

# Manual of Intelligent Flow Totalizer

This flow totalizer can be matched with vortex flowmeter, throttling device, turbine flowmeter, electromagnetic flowmeter, elliptical gear flowmeter and other flowmeter. The flow totalizer adopts high performance processor and standard equation calculation, which solves the problem of imprecise compensation algorithm of traditional totalizer. The high integrated and high-performance device is used to solve the problem of measurement drift and realize wide temperature range and high-precision acquisition. The product is designed with LCD Chinese character display, Chinese and English optional, the keyboard operation is intuitive, simple and user-friendly. Signal input and output with lightning protection makes the equipment more secure, which can be applied to various measurement sites. And wireless GPRS wireless remote transmission function can be attached.

## 1、 Main performance and index

1.1 It can be connected to various types of sensors.

1. the flow sensor can be connected to standard throttling device and electromagnetic flowmeter, and the signal can be 0-10mA or 4-20mA. It can also be connected to the frequency output vortex street or turbine sensor, with the frequency from 1Hz to 5000Hz (V low  $\leq$  1V, v high  $\geq$  3V).

2 Temperature sensor can be connected with PT100 resistance signal or 0-10mA or 4-20mA standard current signal.

3. the pressure sensor can be connected with 0-10mA or 4-20mA signal.

4. signal output: variable output 4 ~ 20mA (load 100 ~ 500  $\Omega$ ), relay contact normally open or normally closed (AC250V, 10a).

1.2 Display function: it can display the accumulated flow, instantaneous flow, accumulated heat, instantaneous heat, differential pressure, frequency, density, pressure, temperature, etc., and call the display at any time through the panel key.

1.3 Various protection measures. Communication, sensor input and current output have lightning protection.

1.4 High precision acquisition. The analog quantity is better than 0.2% FS and the frequency quantity is better than 0.1%. The internal operation accuracy is  $2 \times 10^{-5}$ %.

1.5 Communication function: it has RS485 communication interface and conforms to Modbus protocol.

1.6 It has a variety of flow calculation modes and density compensation functions, and can be programmed and combined.

1.7 Power off protection function: the calculation results in the machine and the data set by the user will not be lost in case of unexpected power off, and the storage time is more than ten years.

1.8 Working conditions: temperature: - 20 ~ 55  $^{\circ}$ C. Humidity: 10% - 85% RH (no condensation).

1.9 Power supply: AC 85 ~ 265vac, 50Hz; DC 24V.

1.10 Power: less than 10W

1.11 Installation mode: horizontal.

1.12 Opening size:  $152 \pm 0.5 \times 76 \pm 0.5$  (width  $\times$  height, unit: mm).

1.13 Boundary dimension:  $160 \times 80 \times 100$  (width  $\times$  height  $\times$  depth, unit: mm).

1.14 Weight: about 1.0kg

## 2、 Wiring instructions

### 2.1 terminal Description:

1	2	3	4	5	6	7	8	9	10	11	12	
PE	NO	NC	24V-	Fr	24V+	-	nA	+	GND	A+	485 B-	
RELAY OUT			PULSE/FREQ FLOW IN			TRANS OUT			COMMUNICATION			
LAC220N	GND	PRESS	+	nA	-	TEMP	DP / FLOW	-	nA	+	GND	PT100 TEMP IN
13	14	15	16	17	18	19	20	21	22	23	24	

Terminal Description: (in the order shown above)

11, 14: external supply of AC220V power input terminal.

2, 3, 4: relay output, 2, 3 are normally open, 3, 4 are normally closed (AC250V, 10a).

5, 6, 7: pulse / frequency flow input (vortex street, turbine, etc.), GND: negative power supply, fr: frequency, 24V +: positive power supply.

8, 9: 4-20ma transmission output (active output).

10, 11, 12: 485 communication interface ground, A +, B -. 15, 16: internal 24V power supply ground of integrator.

16, 17: pressure transmitter 4-20mA current input (no external power supply required).

20, 19: flow / differential pressure transmitter 4-20mA current input (no external power supply required). The active signal is connected to terminals 19 and 20 (such as electromagnetic flowmeter).

16, 18: temperature transmitter 4-20mA input (no external power supply required).

22, 23, 24: PT100 temperature three wire system input.

Two point two Cable selection: the input and output signal wires of the integrator shall be shielded wires, and the cross-sectional area of the core wire shall be  $0.5 \sim 2$  mm<sup>2</sup>.

## 3、 Panel display and key operation

### 3.1 main page parameter display:

The main page parameter display consists of the following pages. The first power on parameter is displayed as the instantaneous flow interface, which is displayed by pressing the up key and the down key in sequence:

Flow 1.234 Kg/h Total 123 Kg Temp 0.000 $^{\circ}$ C Press 1.00 Mpa	Flow 1.234 Kg/h	Total 123.45678 kg
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Frequency 1234.5 Hz Differ press 1.234 Kpa	Temp 1234.5 $^{\circ}$ C Press 1.234 Mpa	Density 1.000 Kg/m <sup>3</sup>
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Parameters set Record query Valve control Quantity control	Note: this interface shows that the pressure value is gauge pressure. 3.2 record query: Press the confirm key on the main
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page to enter the main menu, and the selected items will

be displayed in reverse. When the record query is selected, press the confirm key to enter the record query.

**3.3 parameter setting:** In the main operation menu, when you point to the setting parameters, press the confirm key. Before entering the setting, first enter the password (the default password is 0000). Set the value size through the up and down keys. Shift the left and right keys. After entering the password, press the confirm key to enter the function selection interface. Press up and down to select. The selected item is highlighted. Press the Enter key to enter each setting item. Each setting item is divided into the following two setting forms:

**① Select class settings:**

After entering the setting item, the parameter setting value will be displayed. Press up key value plus one, press down key minus one, cycle display. Press the return key to cancel the parameter setting, and press the confirm key to make the setting effective.

**② Data entry:**

Unsigned data entry: press the left and right buttons to select the setting bit, and the selected bit will be displayed in reverse. Press the up key or the down key to display the value cycle, including the decimal point. After setting, press the OK key to confirm that the value input is valid, and press the back key to cancel the setting.

**3.4 function introduction of each setting item**

**3.4.1 flow:**

1. Fluid selection

0: water vapor; 1: other gases; 2: ideal gas; 3: liquid;

2. Compensation mode selection

0: no compensation (the density is calculated according to the set working density); 1: temperature and pressure compensation (used for superheated steam measurement or gas measurement); 2: saturated steam temperature compensation; 3: saturated steam pressure compensation.

3. Flow sensor selection

0: pulse flow sensor (vortex street, turbine, etc.); 1: 4-20ma throttle (orifice, nozzle, venturi, etc.); 2: 0-10ma throttle; 3: 4-20ma flow (vortex street, turbine, electromagnetic, etc.); 4: 0-10ma flow.

4. Unit selection:

0: kg (kg); 1: t (T); 2: l (L); 3: Nm<sup>3</sup> (standard condition m<sup>3</sup>); 4: condition m<sup>3</sup>.

5. Density in working state density in working state unit: kg / m<sup>3</sup>.

6. Standard state density standard state density value unit: kg / m<sup>3</sup> (used to calculate gas standard state flow)

7. Enthalpy setting the unit of enthalpy value of input fluid: kJ / kg (kJ / kg) (not set in case of automatic compensation);

8. The small signal cutoff setting value is the percentage of the upper range of the output flow.

9. Frequency 1-5 pulse output sensor frequency (different frequency values can be set for sectional compensation) unit: Hz.

10. Pulse instrument coefficient the instrument coefficient of 1-5 pulse output sensor (different flow coefficient can be set for sectional compensation) unit: pulse / m<sup>3</sup>. Note: if there is no need for sectional compensation, only pulse meter coefficient is required. **1 is OK, frequency 1-5 is set to 0 by default**

11. Corresponding unit of upper limit of differential pressure and upper limit of differential pressure of differential pressure transmitter: kPa

12. The lower limit of differential pressure corresponds to the lower limit of differential pressure of differential pressure transmitter (generally 0), unit: kPa

13. The corresponding unit of flow upper limit and flow upper limit of flowmeter is flow upper limit unit (item 15 below)

14. The lower flow limit corresponds to the lower flow limit of the flowmeter

15. Flow upper limit unit is set as the unit of flow upper and lower limit

**3.4.2 temperature:**

1. Temperature sensor type selection

0: not connected; 1: 4-20ma temperature transmitter; 2: 0-10ma temperature transmitter; 3: PT100 temperature sensor;

2. The working temperature sets the temperature value of common working state. If the temperature sensor fails, the display and compensation temperature will be calculated according to this value automatically.

3. Standard state temperature standard state temperature unit: °C

4. Gas critical temperature setting gas critical temperature unit: °C

5. Zero point setting of temperature transmitter and lower limit temperature of 4-20 mA or 0-10 Ma temperature transmitter unit: °C

6. Temperature transmitter range setting and 4-20 mA or 0-10 Ma temperature transmitter upper limit temperature corresponding unit: °C

7. Temperature compensation coefficient this parameter is the liquid temperature compensation coefficient.

**3.4.3 pressure:**

1. Select 0: not connected; 1: 4-20ma pressure transmitter; 2: 0-10ma pressure transmitter.

- The working pressure is set to the gauge pressure value in common working state. If the pressure sensor fails (the current value exceeds the range of 3-20ma), the compensation pressure will be calculated automatically according to this value, in MPa.
- Local atmospheric pressure value of standard state pressure setting unit: MPa;
- Critical pressure set critical pressure unit: MPa.
- Pressure transmitter range setting transmitter range value unit: MPa.

#### 3.4.4 system:

- Cumulative reset: operation method reset.
- Damping coefficient setting: it can be selected in 1-16 seconds.
- Password setting: parameter setting password can be set.
- Restore factory settings: press OK when you are instructed to restore factory settings.
- Language setting: Chinese and English are optional.

#### 3.4.5 communication:

<b>Flow rate</b>	
Fluid selection	Steam
Compensation mode	Temperature and pressure compensation
Sensor selection	Pulse sensor
Company	Tons or kilograms
Meter coefficient	Coefficient of vortex flowmeter

- The baud rate can be set as 1200, 2400, 4800, 9600, 19200.
- The address range is 0-127.

#### 3.4.6 alarm:

- Upper limit setting of instantaneous flow alarm: output alarm when the instantaneous flow exceeds this set value.
- Lower limit setting of instantaneous flow alarm: output alarm when the instantaneous flow is less than this set value.

- Upper limit of cumulative flow alarm: output alarm when cumulative flow exceeds this value.
- Upper limit of temperature alarm: when the temperature exceeds this value, an alarm will be output; when it is set to 0, an alarm will not be given if the temperature exceeds the limit.
- Lower limit of temperature alarm: output alarm when the temperature is lower than this value.
- Upper limit of pressure alarm: output alarm when the pressure is higher than this value. When it is set to 0, it will not alarm if the pressure exceeds the limit.
- Pressure alarm lower limit setting: output alarm when the pressure is lower than this value.

#### 3.4.7 output:

Flow	0.00000
Batch set	<b>Start</b>
00000000	Kg
batch	0.00000

- Upper limit of output flow range 4-20 mA upper limit of flow transmission output
- Lower range of output flow 4-20 mA lower output limit of flow transformation

#### 3.4.8 remote transmission:

- Remote transmission interval data upload interval
- IP address and port number server address and port number

#### 3.5 quantitative control

The basic quantitative control function can be completed in this interface. First set the batch set value (the lowest flashing), press the confirm key to start the batch accumulation, and "start" will cancel the backlight display. When the batch accumulation reaches the set value, the internal relay acts (2, 3, 4 terminals), and the valve or pump action can be controlled by connecting the relay and the AC contactor. When the return key is pressed, the quantitative control interface will exit and the internal relay will reset.

#### 4. Sensor algorithm description

##### Pulse / frequency output flow sensor:

$$Q_m = F/K * \rho * 3600$$

QM: flow (kg / h) f: frequency (Hz); K: instrument coefficient (n / m3); ρ: density (kg / m3).

##### Differential pressure transmitter for throttling device:

$$Q_m = k * \dots$$

QM: flow (kg / h); K: constant of throttling instrument; Pmax: upper limit of differential pressure (kPa); I: actual current value; IMAX: maximum current value; Imin: minimum current value; ρ: density (kg / m3).

##### Calculation method of throttling instrument constant:

$$K = Q_{max} / \dots$$

Qmax: upper limit of flow (kg / h); Pmax: upper limit of differential pressure (kPa); ρ: density (kg / m3).

##### Standard current output flow sensor:

$$Q_m = [(L_{max} - L_{min}) * (I - I_{min}) / (I_{max} - I_{min}) + L_{min}] * \rho$$

QM: flow (kg / h); Lmax: flow upper limit; lmin: flow lower limit; I: actual current value; IMAX: current maximum; Imin: current minimum; ρ: density (kg / m3).

#### 5. Examples

1The integrator is connected to the vortex flowmeter with frequency output to measure steam, with PT100 and pressure transmitter. See the right figure for wiring mode Main settings:

2The integrator is connected with orifice flowmeter to measure gas, with PT100 and pressure transmitter.

See the right figure for wiring mode

Main settings:

Flow rate	
Fluid selection	ideal gas
Compensation mode	Voltage stabilizing compensation
Sensor selection	4-20mA throttling
Company	Standard cubic meter
Working density	See the statement of calculation
Standard density	See calculation sheet or check data
Upper and lower limit of differential pressure	See the statement of calculation
Upper and lower limits and units of flow	See the statement of calculation

1. One set of flow totalizer; 2. One manual; 3. One certificate.

### 6. Precautions for use

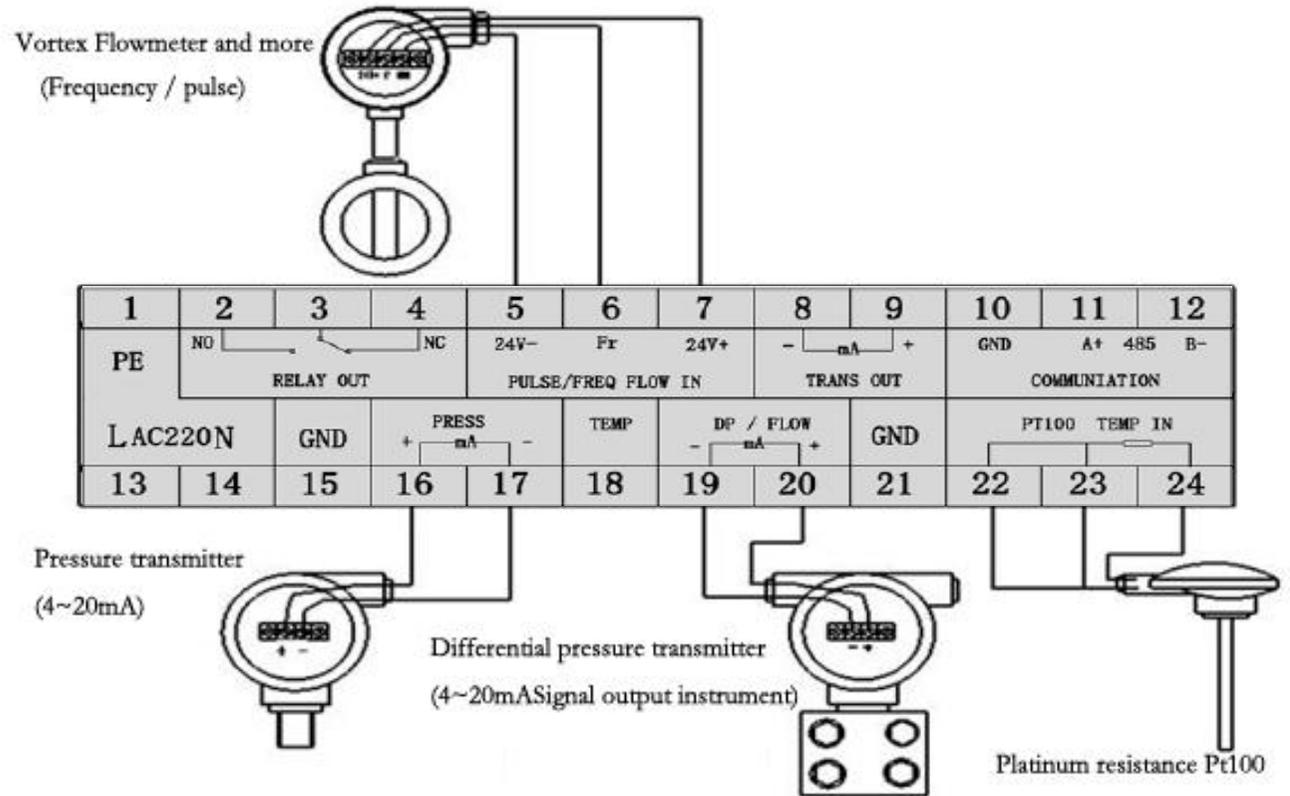
- read this manual carefully. The wiring should be accurate to avoid damaging the instrument. Pay special attention to 220 V AC to avoid electric shock;
- the place of use shall be indoors to avoid direct sunlight, rain and strong electromagnetic interference;

### 7. Ordering precautions

Thank you for purchasing this instrument. Please read the "operation manual" carefully in advance for proper use.

Please understand that this product will be changed without notice due to improvement. If there is any unknown, please contact our technical service department.

Although the instrument has undergone strict quality management, manufacturing and delivery, please inform the company's business personnel, technical service department or the nearby company's agent of any abnormal matters or accidents.



### 8. Packing list

This product has been packed to prevent falling before leaving the factory. Please open the instrument packing box and carefully check the items in the packing box. If you find any missing parts or damages caused by human handling negligence or serious impact, please contact the manufacturer in time.

There are: