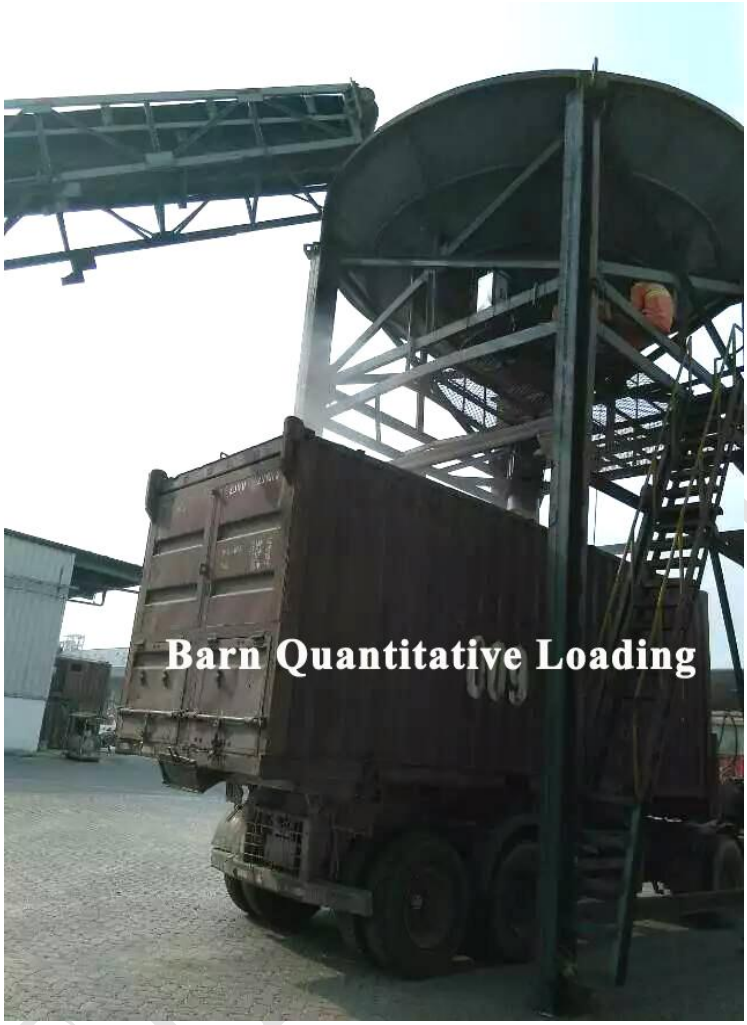
MT100DLD-SY-TF Solid Flow Meter User Manual



METERY TECHNOLOGY CO., LTD

1. Brief Introduction

Impulse type solid flow meter is a kind of flow meter which is based on the momentum principle to measure the free fall of the powder. It is converted into the standard (0-10mA or 4-20mA) ,which is directly proportional to the instantaneous weight.

The solid flow meter (hereinafter referred to as the flow) special devices in support of 24VDC /220VAC power supply, can directly output the standard direct current signal, and the intelligent flow indicator totalizer supporting, medium flow rate to be measured to indicate, integrating and records and quantitative control operation and other instruments supporting, flowmeter especially applicable to computer control, the structure is simple and the reliability is strong.

Flow meter in the sealing conditions of powder or granular medium flow were measured continuously, has been widely used in petroleum, chemical, cement, electric power, mining, food, metallurgy, light industry and other fields.

The measurement of the medium temperature at the temperature of the flow meter and the following 150 and -20 can be customized.

2. Main Technical Parameters

2.1 Parameters Form

Parameter / Name	SY- TF25	SY- TF100	SY- TF100F
Measure Range	0-25t/h （30-40t/h）	0-100t/h (200-300t/h)	0-500t/h (800t/h)
Accuracy	0.5-1.0%·FS	0.5-1.0%·FS	0.5%-1.0%·FS
Power Supply	24V·DC	24V·DC	24V·DC
Signal Output	0-10mA·DC 4-20mA·DC	0-10mA·DC 4-20mA·DC	0-10mA·DC 4-20mA·DC
Load Capability	0-500Ω	0-500Ω	0-500Ω
Medium Temp.	<600℃	<600℃	<600℃
Environment Temp.	-45℃~＋80℃	-45℃~＋80℃	-45℃~＋80℃
Relative Humidity	≤85%	≤85%	≤85%
Atmosphere Pressure	86~106kPa	86~106kPa	86~106kPa
Protection Grade	IP65	IP65	IP65
Weight Of Meter	77kg	93kg	150-300kg
Overall Dimension	Refer to Diagram1	Refer to Diagram 2	Refer to Diagram 3

***Can output RS485 signal if working with Mating Totalizer**

2.2 Installation dimensions (form for reference, if there is a modification to the CAD chart)

① SY- TF25 Overall dimension please refer to diagram 1

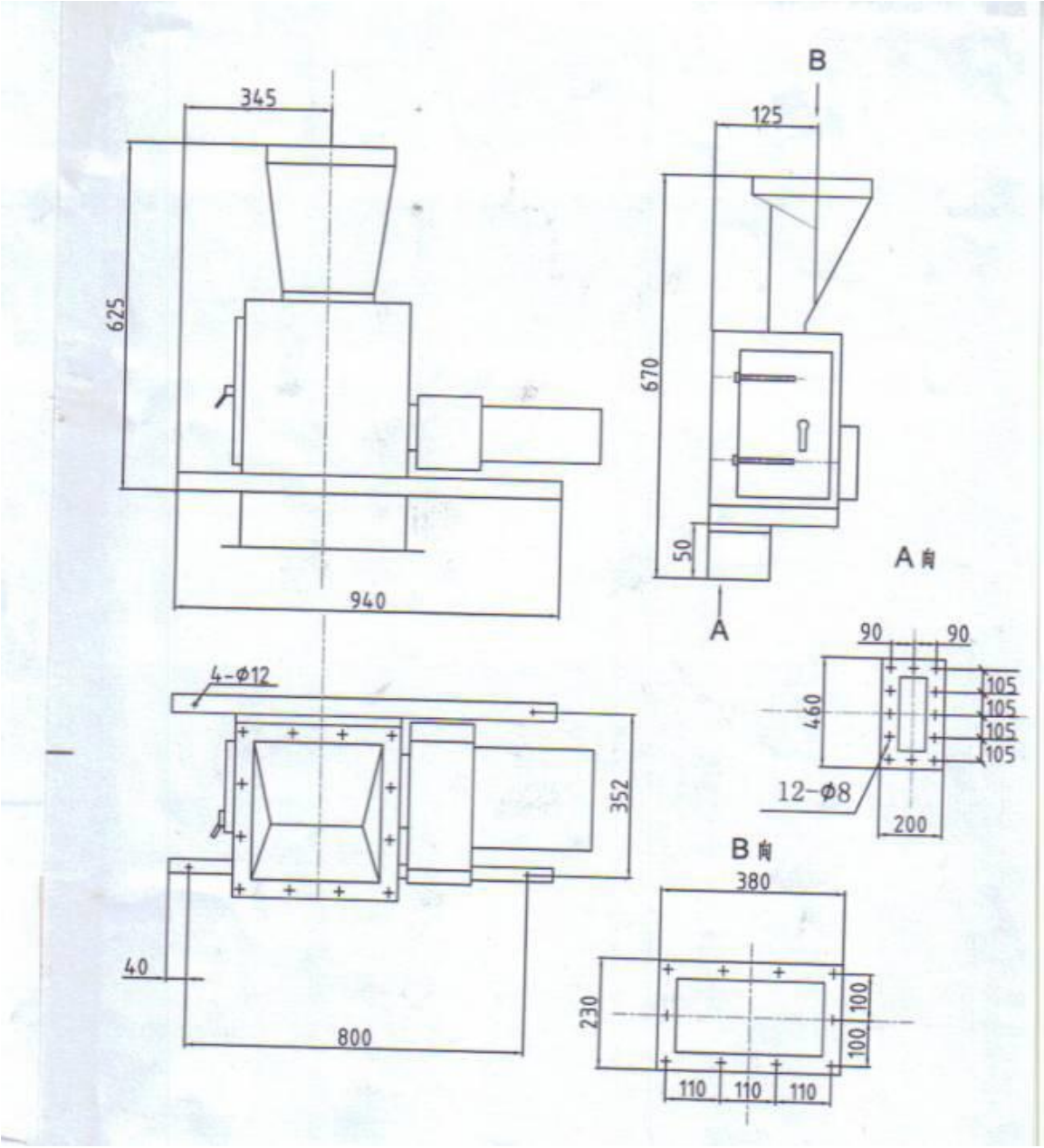


Diagram 1

②SY- TF100 Overall dimension please refer to diagram 2

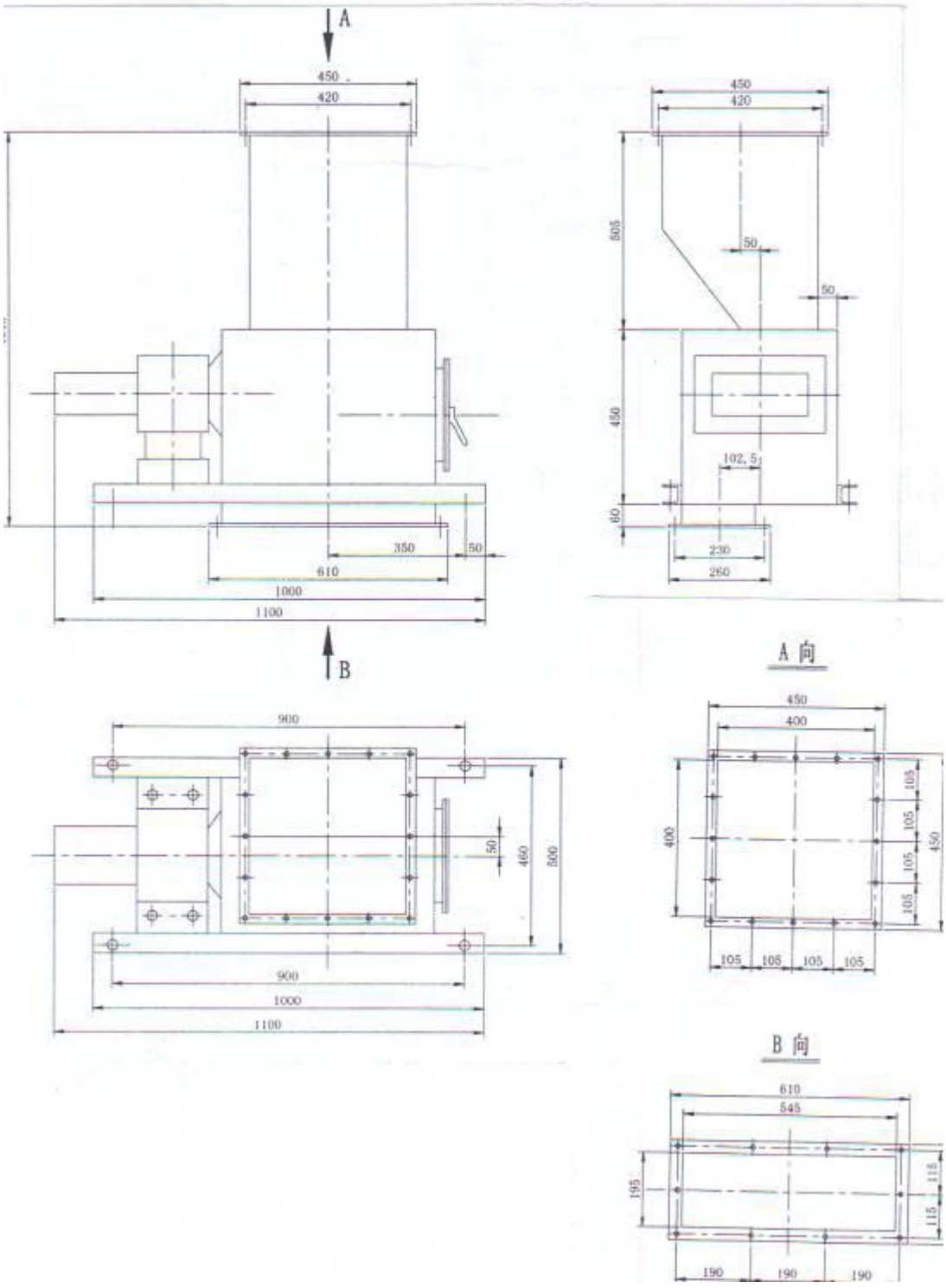
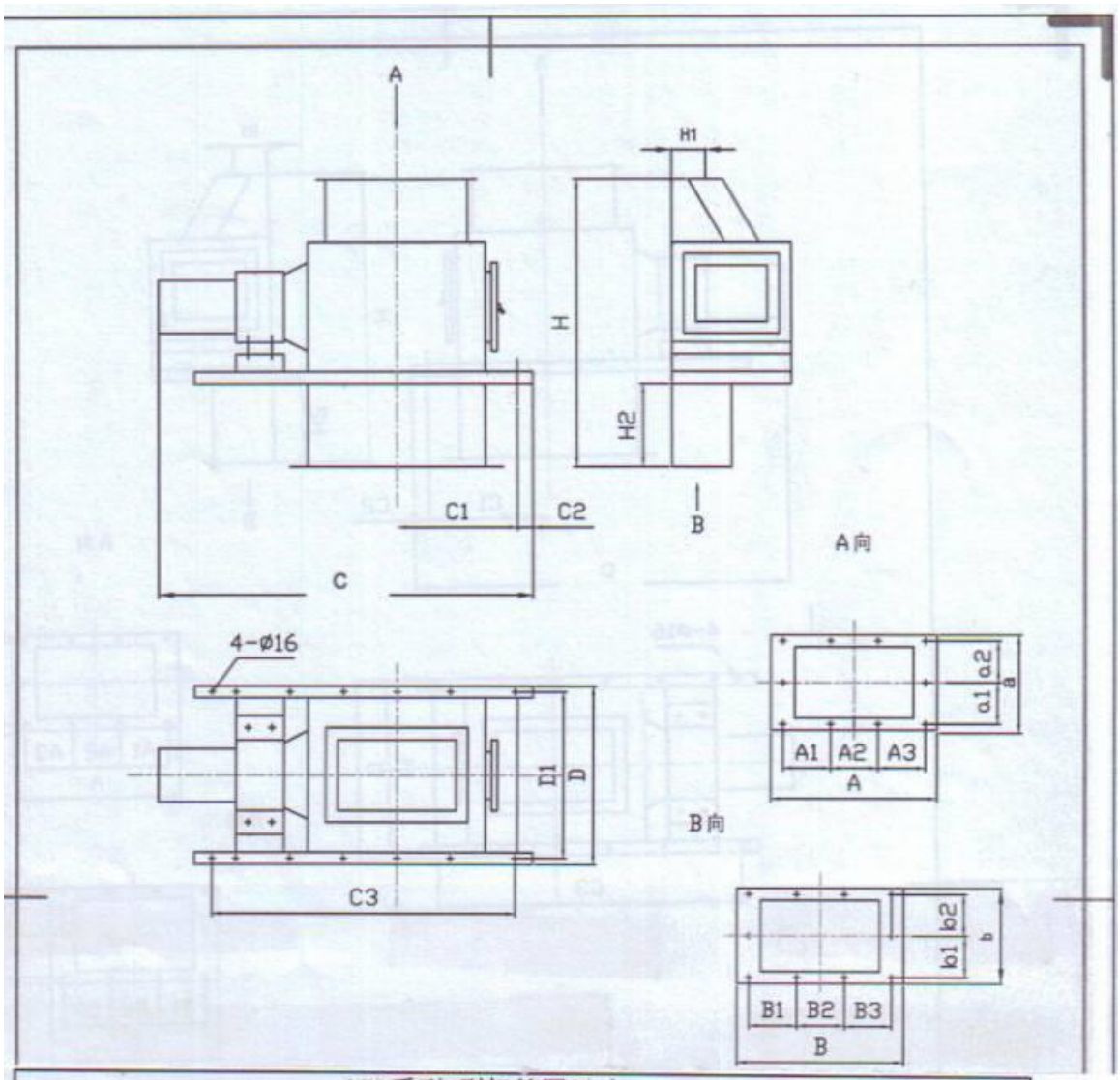


Diagram 2

② SY- TF100F Overall dimension please refer to diagram 3



LFD系列F型机箱图尺寸

	C	C1	C2	C3	D	D1	H	H1	H2	A	A1-3	a	a1-2	B	B1-3	b	b1-2
25t/h	970	350	40	800	370	355	600	70	50	290	85	178	72	440	135	195	80
100t/h	1100	350	50	900	500	460	740	140	50	460	140	280	120	550	167	360	150
300t/h	1350	460	50	1060	900	850	1510	125	50	763	180	410	190	903	220	460	220

Diagram 3

3. Main Features

① Usage Range

Powder and particles：From Mini particles to Fist-size bulk.

Slurry：From the chemical intermediate raw materials to mix concrete

Liquid：A variety of chemical drugs to the room temperature curing of the crystalline material.

Fixed Solid type：Small Nut，Screw.,etc

③ Flow range:

From 500kg/h to 500t/h

④ Sealing Property

When the pipe is completely sealed, it can be measured in the state of complete isolation of the oxide and reducing material, and can prevent dust

⑤ High Reliability

As the flow meter contact measuring body without moving parts, problem rarely, durable use, reliability

⑥ Suitable automatic control

Flow meter for measuring material, good dynamic characteristic and standard signal output can be with various combinations of instrument function instructions, records, integrating, and bulk supply, regulation and ingredients and computer measurement management

⑥ No zero offset when attached situation

Because the flow meter use Horizontal component, when medium attached on the measuring plate, the Zero point never offset.

⑦ Accuracy

Very well, when the particle size is not consistent, intermittent feeding occasions can also reaches 0.5~1%.

⑧ Medium flow smoothly

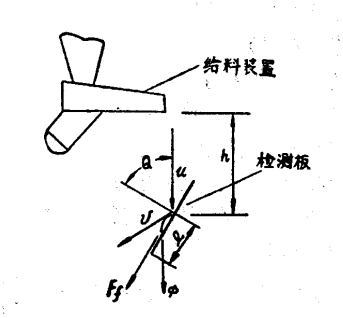
Because the material is hit on the test plate, the material flow is not blocked even when the transmitter is in trouble or the installation is unloaded.

⑨ Light and easy to install

The flowmeter has the advantages of small size, light weight, small occupied space, simple installation of angle steel structure.

4.Working Principle

The flow meter is based on the principle of momentum.
As shown in the picture, the powder material added to the feeding device is free from a certain height, and the force and the material produced by the impact detection plate are in proportion to the instantaneous weight of the material being measured, and the force is converted into a standard electrical signal, which is the basic working principle of the flow meter.



Working Principle Diagram

Calculation formula：

$$FH = A\text{-}B/2\cdot\sqrt{2h/g}\cdot\sin 2\theta - G\cdot If/VM\cdot\cos 2\theta$$

G —— Weight Flow（g/s）

h —— Freely fall height（cm）

g —— Gravity acceleration（98cm）

e —— Test plate and horizontal orientation angle.

l —— Material on the test board of stroke（cm）

VM —— Down Slide Average speed on the plate surface（cm）

f —— Dynamic friction coefficient between medium and plate surface.

A —— Coefficient relating to anti - pull，A=K(1+e)，e=V1/U2

B —— Coefficient of friction，B=(1-β)，β=V1/U2

Coefficient A 、B the K is Air drag coefficient$0<K<1$

U1、U2 The wind speed of the free falling velocity U in the vertical and parallel direction of the detection plate（cm/S）

V1、V2 The wind speed of V in vertical and parallel detection plate direction is respectively（cm/S）

The formula shows that if h, theta, I and material of constant acting on the test plate horizontal component will is proportional to the measured material instantaneous mass flow G.

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5. Structure of Flow Meter

The flow meter is composed of a detecting head, a rectifying device, a shell, and so on.

5.1. Measuring Mechanism Head

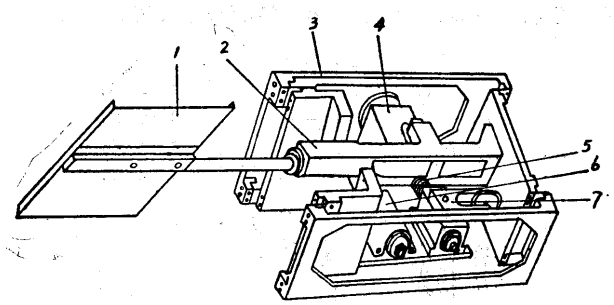


Diagram of Measuring Head

Detecting head are composed of ①detecting head、②Main girder、③Parallel moving mechanism、 ⑥Signal Converter ⑦ Static calibration device and sealing device.,etc

The measured medium from a certain height free fall, horizontal force generated in the detection plate via the main girder. Composed of four groups of cross reed parallel mechanism is transmitted to the transmitter, the girder of the translation will be proportional to be measured, the horizontal component of, through the signal converter into and instantaneous mass flow into standard signal in direct proportion.

5.2. Rectifying device

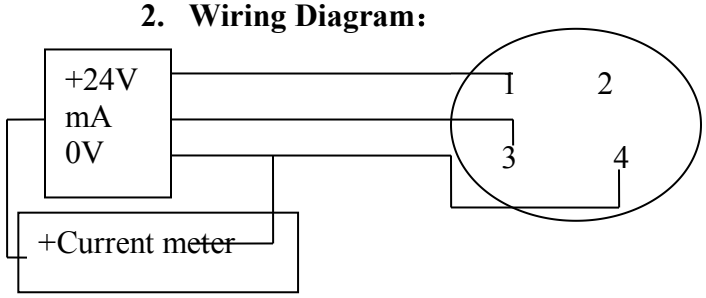
Installed in the above the detection board, is to improve the accuracy of measurement of solid flow meter is an important part of, its role is will give material feeding device material is rectified, so that the whereabouts of their initial velocity constant, and ensure that the measured medium in detecting plate placement unchanged. The structure of the material is different from the type of material.

5.3. Flow meter and intelligent integrator terminal and serial number

Flow meter（Brown）To Totalizer⑦; **Flow meter**（**Black or Double color**）To totalizer⑧; **Flow meter**（**Blue**）To totalizer⑬;

Totalizer current output terminals' No.：㉕、㉖。

2. Wiring Diagram：



Power Source **Flow meter**

5.4. Installation

Installation location choice

In order to ensure the normal operation of the flow meter, the installation location and the environment must meet the following requirements：

① Must be installed on the fixed base or platform (meter level meter into state level), the detection in the direction of displacement and vibration source cross installation

② The flow meter is connected with the hose.

③ There should be room for a certain degree of activity around the installation site, in order to check the flow meter, inspection and maintenance, the activity space: 300-500mm, and set the debug platform

④ The ambient temperature is within the range of -40~+150℃, and the relative humidity is not more than 85%.

④ Should not be installed in a place where there is a strong vibration.

⑤ Keep away from electrical equipment, and reliable grounding

⑥ There should be no corrosive gas in steel, copper, aluminum and other materials.

⑦ Materials such as gas containing either positive or negative pressure isolation device must be installed: fan impeller feeder, etc.

6. Adjustment of Flow meter

Flow meter, although the factory is carefully adjusted and qualified inspection, but after transport, storage and installation of the flow meter may have some changes, in order to make the flow meter can be used normally, before using the need to re adjust

6.1. Prepare before Adjustment

① Flow meter must be installed after, loose detecting head on both sides of the base cover screws, counter clockwise loosen positioning screw, the movable girder can swing freely.

② Open the rear lid, Diagram 9 is shown to the static calibration rack to check the location and fastening

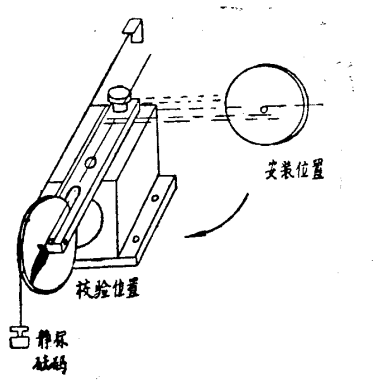
③ Static calibration weights, usually according to 1t/h flow corresponding to 50 grams (according to the material of the different) calculation.

④ Prepare a DC standard value (or any other form of test gauge) for a precision of not less than 0.2 levels to be used for static verification. Make the above preparations, and confirm the wiring error, you can adjust the following

6.2 Flow meter installation level adjustment!! (must do)

If the meter installed in the level, the role in the vertical component of the detection board will instrument. In addition, detecting plate is glued with the medium to be measured will also cause zero drift, which can affect the accuracy of measurement. To this end, the first should adjust the installation level of the flow meter, the flow meter on the level.

6.3 . Static calibration (generally not adjusted, because the factory has been adjusted)



Static calibration diagram

Static calibration of flowmeter：

The purpose is to solve the linear relationship between the horizontal component and the output signal is output by 4~20mA, for example, the steps are as follows:

a. Measuring range adjustment

First, the main beam, the static calibration mechanism is not linked to weight, the instrument output should be 4mA. Otherwise, through the flow meter within the zero potentiometer to the 4mA, and then the full range of weight, the output signal should be 20mA, according to the above, repeated several times, so that the measurement range to meet the requirements

b. Test of basic error and variation

In the efficacy mechanism connected with quite to the weight of the full-scale 10%, 20%, 40%, 60%, 80%, 100%, observe and record the above the output signal, and the difference should be within the scope of the basic error.

Test procedures are as follows：

Static institution with corresponding to 10% of the full range of weight after, first of all to reduce the direction of output signal light dial girder. Then, slowly releasing, to be stable, read this time test point is travel values. Then reverse toggle girder and discharged, stable reads the test point of the reverse stroke value, so that each test point as a weight can get positive and reverse stroke of two numerical, repeat the entire range of each test points can be measured by basic error and variation

c. Basic error calculation：

The error of each test point can be calculated.：

$$\delta i = \frac{I1 - I2}{I}$$

In it： δi —— Static error of each test point（%）

I1 —— Test point output current nominal value（mA）

I2 —— Test point output current（mA）

I—— Output current range（mA）

Meter basic error should stand by δmax，based on requests withδmax≤Basic error limit，Static verification meets the requirements

6.4 Dynamic physical calibration

From the work principle of the formula to show different medium to be measured, in the same measurement of the horizontal component of the force is not exactly the same (as a result of some coefficients of the reactants vary with the material), namely flow coefficient and measured medium about, it must be in the field of physical calibration, measurement coefficient of the material is obtained after correction of the intelligent flow totalizer can be measured correctly.

LFD is a solid flow meter and intelligent flow totalizer system as example, to explain the dynamic calibration method：

1）Preparation of calibration equipment

① For the calibrated instrument containing the measured medium container (preferably with discharging port and at the end of valve), container size according to the instrument maximum weight flow G. As well as the time required to calibrate a time, can be divided into several small containers, which are usually small flow calibration of the time can be considered for about 3 minutes, the amount of >50%, the corresponding reduction in large flow.

② Ready and calibrated container, corresponding to the scale of a material

2）Calibration and correction method

First of all, a good line, the next feed port flange and the container interface between the best and hose connection.

Check and record of Intelligent Flow Totalizer cumulative readings or cumulative values to zero, start feeding device, material flow measurement range of 40-80%. At this time the measured material through a flow meter in weighing container and began to record accumulated value reach the required calibration weight, thus the measured weight conversion kg / word, conversion Formula : weighing value (discharging quantity) ÷ intelligent flow totalizer accumulated value of reading =kg/ word, weighing three times and taking the average value, correction of Intelligent Flow Totalizer:

average value × flowmeter factory maximum measurement range = intelligent flow totalizer correction value.

Correction method：
Intelligent flow totalizer Loc=132 to enter, the F-H value is set to "intelligent flow totalizer correction value"

Example: 10t / h flow meter according to the kind of weighing data: weighing value 920KG ÷ Totalizer readout value 1650 words =0.6KG/ word; 0.6 x the original maximum flow value 10t/h=6t/h; Change the Totalizer maximum flow rate value F-H and transmission output ouH to 6t / h. Or in accordance with the following methods correction (Totalizer parameters unchanged): the original weight is 400g ÷ calculated values 6t/h=67g/t, equals 67g × 10t/h=670g, amended to read as follows: hanging 670g weights and adjust the flow meter module potentiometer enable output current to 20mA; remove the weights, adjust zero potential output to 4mA; repeatedly adjustment so that the output can be linearly. Flow totalizer adjustment please read instructions.

7. Usage and maintenance of flow meter

7.1 Usage

Flow meter can be put into use as the normal operation of the flowmeter, and the following points should be noted when using the meter:

① Flowmeter adjustment before and after do not force pulling the detection board, because the sensor is the use of imported high precision and high sensitivity pressure sensor and because the meter is measured by the level of force, so that the sensor is in unit G, if the force exceeds the pressure sensor will damage the sensor, and the measurement accuracy of the flowmeter influence, not in use to promote it.

② Although there is a certain extra cross section in flow meter, but also should avoid large particles of material or exceed the range of the material to enter, to prevent the flow meter inside the plug, once blocked, please promptly clean, otherwise will damage the sensor, if the application of appropriate tools to clean up, cut not available hammer hammer damage flow meter

③ Regular cleaning inspection board and the main girder of the main beam to avoid the accumulation of the main beam of the main impact of the measurement accuracy

④ To prevent the air flow with the material into the flow meter to cause the measurement error.

7.2 Maintenance and maintenance of flow meter

①Check the dynamic zero point of the flow meter. Whether or not to change the flow meter for further examination, and make necessary adjustments

②Six months on the static of the flow meter to make a full range of testing

③Test and adjust the flow meter per year.

④The flow meter may be in trouble, the cause and the exclusion method are shown in the following table.

Failure phenomenon	Cause	Exclusion method
No output signal	Power is not connected Output signal terminal open circuit or reverse Bad contact connector Signal converter damage	Connected power supply Connect and fix Find out bad contact points to be repaired Exchange signal converter
Output signal, suddenly disappeared or suddenly increased	From the above reasons, there may be an import and export blockage	Clean out the import and export, clear the flow path
Variable difference larger	The mechanical parts are loose or the friction or the impact deformation, the displacement is not normal into the debris, causing changes Strong vibration or loose anchor	To find out the damaged machinery, and repair Cleanup of debris Remove vibration, fastening bolt
Flow meter in debugging or in the use of no change in the number of CITIC, or zero drift is great, no role in the regulation of zero potentiometer	Transmission has been bad, the reason is: 1 material, 2 material impact force is big; the 3 is too large to debug	1 replace the transmitter; 2 check the blocking material reasons, and rule out; 3 if the impact force, in the purchase of the transmitter to provide flow meter in the use of the flow parameters

8. Open of the Package and accessories

After the arrival of the flowmeter, out of the box should be careful, first according to the direction of the "arrows" put away, and then carefully out of the box, to prevent damage to the box installs the flowmeter and totalizer (based on the order), qualified certificate A, a manual.

Flow meter for a while, it should be stored in a warm and ventilated room. The relative humidity shall not exceed 85% and there should be no corrosive gases. Meter moving, focus should be placed on both sides of the angle on the side, don't move.

Flow Meter Code：		Dynamic calibration of solid flow meter		t/h
Time	Readout Value of totalizer （A） （Word）	Actual measured weight (B) (Kg)	B/A×The original max value of the totalizer = Maximum flow correction	Note
1				
2				
3				
4				
5				
6				
7				
8				
Conclusion：The maximum value of the modified flow totalizer（F-H）：				

Medium： Feeding method：

（ In order to ensure the measurement accuracy of the flow meter, the dynamic weighing note: 1. The maximum flow rate of the material is 10%. 2 of the maximum flow rate is 80%.）

Note:

1 transmitter sensor is the use of special high sensitivity and dynamic pressure sensor, the replacement and adjustment can not be externally forced pressure sensor!! Otherwise damage sensor!!

2 after installing the transmitter, observe the distance between the sensor and the top rod: that is, the flow meter in the natural state, the sensor and the top rod is not touching!! If the sensor or the top rod is encountered or the spacing is over 1mm, the top rod is adjusted to meet the requirement of the distance between the sensor and the top rod.

3 meter can not be a long-term over the range of work (i.e., the maximum measurement range), otherwise it will affect the service life of the sensor.

4 flow meter can not be blocked, to ensure the smooth flow of materials!! Otherwise damage sensor!!