SIEMENS
SOFTNETIES7 provider

Version 1.0.0

User's guide

June 21, 2019

【 remarks 】

This document is translated into English by machine translation.

【 revision history 】

Version	Date	Content
1.0.0	2019-06-21	First edition.

【Tested Model 】

Model	Version	Notes
S7-300		
S7-1500		

Contents

1. Introduction

This book is an user's guide of the CAO provider that does writing/reading data to the controller made of SIEMENS (SIEMENS S7 series).

CAO provider (CaoProv.SIEMENS.SOFTNETIES7.dll) that treats in this book is called SOFTNETIES7 provider.

Details of the outline and the variable of the SOFTNETIES7 provider have been described to the chapter 2.

In the SOFTNETIES7 provider, the SOFTNET-IE S7 library is used to use the S7 protocol used to communicate.

Refer to "mn_s7api_e.pdf" of Siemens Automation for details in the address.

2. Outline of provider

2.1. Outline

The SOFTNETIES7 provider is CAO provider that write/reads data by using the SOFTNET-IE S7 library and using the command for the access for the controller made of SIEMENS (S7-300/S7-1500-series). The file format is DLL(Dynamic Link Library), and when using it from the CAO engine, it is dynamically loaded. When the SOFTNETIES7 provider is used, it is necessary to install ORiN2SDK or to register the registry by the hand work referring to the table below.

Moreover, when using it, the SOFTNET-IE S7 license is needed.

Table2-1SOFTNETIES7 provider

File name	CaoProvSIEMENSIES7.dll
ProgID	CaoProv.SIEMENS.SOFTNETIES7
Registry registration	regsvr32 CaoProvSIEMENSIES7.dll
Blotting out of registry registration	regsvr32 /u CaoProvSIEMENSIES7.dll

2.2. Restriction

This provider has the following restrictions depending on the specification of the library used.

- It cannot access the optimized data block.

2.3. Method property

2.3.1. CaoWorkspace::AddController method

The SOFTNETIES7 provider connects the communication referring to connected parameter for the communication at AddController.

Format AddController(<bstrCtrlName:BSTR>,<bstrProvName:BSTR>,
<bstrPCName:BSTR>,<bstrOption:BSTR>)

bstrCtrlName : In controller name

bstrProvName : In provider name. fixed value = "CaoProv.SIEMENS.SOFTNETIES7"

bstrPcName : Execution machine name of in provider

bstrOption : In optional character string

The list specified for an optional character string is shown as follows.

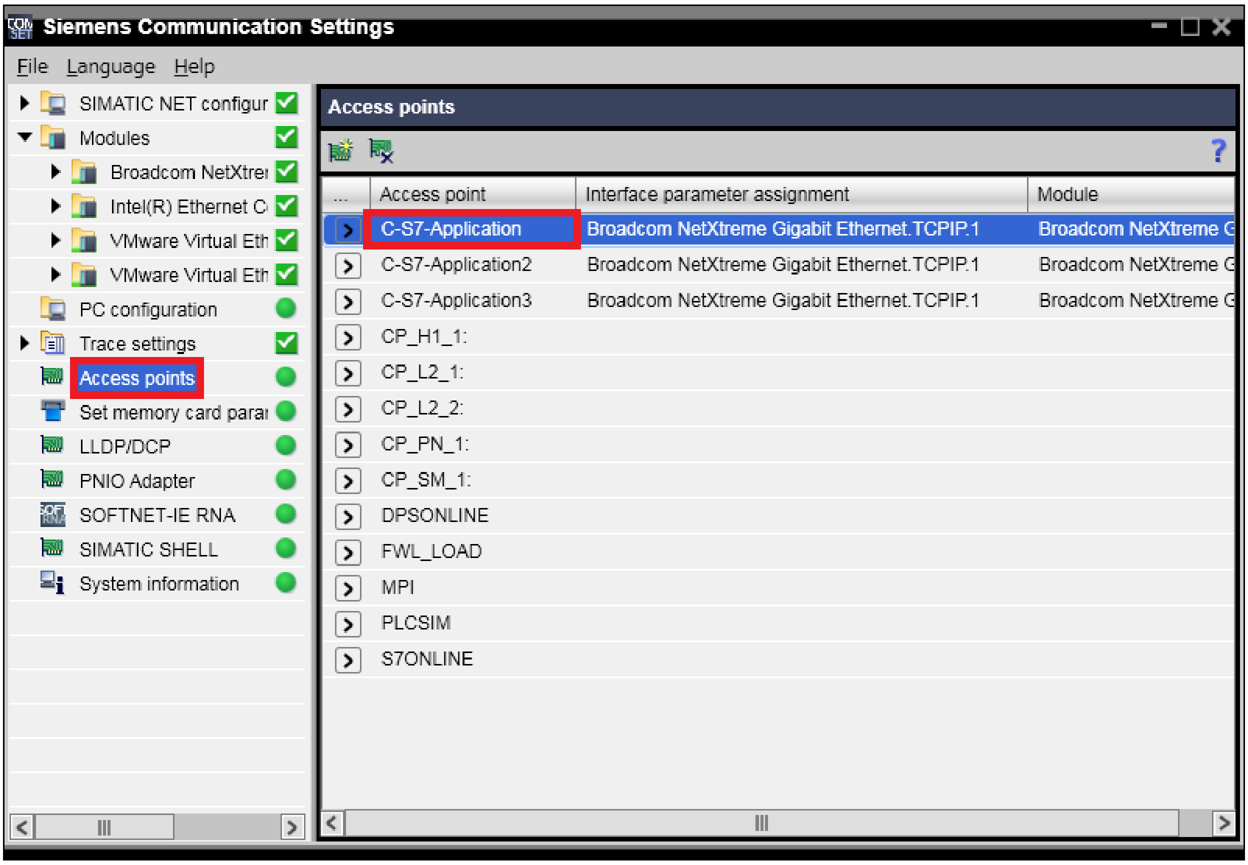
Table2-2Optional character string of CaoWorkspace::AddController

[1]Option ()	Explanation
CPName=<Access point name>	Indispensability. Access point name to be accessed Please refer to chapter 2.3.1.1.
VfdName=< Application name >	Indispensability. Application name to be accessed Please refer to chapter 2.3.1.2
ConnectName =<Connection name >	Indispensability. Connection name to be accessed Please refer to chapter 2.3.1.3
Timeout [=< timeout period >]	Timeout period when sending and receiving it. (millisecond) (default: 3000)

[1] In the square bracket ("[]"), a possible omission is shown. Moreover, the underlined part under the explanation of each parameter becomes a default value when the option is not specified.

2.3.1.1. CPName is optional.

Specify the Access point name set with Communication Settings ([2]) for CPName.

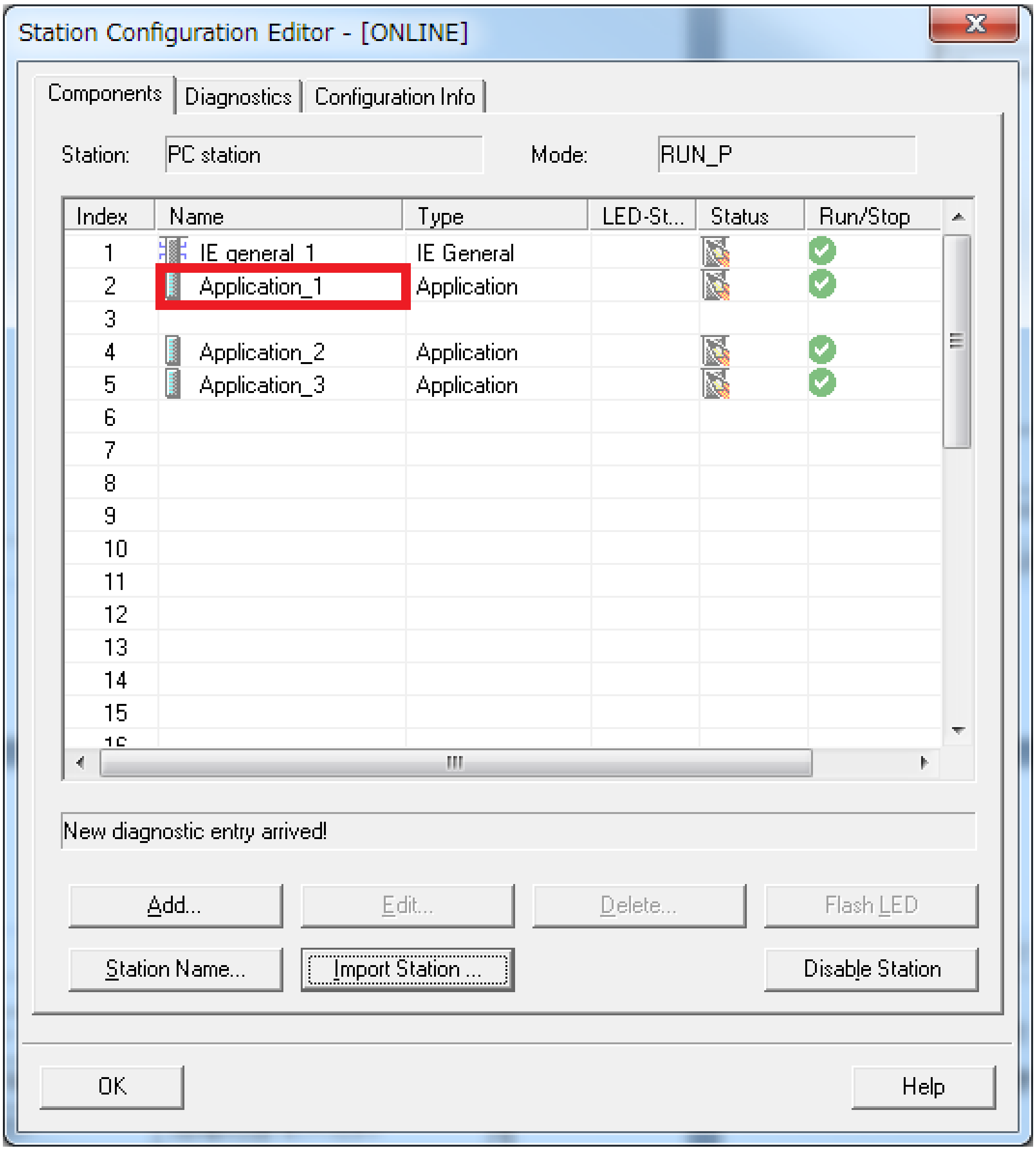


...	Access point	Interface parameter assignment	Module
>	C-S7-Application	Broadcom NetXtreme Gigabit Ethernet.TCPIP.1	Broadcom NetXtreme G
>	C-S7-Application2	Broadcom NetXtreme Gigabit Ethernet.TCPIP.1	Broadcom NetXtreme G
>	C-S7-Application3	Broadcom NetXtreme Gigabit Ethernet.TCPIP.1	Broadcom NetXtreme G
>	CP_H1_1:		
>	CP_L2_1:		
>	CP_L2_2:		
>	CP_PN_1:		
>	CP_SM_1:		
>	DPSONLINE		
>	FWL_LOAD		
>	MPI		
>	PLCSIM		
>	S7ONLINE		

[2] [start] - [Siemens Automation] – [SIMATIC] – [SIMATIC NET] – [Communication Settings]

2.3.1.2. VfdName is optional.

The Component name set with Station Configurator ([3]) is specified for VfdName.



Station: PC station

Mode: RUN_P

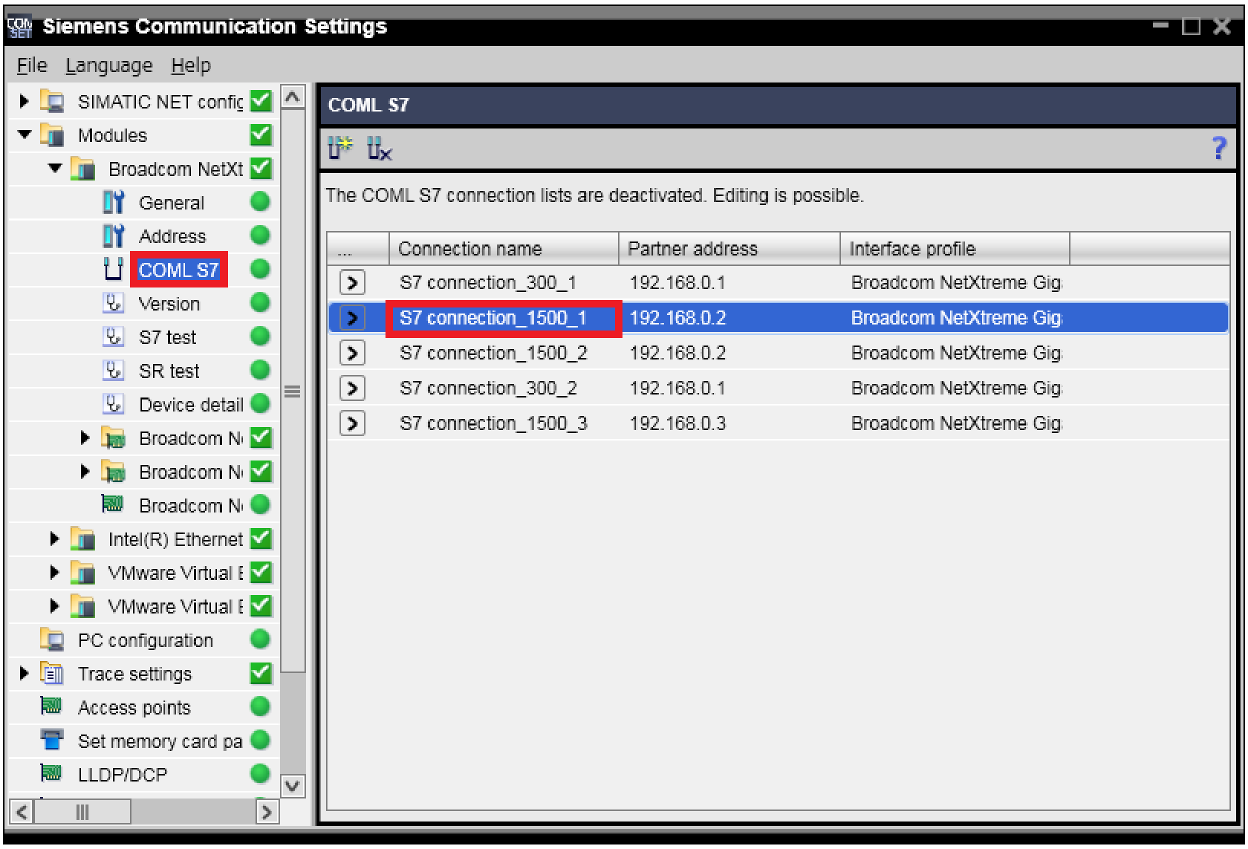
Index	Name	Type	LED-St...	Status	Run/Stop
1	IE general_1	IE General			✓
2	Application_1	Application			✓
3					
4	Application_2	Application			✓
5	Application_3	Application			✓
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

New diagnostic entry arrived!

[3] [start] - [Siemens Automation] – [Station Configurator]

2.3.1.3. ConnectName is optional.

The Connect name name set with Communication Settings (2) is specified for ConnectName.



The COML S7 connection lists are deactivated. Editing is possible.

...	Connection name	Partner address	Interface profile
>	S7 connection_300_1	192.168.0.1	Broadcom NetXtreme Gig
>	S7 connection_1500_1	192.168.0.2	Broadcom NetXtreme Gig
>	S7 connection_1500_2	192.168.0.2	Broadcom NetXtreme Gig
>	S7 connection_300_2	192.168.0.1	Broadcom NetXtreme Gig
>	S7 connection_1500_3	192.168.0.3	Broadcom NetXtreme Gig

2.3.2. CaoController::AddVariable method

The AddVariable method of the CaoController class is a method for making the variable object write/to read data to the address among controllers (SIEMENS S7 series).

Format AddVariable(<bstrVariableName:VT_BSTR>[,<bstrOption:VT_BSTR>])

<bstrVariableName>	:	In variable identifier
<bstrOption>	:	In optional character string

The list specified for an optional character string is shown as follows.

Table2-3Optional character string of CaoController::AddVariable

<table>
<tr><th>Option</th><th>Explanation</th></tr>
<tr><td>DataType=<Data type &gt;</td><td>Indispensability.
Specify the data type to be acquired.
<table>
<tr><th>Data type</th><th>Meaning</th></tr>
<tr><td>DB</td><td>Data block</td></tr>
<tr><td>DI</td><td>Instance data block</td></tr>
<tr><td>E</td><td>Input</td></tr>
<tr><td>A</td><td>Output</td></tr>
<tr><td>M</td><td>Memory position</td></tr>
</table></td></tr>
<tr><td>DBNo=&lt;Data base number &gt;</td><td>Indispensability.
Specify the number of the accessed data block.
The data base number is disregarded when specifying it for a data type excluding "DB" and "DI".
(Please refer to chapter 2.3.2.1)</td></tr>
<tr><td>Type=&lt;Data type &gt;</td><td>Indispensability.
Specify the data type to be acquired.
Specify "X" when specifying it by the unit of bit.
<table>
<tr><th>Data type</th><th>Meaning</th></tr>
<tr><td>X ([4])</td><td>One byte of sign none</td></tr>
<tr><td>CHAR</td><td>One byte with sign</td></tr>
</table></td></tr>
</table>

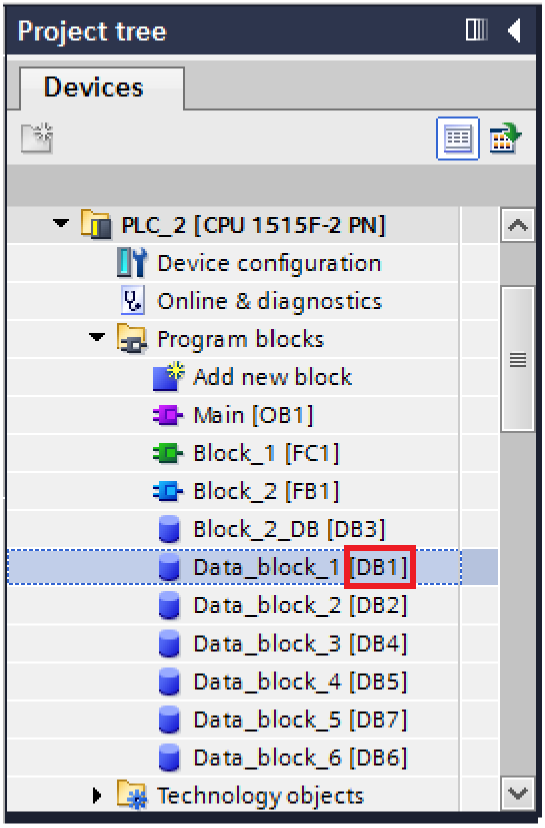
[4] When the data type is only "DB" or "DI", X can be used.

<table>
<tr><td></td><td><table>
<tr><td>BYTE</td><td>One byte of sign none</td></tr>
<tr><td>INT</td><td>Two bytes with sign</td></tr>
<tr><td>WORD</td><td>Two bytes of sign none</td></tr>
<tr><td>DINT</td><td>Four bytes with sign</td></tr>
<tr><td>DWORD</td><td>Four bytes of sign none</td></tr>
<tr><td>REAL</td><td>Single precision real number</td></tr>
</table></td></tr>
<tr><td>Address =< address ></td><td>Specify the address of the accessed memory.
Specify it in the form of { address } . and { bit } when you specify "X" for Type.
Specify only the address when specifying it for Type excluding "X".
(default: 0)</td></tr>
<tr><td>Elem =< the number of element ></td><td>Specify the number of reading and writing elements.
Please specify an integer of 0 or more.
When STRING and WSTRING are specified for VT, Elem is disregarded, and cannot be acquired as an array.
When "X" is specified for Type, it becomes an error.
(default: 0)
Please refer to chapter 2.3.2.2 for details.</td></tr>
<tr><td>Array=[<True / False>]</td><td>Specify whether to acquire the value in the form of the array when the acquisition object is only one element.
(default: False)</td></tr>
<tr><td>Variable type of VT=< ></td><td>Specify the read and written data type.
Please refer to chapter 2.3.2.3 for details.</td></tr>
</table>

2.3.2.1. DBNo option

Please specify the number written on the right side of the data block name of TIAPortal.

In the example below, 1 is specified.

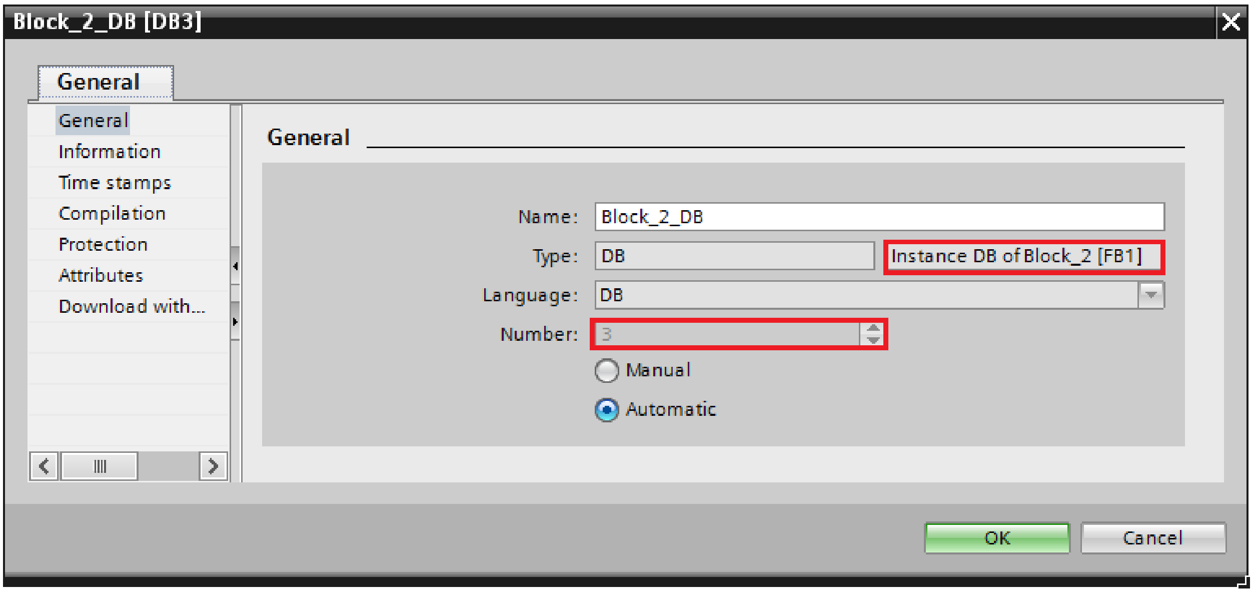


Project tree

Devices

- PLC_2 [CPU 1515F-2 PN]
  - Device configuration
  - Online & diagnostics
  - Program blocks
    - Add new block
    - Main [OB1]
    - Block_1 [FC1]
    - Block_2 [FB1]
    - Block_2_DB [DB3]
    - Data_block_1 [DB1]
    - Data_block_2 [DB2]
    - Data_block_3 [DB4]
    - Data_block_4 [DB5]
    - Data_block_5 [DB7]
    - Data_block_6 [DB6]
  - Technology objects

Instance DB of Block cannot be checked on the project tree, so check the data block by selecting [Right-click]-[Properties].



Block_2_DB [DB3]

General

General

Name: Block_2_DB

Type: DB Instance DB of Block_2 [FB1]

Language: DB

Number: 3

○ Manual

● Automatic

2.3.2.2. Elem is optional.

Specify the read and written element when you specify two or more elements.

The data size treated by the variable at a time becomes 212 bytes. Send and receive it by dividing into the unit installed on one packet when the size to be acquired exceeds this size.

The sample when it accesses eight byte variable (ULInt etc.) is published in appendix A.

2.3.2.3. VT is optional.

Specify the read and written data type.

Table2-4Optional VT that can be specified list

VT Option	Data type	Size	Meaning
BOOL	VT_BOOL	1 Byte	It reads and writes it bitting.
I1	VT_I1	1 Byte	It reads and writes it with every one byte sign.
UI1	VT_UI1	1 Byte	It reads and writes it the sign none one byte.
I2	VT_I2	2 Byte	It reads and writes it with every two byte sign.
UI2	VT_UI2	2 Byte	It reads and writes it the sign none two bytes.
I4	VT_I4	4 Byte	It reads and writes it with every four byte sign.
UI4	VT_UI4	4 Byte	It reads and writes it the sign none four bytes.
R4	VT_R4	4 Byte	It reads and writes it by every four byte single precision real number.
I8	VT_I8	8 Byte	It reads and writes it with every eight byte sign.
UI8	VT_UI8	8 Byte	It reads and writes it the sign none eight bytes.
R8	VT_R8	8 Byte	It reads and writes it by every eight byte double precision real number.
BSTR	VT_BSTR	x Byte	The character string of ASCII (One character: one byte) is read and written.
CHAR	VT_BSTR	1 * x Byte	The character string of ASCII (One character: one byte) is read and written.
WCHAR	VT_BSTR	2 * x Byte	The character string of Unicode (One character: two bytes) is read and written.
STRING	VT_BSTR	1 * x Byte	[5]The character string of ASCII (One character: one byte) is read and written ().
WSTRING	VT_BSTR	2 * x Byte	(..reading and writing of character string of Unicode (One character: Two bytes)..[5]).

[5] String on the S7 series and WString are recorded by a special format. Please use it with String on the S7 series and WString in the declared area optional VT when you specify STRING and WSTRING.

2.3.3. CaoVariable:put_Value property

Write the value according to the specified option.

It is possible to write it in two or more simultaneous elements by specifying the number of writing elements optional Elem it.

The access to character string type (VT=STRING,VT=WSTRING) sends the writing packet two or more times internally unlike other types. Please refer to Appedex B for details.

Table2-4It becomes an abnormal argument when specifying it for a type of the value written excluding the data type of the description. When the number of elements of values written as the specified number of writing elements is different, the array is treated as an abnormal argument optional Elem it when writing it.

2.3.4. CaoVariable:get_Value property

Read the value according to the specified option.

It is possible to read it to two or more simultaneous elements by specifying the number of writing elements optional Elem it.

The access to character string type (VT=STRING,VT=WSTRING) sends the writing packet two or more times internally unlike other types. Please refer to appendix B for details.

2.4. Variable list

2.4.1. CaoController class

Table2-5CaoController class system variable list

Variable identifier	Data type	Explanation	Attribute	
			get	put
@MAKER_NAME	VT_BSTR	Return maker name = "SIEMENS".	✓	-
@VERSION	VT_BSTR	Provider version information.	✓	-
@LAST_ERROR_NO	VT_I4	[6]Error number immediately before ().	✓	-
@LAST_ERROR_DETAIL	VT_BSTR	Content of error immediately before ([6]).	✓	-

Table2-6CaoController class user variable list

Variable identifier	Data type	Explanation	Attribute	
			get	put
Arbitrariness	Variable dependence	Access the address among controllers (SIEMENS S7 series).	✓	✓

[6] Please refer to the chapter of "4.7 s7_last_detailederr_no" and "4.8 s7_last_detailed_err_msg" of "mn_s7api_e.pdf" of Siemens Automation for the content of the error. It is not because 0 is set even when the error doesn't occur. Please refer to "detailed errors" of "sapis7.h" included in the SOFTNET-IE S7 library for the error number.

2.5. Error code

In the SOFTNETIES7 provider, the following and peculiar the error code is defined.

About the ORiN2 commonness error, please refer to the chapter of the error code of "ORiN2 Programming guide".

Table2-7Peculiar error code

Error name	Error number	Explanation
CPName (access point) name is not found.	0x80100000	It returns when the CPName name of the correspondence is not found.
VfdName is not found.	0x80100001	It returns when the VFD name of the correspondence is not found.
The receive data format is abnormal.	0x80100002	[7] It returns when the response data of the communication is a response outside assumption ().
Receive the Abort message.	0x80100003	It is generated by continuing while disconnected. Try to connect the controller.
A specified address is too long.	0x80100004	A specified address is too long. Make it to 32 characters or less.
The CPName acquisition is abnormal.	0x80100005	(..occurrence of abnormality in s7_get_device processing..[7]).
The VfdName acquisition is abnormal.	0x80100006	(..occurrence of abnormality in s7_get_vfd processing..[7]).
The init processing is abnormal.	0x80100007	(..occurrence of abnormality in s7_init processing..[7]).
The cref processing is abnormal.	0x80100008	(..occurrence of abnormality in s7_get_cref processing..[7]).
The initiate demand processing is abnormal.	0x80100009	(..occurrence of abnormality in s7_initiate_req processing..[7]).
The initiate response processing is abnormal.	0x8010000A	(..occurrence of abnormality in s7_get_initiate_cnf processing..[7]).
The abort processing is abnormal.	0x8010000B	(..occurrence of abnormality in s7_abort processing..[7]).
The abort_ind processing is abnormal.	0x8010000C	(..occurrence of abnormality in s7_abort_ind processing..[7]).
The reading demand	0x8010000D	(..occurrence of abnormality in reading demand

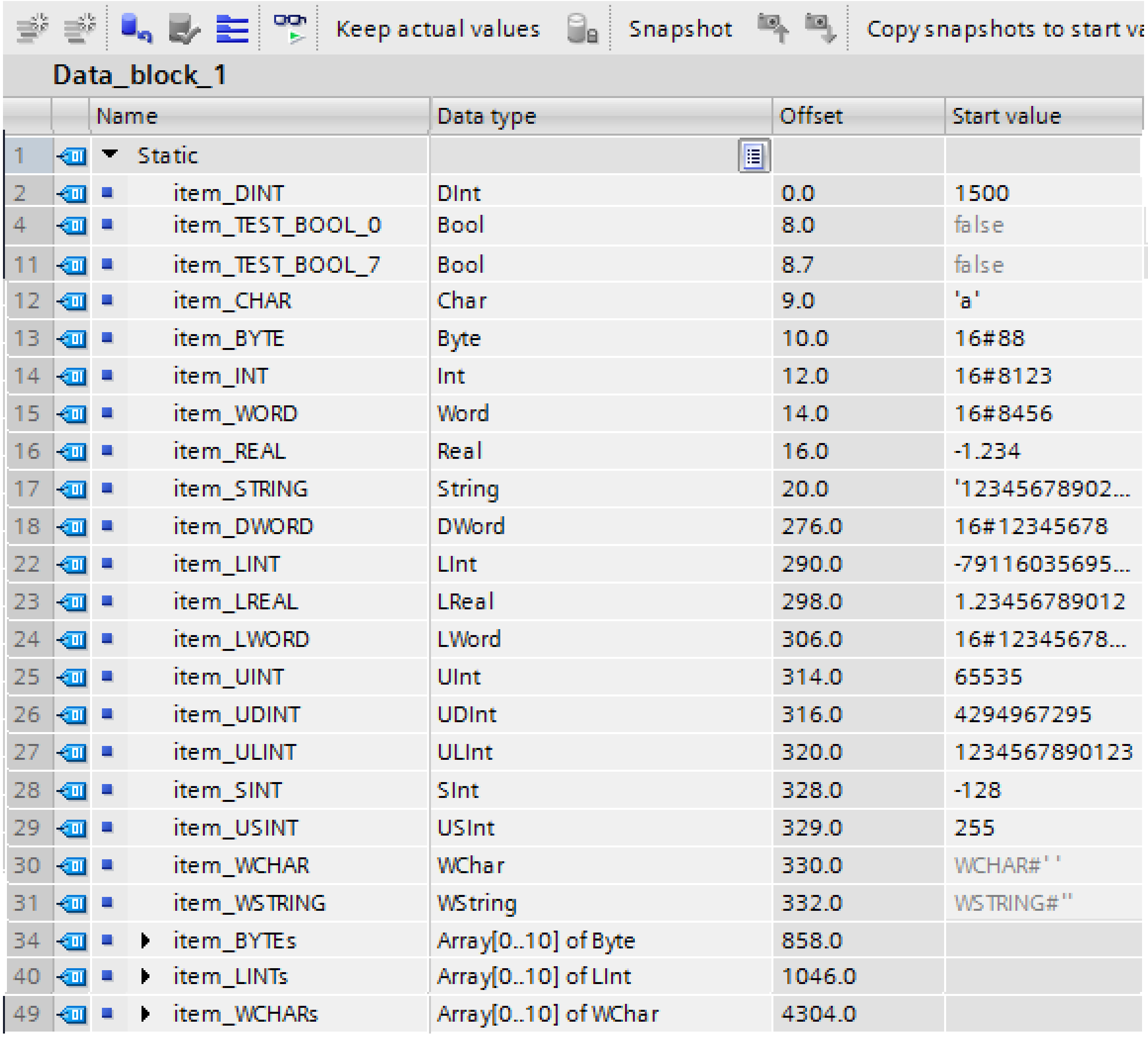
[7] Details of the error can be acquired by using @LAST_ERROR_NO and @LAST_ERROR_DETAIL..
If 11 is returned in @LAST_ERROR_NO, "access from remote partner" may be disabled. Please refer to Appendix C and enable the setting.

processing is abnormal.		processing (s7_read_req)..[7]).
The reading response processing is abnormal.	0x8010000E	(..occurrence of abnormality in reading response processing (s7_get_read_cnf)..[7]).
The writing demand processing is abnormal.	0x8010000F	(..occurrence of abnormality in writing demand processing (s7_write_long_req)..[7]).
The writing response processing is abnormal.	0x80100010	(..occurrence of abnormality in writing response processing (s7_get_write_cnf)..[7]).

Appendix A. Example of addressing

When the definition enumerated as follows on the controller is done, the example of specifying the address to access each data is shown below.

Data block data defined with TIAPotal



Data_block_1

	Name	Data type	Offset	Start value
1	Static			
2	item_DINT	DInt	0.0	1500
4	item_TEST_BOOL_0	Bool	8.0	false
11	item_TEST_BOOL_7	Bool	8.7	false
12	item_CHAR	Char	9.0	'a'
13	item_BYTE	Byte	10.0	16#88
14	item_INT	Int	12.0	16#8123
15	item_WORD	Word	14.0	16#8456
16	item_REAL	Real	16.0	-1.234
17	item_STRING	String	20.0	'12345678902...
18	item_DWORD	DWord	276.0	16#12345678
22	item_LINT	LInt	290.0	-79116035695...
23	item_LREAL	LReal	298.0	1.23456789012
24	item_LWORD	LWord	306.0	16#12345678...
25	item_UINT	UInt	314.0	65535
26	item_UDINT	UDInt	316.0	4294967295
27	item_ULINT	ULInt	320.0	1234567890123
28	item_SINT	SInt	328.0	-128
29	item_USINT	USInt	329.0	255
30	item_WCHAR	WChar	330.0	WCHAR#' '
31	item_WSTRING	WString	332.0	WSTRING#''
34	item_BYTEs	Array[0..10] of Byte	858.0	
40	item_LINTs	Array[0..10] of LInt	1046.0	
49	item_WCHARs	Array[0..10] of WChar	4304.0	

Example 1) BOOL type definition (item_TEST_BOOL_0)

DataType=DB, DBNo=1, Type=X, Address=8.0, VT=BOOL

Example 2) BOOL type definition (item_TEST_BOOL_7)

DataType=DB, DBNo=1, Type=X, Address=8.7, VT=BOOL

Example 3) Byte type definition (item_BYTE)

DataType=DB, DBNo=1, Type=BYTE, Address=10, VT=UI1

Example 4) Int type definition (item_INT)

DataType=DB, DBNo=1, Type=INT, Address=12, VT=I2

Example 5) DInt type definition (item_DINT)

DataType=DB, DBNo=1, Type=DINT, Address=0, VT=I4

Example 6) DWord type definition (item_DWORD)

DataType=DB, DBNo=1, Type=DWORD, Address=276, VT=UI4

Example 7) Real type definition (item_REAL)

DataType=DB, DBNo=1, Type=REAL, Address=16, VT=REAL

Example 8) LInt type definition (item_LINT)

DataType=DB, DBNo=1, Type=DINT, Address=290, Elem=2, VT=I8

Example 9) ULInt type definition (item_ULINT)

DataType=DB, DBNo=1, Type=DINT, Address=320, Elem=2, VT=UI8

Example 10) LReal type definition (item_LREAL)

DataType=DB, DBNo=1, Type=REAL, Address=298, Elem=2, VT=R8

Example 11) Char type definition (item_CHAR)

DataType=DB, DBNo=1, Type=CHAR, Address=9, VT=CHAR

Example 12) WChar type definition (item_WCHAR)

DataType=DB, DBNo=1, Type=WORD, Address=330, VT=WCHAR

Example 13) String type definition (item_STRING)

DataType=DB, DBNo=1, Type=BYTE, Address=20, VT=STRING

Example 14) WString type definition (item_WSTRING)

DataType=DB, DBNo=1, Type=WORD, Address=332, VT=WSTRING

Example 15) Byte type array (ten elements) (item_BYTEs)

DataType=DB, DBNo=1, Type=BYTE, Address=858, Elem=10, VT=UI1

Example 16) LInt type array (ten elements) (item_LINTs)

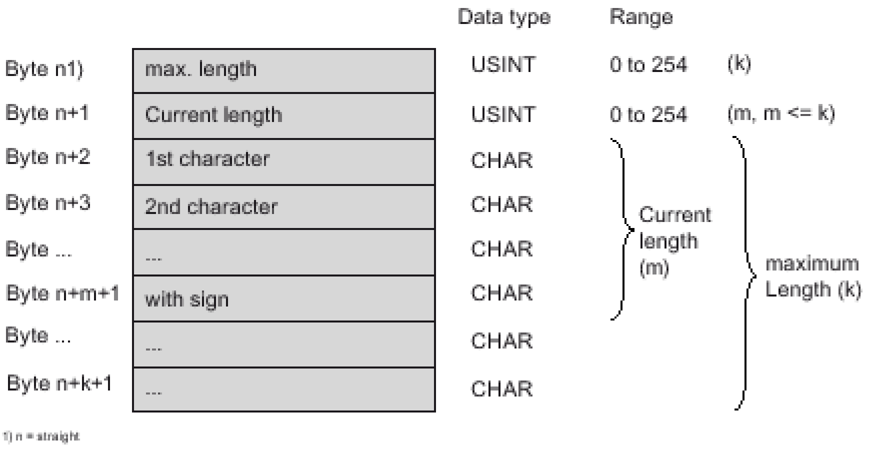
DataType=DB, DBNo=1, Type=DINT, Address=1046, Elem=20, VT=I8

Example 17) WChar type array (ten elements) (item_WCHAR)

DataType=DB, DBNo=1, Type=WORD, Address=4304, Elem=10, VT=WCHAR

Appendix B. About the access to the character string type

Character string type (STRING,WSTRING)Figure2-1It is [noyouna] structure (In the WSTRING type, each element is two bytes).



		Data type	Range	
Byte n1)	max. length	USINT	0 to 254	(k)
Byte n+1	Current length	USINT	0 to 254	(m, m <= k)
Byte n+2	1st character	CHAR		
Byte n+3	2nd character	CHAR		
Byte ...	...	CHAR		
Byte n+m+1	with sign	CHAR		
Byte ...	...	CHAR		
Byte n+k+1	...	CHAR		

1) n = straight

Figure2-1Structure of STRING tag

Write the real data part to acquire "Maximum length" once, and so as not to exceed the size at the time of writing by put_Value. Write "Present head" after writing succeeds.

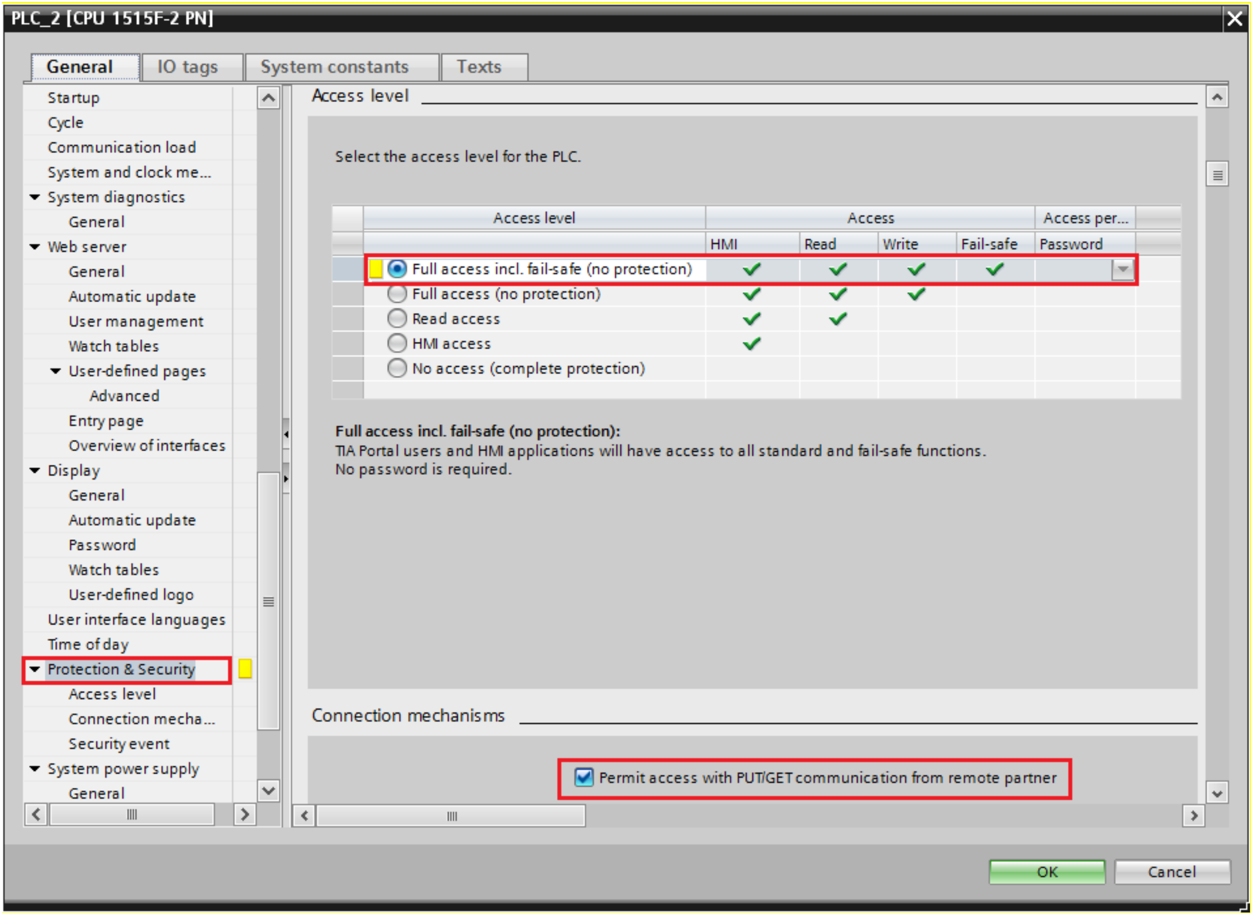
"Present head" is acquired at the time of reading by get_Value, and a real data division ..the size.. is read.

Appendix C. Remote Partner Access Permissions

In the S7-1500[8] series, the "Permit access with PUT/GET communication from remote partner" option is disabled.

In the disabled state, communication from this provider can’t be performed, so enable it.

Set the access level to "Full access incl. fail-safe (no protection)[9]" from "Protection & Security" in Figure 2-2 and check "Permit access with PUT/GET communication from remote partner".



Access level

Select the access level for the PLC.

Access level	Access				Access per...
	HMI	Read	Write	Fail-safe	Password
● Full access incl. fail-safe (no protection)	✓	✓	✓	✓	
○ Full access (no protection)	✓	✓	✓		
○ Read access	✓	✓			
○ HMI access	✓				
○ No access (complete protection)					

Full access incl. fail-safe (no protection):
TIA Portal users and HMI applications will have access to all standard and fail-safe functions.
No password is required.

Connection mechanisms

☑ Permit access with PUT/GET communication from remote partner

Figure2-2 Protection and security

[8] There may be a model whose setting is invalidated even in other models. In that case, please enable it in the same way.

[9] The setting screen can be displayed by right-clicking [Target PLC] and selecting [Properties].