



# ULTIMHEAT

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## HEAT & CONTROLS



# PRESSURE SWITCHES

# AIR SWITCHES

- For thermostats:
- Flow switches & combination controls:

See catalogues No.1 & 2

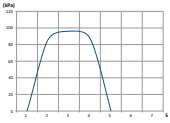
See catalogue No.6





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Positive pressure switches				P1-P8
Section 4		ZA	Low voltage circuit adjustable <b>positive</b> pressure switch. Quick connect terminals. Various center threads. Maximum set point value: 4 bar (0.4 Mpa, 60PSI) Minimum set point value: 10 kPa (100 mbar, 1.5 PSI) Maximum electrical rating: 1A 250VAC	P3
		ZL	Low voltage circuit <b>positive</b> pressure switch. 1/8" center thread or 2.7 or 4mm side spout. Printed circuit or solder terminals. Maximum set point value: 90 kPa (900 mbar, 13 PSI) Minimum set point value: 2 kPa (20 mbar, 0.29 PSI) Maximum electrical rating: 1A 250VAC	P4-P5
		ZQ	Pressure switch, <b>single pole</b> snap action contact. Not adjustable set point. SPDT contact. Many dimensions of fittings available Maximum set point value: 3 bar (0.3 Mpa, 43 PSI) Minimum set point value: 7 kPa (70 mbar, 1 PSI) Maximum electrical rating: 22 (8)A 250VAC	P6
		ZR	<b>Single pole</b> snap action contact pressure switch with check valve. In line assembly on 10mm soft tubes. Special for camping water supply pumps Standard calibrations: 40, 80, 100 kPa (400, 800, 1000 mbar; 5.8, 11.6 and 14.5 PSI) Maximum electrical rating: 22 (8)A 250VAC	P7





Adjustable set point positive pressure switches				P1-P12
Section 5		ZJ	Snap action contact adjustable set point <b>positive</b> pressure switch. IP65 waterproof. 1/8" center threads. Maximum set point value: 2.5 bar (0.25 Mpa, 36 PSI) Minimum set point value: 7 kPa (70 mbar, 1 PSI) Maximum electrical rating: 3A 125/250 VAC	P3
		ZZ	Adjustable set point snap action contact miniature <b>positive</b> pressure switch. 1/8" center thread. Maximum set point value: 2.5 bar (0.25 Mpa, 36 PSI) Minimum set point value: 8 kPa (80 mbar, 1.2 PSI) Maximum electrical rating: 22 (8)A 250VAC	P4
		MA	<b>Single pole</b> snap action pressure switch. Adjustable set point, quick connect terminals. 1/8" center threads. Maximum set point value: 5 bar (0.5 Mpa, 72 PSI) Minimum set point value: 10 kPa (100 mbar, 1.5 PSI) Maximum electrical rating: 22 (8)A 250VAC	P5
		MB	<b>Single pole</b> snap action pressure switch. Adjustable set point. With or without IP65 connection box, screw terminals 1/8" center thread. Maximum set point value: 5 bar (0.5 Mpa, 72 PSI) Minimum set point value: 10 kPa (100 mbar, 1.5 PSI) Maximum electrical rating: 22 (8)A 250VAC	P6-P7

# Summary





Section 5		MC	<p><b>Double pole</b> snap action pressure switch. 2 independent adjustable set points, 1/4" quick connect terminals. 1/2" thread.</p> <p>Maximum set point value: 12 bar (1.2 Mpa, 174 PSI)                  Minimum set point value: 30 kPa (300 mbar, 2.9 PSI)                  Maximum electrical rating: 22 (8)A 250VAC</p>	P8
		MD	<p><b>Double poles</b> snap action pressure switch. 2 independent adjustable set points. With or without IP65 connection box. 1/2" thread.</p> <p>Maximum set point value: 12 bar (1.2 Mpa, 174 PSI)                  Minimum set point value: 30 kPa (300 mbar, 2.9 PSI)                  Maximum electrical rating: 22 (8)A 250VAC</p>	P9-P10
		MN	<p><b>3 Poles</b> pressure switch, set point adjustable by user. 1/8" or 1/4" Brass fitting.</p> <p>Maximum set point value: 2 bar (0.2 Mpa, 29 PSI)                  Minimum set point value: 5 kPa (50 mbar, 0.7 PSI)                  Maximum electrical rating: 3 x 22 (8)A 250VAC</p>	P11

## Vacuum pressure switches with PA66 fitting

				P1-P8
Section 6		ZD	<p>Low voltage circuit <b>vacuum</b> pressure switch. 1/8" center thread or 2.7 or 4mm side spout. Printed circuit or solder terminals.</p> <p>Lowest negative pressure: -90 kPa (-900 mbar, -13 PSI)                  Minimum set point value: -1 kPa (-10 mbar, -0.15 PSI)                  Maximum electrical rating: 1A 250VAC</p>	P3-P4
		ZU	<p>Snap action contact adjustable set point <b>vacuum</b> pressure switch, 1/8" center thread.</p> <p>Lowest negative pressure: -90 kPa (-900 mbar, -13 PSI)                  Minimum set point value: -5 kPa (-50 mbar, -0.7 PSI)                  Maximum electrical rating: 22 (8)A 250VAC</p>	P5
		ZS	<p><b>Vacuum</b> switch, single pole snap action contact. Not adjustable set point. 1/8" center thread</p> <p>Lowest negative pressure: -90 kPa (-900 mbar, -13 PSI)                  Minimum set point value: -2 kPa (-20 mbar, -0.3 PSI)                  Maximum electrical rating: 22 (8)A 250VAC</p>	P6
		ZX	<p>Snap action contact adjustable set point <b>vacuum</b> pressure switch. <b>IP65 waterproof</b>.</p> <p>1/8" center thread.</p> <p>Lowest negative pressure: -90 kPa (-900 mbar, -13 PSI)                  Minimum set point value: -5 kPa (-50 mbar, -0.7 PSI)                  Maximum electrical rating: 3A 125/250 VAC</p>	P7





## Differential pressure switches




				P1-P4
Section 7		ZH	<p>Low voltage circuit <b>differential</b> pressure switch, printed circuit terminals, 4mm spouts.</p> <p>Maximum set point value: +/- 90 kPa (-/+ 900 mbar, +/- 13 PSI)                  Minimum set point value: +/- 1 kPa (-/+ 10 mbar, +/-0.15 PSI)                  Maximum electrical rating: 1A 250VAC</p>	P3
		ZC	<p>Low voltage circuit, IP65 waterproof <b>differential</b> pressure switch, various center threads.</p> <p>Maximum set point value: 4 bar (0.4 Mpa, 60 PSI)                  Minimum set point value: 10 kPa (100 mbar, 1.5 PSI)                  Maximum electrical rating: 1A 250VAC</p>	P4


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Air switches for spas and swimming pools (latching or momentary action)				P1-P10
Section 8		ZG	Miniature <b>single pole</b> air switch, for low voltage, printed circuit or solder terminals, mounting with center ¼" thread, or backside bracket. Dia. 2.7 or 4mm spout Maximum electrical rating: 1A 250VAC	P3-P4
		ZP	<b>Single pole</b> air switch, snap action. <b>Center thread mouting only</b> Momentary or latching action. Maximum electrical rating: 22 (8)A 250VAC	P5-P6
		ZK	Snap action, <b>single pole</b> air switch, center ¼" thread mounting, or surface mounting with side spout Dia. 2.7 or 4mm spout. High sensitivity for long distance remote control Maximum electrical rating: 22 (8)A 250VAC	P7-P8
		ZT	Snap action, <b>double poles</b> air switch, center ¼" thread mounting, or surface mounting with side spout Dia. 2.7 or 4mm spout. High sensitivity for long distance remote control Maximum electrical rating: 22 (8)A 250VAC	P9-P10

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Accessories				P1-P6
Section 10		Z6	Nuts and tube securing nuts ¼" NPSM and 9/16-18 UNC, 6 × 3mm and 3 × 1.5mm PVC tubes. ½ to dia. 4mm spout conversion fittings	P3-P6



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# Technical foreword to Pressure switches and Air switches

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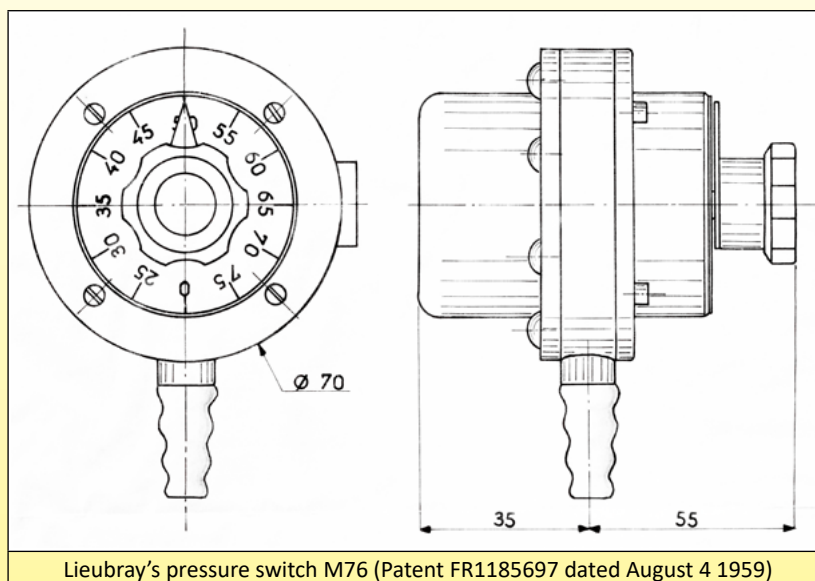
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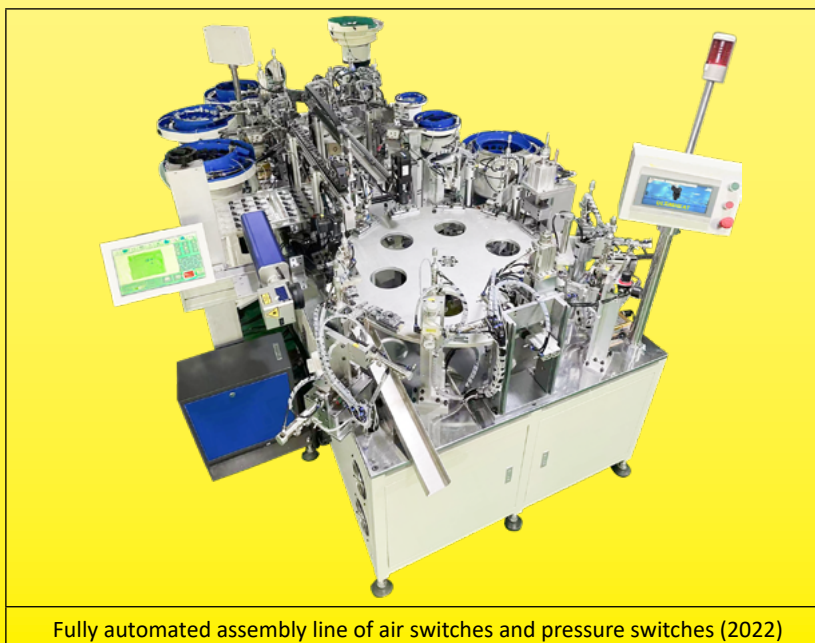
## Technical foreword to Pressure switches and Air switches

JPCI Controls (and later its Ultimheat brand) was founded in China by a French investor in 1999, and is still today a 100% French family business. Its first pressure switches were manufactured in France in 1955 by engineer Lucien Lieubray. The manufacture of pneumatic switches called "Air Switches" began in France at JPC in 1996.



JPCI Controls (and later its brand name Ultimheat) was founded in China by a French investor in 1999, and is still now a 100% French family owned company. It started to manufacture air switches in France in 1996. It is managed by French engineers, ISO9000 and ISO14000 certified, and has been awarded as a High Technology Company by the Chinese government. In 2022, it has more than 300 workers on a 20.000 square meters modern manufacturing building. More than 85% of its production are exported to Asia, USA and Europe. Innovative engineering, top occidental level quality and manufacturing automation are the key word of its development worldwide. We are vertically integrated, including technical plastic molding and elastomeric membranes pressing. The JPCI Ultimheat testing laboratory is UL (USA) and TUV (Europe) certified upon the standard number ISO/IEC 17025:2017 (General requirements for the competence of testing and calibration laboratories).

Don't hesitate to contact us for new developments. **We don't make copies, nor patents infringements, but only genuine products, and on request, we do sign confidential development agreement with our customers.** Ask for our company presentation video to know more about us.



Fully automated assembly line of air switches and pressure switches (2022)

All the products in this catalog are protected by numerous patents and their models are registered

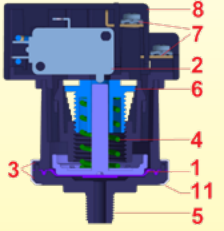
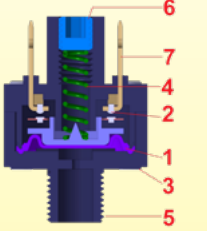
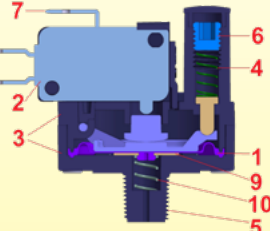
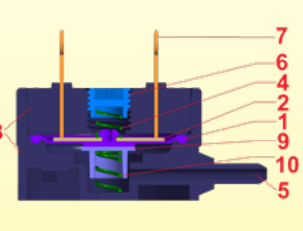
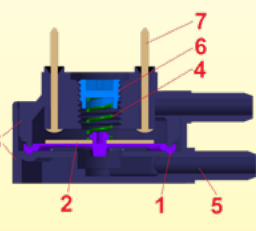


# Technical foreword to Pressure switches and Air switches

## Pressure switches main operating principles

The pressure switches of this catalogue are made to the flexible elastomeric membrane technology. The pressure applied deforms the membrane which then actuates an electrical contact. A counter-pressure system, which force is provided either by the contact system itself or by a spring, is applied to the membrane to adjust the set point.

The assembly is designed to withstand a maximum pressure of about 5 time the maximum set point value

Positive pressure, snap action type	Positive pressure, creep action type	Negative pressure, snap action type	Negative pressure, creep action type	Differential pressure switch, creep action type
				
<p>1: Membrane                      2: Electrical switch                      3: Pressurized body                      4: Back pressure spring</p> <p>5: Pressure inlet                6: Adjustment system                7: Electrical connection                8: Protection housing (Option)</p> <p>9: Spring cap (negative pressure only)                10: Spring (negative pressure only)</p>				

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# Technical foreword to Pressure switches and Air switches

## Description of the different components of pressure switches

### 1: The membrane

- *The membrane area:* to a given pressure, the larger the membrane area, the greater the force with which the membrane pushes the contact system.

- *The membrane flexibility:* it is essential for the realization of switches that are measuring low pressures below 10 kPa (100 mbar, 1.45 PSI). Elastomers used must be flexible and resilient. In general, the lower the pressure to be, the more flexible the membrane must be for fine for good sensitivity.

- *The membrane thickness:* the thin membranes cannot withstand high pressures. The thickness of the membrane will be optimized to give the best sensitivity while resisting the maximum pressure to which it may be subjected in operation. The maximum pressure limit can vary from 5 kPa (50 mbar, 0.73 PSI) to 200 kPa (2000 mbar, 29 PSI) depending on the models and thicknesses.

- *The temperature resistance of the membrane:*

Compared to metal diaphragms, elastomeric membrane have the advantage of flexibility, allowing the use for low pressure measurements. Elastomers are still limited by their temperature (usually not more than 85°C (185°F) in constant temperature), although it is possible, under certain conditions to use silicone membranes that offer greater thermal resistances (up to 125°C (257°F) or more).

- *The chemical resistance of the membrane:* The type of elastomer must be compatible with the nature of the fluid or liquid with which the membrane comes into contact. In addition, it must not harden or crack over time. The gas or liquids in contact with the membrane can have a corrosive or destructive effect on short, medium or long term on it, eg ozone, chlorine and its compounds, bromine and its compounds. The chemical composition of the membrane and how it is vulcanized or molded are the parameters that will influence this resistance.

- *Contact with drinking water:* In some applications, when the float is in contact with drinking water, health standards are added, which regulate the chemical composition. The highest standards known, that are used as a normative reference in many countries are those issued by the FDA (Food and Drug Administration, USA) and the WRC (water research council, GB). These standards provide particularly maximum permissible surface in contact with water and the maximum temperature at which the plastic may be exposed without harmful compounds are released into the water. The WRC also tests elastomers to ensure that they do not facilitate the spread of bacteria

### 2: Electrical contacts

A certain force is required to actuate the electrical contact device. It can range from a few grams for systems with creep action contacts, to several hundred grams for snap action micro-switches.

In general, the force required to operate an electrical contact increases with its electrical rating.

#### **Creep action contacts**

In apparatus slow breaking both sides deviate slowly at speeds of the order of 1/10 mm per second.

In the normal atmosphere, then occurs when the contacts are close together, an electrical arc.

The length of this arc is a function of voltage.

For voltages up to 24V DC or 110V AC, the duration of this arc is short, less than 0.1s.

For higher voltages, the arc lasts much longer, producing premature fusion of the contact, and many radio interference.

This is why it is not recommended, despite the mechanical advantages (simplicity, low cost, high precision) to use this contact in 230V networks to control multiple cycling applications.

#### Disadvantages of creep action contacts:

- Do not allow to cut high amperages due to the large arcs (and the radio interference which are the consequence) that occur between the contacts when they are in close proximity to each other. As electric arcs increase with voltage, they are generally not used for voltages above 24V.

- There are no slow break pressure switches with a changeover contact, they are usually designed to close the contact when the pressure rises (normally open contact NO), but some models are available with a contact which opens with increasing pressure (normally close contact, NC).

#### Advantages of creep action contacts:

- Inexpensive

- Low operating force allowing the use for low pressure values.

- Low differential values between high and low pressure switching levels.

- Easy and inexpensive making of gold-plated contacts for use in low voltage.

#### **Snap action contacts**

On snap action switches, the contact opening speed is around 1 m per second (100.000 faster).

The contact spacing reaches the distance to extinguish the arcing in less than 1/1000 sec. Therefore there is no radio interference, and the contact does not deteriorate. Mechanically, this type of contact, also called "energy storing contact" is much more complicated, expensive, and does not allow such a great control than reed switches.

The snap action micro switch is particularly suitable for devices operating at 240 or 400 V.

#### Disadvantages of snap action contacts:

- Expensive

- Large actuating force limiting their use in low pressure or requesting the use of large diameter membranes

Large differential travel on the switch, affecting the accuracy of pressure control and providing important distance in high and low pressure switching levels.



# Technical foreword to Pressure switches and Air switches

## Advantages of snap action contacts:

- High ratings in 110 and 230V, up to 30A.
- NO, NC or SPDT contacts
- Snap action contacts do not generate EMC

## Reason of material and plating used for contacts

The contact of a switch wears by micro vaporization at each open and close cycle. This wear is proportional to the strength and duration of the electric arc.

The most common contact material is pure or alloyed silver. Silver was chosen because it is the best conductor of heat and electricity known.

Its thermal conductivity quickly evacuates the temperature peak occurring during open and close cycles.

Its very good electrical conductivity provides very low contact resistance, usually less than 3 milli-ohms.

However it oxidizes and is gradually covered with a thin layer of silver oxide, which is not electrically conductive.

This layer is easily vaporized when the switch is used in common household voltages (240V, 300V). However, when used in low voltage (less than 12V) and very low currents (a few milli-amps), and less than 800 mW, the contact opening arc is no longer sufficient to vaporize the silver oxide layer. The solution is to plate the contact with a thin layer of gold (said gold flash) 3 to 5 microns thick, to ensure its protection.

## Advantages and disadvantages of silver and silver alloy contacts

High electrical rating, mandatory use for electrical rating higher than 1A 250VAC

Oxidize and the contact resistance increases with time if they are used to cut electrical rating less than 20V and 100 mA  
Cannot be used in oxidizing atmosphere

## Advantages and disadvantages of gold plated contacts

Cannot be used on voltages lower than 0.1 millivolt, because the contact resistance is too high.

The use on voltages higher than 30V and /or with currents above 100 mA causes vaporization of the gold flash protection. Then contact behaves like a standard silver contact

If the load is less than 30 mV and 10 mA, there is no change in the contact resistance and the electrical life becomes very important (except atmospheric contamination by hydrocarbon)

## 3: The pressurized body (Pressure chamber)

The pressurized body consists of two half-shells which enclose a membrane. It must meet several constraints

*Pressure resistance:* The design must allow these shells to withstand the maximum pressure at which the switch will be submitted. If the switch is subjected to a pressure greater than the pressure for which it was designed, the body will deform or break.

*Temperature resistance:* the pressurized bodies of pressure switches of this catalogue are made of plastic. Plastic strengths decrease with temperature. Any abnormal temperature rise, out of specified limits will result in a decrease in pressure resistance.

*Use in contact with drinking water:* when plastic is in contact with drinking water, sanitation standards require that plastic does not release harmful chemicals into the water. The standards and accepted concentrations differ by country, but all give a maximum operating temperature of plastic materials related to temperature. If an application requires compliance of these standards, it is necessary to provide the standard to be met and the maximum water temperature at which the switch will be submitted.

*Corrosion:* Some disinfectants and chemicals, such as ozone and chlorine compounds used in swimming pools and whirlpools can damage some plastics. It is necessary to inform us if such conditions are encountered in the application, so that the choice of the plastic parts in contact is made wisely. In some slow-break switches, especially differential pressure switches for air, the electrical contacts are in contact with the fluid in the pressure chamber where they are located. Thus these contacts are in the presence of air from the pressure source to be measured, and therefore may be oxidized or corroded by the latter. It is important in these applications, to provide information on the quality of the air which pressure is measured.

## 4: The back pressure spring

We, at JPCI, always make the back pressure spring in stainless steel to withstand various environmental media encountered in applications.

When a switch is subjected to a pressure greater than that for which it was designed, the back pressure spring, or the contact mechanism will be subjected to high stresses that can cause a permanent deformation and thus, result in the set point change of the device.

## 5: The pressure inlet

It is achieved by a plastic thread. The most common are 1/8 NPT, 1/8 BSPT, 1/2 NPT, 1/2 BSPT. These threads are taped to provide a good water tightness

## 6: The adjustment system

Adjusting a pressure switch is made by a force opposed to the movement of the membrane actuating the electrical contact system. This force is produced by a spring which is more or less compressed depending on the setting value to obtain. There are three possible settings:

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# Technical foreword to Pressure switches and Air switches

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<p>- <b>Fixed setting:</b> there is no adjustment possible, as the force is provided by a calibrated spring which is not reachable. This type of control is inexpensive, but with quite large setting tolerances. It is suitable for mass production.</p>	<p>- <b>Sealed setting:</b> the setting is provided by a screw which compresses the spring more or less. After adjustment, the screw is factory sealed. This type of setting is accurate but not accessible by the user.</p>	<p>- <b>Unsealed setting:</b> the end user can change the set point value of the point by himself, with a screw, a dial or a knob. This type of setting is for advanced users.</p>

## 7: The electrical connection

Pins for printed circuits	Solder terminals for wires	Tabs	Screw terminals	Lead wires

## 8: The protection enclosure

The protection housing can have two functions:

- Ingress protection against attacks from the outside environment (rain, dust, shock)
  - Protection against the conditions in which the product will be installed in its application.
- In most cases, pressure switches will be integrated by an OEM into a machine or equipment. Then it is this machine or equipment that will ensure protection against water, dust, shock and other contaminants.
- *Protection against usual external environment:* These are usually plastic housings providing an IPxx (Protection against the penetration of water and dust, EN 60529 ingress protection) and an IKxx (Protection against shock, EN 50102). Some pressure switches may receive protection by epoxy resin or polyurethane potting. The pressure switches themselves have an IP00 degree of protection as they are components to be integrated. Some safety standards require a particular degree of protection
  - *Protection during the welding process:* special protections are required if switches are soldered on electronic circuits (pressure switches with pin terminals). The solder flux is corrosive and can penetrate by capillarity and cause the oxidation of the contacts. Their use should be limited to a minimum. Similarly, the duration and the temperature at which the pressure switch terminals are subject may, if they exceed certain limits, cause melting of the plastic body of the switch and its deterioration or change its set point.
  - *Protection against gas and dust explosive atmospheres:* JPCI pressure switches are not designed for use in these environments and therefore do not meet the applicable standards in this field of application



# Technical foreword to Pressure switches and Air switches

## Life test processes

The lifespan of an electrical contact, i.e. the number of cycles it can withstand without destruction, depends on many parameters. We can cite in particular: the voltage, the intensity, the frequency of the current, the cosine Phi, the ambient temperature, the relative humidity rate, the cycling speed, the material of the contacts, etc. For the devices of regulation, these parameters are defined by standard EN 60730.

It is important, when designing a pressure switch, to take into account the conditions in which it will be used to test and determine this lifespan. The equipment of the JPCI test laboratory makes it possible to simulate all these parameters.

<p><b>Electrical life test equipment for pressure switches.</b> (Used for verification of compliance with applicable UL and CE standards)</p> <p>The pressure switch is located in a climatic chamber whose temperature and degree of humidity can be varied. It is then connected to a load bank whose voltage, current and cosine phi are adjustable. Thousands of contact opening and closing cycles are then carried out, according to a frequency specified by the standards. This installation also makes it possible to carry out specific tests for a special customer application. On the production line, all the devices perform several operating cycles on simplified equipment</p>	<p><b>Electrical life test equipment for air switches.</b> (Used for verification of compliance with applicable UL and CE standards)</p> <p>The air switch is located in a climatic chamber whose temperature and humidity level can be varied. It is then connected to a load bank whose voltage, current and cosine phi are adjustable. Thousands of contact opening and closing cycles simulating the action of a pneumatic push button are then carried out, according to a frequency specified by the standards. This installation also makes it possible to carry out specific tests for a special customer application. On the production line, all the devices perform several operating cycles on simplified equipment</p>

## Pressure calibration processes

<p>The calibration of the pressure switches is carried out with certified measuring devices, and the opening and closing parameters of the contact of each pressure switch tested are automatically recorded and linked to the batch number.</p>	<p>Each air switch undergoes about ten successive pressure cycles, corresponding to its sensitivity. Below is a device used on a manual assembly line. On an automated assembly line, this operation is automatic and the opening and closing parameters of the contact of each air switch are memorized and linked to the batch number.</p>
<p>Verification of pressure switch calibration</p>	<p>Checking air switch operating cycles</p>

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# Technical foreword to Pressure switches and Air switches

## Standards and approvals

Pneumatic pressure switches and air switches are approved by UL and TUV laboratories according to the following standards :

UL : UL60730-1 and UL60730-2-6.

TUV : EN60730-1 and EN60730-2-6.

Although the reference standards are almost identical, the UL tests differ from the European tests on a few points, and are much more restrictive than the old tests according to UL508 still practiced by most North American manufacturers.

## Equipment and special test made on pneumatic remote controls known as "Air switches", designed, patented and manufactured by JPCI-Ultimheat

The function of the air switches is to instigate a "puff" or "sip" of air which travels along a length of PVC tubing and activates the on-off electrical signal.

Their use avoids the use of an electrical voltage between a control button and an electrical device.

The oldest use of this system was the detection of the arrival of a vehicle at gas stations: The vehicle only had to run on a pipe filled with air to activate a signal from a distance. In this way, no electric cable was located in an area made dangerous by the presence of flammable gases or fuel.

The main current applications are in balneotherapy tubs, swimming pools, sink crushers, public toilets, and showers in gymnasiums in order to have an electrically safe control button at the edge of them. The PVC tube in which the air circulates allows the air switch to be activated remotely inside the electrical device without the user coming into contact with electricity in a humid environment. This allows the user to safely activate the device with wet hands. Similar applications exist in hospitals, in particular for emergency bed buttons.

Among the critical parameters of these devices, we must first mention the need to define the best compromise between their size, their electrical rating, and the operating distance.

This compromise usually consists, for devices with snap action intended for the direct control of motors, in a membrane of about 20 mm in diameter, a 250V breaking capacity of 15A resistive or ¾HP, and operating distances of 5 m and more with a 6 × 3 mm PVC connecting tube. This configuration works perfectly with the classic 32 mm push buttons mounted on the edge of Jacuzzis, spas, balneotherapy and swimming pools.

### Influence of operating distance

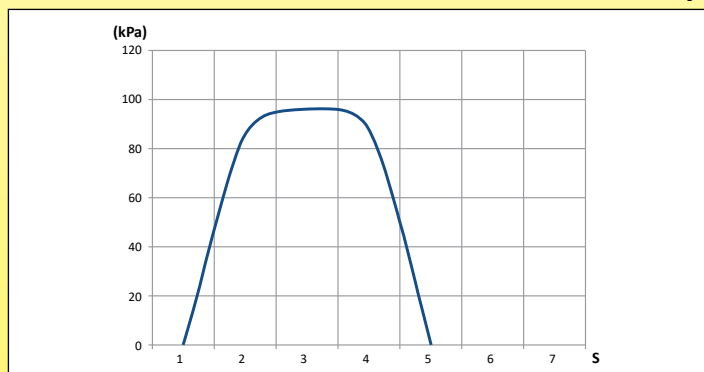


Chart of pressure rise inside a 32 mm diameter air button (such as the 66ZM5 model described in this catalog)



Test equipment for measuring repeatedly and constantly the maximum length of the air switch connecting tubes according to the volume of the push button and the pressure it develops (Ultimheat Laboratory)

**Calculation example:** The push button bellows has a volume of 5.8cm<sup>3</sup> when compressed. The instantaneous pressure of approximately 7.5 kPa (75 mbar, 1.09 PSI) provided by the push button is then diluted in the volume of air in the PVC tube. By applying Boyle-Mariotte's law, which at constant temperature, can be written as P1V1 = P2V2, it is then possible to calculate the maximum control distance using the following parameters:

- P1 and V1 being the pressure and volume of the push button alone and P2 and V2 being the pressure and volume of the push button and the PVC tube when they are interconnected.
  - The interior section of the 3 × 6 mm (¼" × ¼") PVC tube is 0.070 cm<sup>2</sup>, or 7cm<sup>3</sup> per meter
  - The minimum pressure necessary to activate a usual air switch with a 16A 250V rating is 0.6 kPa (6 mbar, 0.09 PSI)
- The maximum control distance (Lmax) can then be calculated by the formula 0.075 × 5.8 = 0.006 × (7 × Lmax + 5.8).

**This formula gives us Lmax = 11.3 m**

This theoretical value must be moderated by the pressure drops undergone by the pressure pulse in the control circuit and any leaks due to the barometric and ambient temperature compensation system.

This distance can also be greatly increased by using tubes with a smaller internal diameter like 1.6 mm (¼").

### Influence of ambient temperature (Gay Lussac's law)

The pressure change in a gas as a function of temperature is given by Gay Lussac's law: P1/T1 = P2/T2

The pressure change in the circuit is therefore directly proportional to the temperature variation and we will have: P2 = P1 × (T2/T1), with P1 = starting atmospheric pressure (i.e. approximately 1 bar or 10 kPa (100 mbar, 1.45 PSI), P2 pressure after temperature increase and T1 starting temperature. (P1 and P2 expressed in °Kelvin). Note that this

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# Technical foreword to Pressure switches and Air switches

pressure increase is independent of the volume.

For example, in the case of a temperature increase of 18°C (64.4°F), we obtain  $P_2 = 0.1 \times (273.15 + 18) / 273.15 = 10.66 \text{ kPa}$  (106.6 mbar, 1.55 PSI), i.e. a pressure increase of 0.66 kPa (6.6 mbar, 0.1 PSI), **which is sufficient to actuate an air switch triggering at 0.6 kPa (6 mbar, 0.09 PSI).**

This explains the untimely triggering of devices when the air switch circuit is subjected to a local rise in ambient temperature such as may be encountered in spas or swimming pools. It is therefore necessary that these air-switches be equipped with an ambient temperature compensation system.

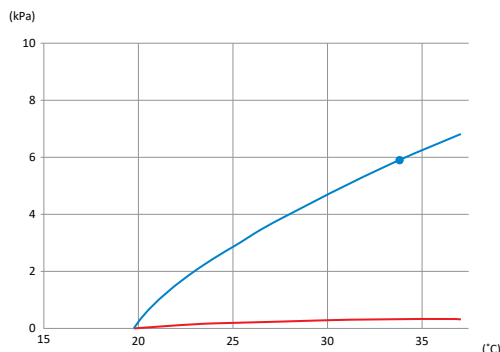


Chart in blue of pressure rise in a push button assembly with 9cm<sup>3</sup> bellows, 6 × 3 mm diameter PVC tube and 5 meters long, and an air switch without temperature compensation. When the pressure switch assembly is closed at a temperature of 20°C (68°F), then when the ambient temperature reaches 34°C (93°F), the **air-switch is actuated (Blue point) by the internal pressure rise without the push button having been pressed.**

In red, same, but with an air switch with barometric compensation by micro-leak in the body. The air-switch is not activated because there is no rise in internal pressure.



Test equipment for measuring, recording and setting the barometric and the ambient temperature compensation systems of the air switches (Ultimheat Laboratory)

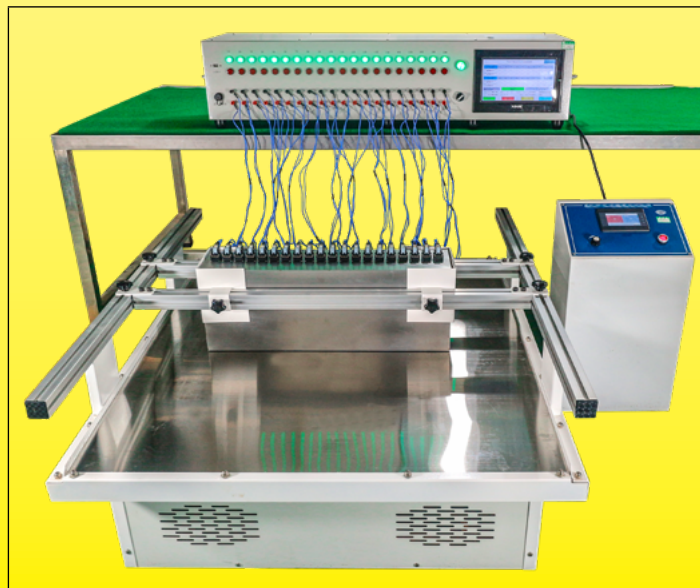
## Influence of atmospheric pressure

A drop in atmospheric pressure due to cloudy or rainy weather can also cause unwanted tripping, because the pressure difference between the pneumatic control circuit and its environment is then equivalent to an increase in internal pressure. At sea level, the average atmospheric pressure is 10.13 kPa (101.3 mbar, 1.47 PSI). Meteorologically speaking, we speak of depression when the pressure drops below 10.1 kPa (101 mbar, 1.46 PSI), but values below 10.06 kPa (100.6 mbar, 1.46 PSI) are usual, and combined with an increase in temperature, are sufficient to trigger an air-switch without compensation of atmospheric pressure.

## Influence of vibrations

Improper design can make an air switch sensitive to vibrations during transport, by switching its contact from an off position to an on position.

It is also necessary to optimize the slow-breaking pressure switch models in order to limit their sensitivity to vibration and shock.



Test equipment to measure the vibration resistance of air switches and slow-action contact of pressure switches by simulation of transport conditions (Ultimheat Laboratory)

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# Alphabetical and reference tables



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References list	References list	References list	References list	References list
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## Alphabetical and reference tables

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# Positive pressure switches



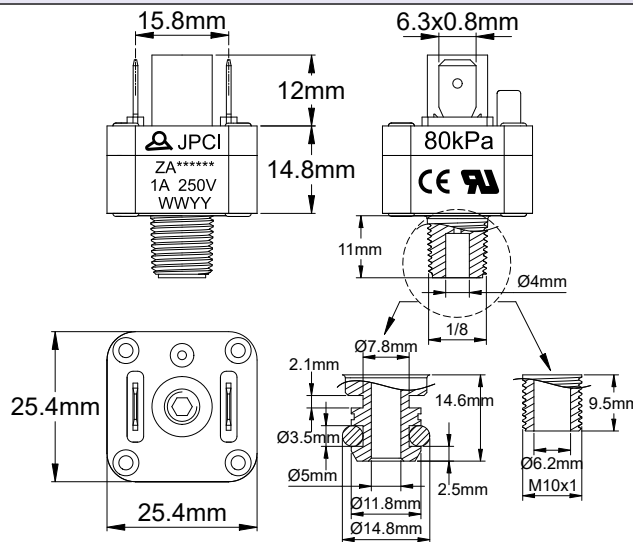
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# Positive pressure switches

Low voltage circuit adjustable **positive** pressure switch.  
Quick connect terminals. Various center threads.

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
PA66	SPNO, 1A 250VAC	10 kPa (100 mbar, 1.5 PSI).	4 bar (0.4 Mpa, 60 PSI)	<b>ZA</b>



## Main applications :

Minimum water pressure detection on water heaters and boilers. This pressure switch is much more sensitive than snap-action systems and can be calibrated at lower pressures, but its use is limited to low power applications, typically on electronic circuits. Very low differential, less than 1 kPa (10 millibars, 0.15 PSI).

**Membranes:** Silicone, dia. 22mm.

**Fluid:** Water or air

**Fitting:** PA66

**Housing:** PA66, UL94 VO

**Contact:** Single pole normally open, slow make and break.

**Electrical rating:**

- Silver contact: max 1A 250VAC

- Gold plated contact: max 100mA, 24VDC

**Action:** Momentary, close on pressure rise.

**Set point calibration:** Factory calibrated and sealed, not field adjustable

**Set point calibration limits:** From 0.1 to 4 bar (0.01 to 0.4 Mpa, 1.5 to 60 PSI)

**Electrical connection:** 6.35 × 0.8mm quick connect terminals

**Bursting pressure:** > 16 bar (1.6Mpa, 232PSI)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14° to 185°F).

**Maximum calibration value:** 4 bar (0.4 Mpa, 60 PSI).

## Parts numbers :

Pressure port	Contact	Calibration				
		10 kPa (100 mbar, 1.5 PSI)	20 kPa (200 mbar, 2.9 PSI)	40 kPa (400 mbar, 5.8 PSI)	60 kPa (600 mbar, 8.7 PSI)	80 kPa (800 mbar, 11.6 PSI)
1/8" NPT	Silver	ZA2X28EA01000000	ZA2X28EA02000000	ZA2X28EA04000000	ZA2X28EA06000000	ZA2X28EA08000000
	Gold plated	ZA2X28EG01000000	ZA2X28EG02000000	ZA2X28EG04000000	ZA2X28EG06000000	ZA2X28EG08000000
1/8" BSPT	Silver	ZA2X2GEA01000000	ZA2X2GEA02000000	ZA2X2GEA04000000	ZA2X2GEA06000000	ZA2X2GEA08000000
	Gold plated	ZA2X2GEG01000000	ZA2X2GEG02000000	ZA2X2GEG04000000	ZA2X2GEG06000000	ZA2X2GEG08000000
M10x1	Silver	ZA2X2MEA01000000	ZA2X2MEA02000000	ZA2X2MEA04000000	ZA2X2MEA06000000	ZA2X2MEA08000000
	Gold plated	ZA2X2MEG01000000	ZA2X2MEG02000000	ZA2X2MEG04000000	ZA2X2MEG06000000	ZA2X2MEG08000000
Snap-in	Silver	ZA2X2TEA01000000	ZA2X2TEA02000000	ZA2X2TEA04000000	ZA2X2TEA06000000	ZA2X2TEA08000000
	Gold plated	ZA2X2TEG01000000	ZA2X2TEG02000000	ZA2X2TEG04000000	ZA2X2TEG06000000	ZA2X2TEG08000000



# Positive pressure switches

## Low voltage circuit positive pressure switch

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
PA66	1A 250VAC	2 kPa (20 mbar, 0.29 PSI)	90 kPa (900 mbar, 13 PSI)	<b>ZL</b>
Printed circuit terminals		Solder terminals		
<b>1/8" thread</b>				
		3 board mounting solutions kit		
		<b>Side spout</b>		

### Main applications :

These miniature slow-action pressure switches greatly outperform snap action models because they have high sensitivity and low differential. They are designed to be incorporated into a printed circuit board which provides power relay. Their reduced thickness of 15mm favors installation in applications requiring a small footprint.

### Technical features :

**Fluid:** Air or water

**Pressure port connection:** 1/8" BSPT, 1/8" NPT or side spout

- For 1/8" (3mm) ID flexible plastic tubing

- For 1/16" (1.5 mm) ID flexible plastic tubing

Maximum PVC tube hardness 70 shore A

**Membrane:** Silicone, 22mm diameter.

**Housing:** PA66

**Contact:** Slow make and break, contact is open when no pressure and closes when pressure increases.

**Electrical rating:** 1A 250VAC resistive (silver contacts), 10mA 24VDC (5 microns gold plated contacts). We recommend gold plated contacts for low voltage and low current circuits to avoid the increase in contact resistance that appears on silver contacts as they oxidize.

**Action:** Momentary

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# Positive pressure switches



**Electrical connection:** 2.8 × 0.5mm quick connect terminals or printed circuit pins 1.2mm × 0.5mm

**Maximum operating pressure:** 90 kPa (900 mbar, 13 PSI)

**Bursting pressure:** > 4bar (0.4Mpa, 60PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F). Water: 0 to 85°C (32 to 185°F).

**Mounting fittings:** 1/8" BSPT or 1/8" NPT or side spout.

## Main part numbers with quick connection terminals and silver contacts\*

Pressure port fitting	Included accessories	Calibration at 10 kPa (100 mbar, 1.45 PSI)	Calibration at 25 kPa (250 mbar, 3.63 PSI)	Calibration at 50 kPa (500 mbar, 7.25 PSI)
1/8" BSPT	None	ZL2X0GQ12A000000	ZL2X0GQ12B500000	ZL2X0GQ12E000000
1/8" NPT	None	ZL2X0SQ12A000000	ZL2X0SQ12B500000	ZL2X0SQ12E000000
Spout on the side for 1/8" (6 × 3mm) tube	One set of 2 different snap-on brackets	ZL2X02Q12A00000V	ZL2X02Q12B50000V	ZL2X02Q12E00000V
Spout on the side for 1/16" (3 × 1.5mm) tube	One set of 2 different snap-on brackets	ZL2X0BQ12A00000V	ZL2X0BQ12B50000V	ZL2X0BQ12E00000V

\* For printed circuit pin, replace Q1 by R1 in the 7th and 8th character.

## Main part numbers with quick connection terminals and gold contacts\*

Pressure port fitting	Included accessories	Calibration at 10 kPa (100 mbar, 1.45 PSI)	Calibration at 25 kPa (250 mbar, 3.63 PSI)	Calibration at 50 kPa (500 mbar, 7.25 PSI)
1/8" BSPT	None	ZL2X0GQG2A000000	ZL2X0GQG2B500000	ZL2X0GQG2E000000
1/8" NPT	None	ZL2X0SQG2A000000	ZL2X0SQG2B500000	ZL2X0SQG2E000000
Spout on the side for 1/8" (6 × 3mm) tube	One set of 2 different snap-on brackets	ZL2X02QG2A00000V	ZL2X02QG2B50000V	ZL2X02QG2E00000V
Spout on the side for 1/16" (3 × 1.5mm) tube	One set of 2 different snap-on brackets	ZL2X0BQG2A00000V	ZL2X0BQG2B50000V	ZL2X0BQG2E00000V

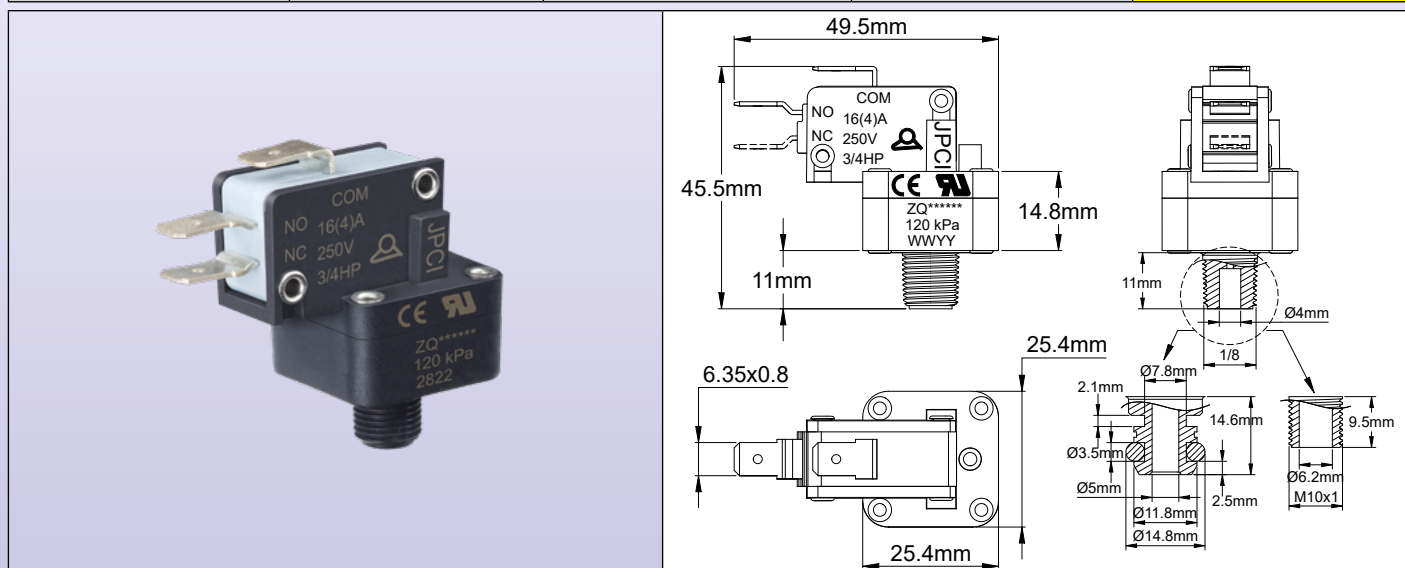
\* For printed circuit pin, replace QG by RG in the 7th and 8th character.



# Positive pressure switches

Pressure switch, **single pole** snap action contact. Not adjustable set point. SPDT contact. Many dimensions of fittings available

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
PA66	SPDT, 16A 250VAC	7 kPa (70 mbar, 1 PSI).	3 bar (0.3 Mpa, 43 PSI)	<b>ZQ</b>



## Main applications :

Minimum water pressure detection on water heaters, boilers; balneotherapy, jacuzzi and swimming pool heaters, detection of clogging of swimming pool filters and other household electrical applications.

**Membranes:** EPDM, dia. 22mm. Silicone on request

**Fluid:** Water or air

**Fitting:** PA66

**Housing:** PA66, UL94 VO

**Contact:** SPDT, snap action

**Electrical rating:** 16 (4)A 125/250VAC; ½HP 125VAC; ¾HP 250VAC. (Available up to 22 (8)A 250VAC, 2HP 250VAC)

**Action:** Momentary

**Set point calibration:** Factory calibrated and sealed, not field adjustable

**Set point calibration limits:** From 7 to 300 kPa (70 to 3000 mbar, 1 to 43 PSI)

**Electrical connection:** 6.35 × 0.8mm quick connect terminals

**Bursting pressure:** >15 bar (1.5 Mpa, 217 PSI)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14° to 185°F)

**Maximum calibration value:** 3 bar (0.3 Mpa, 43 PSI)

**Approval:** UL 508

## Parts numbers :

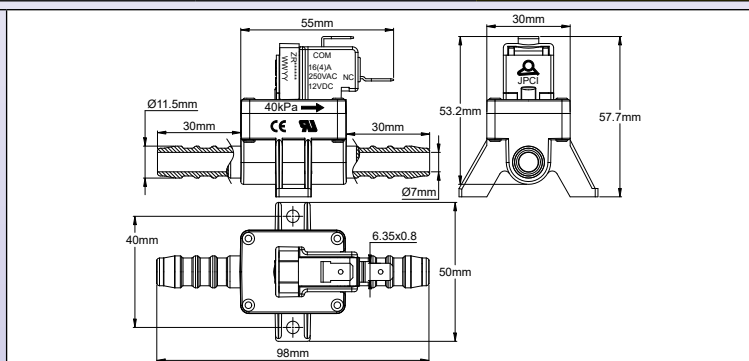
Pressure port	Calibration					
	20 kPa (200 mbar, 2.9 PSI)	40 kPa (400 mbar, 5.8 PSI)	60 kPa (600 mbar, 8.7 PSI)	80 kPa (800 mbar, 11.6 PSI)	1 bar (0.1 Mpa, 14.5 PSI)	1.2 bar (0.12 Mpa, 17.4 PSI)
½" NPT	ZQ2038U502000000	ZQ2038U504000000	ZQ2038U506000000	ZQ2038U508000000	ZQ2038U50A000000	ZQ2038U50A200000
½" BSPT	ZQ203GU502000000	ZQ203GU504000000	ZQ203GU506000000	ZQ203GU508000000	ZQ203GU50A000000	ZQ203GU50A200000
M10x1	ZQ203MU502000000	ZQ203MU504000000	ZQ203MU506000000	ZQ203MU508000000	ZQ203MU50A000000	ZQ203MU50A200000
Snap-in	ZQ203TU502000000	ZQ203TU504000000	ZQ203TU506000000	ZQ203TU508000000	ZQ203TU50A000000	ZQ203TU50A200000



# Positive pressure switches

**Single pole** snap action contact pressure switch with check valve.  
In line assembly on 10mm soft tubes.  
Special for camping water supply pumps

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
For flexible tubes with 10mm ID	22 (8)A 250VAC	30 kPa (300 mbar, 4.3 PSI)	1.1 bar (0.11 Mpa, 16 PSI)	<b>ZR</b>



## Main applications :

Direct actuating of pumps of the water supply for sinks and showers in recreational vehicles (Caravans, motorhomes). It starts the operation of the pump when the valve is open and when the pressure drops in the circuit.

**Fluid:** Water

**Pressure port connection:** Plastic spouts, with barbed end for flexible reinforced tubing with an internal diameter of 10 mm.

**Membrane:** Silicone, thickness 1mm

**Check valve:** PA66 with silicone gasket and stainless steel spring

**Housing:** PA66 compatible with drinking water.

**Contact:** SPNC opening by pressure rise

**Electrical rating:**

In alternating current: 16 (4)A 125 / 250VAC; ½HP 125VAC; ¾HP 250VAC (Available up to 22 (8)A 250VAC, 2HP 250VAC)

Direct current: 16 (4)A 12V

**Electrical connection:** 6.35 × 0.8mm quick connect terminals

**Bursting pressure:** > 4.5bar (0.45Mpa, 65PSI)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F)

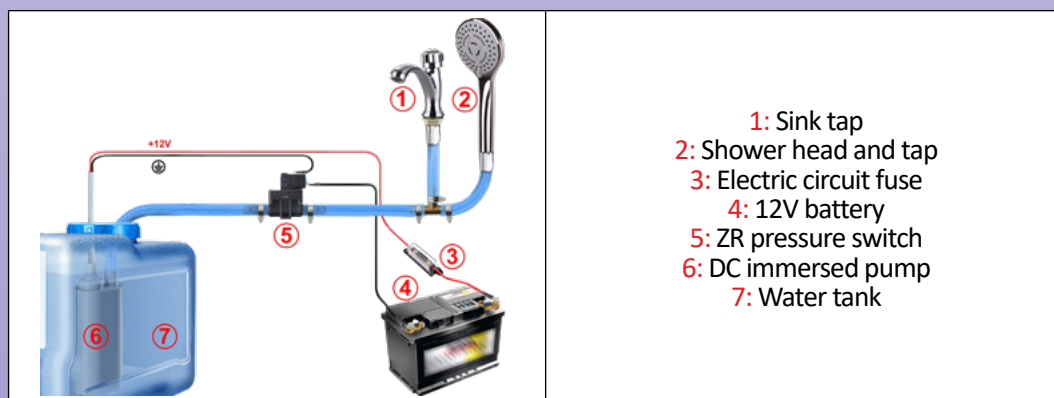
**Mounting:** 2 legs for mounting on a board surface with 2 screws with 40 mm distance

**Operation:** The non-return valve maintains the pressure in the water circuit when the submersible pump is stopped.

**Caution:** This device does not protect the pump against dry running

**Maximum calibration value:** 1.1 bar (0.11 Mpa, 16 PSI)

## Indicative installation mode :



## References :

Set point calibration	40 kPa (400 mbar, 5.8 PSI)	80 kPa (800 mbar, 11.6 PSI)	1 bar (0.1 Mpa, 14.5 PSI)
Part number	ZR202XU5YD000000	ZR202XU5YH000000	ZR202XU5YJ000000

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# Adjustable set point positive pressure switches



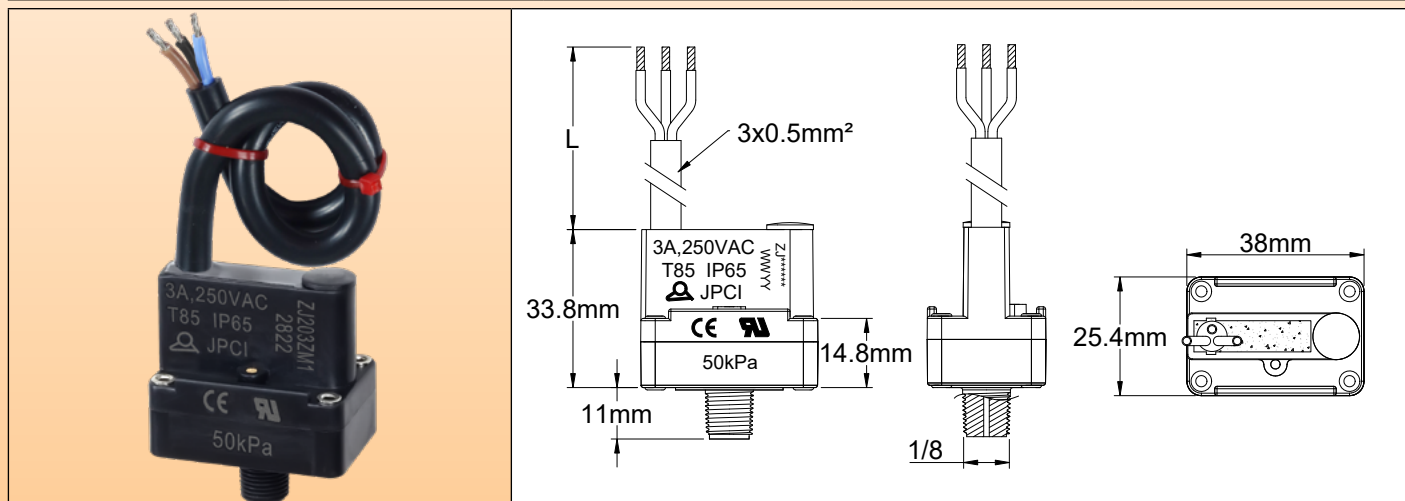
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# Adjustable set point positive pressure switches

Snap action contact **adjustable set point positive** pressure switch.  
IP65 waterproof. 1/8" center threads.

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
PA66, 1/8" BSPT or 1/8" NPT	3A 125/250VAC	7 kPa (70 mbar, 1 PSI)	2.5 bar (0.25 Mpa, 36 PSI)	<b>ZJ</b>



## Main applications :

This pressure switch is distinguished by its small footprint and its IP65 ingress protection. The adjustment can be made by the end user after removing the cap protecting the adjustment screw.

It is particularly intended for domestic reverse osmosis filtration devices, detection of the operation of miniature pumps, spa and balneotherapy heaters, and all applications where there is a risk of splashing water.

## Main Features :

**Membrane:** Silicone.

**Fluid:** Water or air

**Fitting:** PA66, 1/8" BSPT or 1/8" NPT

**Pressure:** Positive

**Housing:** PA66, UL94 VO. IP65 Ingress protection

**Contact:** SPDT, snap action.

**Electrical rating:** 3A 125/250VAC, resistive

**Action:** Momentary.

**Set point adjustment:** Field adjustable by screw driver, after removing the calibration screw cap.

**Adjustment limits:** 7 to 250 kPa (70 to 2500 mbar, 1 to 36 PSI)

**Bursting pressure:** > 10 bar (1 Mpa, 145 PSI)

**Electrical connection:** PVC insulated cable, 3 x 0.5mm² (AWG20)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14 to 185°F).

## Main part numbers. Calibration point preset at 20 kPa (200 mbar, 2.9 PSI) :

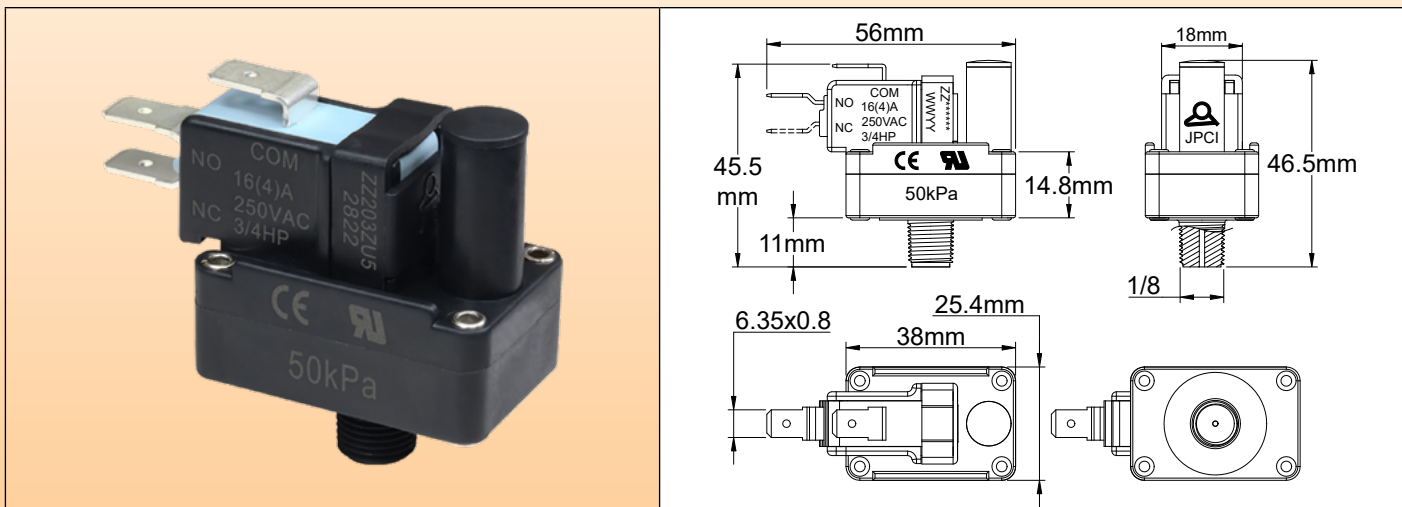
Fitting	Cable length 500mm	Cable length 1000mm	Cable length 2000mm
1/8" BSPT	ZJ203VM1ZB00000E	ZJ203VM1ZB00000J	ZJ203VM1ZB00000T
1/8" NPT	ZJ203ZM1ZB00000E	ZJ203ZM1ZB00000J	ZJ203ZM1ZB00000T



# Adjustable set point positive pressure switches

## Adjustable snap action contact miniature pressure switches, PA66 fitting.

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
PA66, 1/8" BSPT or 1/8" NPT.	22 (8)A 250VAC	8 kPa (80 mbar, 1.2 PSI)	2.5 bar (0.25 Mpa, 36 PSI)	<b>ZZ</b>



### Main applications :

In this pressure switch, the adjustment can be made by the end user after removing the cover protecting the adjustment screw.

It is particularly intended for domestic reverse osmosis water filtration devices, detection of the operation of pumps, spa and balneotherapy heaters, control of clogging of swimming pool filters.

Its high electrical rating allows it to be used in direct control of motors or heating elements.

### Main Features :

**Membrane:** Silicone.

**Fluid:** Water or air

**Fitting:** PA66, 1/8" BSPT or 1/8" NPT.

**Pressure:** Positive

**Housing:** PA66, UL94 VO.

**Contact:** SPDT, snap action.

**Electrical rating:** 2HP 250VAC, 22 (8) A 250VAC

**Action:** Momentary.

**Set point adjustment:** Field adjustable by screw driver, after removing the calibration screw cap.

**Adjustment limits:** 8 to 250 kPa (80 to 2500 mbar, 1.2 to 36 PSI)

**Bursting pressure:** > 10bar (1Mpa, 145PSI)

**Electrical connection:** 6.35 × 0.8mm tabs

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14 to 185°F).

### Main part numbers. Calibration point preset at 20 kPa (200 mbar, 2.9 PSI) :

Fitting	Part number
1/8" BSPT	ZZ273VU6ZB000000
1/8" NPT	ZZ273ZU6ZB000000

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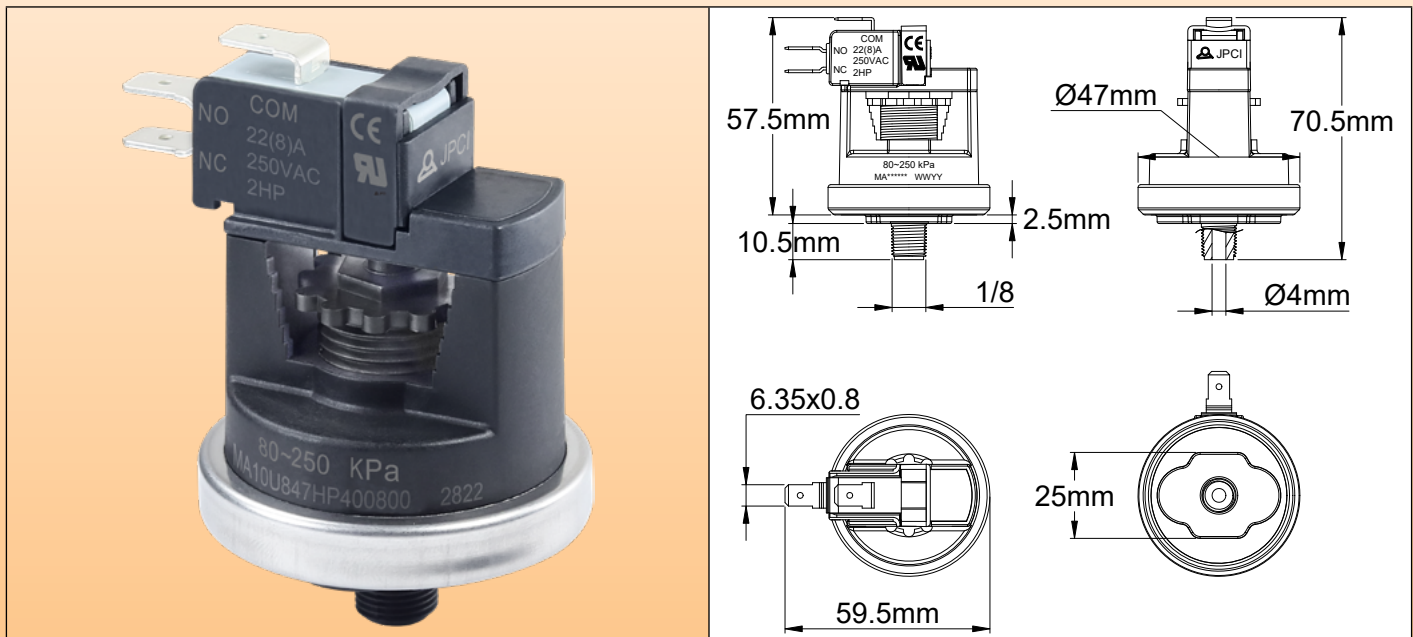




# Adjustable set point positive pressure switches

Snap action contact pressure switches, field adjustable, for incorporation, 1/8" fitting, SPDT contact

Fitting	Pressure	Contact	Minimum set point adjustment	Maximum set point adjustment	Type
PA66, 1/8" BSPT or 1/8" NPT	Positive	SPDT	5 kPa (50 mbar, 0.7 PSI)	5 bar (0.5 Mpa, 72.5 PSI)	<b>MA</b>



## Main applications :

Pressure sensing on water heaters, boilers, spas and swimming pool heaters and filters, sprinklers circuits, electrical appliances. Its high electrical rating allows its use on pumps, motors, electrical heaters. For incorporation.

## Technical features :

**Membrane:** Silicone, dia 45 mm.

**Fluid:** Water or air

**Fitting:** PA66, 1/8"NPT or BSPT

**Pressure:** Positive

**Contact:** SPDT, snap action.

**Electrical rating:** 22 (8)A 250VAC

**Action:** Momentary.

**Set point calibration:** Field adjustable with knob

**Standard adjustment ranges (mbar):** 100 to 200 ; 150 to 350 ; 300 to 800 ; 600 to 5000.

These devices can also be factory calibrated upon customer request.

**Electrical connection:** 6.35 × 0.8mm quick connect terminals

**Maximum adjustment pressure:** 5 bar (0.5 Mpa, 72.5 PSI).

**Bursting pressure:** > 25bar (2.5Mpa, 362PSI)

**Ambient temperature limits:**

Air: -10 to 85°C (14 to 185°F)

Water: 0 to 85°C (32 to 185°F)

## Main parts numbers with 22 (8)A 250VAC switch :

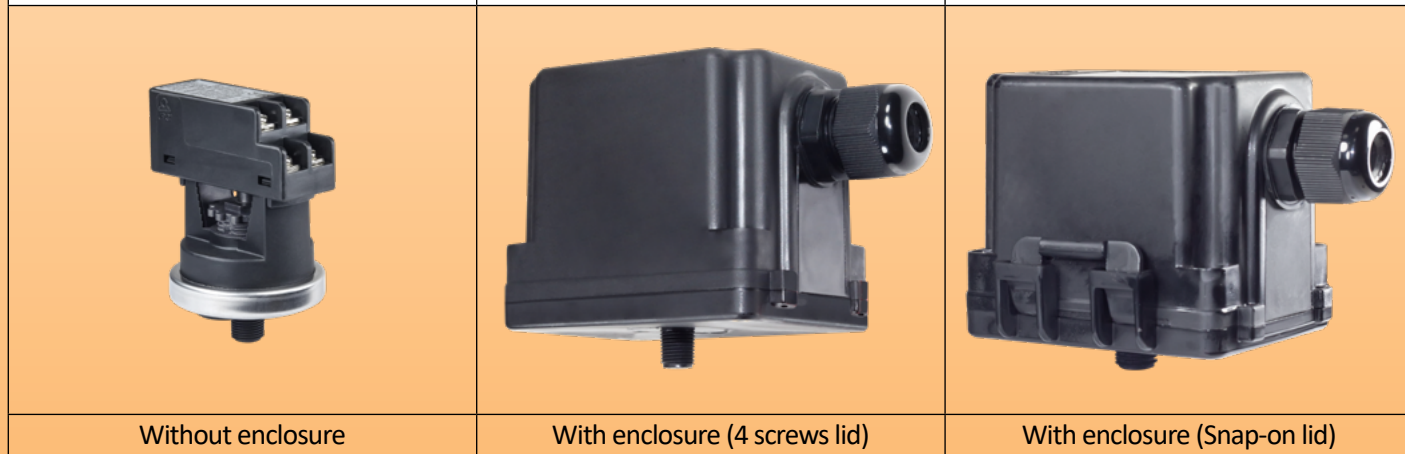
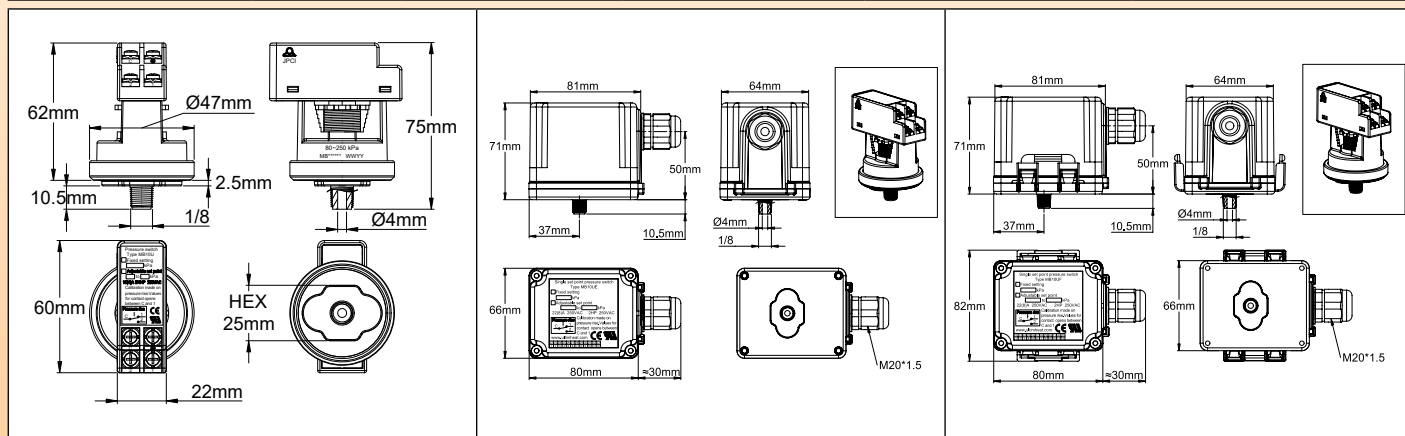
Pressure inlet	Set point adjustment range			
	10 to 20 kPa (100 to 200 mbar, 1.5 to 2.9 PSI)	15 to 35 kPa (150 to 350 mbar, 2.2 to 5.1 PSI)	30 to 80 kPa (300 to 800 mbar, 4.4 to 11.6 PSI)	60 to 500 kPa (600 to 5000 mbar, 8.7 to 72.5 PSI)
1/8" NPT	MA10U847HP410100	MA10U847HP410350	MA10U847HP410800	MA10U847HP415000
1/8"BSPT	MA10U847LP410100	MA10U847LP410350	MA10U847LP410800	MA10U847LP415000



# Adjustable set point positive pressure switches

Snap action contact pressure switches, field adjustable, 1/8" fitting, SPDT contact, with or without IP65 enclosure

Fitting	Pressure	Contact	Minimum set point adjustment	Maximum set point adjustment	Type
PA66, 1/8" BSPT or 1/8" NPT	Positive	SPDT	5 kPa (50 mbar, 0.7 PSI)	5 bar (0.5 Mpa, 72.5 PSI)	<b>MB</b>



Without enclosure

With enclosure (4 screws lid)

With enclosure (Snap-on lid)

## Main applications :

Pressure sensing on water heaters, boilers, spas and swimming pool heaters and filters, sprinklers circuits, electrical appliances. Its high electrical rating allows its use on pumps, motors, electrical heaters. **Their screw terminals allow field mounting and wiring.**

## Technical features :

**Membrane:** Silicone, dia 45 mm.

**Fluid:** water or air

**Fitting:** PA66, 1/8" NPT or BSPT

**Enclosure:** They can be supplied without enclosure or with black PA66 enclosure, IP65 with one M20 cable gland output, 4 screws lid; or with snap-on lid.

**Pressure:** Positive

**Contact:** SPDT, snap action.

**Electrical rating:** 22 (8)A 250VAC

**Action:** Momentary.

**Set point calibration:** Field adjustable with knob

**Standard adjustment ranges (mbar):** 100 to 200 ; 150 to 350 ; 300 to 800 ; 600 to 5000.

These devices can also be factory calibrated upon customer request.

**Electrical connection:** Screw terminals

**Maximum adjustment pressure:** 5 bar (0.5 Mpa, 72.5 PSI).

**Bursting pressure:** > 25bar (2.5Mpa, 362PSI)

**Ambient temperature limits:**

Air: -10 to 85°C (14 to 185°F)

Water: 0 to 85°C (32 to 185°F)

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# Adjustable set point positive pressure switches

## Main parts numbers with 22 (8)A 250VAC switch, **without enclosure**

Pressure inlet	Set point adjustment range			
	10 to 20 kPa (100 to 200 mbar, 1.5 to 2.9 PSI)	15 to 35 kPa (150 to 350 mbar, 2.2 to 5.1 PSI)	30 to 80 kPa (300 to 800 mbar, 4.4 to 11.6 PSI)	60 to 500 kPa (600 to 5000 mbar, 8.7 to 72.5 PSI)
1/8" NPT	MB10U845HP400100	MB10U845HP400350	MB10U845HP400800	MB10U845HP405000
1/8" BSPT	MB10U845LP400100	MB10U845LP400350	MB10U845LP400800	MB10U845LP405000

## Main parts numbers with 22 (8)A 250VAC switch, **with enclosure and 4 screws lid**

Pressure inlet	Set point adjustment range			
	10 to 20 kPa (100 to 200 mbar, 1.5 to 2.9 PSI)	15 to 35 kPa (150 to 350 mbar, 2.2 to 5.1 PSI)	30 to 80 kPa (300 to 800 mbar, 4.4 to 11.6 PSI)	60 to 500 kPa (600 to 5000 mbar, 8.7 to 72.5 PSI)
1/8" NPT	MB10U845HP40010A	MB10U845HP40035A	MB10U845HP40080A	MB10U845HP40500A
1/8" BSPT	MB10U845LP40010A	MB10U845LP40035A	MB10U845LP40080A	MB10U845LP40500A

## Main parts numbers with 22 (8)A 250VAC switch, **with enclosure and snap-on lid**

Pressure inlet	Set point adjustment range			
	10 to 20 kPa (100 to 200 mbar, 1.5 to 2.9 PSI)	15 to 35 kPa (150 to 350 mbar, 2.2 to 5.1 PSI)	30 to 80 kPa (300 to 800 mbar, 4.4 to 11.6 PSI)	60 to 500 kPa (600 to 5000 mbar, 8.7 to 72.5 PSI)
1/8" NPT	MB10U845HP40010B	MB10U845HP40035B	MB10U845HP40080B	MB10U845HP40500B
1/8" BSPT	MB10U845LP40010B	MB10U845LP40035B	MB10U845LP40080B	MB10U845LP40500B

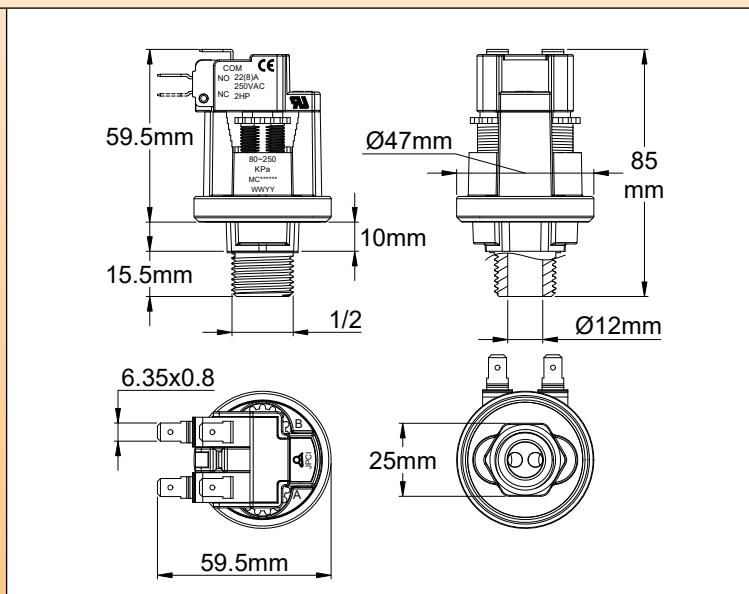
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# Adjustable set point positive pressure switches

**Double pole snap action contact pressure switch, 2 independent adjustable set points, field adjustable, for incorporation, 1/2" fitting, SPDT contact**

Fitting	Pressure	Contact	Minimum set point adjustment	Maximum set point adjustment	Type
PA66, 1/2" BSPT, 1/2" NPT or 1/2" BSPP	Positive	Two snap action SPDT	30 kPa (300 mbar, 2.9 PSI)	12 bar (1.2 Mpa, 174 PSI)	<b>MC</b>



## Main applications :

Pressure sensing on water heaters, boilers, spas and swimming pool heaters and filters, sprinklers circuits, electrical appliances. Its high electrical rating allows its use on pumps, motors, electrical heaters. The two independent set points allow use in control plus alarm, control with differential adjustment, or high and low pressure alarm. They are intended to be incorporated by OEM.

## Main Features :

- Membrane:** Two Silicone membranes, dia 17.5 mm.
- Fluid:** Water or air
- Fitting:** PA66, 1/2" NPT, 1/2" BSPT or 1/2" BSPP
- Pressure:** Positive
- Contacts:** Two SPDT, snap action.
- Electrical rating:** 2 x 22 (8)A 250VAC, (2HP)
- Action:** Momentary.
- Set point calibration:** Field adjustable with knob
- Standard adjustment ranges (mbar):** 300 to 600; 400 to 1200; 900 to 3000; 1400 to 5000; 1500 to 9000. These devices can also be factory calibrated upon customer request.
- Electrical connection:** 6.35 x 0.8mm quick connect terminals
- Maximum operating pressure:** 12 bar (1.2 Mpa, 174 PSI)
- Bursting pressure:** > 50 bar (5 Mpa, 725 PSI)
- Ambient temperature limits:**  
Air: -10 to 85°C (14 to 185°F)  
Water : 0 to 85°C (32 to 185°F)

## Main part numbers :

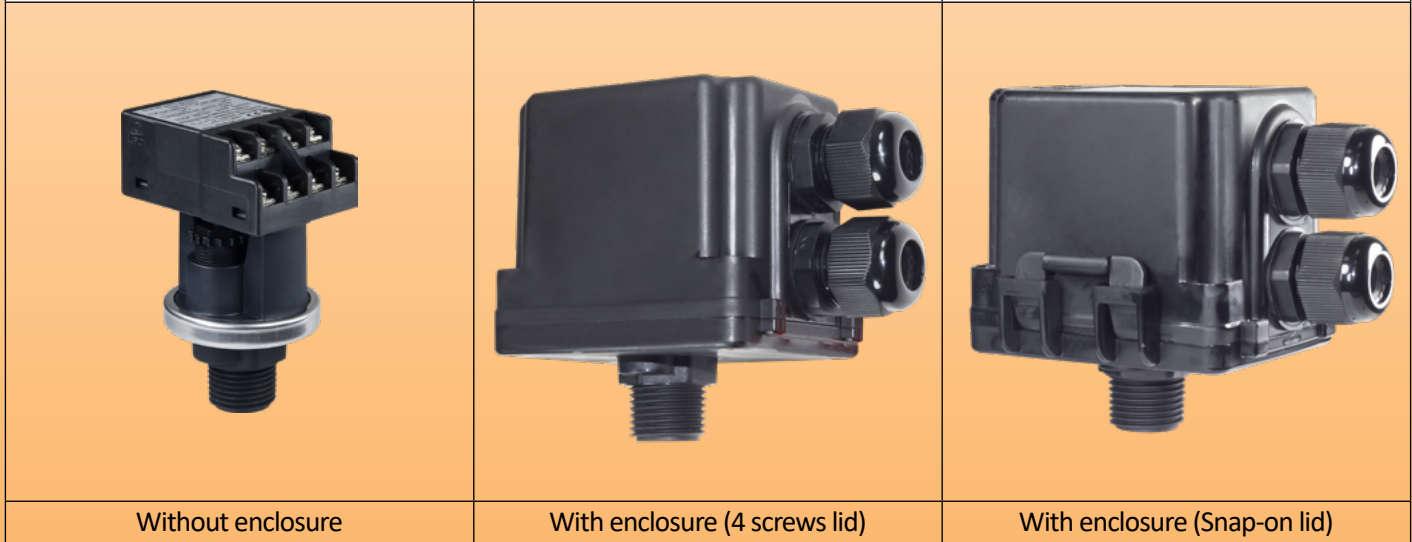
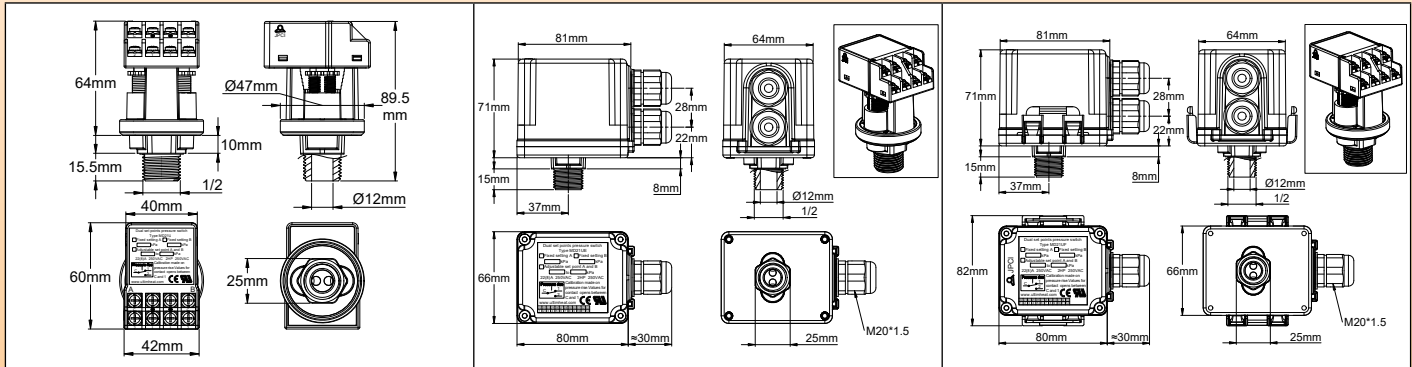
Pressure inlet	Set point adjustment range				
	30 to 60 kPa (300 to 600 mbar, 4.5 to 9PSI)	40 to 120 kPa (400 to 1200 mbar, 6 to 17.5 PSI)	90 to 300 kPa (900 to 3000 mbar, 13 to 43 PSI)	140 to 500 kPa (1400 to 5000 mbar, 20 to 72.5 PSI)	150 to 900 kPa (1500 to 9000 mbar, 20 to 130 PSI)
1/2" NPT	MC21T845PP7V0600	MC21T845PP7V1200	MC21T845PP7V3000	MC21T845PP7V5000	MC21T845PP7V9000
1/2" BSPT	MC21T845QP7V0600	MC21T845QP7V1200	MC21T845QP7V3000	MC21T845QP7V5000	MC21T845QP7V9000
1/2" BSPP	MC21T845RP7V0600	MC21T845RP7V1200	MC21T845RP7V3000	MC21T845RP7V5000	MC21T845RP7V9000



# Adjustable set point positive pressure switches

Double pole snap action contact pressure switch, **2 independents adjustable set points**, field adjustable, 1/2" fitting, SPDT contact, with or without IP65 enclosure

Fitting	Pressure	Contact	Minimum set point adjustment	Maximum set point adjustment	Type
PA66, 1/2" BSPT, 1/2" NPT or 1/2" BSPP	Positive	Two snap action SPDT	30 kPa (300 mbar, 2.9 PSI)	12 bar (1.2 Mpa, 174 PSI)	<b>MD</b>



## Main applications :

Pressure sensing on water heaters, boilers, spas and swimming pool heaters and filters, sprinklers circuits, electrical appliances. Its high electrical rating allows its use on pumps, motors, electrical heaters. **Their screw terminals allow field mounting and wiring.**

## Technical features :

**Membrane:** Two Silicone membranes. dia 17.5 mm.

**Fluid:** Water or air

**Fitting:** PA66, 1/2" NPT, 1/2" BSPT or 1/2" BSPP

**Pressure:** Positive

**Contacts:** Two SPDT, snap action.

**Electrical rating:** 2 x 22 (8)A 250VAC, (2HP)

**Action:** Momentary.

**Set point calibration:** Field adjustable with knob

**Standard adjustment ranges (mbar):** 300 to 600; 400 to 1200; 900 to 3000; 1400 to 5000; 1500 to 9000.

These devices can also be factory calibrated upon customer request.

**Electrical connection:** screw terminals

**Maximum operating pressure:** 12bar (1.2Mpa, 174PSI).

**Bursting pressure:** > 50bar (5Mpa, 725PSI)

**Ambient temperature limits:**

Air: -10 to 85°C (14 to 185°F)

Water: 0 to 85°C (32 to 185°F)



# Adjustable set point positive pressure switches

## Main parts numbers with two 22 (8)A 250VAC switches, **without enclosure**

Pressure inlet	Set point adjustment range				
	30 to 60 kPa (300 to 600 mbar, 4.5 to 9PSI)	40 to 120 kPa (400 to 1200 mbar, 6 to 17.5 PSI)	90 to 300 kPa (900 to 3000 mbar, 13 to 43 PSI)	140 to 500 kPa (1400 to 5000 mbar, 20 to 72.5 PSI)	150 to 900 kPa (1500 to 9000 mbar, 20 to 130 PSI)
½" NPT	MD21T845PP7V0600	MD21T845PP7V1200	MD21T845PP7V3000	MD21T845PP7V5000	MD21T845PP7V9000
½" BSPT	MD21T845QP7V0600	MD21T845QP7V1200	MD21T845QP7V3000	MD21T845QP7V5000	MD21T845QP7V9000
½" BSPP	MD21T845RP7V0600	MD21T845RP7V1200	MD21T845RP7V3000	MD21T845RP7V5000	MD21T845RP7V9000

## Main parts numbers with two 22 (8)A 250VAC switches, **with enclosure and 4 screws lid**

Pressure inlet	Set point adjustment range				
	30 to 60 kPa (300 to 600 mbar, 4.5 to 9PSI)	40 to 120 kPa (400 to 1200 mbar, 6 to 17.5 PSI)	90 to 300 kPa (900 to 3000 mbar, 13 to 43 PSI)	140 to 500 kPa (1400 to 5000 mbar, 20 to 72.5 PSI)	150 to 900 kPa (1500 to 9000 mbar, 20 to 130 PSI)
½" NPT	MD21T845PP7V060E	MD21T845PP7V120E	MD21T845PP7V300E	MD21T845PP7V500E	MD21T845PP7V900E
½" BSPT	MD21T845QP7V060E	MD21T845QP7V120E	MD21T845QP7V300E	MD21T845QP7V500E	MD21T845QP7V900E
½" BSPP	MD21T845RP7V060E	MD21T845RP7V120E	MD21T845RP7V300E	MD21T845RP7V500E	MD21T845RP7V900E

## Main parts numbers with two 22 (8)A 250VAC switches, **with enclosure and snap-on lid**

Pressure inlet	Set point adjustment range				
	30 to 60 kPa (300 to 600 mbar, 4.5 to 9PSI)	40 to 120 kPa (400 to 1200 mbar, 6 to 17.5 PSI)	90 to 300 kPa (900 to 3000 mbar, 13 to 43 PSI)	140 to 500 kPa (1400 to 5000 mbar, 20 to 72.5 PSI)	150 to 900 kPa (1500 to 9000 mbar, 20 to 130 PSI)
½" NPT	MD21T845PP7V060F	MD21T845PP7V120F	MD21T845PP7V300F	MD21T845PP7V500F	MD21T845PP7V900F
½" BSPT	MD21T845QP7V060F	MD21T845QP7V120F	MD21T845QP7V300F	MD21T845QP7V500F	MD21T845QP7V900F
½" BSPP	MD21T845RP7V060F	MD21T845RP7V120F	MD21T845RP7V300F	MD21T845RP7V500F	MD21T845RP7V900F

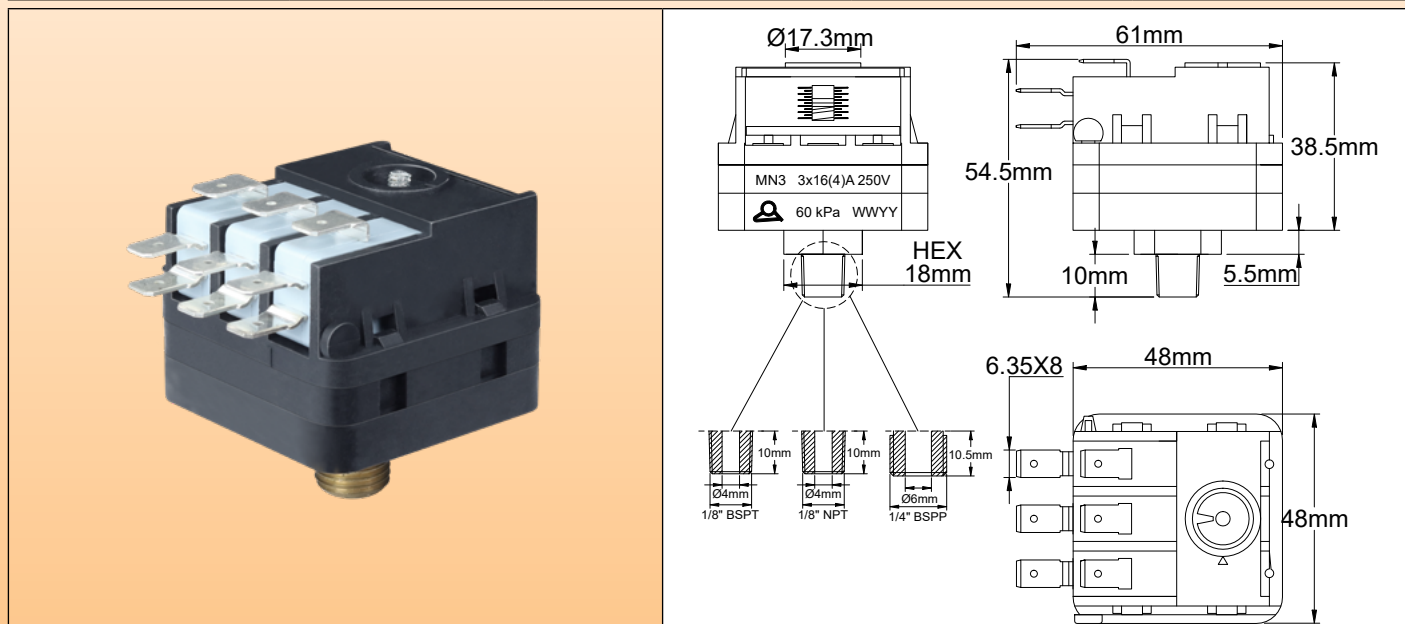
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# Adjustable set point positive pressure switches

## Positive pressure switch Snap action, 3 poles, adjustable, brass fitting

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
Brass	3 × 22 (8)A 250VAC	5 kPa (50 mbar, 0.7 PSI)	2 bar (0.2 Mpa, 29 PSI)	<b>MN3</b>



### Main applications :

Pressure sensing on water heaters, boilers, spas and swimming pools heaters and filters, electrical appliances. Can be used to switch directly 3 pole heating elements.

### Main Features :

**Membrane:** EPDM, dia. 45mm. Silicone on request.

**Fluid:** Water or air

**Fitting:** Brass.

**Pressure:** Positive

**Housing:** PA66, UL94 VO.

**Contacts:** 3 SPDT switches, snap action.

**Electrical rating:** ¾HP 250VAC, 16 (4)A 250VAC (Available up to 3 × 22 (8)A 3 × 2HP 250VAC).

**Action:** Momentary.

**Set point calibration:** Field adjustable with screw driver at +/-20% of the factory calibration value.

**Calibration limits:** 5 kPa to 200 kPa (50 to 2000 mbar, 0.7 to 29 PSI).

**Electrical connection:** 6.35 × 0.8 mm quick connection terminals

**Maximum pressure:** 2 bar (0.2 Mpa, 29 PSI).

**Bursting pressure:** >8 bar (0.8 Mpa, 116PSI)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14 to 185°F)

**Options:** Also available with only 2 switches (type MN2)

**Approval:** no UL certificate

### Main part numbers :

Pressure port	Calibration					
	20 kPa (200 mbar, 2.9 PSI)	40 kPa (400 mbar, 5.8 PSI)	60 kPa (600 mbar, 8.7 PSI)	80 kPa (800 mbar, 11.6 PSI)	1 bar (0.1 Mpa, 14.5 PSI)	1.2 bar (0.12 Mpa, 17.4 PSI)
½" NPT	MN30U540H040D200	MN30U540H040D400	MN30U540H040D600	MN30U540H040D800	MN30U540H040DA00	MN30U540H040DA20
¾" BSPT	MN30U540L040D200	MN30U540L040D400	MN30U540L040D600	MN30U540L040D800	MN30U540L040DA00	MN30U540L040DA20
¾" BSPP	MN30U5403040D200	MN30U5403040D400	MN30U5403040D600	MN30U5403040D800	MN30U5403040DA00	MN30U5403040DA20

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# Adjustable set point positive pressure switches

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# Vacuum pressure switches with PA66 fitting



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# Vacuum pressure switches

## Low voltage circuit vacuum pressure switch.

Fitting	Maximum Electrical rating	Minimum calibration pressure	Lowest negative pressure calibration	Type
PA66	1A 250VAC	-1 kPa (-10 mbar, -0.15 PSI)	-90 kPa (-900 mbar, -13 PSI)	<b>ZD</b>
Printed circuit terminals		Printed circuit terminals		
Solder terminals		Solder terminals		
1/8" thread		3 board mounting solutions kit		
		Side spout		

### Main applications :

These miniature slow-action pressure switches greatly outperform snap action models because they have high sensitivity and low differential. They are designed to be incorporated into a printed circuit board which provides power relay. Their reduced thickness of 15mm favors installation in applications requiring a small footprint.

### Technical features :

**Fluid:** Air or water

**Pressure port connection:** 1/8" BSPT, 1/8" NPT or side spout

- For 1/8" (3mm) ID flexible plastic tubing

- For 1/16" (1.5 mm) ID flexible plastic tubing

Maximum PVC tube hardness 70 shore A

**Membrane:** Silicone, 22mm diameter.

**Housing:** PA66

**Contact:** Slow make and break, contact is closed at atmospheric pressure and open when vacuum increases.

**Electrical rating:** 1A 250VAC resistive (silver contacts), 10mA 24VDC (5 microns gold plated contacts). We recommend gold plated contacts for low voltage and low current circuits to avoid the increase in contact resistance that appears on silver contacts as they oxidize.

**Action:** Momentary

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# Vacuum pressure switches

**Electrical connection:** 2.8 × 0.5mm quick connect terminals or printed circuit pins 1.2mm × 0.5mm

**Lowest negative pressure:** -90 kPa (-900 mbar, -13 PSI)

**Bursting pressure:** > 4bar (0.4Mpa, 60PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F). Water: 0 to 85°C (32 to 185°F).

**Mounting fittings:** 1/8" BSPT or 1/8" NPT or side spout.

## Main part numbers with printed circuit terminals and silver contacts\*

Pressure port fitting	Included accessories	Calibration at -10 kPa (-100 mbar, -1.45 PSI)	Calibration at -25 kPa (-250 mbar, -3.63 PSI)	Calibration at -50 kPa (-500 mbar, -7.25 PSI)
1/8" BSPT	None	ZD2X0PR1Z0100000	ZD2X0PR1Z0250000	ZD2X0PR1Z0500000
1/8" NPT	None	ZD2X0SR1Z0100000	ZD2X0SR1Z0250000	ZD2X0SR1Z0500000
Spout on the side for 1/8" (6 × 3mm) tube	One set of 2 different snap-on brackets	ZD2X02R1Z010000V	ZD2X02R1Z025000V	ZD2X02R1Z050000V
Spout on the side for 1/16" (3 × 1.5mm) tube	One set of 2 different snap-on brackets	ZD2X0BR1Z010000V	ZD2X0BR1Z025000V	ZD2X0BR1Z050000V

\* For quick connection terminal, replace R1 by Q1 in the 7th and 8th character.

## Main part numbers with printed circuit terminals and gold plated contacts\*

Pressure port fitting	Included accessories	Calibration at -10 kPa (-100 mbar, -1.45 PSI)	Calibration at -25 kPa (-250 mbar, -3.63 PSI)	Calibration at -50 kPa (-500 mbar, -7.25 PSI)
1/8" BSPT	None	ZD2X0PRGZ0100000	ZD2X0PRGZ0250000	ZD2X0PRGZ0500000
1/8" NPT	None	ZD2X0SRGZ0100000	ZD2X0SRGZ0250000	ZD2X0SRGZ0500000
Spout on the side for 1/8" (6 × 3mm) tube	One set of 2 different snap-on brackets	ZD2X02RGZ010000V	ZD2X02RGZ025000V	ZD2X02RGZ050000V
Spout on the side for 1/16" (3 × 1.5mm) tube	One set of 2 different snap-on brackets	ZD2X0BRGZ010000V	ZD2X0BRGZ025000V	ZD2X0BRGZ050000V

\* For quick connection terminal, replace RG by QG in the 7th and 8th character.

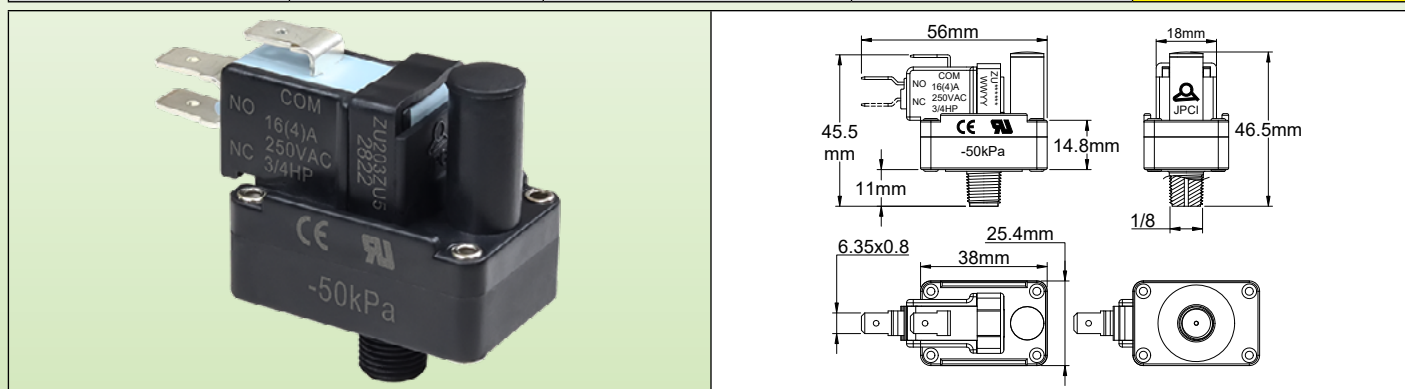
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# Vacuum pressure switches

## Snap action contact adjustable set point vacuum pressure switch

Fitting	Maximum Electrical rating	Minimum calibration pressure	Lowest negative pressure calibration	Type
PA66	22 (8)A 250VAC	-5 kPa (-50 mbar, -0.7 PSI)	-90 kPa (-900 mbar, -13 PSI)	<b>ZU</b>



### Main applications :

Vacuum detection on pumps, in particular on balneotherapy heaters, swimming pool filters, automated assembly lines. The snap-action contact allows direct control of motors or heating elements.

### Main Features :

**Membranes:** Silicone, dia.21 × 33.5mm.

**Fluid:** Water or air

**Pressure port connection:** PA66, 1/8" BSPT or 1/8" NPT

**Pressure:** Negative (Vacuum)

**Housing:** PA66, UL94 VO

**Contact:** SPDT, snap action.

**Electrical rating:**

- Standard rating micro-switch (low and medium vacuum only): 16 (4)A 125/250VAC; 1/2HP 125VAC; 3/4HP 250VAC.

- High rating micro-switch (medium and high vacuum calibration only): 2HP 250VAC, 22 (8)A 250VAC.

**Action:** Momentary.

**Set point calibration:** factory calibrated and sealed, not field adjustable. The value given is that of the opening of the contact when the vacuum becomes greater.

**Calibration condition:** The contact between COM and NC opens when vacuum pressure goes from atmospheric pressure to requested vacuum set point. When the atmospheric pressure is positive, the contact is closed between COM and NC.

**Set point calibration limits:** From -5 kPa (-50 mbar, -0.7 PSI) to -50 kPa (-500 mbar, -7 PSI).

**Electrical connection:** 6.35 × 0.8mm quick connect terminals.

**Lowest negative pressure:** -90 kPa (-900 mbar, -13 PSI).

**Bursting pressure:** > 10bar (1Mpa, 145PSI)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14 to 185°F)

### References (with SPDT contact) :

Pressure inlet	Set point value	Micro-switch 16 (4)A, 1/2HP 250VAC.	Micro-switch 22 (8)A, 2HP 250VAC.
1/8" NPT	-10 kPa (100 mbar, 1.45 PSI)	ZU253ZU1ZA000000	ZU273ZU6ZA000000
	-25 kPa (250 mbar, 3.6 PSI)	ZU253ZU1ZB500000	ZU273ZU6ZB500000
	-50 kPa (500 mbar, 7.3 PSI)	ZU253ZU1ZE000000	ZU273ZU6ZE000000
1/8" BSPT	-10 kPa (100 mbar, 1.45 PSI)	ZU253VU1ZA000000	ZU273VU6ZA000000
	-25 kPa (250 mbar, 3.6 PSI)	ZU253VU1ZB500000	ZU273VU6ZB500000
	-50 kPa (500 mbar, 7.3 PSI)	ZU253VU1ZE000000	ZU273VU6ZE000000

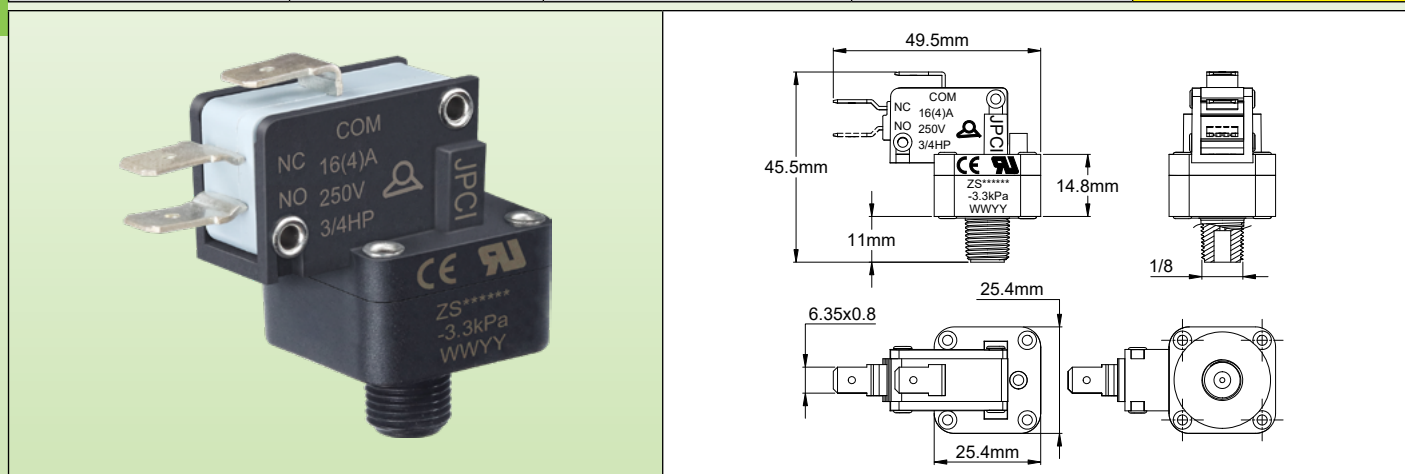
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# Vacuum pressure switches

## Snap action contact miniature vacuum switch

Fitting	Maximum Electrical rating	Minimum calibration pressure	Lowest negative pressure calibration	Type
PA66	22 (8)A 250VAC	-2 kPa (-20 mbar, -0.3 PSI)	-90 kPa (-900 mbar, -13 PSI)	<b>ZS</b>



### Main applications :

Vacuum detection on pumps, in particular on balneotherapy heaters, swimming pool filters, automated assembly lines. The snap-action contact allows direct control of motors or heating elements.

### Main Features :

**Membranes:** EPDM, dia. 22mm. Silicone or NBR on request.

**Fluid:** Water or air

**Pressure port connection:** PA66, 1/8" BSPT or 1/8" NPT

**Pressure:** Negative (Vacuum)

**Housing:** PA66, UL94 VO

**Contact:** SPDT, snap action.

**Electrical rating:**

- *Standard rating micro-switch* (low and medium vacuum only): 16A 125/250VAC; 1/2HP 125VAC; 3/4HP 250VAC. Differential is about 60 mbar.

- *High rating micro-switch* (medium and high vacuum calibration only): 2HP 250VAC, 22 (8)A 250VAC. Differential is about 90 mbar.

**Action:** Momentary.

**Set point calibration:** factory calibrated and sealed, not field adjustable. The value given is that of the opening of the contact when the vacuum becomes greater.

**Calibration condition:** The contact between COM and NC opens when vacuum pressure goes from atmospheric pressure to requested vacuum set point. When the atmospheric pressure is positive, the contact is closed between COM and NC.

**Set point calibration limits:** From -2 kPa (-20 mbar, -0.3 PSI) to -90 kPa (-900 mbar, -13 PSI).

**Electrical connection:** 6.35 × 0.8mm quick connect terminals.

**Maximum positive pressure:** 3 bar (0.3 Mpa, 43.5 PSI).

**Lowest negative pressure:** -90 kPa (-900 mbar, -13 PSI).

**Bursting pressure:** > 15 bar (1.5 Mpa, 217PSI)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14 to 185°F)

**Approval:** UL 508

### References (with SPDT contact) :

Pressure inlet	Set point value	Micro-switch 16 (4)A, 3/4HP 250VAC. (Differential about 60 mbar)	Micro-switch 22 (8)A, 2HP 250VAC. (Differential about 90 mbar)
1/8" NPT	-10 kPa (100 mbar, 1.45 PSI)	ZS2038U50A000000	ZS278U60A0000000
	-20 kPa (200 mbar, 2.9 PSI)	ZS2038U50B0000000	ZS278U60B0000000
	-30 kPa (300 mbar, 4.35 PSI)	ZS2038U50C0000000	ZS278U60C0000000
1/8" BSPT	-10 kPa (100 mbar, 1.45 PSI)	ZS203GU50A0000000	ZS27GU60A0000000
	-20 kPa (200 mbar, 2.9 PSI)	ZS203GU50B0000000	ZS27GU60B0000000
	-30 kPa (300 mbar, 4.35 PSI)	ZS203GU50C0000000	ZS27GU60C0000000

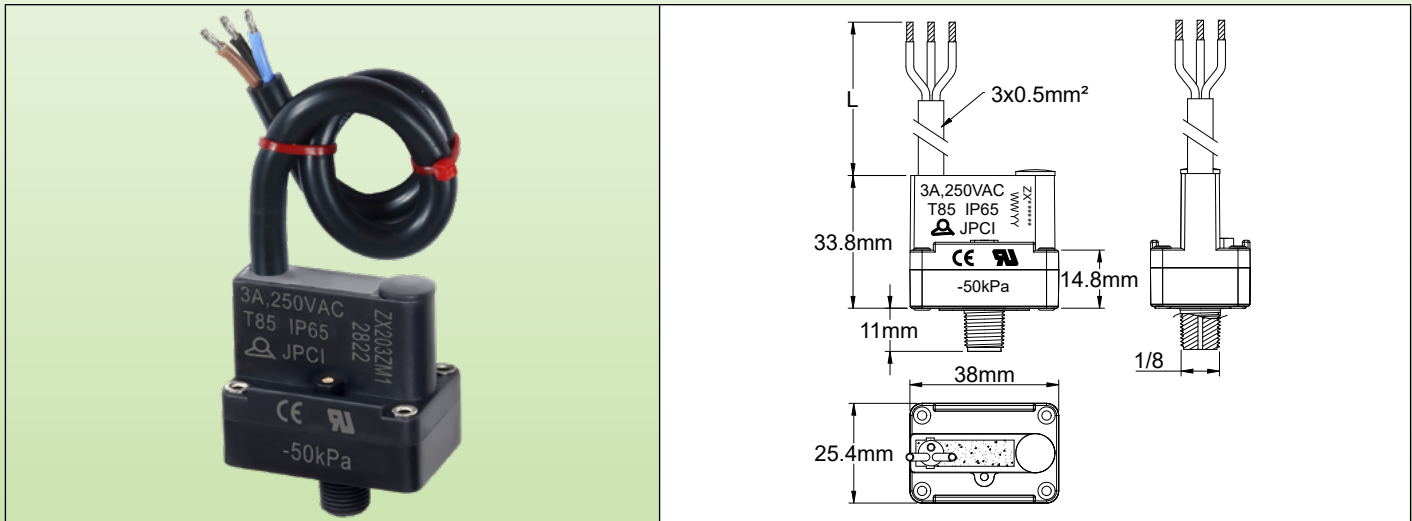
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# Vacuum pressure switches

Snap action contact adjustable set point **vacuum** pressure switch.  
**1/8"** center thread, **IP65 waterproof**.

Fitting	Maximum Electrical rating	Minimum calibration pressure	Lowest negative pressure calibration	Type
PA66	3A 125/250 VAC	-5 kPa (-50 mbar, -0.7 PSI)	-90 kPa (-900 mbar, -13 PSI)	<b>ZX</b>



## Main applications :

Its applications are in the detection of the suction of water pumps, filter clogging of vacuum cleaners, pumps for vacuum packaging devices, checking of the presence of vacuum in professional equipment.  
Its high electrical rating allows it to be used without power relay in the control of motors or heating elements etc.

## Technical features :

**Membrane:** Silicone

**Fluid:** Air only

**Fitting:** PA66, 1/8" BSPT or 1/8" NPT

**Pressure:** Negative

**Housing:** PA66, UL94 VO. IP65 Ingress protection

**Contact:** SPDT, snap action.

**Electrical rating:** 3A 125/250 VAC, resistive

**Action:** Momentary.

**Set point adjustment:** Field adjustable by screw driver, after removing the calibration screw cap.

**Set point calibration values:** Standard -10 kPa (-100 mbar, -1.45 PSI). Other values between -5 kPa (-50 mbar, -0.73 PSI) and -80 kPa (-800 mbar, -11.6 PSI) on request.

**Electrical connection:** PVC insulated cable, 3 x 0.5mm<sup>2</sup> (AWG20)

**Maximum operating pressure:**

- Exposure to ambient atmospheric pressure: +100 kPa (+1000 mbar, +14 PSI)

- Exposure to vacuum pressure: -90 kPa (-900 mbar, -13 PSI)

**Bursting pressure:** > 10bar (1Mpa, 145PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F).

## Main part numbers. Calibration point preset at -10 kPa (-100 mbar, -1.45 PSI) :

Fitting	Cable length 500mm	Cable length 1000mm	Cable length 2000mm
1/8" BSPT	ZX203VM1Z000000E	ZX203VM1Z000000J	ZX203VM1Z000000T
1/8" NPT	ZX203ZM1Z000000E	ZX203ZM1Z000000J	ZX203ZM1Z000000T



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# Differential pressure switches



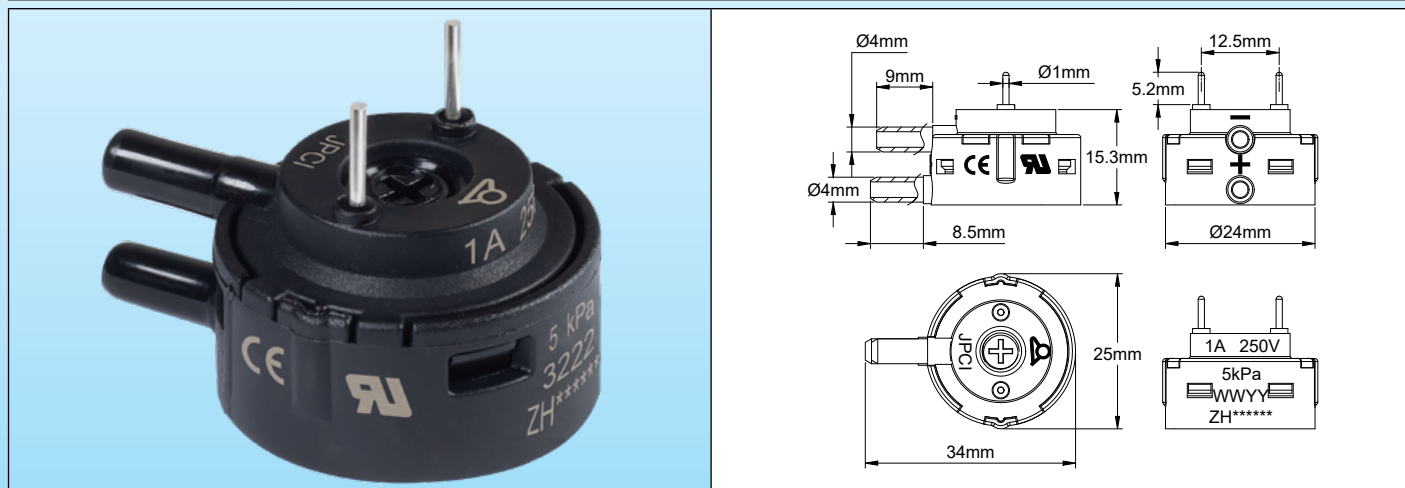
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# Differential pressure switches

## Low voltage circuit **differential** pressure switch, printed circuit terminals, 4mm spouts.

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
Two plastic spouts	1A 250VAC	-/+ 1 kPa (-/+ 10 mbar, -/+0.15 PSI)	-/+ 90kPa (-/+ 900mbar, -/+ 13PSI)	<b>ZH</b>



### Main applications :

Electronic printed circuits. Detection of low positive, negative or differential pressure. Measurement of liquid levels, air flow, filters efficiency. Very small differential, about 0.2 kPa (2 mbar, 0.03 PSI)

**Membranes:** Silicone, dia 22mm.

**Fluid:** Air only

**Fitting:** Two plastic spouts dia 4mm for soft PVC tube 3 × 6mm (1/8")

**Pressure:** Differential

**Housing:** PA66

**Contact:** Single pole normally open, slow make and break.

**Electrical rating:**

- Silver contact: max 1A 250VAC resistive

- Gold plated contact: max 100 mA, 24VDC

**Action:** Momentary, close by pressure rise on positive pressure inlet

**Set point calibration:** Factory calibrated and sealed

**Set point calibration limits:** From -/+1 to -/+60 kPa (-/+ 10 to -/+ 600 mbar, -/+0.15 to -/+9 PSI)

**Differential:** Less than 0.5 kPa (5 mbar, 0.07 PSI)

**Electrical connection:** printed circuit terminal, dia. 1mm, 12.5mm distance

**Maximum operating pressure:** -/+ 90kPa(-/+ 900mbar, -/+ 13PSI)

**Bursting pressure:** > 4bar (0.4Mpa, 60PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F)

**Note:** 10 kPa= 100 millibars = 1.45 PSI= 40 inches of water = 1016mm of water.

### References :

Calibration:	Silver contact	Gold plated contact
5 kPa (50 mbar, 0.72 PSI)	ZH2X25T105000000	ZH2X25TG05000000
10 kPa (100 mbar, 1.45 PSI)	ZH2X25T10A000000	ZH2X25TG0A000000
20 kPa (200 mbar, 2.90 PSI)	ZH2X25T10B000000	ZH2X25TG0B000000
40 kPa (400 mbar, 5.8 PSI)	ZH2X25T10D000000	ZH2X25TG0D000000

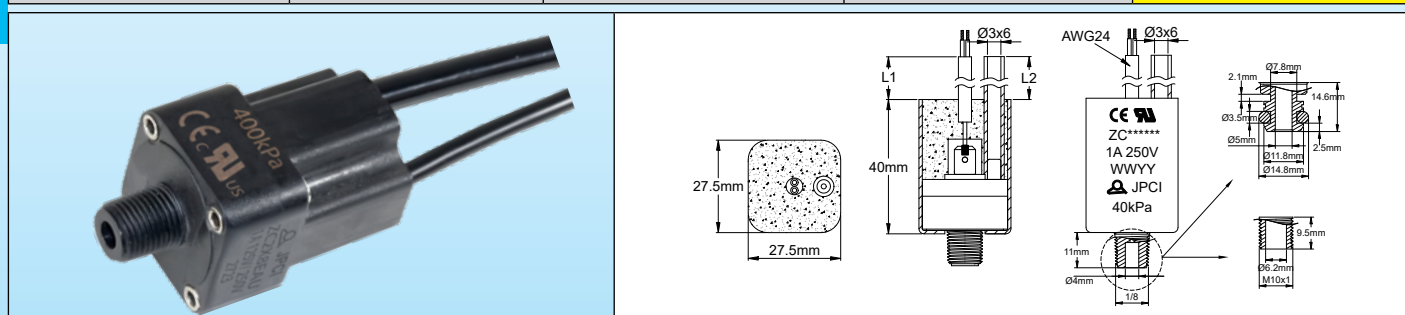
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# Differential pressure switches

Low voltage circuit, IP65 waterproof **differential** pressure switch, various center threads.

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
PA66	1A 250VAC	10 kPa (100 mbar, 1.5 PSI)	4 bar (0.4 Mpa, 60 PSI)	<b>ZC</b>



## Main applications :

Use in areas where IP65 waterproofing is required. Medium positive, negative or differential pressure detection. Water level measurement, detection of clogging of water filters. Minimum water pressure detection on water heaters and boilers. This pressure switch is much more sensitive than snap-action systems and can be calibrated at lower pressures, but its use is limited to low power applications, typically on electronic circuits. Very low differential, less than 1 kPa (10 millibars, 0.15 PSI)

**Membranes:** Silicone, dia. 22mm.

**Fluid:** Water or air. (Connection of liquid on the negative pressure port is not allowed)

### Fitting:

- Negative port by flexible PVC tube 3 × 6mm length 200mm (Other length on request)
- Positive port by 1/8" BSPT or NPT or 1/4" BSPP thread in PA66.

**Housing:** PA66, UL94 VO, IP65 Ingress protection

**Contact:** Single pole normally open, slow make and break.

### Electrical rating:

- Silver contact: max 1A 250VAC
- Gold plated contact: max 100mA, 24VDC

**Action:** Momentary, close on pressure rise on the positive port.

**Set point calibration:** Factory calibrated and sealed, not field adjustable

**Set point calibration limits:** From 10 to 400 kPa (100 to 4000 mbar, 1.5 to 60 PSI)

**Electrical connection:** PVC insulated cable, 2 × 0.2mm<sup>2</sup> (AWG24)

**Maximum pressure:** 4 bar (0.4 Mpa, 60 PSI)

**Bursting pressure:** > 16 bar (1.6 Mpa, 232 PSI)

**Electrical connection:** AWG24 cable, UL 2464 style, length 500mm (other lengths on request)

**Ambient temperature limits:** water: 0 to 85°C (32 to 185°F), Air: -10 ~ 85°C (14 to 185°F)

## Parts number (with 500mm cable and 300mm tube) :

Positive pressure port	Contact	Calibration				
		10 kPa (100 mbar, 1.5 PSI)	20 kPa (200 mbar, 2.9 PSI)	40 kPa (400 mbar, 5.8 PSI)	60 kPa (600 mbar, 8.7 PSI)	80 kPa (800 mbar, 11.6 PSI)
1/8" NPT	Silver	ZC2X28EA01000000	ZC2X28EA02000000	ZC2X28EA04000000	ZC2X28EA06000000	ZC2X28EA08000000
	Gold plated	ZC2X28EG01000000	ZC2X28EG02000000	ZC2X28EG04000000	ZC2X28EG06000000	ZC2X28EG08000000
1/8" BSPT	Silver	ZC2X2GEA01000000	ZC2X2GEA02000000	ZC2X2GEA04000000	ZC2X2GEA06000000	ZC2X2GEA08000000
	Gold plated	ZC2X2GEG01000000	ZC2X2GEG02000000	ZC2X2GEG04000000	ZC2X2GEG06000000	ZC2X2GEG08000000
M10x1	Silver	ZC2X2MEA01000000	ZC2X2MEA02000000	ZC2X2MEA04000000	ZC2X2MEA06000000	ZC2X2MEA08000000
	Gold plated	ZC2X2MEG01000000	ZC2X2MEG02000000	ZC2X2MEG04000000	ZC2X2MEG06000000	ZC2X2MEG08000000
Snap-in	Silver	ZC2X2TEA01000000	ZC2X2TEA02000000	ZC2X2TEA04000000	ZC2X2TEA06000000	ZC2X2TEA08000000
	Gold plated	ZC2X2TEG01000000	ZC2X2TEG02000000	ZC2X2TEG04000000	ZC2X2TEG06000000	ZC2X2TEG08000000



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# **Air switches for spas and swimming pools (latching or momentary action)**



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# Air switches for spas and swimming pools

## Creeping action contact air switch, single pole, momentary action

### New high sensivity types

Fitting	Maximum Electrical rating	Minimum calibration pressure	Maximum calibration value	Type
PA66	1A 250VAC	2 kPa (20 mbar, 0.29 PSI)	90 kPa (900 mbar, 13 PSI)	<b>ZG</b>



Printed circuit terminals	Solder terminals	Printed circuit terminals	Solder terminals	4 or 2.7 mm spouts
1/4" NPSM thread		3 board mounting solutions kit		
		Side spout		

### Main applications :

These miniature slow-action air switches are particularly effective for long-distance control systems, where they greatly outperform models using snap-action switches. They are designed to be incorporated into a printed circuit board which provides power relay and the latching function. They are used for controlling circulating pump motors in spas and swimming pools, counter-current swimming pumps, air blowers motors, as well as for lighting control. Its reduced thickness of 15mm favors its installation in applications requiring a small footprint. **They feature in standard a patented barometric and thermometric compensation system to prevent unwanted tripping.**

### Technical features :

**Fluid:** Air only

**Pressure port connection:** Plastic spout

- For 1/8" (3mm) ID flexible plastic tubing

- For 1/16" (1.5 mm) ID flexible plastic tubing

Maximum PVC tube hardness 70 shore A

**Membrane:** Silicone, 22mm diameter.

**Housing:** PA66

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# Air switches for spas and swimming pools

**Contact:** Slow make and break, closes on pressure rise.

**Electrical rating:** 1A 250VAC resistive (silver contacts), 10mA 24VDC (5 microns gold plated contacts). We recommend gold plated contacts for low voltage and low current circuits to avoid the increase in contact resistance that appears on silver contacts as they oxidize.

**Action:** Momentary: the contact switch on when pressure rises, and switch off when pressure decreases.

**Electrical connection:** 2.8 × 0.5mm quick connection terminal or 1.2 × 0.5mm tin welding terminal

**Maximum operating pressure:** 90 kPa (900 mbar, 13 PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F).

**Barometric compensation:** Calibrated flow leak orifice inside the pressure chamber

**Mounting fittings:** ¼" NPSM thread with 11mm distance flats, for installation through a board, or side spout.

**Switch operation:** Operates on a sealed pressure air displacement, with patented calibrated micro-leak providing barometric and temperature compensation.

**Caution:** Use air transmitters with enough air volume to achieve minimum operating pressure. Too long connection tubes and/or too small pressure transmitter will not operate the air switch.

**Accessories, in option or available as spare parts:** ABS plastic nut (Maximum tightening torque 1.5 Nm) and tube securing nut (Maximum tightening torque 2 Nm).

## How the locking nut tighten the PVC connecting tube :

	In this series, the use of a connecting tube locking nut increases the force required to disconnect the tube by 350%. (It can then reach 14 daN)		¼" NPSM nut reference <b>if ordered as a spare part:</b> <b>Z6VE10003500003A</b>
			¼" NPSM securing nut reference <b>if ordered as a spare part:</b> <b>Z6VE10003500006A</b>

## Maximum actuating distances with flexible PVC connecting tube. (With air button and air pedal of this catalogue)

Tests with reproducible automatic test equipment, 5.6 cm<sup>3</sup> (3.4 cubic inches) pneumatic button chamber, 75 kPa (750 mbar, 10.9 PSI) pressure impulse for 3 seconds)

Calibration	Nominal tube I.D.	With air button	With foot pedal
5 kPa (50 mbar, 0.73 PSI)	1.5 mm	26 m (85 ft. 4 in.)	50 m (164 ft. 1 in.)
	3 mm	11 m (36 ft. 1 in.)	31 m (101 ft. 8 in.)
10 kPa (100 mbar, 1.45 PSI)	1.5 mm	13 m (42 ft. 8 in.)	26 m (85 ft. 4 in.)
	3 mm	5 m (16 ft. 5 in.)	12 m (39 ft. 4 in.)

## Main part numbers (Silver contacts\*)

Pressure port fitting	Included accessories	Calibration a 5 kPa (50 mbar, 0.73 PSI)	Calibration at 10 kPa (100 mbar, 1.45 PSI)
¼" NPSM with spout for ⅜" (3mm) internal diameter PVC tube**	None	ZG2X20F145000000	ZG2X20F14A000000
	¼" NPSM nut	ZG2X20F145000006	ZG2X20F14A000006
	¼" NPSM tube securing nut	<b>ZG2X20F145000007</b>	ZG2X20F14A000007
	¼" NPSM nut + ¼" NPSM tube securing nut	ZG2X20F145000005	ZG2X20F14A000005
Spout on the side for ⅜" (6 × 3mm) tube on the side	One set of 2 different snap-on brackets	<b>ZG2X23F145000000</b>	ZG2X23F14A000000
Spout on the side for ⅜" (3 × 1.5mm) tube on the side	One set of 2 different snap-on brackets	ZG2X2CF145000000	ZG2X2CF14A000000

**In bold:** the most common models.

\* For gold plated contacts, replace F1 by FG.

\*\* Models with spout for ⅜" (1.5mm) internal diameter tube instead of ⅜" (3mm ID): replace the characters "20" in the reference by "2A".

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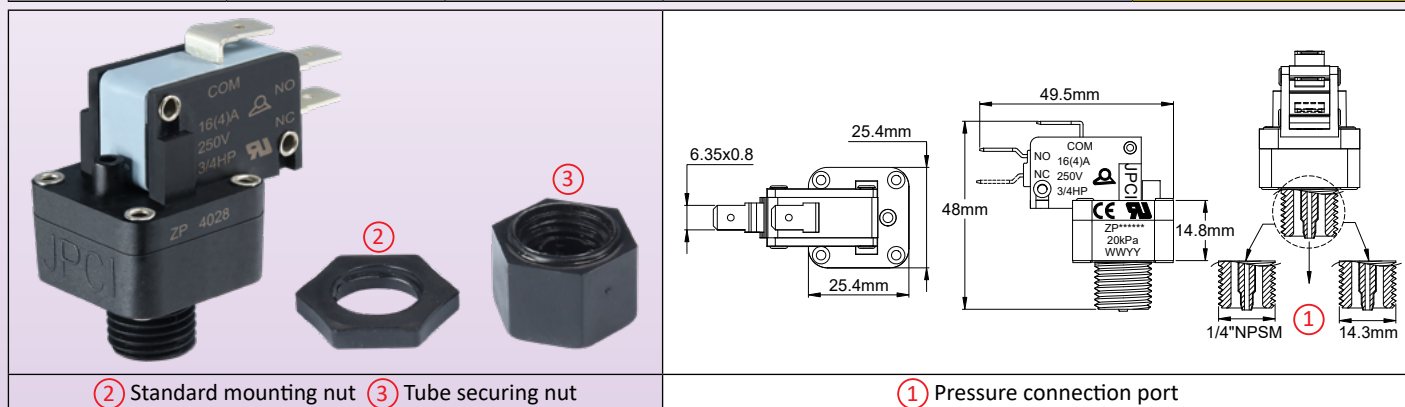




# Air switches for spas and swimming pools

## Snap action contact air switch, **single pole**, momentary or latching action

Fitting	Standard rating	Maximum rating	Maximum remote actuating distance (Manual button, 3mm ID tube)	Type
PA66	16A, ¼HP, 250VAC	22A, 2HP, 250VAC	7 (5)m	<b>ZP</b>



② Standard mounting nut ③ Tube securing nut

① Pressure connection port

### Main applications :

Direct actuating of pumps and blowers in spas and swimming pools, sink erasers, plumbing or home appliances used with risks of water splashing. Resist to spas and swimming pools ozone concentration.

**They feature in standard a patented barometric and thermometric compensation.**

### Technical features :

**Fluid:** Air only

**Pressure port connection:** Plastic spout for ⅛" (3mm) or ¼" (1.5mm) ID flexible plastic tubing with maximum hardness 70 shore A

**Membrane:** EPDM, 22mm diameter. Silicone available on request

**Housing:** PA66, UL94 and ABS

**Contact:** Snap action. DPNO (DPDT available on request)

**Electrical rating:** Depends on micro-switch operating force that is linked to the electrical rating. Increasing the electrical rating reduces the actuating distance

- Standard rating micro-switch: 16A res. 125/250VAC; ½HP 125VAC; ¾HP 250VAC

- High rating micro-switch (short actuating distance): 2HP 250VAC, 22 (8) A 250VAC

**Action (2 styles of action are possible):**

- Momentary: the contact switches when under pressure, and returns to its original position when there is no more pressure.

- Latching: a first pressure pulse switches the contact, which remains in this position, and only returns to its initial position with a second pressure pulse.

**Electrical connection:** 6.35 × 0.8mm quick connect terminals

**Maximum operating pressure:** 200 kPa (2000 mbar, 29 PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F).

**Barometric compensation:** Calibrated flow leak orifice inside the pressure chamber

**Mounting fittings:** ¼" NPSM without flats on thread, or ⅝-18 with 2 possible flat positions

**Switch operation:** Operates on a sealed pressure air displacement.

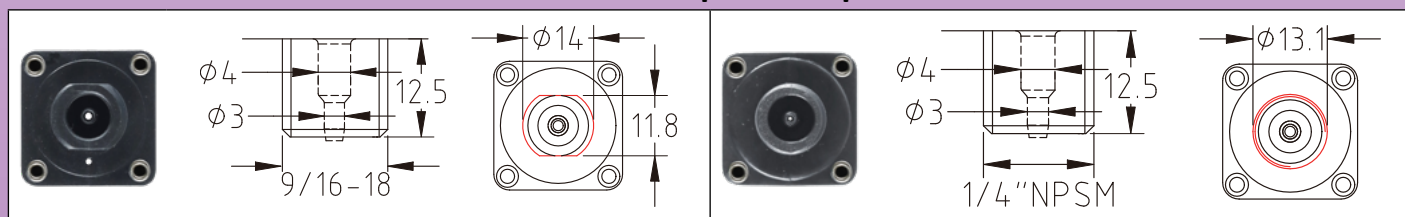
Use air transmitters with enough air volume to achieve minimum operating pressure.

**Caution:** too long connecting tubing and/or too small pressure transmitter will not operate the air switch or will operate it with a momentary action.

**Accessories (in option or available as spare parts):** ABS plastic nut (Maximum tightening torque 1.5 Nm) and tube securing nut (Maximum tightening torque 2 Nm).

**Approval:** UL 508

### ⅝-18 UNC and ¼" NPSM pressure port dimensions :



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# Air switches for spas and swimming pools

## How the locking nut tighten the PVC connecting tube :

	<p>In this series, the use of a tube locking nut increases the force required to disconnect the tube by 180%. (It can then reach 7 daN).</p>		<p>-<math>\frac{1}{4}</math>" NPSM nut reference if ordered as a spare part:  <div style="border: 1px solid black; padding: 2px; display: inline-block;">Z6VE10003500003A</div></p> <p>-<math>\frac{5}{16}</math>-18 UNC nut reference if ordered as a spare part:  <div style="border: 1px solid black; padding: 2px; display: inline-block;">Z6VE10003500007A</div></p>
			<p>-<math>\frac{1}{4}</math>" NPSM tube securing nut reference if ordered as a spare part:  <div style="border: 1px solid black; padding: 2px; display: inline-block;">Z6VE10003500006A</div></p> <p>-<math>\frac{5}{16}</math>-18 UNC tube securing nut reference if ordered as a spare part:  <div style="border: 1px solid black; padding: 2px; display: inline-block;">Z6VE10003500008A</div></p>

## Maximum actuating distances with flexible PVC connecting tube. (With air button and air pedal of this catalogue)

Tests with reproducible automatic test equipment, 5.6 cm<sup>3</sup> (3.4 cubic inches) pneumatic button chamber, 75 kPa (750 mbar, 10.9 PSI) pressure impulse for 3 seconds

Switch operating force	Nominal tube I.D. (mm)	With air button	With foot pedal
100 gr.	3 mm	7 m (23 ft.)	18 m (59 ft. 1 in.)
160 gr.	3 mm	5 m (16 ft. 5 in.)	12 m (39 ft. 4 in.)

## Part numbers with normally open contact, **latching** action\*

Pressure port fitting	Included accessories	Standard switch (16A 250VAC, 3/4HP 250VAC)	High rating switch (22A 250VAC, 2HP 250VAC)
$\frac{1}{4}$ " NPSM	None	ZP1021U500000000	ZP1721U600000000
	$\frac{1}{4}$ " NPSM nut	<b>ZP1021U500000006</b>	ZP1721U600000006
	$\frac{1}{4}$ " NPSM tube securing nut	ZP1021U500000007	ZP1721U600000007
	$\frac{1}{4}$ " NPSM nut + $\frac{1}{4}$ " NPSM tube securing nut	<b>ZP1021U500000005</b>	ZP1721U600000005
$\frac{5}{16}$ -18 UNC, flats at 0°	None	ZP102UU500000000	ZP172UU600000000
	$\frac{5}{16}$ -18 UNC nut	<b>ZP102UU500000008</b>	ZP172UU600000008
	$\frac{5}{16}$ -18 UNC tube securing nut	ZP102UU500000009	ZP172UU600000009
	$\frac{5}{16}$ -18 UNC nut + $\frac{5}{16}$ -18 UNC tube securing nut	ZP102UU500000004	ZP172UU600000004
$\frac{5}{16}$ -18 UNC, flats at 90°	None	ZP102WU500000000	ZP172WU600000000
	$\frac{5}{16}$ -18 UNC nut	ZP102WU500000008	ZP172WU600000008
	$\frac{5}{16}$ -18 UNC tube securing nut	ZP102WU500000009	ZP172WU600000009
	$\frac{5}{16}$ -18 UNC nut + $\frac{5}{16}$ -18 UNC tube securing nut	ZP102WU500000004	ZP172WU600000004

## Part numbers with normally open contact, **momentary** action\*

Pressure port fitting	Included accessories	Standard switch (16A 250VAC, 3/4HP 250VAC)	High rating switch (22A 250VAC, 2HP 250VAC)
$\frac{1}{4}$ " NPSM	None	ZP2021U500000000	ZP2721U600000000
	$\frac{1}{4}$ " NPSM nut	<b>ZP2021U500000006</b>	ZP2721U600000006
	$\frac{1}{4}$ " NPSM tube securing nut	ZP2021U500000007	ZP2721U600000007
	$\frac{1}{4}$ " NPSM nut + $\frac{1}{4}$ " NPSM tube securing nut	<b>ZP2021U500000005</b>	ZP2721U600000005
$\frac{5}{16}$ -18 UNC, flats at 0°	None	ZP202UU500000000	ZP272UU600000000
	$\frac{5}{16}$ -18 UNC nut	ZP202UU500000008	ZP272UU600000008
	$\frac{5}{16}$ -18 UNC tube securing nut	ZP202UU500000009	ZP272UU600000009
	$\frac{5}{16}$ -18 UNC nut + $\frac{5}{16}$ -18 UNC tube securing nut	ZP202UU500000004	ZP272UU600000004
$\frac{5}{16}$ -18 UNC, flats at 90°	None	ZP202WU500000000	ZP272WU600000000
	$\frac{5}{16}$ -18 UNC nut	ZP202WU500000008	ZP272WU600000008
	$\frac{5}{16}$ -18 UNC tube securing nut	ZP202WU500000009	ZP272WU600000009
	$\frac{5}{16}$ -18 UNC nut + $\frac{5}{16}$ -18 UNC tube securing nut	ZP202WU500000004	ZP272WU600000004

**In bold:** the most common models. The UNC  $\frac{5}{16}$ -18 thread is mainly used in North America, and the  $\frac{1}{4}$ " NPSM thread is used in Europe and Asia.

\* Models with change-over (SPDT) contact: replace the 5th character "2" in the reference by "3".

NB: Previous models ZP1021U1\*\*\*\*\* and ZP2021U1\*\*\*\*\* are replaced by ZP1021U5\*\*\*\*\* and ZP1021U5\*\*\*\*\*

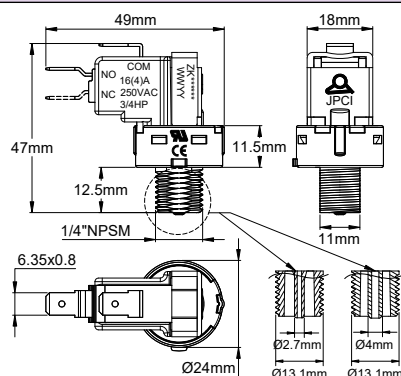
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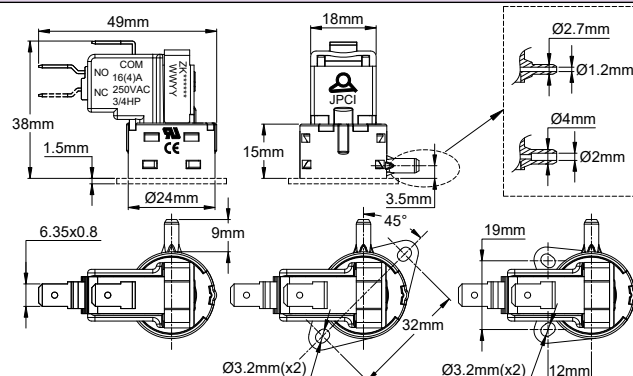
# Air switches for spas and swimming pools

## Snap action contact air switch, single pole, momentary or latching action New high sensivity types

Fitting	Standard rating	Maximum rating	Maximum remote actuating distance (Manual button, 3mm ID tube)	Type
PA66	16A, ¼HP, 250VAC	22A, 2HP, 250VAC	7 (5)m	<b>ZK</b>



¼" NPSM thread



Side spout

### Main applications :

Direct actuating of pumps and blowers in whirlpool baths, hot tubs, jacuzzis and swimming pools, sink erasers, garbage disposers, medical equipment, plumbing or home appliances used with risks of water splashing. Resist to spas and swimming pools ozone concentration.

**They feature in standard a patented barometric and thermometric compensation, anti-vibration locking, and are protected against tampering.** Compared to the old ZP model, although in a smaller footprint, the design of the mechanical assembly and the diaphragm greatly increases the length of the usable connecting tube.

### Technical features :

**Fluid:** Air only

**Pressure port connection:** Plastic spout

- For ⅛" (3mm) ID flexible plastic tubing
- For ¼" (6.35mm) ID flexible plastic tubing

Maximum PVC tube hardness 70 shore A

**Membrane:** Silicone, 22mm diameter.

**Housing:** PA66

**Contact:** Snap action, SPNO.

**Electrical rating:**

- Standard rating micro-switch: 16A 125/250VAC; ½HP 125VAC; ¾HP 250VAC

- On request: up to 22A, 2HP 250VAC

**Action (2 styles of action are possible):**

- Momentary: the contact switches when under pressure, and returns to its original position when there is no more pressure.

- Latching: a first pressure pulse switches the contact, which remains in this position, and only returns to its initial position with a second pressure pulse.

**Electrical connection:** 6.35 × 0.8mm quick connect terminals

**Maximum operating pressure:** 120 kPa (1200 mbar, 17 PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F).

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# Air switches for spas and swimming pools

**Barometric compensation:** Calibrated flow leak orifice inside the pressure chamber

**Mounting fittings:** ¼" NPSM with 2 flats at 11 mm distance on thread, for installation through a board, or without thread, with side spout, for mounting on a board surface with 2 screws with 19mm distance.

**Switch operation:** Operates on a sealed pressure air displacement, with patented calibrated micro-leak providing barometric and temperature compensation.

**Caution:** Use air transmitters with enough air volume to achieve minimum operating pressure.

Too long connection tubes and/or too small pressure transmitter will not operate the air switch or will operate it with a momentary action.

**Accessories, in option or available as spare parts:** ABS plastic nut (Maximum tightening torque 1.5 Nm) and tube securing nut (Maximum tightening torque 2 Nm).

## How the locking nut tighten the PVC connecting tube :

	<p>In this series, the use of a connecting tube locking nut increases the force required to disconnect the tube by 350%. (It can then reach 14 daN)</p>		<p>¼"NPSM nut reference <b>if ordered as a spare part:</b></p> <p>Z6VE10003500003A</p>
			<p>¼"NPSM securing nut reference <b>if ordered as a spare part:</b></p> <p>Z6VE10003500006A</p>

## Maximum actuating distances with flexible PVC connecting tube. (With air button and air pedal of this catalogue)

Tests with reproducible automatic test equipment, 5.6 cm<sup>3</sup> (3.4 cubic inches) pneumatic button chamber, 75 kPa (750 mbar, 10.9 PSI) pressure impulse for 3 seconds

Switch operating force	Nominal tube I.D.	With air button	With foot pedal
100 gr.	1.5 mm	20 m (65 ft. 7 in.)	39 m (127 ft. 11 in.)
	3 mm	7 m (23 ft.)	19 m (62 ft. 4 in.)
160 gr.	1.5 mm	13 m (42 ft. 8 in.)	30 m (98 ft. 5 in.)
	3 mm	5 m (16 ft. 5 in.)	12 m (39 ft. 4 in.)

## Part numbers with normally open contact, **latching** action\*

Pressure port fitting	Included accessories	Standard switch (16A 250VAC, 3/4HP 250VAC)	High rating switch (22A 250VAC, 2HP 250VAC)
¼" NPSM with spout for ⅜" (3mm) internal diameter PVC tube**	None	ZK1020U500000000	ZK1720U600000000
	¼" NPSM nut	<b>ZK1020U500000006</b>	ZK1720U600000006
	¼" NPSM tube securing nut	ZK1020U500000007	ZK1720U600000007
	¼" NPSM nut + ¼" NPSM tube securing nut	<b>ZK1020U500000005</b>	ZK1720U600000005
Spout on the side for ⅜" (6x3mm) tube on the side	None	<b>ZK1022U500000000</b>	ZK1722U600000000
Spout on the side for ⅜" (3x1.5mm) tube on the side	None	ZK152BU100000000	ZK172BU600000000

## Part numbers with normally open contact, **momentary** action\*

Pressure port fitting	Included accessories	Standard switch (16A 250VAC, 3/4HP 250VAC)	High rating switch (22A 250VAC, 2HP 250VAC)
¼" NPSM with spout for ⅜" (3mm) internal diameter PVC tube**	None	ZK2520U100000000	ZK2720U600000000
	¼" NPSM nut	<b>ZK2520U100000006</b>	ZK2720U600000006
	¼" NPSM tube securing nut	ZK2520U100000007	ZK2720U600000007
	¼" NPSM nut + ¼" NPSM tube securing nut	<b>ZK2520U100000005</b>	ZK2720U600000005
Spout on the side for ⅜" (6x3mm) tube on the side	None	<b>ZK2522U100000000</b>	ZK2722U600000000
Spout on the side for ⅜" (3x1.5mm) tube on the side	None	ZK252BU100000000	ZK272BU600000000

**In bold:** the most common models.

\* Models with change-over (SPDT) contact: replace the 5th character "2" in the reference by "3".

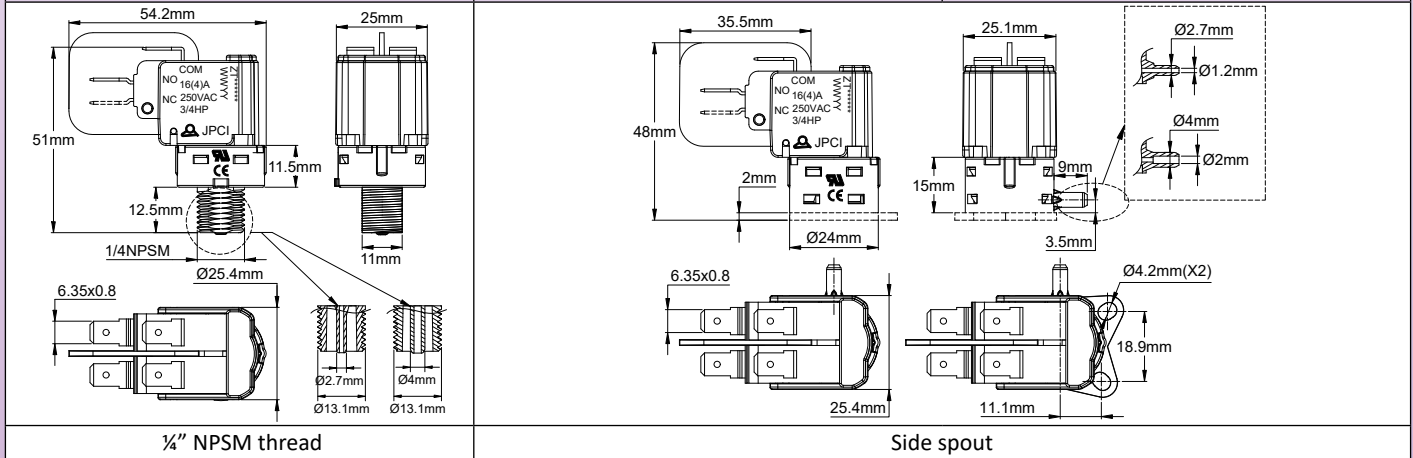
\*\* Models with spout for ⅜" (1.5mm) internal diameter tube instead of ⅜" (3mm ID): replace the characters "20" in the reference by "2A"



# Air switches for spas and swimming pools

Snap action, **double poles** air switch, center ¼" thread mounting, or surface mounting with

Fitting	Standard rating	Maximum rating	Maximum remote actuating distance (Manual button, 3mm ID tube)	Type
PA66	2 × (16A ¼HP, 250VAC)	2 × (22A 2HP, 250VAC)	3 (2) m	<b>ZT</b>



## Main applications :

Direct actuating of pumps and blowers in whirlpool baths, hot tubs, jacuzzis and swimming pools, sink erasers, garbage disposers, medical equipment, plumbing or home appliances used with risks of water splashing. Resist to spas and swimming pools ozone concentration.

**They feature in standard a patented barometric and thermometric compensation, anti-vibration locking, and are protected against tampering.**

## Technical features :

**Fluid:** Air only

**Pressure port connection:** Plastic spout

- For ⅛" (3 mm) ID flexible plastic tubing
- For ¼" (6.35 mm) ID flexible plastic tubing

Maximum PVC tube hardness 70 shore A

**Membrane:** Silicone, 22mm diameter.

**Housing:** PA66

**Contact:** Snap action, SPNO.

**Electrical rating:**

- Standard rating micro-switch: 16A 125/250VAC; ½HP 125VAC; ¾HP 250VAC
- On request: up to 22A, 2HP 250VAC

**Action (2 styles of action are possible):**

- **Momentary:** the contact switches when under pressure, and returns to its original position when there is no more pressure.
- **Latching:** a first pressure pulse switches the contact, which remains in this position, and only returns to its initial position with a second pressure pulse.



# Air switches for spas and swimming pools

**Electrical connection:** 6.35 × 0.8mm quick connect terminals

**Maximum operating pressure:** 120 kPa (1200 mbar, 17 PSI)

**Ambient temperature limits:** Air: -10 ~ 85°C (14 to 185°F).

**Barometric compensation:** Calibrated flow leak orifice inside the pressure chamber

**Mounting fittings:** ¼" NPSM with 2 flats at 11 mm distance on thread, for installation through a board, or without thread, with side spout, for mounting on a board surface with 2 screws with 19mm distance.

**Switch operation:** Operates on a sealed pressure air displacement, with patented calibrated micro-leak providing barometric and temperature compensation.

**Caution:** Use air transmitters with enough air volume to achieve minimum operating pressure.

Too long connection tubes and/or too small pressure transmitter will not operate the air switch or will operate it with a momentary action.

**Accessories, in option or available as spare parts:** ABS plastic nut (Maximum tightening torque 1.5 Nm) and tube securing nut (Maximum tightening torque 2 Nm).

## How the locking nut tighten the PVC connecting tube :

	<p>In this series, the use of a connecting tube locking nut increases the force required to disconnect the tube by 350%. (It can then reach 14 daN)</p>		<p>¼" NPSM nut reference <b>if ordered as a spare part:</b></p> <p>Z6VE10003500003A</p>
			<p>¼" NPSM securing nut reference <b>if ordered as a spare part:</b></p> <p>Z6VE10003500006A</p>

## Maximum actuating distances with flexible PVC connecting tube. (With air button and air pedal of this catalogue)

Tests with reproducible automatic test equipment, 5.6 cm<sup>3</sup> (3.4 cubic inches) pneumatic button chamber, 75 kPa (750 mbar, 10.9 PSI) pressure impulse for 3 seconds

Switch operating force	Nominal tube I.D.	With air button	With foot pedal
100 gr.	1.5 mm	7 m (23 ft.)	15 m (49 ft. 3 in.)
	3 mm	3 m (9 ft. 10 in.)	9 m (29 ft. 6 in.)
160 gr.	1.5 mm	4 m (13 ft. 1 in.)	10 m (32 ft. 10 in.)
	3 mm	2 m (6 ft. 7 in.)	5 m (16 ft. 5 in.)

## Part numbers with normally open contact, **latching** action\*

Pressure port fitting	Included accessories	Standard switch (16A 250VAC, 3/4HP 250VAC)	High rating switch (22A 250VAC, 2HP 250VAC)
¼" NPSM with spout for ⅜" (3mm) internal diameter PVC tube**	None	ZT1520U12L000000	ZT1720U62L000000
	¼" NPSM nut	<b>ZT1520U12L000006</b>	ZT1720U62L000006
	¼" NPSM tube securing nut	ZT1520U12L000007	ZT1720U62L000007
	¼" NPSM nut + ¼" NPSM tube securing nut	ZT1520U12L000005	ZT1720U62L000005
Spout on the side for ⅜" (6x3mm) tube on the side	None	ZT152BU12L000000	ZT172BU62L000000
Spout on the side for ⅜" (3x1.5mm) tube on the side	None	ZT1522U12L000000	ZT1722U62L000000

## Part numbers with normally open contact, **momentary** action\*

Pressure port fitting	Included accessories	Standard switch (16A 250VAC, 3/4HP 250VAC)	High rating switch (22A 250VAC, 2HP 250VAC)
¼" NPSM with spout for ⅜" (3mm) internal diameter PVC tube**	None	ZT2520U12L000000	ZT2720U62L000000
	¼" NPSM nut	ZT2520U12L000006	ZT2720U62L000006
	¼" NPSM tube securing nut	ZT2520U12L000007	ZT2720U62L000007
	¼" NPSM nut + ¼" NPSM tube securing nut	ZT2520U12L000005	ZT2720U62L000005
Spout on the side for ⅜" (6x3mm) tube on the side	None	ZT252BU12L000000	ZT272BU62L000000
Spout on the side for ⅜" (3x1.5mm) tube on the side	None	ZT2522U12L000000	ZT2722U62L000000

**In bold:** the most common models.

\* Models with change-over (SPDT) contact: replace the 5th character "2" in the reference by "3".

\*\* Models with spout for ⅜" (1.5mm) internal diameter tube instead of ⅜" (3mm ID): replace the characters "20" in the reference by "2A"



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# Air buttons and air pedals



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# Air buttons and air pedals

## Air buttons (Hand air transmitters), for hot tubs, spas and swimming pools

Air volume	Button and bezels	Mounting	Ambient temperature	Type
11cm <sup>3</sup>	ABS	Through tub wall	-10 ~ 85°C (-14 ~ 185°F)	<b>66ZM5</b>



### Main applications :

**Use:** Remote operation of air switches. This pneumatic switching technology safely isolates the user from the electrical current. The air transmitters provide the pulse air pressure needed to operate a remote air switch

**Typical applications:** Spas, swimming pools, electrical equipment remote operating of electrical devices on/off including motors, lights, pumps, air blowers, or other associated equipment.

### Technical features :

**Operating distance:** With appropriate tubing, these hand actuation transmitters can operate air switches from distances of up to 30 meters (100 feet.)

**Air volume:** 11cm<sup>3</sup>

**Button and bezels:** ABS, Ozone and UV resistant, low profile dome design, interchangeable.

**Standard Color:** Black, white and nickel plated. Any other color and finish can be made with MOQ (consult factory).

**Mounting:** Through tub wall, with 1/4"-12 UNF nut and flat NBR gasket.

**Mounting hole:** Drill a dia. 32+1/-0mm (1 1/4") hole. The 1/4" nut is staggered to allow using this button for replacement into preexisting dia. 37.3+/-1mm holes.

**Wall thickness:** From 2mm to 45mm (1/16" to 1 7/8").

**Cylinder material:** ABS; ozone and UV resistant.

**Gasket:** NBR.

**Nut:** ABS.

**Bellow:** EPDM, impervious to ozone and chemically treated swimming pool and spa water. No micro leak to avoid pumping action with air switches. Stainless steel spring.

**Tube connection:** Spout for 3mm or 1.7mm (1/8" or 1/16" I.D) flexible PVC or rubber tubing. We recommend tube securing nut to avoid accidental tubing disconnection.

**Mechanical life:** >100,000 cycles.

**Ambient temperature:** -10 to 85°C (14 to 185°F)

**Spare parts:** Cylinder assembly, button and bezel kit are available separately.

**Options:** Custom buttons with logo.

### References :

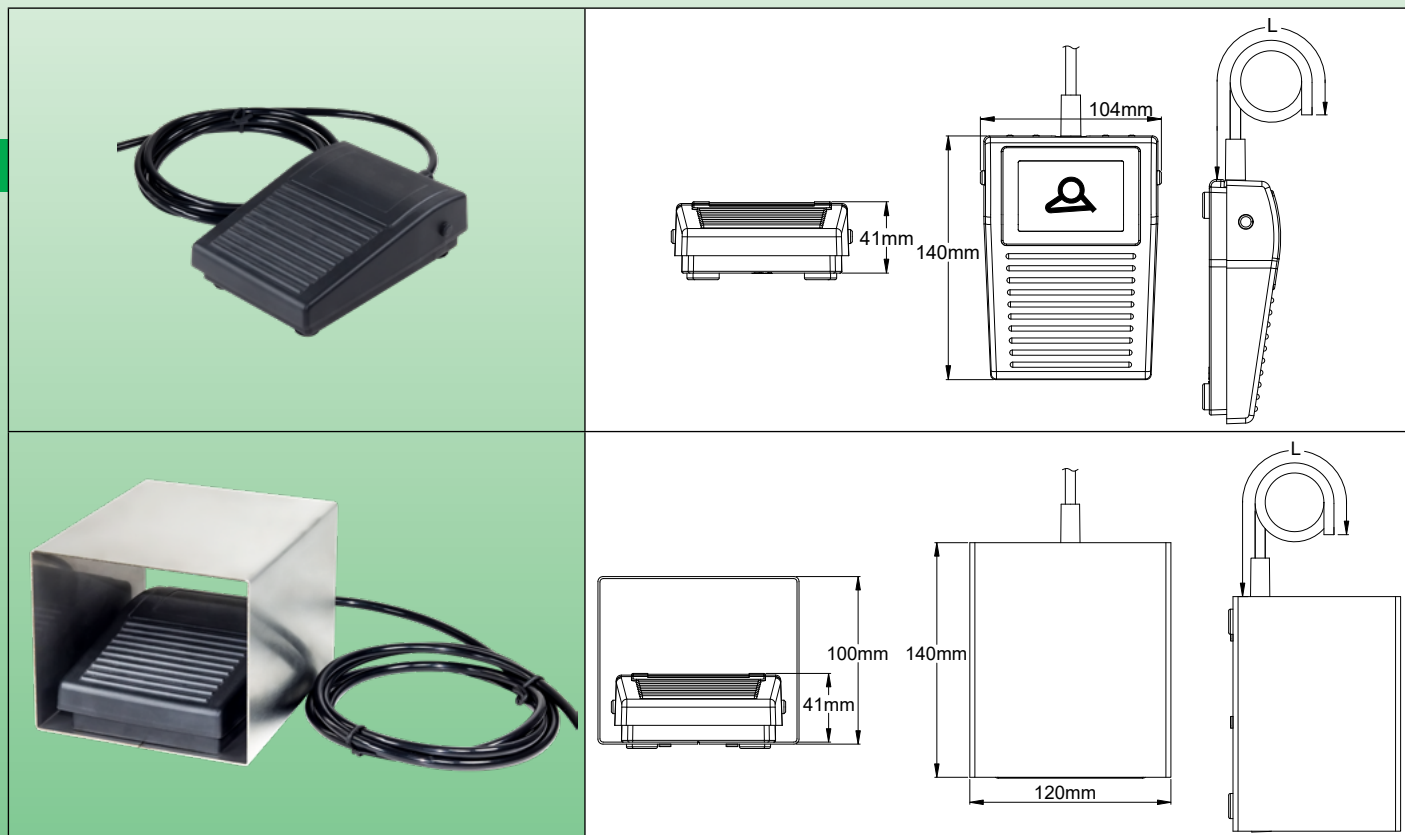
Model	Black (RAL9005)	Nicked plated	White (RAL9003)
With tube securing nut	66ZM500060510000	66ZM500060710000	66ZM500060410000
Without tube securing nut	66ZM500060500000	66ZM500060700000	66ZM500060400000



# Air buttons and air pedals

## Foot air pedal (air transmitters)

Operating distance	Air volume	Bellow material	Ambient temperature	Type
30 meters (100 feet.)	55cm <sup>3</sup>	Rubber	-10 ~ 60°C (-14 ~ 140°F)	<b>66ZMD7</b>



### Main applications :

**Use:** Remote hand free operation of air switches. Even in wet or hazardous environments, this pneumatic foot air pedal safely isolates the user operating power tools and other electrical devices from the electrical current. The foot air pedal provide the pulse air pressure needed to operate a remote air switch

Two switching logics are possible, depending of the air switch used:

- *Momentary Switching:* Press and hold for on, release for off
- *Alternate Action Switching:* Press for on, press again for off

### Technical features :

**Typical applications:** Electrical equipment remote operating of electrical devices on/off including motors, lights, pumps, air blowers, or other associated equipment.

**Operating distance:** With appropriate tubing, these foot air pedals can operate air switches from distances of up to 30 meters (100 feet.)

**Air volume:** 55cm<sup>3</sup>

**Accidental actuation prevention:** By steel strong shroud, 1.2mm thickness. Anti-skid protection is provided by 4 rubber feet.

**Standard Color:** Foot shroud: orange epoxy painting. Any other color can be made with MOQ (consult factory). Stainless steel foot shroud on request.

**Bellow material:** Strong, rubber. No micro leak to avoid pumping action with air switches.

**Tube connection:** Spout for 3 × 6mm flexible PVC or rubber tubing (1/8" I.D), with tube securing nut to avoid accidental tubing disconnection.

**Mechanical life:** >100,000 cycles

**Ambient temperature:** -10 to 85°C (14 to 185°F)

### References :

Foot pedal with steel shroud:	66ZMD70383S10000
Foot pedal without steel shroud:	66ZMD70383S00000

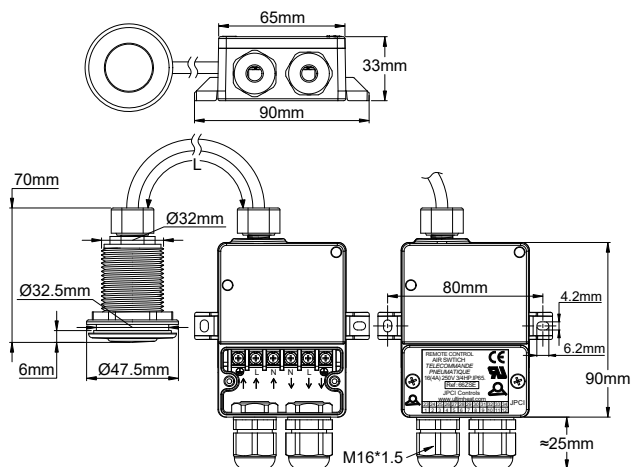


# Air buttons and air pedals

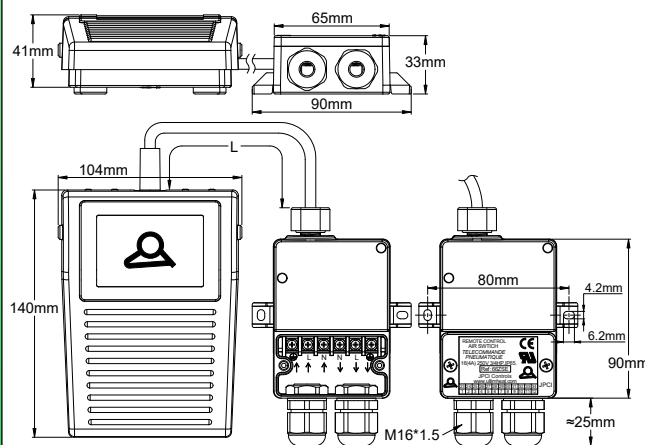
## Pneumatic remote switch kit

Actuating device	Electric wiring	Contact	Maximum remote operation distance	Type
Air button or foot pedal	Screw connection block	Snap action, 16 (4)A 250VAC	6m or 10m	<b>66ZSE</b>

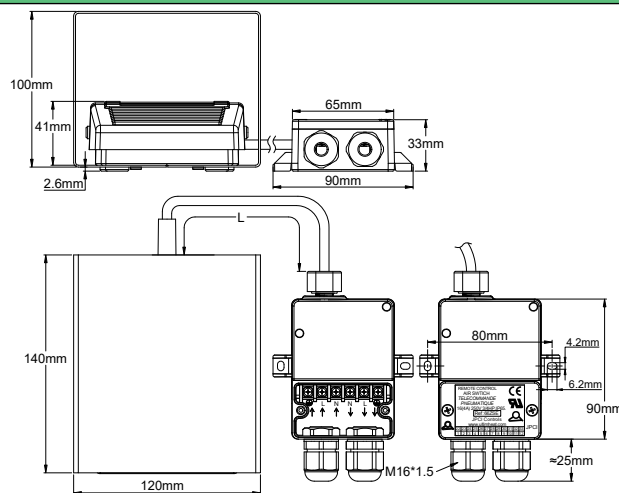
### Air button actuating device



### Foot pedal operating device without mechanical protection



### Foot pedal operating device with mechanical protection



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# Air buttons and air pedals

## Main applications :

Pneumatic kits for remote switching of machine tools, kitchen sink crushers, swimjet pumps, underwater lighting, plumbing machines, medical equipment. (Use in aquatic environments or when there is a risk of the presence of water drops). Rating 16 (4)A 250VAC. Latching action. **Eliminates electrical risks because the user is connected to the equipment only by a pneumatic tube.**

## Technical features :

**Connection box:** PA66, waterproof rating IP44, connection by two M16 cable glands.

**Electrical connection:** Internal, on a 6 × 2.5mm<sup>2</sup> screw terminal block, allowing a power cable and an output cable to be connected.

**Maximum length of connecting tube:** 6m for manual control, 10m for foot control

**Control unit:** Chrome-plated push button, for mounting in a 32mm diameter hole, or foot pedal under stainless steel cover.

**Electrical rating:** 16 (4)A 125/250VAC; ½HP 125VAC; ¾HP 250VAC.

**Ambient temperature:** -10 to 85°C (14 to 185°F)

**Fixing:** On wall with 2 screws with 70mm distance

**Operation:** Sending a pressure impulse by the control unit remotely activates a bistable switch: a first impulse closes the contact, a second impulse opens it

**Options:** Power cord with Euro, UL or other national plug, and output cable (Specify models and length)

## Examples of boxes with cord and connection cable :



## References :

Operating device	PVC pneumatic tube length	1 switch, momentary action (16A 250VAC, 3/4HP 250VAC)	1 switches, bistable action (16A 250VAC, 3/4HP 250VAC)
Hand button	2m	66ZSEHB1ZM46B000	66ZSEHB1ZB46B000
	4m	66ZSEHB1ZM46D000	66ZSEHB1ZB46D000
	6m	66ZSEHB1ZM46F000	66ZSEHB1ZB46F000
	10m	66ZSEHB1ZM46J000	66ZSEHB1ZB46J000
Foot pedal	2m	66ZSEA01ZM46B000	66ZSEA01ZB46B000
	4m	66ZSEA01ZM46D000	66ZSEA01ZB46D000
	6m	66ZSEA01ZM46F000	66ZSEA01ZB46F000
	10m	66ZSEA01ZM46J000	66ZSEA01ZB46J000

### Note:

1. For hand button, standard color in black, replace the 6<sup>th</sup> and 7<sup>th</sup> character "HB" in the reference by "HW" for white color; and replace by "HN" for nickel color.

2. For foot pedal, standard one without stainless steel cover, replace the 6<sup>th</sup> and 7<sup>th</sup> character "A0" in the reference by "AS" for the one with stainless steel cover.

3. For 2 switches models, replace the 8<sup>th</sup> character "1" in the reference by "2". **Attention this is not available for distances longer than 4m**

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# Accessories



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# Accessories

## Nuts specific to pneumatic controls

<b>Compatible threads</b>	<b>Material</b>	<b>Z6VE</b>
1/4" NPT 1/4" NPSM UNC 9/16-18	ABS	

### Tube securing nuts for soft 6 × 3mm (1/4" × 1/8") PVC tubes used in air switches and air buttons

	1/4" NPSM and NPT	UNC 9/16-18

### Main Features :

These nuts prevent the tube from being disconnected as a result of stress occurred during installation. They are particularly useful when these connections are located in hard-to-reach places, such as control boxes for spas and swimming pools. Nothing is more unpleasant to have a pneumatic control which no longer works because the tube has disconnected because it was too short during assembly.

These nuts have 4 teeth which, by tightening on the tube, prevent its inadvertent sliding.

Tightened with a torque of 3 to 4 N.m they make the connection resistant to a pulling force greater than 6 DaN. They are compatible with most pneumatic switches and pneumatic control buttons on the market.

**Material:** Black ABS

**Options:** Realization in different colors for customer customization.

### Cut view after assembly on air switch (Modified colors) :



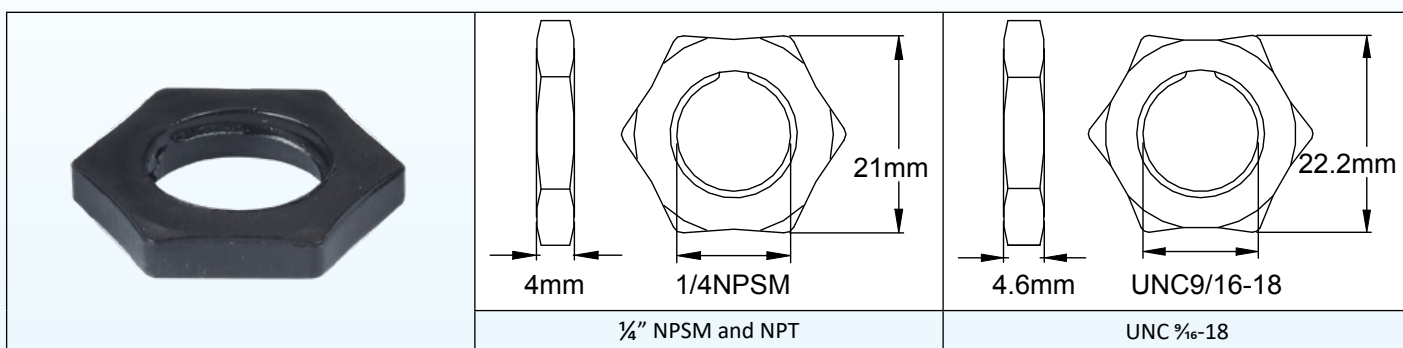
### Part numbers :

For 1/4" NPT or 1/4" NPSM threads:	Z6VE10003500006A
For UNC 9/16-18 threads:	Z6VE10003500008A

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# Accessories



## Main Features :

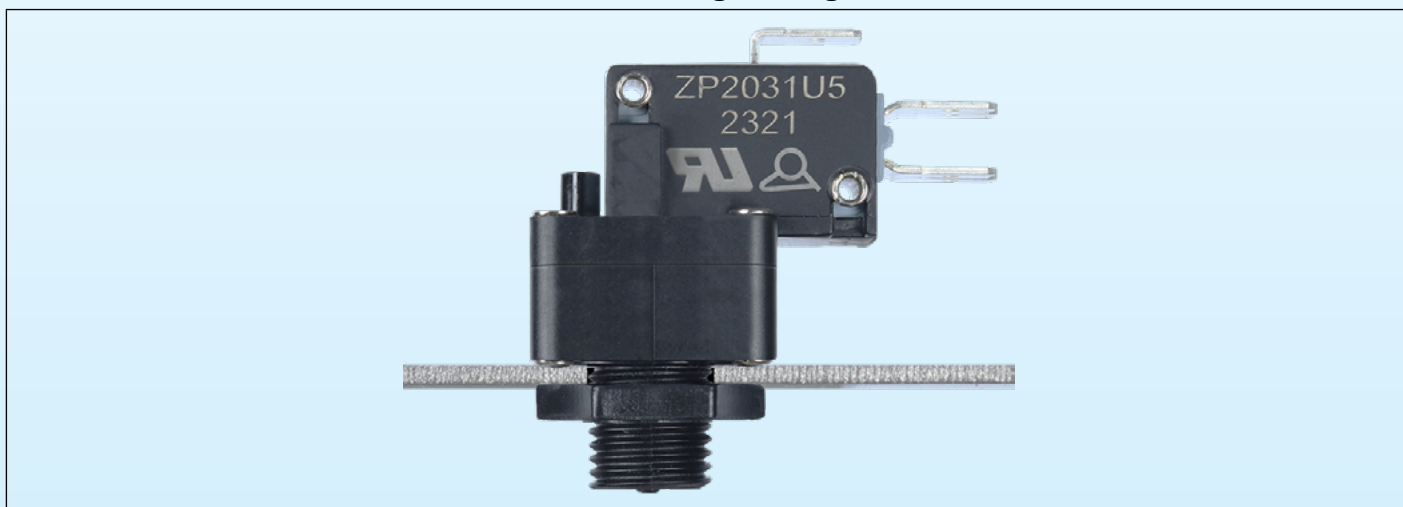
These nuts are used to mount pneumatic remote controls with a 1/4" NPT, 1/4" NPSM or UNC 9/16-18 thread through the wall.

**Recommended tightening torque:** 2N.m. They are compatible with most pneumatic switches and pneumatic control buttons on the market.

**Material:** Black ABS

**Options:** Realization in different colors for customer customization.

## View after mounting through a board :



## Part numbers :

For 1/4" NPT or 1/4" NPSM threads:	Z6VE10003500003A
For UNC 9/16-18 threads:	Z6VE10003500007A

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# Accessories

## Connection accessories of pressure switches on pipes

# 76TU 66RRA

These accessories allow or facilitate the connection between air switches or pressure switches and the equipment on which they are mounted.

### Connection of soft PVC tube :

		<p>1/8" ID x 1/4" OD soft PVC tube, black</p> <table border="1"> <tr><th>Part number</th></tr> <tr><td>Z6TU700000000000</td></tr> </table>	Part number	Z6TU700000000000								
Part number												
Z6TU700000000000												
		<p>1/16" ID x 1/8" OD soft PVC tube, black</p> <table border="1"> <tr><th>Part number</th></tr> <tr><td>Z6TU3C0000000000</td></tr> </table>	Part number	Z6TU3C0000000000								
Part number												
Z6TU3C0000000000												
		<p>1/8" BSPP to 4mm spout conversion fitting</p> <table border="1"> <thead> <tr> <th>Conversion fittings</th> <th>Part number</th> </tr> </thead> <tbody> <tr> <td>1/8" BSPT to 6mm OD tube</td> <td>66RRABSPT1840H15</td> </tr> <tr> <td>1/8" BSPT to 3mm OD tube</td> <td>66RRABSPT1827H15</td> </tr> <tr> <td>1/8" NPT to 6mm OD tube</td> <td>66RRAONPT1840H15</td> </tr> <tr> <td>1/8" NPT to 3mm OD tube</td> <td>66RRAONPT1827H15</td> </tr> </tbody> </table>	Conversion fittings	Part number	1/8" BSPT to 6mm OD tube	66RRABSPT1840H15	1/8" BSPT to 3mm OD tube	66RRABSPT1827H15	1/8" NPT to 6mm OD tube	66RRAONPT1840H15	1/8" NPT to 3mm OD tube	66RRAONPT1827H15
Conversion fittings	Part number											
1/8" BSPT to 6mm OD tube	66RRABSPT1840H15											
1/8" BSPT to 3mm OD tube	66RRABSPT1827H15											
1/8" NPT to 6mm OD tube	66RRAONPT1840H15											
1/8" NPT to 3mm OD tube	66RRAONPT1827H15											

### Connection of pressure switches with pressure taps on metal pipes by **butt welding tees**.

Produced with the flow-drill forming technique, these taps can be made in all diameters of thin-walled stainless steel tubes, they ensure a sufficient thread length without requiring the welding of a fitting. 1/8" NPT, 1/8" BSPP and 1/4" NPT, 1/4" BSPP threads are possible.

		<p>Butt welding tee, 25.4 x 23mm tube, length 43mm, with 1/8" BSPP female thread.</p> <table border="1"> <tr><th>Part number</th></tr> <tr><td>66RRA1252343G81A</td></tr> </table>	Part number	66RRA1252343G81A
Part number				
66RRA1252343G81A				
		<p>Butt welding tee, 34 x 31.6mm tube, length 48mm, with 1/8" BSPP female thread.</p> <table border="1"> <tr><th>Part number</th></tr> <tr><td>66RRA1343248G81A</td></tr> </table>	Part number	66RRA1343248G81A
Part number				
66RRA1343248G81A				

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# Accessories



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		<p>Butt welding tee, 42.4 × 40mm tube, length 50mm, with 1/8" BSPP female thread.</p> <table border="1"> <tr> <td><b>Part number</b></td> </tr> <tr> <td>66RRA1424050G81A</td> </tr> </table>	<b>Part number</b>	66RRA1424050G81A
<b>Part number</b>				
66RRA1424050G81A				

## Connection of pressure switches with pressure taps on metal pipes by **threaded couplings**.

Produced with the flow-drill forming technique, these taps can be made in all diameters of thin-walled stainless steel tubes, they ensure a sufficient thread length without requiring the welding of a fitting. 1/8" NPT, 1/8" BSPP and 1/4" NPT, 1/4" BSPP threads are possible.

		<p>1" BSPP × 1" BSPP female coupling, length 43mm, with 1/8" BSPP female thread.</p> <table border="1"> <tr> <td><b>Part number</b></td> </tr> <tr> <td>66RRA140G143G81A</td> </tr> </table>	<b>Part number</b>	66RRA140G143G81A
<b>Part number</b>				
66RRA140G143G81A				
		<p>1 1/4" BSPP × 1 1/4" BSPP female coupling, length 48mm, with 1/8" BSPP female thread.</p> <table border="1"> <tr> <td><b>Part number</b></td> </tr> <tr> <td>66RRA147G448G81A</td> </tr> </table>	<b>Part number</b>	66RRA147G448G81A
<b>Part number</b>				
66RRA147G448G81A				
		<p>1 1/2" BSPP × 1 1/2" BSPP female coupling, length 50mm, with 1/8" BSPP female thread</p> <table border="1"> <tr> <td><b>Part number</b></td> </tr> <tr> <td>66RRA155G250G81A</td> </tr> </table>	<b>Part number</b>	66RRA155G250G81A
<b>Part number</b>				
66RRA155G250G81A				





# ULTIMHEAT

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PRESSURE

SWITCHES

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AIR

SWITCHES