

Pressure Transmitter **SIPNA™ PRO -131**

Differential Pressure Transmitter **PRO -141**

Reference Manual



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1- General Description

The moho series isolation intelligent pressure/differential pressure transmitter, is my company draw lessons from foreign advanced experience, applied the full isolation circuit R & D design with HART communication full isolation intelligent measurement instruments.

Transmitter using allisolation circuit technology design, on the power supply and signal isolation processing, greatly improving the stability and anti-interference ability.

In addition to having previous transmitter intelligent transmitter zero adjustment, range and zero pressure tuning of three basic function keys, also designed by F1 F2 and F3 display, three buttons in combination, with online passive migration (do not need to add pressure to set the measuring range, modification of zero and full pressure value), set the display of engineering unit, linear and square root transformation, setting damping time and constant current output function

Additional coding transmitter potentiometer, without opening the transmitter table cover, in the meter shell rotary encoder potentiometer knob, can adjust the zero pressure. The site is convenient and flexible to use, use efficiency is greatly improved

The transmitter also has a parameter data backup and recovery function. When data from being damaged when, through three key online restore corrupted data, and can be immediately modified data backup.

2-Shape, structure and dimension

The transmitter is mainly composed of a capacitive pressure/differential pressure sensor, the splint is also called pressure chamber, a pressure joint, fastening bolts, relief valve, instrument shell and electronic components. See photo : 2-1, 2-2, 3, 2-4,

Photo2-1 Transmitter shape

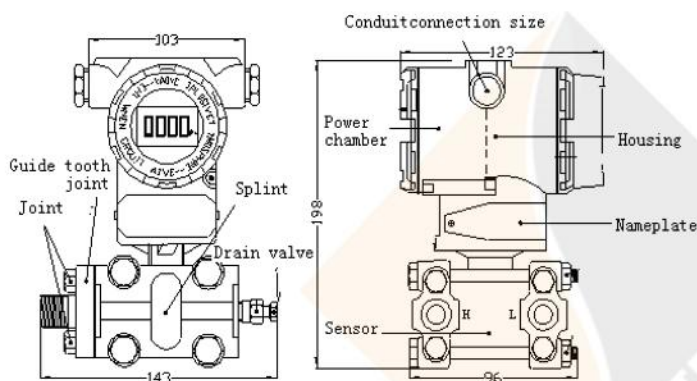


Photo2-2 The transmitter front/side



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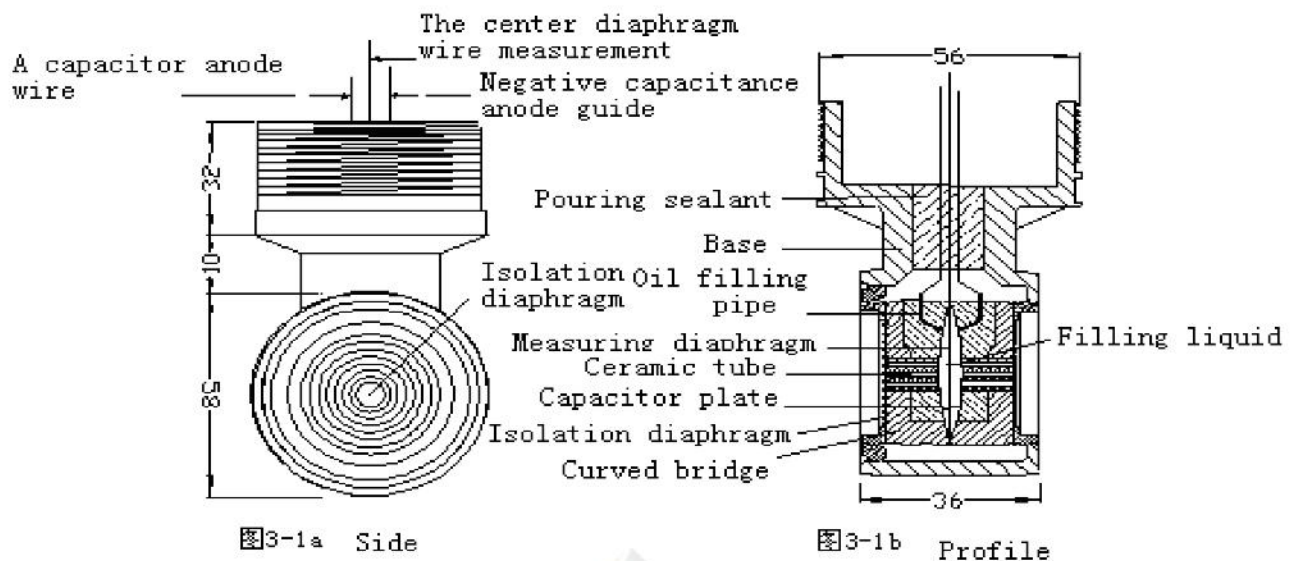
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3-Operation Theory

3.1 Working principle of the sensor

Process (a liquid, gas or steam) pressure through the transmitter side "splint" within the pressure chamber acting on the sensor isolation diaphragm, Through the "filling liquid" is transmitted to sensor inside a "center for measuring diaphragm". A reference pressure by the other side in the same way transfer to "the other side of the diaphragm center measurement". As shown in Figure 3-1, "In the center of the measuring diaphragm" as a tensioned elastic element, its location is on both sides of the capacitor plates to determine, compression displacement deformation, displacement deformation with pressure or differential pressure is proportional to the size of, The maximum displacement of about 0.1mm, "In the center of the measuring diaphragm" after compression displacement deformation in "the capacitor plates formed on the capacitor difference signal". Electronic components to be "center measuring diaphragm" two capacitance plate between the capacitor difference signal is ultimately converted into two-wire DC4~20MA signal output.



3.2 Electronic components working principle

The transmitter electronic components within the "oscillations demodulator" received from the pressure/differential pressure sensor of the differential capacitance signal, converts the signal into a DC voltage into a "A/D signal converter", "thermistor for temperature compensation" voltage signal directly into the "A/D signal converter".

Two voltage signals superimposed after "A/D signal converter" into a composite digital signal, the "light isolator" isolation processing into "microprocessor (CPU)" in digital processing.

After treatment of CPU composite digital signal into the "D/A converter", the "D/A converter" processing of converting loop4-20MA DC signal, through "power transformer" is output to the control system for processing.



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The HART protocol using the industry standard BELL202 frequency phase shift keying(FSK) technology, with either 1.2 or 2.2 KHZ digital signal is superimposed on the 4-20MA loop communication.

From 4-20MA loop on the "HART communicator" send HART digital signal, through the "HART communication module" enter "after demodulation microprocessor(CPU)" are modulated, and then is sent into the "HART communication module", the "power transformer" back to the 4-20MA loop is "HART communicator to receive".

3.3 Power load

Because HART digital communication signal superimposed on the loop 4-20ma, "HART communicator" must pass a series in the loop on the "load" to send or receive HART digital communication signal. In order to make the power supply and communication work, "load" resistance in certain range.

4-Technical specification

4.1 Function parameters

Use scope: liquid, gas and steam.

Signal output: Two line 4-20MA isolated DC signal superposition of the HART digital signal output, can choose linear or square root output, the maximum output current not exceeding 22MA

Power supply: DC12-45V, HART communication, power supply voltage range: 15.5~45VDC, general working voltage: 24DC

Load range: HART communication, the power supply loop of the resistance 250 euro, the supply voltage is greater than or equal to 15.5 volts.

The communication distance: connecting wire diameter greater than 0.6mm, the communication distance is about 1500 meters.

Display: intelligent LCD LCD backlight for 5 and a half digital display

The zero and span migration: measuring range limit is not less than the maximum measuring range lower limit, upper limit not to exceed the maximum measuring range limit value, namely the work range does not exceed the limit value of sensor, zero and range can be set in 4~20mA any corresponding points.

The damping value: electronic damping adjustable range from 0 to 32 seconds

Fault alarm: from diagnostic procedures for the detection of a failure, the analog output of more than 20.8mA or less than 3.9mA

Data recovery data: when data from being damaged when, through three key scene restore corrupted data

Temperature compensation: computer collecting temperature data sent to the transmitter with temperature compensation

Working temperature: Electronic circuit: $-40\sim+85^{\circ}\text{C}$ With LCD liquid crystal display: $-30\sim+80^{\circ}\text{C}$

Sensitive element (silicon oil): $-40\sim+104^{\circ}\text{C}$;

Storage temperature: $-45\sim+90^{\circ}\text{C}$.



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4.2 Technical parameters

Basic error : $\leq \pm 0.075\%$

Repeatability error : $< 0.05\%$

Return difference : $< 0.075\%$

Stability : in the range, within one year of no more than basic error

Constant flow performance : Change in volume $< 0.075\%$

Insulating properties : Power resistance to ground $> 400M\Omega$

Response time : Electric start, response time less than 2 seconds.

Sensitivity : Lower limit value and the range of variation $< 0.01\%$

Supply voltage variation : Lower limit value and the range of variation $< 0.02\%$

Steady state variation : Power interruption, Change in volume $< 0.02\%$

Over range : Lower limit value and the range of variation $< 0.05\%$

Installation position effect : When the sensor measuring diaphragm is not vertical, may have no more than 0.24kPa zero system error, but the error can be achieved by adjusting the zero pressure tuning to eliminate, had no effect on the range

Electrical connection : The transmitter housing two M20x1.5 Screw hole, Used to connect the cable duct. The shell has a terminal and a test pad, such as communicator connected, which can be fixed on the testing pad.

Anti explosion : Flameproof Exd II BT 4 ; Intrinsic safety type Exia II CT6

5-Work site installation and measurement

5.1 Electrical installation

As shown in Figure 5-1 : The power supply is through the signal line is connected to the transmitter, power and signal share a pair of wires, no additional wiring. Power supply terminal is divided into positive, negative terminal, set in the shell instrumentation power chamber. When wiring, unscrew the power bin cover, the power line threading holes (see 2-1, 2-2) according to the positive, negative power signal lines are connected to the positive, negative terminal.

Power line can be twisted pair, In the electromagnetic interference is more serious in the field, recommend the use of shield wire, and good grounding. Power signal wire cross-sectional area: $0.5 \leq S \leq 2.5 \text{ mm}^2$, and other power line wear together in the same metal tube or placed in the same slot, also should not pass the heavy equipment near.

Instrument shell on the threading hole, Sealing plug (Bolt: M20x1.5) Seal up, avoid instrumentation shell power bin indoor moisture accumulation. If the power line threading hole is sealed, should make the threading hole downwards, so that the discharged liquid



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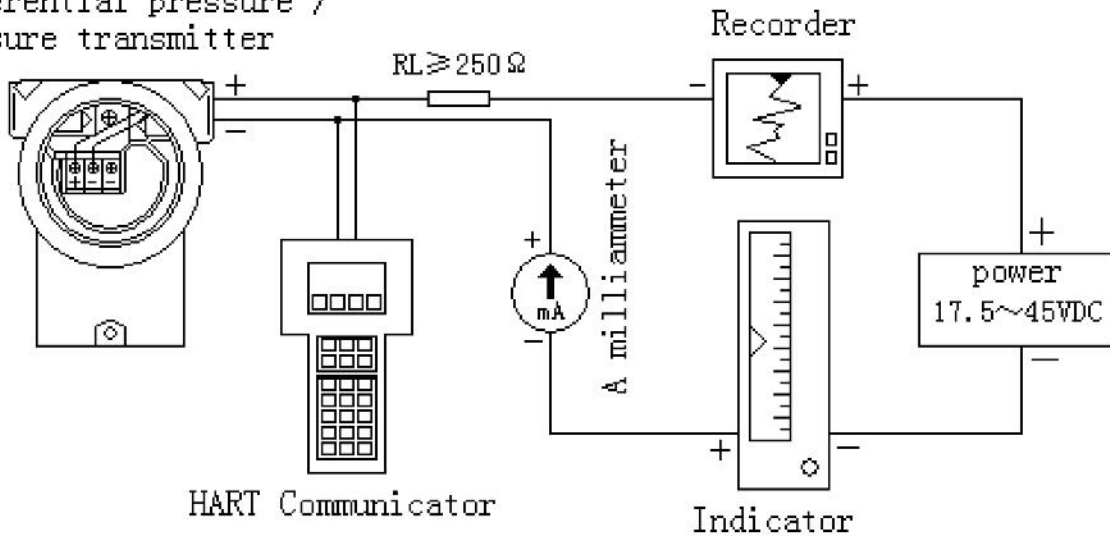


photo 5-1 The transmitter site connection

5.2 Mechanical installation and measurement

5.2.1 Installation type and matters needing attention

The transmitter can be installed on the measuring point, also can be installed on the wall or the use of the mounting (Transmitter attachment) bracket clamp together in 2 "(diameter about 50~60mm) pipe. Transmitter installation type has mainly Bending stent tube, Curved support board, Smooth stent tube, The flat support plate. As shown in figure 5-2a, 5-2B, 5-2c, 5-2d shows: (for the user to choose)

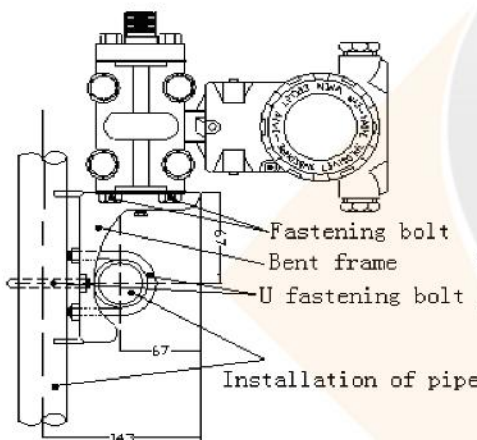


Photo 5-2a Bending stent tube

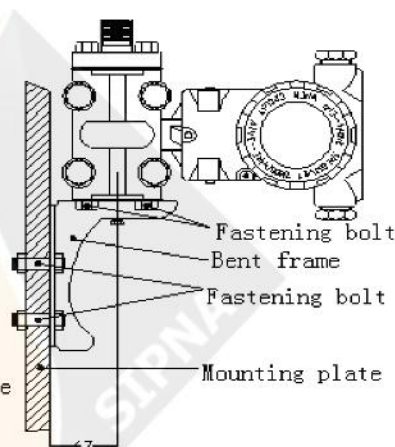


Photo 5-2b Curved support board



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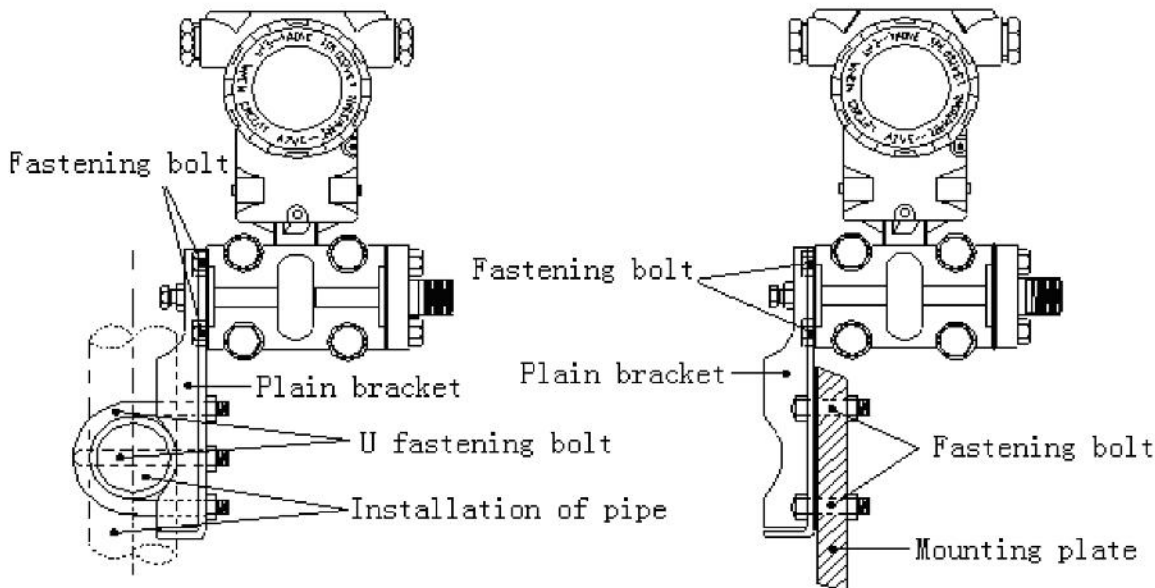


Photo5-2c Smooth stent tube

Photo 5-2d The flat support plate

Transmitter in process piping installation location is correct, and the measured medium concerned. In order to obtain the best effect of installation, to achieve a good working state, the installation should pay full attention to the following circumstances:

- 1-To prevent the transmitter and corrosive or overheating of the measured medium contact;
- 2-Prevent the dregs in the guide pressure tube deposition;
- 3-Pressure pipe should be as short as possible;
- 4-On both sides of pressure pipe within a fluid column pressure should keep balance;
- 5-Pressure pipe should be installed in the temperature gradient and the temperature fluctuation is smaller;

5.2.2 The reasons of error and solution

Pressure pipe so that the transmitter and the process pipeline connected together, and the process pipeline pressure outlet pressure is transmitted to the transmitter, pressure in the transmission process, may cause error for the following reasons;

- 1-Leak;
- 2-Wear loss (especially the use of cleaning agent);
- 3-The liquid pipeline gas, causing pressure error;
- 4-Gas pipeline accumulate liquid, causing pressure error;
- 5-On both sides of the pressure guiding pipe between because of temperature difference caused by different density, pressure error;

Method to decrease the error;



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- 1-Pressure pipe as short as possible;
- 2-Measurement of liquid or steam, pressure pipe should be connected up to process pipeline, the inclination of not less than 1/12;
- 3-Measurement of gas, pressure pipe should be connected downwardly to process pipeline, the inclination of not less than 1/12;
- 4-Liquid pressure transfer tube arrangement to avoid the middle high, gas pressure pipe arrangement to avoid the intermediate point;
- 5-Two pressure pipe should be maintained at the same temperature;
- 6-In order to avoid the effect of friction, pressure pipe diameter should be large enough;
- 7-Fluid filled tube should be no gas exists;
- 8-When using the spacer fluid, on both sides of the liquid in the tubing to the same;
- 9-The cleaning agent, cleaning agent pipe connections should be close to the process piping pressure intake opening, cleaning agent through pipeline, the length and diameter should be the same, should avoid cleaning agent through the transmitter.

Be careful!!!

The medium to be measured is not allowed to freeze, otherwise it will damage sensing element isolation diaphragm, resulting in damage to the transmitter.

6-Maintenance and common breakdown and processing

The BNSLUCN P series isolation intelligent pressure / differential pressure transmitter no moving mechanical parts, also does not need regular maintenance,Users are not allowed to remove the transmitter parts and repair,If the fault cannot be ruled out when,Please contact the company or send the company processing.

- 1-The output is too little or no output
- 2-The output is too large
- 3-Output stability
- 4-The transmitter can not be normal communications
- 5-Transmitter output confusion

7-Explosion proof using

Explosion proof type transmitter for flameproof and intrinsically safe type two, shall be designated by the state quality inspection units pass inspection and obtain explosion-proof explosion-proof certificate.

Flameproof type transmitters is: when the transmitter housing interior when the explosion occurred, will not cause the



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external explosive mixture explosion combustion. Flameproof symbol : Exd BT4.

Intrinsic safety type transmitter means: when the transmitter by the security gate after the circuit in the normal state or fault state generated by electric spark and temperature are not caused by explosive mixture explosion combustion. Safety signs for: Exia CT6.

The use of explosion-proof transmitter should pay attention to,

, In the inflammable and explosive dangerous places use explosion-proof transmitter, electronic and power cover must be tightened, and adds a anti losing device, will not allow when energized to open electronic, power cover.

, Explosion proof type transmitter installation, with the cable connected to the transducer wire hole must has a good seal, the shell must be well grounded.

, Intrinsic safety type transmitter power signal wire should be insulated shielding wire, connected with the transmitter through the security gate. Safety gate installed in a safe place, shielding layer and the insulating shell and a transmitter in a safe place grounding.. Wiring, should be far away from the band power electrical equipment, separate wiring, and other electrical equipment line to separate.

, Is strictly prohibited in the inflammable and explosive dangerous places to use HART communication device (such as a hand operation device or communication computer), only in the security area



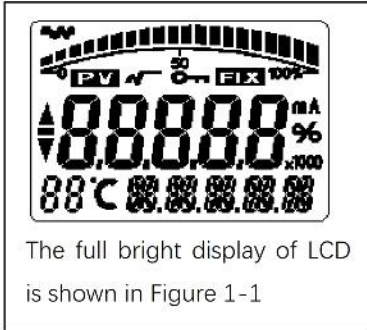
The user can set up the LCD display of the variables and display the number of decimal digits by the configuration software. See the configuration software settings section of the instrument configuration, "output characteristics". LCD support for the dual variables display, can be set to display variables including current, percentage of main variable and the main variables; each variable can independent set up to display the location of the decimal point: 0, 1, 2, 3, 4. If the two display variables are the same, the LCD only shows a variable; otherwise, the LCD will be 3 seconds, and the display variable is displayed alternately.



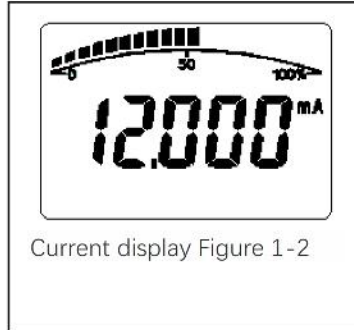
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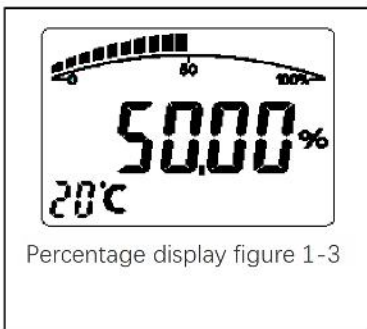
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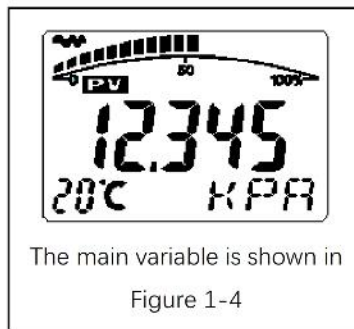
The full bright display of LCD is shown in Figure 1-1



Current display Figure 1-2








Percentage display figure 1-3



The main variable is shown in Figure 1-4

Other display instructions:

- If the state in communication,  display the upper left corner of LCD.
- If the output is a square, LCD display .
- If the fixed output current, LCD display .
- If the start write protection, LCD display .
- If the temperature is displayed in real time, the "88" character of the lower left corner of the LCD display  temperature, and the temperature is less than -19 or more than 99.

Key function

The main variables can be adjusted by the key, zero migration [zero], and the range migration [Full]Setting unit, measuring range, damping, setting display variable.

Key function code table

When using the button on the scene, the LCD "88" character is used to indicate the current setting variable type, which is the setting function of the current key. Its corresponding relationship is:

Bottom left corner "88" character display	Set variable
0 or spaces	Normal display
1	Enter the operating code (can be directly input and



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	the following functions corresponding to the number, in order to directly carry out the function of the setting)
2	Setting unit
3	Set range lower limit
4	Set range limit
5	Set damping
6	Main variable zero
7	Zero migration and range migration [zero sum
8	The output characteristics of linear output, or [set] evolution output

Note: through the input of each function corresponding to the operation code, you can quickly enter the corresponding function. For example, enter "5", directly into the set of damping function.

Key mode description

This product supports two kinds of operation mode, "double button" and "three keys". "Three keys" operation mode: the operation is more quick, suitable for LCD with 3 key products. At this point, the Z key is used to enter the data set interface and shift; the S key is used to enter the data set interface, to increase the number and data storage; the M key is used for data preservation.

Double button operation mode: this mode of operation is usually used for external only 2 non touch buttons. At this point, the Z key is used to enter the prompt data set interface and shift; the S key is used to enter the data set interface, to increase the number and data preservation.

Data setting method

When the lower left corner of the "88" character display 1 ~ 7, it shows that the transmitter is in the field configuration mode, this time by the keys to enter the password, modify the parameters, or migration.

In the data setting process, the "S" key is used to adjust the number and decimal point, "Z" key for the shift, "M" key for saving.

Setup process is as follows:

1. Press the S key to enter the data set interface, while the symbol bit to start flashing, said the symbol can be modified.
2. If again press the S key, can be positive and negative switching data (that use arrow plus).
3. Press Z key, the first digit to start flashing, said to be modified, at this time, press S key to press or press the 0~9 key, set the number of cycles between the.



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4. Again press Z key, can be set to fifth to second digits, setting method and the same as the first.
 5. After setting the fifth digit, press Z key and start setting up the decimal point. The four decimal points are beginning to flash, which indicates that the decimal point can be set at this time by S, and the position of the decimal point can be switched to the point.
 6. After the 6 decimal point is set up, press Z key, the left arrow starts to flash, which indicates that the setting can be saved.
 7. Press S key to save settings; press Z key, the symbol is beginning to flash, can start to set up data.
- Note: if the "three key" mode of operation, in the process of setting data, any moment can press the M key, to quickly save settings without wait for a flashing arrow to save the settings.

Key operation instructions

Main variable zero

1. In real time normal display state, while pressing "M" + "Z" key, and hold for 5 seconds, directly into the main variable zero function.
2. For the early version, the need to enter the operating code 2 after entering the setting function; or enter the operating code 6 after the direct access. After entering the main variable zero function, the lower left corner of the function code shows the 6, the middle shows the current main variable values, the bottom area shows the YES or NO".
 1. when the display "YES", press the "M" or "Z" key, the implementation of the "main variable zero" operation. After performing this function, the output pressure is "0".
 2. when the display "NO", press the "M" or "Z" key, the end of "the main variable zero" operation.
 3. press the "S" button, you can switch between "YES" and "NO".

Configuration function

Function overview

In real time normal display, press Z key to enter configuration data set state. After entering this state, the LCD lower left corner of the display "01", prompting the input operation code. After the completion of the corresponding function, automatic cycle settings.

Bottom left corner "88" character display	Set variable
2	Setting unit
3	Set range lower limit
5	Set damping
6	Main variable zero
8	The output characteristics of linear output, or



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[set] evolution output

According to the 2.2 data set method, the input of the operation code can be completed, the upper and lower limits of the range and the damping are set up.

Description:

- If the data set is overrun, LCD display "OVER", then press the S button or Z button can be reset.
- Upon the configuration data is set to complete and return to normal display state, if the user within 10 seconds again press the Z button, start over configuration setting process and skip input code verification steps.
- To enter configuration data set after 2 minutes, if no button is pressed, then return to normal display.
- If the "1 function", input operation code, execute the following functions:

Enter "X X X X 3" (i.e., the first 4 can be any number), then enter the unit setting.

Enter "X X X X 3" (i.e., the first 4 can be any number), then enter the range limit set.

Enter "X X X X 5" (i.e., the first 4 can be any number), then enter the damping settings.

Enter "X X X X 6" (i.e., the first 4 can be any number), then enter the main variable zero.

Enter "X X X X 8" (i.e., the first 4 can be any number), then enter the output characteristic adjustment.

If you enter other data, return to normal. This can avoid human error operation.

Setting unit

Set the unit process, the LCD lower right corner of the display unit of the current selection. Unit setting process is as follows:

1 press the "S" button to select the main variable units; (kPa Torr, atm MPa, inHO, inHG, ftHO, mmHO, mmHG, psi, bar, mbar, , gcm, Kgcm, pa etc.)

2 press the "Z" or "M" button to confirm the current selection of the main variable unit, and directly into the "range lower limit set" function interface.

Description:

- The display unit "l4H2O" said: 4 degrees Celsius inches of water;
- The display unit "m4H2O" said: 4 degrees Celsius mm water column;

Setting range

When the range is set, you must first enter the "range limit", and then enter the "range limit".

Set the range of the operation, the lower left corner of the operating code display "03" or "04", respectively, corresponding to the input "lower" and "upper limit". After the lower range limit of input, automatically enter the setting of the "range limit".

Data input method, see "2.2 data setting method".

Set damping

You can directly enter the setting damping page by entering the operating code "5", or directly enter the setting after setting the upper limit.

The left lower corner of the operation code shows the "05" when the value of the setting is set. The input range of the damping value is 0 to 32 seconds.

Data input method, see "2.2 data setting method".

Special note: if the input damping value is "05678", it is automatically performed "recovery factory setting" operation. [need to perform "data backup" operation before the factory



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Set output characteristic

Set in the output characteristics, the LCD in the lower right corner of the flashing display the currently selected output characteristic (linear Lin output, or output with square sqrt). Set process is as follows:

1. Press the "S" button, select the current output mode; (LIN, SQRT)

.Press on the "Z" key or "m" key, confirm the choice of output characteristics, and the end of the current round of settings, return to the end of the set "function interface [in the bottom left of the LCD display function code" 0 ". If there is no key operation within 10 seconds, will return to normal, otherwise it will continue to set up from the range unit [no need to enter the code].

Note: LIN represents a linear current output current output; SQRT extraction.

Zero migration and range migration [zero/ full]

In real time normal display, press the "Z" key and "S" key, and hold it for 5 seconds, and enter the state of zero migration and the range migration. At this time, the lower left corner of the operating code shows the "07", that can be adjusted to zero and full operation. Zero migration, that is, "zero" operation: the current pressure is set to the lower limit of the range, the transmitter output is adjusted to 4mA

"Range migration", that is, "full" operation: the current pressure is set to the upper limit, the transmitter output adjustment is 20mA. Set the process, if no button is pressed in 2 minutes, then return to normal display state.

Display variable settings

Liquid crystal display can display the "current", "percentage", "the main variable" three kinds of variables of one or two of the kinds of variable (interval time of 4 seconds). In normal real-time status display, use the s key to change two display variable, when the two display variable settings for the same parameters, the screen fixed display a variable; when the two display variable set different parameters, the screen on the alternate display two kinds of variables.

Methods are as follows: press "s" key, the current display variables (current) change, "current, percentage, main variable cycle showed, when the display variable (such as: the main variables) appeared on the screen, release the "s" key, that is, to achieve the display variable "current "changed to" main variable.

Examples:

Assuming the current display variable is "current", it is required to set the "main variable" and "percent".

Step:

Modify the first display variable: press the "S" button, the liquid crystal display "current, percentage, the main variable", when the "main variable", release the "S" button, you can. At this point, the liquid crystal display "main variable" and "current".

Modify the second show variable: when the liquid crystal display "current", press "s" key, the circulation of liquid crystal display "current, percentage, main variable, when the" percentage "display, loosen the" s "key, that is set successfully.

Note: this function only software version 5 and above board support, and with buttons to adjust the "current" and "main variable decimal digit automatic switching for three and the" percentage "automatic switching for A.

Restore factory settings

If the transmitter has been in the factory, the configuration and other data for a backup, you can enter the key input damping 5678 to the scene to recover data.



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The configuration data backup: run HART-CONFIG tool software, in "advanced features", "additional functions" option, click "backup" button can be transmitter units, range, damping and other information for backup.

The recovery of backup data has the following ways:

1. Through the Tool HART-CONFIG software, in the instrument configuration, the output characteristics of the page, enter the damping 5678, and then click write, you can restore the backup data. [tip: when writing data, it may prompt the communication failure, is a normal phenomenon, does not affect the recovery of data. Because "05678" is not an effective damping value.

2 recovery by HART375 handheld. In the "detail settings"→"Signal status"→"Damping" Input damping"5678", and write, can restore the backup data. [tip: when writing data, it may prompt the communication failure, is a normal phenomenon, does not affect the recovery of data. Because "05678" is not an effective damping value.

By pressing the button, in the fifth item, the input is damped when the input is "05678", and is saved, and the backup data will be restored. [this operation does not affect the true damping value].

Trouble shooting

In case of failure, the following steps can help to find out the cause of the problem. At the same time can help determine whether the need to dismantle and repair.

1 no show

Check whether the power supply is good; check whether the circuit is short circuit; the power of the positive and negative polarity is reversed. 6.2 large deviation check the diaphragm side if trapped gas, such as gas, free gas discharge valve release. Check the diaphragm side whether the sediment crystallization; if there is a sediment or crystallization, by flushing the Kong Chongdiao, such as can not be obliterated, the flushing ring removed and cleaned, the cleaning attention not to damage the diaphragm. Check whether the voltage is normal; if the change is seasonal, then the seasonal adjustment.

2 output instability

Temperature check whether to enter the steady working; inspection machine around whether or not there is a frequency converter or a high-power engine, to take the necessary quarantine measures; fluid velocity is too volatile, stable fluid to be measured again after; pipeline inspection whether the fluid filled tube and clip is gas; pipe check whether there is a strong vibration; to check whether the power supply voltage fluctuation is too big; check the damping value is set too small, properly adjust the damping can increased stability (used in military exercises for adjusting the damping parameters).

Maintenance



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