

# UART Communication Protocol

Baud rate: 9600bps Data bit: 8 Stop bit: 1 Check bit: null

## Summary:

1. The data in the explanation are all hex data. Such as 46 is decimal [70]
2. [xx] is single byte data(no symbol,0-255) ;(xx) is double byte data, signed integer (-32768 to +32767),the top one is ahead, "—" followed by explanation;
3. All the data are integer. It has (100, 10, and 1) times relationship with true data. For example, if an instrument of four components SO<sub>2</sub>, CO<sub>2</sub>, CO, O<sub>2</sub>, show as 899PPM, 2.000%, 010.0%, 20.80%, then the instrument return data are divided by 1,1000,10,100 as the instrument display data.
4. The length of command byte is [LB]+3.

## Command Format:

Send: [IP] [LB] [CMD] [DF] [CS]  
 [IP] address (fixed as 11).  
 [LB] byte length followed does not include CS  
 [CMD] command  
 [DF] parameter items with command, optional  
 [CS] CS= - (IP +LB+CMD +DF)

## Response:

- a. When the command is implemented correctly, it responses

[ACK] [LB] [CMD] [DF] [CS]  
 [ACK]=0X16 right command  
 [LB] byte length followed does not include CS  
 [CMD] command  
 [DF] parameter items with command, optional  
 [CS] CS= - (ACK +LB+CMD+DF)

- b. When the command is not implemented correctly, it responses

[NAK] [LB] [CMD] [EC] [CS]  
 [NAK]=0X06 Command is not implemented correctly  
 [LB]=2 byte length followed does not include CS  
 [CMD] command  
 [EC] the error code that command is not implemented correctly  
 [CS] CS= - (NAK +LB+CMD+DF)

- [EC]  
 01 Order length is wrong  
 02 The command is not correct  
 03 Can't implement this command under current status.

## Function list

| No | Function                | CMD  | Description  |
|----|-------------------------|------|--|
| 1. | measuring results check | 0x01 | Besides measuring data, it also has status information |
| 2. | measuring results check | 0x02 | Measurement results of each component                  |
| 3. | software version check  | 0x1E |  |
| 4. | sensor serial No. check | 0x1F |  |

## Detail description

### 1. Look up measurement result

Send: 11 01 01 ED

Response: [ACK] 05 01 [DF1] [DF2] [ST1] [ST2] [CS]

Function: Look up measurement result.

Remarks:

- 1). Gas 1 concentration =  $(DF1 * 256 + DF2) / (\text{ppm})$
- 2). [ST] means status of system, which give the information of working status of it. For example: to check whether it needs zeroing, sampling signal is correct, user's options.

### 2. Look up voltage result

Send: 11 02 02 [TVM] EB

Response: [ACK] 0A 02 [TVM] [FV1] [FV2] [FV3] [FV4] (refVpp) (testVpp) [CS]

Function: Look up voltage result.

Remarks:

- 1). [TVM] gas measurement voltage. 00 is the first component, 01 is the second component, (this place only has the first component)
- 2). [FV1] [FV2] [FV3] [FV4] to calculate voltage. Four bytes consist of floating type
- 3). (refVpp) is referred voltage peak, its range is about 0-4 or 5 k
- 4). (testVpp) is measurement voltage peak
- 5). For example, there is an instrument consist two component, CO+CO2, which has know as the first component was CO, now take CO to measure voltage, should sent "11 02 02 00 EB", then take the second component of CO2 to send "11 02 02 01 EA"

### 3. Software version check

Send: 11 01 1E D0

Response : [ACK] 0C 1E [CH1] [CH2] [CH3] [CO2] [CH5] [CH6] [CH7] [CH8] [CH9] [CH10] [CH11] [CH12] [CS]

Function: to check software version

Remark:

Out put the version code. [CHx] is ASCII code.

### 4. Series number check

Send: 11 01 1F CF

Response: ACK] 0B 1F (SN1) (SN2) (SN3) (SN4) (SN5) [CS]

Function:

Remark:

Output the series number of software. SNn is from 0-9999, three integer consists of 12 bits series number