

Modbus Registers

Gas Flow Meters

Models:

Thermal Mass: FLE, FLF, FLO, FLT

Pitot Tube: FLP

Vortex: FLV



Introduction

1. Communication parameters

Default settings:

Address:.....1

Baud rate:.....9600

Data Length:.....8

Parity:.....None

Stop Bit:1

Response Time out:....1 second

Response Delay:0 ms

Inter-frame spacing:...7 char

2. Holding register definition

Logical channels, data and related holding registers

- Modbus read command: 0x03
- Modbus write command: 0x06 for single register, 0x10 for multiple register
- Coil registers write command: 0x05

3. Process Data Format

Supports two data types:

- IEEE 754 float data, and
- Unsigned int data

Float Format

Value (Decimal)	IEEE 754 float	Register N		Register N+1	
		High Byte	Low Byte	High Byte	Low Byte
123.4	0x42F6CCCD	0xCC	0xCD	0x42	0xF6

Unsigned int format

Value (Decimal)	Unsigned int	Register N		Register N+1	
		High Byte	Low Byte	High Byte	Low Byte
123456789	0x075BCD15	0xCD	0x15	0x07	0x5B

4. Byte Order

Data is little end, and least significant bit transmitted first

32bit: CD AB

64bit: GH EF CD AB

5. Holding Register: Process Data Table

*Flow Meter Models:

- Thermal Mass: FLE, FLF, FLO, FLT
- Pitot Tube: FLP
- Vortex: FLV

Holding Register Addr	Data type	No of Data byte	Data	Unit	Read / Write	Used in Flow Meter Model*
0	FLOAT_L	4	Standard Flow		R	Thermal Mass Pitot Tube Vortex
2	FLOAT_L	4	Standard Velocity		R	Thermal Mass Pitot Tube Vortex
4	DOUBLE_L	8	Standard Consumption		R W: Write "0" to clear value	Thermal Mass Pitot Tube Vortex
8	FLOAT_L	4	Temperature		R	Thermal Mass Pitot Tube Vortex
10	FLOAT_L	4	Gauge Pressure		R	Pitot Tube Vortex
12	FLOAT_L	4	Actual Flow		R	Pitot Tube Vortex
14	FLOAT_L	4	Actual Velocity		R	Pitot Tube Vortex
16	DOUBLE_L	8	Actual Consumption		R W: Write "0" to clear value	Pitot Tube Vortex
20	FLOAT_L	4	Density		R	Pitot Tube Vortex
22	UNSIGNED LONG	4	Standard Consumption (4 byte value type)		R W: Write "0" to clear value	Thermal Mass Pitot Tube Vortex

Holding Register Addr	Data type	No of byte	Data	Unit	Read / Write	Used in Flow Meter Model*
24	UNSIGNED LONG	4	Actual Consumption (4 byte value type)		R W: Write "0" to clear value	Pitot Tube Vortex
26	UNSIGNED INT	2	Gas Type		R/W 0: Air (Default) 1: Oxygen (O2) 2: Nitrogen (N2) 3: Hydrogen (H2) 4: Carbon monoxide (CO) 5: Carbon dioxide (CO2) 6: Sulfur hexafluoride (SF6) 7: Argon (Ar) 8: Helium (He) 9: Nitrous oxide (N2O) 10: Methane (CH4) 11: Ethane (C2H6) 12: Propane (C3H8) 13: Butane (C4H10)	Thermal Mass Pitot Tube Vortex
27	UNSIGNED INT	2	Flow Unit		R/W 0: m ³ /h (Nm ³ /h) 1: m ³ /min (Nm ³ /min) (Default) 2: m ³ /s (Nm ³ /s) 3: l/min (Nl/min) 4: l/s (Nl/s) 5: cfm (Ncfm) 6: kg/h 7: kg/min 8: kg/s	Thermal Mass Pitot Tube Vortex
28	UNSIGNED INT	2	Velocity Unit		R/W 0: m/s (Nm/s) (Default) 1: ft/s (Nft/s)	Thermal Mass Pitot Tube Vortex
29	UNSIGNED INT	2	Consumption Unit		R/W 0: m ³ (Nm ³) (Default) 1: ft ³ (Nft ³) 2: kg	Thermal Mass Pitot Tube Vortex
30	UNSIGNED INT	2	Temperature Unit		R/W 0: °C (Default) 1: °F	Thermal Mass Pitot Tube Vortex
31	UNSIGNED INT	2	Pressure Unit		R/W 0: Pa 1: hPa 2: kPa (Default) 3: MPa	Pitot Tube Vortex

Holding Register Addr	Data type	No of byte	Data	Unit	Read / Write	Used in Flow Meter Model*
					4: mbar 5: bar 6: psi	
32	FLOAT_L	4	Pipe Inner Diameter	mm	R/W	Pitot Tube Vortex
34	FLOAT_L	4	Normal Temperature	°C	R/W Default: 20°C	Thermal Mass Pitot Tube Vortex
36	FLOAT_L	4	Normal Pressure	kPa	R/W Default: 100kPa	Thermal Mass Pitot Tube Vortex
38	UNSIGNED INT	2	Filter Grade		R/W Default: 5 Vortex Range: 1~32 Thermal Mass and Pitot Tube Range: 1~255	Thermal Mass Pitot Tube Vortex
39	FLOAT_L	4	Flow Factor (Note 1)		R/W Value must >0, default is 1	Thermal Mass Pitot Tube Vortex
41	FLOAT_L	4	Atmosphere Pressure	kPa	R/W: Default: 100 kPa Used to compensate gauge pressure	Pitot Tube Vortex
43	UNSIGNED INT	2	Anti-condensation		R/W 0: OFF 1: ON (Default)	Pitot Tube
56	DOUBLE_L	8	Reverse Direction Nor. Consumption		R W: Write "0" to clear value	Pitot Tube
60	DOUBLE_L	8	Reverse Direction Act. Consumption		R W: Write "0" to clear value	Pitot Tube
64	UNSIGNED LONG	4	Reverse Direction Nor. Consumption (4 byte value type)		R W: Write "0" to clear value	Pitot Tube
66	UNSIGNED LONG	4	Reverse Direction Act. Consumption (4 byte value type)		R W: Write "0" to clear value	Pitot Tube
70	FLOAT_L	4	Velocity Cutoff	Nm/s	R/W Value must >= 0	Thermal Mass Pitot Tube Vortex

Holding Register Addr	Data type	No of byte	Data	Unit	Read / Write	Used in Flow Meter Model*
72	FLOAT_L	4	Vortex Meter F actor (Note 2)	P/L	R/W	Vortex
74	FLOAT_L	4	Vortex Output Frequency (Note 2)	Hz	R	Vortex
101	UNSIGNED INT	2	Software (SW) Version		R	Thermal Mass Pitot Tube Vortex
102	UNSIGNED INT	2	Hardware (HW) Version		R	Thermal Mass Pitot Tube Vortex
103	DOUBLE_L	8	Serial Number		R	Thermal Mass Pitot Tube Vortex

Notes:*** Flow Meter Models:**

- Thermal Mass: FLE, FLF, FLO, FLT
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1. **Flow Factor** is used to compensate the flow value shown.

i.e. Flow value shown = Measured Flow × Flow factor

For example: if the measured flow = 50 Nm³/min and the flow factor = 0.8, then the value shown = 50 × 0.8 = 40 Nm³/min

2. **Vortex Frequency Output / Vortex Meter F actor = Act Flow** (L/s)

Example for setting

Float value is 123.4 and its corresponding hex value is 0x42F6CCCD.

Write it into device address 1, holding register address 36 which hex code is 0x24

Send Modbus command : 01 10 0024 0002 04 CCCD 42F6 EE0D

01: Device address

10: Function code 16 in Hex format

0024: Holding register address 36 in Hex format

0002: Number of holding register

04: Number of bytes for holding register (0x42F6 CCCD total 4 byte)

CCCD: Low 16 bit of float number

42F6: High 16 bit of float number

EE0D: CRC

Device response : 01 10 0024 0002 01C3

01: Device address

10: Function code 16 in Hex format

0024: Holding register address 36 in Hex format

0002: Number of holding register

01C3: CRC

6. Holding Register: Communication Configuration Table

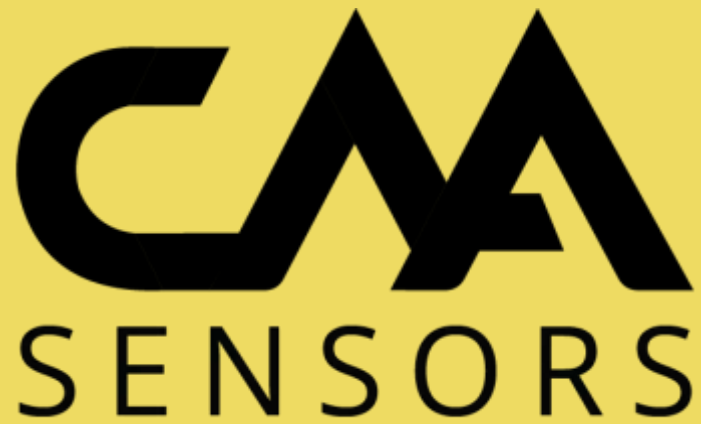
Note:

These settings will take effect after writing a "1" to the holding register address 50. Then Modbus master must change communication settings accordingly in order to communicate with the slave.

Holding Register Addr	Data type	No of byte	Contents	Unit	Read / Write
50	UNSIGNED INT	2	Restart device (Write "1" to restart device)		W
51	UNSIGNED INT	2	Device address: Range = 1...247 Default = 1		R/W
52	UNSIGNED INT	2	Baud rate: 12 = 1200 bps 24 = 2400 bps 48 = 4800 bps 96 = 9600 bps (default) 144 = 14400 bps 192 = 19200 bps 384 = 38400 bps 560 = 56000 bps 576 = 57600 bps 1152 = 115200 bps	bps	R/W
53	UNSIGNED INT	2	Parity: 0 = None (default) 1 = Odd 2 = Even		R/W
54	UNSIGNED INT	2	Stop bit: 1 = 1 bit (default) 2 = 2 bit		R/W
55	UNSIGNED INT	2	Response Time Out: Range = 0...255 ms Step = 1 ms/step Default = 0 ms	ms	R/W

7. Coil Register Table

Coil Register Addr	Data type	No of byte	Contents	Unit	Read / Write
0	UNSIGNED INT	2	Restart Modbus Communication Read: Always 0 Write: 0x0000 = Do Nothing 0xff00 = Restart Default: 0		R/W



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