SAPIS7 - Driver of SAPIS7 Protocol for SIMATIC S7 PLCs User's Manual

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1. SAPIS7 - Driver of SAPIS7 Protocol for SIMATIC S7 PLCs

1.1. Driver Use

The SAPIS7 driver is used for data exchange with SIMATIC S7 PLCs by means of the MPI interface or a PROFIBUS bus communication processor. In an **asix** system computer the SIEMENS CP5611, CP5412(A2) or CP5613 card is used. The data exchange with use of the SAPIS7 protocol is based on so called S7 functions.

Operation of the **asix** system with the SIMATIC S7 PLC by use of the SAPIS7 protocol does not require any controller's program adaptation for data exchange.

1.2. Declaration of Transmission Channel

The full syntax of declaration of transmission channel operating according to the SAPIS7 protocol is given below:

logical_name=SAPIS7, *device,connection*

where:

device	- virtual device name (*VFD*),
connection	- connection name.

Names *VFD* and *connection name* must be compatible to parameters declared by use of the configuration program COML S7 supplied with the communication processor board.

EXAMPLE

An examplary item declaring use of transmission channel operating according to the SAPIS7 protocol is given below:

CHAN1=SAPIS7, VFD1, S7_connection1

The logical channel named CHAN1 has defined the following parameters:
SAPIS7 protocol,
virtual device name (*VFD*) - VFD1,
connection name - S7_connection1.

Rules of creating the symbolic addresses of variables belonging to the transmission channel using the SAPIS7 protocol are the same ones as in case of a channel using the AS512 protocol.

The set of process variable types used in the SAPIS7 protocol was extended with the following elements in relation to the set offered by the AS512 protocol:

EDI	- 16-byte words in INTEL convention,
ER	- content of data blocks, treated as floating-point numbers,
EB	- content of data blocks, treated as bytes.

The SAPIS7 driver is loaded as a DLL automatically.

1.3. Driver Configuration

The SAPIS7 protocol driver may be configured by use of the **[SAPIS7]** section placed in the application INI file. All items in the section has the following format:

item_name = [number] [YES|NO]

MAX_BUFFER_LEN = number

Meaning - the length of telegrams accepted by an MPI interface depends on the CPU type of S7 controllers and on a program executed by them.

Default value - the default, length of a telegram is equal to 220 bytes.

Parameter:

number - length of telegrams passed in bytes.

STATISTICS = yes/no

Meaning - the item allows to display (every 1 minute) information about number of transmission sessions that have been carried-out, average transmission time and number of transmission errors. The item was developed as a designer support on the stage of the **asix** system start-up.

Default value - by default, the transmission statistics is not displayed.

CONSOLE=YES|NO

Meaning - the item allows to create a console window where SAPIS7 driver messages concerning operations executed by the driver are displayed currently.

Default value - by default, any console window is not created.

LOG_FILE=file_name

Meaning - the item allows to define a file to which all SAPIS7 driver messages concerning operations performed by the driver are written. If the item does not define the full name, then the log file is created in the current directory.

Default value - by default, the log file is not created.

Time Synchronization

By using the SAPIS7 driver it is possible to synchronize an **asix** station time with a controller time by the following item.

TIME_SYNCHRONIZATION=channel_name,variable_name

Parameters:

CHANNEL	- name of the ASMEN channel using the SAPIS7 protocol;
VARIABLE	- name of the ASMEN variable belonging to the channel CHANNEL and used for time synchronization.

The time synchronization algorithm consists in cyclic writing a frame containing an actual **asix** time to the S7. The frame is written according to the VARIABLE variable address and a refreshing frequency assigned to the variable VARIABLE.

The variable VARIABLE must be an array with a size of min. 10 bytes (the size of a time frame).

The time frame format (all the data in BCD format):

Byte	**Contents**	**Range**
0	Year	1990 to 2089 (only two last digits)
1	Month	01 to 12
2	Day	1 to 31
3	Hour	0 to 23
4	Minute	0 to 59
5	Second	0 to 59
6	millisecond	00 to 99 two most significant tetrads of milliseconds
7	millisecond	0 to 9 the least significant tetrad of millisecond written on the older tetrad of the byte no. 7
7	week day	1 to 7 written on the lower tetrad of the byte no. 7 (Sunday=1)
8	Mark of new time	1
9	Irrelevant	always 0

EXAMPLE

The time synchronization in the channel `CHAN1` is executed by means of the variable `X1`. The time frame is written every 30 seconds to the data block `DB100` from the byte 0 to the byte 9 inclusive:

```
; declaration of the variable X1
X1, EB100.0, CHAN1, 10, 30, NOTHING_BYTE

; declaration of time synchronization bye means of the variable X1
[ASMEN]
CHAN1 = SAPIS7,VFD2,conn_4
TIME_SYNCHRONIZATION = CHAN1, X1
```

Signalization of Controller STOP State

In the configuration with the S7 controller where the communication processor is independent of the central processor, in order to signal a controller STOP state correctly you should:

- declare in the controller a 1-byte control variable the value of which is changed during the processor work;

- declare the same variable as an ASMEN variable;
- declare (in the ASMEN section beside the logical channel declaration) a checking of operation by verification of control variable changes.

EXAMPLE

The variable named S7_CONN_0 is declared in the channel SINEC1 as a control variable:

S7_CONN_0 control byte RUN PLC 1, EM0, SINEC1, 1, 1, NOTHING_BYTE

The declaration of the channel SINEC1 in the ASMEN section:

SINEC1=SAPIS7,VFD1,SMOLA_OP1,**S7_CONN_0**,**1**,**yes**

Control parameters:

S7_CONN_0	- control variable name;
,1	- generated alarm number;
,yes	- determines whether an alarm of communication breakdown has to be generated.

Additional items:

NUMBER_OF_CHECK_READINGS=<number>

Meaning	- the item specifying a minimal number of successive readings of control variable (of a constant value) which cause a signalization of the controller STOP status.
Default value	- by default, the item assumes a value of 3.

TELEGRAM_LOG = [YES|NO]

Meaning	- declaration of writing the contents of telegrams sent and received by the SAPIS7 driver within reading/writing of process variables to the log file declared in the item LOG_FILE.
Default value	- NO.

SERIALISING = [YES|NO]

Meaning	- declaration of servicing the transmission from the S7 by transferring single YES or many NO queries.
Default value	- YES.