GenTwo®

AK Protocol Description

Software description for GenTwo® Multigas Analyzers

Version 1.00.00

AK Protocol software version 1.00.010

Quick support

If you have any questions about this product regarding commissioning, handling or technical service - feel free to contact us. We will support you directly, quickly and of course free of charge with our experience and product knowledge.

Please contact our service center in Ratingen, Germany,

for US Service Ventura, California

Please help us by providing this information about the device, if possible:

- Product model

- Product serial number

- M&C order or invoice number

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In addition, we are continuously working on providing further assistance for many of our products online on our webpage:

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Table of Contents

Table of Illustrations

1 About this document

This documentation only applies to GenTwo® analyzers starting with software version 1.00. The document is therefore also explicitly non-transferable.

If you have any questions about this document, please contact M&C or one of our official distributors.

Document:	Software description in EN for AK Protocol
Version:	1.00.00
Software Version:	1.00.010
Release date:	01.2023
Copyright:	© 2023 M&C TechGroup
Published by:	M&C TechGroup Germany GmbH, Rehhecke 79
	40885 Ratingen, Deutschland

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The German software description is the original document.

With the release of this version all older versions will no longer be valid.

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2 Important safety information

Please follow the general safety precautions when mounting, commissioning and operating M&C components.

The AK Protocol description with applications is a software description for GenTwo® multi-gas analyzers for implementing the AK Protocol.

Implementation may only be carried out by personnel specially trained for this purpose. Missing or incorrect data may cause damage to the instrument or to the plant where the instrument has been used.

2.1 Signs and definitions in this document

Qualified personnel	"Qualified personnel" are experts who are familiar with the installation, mounting, commissioning and operation of these types of products.
Note	"Note" indicates important information relating to the product or highlights parts of the documentation for special attention.

3 AK Protocol via TCP-IP

The O2 analyzer is a AK Protocol server. The AK Protocol client has to set up a connection to the device on its IP address and port. Currently, only one connection is possible at a time.

IP address: 172.20.30.2   (is always active)

Port: 2200

Note	Standard IP address is 172.20.30.2 and the standard port is 2200 .
	The changeable APP IP address is then to be used. Port remains 2200.
	The AK protocol via TCP-IP requires a functioning network connection.

3.1 AK Protocol implementation

Qualified personnel	Implementation should only be carried out by personnel specially trained for this purpose.

The AK protocol originates from times of the RS232 and its content is ASCII-encoded. Therefore, all characters between an STX and ETX are always to be evaluated as ASCII (0x20h ... 0x7Ah)

The implementation of the AK protocol was carried out in accordance with the following specification:
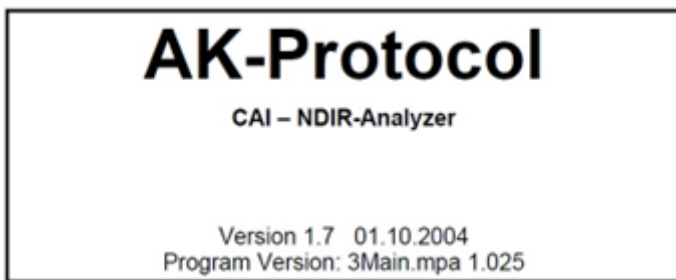
akprotocol_for_ndir_1_1_.700.pdf:

Fig. 1:   The protocol is based on this specification

3.2   Protocol Legend

Abbreviation	Description
Kx	'K' + channel number of the HMI display (K1...K9)
ff	float measuring value (e.g.: concentration)
E	Error code
	'0' = No error
	'S' = Syntax error, e.g.: received message not complete
	'N' = Not included, e.g.: received request is not (yet) included in the HMI software.
s	Status individual bits: '0' or '1'
S32	Status 32 bit: '0' or '1'
STX	Start identifier of a data record (0x02h) "Start of text"
ETX	End identifier of a data record (0x03h) "End of text"
SPACE	Separating identifier of a data record (0x20h) "Space = Separator" between data blocks and control characters
HMI	is AK protocol server and replies to requests from the PC
PC/Remote software	is AK protocol client and initiator of the protocol

3.3   General setup: Data Record/Request from PC (Initiator)

Byte	Description	Value (HexCode)	Note
1	STX	0x02	Start identifier
2	SPACE	0x20	Separator
3	Function Code 1	0xXX	AK function code, e.g.: ASTZ always consists of 4 ASCII codes
4	Function Code 2	0xXX	
5	Function Code 3	0xXX	Between: 'A' and 'Z'
6	Function Code 4	0xXX	
7	SPACE	0x20	Separator
8	K	0x4B	'K' for channel
9	x	0x31 - 0x39	Indicates the HMI channel no. "Kx", which data are to be read by the HMI
10	SPACE	0x20	Separator
...	D		AK functional parameter
...	a		Length is variable
...	t		For most requests, further parameters do not apply, therefore these data remain "empty"
...	e		
...	n		
n-1	SPACE	0x20	Separator in front of the end of text
n	ETX	0x03	End identifier

3.4 General setup: Response Data Record of the HMI

Byte	Description	Value (HexCode)	Note
1	STX	0x02	Start identifier
2	SPACE	0x20	Separator
3	Function Code 1	0xXX	HMI response on the AK function code. Always consists of 4 ASCII codes between: 'A' and 'Z'
4	Function Code 2	0xXX	
5	Function Code 3	0xXX	
6	Function Code 4	0xXX	
7	SPACE	0x20	Separator
	Error status		Error status:
		0x30	'0' is no error
		0x53	'S' = Syntax error
		0x4E	'N' = Not included
8	SPACE	0x20	Separator
9	K	0x4B	'K' for channel
10	x	0x31 - 0x39	HMI response of the requested channel no. "Kx"
11	SPACE	0x20	Separator
...	D		HMI response data
...	a		Length is variable
...	t		Can be a status or a measuring value or ...
...	e		
...	n		
n-1	SPACE	0x20	Separator before end of text
n	ETX	0x03	Indicator for end

3.5 Protocol Error Descriptions

Byte	Description	Value (HexCode)	Note
	Error status		Error status:
		0x30	'0' is no error
		0x53	'S' = Syntax error
		0x4E	'N' = Not included

3.6   Function Codes: HMI Measuring value of the Concentration of Kx

PC Command	HMI Reply	Description
AKON K1 ⇨		Measuring value request of concentration as float from K1
	⇦ AKON 0 K1 20.96	

3.7   Function Codes: HMI Status Information from Kx

PC Command	HMI Reply	Description
ASTZ K1 ⇨		Status request from K1
	⇦ ASTZ 0 K1 11 1011001100100000001000000000000000	

S32: Status information in bits[2]

ss: Status settings in bits[1]

Response: channel no.

Error status: ‚0‘ is no error

Response: Function code

3.7.1   Kx Status settings in bits

PC Command	HMI Reply	Description
ASTZ K1 ⇨		Status request from K1
	⇦ ASTZ 0 K1 11 1011001100100000001000000000000000	

ss: Status settings in bits[1]

To foot note 1):

There are 2 general bits ss that specify the HMI channel x:

Bit 0: Sensor Kx is active (‚0‘ = no , ‚1‘ = active)

Note   This bit tells whether the sensor Kx on the HMI is active or not.

Bit 1: Kx concentration: unit in Vol.-%/ppm ('1' = vol% , '2' = ppm)

| Note | If no previous ASTZ request takes place, then the unit of concentration is undefined. |

3.7.2 Kx Status information in 32 bits

PC Command	HMI Reply	Description
ASTZ K1 ⇨		Status request from K1
	⇦ ASTZ 0 K1 11 <u>10110011001000000010000000000000</u>	
	S32: Status information in bits[2]	

To foot note 2):

| Bit	Channel	
0	Kx ready for measuring	(0 = not ready [false], 1 = ready [true])
1	Kx Collective Status	(0 = ok, no error, 1 = any error)
2	I/O Relais R1	(0 = off, 1 = on) for safety first
3	I/O Relais R2	(0 = off, 1 = on) for calibration
4	I/O HighSideSwitch 1	(0 = off, 1 = on) for measuring range 2
5	I/O-HighSideSwitch 2	(0 = off, 1 = on) for measuring range 3
6	I/O-HighSideSwitch 3	(0 = off, 1 = on) for operational limit Lim1
7	I/O-HighSideSwitch 4	(0 = off, 1 = on) for operational limit Lim2
8	Error: Temperature	(0 = no, 1 = yes)
9	Error: Pressure	(0 = no, 1 = yes)
10	Error: Flow	(0 = no, 1 = yes)
11	Not in use	Reserve (bits 11 to 15)
12		
13		
14		
15		
16	measuring range 1	(0 = no, 1 = yes) selected measuring range 1
17	measuring range 2	(0 = no, 1 = yes) selected measuring range 2
18	measuring range 3	(0 = no, 1 = yes) selected measuring range 3
19	measuring range 4	(0 = no, 1 = yes) selected measuring range 4
20 bis 31	Not in use	Reserve (bits 20 to 31)

3.8 Protocol LOG File Recording

Command	Reply
PC ⇨	ASTZ K1
⇦ HMI	ASTZ 0 K1 11 101100110010000000010000000000000
PC ⇨	ASTZ K2
⇦ HMI	ASTZ 0 K2 12 100010110010000001000000000000000
PC ⇨	ASTZ K9
⇦ HMI	ASTZ 0 K9 01 010000000000000010000000000000000
PC ⇨	AKON K1
⇦ HMI	AKON 0 K1 18.23
PC ⇨	AKON K2
⇦ HMI	AKON 0 K2 177200.0
PC ⇨	AKON K9
⇦ HMI	AKON 0 K9 0.0

Your contact to M&C in Germany and the USA
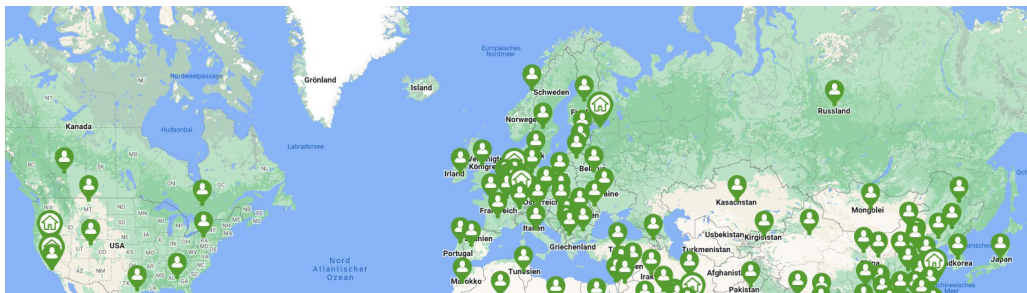
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