

Mikoflow®

Universal Multivariable Flow Transmitter

Operation Manual



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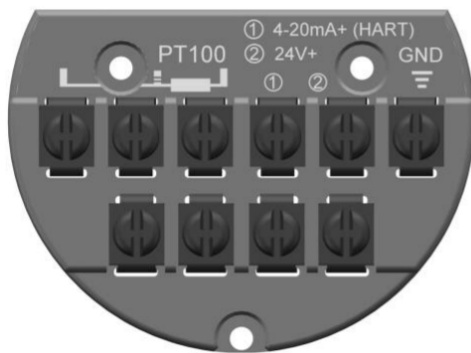
Zhengwq9@hotmail.com

Thanks for your selection for the flow transmitters. The manual will guide you to operate it.

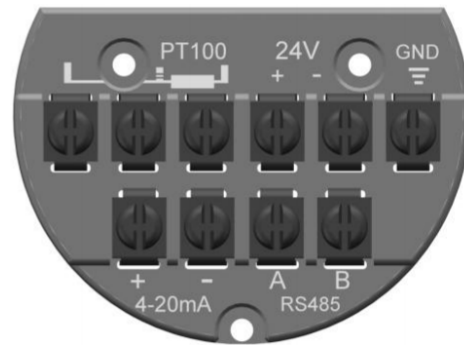
Notes while installation and operation steps,

- (1) Installation any one primary element (DP devices) and 3-way manifold;
- (2) Installation MMF or MTF on the top of 3 way manifold, be sure no any divulge;
- (3) Loosing the screw on house, selection suitable direction. Turing display board, selection suitable display position (+/-90°);
- (4) Terminal connection:
 - 4~20mA+HART: 24Vdc+, 24Vdc-(/4~20mA+), Grand, 3 lines Pt100 (or without);
 - 4~20mA+Modbus/RS485: addition 4 terminal, 4~20mA+/-, A,B(RS485);
- (5) Check 4~20mA loop currents,
 - Set a small ‘Flow Range’, let instrument into “Error 2” or other errors;
 - Entering user menu to “Alarm Out Select [mA]”, selection “Fixed Current out”, and “Alarm_Value[mA]”, setting within 4.0mA to 20.0mA, checking control room’s 4~20mA input.
 - If the error between two sides over +/-0.5mA, need to check the mA loop.
 - If need let instrument to modify mA output, need entering special PIN (86123), to fine the 4mA code and 20mA code, which original codes can be seen at “Check Sheet of Factory”. Press middle key, to large current; press the right key, to reduce. Need alternative change both codes, let 4/8/16/20mA up to all OK!
 - If confusion, need to fill original code, to refine tuning.
- (6) Entering user menu, set “Dp Zero” into Zero(see user menu).
- (7) Entering user menu, to set others parameters as”Calculation Sheet”, then “Save” all setting.

1. Back terminal (either-or)



4~20mA +HART terminal

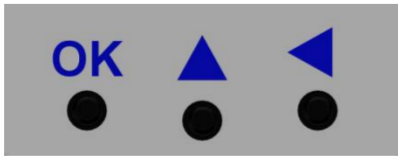


4 lines 4~20mA+Modbus (RS485)

- 2 lines 4~20mA +HART(only top line), which can be Ex ia & Ex id
 - (11~30)VDC+, 4~20mA+, GND
 - PT100 thermal resister 3 lines
- 4 lines 4~20mA+Modbus(RS485), which can be only Ex id
 - (11~30)VDC for power (top line)
 - PT100 thermal resister 3 lines(top line)
 - 4~20mA output (second line)
 - Modbus/RS485 A port and B port (second line)

2. Human machine interface

2.1 3 keys



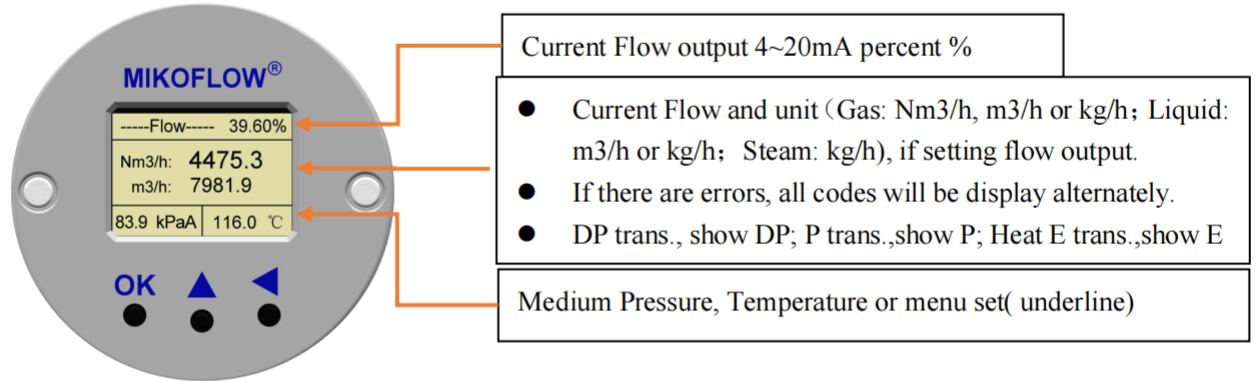
There are 3 keys to operation

- confirm/selection key (OK)
- (0~9)circle/selection up or down (▲) ;
- Left /right shift mod bit (◀)

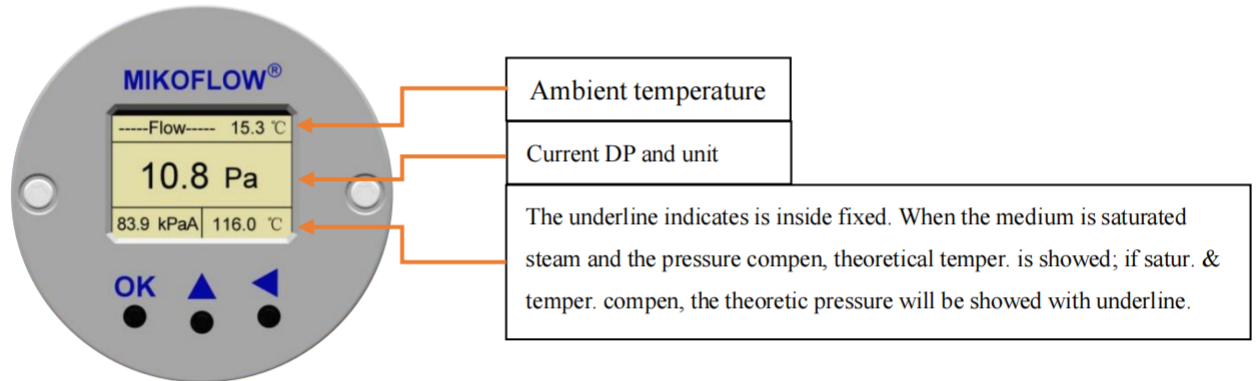
2.2 Display interfaces

More information can be seen on the 3 displays. Press“OK”will show next display. Or display next after wait 8 seconds . It will be return the 1st display if no operation up to 5 min.

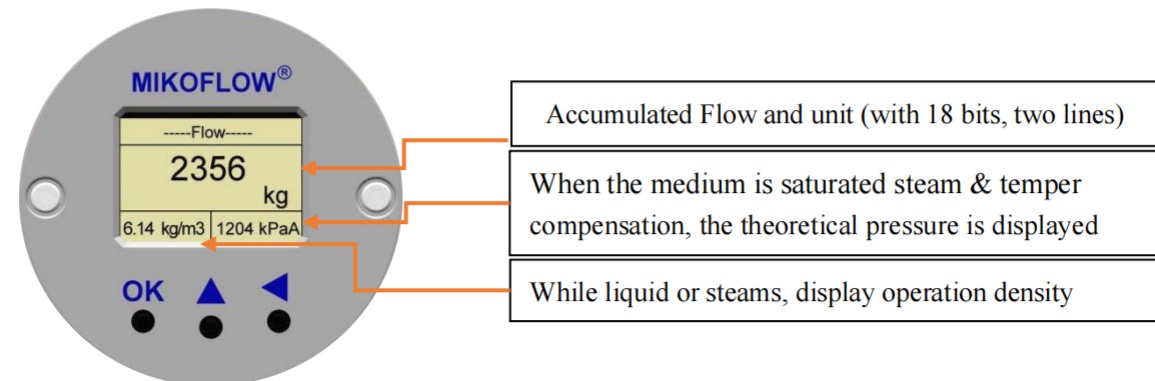
2.2.1 1st display: current flow, flow unit, medium pressure(kPaA), temperature(°C) and 4~20mA output percent(%). P or T with underline is set by menu, not real measurement.



2.2.2 2nd display (current different pressure DP and unit)



2.2.3 3rd display (integrated flow, unit, density,.....)



3 . Phone APP or computer calculation result- Meter Coefficient and Keys

Website: <http://47.106.98.116/systecMeterCoef> or www.mikoflow.cn

3.1 Input and calculation “meter coefficient”

- Open APP on phone or computer, input;
- Pipe information;
- Sensor and Primary element information
 - for DF series, only input types;
 - for any others primary element, input flow coefficient K or α and ϵ (coefficient of expansion), which can be found in their calculation sheet.
- Technical data: selection medium, input temperature /pressure. If user gives operation density, “other gas”or “other liquid” has to be selected, input directly operation density.
- User’s scale /max/normal/min flow. If the range is larger than the given max flow, need to change Dp sensor measurement range. Then, press “Calculation” and press “Generate calculation paper”, which can be printed out.
- All flow data are concentrated into “Meter Coefficient”.
- “Calculation paper”, as next page.

Pipe date

Pipe material: CS (20#)

Wall thickness: 5 mm

Round

Inside Diameter: 100 mm

Square

Long: 100 × Wide: 100 mm

Technical Data

Fluid type: O2

Pressure (A) : 100 KPa abs

Temperature: 20 °C

Normal Density: 1.42895 Kg/Nm³ (0°C, 101.325KPa)

Process Density: 1.31405 Kg/m³

Sensor and Primary Element

Products Type: MMF (Dp&P measure + Flow integrator)

Dp/P sensors: BD (diaphragm, 6.0Kpa@2Mpa)

Prim. Element: Other: UD others

$\beta(d/D)$: 1.0 d20: 100.000mm

K-Factor or α : 0.57375 zeta: 3.03777

Expansion factor(2/3): 0.98879

Probe safety: -

Flow Data

Min~Max Flow Range: 25.736~1409.609 Nm3/h

Flow Scale Range: 1000 Nm3/h

Q_max : 1000 Nm3/h

Q_norm : 1000 Nm3/h

Q_min : 1000 Nm3/h

	DP(kPa)	DP loss(Pa)	Eps	ReD	v(m/s)
Q _{design}	3.020	1600.5	0.966650	248235	38.460
Q _{max}	3.020	1600.5	0.966650	248235	38.460
Q _{norm}	3.020	1600.5	0.966650	248235	38.460
Q _{min}	3.020	1600.5	0.966650	248235	38.460

ImproveIT

ImproveIT-factor: 1

Keys: 1.10445006

MMF BD UD

Meter Coefficient: 13.9751700

3.2 Calculation Results

sys^{te}c Universal Mass Flow Calculation Results

sys^{te}c Controls Mess- und Regeltechnik GmbH

Lindberghstraße 4,82178 Puchheim, Germany

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Phone : ++49-(0)89-80906-0

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NO:MFB2023042100923

Ver: 1.00

Order Company	Contact/Tel	/*****
Contract Number	Data resources	
Project Name	End User	
Tag	Applications	
S/N	Number	1
Noted:		

Type of Transmitters and its Introduce

Type	MMF BD UD
MMF measures process DP, P and T for gas, liquid or steam. Process density is compensated by P, T and normal density. Flow/DP/Pressure/Heat Energy can be selected as 4~20mA output. 2-lines 12~30Vdc is power+output+HART. 4-lines 4~20mA+RS485(option).	
Digital shower can display Flow, DP, P, T, Density, Integrated flow (18 bits), Units, Error info, and so on.	
There are 10 points non-linear calibration for Q(i)-A(i), the flow precision will be higher from 1%FS to 0.5%R.	
Sensor: see label.Element:UD,User Define, such as nozzle, orifice, or bar.	

Process Data

Pipe type	Round	Pipe material	CS (#20)
Inside Dia.	100.0 mm	Well thickness	5.0 mm
Equi. ID	100.00 mm, under temper	Fluid name	O2
Pressure	100.0 KPa, A	Normal Density	1.42895 Kg/Nm ³ , (0°C,101.325KPa)
Temperature	20.0 °C	Operation Density	1.31405 Kg/m ³

Calculation Results:(under flow scale)

Min~Max Flow Range	26~1410 Nm ³ /h	ImprovellT-factor	1.00000 -		
Viscosity	0.02036 Cp	Isentropic index	1.39770 -		
K-Factor or α	0.57375 -	Probe safety	-		
flow	unit Nm ³ /h	Q	Q_max	Q_norm	Q_min
DP	kPa	3.0196	3.0196	3.0196	3.0196
DP loss	Pa	1600.48	1600.48	1600.48	1600.48
ε	—	0.9666	0.9666	0.9666	0.9666
ReD	—	248235	248235	248235	248235
v	m/s	38.46	38.46	38.46	38.46

Transmitter KEY Parameters Setting

Fluid Name	Gas
Meter Coefficient	13.9751700 Keps 1.10445006
Full range of Flow	1000 unit Nm ³ /h (not need input)
Filter constant	1~999 second (based on the fluid stability.)
Note	Please select correction temperature resource--inside or Pt100 from terminal

Last part is information which will be inputted into MMF/MTF.

- Fluid name: only 5 kinds, Gas/ water/Sat_steam/Suph_steam/ Liquid, for selection.
- “Meter Coefficient”: Each bit never mistake!!!
- “Keps” is modification factor of ε.
- Scale flow range must be same with design sheet and DCS’s setting;
- Flow unit does not need input, only tell customer.

3.3 Entering setting menu: keep Press “OK” 5 second on any display, press “OK”, it will enter “user menu”.

3.4 Return back display:

3.4.1 normal mode: last menu “Save”, selection “yes”, then save all setting and return.

3.4.2 Long press “OK” 5 second at any menu, it will not save to quit .

3.4.3 It will be returned if no any operation after 5 min. Note, no any save at the situation.

Note: after power off, 3.5.2 and 3.5.3 case, the changed data cannot be saved.

4. User menu

-----Flow-----
PIN: 00000
PIN: 00000

4.1 PIN

Show “PSW”: 000000, press directly “OK”, it will enter user menu.

----Flow----
Gas/ water/ Sat_Steam /Suph steam/ liquid
Select

4.2 Process medium selection (march with Calculation sheet)

Cycle switch shows Gas /Water /Saturated steam/Superheated steam /Liquid, based on “Calculation sheet”.

Liquid density (m3/h) must be asked to enter if selecting “Liquid”, others density will be calculated automatic in instrument.

Please note: Once changing medium, the compute mode and formula will be changed, all accumulated flow will be reset to zero. Below display has some alarm!!!

-(Flow/DP/P/HE) select-
Flow/DP/P/Heat E
mA out define
----Flow/DP/P/HE----
00010000.00
Flow Range Nm3/h

4.3 Range setting (Flow/ DP /P /Heat Energy range, depend setting)

Transmitter 4~20mAoutput declination, based on special setting (PIN:86123), there are 4 kinds of 4~20mA output define: Current Flow/ DP /P /Heat Energy”.

After define of 4~20mA output, the menu can be showed different:

“Flow range”: as “Calculation sheet”, flow unit does not need to input.

“DP/P range”: must be smaller than max DP(Pa)/P(kPa), which setting at selection model, such as 6kPa@2MPa. Max DP is 6kPa, Max P is 2000kPa.

“Heat Range” is free setting, unit is GJ(10⁹ Joule). Then need to enter “(heat) Water Range” as “Calculation sheet” and input cool temperature.

For Flow output, no more information. For “DP/P/Heat E”, 1st display will add “DP: xxxxPa ” /P:xxxxPa /E xxxxGJ/h, show what kinds of output.

-----Flow-----
012.1650005
Meter Coef

4.4 Meter Coefficient (Must march with Calculation sheet)

Please note: never take any mistake while entering each bits, because each bit has more information. It must be march with Calculation sheet.

-----Flow-----
0.2390283
Keps

4.5 Keps

It is one modifying factor for real calculation “coefficient of expansion”.

Check the “Calculation sheet”. Default value is 0, its range is 0~5.0000.

While medium is water or liquid, it always is 1, no the menu. It need to input for any gas /steam.

-----Flow-----
1.000000
Linear Gain

4.6 Linear Gain (current flow fine tuning, UP or Down linear for all range)
 It will let current flow linear fine tuning at full range.
 LG>1: let flow linear larger; LG<1, let flow linear smaller.
 Default value: 1.00000, modify range is 1.2~0.8.

-----Flow-----
003
Damp [s]

4.7 Damping [s]
 Setting range :1~999 second, default value: 3 sec.
 Please let it larger if the system is unstable.

-----Flow-----
Alarm_H/Alarm_L /FixedCurrent Value
Alarm Out Select

4.8 Alarm Out Selection
 While instrument meets major errors, 4~20mA will be stop, which output depend on the menu selection. There are 4 kinds output for selection.
 Alarm_H: output 21.6mA; Alarm_L: 3.8mA; "Current Value" output or Fixed one fixed value within 3.8~21.6mA for next menu.

-----Flow-----
003
Min. DP (0-50)Pa

4.9 min. DP (0~50)Pa
 Minimal DP can be selected by user based on system.

-----Flow-----
30.4 Pa
DP ZERO

4.10 Dp ZERO (**Please note: no any flow at moment**)

While installation the transmitter before running, need to set transmitter DP into zero. The max zero is about +/-390Pa if DP two poles are under vertical, which is not good installation position, special for small flow range(0~1kPa range). Under the menu, press right key over 3 second, showing"SURE yes no", press right key, move cursor to "YES", press "OK", "CLR ZERO", after one second, DP will be clear, show 0.0 Pa. Setting DP zero will be finished. DP zero can be setting more times.

After then, the zero bias value has been saved instantly, not need save up to last menu.

-----Flow-----
FIXED YES NO ▲
Inside Set Temp

4.11 Temperature Resource selection (Pt100 or inside menu digital setting)

Medium temperature come from: Pt100 from terminal 1,2,3(outside),or inside menu digital setting.

If selecting YES(inside setting), next menu will need input one fixed temperature (20 or 100°C). If medium is steam, it will show "Set limit" if it is smaller than 100°C. After then, the value will be showed with underline at 1st and 2nd display.

If selecting "No", temperature resource will be from terminal 1,2,3. It will be show "Error 6" if terminal is empty, or cables blocked. 4~20mA output will be defined as 4.8.

The inside or outside temperature will be showed in lower right corner of 1st /2nd display. Inside or outside temperature can be used for off-line or on-line estimation by temperature, pressure and DP.

When the medium is "Saturated Steam", the menu will be two options: "Temperature or Pressure Compensation". If "Pressure Compensation" is selected, temperature and density are calculated based on pressure. When temperature compensation is selected, the pressure and density

will be calculated based on temperature, and showed on 2nd and 3rd display. At this time, temperature or pressure will be with under line.(2500kpaA or 250°C).

It is MMF, there are more selection. Selection pressure compensation without PT100.

If order MTF, saturated steam measure can only be temperature compensation, by inside or outside temperature resource.

-----Flow-----	
FIXED	YES NO
	▲
Inside	Set Temp

4.12 Pressure resource selection

Outside source(NO): measure high pressure side (+) of primary element, its type is absolute pressure (such as 200kPaA)

Inside source(YES): menu setting one fixed pressure, for temp-pressure compensation, or digital estimation. Setting pressure unit is kPaA. After then, 1st and 2nd display's pressure will be underline, its mean is inside setting, not outside measured. After setting, its density will be checked, if over water/steam density range, instrument will be show "ERROR XX";

If order MTF, no real-time measure medium pressure, only inside setting, no the menu, directly enter setting inside pressure. So it is call fixed pressure temperature compensation.

4.13 Dp-Flow estimation (need order)

-----Flow-----	
FIXED	YES NO
	▲
Dp-Flow Est	

Only order the on-line/ off-line estimation and 10 points calibration function, the follow menus can be seen. Other wise it will be jump to 4.17

If selection "NO", the program will jump to 4.1; selection "YES", it will enter estimation part.

-----Flow-----	25.8%
Qm:	1278.2
Dp:	2991829.2 1275
923 kPa	135°C

4.14 Off-line and on-line estimation (need order)

Entering the menu, the current pressure(kPa) , current temperature, can be seen below line, which setting before menu. The middle area are estimation area, (DP:) can set Dp value with 7 digital, 1 decimal. Current flow will be calculated by Dp, P, T, Meter Coef., ε(eps), S heat compensation, etc. It (Qm') will be showed next Dp. If you select 10 points non-linear calibration, Qm is new current flow after 10 points(segments) modified, with 1 decimal, a litter different with before calibration. If no 10 segment calibration, two flow are the same, only Qm has one decimal more.

4~20mA's percent (25.8%) will be display at top right corner, which is march with real output. It is only digital estimation, no real 4~20mA output. It does not have any relationship with current mA output.

If pressure and temperature both are real time measuring from DP diaphragm or back terminal, it will be real time estimation.

If the pressure and temperature are setting by menu, it is total off-time digital estimation, but its parameters are total as user offered.

Customer can calculate Qm' and Qm based on their "calculation paper" which is total theoretic values. Then to input Dp(i), copy down Qm(i)' and A(i)(=Qreal(i)/Qm(i)').

Qreal(i): maybe is theoretic value, or real running Qreal(i) under real Dp(i) /P(i)/T(i)

Setting one excel table (red color er lines)

i	1	2	3	4	5	6	7	8	9	10
Qm'	100	200	250	320	500	1000	2000	93000	-	-
Qreal	108	203	260	310	480	998	2015	3010	4008	6003
A(gain)	1.0800	1.0150	1.0400	0.9688	0.9600	0.9980	1.0075	-	-	-

Taking (100,1.08000),(200,1.0150),.....input next menu.

Had better drawing a curve grape, find out each knee point. Kick to linear parts. Selection the key points as segments.

-----Flow-----
000000100 Q(1)
1.080000 A(1)
Fine Tuning A1

4.15 Fine tuning for 10 segments non-linear (need order)

Each menu can input one segment (knee point). One by one modification, if some bit input mistake, it can re-back from 1st bit again. Q(i) has 9-bit integer, A(i) has 6 bit decimal. Any flow will be linear interpolation based on top-down Qm(i) and Ai. There are some rules, as follow:

- Q(0)=0, A0=1;
- Q(i+1)>Q(i); otherwise, program will be alarm, asking re-input.
- $0.8 \leq A(i) \leq 1.2$, over range will be alarm.
- If want to close 10 segment calibration, let the $Q(1) > 120\% Qfs$ (120% scale range), it will just to finish(menu 4.13) .
- If only wish set 7 segments, as above example, let $Qm'(8) > 120\% Qfs$, it will jump to 4.13.
- If want to jump out the segment, let its $A(i)=1$, the segment 's gain will be 1.0 without any fine modification.

-----Flow-----
Back Yes NO
▲
Check again

4.16 Check again (need order)

After input each segment, or jump some segments, to the menu. Asking if need to go back 1st segment to check again. If need back to check, press “YES”, wish go next menu, press “NO”.

-----Flow-----
Normal /rolling
Display_Style

4.17 1st, 2nd and 3rd display working mode selection

“Rolling”: each display will automatic show 8 second , after next.
 “Normal”, each display will be controlled by “OK” key. Press once, next.

-----Flow-----
English/ German
/Chinese
Language

4.18 Language Selection

It has English /German /Chinese for selection. The selection can be saved at last menu. No save, no successful to change language.

-----Flow-----
SAVE YES NO
▲
END SET

4.19 Setting Save and Exit or Not

Select: “YES”, save all setting and exit
 Select: “NO”, not save and not exit, return to first menu again.
 If selection “NO”, and medium had been changed, middle quit, no save. Program will work as new medium, but cannot clear integrated flow. Only power off, the all new setting will be forgot. New language can not work until save at the menu.

For advanced engineer password PIN 86123, only enter once. If selection NO save, enter normal “user menu”, not before menu, in order to safety.

So, wish to save and then quit, it will store all new setting parameters.

-----Flow-----		
TF CLR	YES	NO
		▲
CLR MF		

4.17 Accumulated Flow reset to zero

Under 3rd display, press “◀” and “▲” together keep 5 second, entering sets zero procedure for accumulated flow. The first selection “YES”, then need enter password (97531); AFTER check, press “▲”(middle key) again, Accumulated Flow will be cleared.

5. Errors definition

When happening one of “Error 1” or “Error 2” or “Error3” or “Error4” or “Error5” or “Error6” or “Error10”(see below table), the instrument will stop to compute current flow, asking user to find out questions. Meanwhile, 4~20mA output as setting “Current mA/3.8mA/21.6mA/free setting within 3.8~21.6mA. See 4.8.

If there are more than one error, they will be showed one after one on the 1st display.

Error Codes table(show at 1st display)

Error Code	Fault content	Cases and solutions
Error 1	IIC bus error, DP/P reading error	Check connection cable, if not obvious bloke, need send back factory
Error2	Current Flow is larger than 110% Flow Range	Flow output over flow range 110%. Normal: Flow Coef /Flow Range enter mistake, Pt100 entering mistakes, linear gain is too large,.....
Error3	Density of saturated steam error	The measured pressure or temperature does not meet the saturated steam conditions, please check whether the process pressure or temperature are correct
Error4	Density of superheated steam error	The measured pressure or temperature does not meet the superheated steam condition, please check whether the process pressure or temperature are correct
Error5	Density of water error	The measured pressure or temperature does not meet the water conditions, please check whether the process pressure or temperature are correct
Error6	Pt100 thermal resistance error	Check that the Pt100 thermal resistance wiring is correct or disconnected
Error7	ambient temperature >70°C	Take thermal isolation or strengthen heat dissipation to ensure that the transmitter ambient temperature is less than 70°C, it is recommended to change to split installation
Error8	medium temperature>500°C	Check the external Pt100 resistance wiring or resistance fault
Error9	DP measurement lower alarm	DP zero point: not calibration; High/low pressure installation disordered, high pressure side of primary element is blocking. Need to clear guide-pressure pipe,....
Error10	DP measurement higher alarm	DP zero point: not calibration; High/low pressure installation disordered, low pressure side of primary element is blocking. Need to clear guide-pressure pipe, DP range is too small.
Error11	Pressure (A) lower alarm	Transmitter is under big vacuum condition or under negative condition.
Error12	Pressure (A) higher alarm	Full range of transmitter is too small. Need to select high level.

6. Special PIN for engineers (86123)

There are 5 menus more than user menu, which need careful set or selection. Most are the same with user menu. After “pressure inside/outside” menu, these menus will be found. The PIN only be effective once. If no “SAVE” and no quit, enter the first menu of normal user menu. If you want enter again, need input PIN again, it is for safety.

-----Flow-----
Flow /DP/ P/ Heat E
mA out define

6.1 mA out define

Customer can free select 4~20mA out as Flow or DP or P or Heat Energy. Please reference 2.2.1 (1st display) and menu 4.3.

- If select “Flow”, as normal, no more change. If select others, flow calculation will still be operated, only 4~20mA is other variables.
- If select “DP”, 1st display will show “DP” , current dp value and unit. In the 4.3, need input DP scale range, which must smaller then max DP of the instrument. Such as 0~6kPa, any less than 6kPa can be inputted, otherwise will be alarmed. The top right corner of 1st will be DP’s percent (0~100%).
- If select “P”, 1st display will show “P” , current pressure value and unit kPa(A), total same with below pressure. In the 4.3, need input Pressure scale range, which must smaller then max Pressure of the instrument. Such as 0~2MPa, any less than 2MPa can be inputted, otherwise will be alarmed. The top right corner of 1st will be Pressure’s percent (0~100%).
- If select “ Heat E”, 1st display will show “E” , current heat energy and unit GJ/h. The integrated flow will be show at 3rd display. In the 4.3, medium must be “Water”, cannot be changed. After then, need to set scale Heat Energy, cool temperature and scale flow of water as “calculation paper”. The 20mA must match with DCS’s scale Heat Energy. The top right corner of 1st will be Heat E ’s percent (0~100%).

-----Flow-----
MD YES NO
4.0/20mA Out Test
-----Flow-----
01245
4.0/20mA MOD

6.2 4.0mA out test

Please reference beginning of installation. If need to modification 4~20mA, it can support to larger or smaller 4mA.

Selection “YES”, the D/A output code will be showed. Press middle key, the code will be larger,the 4mA value will be higher one unit. Press right key, the code will be down/reduce, 4mAvalue will be smaller one unit. Press “OK”, new code will be stored. Original codes are written on “Check sheet of factory”.

6.3 20mA out test

The steps and function are total the same with 6.2. BE careful:

- no only change one side (4mA or 20mA), they are affection each other.
- All operation must be in series with 4 1/2 current meter.

End word

Please contact with us, if meet trouble while operating the instrument.

Or visit www.mikoflow.cn/copy_index.html?chlang=&langid=2, which English version. You can get more information and many material can be download. During the instrument will add more functions, so menu will still have some changes, please understand.