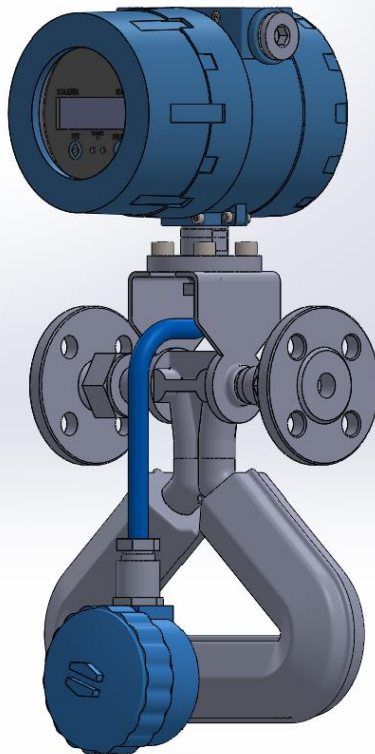


KMS-2000

MANUAL



Content

Chapter 1 Specifications	- 1 -
1.1 Introduction	- 1 -
1.2 Operating Principle	- 1 -
1.3 Features	- 1 -
1.4 Operating Environment	- 2 -
1.5 Operating conditions	- 2 -
1.6 Temperature Class	- 2 -
Chapter 2 Composition	- 3 -
2.1 Mass flow sensor	- 3 -
2.1.1 Main parameters	- 3 -
2.1.2 Sensor Dimension	- 4 -
2.2 Mass flow transmitter	- 4 -
2.2.1 Main Features	- 5 -
2.2.2 Basic Parameters	- 5 -
2.2.3 Transmitter Dimension	- 6 -
Chapter 3 Installation	- 6 -
3.1 Attention	- 6 -
3.2 Before Installation	- 7 -
3.3 Installation	- 7 -
3.3.1 Installation Steps	- 7 -
3.3.2 Site selection	- 8 -
3.3.3 Installation methods	- 8 -
3.3.4 Ground	- 9 -
3.3.5 Other Requirements	- 9 -
Chapter 4 Wiring & Circuit	- 10 -
4.1 Wiring	- 10 -

4.1.1 Reverse Display Module	- 10 -
4.1.2 Power cable	- 11 -
4.1.3 Wiring Requirements	- 12 -
4.2 Circuit.....	- 12 -
4.2.1 Connection Cable	- 12 -
4.2.2 Terminal definition	- 13 -
4.2.3 Connection with Pulse Receiver(Count)	- 14 -
4.2.4 Start.....	- 15 -
Chapter 5 Meter Interface	- 16 -
5.1 Operating Interface	- 16 -
5.2 Interfaces	- 16 -
5.2.1 Main Interfaces.....	- 16 -
5.2.2 Setup Interface.....	- 17 -
Chapter 6 Configuration Software	- 17 -
6.1 Connection Between Meter & Computer	- 17 -
6.2 Process Variables Monitoring	- 18 -
6.3 Mainboard Information.....	- 18 -
6.4 Density Calibration.....	- 18 -
Chapter 7 Operation	- 18 -
7.1 Calibration Factor Setup	- 19 -
7.2 Flow Cutoff Setup	- 22 -
7.3 Frequency of Pulse Output Setup	- 22 -
7.4 Pulse Equivalent	- 22 -
7.5 Flow Direction	- 23 -
7.6 Zero Calibration	- 23 -
7.7 Fixed Frequency Output Test.....	- 24 -
7.8 Total Reset	- 24 -
7.9 Volume Calculation	- 24 -

7.10 Units of Measure.....	- 25 -
7.11 Password Setup	- 26 -
7.12 Parameter Backup	- 26 -
7.13 Languages	- 26 -
7.14 Timeout	- 26 -
7.15 Display Setup.....	- 27 -
7.16 Sensor Status	- 27 -
Chapter 8 Troubleshooting.....	- 28 -
8.1 Self-diagnosis	- 28 -
8.2 Troubleshooting	- 29 -
Chapter 9Completeness	- 30 -
Chapter 10Transport and storage	- 30 -
Chapter 11 MODBUS-RTU	-31-

Attention

Please read this manual carefully before installation and operation. It is a detailed introduction of configuration, principle, specification, installation, etc. of mass flow meter.

The meter meets the following standards,

It is produced according to *National Regulation of Coriolis Mass Flow Meter GB/T 31130-2014*, and Ex-proof approved. Each sensor has its own paired transmitter. Please do not change any component in case of failure.

Please cut off the power before installation. Keep junction box intact and wiring correct; make sure no gasket, o-ring or holding screw missing, and electricity ex-proof device in good condition during the installation.

Chapter 1 Specifications

1.1 Introduction

The meter is designed and produced according to world's latest Coriolis technology, with better appearance, stability and accuracy to measure mass flow rate of a fluid traveling through a tube, widely applied to alternative energy, oil & gas, chemical, food & beverage, industrial energy, marine, power, pulp & paper, water & wastewater industries, etc.

1.2 Operating Principle

Mass flow meter measures the mass based on Coriolis effect. The operating principle involves inducing a vibration of the tube through which the fluid passes. The vibration, though not completely circular provides the rotating reference frame that gives rise to the Coriolis effect. While specific methods vary according to the design of the flow meter, sensors monitor and analyze changes in frequency, phase shift & amplitude of the vibrating flow tubes. The changes observed represent the mass flow rate and density of the fluid.

1.3 Features

- Measurement is not influenced by flow density, viscosity, temperature & pressure;
- Low requirement of straight pipe, because nothing inside holds back the flow;
- Low power dissipation; stable zero point; better accuracy;
- Meter is ARM system, with 3 calculators to count density, temperature & mass flow rate;
- Transmitter is assembled by surface mounting technology, with self-inspection function;
- Ex-mark is Ex d IIC T5(IP67)

1.4 Operating Environment

Atmospheric pressure: 85kPa~106kPa

Ambient temp.: Parts with LCD display -30°C~+60°C;

Parts without LCD display -30°C~+85°C

Relative humidity: 5%~95%, non condensed

1.5 Operating conditions

Fluid : Liquid/Gas

Fluid temperature: -200°C~+200°C (higher temp. model is customizable)

Nominal pressure: 4MPa(general model)
25MPa(high pressure model)

Supply voltage: AC 85~265VAC, 50/60Hz
DC 12~24VDC, 5W

Comm. Port:

1.6 Temperature Class

Requirements for each class:

Temp. Class	Fluid Temp.	Min. Ext. Length	Transmitter Operating Temp.	
			Display	No Display
T6	-200~+60°C	10cm	-30~+45°C	
T5	-200~+80°C	10cm	-30~+45°C	
T4	-200~+105°C	10cm	-30~+45°C	
T3	-200~+138°C	10cm	-30~+45°C	

T2	-200~+238°C	50cm	-30~+60°C	-30~+85°C
T1	-200~+388°C	50cm	-30~+60°C	-30~+85°C

Table 1-1 Temp. Class Table

Chapter 2 Composition

The meter consists of mass flow sensor and transmitter, adopting executive standard GB/T 31130-2014.

2.1 Mass flow sensor

Mass flow sensor is a phase-sensitive resonant sensor based on Coriolis effect, composed of vibration tube, signal detector, concussion driver, structural support, shell, etc.

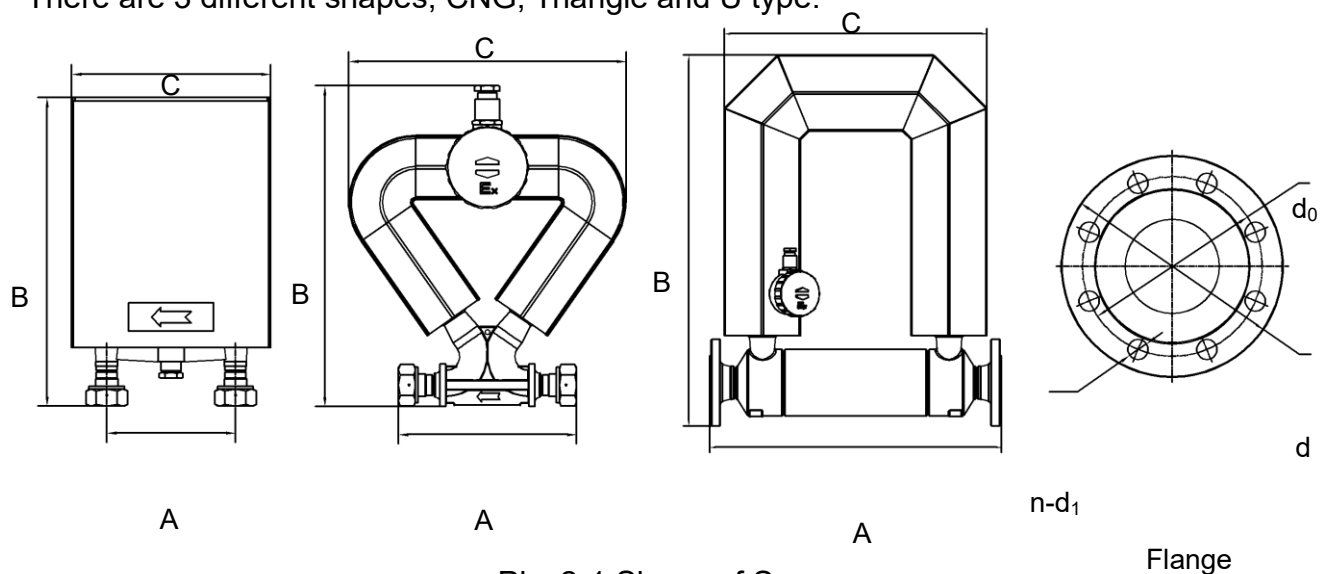
2.1.1 Main parameters

Item	Parameters
Accuracy class	0.2, 0.3, 0.5
Vibrating tubes	Stainless steel 316L
Pressure drop	≤0.2MPa
Case protection	IP67
Ex-mark	Ex d IIC T5

Table 2-1 Main Parameter of Sensor

2.1.2 Sensor Dimension

There are 3 different shapes, CNG, Triangle and U type.



Pic. 2-1 Shape of Sensor

Shape	Model No.	DN	Flow Range (kg/h)	Dimension			Flange (Standard DIN2635)			Bolt
				A	B	C	d	d ₀	n-d ₁	
TRI	CG-06	6	120~1200	162	319	235	95	65	4-φ14	M12
	CG-15	15	300~3000	188	369	293				M32*1.5
TRI	CG-25	25	1200~12000	211	574	448	115	85	4-φ14	M12
U	CG-50	50	3000~60000	556	708	501	165	125	4-φ18	M16
	CG-80	80	75000~150000	830	970	501	200	160	8-φ18	M16
	CG-100	100	12000~2400000	997	1032	832	200	160	8-φ22	M20

Table 2-2 Dimension/ mm

2.2 Mass flow transmitter

Mass flow transmitter is a micro-programming-centered electronic system, which supplies thrust to sensor, transforms sensor signal into mass flow signal and others, and improves accuracy in accordance with temperature parameter.

It is composed of switching power supplier, guard grating, core processor board, display module, etc, installed in a ex-proof junction box. Switching power supply offers power for the transmitter; safe grating isolates flow sensor and transmitter intrinsically; core processor

detects & processes sensor phase signal, sends mass flow signal and process communication.

2.2.1 Main Features

- Capable of configuration modification for different fluids;
- Capable of flow rate, density & temp. measurement;
- Capable of RS-232, RS-485 & ModBus communication;
- Capable of mass total, volume total & density calculation, with 3 calculators;
- Capable of recording real-time total.

2.2.2 Basic Parameters

(1) Transmitter

Power: $\leq 5W$

Display: Display with wide angle of view, wide temperature & backlight, to show flow rate, unit, total, alarm, alarm type, etc.

Switches: Optical switches SET & SELECT for all setup & operation.

(2) Setup operation

There are 2 ways for setup, SET/ SELECT & configuration software.

(3) RS-485 communication port

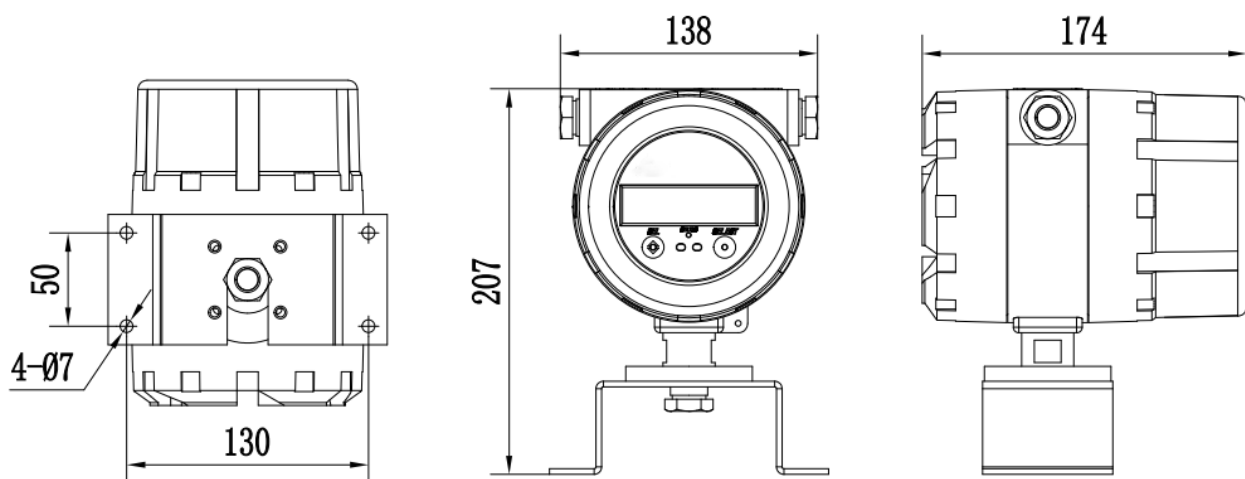
The meter is capable of communication with PLC through RS-485(ModBus RTU protocol) communication port. Please contact us for the protocol if need.

(4) Pulse signal output

It is passive OC gate output, capable of electrical totalizer connection.

2.2.3 Transmitter Dimension

There are 2 different configurations, F23X.



Pic. 2-3 Dimension of F23X

Chapter 3 Installation

There are strict safety requirements for the design, test, and power supply of mass flow meter; thus, please read this manual carefully and do accordingly before installation for safe operation.

3.1 Attention

a) Please take the safety requirements of flow rate, related device and environment into consideration before site selection & installation;

-
- b) Installation and maintenance shall be done by professional technician;
 - c) Connect sensor with pipes correctly, without any leakage;
 - d) Take measure to avoid electric shock;
 - e) Fluid pressure shall be no more than the value marked on nameplate;
 - f) Installation tools meets safety requirement.

3.2 Before Installation

- a) Make sure the flange, case & wire plug undamaged.
- b) Make sure the wiring & wiring board tight and undamaged.
- c) Make sure the model number on nameplate is same as ordered.





Mark	Description	Danger
	EX-Danger Area	Please operate according this manual to meet Ex-proof certificate.
	High Pressure	Possibility of electric shock.
	Routine Danger	Possibility of routine danger which may cause injury.
	Surface Overheating or High Temperature	Possibility of scold.

Table 3-1 Danger Mark

3.3 Installation

3.3.1 Installation Steps

-
- a) Choose correct installation site, taking installation area, pipeline, transmitter location & valve location into consideration;
 - b) Install the meter according to direction mark on sensor;
 - c) Install the sensor & transmitter on pipeline;
 - d) Connect transmitter & sensor with 12-pin cable;
 - e) Start.

3.3.2 Site selection

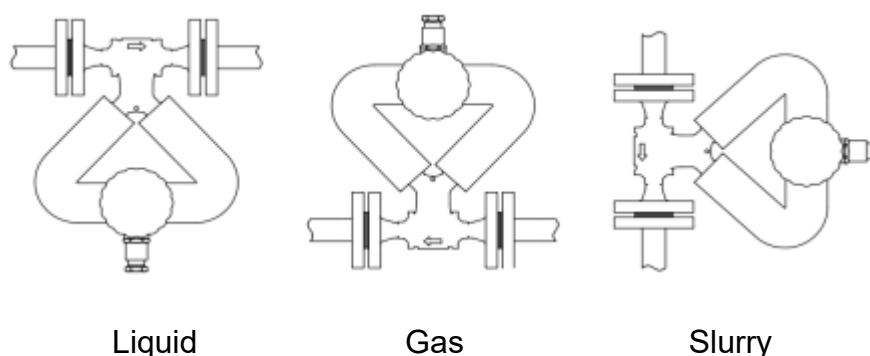
- a) Sensor stays away from mechanical vibration source, for example, pump. Use flexible pipe to connect meter with pipeline if inevitable. The case of meter must be standalone, out of touch with any other device. There must be 3 times the size of sensor between 2 sensors if there are many flow meters on the same pipeline, to avoid resonance.
- b) Do not install sensor on pipeline that easily expands with hot and contracts with cold, especially near expansion joint, which leads to a worse stability.
- c) Sensor stays away from industrial electromagnetic field, such as large generator and transformer, better 5m at least. Such device influences the performance of drive coil and pickoffs. Make sure magnetic field intensity less than 400A/m.
- d) Sensor shall be installed on lower pipeline, to be easily full of fluid.
- e) Make sure Ex-mark meet application requirements if in hazardous area.
- f) Build a sunshade if the meter is under direct solar radiation.
- g) Keep the meter from corrosive liquid.

3.3.3 Installation methods

The sensor can not be a support point of the whole pipeline; the pipeline shall support itself. Meanwhile, sensor shall not be under overlarge tension stress during the connection, since

pipeline expansion will make this stress heavier.

There are 3 installation methods for different fluid, as follows.



Pic. 3-1 Installation Methods

- a) For liquid, install the sensor downwards, to avoid air gathering in tubes.
- b) For gas, install the sensor upwards, to avoid condensate gathering in tubes.
- c) For slurry, install the sensor on vertical pipe, to avoid particle gathering in tubes.

3.3.4 Ground

Current signal from sensor is extremely weak, only several millivolt even when full range; thus, sensor shall be well grounded to filter other signals. There are 2 requirements as follows.

- a) The electric potential of ground terminal of sensor and transmitter shall be the same as that of fluid.
- b) Make the ground as zero potential to reduce interference. It's easy to meet this requirement, because generally the pipeline is metal and grounded itself already. However, the meter shall be grounded itself if there is strong interference. Meter ground cable shall be copper material, with section over 4mm^2 , and not connected with common ground cable of motor, etc.; ground resistance shall be less than 10Ω .

3.3.5 Other Requirements

-
- a) Make sure the meter coaxial with pipeline, and axis deviation $\leq 1.5\text{mm}$ for DN50 or smaller models.
 - b) Make sure the gasket of high corrosion resistance, and not touch tube interior.
 - c) Fasten bolt & nut, and make sure the thread intact. Select a suitable torque spanner for the fastening.
 - d) Isolate the meter during welding or flame cutting of close pipeline, to avoid heating.

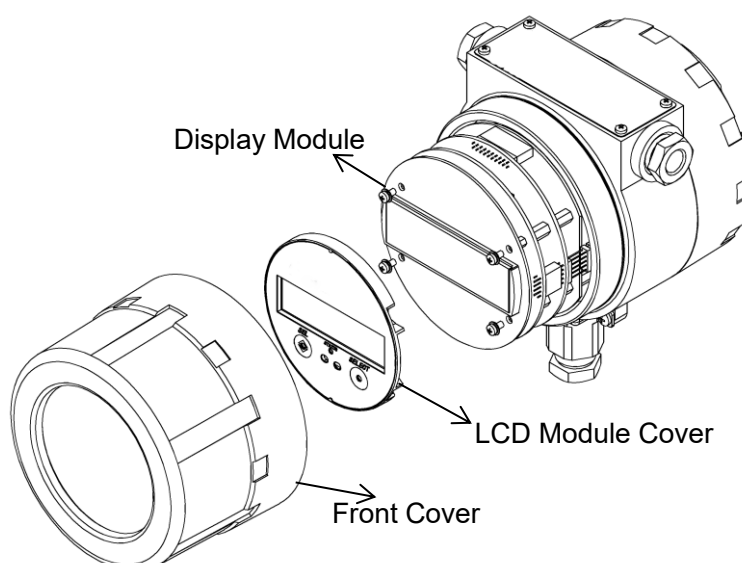
Chapter 4 Wiring & Circuit

4.1 Wiring

Only the sensor-transmitter- connection cable is provided with the meter; please prepare the power cable and others yourself.

4.1.1 Reverse Display Module

This chapter is for transmitter with display. Please rotate the front cover anti-clockwise, remove screws & 6P wire, and reverse the display module if you need the display reverse.



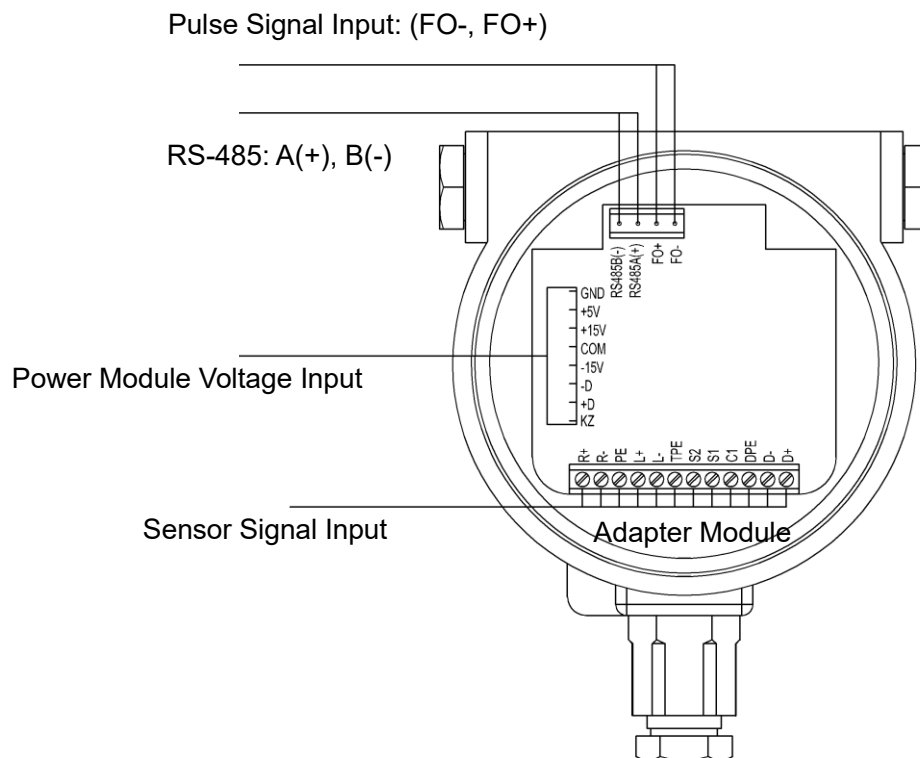
Pic. 4-1 Display Module

4.1.2 Power cable

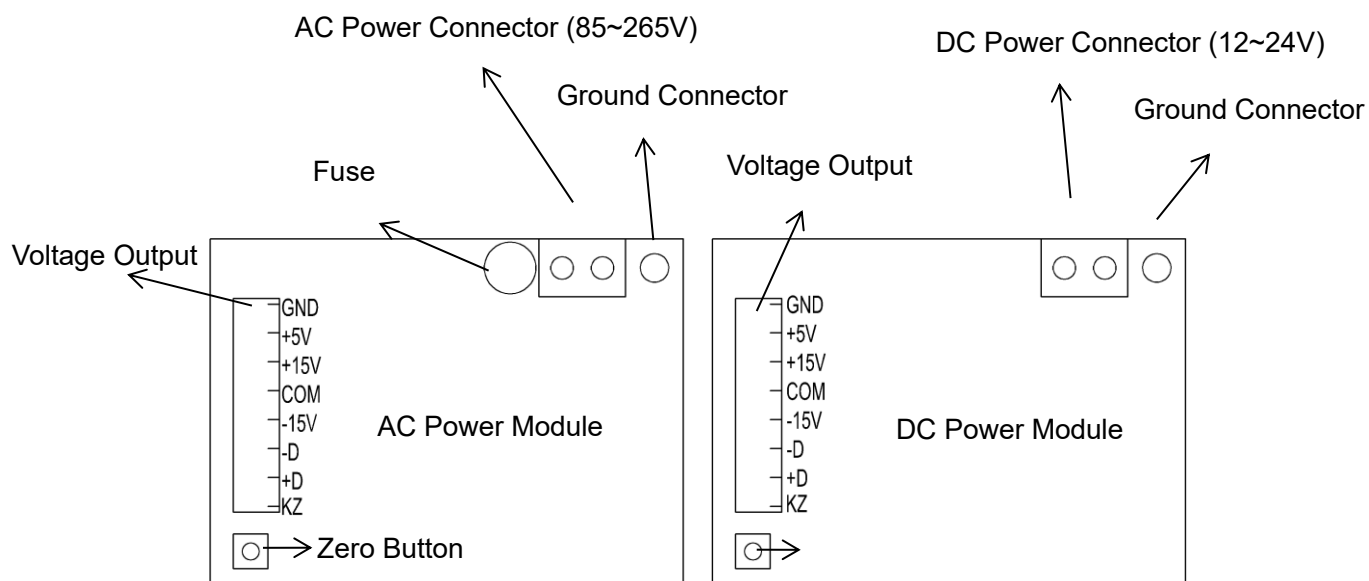
The power supply can be 85~265VAC or 12~24VDC. Section area of power cable shall be more than 0.8mm², and length no more than 100m.

There are 2 kinds of transmitter, KSM-2000. Please refer to the following diagrams respectively according to the model purchased.

Open the back cover of KMS-2000, and you will find power module on the top and adapter module on the bottom.



Pic.4-3 Wiring Diagram of KSM-2000



Pic.4-4 Wiring Diagram of F23X Power Module

4.1.3 Wiring Requirements

- Cut off power before wiring;
- Use correct wire;
- Correct steps to thread wire: Loosen locknut; remove block board; thread wire through locknut, rubber ring and wire plug all at once; do the wiring; settle wires; tighten locknut.
- Do not damage insulating layer when pare the cable. For sensor signal input wire, do not pare shielding layer if wirable.

4.2 Circuit

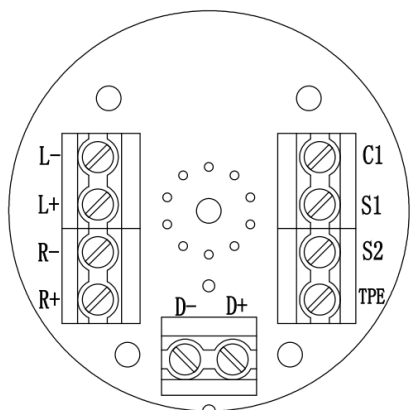
4.2.1 Connection Cable

Sensor and transmitter are connected through a 9-pin shielded cable(the shielded cable is divided into 3, so the transmitter end is actually a 12-pin). Do not use other cable for the connection, in case of accuracy failure; do not hang this cable over motor or other power

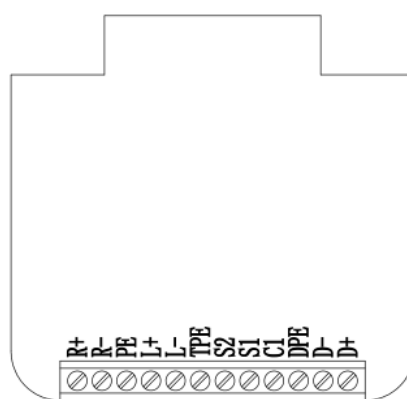
equipment, in case of electromagnetic influence; the max. length could be 100m.

4.2.2 Terminal definition

Open the back cover of the transmitter and junction box of sensor, and you will see the terminal boards as follows. Please wire accordingly.



Pic. 4-5 Sensor Terminal Board



Pic. 4-6 F23X Transmitter Terminal Board

The definition is as follows.

Code	L-	L+	R-	R+	D-	D+	TPE	S2	S1	C1
Color	Purple	Grey	Yellow	White	Red	Blue	Black (Shield)	Black	Green	Orange
Function	Right pickoff detection		Left pickoff detection		Coil drive		Temp. detection			

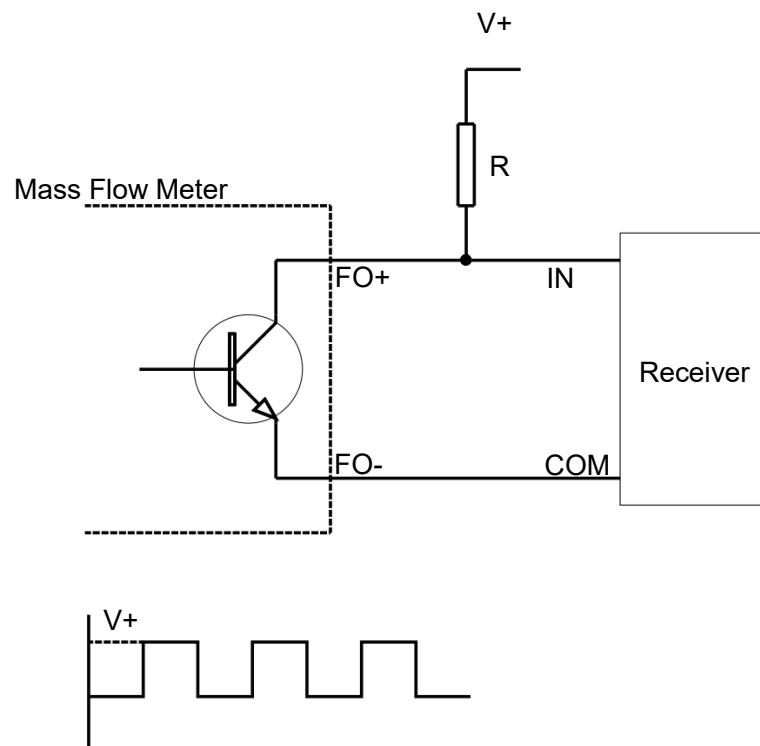
Table 4-1 Sensor Terminal Definition

Code	R+	R-	PE	L+	L-	TPE	S ₂	S ₁	C ₁	DPE	D-	D+
Color	White	Yellow	Black (Shield)	Gray	Purple	Black (Shield)	Black	Green	Orange	Black (Shield)	Red	Blue
Function	Left pickoff detection			Right pickoff detection			Temp. detection			Coil Drive		

Table 4-2 Transmitter Terminal Definition

4.2.3 Connection with Pulse Receiver(Count)

The meter can work with a pulse receiver(Count). The connection is as follows. The resistance value is up to the cable length & the max. input pulse frequency of receiver. Current 10mA is suitable for most receivers; however, you can reduce the resistance value when the cable is long. The max. current could be 50mA. Please use the fixed frequency output function to check if the cable length & resistance value is suitable(refer to Chapter 7.7 for more details).



Pic. 4-7 Connection Diagram for Meter & Pulse Receiver

4.2.4 Start

Please check following items before operation, and operate according to relevant rules.

- a) If the meter is damaged during shipment and installation;
- b) If the voltage is same as marked on nameplate;
- c) If the fuse is correct;
- d) If the meter is grounded properly.

If everything is fine, please conduct zero calibration after first start, and shall do this again if the meter is moved to another site.

Preparation for zero calibration:

- a) Power on the meter for approximately 20min for warm-up;
- b) Run the process fluid through the sensor until the sensor temperature reaches the normal process operating temperature.
- c) Close the shutoff valve downstream from the sensor.
- d) Ensure that the sensor is completely filled with fluid and the process flow has completely stopped.

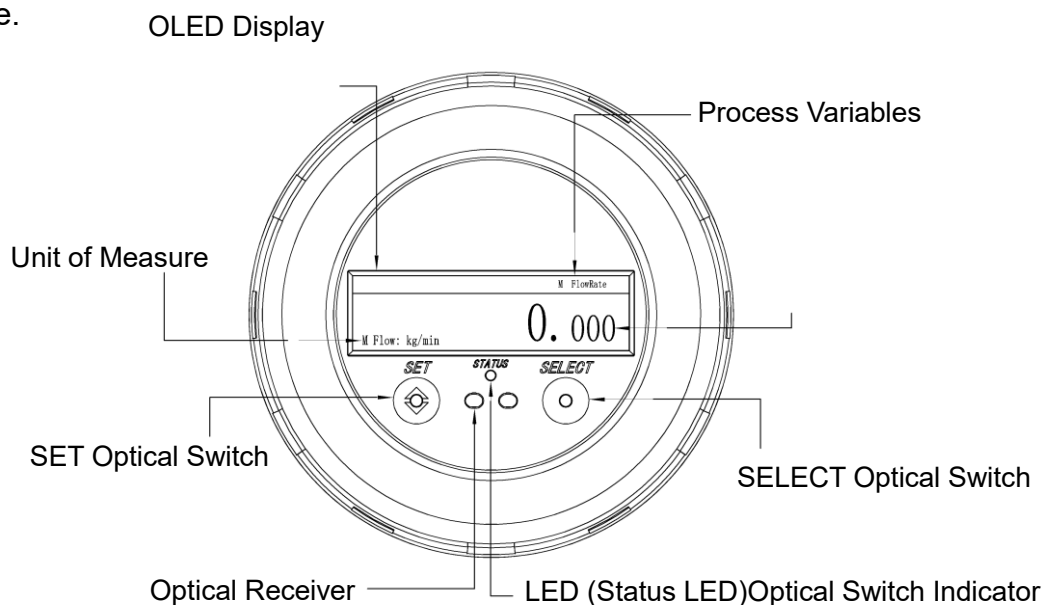
Please refer to Chapter 7.6 for detail operation of zero calibration.

Mark: Zero calibration is quite important, or the accuracy may be bad. It is highly recommended to check the zero point each 3 months, and do zero calibration if the zero point changes a lot.

Chapter 5 Meter Interface

5.1 Operating Interface

There are 2 optical switches(SET & SELECT) on the operating panel, and a bicolor indicator in the middle.



Pic. 5-1 Operating Panel Diagram

5.2 Interfaces

5.2.1 Main Interfaces

There are 3 main interfaces.

Interface 1		Interface 2		Interface 3	
Process Variables		Mass Total		M FlowRate	
TOTAL: 0.000 kg		0.000		0.000	
FLOW: 0.000 kg/min					
D: 0.0000 g/cm³	T: 0.00 °C	M TOTAL: kg		M FLOW: kg/min	
Density	Temp.	Total		Flow Rate	

Pic. 5-2 Main Interfaces

5.2.2 Setup Interface

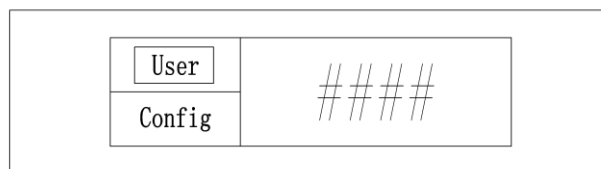
There are 2 options, User & Config.

Use Setup: Display Setup, System Setup, Troubleshooting & Sensor Status.

Config. Setup: Meter Setup, Communication Setup, Pulse Setup, Parameter Backup & Password Setup.

Original password: User 0001; Config. 0002.

Password initialization: Un-plug & plug the meter, press reset switch on display board for 3s immediately when it shows version number on screen. In this way, all passwords will be initialized as factory set.



Pic. 5-3 Setup Interface

Chapter 6 Configuration Software

6.1 Connection Between Meter & Computer

Connect the meter and computer with a USB-to-RS485 converter(converter A+ end to transmitter A+ end, B- to B-, and GND to GDN); turn to device manager of the computer to check COM port connected with meter. Start the software, select the right COM port and click **Connect**; do not change any other parameters.

You can click **Connection** on the tool bar to disconnect or connect again; the connection

status is shown at the bottom if the software.

6.2 Process Variables Monitoring

This interface comes automatically after the meter and computer are connected, or click **Functions > Process Variables** on the tool bar to callout this interface. It shows real-time Flow Rate, Total, Density & Temperature.

6.3 Mainboard Information

This interface is to read mainboard number and mainboard real-time operating temperature. Click Functions > Mainboard Info on tool bar to callout.

6.4 Density Calibration

Do not change any parameter in this interface, but only when the transmitter is replaced. Click tool bar > Functions > Calibration > Density Calibration to callout, and input parameters marked on the nameplate of new transmitter.

Chapter 7 Operation

The SET and SELECT optical switches are used to navigate the transmitter display. To activate an optical switch, touch the glass in front of the optical switch or move your finger 1~2mm over the optical switch close to the glass.

The indicator will flash green when the display is timeout, will be solid red when one switch is activated, and will flash red when one switch is activated for 3s(hereafter referred to as long activate). Solid-red or flash-red means that the indicator has identified your operation;

thus, please remove your finger afterwards, and do not touch the other optical switch, or it will be regarded as another operation.

The general operation is listed as follows.

On Main Interfaces	Activate SET to alternate mass and volume values.
	Activate SELECT to alternate main interfaces.
	Long activate SELECT to enter Setup Interface.
	Long activate SET for total reset.
Back to Main Interface	Long activate SET & SELECT at the same time.
Select Submenu, Parameters & Numbers	Activate SELECT to select the submenu, parameters or numbers.
	Activate SET to go to submenu or save parameters/numbers.
Save setup	Long activate SET to save the modified setup.
Back or Exit	Long activate SELECT.

Table 7-1 Operation Table

Mark:

1. The display will timeout without any operation for 5 min.
2. During numbers input, the decimal point will come up automatically if the first digit is 0; if not 0, please activate SELECT until decimal point shows up.

7.1 Calibration Factor Setup

There are 2 calibration factors, factory & user. Each meter has its own factory calibration factor marked on calibration certificate & nameplate of sensor, and the original user factor is 1 for all meters. Please use user factor for calibration, and do not change the factory factor.

Formula:

$$\text{New Factor} = \frac{\text{Original Factor}}{1 + \left(\frac{\text{Measured Value} - \text{Real Value}}{\text{Real Value}} \right)}$$

Mark: Customer can use the meter directly without setting new factor, but in the following 2 cases: 1. Transmitter is replaced; 2. There is a big difference between measured value & real value.

- By transmitter

Config > Meter Setup > Meter Parameters > User Cal. Factor > Mass Factor/ Volume Factor > Set > Save.

Detail Steps:

1. Long activate SELECT to go to the setup interface;
2. Activate SELECT until **Config** is selected;
3. Activate SET to go to the password input box;
4. Activate SELECT to select the right number, then activate SET to confirm, and it will come to next digit automatically;
5. Activate SET after you input all digits of password to go to the submenu;
6. **Meter Setup** will be selected directly because it is the first item on this submenu(activate SELECT until it is selected, if not);
7. Activate SET to go to the submenu of Meter Setup;
8. Activate SELECT until **Meter Parameters** is selected;
9. Activate SET to go to the submenu of Meter Parameters;

-
10. Activate SELECT until **User Cal. Factor** is selected;
 11. Activate SET to go to the submenu of User Cal. Factor;
 12. Activate SELECT to select **Mass Factor** or **Volume Factor**;
 13. Activate SET to go to the factor setup interface;
 14. Activate SET again to go to the new factor input box;
 15. Activate SELECT to select the right number, then activate SET, and it will comes to next digit directly;
 16. Long activate SET after you input all digits of the new factor to save the setup.
 17. Done;
 18. Long activate SELECT to go back, or long activate SET & SELECT at the same time to go to the main interface directly.

- By software

Tool bar > Functions > Configuration > Flow Rate > Factory Cal. Factor/ User Mass. Factor/ User Vol. Factor.

7.2 Flow Cutoff Setup

There are some factors that may cause the meter count even when there is no fluid flowing through the sensor, such as the installation, vibration, etc; thus, a min. flow cutoff value is necessary. The meter won't count itself when the flow rate is less than this value.

- By transmitter

Config > Meter Setup > Flow Parameters > Flow Cutoff > Mass Cutoff/ Volume Cutoff.

- By software

Tool bar > Functions > Configuration > Flow Rate > Mass Cutoff / Volume Cutoff.

7.3 Frequency of Pulse Output Setup

- By transmitter

Config > Pulse Setup > Max. Frequency of Pulse Output.

- By software

Tool bar > Functions > Configuration > Frequency > Max. Fre. Of Pulse Output.

7.4 Pulse Equivalent

The factory set equivalent is suitable for most application. The pulse receiver may not detect the pulse when the value is too small, and it may lead to lack of measurement resolution when it is too big.

How to calculate a suitable equivalent:

$$\text{Pulse Equivalent} = 1.2 * \frac{\text{Max. Real Working Flow Rate}}{\text{Max. Working Frequency of Pulse Receiver}}$$

-
- By transmitter

Config > Pulse Setup > Pulse Equivalent.

- By software

Tool bar > Functions > Configuration > Frequency > Pulse Equivalent.

7.5 Flow Direction

- By transmitter

Config > Meter Setup > Flow Parameters > Flow Direction.

- By software

Tool bar > Functions > Configuration > Flow Rate > Flow Direction.

7.6 Zero Calibration

- By transmitter

There are 2 methods to do zero calibration by transmitter.

1. Config > Meter Setup > Calibration > Zero Calibration > Start. The indicator will flash green during the calibration.

2. Open the back cover, push the reset button on power board for 3s, and then calibration begins. Please kindly note that the meter is not ex-proof if you take off the back cover; thus, please do not conduct this method in hazardous area.

Please refer to Chapter 4.2.4 before calibration.

- By software

Tool bar > Functions > Calibration > Zero Calibration > Auto Zeroing.

7.7 Fixed Frequency Output Test

This is to output a simulative fixed frequency, to help test the count accuracy of pulse receiver and the max. receiving frequency.

- By transmitter

Config > Pulse Setup > Fixed Pulse Output Test > Fixed Frequency Setup.

- By software

Tool Bar > Functions > Output Test > Fixed Frequency Test > Modify > OK.

7.8 Total Reset

There are 2 totals, mass & volume. The other will be reset automatically if either is reset(irrecoverable).

- By transmitter

Method 1: on any main interface, long activate SET, and then comes the total reset interface.

Method 2: Config > Meter Setup > Total Reset. There are 2 options here. Go to **Reset Total** for total reset; go to **Setup** if you want the total password-protected.

There are also 2 options for **Setup**. Go to **Password or Not** to enable/ disable the password(the total can be reset without password if disabled); go to **Reset Password** to change the password. The original password is 0003.

Mark: This password only works for Method 1. This is no need to input password with Method 2.

- By software

Tool Bar > Functions > Total Reset.

7.9 Volume Calculation

Mass flow meter measures mass directly, but it can also show in volume. There are 2 options for volume calculation, by fixed & real-time density. Fixed density is the one you input, which does not change, and the real-time density is the one the meter measures, which changes when the flow, environment, etc. changes.

- By transmitter

Config > Meter Setup > Flow Parameters > Volume Calculation > Density Options > Fixed/Real-T.

- By software

Tool Bar > Functions > Density Options > Fixed Density/ Real-Time Density > Save.

7.10 Units of Measure

- By transmitter

Config > Meter Setup > Units of Measure.

- By software

Tool Bar > Functions > Configuration > Flow Rate.

The following units are available.

Name	Units Available
Mass Total	G, kg, T, St, lt, lb.
Volume Total	m ³ , L, ft ³ , barrels, UKgal, USgal.
Mass Flow	lt/day, lt/hour, st/day, st/hour, st/min, lb/day, lb/hour, lb/min, lb/s, T/day, T/hour, T/min, kg/day, kg/hour, kg/min,

	kg/s, g/hour, g/min, Special.
Volume Flow	ft ³ /h, ft ³ /min, USgal/day, L/hour, UKgal/h, USgal/h, Bar/day, Bar/h, m ³ /hour, m ³ /s, m ³ /min, Special.
Temp.	C°, °F, K, °R.
Density	g/cm ³ , st/yd ³ , lb/in ³ , g/L, kg/L, g/mL, lb/ft ³ , lb/gal, kg/m ³ .

Table 7-2 Units Table

7.11 Password Setup

- By transmitter

Config > Password Setup.

7.12 Parameter Backup

- By transmitter

Config > Parameter Backup > Backup/ Restore.

7.13 Languages

Only English

- By transmitter

User > System Setup > Languages.

7.14 Timeout

- By transmitter

User > System Setup > Timeout > Set > Save.

7.15 Display Setup

This is to choose what will be shown on main interfaces, mass, volume, or mass & volume. You can activate SET to alternate mass and volume if you choose M&V.

- By transmitter

Use > Display Setup > Set > Save.

7.16 Sensor Status

Please check the following factors if they are the same as marked on nameplate of sensor when transmitter/ sensor is replaced or transmitter is updated. Please modify accordingly if not.

FLOW CAL: Factory Calibration Factor;

D1: Low Density Calibration Value D2: High Density Calibration Value

K1: Low Density Calibration Time K2: High Density Calibration Time

TC: Density Temperature Compensation Factor

- By transmitter

Method 1: On main interface, long activate SET & SELECT at the same time, and it will go to sensor status interface.

Method 2: User > Sensor Status.

- By software

Tool bar > Functions > Configuration > check the parameters under Flow Rate and Density.

-
- The biggest capacitance from intrinsically safe sensor to transmitter allowed is 0.11 μ F, the biggest inductance 0.2mH;

Name	Max. Output Voltage/ V	Max. Output Current/ mA	Max. Output Capacitance/ μF
Dirve coil	11.8	100	9.9
Temp. sensor	6.2	43	790
Pickoffs	7.8	54	130

Table 8-1

- Ambient temperature: -30~+65°C;
- The meter shall be well grounded during operation;
- Do not replace any component or part inside transmitter without manufacturer's guide;
- Inner diameter of wiring cable shall be ϕ 8.5 or ϕ 12, external diameter between ϕ 8 & ϕ 8.5 or ϕ 8.5 & ϕ 12. Please replace wiring cable if wornout;
- Keep corrosive gas from junction box;
- Do not install or dismount under inflammable gas environment.

Chapter 8 Troubleshooting

8.1 Self-diagnosis

The transmitter & software will self-diagnose once powered on/ connected.

The transmitter will show error code immediately on the top of display if there is anything wrong.

-
- 1.Error 01: Sensor error; 2.Error 02: Temp. sensor overrun;
 3.Error 03: Zero failed; 4.Error 04: Transmitter initializing.

To callout the interface on software, click Functions > Status on tool bar. The light in front is green when everything is fine, but will be red if there is any error.

8.2 Troubleshooting

Error	Possible cause
No display	Maybe the screen is under auto-off status. Check if the voltage between terminal L/+ & N/- is 220V/24V. Check if the wiring between display terminal and mainboard is loosen or wrong.
Transmitter operation failure	Check if the wiring between display and mainboard is loosen or wrong.
No Modbus communication	Check if the communication wiring is loosen or wrong. Check communication port setting.
Unstable zero point	Check if the pipe is full of gas/liquid. Check if there is any bubble inside. Check if the meter is properly grounded. Check if motor, transformer or other electrical equipment is near. Check if the detector is under mechanical pressure. Check if the junction box is kept away from dust and water.
Flow rate accuracy failure	Check if zero point setting is correct. Check if flow unit and min. cutoff value is set properly. Check if the meter is properly grounded. Check if there is any bubble inside. Check if the reference value is correct.
Density accuracy failure	Check if the density unit is set properly. Check if it is fixed density. Check if the pipe is full of fluid, without any other impurity. Check if the temperature measurement is correct. Check if the meter is rusted or corrupted. Check if there is any impurity piled inside.
Temp. accuracy failure	Check the wiring of transmitter. Check if platinum resistor PT100 is correct. Check if the unit is the same.

Signal output failure	Check if the suspicious output signal setting is correct. Check if the output is normal.
Please contact the manufacturer if problem can not be solved.	

Table 8-1 Troubleshooting

Chapter 9 Completeness

The meter consists of sensor, transmitter and the connection cable. Please mark in PO if companion flange is needed. Along with the meter, there are use manual, certificate of qualified product & packing list.

Chapter 10 Transport and storage

Please keep the meter in good condition during transport, better packed in the original package from the manufacturer.

Please make sure the site meets following requirements, if keep the meter in storage.

- a) Waterproof and moisture-proof;
- b) With few mechanical vibration and crush;
- c) Temperature from -30°C to +85°C;
- d) Humidity less than 80%, better about 50%;
- e) Please clear up the sensor if storage used one;
- f) Performance will be influenced if storage in the open.

Chapter 11 MODBUS-RTU

Interface description		
Physical interface	RS485	Modbus applies to all KMS-2000 Series products
Comm. Protocol	Modbus-RTU	
Baud	19200	
Date bits	8b	
Parity check	Even	
Stop bits	1b	
Reg offset address	1	

Security coils				
Address	Properties	Description	Unit	Normal
0002	read and write	Start/stop totalizers Set coils (1) : Start totalizers Reset coils (0) : Stop totalizers	None	1
0003	write only	Reset totals Set coils (1) : Reset accumulation is performed After Reset accumulation is performed ,this coils will be cleared.	None	0
0005	read and write	Perform flowmeter zeroing Set coils (1) : Perform flowmeter zeroing Reset coils (0) : Cancel flowmeter zeroing Attention : After Perform flowmeter zeroing ,this coils will be cleared. If the coil is cleared during calibration (0),The current operation will be canceled and this operation does not produce	None	0
0012	read and write	start fix frequency output Set coils (1) :The pulse is output according to the set fixed frequency. (fixed frequency address :Floating-point regsiter [0147~0148]) Attention : The fixed frequency output will stop after 40 seconds , and the coil will be cleare	None	0

0013	read and write	Density for low-density calibration Warning : If user no calibration conditions , prohibit operation this coils .	None	0
0014	read and write	Density for high-density calibration Warning : If user no calibration conditions , prohibit operation this coils .	None	0
0015	read and write	Temperature for temperature offset calibrations Warning : If user no calibration conditions , prohibit operation this coils	None	0
0016	read and write	Temperature for temperature slope calibrations Warning : If user no calibration conditions , prohibit operation this coils .	None	0

Floating-point regster pairs

Address	Properties	Description	Unit	Normal
0147-0148	read and write	Fixed frequency for frequency/output test (Hertz)	Hz	10000
0151-0152	read and write	temperature coefficient	None	
0155-0156	read and write	Density for low-density calibration	g/cc	
0157-0158	read and write	Density for high-density calibration	g/cc	
0159-0160	read and write	Density for low-density calibration times	usec	
0161-0162	read and write	Density for high-density calibration times	usec	
0163-0164	read and write	Density temperature coefficient	None	
0195-0196	read and write	Mass flow cutoff When the mass flow is lower than the cutoff value, mass flow rate is 0 and quality will not accumulate	kg/min	
0197-0198	read and write	Volume flow cutoff for frequency/pulse output and totalizers	L/min	
0245-0246	Read only	Sensor error status	None	
0247-0248	Read only	Real-time mass flow rate	kg/min	
0249-0250	Read only	Real-time density	kg/m ³	
0251-0252	Read only	Real-time temperature	℃	
0253-0254	Read only	Real-time volume flow rate	L/min	
0259-0260	Read only	Real-time mass total	kg	
0261-0262	Read only	Real-time volume total	L	
0279-0280	read and write	Mass flow rate meter factor	None	
0281-0282	read and write	Volume flow rate meter facto	None	
0285-0286	Read only	Raw tube frequency	Hz	
0293-0294	Read only	Mass flow live zero flow	kg/min	
6101-6102	read and write	Volume calculation method (0) Volume = Mass/Real-time density Attention : Real-time volume affected by the temperature greatly. (1) Volume = Mass/Fix density	None	

		Attention : Only for the standard density of the media is known		
6501-6502	read and write	Fixe density Attention : Only used Fixed density calculation	kg/m ³	

KOMETER

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