

CC-Link
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**Control & Communication
System Profile
Specification (for Machine)
Part 4: Mapping with
Communications Protocol**



Revisions

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1. FOREWORD

This document is "Part 4 - Mapping with Communications Protocol" of "Control & Communication System Profile Specification (for Machine)".

The Control & Communication System Profile for machine (hereinafter referred to as "CSP+ for machine") is a data set that visualizes machine information to simplify development by application vendors of application software that manages, monitors, and controls the machine, and settings by the machine users. The CSP+ for machine contains the following information related to the machine described.

- Information related to the machine specifications
- Machine information to be released for application software (machine information)
- Information related to data to be acquired from the machine and its acquisition method (machine data)
- Linked information between machine information and machine data

The CSP+ for machine is generally handled as CSP+ file for machine described in the XML format.

"Part 4 - Mapping with Communications Protocol" specifies element and item description rules corresponding to the communications protocol used for data acquisition from the machine.

The version of Control & Communication System Profile for machine specification described in this document (hereinafter referred to as CSP+ for machine specification version) is version 1.0.

2. SCOPE OF APPLICATION

This document is "Part 4 - Mapping with Communications Protocol" of "Control & Communication System Profile Specification (for Machine)", and specifies description rules for elements and items corresponding to the communications protocol used for data acquisition from the machine.

3. NORMATIVE REFERENCES

None.

4. TERMINOLOGY, DEFINITIONS, ABBREVIATIONS

4.1. Terminology

4.1.1. CSP+ for machine

Data set to describe the following information related to the machine

- Information related to the machine specifications
- Machine information to be released for application software
- Data to be acquired from the machine and its acquisition method
- Linked information between machine information and machine data

4.1.2. CSP+ file for machine

CSP+ for machine in the XML format

4.1.3. Machine

Machine controlled by machine tools or at least one controller (such as PLC and CNC)

4.1.4. Machine data

Generic term of information related to data to be acquired from the machine and its acquisition method

4.1.5. Machine information

Information created by aggregation of machine data aggregated for easy handling in application software.

4.1.6. Section

Component of the CSP+ for machine

4.1.7. Part

Component of the section

4.1.8. Element

Component of the part

4.1.9. Item

Detailed information related to the element. Example: Data type, engineering unit

4.1.10. Machine vendor

Vendors that develop the machine

4.1.11. Application vendor

Vendors that develop application software

4.1.12. Machine user

End users who use the machine and companies that provide machine installation and maintenance

4.1.13. Abbreviations and symbols

CNC	Computer Numerical Control
CSP+	Control & Communication System Profile
PLC	Programmable Logic Controller
SLMP	Seamless Message Protocol
XML	Extensible Markup Language

5. SPECIFICATIONS CORRESPONDING TO COMMUNICATIONS PROTOCOL

This chapter describes the specifications prescribed per communications protocol. This document prescribes specifications shown in Table 5-1.

Table 5-1 Communications Protocol Prescribed in This Document

No.	Protocol name*1	Reference target	Remarks	Specification version*2
1	SLMP	Section 5.1	Seamless Message Protocol	1

*1: Character string to be specified for the DATA item of the ProtocolType element of the DEVICE_IF part

*2: Numerical value to be specified for the DATA item of the ProtocolVersion element of the DEVICE_IF part

The settings relating to the communications protocol are as follows:

- 1) Setting the communications protocol type to the DATA item of the ProtocolType element of the DEVICE_IF part
- 2) Setting the specification version to the DATA item of the ProtocolVersion element of the DEVICE_IF part
- 3) Setting codes to be assigned to the ASSIGN items of the individual elements of the BLOCK_MEMORY part

5.1. SLMP

5.1.1. Scope of support

Among the specifications of the SLMP (Seamless Message Protocol), this section describes the specifications shown in Table 5-2.

Table 5-2 Targeted SLMP Specifications

No.	Specification classification	Target	Remarks
1	Lower protocol	<ul style="list-style-type: none"> • CC-Link • CC-Link IE Control • CC-Link IE Field • TCP/IP • UDP/IP 	The specifications prescribed in this section do not depend on the lower protocol.
2	Communication frame structure	<ul style="list-style-type: none"> • ST type • MT type • Extended MT type 	The specifications prescribed in this section do not depend on the communication frame structure.
3	Mode	<ul style="list-style-type: none"> • ASCII mode • Binary mode 	The mode to be used depends on description specifications (5.1.2).
4	Function type	<ul style="list-style-type: none"> • Internal Memory (Device) 	-
5	Operation of Device for function type	<ul style="list-style-type: none"> • Batch Read (Read) • Batch Write (Write) • Random Read (ReadRandom) • Random Write (WriteRandom) • Register Monitor Data (EntryMonitorDevice) • Monitor (ExecuteMonitor) • Batch Read Multiple Blocks (ReadBlock) • Batch Write Multiple Blocks (WriteBlock) 	-
6	Specifying memory address	<ul style="list-style-type: none"> • 16-bit address • 32-bit address 	The specification method to be used depends on description specifications (5.1.2).

For "lower protocol" and "communication frame structure", the application software which uses CSP+ for machine necessarily needs not to support all of the specifications above. Supporting only parts of the specifications in accordance with purposes and usage is acceptable. For example, only TCP/IP can be supported as the lower protocol, and only the MT type may be supported as the communication frame structure.

5.1.2. Description specifications

5.1.2.1. Description specifications of DEVICE_IF part

Set "SLMP" for the DATA item of the ProtocolType element of the DEVICE_IF part.

For the DATA item of the ProtocolVersion element of the DEVICE_IF part, set a numerical value to be written as the specification version of No.1 in Table 5-1.

5.1.2.2. Description specifications of BLOCK_MEMORY part

For the ASSIGN item of each element of the BLOCK_MEMORY part, write a character string resulted from the combination of the following: a prefix which indicates a function type, mode, and memory address specification method and a value to be written at the memory address specification portion in the SLMP frame. The description specifications of prefixes are shown in Table 5-3, and the description specifications of values to be written at the memory address specification portions in the SLMP frame are shown in Table 5-4.

Table 5-3 Prefixes to Be Written for the ASSIGN Item (SLMP)

No.	Function type	Mode	Memory address specification method	Prefix
1	Internal Memory (Device)	ASCII mode	16-bit address	DA16:
2			32-bit address	DA32:
3		Binary mode	16-bit address	DB16:
4			32-bit address	DB32:

Table 5-4 Description Specifications of Memory Address Values to Be Written for the ASSIGN Item (SLMP)

No.	Function type	Mode	Memory address specification method	Description specifications of memory address values
1	Internal Memory (Device)	ASCII mode	16-bit address	Write a character string (8 characters ^{*1}) to be written at the memory address specification portions in the SLMP frame.
2			32-bit address	Write a character string (12 characters ^{*2}) to be written at the memory address specification portions in the SLMP frame.
3		Binary mode	16-bit address	As a value to be written at the memory address specification portions in the SLMP frame, write a character string (eight characters ^{*3}) in the hexadecimal notation, byte by byte, in the intra-frame sequence. Example: When the initial memory number is 0x34 and the memory type is 0xAB, write "340000AB".
4			32-bit address	As a value to be written at the memory address specification portions in the SLMP frame, write a character string (12 characters ^{*4}) expressed in hexadecimal notation, byte by byte, in the intra-frame sequence. Example: When the initial memory number is 0x34 and the memory type is 0xABCD, write "34000000ABCD".

*1: 2-octet memory type plus 6-octet initial memory number (8 octets in total = 8 characters)

*2: 4-octet memory type plus 8-octet initial memory number (12 octets in total = 12 characters)

*3: 3-octet initial memory number plus 1-octet memory type (4 octets in total = 8 characters in hexadecimal notation)

*4: 4-octet initial memory number plus 2-octet memory type (6 octets in total = 12 characters in hexadecimal notation)

Description examples of memory addresses of the ASSIGN item are shown in Figure 5-1. (ASCII mode)

16-bit length



Prefix

Memory type

Initial memory number

32-bit length



Prefix

Memory type

Initial memory number

Figure 5-1 Memory Address Description Method and Example

5.1.3. Usages

Recommended usages for the application software which uses CSP+ for machine are described below:

- Identify a function type, mode, and memory address specification method by interpreting the prefix of the ASSIGN item of the element to be read/written.
- The application software which uses CSP+ for machine determines which operation is to be used for reading/writing an element.
- Reading/writing an element is enabled by storing the memory address portion of the ASSIGN item of the element to be read/written in the SLMP frame having the format which correspond to the operation/mode/memory address specification method.
- Reading/writing multiple items through a single function execution (single SLMP frame) is acceptable. As for processing regarding responses (normal/abnormal), determine in the specifications of the application software which uses CSP+ for machine. The processing is not prescribed in CSP+ for machine.

RELATED SPECIFICATIONS

- [1] BAP-2006ENG-001 SLMP (Seamless Message Protocol) Specification (Overview)
- [2] BAP-2006ENG-002 SLMP (Seamless Message Protocol) Specification (Services)
- [3] BAP-2006ENG-003 SLMP (Seamless Message Protocol) Specification (Protocol)

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