FB400 Smart Vortex Flowmeter

Modbus Protocol Instructions

1 Brief description of the protocol

This product adopts standard MODBUS-RTU mode. Supported function codes include:

Function code: 03, read the value of the holding register, including configuration data and other settings;

Function code: 04, read the value of the input register, here refers to read the dynamic variable.

Function code: 06, write a holding register.

Function code: 16, write multiple holding registers.

The MODBUS operating principle is based on the "register" concept, and its standard function number basically reads and writes the specified "register" operate. Based on this concept, some commonly used parameters are set as "registers" to facilitate common use with other systems.

1.1 Communication parameter setting

Parameter Name	Value Range	Defaults
Converter Address	1--247	1
Baud Rate	9600	9600
Data Bit	8	8
Parity	No	none
Stop Bit	1	1

1.2 Communication data format

Supported data types:

1) Float: floating point data

4-byte floating point number in standard IEE-754 format;

For example: taking 100.0 (hexadecimal representation: 0x42, 0xC8, 0x00, 0x00) as an example, the order of transmission is: 0x42, 0xC8, 0x00, 0x00.

2) **Unsigned short: 2** -byte unsigned integer

For example: take 4660 (hexadecimal notation: 0x12, 0x34) as an example, the order of transmission is: 0x12, 0x34.

3) **Unsigned** char: single-byte unsigned number

1.3 Communication interface data format

1.3.1 Command 03 (read holding register)

Example: read the upper limit of the main variable range (assuming its current value is 100.0), the corresponding register start address is: 524 (hexadecimal is 0x020C).

Request message:

Address	Function Code	Register Number of Address	Registers	CRC check
0x01	0x03	0x02,0x0C	0x00,0x02	0x05,0xB0

Response message:

Address	Function Code	Data Length	Data	CRC check
0x01	0x03	0x04	0x42,0xC8,0x00,0x00	0x6F,0xB5

1.3.2 Command 04 (read input register, that is, read variable)

Example: To read the cumulative value (assuming its current value is 100.0), the starting address of the corresponding register is: 1034 (0x040A in hexadecimal).

Request message:

Address	Function Code	Registers Address	Register Number	CRC check
0x01	0x04	0x04,0x0A	0x00,0x02	0x50,0xF9

Response message:

Address	Function Code	Data Length	Data	CRC check
0x01 0x04		0x04	0x42,0xC8,0x00,0x00	0x6E,0x02

1.3.3 Command 16 (write holding register)

Example: Set the upper limit of the main variable range to 100.0, and the corresponding register start address is: 524 (0x020C in hexadecimal).

Request message:

Address	function code	register address	register number	data length	data	CRC check
0x01	0x10	0x02,0x0C	0x00,0x02	0x04	0x42,0xC8,x00,0x00 0x7F,	0x1C

Response message:

Address	Function Code	Registers Address	Register Number	CRC check
0x01	0x10	0x02,0x0C	0x00,0x02	0x80,0x73

2 register description

2.1 Input register list (dynamic variable)

register address (hexadecimal)	parameter name	acces s type	data length (word)	type of data	Note
0x0402	Percentage	R	2	float	
0x0404	instantaneous	R	2	float	Register 0x021C stores the unit of instantaneous flow
0x0408	flow sensor value	R	2	float	sensor frequency value
0x040A	Accumulated flow value	R	2	float	register 0x021D stores the unit of cumulative flow
0x040C	Accumulated flow overflow times	R	2	float	
0x0414	Actual magnification	R	2	float	
0x041C	Actual working channel	R	1	unsigned short	
0x0421	Current value	R	2	float	
0x0423	Pressure value	R	2	float	
0x0425	Temperaturevalue	R	2	float	
0x0427	Density value	R	2	float	
0x0429	Pressure riginal value	R	2	float	

0x042B	temperature raw value	R	2	float	

2.2 Holding register list (configuration data)

register address (hexadecimal)	parameter name	access type	Data length (word)	type of data	Note
0x0200	address	R/W	1	unsigned short	value range 1 ~ 247
0x0201	Flow mode	R/W	1	unsigned short	{ 0, "Liquid_QV liquid volume"}, {1, "Liquid_QM liquid quality"}, {2, "Gas_QV gas volume"}, {3, "Gas_QM gas quality"}, {4, "Steam_QV steam volume"}, {5,"Steam_PT superheated steam temperature and pressure compensation"}, {6,"Steam_SAT_T saturated steam temperature compensation"}, {7,"Steam_SAT_P saturated steam pressure compensation"}
0x0202	Media type and vortex caliber	R/W	1	unsigned short	{ 0x0000, "Liquid N15" }, { 0x0001, "Liquid DN20" }, { 0x0002, "Liquid DN25" }, { 0x0003, "Liquid DN32" }, { 0x0004, "Liquid DN40" }, { 0x0005, "Liquid DN50" }, { 0x0006, "Liquid DN65" }, { 0x0007, "Liquid DN80" }, { 0x0008, "Liquid DN100"}, { 0x0009, "Liquid DN125"}, { 0x000A, "Liquid DN150"}, { 0x000B, "Liquid DN200"}, { 0x000C, "Liquid DN250"}, { 0x000D, "Liquid DN300"}, { 0x000E, "Liquid DN350"}, { 0x000F, "Liquid DN400"}, { 0x0010, "Liquid DN450"}, { 0x0011, "Liquid DN500"}, { 0x0012, "Liquid DN600"}, { 0x0100, "Gas DN15" }, { 0x0101, "Gas DN20" }, { 0x0102, "Gas DN25" }, { 0x0103, "Gas DN32" }, { 0x0104, "Gas DN40" }, { 0x0105, "Gas DN50" }, { 0x0106, "Gas DN65" }, { 0x0107, "Gas DN80" },

					{ 0x0108, "Gas DN100"}, { 0x0109, "Gas DN125"}, { 0x010A, "Gas DN150"}, { 0x010B, "Gas DN200"}, { 0x010C, "Gas DN250"}, { 0x010D, "Gas DN300"}, { 0x010E, "Gas DN350"}, { 0x010F, "Gas DN400"}, { 0x0110, "Gas DN450"}, { 0x0111, "Gas DN500"}, { 0x0112, "Gas DN600"},
0x0204	Maximum magnification	R/W	2	float	0~1500
0x0206	Minimum frequency	R	2	float	
0x0208	Maximum frequency 0x020A	R	2	float	
0x020A	Gauge factor K value	R/W	2	float	>0
0x020C	Meter factor K value R/W Range	R/W	2	float	>0
0x020E	upper limit damping	R/W	2	float	0 ~ 32.0
0x0210	alarm upper limit	R/W	2	float	
0x0212	alarm lower limit	R/W	2	float	
0x0214	gas standard condition density (kg/m3)	R/W	2	float	
0x0216	Gas pressure (gauge pressure)	R/W	2	float	
0x0218	Gas temperature (°C)	R/W	2	float	
0x021A	Liquid density (g/c m3)	R/W	2	float	
0x021C	Instantaneous flow unit	R/W	1	unsigned short	{ 188 ，"Nm3/h" }, { 189 ，"Nm3/min" }, { 190 ，"Nm3/s" }, { 29 "m3/d" }, { 19 "m3/h" }, { 131 , "m3/min"}, { 28 ,"m3/s" }, { 138, "l/h" }, { 17, "l/min" }, { 24, "l/s" }, { 185, "Scf/h" }, { 123, "Scf/m" }, { 186, "Scf/s" }, { 130, "cf/h" }, { 15 ，"cf/m" }, { 26 ，"cf/s" }, { 136, "USG/h" }, { 16 ，"USG/m" }, { 22 ，"USG/s" },

					{ 30 ，"UKG/h" }, { 18 ，"UKG/m" }, { 137, "UKG/s" }, { 135, "bbl/d" }, { 134, "bbl/h" }, { 253, "special_Qv" } { 79, "t/d" }, { 78, "t/h" }, { 77, "t/min" }, { 76, "kg/d" }, { 75, "kg/h" }, { 74, "kg/min"}, { 73, "kg/s" }, { 72, "g/h" }, { 71, "g/min" }, { 70, "g/s" }, { 83,"lb/d" }, { 82, "lb/h" }, { 254, "special_Qm" }
0x021D	Cumulative flow unit	R	1	unsigned short	{ 43, "m3" }, { 41, "l" }, { 172, "Nm3"}, { 168, "Scf" }, { 112, "cf" }, { 40, "USGal" }, { 42, "UKgal" }, { 46, "bbl"}, { 61, "kg" }, { 60, "g" }, { 62, "ton"}, { 63, "lb"}, { 253, "special"}, { 254, "special"},
0x0250	display mode	R/W	1	unsigned short	{ 0, "3 lines to display" }, { 1, "2 lines to display" },
0x021E	The third line displays variable	R/W	1	unsigned short	{ 0, "current value" }, { 1, "percentage value" }, { 4, "frequency value" }, { 6, "Density value" }, { 7, "pressure value" }, { 8, "temperature value" }, { 9, "temperature and pressure value" },

0x021F	Instantaneous flow decimal point	R/W	1	unsigned short	{ 0, "0" }, { 1, "1" }, { twenty two" }, { 3, "3" },
0x0220	write protection	R/W	1	unsigned short	{ 0, "Unprotected" }, { 1, "write-protected" }
0x0221	User Calibration: Points	R/W	1	unsigned short	{ 0x00, "0" }: No user calibration { 0x02, "2" }, { 0x03, "3" }, { 0x04, "4" }, { 0x05, "5" }
0x0222	User calibration: frequency value 1	R/W	2	float	
0x0224	User calibration: frequency value 2	R/W	2	float	
0x0226	User calibration: frequency value 3	R/W	2	float	
0x0228	User calibration: frequency value 4	R/W	2	float	
0x022A	User calibration: frequency value 5	R/W	2	float	
0x022C	User calibration: correction factor 1	R/W	2	float	
0x022E	User calibration: correction factor 2	R/W	2	float	
0x0230	User calibr ation: correction factor 3	R/W	2	float	
0x0232	User calibration: correction factor 4	R/W	2	float	
0x0234	User calibration: correction factor 5	R/W	2	float	
0x0236	Small flow cutoff value (%)	R/W	2	float	0 ~ 20.0
0x023B	feature flag	R/W 1		unsigned short	{ 0x0100, "Cumulative flow reset" },
0x0247	Pulse unit	R/W 1		unsigned short	{ 43, "m3" }, { 172, "Nm3"} { 61, "kg" }, { 62,"ton"}, { 168, "Scf" }, { 112, "cf" }, { 40, "USGal" }, { 42, "UKgal" }, { 46, "bbl"}, { 63, "lb"},
0x023F	Output at 1 pulse unit Number of pulses	R/W 2		float	>0
0x0244	Operating mode	R/W 1		unsigned short	{ 0x0000, "F1:Anti-vibration mode" }, { 0x0001, "F2:Standard mode" }, { 0x0002, "F3:Turbo mode" }, { 0x0003, "F4:Test mode" },

0x0245	Temperature and pressure collection method	R/W	1	unsigned short	{ 0x0000, "Pressure manual input, temperature manual input "}, { 0x0001, "Manual input of pressure, automatic collection of temperature "}, { 0x0010, "Automatic collection of pressure, manual input of temperature "}, { 0x0011, "Pressure automatic collection, temperature automatic collection "},
0x0246	Communication baud rate	R/W	1	unsigned short	{ 0, "9600bps, 8bits, 1stop, no parity" }, { 1, "4800bps, 8bits, 1stop, no parity" }, { 2, "2400bps, 8bits, 1stop, no parity" }, { 3, "1200bps, 8bits, 1stop, no parity" }, { 4, "600bps, 8bits, 1stop, no parity" }
0x024A	Lower limit flow	R/W	2	float	>0, unit: m3/h
0x024C	upper limit flow	R/W	2	float	>0, unit: m3/h
0x024E	Frequency correction coefficient	R/W	2	float	0~20
0x2400	Pressure calibration zero point collection value	R/W	2	float	unit: mV
0x2402	Pressure calibration full point collection value	R/W	2	float	unit: mV
0x2404	Temperature calibration low point collection value	R/W	2	float	unit: Ohm
0x2406	Temperature calibration high point collection value	R/W	2	float	unit: Ohm
0x2408	Pressure calibration zeropoint value	R/W	2	float	Unit: Kpa
0x240A	Pressure calibration Full point value	R/W	2	float	Unit: Kpa
0x240C	Temperature calibration low point resistance value	R/W	2	float	unit: Ohm
0x240E	Temperature calibration high point resistance value	R/W	2	float	unit: Ohm
0x2410	Small pressure cutoff value	R/W	2	float	Unit: Kpa
0x2412	Pressure migration value	R/W	2	float	Unit: Kpa