

TE3000 DIGITAL DIFFERENTIAL PRESSURE SWITCH

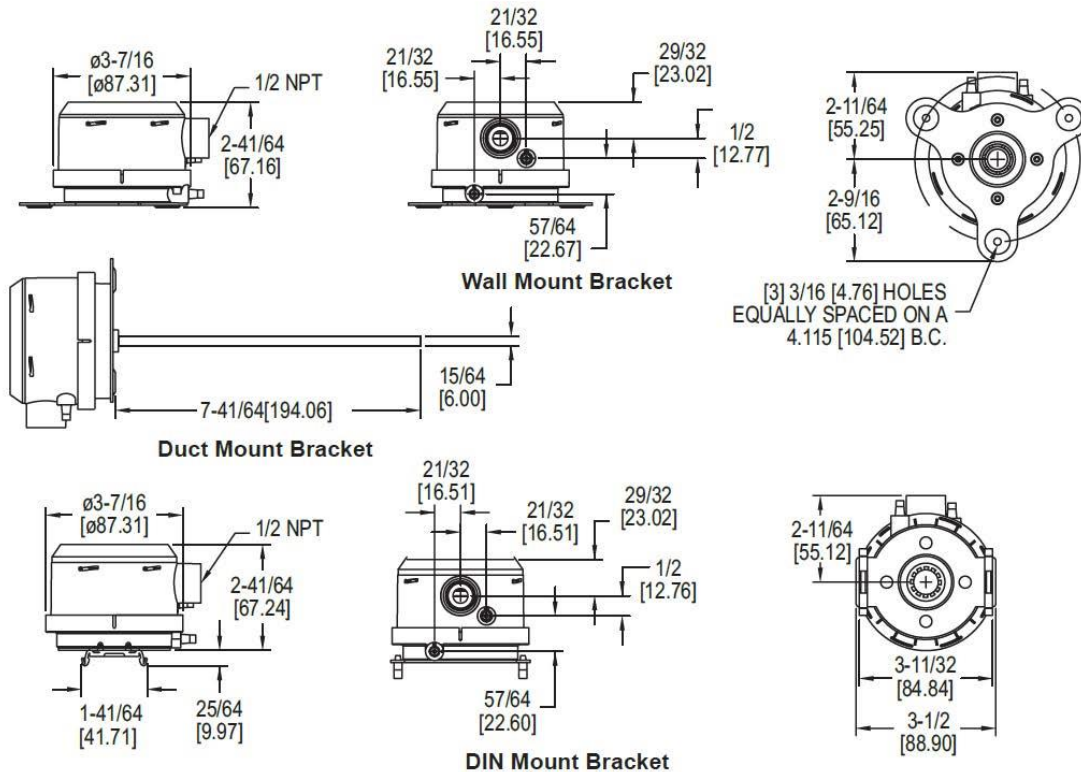
1 INTRODUCTION

The TE3000 digital differential pressure switch adopts the international advanced digital micro differential pressure sensor, based on the gas heat flow measurement principle. It has the characteristics of high precision, low zero drift, easy operation, and wide applicability. It can be used to measure the clean room of pharmaceutical factories and electronics factories. The positive and negative pressure difference of the plant, the special meters for HVAC, purification air conditioning, clean benches, air shower rooms, and the detection of the pressure difference of the clean air conditioning filter.



The TE3000 digital differential pressure switch includes three standard signal output modes of 4-20mA, 0-5/10V and digital 485, which can be directly connected with various monitoring systems to realize information collection and control based on the Internet of Things. At the same time, the internal integrated switch and local display, through the switch selection and key operation, to achieve the setting and viewing of gas type, range, unit, measurement method, etc., to meet the needs of various applications.

2 SPECIFICATIONS AND INSTALLATION



2.1 Surface mounting:

The digital differential pressure switch uses three 8*1/2" pan-head metal screws, which are fixed on the vertical surface through the mounting flange bracket. Keep the process connection down to prevent moisture from entering the pressure port or cable connection port. The diaphragm must be kept vertical to reduce the influence of gravity on the diaphragm.

2.2 Pipeline installation:

The digital differential pressure switch should be installed away from fans, corners, heating and cooling

coils, and other devices that will affect pressure measurement.

- 1) Reserve a 12.70mm installation hole on the installation pipe;
- 2) Insert the sensor probe into the pipeline;
- 3) Using the mounting flange as a reference, mark the positions of three mounting holes on the pipeline and drill holes;
- 4) Use three 8*1/2" pan-head metal screws to connect and fix the micro-manometer to the pipeline through the mounting flange bracket.

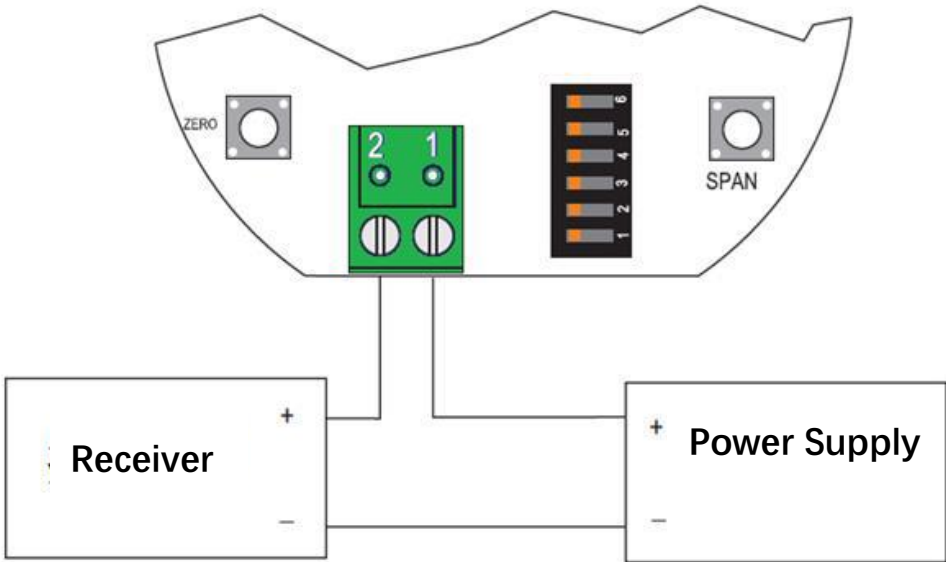
3 TECHNICAL SPECIFICATIONS

Range	<ul style="list-style-type: none"> • 0~±25/40/50/100Pa; • 0~±250/500/750/1250Pa; • 0~±2.5/3.5/5.0/7.0kPa
Measured medium (a)	Dry air, and other non-flammable, non-corrosive gases (O ₂ 、N ₂ 、Ar、CO ₂)
Overload pressure	1PSI (0.07bar)
Accuracy class	1%(≤100Pa)/0.5%(>100Pa)
Long-term stability	Typical: ±0.1%FS/Year
Zero temperature drift	Typical: ±0.1%FS/10°C; Maximum: ±0.2%FS/10°C
Range temperature drift	Typical: ±0.2%FS/10°C; Maximum: ±0.5%FS/10°C
Power supply voltage (b)	15~35Vdc (voltage type); 10~35V (current type, bus type)
Output mode	<ul style="list-style-type: none"> • Current type: 4~20mA (two-wire system); • Voltage type: 0~5/10V (three-wire system); • Bus type: RS-485 (four-wire system) working current
Working current	<40mA
Working temperature	-20~85°C
Response speed	2.5Hz output refresh,
Zero/range adjustment	Button operation
Lcd display	5-digit LCD (support 180°rotation)
Load resistance (b)	Current type: 0~1250Ω; Voltage type: ≥1kΩ
Terminals	European standard 16~26AWG terminal block, suitable for 5~10mm cable
Process connection	Typical: 5mm ID tube; Maximum: 9mm OD
Shell material	PC
Weight	<250g

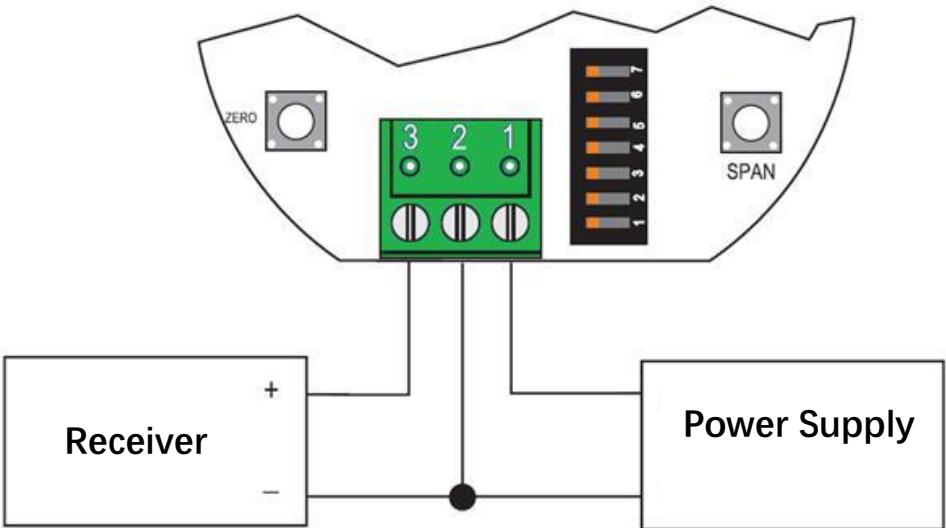
Protection level	IP65
(A) Select the gas type through the buttons and configuration software, see "6 Gas Type Selection" for details; (B) The power supply voltage needs to increase as the load resistance increases.	

4 ELECTRICAL WIRING

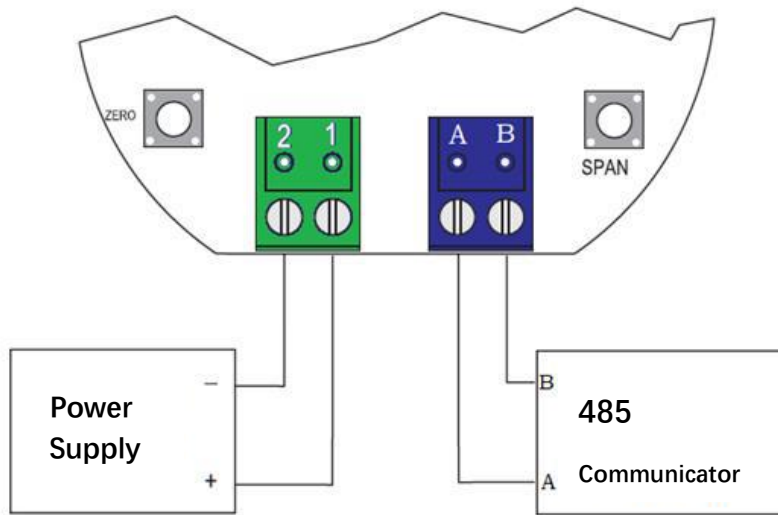
4.1 Current output type (4~20mA two-wire system):



4.2 Voltage output type (0~5/10V three-wire system):



4.3 Bus output type (isolated four-wire system):



5 SWITCH SETTING

Through the toggle switch on the circuit board, the range, unit, pressure/differential pressure, output direction, etc. can be selected and set.

DIAL POSITION	FUNCTION
1-2	Range setting
3	Pressure/differential pressure selection
4-5 (a)	Display unit settings
6	Output direction
7(b)	Voltage type output range setting

(a) The digital bus type only has this option.
 (b) This option is only available for voltage output models.

5.1 Range setting

Through the DIP switch 1-2, according to the different measuring range of the sensor, different range output can be set.

DIP switch		Output range ^(a) (UNIT: Pa)	
1	2	MAX. 100Pa	MAX.1250Pa

OFF	OFF	25	250
OFF	ON	40	500
ON	OFF	50	750
ON	ON	100	1250

(A) The values listed in this table are for the range value when the measuring gas is dry air; if it is configured for other gas types, the set range will be scaled according to the correlation coefficient in the chapter "6 Gas Type Selection".

5.2 Pressure/differential pressure setting

Through the DIP switch 3, select the measurement method to be pressure or differential pressure:

- OFF position: differential pressure mode;
- ON position: pressure mode.

Note: When the differential pressure mode is selected, the actual range is doubled, and the output accuracy will be doubled.

5.3 Display unit setting

Through the DIP switch 4-5, set different display units.

DIP switch		Display		
4	5	pressure	flowrate rate	flow
OF	OF	kPa	m/s	m ³ /h
OF	ON	mm w.c.	m/s	m ³ /h
ON	OF	Pa	m/s	m ³ /h
ON	ON	in w.c.	FPM	cfm

5.4 Output direction setting

Through the dial switch 6, select the output direction:

- OFF position: the output is reversed;
- ON position: the output is positive.

5.5 Voltage output range setting

Through the dial switch 7, select the range of output voltage:

- OFF position: 0~5V output;
- ON position: 0~10V output.

Note: When 0~5V is selected, the output accuracy will be doubled.

6 GAS TYPE SELECTION

It is mainly used for dry air pressure, flow rate and flow measurement, and can be used for other non-flammable, non-corrosive gases O₂, N₂, Ar, CO₂ measurement. When different gas types are selected, the actual measurement value and measurement range will be zoomed. The corresponding zoom ratios are shown in the table below.

Gas type	Correction factor
Dry air	1.0
(O ₂)	1.07
(N ₂)	0.97
(Ar)	0.98
(CO ₂)	0.56

The gas type can be configured through the keys or the host software. For specific operations, please refer to the relevant chapters or documentation.

7 INPUT/OUTPUT CALIBRATION

7.1 Measurement input calibration

When there is an error between the measured value and the input, the zero position/range calibration can be performed by pressing the button.

- Zero calibration: Keep the input pressure balance between the positive and negative ends of the micromanometer, press and hold the Zero button for 5s after it is stable, the screen displays "ZERO", the zero calibration is successful, and the measurement and output are cleared; otherwise, it displays "FAIL", No change in measurement and output;

- Span calibration: keep the input pressure at the set full-scale value, press and hold the Span button for 5s after it is stable, the screen displays "SPAN", the span calibration is successful, and the measurement and output are full-scale; otherwise, "FAIL" is displayed, measuring and There is no change in output.

7.2 Analog output calibration

When the measurement and display are correct, but there is an error in the analog output, the analog output calibration is required. This operation is usually completed when leaving the factory.

If you need to perform output calibration, please ensure that the output terminal has a high-precision digital voltage/current meter for monitoring. At the same time, this operation requires the use of a specific configuration communication interface and upper computer operating software. For details, please refer to the relevant software operating instructions.

8 LCD DISPLAY

The equipped LCD liquid crystal display can be used to display the measured value and various fault states in real time on the spot.

8.1 Fault display information

SCREEN DISPLAY	CAUSE OF ISSUE	HANDLING METHOD
ovEr	The measured value is higher than the upper limit of the range	Reduce the input pressure; or change the range

UndEr	The measured value is below the lower limit of the range	Increase the input pressure; or change the range
FAIL	Zero/span calibration failed	Perform zero/span calibration
Err1	Sensor/device failure	Return to factory for repair

8.2 Menu and parameter configuration

In addition, with key operation, it can be used for configuration settings of more parameters. See Appendix A for the detailed menu operation process.

8.2.1 Menu entry and factory reset

- Configuration menu entry: In the normal measurement display mode, press and hold the two keys at the same time for more than 2 seconds to enter the menu setting mode, and the first-level menu will be displayed on the screen;
- Restore factory settings: After entering the menu, keep the two buttons unreleased. After 7 seconds, the screen will display "FACT". After the button is released, the internal configuration parameters of the instrument will be restored to the factory settings.

8.2.2 Display mode selection

The first setting option after entering the menu is "Display Mode". Short press the zero "ZERO" button to select among the three display modes "PrES pressure", "uEL flow rate" and "Flo flow rate".

Velocity is calculated using the below equation:

$$\text{Velocity(fpm)} = \text{K-Factor} \times 4004.4 \times \sqrt{(\text{Diff. Press. (in of w.c.)})}$$

Velocity in m/s is then calculated from the equation:

$$\text{Velocity(m/s)} = \text{Velocity(fpm)} \times 0.00508$$

Flow is calculated using the below equation:

$$\text{Flow(cfm)} = \text{Area(Ft}^2) \times \text{K-Factor} \times 4004.4 \times \sqrt{(\text{Diff. Press. (in of w.c.)})}$$

$$\text{Flow (m}^3/\text{h)} = \text{Flow (cfm)} \times 1.6992$$

After the display mode is selected, press and hold the "SPAN" button to enter the next menu.

8.2.3 Moving average coefficient

The "moving average coefficient", that is, the digital damping value, is calculated by averaging multiple samples to keep the output and display values stable. The maximum smoothing factor can be set to 240s.

Note: The refresh rate of the display and output is always 2.5Hz (that is, the update is maintained 2.5 times in 1s), but the displayed value will be arithmetic averaged according to the smoothing coefficient. The larger the smoothing coefficient, the more stable the display and output, but the more obvious the output lag.

8.2.4 Pressure parameter setting

If the mode selection in 8.2.2 is "PrES pressure", enter the corresponding pressure parameter setting menu. The main selection and setting of output range (PoH) under this menu:

- If "PoH" is selected as "n", the output range is determined according to the selection of DIP switch 1-2;
- If "PoH" is selected as "y", you can manually set the output range to any value within the minimum/maximum range. If the set range exceeds the selection range of the DIP switch, the selection of the DIP switch is still used as the actual output range.

8.2.5 Flow rate parameter setting

If the mode selection in 8.2.2 is "uEL flow rate", enter the corresponding flow rate parameter setting menu.

The setting parameters of flow rate include K factor and output range:

- The K factor is used to calculate the flow rate, and the adjustable range is 0.001~9.999;
- The range setting can be set in flow rate unit or pressure unit. If you select "AdJ u", enter "uoH" and set the upper limit of the range by flow rate unit; if you select "AdJ P", enter the pressure range setting interface "PoH" (see 8.2.4).

8.2.6 Flow parameter setting

If the mode selection in 8.2.2 is "FLo Flow Rate", enter the corresponding flow parameter setting menu.

The flow setting parameters include K factor, Area factor, and output range:

- The K factor is used to calculate the flow rate, and the adjustable range is 0.001~9.999;
- Area coefficient is used in the calculation of flow;
- The range setting can choose to use flow unit or pressure unit to set. If you select "AdJ F", you will enter "FoH" and set the upper limit of the range by the flow unit; if you select "AdJ P", you will enter the pressure range setting interface "PoH" (see 8.2.4).

8.2.7 Save configuration parameters

After setting all the parameters, enter the "SAVE" menu and ask whether to save the configuration parameters.

- Select "no", the menu configuration parameters will be discarded, and the previously set parameters will still be used;
- Select "yes", all the parameters set in this operation will be saved and used.