L_MagH Electromagnetic Flowmeter Heat Meter Instructions

Executive standard:

JB/T9248-2015 electromagnetic flowmeter

CJ128-2007 heat meter

1. Wiring

1. Signal and excitation line

1.1 Signal line processing

When the heat meter is used with the sensor, if the conductivity of the fluid to be measured is greater than 50μS/cm, the flow signal transmission cable can use a PVC sheathed metal mesh shielded signal cable with the model number RVPPB2*0.12*280 mm 2. The use length should not be greater than 100m. The signal line and sensor are matched with the factory. This heat meter provides equipotential excitation shielding signal output voltage to reduce the influence of the distributed capacitance transmitted by the cable on the flow signal measurement. When the measured conductivity is less than 50μS/cm or long-distance transmission, a dual-core dual-shielded signal cable with equipotential shielding can be used. For example, STT3200 dedicated cable or BTS type triple shielded signal cable.

1.2 Excitation current line

The excitation current line can be a two-core insulated rubber flexible cable, and the recommended model is RVVP2*0.12*250mm2. The length of the excitation current wire is the same as the length of the signal cable. When the STT3200 dedicated cable is used, the excitation cable and signal cable are combined into one.

2. Wiring of instrument terminals

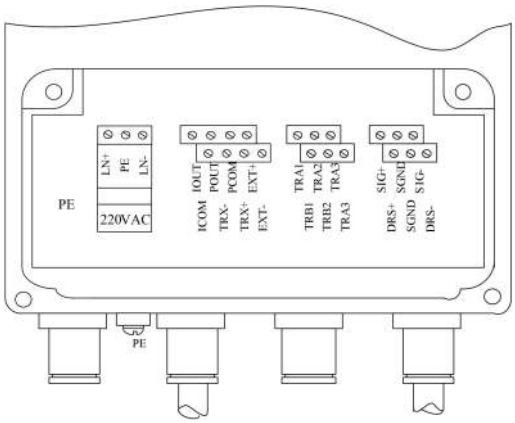


Figure 1.1 M8RBF15/16 main board wiring terminal diagram

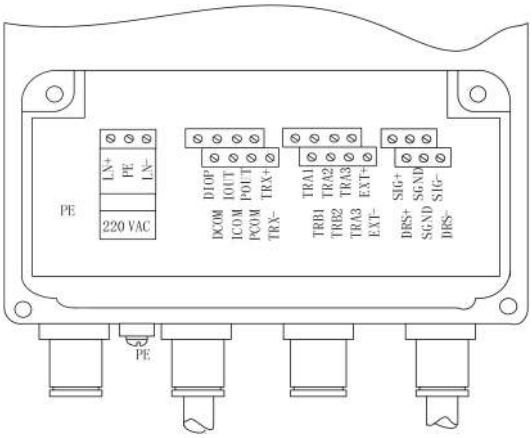


Figure 1.2 M8RBF20 motherboard wiring terminal diagram

The meanings of the terminals are as follows: Table 1.1

TRA1	Inlet temperature input	TRA2	Inlet temperature input
TRA3	Inlet temperature input	TRB1	Outlet temperature input
TRB2	Outlet temperature input	TRB3	Outlet temperature input
SIG +	Signal 1	SGND	Signal ground
SIG-	Signal 2	DRS +	Excitation shield 1
DRS-	Excitation shield 2	MTDR	Reserve
EXT+	Excitation current +	EXT-	Excitation current-
POUT	Frequency output positive	PCOM	Frequency output ground
IOUT	Current output positive	ICOM	Current output ground
TRX-	Communication interface (RS485-B)	TRX+	Communication interface (RS485-A)
LN-	220V power input	LN+	220V power input
DIOP	Reserved		Reserved

3. Output and power cord

All output and power cords are prepared by the user according to the actual situation. But please pay attention to meet the requirements of load current.

3.1 Frequency and pulse output wiring

The frequency and pulse output external power supply and load are shown in the figure below. When using an inductive load, a freewheeling diode should be added as shown in the figure.

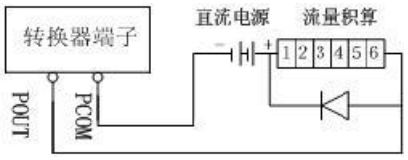


Figure 1.3 External power supply connected to electronic counter

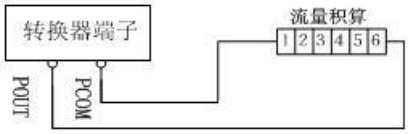


Figure 1.4 The internal power supply is connected to the electronic counter

3.2 Current output wiring

Figure 1.5 Current output

3.3 Connection mode of OC gate in the table

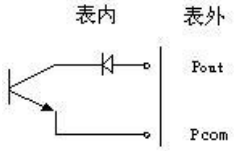


Figure 1.6 Connection mode of OC gate in the table

3.4 Grounding requirements for converter installation

The ground terminal of the converter housing should be connected to the earth with a grounding copper wire not less than 1.6mm2. The grounding resistance from the converter case to the ground should be less than 10Ω.

First, cut the Φ20 red copper tube into a length of 1700mm (lengthenable according to needs) to make a ground nail 1500mm (note: when burying the ground nail, sprinkle a layer of wood charcoal on the tip of the ground nail, and then pour salt water);

Next, weld the 4mm² red copper wire to the ground nail, and finally connect the ground wire to the sensor flange, ground ring, and pipe flange, as shown in Figure 1.7.

Note: Stainless steel materials are required to fix the ground screw, spring washer, and flat washer.

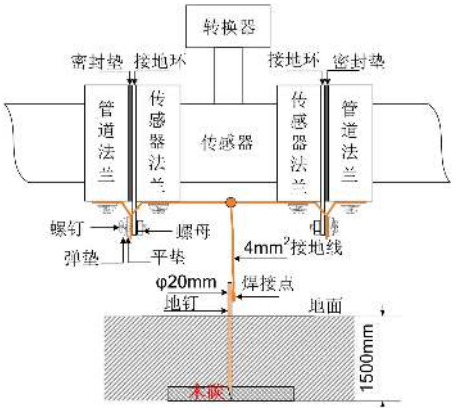


Figure 1.7 Schematic diagram of converter grounding

2. Introduction to instrument parameters

1. Flow parameters

1.1 Instrument working mode

The L_MagH electromagnetic flowmeter heat meter has three working modes:

Hot table working mode, cold table working mode, cold table hot table mode.

Heat meter mode: only calculates heat, which is the default mode of the meter. "H" means heat

Cold meter mode: only the cold capacity is calculated. "R" means cooling capacity

Cold table and hot table mode: Both the cold table and the hot table are calculated and displayed separately.

1.2 Measuring pipe diameter

L_MagH electromagnetic flowmeter heat meter matching sensor diameter range: 10 ~ 2000 mm.

10, 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000.

1.3 Units of heat flow and cold flow

The meter heat display unit has four options: MJ/h, GJ/h, KWh/h, MWh/h.

1.4 Measuring damping time

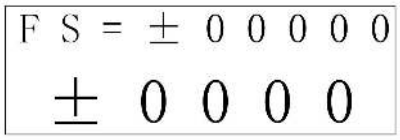
That is, the filtering time and the long measurement damping time can improve the stability of the meter flow display and the stability of the output signal, which is suitable for the total accumulated pulsating flow measurement. The short measurement damping time represents a fast measurement response speed, which is suitable for production process control. The setting of measuring damping time adopts the selection method.

1.5 Flow direction selection

If the user thinks that the fluid direction during debugging is inconsistent with the design, the user does not need to change the excitation line or signal line connection method, but can use the flow direction setting parameter to change.

1.6 Flow zero point correction

During zero point correction, make sure that the sensor tube is filled with fluid and the fluid is in a static state. The flow zero point is expressed in terms of flow velocity, and the unit is mm/s. The zero point correction of the flow rate of the heat meter is displayed as follows:



Upstream small print display: FS represents the zero point measurement value of the meter;

Downward display in large characters: zero correction value of flow velocity;

When the FS display is not “0”, the correction value should be adjusted so that FS=0.

Note: If you change the downstream correction value, the FS value will increase. You need to change the positive and negative signs of the downstream value so that FS can be corrected to zero.

The correction value of the flow zero point is the matching constant value of the sensor, which should be recorded in the record sheet of the sensor and the sensor label. When recording, the sensor zero value is the flow rate value in mm/s, and its sign is opposite to the sign of the correction value.

1.7 Small signal removal point

The small signal cut-off point setting is expressed in terms of flow rate. When the small signal is cut off, only the flow rate is displayed, and the cut off flow rate, percentage display and signal output are displayed.

1.8 Temperature difference signal removal

Temperature difference signal cutoff: When the temperature difference between the inlet and outlet is lower than this setting, the meter does not calculate the heat and cooling capacity.

1.9 Total flow unit

The heat meter display is a 9-digit counter, and the maximum allowable count value is 999999999.

The unit of total usage flow is m3 (cubic meters).

The total flow equivalent is: 0.001m3, 0.010m3, 0.100m3, 1.000m3.

1.10 Total unit of heat and cooling capacity

The heat meter display is a 9-digit counter, and the maximum allowable count value is 999999999.

The total amount of heat used is: MJ, GJ, KWh, MWh.

The total heat equivalent is: 0.001MJ, 0.010MJ, 0.100MJ, 1.000MJ 0.001GJ, 0.010GJ, 0.100GJ, 1.000GJ 0.001 KWh, 0.010 KWh, 0.100 KWh, 1.000 KWh 0.001 MWh, 0.010 MWh, 0.100 MWh, 1.000 MWh
Note: The unit of KWh and MWh can only display 8 significant digits, and the accumulated maximum is 99999999; the cumulative amount of cooling capacity has a direction display and the cumulative amount is one less than the total amount of heat.

1.11 Reverse measurement prohibited
The L_MagH electromagnetic flowmeter heat meter has a reverse output prohibition function. When "prohibited", the heat and cooling capacity are not calculated, and there is no output, only the flow rate is displayed; when "permitted", the heat meter is all working normally, because in principle, the flow rate The heat and cooling capacity should not be calculated in the reverse direction, and all default settings are "prohibited".

2. Output parameters

2.1 Current output mode
L_MagH electromagnetic flowmeter heat meter current output has five modes: flow output, heat output, cold output, cold and hot state output, flow direction output.
Flow output: the current is output as a percentage of instantaneous flow, and the percentage position shows the percentage of flow;
Heat output: The current is output according to the instantaneous heat percentage, and the percentage position shows the percentage of heat;
Cooling capacity output: the current is output according to the instantaneous cooling capacity percentage, and the percentage position shows the percentage of cooling capacity;
Cold and hot state output: the current output indicates the cooling capacity or heat, 20 mA for cooling capacity and 4 mA for heating capacity;
Flow direction output: The current output means the flow is forward and reverse, 20mA in the reverse direction and 4 mA in the forward direction.
2.2 Setting of flow, heat and cold capacity range
The meter range setting means to determine the upper limit flow value, and the lower limit flow value of the meter is automatically set to "0".
Therefore, the meter range setting determines the meter range range, and also determines the corresponding relationship between the meter percentage display, meter current and frequency output and flow, heat, and cooling capacity:
Percentage display value of the meter = (measurement value of flow value / range of the meter) * 100 %;
Instrument current output value = (measured flow value / instrument range) * 20 mA + 4mA;
Meter frequency output value = (measured flow value / meter range) * full frequency value.
2.3 Pulse output type
L_MagH electromagnetic flowmeter heat meter pulse output has sixteen ways: flow pulse Ltr, flow pulse m3, heat pulse MJ, heat pulse GJ, heat pulse KWh, cold output MWh, cold pulse MJ, cold pulse GJ, cold Quantity pulse KWh, cold and heat output MWh, cold and heat pulse MJ, cold and heat pulse GJ, cold and heat pulse KWh, cold and heat output MWh, cold and hot state output, flow direction output.
Frequency output mode: The frequency output is a continuous square wave, and the frequency value corresponds to the percentage of the flow rate, see 2.4 for details;
Pulse output mode: The pulse output is a rectangular wave pulse train. Each pulse represents a flow equivalent of the pipeline. The pulse equivalent is set by the two parameters of "pulse output type" and the following "output pulse coefficient".
The pulse output method is mostly used for total accumulation, and is generally connected with an accumulation meter;
Cold and hot state output: When the pulse output indicates the cold and hot state, the heat is at low level and the cooling

capacity is at high level;
Flow direction output: When the pulse output indicates the flow direction, the forward direction is low level, and the reverse direction is high level.
2.4 Frequency output upper limit
The L_MagH electromagnetic flowmeter heat meter frequency corresponds to the percentage output of the flow rate (not corresponding to the heat and cold capacity), and the range is 1~5000. Calculated as follows:
Instrument frequency output value = (measured flow value / flow range) * frequency full-scale value;
2.5 Output pulse coefficient
The pulse coefficient is the pulse equivalent, the range is 0.001～59.999, the unit is the same as the unit of the selected pulse output type, and it is used to measure the pulse output.
2.6 Output pulse width
Pulse output is active low, pulse width: 01~499.9ms
Pulse Width—Maximum Output Pulse Number Correspondence Table (Table 2.1)

Serial number	Pulse width (ms)	Maximum number of output pulses per hour (p/h)
1	1	1800000
2	5	360000
3	10	180000
4	50	36000
5	100	18000
6	200	9000
7	500	3600

3. Sensor parameters

3.1 Sensor coefficient value
Sensor coefficient: the calibration coefficient of the whole electromagnetic flowmeter. The coefficient is obtained from the actual standard and is stamped on the sensor label. The user must put this coefficient in the L_MagH converter parameter table.
3.2 Excitation method selection
L_MagH electromagnetic heat meter provides two excitation frequency options: 1/10 power frequency (mode 1), 1/12 power frequency (mode 2). The small-caliber sensor excitation system has a small inductance, so 1/10 power frequency should be selected. The large-caliber sensor excitation system has a large inductance, and the user should choose 1/12 power frequency. During use, select excitation mode 1 first. If the zero point of the flow velocity of the meter is too high, select mode 2 in turn. ※Note: In which excitation mode is calibrated, it must work under which excitation mode.
3.3 Sensor coding 1, 2
The factory is used to record the code of the sensor.
3.4 Location of flow meter
If the heat meter flow sensor is installed at the inlet of the heating pipe, please select “flow inlet”; if the heat meter flow sensor is installed at the outlet of the heating pipe, please select “flow outlet”. Do not, this parameter does not correspond to the actual installation, which will cause calculation errors

4. Temperature parameters

4.1 Measuring the water temperature from the hot and cold meters
The temperature limit for the meter to measure the heat and cooling capacity. When the temperature is lower than the set temperature, the meter does not calculate the heat and cooling capacity.
4.2 Working pressure selection
The L_MagH electromagnetic heat meter complies with the People's Republic of China's urban construction industry standard CJ128—2007. It is convenient for users to set two pressures of 0.6MP and 1.6MP.
4.3 Inlet and outlet temperature zero point, temperature calibration
The Pt1000 thermal resistance three-wire bridge connection method for L_MagH electromagnetic heat meter. Please refer to Appendix 4 for the specific calibration method.

5. Alarm parameters

5.1 Empty pipe alarm allowed
L_MagH has an empty tube detection function, and no additional electrodes are required. If the user chooses to allow the empty pipe alarm, the meter can detect an empty pipe state when the fluid in the pipe is lower than the measuring electrode. After the empty pipe status is detected, the analog output and digital output of the meter are set to signal zero, and the flow rate of the meter is displayed as zero at the same time.
5.2 Empty pipe alarm threshold
In the case of fluid full pipe (with or without flow rate), the empty pipe alarm setting has been modified to make it more convenient for users to use. The upper part of the empty pipe alarm threshold parameter displays the measured conductivity, and the lower part sets the empty pipe alarm threshold. When the empty pipe alarm threshold is set, it can be set according to the measured conductivity, and it can be set to 3 to 5 times of the measured conductivity. When alarming, the meter will display "MT" on the measurement screen.
5.3 Excitation alarm
Select allow, with excitation alarm function, select prohibit, cancel excitation alarm function. When an alarm occurs, the meter will display "SY" on the measurement screen.

6. Linear correction parameters

6.1 Flow correction allowed
This parameter is used to select whether the instrument performs non-linear correction, when it is "allowed", it is corrected, and when it is "forbidden" it is not corrected.
6.2 Flow correction points 1-4
Please refer to appendix 2 for the specific setting method
6.3 Number of flow corrections 1-4
Please refer to appendix 2 for the specific setting method

7. Communication parameters

7.1 Communication address of the instrument
Refers to the optional range of communication address of this watch during data communication: address 01～99, address 0 is reserved.

7.2 Communication speed of the instrument

The instrument communication baud rate selection range: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.

7.3 Communication terminal resistance

Switch 1 or 2 definition:

ON is connected to RS485 communication terminal resistance (standard configuration resistance: 120Ω);

OFF means no connection.

Note: The terminal resistance is used for long-distance communication, not short-distance connection.

Figure 2.1 Communication resistance switch 

8. Time parameters

Year, month, day, hour, minute, second time settings, used for power-down timing and total monthly accumulation clock settings

9. Factory correction parameters

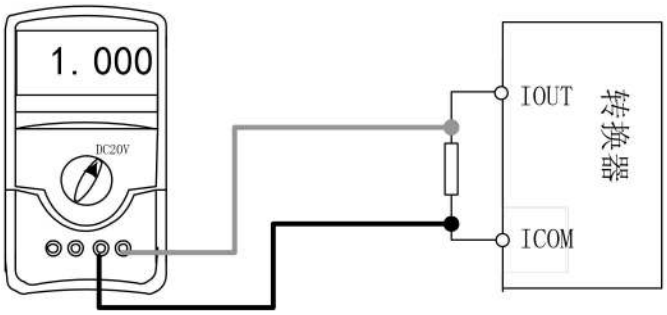
9.1 Factory calibration coefficient

This coefficient is a special coefficient of the heat meter manufacturer. The heat meter manufacturer uses this coefficient to normalize the L_MagH electromagnetic heat meter measuring circuit system to ensure that the interchangeability of all L_MagH electromagnetic heat meters reaches 0.1%.

9.2 Current zero point and full scale correction

(1) Preparation for instrument adjustment:

The instrument is turned on and run for 15 minutes to make the inside of the instrument thermally stable. Prepare a 0.1% grade ammeter, or a 250Ω resistance and 0.1% voltmeter, and connect them as shown in the figure below.



(2) Current "0" point correction:

Set the converter to the parameter setting state, select the "Current Zero Point Correction" item, enter, set the standard signal source to the "0" gear, adjust the correction coefficient value, so that the ammeter indicates exactly 4mA (±0.004mA).

(3) Current full-scale correction

Select the "Current Full Scale Correction" parameter, enter, set the standard signal source to the full scale range, and adjust the converter correction coefficient so that the ammeter indicates exactly 20mA (±0.004mA).

After adjusting the "0" point and full-scale value of the current, the current function of the converter can ensure accuracy. The converter's current output linearity is within 0.1%.

9.3 Total reset password

The user can use the second level password to set the password, and then set the password within the total reset.

9.4 Instrument code 1, 2

The converter code records the factory time and serial number of the converter.

9.5 Language

The L_MagH electromagnetic heat meter has two languages, Chinese and English, and users can choose to operate.

10. Total amount setting parameters

10.1 High and low total traffic volume

The total high and low settings can change the cumulative total value of the flow, which is mainly used for instrument maintenance and instrument replacement. The user uses a level 2 password to enter, and can modify the flow accumulation, generally not exceeding the maximum value counted by the counter (999999999).

10.2 High and low total heat and cooling capacity

The setting method is the same as the high and low positions of the total flow. Note: Only 8 valid digits can be displayed in KWh and MWh units, and the cumulative maximum is 99999999. When the setting exceeds the limit, it will display 99999999. The total amount of cooling capacity can display up to 8 as a valid number, and it will display 99999999 when the limit is exceeded.

3. Instrument display and operation

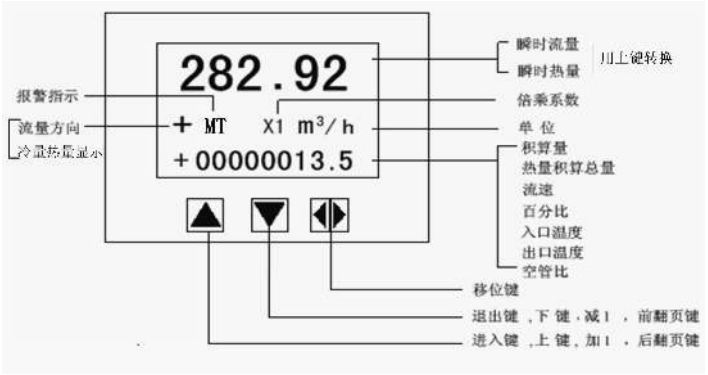


Figure 3.1 Keyboard definition and LCD display

When the meter is powered on, it automatically enters the measurement state. In the automatic measurement state, the meter automatically completes each measurement function and displays the corresponding measurement data. In the parameter setting state, the user uses the three panel keys to complete the instrument parameter setting.

4. Product performance and indicators

1. Basic functions

Low frequency square wave excitation, excitation frequency: 1/10 power frequency, 1/12 power frequency;

Excitation current is 125mA, 250 mA;

Empty tube measurement function without additional electrodes, continuous measurement, fixed value alarm;

Velocity measurement range: 0.1 --- 15 m/s, velocity resolution: 0.5 mm/s;

AC high frequency switching power supply, voltage application range: 85VAC --- 250VAC;

DC 24V switching power supply, voltage application range: 20VDC --- 36VDC;

Network functions: MODBUS (standard), HART (optional), GPRS (optional), PROFIBUS (optional);
Chinese and English display mode, (other languages can be customized);
There are two totalizers inside, which can be recorded separately: total flow and total heat.

2. Normal working conditions

Ambient temperature: -10～+60℃;
Relative humidity: 5%～90%;
Power supply: single-phase alternating current 85～250V, 45～63Hz;
Power dissipation: less than 20W (after connecting the sensor)

3. Connection type with sensor
Square shell split type: wall-mounted square shell, the converter is connected with the sensor cable.

4. Sensor matching requirements
Sensor signal sensitivity: at a flow rate of 1 m/s, the sensor outputs 150μV to 200μV;
For the L_MagH electromagnetic flowmeter heat meter, 125 mA current is used in the excitation circuit, which can adapt to the resistance of the excitation coil of the sensor from 100Ω to 110Ω; 250 mA current is used in the excitation circuit, which can adapt to the resistance of the excitation coil of the sensor from 40Ω to 60Ω;

5. Installation size drawing and picture of the whole machine

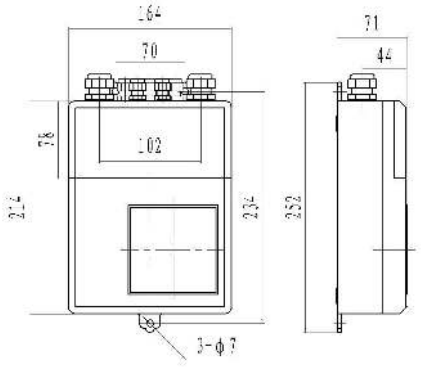


Figure 4.1 Dimensional drawing of the split type of square shell

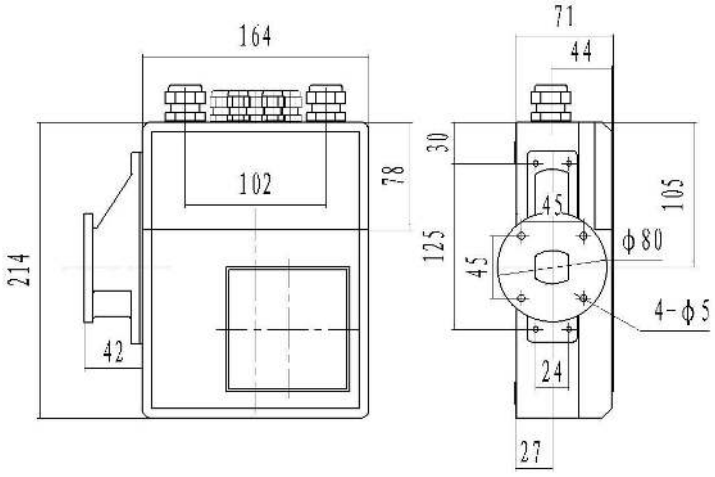


Figure 4.2 Dimensional drawing of one-piece square shell

Figure 4.3 The whole picture of electromagnetic flowmeter heat meter

6. Measurement accuracy of the whole machine

VS: Setting range (m/s) Table 4.1

Diameter mm	Range m/s	Accuracy
3～20	0.3 or less	±0.25%FS
	0.3～1	±1.0%R
	1～15	±0.5%R
25～600	0.1～0.3	±0.25%FS
	0.3～1	±0.5%R
	1～15	±0.3%R
700～3000	0.3 or less	±0.25%FS
	0.3～1	±1.0%R
	1～15	±0.5%R
%FS: Relative range; %R: Relative measurement value.		

7. Digital frequency output

Frequency output range: 1-5000;

Output electrical isolation: photoelectric isolation. Isolation voltage:> 1000V DC;

Frequency output drive: field effect tube output, the maximum withstand voltage is 36VDC, and the maximum load current is 250mA.

8. Analog current output

Load resistance: 0～750Ω.

Basic error: 0.1%±10μA.

9. Digital communication interface and communication protocol

RS485 interface: Modbus protocol, RTU format, see appendix 5 for the register address; electrical isolation 1000V;

10. Electrical isolation

The insulation voltage between analog input and analog output is not less than 500V;

The insulation voltage between the analog input and the alarm power supply is not less than 500V;

The insulation voltage between analog input and AC power supply is not less than 500V;

The insulation voltage between the analog output and the AC power supply is not less than 500V;

The insulation voltage between the analog output and the ground is not less than 500V;

The insulation voltage between the pulse output and the AC power supply is not less than 500V;

The insulation voltage between the pulse output and the earth is not less than 500V;

The insulation voltage between the alarm output and the AC power supply is not less than 500V;
The insulation voltage between the alarm output and the earth is not less than 500V.

11. Digital and analog output and calculation

11.1 Frequency output

Digital output refers to frequency output. The range of frequency output is selectable from 1-5000Hz. The frequency output mode is generally used in control applications because it reflects the percentage flow rate and is mainly used for instrument calibration.

Instrument frequency output value = (measured flow value / instrument range) * frequency full range value;

11.2 Wiring of digital output

The digital output has two contacts: digital output contact and digital ground contact. The symbols are as follows:

POUT ———— Digital output contact;

PCOM ———— Digital ground connection;

POUT is an open-collector output, the user can refer to the following circuit when wiring:

11.3 Digital level output connection

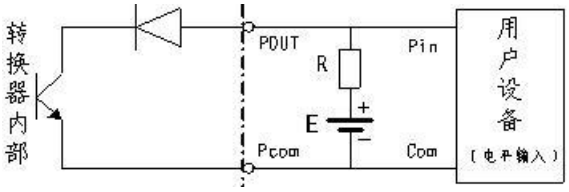


Figure 4.4

11.4 Connect digital output to photocoupler (such as PLC, etc.)

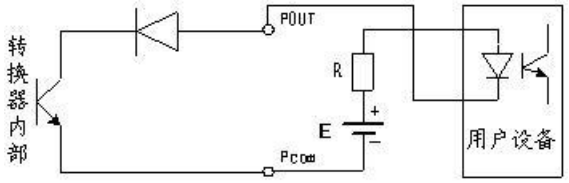


Figure 4.5

Generally, the user optocoupler needs about 10mA current, so E/R=about 10mA. E=5～24V.

11.5 Connect the digital output to the relay

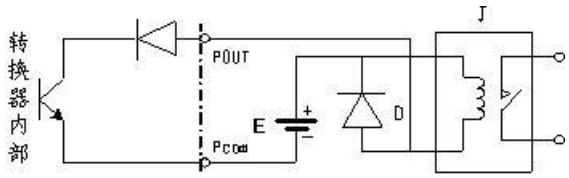


Figure 4.6

Generally, the E required by the intermediate relay is 12V or 24V. D is a freewheeling diode, and most of the intermediate relays currently have this diode. If the intermediate relay does not contain this diode, the user should connect one externally.

The digital output parameter table is as follows:

POUT parameters Table 4.2

Parameter	Test Conditions	Minimum	Typical value	Max	unit
Operating Voltage	IC=100mA	5	24	36	V
Working current	Vol≤1.4V	0	300	350	mA
working frequency	IC=100mAVcc=24V	0	5000	7500	Hz
High level	IC=100mA	Vcc	Vcc	Vcc	V

Low level	IC=100mA	0.9	1	1.4	V

11.6 Analog output

The analog output refers to a 4-20mA signal system.

The analog current output is internally supplied with 24V and can drive a load resistance of 750Ω.

The analog quantity current output corresponds to the percentage flow of the flow, namely:

I0 = measured value / full scale value * current range + current zero point

For the 4-20mA signal system, the current zero point is 4mA.

Therefore, in order to improve the resolution of the output simulation current, the user should appropriately select the range of the flowmeter. When the flowmeter leaves the factory, the manufacturer has calibrated the parameters of the simulated output. Under normal circumstances, no further adjustment is required by the user. If an abnormal situation occurs and the user needs to calibrate the analog output, the calibration can be introduced according to the current zero point full scale parameter.

※Remarks: After the L_MagH electromagnetic flowmeter heat meter and sensor are connected to the fluid pipeline (whether it is for calibration or use), the following work should be performed first:

Connect the pipes before and after the sensor with copper wires well and tightly.

Ground the sensor well. When adjusting the zero point of the instrument, make sure that the fluid in the pipeline is still.

Ensure that the oxide film of the sensor electrode is formed stably (the electrode is in continuous contact with the fluid for 48 hours).