

Mitsubishi Programmable Controller

**MELSEC iQ-R**  
series

**RD77GF Preventive Maintenance FB Reference**

---



# CONTENTS

<b>CHAPTER 1 OVERVIEW</b>	<b>3</b>
1.1 Introduction	3
1.2 Applicable Hardware and Software	3
1.3 System Configuration	3
1.4 Relevant Manuals	4
1.5 Notes	4
<b>CHAPTER 2 FUNCTION DESCRIPTION</b>	<b>5</b>
2.1 Sample Program	5
2.2 Diagnostic Data Items to be Collected	6
2.3 Sample Program Configuration	7
2.4 Startup Procedure	8
2.5 Preparation for the Database	8
2.6 Execution Method	8
2.7 Program Details	9
Database creation program (Sample/CreateDB)	9
Diagnostic data collection program (Sample/DataCollection)	10
2.8 Global Label	14
2.9 Machine Diagnostic Data Storage Database	15
Database (DB) definition	15
DB output format	18
2.10 Settings in GX Works3	19
System parameter	19
RD77GF Module Parameter (Motion)	19
RD77GF Module Parameter (Network)	20
Servo amplifier MR-J4-GF parameter	20
RD77GF Module Extended Parameter	20
<b>CHAPTER 3 FUNCTION BLOCK (FB)</b>	<b>21</b>
3.1 List of FBs	21
3.2 Restrictions and Precautions	21
3.3 Details of each FB	22
DB_Create (Database creation)	22
DB_Operation (Database operation)	24
CollectInterval (Control of collection intervals)	26
AxisDiagnosisData (Axis diagnostic data reading)	28
ReadSvTransSDO1 to 4 (CiA402 object reading)	30
3.4 List of Structures	32
AXIS_REF (Axis information)	32
stDBInfo (Database information)	32
stDBTable1Field (Database table 1 field information)	33
stDBTable2Field (Database table 2 field information)	33
stDBTable1Data (Database table 1 data)	34
stDBTable2Data (Database table 2 data)	34
3.5 List of Global Labels	35
G_stDBInfo (Database information)	35
G_stDBTableData (Database table data)	35

<b>3.6 Troubleshooting</b> .....	<b>36</b>
List of error codes .....	36

**INSTRUCTION INDEX** **37**

---

REVISIONS .....	39
TRADEMARKS .....	40

# 1 OVERVIEW

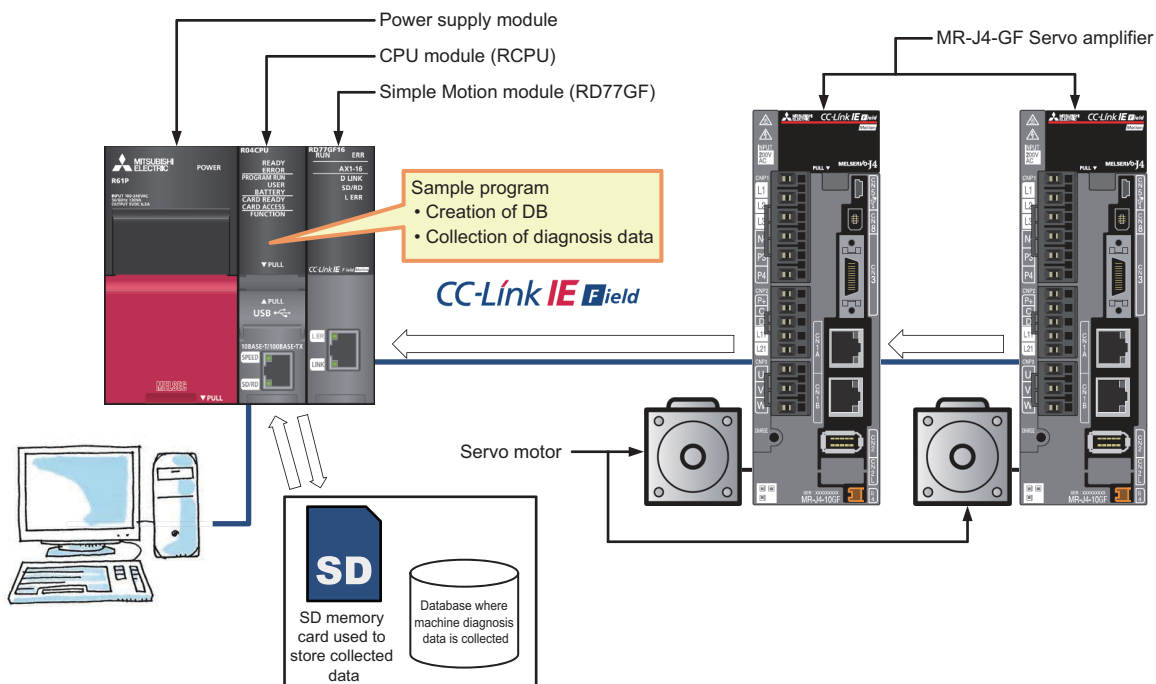
## 1.1 Introduction

This manual describes the sample program to read data in the MR-J4 servo amplifiers by the diagnosis function of the servo amplifier with the Simple Motion module and to save the data in the database of the CPU module.

## 1.2 Applicable Hardware and Software

Applicable hardware and software	Description
CPU module	MELSEC iQ-R series CPU module R**CPU, R**ENCPU
Applicable module	MELSEC iQ-R series Simple Motion module RD77GF** (except for RD77GF32)
Engineering software	MELSOFT GX Works3 of version 1.026C or later
Slave unit	CC-Link IE Field Network compatible MELSERVO-J4 servo amplifier MR-J4-GF

## 1.3 System Configuration



## 1.4 Relevant Manuals

---

- MR-J4-\_GF\_(-RJ) SERVO AMPLIFIER INSTRUCTION MANUAL (MOTION MODE) [SH030218]
- MELSERVO-J4 Servo amplifier INSTRUCTION MANUAL (TROUBLE SHOOTING) [SH030109]
- MELSEC iQ-R Simple Motion Module User's Manual (Application) [IB0300247]
- MELSEC iQ-R CPU Module User's Manual (Application) [SH081264ENG]
- MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks) [SH081266ENG]
- GX Works3 Operating Manual [SH081215ENG]

## 1.5 Notes

---

This manual describes functions of the function blocks.

This manual does not include the information on restrictions for using modules, PLC CPUs, and the combination of the both.

Please read the user's manuals of the products before using them.

Please note the following and use the FBs described in this manual.

- When using the FBs in an actual system, confirm that the FBs do not cause system control problems.
- Consider the points where interlock conditions are required in the system and insert interlock conditions.
- Mitsubishi Electric Corporation will not compensate any damages caused by the FBs.
- Contents may be deleted or changed without prior notice.

# 2 FUNCTION DESCRIPTION

## 2.1 Sample Program

The sample program collects machine diagnostic data of the MR-J4-GF servo amplifiers twice a month on the collection dates (1st and 15th). The program performs the first data collection at the collection start time and then collects data every two hours. The data is collected four times in total.

Collected data is stored in the database created on the SD memory card inserted in the CPU module.

The collection date, collection start time, collection intervals, and the number of times to collect data can be adjusted in the program.

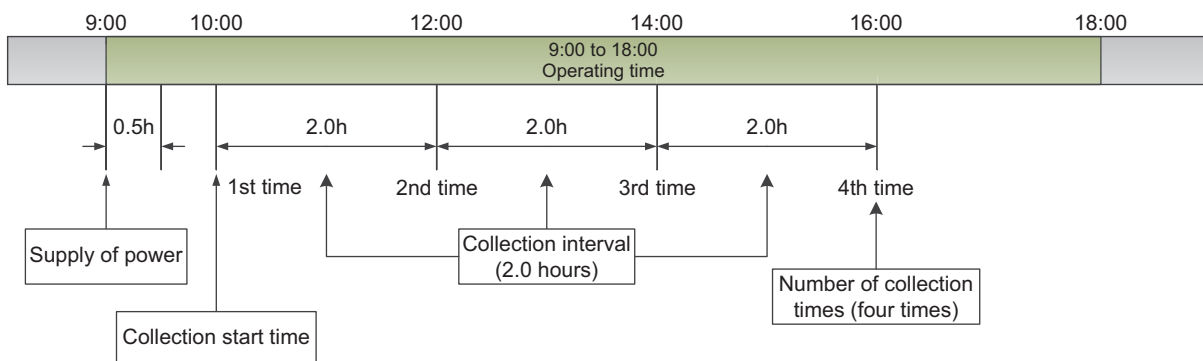
The collection start time is ignored until 30 minutes have passed from power-on (the CPU module is reset or powered ON). When the clock time after 30 minutes exceeds the collection start time, the first data collection is performed immediately.

### Point

- The clock data of the CPU module is used.
- Power ON the CPU module and the MR-J4-GF servo amplifiers simultaneously.
- The sample program does not check the contents of collected data. Check if the machine diagnosis information is in the estimated completion status or not with the collected data.

### Ex.

When the operating time of the system is from 9:00 to 18:00, the first collection time is set to 10:00, and data is collected four times every two hours a day, data is collected at the following timing.



## 2.2 Diagnostic Data Items to be Collected

The following table lists the machine diagnostic data items collected by the sample program.

Target item	Description	Object index	Sub index
Date	PLC date	—	—
Time	PLC time	—	—
I/O number	I/O number of the target Simple Motion module	—	—
Axis number	Axis number	—	—
Axis operation status	Axis operation status	—	—
Machine diagnostic status	Value of the object index 2C20H	2C20H	0H
Coulomb friction torque in positive direction	Value of the object index 2C21H	2C21H	0H
Friction torque at rated speed in positive direction	Value of the object index 2C22H	2C22H	0H
Coulomb friction torque in negative direction	Value of the object index 2C23H	2C23H	0H
Friction torque at rated speed in negative direction	Value of the object index 2C24H	2C24H	0H
Oscillation frequency during motor stop	Value of the object index 2C25H	2C25H	0H
Vibration level during motor stop	Value of the object index 2C26H	2C26H	0H
Oscillation frequency during motor operating	Value of the object index 2C27H	2C27H	0H
Vibration level during motor operating	Value of the object index 2C28H	2C28H	0H
Power ON cumulative time	Value of the object index 2C18H	2C18H	0H
Inrush relay ON/OFF number	Value of the object index 2C19H	2C19H	0H
Temperature of motor thermistor	Value of the object index 2B17H	2B17H	0H
Encoder inside temperature	Value of the object index 2B25H	2B25H	0H
Unit total power consumption	Value of the object index 2B2EH	2B2EH	0H
Effective load ratio	Value of the object index 2B09H	2B09H	0H
User data	Specified user data	—	—



## 2.3 Sample Program Configuration

File name	Description	Model	Engineering environment
Vol13_Prevention_PL_C_R gx3	FBD, ST program	R04CPU	MELSOFT GX Works3
	Simple Motion setting	RD77GF	
	Servo amplifier setting	MR-J4-GF	
DiagDBInfo.txt	Unicode text file for database creation	—	—

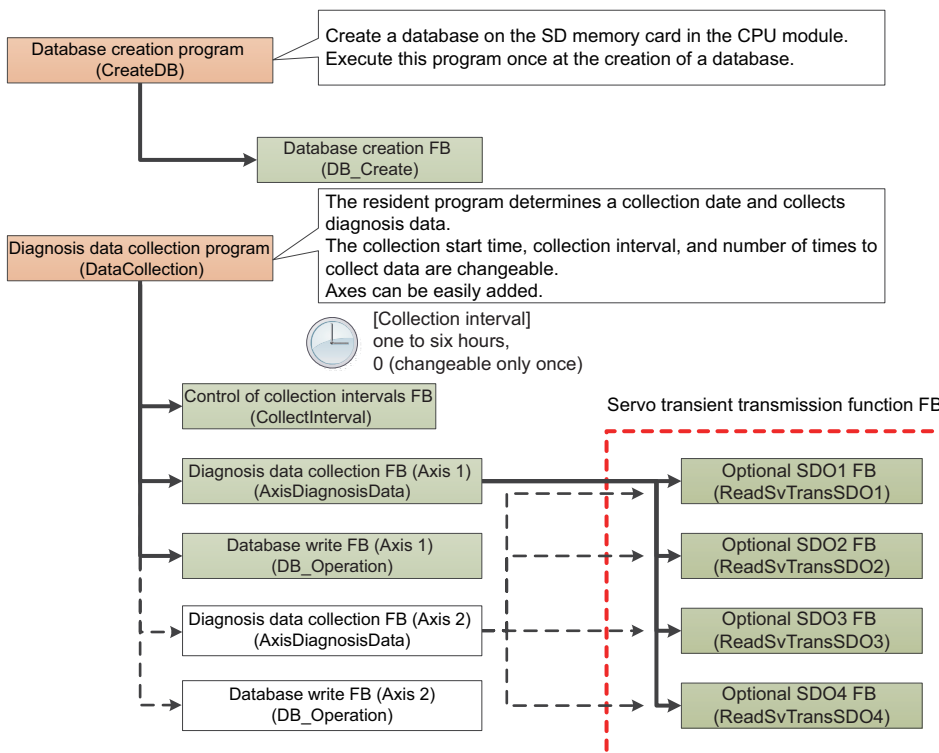
### List of programs

Program name	Description	Execution type	Description method
Sample/CreateDB	Database creation program	Scan	FBD
Sample/DataCollection	Diagnostic data collection program	Scan	FBD
I44Prg/I44Prg	I44 interrupt processing program	Event (2.0 ms)	LD

### FB library

FB name	Description
Diagnosis/DB_Create	Creates a database.
Diagnosis/DB_Operation	Adds diagnostic data to the database.
Diagnosis/CollectInterval	Controls collection intervals.
Diagnosis/AxisDiagnosisData	Gets diagnostic data of the specified axis.
SvTransient/ReadSvTransSDO1 to 4	Reads objects by using the servo transient transmission function.

### Program/FB relationship diagram



## 2.4 Startup Procedure


---

1. Decompress the downloaded compressed file in a folder.
2. Double-click the decompressed file "Vol13\_Prevention\_PLC\_R.gx3" and launch the programming tool.
3. Change the model settings according to the CPU type used.
4. Write the sample data to the CPU module and Simple Motion module.
5. After writing the data, reset the CPU module.

## 2.5 Preparation for the Database

---

1. Insert an SD memory card into the CPU module.
2. Select the following items from the menu of GX Works3.

 [Online] ⇒ [User Data] ⇒ [Write]

Select the folder that stores the decompressed file for "Write Target Folder" and the root folder for "CPU Write Target Folder" in the User Data Operation window. Select "SD Memory Card" as a destination to which "DiagDBInfo.txt" is transferred in the user data tree. Press the Execute button to write the file to the SD memory card.

## 2.6 Execution Method

---

This sample program starts in the collection end status (bCollectEnd = ON) and is switched to the standby status.

To execute this program for the first time, execute the database creation program (Sample/CreateDB) to create a database on the SD memory card. After that, turning OFF the collection end flag (bCollectEnd) of the diagnostic data collection program (Sample/DataCollection) starts monitoring of the data collection date.

## 2.7 Program Details

### Database creation program (Sample/CreateDB)

This FB creates a database on the SD memory card inserted in the CPU module.

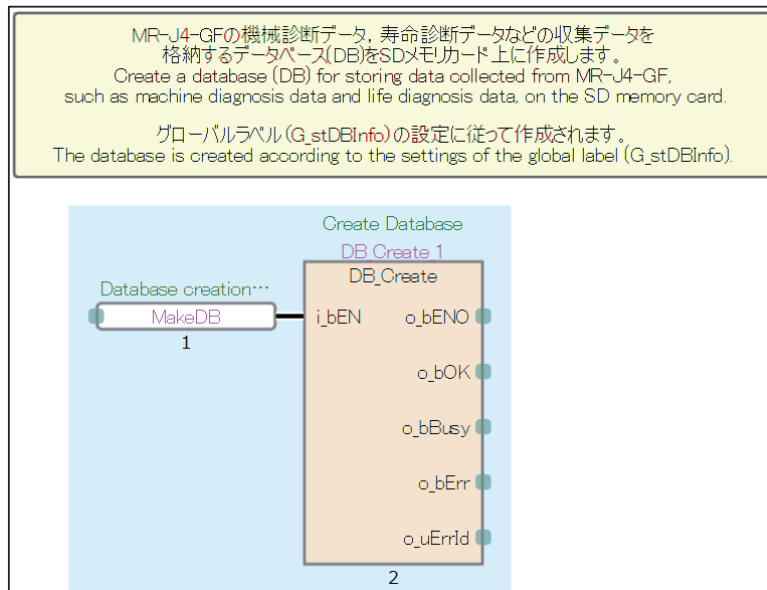
Execute this FB only to create a database for the first time or recreate a database (This FB deletes data in the database and recreates a database.).

Turning ON the DB creation execution label (MakeDB) creates a database.

Information in the import file path (wsImportPath) of the global label (G\_stDBInfo) is used to create a database.

After the database creation, the data in the SD memory card is not deleted even after the system is powered OFF.

Execute this FB again when there is a need to recreate a database.



# Diagnostic data collection program (Sample/DataCollection)

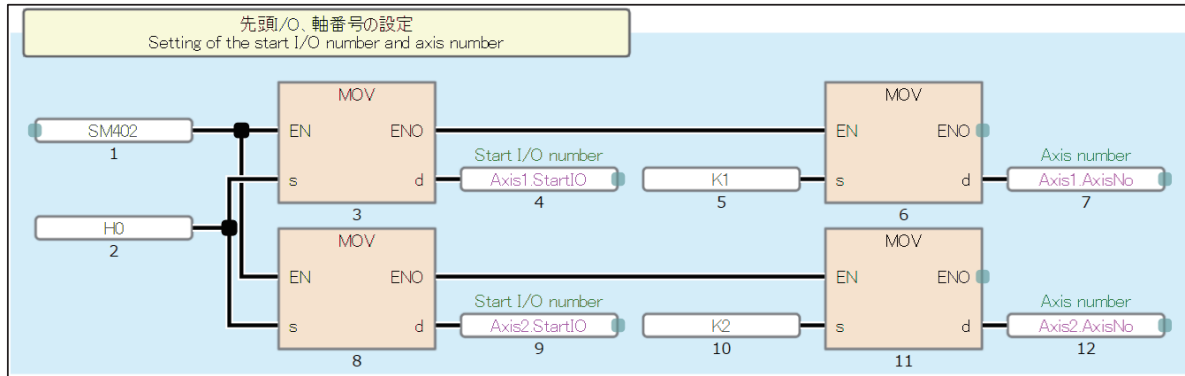
The collection end flag (bCollectEnd) turns ON and the status shifts to the collection end status after the operating status of the CPU module is switched to RUN in the diagnostic data collection program.

To start the program operation, turn OFF the collection end flag (bCollectEnd).

Create a database in advance by executing the database creation program.

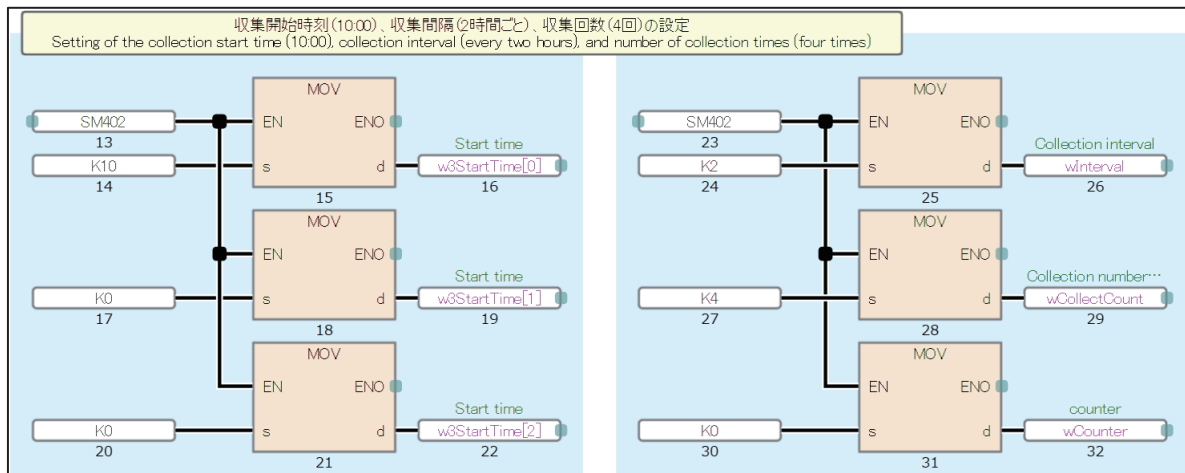
## 1. Set the start I/O number (H0) and axis numbers (Axis 1 and 2).

These items are set in one scan after the operating status of the CPU module is switched to RUN.



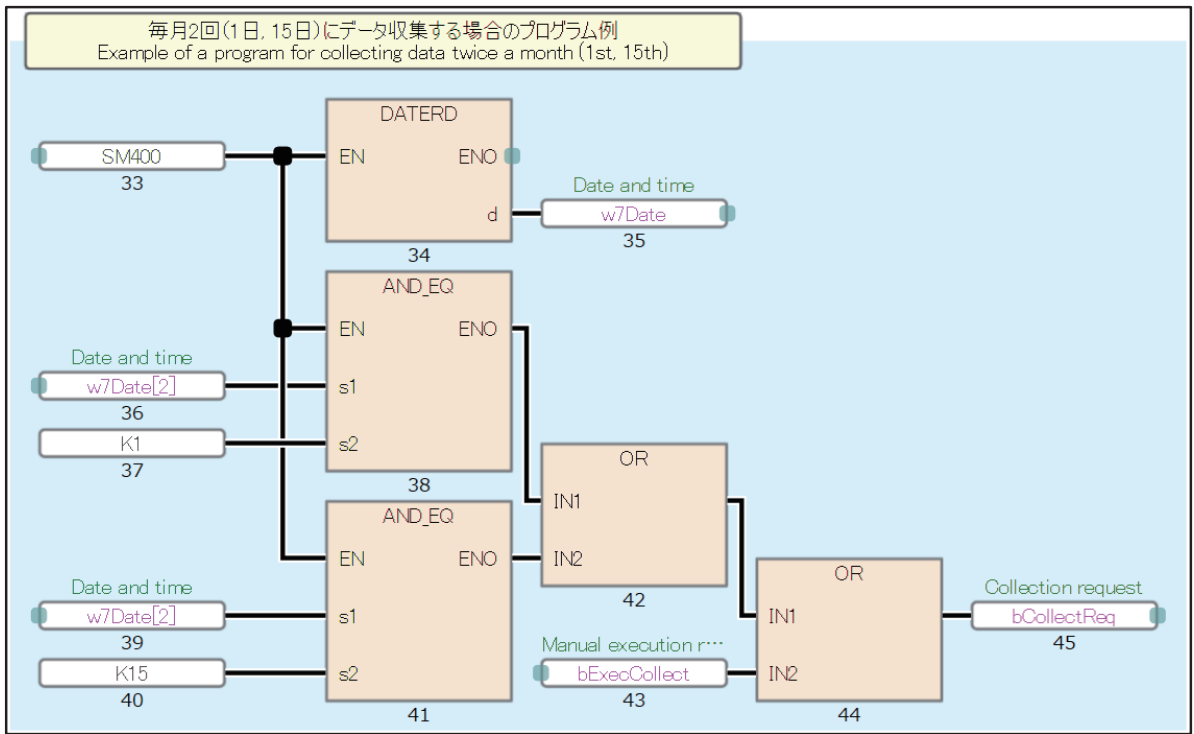
## 2. Clear the settings of the collection start time (10:00), the collection intervals (every two hours), the number of times to collect data (four times), and the counter for execution times.

These items are set in one scan after the operating status of the CPU module is switched to RUN.



**3.** Refer to the clock data and turns ON the collection request when the date is 1st or 15th.

Turning ON the manual execution request (bExecCollect) collects data on a date other than the collection dates.



**4.** Control the collection start time and collection intervals.

The execution request (bExecReq) turns ON when the collection start time has come.

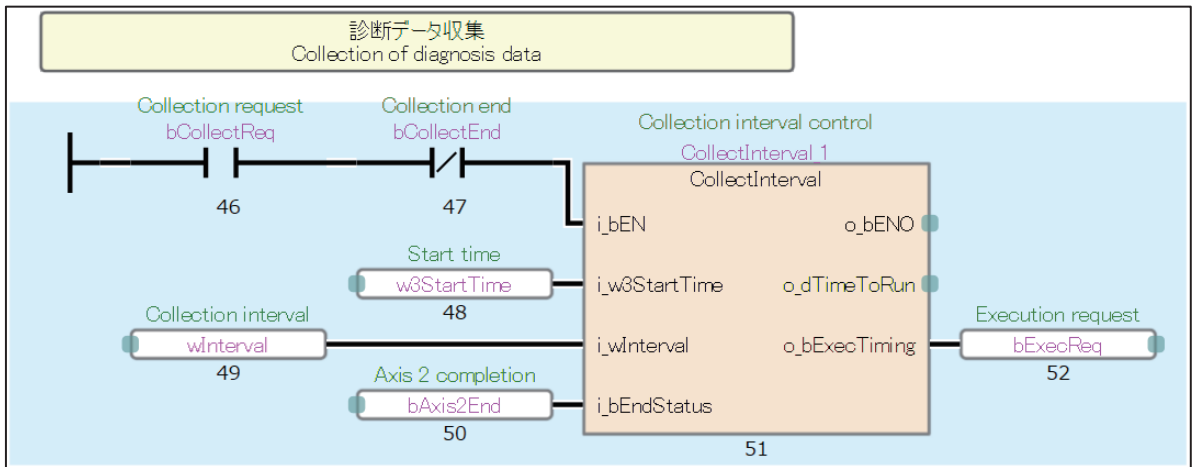
Turning ON the execution request performs the processing described in step 5. for collecting and saving data in the database.

When the processing is completed, the completion status (i\_bEndStatus) turns ON.

Enter Axis 2 completion (bAxis2End) in this program.

Turning ON the completion status starts monitoring of the collection intervals. The execution request (bExecReq) turns OFF.

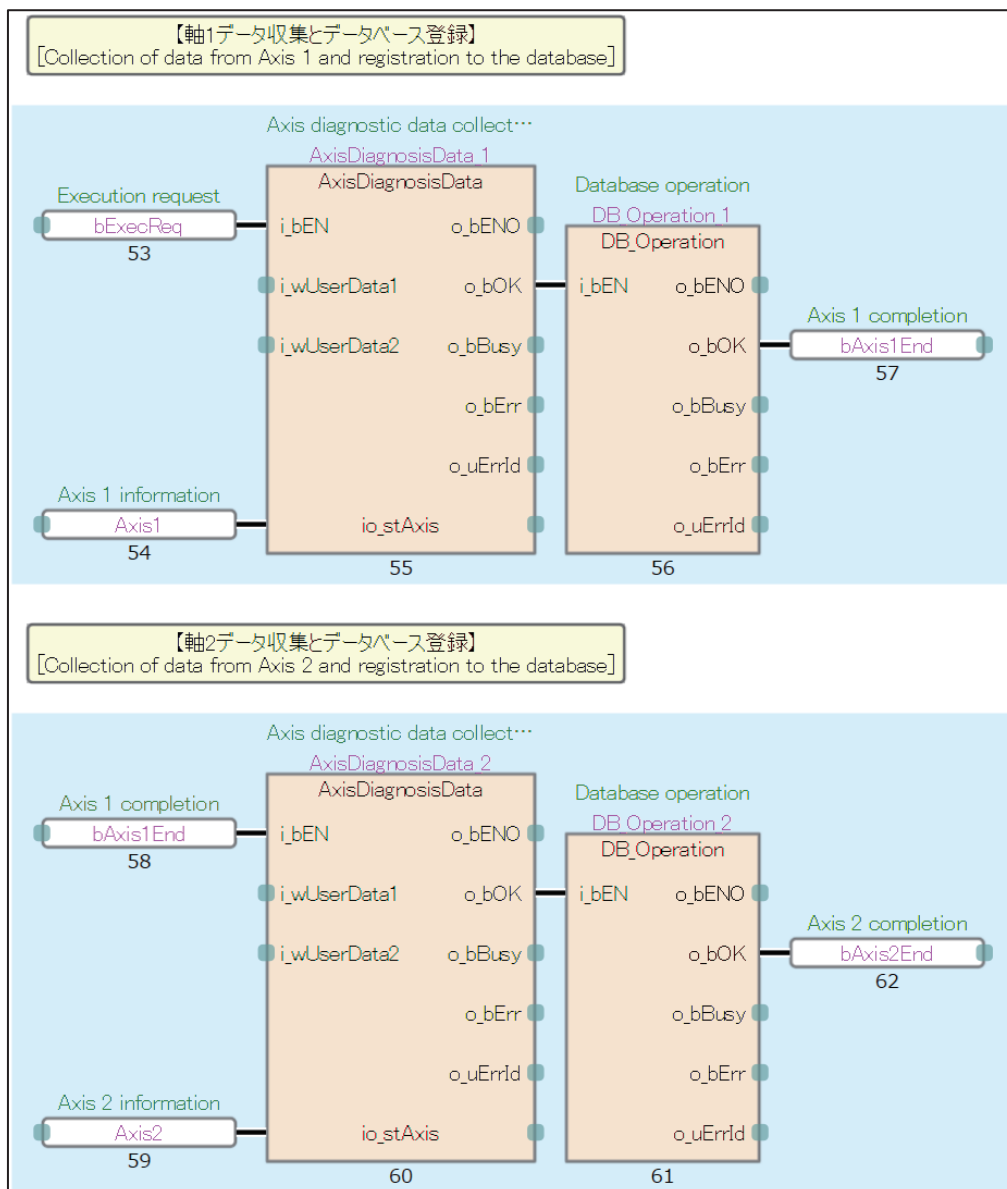
When the time set as the collection interval has passed, the execution request (bExecReq) turns ON again.



**5.** Turning ON the execution request collects and saves data in the database.

Data is collected by each axis and added to the database.

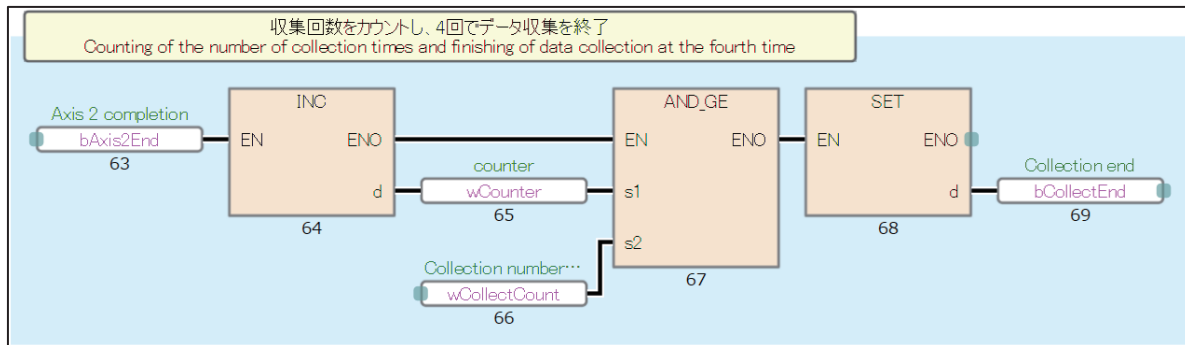
The sample program does not include the processing for errors.



6. The number of times to collect data is counted (wCounter) every time the processing for the last axis is completed, and the collection end (bCollectEnd) turns ON when the number of times to collect data reaches the set number of times (wCollectCount).

Stop the control of collection intervals described in step 4.

The program counts axis 2 completion (bAxis2End).



## 2.8 Global Label

This sample program uses the global labels listed below.

The initial value of each structure definition is used as the initial values of the global labels.

Devices are assigned to each table data of the global labels (G\_stDBTbl1Data, G\_stDBTbl2Data) for the registration of a database. The devices need to be assigned so that each table data is arranged continuously.

Label name	Data type	Assignment (Device)	Description
G_stDBInfo	stDBInfo	—	Database information
G_stDBTbl1Data	stDBTable1Data	D0 to D19	Database table 1 data
G_stDBTbl2Data	stDBTable2Data	D20 to D39	Database table 2 data

### Assignment device

Device No.	Description
D0	Number of records
D1	Size per record
D2	Date
D4	Time
D6	I/O
D7	Axis number
D8	Axis operation status
D9	Machine diagnostic status
D10	Coulomb friction torque in positive direction
D11	Friction torque at rated speed in positive direction
D12	Coulomb friction torque in negative direction
D13	Friction torque at rated speed in negative direction
D14	Oscillation frequency during motor stop
D15	Vibration level during motor stop
D16	Oscillation frequency during motor operating
D17	Vibration level during motor operating
D18	User data
D19	Abnormal value field information
D20	Number of records
D21	Size per record
D22	Date
D24	Time
D26	I/O
D27	Axis number
D28	Axis operation status
D29	Power ON cumulative time
D31	Inrush relay ON/OFF number
D33	Temperature of motor thermistor
D34	Encoder inside temperature
D35	Unit total power consumption
D37	Effective load ratio
D38	User data
D39	Abnormal value field information



## 2.9 Machine Diagnostic Data Storage Database

### Database (DB) definition

The following defines the database for storing collected machine diagnostic data and life diagnostic data.

Each data is divided into tables and user-specified data is stored in each table.

Specify user-specified data with inputs of the FBs.

2

#### Database: DiagnosisData (Machine diagnostic data DB)

■Table 1: MachineDiagnosis (Machine diagnostic-related information)

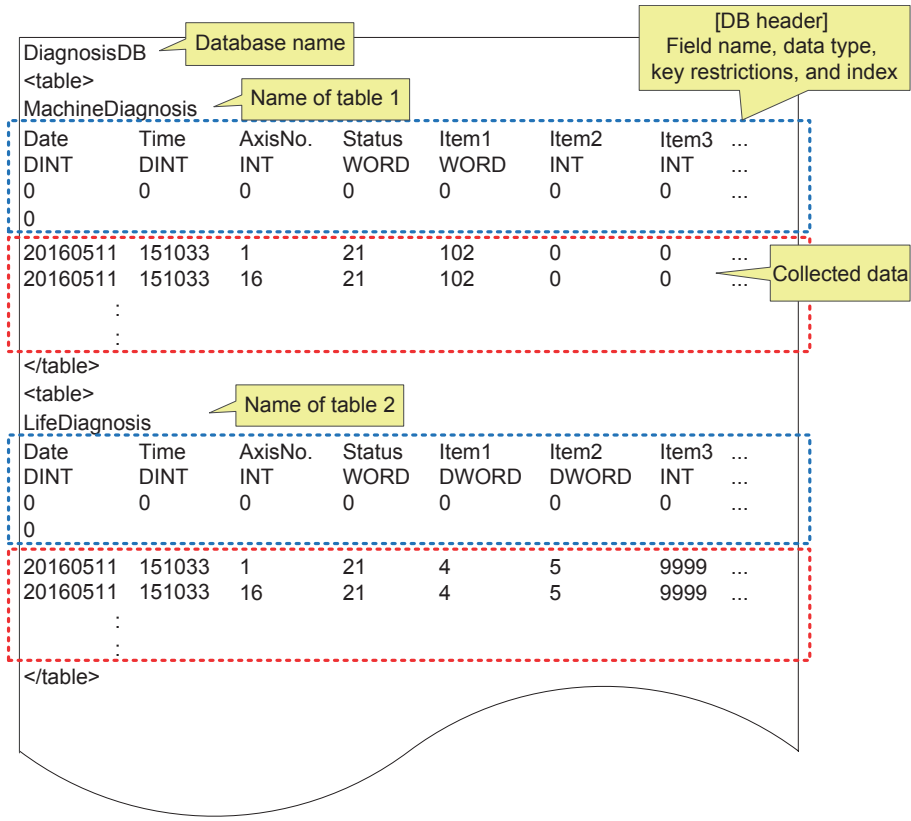
Field information	Field name	Data type	Description
1	Date	Double word [signed]	Stores the PLC date.
2	Time	Double word [signed]	Stores the PLC time.
3	I/O number	Word [signed]	Stores an I/O number.
4	Axis number	Word [signed]	Stores an axis number.
5	Axis operation status	Word [unsigned]/bit string [16 bits]	Stores the axis operation status.
6	Machine diagnostic status	Word [unsigned]/bit string [16 bits]	Stores the value obtained by the object index 2C20H.
7	Coulomb friction torque in positive direction	Word [signed]	Stores the value obtained by the object index 2C21H.
8	Friction torque at rated speed in positive direction	Word [signed]	Stores the value obtained by the object index 2C22H.
9	Coulomb friction torque in negative direction	Word [signed]	Stores the value obtained by the object index 2C23H.
10	Friction torque at rated speed in negative direction	Word [signed]	Stores the value obtained by the object index 2C24H.
11	Oscillation frequency during motor stop	Word [signed]	Stores the value obtained by the object index 2C25H.
12	Vibration level during motor stop	Word [signed]	Stores the value obtained by the object index 2C26H.
13	Oscillation frequency during motor operating	Word [signed]	Stores the value obtained by the object index 2C27H.
14	Vibration level during motor operating	Word [signed]	Stores the value obtained by the object index 2C28H.
15	User data	Word [signed]	Stores specified user data.

Field information	Field name	Data type	Description																								
16	Abnormal value field information	Word [unsigned]/bit string [16 bits]	<p>Stores the field information that failed to read objects. The field 1 is assigned to the lowest bit, and each of field numbers until field 15 is assigned to a corresponding bit. 0 is stored in the items other than the object read.</p> <p>b15 <span style="float: right;">b0</span></p> <div style="border: 1px solid black; width: 100%; height: 15px; margin-bottom: 5px;"></div> <p>1: Object reading failed</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Bit</th> <th>Field information</th> </tr> </thead> <tbody> <tr> <td>b0 to b4</td> <td>Fixed to 0</td> </tr> <tr> <td>b5</td> <td>Field 6</td> </tr> <tr> <td>b6</td> <td>Field 7</td> </tr> <tr> <td>b7</td> <td>Field 8</td> </tr> <tr> <td>b8</td> <td>Field 9</td> </tr> <tr> <td>b9</td> <td>Field 10</td> </tr> <tr> <td>b10</td> <td>Field 11</td> </tr> <tr> <td>b11</td> <td>Field 12</td> </tr> <tr> <td>b12</td> <td>Field 13</td> </tr> <tr> <td>b13</td> <td>Field 14</td> </tr> <tr> <td>b14 to b15</td> <td>Fixed to 0</td> </tr> </tbody> </table>	Bit	Field information	b0 to b4	Fixed to 0	b5	Field 6	b6	Field 7	b7	Field 8	b8	Field 9	b9	Field 10	b10	Field 11	b11	Field 12	b12	Field 13	b13	Field 14	b14 to b15	Fixed to 0
Bit	Field information																										
b0 to b4	Fixed to 0																										
b5	Field 6																										
b6	Field 7																										
b7	Field 8																										
b8	Field 9																										
b9	Field 10																										
b10	Field 11																										
b11	Field 12																										
b12	Field 13																										
b13	Field 14																										
b14 to b15	Fixed to 0																										



# DB output format

The database stores machine diagnostic data in the table 1, and life diagnostic data and other information in the table 2. Data for one axis is written by a single write processing. To write data for multiple axes, perform the write processing for each axis.



## 2.10 Settings in GX Works3

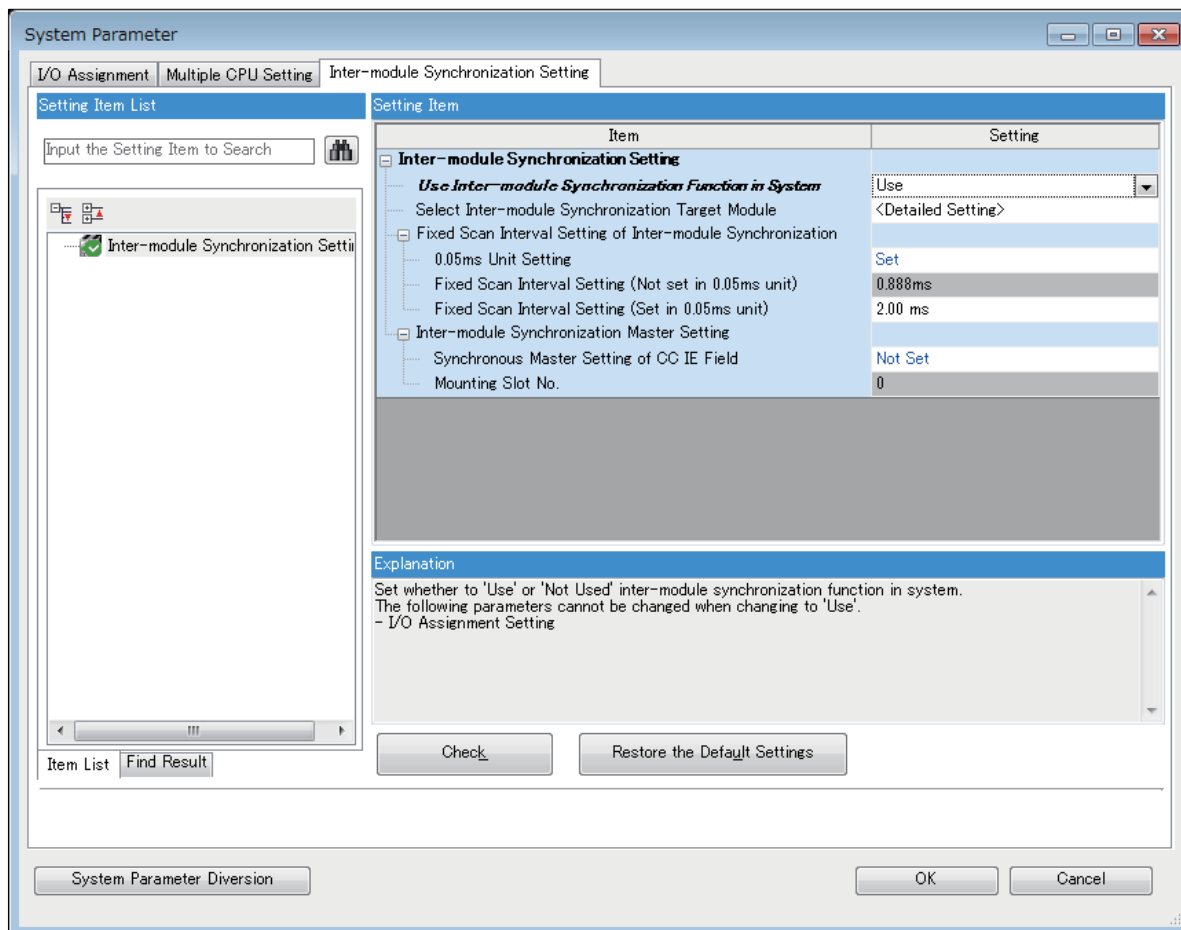
The sample program has been designed to collect diagnostic data with the 2-axis system.  
The following shows the parameters whose values have been changed from their initial values.

### System parameter

Inter-module Synchronization Setting: Use Inter-module Synchronization Function in System

Select Inter-module Synchronization Target Module: RD77GF (Synchronize)

Fixed Scan Interval Setting: 2.00 ms



### RD77GF Module Parameter (Motion)

- Module operation setting

Module extension parameter storage location setting: CPU module

- Refresh setting

Refresh at the set timing.: Invalid

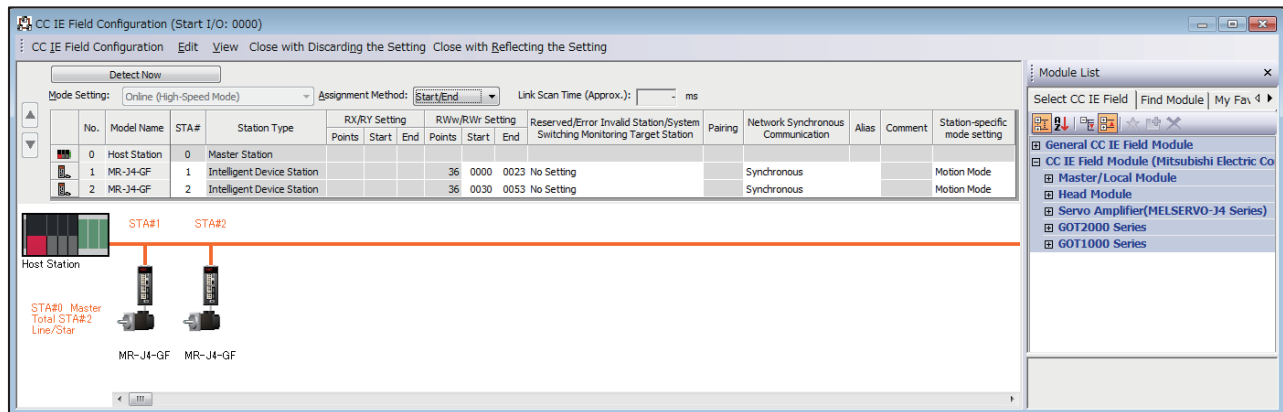
## RD77GF Module Parameter (Network)

[Basic Settings] ⇨ [Network Configuration Settings]

Slave device setting: MR-J4-GF (2 axes)

Network Synchronous Communication: Synchronous

Station-specific mode setting: Motion Mode



## Servo amplifier MR-J4-GF parameter

The default parameters are used except for the following parameters.

Parameter	Axis 1	Axis 2
PA04: Servo forced stop selection	1: Disabled	1: Disabled
PD41: Sensor input type selection	1: Input from controller	1: Input from controller
PN04: CC-Link IE communication network number	1	1

## RD77GF Module Extended Parameter

The default parameters are used except for the following parameters.

Parameter	Axis 1	Axis 2
Pr.2: No. of pulses per rotation	4194304	4194304
Pr.3: Movement amount per rotation	4194304	4194304
Pr.8: Speed limit value	209715200	209715200

# 3 FUNCTION BLOCK (FB)

## 3.1 List of FBs


The following table lists the FBs used in the MELSEC iQ-R series Simple Motion module RD77GF.

Item	Description	Version
DB_Create	Creates a database.	00A
DB_Operation	Adds diagnostic data to the database.	00A
CollectInterval	Controls collection intervals.	00A
AxisDiagnosisData	Gets diagnostic data of the specified axis.	00A
ReadSvTransSDO1 to 4	Reads objects by using the servo transient transmission function.	00A

## 3.2 Restrictions and Precautions

The following describes restrictions and precautions common to all FBs.

The restrictions and precautions specific to each FB are separately described. Refer to  Page 22 Details of each FB.

Item	Description
Restrictions and precautions	<ul style="list-style-type: none"><li>• The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li><li>• The FB does not detect an alarm or a warning that has occurred in the servo amplifier. Program the processing to monitor alarms and warnings in the servo amplifiers. For the alarms and warnings that have occurred in the servo amplifiers, refer to the instruction manual of the servo amplifiers in use.</li><li>• The FB cannot be used in an interrupt program.</li><li>• When two or more FBs are used, be careful not to repeatedly specify and simultaneously start an axis.</li><li>• Please ensure that Execution command (i_bEN) can be turned OFF with a program. Do not use this FB in programs that are only executed once, such as a subroutine program and FOR-NEXT loop because Execution command (i_bEN) cannot be turned OFF in these programs.</li><li>• When Execution command (i_bEN) is turned ON, the FB reads data of the input label. Thus, set the input label before turning ON Execution command (i_bEN).</li><li>• Do not change the values of other input labels after turning ON Execution command (i_bEN). For some FBs such as the one whose operation type is real-time execution, however, input labels can be changed even after Execution command (i_bEN) is turned ON. For details, refer to  Page 22 Details of each FB.</li><li>• The FBs can control 1 to 16 slave stations (axes). Set a station number of the servo amplifier within the setting range.</li><li>• The number of FB steps in a program varies depending on the CPU model to be used and I/O definitions.</li></ul>

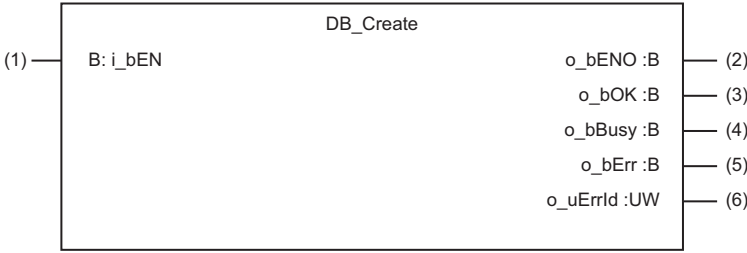
## 3.3 Details of each FB

### DB\_Create (Database creation)

#### Name

DB\_Create

#### Overview

Item	Description
Function overview	Creates a database on the SD memory card by reading the information in the database definition file "DiagDBInfo.txt".
Symbol [Structured Ladder]	
Symbol [Structured Text]	DB_Create(i_bEN, o_bENO, o_bOK, o_bBusy, o_bErr, o_uErrId);

#### Labels

##### ■ Input labels (Load: $\Pi$ : Always, $\uparrow$ : Only at start)


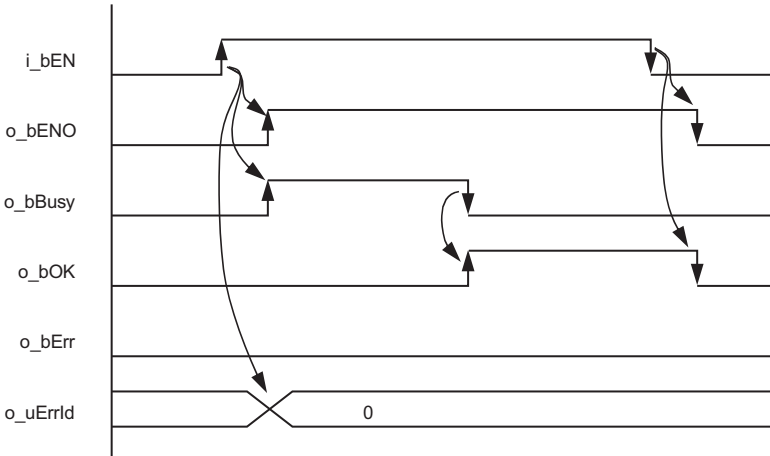
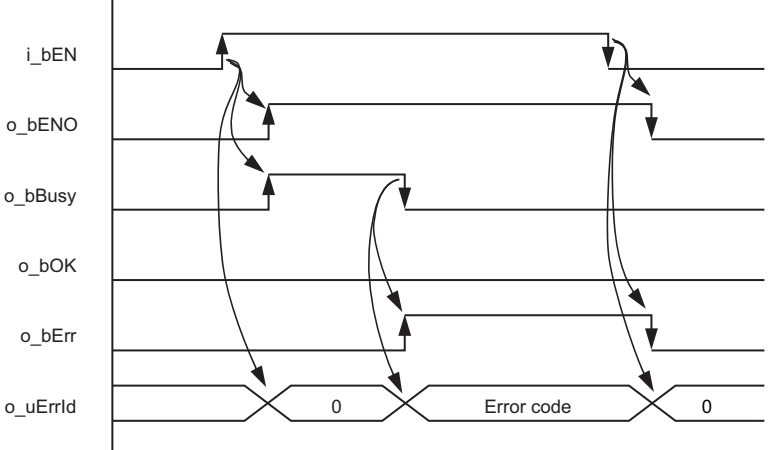
No.	Label name	Name	Data type	Initial value	Import	Setting range	Description
(1)	i_bEN	Execution command	Bit	OFF	$\uparrow$	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.

##### ■ Output labels

No.	Label name	Name	Data type	Initial value	Description
(2)	o_bENO	Execution status	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
(3)	o_bOK	Normal completion	Bit	OFF	When ON, it indicates that a database has been created.
(4)	o_bBusy	Executing	Bit	OFF	When ON, it indicates that a database is being created.
(5)	o_bErr	Error completion	Bit	OFF	When ON, it indicates that an error has occurred in the FB.
(6)	o_uErrId	Error code	Word [unsigned]/bit string [16 bits]	0	The error code generated in the FB is stored.



## Function overview

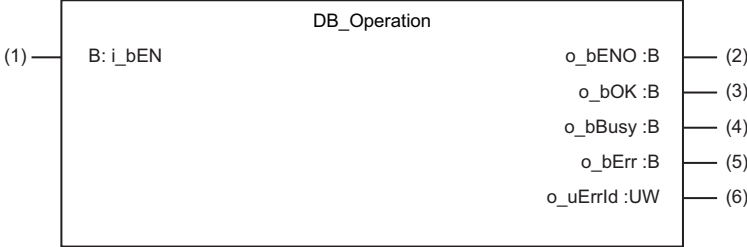
Item	Description
Language	Structured Text
Number of basic steps	104 steps
Function description	<p>By turning ON Execution command (i_bEN), this FB imports the information in the database definition file set to the global variable (G_stDBInfo.wslImportPath) and creates a database on the SD memory card.</p> <p>Executing (o_bBusy) is ON while a database is being created.</p> <p>When the operation is completed normally, Normal completion (o_bOK) turns ON.</p> <p>When an error has occurred in the FB, Error completion (o_bErr) turns ON and error details are stored in Error code (o_uErrId).</p> <p>For details of error codes, refer to  Page 36 Troubleshooting.</p>
Restrictions and precautions	<p>Before executing this FB, set the import file path (wslImportPath) of the stDBInfo structure.</p> <p>Also, transfer the Unicode text file specified in the import file path to the SD memory card.</p>
FB compiling method	Macro type
FB operation type	Pulsed execution (multiple scan execution type)
Timing chart	<p>[Normal completion]</p>  <p>[Error completion]</p> 

# DB\_Operation (Database operation)

## Name

DB\_Operation

## Overview

Item	Description
Function overview	Adds data stored in the global variables (G_stDBTb1Data, G_stDBTb2Data) to the database and exports it.
Symbol [Structured Ladder]	
Symbol [Structured Text]	DB_Operation(i_bEN, o_bENO, o_bOK, o_bBusy, o_bErr, o_uErrId);

## Labels


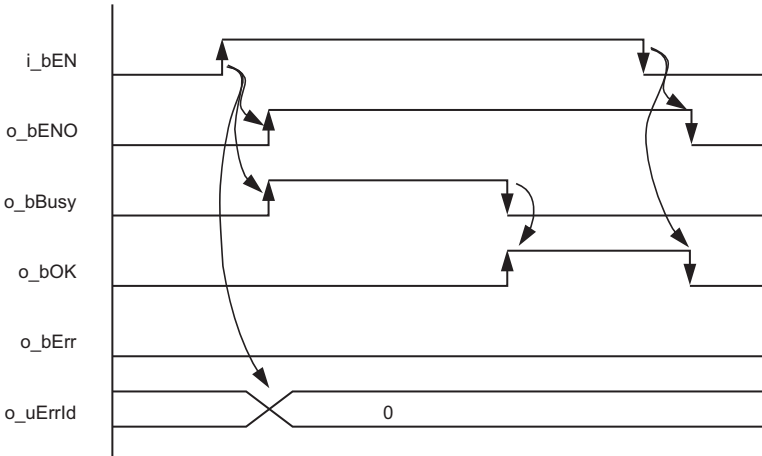
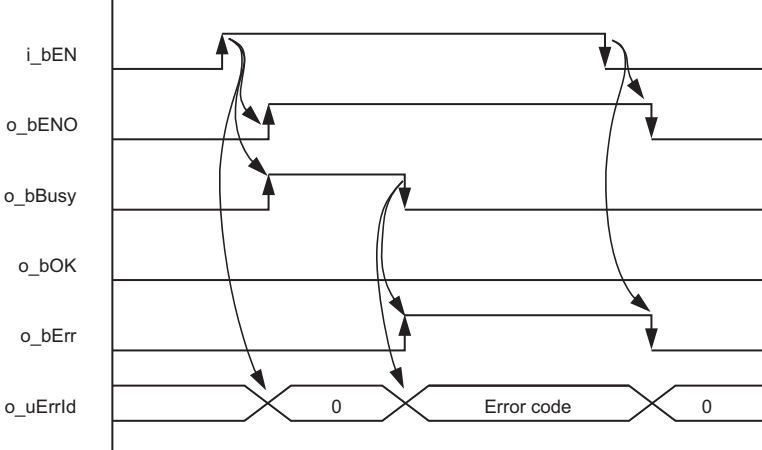
### ■ Input labels (Load: Π: Always, ↑: Only at start)

No.	Label name	Name	Data type	Initial value	Import	Setting range	Description
(1)	i_bEN	Execution command	Bit	OFF	↑	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.

### ■ Output labels

No.	Label name	Name	Data type	Initial value	Description
(2)	o_bENO	Execution status	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
(3)	o_bOK	Normal completion	Bit	OFF	When ON, it indicates that a database has been created.
(4)	o_bBusy	Executing	Bit	OFF	When ON, it indicates that a database is being created.
(5)	o_bErr	Error completion	Bit	OFF	When ON, it indicates that an error has occurred in the FB.
(6)	o_uErrId	Error code	Word [unsigned]/bit string [16 bits]	0	The error code generated in the FB is stored.

## Function overview

Item	Description
Language	Structured Text
Number of basic steps	345 steps
Function description	<p>By turning ON Execution command (i_bEN), this FB opens the database set in the global variable (G_stDBInfo.wsDbFilePath) and adds the data stored in the global variables (G_stDBTb1Data, G_stDBTb2Data) to the database. After that, the FB closes the database and exports the data.</p> <p>Executing (o_bBusy) is ON while the database is being operated.</p> <p>When the operation is completed normally, Normal completion (o_bOK) turns ON.</p> <p>When an error has occurred in the FB, Error completion (o_bErr) turns ON and error details are stored in Error code (o_uErrId).</p> <p>For details of error codes, refer to  Page 36 Troubleshooting.</p>
Restrictions and precautions	—
FB compiling method	Macro type
FB operation type	Pulsed execution (multiple scan execution type)
Timing chart	<p>[Normal completion]</p>  <p>[Error completion]</p> 

# CollectInterval (Control of collection intervals)

## Name

CollectInterval

## Overview

Item	Description
Function overview	Monitors the elapsed time from the power-on, the collection start time, and the collection intervals, and then controls.
Symbol [Structured Ladder]	
Symbol [Structured Text]	CollectInterval(i_bEN, i_w3StartTime, i_wInterval, i_bEndStatus, o_bENO, o_dTimeToRun, o_bExecTiming);

## Labels

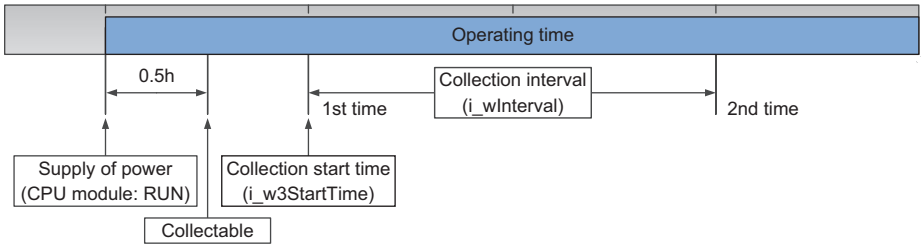
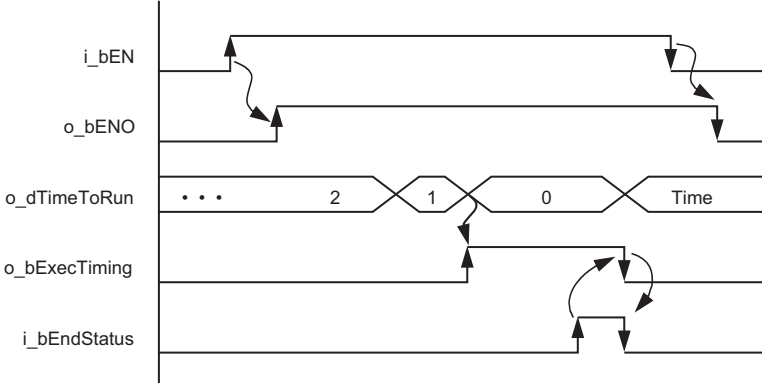
### Input labels (Load: $\Pi$ : Always, $\uparrow$ : Only at start)

No.	Label name	Name	Data type	Initial value	Import	Setting range	Description
(1)	i_bEN	Execution command	Bit	OFF	$\uparrow$	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_w3StartTime	Start time	Word [signed] (0..2)	0	$\uparrow$	Time	Specify the first collection time (hour, minute, second).
(3)	i_wInterval	Collection interval	Word [signed]	0	$\uparrow$	0 to 6	0: No collection intervals are set. Specify this value to collect data only once at the start time. 1 to 6: Specify the collection interval by the set hour(s). -1: For operation check. Data is collected every two minutes.
(4)	i_bEndStatus	Completion status	Bit	OFF	$\uparrow$	ON, OFF	ON: Specify the completion of data collection and start monitoring of the next collection interval. OFF: It indicates that the data collection processing is not completed.

### Output labels

No.	Label name	Name	Data type	Initial value	Description
(5)	o_bENO	Execution status	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
(6)	o_dTimeToRun	Waiting time	Double word [signed]	0	Store the time of 30 minutes from power-on, the time taken from power-on to the collection start time, and the time taken to turns ON the next execution timing after the collection interval in second units.
(7)	o_bExecTiming	Execution timing	Bit	OFF	When ON, it indicates that the execution timing has come.

## Function overview

Item	Description								
Language	Structured Text								
Number of basic steps	353 steps								
Function description	<p>By turning ON Execution command (i_bEN), this FB monitors the time that has elapsed from power-on and the collection start time.</p> <p>The clock time of when supply of the power is started is stored in the base date (w7BaseDate).</p> <p>The collection possible flag (bCollectable) turns ON in 30 minutes from power-on.</p> <p>The collection start time is ignored until 30 minutes have passed from power-on (The CPU module is reset or powered ON.).</p> <p>Monitoring of the collection start time starts when data collection is ready, and Execution timing (o_bExecTiming) turns ON when the start time (i_w3StartTime) has come.</p> <p>Collect diagnostic data of each axis by turning ON Execution timing (o_bExecTiming).</p> <p>After the processing of each axis has been completed, turn ON Completion status (i_bEndStatus).</p> <p>When Completion status (i_bEndStatus) turns ON, Collection interval (i_wInterval) is monitored.</p> <p>The FB waits for the time to elapse by the time set in Collection interval (i_wInterval) from the time when the previous execution timing (o_bExecTiming) turned ON.</p> <p>After the time set in Collection interval (i_wInterval) has passed, Execution timing (o_bExecTiming) turns ON again.</p> <p>When 0 has been specified in Collection interval (i_wInterval), the collection intervals are not monitored.</p>  <p>The following values can be specified in Collection interval (i_wInterval). When a value out of range has been set, it is handled as "0: None (Data is collected only once)".</p> <table border="1" data-bbox="438 1019 973 1164"> <thead> <tr> <th>Value</th> <th>Collection interval</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>2 minutes (for operation check)</td> </tr> <tr> <td>0</td> <td>None (Data is collected only once)</td> </tr> <tr> <td>1 to 6</td> <td>1 to 6 hours</td> </tr> </tbody> </table> <p>Time to execution (o_dTimeToRun) outputs the time until Execution timing (o_bExecTiming) turns ON.</p> <p>No error occurs in this FB.</p>	Value	Collection interval	-1	2 minutes (for operation check)	0	None (Data is collected only once)	1 to 6	1 to 6 hours
Value	Collection interval								
-1	2 minutes (for operation check)								
0	None (Data is collected only once)								
1 to 6	1 to 6 hours								
Restrictions and precautions	<ul style="list-style-type: none"> <li>• Clock data of the CPU module is used.</li> <li>• Machine diagnostic data of servo amplifiers can be acquired only when the servo amplifiers are sufficiently operating. Therefore, data is not collected until 30 minutes have passed from power-on of the servo amplifiers. Turn ON the power of the CPU module and the MR-J4-GF servo amplifiers simultaneously.</li> </ul>								
FB compiling method	Macro type								
FB operation type	Pulsed execution (multiple scan execution type)								
Timing chart	<p>[Turning ON of Execution timing and reset operation with Completion status]</p> 								

# AxisDiagnosisData (Axis diagnostic data reading)

## Name

AxisDiagnosisData

## Overview

Item	Description
Function overview	Reads out machine diagnostic data of the specified axis.
Symbol [Structured Ladder]	
Symbol [Structured Text]	AxisDiagnosisData(i_bEN, i_wUserData1, i_wUserData2, o_bENO, o_bOK, o_bBusy, o_bErr, o_uErrId, io_stAxis);

## Labels

### ■ Input labels (Load: Π: Always, ↑: Only at start)

No.	Label name	Name	Data type	Initial value	Import	Setting range	Description
(1)	i_bEN	Execution command	Bit	FALSE	↑	—	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_wUserData1	User data 1	Word [signed]	0	↑	—	Stores user-specified data in the table 1.
(3)	i_wUserData2	User data 2	Word [signed]	0	↑	—	Stores user-specified data in the table 2.



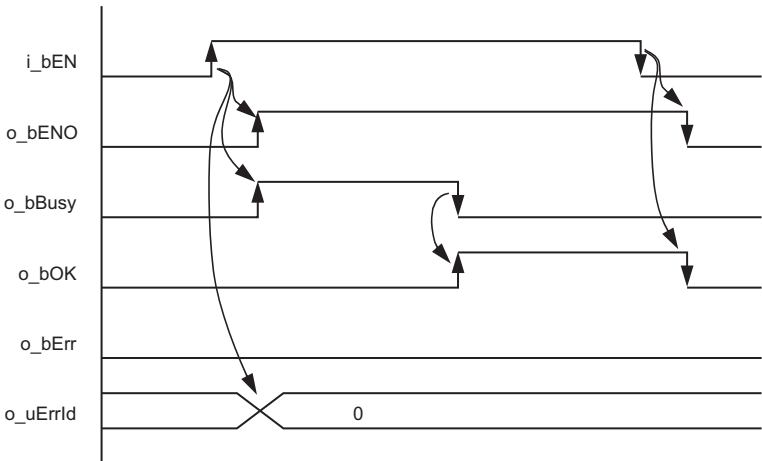
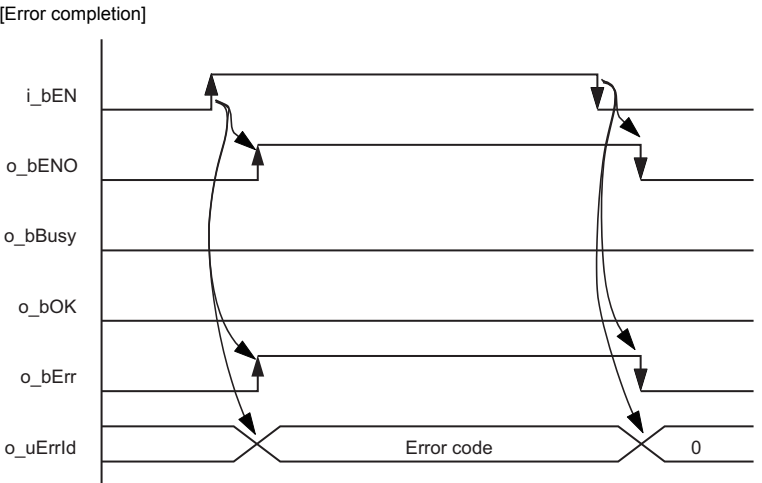
### ■ I/O label

No.	Label name	Name	Data type	Setting range	Description
(4)	io_stAxis	Axis information	AXIS_REF	—	—

### ■ Output labels

No.	Label name	Name	Data type	Initial value	Description
(5)	o_bENO	Execution status	Bit	FALSE	ON: Execution command is ON. OFF: Execution command is OFF.
(6)	o_bOK	Normal completion	Bit	FALSE	When ON, it indicates that diagnostic data of the specified axis has been read.
(7)	o_bBusy	Executing	Bit	FALSE	When ON, it indicates that diagnostic data of the specified axis is being read.
(8)	o_bErr	Error completion	Bit	FALSE	When ON, it indicates that an error has occurred in the FB.
(9)	o_uErrId	Error code	Word [unsigned]/bit string [16 bits]	0	The error code generated in the FB is stored.

## Function overview

Item	Description
Language	Structured Text
Number of basic steps	1456 steps
Function description	<p>This FB uses CiA402 object reading FBs (ReadSvTransSDO1 to 4) to read machine diagnostic data of axes. For target diagnostic data, refer to  Page 6 Diagnostic Data Items to be Collected. User data 1 and 2 (i_wUserData1, i_wUserData2) of the input labels are stored in each table. Optional data can be stored with diagnostic data.</p> <p>By turning ON Execution command (i_bEN), this FB reads data of the axis specified in Axis information (io_stAxis). Executing (o_bBusy) is ON while machine diagnostic data is being read.</p> <p>When the data has been read normally, Normal completion (o_bOK) turns ON.</p> <p>Read data is stored in the global variables (G_stDBTable1Data, G_stDBTable2Data).</p> <p>When an error has occurred in the FB, Error completion (o_bErr) turns ON and error details are stored in Error code (o_uErrId).</p> <p>When diagnostic data has been read with an error (ReadSvTransSDO1 to 4 have been completed with errors), no error is detected. 0 is stored in the global variables (G_stDBTable1Data, G_stDBTable2Data). For the field information that has been completed with an error, a bit corresponding to "Abnormal value field information" of each table turns ON.</p> <p>For details of error codes, refer to  Page 36 Troubleshooting.</p>
Restrictions and precautions	<ul style="list-style-type: none"> <li>• This FB uses ReadSvTransSDO1 to 4 FBs. Do not execute the FBs while this FB is being executed.</li> <li>• Do not change the axis number or I/O number of Axis information (io_stAxis) during execution of this FB.</li> </ul>
FB compiling method	Macro type
FB operation type	Pulsed execution (multiple scan execution type)
Timing chart	<p>[Normal completion]</p>  <p>[Error completion]</p> 

# ReadSvTransSDO1 to 4 (CiA402 object reading)

## Name

ReadSvTransSDO1  
 ReadSvTransSDO2  
 ReadSvTransSDO3  
 ReadSvTransSDO4

## Overview

Item	Description
Function overview	Reads out the CiA402 object of the slave device.
Symbol [Structured Ladder]	
Symbol [Structured Text]	ReadSvTransSDO_(i_bEN, i_uODIndex, i_wODSub, o_bENO, o_bOK, o_bBusy, o_dData, o_bErr, o_uErrId, io_stAxis); _: 1 to 4

## Labels

### ■ Input labels (Load: Π: Always, ↑: Only at start)

No.	Label name	Name	Data type	Initial value	Import	Setting range	Description
(1)	i_bEN	Execution command	Bit	OFF	↑	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uODIndex	Object index	Word [unsigned]/bit string [16 bits]	0	↑	—	Specify a CiA402 object index of the slave device.
(3)	i_wODSub	Object sub index	Word [signed]	0	↑	—	Specify a CiA402 object sub index of the slave device.

### ■ I/O label


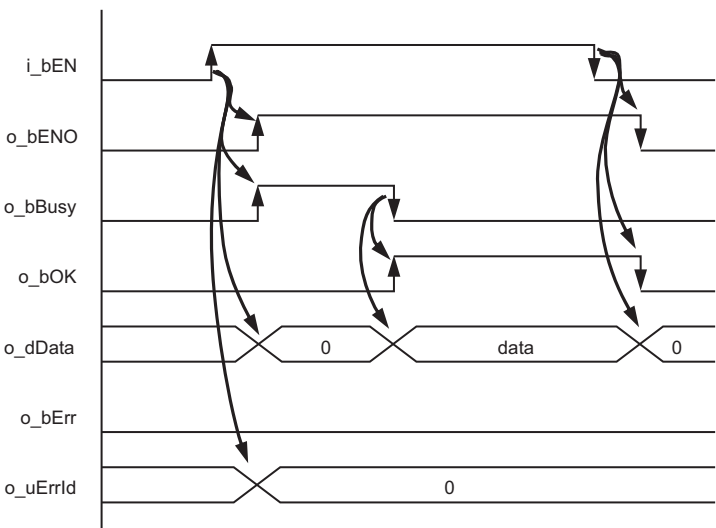
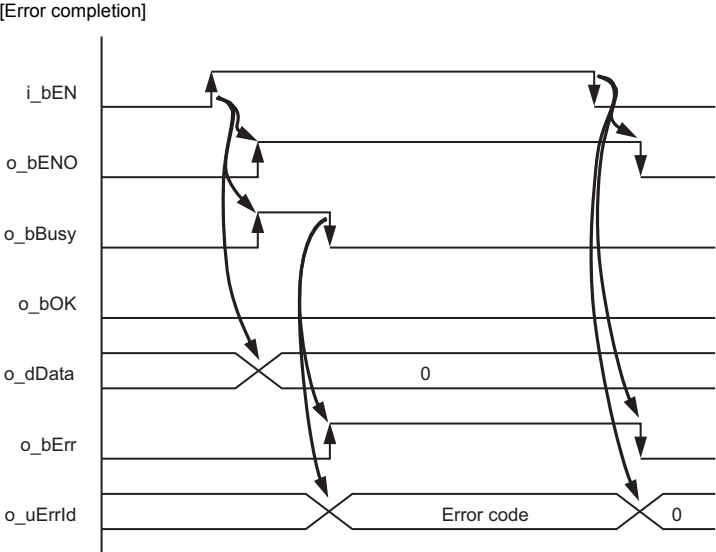
No.	Label name	Name	Data type	Setting range	Description
(4)	io_stAxis	Axis information	AXIS_REF	—	—

### ■ Output labels

No.	Label name	Name	Data type	Initial value	Description
(5)	o_bENO	Execution status	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
(6)	o_bOK	Normal completion	Bit	OFF	When ON, it indicates that data of the specified object has been read.
(7)	o_bBusy	Executing	Bit	OFF	When ON, it indicates that data of the specified object is being read.
(8)	o_dData	Read data	Double word [signed]	0	When data of the specified object has been read normally, the read data is stored.
(9)	o_bErr	Error completion	Bit	OFF	When ON, it indicates that an error has occurred in the FB.
(10)	o_uErrId	Error code	Word [unsigned]/bit string [16 bits]	0	The error code generated in the FB is stored.



## Function overview

Item	Description
Language	Structured Text
Number of basic steps	449 steps
Function description	<p>This FB is used to use the servo transient transmission function. Four points of optional SDO1 to 4 correspond to ReadSvTransSDO1 to 4.</p> <p>By turning ON Execution command (i_bEN), this FB reads objects of the axes specified in Axis information (io_stAxis), Object index (i_uODIndex), and Object sub index (i_wODSub).</p> <p>Executing (o_bBusy) is ON while the objects are being read.</p> <p>When the objects have been read normally, Normal completion (o_bOK) turns ON and the data is stored in Read data (o_dData).</p> <p>When an error has occurred in the FB, Error completion (o_bErr) turns ON and error details are stored in Error code (o_uErrId).</p> <p>For details of error codes, refer to  Page 36 Troubleshooting.</p>
Restrictions and precautions	<ul style="list-style-type: none"> <li>• This FB is used in AxisDiagnosisData (Axis diagnostic data reading). Do not use this FB while AxisDiagnosisData is being executed.</li> <li>• Do not change the axis number or I/O number of Axis information (io_stAxis) during execution of this FB.</li> <li>• For Object index (i_uODIndex) and Object sub index (i_wODSub), refer to the manuals of the slave device used. When an object that is not supported by the slave device has been specified, an error occurs.</li> <li>• Execute this FB only for the axes set in the network configuration. When the FB is executed for other axes, the processing is not continued and Executing (o_bBusy) remains ON.</li> </ul>
FB compiling method	Subroutine type
FB operation type	Pulsed execution (multiple scan execution type)
Timing chart	<p>[Normal completion]</p>  <p>[Error completion]</p> 

## 3.4 List of Structures

The following table lists the structures used in these FBs.

Structure name	Description	Version
AXIS_REF	Axis information	00A
stDBInfo	Database information	00A
stDBTable1Field	Database table 1 field information	00A
stDBTable2Field	Database table 2 field information	00A
stDBTable1Data	Database table 1 data	00A
stDBTable2Data	Database table 2 data	00A

### AXIS\_REF (Axis information)

#### Name

AXIS\_REF

#### Labels

Label name	Data type	Initial value	Description
AxisNo	Word [signed]	0	Specifies the axis number of the control target. [Setting range] 1 to 16
StartIO	Word [signed]	0	Specifies the start I/O number of the Simple Motion module to be the control target. (First three digits of four digits (hexadecimal))

### stDBInfo (Database information)

#### Name

stDBInfo

#### Labels

Label name	Data type	Initial value	Description
wsImportPath	String [Unicode] (32)	"2:\DiagDBInfo.txt"	Specifies the import file path. This label is referred to at the creation of a database.
wsDbFilePath	String [Unicode] (32)	"2:\DiagnosisDB"	Specifies the database path. This label is referred to when the database is operated.
wsDbTbl1Name	String [Unicode] (32)	"MachineDiagnosis"	Specifies the database table 1 name. This label is referred to when the database is operated.
wsDbTbl2Name	String [Unicode] (32)	"LifeDiagnosis"	Specifies the database table 2 name. This label is referred to when the database is operated.
stDbTbl1Field	stDBTable1Field	—	Database table 1 field information This label is referred to when the database is operated.
stDbTbl2Field	stDBTable2Field	—	Database table 2 field information This label is referred to when the database is operated.

## stDBTable1Field (Database table 1 field information)

### Name

stDBTable1Field

### Labels

Label name	Data type	Initial value	Description
wFieldNum	Word [signed]	16	Specify the number of fields.
wsFieldName1	String [Unicode] (31)	"Date"	Date
wsFieldName2	String [Unicode] (31)	"Time"	Time
wsFieldName3	String [Unicode] (31)	"I/O"	I/O
wsFieldName4	String [Unicode] (31)	"Axis No."	Axis number
wsFieldName5	String [Unicode] (31)	"Operation Status"	Axis operation status
wsFieldName6	String [Unicode] (31)	"OD2C20"	Machine diagnostic status
wsFieldName7	String [Unicode] (31)	"OD2C21"	Coulomb friction torque in positive direction
wsFieldName8	String [Unicode] (31)	"OD2C22"	Friction torque at rated speed in positive direction
wsFieldName9	String [Unicode] (31)	"OD2C23"	Coulomb friction torque in negative direction
wsFieldName10	String [Unicode] (31)	"OD2C24"	Friction torque at rated speed in negative direction
wsFieldName11	String [Unicode] (31)	"OD2C25"	Oscillation frequency during motor stop
wsFieldName12	String [Unicode] (31)	"OD2C26"	Vibration level during motor stop
wsFieldName13	String [Unicode] (31)	"OD2C27"	Oscillation frequency during motor operating
wsFieldName14	String [Unicode] (31)	"OD2C28"	Vibration level during motor operating
wsFieldName15	String [Unicode] (31)	"User data"	User data
wsFieldName16	String [Unicode] (31)	"Error Info"	Abnormal value field information

## stDBTable2Field (Database table 2 field information)

### Name

stDBTable2Field

### Labels

Label name	Data type	Initial value	Description
wFieldNum	Word [signed]	13	Number of fields
wsFieldName1	String [Unicode] (31)	"Date"	Date
wsFieldName2	String [Unicode] (31)	"Time"	Time
wsFieldName3	String [Unicode] (31)	"I/O"	I/O
wsFieldName4	String [Unicode] (31)	"Axis No."	Axis number
wsFieldName5	String [Unicode] (31)	"Operation Status"	Axis operation status
wsFieldName6	String [Unicode] (31)	"OD2C18"	Power ON cumulative time
wsFieldName7	String [Unicode] (31)	"OD2C19"	Inrush relay ON/OFF number
wsFieldName8	String [Unicode] (31)	"OD2B17"	Temperature of motor thermistor
wsFieldName9	String [Unicode] (31)	"OD2B25"	Encoder inside temperature
wsFieldName10	String [Unicode] (31)	"OD2B2E"	Unit total power consumption
wsFieldName11	String [Unicode] (31)	"OD2B09"	Effective load ratio
wsFieldName12	String [Unicode] (31)	"User data"	User data
wsFieldName13	String [Unicode] (31)	"Error Info"	Abnormal value field information

## stDBTable1Data (Database table 1 data)

### Name

stDBTable1Data

### Labels

Label name	Data type	Initial value	Description
uRecordNum	Word [unsigned]/bit string [16 bits]	0	Number of records
uRecordSize	Word [unsigned]/bit string [16 bits]	0	Size per record
dDate	Double word [signed]	0	Date
dTime	Double word [signed]	0	Time
wIO	Word [signed]	0	I/O
wAxisNo	Word [signed]	0	Axis number
uOperationStatus	Word [unsigned]/bit string [16 bits]	0	Axis operation status
uMachineDiagStatus	Word [unsigned]/bit string [16 bits]	0	Machine diagnostic status
wPosTrqStaticFriction	Word [signed]	0	Coulomb friction torque in positive direction
wPosTrqKineticFriction	Word [signed]	0	Friction torque at rated speed in positive direction
wNegTrqStaticFriction	Word [signed]	0	Coulomb friction torque in negative direction
wNegTrqKineticFriction	Word [signed]	0	Friction torque at rated speed in negative direction
wOscFreqDuringStop	Word [signed]	0	Oscillation frequency during motor stop
wVibLevelDuringStop	Word [signed]	0	Vibration level during motor stop
wOscFreqDuringOpertng	Word [signed]	0	Oscillation frequency during motor operating
wVibLevelDuringOpertng	Word [signed]	0	Vibration level during motor operating
wUserData	Word [signed]	0	User data
uErrInfo	Word [unsigned]/bit string [16 bits]	0	Abnormal value field information

## stDBTable2Data (Database table 2 data)

### Name

stDBTable2Data

### Labels

Label name	Data type	Initial value	Description
uRecordNum	Word [unsigned]/bit string [16 bits]	0	Number of records
uRecordSize	Word [unsigned]/bit string [16 bits]	0	Size per record
dDate	Double word [signed]	0	Date
dTime	Double word [signed]	0	Time
wIO	Word [signed]	0	I/O
wAxisNo	Word [signed]	0	Axis number
uOperationStatus	Word [unsigned]/bit string [16 bits]	0	Axis operation status
udCumulativePwrOnTime	Double word [unsigned]/bit string [32 bits]	0	Power ON cumulative time
udNumInrushCurSwTimes	Double word [unsigned]/bit string [32 bits]	0	Inrush relay ON/OFF number
wMotorThermTemp	Word [signed]	0	Temperature of motor thermistor
wInternalTempEnc	Word [signed]	0	Encoder inside temperature
dTotalPowerConsumption	Double word [signed]	0	Unit total power consumption
uEffectiveLoadRatio	Word [unsigned]/bit string [16 bits]	0	Effective load ratio
wUserData	Word [signed]	0	User data
uErrInfo	Word [unsigned]/bit string [16 bits]	0	Abnormal value field information

## 3.5 List of Global Labels

### G\_stDBInfo (Database information)

#### Name

G\_stDBInfo

#### Overview

Database information for collecting diagnostic data is defined in this parameter. Define the import file path, database path, table name, and field information in this parameter. FBs (DB\_Create, DB\_Operation) refer to this parameter and access to the database.

#### Setting

Label name	Data type	Class	Assignment (device/label)	Description
G_stDBInfo	stDBInfo	VAR_GLOBAL	-	Database information is set in this parameter. The initial value of the structure stDBInfo is set as the initial value of this parameter.

### G\_stDBTbl□Data (Database table data)

#### Name

G\_stDBTbl1Data

G\_stDBTbl2Data

#### Overview

These data variables are for one record stored in each table of the database for collecting diagnostic data. Diagnostic data collected by the FB (AxisDiagnosisuData) is stored in this parameter. The FB (DB\_Operation) adds each table data set in this parameter to the database.

Assign devices for this parameter. Assign devices so that data of each table is arranged continuously. Otherwise, data cannot be saved properly.

Data of the table 1 is assigned in D0 to D19 and data of the table 2 is assigned in D20 to D39 by the sample program.

Change the assignment of the devices as needed.

#### Setting

Label name	Data type	Class	Assignment (device/label)	Description
G_stDBTbl1Data	G_stDBTbl1Data	VAR_GLOBAL	D0 to D19	This parameter stores the data to be added to the table 1 of the database.
G_stDBTbl2Data	G_stDBTbl2Data	VAR_GLOBAL	D20 to D39	This parameter stores the data to be added to the table 2 of the database.

## 3.6 Troubleshooting

---

### List of error codes

---

The following table lists the error codes to be output in this sample program.

For the error codes that occurs due to the access to the database, refer to the MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks).

For other errors, refer to the error codes of the module.

Error code	Description	Remedy
100h	A value out of the range is set as an axis number.	Review and correct the setting and then execute the FB again.
101h	A communication error has occurred.	Review and correct the setting and then execute the FB again.

# INSTRUCTION INDEX

---

## A

---

AxisDiagnosisData . . . . . 28

## C

---

CollectInterval. . . . . 26

## D

---

DB\_Create . . . . . 22

DB\_Operation. . . . . 24

## R

---

ReadSvTransSDO1 . . . . . 30

ReadSvTransSDO2 . . . . . 30

ReadSvTransSDO3 . . . . . 30

ReadSvTransSDO4 . . . . . 30



# MEMO

---



# REVISIONS

---

\*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
September 2016	BCN-B62005-794-A	First edition

Japanese manual number: BCN-B62005-793-A

---

This manual confers no industrial property rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

---

© 2016 MITSUBISHI ELECTRIC CORPORATION

# TRADEMARKS

---

Unicode is either a registered trademark or a trademark of Unicode, Inc. in the United States and other countries.

The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.

In some cases, trademark symbols such as <sup>™</sup> or <sup>®</sup> are not specified in this manual.



BCN-B62005-794-A(1609)MEE

## **mitsubishi electric corporation**

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN  
NAGOYA WORKS : 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA, JAPAN

When exported from Japan, this manual does not require application to the  
Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.