Electromagnetic Flow Meter Style 2

QUICK User Manual

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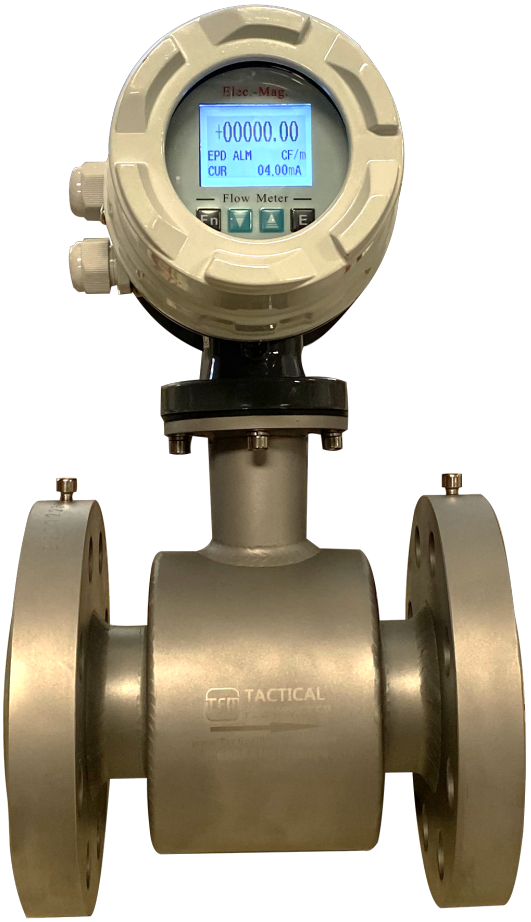

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QUICK Instruction Manual

Features

- Low-frequency square-wave excitation, excitation frequencies: 1/16 power frequency、1/20 power frequency、1/25 power frequency;
- High-frequency square-wave excitation, excitation frequency: 1/2 power frequency
- Excitation current may be selected to apply the following currents: 125mA, 187.5mA, 250mA, or 500 mA;
- Velocity range: 0.1 to 15 m/s, velocity resolution: 0.5 mm/s;
- OPTIONAL AC high-frequency switching power, AC voltage range: 85VAC to 250VAC;
- DC 24V switching power, DC voltage range: 20VDC to 36VDC;
- Communication Protocol: MODBUS RTU
- Three totalizers: Forward total, reverse total, and negative total.
- DC Power Model 20VDC to 36VDC Power consumption < 20 W
- Normal operating conditions

  Ambient Temperature Range: –10 to +60 °C;

  Relative Humidity: 5% to 90%;

Circuit Overview:

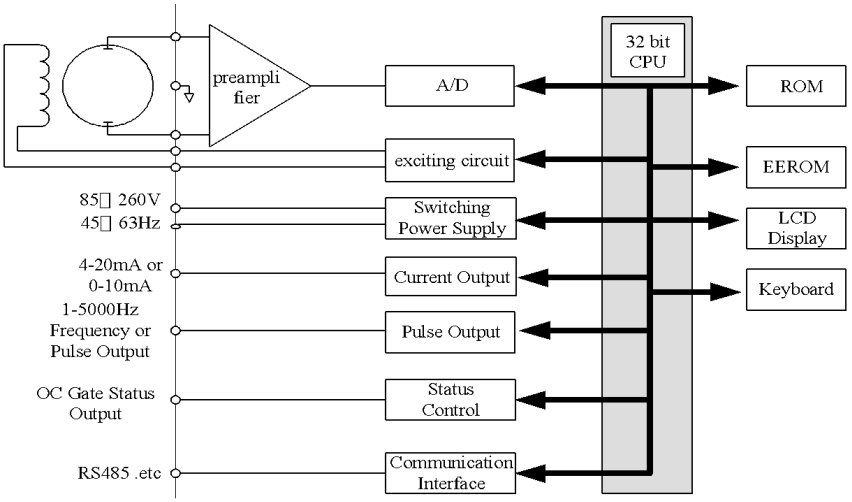


Fig.2. 1 MAG Meter Circuit

Range and Accuracy:

Table 3.1 V_S: Velocity range, meters/second (m/s)

Diameter “ [mm]	Range (m/s)	Accuracy

0.13” [3] - 0.80” [20]	≤0.3	±0.25%FS
	0.3 to 1	±1.0R
	1 to 15	±0.5%R
1.0” [25]- 24” [600]	0.1 to 0.3	±0.25%FS
	0.3 to 1	±0.5%R
	1 to 15	±0.3%R
28” [700] – 124” [3000]	≤0.3	±0.25%FS
	0.3 to 1	±1.0%R
	1 to 15	±0.5%R
%FS：for relative ranges； %R：for relative value of measurement		

4-20 4-20 mA Input Load resistor: 0 to 750Ω (4~20mA).

Basic measurement errors: 0.1%±10μA.

Digital frequency output

Frequency output range: 1 to 5000Hz；

Output electric isolation: Photoelectric isolation. Isolation voltage: > 1000VDC；

Frequency output drive: output using field-effect transistors, the maximum voltage is 36VDC，maximum output current is 250 mA.

Digital pulse output

Pulse output range: 0 to 100 pulse/s.

Pulse output value: 0.001 to 1.000 m^3 / cp 0.001 to 1.000 Ltr / cp 0.001 to 1.000 USG / cp、0.001 to 1.000 UKG / cp;

Pulse output width: 50ms,

Pulse output isolation: photoelectric isolation. Isolation voltage: > 1000VDC；

Pulse output drive: output using field-effect transistors, maximum voltage: 36VDC, maximum output current: 250 mA.

Alarm output

Alarm output junction：ALMH--- upper limit; ALML--- lower limit;

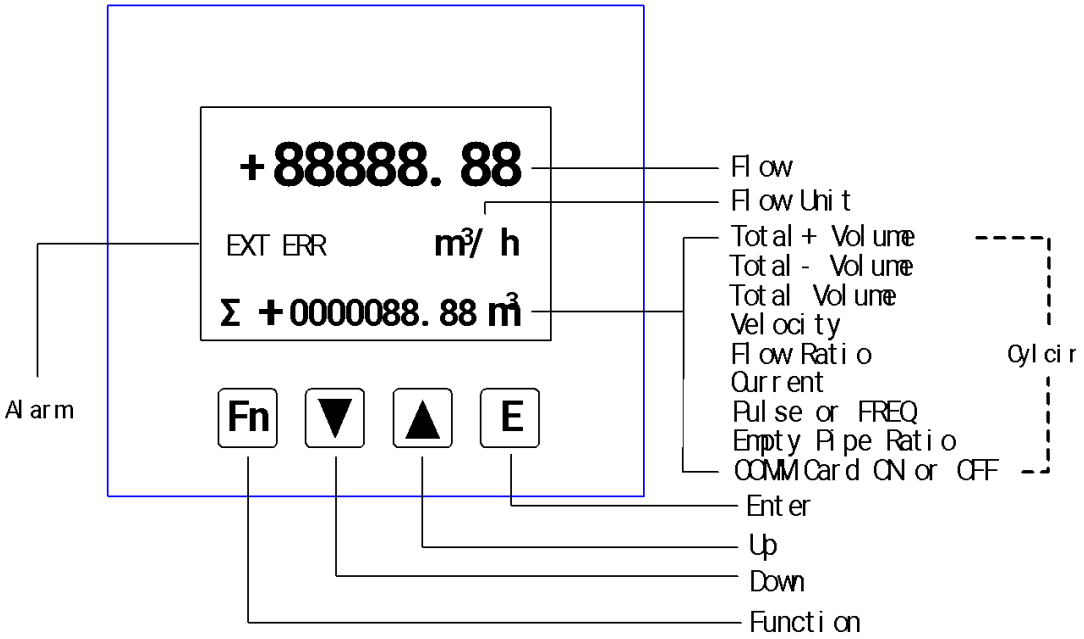
Output isolation: photoelectric isolation. Isolation voltage: > 1000VDC;

Alarm output drive: output using Darlington Pair Transistor, maximum voltage: 36VDC, maximum current: 250 mA.

Digital communication port and protocol

MODBUS RTU

Display and Keyboard



The electromagnetic flow electronics enters into the automatic measurement status after power on. All of the measurement functions are ready and measurement data is displayed.

Keyboard

The parameters can be setup and displayed by pressing four keys: Up key, Down key, Function key, and Enter key.

Up key	**P**lus 1 for the selected digit, or go back to the previous item
Down key	**M**inus 1 for the selected digit, or enter the next item
Function key + Up key	**M**ove cursor to right
Function key + Down key	**M**ove cursor to left
Function key + Enter key	**S**elect the password menu, enter the password, then go to the lower submenu, and save parameters
Enter key	**G**o back to the upper submenu. Pressing and holding for more than two seconds, then releasing it at Level One menu can activate the flow meter automatically going to the measurement mode

Note: Pressing and holding the Enter Key for more than two seconds, then releasing will cause the meter to exit programming mode and go to the measurement mode.

Password

The level one default password is “10000”, which allows the user to VIEW settings. The level two default password is “40000”, which allows the user to edit settings such as Full Scale, units, and other useful settings. The level three password is “99999”, this password should only be used by skilled individuals. Any changes to

the wrong parameters can harm the meter performance.

Menu List

The menu list is shown below.

Tab.1 Electronics abbreviations used

Abbreviation	Description	Abbreviation	Description
BLKT	Back Light	**FREQ**	Frequency
NEGF	Negative Flow	**ALMH**	High Limit Alarm
CAL	Calibration	**INIT**	Initialization
COEF	Coefficient	**ALML**	Low Limit Alarm
COD	Code of Production	**MAINT**	Maintenance
DEC	decimal	**PF**	Power Frequency
DIR	Direction	**THD**	Threshold
DOD	Date of Production	**COMM**	Communication
EPD	Empty Pipe Detection		
EXT	Excitation		
POSF	Positive Flow		

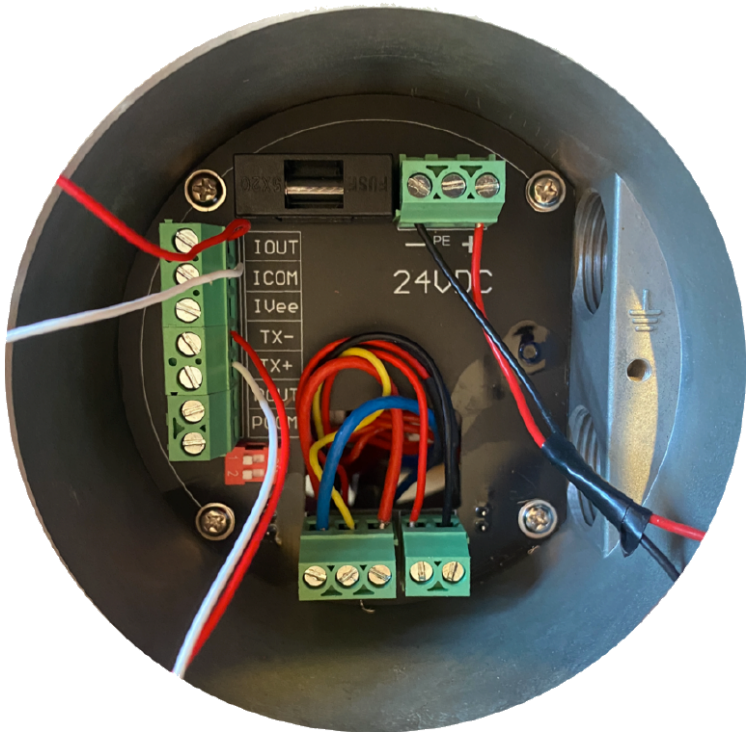
Table.2 Electronics LCD menu list

First Level Menu	Second LevelMenu	Third Level Menu
PARAMETER SETTING	DIAMETER	3mm~3000mm
	DAMPING TIME	0~99 Sec.
	FLOW UNIT	L/h、L/m、L/s、m^3/h、m^3/m、m^3/s、t/h、t/m、t/s、kg/h、kg/m、kg/s、GPM, CF/m, CF/h, BBL/day, BBL/hr
	FLOW DEC SET	Auto or Manu for decimal point
	VOLUME UNIT	0.001m^3、0.01m^3、0.1m^3、1m^3、0.001L、0.01L、0.1L、1L、1t、1kg、GAL, CF
	MEASURE RANGE	Setting for FULL SCALE in units
	EXT FREQ	1/8(PF) Exciting Frequency
	LIQUID DENSITY	Set at 1000 Kg/m3 for water by default
FUNCTION SETTING	MEASURE DIR	FORWARD/BACKWARD
	NEGF MEASURE	ON/OFF
	NEGF OUTPUT	ON/OFF
	LOWFLOWCUTOFF	ON/OFF
	LOWFLOW VALUE	Setting, usually 5% to null out noise.
	METER ALARM	ON/OFF
	EXT ALARM	ON/OFF
	EPD ALARM	ON/OFF
	EPD ALARM THD	Setting
	ALMH ALARM	ON/OFF
	ALMH ALARM THD	Setting
	ALML ALARM	ON/OFF
	ALML ALARM THD	Setting

COMMUNICATION SETTING	MODBUS	BUS ADDRESS	
		BAUDRATE	300,600,1200,2400 , 4800,9600,19200, 38400 Normally 9600
		CHECK BIT	None/Odd/Even Normally None
OUTPUT SETTING	OUTPUTMODE	FREQ/PULSE	
	PULSE POLORY	POS/NEG Normally POSitive	
	PULSE UNIT	Setting between 0.001L~10000.000L and Gal	
	PULSEWIDTH	Setting	
	FREQRANGE	1~10000 Hz	
SYSTEM SETTING	LANGUAGE	ENGLISH	
	RESTORE DEFAULT	Restore Factory Settings	
	SAVE AS DEFAULT	Save As Factory Setting	
	LCD CONTRAST	Setting	
	LCD BKLT	Open/Close	
	LCD BKLT TIME	1\5\10\30\60 min	
	POSF SUM PRESET	Setting	
	NEGF SUM PRESET	Setting	
	FLOW SUM RESET	Total Cumulative Flow totalizer reset	
	SHOW PASSWORD	Including three level Password	
	PASSWORD SET	Including three level Password	
CALIBRATION SETTING	ZERO CORRECTION	Setting	
	SENSORCOEF	On the label.	
	SENSOR COEF CAL	Enter the standard flow, the sensor COEF will be calculated automatically	
	NORMALIZED COEF	Setting	
	FLOW CORRECTION	FLOW CORRECT UNIT	m3/h、m3/m、m3/s、kg/h、kg/m、kg/s、t/h、t/m、t/s、GPM、m/s、L/h、L/m、L/s CF/m
		CORRECTPOINT 1	Setting
		STANDARD FLOW 1	Setting
		CORRECTPOINT 2	Setting
		STANDARD FLOW 2	Setting
		CORRECTPOINT 3	Setting
		STANDARD FLOW3	Setting

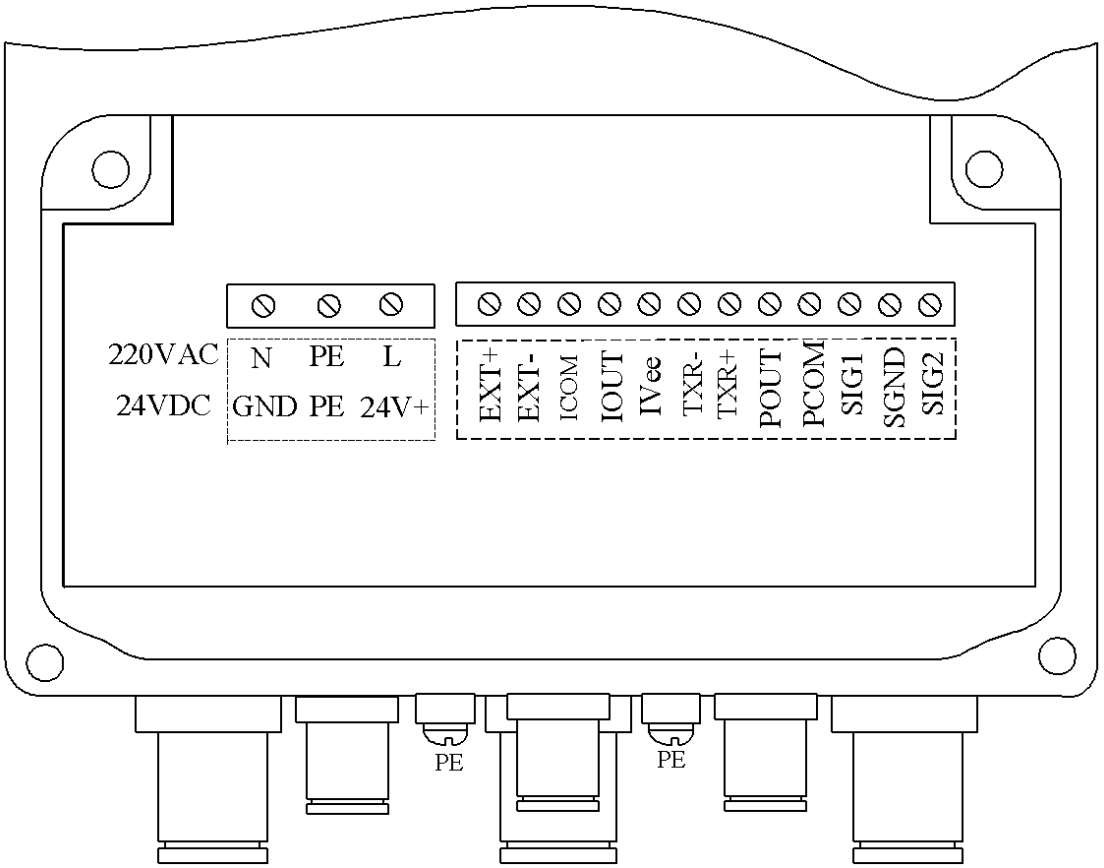
		CORRECTPOINT 4	Setting
		STANDARD FLOW4	Setting
		CORRECTPOINT 5	Setting
		STANDARD FLOW5	Setting
	CORRECT SET	ON/OFF	

Electronics wiring diagram and signal definitions



- **- 24 VDC GND**
- **+ 24 VDC power 500 mA max**

- **IOUT 4-20 + Out for Self powered and 24 VDC powered**
- **ICOM 4-20 - Out for Self powered**
- **Ivee 4-20 - Out for 24 VDC powered**
- **TX- ModBus +B**
- **RX- ModBus -A**
- **Pout Pulse or frequency signal +**
- **Pcom Pulse or frequency Signal -**



SIG 1 Signal 1
SGND Signal Ground
SIG 2 Signal 2
EXT + Excitation +
EXT - Excitation -
→ To Sensor

IVee Current Output Power
IOUT Current Output
ICOM Current Output Ground
→ Current Output

POUT FREQ/Pulse Output
PCOM FREQ/Pulse Ground
→ FREQ/Pulse Output

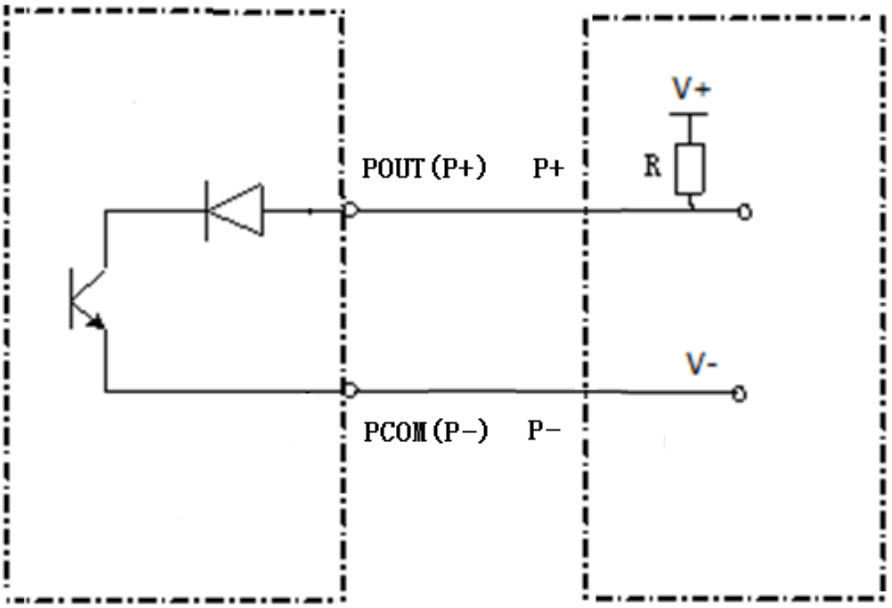
TXR + COMM(RS485+)
TXR - COMM(RS485-)
→ COMM Interface

Frequency/Pulse Output

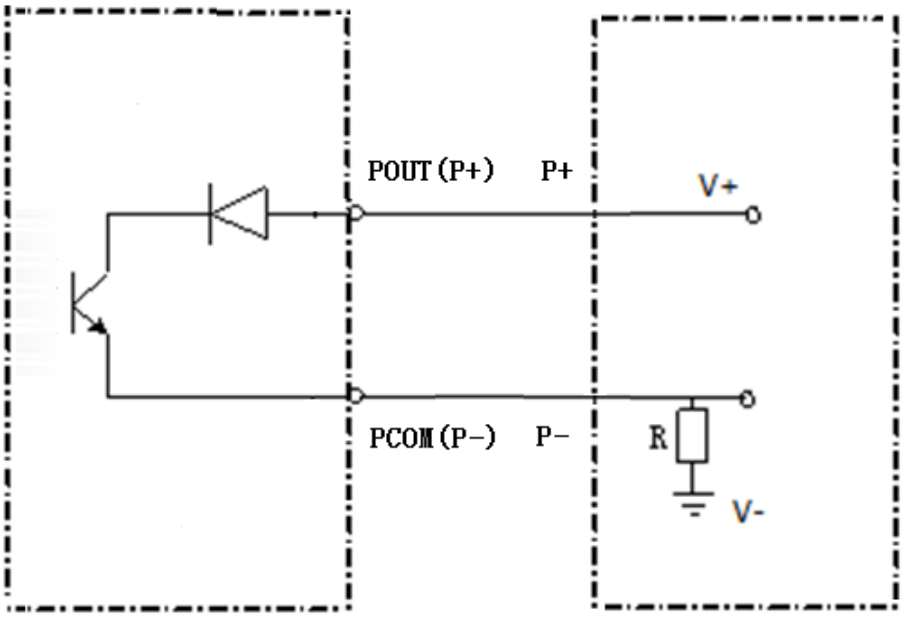
The Frequency and Pulse output are using the same output interfaces: POUT(P+

)and PCOM(P-), and users can select the output mode via the menu. The Frequency/Pulse support 3 connection mode:

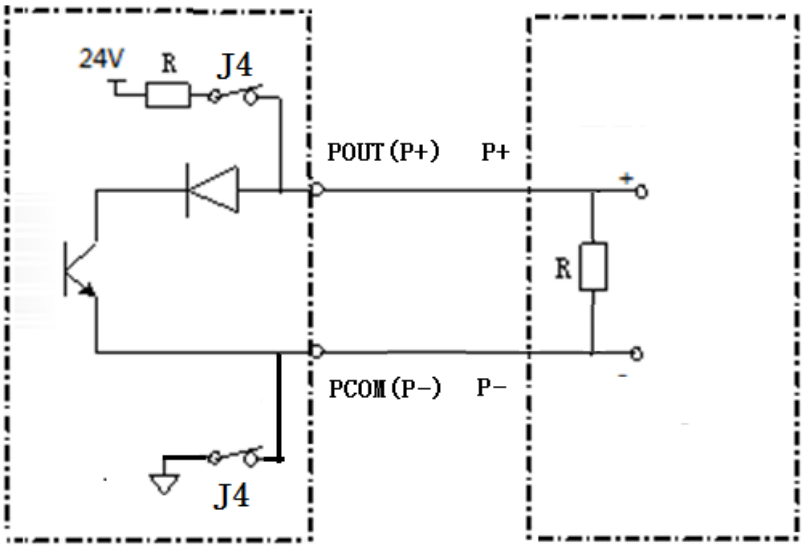
Connection Mode 1：External Power Supply with OC Gate



Connection Mode 2：External Power Supply with OC Gate。



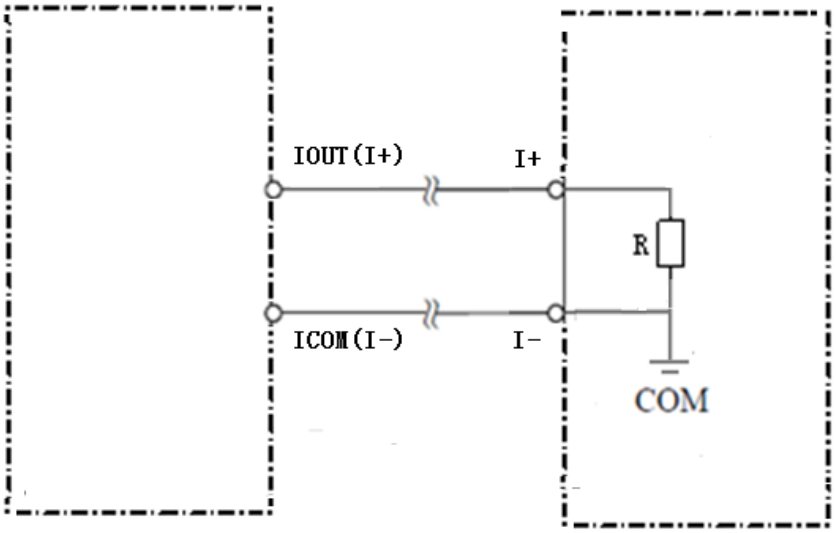
Connection Mode 3：Internal Power Supply with OC Gate。



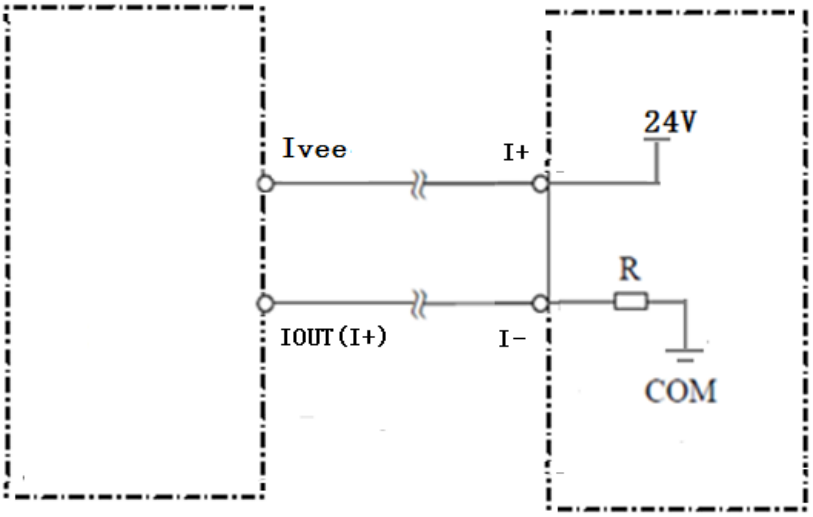
4-20mA Current Output

There are 3 interfaces of the current output: IOUT(I+)、ICOM（I-）and IVee (External Power), which can support 2 connection modes: Internal Power Supply and External Power Supply.

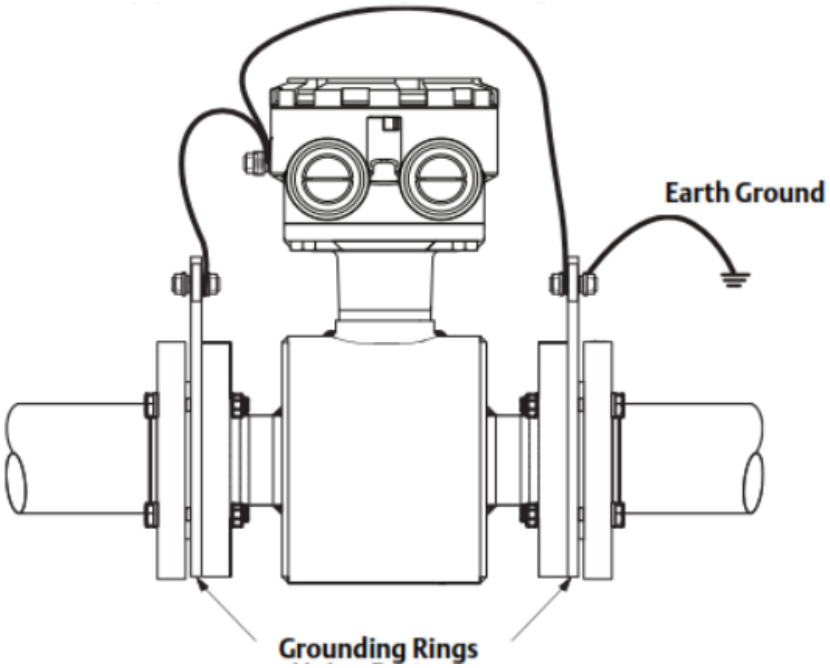
Connection Mode 1： Internal Power Supply Mode



Connection Mode 2：External Power Supply Mode



Grounding Requirements VERY IMPORTANT!



The MAG meter must be properly grounded for a stable reading. The grounding rings connect the ground to the fluid via the inner annulus of the grounding ring touching the fluid.

Digital output notes

Digital output can be set to either frequency or pulse output.

4.5.1 Frequency output

Frequency output range is 0 to 5000 HZ, and corresponds to the percent of full scale.

$$\text{Frequency Output} = \frac{\text{Measured value}}{\text{Full scale value}} \bullet \text{frequency range}$$

The frequency output can be up to 10,000 Hz but we recommend no more than 5000Hz Frequency output mode is normally used in control applications, because it responds to the percent Full Scale. Users can choose pulse output when the equipment is connected to a totalizer counter or the like.

Pulse output mode notes:

Pulse output mainly applies in count mode. A pulse output delegates a unit flow value, such as 1L or $1M^3$ etc. Pulse output units can be divided into many different units..When choosing the pulse unit you will want to match the Full Scale range of flow meter and pulse unit. For volume flow, the count formula is as follows:

$Q_L=0.0007854\times D^2\times V$ (L/S)

Or $Q_M=0.0007854\times D^2\times V\times 10^{-3}$ (M^3/S)

Note: D-nozzle (mm)

V-velocity of flow (m/s)

The values must be chosen to not over range the pulse output units. Generally, pulse output should be below 3000 P/S. Typical maximum is 1000 P/S for most electronic totalizer counters.

Appendix 1 Basic Parameters

PARAMETER SETTING:

DIAMETER:

The electronics can be mated with different sensors that have different diameter of flow meter sizes from 3mm to 3000.

DAMPING TIME:

It means time of filter measure value. The long one can enhance the stability of flow display and output digital, and fits for gross add up of pulse flow; the short one means fast response rate, and fits for production control.

FLOW UNIT:

The flow unit can choose from the parameters (L/h、L/m、L/s、m^3/h、m^3/m、m^3/s、t/h、t/m、t/s、kg/h、kg/m、kg/s、GPM),and the user can choose the proper unit according to the technological requirement and using habit.

VOLUME UNIT:

The electronics display is counter with 9 bits, and the max is 999999999.

Integrator units are L, m3(liter, cubic meters). This unit is set according to the flow unit and is set automatically.

This is the same as the flow unit. When the flow unit is L/h, L/m and L/s the integrator unit is liter, when the flow unit is m3/h,m3/m and m3/s the integrator unit is the same.

Flow integrator value: 0.001m^3、0.01m^3、0.1m^3、1m^3、0.001L、0.01L、0.1L、1L、1t、1kg、GAL.

MEASURE RANGE:

Flow range means upper limit value, and lower limit value is set "0" automatically. So, it makes the range, and makes the relation of percent display, frequency output and current output with flow:

percent display = (flow measure / measure range) * 100 %;

frequency output = (flow measure / measure range) * frequency full;

current output = (flow measure / measure range) * current full + base point;

pulse output will not affect.

FUNCTION SETTINGS:

MEASURE DIR:

This is used to select the flow direction that saves the hassle of turning the meter around.

LOWFLOWCUTOFF:

This function is selectable: ON/OFF

In "ON" mode, when flow ratio is less than the low flow cut-off value, it will be cut off and the LCD display indicates "0";

In "OFF" mode, will show the low flow values and not suppress the low values.

LOW FLOW VALUE:

This function allows the user to set the minimum flow that the flowmeter will respond to.

This variable is expressed in percentage, such as 0.5%, 2%, 5%, etc.

METER ALARM：

This function is selectable: ON/OFF

In “ON” mode, the flowmeter indicates according to all of the alarm setting status;

In “OFF” mode, the flowmeter turns off all alarm alerts.

EPD ALARM THD**:**

In “ON” mode, the user may set the threshold value so that the flowmeter can detect an empty pipe status. Following are examples.

Keep the pipe full of liquid to prevent alarm

If the fluid is NOT moving the alarm will alert

COMMUNICATION SETTING：

MODBUS

- **BUS ADDRESS**：

  Instrument address or Slave ID values 001-255. 0 is reserved.

- **BAUDRATE**：

  Baud rate：300、600、1200、2400、4800、9600、19200、38400。

- **CHECK BIT (PARITY)**：

  None/Odd/Even。

OUTPUT SETTING：

OUTPUTMODE**:**

Two kinds of Outputs can be selected: Frequency Output and Pulse Output. Frequency Output is continuous square waveform and Pulse output is a serial output of square wave. Frequency output is mainly used for instant flow and total integrated flow in short time measurement. Frequency output can be chosen in an equivalent frequency unit and volume of integrated flow can be displayed. Frequency Output can be used in long time measurement for total

integrated flow with volume units.

Frequency output and pulse output are usually from Open Collector transistors so that proper DC power supplies and load resistors have to be required.

PULSE UNIT:

Pulse Unit is referred to as one pulse for value of flow.

Under the same flow, the smaller pulse, the higher frequency output, and the smaller error will be.

PULSE WIDTH:

The Pulse width can be selected from 0.1ms to 100ms.

FREQ RANGE**:**

Frequency output full scale, say 1000 Hz, will be output at 100%. of the Full Scale Flow of the meter. Frequency Full Scale output can be selected between 1- 10000Hz. Of course, 1 Hz Full Scale makes no sense.

SYSTEM SETTINGS:

LANGUAGE:

There are 2 languages, English and Chinese, for electronics.

CALIBRATION SETTING:

ZERO CORRECT:

Make sure the sensor is full of flow, and the flow is at zero flow. Flow zero is shown as velocity of flow, mm/s.

electronics's zero-flow correction display will look like this:

± ○ ○ ○ ○ ○mm/s

FS =±○○○○○mm/s

*Upper large numerals: correction value of zero;

*Lower small numerals: FS indicates the value at zero;

*Note: Adjust the value up or down to make the upper value to indicate the same as the lower value..

Flow zero is the compound value of the sensor, and should be recorded.. The units are mm/s, and the sign will be the opposite of the correction value. This NULLS out the zero.

SENSOR COEF :

"Sensor Coefficient" is printed on the Label. The "sensor coefficient" is also set into Sensor Coefficient Parameter on the electronics.

Appendix 2 Notes on flow correction

Flow correction is used for different flow segments for non-linear correction. The measurement range can be divided into five segments: Five correction points and five standard flows.

Flow correction is set up based on the original meter coefficient. Turn off the correction function first, and then turn it on to enable the correction function. The user will set up the flow correction point and its standard value in pairs. Using this method can provide calibration in systems where flow profile is non-ideal.

The original velocity comes from the meter coefficient calculation. The corrected velocity comes from the flow correction. The corrected velocity corresponds to the following:

✔ If original flow<**Correction point 1**

Corrected flow= $original\ flow * \frac{Standard flow\ 1}{Correction\ point\ 1}$

If original flow = **Correction point 1**

Then Corrected flow = Standard flow 1

✔ If**Correction point 1<** original flow **<Correction point2**

Corrected flow =Standard flow 1 +

$(original\ flow - Correction\ point\ 1) * \frac{Standard\ flow\ 2 - Standard flow\ 1}{Correction\ point\ 2 - Correction\ point\ 1}$

If original flow = Correction point 2

Then Corrected flow = Standard flow2

✔ If **Correction point 2<** original flow **<Correction point3**

Corrected flow = Standard flow2 +

$(original\ flow - Correction\ point\ 2) * \frac{Standard\ flow\ 3 - Standard flow2}{Correction\ point\ 3 - Correction\ point\ 2}$

If original flow = Correction point 3

Then Corrected flow = Standard flow 3

✔ If **Correction point 3<** original flow **<Correction point4**

Corrected flow = Standard flow3 +

$$(original\ flow\ -\ Correction\ point\ 3)\ *\ \frac{Standard\ flow\ 4-\ Standardflow3}{Correction\ point\ 4-\ Correction\ point\ 3}$$

If original flow = Correction point 4
Then Corrected flow = Standard flow 4

✔ If **Correction point 4<** original flow **<Correction point 5**

Corrected flow = Standard flow 4 +

$$(original\ flow\ -\ Correction\ point\ 4)\ *\ \frac{Standard\ flow\ 5-\ Standardflow4}{Correction\ point\ 5-\ Correction\ point\ 4}$$

If original flow = Correction point 5
Then Corrected flow = Standard flow5

Note: When setting up the correction point and standard **flow**, the user must have the correction points monotonically increasing. Or: **Correction point 1< correction point 2< correction point 3< correction point 4< correction point 5 Standard flow 1<Standard flow 2<Standard flow 3<Standard flow 4<Standard flow 5**

Appendix 3 ModBus

1vMODBUS-RTU Protocol

The Electromagnetic flowmeter integrates the standard RS-485 interface and Mobus-RTU communication protocol.

Follows is the protocol frame and data format:

The communication is asynchronous transfer mode in bytes. The data format between master and slave is 10-bit as following:

Data format	10-bit
Start bit	1 bit
Data bits	8 bits
Check bit	No
Stop bit	1 bit

Frame format:

Data format:	Address	Function	Data	CRC check
Data length:	1 byte	1 byte	N bytes	16-bit CRC(2 bytes)

Communication Process

The Modbus protocol is a Master-Slave protocol (the flowmeter is the slave). The system must only have one master node that issues explicit commands to one of the slave nodes and processes responses. Slave node will not typically transmit data without a request from the master node, and does not communicate with other slaves, and the master node initiates only one Modbus transaction at a time. The Slave will response to the master according to the data in the frame from the master.

Address Field

The Modbus protocol, the address field only contains the slave address, in this version, the address rang is 1-255. Every slave in the same system must has different slave address. A master addresses a slave by placing the slave address in the address field of the message. When the slave returns its response, it places its own address in the response address field to let the master know which slave is responding.

Function Code

The function code indicates to the server what kind of action to perform. The function code can be followed by a data field that contains request and response parameters.in this file, the electromagnetic flowmeter only uses the '03' and '10' function codes, others are reserved:

Function code	Definition	Operation
03	Read multi-register	Read one or multi-register data
10	Write multi-register	Write one or multi-register data

Data Filed

The data filed contains the information which information the slave needs to response. For example: flow rate,velocity、totalized value of forward flow etc. Every register in slave is 16-bit format (2 bytes), high byte in front; master can read max 50 registers one time; Some register is 4-bytes, like forward flow. Master needs to read the high 2-bytes and low 2-bytes separately (2 registers).

MODBUS Function Code

Function Code "03": Read Multi-Register

For example: Master needs to read 3 registers based from ''0x000E' from the Slave addressed '0x01': the register in the slave is as following:

Register	Data	Variable
0x000E	0x0180	V1
0x000F	0x0180	V2
0x0010	0x0180	V3

Master will send the following frame:

	Bytes Number	Send Data	Note
Slave Address	1	0x01	Send the Slave Address
Function Code	1	0x03	Read Multi-Register
Register Start Address	2	0x000E	The start register address:0x000E
Register number	2	0x0003	Read 3 registers（6 bytes）
CRC Check	2	0x6408	The CRC Check code

Slave will respond as follows::

	Bytes Number	Send Data	Note
Slave Address	1	0x01	Send the Slave Address
Function Code	1	0x03	Read Multi-Register
Bytes response	1	0x06	The data contains 6 bytes
Register 1	2	0x0180	The 0x000E register data
Register 2	2	0x0180	The 0x000F register data
Register 3	2	0x0180	The 0x0010 register data
CRC Check	2	0x215E	The CRC Check code

Function Code "10": Write Multi-Register

The master can use this function code to save the date into the target registers in slave.
For example: Master needs to save '0x0003' and '0x00FF' into the '0x003A' and '0x003B' registers in the Slave Addressed '0x01':

Master will send the following frame:

	Byte Number	Send Data	Note
Slave Address	1	0x01	Send the Slave Address

Function Code	1	0x10	Write Multi-Register
Register Start Address	2	0x003A	The Register Start Address
Register Number	2	0x0002	Register number
Data Length	1	0x04	Date Length in all registers
Register 1 Data	2	0x0003	The 0x003A register data
Register 2 Data	2	0x00FF	The 0x003B register data
CRC Check	2	0xC084	The CRC Check code

Slave will respond as follows

	Byte Number	Send Data	Note
Salve Address	1	0x01	Send the Slave Address
Function Code	1	0x10	Write Multi-Register
Register Start Address	2	0x003A	The Register Start Address
Register Number	2	0x0002	Register number
CRC Check	2	0x61C5	The CRC Check code

Data Format and Special Parameters Description

Data Format

Authority:
RO Read Only;
RW Readable and Writable;

Format:
DW 4-bytes integer data;
W 2-bytes integer data;
B 1-byte integer, this parameter will be added to 2-bytes with the '0x00' high byte;
SF 4-bytes single-precision IEEE 754 ABCD floating-point format data; Reference here

Fixed Point Data: For Example: DW*1000 means the parameter is amplified 1000-fold. If the real value is 0.123, in the Modbus, the slave will response the value as 123.

Float format:

The IEEE754 format is used for the 4-bytes float data as following:

Register 1		Register 2	
BYTE1	BYTE2	BYTE3	BYTE4
S EEEEEEE	E MMMMMMM	MMMMMMMM	MMMMMMMM

Special Parameters Description

Flow Rate Unit(Register 24, Register 105):

0:L/H
1:L/M
2:L/S
3:M3/H
4:M3/M
5:M3/S
6:KG/H
7:KG/M
8:KG/S
9:T/H
10:T/M

11 : T/S

Volume Unit(Register 25, for display setting):

0 : 0.001L
1 : 0.01L
2 : 0.1L
3 : 1L
4 : 0.001M3
5 : 0.01M3
6 : 0.1M3
7 : 1M3
8 : 1KG
9 : 1T

EPD: Empty Pipe Detecting

List of Modbus Registers

Frequently-used Registers List

Register Address	PLC Address	Unit	Bytes	Authority	Format	Description
90	40091	M^3	4	RO	SF	Totalized Value of Forward flow
92	40093	M^3	4	RO	SF	Totalized Value of Reverse flow
94	40095	M^3	4	RO	SF	Flow Total Data (forward minus reverse)
96	40097		4	RW	DW	Totalizer Reset
98	40099	Refer to Register 105	4	RO	SF	Flow Rate
100	40101	m/s	4	RO	SF	Velocity
102	40103	%	4	RO	SF	Flow Ratio
104	40105	%	2	RO	W	EPD Value
105	40106		2	RO	W	Flow Rate Unit
106	40107		2	RO	W	EPD Alarm
107	40108		2	RO	W	Excitation Current Alarm

Full Registers List

Register Address	PLC Address	Unit	Bytes	Authority	Format	Description
0	40001	m/s	2	R0	DW*1000	Velocity--High bytes
1	40002		2	R0	DW*1000	Velocity--Low bytes
2	40003	Refer to Register 24	2	R0	DW*100	Flow Rate--High bytes
3	40004		2	R0	DW*100	Flow Rate--Low bytes

4	40005	%	2	R0	B*100	Flow Ratio
5	40006	%	2	R0	B*100	EPD Value
6	40007	M^3	2	R0	DW*1	Totalized Value of Forward Flow--High bytes
7	40008		2	RO	DW*1	Totalized Value of Forward Flow--Low bytes
8	40009	M^3	2	RO	DW*1	Totalized Value of Reverse Flow--High bytes
9	40010		2	RO	DW*1	Totalized Value of Reverse Flow--Low bytes
10	40011		2	RO	DW*1	Reserved
11	40012		2	RO	DW*1	Reserved
12	40013		2	RO	B*1	System Alarm
13	40014		2	RO	B*1	Flow Direction
14	40015		2	RO	DW	Reserved
15	40016		2	RO	DW	Reserved
16	40017		2	RO	B	Reserved
17	40018		2	RO	B	Reserved
18	40019		2	RO	B	Reserved
19	40020		2	RO	B	Reserved
20	40021		2	RO	B	Reserved
21	40022	mm	2	RW	W	Pipe Diameter
22	40023		2	RW	DW	Flow Rate Range--High bytes
23	40024		2	RW	DW	Flow Rate Range--Low bytes
24	40025		2	RW	B	Flow Rate Unit
25	40026		2	RW	B	Volume Unit
26	40027	S	2	RW	W*1	Damping Period
27	40028		2	RW	W*10000	Sensor Coefficient
28	40029	HZ	2	RW	B	Excitation Frequency
29	40030	%	2	RW	B	Excitation Current
30	40031		2	RW	B	Flow Direction Setting
31	40032	mm/s	2	RW	W	Zero Drift
32	40033	%	2	RW	W*100	Flow Rate Cut-off Percent
33	40034		2	RW	B	Flow Rate Cut-off Enable
34	40035		2	RW	B	Reverse Output Enable

35	40036		2	RW	B	EPD Enable
36	40037	%	2	RW	B	EPD Alarm Threshold
37	40038		2	RW	B	Flow Rate Upper Limit Alarm Enable
38	40039	%	2	RW	W*100	Flow Rate Upper Limit Alarm Threshold
39	40040		2	RW	B*1	Flow Rate Lower Limit Alarm Enable
40	40041	%	2	RW	W*100	Flow Rate Lower Limit Alarm Threshold
41	40042		2	RW	B	Reserved
42	40043		2	RW	W*100	Reserved
43	40044		2	RW	B	Excitation Current Alarm
44	40045		2	RW	B	Pulses or Frequency Output Select
45	40046	ml	2	RW	B	Pulse Unit
46	40047	HZ	2	RW	W	Frequency Output Range
47	40048		2	RW	W	Reserved
48	40049		2	RW	B	Reserved
49	40050		2	RW	B	Reserved
50	40051		2	RW	W	Reserved
51	40052		2	RW	B	Reserved
52	40053		2	RW	B	Reserved
53	40054		2	RW	W	Reserved
54	40055		2	RW	B	Reserved
55	40056		2	RW	B	Reserved
56	40057		2	RW	W	Reserved
57	40058		2	RW	B	Reserved
58	40059		2	RW	B	Reserved
59	40060		2	RW	DW*10000	Reserved
60	40061		2	RW	DW*10000	Reserved
61	40062		2	RW	W	Reserved
62	40063		2	RW	W	Reserved
63	40064		2	RW	W	Reserved

64	40065		2	RW	W	Reserved
65	40066		2	RW	W*10000	Reserved
66	40067		2	RW	B	Flow Filter Enable
67	40068		2	RW	W*10000	Flow Filter Coefficient
68	40069	Min	2	RO	DW*60	Reserved
69	40070	Min	2	RO	DW*60	Reserved
70	40071		2	RW	DW	Flow Correction Point 1--High bytes
71	40072		2	RW	DW	Flow Correction Point 1--Low bytes
72	40073		2	RW	DW	Flow Correction Point 2--High bytes
73	40074		2	RW	DW	Flow Correction Point 2--Low bytes
74	40075		2	RW	DW	Flow Correction Point 3--High bytes
75	40076		2	RW	DW	Flow Correction Point 3--Low bytes
76	40077		2	RW	DW	Flow Correction Point 4--High bytes
77	40078		2	RW	DW	Flow Correction Point 4--Low bytes
78	40079		2	RW	DW	Flow Correction Point 5--High bytes
79	40080		2	RW	DW	Flow Correction Point 5--Low bytes
80	40081		2	RW	DW	Standard Flow 1--High bytes
81	40082		2	RW	DW	Standard Flow 1--Low bytes
82	40083		2	RW	DW	Standard Flow 2--High bytes
83	40084		2	RW	DW	Standard Flow 2--High bytes
84	40085		2	RW	DW	Standard Flow 3--High bytes
85	40086		2	RW	DW	Standard Flow 3--High bytes
86	40087		2	RW	DW	Standard Flow 4--High bytes
87	40088		2	RW	DW	Standard Flow 4--High bytes
88	40089		2	RW	DW	Standard Flow 5--High bytes
89	40090		2	RW	DW	Standard Flow 5--High bytes
90	40091	M^3	2	RO	SF	Totalized value of forward flow--High bytes
91	40092		2	RO	SF	Totalized value of forward flow--Low bytes

92	40093	M^3	2	RO	SF	Totalized value of reverse flow--High bytes
93	40094		2	RO	SF	Totalized value of reverse flow--Low bytes
94	40095	M^3	2	RO	SF	Flow total data--High bytes
95	40096		2	RO	SF	Flow total data-- Low bytes
96	40097		2	RW	DW	Totalizer Reset--High bytes
97	40098		2	RW	DW	Totalizer Reset-- Low bytes
98	40099	Refer to Register 105	2	RO	SF	Flow Rate--High bytes
99	40100		2	RO	SF	Flow Rate--Low bytes
100	40101	m/s	2	RO	SF	Velocity--High bytes
101	40102	m/s	2	RO	SF	Velocity-- Low bytes
102	40103	%	2	RO	SF	Flow Ratio--High bytes
103	40104	%	2	RO	SF	Flow Ratio-- Low bytes
104	40105	%	2	RO	W	EPD Value
105	40106		2	RO	W	Flow Rate Unit
106	40107		2	RO	W	EPD Alarm
107	40108		2	RO	W	Excitation Current Alarm
108	40109		2	RO	W	Reserved
109	40110		2	RO	W	Reserved
110	40111		2	RO	W	Reserved
111	40112		2	RO	W	Reserved
112	40113		2	RO	W	Reserved
113	40114		2	RO	W	Protocol Version
114	40115		2	RO	W	Flow Rate Range Unit
115	40116		2	RO	W	Reserved

Modbus Communication Examples

Read the totalized flow value for forward flow example

Register Address: 90(0x5A). PLC Address: 40091
Master Send : 01 03 00 5A 00 02 E4 18

	Data Length	Send Data
Slave Address	1	01
Function Code	1	03
Register Start Address	2	00 5A
Register Length	2	00 02
CRC Check	2	E4 18

Slave Response : 01 03 04 3F C1 97 4E 49 DF

	Data Length	Send Data
Slave Address	1	01
Function Code	1	03
Data Number	4	04
Register 1 Data	2	3F C1
Register 2 Data	2	97 4E
CRC Check	2	49 DF

The totalized value of forward flow is 1.51243 m3 (the register data 3F C1 97 4E converts to 1.51243 in IEEE754 ABCD format) Reference here

Read flow rate example

Register Address: 98 (0x62). PLC Address: 40099
Master Send : 01 03 00 62 00 02 65 D5

	Data Length	Send Data
Slave Address	1	01
Function code	1	03
Register Start Address	2	00 62
Register Length	2	00 02
CRC Check	2	65 D5

Slave Response: 01 03 04 42 0C 00 00 2E 48

	Data Length	Send Data
Slave Address	1	01
Function Code	1	03
Data Number	4	04
Register 1 Data	2	42 0C
Register 2 Data	2	00 00

CRC码	2	2E 48

The flow rate is 35 (the register data 42 0C 00 00 converts to 35 in IEEE754 ABCD format). Reference here