ATEK ALFA

AST 230 SERIES MODBUS COMMUNICATION PROTOCOL

1、communicational parameter

order number	parameter	scope	explain
1	Slave Address	1~247	Initial value: 1
2	Baud rate	1200/4800/9600/19200/38400/57600/11520	Initial value: 9600
3	data bit	8bit	fixed
4	stop bit	1bit	fixed
5	check bit	NONE,ODD,EVEN	initial valueNONE

2. Communication Command

Example: (Slave bus address: 01H)

1. Read sensor data (Function Code 03H)

The pressure unit can be configured; for the corresponding unit codes, please refer to Table 3; the temperature unit is fixed as °C.

（1）Read single-precision floating-point number

Host transmission: 01 03 00 00 00 04 44 09

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	03 Read Sensor Data
2~3	start address	2	00 00 Data Address
4~5	Number of addresses	2	00–04: The number of memory addresses read is 4.
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 03 08 41 45 70 A4 41 CC 00 00EA 05

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	03 Read Sensor Data
2	Byte count	1	08 indicates that 8 bytes of data have been received.
3~6	pressure	4	41 45 70 A4 denotes a single-precision floating-point number with a decimal value of 12.34.
7~10	temperature	4	41 CC 00 00 represents a single-precision floating-point number, equivalent to 25.5 °C in decimal notation.
11~12	check code	2	CRCLCRCH

To read floating-point pressure or temperature data individually, you can modify the starting address and the number of addresses; the starting address for pressure values is 00 00, and the starting address for temperature values is 00 02; both the number of addresses is 02.

Example: Querying pressure value: Host sends: 01 03 00 00 00 02 C4 0B; Slave responds: 01 03 04 41 45 70 A4 DB A1
Query temperature value: Host sends: 01 03 00 02 00 02 65 CB; Slave responds: 01 03 04 41 CC 00 00 2E 30
Complete data addresses are provided in Table 1.

2. Write slave device address, baud rate, pressure unit, or reset (Function Code 06H)

（1）Write slave address (register address 0x012A):

Host transmitter: 01 06 01 2A 00 02 28 3F

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	012A Slave Address – Storage Address
4~5	Data Content	2	00 02 – Write to address 012A
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 06 01 2A 00 02 28 3F

order	definition	Byte count	explain
0	Slave Address	1	Upon completion of this command, the slave address will be set to 2.
1	FC	1	06 Pre-configure single register
2~3	start address	2	012A Slave Address – Storage Address
4~5	Data Content	4	00 02 – Address written successfully; the slave device address is now 2.
6~7	check code	2	CRCLCRCH

Slave device error response: 01 86 02 A2 61

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 86 indicates an error for a command with function code 06.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

Address range: 1–247

Set slave device baud rate (register address 0x012B):

Host transmission: 01 06 01 2B 00 02 79 FF

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	01 2B baud rate storage address
4~5	Data Content	2	00 02 – Write to address 01 2B
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 06 01 2B 00 02 79 FF

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	01 2B baud rate storage address
4~5	Data Content	4	00 02 – The baud rate setting was successful; at this point, the slave machine's baud rate is 960
6~7	check code	2	CRCLCRCH

Slave device error response: 01 86 02 A2 61

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 86 indicates an error for a command with function code 06.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

（2）Write the slave check bit (register address 0x012C):

Host transmission: 01 06 01 2C 00 02 C8 3E

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	01 2C Check Bit Storage Address
4~5	Data Content	2	00 02 – Write to address 01 2C
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 06 01 2C 00 02 79 FF

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	01 2C Check Bit Storage Address
4~5	Data Content	4	00 02: Writing the check bit was successful; at this point, the slave device's check bit is EVEN.
6~7	check code	2	CRCLCRCH

Slave device error response: 01 86 02 A2 61

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 86 indicates an error for a command with function code 06.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

（3）Pressure unit:

Host transmission: 01 06 00 17 00 0C 39 CB

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	00 17 Pressure Unit Storage Address
4~5	Data Content	2	Write 00 0C to address 00 17
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 06 00 17 00 05 09 CD

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	00 17 Pressure Unit Storage Address
4~5	Data Content	4	00 0C – Writing pressure unit succeeded; the pressure unit is now KPa.
6~7	check code	2	CRCLCRCH

Slave device error response: 01 86 02 A2 61

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 86 indicates an error for a command with function code 06.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

Note: When the function code is 06, the device can respond to the Address 0 command issued by the host computer.

（4）Clear Stress:

Host sends: 01 06 00 10 00 00 88 0F

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	00 10 Pressure Offset Value Storage Address
4~5	Data Content	2	00 00 indicates a reset operation.
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 06 00 10 00 00 88 0F

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	06 Pre-configure single register
2~3	start address	2	00 10 Pressure Offset Value Storage Address
4~5	Data Content	2	00 00 indicates that the reset operation was successful.
6~7	check code	2	CRCLCRCH

Slave device error response: 01 86 02 A2 61

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 86 indicates an error for a command with function code 06.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

Note: When the function code is 06, the device can respond to the Address 0 command issued by the host computer.

3. Read slave device address, baud rate, pressure unit, and pressure offset value (Function Code 04H)

（1）Read slave address (register address 0x012A):

Host transmitter: 01 04 01 2A 00 01 11 FE

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	start address	2	012A Slave Address – Storage Address
4~5	quantity	1	00 01
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 04 02 00 01 78 F0 (This sequence consists of 7 bytes; however, the sequence in the following table is missing 6–7 bytes).

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2	quantity	1	The byte sequence after 02 is 00 01.
3~4	quantity	2	00 01 Slave Address Bit 1
5~6	check code	2	CRCLCRCH

Slave error response: 01 84 02 C2 C1

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 84 indicates an error for a command with function code 04.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

Address range: 1–247

(2) Read slave baud rate (register address 0x012B):

Host transmission: 01 04 01 2B 00 01 40 3E

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	start address	2	01 2B Slave Device Baud Rate Storage Address
4~5	quantity	1	00 01
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 04 02 00 02 38 F1

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	quantity	2	00 02 indicates a slave device baud rate of 9600.
4~5	check code	2	CRCLCRCH

Slave error response: 01 84 02 C2 C1

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 84 indicates an error for a command with function code 04.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

（2）Read the slave check bit (register address 0x012C):

Host sends: 01 04 01 2C 00 01 F1 FF

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	start address	2	01 2C Slave Device Checksum Storage Address
4~5	quantity	1	00 01
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 04 02 00 02 38 F1

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	quantity	2	00 02 indicates that the slave device's parity bit is EVEN.
4~5	check code	2	CRCLCRCH

Slave error response: 01 84 02 C2 C1

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 84 indicates an error for a command with function code 04.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

（3）Read pressure unit (register address 0x012B):

Host sends: 01 04 00 17 00 01 81 CE

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	start address	2	00 17 Pressure Unit Storage Address
4~5	quantity	1	00 01
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 04 02 00 0C B9 35

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	quantity	2	00 0C indicates that the pressure unit is kPa.
4~5	check code	2	CRCLCRCH

Slave error response: 01 84 02 C2 C1

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 84 indicates an error for a command with function code 04.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

（4）Read the pressure offset value (register address 0x0010):

Host transmitter: 01 04 00 10 00 02 70 0E

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2~3	start address	2	00 10 Pressure Offset Value Storage Address
4~5	quantity	1	00 02
6~7	check code	2	CRCLCRCH

Slave device correct response: 01 04 04 3F 99 99 9A CD 84

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	04 Read Register
2	Byte count	1	04 indicates the reception of 4 bytes of data.
3~6	Pressure Offset Value	4	3F 99 99 9A – Floating-point number: 1.2 kPa
7~8	check code	2	CRCLCRCH

Slave error response: 01 84 02 C2 C1

order	definition	Byte count	explain
0	Slave Address	1	01 Slave address: 1
1	FC	1	The code 84 indicates an error for a command with function code 04.
2	extra-code	2	02 Fixed
3~4	check code	2	CRCLCRCH

Sensor Data Register Address: 40001 (Factory Default)

name	address	Read length	Number of bytes returned	form
Pressure or temperature primary variable (floating-point number)	0x0000	0x0002	4	floating number
Reference temperature (floating-point number °C)	0x0002	0x0002	4	floating number
For manufacturer's debugging purposes	0x0004	0x0002	4	floating number
For manufacturer's debugging purposes	0x0006	0x0002	4	floating number
For manufacturer's debugging purposes	0x0008	0x0002	4	floating number
For manufacturer's debugging purposes	0x000A	0x0002	4	floating number
For manufacturer's debugging purposes	0x000C	0x0002	4	floating number
For manufacturer's debugging purposes	0x000E	0x0002	4	floating number
For manufacturer's debugging purposes	0x0010	0x0002	4	floating number
For manufacturer's debugging purposes	0x0012	0x0002	4	floating number
Pressure (signed integer) The first and second bytes represent the integer part. The 3rd and 4th bytes represent the divisor factor.	0x0014	0x0002	4	Signed integer Actual pressure value = Integer part/Divisor factor
Pressure (signed integer)	0x0016	0x0001	2	Signed integer Actual pressure value = Signed integer / 100

Table 1

Note: The "Divisor Factor" in Table 1 can only take one of five possible values: 1, 10,100,1000, or 10000.

Baud rate range:

Baud rate	definition
1200	00 00
4800	00 01
9600	00 02
19200	00 03
38400	00 04
57600	00 05
115200	00 06

Table 2

Checkbit range:

check bit	definition
NONE	00 00
ODD	00 01
EVEN	00 02

Table 3

Unit Code:

unit	definition(HEX)	explain
inH2O	00 01	0.249082 kPa
inHg	00 02	3.3863787 kPa
ftH2O	00 03	2.9889841 kPa
mmH2O	00 04	0.00980665 kPa
mmHg	00 05	0.133322 kPa
psi	00 06	6.8947591 kPa
bar	00 07	100.0 kPa
mbar	00 08	0.1 kPa
g_SqCm	00 09	0.0980665205 kPa
kg_SqCm	00 0A	98.0665205 kPa
Pa	00 0B	0.01 kPa
kPa	00 0C	1.0 kPa
Torr	00 0D	0.133322 kPa
atm	00 0E	101.325 kPa
MPa	00 ED	1000.0 kPa
mH2O	00 AB	9.80665 kPa
mHg	00 B3	133.3220 kPa
m	00 2D	9.80665 kPa
mm	00 31	0.00980665 kPa
cm	00 30	0.0980665 kPa
℃	00 32	Only JT3051TR is used as a temperature transmitter.

Table 4