## 18257-SW USER MANUAL



## APPLICATION

The PS-100/PS-110 series differential air pressure switch is designed to be used on air or combustion products such as boilers, furnaces and other HVAC equipments functions as airflow and air pressure supervision.

Featured with factory fixed set-point or field adjustable set-point versions, these switches can be used to sense positive, negative or differential air pressure. A highly reliable micro-switch is used as the power switching element which offers minimum 100,000 cycles under rated load. .

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## FEATURES

- Suitable for positive, negative and differential pressure applications.
- PS-100/110 series switches can be used up to $105^{\circ} \mathrm{C}$.
- Can be used with air or combustion products.
■ Pressure set point can be factory fixed (PS-100) or field adjustable (PS-110).
- Diaphragm responds to pressure changes as low as 25 Pa .

Snap action switch UL1054 \& VDE approved with life cycles $>100,000$ cycles at rated load.

- Various types of quick connect terminals are available.
- Flexible connector orientation, mounting position and mounting holes are available.
- Various optional mounting brackets are available for easy installation.


## WORKING PRINCIPAL \& EXAMPLE

Consider a typical HVAC system as an example.


When the fan operates properly and the filter is not blocked, the pressure of the air released from the fan is larger than atmosphere pressure and that intake to the fan is lower than atmosphere pressure.

In this system, a pressure switch is used for:

1. Energy saving. When there is no air flow in the air passage, the appliance will be switched off.
2. When abnormal combustion would result from a reduced air-flow rate (thus pressure drop), the appliance must either not start up or shut down if it is already in operation.
3. Appliance must stop if the air inlet or outlet becomes restricted or blocked which may result a dangerous situation.

## Positive sensing

- Remove Connection A, use Connection-B only.
- The pressure switch senses a high pressure from inlet H and the atmosphere pressure from inlet $L$ respectively.
- As long as the pressure difference is high enough, the switch will be actuated.


## Negative sensing

- Remove Connection-B, use Connection-A only.
- The pressure switch senses a low pressure from inlet $L$ and the atmosphere pressure from inlet H respectively.
- As long as the pressure difference is high enough, the switch will be actuated.


## Differential sensing

- Use both Connection-A and Connection-B as shown in the circuit above.
- The pressure switch senses a high pressure from inlet H and a low pressure from inlet L respectively.
- As long as the pressure difference is high enough, the switch will be actuated.


## SPECIFICATIONS \& CHARACTERICS

All specifications and characteristics in this User Manual refer to vertical installation. For the applications that require horizontal installation, the operation set pint shifts as indicated in Page 8.

## Switch Set Point

18257-SW Vacuum: 0.07" H2O Decreasing
Factory Fixed set-point
0.07" H2O = 0.0025 PSI

## Maximum Pressure Allowed

 6000Pa (0.87PSI)
## Switch Rating

5A resistive @ 120~277 VAC
0.1 A resistive @ 120 ~ 277 VAC

1/10 hp @ 120 ~ 277 VAC
1 A pilot duty @ 120 VAC
28 VA pilot duty @ 24VAC
Switching Element
Snap-action switch
Contact Arrangement
SPDT, SPST-NO, SPST-NC

## Measured Media

Air
Combustion products

## Operating Temperature

-40 to $105{ }^{\circ} \mathrm{C}$

## Sample Line Connectors

Barbed fittings will accept $1 / 4^{\prime \prime}$ or $3 / 8^{\prime \prime}$ ID
flexible slip on tubing
Custom-made design is available

## Mounting

Vertical
Horizontal (optional)

## Material

Diaphragm: Silicon
Plastic Housing: PPO
Optional Bracket: Brass/Steel

## Terminals

$250(6.3 \times 0.8 \mathrm{~mm})$ Quick connect
$187(4.8 \times 0.5 \mathrm{~mm})$ Quick connect
Screw Terminals
Soldering Terminals
Relative humidity
$5 \%$ to $95 \%$ relative humidity at $40^{\circ} \mathrm{C}$

Factory Fixed Set-points Range \& Accuracy

| Pressure range | Setting ON <br> Accuracy | Setting ON <br> Accuracy (\%) | Setting OFF <br> Accuracy | Setting OFF <br> Accuracy (\%) |
| :---: | :---: | :---: | :---: | :---: |
| $0.10^{\prime \prime} \sim 0.32$ " w.c | $\pm 0.04$ " w.c | - | $\pm 0.04$ " w.c | - |
| $0.32^{\prime \prime} \sim 1.00$ " w.c | $\pm 0.05$ " w.c | - | $\pm 0.05$ " w.c | - |
| 1.00 " $\sim 5.00$ " w.c | - | $10 \%$ | - | $10 \%$ |

Field Adjustable Set-point Model, Range \& Accuracy

| Model | Set point range | Set point increase <br> per turn | Initial set point <br> (at factory) | Tolerance |
| :---: | :---: | :---: | :---: | :---: |
| PS-112 | $0.20-1.0$ " w.c. | $0.16^{\prime \prime}$ w.c. | 0.20 " w.c. | $\pm 0.08$ " w.c. |
| PS-113 | $1.0-5.0$ " w.c. | $0.80^{\prime \prime}$ w.c. | $1.0^{\prime \prime}$ w.c. | $\pm 10 \%$ |

## Recommendation:

The set-point values for your application shall be determined by measuring the pressure differential where the pressure switch will be connected. The set-points of the pressure switch must be determined by measuring the pressure differential on the position where the pressure switch is to be installed.

CONNECTORS POSITIONS


## RECOMMENDED CONNECTORS ORIENTATION



## Remarks:

1. All recommended installation positions are with the diaphragm vertical.
2. Connector in upward position is not recommended to avoid water vapor condensation penetrating into the pressure switch.

## AIR SAMPLING CONNECTIONS



## DIMENSIONAL DRAWING \& MOUNTING HOLES



## CIRCUIT CONNECTIONS

- Without pressure applied to the diaphragm, switch contacts are in the position shown.
- Pressure switch can come with SPDT, SPST-NO or SPST-NC circuit arrangement.



## OPTIONAL MOUNTING BRACKET

Different standard mounting brackets are available for quick installation. Customers can also tool up their own bracket design at low cost through our own tooling shop. Please contact Goldtech or your local sales representatives for details.


## OPTIONAL BLEEDING HOLES

Optional bleeding holes of 0.4 mm or 0.5 mm in diameter can be drilled in the Low or High sampling connection as shown in above drawing. Bleeding hole is not drilled by default but is available on demand. It bleeds off pressure slowly during normal operation in some systems to prevent air (e.g. non-stopping exhausted air) from being trapped inside the switch chamber.

Typical Example: when the pressure switch is used to sense pulse pressure in a HVAC system.
Caution: if a bleeding hole is built, make sure the pressure switch is installed with the bleeding hole at the bottom such that it is not blocked during installation and in normal operation.

## INSTALLATION \& APPLICATION SAFETY

When installing this product:

- Make sure the installation process is performed by trained technicians or engineers.
- Follow all appliance instructions carefully. Failure to follow the instructions could damage the product or cause a hazardous condition.
- Check that this product has the required pressure and electrical rating for the application.
- On completing the installation, check


## INSTALLATION LOCATION

- Combustion products usually contain a large quantity of vapor. As it cools, condensation generated within the switch body and the tubing can shift the pressure set-points.
■ Mount the pressure switch with the pressure connectors at the bottom so that condensate does not flow or penetrate into the switch.
■ The switch should be placed in a position higher than the connecting tubes and the condensate drainage. This prevents any liquid flow into the switch
that all components operate correctly.
- When it is used as the primary safety control of your system, it must be part of a safe start circuit. A safe start check circuit will not allow the system (e.g. burner) to operate unless the pressure switch contacts are in the correct position before the operating cycle begins. This ensures the pressure switch and the control circuit are both operating properly.
and affects the normal operation.
- The surrounding temperature of the switch could not be higher than $105^{\circ} \mathrm{C}$.
- Make sure the connection tube you use is able to sustain high temperature.
- Select a position such that convenient connection of the pressure tubing and electrical wiring is allowed.
- The pressure switch shall not be installed in a location where it is subjected to severe vibrating which may change the pressure switch set-points.
highest operating temperature of your system.
- When selecting a tube, make sure that it is sufficient pull strength (independent ambient temperature changes).
- Use gradual turns in the piping route and avoid sharp bends to ensure correct pressure sensing.
terminal), do not force the switch upward or downward to bend the terminals. This will affect the pressure set-point.
- Prevent the terminals from contacting any liquid or exposed in a high humid location.


## MOUNTING METHODS

■ The pressure switch should be installed with the diaphragm vertical.

- When the pressure switch is mounted with the diaphragm horizontal, the weight of the membrane will affect the set point of the switch.
- Use only the holes provided or the optional mounting bracket for mounting purpose. Do not drill holes for mounting purpose, as this would damage the switch.

| Pressure Switch Orientation | ON Offset | OFF Offset |
| :--- | :---: | :---: |
| Default Orientation: Diaphragm vertical | 0 mbar | 0 mbar |
| a) Horizontal; micro-switch upper position | a) -0.26 mbar | a) -0.26 mbar |
| b) Horizontal: micro-switch lower position | b) +0.26 mbar | b) +0.26 mbar |


| Switch <br> Orientation | Set point accuracy |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 0.25 to 0.80 mbar |  | 0.80 to 2.50 mbar | 2.50 to 12.50 mbar |  |  |
|  | ON | OFF | ON | OFF | ON | OFF |
| Vertical | $\pm 0.10 \mathrm{mbar}$ | $\pm 0.10 \mathrm{mbar}$ | $\pm 0.13 \mathrm{mbar}$ | $\pm 0.13 \mathrm{mbar}$ | $\pm 10 \%$ | $\pm 10 \%$ |
| Horizontal | $\pm 0.14 \mathrm{mbar}$ | $\pm 0.14 \mathrm{mbar}$ | $\pm 0.17 \mathrm{mbar}$ | $\pm 0.17 \mathrm{mbar}$ | $\pm 10 \%$ | $\pm 10 \%$ |


Position \#1

Position \#2

Position \#3

Position \#1: Diaphragm vertical
Position \#2: Diaphragm horizontal, micro-switch is in lower position
Position \#3: Diaphragm horizontal, micro-switch is in upper position

## Example: Installation Position \& Condensate Drainage



## ORDERING INFORMATION



```
UL File Number: MH 29861
Approved Ratings:
    3A, 120VAC, 60Hz
    3A, 30VDC
    125VA @ 120VAC, Pilot Duty
    Electrical Endurance > 100,000 cycles
```

Pressure Conversion Table

|  | PSI | In $\mathrm{H}_{2} \mathrm{O}$ | In Hg | kPa | mbar | cm $\mathrm{H}_{2} \mathrm{O}$ | mm H20 | mm Hg | $\mathrm{k} / \mathrm{cm}^{2}$ | Atm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 PSI | 1.0000 | 27.6806 | 2.0360 | 6.8948 | 68.9475 | 70.3088 | 703.0700 | 51.7149 | 0.0703 | 0.0681 |
| $1 \mathrm{ln} \mathrm{H}_{2} \mathrm{O}$ | 0.0361 | 1.0000 | 0.0736 | 0.2491 | 2.4908 | 2.5400 | 25.4000 | 1.8683 | 0.0025 | 0.0025 |
| 1 ln Hg | 0.4912 | 13.5945 | 1.0000 | 3.3864 | 33.8638 | 34.5324 | 345.3240 | 25.4000 | 0.0345 | 0.3342 |
| 1 kPa | 0.1450 | 4.0147 | 0.2953 | 1.0000 | 10.0000 | 10.1974 | 101.9716 | 7.5006 | 0.0102 | 0.0099 |
| 1 mbar | 0.0145 | 0.4015 | 0.0295 | 0.1000 | 1.0000 | 1.0197 | 10.1972 | 0.7501 | 0.0010 | 0.0010 |
| $1 \mathrm{~cm} \mathrm{H} \mathrm{H}^{\mathrm{O}}$ | 0.0142 | 0.3937 | 0.0290 | 0.0981 | 0.9806 | 1.0000 | 10.0000 | 0.7355 | . 0010 | 0.0010 |
| $1 \mathrm{~mm} \mathrm{H} \mathbf{2}$ | 0.0014 | 0.0394 | 0.0029 | 0.0098 | 0.0981 | 0.1000 | 1.0000 | 0.0736 | 0.0001 | 0.0001 |
| 1 mm Hg | 0.0193 | 0.5353 | 0.0394 | 0.1333 | 1.3332 | 1.3595 | 13.5954 | 1.0000 | 0.0014 | 0.0013 |
| $1 \mathrm{kp} / \mathrm{cm}^{2}$ | 14.2233 | 393.7110 | 28.9589 | 98.0665 | 980.6650 | 1000.0200 | 10000.20 | 735.5610 | 1.0000 | 0.9678 |
| 1 atm | 14.6959 | 406.7930 | 29.9213 | 101.3250 | 1013.2500 | 1033.2500 | 10332.50 | 760.0020 | 1.0332 | 1.0000 |

For example: $1 \mathrm{mbar}=10.1972 \mathrm{~mm} \mathrm{H}_{2} \mathrm{O}$

$$
1 \mathrm{PSI}=27.6806 \ln \mathrm{H}_{2} \mathrm{O}
$$

$1 \mathrm{In} \mathrm{H}_{2} \mathrm{O}=0.2491 \mathrm{kPa}$

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