

OPERATING INSTRUCTIONS

DIFFERENTIAL PRESSURE TRANSMITTER

MODEL: MVSPT / MVCPT / MVDPT



Warnings

Please read this manual carefully before using this product!

1. Place the transmitter horizontally before adjusting.
2. Adjust the zero point of the transmitter after it is installed on site.
3. The process connection should be well installed and tightened before the transmitter is pressurized.
4. The transmitter should be installed in a dry environment preventing from getting wet by rain. In harsh environments, protection box for the transmitter should be used.
5. It is forbidden for user to disassemble the transmitter byself.
6. Do not disassemble the transmitter cover in an explosive/flammable environment when power is on.
7. Please check if the transmitter power supply voltage meets the power supply voltage requirements in the manual.
8. The external grounding screw of the transmitter should be connected to the ground securely.
9. When doing transmitter calibration and temperature compensation using HART communication, use the communication equipment and software provided by the manufacturer.

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Brief Introduction

The intelligent transmitter produced by our company is a multi- functional digital instrument. It is designed with advanced, mature and reliable silicon sensor or capacitive sensor technology combined with advanced single-chip technology and sensor digital conversion technology.

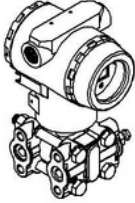
The powerful functions and high-speed computing capabilities of MCU, the core component, ensure the excellent quality of the transmitter. The entire design framework focuses on reliability, stability, high-precision and intelligence.

The transmitter has powerful interface operation function. The digital header can display pressure, percentage, current, and 0~100% analog indication. By key operation, zero point shift, range setting and damping setting can be easily completed without standard pressure source. The setting of basic parameters is very convenient for on-site comissioning.

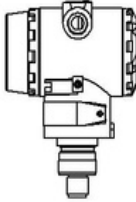
Signal conversion, signal acquisition and processing, and current output control use the application-specific integrated circuit (ASICs) to make the transmitter stable, reliable, and vibration resistant, with good interchangeability.

1. Overview

1.1 Overall appearance



(Monocrystalline silicon
differential pressure
transmitter)



(Monocrystalline silicon
pressure transmitter)

1.2 Exploded Views

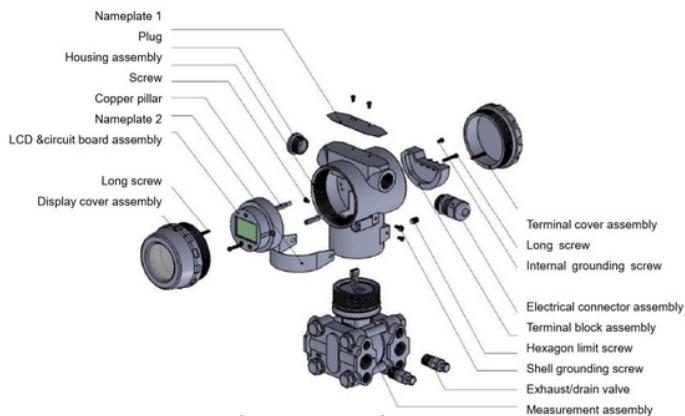


Figure 1 Components of monocrystalline silicon differential pressure transmitter

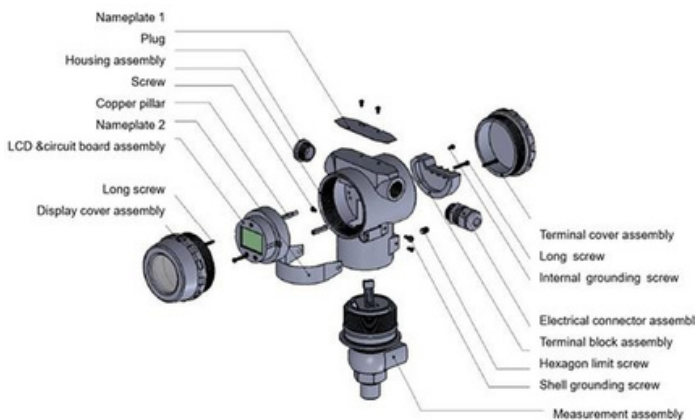


Figure 2 Components of monocrystalline silicon pressure transmitter

1.3 Transmitter system communication connection diagram

1.3.1 HART communication connection diagram

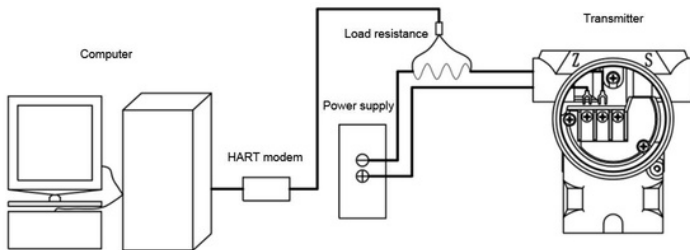


Figure 3
Communication connection diagram of upper computer

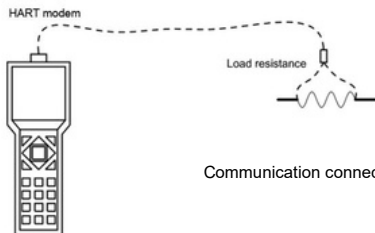
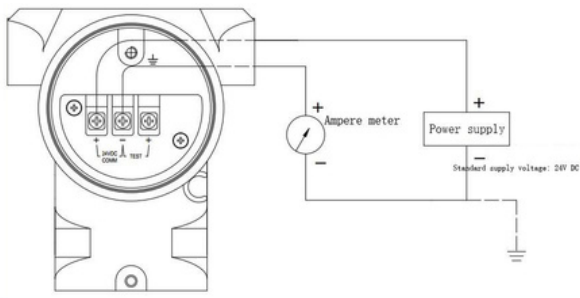


Figure 4
Communication connection diagram of manual operator

1.3.2 Electrical wiring principle of non-flameproof transmitter



MV Endüstriyel Ölçüm Cihazları Anonim Şirketi

Nispetiye Mahallesi Gazi Güçnar Sokak No: 4 Daire 2 , 34340 Beşiktaş-İstanbul-Türkiye

Tel No : +90 212 823 33 99 Fax No : +90 212 823 03 42 Mobil No : +90 532 224 8756

www.mvendustri.com / satis@mvendustri.com

(Note 1: The user allocates distributor or safety barrier according to the site and design requirements)
It is recommended to wire the explosion-proof cable to the terminal, the cable diameter is $\phi 8 \sim \phi 12$. The terminal of the cable is designed with the test end to facilitate the operator to test online. The signal terminals are located in a separate cabinet of the electrical box. Unscrew the cover of indicator to make the wire connection. The upper terminal is the signal terminal and the lower terminal is for the test meter. Figure 5 shows the terminal position. The test terminal is used to connect with the optional indicator or for testing. The power is sent to the transmitter through the signal line, no additional wires are required.

! Pay special attention:

Do not connect the signal line with power to the test terminal, otherwise the diode inside the test terminal will be destroyed.

If the diode is damaged unfortunately, the direct connected (not through the shield plate) test terminal can make the transmitter keep working, but it will not be able to connect to the local indicator.

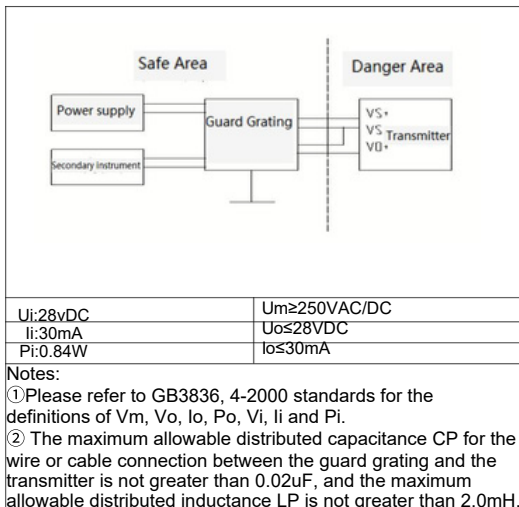
The signal line does not need to be shielded, but the effect will be better if the stranded wire is used. The signal line should not be arranged together with other power lines, or near the heavy current installation.

The threading hole of the transmitter housing should be sealed or inserted with a plug coated with the sealant, so as to prevent the moisture accumulation in the housing. If there is no sealing for the wiring, during the transmitter installation, the threading hole should face downward to discharge water.

The signal line can be un-grounded (floating) or the ground connection can be on the arbitrary point of the signal loop line. The transmitter housing can be grounded or un-grounded; there is no voltage stabilization requirement for the power supply, and even if the peak-peak value of the power ripple reaches 1V, the transmitter output ripple can still be ignored. Because the ground connection of the transmitter is through capacity coupling, please don't use the high voltage tramegger to check the insulation resistance. The voltage to be used to check the lines should not be more than 100V.

The transmitter circuit design is the intrinsic safety circuit, and the output current is limited below 24mA DC (24mA DC under the condition of high temperature or high supply voltage).

1.3.3 Intrinsic Safety Explosion-proof Type Transmitter System Wiring Diagram



2. Installation

2.1 On-site installation

2.1.1 Selecting an installation position

The transmitter works well even under harsh environmental conditions, and in order to ensure long-term stability and accuracy, please follow the following points when choosing an installation site.

① Ambient temperature

Try to avoid locations with large temperature changes or significant step temperatures, and take insulation or ventilation measures if the site is exposed to thermal radiation from plant equipment.

② Air conditions

Do not install transmitter in corrosive environment. If unavoidable, measures must be taken to ventilate and prevent rainwater from entering the cable.

③ Shock and vibration

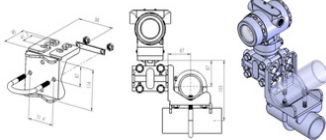
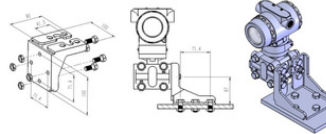
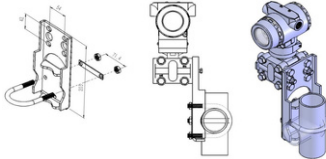
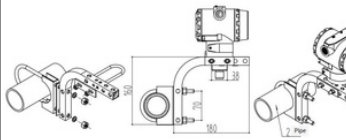
Although the transmitter is designed to be shock-resistant and vibration-resistant, it should also be installed in places with less impact and less vibration as far as possible.

④ Installation of flameproof transmitter

The flameproof transmitter is installed in hazardous areas containing explosive gases. The flameproof grade of our products is: Ex d II C T6Gb; Maximum process temperature 85°C (T6); Ambient temperature: -30 °C ~ 70 °C, wiring reference 1.3.3 "Intrinsic safety explosion-proof transmitter system wiring diagram"

2.1.2 Installation mode selection

Our pressure transmitters can be mounted directly on 2" pipes Or mount directly on the wall and on the dashboard. Differential pressure transmitter has 3 kinds of mounting bracket selection, pressure transmitter has 1 L-type mounting bracket selection.

Pipe installation bending bracket	
Plane installation bending bracket	
Plane installati on bending bracket	
L-bracket	

After loosening the locking screw, the electronic compartment can be rotated 90° left and right. As shown in Figure 2-3.

Warning: Do not rotate more than 90°! So as not to break the internal cable!

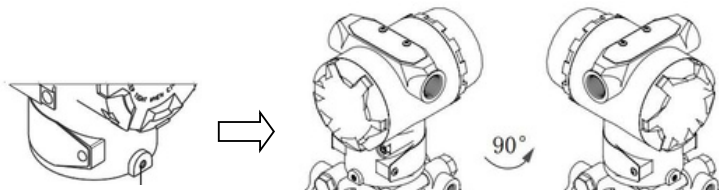


Figure 6 Housing rotation

2.2 Pressure method

2.2.1 Process connection instructions

- ① The pressure of monocrystalline silicon pressure transmitter is mainly through thread connection, and the user can match the pressure induction welding joint according to the specific thread.
- ② There are three pressure modes of monocrystalline silicon differential pressure transmitter, as shown in Figure 7:

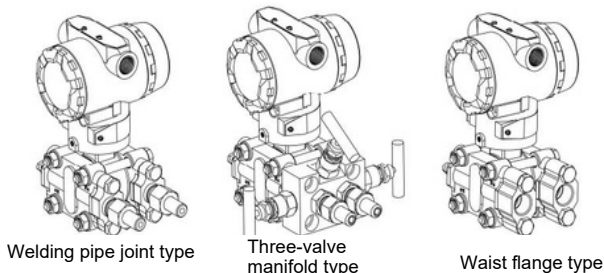


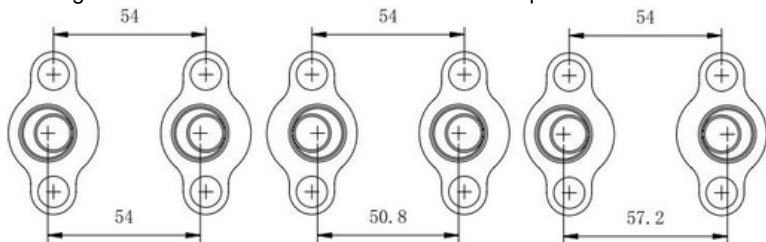
Figure 7 Monocrystalline silicon differential pressure transmitter inlet pressure diagram

2.2.2 Differential pressure transmitter process connection hole distance adjustment instructions

The process connection holes on the pressure chamber are

1/4-18 NPT. These process connection holes require a thread seal. When using a waist flange joint, the transmitter can be easily removed from the production unit by simply removing the upper and lower bolts of the joint. The center distance between the two process connection holes is 54 mm. Rotating the waist flange joint, the center distance can be changed to 50.8 mm, 54 mm, 57.2 mm as shown in the figure 8:

Figure 8 Connection hole distance of differential pressure transmitter



2.3 Notes for measurement methods

Liquid measurement	When measuring the flow rate of the liquid, the pressure tap should be opened on the side of the process piping to avoid sedimentation of the dross. At the same time, the transmitter should be installed beside or below the pressure tap to allow air bubbles to be discharged into the process piping.
Gas measurement	When measuring the gas flow, the pressure tap should be opened on the top or side of the process piping. And the transmitter should be mounted beside or above the process piping so that the accumulated liquid can easily flow into the process piping.
Steam measurement	When measuring the steam flow, the pressure tap should be opened on the side of the process piping and the transmitter is installed below the pressure tap so that the pressure tube can be filled with the collected cold liquid. It should be noted that when measuring steam or other high temperature media, the temperature should not be higher than the limiting operating temperature of the transmitter. When the measured medium is steam, the pressure tube should be filled with water to prevent the steam from directly contacting the transmitter so that the volume change of the transmitter is negligible when the transmitter is working, and there is no need to install a condensing tank.
Level measurement	The differential pressure transmitter used to measure the liquid level is actually the static head that measures the liquid column. This pressure is determined by the level and the

	specific gravity of the liquid, and it's equal to the liquid level above the pressure tap multiply by the specific gravity of the liquid, regardless of the volume or shape of the container.
Liquid level measurement of open containers	When measuring the liquid level of the open container, the transmitter is mounted close to the bottom of the container to measure the pressure corresponding to the liquid level above the transmitter. The pressure of liquid level in the container acts on the high-pressure side of the transmitter while the low-pressure side is connected with the atmosphere. If the lowest level of the measured level changes is above the place where the transmitter is mounted, the transmitter must make the positive transfer.
Level measurement closed of containers	In the closed container, the pressure P_0 of the container above the liquid affects the measured pressure at the bottom of the container. Therefore, the pressure at the bottom of the vessel is equal to the liquid level multiply by the specific gravity of the liquid plus the pressure P_0 of the closed container. In order to measure the actual level, the pressure P_0 of container should be subtracted from the measured pressure at the bottom of container. For this reason, open a pressure tap on the top of the container and get it connected to the low-pressure side of the transmitter. Thus, the pressure in the container acts on both the high and the low pressure sides of the transmitter at the same time. As a result, the differential pressure obtained is proportional to the product of the liquid level and the specific gravity of the liquid. (Note: Transmitter H is connected to the bottom of the tank and L is connected to the top of the tank)

Pressure connections

① Dry pressure connection

If the gas above the liquid does not condense, the connecting tube on the low- pressure side of the transmitter will remain dry. This condition is called the dry pressure connection. The method of determining the measurement range of the transmitter is the same as the method of determining the measuring liquid level of opening container.

② Wet pressure connection

If the gas above the liquid condenses, the liquid will gradually accumulate in the pressure tube on the low-pressure side of the transmitter so that the measurement error is caused. In order to eliminate this error, a certain liquid is previously filled in the pressure tube on the low- pressure side of the transmitter, which is called the wet pressure connection.
In the above case, there is a pressure head on the low-pressure side of the transmitter, so the negative transfer must be performed.

3. Debugging and Operation

3.1 Overview of LCD display functions

Our monocrystalline silicon intelligent pressure transmitter series products has A, B two HART head selection.
A Type: MVSPT / MVCPT / MVDPT (LCD screen is beige when the power is on)

B Type: MVSPT / MVCPT / MVDPT (The LCD screen is brown-green when the power is off)

3.1.1 Display interface introduction

The following uses MVSPT / MVCPT / MVDPT as an example

① The user can set the variables and decimal number of LCD displayed by configuration software, and the maximum display 5 digits.

② LCD supports bivariate display. Display variables that can be set include current, percentage of pivot variables and pivot variables. Each variable can be set independently to display the decimal position: 0, 1, 2, 3, 4.

③ If two display variables are the same, the LCD displays only one variable. Otherwise, the LCD will alternately display the set display variables at 3-second intervals.

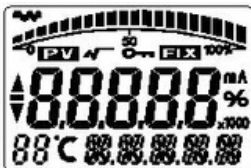


Figure 1-1 LCD Full light display image

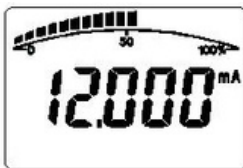


Figure1-2 Current display image

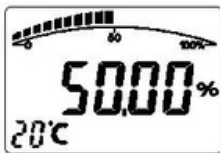


Figure 1-3 Display image of main variables percentage



Figure 1-4 main variables image

3.2 LCD key function quick look-up table

3.2.1 MVSPT / MVCPT / MVDPT Key function quick look-up table

Menu 1: the LCD display and decimal point	When displaying normally, long press and hold the S key to switch the display, while Change displaying DP0, DP1, DP2, DP3 indicates the decimal number displayed, and let go when it needs to be displayed; At this time, the jump may be displayed every 3 seconds.If there is an unwanted variable, repeat the above operation once
Menu 2: Change the unit	When displaying normally, long press the Z key, when the cursor moves to the rightmost position, letgo, press the S key,change the number to"00002",press the M key once, the LCD prompts "primary variable unit".Press the S key once to switch one until the desired unit appears, press the M key to save and move the cursor up, press the M key once to enter the next menu

Menu 3/4: Change the pressure range	When displaying normally, long press the Z key, when the cursor moves to the rightmost position, let go, press the S key, change the number to "00003", press the M key once, the LCD prompts "lower limit of range". Press the S key once to move the cursor under "+", press the Z key to shift, and press the S key to change the number. After the number "9" is displayed, press the S key again to appear the decimal point. Press M to save the data and move the cursor up. (Note: If you do not need to adjust the lower limit, you can directly press the M key to skip after entering the "lower range" and directly enter the "upper range") Press the M key once to enter the next menu. At this time, the LCD prompts "upper limit of range", repeat the above operations, and press the M key to save after changing the number.
Menu 5: Change damping	When displaying normally, long press the Z key, when the cursor moves to the rightmost position, let go, press the S key, change the number to "00005", press the M key once, the LCD prompts "Damping (S)". Press the S key once to move the cursor under "+", press the Z key to shift, and press the S key to change the number. After the number "9" is displayed, press the S key again to appear the decimal point. After input, press M to save the data and move the cursor to the upper left corner. Press M once to enter the next menu.
Menu 6: Set	When displaying normally, long press the Z key, when the cursor moves to the rightmost position, let go, press the S key, change the number to "00006", press the M key once, the LCD prompts "Master variable clear zero".

Menu 7: main variable to zero	Press S to switch between No and Yes. When Yes is displayed, press M to reset the value, save the Settings, and move the cursor up. Shortcut key: When the normal display, press the M+Z key at the same time, and hold for 5 seconds. The number "principal variable clear zero" is displayed in the upper left corner of the LCD, and other operations are the same as above. Note: Hold down the M+Z key for more than 5S to clear the zero quickly.
Menu 8: Output functions	When displaying normally, long press the Z key, release the cursor when it moves to the rightmost position, press the S key, change the number to "00008", and the M key prompts "Output Characteristics" once. Press the S key to display the switch between "linear" and "root", and press the M key to save when the desired function appears. Note (LIN is linear; SQRT is the root)
Menu 9/10: Calibration upper and lower limits Note: This function requires 9, 10 menus must be calibrated at the same time! And the upper and lower limits cannot be the same pressure!	When displaying normally, long press the Z key, when the cursor moves to the rightmost position, let go, press the S key, change the number to "00009", press the M key once, the LCD prompts "Lower limit calibration". Press the S key once, move the cursor to "+", enter corresponding the calibration, add the pressure, press the Z key to shift, press the S key to change. After the number is displayed as "9", press the S key again to appear the decimal point. After input, press M key to save the data and move the cursor up, press M key once to enter the next menu at this time, the LCD prompts "Upper limit calibration", add the corresponding pressure, repeat the above operations, enter the pressure value and press M key to save

Menu11: Any	After adjusting "Upper Limit Calibration", point migration press M key once to enter "Any point Migration" and refer to 9/10 data setting method. Adjust the value you want to migrate to (the current pressure value) on the screen, press the M key, and save the data
Note 1 : In any menu in 2-3-4-5-6-8, every time the M key is pressed, it will switch to the next menu, and if there are any changes, it will be saved at the same time. After Menu 8 is set, return to the main interface (no percentage progress bar is displayed at this time, and the numerical value is displayed correctly. If there is no key operation at this time, it will be automatically after 10 seconds exit and start normal display. If there is a key operation within 10 seconds, the 2-3-4-5-6-8 menu will be recirculated.	
Note 2 : Input 5678.0 in damping to restore the meter to factory condition.	
Note 3 : The menu 9-10-11 requires professional operation, so it is no longer in the above loop, and can only be entered through "00009".	

3.2.2 MVSPT / MVCPT / MVDPT T Key function quick look - up table

	Refer to the table above
Menu 12: Adjust the decimal point position	When displaying normally, press the Z key for a long time, and five zeros soon the screen will flash in turn. When the rightmost position flashes, let go, press the S key, change the number to "00012", press the M key once, and the lower left corner of the LCD shows the number "12". Press the S key to flash first, and press the S key to change the number. 0-4 decimal places. After entering, press the M key to save the data and automatically switch to menu 13
Menu 13: Change density	When displaying normally, press the Z key for a long time, and five zeros on the screen will flash in turn. When the rightmost position flashes, let go, press the S key, change the number to "00021", press the M key once, and the lower left corner of the LCD shows the number "21". Press the S key to flash, press the Z key to shift, and press the S key to change the number. After entering, press the M key to save the data and automatically switch to Menu 22.
Note 1: In any menu in 2-3-4-5-6-8, every time you press the M key, you will switch to the next menu, and if there are any changes, it will save them at the same time. The next menu of 8 is 0, which means that it is normal display state. If there is no key operation at this time, it will automatically exit the adjustment state after 3 seconds and start normal display. If there is a key operation during 3 seconds, the 2-3-4-5-6-8 menu will be recirculated.	

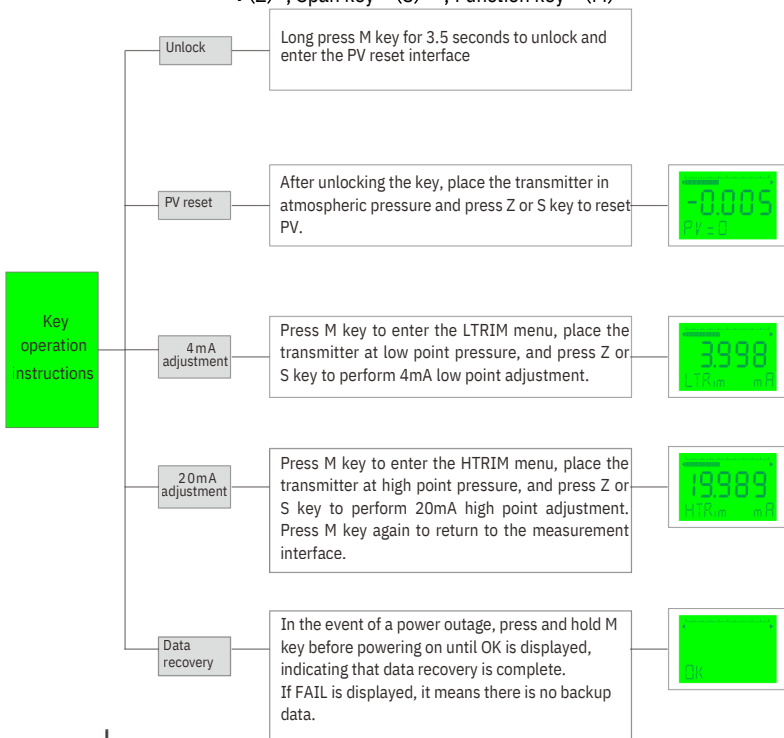
Note 1 Restore factory settings : When displaying normally, press the Z key for a long time, and five zeros on the screen will flash in turn. When the rightmost position flashes, let go and press the S key to change the number to "05678".

Press the M key once, and "NO" is displayed in the lower right corner of the LCD. Then press the S key, and the lower right corner is displayed to switch between "NO" and "YES" when "YES" is displayed

When M is pressed, WAIT is displayed at the lower right corner of the LCD, indicating that data recovery is underway. When OK is displayed at the lower right corner of the LCD, data recovery is completed and the monitoring interface is automatically returned.

3.2.3 MVSPT / MVCPT / MVDPT D Key function quick look - up table

Zero key (Z) , Span key (S) , Function key (M)



**Measure
ment
Mode**

