SISCO-E600 Flow Totalizer

Operation Instruction

I. Introduction

SISCO-E600 series flow totalizer has been produced by fully-automatic chip mounter with surface-mount technology and has a high anti-jamming capability. It is capable of collection, display, control, remote transmission, communication, and printing of site signals including temperature, pressure, and flow to form a digital collection system and control system, applicable to flow totalizing, measurement, and control of liquid, general gas, superheated steam, and saturated steam etc.

II. Technical Specification

Input				
Input signals	Current	Voltage	Resistance	Thermocouple
Input Impedance	≤250Ω	≥500KΩ		
Maximum input current	30mA			
Maximum input voltage		<6V		
Output				
Output signals	Current	Voltage	Relay	24V (distribution or feed)
Output load capability	≤500Ω	≥250 KΩ (Note: Please replace the module if higher load capacity is required)	AC220V/2A (large) DC24V/2A (large)	≤30mA
Comprehensive parameter				
Accuracy	0.2%FS±1 unit of last place of digit			
Setting Mode	Light touch control panel for digital setting, the value of which will be stored permanently even in case of power failure; set value locked and protected with password			
Display mode	Measured value of instantaneous flow: 0 ~ 99999 Measured value of cumulative flow: 0 ~ 99999999.999 Measured value of temperature compensation: -1999 ~ 9999 Measured value of pressure compensation: -1999 ~ 9999 Measured value of flow (differential pressure, frequency): -1999 ~ 9999 Current time and LED working status displayed			
Operating environment	Ambient temperature: 0 ~ 50 ℃; relative humidity: ≤ 85% RH; far from strong corrosive gas			
Power supply	AC 100 ~ 240V (switch power), (50-60HZ); DC 20 ~ 29V (switch power)			
Power consumption	≤6W			
Structure	Standard snap-in structure			
Communication	Standard MODBUS communication protocol, communication distance of RS-485 up to 1 km, and communication distance of RS-232 up to 15 meters. Note: active converter is preferred if the instrument has communication function.			

III. Function

Automatic calculation and cumulation of mass flow;

Automatic calculation and cumulation of standard volumetric flow;

Simultaneous display of measured values of instantaneous flow and cumulative flow (unit of cumulative flow may be set without limitation);

Switch between display of measured value of instantaneous flow, time, current cumulative flow, total cumulative flow of 11-digit, flow (differential pressure, frequency) input, pressure compensation input value, temperature compensation input value;

Small signals cut-off function (display “0” when instantaneous flow is less than set value) available;

Quantitative control of flow available;

Automatic temperature and pressure compensation available;

The following sensors may be chosen through programming:

1. △P: differential pressure type flow sensor input;
2. △P, T: differential pressure type flow sensor and temperature sensor input;
3. △P, P, T: differential pressure type flow sensor, pressure sensor and temperature sensor input;
4. f: frequency type flow sensor input;
5. f, T: frequency type flow sensor and temperature sensor input;
6. f, P: frequency type flow sensor and temperature sensor input;
7. f, P, T: frequency type flow sensor, pressure sensor and temperature sensor input;
8. G: flow sensor (linear flow signals) input;
9. G, T: flow sensor and temperature sensor input;
10. G, P: flow sensor and pressure sensor input;
11. G, T, P: flow sensor, temperature sensor and pressure sensor input;

Three kinds of compensation are available:

Automatic temperature compensation;

Automatic pressure compensation;

Automatic temperature and pressure compensation

Display function:

Display of measured value of instantaneous flow, current cumulative flow, measured value of differential pressure, measured value of pressure compensation, measured value of temperature compensation and frequency etc of each channel;

PV + SV display of cumulative flow: 11 digits (0 ~ 99999999.999)

Display of current date and time

Storage of total cumulative flow under power failure; automatic clear of total cumulative flow when it reaches full range (99999999.999); current cumulative flow will not be stored under power failure.

IV. Display Panel and Function Keys

1) Instrument dimension and hole size:

Dimensions	Hole Size
160*80mm (Horizontal)	152*76mm
80*160mm (Vertical)	76*152mm
96*96mm (Square)	92*92mm
96*48mm(Horizontal)	92*45mm

2) Digital display window:

PV display window (5 digits):

Display of instantaneous flow; in the parameters setting status, display of parameter symbols; input of flow compensation, pressure compensation, and temperature compensation may also be displayed through proper setting;

SV display window (8 digits):

Display of cumulative flow; in the parameters setting status, display of set value;

PV + SV display window (totally 11 digits): internal parameters may be set to display total cumulative value of 11 digits (millions digit is the third digit on the right of number displayed on PV window).

3) Panel indicators

AL1: Alarm 1 indicator

AL2: Alarm 2 indicator

t——Time: Current time indicator

q——flow-rate: instantaneous flow indicator

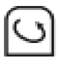
T——Temperature: temperature compensation indicator

P——Pressure : pressure compensation indicator

F——Flow: differential pressure and flow indicator

Sum: current cumulative value indicator

4) Operation button

	Enter key: conformation for digits and parameters change; Page Down: Page down for parameter settings; Setting exit: Hold for 2 seconds to return to measurement screen; Together with  to clear the cumulative flow; Together with  to make the decimal point shift to the left one place by every press;
	Shift key: Shift to the left one digit by every press; Return key: Hold for 2 seconds to return to the upper level of parameters
	Minus key: to reduce the value; Switch the display key: the display of the measured values, the measured value of each channel can be switched to show; To display time if printing function is available;
	Plus key: to increase the value; For manual printing if printing function is available

5) Instrument wiring

Attention shall be paid to the following items during wiring:

PV input (process input)

1. To reduce electrical interference, the low-voltage DC signal and sensor input wire should stay away from heavy-current electrical wire. Otherwise, shielded wire shall be used and grounding shall be made at the same point.

2. Any device between the sensor and terminal may affect the measurement accuracy due to resistance or leakage current.

Thermocouple or pyrometer input

Compensation wires corresponding to the thermocouple shall be used as extension wire, which shall be shielded as far as possible.

RTD (platinum resistance) input

The resistance for 3 wires must be the same, which shall not exceed 15Ω.

V. Power-on Setting

As soon as the instrument is powered on, it enters into the self-test status (see figure in the right), and when self-test is completed, it automatically enters into the working status. In the working status, press and it displays LOC. LOC parameters could be set as follows:

1.1) You can enter into Level 1 menu whatever the Loc is (no locking if LOC=00, 132);

2) When Loc = 132, press for 4 seconds to enter into Level 2 menu;

3) When Loc = 128, press for 4 seconds to enter into Level 3 menu for automatic calculation of flow coefficient;

4) When Loc = 130, press for 4 seconds to enter into the time setting menu;

5) When Loc = 111, While pressing the key and the key to allow this accumulated flow value manually cleared

6) When Loc = 112, While pressing the key and the key to allow this accumulation and the total accumulated flow values manually cleared;

7) When Loc = other values, pressure for 4 seconds to return to the measuring screen.

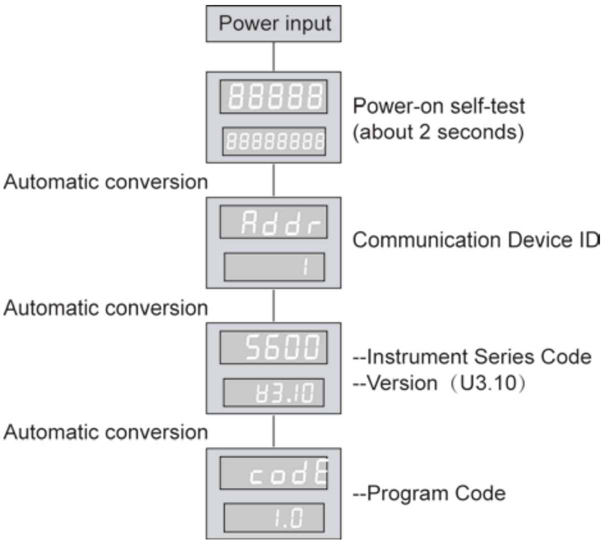
2. If Loc = 577, in the Loc menu, press and for 4 seconds simultaneously to restore all the parameters to factory default settings.

3. In any other menu, pressure for 4 seconds to return to the measuring screen.

★ Back to working status

1. Manual: In the status of parameters setting, press for 4 seconds, the instrument will automatically return to real-time measurement status.

2. Auto: In the status of parameters setting, do not press any key. After 30 seconds the instrument will automatically return to real-time measurement status.



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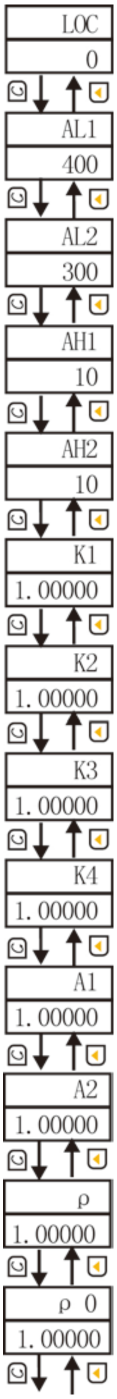
VI. Parameters Setting

6.1 Level 1 parameters setting

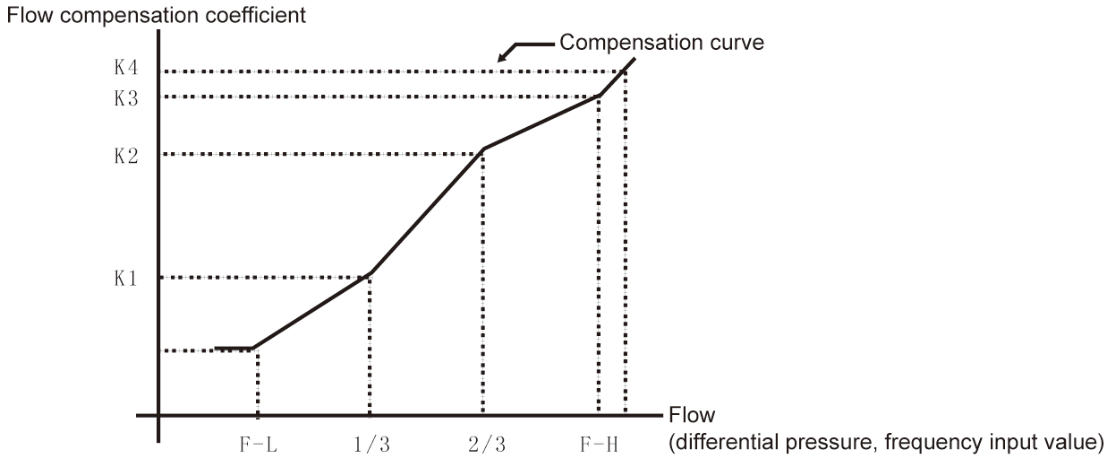
In the working status, press [SET] and PV will display LOC and SV display the parameter values: press [▲] or [▼] to set parameters. Press [◄] for 2 seconds to return to upper level of parameters. You can enter into Level 1 parameter setting by pressing [SET] when Loc = any value.

Default setting	Parameters	Setting Range	Description
	LoC Parameters locking	0 ~ 999	LOC=00: No locking (Level 1 parameters can be modified) LOC≠00, 132: Locking (Level 1 parameters can not be modified) LOC=132: No locking (Level 1 and Level 2 parameters can be modified)
	AL1 Alarm 1 set value	-199999 ~ 999999	Set value of Alarm 1
	AL2 Alarm 2 set value	-199999 ~ 999999	Set value of Alarm 2
	AH1 Alarm 1 return difference	0 ~ 999999	Return difference value of Alarm 1
	AH2 Alarm 2 return difference	0 ~ 999999	Return difference value of Alarm 2
	K1 Flow coefficient 1	0 ~ 999999	Display flow coefficient of differential pressure type flow sensor, frequency type flow sensor, and pressure sensor input See the figure of flow compensation coefficient Kx.
	K2 Flow coefficient 2	0 ~ 999999	Display flow coefficient of differential pressure type flow sensor, frequency type flow sensor, and pressure sensor input See the diagram of flow compensation coefficient Kx.
	K3 Flow coefficient 3	0 ~ 999999	Display flow coefficient of differential pressure type flow sensor, frequency type flow sensor, and pressure sensor input See the diagram of flow compensation coefficient Kx.
	K4 Flow coefficient 4	0 ~ 999999	Display flow coefficient of differential pressure type flow sensor, frequency type flow sensor, and pressure sensor input See the diagram of flow compensation coefficient Kx.
	A1 Density compensation constant	0 ~ 999999	Display the density compensation constant of measured medium
	A2 Density compensation coefficient	0 ~ 999999	Display the density compensation coefficient of measured medium
	ρ Density in operating condition	0 ~ 999999	Display the density of measured medium in operating condition (unit: Kg/m^3)
	ρ0 Density in standard condition	0 ~ 999999	Display the density of measured medium in standard condition (1 bar, 20℃) (unit: Kg/m^3)

Default setting	Parameters	Setting Range	Description
T 20	Γ Temperature in operating condition	0 ~ 999999	Display the temperature constant in operating condition (this parameters is used when Tin = 0, i.e. the temperature for compensation calculation is invariable)
P 1. 00000	P Pressure in operating condition	0 ~ 999999	Display the pressure constant in operating condition (this parameters is used when Tin = 0, i.e. the gas pressure for compensation calculation is invariable)
disp 2	dI SP For switch of contents displayed on PV window	0 ~ 7	diSP=0: Display the following contents in turn (see display switch) diSP=1: Display the current time (Hour: Minute) diSP=2: Display the instantaneous flow diSP=3: Display input of temperature compensation diSP=4: Display input of pressure compensation diSP=5: Display measured value of flow (differential pressure or frequency) diSP=6: Display current cumulative value (cleared upon reset or power failure) diSP=7: Display cumulative value in 11 digits
FS 0 Return to original screen LOC	FS Flow/Heat switch	0 ~ 1	FS=0: Display instantaneous flow or cumulative flow FS=1: Display instantaneous heat or cumulative heat

★Notes on flow compensation coefficient Kx:

When Level 2 parameter KE = 1, nonlinear compensation of flow input can be achieved through Level 1 parameter Kx. The figure of compensation coefficient K is as follows:



■ Nonlinear input signal of flow can be compensated through setting coefficient Kx;

■ This function can be also used for small signal cut-off of frequency input;

■ Flow rate (linear, differential or frequency) of the input value is less than 1/3, the coefficient K1 for compensation; flow rate (linear, differential or frequency) of the input value is greater than the FH by K4 as coefficient compensation.

■ For linear compensation, Level 2 parameter KE will be generally set to be 0, so only parameter K1 will be served as compensation coefficient in Level 1 parameter setting, and K2, K3, K4 will not be displayed.

Note: this function is invalid in the case of frequency input, in which case error will occur to the program if this parameter has been set.

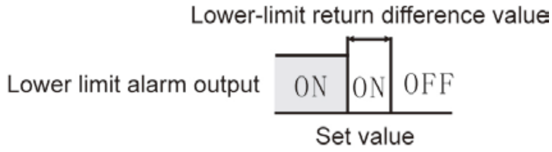
★Control output type (AL1, AL2, AH1, AH2)

Control output type can be set by Level 2 parameter “ALM”; see details below.

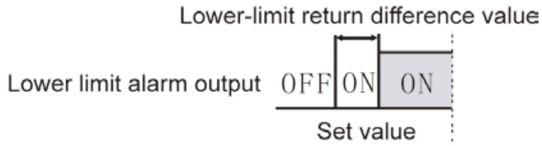
Symbol	Name	Setting Range	Function description	Output type
ALM1	Alarm 1	Full range	- No alarm; - Upper limit alarm of instantaneous flow; - Lower limit alarm of instantaneous flow; - Quantitative process output of flow: auto start, output “1”, - Quantitative result output of flow: auto start, output “0”, - Quantitative result output of flow: auto start, auto clear, impulse width output	See details below
ALM2	Alarm 2	Full range	- No alarm; - Upper limit alarm of instantaneous flow; - Lower limit alarm of instantaneous flow; - Quantitative process output of flow: auto start, output “1”; - Quantitative result output of flow: auto start, output “0” ;	

(1) This instrument will have a return difference for alarm/control output to prevent frequent action during fluctuation of output relay at output critical point; it works as followed:

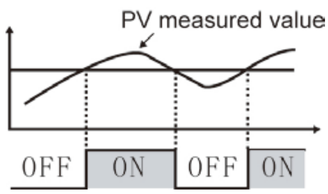
★The measured value increases from a low value:



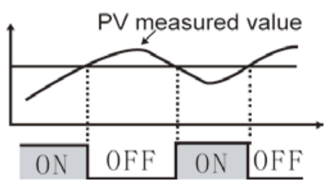
★The measured value decreases from a high value:



★Upper limit alarm output:



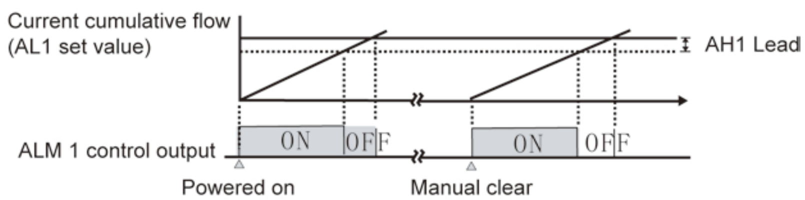
★Lower limit alarm output:



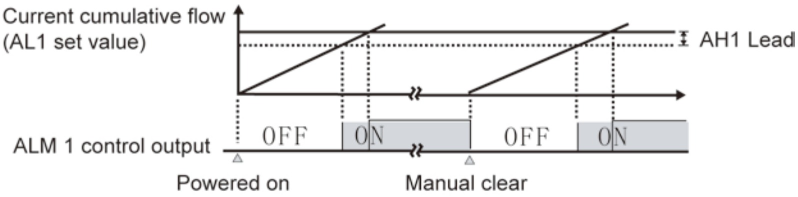
(2) Quantitative control output of flow

1.Sequence diagram of AL1 quantitative control output:

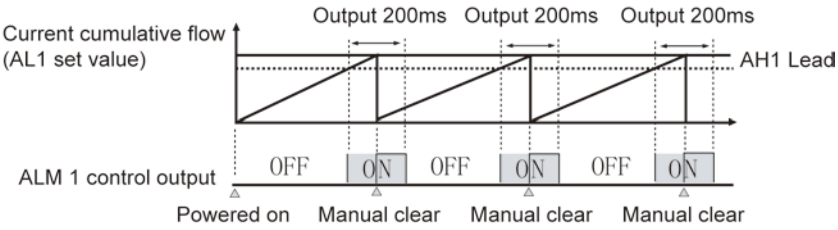
★ AL1 quantitative process control output: (auto start, output "1")



★ AL1 quantitative result control output: (auto start, output "0")

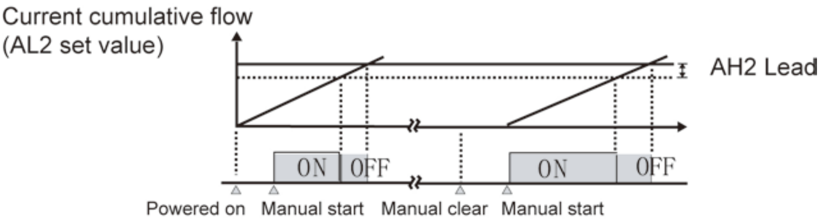


★ AL1 quantitative result control output: (auto clear, impulse width output)

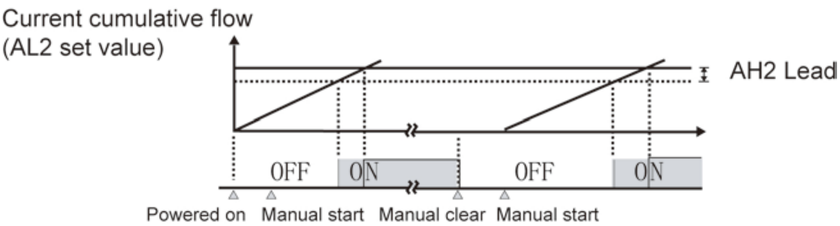


2. AL2 quantitative control output timing diagram

★ AL2 quantitative process control output: (manual start, and outputs "1")



★ AL2 quantitative control output: (manually start the output of "0")



☆AH2 means control output lead value.

☆Upon control output of the instrument, if there’s still instantaneous flow input, it will continue to be accumulated.

☆Upon the control output, current control is completed. Manual start is required for next control upon which control output will continue.

☆Method of starting quantitative control of flow in AL2 (AL2: manual start of quantitative control)

1. Press the external switch of “Start”, and it starts quantitative control of flow;
2. Set Level 1 parameter LOC as 111, and in the status where PV window displays measured value, press [key] to start quantitative control of flow.

☆Method of stopping quantitative control of flow in AL2 (AL2: manual start of quantitative control):

1. Press the external switch of “Stop”, and it stops quantitative control output of flow;
2. Set Level 1 parameter LOC as 111, and in the status where PV window displays measured value, press [key] and [key] simultaneously to stop quantitative control output of flow.

★When key “Stop” is pressed, control output will be stopped no matter whether there’s quantitative control output; if there’s still instantaneous flow input at this time, it will be accumulated. In order to initiate quantitative control output of cumulative flow, quantitative control output of flow must be "started" again.

★Current cumulative value will be cleared in case of power failure or reset. Press and simultaneously for manual clear of value. In case of quantitative control with external switch, press external switch "Clear" for manual clear of value.

★The total cumulative value will be cleared when it reaches full 11 digits. In case of need for clear before it reaches full 11 digits, set Level 1 parameter LOC as 111, and in the status where PV window displays measured value, press and simultaneously for manual clear. In case of quantitative control with external switch, press external switch "Clear" for manual clear of value.

★ The maximum cumulative flow of the instrument is 99999999999, and Level 2 parameters can be set to change display form within the range of 99999999.999 to 999999999.99.

6.2 Level 2 parameters setting

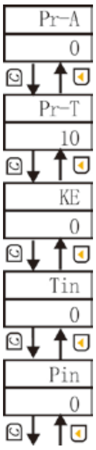
In the working status, press and PV will display LOC and SV display parameter values; press or for setting. Press and hold the key for 2 seconds to return back to the upper level parameters; when Loc = 132, press for 4 seconds to enter into Level 2 parameters setting.

Default setting	Parameters	Setting range	Description
tYPE 04	tYPE Formula type	0~28	See details in compensation formula model table.
ALM1 2	ALM1 Alarm 1	0~5	ALM1=0: No alarm ALM1=1: Lower limit alarm of instantaneous flow; ALM1=2: Upper limit alarm of instantaneous flow; ALM1=3: Quantitative process control output of flow – auto start, output "1"; ALM1=4: Quantitative result control output of flow – auto start, output "0"; ALM1=5: Quantitative result control output – auto start, auto clear, pulse width output
ALM2 1	ALM2 Alarm 2	0~4	ALM2=0: No alarm ALM2=1: Lower limit alarm of instantaneous flow; ALM2=2: Upper limit alarm of instantaneous flow; ALM2=3: Quantitative process control output of flow – manual start, output "1"; ALM2=4: Quantitative result control output of flow – manual start, output "0"
Qn 0	Qn Flow measurement option	0~1	Qn=0: measurement of mass flow; Qn=1: measurement of volume in standard condition
Addr 1	Addr Device ID	0~250	The ID for the device when setting communication parameters
Baud 3	bAud Communication baud rate	0~3	Baud = 0: Communication baud rate is 1200bps; Baud = 1: Communication baud rate is 2400bps Baud = 2: Communication baud rate is 4800bps; Baud = 3: Communication baud rate is 9600bps

Default setting	Parameters	Setting range	Description
Q-Tn 2	q-Tn Time unit of instantaneous flow display	0~5	Q-Tn=0: second ; Q-Tn=1: minute; Q-Tn=2: hour; Q-Tn=3: 1/10 hour; Q-Tn=4: 1/100 hour; Q-Tn=5: 1/1000 hour
M-dp 1	m-dP Precision of cumulative flow display	0~3	M-dP=0: 1 (displayed as XXXXXX); M-dP=1: 0.1 (displayed as XXXXX.X); M-dP=2: 0.01 (displayed as XXXX.XX); M-dP=3: 0.001 (displayed as XXX.XXX)
Q-dp 1	q-dP Decimal point of instantaneous flow display	0~3	Q-dP =0: no decimal point (displayed as XXXX); Q-dP =1: Ten decimal places (displayed as XXX.X) Q-dP=2: One hundred decimal places (displayed as XX.XX) Q-dP=3: One thousand decimal places (displayed as X.XXX)
H-Tn 2	H-Tn Time unit of instantaneous heat display	0~5	H-Tn=0: second ; H-Tn=1: minute; H-Tn=2: hour; H-Tn=3: 1/10 hour; H-Tn=4: 1/100 hour; H-Tn=5: 1/1 000 hour
N-dp 0	n-dP Precision of cumulative heat display	0~3	N-dP=0: 1 (displayed as XXXXXX); N-dP=1: 0.1 (displayed as XXXXX.X); N-dP=2: 0.01 (displayed as XXXX.XX); N-dP=3: 0.001 (displayed as XXX.XXX)
H-dp 0	H-dP Decimal point of instantaneous heat display	0~3	H-dP=0: no decimal point (displayed as XXXX); H-dP =1: Ten decimal places (displayed as XXX.X) H-dP=2: One hundred decimal places (displayed as XX.XX) H-dP=3: One thousand decimal places (displayed as X.XXX)
T-dp 1	T-dP Decimal point of temperature compensation display	0~3	T-dP=0: no decimal point (displayed as XXXX); T-dP =1: Ten decimal places (displayed as XXX.X) T-dP =2: One hundred decimal places (displayed as XX.XX) T-dP=3: One thousand decimal places (displayed as X.XXX)
P-dp 3	P-dP Decimal point of pressure compensation display	0~3	P-dP=0: no decimal point (displayed as XXXX); P-dP =1: Ten decimal places (displayed as XXX.X) P-dP=2: One hundred decimal places (displayed as XX.XX) P-dP=3: One thousand decimal places (displayed as X.XXX)
F-dp 0	F-dP Decimal point of flow (linear differential pressure) display	0~3	F-dP=0: no decimal point (displayed as XXXX); F-dP =1: Ten decimal places (displayed as XXX.X) F-dP=2: One hundred decimal places (displayed as XX.XX) F-dP=3: One thousand decimal places (displayed as X.XXX)
FK 0	FK Filter coefficient of instantaneous flow	0~19	Filter coefficient of instantaneous flow

Default setting	Parameters	Setting range	Description
T-n 14	T - n Type of temperature compensation input	0~35	See Graduation Table in Model Selection section.
P-n 27	P - n Type of pressure compensation input	25~35	See Graduation Table in Model Selection section.
F-n 27	F - n Type of flow input (linear, differential pressure type)	25~36	See Graduation Table in Model Selection section.
T-b 0	T - b Zero shift of temperature compensation	Full range	Set the zero shift for display of measured value of temperature compensation (see Note 1)
T-K 1. 000	T - K Amplification scale of measuring range of temperature compensation	0~1.999	Set the amplification scale of measuring range for display of temperature compensation (see Note 1)
P-b 0	P - b Zero shift of pressure compensation	Full range	Set the zero shift for display of measured value of pressure compensation (see Note 1)
P-K 1. 000	P - K Amplification scale of measuring range of pressure compensation	0~1.999	Set the amplification scale of measuring range for display of pressure compensation (see Note 1)
F-b 0	F - b Zero shift of flow input	Full range	Set the zero shift for display of measured value of flow input (see Note 1)
F-K 1. 000	F - K Amplification scale of measuring range of flow input	0~1.999	Set the amplification scale of measuring range for display of flow input (see Note 1)
01-b 0. 000	0 1 - b Zero shift of transmission output 1	0~1.200	Set the zero shift for display of transmission output 1 (see Note 2)
01-K 1. 000	0 1 - K Amplification scale of transmission output 1	0~1.900	Set the amplification scale for display of transmission output 1 (see Note 2)
02-b 0. 000	0 2 - b Zero shift of transmission output 2	0~1.200	Set the zero shift for display of transmission output 2 (see Note 2)
02-K 1. 000	0 2 - K Amplification scale of transmission output 2	0~1.900	Set the amplification scale for display of transmission output 2 (see Note 2)
ouL 0	o u L Lower limit of measuring range of transmission output	0~999999	Set the lower limit of measuring range of transmission output, which shall be subject to the instantaneous flow.

Default setting	Parameters	Setting range	Description
ouH 1000	ouH Upper limit of measuring range of transmission output	0~999999	Set the lower limit of measuring range of transmission output, which shall be subject to the instantaneous flow.
PA 0. 10133	PA Atmospheric pressure in operating condition	Full range	Set the atmospheric pressure at the site where the instrument operates. Unit: depending on set value of P-u; common units: MPa, KPa, Kgf/cm2, bar and etc. Standard unit: MPa
T-L 0	T-L Lower limit of measuring range of temperature compensation	Full range	Set the lower limit of measuring range of temperature compensation Unit: ℃
T-H 650	T-H Upper limit of measuring range of temperature compensation	Full range	Set the upper limit of measuring range of temperature compensation Unit: ℃
P-L 0	P-L Lower limit of measuring range of pressure compensation	Full range	Set the lower limit of measuring range of pressure compensation Unit: depending on set value of P-u; common units: MPa, KPa, Kgf/cm2, bar and etc. Standard unit: MPa
P-H 1. 000	P-H Upper limit of measuring range of pressure compensation	Full range	Set the upper limit of measuring range of pressure compensation Unit: depending on set value of P-u; common units: MPa, KPa, Kgf/cm2, bar and etc. Standard unit: MPa
F-L 0	F-L Lower limit of measuring range of flow input	Full range	Set the lower limit of measuring range of flow input Unit: same as output signal of flow meter; MPa in the case of differential pressure input
F-H 1000	F-H Upper limit of measuring range of flow input	Full range	Set the upper limit of measuring range of flow input Unit: same as output signal of flow meter; MPa in the case of differential pressure input
Cut 0	Cut Small signal cutoff of flow input	Full range	Set small signal cutoff of flow input
T-u 7	T-u Unit of temperature compensation	0 ~ 45	See Unit Code Table
P-u 2	P-u Unit of pressure compensation	0 ~ 45	See Unit Code Table
F-u 3	F-u Unit of flow input	0 ~ 45	See Unit Code Table
Q-u 25	q-u Unit of instantaneous flow	0 ~ 45	See Unit Code Table
H-u 26	H-u Unit of instantaneous heat	0 ~ 45	See Unit Code Table

<table>
<tr><th>Default setting</th><th>Parameters</th><th>Setting range</th><th>Description</th></tr>
<tr><td rowspan="5">

Return to original screen tyPE</td><td>Pr-A
Alarm printing</td><td>0 ~ 1</td><td>Pr-A = 0: no alarm printing function
Pr-A = 1: alarm printing function available</td></tr>
<tr><td>Pr-T
Interval of printing</td><td>1 ~ 2400 minutes</td><td>Set the interval of timed printing</td></tr>
<tr><td>KE
Mode of flow coefficient compensation</td><td>0 ~ 1</td><td>KE=0: flow coefficient K – linear compensation (only Level 1 parameter K1 used for compensation)
KE=1: flow coefficient K – nonlinear compensation (Level 1 parameters K1, K2, K3, K4 used for compensation)</td></tr>
<tr><td>Tin
Temperature input</td><td>0 ~ 1</td><td>Tin=0: Temperature as a constant
Tin=1: Temperature input from external sensor</td></tr>
<tr><td>Pin
Pressure input</td><td>0 ~ 1</td><td>Tin=0: Pressure as a constant
Tin=1: Pressure input from external sensor</td></tr>
</table>

Compensation formula model table:

Code	Compensation type	Note
0	Internal reserved parameter	Reserved parameter
1	Superheated steam (temperature / pressure compensation)	Linear input
2	Saturated steam (temperature compensation)	Linear input
3	Saturated steam (pressure compensation)	Linear input
4	General medium (temperature / pressure compensation)	Linear input
5	General medium (temperature compensation)	Linear input
6	General medium (pressure compensation)	Linear input
7	General medium (no compensation)	Linear input
8	Superheated steam (temperature / pressure compensation)	Non-extracted signal
9	Saturated steam (temperature compensation)	Non-extracted signal
10	Saturated steam (pressure compensation)	Non-extracted signal
11	General medium (temperature / pressure compensation)	Non-extracted signal
12	General medium (temperature compensation)	Non-extracted signal
13	General medium (pressure compensation)	Non-extracted signal
14	General medium (no compensation)	Non-extracted signal
15	Superheated steam (temperature / pressure compensation)	Extracted signal
16	Saturated steam (temperature compensation)	Extracted signal
17	Saturated steam (pressure compensation)	Extracted signal
18	General medium (temperature / pressure compensation)	Extracted signal
19	General medium (temperature compensation)	Extracted signal
20	General medium (pressure compensation)	Extracted signal
21	General medium (no compensation)	Extracted signal
22	Superheated steam (temperature / pressure compensation)	Frequency input
23	Saturated steam (temperature compensation)	Frequency input
24	Saturated steam (pressure compensation)	Frequency input
25	General medium (temperature / pressure compensation)	Frequency input
26	General medium (temperature compensation)	Frequency input
27	General medium (pressure compensation)	Frequency input

28	General medium (no compensation)	Frequency input

★Unit code table:

Code	0	1	2	3	4	5	6	7	8	9	10	11
Unit	kgf	Pa	KPa	MPa	mmHg	mmH_2O	bar	℃	%	Hz	m	t
Code	12	13	14	15	16	17	18	19	20	21	22	23
Unit	l	m^3	kg	J	MJ	GJ	Nm^3	m/h	t/h	l/h	m^3/h	Kg/h
Code	24	25	26	27	28	29	30	31	32	33	34	35
Unit	J/h	MJ/h	GJ/h	Nm^3/h	m/m	t/m	l/m	m^3/m	Kg/m	J/m	MJ/M	GJ/m
Code	36	37	38	39	40	41	42	43	44	45		
Unit	Nm^3/m	m/s	t/s	l/s	m^3/s	Kg/s	J/s	MJ/s	GJ/s	Nm^3/s		

Note1: T-b, T-k, P-b, P-k, F-b, F-k calculation formula:

X-k = set full range ÷ (original full range × original X-k)

X-b = lower limit of set measuring range – {lower limit of original measuring range × (X-k) + original (X-b) }

Take one instrument with pressure compensation of 4~20mA and measuring range of 0~2MPa for example. At the time of calibration, it's found that in case of 4mA input, it will display -0.03 and in case of 20mA input, it will display 2.08. (Original P-k=1.000, original P-b=0)

Based on the formula:

P-k = set full range ÷ (original full range × original P-k)

= (2-0) ÷ (2.08 - (-0.03)) = 2 ÷ 2.11× 1.000 ≈ 0.94787

P-b = lower limit of set measuring range – (lower limit of original measuring range × P-k + original P-b}

= 0 - (-0.03×0.94787) + 0 ≈ 0.02836

So now It's set that P-b = 0.02836, P-k = 0.94787

Note 2: the setting of output shift of O1-b, O1-K, O2-b, O2-K is as follows:

Instrument transmission output will be collated at 0-20mA or 0-5V; change of output range or output error correction may be realized by the following formulas:

$$\text{New Oub} = \text{Current Oub} - \frac{\text{Current output lower limit} - \text{Set output lower limit}}{\text{Full range}}$$

$$\text{New OuK} = \text{Current OuK} - \frac{\text{Current output Upper limit} - \text{Set output Upper limit}}{\text{Full range}}$$

Where in case of current signal output, full range = 20; in case of voltage signal output, full range = 5.

Example 1: transmission current output 0-20mA is now desired to be changed to 4-20mA output. In case of zero input, the output is 0mA; in case of full range of input, the output is 20mA; current Oub=0, current OuK=1.

$$\text{New Oub} = 0 - \frac{0-4}{20} = 0.2 \qquad \text{New OuK} = 1 - \frac{20-20}{20} = 1$$

Therefore, if Oub is set to be 0.2 without change of OuK, the 0-20mA output will be changed to 4-20mA.

★Small signal cutoff: when measured value of instantaneous flow is less than CAA, instantaneous flow will be displayed as zero, and the flow will not be accumulated.

★In parameters setting, if required parameters are not available currently, the following parameters may be set first. After one cycle of setting, the require parameters may appear as they may be closed by the following parameters.

★The unit in parameters setting must be the same as that for actual measurement.

★In the case of saturated steam measurement, either temperature compensation or pressure compensation may be selected.

★Print interval: Pr-T = 0 is not printed, the print format right:

TIME　　PRINT

2009—04—14

　　21：06：15

F= 1.000KPa

T= 20℃

P= 100.0MPa

M= 1213.5t/h

Σ 5846.415t

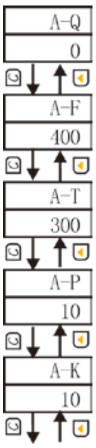
Q=134.5J/h

Σ 21046.325GJ

ALM：●　○

6.3 Level 3 parameters setting (automatic calculation of flow coefficient K)

In the working status, press and PV will display LOC and SV display parameter values; press or for setting. Press and hold the key for 2 seconds to return back to the upper level parameters; when Loc = 128, press for 4 seconds to enter into Level 3 parameters setting.

Default setting	Parameters	Setting range	Description
	A-Q Instantaneous flow	0~999999	Maximum Instantaneous flow value in the working status
	A-F Operating flow	0~999999	Maximum flow signal input in the working status
	A-T Operating temperature	0~999999	Temperature compensation input value in the working status
	A-P Operating pressure	0~999999	Pressure compensation input value in the working status
Return to original screen A-Q	A-K Flow coefficient	0~999999	Display the calculation result and change Level 1 parameter K1

Level 3 parameters are used for automatic calculation of flow coefficient K. It gives user great convenience to set parameters and improve the instrument's user-friendliness. Before setting of Level 3 parameters, Level 2 parameters setting shall be completed to determine instrument type, display precision, input type, compensation range, measuring range and unit. And then we can enter into Level 3 parameters setting to set maximum instantaneous flow A-Q, operating flow A-F, operating temperature A-T, and operating pressure A-P. The instrument will automatically calculate the flow coefficient A-K based on Level 2 parameters and upper limit of measuring range (differential pressure) and change the Level 1 parameter K1.

Note: in the case of flow input of pulse signal, the automatic calculation function is invalid.

6.4 Time setting

In the working status, press and PV will display LOC and SV display parameter values; press or for setting. When Loc = 130, press for 4 seconds to enter into time setting.

	Symbol	Name	Setting Range	Description	Default setting
dATE	dATE	Date		Set the date format: for example, 080210 means 2008-02-10	
TIME	TIME	Time		Set the time format: for example, 150935 means 15:09:35	

6.5 Voltage Range Regulation in Frequency Input

1): With open collector, the input end has a voltage of 10V; with open emitter, there's no voltage;

	Frequency input: OC	Frequency input: OE
JP2 status	 1 3	 1 3

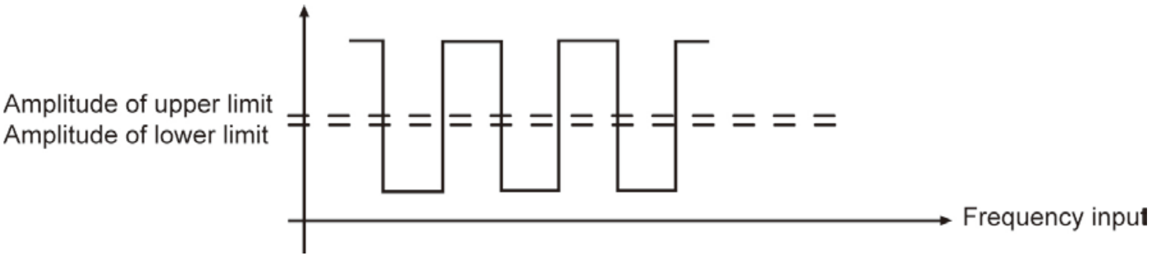
Frequency voltage range can be regulated as follows:

Voltage regulation:

1. Regulate upper limit of input voltage: regulate potentiometer W1 (clockwise rotation for decrease and counterclockwise rotation for increase) so that voltage at negative end of frequency input of pin pair 7 of LM339 is not more than upper limit of input voltage.

2. Regulate lower limit of input voltage: regulate potentiometer W2 (clockwise rotation for decrease and counterclockwise rotation for increase) so that voltage at negative end of frequency input of pin pair 8 of LM339 is not less than lower limit of input voltage.

★ Regulate W1 and W2 to keep the amplitude of upper limit / lower limit of voltage is within the range of wave shape. The voltage is preset as about 2.5V and 4.5V for lower limit and upper limit amplitude.



2) Switch between voltage and current pulse input:

	Current pulse input	Voltage pulse input
JP1 status	 1 3	 1 3

★ Remarks: the internal shunt resistor 1K resistor, if the amplitude of the signal is high JP1 inserted in the position of the input of the voltage pulse, and to achieve the signal input through the external resistor, which prevents the amplitude is too high damage to the internal device.

VII. Instrument Models and Wiring Diagram

7.1 Instrument models

OHR-E600□-□/□/□-□/□/□/□/□ ( )-□- ( )

① ②③④ ⑤⑥⑦⑧⑨ ⑩ ⑾

① Specification		②First-channel flow signal input graduation ③Second-channel pressure compensation input graduation ④Third-channel temperature compensation input graduation	
Code	width * height * depth	Code	Graduation (measuring range)

A	160*80*110mm (Horizontal)
B	80*160*110mm (Vertical)
C	96*96*110mm (Square)
D	96*48*110mm (Horizontal)

⑤Transmission output 1(OUT1)

Code	Output type (Load resistance RL)
X	No output
0	4 ~ 20mA (RL≤600Ω)
1	1 ~ 5V (RL≥250KΩ)
2	0 ~ 10mA (RL≤1.2KΩ)
3	0 ~ 5V (RL≥250KΩ)
4	0 ~ 20mA (RL≤600Ω)
5	0 ~ 10V (RL≥4KΩ)

⑥Transmission output 2(OUT2)

Code	Output type (Load resistance RL)
X	No output
0	4 ~ 20mA (RL≤600Ω)
1	1 ~ 5V (RL≥250KΩ)
2	0 ~ 10mA (RL≤1.2KΩ)
3	0 ~ 5V (RL≥250KΩ)
4	0 ~ 20mA (RL≤600Ω)
5	0 ~ 10V (RL≥4KΩ)

⑦Alarm output (relay contact output)

Code	The number of alarm limits
X	No output
1	1-limit alarm
2	2-limit alarm

⑧Communication output / external event input

Code	communication Interface / digital value input interface
X	No output
D1	RS-485 communication Interface (Modbus)
D2	RS-232 communication Interface (Modbus)
D3	RS232C printing interface
Y	Start, Stop, Clear

X	No input signal
00	Thermocouple B (400 ~ 1800 ℃)
01	Thermocouple S (0 ~ 1600 ℃)
02	Thermocouple K (0 ~ 1300 ℃)
03	Thermocouple E graduation (0 ~ 1000 ℃)
04	Thermocouple T graduation (-200.0 ~ 400.0 ℃)
05	Thermocouple J graduation (0 ~ 1200 ℃)
06	Thermocouple R graduation (0 ~ 1600 ℃)
07	Thermocouple N graduation (0 ~ 1300 ℃)
08	Thermocouple F2 graduation (700 ~ 2000 ℃)
09	Thermocouple Wre3-25 graduation (0 ~ 2300 ℃)
10	Thermocouple Wre5-26 graduation (0 ~ 2300 ℃)
11	Thermal resistance Cu50 (-50.0 ~ 150.0 ℃)
12	Thermal resistance Cu53 (-50.0 ~ 150.0 ℃)
13	Thermal resistance Cu100 (-50.0 ~ 150.0 ℃)
14	Thermal resistance Pt100 (-200.0 ~ 600.0 ℃)
15	Thermal resistance BA1 (-200.0 ~ 600.0 ℃)
16	Thermal resistance BA2 (-200.0 ~ 600.0 ℃)
17	Linear resistance 0 ~ 400Ω (-1999 ~ 9999)
18	Remote Resistance 0 ~ 350Ω (-1999 ~ 9999)
19	Remote Resistance 30 ~ 350Ω (-1999 ~ 9999)
20	0 ~ 20mV (-1999 ~ 9999)
21	0 ~ 40mV (-1999 ~ 9999)
22	0 ~ 100mV (-1999 ~ 9999)
23	-20 ~ 20mV (-1999 ~ 9999)
24	-100 ~ 100mV (-1999 ~ 9999)
25	0 ~ 20mA (-1999 ~ 9999)
26	0 ~ 10mA (-1999 ~ 9999)
27	4 ~ 20mA (-1999 ~ 9999)
28	0 ~ 5V (-1999 ~ 9999)
29	1 ~ 5V (-1999 ~ 9999)
30	-5 ~ 5V (-1999 ~ 9999)
31	0 ~ 10V (-1999 ~ 9999) (non-switcheable)
32	0 ~ 10mA extraction (-1999 ~ 9999)
33	4 ~ 20mA extraction (-1999 ~ 9999)
34	0 ~ 5V extraction (-1999 ~ 9999)
35	1 ~ 5V extraction (-1999 ~ 9999)
36	Pulse input (0 ~ 10KHz)
55	Full switch
56	Special specification

⑨Feeder output

Code	Feed output (output voltage)
X	No output
1P	1-channel feed output
2P	2-channel feed output
	For example, "2P (12/24)" means first-channel output of 12V and second-channel feed output of 24V.

⑩Power supply

Code	Voltage range
A	AC/DC 100 ~ 240V (50 / 60Hz)
D	DC 20 ~ 29V

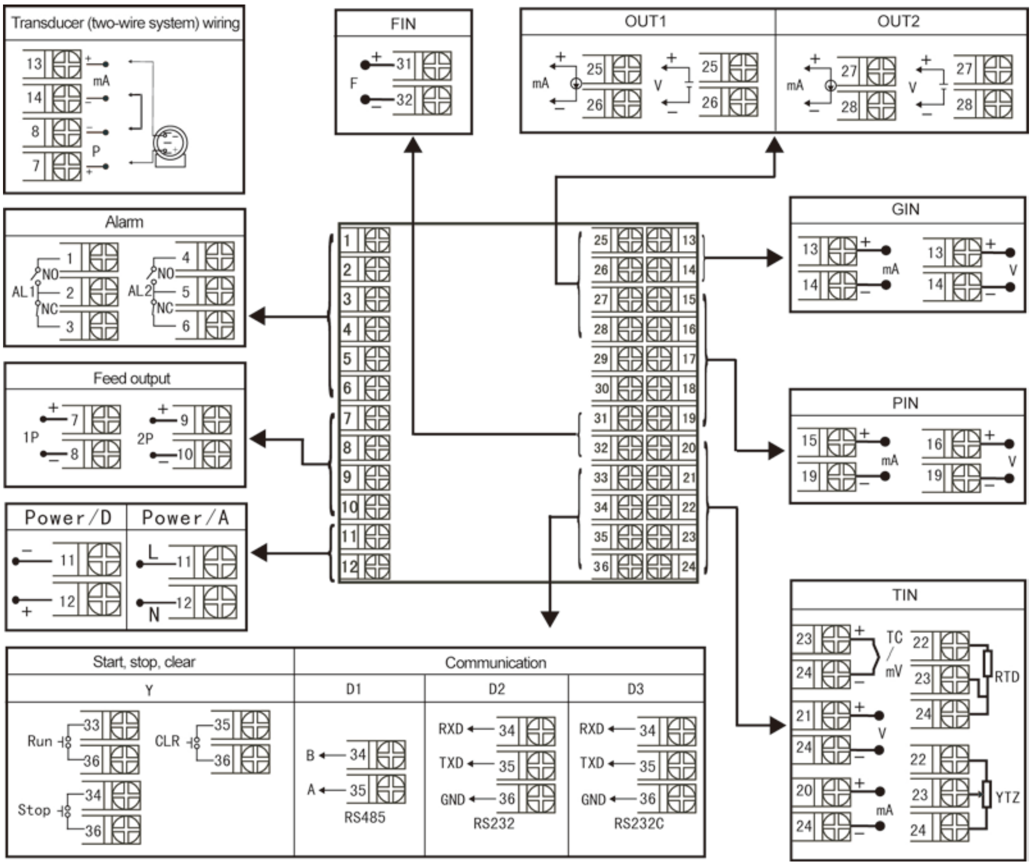
⑪Notes

Remarks: 1. For pressure compensation channel input type, only voltage or current signal will be selected; for flow channel input type, only voltage, current or pulse input will be selected, where pulse input is only available for flow channel.

2. The model input type code 36 (pulse input), instrumentation simply changed the compensation formula model frequency input (tYPE = 22 ~ 28) can be realized.

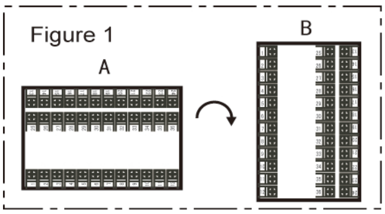
3. If vortex flow meter needs to use power distribution function, second-channel transmission output may be used for such function when second-channel transmission output will be invalid.

7.2 Instrument wiring diagram



Wiring diagram of model A, B and C

Note: the wiring terminal directions at rear cover of horizontal and vertical instrument are different; see Figure 1.



Note: For special order, if the diagram is different from the above, please refer to the diagram with the instrument. If two-channel feed output is available, two ends of current input (pin 19 and pin 24) must be short-circuited.

Note: The switch between flow voltage and current signal input must be completed through the short circuit loop, as shown in the figure below:

	DC current input	DV voltage input
J1, J2 short circuit loop status		

VIII. Mathematical Models

(1) Mass flow (M) calculation formula:

1. Input signal of differential pressure (ΔP, non-extracted)

Level 2 parameters setting: tYPE=14, Qn=0, F-n=27

Level 1 parameters setting: K, ρ

$$M=K\times\sqrt{\rho\times\Delta P}$$

2. Input signal of differential pressure (ΔP, non-extracted), temperature compensation (T)

Level 2 parameters setting: tYPE=12, Qn=0, T-n=14, F-n=27

Level 1 parameters setting: K, A1, A2

$$M=K\times\sqrt{(A1+A2\times T)\times\Delta P}$$

3. Input signal of differential pressure (ΔP, non-extracted), pressure compensation (P)

Level 2 parameters setting: tYPE=13, Qn=0, P-n=27, F-n=27

Level 1 parameters setting: K, A1, A2

$$M=K\times\sqrt{(A1+A2\times P)\times\Delta P}$$

4. Input signal of differential pressure (ΔP, non-extracted), pressure compensation (P), temperature compensation (T)

Level 2 parameters setting: tYPE=11, Qn=0, T-n=14, P-n=27, F-n=27

Level 1 parameters setting: K, ρ20

$$M=K\times\sqrt{\rho_{20}\times\frac{(T_0+20℃)\times(P+P_A)}{P_0\times(T+T_0)}\times\Delta P}$$

5. Input signal of differential pressure (ΔP, extracted)

Level 2 parameters setting: tYPE=21, Qn=0, F-n=27

Level 1 parameters setting: K, ρ

$$M=K\times\sqrt{\rho}\times\Delta P$$

6. Input signal of differential pressure (ΔP, extracted), temperature compensation (T)

Level 2 parameters setting: tYPE=19, Qn=0, T-n=14, F-n=27

Level 1 parameters setting: K, A1, A2

$$M=K\times\sqrt{(A1+A2\times T)}\times\Delta P$$

7. Input signal of differential pressure (ΔP, extracted), pressure compensation (P)

Level 2 parameters setting: tYPE=20, Qn=0, P-n=27, F-n=27

Level 1 parameters setting: K, A1, A2

$$M=K\times\sqrt{(A1+A2\times P)}\times\Delta P$$

8. Input signal of differential pressure (ΔP, extracted), pressure compensation (P), temperature compensation (T)

Level 2 parameters setting: tYPE=18, Qn=0, T-n=14, P-n=27, F-n=27

Level 1 parameters setting: K, ρ20

$$M=K\times\sqrt{\rho_{20}\times\frac{(T_0+20℃)\times(P+P_A)}{P_0\times(T+T_0)}}\times\Delta P$$

9. Input signal of flow (G)

Level 2 parameters setting: tYPE=7, Qn=0, F-n=27

Level 1 parameters setting: K, ρ

$$M=K\times\rho\times G$$

10. Input signal of flow (G), temperature compensation (T)

Level 2 parameters setting: tYPE=5, Qn=0, T-n=14, F-n=27

Level 1 parameters setting: K, A1, A2

$$M=K\times(A1+A2\times T)\times G$$

11. Input signal of flow (G), pressure compensation (P)

Level 2 parameters setting: tYPE=6, Qn=0, P-n=27, F-n=27

Level 1 parameters setting: K, A1, A2

$$M=K\times(A1+A2\times P)\times G$$

12. Input signal of flow (G), pressure compensation (P), temperature compensation (T)

Level 2 parameters setting: tYPE=4, Qn=0, T-n=14, P-n=27, F-n=27

Level 1 parameters setting: K, ρ20

$$M=K\times\rho_{20}\times\frac{(T_0+20℃)\times(P+P_A)}{P_0\times(T+T_0)}\times G$$

13. Input signal of frequency (f)

Level 2 parameters setting: tYPE=28, Qn=0, F-n=36

Level 1 parameters setting: K, ρ

$$M=\frac{3.6}{K}\times\rho\times f$$

14. Input signal of frequency (f), temperature compensation (T)

Level 2 parameters setting: tYPE=26, Qn=0, T-n=14, F-n=36

Level 1 parameters setting: K, A1, A2

$$M=\frac{3.6}{K}\times(A1+A2\times T)\times f$$

15. Input signal of frequency (f), pressure compensation (P)

Level 2 parameters setting: tYPE=27, Qn=0, P-n=27, F-n=36

Level 1 parameters setting: K, A1, A2

$$M=\frac{3.6}{K}\times(A1+A2\times P)\times f$$

16. Input signal of frequency (f), temperature compensation (T), pressure compensation (P)

Level 2 parameters setting: tYPE=25, Qn=0, T-n=14, P-n=27, F-n=36

Level 1 parameters setting: K, ρ20

$$M=\frac{3.6}{K}\times\rho_{20}\times\frac{(T_0+20℃)\times(P+P_A)}{P_0\times(T+T_0)}\times f$$

17. In superheated steam measurement, linear input signal (G), and input signal of temperature compensation (T), pressure compensation (P)

Level 2 parameters setting: tYPE=1, Qn=0, T-n=14, P-n=27, F-n=27

Level 1 parameters setting: K

$$M=K\times\rho_{measured}\times G$$

18. In superheated steam measurement, input signal of differential pressure (ΔP, non-extracted), temperature compensation (T), pressure compensation (P)

Level 2 parameters setting: tYPE=8, Qn=0, T-n=14, P-n=27, F-n=27

Level 1 parameters setting: K

$$M=K\times\sqrt{\rho_{measured}\times\Delta P}$$

19. In superheated steam measurement, input signal of differential pressure (ΔP, extracted),

temperature compensation (T), pressure compensation (P)

Level 2 parameters setting: tYPE=15, Qn=0, T-n=14, P-n=27, F-n=27

Level 1 parameters setting: K

$$M=K\times\sqrt{\rho_{measured}}\times\Delta P$$

20. In superheated steam measurement, input signal of frequency (f), temperature compensation (T), pressure compensation (P)

Level 2 parameters setting: tYPE=22, Qn=0, T-n=14, P-n=27, F-n=36

Level 1 parameters setting: K

$$M=\frac{3.6}{K}\times\rho_{measured}\times f$$

21. In saturated steam measurement, linear input signal (G), and input signal of temperature compensation (T) or pressure compensation (P)

Level 2 parameters setting: tYPE=2, Qn=0, T-n=14, F-n=27 (temperature compensation)

Or tYPE=3, Qn=0, P-n=27, F-n=27 (pressure compensation)

Level 1 parameters setting: K

$$M=K\times\rho_{measured}\times G$$

22. In saturated steam measurement, input signal of differential pressure (ΔP, non-extracted), temperature compensation (T) or pressure compensation (P)

Level 2 parameters setting: tYPE=9, Qn=0, T-n=14, F-n=27 (Temperature compensation)

Or tYPE=10, Qn=0, P-n=27, F-n=27 (Pressure compensation)

Level 1 parameters setting: K

$$M=K\times\sqrt{\rho_{measured}\times\Delta P}$$

23. In saturated steam measurement, input signal of differential pressure (ΔP, extracted), temperature compensation (T) or pressure compensation (P)

Level 2 parameters setting: tYPE=16, Qn=0, T-n=14, F-n=27 (temperature compensation)

Or tYPE=17, Qn=0, P-n=27, F-n=27 (pressure compensation)

Level 1 parameters setting: K

$$M=K\times\sqrt{\rho_{measured}}\times\Delta P$$

24. In saturated steam measurement, input signal of frequency (f), temperature compensation (T) or pressure compensation (P)

Level 2 parameters setting: tYPE=23, Qn=0, T-n=14, F-n=36(temperature compensation)

Or tYPE=24, Qn=0, P-n=27, F-n=36 (pressure compensation)

Level 1 parameters setting: K

$$M=\frac{3.6}{K}\times\rho_{measured}\times f$$

(2) Standard volumetric flow (Qn) calculation formula:

Level 2 parameters setting: Qn=1

Level 1 parameters setting: ρ20

$$QN=\frac{M}{\rho_{20}}$$

(3) Density calculation formula (model)

1. Either pressure or temperature compensation

Level 2 parameters setting: T-n≠X, P-n=X, F-n≠X (temperature compensation)

Or T-n=X, P-n≠X, F-n≠X (pressure compensation)

Level 1 parameters setting: A1, A2

$$\rho=A1+A2\times P \text{ or } \rho=A1+A2\times T$$

As pressure or temperature has a linear relation with density in a narrow range, so compensation will be made based on linear relations, and A1 and A2 will be worked out at the time of use, which may be obtained simply by a system of linear equations of two unknowns with two groups of pressure or temperature value and corresponding density value. If relatively high compensation precision is required, density can be worked out by referring to the density table (measured medium or density table shall be specified in the order).

2. Both pressure and temperature compensation

Level 2 parameters setting: T-n≠X, P-n≠X, F-n≠X

Level 1 parameters setting: $\rho 20$， PA

$$\rho=\rho_{20}\times\frac{(T_0+20℃)\times(P+P_A)}{P_0\times(T+T_0)}$$

(4) Calculation of compensation coefficient K

1. Linear input signal

a) Flow input unit: volume (e.g. m^3/h): K=1

b) Flow input unit: mass (e.g. T/h): compensation coefficient K will be calculated based on relevant mass flow calculation formula.

2. Input signal of frequency

a) If coefficient of frequency type flow transducer is known, it may be set according to default set value:

K= flow coefficient of frequency type flow transducer (unit:■⎍ /liter)

b) If the flow coefficient of transducer is unknown, it may be worked out based on relevant mass flow calculation formula.

3. Input signal of differential pressure

a) Compensation coefficient K will be worked out based on relevant mass flow calculation formula.

b) Based on standard formula:

$$M=K\times\sqrt{\rho\times\Delta P}$$

K=3.995×α×ε×P-n ---- M unit: Kg/h; DP unit: MPa

K=0.1264×α×ε×P-n ---- M unit: Kg/h; DP unit: MPa

K=0.01251×α×ε×P-n ---- M unit: Kg/h; DP unit: mmH_20

$$a=\frac{C}{\sqrt{1-\beta^4}} \qquad \beta=\frac{d}{D}$$

Where:

M – measured value of mass flow;

α – flow coefficient;

ε – expansion coefficient of flow;

C – outflow coefficient;

B – diameter ratio;

d – diameter of open hole of throttling device or orifice plate in operating condition (mm)

D – inner diameter of upstream tube in operating condition (inner diameter of classic Venturi tube)

(5) Symbols introduction

M – measured value of mass flow (unit: defined by user)

△P – input signal of differential pressure of flow meter (unit: depending on Level 2 parameter DCA; usually MPa)

PA – atmospheric pressure at the site where the instrument operates (local atmospheric pressure; unit: same as unit of Level 2 parameter DP – pressure compensation; usually MPa)

ρ20 – density of measured medium in industrial standard condition (0.10133 MPa, 20 ℃)

T – input signal of temperature compensation (unit: ℃)

T0 – -273.15 ℃

P0 – 0.10133 MPa

ρ – density in operating condition (unit: Kg/m^3)

P – input signal of pressure compensation (unit: same as unit of Level 2 parameter DP – pressure compensation; usually MPa)

A1 – compensation coefficient

A2 – compensation coefficient

K – flow coefficient

G – input signal of linear flow meter (unit: same as output of flow meter; e.g. m^3/h)

Qn – volumetric flow in standard condition

(6) Superheated steam totalizing:

For superheated steam measurement, the compensation table may be referred to. The instrument will automatically check the superheated steam compensation table inside the instrument with actually measured value of flow (differential pressure) input, pressure compensation, and temperature compensation for high-precision compensation calculation.

(7) Saturated steam totalizing:

For saturated steam measurement, the temperature or pressure compensation table may be referred to. The instrument will automatically check the saturated steam compensation table inside the instrument with actually measured value of flow (differential pressure) input, temperature compensation or pressure compensation (either temperature compensation or pressure compensation may be selected in saturated steam measurement; if both of them are selected, the calculation will be made based on pressure compensation) for high-precision compensation calculation.

Temperature (t) ℃	0		1		2	
	Pressure (P)	Density (ρ)	Pressure (P)	Density (ρ)	Pressure (P)	Density (ρ)
100	0.1013	0.5977	0.1050	0.6180	0.1088	0.6388
110	0.1433	0.8265	0.1481	0.8528	0.1532	0.8798
120	0.1985	1.122	0.2049	1.155	0.2114	1.190
130	0.2701	1.497	0.2783	1.539	0.2867	1.583
140	0.3614	1.967	0.3718	2.019	0.3823	2.073
150	0.4760	2.548	0.4888	2.613	0.5021	2.679
160	0.6181	3.260	0.6339	3.339	0.6502	3.420
170	0.7920	4.123	0.8114	4.218	0.8310	4.316
180	1.0027	5.160	1.0259	5.274	1.0496	5.391
190	1.2551	6.397	1.2829	6.532	1.3111	6.671
200	1.5548	7.864	1.5876	8.025	1.6210	8.188
210	1.9077	9.593	1.9462	9.782	1.9852	9.974
220	2.3198	11.62	2.3645	11.84	2.4098	12.07
230	2.7975	14.00	2.8491	14.25	2.9010	14.52
240	3.3477	16.76	3.4070	17.06	3.4670	17.37

Temperature (t) ℃	3		4		5	
	Pressure (P)	Density (ρ)	Pressure (P)	Density (ρ)	Pressure (P)	Density (ρ)
100	0.1127	0.6601	0.1167	0.6952	0.1208	0.7105
110	0.1583	0.9057	0.1636	0.9359	0.1691	0.9650
120	0.2182	1.225	0.2250	1.261	0.2321	1.298
130	0.2953	1.627	0.3041	1.672	0.3130	1.719
140	0.3931	2.129	0.4042	2.185	0.4155	2.242
150	0.5155	2.747	0.5292	2.816	0.5433	2.886
160	0.6666	3.502	0.6835	3.586	0.7008	3.671
170	0.8511	4.415	0.8716	4.515	0.8924	4.618
180	1.0737	5.509	1.0983	5.629	1.1233	5.752
190	1.3397	6.812	0.3690	6.955	1.3987	7.100
200	1.6548	8.354	1.6892	8.522	1.7242	8.649
210	2.0248	10.17	2.0650	10.37	2.1059	10.57
220	2.4559	12.30	2.5026	12.53	2.5500	12.76
230	2.9546	14.78	3.0085	15.05	3.0631	15.33
240	3.5279	17.68	3.5897	17.99	3.6522	18.31

Temperature (t) ℃	6		7		8		9	
	Pressure (P)	Density (ρ)	Pressure (P)	Density (ρ)	Pressure (P)	Density (ρ)	Pressure (P)	Density (ρ)
100	0.1250	0.7277	0.1294	0.7515	0.1339	0.7758	0.1385	0.8008
110	0.1746	0.9948	0.1804	1.025	0.1863	1.057	0.1923	1.089
120	0.2393	1.336	0.2467	1.375	0.2543	1.415	0.2621	1.455
130	0.3222	1.766	0.3317	1.815	0.3414	1.864	0.3513	1.915
140	0.4271	2.301	0.4389	2.361	0.4510	2.422	0.4633	2.484
150	0.5577	2.958	0.5723	3.032	0.5872	3.106	0.6025	3.182
160	0.7183	3.758	0.7362	3.847	0.7544	3.937	0.7730	4.029
170	0.9137	4.723	0.9353	4.829	0.9573	4.937	0.9797	5.048
180	1.1487	5.877	1.1746	6.002	1.2010	6.312	1.2278	6.264
190	1.4289	7.248	1.4596	7.398	1.4909	7.551	1.5225	7.706
200	1.7597	8.868	1.7959	9.045	1.8326	9.225	1.8699	9.408
210	2.1474	10.77	2.1896	10.98	2.2323	11.19	2.2757	11.41
220	2.5981	13.00	1.6469	13.24	2.6963	13.49	2.7466	13.74
230	3.1185	15.61	3.1746	15.89	3.2316	16.18	3.2892	16.47
240	3.7155	18.64	3.7797	18.97	3.8448	19.30	3.9107	19.64

IX. Common Gas Density Table

Name	0 ℃ (Kg/m^3)	20 ℃ (Kg/m^3)	Name	0 ℃ 760 (Kg/m^3)	20 ℃ 760 (Kg/m^3)
Dry air	1.2928	1.205	Acetylene	1.1717	1.091
Nitrogen	1.2506	1.165	Methane	0.7167	0.668
Hydrogen	0.08988	0.084	Ethane	1.3567	1.263

Oxygen	1.4289	1.331	Propane	2.005	1.867
Chlorine	3.214	3.00	Ethene	1.2604	1.174
Ammonia	0.771	0.719	Propylene	1.914	1.784
CO	1.2504	1.165	natural gas	Depending on components	Depending on components
CO2	1.977	1.842	Coal gas	Depending on components	Depending on components

X. Saturated Steam Density Table (Unit: density ρ = Kg/m^3; pressure P = MPa; temperature t = ℃)

★In saturated steam measurement, either temperature or pressure compensation may be selected as compensation input.

★Example of table checking: when temperature compensation is 218 ℃, the densit

When pressure compensation is +0.10133MPa = 2.2323MPa, the density is 11.19Kg/m^3

★Pressure in the table is absolute pressure. Absolute pressure = displayed pressure (compensated pressure) + atmospheric pressure.

XI. Superheated Steam Density Table (Unit: ρ = Kg/m^3)

P	t ℃							
MPa	150	170	190	210	230	250	270	290
0.10	0.5164	0.4925	0.4707	0.4507	0.4323	0.4156	0.4001	0.3857
0.15	0.7781	0.7412	0.7079	0.6777	0.6500	0.6246	0.6010	0.5795
0.20	1.0423	0.9918	0.9466	0.9056	0.8684	0.8342	0.8027	0.7736
0.25	1.3089	1.2444	1.1869	1.1349	1.0849	1.0445	1.0048	0.9682
0.30	1.5783	1.4990	1.4287	1.3653	1.3079	1.2540	1.2077	1.1634
0.40	2.1237	2.0141	1.9166	1.8297	1.7513	1.6527	1.6152	1.5554
0.50	2.6658	2.5380	2.4121	2.2997	2.1992	2.1081	2.0255	1.9495
0.80	4.3966	4.1676	3.9372	3.7400	3.5655	3.4110	3.2718	3.1453
1.10	6.1313	5.8332	5.5342	5.2356	4.7919	4.7459	4.5445	4.3612
1.40	7.8785	7.5163	7.1540	6.7913	6.4288	6.1149	5.8437	5.6006
1.70	9.8464	9.3688	9.2473	8.4130	7.9352	7.5219	7.1713	6.8607
2.00	11.6295	11.0985	10.5676	10.0366	9.5054	8.9744	8.5350	8.1447
2.50	15.1890	14.4516	13.7150	12.9776	12.2406	11.5036	10.8794	10.3500
3.00	18.4168	17.5709	16.7243	15.8776	15.0367	14.1842	13.3377	12.6359
3.50	22.7008	21.5713	20.4427	19.3131	18.2266	17.0530	15.9243	15.0163
4.00	27.164	25.7470	24.3303	22.9129	21.4954	20.0778	18.6603	17.4997
4.50	30.3852	28.9163	27.4475	25.9784	24.5096	23.0407	21.5717	20.1028
5.00	35.4243	33.6293	31.8342	30.0384	28.2433	26.4483	24.6532	22.8580
6.00	43.8954	41.7475	39.5988	37.4508	35.3020	33.1541	31.0062	28.8574
7.00	56.7201	53.6991	50.6780	47.6561	44.6352	41.6133	38.5922	35.5704
8.00	65.4713	62.1800	58.8883	55.5968	52.3061	49.0145	45.7231	42.4316
9.00	84.5457	79.8261	75.1061	70.3863	65.6665	60.9465	56.220	51.5077
10.0	108.6250	102.0289	95.4346	88.8412	82.2486	75.6543	65.7699	62.4676
12.5	158.3464	148.7516	139.1578	129.5629	119.9781	110.3842	95.7769	91.1964
15.0	206.4175	194.4276	182.4477	170.4577	158.4766	146.4967	127.6820	122.5268
17.5	250.3934	236.6910	222.8603	209.1592	195.4568	181.6261	163.4280	154.2312
20.0	327.8165	309.9521	291.2953	273.4409	255.5786	236.9217	219.0574	201.2031
21.5	384.6647	363.2975	341.9027	320.5455	299.1880	277.7931	256.4260	235.0688

P MPa	t ℃							
	310	330	350	370	390	410	430	450
0.10	0.3724	0.3600	0.3484	0.3375	0.3272	0.3176	0.3086	0.2998
0.15	0.5594	0.5404	0.5230	0.5066	0.4912	0.4767	0.4631	0.4502
0.20	0.7465	0.7214	0.6980	0.6759	0.6553	0.6360	0.6178	0.6005

P MPa	t ℃						
	470	490	510	530	550	570	590
0.10	0.2919	0.2842	0.2769	0.2700	0.2634	0.2571	0.2512
0.15	0.4381	0.4270	0.4156	0.4052	0.3953	0.3858	0.3768
0.20	0.5842	0.5688	0.5541	0.5403	0.5271	0.5146	0.5026
0.25	0.7316	0.7113	0.6925	0.6757	0.6591	0.7558	0.6284
0.30	0.8856	0.8540	0.8320	0.8108	0.7913	0.7724	0.7540
0.40	1.1708	1.1396	1.1102	1.0821	1.0556	1.0303	1.0062
0.50	1.4648	1.4258	1.3888	1.3537	1.3204	1.2887	1.2585
0.80	2.3500	2.2869	2.2274	2.1700	2.1164	2.0650	2.0168
1.10	3.2402	3.1529	3.0690	2.9902	2.9150	2.8449	2.7774
1.40	4.3496	4.2291	3.9157	3.8143	3.7183	3.6271	3.5401
1.70	5.0374	4.8972	4.7665	4.6408	4.5230	4.4116	4.3056
2.00	5.9419	5.7760	5.6204	5.4725	5.3322	5.1989	5.0745
2.50	7.4632	7.2511	7.0515	6.8637	6.6858	6.5177	6.3582
3.00	8.9991	8.738	8.4945	8.2657	8.0486	7.8437	7.6498
3.50	10.5512	10.2402	9.9499	9.6776	9.4197	9.1777	8.9480
4.00	12.1835	11.7548	11.4169	11.0994	10.8003	10.5191	10.2533
4.50	13.7009	13.2822	12.8950	12.5315	12.1894	11.8683	11.5650
5.00	15.3017	14.8249	14.3859	13.9749	13.5885	13.2267	12.8850
6.00	18.5495	17.9518	17.4029	16.8912	16.4119	15.9657	15.5440
7.00	21.8675	21.1373	20.4699	19.8506	19.2745	18.7350	18.2314
8.00	25.2640	24.3864	23.5905	22.8573	22.1742	21.5400	20.9500
9.00	28.4637	27.6971	26.7676	25.9068	25.1124	24.3771	23.6949
10.0	32.3002	31.0863	30.0116	29.0164	28.1000	27.2557	26.4738
12.5	41.5884	39.8569	38.3537	36.9936	35.7414	34.6072	33.5541
15.0	51.5265	49.1381	47.1249	45.3087	43.6680	42.1936	40.8349
17.5	62.1807	59.0050	56.3427	53.9875	51.8985	50.0237	48.3269
20.0	73.6858	69.5196	66.0602	63.0674	60.4493	58.1253	56.0402
21.5	81.0184	76.1621	72.1376	68.7108	65.7370	63.1132	60.7719

Note: The pressure in the table above is absolute pressure. The operating pressure in the formula refers to displayed pressure. Absolute pressure = displayed pressure + atmospheric pressure.

XII. Enthalpy Table of Steam

1) Saturated steam pressure – enthalpy table (ranked by pressure)

Pressure (MPa)	Temperature (℃)	Enthalpy(KJ/Kg)	Pressure (MPa)	Temperature (℃)	Enthalpy(KJ/Kg)
0.0010	6.982	2513.8	1.00	179.88	2777.0
0.0020	17.511	2533.2	1.10	184.06	2780.4

0.0030	24.098	2545.2	1.20	187.96	2783.4
0.0040	28.981	2554.1	1.30	191.60	2786.0
0.0050	32.90	2561.2	1.40	195.04	2788.4
0.0060	36.18	2567.1	1.50	198.26	2790.4
0.0070	39.02	2572.2	1.60	201.37	2792.2
0.0080	41.53	2576.7	1.70	204.30	2793.8
0.0090	43.79	2580.8	1.80	207.10	2795.1
0.010	45.83	2584.4	1.90	209.79	2796.4
0.015	54.00	2598.9	2.00	212.37	2797.4
0.020	60.09	2609.6	2.20	217.24	2799.1
0.025	64.99	2618.1	2.40	221.78	2800.4
0.030	69.12	2625.3	2.60	226.03	2801.2
0.040	75.89	2636.8	2.80	230.04	2801.7
0.050	81.35	2645.0	3.00	233.84	2801.9
0.060	85.95	2653.6	3.50	242.54	2801.3
0.070	89.96	2660.2	4.00	250.33	2799.4
0.080	93.51	2666.0	5.00	263.92	2792.8
0.090	96.71	2671.1	6.00	275.56	2783.3
0.10	99.63	2675.7	7.00	285.80	2771.4
0.12	104.81	2683.8	8.00	294.98	2757.5
0.14	109.32	2690.8	9.00	303.31	2741.8
0.16	113.32	2696.8	10.0	310.96	2724.4
0.18	116.93	2702.1	11.0	318.04	2705.4
0.20	120.23	2706.9	12.0	324.64	2684.8
0.25	127.43	2717.2	13.0	330.81	2662.4
0.30	133.54	2725.5	14.0	336.63	2638.3
0.35	138.88	2732.5	15.0	342.12	2611.6
0.40	143.62	2738.5	16.0	347.32	2582.7
0.45	147.92	2743.8	17.0	352.26	2550.8
0.50	151.85	2748.5	18.0	356.96	2514.4
0.60	158.84	2756.4	19.0	361.44	2470.1
0.70	164.96	2762.9	20.0	365.71	2413.8
0.80	170.42	2768.4	21.0	369.79	2340.2
0.90	175.36	2773.0	22.0	373.68	2192.5

2) Saturated steam temperature – enthalpy table (ranked by temperature)

Temperature (℃)	Pressure (MPa)	Enthalpy (KJ/Kg)	Pressure (MPa)	Temperature (℃)	Enthalpy (KJ/Kg)
0	0.0006108	2501.0	80	0.047359	2643.8
0.01	0.0006112	2501.0	85	0.057803	2652.1
1	0.0006566	2502.8	90	0.070108	2660.3
2	0.0007054	2504.7	95	0.084525	2668.4
3	0.0007575	2506.5	100	0.0101325	2676.3
4	0.0008129	2508.3	110	0.14326	2691.8
5	0.0008718	2510.2	120	0.19854	2706.6
6	0.0009346	2512.0	130	0.27012	2720.7
7	0.0010012	2513.9	140	0.36136	2734.0

8	0.0010012	2515.7	150	0.47597	2746.3
9	0.0011473	2517.5	160	0.61804	2757.7
10	0.0012271	2519.4	170	0.79202	2768.0
11	0.0013118	2521.2	180	1.0027	2777.1
12	0.0014015	2523.0	190	1.2552	2784.9
13	0.0014967	2524.9	200	1.5551	2791.4
14	0.0015974	2526.7	210	1.9079	2796.4
15	0.0017041	2528.6	220	2.3201	2799.9
16	0.0018170	2530.4	230	2.7979	2801.7
17	0.0019364	2532.2	240	3.3480	2801.6
18	0.0020626	2534.0	250	3.9776	2799.5
19	0.0021960	2535.9	260	4.6940	2795.2
20	0.0023368	2537.7	270	5.5051	2788.3
22	0.0026424	2541.4	280	6.4191	2778.6
24	0.0029824	2545.0	290	7.4448	2765.4
26	0.0033600	2543.6	300	8.5917	2748.4
28	0.0037785	2552.3	310	9.8697	2726.8
30	0.0042417	2555.9	320	11.290	2699.6
35	0.0056217	2565.0	330	12.865	2665.5
40	0.0073749	2574.0	340	14.608	2622.3
45	0.00958172	2582.9	350	16.537	2566.1
50	0.012335	2591.8	360	18.674	2485.7
55	0.015740	2600.7	370	21.053	2335.7
60	0.019919	2609.5	371	21.306	2310.7
65	0.025008	2618.2	372	1.562	2280.1
70	0.031161	2626.8	373	21.821	2238.3
75	0.038548	2635.3	374	22.084	2150.7

3) Superheated steam temperature and pressure – enthalpy table

T (℃	MPa							
	0.001	0.005	0.010	0.1	0.5	1.0	3.0	5.0
0	0.0	0.0	0.0	0.1	0.5	1.0	3.0	5.0
10	2519.5	42.0	42.0	42.1	42.5	43.0	44.9	46.9
20	2538.1	83.9	83.9	84.0	84.3	84.8	86.7	88.6
40	2575.5	2574.6	167.4	167.5	167.9	168.3	170.1	171.9
60	2613.0	2612.3	2611.3	251.2	251.2	251.9	253.6	255.3
80	2650.6	2650.0	2649.3	335.0	335.3	335.7	337.3	338.8
100	2688.3	2687.9	2687.3	2676.5	419.4	419.7	421.2	422.7
120	2726.2	2725.9	2725.4	2716.8	503.9	504.3	505.7	507.1
140	2764.3	2764.0	2763.6	2756.6	589.2	589.5	590.8	592.1
160	2802.6	2802.3	2802.0	2796.2	2767.3	675.7	676.9	678.0
180	2841.0	2840.8	2840.6	2835.7	2812.1	2777.3	764.1	765.2
200	2879.7	2879.5	2879.3	2875.2	2855.5	2827.5	853.0	853.8
220	2918.6	2918.5	2918.3	2914.7	2898.0	2874.9	943.9	944.4
240	2957.7	2957.6	2957.4	2954.3	2939.9	2920.5	2823.0	1037.8
260	2997.1	2997.0	2996.8	2994.1	2981.5	2964.8	2885.5	1135.0

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280	3036.7	3036.6	3036.5	3034.0	3022.9	3008.3	2941.8	2857.0
300	3076.5	3076.4	3076.3	3074.1	3064.2	3051.3	2994.2	2925.4
350	3177.2	3177.1	3177.0	3175.3	3167.6	3157.7	3115.7	3069.2
400	3279.5	3279.4	3279.40	3278.00	3217.80	3264.00	3231.60	3196.90
420	3321.06	3320.96	3320.96	3319.68	3313.80	3306.60	3276.90	3245.40
440	3362.62	3362.52	3362.52	3361.36	3355.90	3349.30	3321.90	3293.20
450	3383.40	3383.30	3383.30	3382.20	3377.10	3370.70	3344.40	3316.80
460	3404.52	3404.44	3404.42	3403.34	3398.30	3392.10	3366.80	3340.40
480	3446.76	3446.72	3446.66	3445.62	3440.90	3435.10	3411.60	3387.20
500	3489.00	3489.00	3488.90	3487.90	3483.70	3478.70	3456.40	3433.80
520	3531.92	3531.88	3531.82	3530.90	3526.90	3521.86	3501.28	3480.12
540	3574.84	3574.76	3574.74	3573.90	3570.10	3565.42	3546.16	3526.44
550	3596.30	3596.20	3596.20	3595.40	3591.70	3587.20	3568.60	3549.60
560	3618.10	3618.02	3618.00	3617.22	3613.64	3609.24	3591.18	3572.76
580	3661.70	3661.66	3661.60	3660.86	3657.52	3653.32	3636.34	3619.08
600	3705.30	3705.30	3705.20	3704.50	3701.40	3697.40	3681.50	3665.40

T (℃)	MPa					
	7.0	10.0	14.0	20.0	25.0	30.0
0	7.1	10.1	14.1	0.1	25.1	30.0
10	48.8	51.7	55.6	61.3	66.1	70.8
20	90.4	93.2	97.0	102.5	107.1	111.7
40	173.6	176.3	179.8	185.1	189.4	193.8
60	256.9	259.4	262.8	267.8	272.0	276.1
80	340.4	342.8	346.0	350.8	354.8	358.7
100	424.2	426.5	429.5	434.0	437.8	441.6
120	508.5	510.6	513.5	517.7	521.3	524.9
140	593.4	595.4	598.0	602.0	605.4	603.1
160	679.2	681.0	683.4	687.1	690.2	693.3
180	766.2	767.8	769.9	773.1	775.9	778.7
200	854.6	855.9	857.7	860.4	862.8	856.2
220	945.0	946.0	947.2	949.3	951.2	953.1
240	1038.0	1038.4	1039.1	1040.3	1041.5	1024.8
260	1134.7	1134.3	1134.1	1134.1	1134.3	1134.8
280	1236.7	1235.2	1233.5	1231.6	1230.5	1229.9
300	2839.2	1343.7	1339.5	1334.6	1331.5	1329.0
350	3017.0	2924.2	2753.5	1648.4	1626.4	1611.3
400	3159.70	3098.50	3004.00	2820.10	2583.20	2159.10
420	3211.02	3155.98	3072.72	2917.02	2730.76	2424.70
440	3262.34	3213.46	3141.44	3013.94	2878.32	2690.30
450	3288.00	3242.20	3175.80	3062.40	3952.10	2823.10
460	3312.44	3268.58	3205.24	3097.96	2994.68	2875.26
480	3361.32	3321.34	3264.12	3169.08	3079.84	2979.58
500	3410.20	3374.10	3323.00	3240.20	3165.00	3083.90
520	3458.60	3425.10	3378.40	3303.70	3237.00	3166.10

540	3506.40	3475.40	3432.50	3364.60	3304.70	3241.70
550	3530.20	3500.40	3459.20	3394.30	3337.30	3277.70
560	3554.10	3525.40	3485.80	3423.60	3369.20	3312.60
580	3610.60	3574.90	3538.20	3480.90	3431.20	3379.80
600	3649.00	3624.00	3589.80	3536.90	3491.20	3444.20

XIII. Programming Examples

Some gas is measured with orifice plate with input of differential pressure as well as pressure and temperature compensation without output; it's required that no cumulation will be made when the differential pressure is less than 10KPa. Relevant parameters are as follows:

Differential pressure transducer: 4~20mA; measuring range: 0~80KPa

Pressure transducer: 1~5V; measuring range: 0~3KPa

Temperature transducer: 4~20mA; measuring range: 0~300 ℃

Atmospheric pressure at the site where the instrument operates (PA): 0.08 MPa

Density in standard condition: ρ20 = 2Kg/m^3

When operating pressure (compensated pressure) P = 3MPa and operating temperature T =300 ℃, the maximum flow M = 100T/h.

Instrument model selection: OHR-E600A-27/29/27-X/2/X/X-A

Based on the formula:

$$M = K \times \sqrt{\rho_{20} \times \frac{(T_0 + 20℃) \times (P + P_A)}{P_0 \times (T + T_0)} \times \Delta P}$$

$$K = \frac{M}{\sqrt{\rho_{20} \times \frac{(T_0 + 20℃) \times (P + P_A)}{P_0 \times (T + T_0)} \times \Delta P}}$$

$$= \frac{100}{\sqrt{2 \times \frac{(273.15+20) \times (3+0.08)}{0.10133 \times (300+273.15)} \times 80}}$$

$$= 2.00504$$

The parameters are set as follows:

1. Level 2 parameters setting:

Parameter	Name	Set value
tYPE	Flow model	11
ALM1	Alarm 1	0
ALM2	Alarm 2	0
Qn	Flow measurement option	0
Addr	Device ID	1
Baud	Communication baud rate	3
Q-Tn	Time unit of instantaneous flow display	2
M-dp	Precision of cumulative flow display	3
Q-dp	Decimal point of instantaneous flow display	1
H-Tn	Time unit of instantaneous heat display	2
N-dp	Precision of cumulative heat display	3
H-dp	Decimal point of instantaneous heat display	2
Y-dp	Decimal point of temperature compensation display	1

P-dp	Decimal point of pressure compensation display	3
F-dp	Decimal point of flow input	1
FK	Filter coefficient	0
T-n	Type of temperature compensation input	27
P-n	Type of pressure compensation input	29
F-n	Type of flow signal input	27
T-b	Zero shift of temperature compensation	0
T-k	Amplification scale of measuring range of temperature compensation	1.000
P-b	Zero shift of pressure compensation	0
P-k	Amplification scale of measuring range of pressure compensation	1.000
F-b	Zero shift of flow input	0
F-k	Amplification scale of measuring range of flow input	1.000
O1-b	Zero shift of transmission output 1	0
O1-k	Amplification scale of transmission output 1	1.000
OUL	Lower limit of measuring range of transmission output	0
OUH	Upper limit of measuring range of transmission output	1000
PA	Atmospheric pressure in operating condition	0.10133
T-L	Lower limit of measuring range of temperature compensation	0
T-H	Upper limit of measuring range of temperature compensation	300
P-L	Lower limit of measuring range of pressure compensation	0
P-H	Upper limit of measuring range of pressure compensation	3
F-L	Lower limit of measuring range of flow input	0
F-H	Upper limit of measuring range of flow input	80
Cut	Small signal cutoff of flow input	10
T-u	Unit of temperature compensation	3
P-u	Unit of pressure input	2
F-u	Unit of flow input	2
Q-u	Unit of instantaneous flow	20
H-u	Unit of instantaneous heat	26
Pr-A	Alarm printing	0
Pr-T	Interval of printing	0
KE	Mode of flow coefficient compensation	0
Tin	Temperature input	0
Pin	Pressure input	0

2. Exit Level 2 parameter setting screen and return back to Level 1 parameter setting screen:

Symbol	Name	Set value	Symbol	Name	Set value
LOC	Parameter locking	0	ρ20	Density in standard condition	2
K1	Flow coefficient 1	2.00504	DIP	PV display content	2

3. Instrument collation – instantaneous flow checking:

Measured value of flow input (KPa)	20.0	40.0	60.0	80.0
Pressure compensation input (MPa)	0.750	1.500	2.250	3.000
Temperature compensation input (℃)	300	300	300	300
Instantaneous value (T/h)	25.9	50.6	75.3	100.0