Mitsubishi Electric Corporation
Mitsubishi EZSocket CNC provider

Version 1.4.7

User's guide

March 28, 2023

Remarks:
Connect with the CNC with firmware version FL version or later.
To use this provider, Mitsubishi CNC communication software runtime library (FCSB1224W100) is required. This provider was developed using library version A5.
Machine translation is used for English translation of this document.

【 revision history 】

Version	Date	Content
1.2.2	2018-08-30	First edition.
1.3.0	2018-08-31	PLCRANGE variable addition.
	2018-09-05	Objection correction.
1.3.1	2018-10-12	Correct the trouble of the method of the access to the element of the device type of PLC of addressing and the trouble of the method of specifying the device name of the counter coil and 10ms unit timer coil.
1.3.2	2018-10-26	Correction of trouble when controller plurals connects it.
	2018-11-21	Correct the default value of optional Timeout when the controller is added.
	2019-03-05	User's guide correction
1.3.3	2019-06-24	Fixed a bug when getting the value of PLCELEM variable.
1.4.0	2019-12-05	Changed the internal logic.
1.4.1	2019-01-15	Fixed a bug.
1.4.2	2020-02-28	Changed the connection method with CNC. Added error code.
1.4.4	2020-06-30	The connection method with CNC has been returned to the method of Ver 1.4.1. Changed the provider thread model to STA.
	2020-08-03	User's guide was revised.
	2021-03-09	Correct duplicate error codes
1.4.5	2021-05-14	Fixed a bug when calling the CaoWorkspace :: AddController method without the communication library.
1.4.6	2021-08-31	Optimized log output. Internal code optimization.
	2022-07-07	User's guide was revised.
1.4.7	2022-08-08	Correction of internal processing
	2023-03-28	Remarks have been added.

【 Operation check model 】

Model	Version	Notes
M700 series lathe		

Contents

1. Introduction

This book is an user's guide of the provider that accesses various information on CNC of Mitsubishi Electric Corporation. Figure 1-1 Block diagram However, it becomes a whole of device block diagram with this provider. This provider connects to Mitsubishi CNC by TCP / IP communication using Mitsubishi's S / W runtime library for CNC communication. If you want to support multithreading, you need to install a runtime that supports multithreading on your PC.This provider is named CNC provider later.

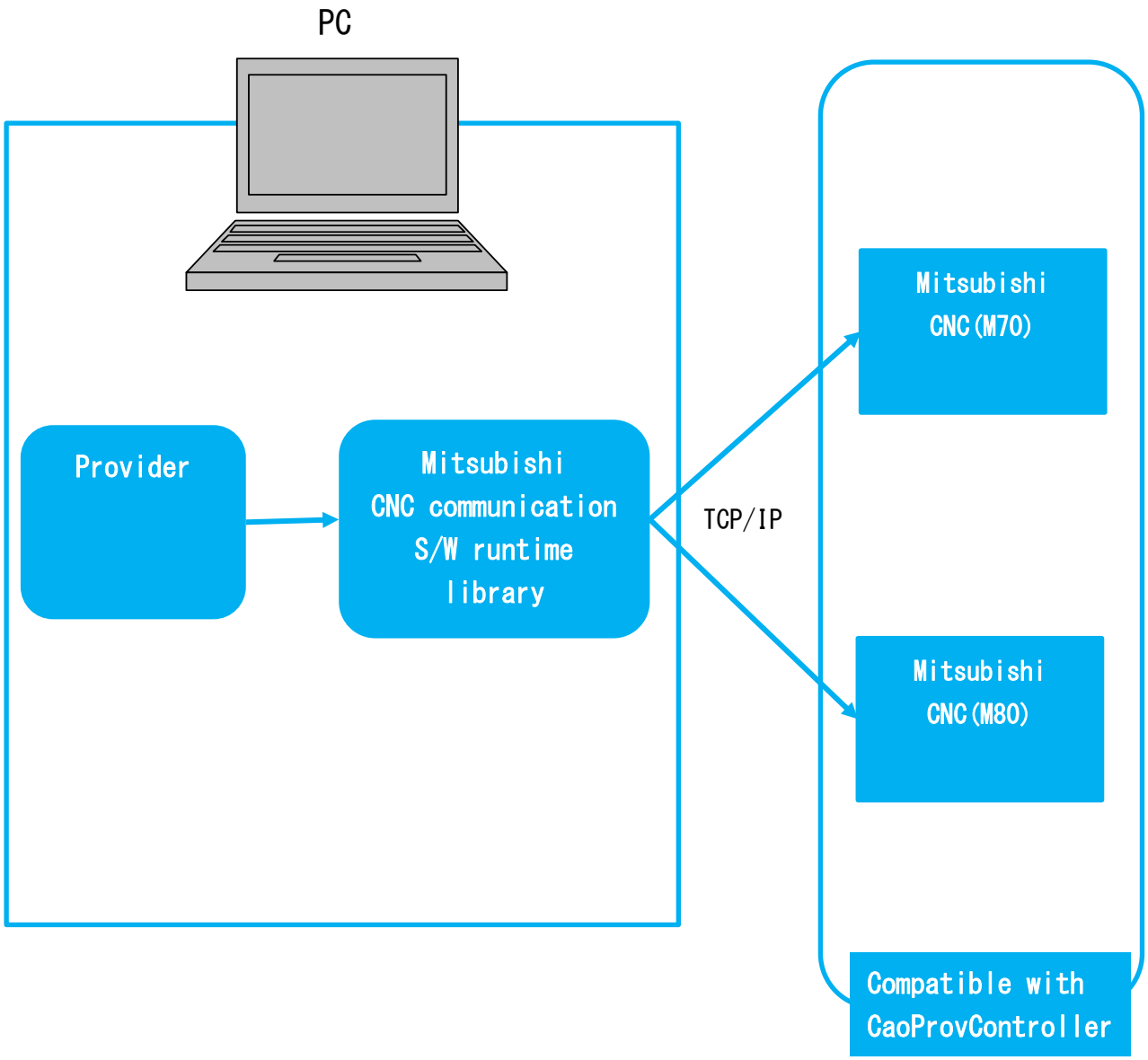


Figure 1-1 Block diagram

Moreover, this provider and correspondence each device Figure 1-2 is shown.
(* It is one example. It is not because everything is shown.)

Figure 1-2 Composition of provider and correspondence chart with device information

1.1. Environment and version that this book assumes

Client PC operates on Windows, and the environment whose targeted CNC is possible Ethernet connection's device made of company name kind is assumed. The development setting of PC can be developed in case of the programming environment that supports Component Object Model (COM and Component Object Model).

1.2. Source that becomes reference

The CNC provider is created by referring to the following manual. The information described in this document is the information referenced during development, so it may not be the latest information. For the latest information, refer to the latest reference manual published by Mitsubishi Electric Corporation.

- Mitsubishi CNC software FCSB1224W000 Reference Manual IB-1501208-D

All programming examples in this book are written in Visual Basic 6.0, but you can develop in various programming languages such as C++, Java, .NET. Please refer to "ORiN2 Programming Guide" for the usage.

"ORiN 2 programming guide" corresponds to the following files of the ORiN2 SDK installation folder.

- ORiN2¥CAO¥Doc¥ORiN2_ProgrammersGuide_<lang>.pdf

- Replace with the language character string of each environment and read the part of <lang >.

ORiN2 needed in developing the application that uses the provider and COM/DCOM are explained while exchanging the example for basic knowledge and the technology.

2. Environmental setup for application development

2.1. Connection of CNC and client PC

The CNC provider connects it with CNC by using Mitsubishi EZSocketCNC API, and when connecting it with CNC, Mitsubishi EZSocketCNC API connects it by the TCP/IP communication. Insert LAN cable connected with client PC in the CNC device. As shown in Figure 2.1-1, there are two outlets, but insert them into the red circle on the left.

* The usage may differ for each LAN port depending on the specifications of the device. If communication is not possible even after plugging in as shown in the figure, contact the manufacturer.

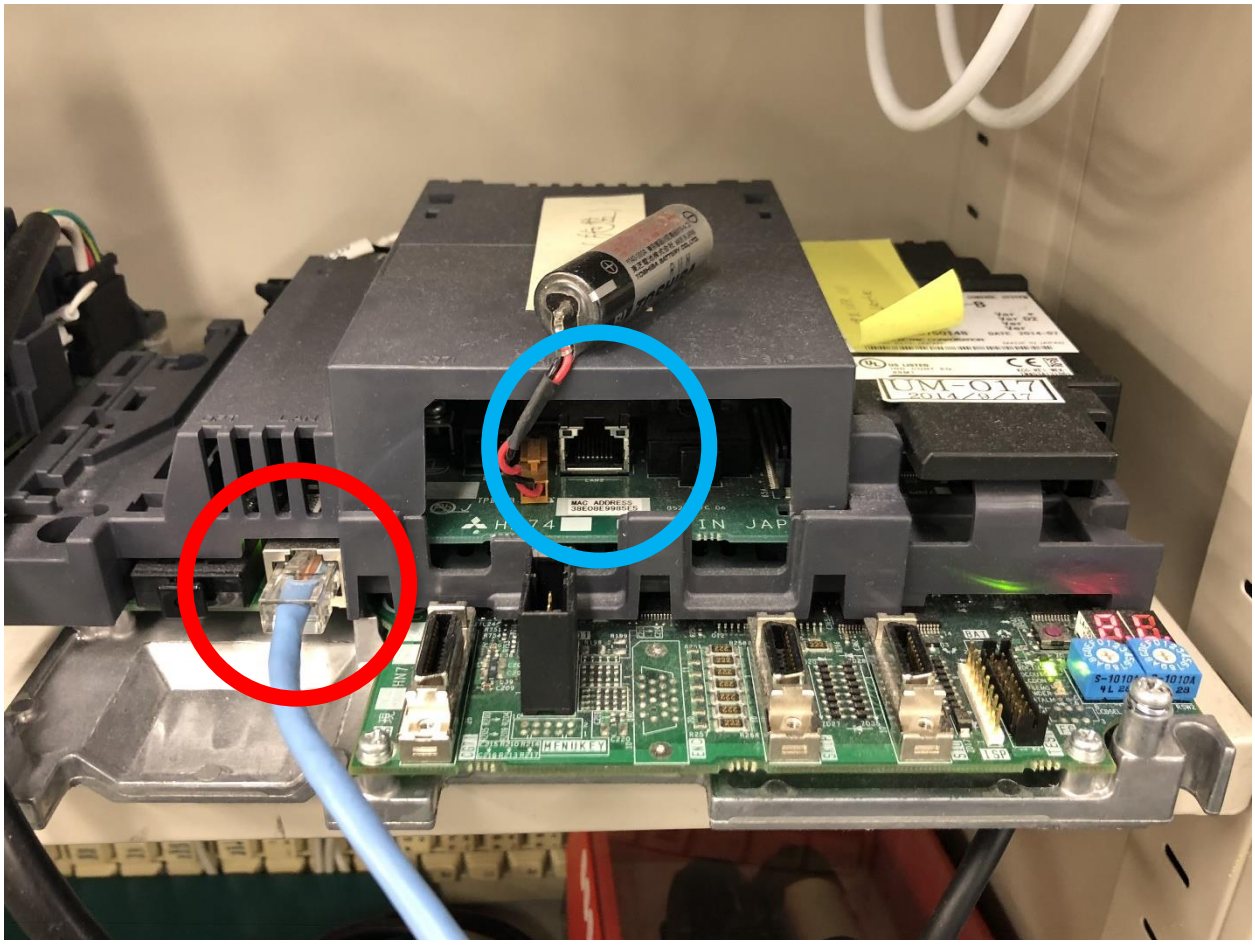


Figure 2.1-1 Device of actual

2.2. Setup of PC development setting

2.2.1. Preparation for execution run time

Install the Mitsubishi CNC communication S/W runtime library on the Mitsubishi Electric homepage on the development PC in advance. To support multi-threading, you need to install the multi-threaded version of the runtime library.

2.2.2. Manual installation of CNC provider

It is necessary to register the following registry by the hand work to use the CNC provider. Start the command prompt by the manager authority, and execute the regsvr32 command when you register the registry. Move to passing with the file when executing it or execute the file passing specifying it.

Moreover, if one regular ORiN2 SDK license of each PC is not registered beforehand so that the CAO engine may work, it doesn't become it. Refer to the paragraph of "Addition and deletion of the license" in the ORiN2 SDK user's guide.

Table 2-1 CNC provider

File name	CaoProvMitsubishiEZSocketCNC.dll
ProgID	CaoProv.Mitsubishi.EZSocketCNC
Registry registration	regsvr32 CaoProvMitsubishiEZSocketCNC.dll
Blotting out of registry registration	regsvr32 /u CaoProvMitsubishiEZSocketCNC.dll

3. Programming by CNC provider

In the CNC provider, client PC and CNC can be connected according to the following procedures.

- Making of CaoEngine
- Making of CaoWorkspace
- Making of CaoController

After it connects it with CNC, it can access information in CNC by generating the CaoVariabe object to CaoController.

3.1. Sample programming accessed PLC

The sample program that reads and writes the value of register area R of PLC as an example is shown here. Table 3-1 The requirement for sample program, Figure 3-1 The flow of sample program is described respectively.

Table 3-1 Requirement for sample program

Requirement	Explanation
Connection destination	Connect it by TCP/IP.
	Connection destination Internet Protocol address is 10.195.133.20.
	The connection destination port number is 683.
Content of processing	Read the value from R0100 of PLC.
	Write the acquired value + 1 value to R1100 of PLC.

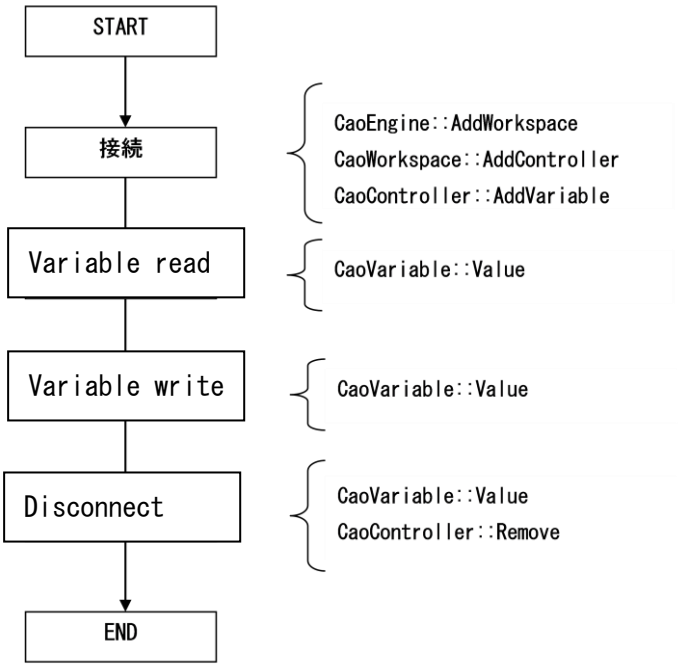


Figure 3-1 Flow of PLC access

A concrete code is shown from the following paragraphs.

3.1.1. Sample program

The whole image of the sample program is shown as follows.

Sample	READ_WRITE_PLC.vb

```
Sub Main
    ' object
    Dim engine As caoEngine
    Dim workspace As caoWorkspace
    Dim ctrl As CaoController
    Dim varR0100 As CaoVariable
    Dim varR1100 As CaoVariable

     ' generation of CaoEngine object
    Set engine = New caoEngine
     ' generation of CaoWorkspace object
    Set workspace = engine.AddWorkspace("NewWrks", "")
     ' generation of CaoController object
    Set ctrl = workspace.AddController("EZSocketCNC", _
                                       "CaoProv.MITSUBISHI.EZSocketCNC", _
                                       "", _
                                       "CONN=ETH:10.195.133.20, TIMEOUT=50")

     ' add CalVariable accessed R0100 to CaoController.
    Set varR0100 = ctrl.AddVariable("PLCELEM_R0100", "DeviceType = R, Number = 100")
```

```
    ' add CaoVariable accessed R1100 to CaoController.
    Set varR1100 = ctrl.AddVariable("PLCELEM_R1100", "DeviceType = R, Number = 1100")

    ' Read value from R0100
    Dim value As Long
    value = varR0100.value

    ' Write the value read from R0100 + 1 to R1100
    varR1100.value = value + 1

    ' delete CaoController from CaoWorkspace.
    Call workspace.Controllers.Remove(ctrl.Index)
    ' deletion of CaoController
    Set ctrl = Nothing

    ' delete CaoWorkspace from CaoEngine.
    Call engine.Workspaces.Remove(workspace.Index)
    ' deletion of CaoWorkspace
    Set workspace = Nothing

    ' deletion of CaoEngine
    Set engine = Nothing
End Sub
```

3.1.1.1. Connection

Take the following procedures to connect it with CNC.

(1) Prepare the variable to maintain the object. The object necessary for the controller connection is CaoEngine object, CaoWorkspace object, and CaoController object. When the CaoController object is acquired from CaoWorkspaces, the CaoWorkpace object need not prepare the variable. Moreover, the CaoVariable object to access the variable is needed. The example of the code in VB6 is shown as follows.

```
Dim engine As caoEngine          ' variable for CaoEngine object
Dim workspace As caoWorkspace    ' variable for CaoWorkspace object
Dim ctrl As CaoController        ' variable for CaoController object
Dim varR0100 As CaoVariable      ' variable for CaoVariable object
Dim varR1100 As CaoVariable      ' variable for CaoVariable object
```

(2) Generate the CaoEngine object. The CaoEngine object uses and generates the New key word.

```
' generation of CaoEngine object
Set engine = New caoEngine
```

(3) Acquire the CaoWorkspace object or generate it. When the CaoEngine object is

generated, the CaoWorkspaces object and the CaoWorkspace object are generated with default one by one. The example of the code of newly generating the CaoWorkspace object and CaoWorkspace of default are shown as follows.

```
' generation of CaoWorkspace object
Set workspace = engine.AddWorkspace("NewWrks", "")
```

(4) Generate the CaoController object. Set the CaoController object and set the provider name used and the parameter to use it to generate it. In the CNC provider, specify Internet Protocol address of the controller of the connection destination in the option. The example of the code is shown as follows.

```
' generation of CaoController object
Set ctrl = workspace.AddController("EZSocketCNC", _
                                   "CaoProv.MITSUBISHI.EZSocketCNC", _
                                   "", _
                                   "CONN=ETH:10.195.133.20, TIMEOUT=50")
```

(5) Generate the CaoVariable object. Generate the CaoVariable object of the variable to be connected. The example of the code of generating the variable object accessed PLC(R0100) and PLC(R1100) is shown as follows.

```
Set varR0100 = ctrl.AddVariable("PLCELEM_R0100", "DeviceType = R, Number = 100")
Set varR1100 = ctrl.AddVariable("PLCELEM_R1100", "DeviceType = R, Number = 1100")
```

3.1.1.2. Read Write in PLC address

Reference/set the Value property of the CaoVariable object acquisition/to set the value of the connected PLC address. When the value of the PLC address acquisition/is set, there is a sign and it is necessary to prepare the integer by 32 bits. The example of the code is shown as follows.

```
Dim value As Long
value = varR0100.' Value acquisition of value
varR1100.value = value + 1                    ' setting of value
```

3.1.1.3. Disconnect

Delete the generated object, and delete the object deleted from the collection class that manages the object when cutting it with the controller. The example of the code is shown as follows.

```
' clear CaoVariable from CaoController.
Call ctrl.Variables.Clear
' deletion of CaoVariable
Set varR0100 = Nothing
Set varR1100 = Nothing

' delete CaoController from CaoWorkspace.
Call workspace.Controllers.Remove(ctrl.Index)
' deletion of CaoController
Set ctrl = Nothing
' delete CaoWorkspace from CaoEngine.
Call engine.Workspaces.Remove(workspace.Index)
' deletion of CaoWorkspace
Set workspace = Nothing
' deletion of CaoEngine
Set engine = Nothing
```

4. Command reference

4.1. Method/property list

Table 4-1 Method/property list

Category	[1]Method/property		Function	Reference
CaoWorkspace				
	Addcontroller	M	Connect it with the controller.	P.15
CaoController				
	Index	P	Get controller number.	P.17
	Name	P	Get controller name.	P.17
	VarialbeNames	P	Acquisition of variable identifier list that can be connected	P.18
	Variables	P	Acquisition of variable collection that controller maintains	P.18
CaoVariable				
	Index	P	Get task number.	P.19
	Name	P	Get task name.	P.20
	Value	P	Acquisition/setting of value	P.20

4.2. Method property

4.2.1. CaoWorkspace class

4.2.1.1. AddController method

Add the controller object to CaoWorkspace. The CNC provider refers to the parameters passed when the AddController method is executed and connects with the CNC.

Format

CaoController AddController

```
(
        "< controller name >"                   // Controller name (arbitrariness)
        "CaoProv.MITSUBISHI.EZSocketCNC",       // Provider name (fixation)
        "< machine name >"                      //  Provider execution machine name
(unused)
        "< option >"                            // Optional character string
)
```

[1] M:Method and P: The property is E: The event is shown respectively.

Usage example

```
Dim caoEng As CaoEngine       ' Engine object
Dim caoWs As CaoWorkspace     ' WorkSpace object
Dim caoCtrl As CaoController ' Controlle object

Set caoEng = New CaoEngine
Set caoWS = caoEng.Workspaces.Item(0)
Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                  "CaoProv.MITSUBISHI.EZSocketCNC",
                                  "",
                                  "CONN = ETH:10.195.133.20 ,TIMEOUT=50")
```

Option

The option specified for an optional character string is shown as follows. An optional character string becomes a character string to which each option shown in the following ties by comma (,).

Option	Required	Explanation	Range of value	Default value
Conn=	✓	Option (ETH) for connection	-----	Refer to 4.2.1.1.1.
Series=	--	NC system type	5:M700 series lathe 6:M700 series machining 8:M800 series lathe 9:M800 series machining	5
Machine=	--	NC control unit-number - When plurals are connected, it is necessary to give a number unique in each controller.	1 - 255	1
Timeout=	--	Response standby time (100ms)	1 - 3000	10
Multithread=	--	Specify whether to communicate with the MultiThreading. If true is specified, it becomes possible for two or more NC to communicate simultaneously. Note that the provider crashes when true is specified when run time doesn't do for the MultiThreading.	true/false	false

4.2.1.1.1. Conn is optional.

conn = eth:<dest IP>[:<dest port>[:<local IP>[:<local port>]]]>

< dest IP > : Connection destination Internet Protocol address is specified in the form of "***.***.***.***".

< dest port > : Specify the connection destination port number.
Default: 683

< local IP > : Local Internet Protocol address is specified in the form of "***.***.***.***".
Default: Unspecification
< local port > : Default: Unspecification

4.2.2. CaoController class

4.2.2.1. Index property

Get the controller number in Long type (4 byte integer type). This number indicates the number of data in the controller collection that the corresponding controller holds in the CaoWorkspace class.

Usage example

```
Dim caoEng As CaoEngine       ' Engine object
Dim caoWs As CaoWorkspace     ' WorkSpace object
Dim caoCtrl As CaoController ' Controller object

Set caoEng = New CaoEngine
Set caoWS = caoEng.Workspaces.Item(0)
Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                  "CaoProv.MITSUBISHI.EZSocketCNC",
                                  "",
                                  "CONN = ETH:10.195.133.20 ,TIMEOUT=50")
' Get Index
Dim index as Long
index = caoCtrl.Index
```

4.2.2.2. Name property

Get the controller name specified in AddController method of CaoWorkspace class.

Usage example

```
Dim caoEng As CaoEngine       ' Engine object
Dim caoWs As CaoWorkspace     ' WorkSpace object
Dim caoCtrl As CaoController ' Controller object

Set caoEng = New CaoEngine
Set caoWS = caoEng.Workspaces.Item(0)
Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                  "CaoProv.MITSUBISHI.EZSocketCNC",
                                  "",
                                  "CONN = ETH:10.195.133.20 ,TIMEOUT=50")

Debug.Print caoCtrl. Name
```

4.2.2.3. VariableNames property

Acquire the variable identifier list that can be connected. Describe the variable identifier acquired in this property later. The variable identifier acquired in this property can be used for the first argument of the AddVariable method of the following description.

Usage example

```
    Dim caoEng As CaoEngine      ' Engine object
    Dim caoWs As CaoWorkspace    ' WorkSpace object
    Dim caoCtrl As CaoController ' Controller object

    Set caoEng = New CaoEngine
    Set caoWS = caoEng.Workspaces.Item(0)
    Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                      "CaoProv.MITSUBISHI.EZSocketCNC",
                                      "",
                                      "CONN = ETH:10.195.133.20 ,TIMEOUT=50")

    ' File name list acquisition
    Dim variables as Variant
    variables = caoCtrl.VariableNames
```

4.2.2.4. Variables property

Acquire the variable collection that the controller maintains.

Usage example

```
    Dim caoEng As CaoEngine      ' Engine object
    Dim caoWs As CaoWorkspace    ' WorkSpace object
    Dim caoCtrl As CaoController ' Controller object

    Set caoEng = New CaoEngine
    Set caoWS = caoEng.Workspaces.Item(0)
    Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                      "CaoProv.MITSUBISHI.EZSocketCNC",
                                      "",
                                      "CONN = ETH:10.195.133.20 ,TIMEOUT=50")

    ' Variable collection acquisition
    Dim variables as CaoVariables
    Set variables = caoCtrl.Variables

    ' Variable acquisition
    Dim variable as CaoVariable
    Set variable = Variables.Item(0)
```

4.2.2.5. AddVariable method

The variable object is added to CaoController. Only the one shown in 4.3.1 can be used for the variable identifier.

The specification of AddVariable is shown as follows.

Format

CaoVariable AddVariable

```
(
        "< variable identifier >"              // Variable identifier
        "< option >"           // Optional character string
)
```

Usage example

```
    Dim caoEng As CaoEngine      ' Engine object
    Dim caoWs As CaoWorkspace    ' WorkSpace object
    Dim caoCtrl As CaoController ' Controller object

    Set caoEng = New CaoEngine
    Set caoWS = caoEng.Workspaces.Item(0)
    Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                      "CaoProv.MITSUBISHI.EZSocketCNC",
                                      "",
                                      "CONN = ETH:10.195.133.20 ,TIMEOUT=50")

    'Variable object
    Dim var as CaoVariable
    Set var = caoCtrl.AddVariable("PLCELEM<D0100>", "DeviceType = D, Number = 100")
```

4.2.3. CaoVariable class

4.2.3.1. Index property

Get the variable number in Long type (4 byte integer type). This number indicates the number of data in the variable collection that the corresponding variable holds in the CaoController class.

Usage example

```
    Dim caoEng As CaoEngine      ' Engine object
    Dim caoWs As CaoWorkspace    ' WorkSpace object
    Dim caoCtrl As CaoController ' Controller object

    Set caoEng = New CaoEngine
    Set caoWS = caoEng.Workspaces.Item(0)
    Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                      "CaoProv.MITSUBISHI.EZSocketCNC",
```

```
                                    "",
                                    "CONN = ETH:10.195.133.20 ,TIMEOUT=50")

    ' Variable object
    Dim var as CaoVariable
    Set var = caoCtrl.AddVariable("PLCELEM<D0100>", "DeviceType = D, Number = 100")

    ' Get Index
    Dim index As Long
    Index = var.Index
```

4.2.3.2. Name property

Get the variable name specified in AddVariable method of CaoController class.

Usage example

```
    Dim caoEng As CaoEngine      ' Engine object
    Dim caoWs As CaoWorkspace    ' WorkSpace object
    Dim caoCtrl As CaoController ' Controller object

    Set caoEng = New CaoEngine
    Set caoWS = caoEng.Workspaces.Item(0)
    Set caoCtrl = caoWS.AddController("EZSocketCNC",
                                    "CaoProv.MITSUBISHI.EZSocketCNC",
                                    "",
                                    "CONN = ETH:10.195.133.20 ,TIMEOUT=50")

    ' Variable object
    Dim var as CaoVariable
    Set var = caoCtrl.AddVariable("PLCELEM<D0100>", "DeviceType = D, Number = 100")

    Debug.Print varD0100.Name
```

4.2.3.3. Value property

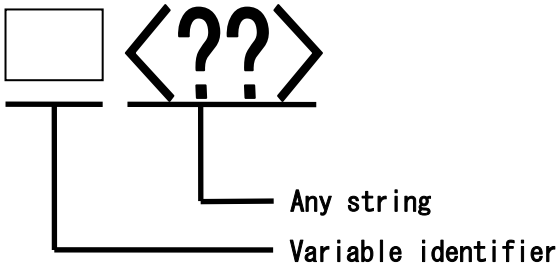
Acquisition/set data from connected CNC. Operation is different depending on the variable identifier. Please refer to chapter 4.3.1 for details.

4.3. Variable list

Define the variable list that can be used in each class. The variable indicates the object of the CaoVariable class.

When specifying user variables, it is possible to add arbitrary character strings to register multiple variables (useful for changing only options, etc.) as shown below. The format for assigning arbitrary character strings to variable names is shown below.

Two or more variable commonness and specification formats



4.3.1. CaoController class variable

Variable identifier	Explanation	Value		Reference
		get	put	
@MAKER_NAME	Acquire the manufacturer name.	✓	-	P.21
@VERSION	Acquire the DLL version.	✓	-	P.22
PLCELEM<??>	Access one element of the device of PLC.	✓	✓	P.22
PLCRANGE<??>	Access the device of PLC the range.	✓	✓	P.24
COMMON<??>	Access a common variable.	✓	-	P.24
TOOL_OFFSET<??>	Acquire the amount of the tool correction.	✓	-	P.27
PRG_NAME<??>	Return the program number while completing the search or driving automatically now.	✓	-	P.28

4.3.1.1. @MAKER_NAME

Acquire the manufacturer name.

Usage example

```
Dim engine As caoEngine
Dim workspace As caoWorkspace
Dim ctrl As CaoController
Set engine = New caoEngine
Set workspace = engine.AddWorkspace("NewWrks", "")
Set ctrl = workspace.AddController("EZSocketCNC", _
                                   "CaoProv.MITSUBISHI. EZSocketCNC", _
                                   "", _
                                   "CONN=ETH:10.195.133.20, TIMEOUT=50")
' Variable addition
Dim var As CaoVariable
Set var = ctrl.AddVariable("@MAKER_NAME")
' Value acquisition
Dim strVal As String
```

```
strVal = var.value
```

Data type

Type explanation	
VT_BSTR	Acquire the manufacturer name.

4.3.1.2. @VERSION

Acquire the version of DLL.

Usage example

```
Dim engine As caoEngine
Dim workspace As caoWorkspace
Dim ctrl As CaoController
Set engine = New caoEngine
Set workspace = engine.AddWorkspace("NewWrks", "")
Set ctrl = workspace.AddController("EZSocketCNC", _
                            "CaoProv.MITSUBISHI.EZSocketCNC", _
                            "", _
                            " CONN=ETH:10.195.133.20, TIMEOUT=50")
' Variable addition
Dim var As CaoVariable
Set var = ctrl.AddVariable("@VERSION")
' Value acquisition
Dim value As String
value = var.value
```

Data type

Type explanation	
VT_BSTR	Acquire the version of DLL. *.*.*

4.3.1.3. PLCELEM<??>

Access each element of the PLC device. Enter any character string after PLCELEM. The options and return values at the time of acquisition/setting are described below.

Usage example

```
Dim engine As caoEngine
Dim workspace As caoWorkspace
Dim ctrl As CaoController
Set engine = New caoEngine
Set workspace = engine.AddWorkspace("NewWrks", "")
Set ctrl = workspace.AddController("EZSocketCNC", _
                                   "CaoProv.MITSUBISHI. EZSocketCNC", _
                                   "", _
```

```
                                        "CONN=ETH:10.195.133.20, TIMEOUT=50")
    ' Variable addition
    Dim var As CaoVariable
    Set var = ctrl.AddVariable("PLCELEM<R0100>", "DeviceType=R, Number=100")

    ' Value acquisition
    Dim value As Long
    value = var.value
```

Option

Option	Required	Explanation	Range of value	Default value
DeviceType=	✓	Specify the access device.	----	----
Number=	✓	Specify the access head address by the hexadecimal number.	0 -	----
DataType=	--	Specify the data type of the Value property. It becomes the type of the default of the access device when omitting it.	1: Bit 8: Byte 16: Word 32: Dword	Depends on the access device.
Elem=	--	Specify how many points to read.	1 -	1
IsArray=	--	Specify whether to arrange it when Elem is one.	true/false	false

Data type

DataType	Type explanation	
1	VT_BOOL	It reads and writes it by the VT_BOOL type.
8	VT_UI1	It reads and writes it by the VT_UI1 type.
16	VT_I2	It reads and writes it by the VT_I2 type.
32	VT_I4	It reads and writes it by the VT_I4 type.

- Two or more is specified for Elem or if True is specified for IsArray, it becomes an array.

Device kind

Device name	Name
B	Counter (fixed counter)
C (*3)	Counter coil
D	Data register

Device name	Name
E	Special relay
F	Alarm message interface. Intermediate data storage.
G	Intermediate data storage
I	I device
J	J device
L	Latch relay (backup memory)
M	Intermediate data storage
Q	Q device
R	File register(*1)
SM	Special relay(*1)
SB	Special relay for link
SD	Special register
ST	Multiplication timer
SW	Special register for link
T (*3)	10ms unit timer coil
U	For 2 input signals to PLC(*1)
V	V device
W	For 2 input signals to PLC(*1)
X	Input signal to PLC(*1)
Y	Output signal to PLC(*1)
ZR	File register

* 1: The usage is decided to this device. Do not use any undefined empty device other than the device corresponding to the input/output signal with the machine side.

* 2: These devices are only for reading.

* 3: For C and T devices, C is displayed as CI and T is displayed as TI on the CNC, but specify them as C and T here.

4.3.1.4. PLCRANGE<??>

Range access to PLC devices. Enter any character string after PLCRANGE. The options and return values at the time of acquisition/setting are described below.

Usage example

```
Dim engine As caoEngine
Dim workspace As caoWorkspace
Dim ctrl As CaoController
```

```
Set engine = New caoEngine
Set workspace = engine.AddWorkspace("NewWrks", "")
Set ctrl = workspace.AddController("EZSocketCNC", _
                                   "CaoProv.MITSUBISHI. EZSocketCNC", _
                                   "", _
                                   "CONN=ETH:10.195.133.20, TIMEOUT=50")
' Variable addition
Dim var As CaoVariable
Set var = ctrl.AddVariable("PLCRANGE<R0100>", "DeviceType=R, Number=100, Elem=100")

' Value acquisition
Dim value(99) As Long
value = var.value
```

Option

Option	Required	Explanation	Range of value	Default value
DeviceType=	✓	Specify the access device.	----	----
Number=	✓	Specify the access head address by the hexadecimal number.	0 -	----
DataType=	--	Specify the data type of the Value property. It becomes the type of the default of the access device when omitting it.	1: Bit 8: Byte 16: Word 32: Dword	Depends on the access device.
Elem=	--	Specify how many points to read. The maximum value of each DataType that can be specified is different.	Bit: 2 - 1280 Byte: 2 - 1280 Word: 2 - 640 Dword: 2 - 320	2

Data type

DataType	Type explanation	
1	VT_BOOL | VT_ARRAY	It reads and writes it by the VT_BOOL type.
8	VT_UI1 | VT_ARRAY	It reads and writes it by the VT_UI1 type.
16	VT_I2 | VT_ARRAY	It reads and writes it by the VT_I2 type.
32	VT_I4 | VT_ARRAY	It reads and writes it by the VT_I4 type.

Device kind

PLCELEM<??>It is similar.

4.3.1.5. COMMON<??>

Access a common variable. Input an arbitrary character string after COMMON. Record the return value at the option and Get as follows.

Usage example

```
Dim engine As caoEngine
Dim workspace As caoWorkspace
Dim ctrl As CaoController
Set engine = New caoEngine
Set workspace = engine.AddWorkspace("NewWrks", "")
Set ctrl = workspace.AddController("EZSocketCNC", _
                                   "CaoProv.MITSUBISHI. EZSocketCNC", _
                                   "", _
                                   "CONN=ETH:10.195.133.20, TIMEOUT=50")
' Variable addition
Dim var As CaoVariable
Set var = ctrl.AddVariable("COMMON<100>", "Number=100")

' Value acquisition
Dim value As Double
value = var.value
```

Option

Option	Required	Explanation	Range of value	Default value
Head=	--	Specify the system.	1 -	1
Number=	✓	Specify the common variable number in decimal.	1 -	----
Elem=	--	Specify how many points to read.	1 -	1
IsArray=	--	Specify whether to arrange it when Elem is one.	true/false	false

Data type

Type explanation			
VT_ARRAY | VT_VARIANT			
	i	VT_VARIANT	The type acquired by the situation of the read common variable is different. VT_EMPTY: When value of common variable unsets it VT_R8: When the value is set to a common variable

4.3.1.6. TOOL_OFFSET<??>

Get the amount of tool offset. Enter any character string after TOOL_OFFSET. Since the tool data differs depending on the connected CNC, the return value of the tool compensation amount for each connected CNC is shown in a separate table.

Usage example

```
Dim engine As caoEngine
Dim workspace As caoWorkspace
Dim ctrl As CaoController
Set engine = New caoEngine
Set workspace = engine.AddWorkspace("NewWrks", "")
Set ctrl = workspace.AddController("EZSocketCNC", _
                                   "CaoProv.MITSUBISHI. EZSocketCNC", _
                                   "", _
                                   "CONN=ETH:10.195.133.20, TIMEOUT=50")
' Variable addition
Dim var As CaoVariable
Set var = ctrl.AddVariable("TOOL_OFFSET<1>", "Number = 1")
' Value acquisition
Dim values() As Double
values = var.value
```

Option

Option	Required	Explanation	Range of value	Default value
Head=	--	Specify the system.	1 -	1
Number=	✓	Specify the tool number by the decimal number.	1 -	----
Elem=	--	Number of reading tools	1 -	1
IsArray=	--	Specify whether to arrange it when Elem is one.	true/false	false

Table 4-2 machining center 1

Type explanation			
VT_VARIANT | VT_ARRAY			Amount of correction of all read tools
i(*)	VT_ARRAY | VT_R8		Data of one tool
		0 VT_R8	Amount of tool correction

* $0 \leq i < Elem$

Table 4-3 machining center 2

Type explanation	
VT_VARIANT | VT_ARRAY	Amount of correction of all read tools

Type explanation				
i(*)	VT_ARRAY | VT_R8			Data of one tool
		0	VT_R8	Amount of size of length of tool correction
		1	VT_R8	Amount of wear-out of length of tool correction
		2	VT_R8	Amount of tool diameter size correction
		3	VT_R8	Amount of tool diameter wear-out correction

* $0 \leq i <$ Elem

Table 4-4 lathe

Type explanation				
VT_VARIANT| VT_ARRAY				Amount of correction of all read tools
i(*)	VT_ARRAY | VT_R8			Data of one tool
		0	VT_R8	Amount X of tip of the blade wear-out correction
		1	VT_R8	Amount Z of tip of the blade wear-out correction
		2	VT_R8	Amount C(Z) of tip of the blade wear-out correction
		3	VT_R8	Amount X of tip of the blade size correction
		4	VT_R8	Amount Z of tip of the blade size correction
		5	VT_R8	Amount C(Z) of tip of the blade size correction
		6	VT_R8	Radius R of tool
		7	VT_R8	Wear volume of radius R of tool
		8	VT_R8	Virtual tip of the blade point number P (0 - 8)

* $0 \leq i <$ Elem

4.3.1.7. PRG_NAME<??>

Return the program number while completing the search or driving automatically now. Input an arbitrary character string after PRG_NAME.

Usage example

```
Dim engine As caoEngine
Dim workspace As caoWorkspace
Dim ctrl As CaoController
Set engine = New caoEngine
Set workspace = engine.AddWorkspace("NewWrks", "")
Set ctrl = workspace.AddController("EZSocketCNC", _
                                   "CaoProv.MITSUBISHI. EZSocketCNC", _
                                   "", _
                                   "CONN=ETH:10.195.133.20, TIMEOUT=50")
' Variable addition
Dim var As CaoVariable
Set var = ctrl.AddVariable("PRG_NAME<1>")
```

```
' Value acquisition
Dim value As String
value = var.value
```

Option

Option	Required	Explanation	Range of value	Default value
Head=	--	Specify the system.	1 -	1
ProgramType=	--	Specify the kind of the program.	0: Main 1: Sub	0

Data type

Type explanation	
VT_BSTR	The program number while completing the search or driving automatically is returned as UNICODE character string now.

5. CNC provider error code

In this provider, the following and original the error code exists. (Table 5-1Reference)
The error code from API is described to appendix B.
About a common error of ORiN2, "ORiN2 Programing Guide" Refer to the chapter of the error code of".

Table 5-1 Original error code table

Error number	Explanation
0x80110001	An indispensable option is not input.
0x80110002	The specified value is outside the range.
0x80110003	An unsupported device is specified.
0x80110004	Exclusive control failed. If this error occurs frequently, specify a longer time using AddController's Timeout and try again.
0x80110005	The callback method was not called within the set Timeout time. If this error occurs frequently, specify a longer time in Timeout of AddController and try again.
0x80110006	Execution error. If you receive this error code, please contact the developer.
0x80110007	An unexpected exception occurred when getting the value.
0x80110008	An unexpected exception occurred when setting the value.
0x8011000A	A system number that does not exist is specified. Specify the existing system number and recreate the variable.

Appendix A. Table for API

CaoWorkspace::CaoAddController

API function name
IEZNcCommunication2::SetTCPIPProtocol
IEZNcCommunication3::Open2
IEZNcCommunication3::Close *When Multithread=false is specified for CaoWorkspace::AddController in the option
IEZNcCommunication3::Close2 *When Multithread=true is specified for CaoWorkspace::AddController in the option

CaoVariable

Variable identifier	Get_Value	Set_Value
PLCELEM<??>	IEZNcDevice::SetDevice IEZNcDevice::ReadDevice	IEZNcDevice::SetDevice IEZNcDevice::WriteDevice
PLCRANGE<??>	IEZNcDevice::ReadBlockDevice	IEZNcDevice::WriteBlockDevice
COMMON<??>	IEZNcCommunication::GetHead IEZNcCommunication::SetHead IEZNcSystem::GetSystemInformation IEZNcCommonVariable2::CommonVRead	---
TOOL_OFFSET<??>	IEZNcCommunication::GetHead IEZNcCommunication::SetHead IEZNcSystem::GetSystemInformation IEZNcTool::GetOffset IEZNcTool::GetType	---
PRG_NAME<??>	IEZNcCommunication::GetHead IEZNcCommunication::SetHead IEZNcSystem::GetSystemInformation	---

Appendix B. Error list from API

Error number	Explanation
0x80A00101	The telecommunication line has not been opened.
0x80A00104	Double, open error
0x80A00105	The data type of the argument is illegal.
0x80A00106	The data range of the argument is illegal.
0x80A00107	It doesn't support it.
0x80A00109	The telecommunication line cannot be opened.
0x80A0010A	The argument is NULL pointer.
0x80A0010B	Data is illegal of the argument.
0x80A0010C	COMM port steering wheel error
0x80B00101	The memory cannot be secured.
0x80B00102	The error of EZSocketPc cannot be acquired.
0x80B00201	Mode specification injustice
0x80B00202	Unfile opening
0x80B00203	The file already exists.
0x80B00204	The file opening has already been done.

Error number	Explanation
0x80B00205	A temporary file cannot be made.
0x80B00206	The file opening is not done by the writing mode specification.
0x80B00207	The writing data size is illegal.
0x80B00208	State that cannot be written
0x80B00209	The file opening is not done by the reading mode specification.
0x80B0020A	State that cannot be read
0x80B0020B	A temporary file cannot be made.
0x80B0020C	The file doesn't exist (READ mode).
0x80B0020D	The file cannot be opened.
0x80B0020E	Passing the file is illegal.
0x80B0020F	The reading file is illegal.
0x80B00210	The writing file is illegal.
0x80B00301	The host name when local connecting it by the automation call is illegal.
0x80B00302	The TCP/IP communication is not set.
0x80B00303	It is not possible already to set it because it is communicating.
0x80B00304	There is no subordinate position module.
0x80B00305	The EZSocketPc object is not generable.
0x80B00401	Data doesn't exist.
0x80B00402	Data repetition
0x80B00501	There is no parameter information file.
0x80020190	The NC card number is illegal.
0x80020102	The device has not been opened.
0x80020132	The command is illegal.
0x80020133	The parameter in communication tools data range is illegal.
0x80030143	Abnormality is found in the filesystem.
0x80030191	The directory doesn't exist.
0x8003019B	The drive doesn't exist.
0x800301A2	The directory doesn't exist.
0x800301A8	The drive doesn't exist.
0x80050D90	The system and the axis specification are illegal.
0x80050D02	The alarm kind is illegal.
0x80050D03	There is an error in the communication data between NC and PC.
0x80041194	Kind specification injustice of longevity management data
0x80041195	Range of set data

Error number	Explanation
0x80041196	Set tool number disagreement
0x80041197	The specified tool number is outside the specification.
0x80040190	The system and the axis specification are illegal.
0x80040191	The large division number is illegal.
0x80040192	The subsection number is illegal.
0x80040196	Do not finish entering the buffer that the application prepared.
0x80040197	The data type is illegal.
0x8004019D	It is in the state that data cannot be read.
0x8004019F	Data only for writing
0x800401A0	Axis specification injustice
0x800401A1	The data number is illegal.
0x800401A3	Reading data none
0x8004019A	The reading data range is illegal.
0x80040290	The system and the axis specification are illegal.
0x80040291	The large division number is illegal.
0x80040292	The subsection number is illegal.
0x80040296	Do not finish entering the buffer that the application prepared.
0x80040297	The data type is illegal.
0x8004029B	Data only for reading
0x8004029E	It is in the state that data cannot be written.
0x800402A0	Axis specification injustice
0x8004024D	The safety password is being locked.
0x800402A2	The format discontinuance was done according to an illegal parameter of SRAM open.
0x800402A4	Unable to register edit file (already editing).
0x800402A5	The edit file cannot be released.
0x800402A3	Data none at writing destination
0x8004029A	The writing data range is illegal.
0x800402A6	Safety password unsetting
0x800402A7	Safety data adjustment check error
0x800402A9	Invalid data type for safety.
0x800402A8	It is not possible to write it while sorting the tool data.
0x80040501	It reads at high speed and it is not registered.
0x80040402	Priority specification injustice
0x80040401	Number of registrations exceeded.

Error number	Explanation
0x80040490	The address is illegal.
0x80040491	The large division number is illegal.
0x80040492	The subsection number is illegal.
0x80040497	The data type is illegal.
0x8004049B	Data only for reading
0x8004049D	It is in the state that data cannot be read.
0x8004049F	Data only for writing
0x800404A0	Axis specification injustice
0x80040BA3	There is no re-twisting off position setting.
0x80030101	Another directory has already been opened.
0x80030103	Data size exceeded.
0x80030148	The file name is long.
0x80030198	The file name format is illegal.
0x80030190	It is not opened.
0x80030194	File information lead error
0x80030102	Another directory has already been opened (Only PC :).
0x800301A0	It is not opened.
0x800301A1	The file doesn't exist.
0x800301A5	File information lead error
0x80030447	It is in the state that cannot be copied (running).
0x80030403	Registration number
0x80030401	The file already exists at the copy destination.
0x80030443	Abnormality is found in the filesystem.
0x80030448	The file name is long.
0x80030498	The file name format is illegal.
0x80030404	Memory capacity
0x80030491	The directory doesn't exist.
0x8003049B	The drive doesn't exist.
0x80030442	The file doesn't exist.
0x80030446	It is in the state that cannot be copied (PLC is operating).
0x80030494	The former forwarding file cannot be read.
0x80030495	It is not possible to write it in the forwarding site file.
0x8003044A	It is in the state that cannot be copied (Be protecting it).
0x80030405	Collation error

Error number	Explanation
0x80030449	The collation function is not supported.
0x8003044C	The file is being copied.
0x80030490	The file has not been opened.
0x8003044D	The safety password is being locked.
0x8003049D	The file format is illegal.
0x8003049E	The password is different.
0x800304A4	The file is not generable (Only PC :).
0x800304A3	The file cannot be opened (Only PC :).
0x80030402	The file already exists at the copy destination.
0x800304A7	The file name format is illegal.
0x800304A2	The directory doesn't exist.
0x800304A8	The drive doesn't exist.
0x800304A1	The file doesn't exist.
0x800304A5	The former forwarding file cannot be read.
0x800304A6	It is not possible to write it in the forwarding site file.
0x80030406	Capacity of disk
0x800304A0	The file has not been opened.
0x80030201	File that cannot be deleted
0x80030242	The file doesn't exist.
0x80030243	Abnormality is found in the filesystem.
0x80030247	It is in the state that cannot be deleted (running).
0x80030248	The file name is long.
0x8003024A	It is in the state that the file cannot be deleted (Be protecting it).
0x80030291	The directory doesn't exist.
0x80030298	The file name format is illegal.
0x8003029B	The drive doesn't exist.
0x80030202	File that cannot be deleted
0x800302A7	The file name format is illegal.
0x800302A2	The directory doesn't exist.
0x800302A8	The drive doesn't exist.
0x800302A1	The file doesn't exist.
0x80030301	The new file name already exists.
0x80030342	The file doesn't exist.
0x80030343	Abnormality is found in the filesystem.

Error number	Explanation
0x80030347	It is in the state that cannot be renamed (running).
0x80030348	The file name is long.
0x8003034A	It is in the state that cannot be renamed (Be protecting it).
0x80030391	The directory doesn't exist.
0x80030398	The file name format is illegal.
0x8003039B	The drive doesn't exist.
0x80030303	It is not possible to rename it.
0x80030305	The old and new file name is the same.
0x80030302	The new file name already exists.
0x800303A7	The file name format is illegal.
0x800303A2	The directory doesn't exist.
0x800303A8	The drive doesn't exist.
0x800303A1	The file doesn't exist.
0x80030691	The directory doesn't exist.
0x8003069B	The drive doesn't exist.
0x80030643	Abnormality is found in the filesystem.
0x80030648	The file name format is illegal.
0x800306A2	The directory doesn't exist (Only PC :).
0x800306A8	The drive doesn't exist (Only PC :).
0x80030701	Do not finish entering the buffer that the application prepared.
0x80030794	Drive information lead error
0x82020001	It has already been opened.
0x82020002	It is not opened.
0x82020004	The card doesn't exist.
0x82020006	The channel number is illegal.
0x82020007	Invalid file descriptor is illegal.
0x8202000A	It is not connected.
0x8202000B	It is not closed.
0x82020014	Time-out
0x82020015	Data is illegal.
0x82020016	It ended by the cancel request.
0x82020017	The packet size is illegal.
0x82020018	It ended by the task end.
0x82020032	The command is illegal.

Error number	Explanation
0x82020033	The setting data is illegal.
0x80060001	The data lead cash is invalid.
0x80060090	The address is illegal.
0x80060091	The large division number is illegal.
0x80060092	The subsection number is illegal.
0x80060097	The data type is illegal.
0x8006009A	The data range is illegal.
0x8006009D	It is in the state that data cannot be read.
0x8006009F	The data type is illegal.
0x800600A0	Axis specification injustice
0x80070140	The work area cannot be secured.
0x80070142	The file cannot be opened.
0x80070147	It is in the state that the file cannot be opened (running).
0x80070148	The file passing is long.
0x80070149	Unsupport (CF uncorrespondence)
0x80070192	It has already been opened.
0x80070199	The maximum file opening number was exceeded.
0x8007019F	It is not possible to open while sorting the tool data.
0x800701B0	The safety password unattests it.
0x80070290	The file has not been opened.
0x80070340	The work area cannot be secured.
0x80070347	It is in the state with a not generable file (running).
0x80070348	The file passing is long.
0x80070349	Unsupport (CF uncorrespondence)
0x80070392	It has already been generated.
0x80070393	Unable to generate file.
0x80070399	The maximum file opening number was exceeded.
0x8007039B	The drive doesn't exist.
0x80070490	The file has not been opened.
0x80070494	File information lead error
0x80070549	Writing is improper.
0x80070590	The file has not been opened.
0x80070595	File writing error
0x80070740	File deletion error

Error number	Explanation
0x80070742	The file doesn't exist.
0x80070747	It is in the state that the file cannot be deleted (running).
0x80070748	The file passing is long.
0x80070749	Unsupport (CF uncorrespondence)
0x80070792	The file has been opened.
0x8007079B	The drive doesn't exist.
0x80070842	The file doesn't exist.
0x80070843	File that cannot be renamed
0x80070848	The file passing is long.
0x80070849	Unsupport (CF uncorrespondence)
0x80070892	The file has been opened.
0x80070899	The maximum file opening number was exceeded.
0x8007089B	The drive doesn't exist.
0x80070944	Illegal command (uncorrespondence)
0x80070990	It is not opened.
0x80070994	Lead error
0x80070995	Light error
0x80070996	Do not finish entering the buffer that the application prepared.
0x80070997	The data type is illegal.
0x80070949	Unsupport (CF uncorrespondence)
0x80070A40	The work area cannot be secured.
0x80070A47	It is in the state that the directory cannot be opened (running).
0x80070A48	The file passing is long.
0x80070A49	Unsupport (CF uncorrespondence)
0x80070A91	The directory doesn't exist.
0x80070A92	It has already been opened.
0x80070A99	The maximum directory opening number was exceeded.
0x80070A9B	The drive doesn't exist.
0x80070B90	The directory has not been opened.
0x80070B91	The directory doesn't exist.
0x80070B96	Do not finish entering the buffer that the application prepared.
0x80070D90	The directory has not been opened.
0x80070E48	The file passing is long.
0x80070E49	Support (CF uncorrespondence)

Error number	Explanation
0x80070E94	File information reading error
0x80070E99	The maximum file opening number was exceeded.
0x80070E9B	The drive doesn't exist.
0x80070F48	The file passing is long.
0x80070F49	Unsupport (CF uncorrespondence)
0x80070F94	File information reading error
0x80070F90	The file has not been opened.
0x80070F9B	The drive doesn't exist.
0x8007099C	Format is canceled due to invalid SRAM release parameter.
0xF00000FF	The argument is illegal.
0xFFFFFFFF	Data cannot be read or written.
0x01XXXXXX 0x02XXXXXX 0x03XXXXXX 0x04XXXXXX 0x10XXXXXX	Refer to the following manual for details. ·EZSocket standard reference manual (chapter MELSEC) (BAD-801Q013) ·Reference manual for professional FX CPU EZSocket (chapter MELSEC)(BAD-801Q025)