

This series of pressure switches can be used for all applications where an electrical circuit is required to close or open at a required pressure.

The robustness of this series of pressure switches enables all applications in all industries to be satisfied.

- **Robust & Reliable**
- **Diaphragm Operated <42 bar**
- **Piston Operated >42 bar**
- **Proven Performance**
- **Wetted parts for use with all Fluids**
- **Fully Adjustable**
- **Easily Customised**
- **Enclosure Rating IP65**
- **CE marked for all Directives that apply**
- **LPCB Approved**
- **UL 508 Certified**

## Pressure Ranges

TYPE No.	PRESSURE RANGE	HYSTERESIS TYPICAL
1381	-1 to +1 bar	0.04 bar
1381	0.2 to 4 bar	0.07 bar
1381	0.5 to 11 bar	0.3 bar
1381	0.7 to 14 bar	0.4 bar
1381	2 to 28 bar	0.6 bar
1381	2 to 42 bar	0.8 bar
1481	5 to 125 mbar	2.5 mbar
1481	15 to 250 mbar	4 mbar
1481	25 to 400 mbar	10 mbar
1581	9 to 100 bar	10 bar*
1581	14 to 200 bar	18 bar*
1581	20 to 400 bar	25 bar*

\*Typical for mid-range set point

## Maximum Pressure

To ensure long service life select the pressure range as follows:  
 Dynamic pressure applications Pmax = 75% of Range  
 Static pressure applications Pmax = 100% of Range  
 Maximum pressure that can be applied is 125% of pressure range  
 (see option Q page 8 for higher pressures.)

## Electrical Ratings

10 amp at 250V 50 Hz Inductive load  
 1 amp at 30V dc Inductive load  
 For other voltages and currents please consult our technical department.

Setting Accuracy .....±2%

Temperature Range .....-10 to +85°C  
 (Process fluid must not solidify)

Temperature Coefficient .....0.05%  
 of range per °c from 20°C



## Installation

These pressure switches can be mounted directly on the connecting thread. Sealing grooves are machined onto the end face of parallel threads for use with sealing washers. A Mounting Bracket is available if required.

## Vacuum Setting

At ambient pressure the switches will be in the operated condition consequently the wiring should be reversed i.e. NO becomes NC.

## Connecting Threads

All connecting threads used in industry are available including British, American and metric. Please state the connection thread when ordering.

## Flanges & Hygienic Fittings

(see page 5 for alternative connections)  
 Flanged fittings are available and all types of Hygienic fittings can be supplied assembled directly onto the pressure switch.  
 If flush diaphragms are required please consult our Technical Department

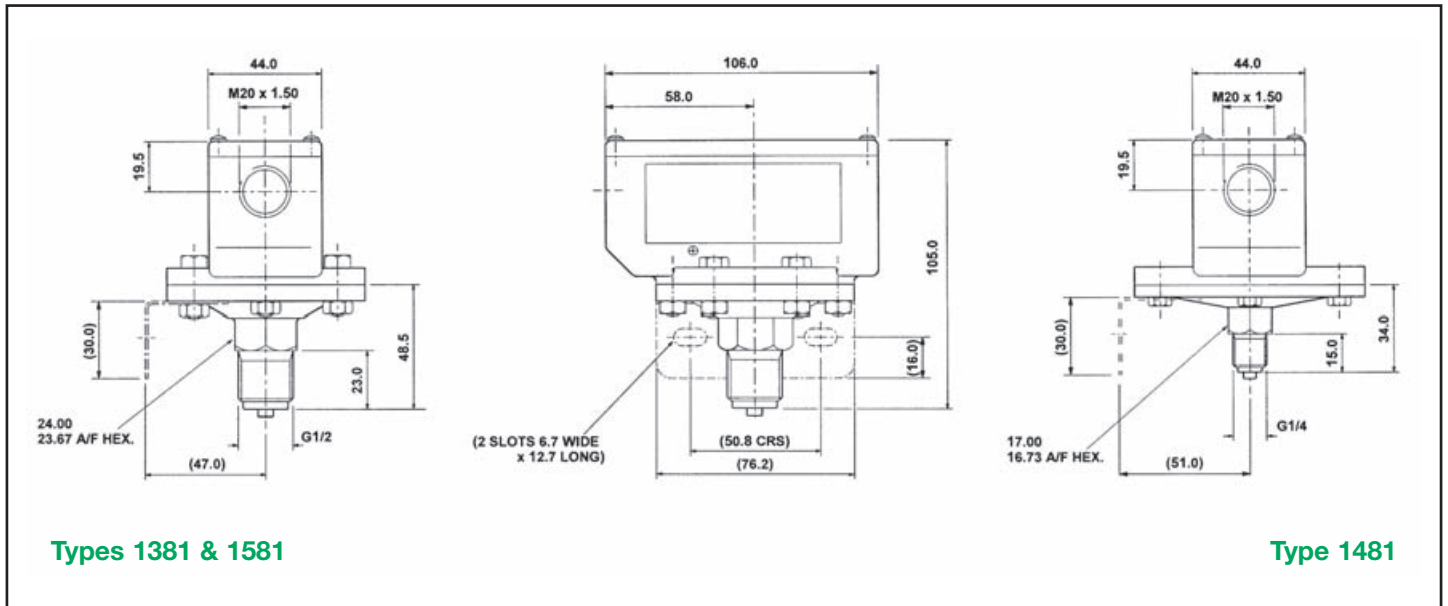
## Materials of Construction Types 1381 & 1481

Diaphragm.....Beryllium Copper  
 Seal .....Glass filled PTFE <11 bar  
 Nitrile rubber >11 bar  
 Base .....Brass  
 Housing .....Aluminium / Zinc diecast  
 Cover.....Glass Filled Nylon with Nitrile seal

## Material of Construction Type 1581

Piston .....Stainless Steel  
 Seal .....Nitrile rubber with PTFE  
 anti-extrusion rings  
 Base .....Stainless Steel  
 Housing .....Aluminium / Zinc diecast  
 Cover.....Glass Filled Nylon with Nitrile seal

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Types 1381 & 1581

Type 1481

### Alternative Wetted Parts

(see page 9 for abbreviated chemical compatibility chart)

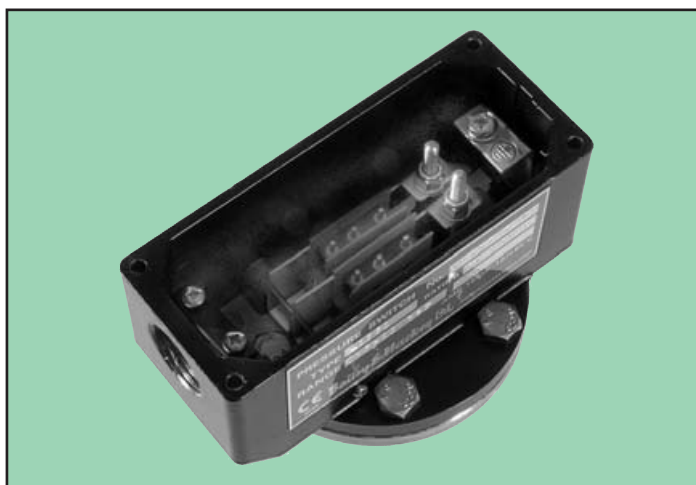
Switches with standard wetted parts above are suitable for applications using air, nitrogen, inert gasses, oils, water & steam.

Alternatives for use with fluids other than these are shown opposite.

Please contact our Technical Department for further information.

MATERIAL	BASE	DIAPHRAGM	PROTECTION DISC
316 Stainless Steel	Yes	No	Yes
17/7 Stainless Steel	No	Yes	No
Carbon Steel	Yes	No	No
UPVC	Yes	No	No
PTFE	Yes	No	Yes
PVDF	Yes	No	No
Silver Plate	No	No	Yes
Pure Silver	No	Yes	Yes
Halar Lined	Yes	No	No
Dykor coated	No	Yes	No
Rubber Lined	Yes	No	No
Chrome Plated	Yes	Yes	No

## Variants To Series 1000 Pressure Switches Type 2381, 2481 & 2581 Twin Circuit Pressure Switches



- Two independently operating Micro-switches.
- External Dimensions are the same as the Standard Switches.
- Reset Differentials are approx. twice those given for standard switches.
- Electrical Rating 5 amp at 250V 50Hz
- For Pressure ranges see page 2

### Applications

Both micro-switches are SPDT and can be used to give two independent opening or closing contacts at different switch points. The two micro-switches cannot be set to give a switch at the same pressure. A DPDT micro-switch must be used for this function see page 10. These switches can be set to give High/High, Low/Low or High/Low set points.

## Type 1391, 1491 & 1591 Single Visual Setting Pressure Switches

## Type 2391, 2491 & 2591 Twin Visual Setting Pressure Switches



- Accurate Visual Setting Scale
- One or Two independently operating Micro-switches depending on type
- External adjustment
- Scale calibrated to  $\pm 2\%$  of range

### Applications

Visual setting pressure switches are particularly suitable for application where frequent alteration of the pressure setting is required.

### Pressure Ranges

TYPE No.	PRESSURE RANGE	HYSTERESIS TYPICAL
1391 & 2391	1 to 0 bar vacuum	Hysteresis as the standard for single visual setting
1391 & 2391	0 to 1 bar	
1391 & 2391	0.2 to 4 bar	
1391 & 2391	0.5 to 10 bar	
1391 & 2391	2 to 30 bar	Hysteresis approx. twice the standard for twin visual setting.
1391 & 2391	2 to 40 bar	
1491 & 2491	5 to 125 mbar	
1491 & 2491	15 to 250 mbar	
1491 & 2491	25 to 400 mbar	See p2.
1591 & 2591	9 to 100 bar	
1591 & 2591	14 to 200 bar	
1591 & 2591	20 to 400 bar	

## Cooling Coil Transmitter

- For temperatures up to 200°C
- For viscous or corrosive fluids

The pressure switch body is isolated from the heat source via a secondary diaphragm and coiled copper tube allowing the heat to be dissipated.

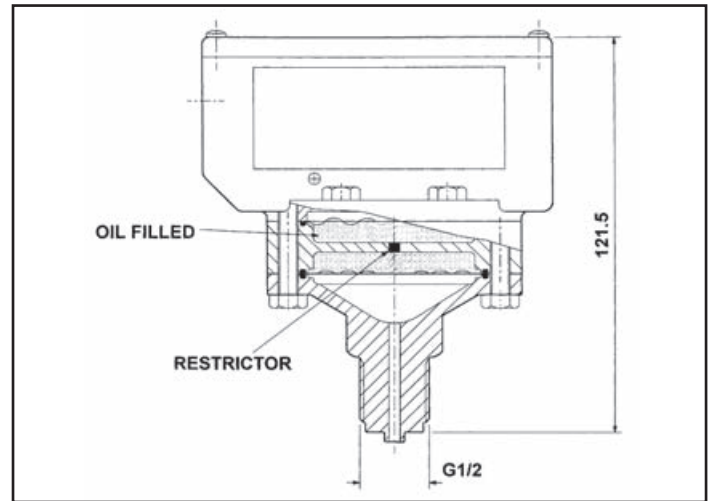
The flange clamping bolts must not be un-tightened as this will break the pressure seal and render the switch in-operative.



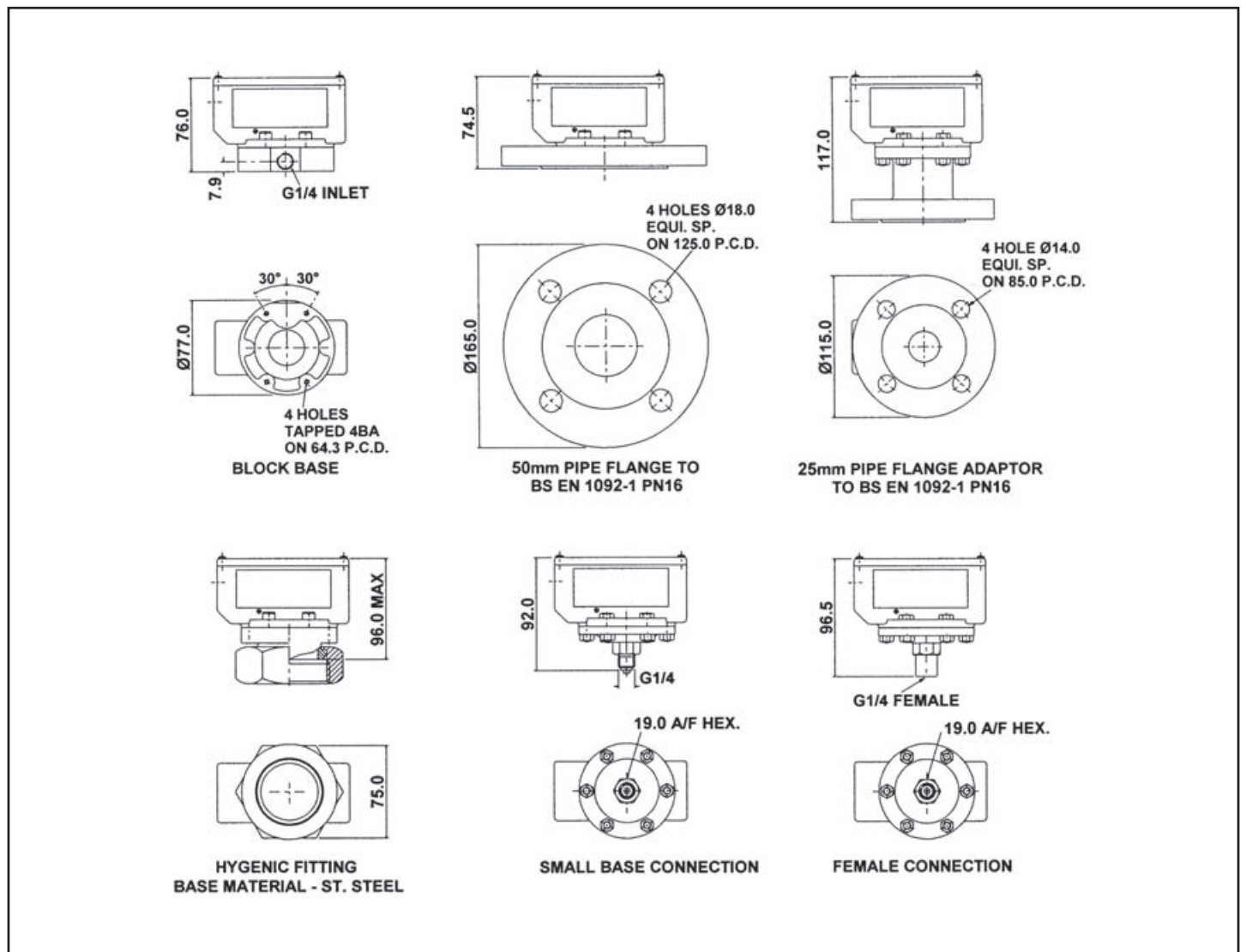
## Throttled Transmitter

### ■ Stops pressure pulses giving false switching

In many applications where pressure switches are used it is not possible to provide protection against pulsating pressures by means of a snubber involving small orifices. The Bailey & Mackey solution to this problem is integral hydraulic damping, allowing a mean switch point to be achieved irrespective of the severity of the pressure pulses.



## Alternative Base Fittings Suitable for adding to 1000 Series & 3000 series



- For use in Pneumatic Systems
- For use in Hazardous Areas
- Signal Above Set Point suffix A or
- Signal Below Set Point suffix B
- Automatic or Manual Reset

## Applications

Pneumatic Pressure Switches are ideal for use where an electric pressure switch cannot be used. In Hazardous areas they can provide a more sensitive and cost effective alternative to flameproof or intrinsically safe equipment. The Pneumatic signal can be used to operate pneumatic valves or similar equipment or taken into the safe area and made to operate an electric pressure switch. This type of pressure switch operates on an air bleed system. Gasses other than air should not be used as the pilot medium. Please see page 24 for pneumatic pressure switches without the air bleed.

## Pressure Ranges

TYPE No.	PRESSURE RANGE	HYSTERESIS TYPICAL
1361	-1 to 0.07 bar	40 mbar
1361	-1 to +1 bar	40 mbar
1361	0.2 to 4 bar	70 mbar
1361	0.5 to 10 bar	0.3 bar
1361	0.7 to 14 bar	0.4 bar
1361	2 to 28 bar	0.6 bar
1361	2 to 42 bar	0.8 bar
1461	10 to 125 mbar	3 mbar
1461	15 to 250 mbar	6 mbar
1461	25 to 400 mbar	10 mbar
1561	9 to 100 bar	10 bar*
1561	14 to 200 bar	18 bar*
1561	20 to 400 bar	25 bar*

\*Typical for mid-range set point

## Maximum Pressure

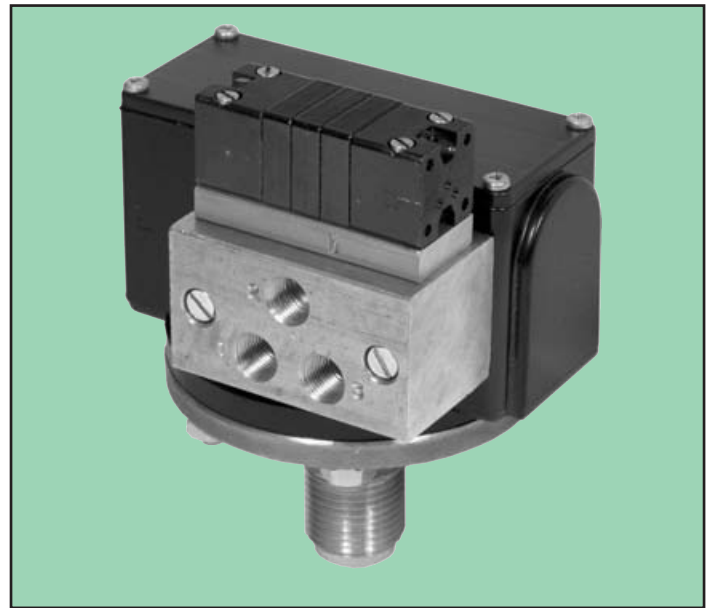
To ensure long service life please select the pressure range as follows:

Dynamic pressure applications  $P_{max} = 75\%$  of Range  
 Static pressure applications  $P_{max} = 100\%$  of Range  
 Maximum pressure that can be applied is 125% of pressure range (see option Q page 8 for higher pressures)

Setting Accuracy .....±5%

Temperature Range .....-10 to +85°C  
 (Process fluids must not solidify)

Temperature Coefficient .....0.05%  
 of range per °C from 20°C



## Signal Air Supply

Compressed air at a supply pressure between 2 and 8 bar is required to operate the switch. Signal output is 200NI / min at 5.5 bar with a 10% pressure drop. The flow of air through the bleed from the back-pressure valve when it is open is less than 3NI / min. A 25µM filter should be fitted in the supply line.

## Signal Air Connection

Switches with suffix A  
 For signal above set point – connect air supply to port marked 1, connect signal line to port marked 2, exhaust on change-over will come from port marked 3.  
 Switches with suffix B  
 For signal below set point – connect air supply to port marked 3, connect signal line to port marked 2, exhaust on change-over will come from port marked 1.

## Installation

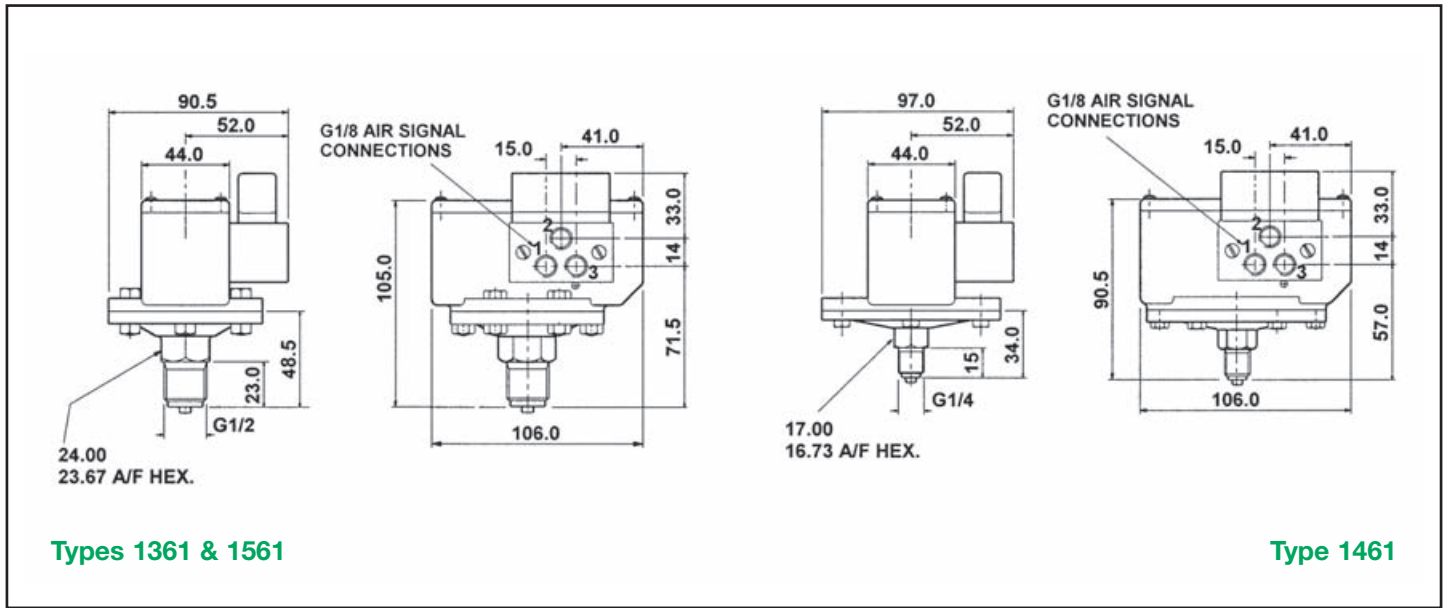
These pressure switches can be mounted directly on the connecting thread. Sealing grooves are machined onto the end face of parallel treads for use with sealing washers. A Mounting Bracket is available if required. It is recommended that these switches be installed vertically i.e. with the process connection vertically down.

## Vacuum Setting

At ambient pressure the back-pressure valve will be operated, consequently, if the pneumatic signal is required between atmospheric pressure and the vacuum setting suffix A is required, suffix B gives an air signal after the vacuum has been reached.

## Connecting Threads

All process connecting threads used in industry are available including British, American and metric. Please state the connection thread when ordering.



Types 1361 & 1561

Type 1461

### Materials of Construction Type 1361 & Type 1461

- Diaphragm.....Beryllium Copper
- Seal .....Gas filled PTFE < 10 bar  
Nitrile rubber > 10bar
- Base .....Brass
- Housing .....Aluminium / Zinc diecast
- Cover.....Gas Filled Nylon with Nitrile seal
- Connecting Block .....Brass
- Amplifier Valve.....Aluminium / Zinc body with Nitrile seals.

### Materials of Construction Type 1561

- Piston .....Stainless Steel
- Seal .....Nitrile rubber  
with PTFE anti-extrusion rings
- Base .....Stainless Steel
- Housing .....Aluminium / Zinc diecast.
- Cover.....Glass Filled Nylon with Nitrile seal
- Connecting Block .....Brass
- Amplifier Valve.....Aluminium / Zinc body with Nitrile seals.

### Alternative Wetted Parts

(see page 9 for abbreviated chemical compatibility chart)

Switches with standard wetted parts above are suitable for applications using air, nitrogen, inert gasses, oils, water and steam.

Alternatives for use with fluids other than these are shown opposite.

Please contact our Technical Department for further information.

MATERIAL	BASE	DIAPHRAGM	PROTECTION DISC
316 Stainless Steel	Yes	No	Yes
17/7 Stainless Steel	No	Yes	No
Carbon Steel	Yes	No	No
UPVC	Yes	No	No
PTFE	Yes	No	Yes
PVDF	Yes	No	No
Silver Plate	Yes	Yes	No
Pure Silver	No	No	Yes
Halar Lined	Yes	No	No
Dykor coated	No	Yes	No
Rubber Lined	Yes	No	No
Chrome Plated	Yes	Yes	No

### Flanges and Hygienic Fittings

(See page 5 for alternative connections)

Flanged fittings are available and all types of Hygienic fittings can be supplied assembled directly onto the Pressure Switch.

If flush diaphragms are required please consult our Technical Department.

To make series 1000 Pressure Switches more suitable for many applications there are several standard options available.

### Option D – Degreased for oxygen use

Pressure switches for use on oxygen have to be free from all traces of oil or grease. Diaphragm pressure switches have the diaphragm, pressure chamber and seal specially cleaned and handled during assembly and are marked with the 'Use no oil' symbol.

### Option G – Gold plated Micro-switches

Micro-switches with Gold plated contacts are used in low power circuits where the contact resistance of standard silver contacts is too high. For electrical loads below 6V at 0.1A dc.

### Option H – Low leak assembly

A modified design of pressure switch is available for use on extinguishers, switchgear, transformers or other sealed pressure systems. Special machining and assembly gives freedom from leaks greater than  $10^{-5}$  Nccs/sec.

### Option M – For mining applications

No aluminium parts used.

### Option P – With plug & socket

Fitted with 4 – pin plug and socket for SPDT micro-switch version.  
Fitted with 7 – pin plug and socket for twin SPDT or DPDT micro-switch versions.

### Option Q – Overload Protection

Pressures above the adjustable range shown in the table should not be applied to the switches. Overload will strain the diaphragm, either causing distortion that will alter the set point of the pressure switch or reduce the diaphragm life through fatigue failure. Normally, the pressure range should be chosen to cover the highest pressures likely to develop in the system; Series 1000 switches can be constructed to accept higher pressures than the adjustable range by fully supporting the diaphragm above its normal operating deflection. Maximum temperature is 60°C.

MAXIMUM ADJUSTABLE RANGE	OVERLOAD PRESSURE ALT. 1	OVERLOAD PRESSURE ALT. 2
400 mbar	7 bar	–
1 bar	28 bar	–
4 bar to 42 bar	70 bar	200 bar

### Option R & RF – Manual Reset

On some applications, for safety reasons, a manual reset is required e.g. after changing a filter element or for alarm purposes.

R = Manual Reset above the set point

RF = Manual Reset Below the set point.

### Option V – Adjustable Hysteresis

This option enables the hysteresis to be increased and can be varied between approximately 5% and 95% of the adjustable pressure range.

### Option X

In some applications a higher electrical rating is required this option is fitted with a micro-switch for 15amps at 250V 50Hz.

## Pressure Conditions

Standard materials for wetted parts are brass pressure chamber and beryllium copper diaphragm. This can be changed to make the wetted parts suitable for most other fluid applications. The diaphragm can be protected against corrosion, by a thin sheet of suitable material and the pressure chamber can be electro-plated or machined from a suitable material either metal or plastic. Examples of suggested materials for use with a range of chemicals are given in the tables below ; these are only suggestions and it is the users responsibility to ensure that the material used is compatible with the chemicals used and the application conditions of concentration and temperature.

## Vacuum Conditions

Diaphragm protection under vacuum conditions must be integral with the diaphragm. On vacuum applications or where suction can occur a 17/7 precipitation hardened stainless steel can be used as an alternative to beryllium copper. 17 / 7ph is less corrosion resistant than 316 stainless steel but it can be hardened and tempered to give reasonable spring properties. If this is not sufficiently resistant for the application the beryllium copper diaphragm can be electroplated or coated with a suitable plastic material.

### Malleable Iron Base, 316 S.Steel Disc

Acetylene  
Alkyl Chlorides  
Ammonia (Max 60°C)  
Aniline  
Calcium Chloride (Max 60°C)  
Caustic Soda (Max 60°C)  
Chlorides of Na, K, Mg  
Hydrocyanic Acid  
Pyridine

### Silver Plated Base, Fine Silver Disc

Brines  
Bromine  
Chlorine (wet or dry)  
chlorates of Na, K, Ba  
Chlorides of Na, K, Mg  
Flourine  
Mercuric Chloride  
Ozone

### UPVC Base 1/2" BSP, PTFE Disc

Max Temperature 40°C  
Max Pressure 200 lbf/in<sup>2</sup>  
Anhydrous Ammonia  
Aluminium Chloride  
Caustic Soda  
Hydrobromic Acid (50%)  
Hydrochloric Acid (36%)  
Hydrogen Sulphide  
Lead Acetate  
Methanol  
Oxalic Acid  
Phosphoric Acid (50%)  
Potassium Salts  
Sodium Hypochlorite  
Sodium Salts  
Sulphuric Acid (70%)  
Waste Gases

### 316 Stainless Base and Disc

Acetic Acid  
Ammonium Hydroxide  
Carbon Disulphide  
Carbon Tetrachloride  
Caustic Soda  
Caustic Potash  
Citric Acid  
Formic Acid  
Fruit Juices  
Food Machinery  
Hexamine  
Hydrogen Peroxide  
Oil-Phosphate Ester Based  
Silver Nitrate  
Water De-ionised



## Type 1371P, 1371PV and 2371P

Being a modified version of our series 1000 pressure switches these pressure switches have been specially developed for heavy duty cyclic applications.

They can be used for compressor control, pump control or other applications where accuracy and long service life are paramount. Variants of this pressure switch type are adjustable set point with fixed hysteresis, adjustable set point with adjustable hysteresis and either Single Pole Double Throw (SPDT) or Double Pole Double Throw (DPDT) micro-switches as well as twin switches for high/low adjustable set points.

- **Robust and Reliable**
- **Long Service Life**
- **Diaphragm Operated**
- **Accurate and Stable**
- **SPDT & DPDT versions**
- **Gold contacts available**
- **Enclosure Rating IP65**
- **CE marked for all Directives that apply**

### Pressure Ranges

0.5 to 2.5 bar
1 to 4 bar
1.5 to 6 bar
2.5 to 11 bar
4 to 16 bar
7 to 25 bar
8 to 32 bar

**Maximum working pressure**.....70 bar

**Temperature range** .....-40 to +85 °C  
(Process fluids must not solidify)

### Electrical connection

Via 4 pin plug & socket on SPDT switches and 7 pin plug & socket on DPDT and twin switches.



### Construction Materials

Diaphragm.....Silicon rubber  
 Connection .....Brass  
 Housing .....Aluminium / Zinc alloy  
 Cover.....Glass filled nylon with Nitrile rubber seal.

### Type 1371P

Features an adjustable set point and a fixed hysteresis. Both SPDT and DPDT micro-switches can be fitted; when ordering state which is required. Standard micro-switch contacts are silver, gold contacts can be provided for electrical loads below 6 volts at 0.1 amps dc.

### Type 1371VP

Features an adjustable set point and an adjustable hysteresis. Both SPDT and DPDT micro-switches can be fitted; when ordering state which is required. Standard micro-switch contacts are silver, gold contacts can be provided for electrical loads below 6 volts at 0.1 amps dc.

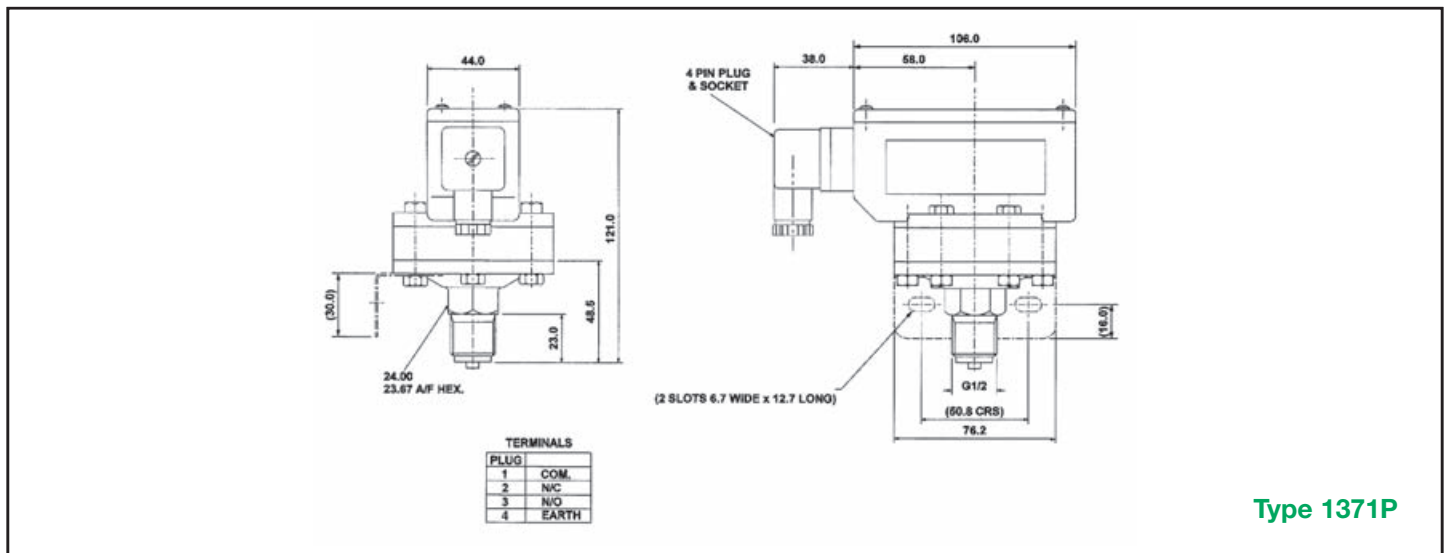
### Type 2371P

Features 2 adjustable set points with a fixed hysteresis. Only SPDT micro-switches can be fitted. Standard micro-switch contacts are silver, gold contacts can be provided for electrical loads below 6 volts at 0.1 amps dc.

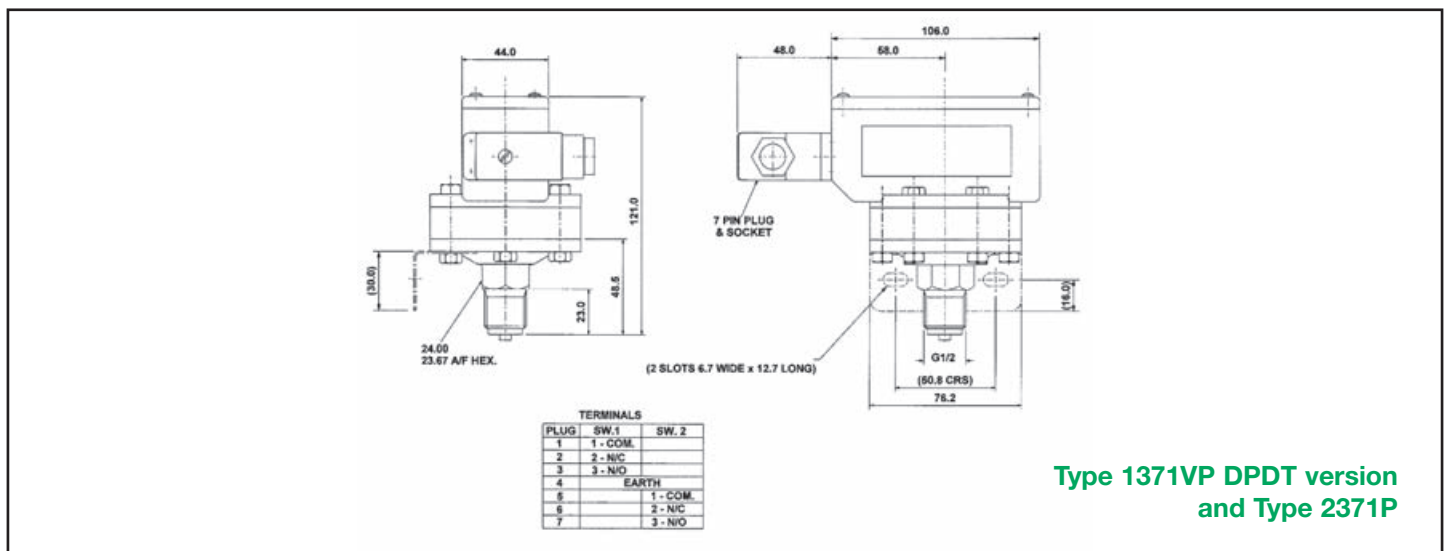
## Electric Ratings

	A.C. AMPS				D.C. AMPS				
Volts	14	30	125	250	8	14	30	125	250
Type 1371P and 1371VP SPDT Switch									
Resistive	15	15	15	15	FOR D.C. LOADS				
Inductive	15	15	15	15	Consult our Technical Department				
Type 1371P and 1371VP DPDT Switch									
Resistive	10	10	10	10	10	10	10	0.5	0.25
Inductive	6	6	6	4	6	6	4	0.05	0.03
Type 2371P SPDT Switch									
Resistive	5	5	5	5	FOR D.C. LOADS				
Inductive	5	5	5	5	Consult our Technical Department				

## Dimensions



Type 1371P



Type 1371VP DPDT version and Type 2371P

This series of pressure switches are used to monitor the difference between two pressures. For example, they can be used to monitor filter condition and signal when the filter is becoming blocked. They can also be used as flow monitoring switches if used across orifice plates etc.

- Robust and Reliable
- Diaphragm Operated
- Proven Performance
- Fully Adjustable
- Enclosure Rating IP65
- CE marked for all Directives that apply
- UL 508 Certified

## Pressure Ranges

TYPE No.	PRESSURE RANGE	HYSTERESIS TYPICAL
1382	0.07 to 1 bar	0.04 bar
1382	0.2 to 4 bar	0.07 bar
1382	0.5 to 11 bar	0.3 bar
1382	2 to 28 bar	0.6 bar
1482	5 to 125 mbar	2.5 mbar
1482	15 to 250 mbar	4 mbar
1482	25 to 400 mbar	10 mbar

## Max. Line Pressure

Pressure range >250mbar .....34 bar  
 Pressure range <125 mbar ..... 14 bar

## Electrical Ratings

10 amp at 250V 50Hz Inductive load  
 1 amp at 30V dc Inductive load  
 For other voltages and currents please consult our technical department.

## Overload

Dimensions of the diaphragm housing are such that the movement of the diaphragm is stopped when the diaphragm exceeds the range. This ensures that the differential pressure switches will accept the accidental application of 4 times the range without damage except for a possible setting shift of up to 2 % of range. It is possible that these switches can be modified to accept the full line pressure on one side of the diaphragm.



## Installation

These pressure switches can be mounted directly on the connecting thread. A Mounting Bracket is available if required.

## Vacuum Use

If used to detect the difference between two levels of vacuum a slight modification is needed and vacuum use must be specified when ordering.

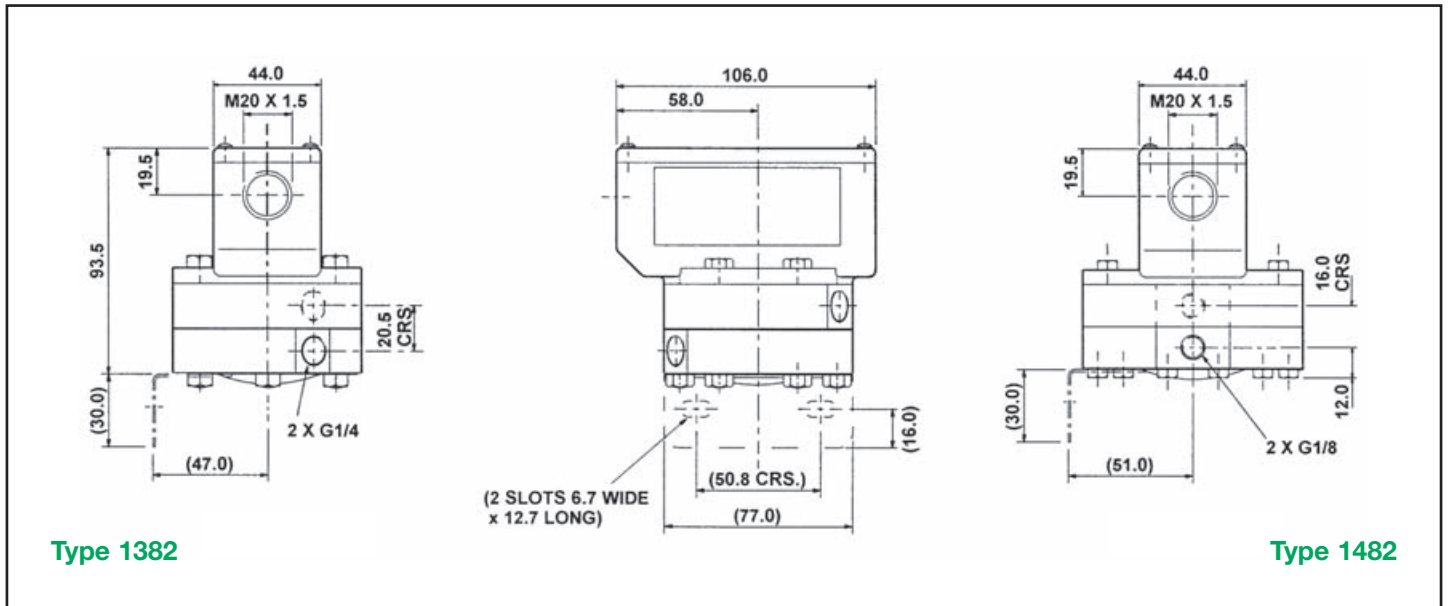
At ambient pressure the switches will be in the operated condition consequently the wiring should be reversed i.e. NO becomes NC.

## Materials of Construction Types 1382 & 1482

Diaphragm.....Beryllium Copper  
 All Seals.....Nitrile rubber  
 Connection .....Brass  
 Housing .....Aluminium / Zinc diecast  
 Cover .....Glass Filled Nylon with Nitrile seal

## Alternative Wetted Parts

Connections .....316 Stainless Steel  
 Diaphragm.....17 / 7 ph Stainless Steel  
 Seals .....Viton rubber



Type 1382

Type 1482

## Options Available

To make Series 1000 Differential Pressure Switches more suitable for many applications there are several standard options available. A suffix letter that follows the Type Number designates these options.

### Option D – Degreased for oxygen use

Pressure switches for use on oxygen have to be free from all traces of oil or grease. Diaphragm pressure switches have the diaphragm, pressure chamber and seal specially cleaned and handled during assembly and are marked with the 'Use no oil' symbol.

### Option G – Gold plated micro-switches

Micro-switches with Gold plated contacts are used in low power circuits where the contact resistance of standard silver contacts is too high. For electrical loads below 6V at 1.0A dc.

### Option P – With plug & socket

Fitted with 4 –pin plug and socket for SPDT micro-switch version.  
Fitted with 7 –pin plug and socket for twin SPDT & DPDT micro-switch versions.

### Option R & RF – Manual Reset

On some applications, for safety reasons, a manual reset is required e.g. after changing a filter element or for alarm purposes.

R = Manual Reset above the set point

RF = Manual Reset below the set point

### Option V- Adjustable Hysteresis

This option enables the hysteresis to be increased and can be varied between approximately 5% and 95% of the adjustable pressure range.

### Option X

In some applications a higher electrical rating is required this option is fitted with a micro-switch for 15 amps at 250V 50Hz.

## Other Options

Visual Setting Scale	Type 1392 & 1492
Twin Circuit	Type 2382 & 2482
Twin Circuit with Visual Setting Scale	Type 2392 & 2492