



Modbus Protocol

eyc-tech FUM06

Ultrasonic Flow Transmitter



Introduction

This document describes the protocol detail of Modbus for FDM06 series.

Hardware interface

- The interface on the sensor is RS-485.
- Hardware named D+, D-
- Meet the standards TIA/EIA-232-F and TIA/EIA-485-A

RS-485 Slave Address, Baud rate, Data format

- Slave Address: 1~247
- Baud rate: 9600, 19200, 38400, 57600, 115200
- Parity: None, Even, Odd
- Data length: 8 bit
- Stop bit: 1 or 2 bit
- Default Address = 1, Data format= 9600, N81

About Modbus (ref PI-MBUS-300)

- Support RTU mode
- Broadcast support (Address 0)
- Bit addressable items (i.e. Coils and Discrete inputs) will not be implemented
- Measurement Values are represented in IEEE 754 single-precision 32-bit floating point type http://en.wikipedia.org/wiki/IEEE_754
- Modbus protocol structure:
 - 1st byte: Address (1~247)
 - 2nd byte: Function code (1 byte)
 - 3~Nth bytes: Data bytes
 - N+1th~N+2th byte: CRC (16 bits), LSB first

Instrument Holding Registers for measurement engineering (ex: ModScan)

Item No.	Address	Address HEX	Parameter	Point Type	Data Type	Unit
1	1361	0551H	Flow Velocity	Holding Register	Floating Pt.	m/s
2	1365	0555H	Flow Volume	Holding Register	Floating Pt.	L/min
3	1369	0559H	Pos Totalizer	Holding Register	Floating Pt.	L
4	1373	055DH	Neg Totalizer	Holding Register	Floating Pt.	L
5	1377	0561H	Net Totalizer	Holding Register	Floating Pt.	L

^{[1][2]} Parameter could be configured by output configuration registers

- The base address is 1 rather than 0 in ModScan application.
- The register shown on the table is 1 byte whereas the ModScan 2 bytes.
- So the corresponding value against address 5 of the "table" would be address 40003 of the ModScan

Instrument Hold

Item No.	Address	Value
1	01	
2	05	
3	09	
4	13	

ModScan1

Address: 0001

Length: 8 03:

40001: <3B3EH>

40002: <41C0H>

40003: <A7EDH>

40004: <4273H>

40005: <2000H>

40006: <4495H>

40007: <0000H>

40008: <0000H>

Instrument Holding Registers for application engineering

Item No.	Address	Address HEX	Parameter	Point Type	Data Type	Unit
1	1361	0551H	Flow Velocity	Holding Register	Floating Pt.	m/s
2	1365	0555H	Flow Volume	Holding Register	Floating Pt.	L/min
3	1369	0559H	Pos Totalizer	Holding Register	Floating Pt.	L
4	1373	055DH	Neg Totalizer	Holding Register	Floating Pt.	L
5	1377	0561H	Net Totalizer	Holding Register	Floating Pt.	L
6	1381	0565H	Down temperatura	Holding Register	Floating Pt	°C
7	1385	0569H	Up temperatura	Holding Register	Floating Pt	°C
8	1389	056DH	Frssi down	Holding Register	Floating Pt	%
9	1393	0571H	Frssi Up	Holding Register	Floating Pt	%
10	1397	0575H	Signal quality	Holding Register	Floating Pt	%

Remark: The base address is 1 rather than 0 in ModScan application. One register occupies 2 bytes memory address and one floating number splits into 2 registers. Thus, one measure occupies 4 bytes memory address or 2 registers length of count.

Instrument Holding Registers for software engineering

Item No.	Address	Address HEX	Parameter	Data Bytes	Data Type	Unit	Value
Information							
1	65-80	0041H-0050H	Model Name	16 bytes	ASCII		
2	81-96	0051H-0060H	Serial Number	16 bytes	ASCII		
3	97-112	0061H-0070H	Firmware version	16 bytes	ASCII		
RS-485 Slave Address, Baud rate, Data format							
3	116	0074H	Slave Address	2 bytes	unsigned Integer		1-247
4	118	0076H	Baud rate	2 bytes	unsigned Integer		0: 9600 1: 19200 2: 38400
5	120	0078H	Data type	2 bytes	unsigned Integer		0: N81 1: N82 2: E81 3: E82 4: O81 5: O82
6	122	007AH	Stop bit	2 bytes	unsigned Integer		0:1 bit 1:2 bits

ASCII format, Item No. 1-2

1st Word		2nd Word		3rd Word		4th Word		5th Word		6th Word		7th Word		8th Word	
Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte

"ABCDEF0123456789" is represented in byte of hexadecimal as

<41><42><43><44><45><46><30><31><32><33><34><35><36><37><38><39>

IEEE754 format

Data Hi Word, Hi Byte		Data Hi Word, Lo Byte		Data Lo Word, Hi Byte		Data Lo Word, Lo Byte	
SEEE	EEEE	EMMM	MMMM	MMMM	MMMM	MMMM	MMMM

Where

S represents the sign bit where 1 is negative and 0 is positive

E is the two's complement exponent with an offset of 127 i.e. an exponent of zero is represented

by 127, an exponent of 1 by 128 etc.

M is the 23-bit normal mantissa. The highest bit is always 1 and, therefore, is not stored.

Using the above format the floating point number 23.83 is represented in byte of hexadecimal as

<41><BE><A3><D7>:

Data Hi Word, Hi Byte	Data Hi Word, Lo Byte	Data Lo Word, Hi Byte	Data Lo Word, Lo Byte
0x41	0xBE	0xA3	0xD7

Read Serial No.

Request the host (PC or PLC) to polling the data of FDM06			
Field Name	Value	Type	Byte
Slave Address	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	00	Byte	1
Starting Address Lo	50	Byte	1
No. of registers Hi	00	Byte	1
No. of registers Lo	08	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Registers of Serial No. are 0x30 ~ 0x3F

Response FDM06 response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Slave Address	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	10	Byte	1
1st Word, Lo byte	0x4E	Byte	1
1st Word, Hi byte	0x53	Byte	1
2nd Word, Lo byte	0x31	Byte	1
2nd Word, Hi byte	0x30	Byte	1
3rd Word, Lo byte	0x33	Byte	1
3rd Word, Hi byte	0x32	Byte	1
4th Word, Lo byte	0x35	Byte	1
4th Word, Hi byte	0x34	Byte	1
5th Word, Lo byte	0x37	Byte	1
5th Word, Hi byte	0x36	Byte	1
6th Word, Lo byte	0x39	Byte	1

6th Word, Hi byte	0x38	Byte	1
7th Word, Lo byte	0x42	Byte	1
7th Word, Hi byte	0x41	Byte	1
8th Word, Lo byte	0x44	Byte	1
8th Word, Hi byte	0x43	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*example of Serial No. is "SN0123456789ABCD"

Read Firmware Version

Request the host (PC or PLC) to polling the data of FDM06			
Field Name	Value	Type	Byte
Slave Address	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	00	Byte	1
Starting Address Lo	60	Byte	1
No. of registers Hi	00	Byte	1
No. of registers Lo	05	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Registers of Firmware Version are 0x40 ~ 0x49

Response FDM06 response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Slave Address	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	0A	Byte	1
1st Word, Lo byte	0x31	Byte	1
1st Word, Hi byte	0x2E	Byte	1
2nd Word, Lo byte	0x30	Byte	1
2nd Word, Hi byte	0x2E	Byte	1
3rd Word, Lo byte	0x31	Byte	1
3rd Word, Hi byte	0x00	Byte	1
4th Word, Lo byte	0x00	Byte	1
4th Word, Hi byte	0x00	Byte	1
5th Word, Lo byte	0x00	Byte	1
5th Word, Hi byte	0x00	Byte	1
CRC Lo	CRC Lo	Byte	1

CRC Hi	CRC Hi	Byte	1
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*example of Firmware Version is “1.0.1”

Revise history

- V1 2025_07_14 Initial

eyc-tech Measuring Specialist

enhance your capability with **sensor** technology

Air flow | Humidity | Dew point | Differential pressure | Liquid flow

Temp. | Pressure | Level | Air quality | Signal meter



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