



***S700 - Driver of MAIHAK Analyzer
Protocol
User's Manual***

Doc. No. ENP4049
Version: 29-08-2005

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1. S700 - Driver of MAIHAK Analyzer Protocol

1.1. Driver Use

The S700 driver is used for data exchange between Maihak S700 gas analyzers and an **asix** system computer by use of the AK protocol. The communication is performed via standard serial ports of an **asix** computer and the serial interface no. 1 of the analyzer.

NOTE

Settings *Serial interface # 1* of the analyzer must have the following values:

- without RTS/CTS protocol,
- without XON/XOFF protocol.

Settings *Communication # 1* of the analyzer must have the following values:

- ON (1).

1.2. Declaration of Transmission Channel

The full syntax of declaration of transmission channel operating according to the S700 protocol is given below:

logical_channel_name=S700, id, port [, baud ,character, parity, stop]

where:

- | | |
|-------------|---------------------------------------|
| <i>S700</i> | - driver name, |
| <i>id</i> | - analyzer identifier (number AK-ID), |
| <i>port</i> | - port name: COM1, COM2 etc., |

optional parameters:

- | | |
|------------------|----------------------------------|
| <i>baud</i> | - transmission speed, |
| <i>character</i> | - number of bits in a character, |
| <i>parity</i> | - parity check type, |
| <i>stop</i> | - number of stop bits. |

If optional parameters are not given, then default values are as follows:

- transmission speed of 9600 baud,
- 8 bits in a character,
- no parity check (NONE),
- number of stop bits 1.

EXAMPLE

The declaration of the logical channel named CHAN1 operating according to the S700 protocol and exchanging data with the analyzer no. 1 via the COM2 port is as follows:

CHAN1=S700, 1, COM2

The S700 driver is loaded as a DLL automatically.

1.3. Addressing the Process Variables

The syntax of symbolic address which is used for variables belonging to the S700 driver channel is as follows:

$\langle type \rangle [\langle index \rangle] [. \langle element \rangle]$

where:

<i>type</i>	- variable type,
<i>index</i>	- index within the type (for some types of variables),
<i>element</i>	- element within the index (for some types of variables).

Types which use no index (in parentheses a type of raw variable value is given):

CZK	- time of calibration measure (WORD),
CZO	- delay time (WORD),
IDA	- analyzer identifier (up to 40 characters) (BYTE),
MNU	- menu language identifier (BYTE),
NRS	- analyzer serial number (BYTE),
PGB	- measure (introducing) of tested gas to the analyzer (WORD),
SPKK	- state of a calibration tray pump (WORD).

Types which need to give an index (in parentheses a type of raw variable value is given):

DWK	- sensibility drift after calibration (FLOAT),
DZK	- zero-point drift of measure substance after calibration (FLOAT),
NSKK	- rated value of measured substance in calibration tray (FLOAT),
PGKW	- measuring (introducing) of standard calibration gas in the analyzer (WORD),
PGKZ	- measuring (introducing) of zero calibration gas to the analyzer (WORD),
SKT	- compensation of measured substance temperature (WORD),
SPKW	- status of a standard calibration gas pump (WORD),
SPKZ	- status of a zero calibration gas pump (WORD),
SPT	- name of measure substance (BYTE),
SPW	- current values of measured substances (FLOAT),
SPZ	- end value of measuring range of measured substance (FLOAT),
STA	- actual analyzer state (WORD).

Types which need to give an index and an element (in parentheses a type of raw variable value is given):

NSPW	- rated value of measured substance in standard calibration gas (FLOAT),
NSPZ	- rated value of measured substance in zero calibration gas (FLOAT).

Types only for reading :

DWK	- sensibility drift after calibration,
DZK	- zero-point drift of calibration substance after calibration,
MNU	- menu language identifier,
NRS	- analyzer serial number,
NSKK	- rated value of measure substance in calibration tray,
SPKK	- status of a calibration tray pump,
SPT	- name of measured substance,
SPW	- current values of measured substance,
SPZ	- limit range value of measured substance,
STA	- current analyzer status.

Types only for writing:

PGB	- measuring (introducing) of tested gas in the analyzer,
PGKW	- measuring (introducing) of standard calibration gas to the analyzer,
PGKZ	- measuring (introducing) of zero calibration gas to the analyzer.

Types for reading and writing:

CZO	- delay time,
CZK	- time of calibration measurement,
IDA	- identifier of the analyzer,
NSPW	- rated value of the measured substance in zero calibration gas,
NSPZ	- rated value of measured substance in zero calibration gas,
SKT	- compensation of measured substance temperature,
SPKW	- status of a standard calibration gas pump,
SPKZ	- status of a zero calibration gas pump.

EXAMPLE

Exemplary declarations of variables.

names of types (SPT) and ranges (SPZ) of measured substances – with an index

```
X1, SPT1, CHAN1, 10, 1, NOTHING_TEXT
X2, SPZ1, CHAN1, 1, 1, NOTHING_FP
X3, SPT2, CHAN1, 10, 1, NOTHING_TEXT
X4, SPZ2, CHAN1, 1, 1, NOTHING_FP
X5, SPT3, CHAN1, 10, 1, NOTHING_TEXT
X6, SPZ3, CHAN1, 1, 1, NOTHING_FP
X7, SPT4, CHAN1, 10, 1, NOTHING_TEXT
X8, SPZ4, CHAN1, 1, 1, NOTHING_FP
X9, SPT5, CHAN1, 10, 1, NOTHING_TEXT
X10, SPZ5, CHAN1, 1, 1, NOTHING_FP
```

state bytes (STA) of analyzer with an index

```
X11, STA1, CHAN1, 1, 1, NOTHING
X12, STA2, CHAN1, 1, 1, NOTHING
X13, STA3, CHAN1, 1, 1, NOTHING
X14, STA4, CHAN1, 1, 1, NOTHING
X15, STA5, CHAN1, 1, 1, NOTHING
X16, STA6, CHAN1, 1, 1, NOTHING
X17, STA7, CHAN1, 1, 1, NOTHING
X18, STA8, CHAN1, 1, 1, NOTHING
```

actual values (SPW) of measured substances – with an index

```
X21, SPW1, CHAN1, 1, 1, NOTHING_FP
X22, SPW2, CHAN1, 1, 1, NOTHING_FP
X23, SPW3, CHAN1, 1, 1, NOTHING_FP
X24, SPW4, CHAN1, 1, 1, NOTHING_FP
X25, SPW5, CHAN1, 1, 1, NOTHING_FP
```

time pauses (CZO and CZK) – without an index

```
X31, CZO, CHAN1, 1, 1, NOTHING
X32, CZK, CHAN1, 1, 1, NOTHING
```

results after calibration : zero drift (DZK), sensibility drift (DWK) – without an index

X42, DZK1, CHAN1, 1, 1, NOTHING_FP
X43, DWK1, CHAN1, 1, 1, NOTHING_FP

X44, DZK2, CHAN1, 1, 1, NOTHING_FP
X45, DWK2, CHAN1, 1, 1, NOTHING_FP

status of temperature compensation (SKT) – with an index

X51, SKT1, CHAN1, 1, 1, NOTHING
X52, SKT2, CHAN1, 1, 1, NOTHING
X53, SKT3, CHAN1, 1, 1, NOTHING
X54, SKT4, CHAN1, 1, 1, NOTHING
X55, SKT5, CHAN1, 1, 1, NOTHING

identifier of analyzer (IDA) – without an index

X61, IDA, CHAN1, 42, 1, NOTHING_TEXT

#serial number of analyzer (IDA) - without an indexes

X62, NRS, CHAN1, 20, 1, NOTHING_TEXT

menu language of analyzer (IDA) - without an index

X63, MNU, CHAN1, 1, 1, NOTHING_BYTE

state of zero calibration gas pump (1 and 2) (SPKZ) – with an index

X70, SPKZ1, CHAN1, 1, 1, NOTHING
X80, SPKZ2, CHAN1, 1, 1, NOTHING

nominal values of zero calibration gases (1 and 2) (NSPZ) – with an index and element

X71, NSPZ1.1, CHAN1, 1, 1, NOTHING_FP
X72, NSPZ1.2, CHAN1, 1, 1, NOTHING_FP
X73, NSPZ1.3, CHAN1, 1, 1, NOTHING_FP
X74, NSPZ1.4, CHAN1, 1, 1, NOTHING_FP
X75, NSPZ1.5, CHAN1, 1, 1, NOTHING_FP

X81, NSPZ2.1, CHAN1, 1, 1, NOTHING_FP
X82, NSPZ2.2, CHAN1, 1, 1, NOTHING_FP
X83, NSPZ2.3, CHAN1, 1, 1, NOTHING_FP
X84, NSPZ2.4, CHAN1, 1, 1, NOTHING_FP
X85, NSPZ2.5, CHAN1, 1, 1, NOTHING_FP

status of standard calibration gas pump (3 - 6) (SPKW) – with an index

X90, SPKW3, CHAN1, 1, 1, NOTHING
X100, SPKW4, CHAN1, 1, 1, NOTHING
X110, SPKW5, CHAN1, 1, 1, NOTHING
X120, SPKW6, CHAN1, 1, 1, NOTHING

rated values of standard calibration gases (3 - 6) (NSPW) – with an index and element

X91, NSPW3.1, CHAN1, 1, 1, NOTHING_FP
X92, NSPW3.2, CHAN1, 1, 1, NOTHING_FP
X93, NSPW3.3, CHAN1, 1, 1, NOTHING_FP
X94, NSPW3.4, CHAN1, 1, 1, NOTHING_FP
X95, NSPW3.5, CHAN1, 1, 1, NOTHING_FP

X101, NSPW4.1, CHAN1, 1, 1, NOTHING_FP
X102, NSPW4.2, CHAN1, 1, 1, NOTHING_FP
X103, NSPW4.3, CHAN1, 1, 1, NOTHING_FP

```

X104, NSPW4.4, CHAN1, 1, 1, NOTHING_FP
X105, NSPW4.5, CHAN1, 1, 1, NOTHING_FP

X111, NSPW5.1, CHAN1, 1, 1, NOTHING_FP
X112, NSPW5.2, CHAN1, 1, 1, NOTHING_FP
X113, NSPW5.3, CHAN1, 1, 1, NOTHING_FP
X114, NSPW5.4, CHAN1, 1, 1, NOTHING_FP
X115, NSPW5.5, CHAN1, 1, 1, NOTHING_FP

X121, NSPW6.1, CHAN1, 1, 1, NOTHING_FP
X122, NSPW6.2, CHAN1, 1, 1, NOTHING_FP
X123, NSPW6.3, CHAN1, 1, 1, NOTHING_FP
X124, NSPW6.4, CHAN1, 1, 1, NOTHING_FP
X125, NSPW6.5, CHAN1, 1, 1, NOTHING_FP

# settings of calibration tray (SPKK) - pump, (NSKK) - rated
X130, SPKK, CHAN1, 1, 1, NOTHING
X131, NSKK1, CHAN1, 1, 1, NOTHING_FP
X132, NSKK2, CHAN1, 1, 1, NOTHING_FP
X133, NSKK3, CHAN1, 1, 1, NOTHING_FP
X134, NSKK4, CHAN1, 1, 1, NOTHING_FP
X135, NSKK5, CHAN1, 1, 1, NOTHING_FP

# start of zero calibration gas (1 and 2)
X201, PGKZ1, CHAN1, 1, 1, NOTHING
X202, PGKZ2, CHAN1, 1, 1, NOTHING

# start of standard calibration gas measuring (3 – 6)
X203, PGKW3, CHAN1, 1, 1, NOTHING
X204, PGKW4, CHAN1, 1, 1, NOTHING
X205, PGKW5, CHAN1, 1, 1, NOTHING
X206, PGKW6, CHAN1, 1, 1, NOTHING

# start of tested gas measuring
X207, PGB, CHAN1, 1, 1, NOTHING

```

1.4. Driver Configuration

The S700 protocol driver may be configured by use of the section [S700] placed in the application INI file. Individual parameters are transferred in separate items of the section. Each item has the following syntax:

item_name=[number [,number]] [YES] [NO]



LOG_FILE=*file_name*

Meaning	- the item allows to define a file to which all diagnostic messages of the S700 driver and information about contents of telegrams received by the driver are written. If the item does not define the full path, then the log file is created in the current directory. The log file should be used only while the asix start-up.
Default value	- by default, the log file is not created.

**LOG_OF_TELEGRAMS=YES/NO**

- Meaning - the item allows to write to the log file (declared by use of LOG_FILE) the contents of telegrams transferred within the communication with a S700 analyzer. Writing the contents of telegrams to the log file should be used only while the **asix** start-up.
- Default value - by default, telegrams are not written.

**LOG_FILE_SIZE=number**

- Meaning - the item allows to specify the log file size in MB.
- Default value - by default, the item assumes that the log file has a size of 1 MB.

**IGNORE_STATUS_CHARACTER=YES/NO**

- Meaning - in each answer from S700 an internal status byte of the analyzer is transferred. The content of this byte decides about the status of data which are transferred in a given answer from the analyzer. If the byte has a value of 0, then the variables receive a correct status, otherwise they receive an error status. The use of the item IGNORE_STATUS_CHARACTER with a value of YES causes that a correct status is assigned to the variables, irrespectively of the status byte content.
- Default value - by default, the item has a value of NO.

**RECV_TIMEOUT=station_no,number**

- Meaning - the item RECV_TIMEOUT allows to specify a waiting time for arriving the first character of an answer sent from a specified analyzer. After passage of this time it is assumed that a given analyzer does not work correctly and the transmission session ends with an error.
- Default value - by default, it is assumed that the maximal waiting time for the first character of an answer is equal to 1000 milliseconds.
- Parameter:
- | | |
|-------------------|--|
| <i>station_no</i> | - number AK-ID of the analyzer, |
| <i>number</i> | - time in milliseconds (from 100 to 5000). |

**CHAR_TIMEOUT=station_no,number**

- Meaning - the item allows to determine a maximal time between successive characters of answer from a given analyzer. After passage of this time it is assumed that a given analyzer does not work correctly and transmission session ends with an error.
- Default value - by default, it is assumed that the time between successive characters is equal to 50 millisecond.
- Parameter:

station_no - number AK-ID of analyzer,
number - time in milliseconds (from 10 to 300).

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