is 389,120 points.



●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	Off	On: Execution command is on. Off: Execution command is off.
Normal completion	FB_OK	Bit	Off	The on state indicates that continuous logging start or stop request has been completed.
Number of read completed logging data points	od_CompLogPoints	Double Word	0	The number of read completed logging data points is returned.
Error flag	FB_ERROR	Bit	Off	The on state indicates that an error has occurred.
Error completion	ERROR_ID	Word	0	The error code that occurred in the FB is returned.

FB Version Upgrade History

Version	Date	Description
1.00A	2017/10	First edition

Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

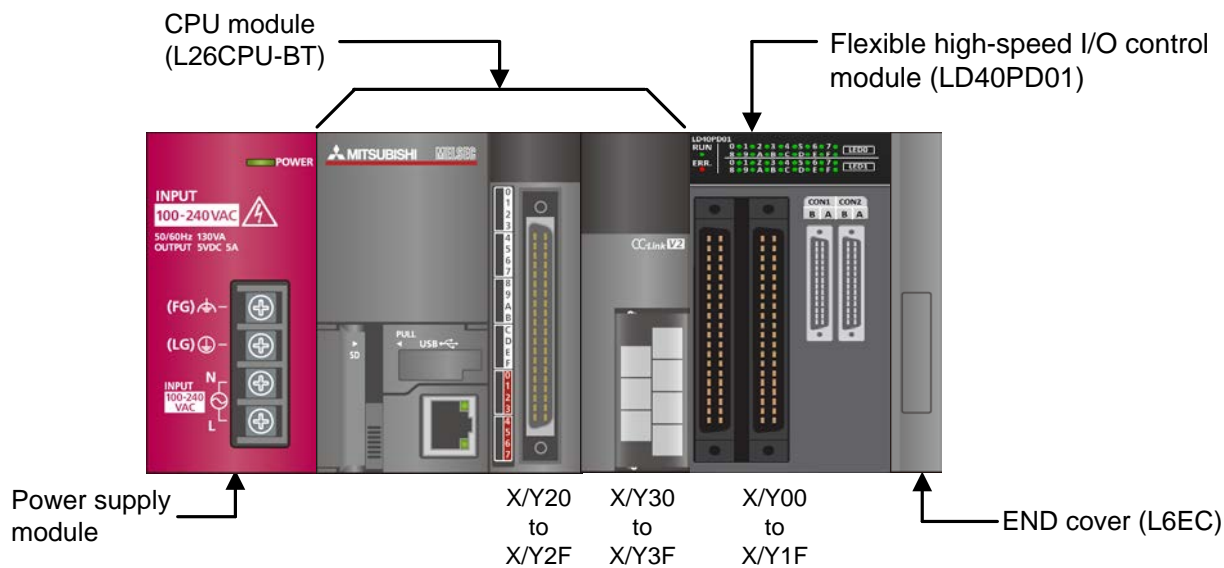
Please make sure to read user's manuals for the corresponding products before using the products.



Appendix 1. FB Library Application Examples

LD40PD01 FB application examples are as follows.

1) System configuration



Reminder

- The configuration of the ladder is required for every input label. If not set, the values will be unspecified.
- Abbreviations may be used in the label comments due to the limitation on the number of the characters to display in GX Works2.
- When using the continuous logging function, set ZZ in the index modification setting of the ZR device from PLC parameters.

2) Global label setting

None

3) Application example setting

a) Common setting

Input and output item	Value	Description
Module start XY address	0	Specify the start XY address where the LD40PD01 is connected.

4) List of devices

a) External input (command)

Device	FB name	Application (ON details)
M0	M+LD40PD01_SaveSamplingData	Sampling data save request
M1		Overwrite save command request
M10	M+LD40PD01_ContinuousLoggingReq	Cnt log start/stop req FB exe
M11		Cnt log start/stop request
M20	M+LD40PD01_ReadContinuousLogging	Continuous log read FB exe com

b) External output (check)

Device	FB name	Application (ON details)
M2	M+LD40PD01_SaveSamplingData	Samp data save FB prep com
M3		Sampling data save complete
M4		Creating CSV file
M5		Maximum number exceeded
F0		Samp data save req FB err com
D0		Samp data save req FB err code
M12	M+LD40PD01_ContinuousLoggingReq	Cnt log strt/stp req FB prep com
M13		Cnt log start/stop req FB com
D10		Cnt log strt/stp req FB log stts
D11		Cnt log strt/stp req FB log cyc
F1		Cnt log strt/stp req FB err com
D12		Cnt log strt/stp req FB err code
M21	M+ LD40PD01_ReadContinuousLogging	Cnt log data read FB prep com
M22		Cnt log data read FB com
D30		Cnt log data read comp points
F2		Cnt log data read FB err com
D40		Cnt log data read FB err code

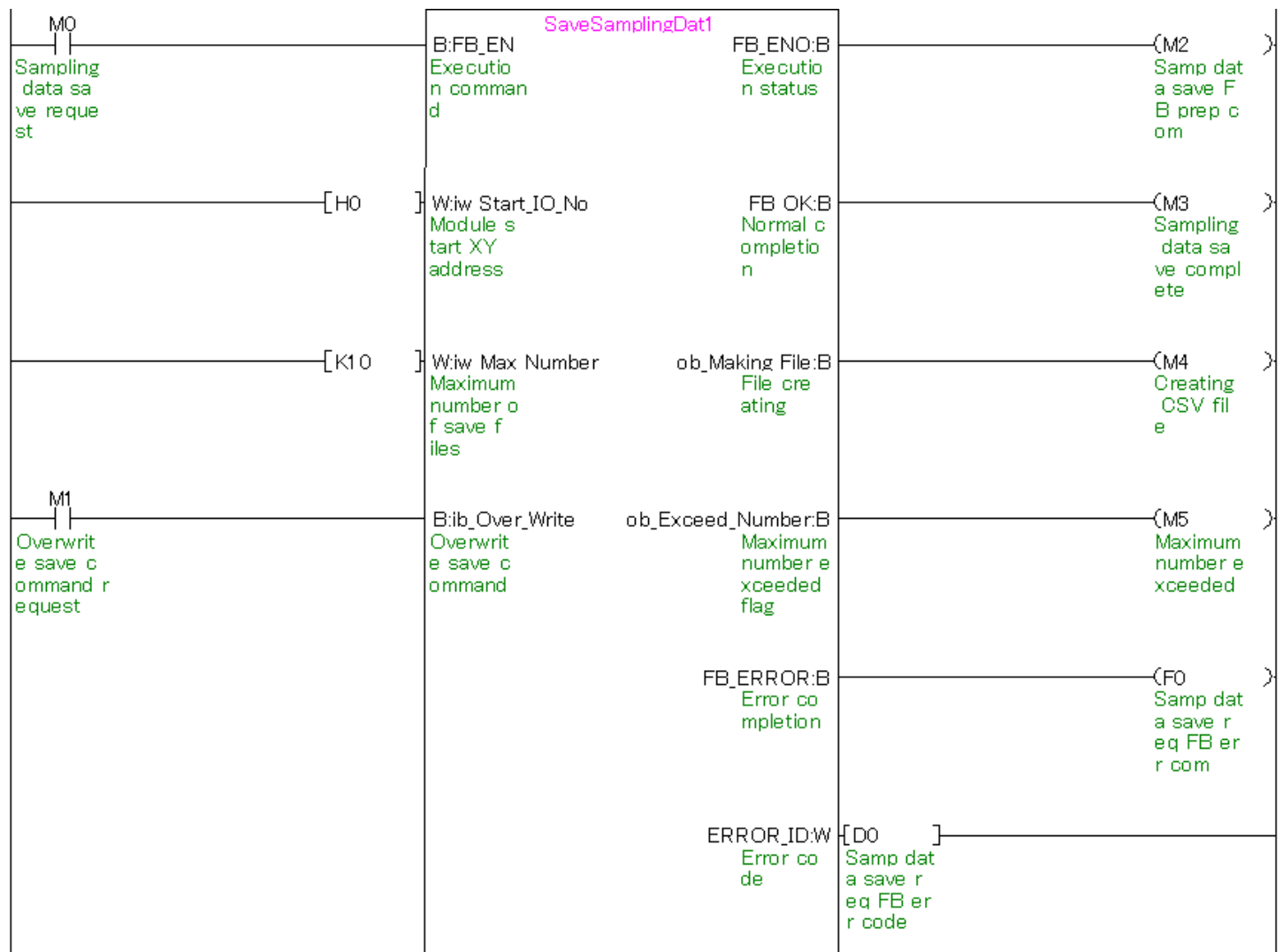


5) Programs

M+LD40PD01_SaveSamplingData (Sampling data save)

Label name	Setting value	Description
iw_Start_IO_No	H0	Specifies 0H for the start XY address where the M+LD40PD01 is connected.
iw_Max_Number	K10	Sets 10 for the maximum number of CSV files to be saved.
ib_Over_Write	On/off	Specifies whether to overwrite the CSV file to which the sampling data is written.

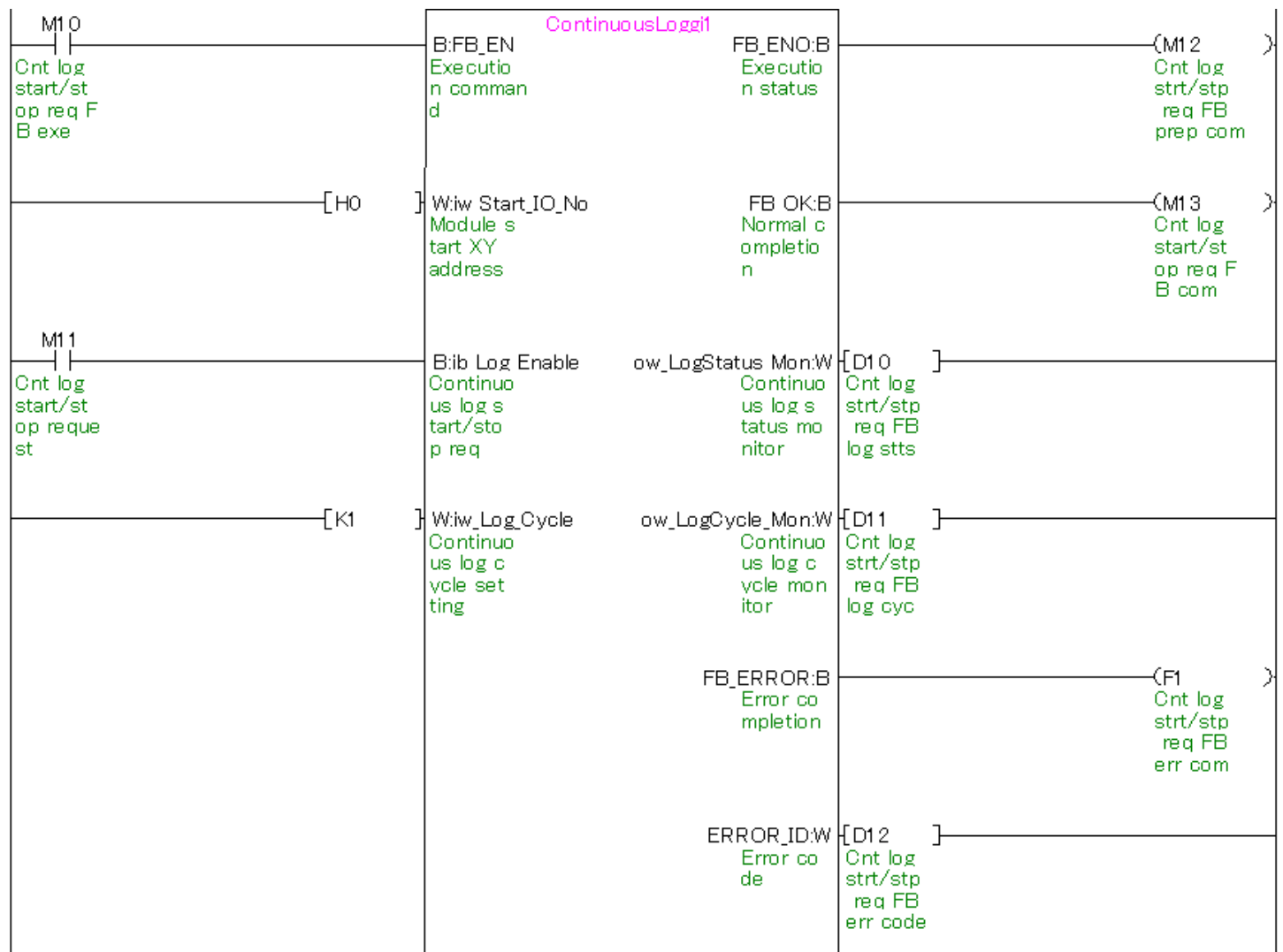
Turning on M0 saves the sampling data in a file. When the maximum number of CSV files to be saved is exceeded or when M1 is on, the data is overwritten to the existing CSV file .



M+LD40PD01_ContinuousLoggingReq (Continuous logging start/stop request)

Label name	Setting value	Description
iw_Start_IO_No	H0	Specifies 0H for the start XY address where the M+LD40PD01 is connected.
ib_Log_Enable	On/off	Issues a continuous logging start/stop request.
iw_Log_Cycle	K1	Specifies 10μs for Continuous logging cycle setting.

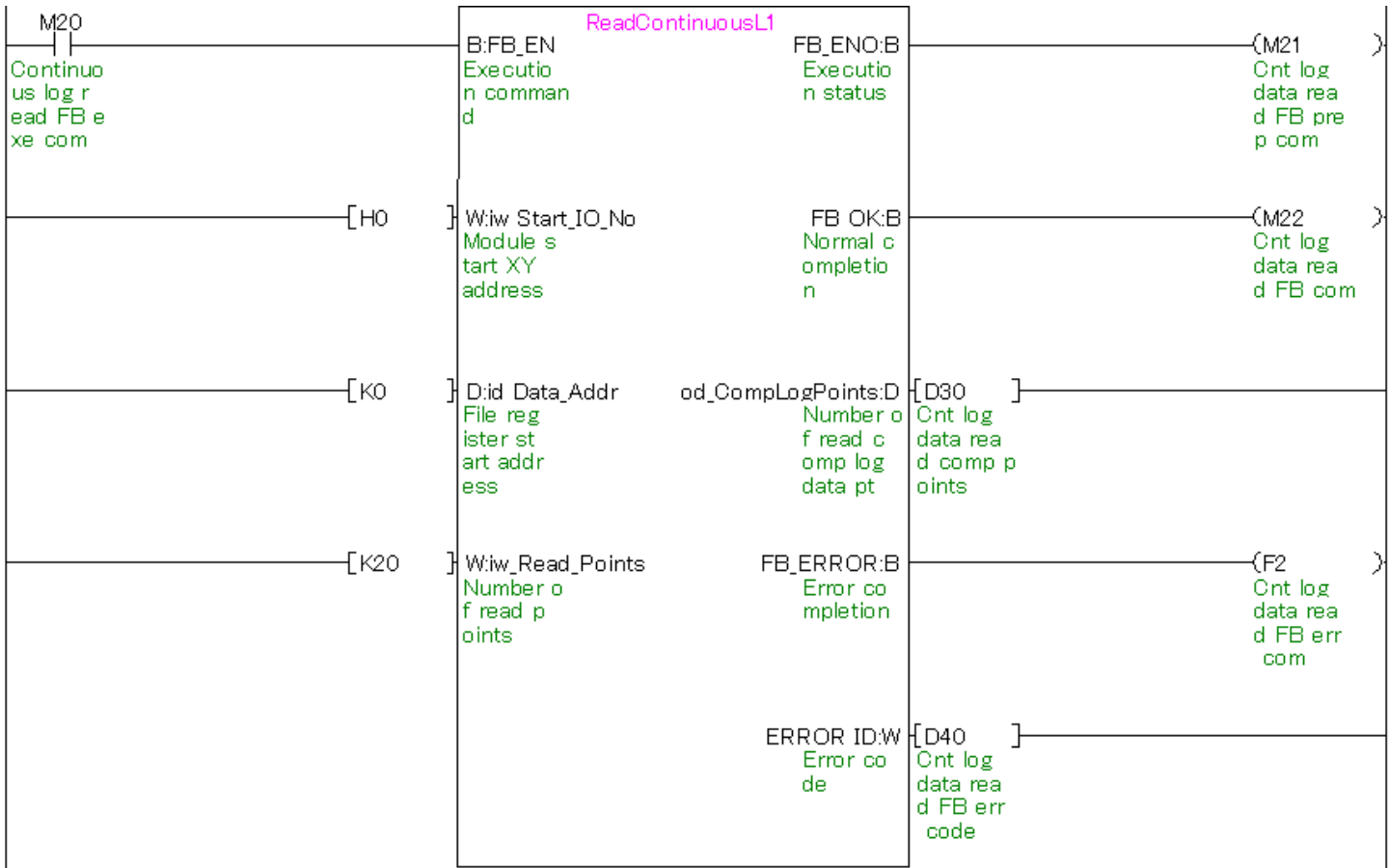
When M11 is turned on after turning on M10, Continuous logging start request is issued.



M+LD40PD01_ReadContinuousLogging (Continuous logging data read)

Label name	Setting value	Description
iw_Start_IO_No	H0	Specifies 0H for the start XY address where the M+LD40PD01 is connected.
id_Data_Addr	K0	Specifies ZR0 for the start address of the save destination file register (ZR).
iw_Read_Points	K20	Specifies 102,400 points for the number of logging data points.

Turning on M20 reads the logging data to the file register (ZR0 to ZR102399).



Appendix 2. CSV File Format for Sampling Data Save (CSV File) FB

This appendix describes the CSV file format for output by M+LD40PD01_SaveSamplingData (Sampling data save). (A CSV file has an extension ".csv" and can be opened in general applications such as Microsoft Excel and Notepad.)

The CSV file format specifications of sampling data are as follows.

Item	Character
Delimiter	Comma (,)
Linefeed code	CRLF (0x0D,0x0A)

[LOGGING]	LD40PD01_1	2	3				
DATETIME[YYYY/MM/DD hh:mm:ss	us]	INDEX	BIT[1;0]	BIT[1;0]	LONG[DEC.0]	BIT[1;0]	TRIGGER[*]
TIME	usec	INDEX	IN 0	OUT 5_DIF	Counter0 Counter_Timer_0 Count Value	Counter0 Counter_Timer_1 STOP	Trigger
2017/03/03 15:04:00	999600	1	0	0	2222	0	
2017/03/03 15:04:00	999700	2	0	0	-2770	0	
2017/03/03 15:04:00	999800	3	0	0	-9791	0	
2017/03/03 15:04:00	999900	4	0	0	-9781	0	
2017/03/03 15:04:01	000000	5	0	0	6619	0	*
2017/03/03 15:04:01	000100	6	0	0	6627	0	
2017/03/03 15:04:01	000200	7	0	0	6637	0	
2017/03/03 15:04:01	000300	8	0	0	6646	0	
2017/03/03 15:04:01	000400	9	1	1	6658	0	
2017/03/03 15:04:01	000500	10	0	0	6664	1	
	to	to	to	to	to	to	

■1st line

[LOGGING],LD40PD01_1,2,3,4 is output (fixed output).

■2nd line

In the 1st to 3rd rows, DATETIME[YYYY/MM/DD hh:mm:ss,us],INDEX is output (fixed output).

In the 4th and subsequent rows, the sampling data type is output.

Bit	Word (unsigned) Double Word (unsigned)	Word (signed) Double Word (signed)
BIT[1;0]	ULONG[DEC.0]	LONG[DEC.0]

Also, in the last row of the 2nd line, TRIGGER[*] is output (fixed output).



■3rd line

In the 1st to 3rd rows, TIME,usec,INDEX is output (fixed output).

In the 4th and subsequent rows, the name of each input terminal is output.

I/O terminal	Output detail
<ul style="list-style-type: none"> Input terminal of the hardware logic outline window Output terminal of the hardware logic outline window 	Block name
<ul style="list-style-type: none"> Input terminal of the multi function counter block detail window Output terminal of the multi function counter block detail window 	Multi function counter name Block name Terminal name

In the last row, Trigger is output (fixed output).

For terminal names, refer to “MELSEC-L Flexible High-Speed I/O Control Module User's Manual”.

■4th to 2051 lines

- In the 1st and 2nd rows, the time when sampling data is acquired is output in chronological order (per sampling cycle). In the 1st row, year/month/day hour:minute:second is output and in the 2nd row, time after milliseconds is output in increments of μ seconds.
- In the 3rd and subsequent rows, the acquired data is output in chronological order (per sampling cycle).

Window name	Block name		Terminal	Data type	Acquired data
Hardware logic outline window	External input block	IN0 to INB	Output terminal	BIT[1;0]	Indicates the High/Low status of the terminal. 0: Low status 1: High status
		OUT 0 to OUT 7	Input terminal	BIT[1;0]	
	External output block	OUT 0_DIF to OUT 5_DIF	Input terminal	BIT[1;0]	
Multi function counter block detail window	Counter timer block	Counter_Timer_0 to Counter_Timer_7	CountValue terminal	ULONG[DEC.0]/LONG[DEC.0]	Count value
			UP terminal	BIT[1;0]	Indicates the internal operation status in the counter timer block for the input terminal. 0: Low status 1: High status
			DOWN terminal	BIT[1;0]	
			PRESET terminal	BIT[1;0]	
			RUN terminal	BIT[1;0]	
			STOP terminal	BIT[1;0]	

Also, in the last row of the line where a trigger is detected, [*] is output (fixed output).

