# ZINACA-3051-C
# Intelligent monocrystalline silicon pressure/differential pressure transmitter
# operation instructions

# Preface

Thank you very much for purchasing our company's monocrystalline silicon transmitter series products.

This manual provides a detailed introduction to the various functions, wiring methods, setting methods, operation methods, and fault handling methods that the instrument can achieve. Before putting the instrument into operation, it is necessary to carefully read this manual and master the correct usage method before proceeding with specific operations to avoid unnecessary losses caused by incorrect operations.

Our company promises to the user that there are no defects in the materials and manufacturing processes of the hardware and accessories that should be provided when supplying this instrument. Starting from the date of purchase of the instrument, within the one-year warranty period, if we receive notification from the user about such defects, our company will provide unconditional free maintenance or replacement for products that do indeed have defects. Our company guarantees lifelong maintenance for all products.

To adhere to the principle of sustainable development, our company reserves the right to modify the performance parameters described in this manual without prior notice. We reserve the right to revise or abolish this manual without prior notice. When the modification of certain performance parameters of the instrument may lead to serious accidents, our company will definitely inform the user in advance. For the improved instruments, our company will have a new version of the user manual or improvement instructions. If there is any deviation between the description in this manual and the actual product, please refer to the actual product.

Any modification of the instrument is strictly prohibited! Our company is not responsible for any accidents caused by unauthorized modification of this product.

# Directory

# I. Overview

### 1.1 Overview of transmitters

This series of intelligent pressure/differential pressure transmitters is a multifunctional digital intelligent instrument developed by our company. It is carefully designed based on mature and reliable sensor technology, combined with advanced single-chip computer technology and sensor digital conversion technology. Widely used in fields such as petroleum and petrochemicals. The core component adopts a 16 bit microcontroller, whose powerful functions and high-speed computing ability ensure the excellent quality of the transmitter. The entire design framework focuses on reliability, stability, high precision, and intelligence, meeting the increasingly increasing requirements of industrial field applications. To this end, digital signal processing technology has been applied in the software, making it have excellent anti-interference ability and zero point stability, as well as zero point automatic stable tracking ability (ZSC) and temperature automatic compensation ability (TSC). The powerful interface function ensures good interactivity without the need for a manual operator. Digital LCD with backlight indication, button operation can easily achieve zero adjustment without a standard pressure source. Structurally, users can easily calibrate, set up, and configure the transmitter through a Hart communication manual operator.

# II. Main application and characteristic

### 2.1 Main uses

★Oil and gas field automation control remote transmission system

★Power and energy systems

★Industrial site process control

★Liquid level measurement and water supply system

★Hydraulic and pneumatic control system

**2.2 Characteristics of the transmitter**

★ Advanced monocrystalline silicon pressure and differential pressure sensor technology and packaging process, carefully developed as a leading technology ultra-high performance pressure and differential pressure transmitter

★ Unidirectional overvoltage up to 60MPa

★ The microprocessor as the core and aided by advanced digital isolation technology design make the instrument highly anti-interference and stable

★ The latest one click reset function does not affect the electrical protection level, making it safer and faster.

# III. Specification

Environmental temperature: - 30℃ ~ 70 ℃

Environmental humidity: 0 - 95%（non condensing）

Range: - 0.1 ~ 60MPa（optional range）

Accuracy: ± 0.05% ± 0.075% ± 0.1%（including linearity, deviation, and repeatability from zero）

Repeatability: 0.075% FS 0.1% FS 0.2% FS

Insulation resistance: ≥ 20MΩ

Insulation strength: 500V(50Hz)/1min, without breakdown or arcing phenomenon

Stability: 0.1%/three year

Reverse protection: not damaged

Vibration effect: Only the resonant frequency effect is considered, and other vibration effects are ignored. Under resonance, a vibration of 15-2000Hz is applied at any angle to the axial direction of the pipeline for testing, and the vibration effect is less than ± 0.05% UR/Lg.

Output signal: Two wire 4-20mA+HART

Output method: linear

Power supply: 12-36VDC

Electrical connection size: M20 * 1.5 internal thread

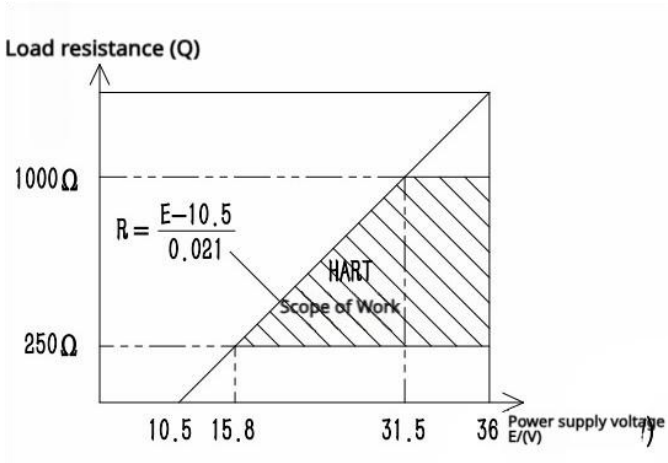
Protection level: IP65

Explosion proof level: Ex d Ⅱ C T6 Gb

Zero point adjustment: The zero point can be adjusted freely within the upper and lower limits of the range

Impact pressure limit: The impact pressure is 150% of the full range for 1 minute without damage

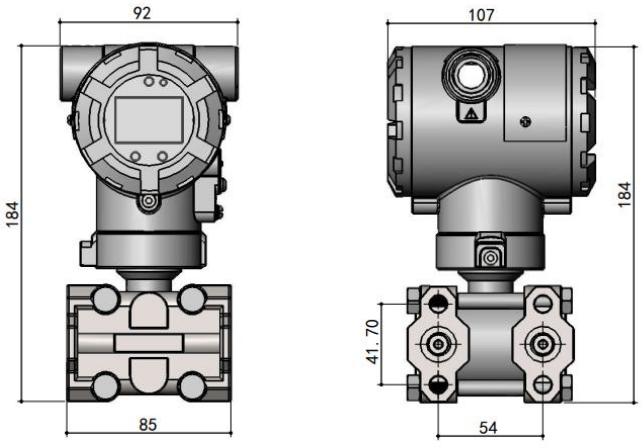
Overvoltage limit: The instantaneous overvoltage limit is 3 times the full range without damage



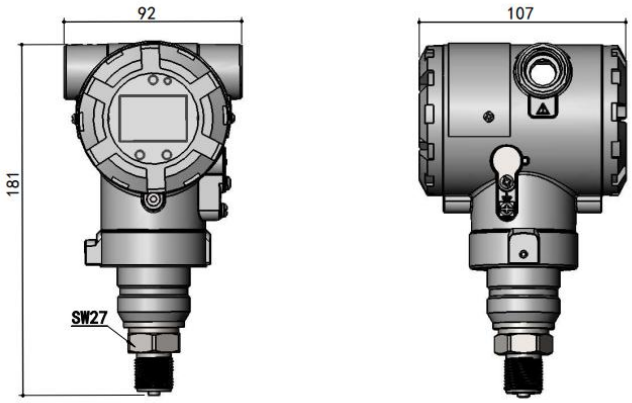

**Power supply voltage and external load relationship diagram**

# IV. Structure and Principle

### 4.1External dimensions of the transmitter




**Dimensional diagram of differential pressure transmitter**




**Dimensional diagram of pressure transmitter**

# V. Instructions for use

### 5.1 Site installation

1) Main installation matters

a. Prevent the transmitter from coming into contact with corrosive or high-temperature (≥ 90 ℃) test media.

b. To prevent sediment from settling inside the pressure pipe.

c. The pressure pipe should be as short as possible.

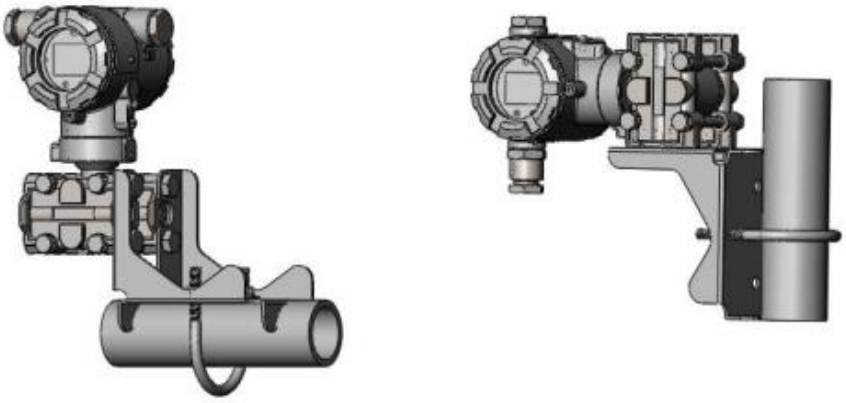
d. The liquid column pressure heads inside the pressure pipes on both sides should be kept balanced.

e. Pressure pipes should be installed in areas with low temperature gradients and fluctuations.

f. Prevent crystallization or low-temperature freezing inside the pressure pipe

5.1.1 Installation of differential pressure transmitter：

Differential pressure transmitters can be directly installed on 2-inch pipes or on walls and instrument panels.



**Pipe bending bracket**

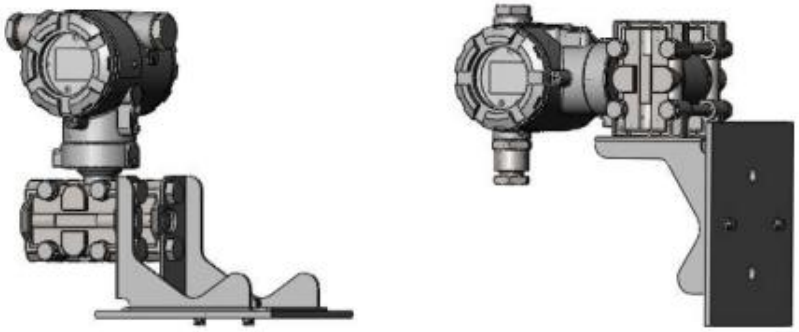
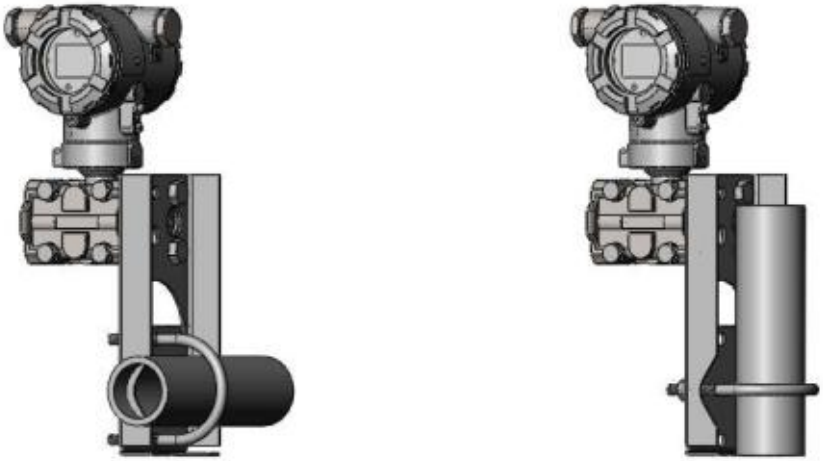


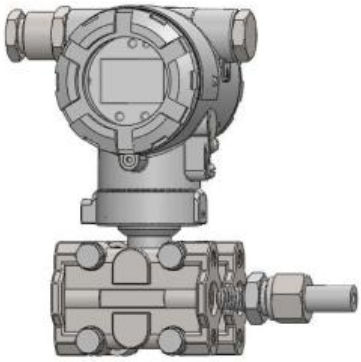
**Plate mounted bending bracket**



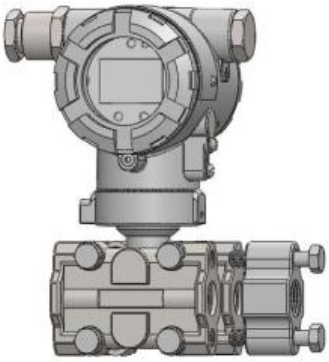
**Pipe mounted flat bracket**

Address; No.12 yard in the yard of Outer Ring Industrial Company, Fujin Road, Zhongbei Town, Xiqing District, Tianjin, China Zip code: 300300 Telephone: 008615320082517
WEB: https://www.zinacainstruments.com/ E-mail: zinacaoverseas@gmail.com

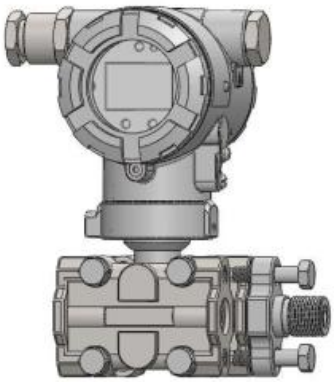
**5.1.2 Differential pressure transmitter pressure introduction method：**



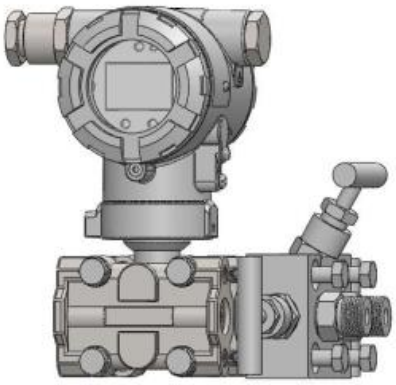
**Welded pipe joints**



**Waist flange**



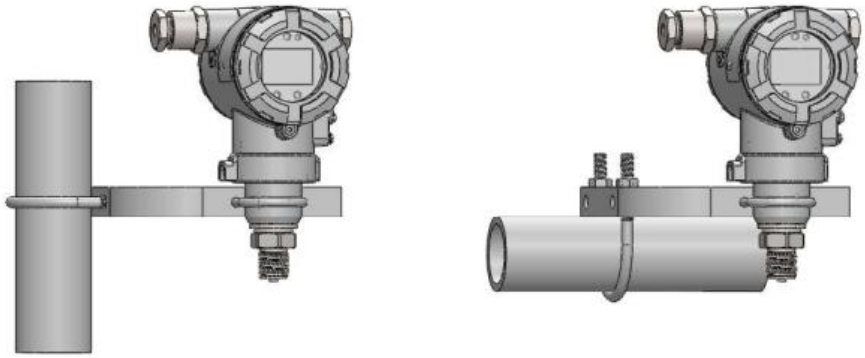
**T-joint**



**Three valve group**

### 5.1.3 Pressure transmitter installation ：

Pressure transmitters can be directly installed on pipelines using M20 * 1.5 external threads or other threads, or can be installed through pressure pipes and brackets.



### 5.1.4 Installation of pressure pipes:

**pay attention to**

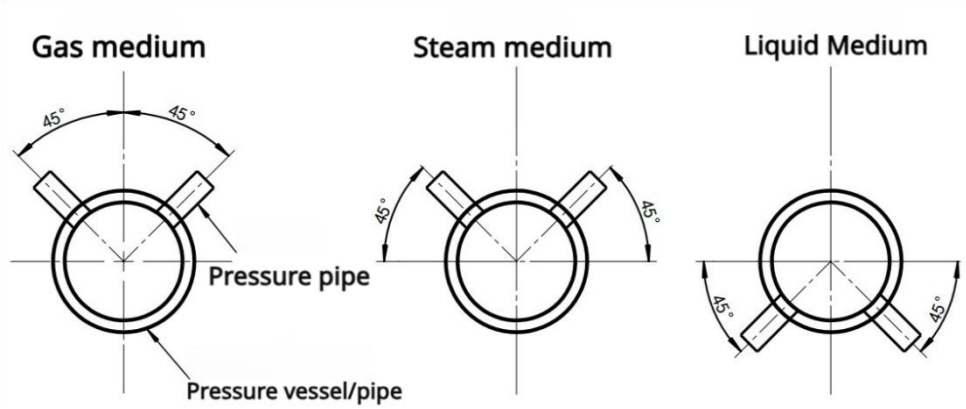
The pressure pipe should be as short as possible and installed in a location with low temperature fluctuations and less prone to sedimentation.

To reduce the impact of friction and prevent blockage, a sufficiently large diameter pressure pipe should be used.

When measuring under high pressure, the pressure pipe should have sufficient resistance to high pressure.

The pressure pipe should be installed at an angle to allow gas to be discharged from the liquid medium or liquid to be discharged from the gas medium.

The angle of pressure introduction during the process is shown in the following figure：



Pressure introduction angle

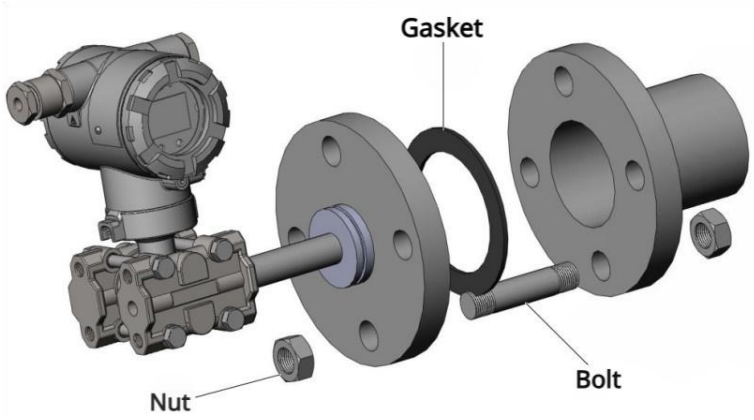
When measuring gas media, the pressure pipe should be installed vertically and within a 45 ° range on both sides, and the transmitter should be installed above the side pressure tap to facilitate liquid discharge into the process pipeline.

When measuring steam medium, the pressure pipe should be installed within a 45 ° range above the horizontal direction, and the transmitter should be installed below the side pressure tap to allow condensate to flow into the pressure pipe. It should be noted that when measuring steam or other high-temperature media, their temperature should not exceed the limit temperature of the transmitter's use.

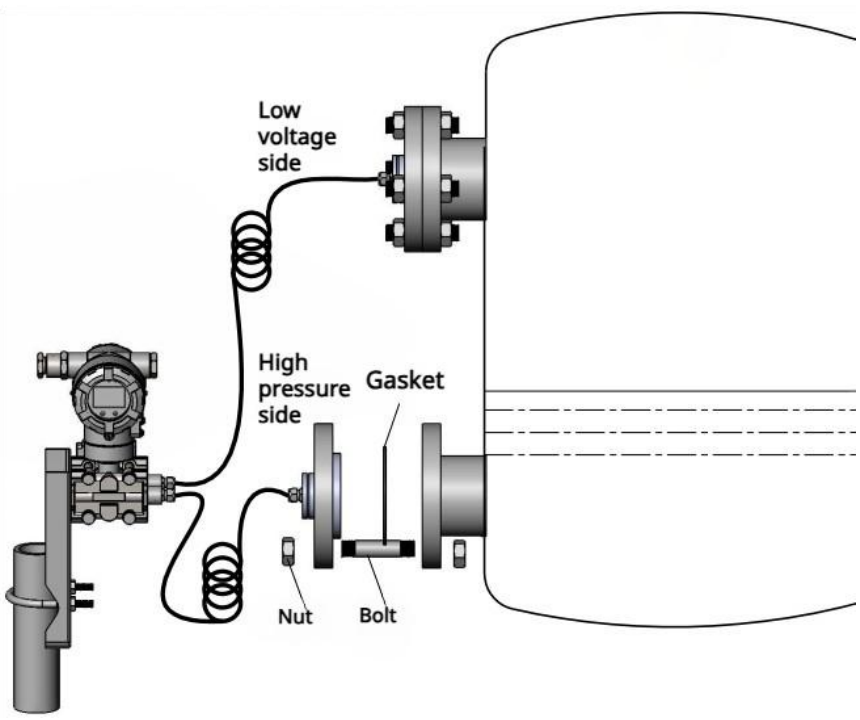
When measuring liquid media, the pressure pipe should be installed within a 45 ° range below the horizontal direction, and the transmitter should be installed below the side pressure tap to facilitate gas discharge into the process pipeline.

When using a transmitter with a side exhaust/drain valve, the pressure tap should be installed on the side of the process pipeline. When the working medium is liquid, the exhaust/liquid discharge valve is installed on the upper part of the flange to discharge the gas; When the working medium is gas, the exhaust/liquid discharge valve is installed at the lower part of the flange to discharge the liquid.

**5.1.5 Installation of single flange liquid level transmitter ：**



**5.1.6 Installation of dual flange liquid level transmitter ：**




⚠

1. Please ensure that the inner diameter of the gasket used is greater than the inner diameter of the diaphragm seal. If the inner diameter of the gasket used is smaller than the inner diameter of the diaphragm seal, it may affect the normal operation of the diaphragm, cause errors, or damage the diaphragm.

2.Be careful not to damage the surface of the membrane. If the membrane is placed facing downwards, it may damage the surface of the membrane.

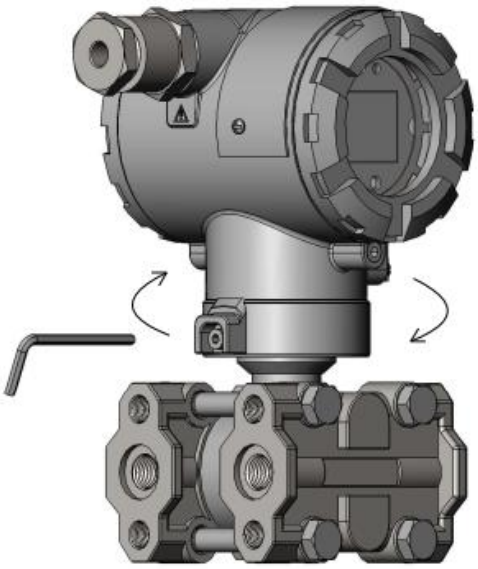
3.Do not twist, squeeze the capillary tube, and do not apply excessive pressure to it.

4.Do not loosen the two screws on the chamber flange or the screws on the capillary connection flange (if the filling liquid leaks, the transmitter will not work).

5.Install the flange diaphragm on the high and low pressure sides of the liquid tank as shown on the H and L labels.

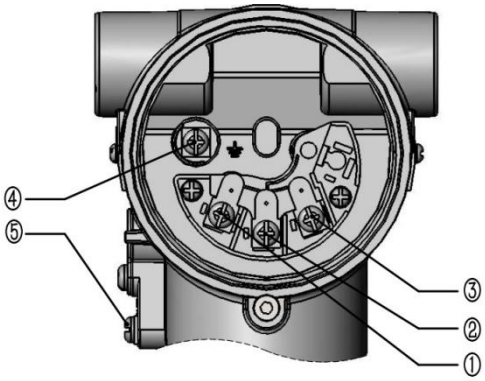
6.To avoid measurement errors caused by temperature differences, capillary tubes can be bundled together. The capillary must be securely fixed to the tank wall to prevent the influence of wind and vibration. If the capillaries are too long, they should be rolled together and secured with clips.

There are connecting wires inside the connection part between the transmitter housing and the sensor component. The shell can be rotated up to 180 ° clockwise or counterclockwise, and excessive rotation is not allowed to cause damage to the internal connecting wires



## 5.2 Electrical connections

### 5.2.1 Two wire wiring terminals

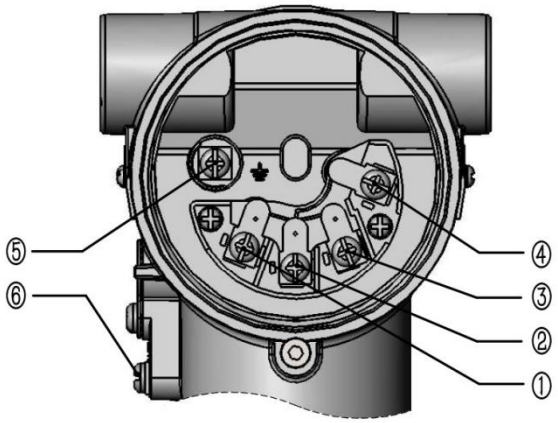



① Positive power supply for transmitter
② Negative transmitter power supply (4-20mA test terminal negative)
③ 4-20mA test terminal
④ Internal grounding screw
⑤ External grounding screw

⚠

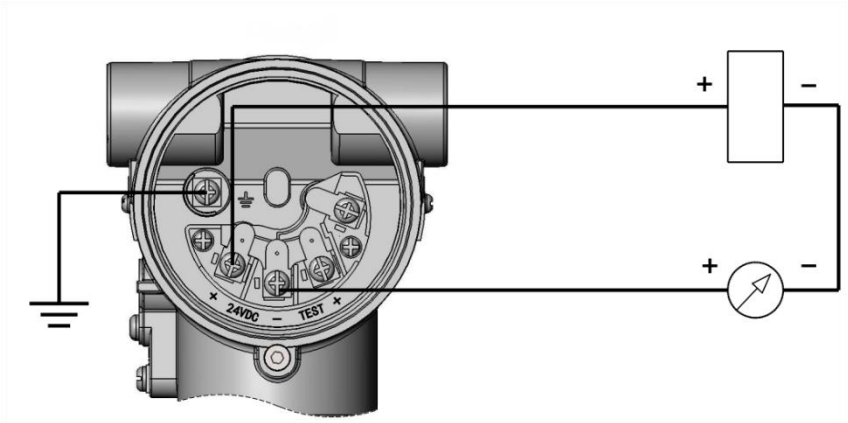
Do not connect the signal line with power supply to the test terminal, otherwise it will destroy the diode inside the test terminal. If the diode is unfortunately damaged, short circuiting the test terminal can continue to operate the transmitter, but this machine cannot be connected to an external test meter. The signal line does not need to be shielded, but using twisted wires is more effective. Do not arrange the signal line together with other power lines or near strong electrical equipment.

### 5.2.2 Four wire wiring terminals（RS485）

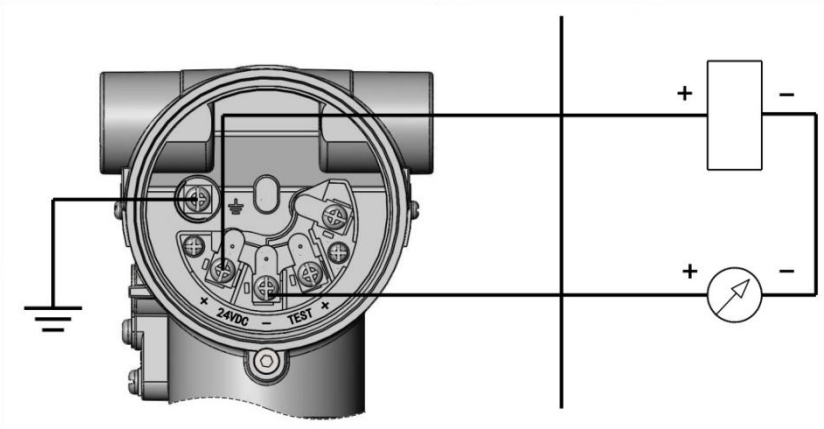



**① Positive power supply for transmitter**
**② Negative power supply of transmitter**
**③ RS485 communication port A**
**④ RS485 communication port B**
**⑤ Internal grounding screw**
**⑥ External grounding screw**

### 5.2.3 Two wire power cord connection

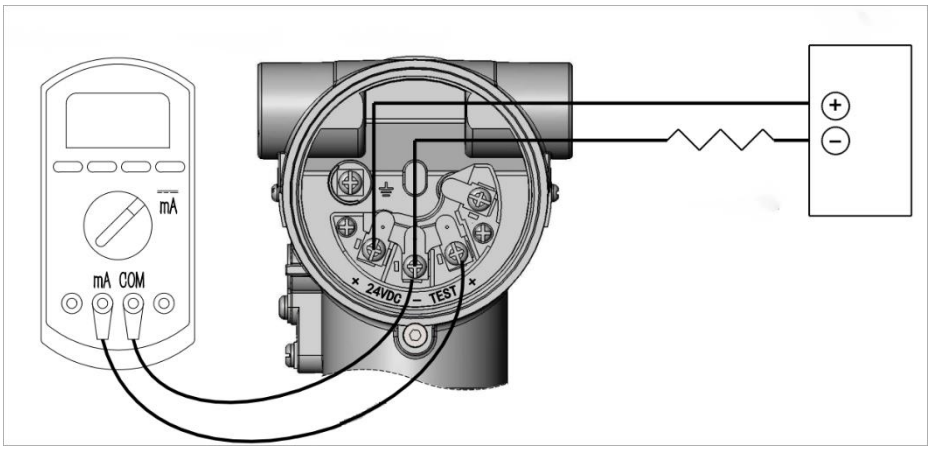



**Power connection diagram for transmitters in non explosion-proof areas**

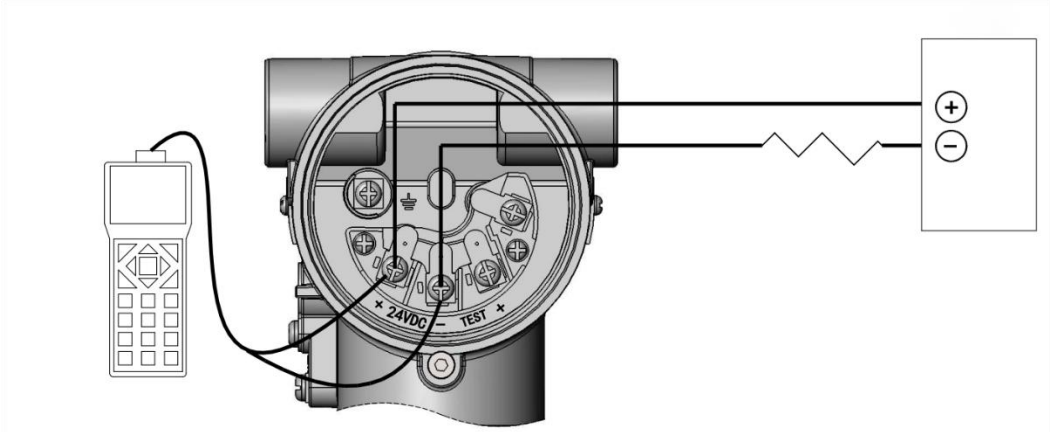



**Explosion proof transmitter power connection diagram**

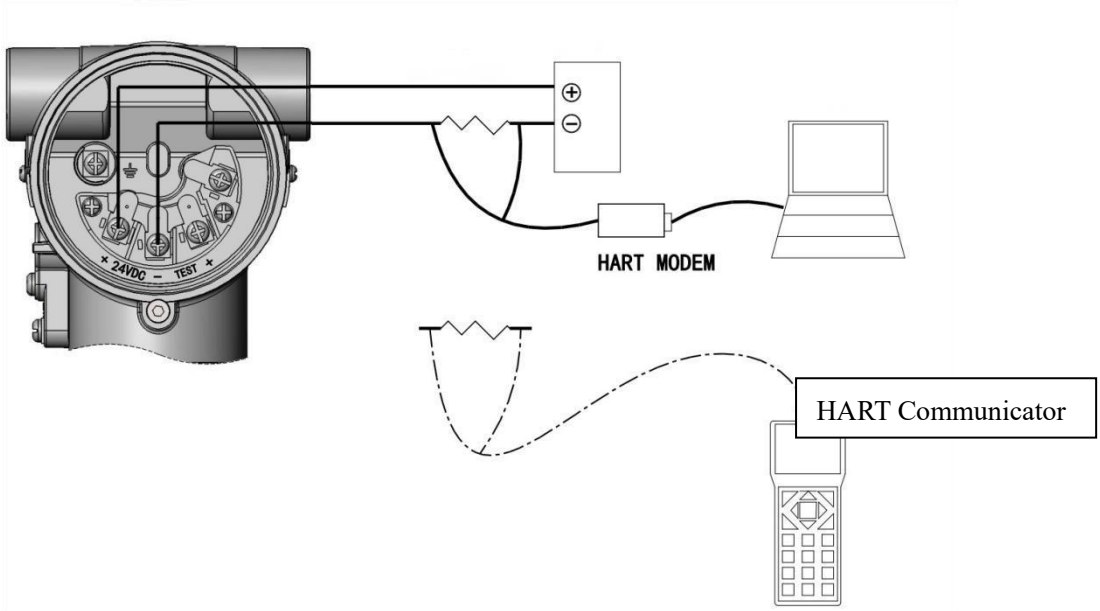
### 5.2.4 Two wire current testing instrument connection




### 5.2.5 Two wire Hart communication connection

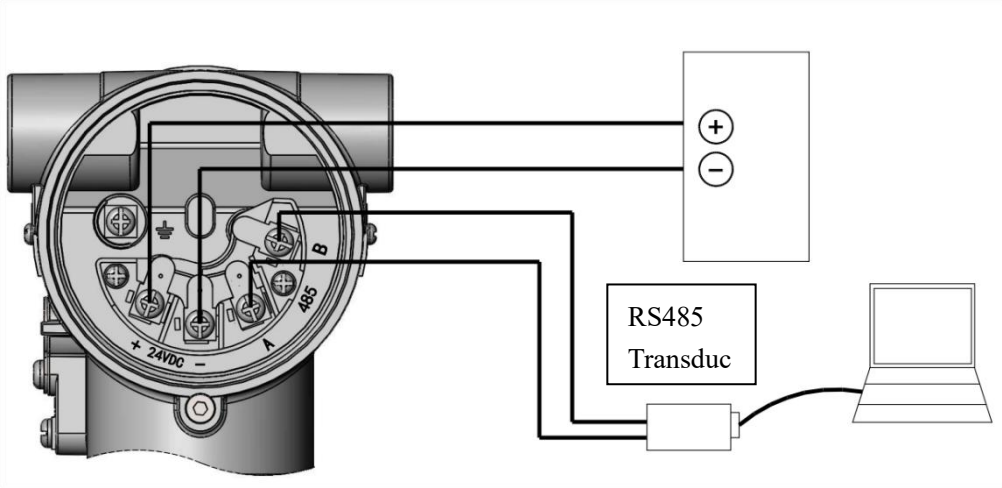



**Hart communicator connection at the transmitter end**




**Computer or Hart communicator connection at the two-wire power supply end**

### 5.2.6 Four wire RS485 communication connection




### 5.3 Wiring instructions for intrinsically safe and explosion-proof transmitters

The explosion-proof safety performance complies with GB3836.1-2010 "Explosive Atmospheres Part 1: General Requirements for Equipment" and GB3836.4-2010 "Explosive Atmospheres Part 4: Equipment Protected by Intrinsically Safe Type", and the explosion-proof mark of the product is Ex ia Ⅱ CT6Gb.

The user of the transmitter should be reliably grounded during use, with an ambient temperature range of -20 ℃ to+60 ℃.

When installing and using intrinsically safe transmitters on site, they must be connected to safety barriers recognized by explosion-proof inspection agencies in order to form an intrinsically safe explosion-proof system. If they want to be connected to other types of safety barriers, they must obtain approval from explosion-proof inspection agencies. The safety barrier must be placed in a non hazardous area, and its installation and use must comply with the user manual of the safety barrier.

The connecting cable between the transmitter and the intrinsically safe end of the safety barrier is a two core shielded cable (the cable must have a cable sheath). The cross-sectional area of the core wire is ≥ 0.5mm2, and its shielding layer is grounded at a single end in a safe place and insulated from the product casing; Cable routing should minimize the influence of electromagnetic interference and control cable distribution parameters within 0.06 μ Within F/1mH.

# VI. Calibration instructions for transmitters

### 6.1 Calibration instructions for transmitters

In addition to remote calibration, the transmitter can also achieve zero and range adjustment functions for on-site instruments. During the on-site calibration process, actual pressure can be added or not. The on-site calibration function of the instrument is completed through button configuration.

### 6.2 Quick Reference Table for Key Function Codes

Menu 1: Change Units

When displayed normally, long press the Z key, and the 5 zeros on the screen will flash in sequence. When the rightmost position flashes, release your hand and press the S key to change the number to "00002". Press the M key once, and the number "2" will be displayed in the bottom left corner of the LCD. For each press of the S key, the unit in the bottom right corner will switch until the desired unit appears. Press the M key to save.

Menu 2: Change Range

When displayed normally, long press the Z key, and the 5 zeros on the screen will flash in sequence. Release when the rightmost position flashes, press the S key to change the number to "00003", press the M key once, and the number "3" will be displayed in the bottom left corner of the LCD, press the S key once, the leftmost arrow flashes, press the Z key to shift, and press the S

key to change the number. When the rightmost digit flashes, press the Z key and all decimal points will light up. Press the S key to select the decimal point position. After entering, press the M key to

save the data and automatically switch to the upper limit of the range. (Note: If there is no need to adjust the lower limit, you can directly press the M key to skip after entering "3", and directly enter "4". At this time, the bottom left corner of the LCD will display "4". Repeat the above operation, change the number, and press the M key to save.).

Menu 3: Zero adjustment of main variable

When displaying normally, press the M and Z keys simultaneously for 5 seconds to complete the zero adjustment.

# VII. Ordering Instructions

### 7.1 Ordering Instructions

a. When placing an order, users need to provide detailed technical parameters, such as pressure measurement range, accuracy requirements, output signal types, and special requirements, in order to choose a digital instrument that is more suitable for their requirements.

b. For detailed selection methods, please refer to the company's latest selection samples or log in to the company's website for selection.

# VIII. After-sale service

### 8.1 After-sale service

a. When the pressure transmitter cannot function properly due to quality issues with the product itself, our company is responsible for repairing or replacing it within one year.

b. In order to ensure the maintenance and upkeep of users, our company provides various accessories and pressure transmitter software and hardware upgrade services to users for a fee.

# IX. User maintenance

### 9.1 Soft maintenance

The pressure transmitter produced by our company is an intelligent product, and the parameters are open to users. Users can adjust the zero point, set the range, and set the damping according to the actual situation. This can also cause confusion in parameter settings or modification of core parameters, resulting in software failures. When the core parameters (factory calibration values) are changed, they must be recalibrated according to the operating instructions or reset through communication. When the core parameters are maintained, the soft fault can be readjusted according to the operating instructions to ensure normal operation of the transmitter.

### 9.2 Hard maintenance

Generally speaking, sensor components, main circuit board, and meter heads are non repairable on site, and the user's hard fault repair items are limited to circuit connection inspection, transmitter cleaning, and meter head replacement. Check the meter head. Unscrew the meter head cover and use a Phillips screwdriver to unscrew the two M3 screws. The meter head can be removed by hand. Remove the cable plug and power plug to remove the meter head. Check if there is dirt on the circuit board of the meter head and if there are any problems with the circuit connection socket. If there are any problems, they should be dealt with in a timely manner. The reinstallation of the meter head should be carried out in the opposite order of disassembly.

### 9.3 Quick troubleshooting table

| Fault phenomenon | Reasons for occurrence | Resolvent |
|---|---|---|
| The instrument display is | The installation position has changed, that is, it is installed vertically upwards in a non-axial direction.<br>(For small range instruments only) | Zero calibrate the instrument according to the installation position at that time |
| | Measurement of impurities blocking pressure measurement holes in the medium | Cleaning with water or other organic solvents |

| | | |
|---|---|---|
| not zero during air compression | The measurement medium and ambient temperature exceed the product measurement range | Prevent working outside the temperature range of instrument use |
| | The measurement medium contains hard debris that damages the measurement membrane, or the measurement membrane is artificially punctured | Return to factory for repair |
| | During the installation process, there was a phenomenon of pressure suppression, causing deformation of the pressure diaphragm | First perform zero calibration operation. If calibration is not possible, return to the factory for repair |
| | Instrument zero drift | Perform zero calibration operation |
| 3.900mA, 21.00mA, or incorrect pressure value displayed on the instrument when under pressure | Measurement of impurities blocking pressure measurement holes in the medium | Cleaning with water or other organic solvents |
| | The measurement medium contains hard debris that damages the measurement membrane, or the measurement membrane is artificially punctured | Return to factory for repair |
| | The pressure source has instantaneous impact | Installing pressure dampers |
| | Instantaneous impact of pressure source causes damage to pressure sensor | Return to factory for repair |
| | Pressure exceeds the instrument range | Prevent pressure from exceeding the range of the instrument or selecting a suitable range instrument again |
| | The pressure exceeds the maximum range of the instrument, causing damage to the pressure sensor due to overpressure | Return to factory for repair |
| | Low power supply voltage or excessive interference | Check the power supply |
| | Excessive electromagnetic interference | Installed in environments with low electromagnetic interference |

| | | |
|---|---|---|
| No display | External power supply without voltage or voltage too high | Disconnect the power supply and check if there is a short circuit in the instrument. If there is a short circuit, return it to the factory for repair. If not, check the power supply |
| | Damaged LCD screen | Return to factory for repair |
| No output signal | Wiring error | Connect the wires correctly according to the instrument wiring diagram |